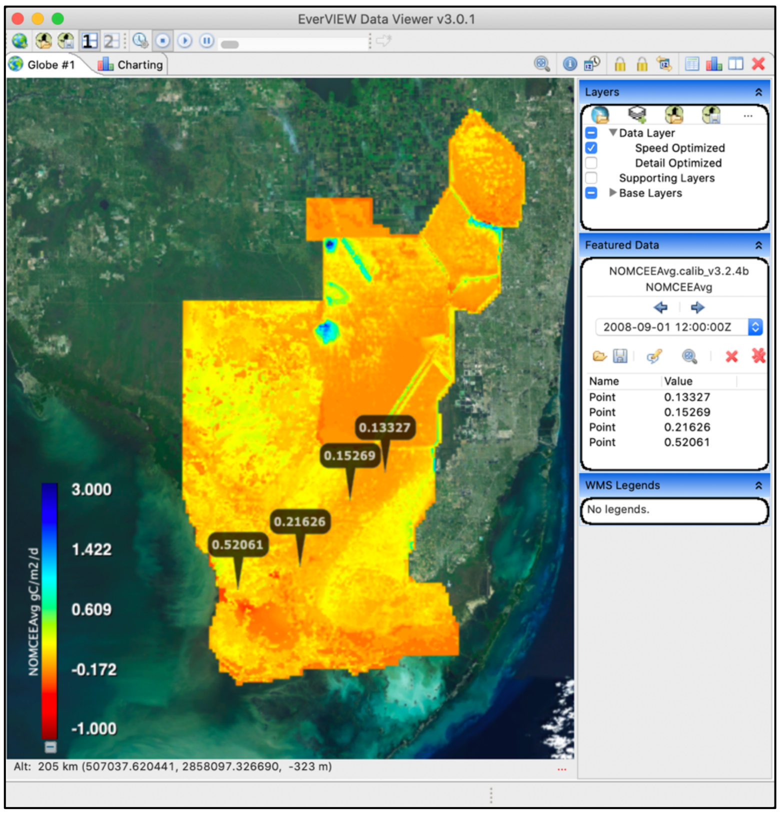
Refinements to the Everglades Landscape Model: ELM v3.2.4

LTER: Coastal Oligotrophic Ecosystem Research - Integrated Modeling
Consulting Agreement No. 000418, Year 2 Final



ELM
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February 26, 2023

Abstract

For EcoLandMod's Florida Coastal Everglades (FCE) LTER subcontract, this document describes the progress in updating hydro-ecological performance and applications of the Everglades Landscape Model (ELM) to v3.2.4. For this major upgrade of v2 to v3, last year (Fitz 2021) we extended the historical calibration-validation performance assessments for January 1984 through December 2010. Here, we enhance that update by describing the results of having:

- refined biological parameters that improved model performance in surface water P, floc P, periphyton & macrophyte turnover, and soil & P accumulation;
- added 20 additional sites in the mangrove-dominated southwest and southern regions for enhanced spatial hydrologic performance assessment;
- added code for empirical small-fish density responses to hydrology and phosphorus, driven by the new-acceptable floc/periphyton P model performance (complementing the recent addition of empirical diatom community response to those drivers).
- added code to summarize existing dynamics in order to output Net Total Primary Production, Total Soil Decomposition, and Net Organic Matter Carbon Ecosystem Exchange (for partial comparison to FCE carbon flux tower data)

Understanding long term, cumulative interactions of ecosystem processes is fundamental to LTER goals, and we continued to advance a unique simulation tool for use in addressing integrative ecosystem dynamics across a heterogenous landscape. This is a spatial model that explicitly integrates dynamic modules of 3D raster-vector hydrology with dynamic modules of biogeochemistry (TP, Cl, SO_4), plant biology (growth/mortality of macrophytes and periphyton), soil processes (organic carbon accumulation/loss), and habitat succession. One of the primary integrative model metrics in our studies has been peat accumulation, which responded to the dynamic ecosystem drivers of water depths and associated TP and Cl concentrations.

Last year, we used sensitivity analyses to show how a range of parameter modifications that affected biology (periphyton turnover) impacts biogeochemistry (P cycling), which impacts other-biology (soil accretion), which impacts hydrology (water depth). That hydrologic response, in turn, further impacts the biology: truly dynamic integrative simulations. Here, we modified a) the (global, domain-wide) parameters of floc bulk density, and those of periphyton gross production, respiration, drydown-related mortality, and P affinity; and b) the habitat-specific parameters of P affinity equally in all habitats, but with additional changes to mangrove & buttonwood forests & scrub, and finally, the water tolerance of buttonwood forest.

As with any ELM update that can affect a performance measure of interest, we evaluated the statistical and graphical model performance of a) daily stage, b) seasonal/daily surface water P, and c) seasonal/daily surface water Cl. In addition, along with assessing the spatio-temporal patterns of macrophyte & periphyton biomass & production, we assessed performance of the most integrative of ecological metrics: soil P accumulation and organic soil accretion. Overall very good performance in spatial and temporal magnitudes and trends of the above variables met the expectations of ecological modeling across large spatial and temporal extents.

With the refined (reduced model bias) P concentration in floc (statistically fit to periphyton concentration), we added the empirical model (Trexler, *pers. comm.*) in which freshwater fish density responds to both days since last drydown and P concentration in floc/periphyton. In another empirical approach, which we encoded in 2019, the diatom community succession model

(Mazzei, *pers. comm.*) has hydrologic and salinity drivers, in addition to the important floc/periphyton P driver. The updated ELM v.3.2.4 performance allows us start more formally assessing/refining those two empirical models within the ELM framework.

We added new, simple code to express output data on ecosystem carbon fluxes involved summing (periphyton + macrophyte) Net Total Primary Production (NTPP_C), summing (floc + soil) Total Soil Decomposition (TSDecomp_C), and expressing the difference of those for Net Organic Matter Carbon Ecosystem Exchange (NOMCEE). NOMCEE does not include respiration from plants (nor consumers); thus total ecosystem respiration is the difference between (measured) Net Ecosystem Exchange (NEE) and (simulated) Net Organic Matter Carbon Ecosystem Exchange (NOMCEE). We anticipate using comparisons to FCE C flux tower data (Malone, *pers. comm.*) to consider further ELM refinements, particularly with respect to the fast-processes of ecosystem fluxes and their cumulative effect on longer time scale integrative ecosystem characteristics.

Previous ELM versions have been applied to a range of research and management applications, including evaluations of water management alternatives in response to various future climate and sea level rise scenarios. While our modeling program will continue to be added to and refined, this new ELM v3.2.4 is now available for additional such model evaluations.

Model Refinement: Biological parameters

Last year (Fitz 2021), (the updated v2 -> v3) ELM v3.2.1 sensitivity analyses showed how some periphyton parameter modifications affected biology (periphyton turnover), biogeochemistry (P cycling), other-biology (soil accretion), and hydrology (water depth). In particular, for the Taylor Slough region (and elsewhere to lesser extents), we were interested in the ecological-process-reasons for some slight, but likely-ecologically-meaningful, bias in surface water P concentrations, and concomitant bias in floc/periphyton P concentrations (all of which we consider important driving variables for other ecological processes).

Towards those and other ELM performance improvements, we modified the following parameters, for basically the first parameter change (with the exception of new-module parameter additions) since ELM v2.5 (Fitz and Trimble 2006). New values for the updated ELM v3.2.4 are:

Global parameters (domain-wide)

GP_Floc_BD=	20	mg/cm3	***Bulk density of floc layer (mg/cm3 == kg/m3)
GP_ALG_RC_PROD=	0.075	1/d	***Maximum specific rate observed/attainable of algal (periphyton) gross primary production
GP_ALG_RC_RESP=	0.001	1/d	***Max specific rate of algal (periphyton) respiration
GP_ALG_RC_MORT_DRY=	0.0005	1/d	***Specific mortality rate of benthic algae (periphyton) in "drydown" conditions (different from baseline specific mortality)
GP_C_ALG_KS_P=	0.01	mg/L	***Half-saturation conc of avail phosphorus for uptake kinetics, oligotrophic (was Calcareous, C_ALG) periphyton

Habitat-specific parameters (vary depending on grid cell's current habitat)

HP_MAC_KSP[***ALL***]=	***<10x***	mg/L	***Half-saturation conc of avail phosphorus for uptake kinetics of macrophytes. ***DECREASED IN ALL HABS BY 10X. Then, assigned slightly lower values (=0.02 mg/L) to Mangrove Scrub, Mangrove Forest, Buttonwood Forest, Buttonwood Scrub***
HP_MAC_WAT_TOLER	1_diff	m	***Depth of ponded surface water above which plant growth becomes restricted. ***ONLY ONE CHANGE:*** **Decreased value for Buttonwood Forest**

Please see the Data Chapter 4 in Fitz and Trimble (2006) for documentation of all parameters, and their use in the Model Structure (that Chapter 5). For comprehensive understanding, this is important regarding the context of the parameters and their use in the model equations.

Formal model performance evaluations are detailed in the next section. Prefacing those evaluations that showed very good statistical and graphical improvements in the principal driving variables, here we show examples of relations among decadal fluctuations in hydrology, water quality, and biological dynamics in a southern Everglades Taylor Slough region (Figure 1).

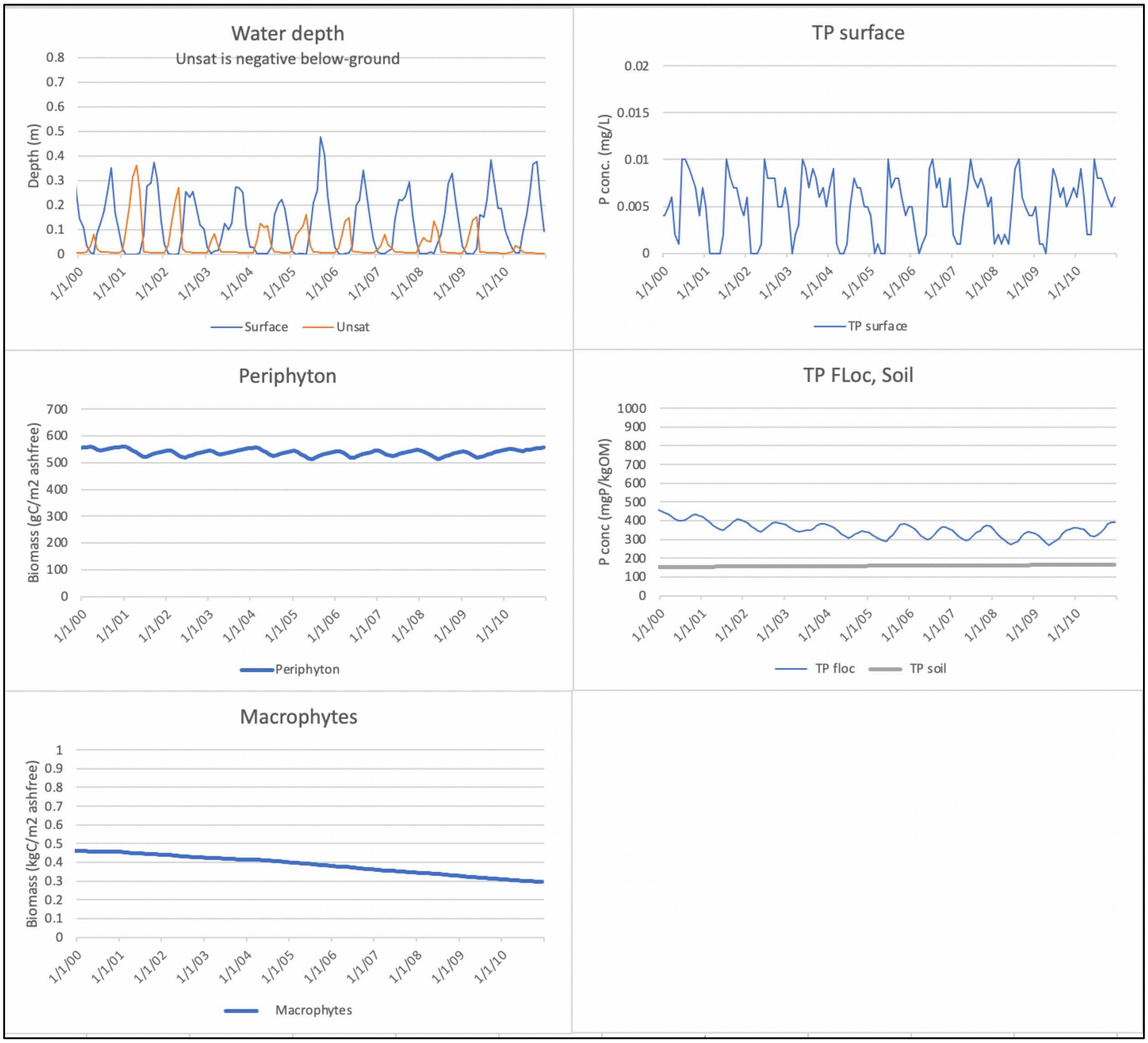


Figure 1. An assemblage of hydro-ecological variables in a southern Everglades, Taylor Slough, Indicator Region of four model grid cells centered on the FCE TS/Ph-3 monitoring site. For clarity of temporal dynamics, the graphics show a 10-yr subset of the 1984-2010 historical (calibration) simulation.

While the new v3.2.4 improves on P dynamics in water column, floc, and soil, we continue to have concerns with performance in assessing P concentrations in the live periphyton variable (with highly transient live dynamics, and other fast-process attributes). Thus, for the driving-data needs of the new fish and diatom empirical modules (see later sections), we rely upon the very good linear statistical relationship of P concentration in periphyton and in floc (Figure 2), using 1999 Everglades transect data (Gaiser 2006). Floc and periphyton are similarly "fast" variables, and appear similarly useful in assessing P eutrophication.

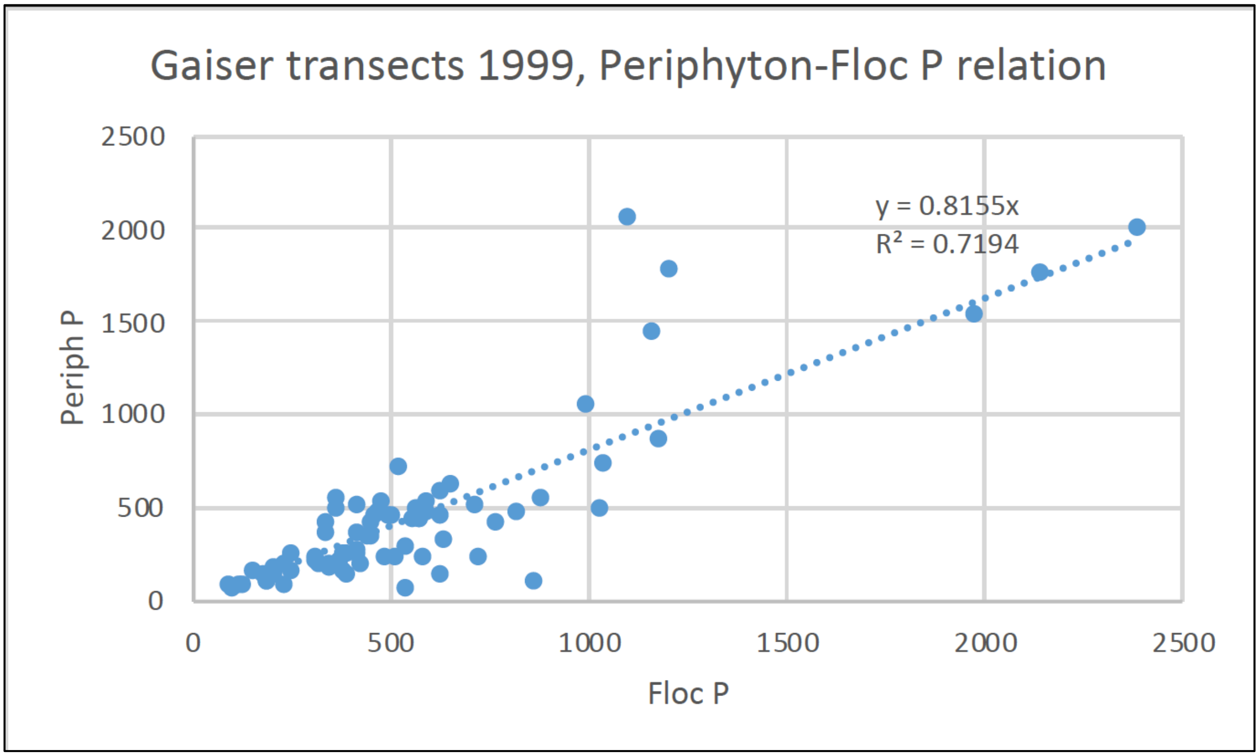


Figure 2. Relationship between observed P concentration (ug g^{-1}) in floc and in periphyton (AFDM).

Model Performance: Stage, surface water TP & Cl

In assessing model performance for these three principal hydro-ecological drivers, we used newly acquired data from Anderson et al. (2014) and DBHYDRO (2022). The FCE-specific water quality and related data used by Fitz (2021) (Gaiser 2021, Troxler 2021a&b) did not require updating here.

Regional stage

Last year, Fitz (2021) reported the model performance update for the historical period of simulation 1984-2010. In our current update, we added 20 new sites that were primarily in mangrove dominated regions (see Figure 3). Moreover, to improve performance of a variety of ecological variables, we modified a host of model parameters that have remained fixed since 2006's ELM v2.5 (see previous section). Such modifications can influence hydrology in this integrated model (via altered land elevation gradients, Manning's roughness, leaf area index, etc.). Thus, we re-evaluated the full suite of hydrologic (and surface water quality) performance measures.

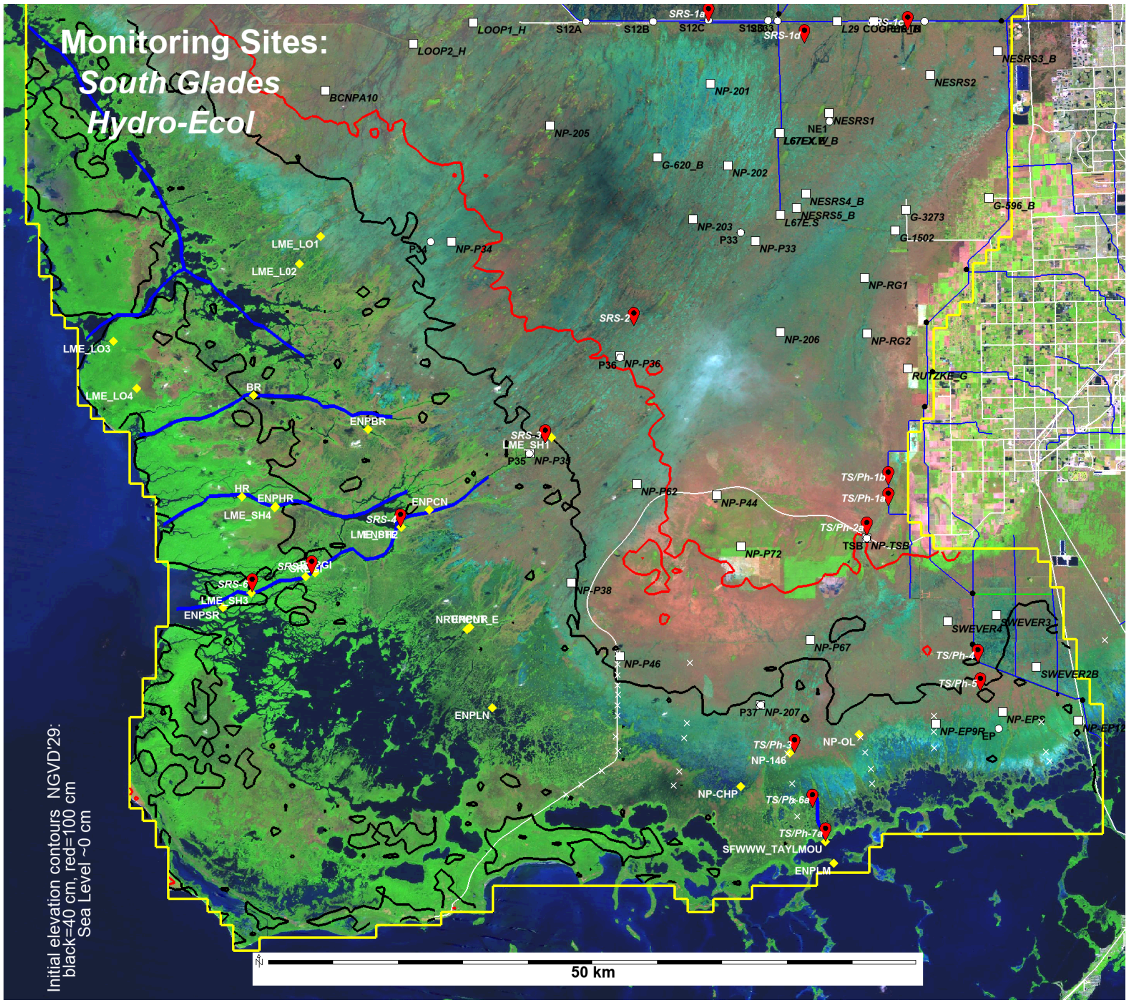


Figure 3. Monitoring sites in the southern domain of the regional ELM v3.2.4. White box symbols are specific to stage; white circle symbols are specific to water quality. Sites added for ELM v3.2.1 and v3.2.4 are shown in yellow diamonds: these include stage observations, with some sites including salinity. Two contours of initial land surface elevation are shown for reference. Thick blue lines in mangrove region show the ELM simulated river vectors. The (partial) ELM domain boundary is the thick yellow line.

In this section, we simply provide the statistical (Table 1) and graphical (Appendix A) stage prediction results for the 106 sites in the regional domain. The model continued to perform very well, and we are not aware of any other spatial hydrologic models that consider the suite of southern & southwest mangrove-related sites that we added and evaluated.

Table 1 (continuous over ~3 pages). Statistical evaluations of (ELM v3.2.4) observed vs. simulated daily stage, 1984-2010 at 106 sites in the regional domain. Bias is observed minus simulated. Sites are ordered from northwest to southeast in the regional domain.

It is essential to view the model-observed time series plots (Appendix A), particularly those associated with the sites that have unusual performance characteristics. In updating to v3.2.1 using new water control structure flows and other new data, the sites in yellow highlighting (Holey Land, Rotenberger Tract, WCA-2B) have newly anomalous periods of performance that we have not yet investigated. The sites in yellow highlighted red italics are a subset of the newly acquired sites, which have unusual performance characteristics that usually appear to be related to an offset bias (see time series plots), and the sites in *grey italics* have some somewhat questionable performance attributes. For example (see Appendix A), the ENPTE data have a constantly large model bias relative to model-observed bias of LMER project's LME_SH2 (same location) data, the latter of which are very close to the ELM simulated data.

While all observed and model data explicitly state use to the NAVD 1988 vertical datum, we will further investigate the model grid cell attributes, and source data's survey base. ***In many of these cases, we anticipate that the offsets may be related to river/creek vs. marsh sampling locations***.

Site	Basin	Stage 1984-2010 N	Bias (m)	RMSE (m)	R^2	NS Eff.
_1-7	WCA1	9593	0.10	0.16	0.70	0.02
1-8T	WCA1	9501	0.05	0.18	0.67	0.35
_1-9	WCA1	9426	0.05	0.14	0.69	0.33
HOLEY1	Holey L.	7441	-0.34	0.40	0.49	-2.55
HOLEY_G	Holey L.	9251	-0.25	0.36	0.44	-2.99
ROTT.S	Roten. T.	8732	-0.17	0.29	0.20	-1.22
WCA2F1	WCA2A	5911	0.08	0.15	0.78	0.64
HOLEY2	Holey L.	7512	-0.28	0.34	0.50	-0.84
WCA2F4	WCA2A	5593	0.09	0.17	0.76	0.47
WCA2E4	WCA2A	5912	0.12	0.21	0.75	0.30
3A-NW_B	WCA3A	9139	-0.20	0.25	0.64	0.00
2A-17_B	WCA2A	9852	0.06	0.19	0.73	0.54
3A-10_B	WCA3A	9266	-0.02	0.51	0.33	-5.12
3A-NE_B	WCA3A	9538	-0.02	0.21	0.62	0.60
2A-300_B	WCA2A	9852	0.12	0.25	0.70	0.37
WCA2U1	WCA2A	5659	0.15	0.31	0.63	-0.09
3A-11_B	WCA3A	9239	0.12	0.17	0.80	0.41
3A-3_G	WCA3A	9852	0.04	0.20	0.73	0.70
3A-2_G	WCA3A	9759	0.01	0.13	0.79	0.76
3A-12_B	WCA3A	9413	-0.06	0.20	0.61	0.27
BCNPA13	BCNP	5575	-0.01	0.20	0.67	0.54
_3-99	WCA2B	6974	0.20	0.65	0.22	-2.09
2B-Y	WCA2B	9167	0.03	0.70	0.26	-0.58
L28.GAP	BCNP	9765	0.09	0.17	0.63	0.49
3A-9_B	WCA3A	9852	0.07	0.17	0.73	0.64
L28-2	WCA3A	7659	0.02	0.19	0.72	0.19
3A-S_B	WCA3A	9754	0.06	0.17	0.71	0.57
_3-76	WCA3B	6975	0.29	0.31	0.41	-3.05
3A-SW_B	WCA3A	9600	-0.01	0.14	0.72	0.65
3A-4_G	WCA3A	9852	0.08	0.20	0.68	0.54

BCNPA5	BCNP	7222	-0.04	0.16	0.63	0.55
BCNPA4	BCNP	7253	0.17	0.27	0.65	0.36
_3-71	WCA3B	7106	0.17	0.20	0.64	-0.59
_3-34	WCA3B	1633	0.05	0.09	0.93	0.81
TAMI.40M	BCNP	9852	-0.04	0.16	0.71	0.69
3A-28_G	WCA3A	9842	-0.09	0.20	0.63	0.47
SHARK.1_H	WCA3B	9846	0.08	0.15	0.71	0.61
BCNPA11	BCNP	7201	0.10	0.21	0.63	0.51
3B-SE_B	WCA3B	9681	-0.01	0.16	0.77	0.74
LOOP1_H	ENP	9580	0.06	0.14	0.67	0.50
L29	ENP	9852	-0.02	0.14	0.57	0.45
G-618_B	ENP	9671	-0.04	0.11	0.75	0.71
LOOP2_H	ENP	9613	0.14	0.19	0.76	0.48
NESRS3_B	ENP	9231	0.10	0.18	0.73	0.55
NESRS2	ENP	9275	-0.03	0.09	0.78	0.75
NP-201	ENP	9307	0.12	0.16	0.86	0.65
BCNPA10	ENP	7289	-0.04	0.14	0.70	0.67
NESRS1	ENP	9647	-0.06	0.11	0.73	0.61
NP-205	ENP	9728	-0.05	0.14	0.85	0.80
L67EX.W	ENP	9374	0.00	0.16	0.77	0.64
L67EX.E_B	ENP	6187	-0.11	0.16	0.68	0.40
G-620_B	ENP	9480	0.00	0.10	0.83	0.82
NP-202	ENP	9642	0.05	0.12	0.84	0.72
NESRS4_B	ENP	8506	-0.06	0.12	0.74	0.57
G-596_B	ENP	9812	-0.20	0.28	0.53	-0.49
NESRS5_B	ENP	8562	-0.05	0.09	0.79	0.65
G-3273	ENP	9789	-0.17	0.24	0.72	0.41
L67E.S	ENP	5680	0.06	0.15	0.69	0.59
NP-203	ENP	9617	0.01	0.10	0.82	0.79
G-1502	ENP	9851	-0.15	0.23	0.70	0.49
LME_LO1	*ENP*	*4637*	*0.19*	*0.22*	*0.89*	*-1.38*
NP-P34	ENP	9540	0.00	0.13	0.78	0.75
NP-P33	ENP	9694	-0.02	0.10	0.75	0.72
LME_L02	ENP	4625	-0.03	0.13	0.63	-0.12
NP-RG1	ENP	5195	-0.23	0.27	0.79	0.22
NP-206	ENP	9217	-0.13	0.23	0.73	0.58
NP-RG2	ENP	5154	-0.22	0.26	0.83	0.31
LME_LO3	*ENP*	*3584*	*0.31*	*0.42*	*0.15*	*-14.65*
NP-P36	ENP	9499	0.01	0.11	0.68	0.67
RUTZKE_G	ENP	6021	-0.07	0.22	0.82	0.58
LME_LO4	ENP	2018	-0.02	0.11	0.80	0.64
BR	*ENP*	*3580*	*0.35*	*0.42*	*0.46*	*-9.43*
ENPBR	ENP	5562	-0.04	0.16	0.33	-0.31
LME_SH1	ENP	5101	-0.04	0.09	0.85	0.78
NP-P35	ENP	9391	-0.11	0.15	0.75	0.31
NP-P62	ENP	9363	0.02	0.13	0.79	0.78
HR	*ENP*	*1652*	*-0.03*	*0.24*	*0.40*	*-1.97*
NP-P44	ENP	9149	-0.22	0.30	0.74	0.45
LME_SH4	*ENP*	*4794*	*0.35*	*0.44*	*0.33*	*-10.24*
ENPHR	*ENP*	*5037*	*0.12*	*0.29*	*0.29*	*-4.82*
LME_SH5	*ENP*	*4982*	*0.26*	*0.38*	*0.44*	*-9.75*

ENPCN	ENP	6111	0.03	0.10	0.64	0.42
ENPTE	*ENP*	*5216*	*-0.17*	*0.21*	*0.41*	*-2.01*
LME_SH2	ENP	5335	-0.08	0.16	0.39	-1.47
NP-TSB	ENP	9846	-0.14	0.19	0.86	0.68
NP-P72	ENP	9780	-0.14	0.25	0.71	0.55
ENPGI	*ENP*	*7538*	*-0.11*	*0.22*	*0.09*	*-2.65*
SRBGI	ENP	3537	-0.04	0.19	0.30	-1.27
NP-P38	ENP	9409	0.03	0.12	0.84	0.58
LME_SH3	*ENP*	*4048*	*0.29*	*0.37*	*0.16*	*-10.93*
SWEVER3	ENP	8967	0.09	0.15	0.77	-0.18
SWEVER4	ENP	9213	-0.04	0.17	0.77	-0.34
ENPNR	*ENP*	*5883*	*-0.18*	*0.27*	*0.17*	*-4.26*
NRUPCUT_E	*ENP*	*3565*	*-0.12*	*0.24*	*0.22*	*-2.95*
NP-P67	ENP	9749	-0.03	0.11	0.81	0.71
NP-P46	ENP	9151	0.01	0.14	0.73	0.36
SWEVER2B	ENP	5488	0.02	0.08	0.80	0.70
ENPLN	*ENP*	*5229*	*-0.11*	*0.21*	*0.24*	*-2.24*
NP-207	ENP	5736	-0.02	0.08	0.87	0.80
NP-EPS	ENP	8892	-0.03	0.10	0.82	0.16
NP-EP12R	ENP	2828	-0.12	0.13	0.82	-0.92
NP-EP9R	ENP	2608	-0.15	0.16	0.81	-0.64
NP-OL	ENP	5373	-0.05	0.10	0.74	0.63
NP-146	ENP	5945	-0.04	0.08	0.88	0.68
NP-CHP	ENP	9375	-0.04	0.10	0.74	0.68
SFWWW_TAYLMOU	*ENP*	*5479*	*-0.15*	*0.18*	*0.41*	*-1.64*
	Median:	9053	-0.02	0.17	0.71	0.46

Regional surface water quality - TP

In this section, we simply provide the statistical (Table 2) and graphical (Appendix B) surface water TP concentration prediction results for the 94 sites in the regional domain. The model continued to perform very well, and we are not aware of any other spatial models that consider the suite of sites that we evaluated in the regional Everglades.

- Updated biological parameters (see below section) resulted in improved model performance in simulating TP concentration in surface water, and in particular, we largely removed the prior versions' model overprediction bias in some Taylor Slough (and other) locations, an ecologically meaningful improvement.

Table 2 (continuous over ~3 pages). Statistical evaluations of (ELM v3.2.4) observed vs. simulated seasonal (wet & dry) mean surface water TP concentrations, 1984-2010 at 94 sites in the regional domain. Bias (observed minus simulated) and RMSE units are ug l^{-1}. RelBias is Bias/ObservedMean. Sites are ordered from northwest to southeast in the regional domain.

Site type refers to Marsh vs. Canal vs. River locations; for transect gradients, M. Transect refers to Marsh Transect, and may be associated with Canal-Marsh Transect (Can-M. Transect) or River-Marsh Transect (River-M. Transect).

It is essential to view the model-observed time series plots (Appendix B).

			TP surface water 1984-2010				
Site	Basin	Site type	N	ObsMean	RelBias	Bias	RMSE
LOX4	WCA1	Marsh	32	11	0.09	1	6
LOX3	WCA1	Marsh	26	10	0.50	5	8
LOX5	WCA1	Marsh	18	9	0.44	4	5
LOX10	WCA1	Marsh	32	9	0.33	3	4
LOX9	WCA1	Marsh	32	8	0.50	4	5
LOX8	WCA1	Marsh	34	9	0.44	4	5
LOX7	WCA1	Marsh	34	9	0.44	4	5
LOX6	WCA1	Marsh	30	7	0.14	1	3
X2	WCA1	M. Transect	28	16	0.44	7	9
X4	WCA1	M. Transect	26	11	0.55	6	7
X1	WCA1	M. Transect	26	41	0.59	24	32
X3	WCA1	M. Transect	28	10	0.30	3	5
Z1	WCA1	M. Transect	26	36	0.44	16	19
Y4	WCA1	M. Transect	28	10	0.60	6	10
Z2	WCA1	M. Transect	26	16	-0.13	-2	11
LOX11	WCA1	Marsh	34	9	0.44	4	5
Z3	WCA1	M. Transect	28	11	0.45	5	6
Z4	WCA1	M. Transect	28	8	0.50	4	5
LOX12	WCA1	Marsh	34	8	0.50	4	5
LOX13	WCA1	Marsh	31	8	0.50	4	5
LOX14	WCA1	Marsh	34	8	0.13	1	2
LOX15	WCA1	Marsh	34	7	-0.86	-6	7
LOX16	WCA1	Marsh	33	8	0.00	0	2
F1	WCA2A	M. Transect	25	81	0.73	59	82
E1	WCA2A	M. Transect	29	48	0.58	28	35
F2	WCA2A	M. Transect	30	49	0.71	35	50
E2	WCA2A	M. Transect	24	44	0.50	22	28
E3	WCA2A	M. Transect	28	31	0.52	16	20
F3	WCA2A	M. Transect	29	26	0.54	14	16
F4	WCA2A	M. Transect	30	17	0.41	7	8
F5	WCA2A	M. Transect	30	10	0.20	2	4
E4	WCA2A	M. Transect	30	14	0.29	4	5
CA33	WCA2A	Marsh	34	12	-0.08	-1	6
CA35	WCA3A	Marsh	30	10	-0.80	-8	12
U3	WCA2A	M. Transect	32	9	0.33	3	7
E5	WCA2A	M. Transect	29	8	0.00	0	3

U2	WCA2A	M. Transect	30	11	0.45	5	20
CA32	WCA3A	Marsh	33	7	0.14	1	3
U1	WCA2A	M. Transect	30	10	0.30	3	6
CA36	WCA3A	Marsh	30	33	0.42	14	22
CA38	WCA3A	Marsh	34	7	-0.29	-2	4
CA34	WCA3A	Marsh	33	10	0.30	3	5
CA311	WCA3A	Marsh	34	6	-0.17	-1	2
CA315	WCA3A	Marsh	34	6	0.17	1	2
SRS1a	ENP	M. Transect	9	13	0.08	1	3
SRS1c	ENP	M. Transect	3	7	0.29	2	2
SRS1d	ENP	M. Transect	10	9	0.22	2	4
NE1	ENP	Marsh	49	9	0.33	3	6
P33	ENP	Marsh	50	7	0.00	0	3
P34	ENP	Marsh	41	5	-0.60	-3	4
SRS2	ENP	M. Transect	21	6	0.17	1	2
P36	ENP	Marsh	50	13	0.62	8	19
SRS3	ENP	M. Transect	21	8	0.25	2	4
P35	ENP	Marsh	49	11	0.55	6	12
TS/Ph1b	ENP	M. Transect	7	5	-0.40	-2	2
TS/Ph1a	ENP	M. Transect	16	7	0.14	1	5
SRS4	ENP	M. Transect	21	13	0.38	5	8
TS/Ph2	ENP	M. Transect	24	6	0.00	0	4
TSB	ENP	Marsh	47	7	0.14	1	4
TS/Ph4	ENP	M. Transect	18	6	0.33	2	5
TS/Ph5	ENP	M. Transect	18	4	-0.50	-2	3
P37	ENP	Marsh	44	5	-0.40	-2	3
EP	ENP	Marsh	44	5	-0.20	-1	3
TS/Ph3	ENP	M. Transect	20	5	0.00	0	3
TS/Ph6a	ENP	M. Transect	26	11	0.55	6	7
TS/Ph7a	ENP	M. Transect	26	10	0.00	0	4
L7	WCA1	Canal	8	118	0.14	16	59
L40-1	WCA1	Canal	20	62	-0.05	-3	29
L40-2	WCA1	Canal	20	84	0.25	21	33
S10A	WCA1	Canal	39	40	-0.63	-25	39
S10C	WCA1	Canal	40	52	-0.27	-14	31
S10D	WCA1	Canal	54	75	0.21	16	32
S10E	WCA1	Canal	31	79	0.18	14	38
X0	WCA1	Can-M. Transect	26	51	0.00	0	19
Z0	WCA1	Can-M. Transect	26	52	0.04	2	16
E0	WCA1	Can-M. Transect	31	62	0.56	35	45
F0	WCA1	Can-M. Transect	30	70	0.59	41	48
S144	WCA2A	Canal	24	21	-0.52	-11	27
S145	WCA2A	Canal	50	16	-0.50	-8	19
S146	WCA2A	Canal	24	17	-0.82	-14	28
S11A	WCA2A	Canal	48	24	-0.17	-4	21
S11B	WCA2A	Canal	47	34	0.15	5	15
S11C	WCA2A	Canal	54	44	0.43	19	26
C123SR84	WCA3A	Canal	46	37	0.54	20	25
S151	WCA3A	Canal	54	23	0.35	8	15
S12A	WCA3A	Canal	54	18	0.44	8	21
S12B	WCA3A	Canal	54	14	0.29	4	14

S12C	WCA3A	Canal	54	13	0.15	2	7
S12D	WCA3A	Canal	54	13	0.15	2	7
S333	WCA3A	Canal	54	15	0.27	4	8
COOPERTN	WCA3A	Canal	40	12	0.42	5	6
S31	WCA3A	Canal	43	18	0.56	10	14
SRS6	ENP	River-M. Transect	21	29	0.38	11	21
SRS5	ENP	River-M. Transect	21	19	0.32	6	11
		Median All:	30	11	0.29	3	7
		Median Canal&River:	40	32	0	5	21
		Median Marsh:	30	9	0	3	5

Regional surface water quality - Cl

In this section, we simply provide the statistical (Table 3) and graphical (Appendix C) surface water Cl concentration prediction results for the 107 sites in the regional domain. Adding 22 new sites in the mangrove dominated region, the model continued to perform very well, and we are not aware of any other spatial models that consider the suite of sites that we evaluated in the regional Everglades, nor in the mangrove dominated region.

- *Note that ELM uses Cl in computations; conversions to-from salinity are made as needed*

Table 3 (continuous over ~3 pages). Statistical evaluations of (ELM v3.2.4) observed vs. simulated seasonal (wet & dry) mean surface water Cl concentrations, 1984-2010 at 107 sites in the regional domain. Bias (observed minus simulated) and RMSE units are mg l^{-1}. RelBias is Bias/ObservedMean. Sites are ordered from northwest to southeast in the regional domain.

Site type refers to Marsh vs. Canal vs. River locations; for transect gradients, M. Transect refers to Marsh Transect, and may be associated with Canal-Marsh Transect (Can-M. Transect) or River-Marsh Transect (River-M Transect). The *Estuarine* designation denotes sites that generally have values that are several orders of magnitude greater than in freshwater sites.

It is essential to view the model-observed time series plots (Appendix C).

				Cl surface water 1984-2010				
Site	Basin	Site type	Estuarine	N	ObsMean	RelBias	Bias	RMSE
LOX4	WCA1	Marsh		24	55	-0.48	-26	45
LOX3	WCA1	Marsh		17	24	0.53	13	16
LOX5	WCA1	Marsh		11	18	0.55	10	11
LOX10	WCA1	Marsh		24	28	-1.82	-51	58
LOX9	WCA1	Marsh		23	20	-0.55	-11	21
LOX8	WCA1	Marsh		26	19	0.60	11	12
LOX7	WCA1	Marsh		24	23	0.48	11	14
LOX6	WCA1	Marsh		23	39	-0.17	-7	25
X2	WCA1	M. Transect		28	83	-0.35	-29	44
X4	WCA1	M. Transect		27	41	-0.31	-13	26
X1	WCA1	M. Transect		26	112	-0.08	-9	28
X3	WCA1	M. Transect		28	64	-0.55	-35	51
Z1	WCA1	M. Transect		27	112	0.01	2	30
Y4	WCA1	M. Transect		28	44	-0.32	-14	28
Z2	WCA1	M. Transect		27	90	-0.24	-21	39
LOX11	WCA1	Marsh		24	18	0.42	7	9
Z3	WCA1	M. Transect		28	55	-0.25	-14	32
Z4	WCA1	M. Transect		28	38	-0.18	-7	15
LOX12	WCA1	Marsh		26	35	-0.43	-15	19
LOX13	WCA1	Marsh		21	16	-1.37	-22	30
LOX14	WCA1	Marsh		26	27	-0.90	-24	31
LOX15	WCA1	Marsh		26	56	-0.99	-55	60
LOX16	WCA1	Marsh		25	24	-3.27	-78	83
F1	WCA2A	M. Transect		25	160	0.33	52	67
E1	WCA2A	M. Transect		31	155	0.23	36	50
F2	WCA2A	M. Transect		30	153	0.24	37	50
E2	WCA2A	M. Transect		27	124	0.13	16	37
E3	WCA2A	M. Transect		31	128	0.11	14	35
F3	WCA2A	M. Transect		31	151	0.21	32	41
F4	WCA2A	M. Transect		31	134	0.21	28	36
F5	WCA2A	M. Transect		31	138	0.26	36	42
E4	WCA2A	M. Transect		31	118	0.12	14	34
CA33	WCA3A	Marsh		24	50	-0.31	-16	25
CA35	WCA3A	Marsh		20	39	-1.10	-43	54
U3	WCA2A	M. Transect		32	129	0.25	33	39
E5	WCA2A	M. Transect		31	110	0.14	16	30
U2	WCA2A	M. Transect		31	123	0.27	33	42
CA32	WCA3A	Marsh		25	54	0.26	14	35

U1	WCA2A	M. Transect		31	103	0.10	11	27
CA36	WCA3A	Marsh		17	68	0.10	7	11
CA38	WCA3A	Marsh		26	33	-0.30	-10	20
CA34	WCA3A	Marsh		25	52	-0.01	0	10
CA311	WCA3A	Marsh		26	32	-0.15	-5	13
CA315	WCA3A	Marsh		26	32	0.18	6	10
SRS1a	ENP	M. Transect		*inadequate observed N, ignored*				
SRS1c	ENP	M. Transect		*inadequate observed N, ignored*				
SRS1d	ENP	M. Transect		*inadequate observed N, ignored*				
NE1	ENP	Marsh		41	68	0.13	9	22
LME_LO1	ENP	Marsh		27	131	0.70	91	108
P33	ENP	Marsh		42	63	0.03	2	19
P34	ENP	Marsh		37	20	-1.22	-24	32
SRS2	ENP	M. Transect		*inadequate observed N, ignored*				
LME_LO3	*ENP*	*Marsh*	*Estuarine*	*20*	*14266*	*0.96*	*13668*	*14137*
P36	ENP	Marsh		42	62	0.09	5	23
LME_LO4	*ENP*	*Marsh*	*Estuarine*	*13*	*4778*	*0.98*	*4680*	*4931*
ENPBR	*ENP*	*Marsh*	*Estuarine*	*42*	*1020*	*1.04*	*1062*	*1315*
LME_SH1	ENP	Marsh		30	139	0.55	77	80
SRS3	ENP	M. Transect		*inadequate observed N, ignored*				
P35	ENP	Marsh		39	99	0.44	43	107
TS/Ph1b	ENP	M. Transect		*inadequate observed N, ignored*				
TS/Ph1a	ENP	M. Transect		*inadequate observed N, ignored*				
ENPCN	*ENP*	*Marsh*	*Estuarine*	*42*	*543*	*-2.56*	*-1389*	*1977*
SRS4	*ENP*	*M. Transect*	*Estuarine*	*21*	*1479*	*-1.19*	*-1758*	*2338*
LME_SH2	*ENP*	*Marsh*	*Estuarine*	*29*	*1438*	*-1.03*	*-1486*	*2398*
TS/Ph2	ENP	M. Transect		*inadequate observed N, ignored*				
TSB	ENP	Marsh		41	36	0.15	5	13
ENPGI	*ENP*	*Marsh*	*Estuarine*	*30*	*4515*	*0.01*	*28*	*1440*
ENPNR	*ENP*	*Marsh*	*Estuarine*	*40*	*2403*	*1.04*	*2506*	*2954*
TS/Ph4	ENP	M. Transect		18	23	-0.22	-5	74
TS/Ph5	ENP	M. Transect		18	15	-0.62	-10	65
ENPLN	*ENP*	*Marsh*	*Estuarine*	*30*	*3409*	*0.99*	*3384*	*3698*
P37	ENP	Marsh		35	26	0.29	7	14
EP	ENP	Marsh		38	113	0.59	66	145
TS/Ph3	ENP	M. Transect		*inadequate observed N, ignored*				
TS/Ph6a	*ENP*	*M. Transect*	*Estuarine*	*26*	*4369*	*-0.31*	*-1360*	*2730*
TS/Ph7a	*ENP*	*M. Transect*	*Estuarine*	*26*	*7954*	*-0.10*	*-766*	*3074*
L7	WCA1	Canal		10	226	0.27	62	117
L40-1	WCA1	Canal		18	132	0.27	35	50
L40-2	WCA1	Canal		18	80	-0.25	-20	47
S10A	WCA1	Canal		37	88	-0.36	-32	43
S10C	WCA1	Canal		40	112	-0.08	-9	41
S10D	WCA1	Canal		53	129	0.08	10	39
S10E	WCA1	Canal		23	136	0.02	2	33
X0	WCA1	Can-M. Transect		28	120	-0.08	-9	29
Z0	WCA1	Can-M. Transect		28	119	-0.08	-10	30
E0	WCA1	Can-M. Transect		32	123	-0.02	-3	22
F0	WCA1	Can-M. Transect		32	126	0.00	0	22
S144	WCA2A	Canal		23	127	0.14	17	35
S145	WCA2A	Canal		47	114	0.01	1	30

S146	WCA2A	Canal		24	117	0.08	9	30
S11A	WCA2A	Canal		44	115	0.13	16	27
S11B	WCA2A	Canal		47	116	0.16	19	30
S11C	WCA2A	Canal		53	116	0.14	16	25
C123SR84	WCA3A	Canal		35	68	0.09	6	16
S151	WCA3A	Canal		51	93	0.21	20	28
S12A	WCA3A	Canal		53	28	-1.24	-34	37
S12B	WCA3A	Canal		53	36	-0.69	-25	29
S12C	WCA3A	Canal		54	51	-0.22	-11	22
S12D	WCA3A	Canal		47	64	0.03	2	22
S333	WCA3A	Canal		53	72	0.11	8	22
S31	WCA3A	Canal		32	84	-0.31	-26	63
SRS6	*ENP*	*River-M. Transect*	*Estuarine*	*21*	*12644*	*-0.02*	*-292*	*1418*
LME_SH3	*ENP*	*River*	*Estuarine*	*29*	*13209*	*0.07*	*948*	*2416*
SRS5	*ENP*	*River-M. Transect*	*Estuarine*	*21*	*7733*	*-0.06*	*-453*	*1645*
LME_SH4	*ENP*	*River*	*Estuarine*	*30*	*7445*	*0.09*	*651*	*2205*
LME_SH5	*ENP*	*River*	*Estuarine*	*30*	*4885*	*-0.40*	*-1968*	*3498*
ENPHR	*ENP*	*River*	*Estuarine*	*30*	*5842*	*-0.13*	*-772*	*2003*
		Median Fresh Marsh:		27	55	0.09	5	32
		Median Fresh Canal:		37	115	0.02	2	30
		Median Estuarine:		29	4832	-0.01	-132	2407

Appendices A,B,C are important

As emphasized throughout: visualizations of the temporal trends in simulated and observed data are an important component of understanding the model performance. Here we don't reiterate (Fitz 2021) the way the model effectively captures hydrologic, TP, and Cl/salinity gradients along the FCE transects. We do, however, reiterate - again - the utility of visual graphical assessments.

NOTE on graphs: For graphical comparisons, ELM-simulated chloride concentrations (Appendix C) in FCE freshwater sites are associated with all-zero FCE data because of instrumentation precision/accuracy, and thus display substantial differences simply due to FCE measured data being targeted towards estuarine salinity vs. typical (orders of magnitude lower) freshwater chloride concentrations. FCE transects measured salinity (ppt/ PSU/ g/L), and we converted those data to chloride concentrations for use in ELM simulated-observed comparisons. For FCE, "salinity is measured with an YSI conductivity meter", and that did not have the low-concentration accuracy of the freshwater Cl measurements of DBHYDRO (regional monitoring) and SFWMD (WCA1 and WCA2A transect monitoring). Thus, there were observed values of 0.0 in all times at FCE fresh sites (TS/Ph1-3, SRS1-2) , in the observed data used in ELM v3.2 comparisons through 12/2010.

NOTE on graphs: In Appendices B and C, the Raw Data graphs (unaggregated temporally) show simulated concentration data points that may be in water depths that were too shallow for field sampling, thus sometimes showing simulated data with "flashy" and high concentrations (with no observed data on those days). The aggregated data and statistical computations only used matching data points (i.e., simulated and observed data on same day)..

NOTE on graphs: In Appendices B and C, the graphs for canal monitoring points: some sets of canal-based monitoring sites reference a single ELM-canal reach for multiple sites (e.g., S10's, S11's, S12's); an ELM canal reach (identified by the single integer in parentheses following the site name in the graph headings) is homogenous in all characteristics, including constituent concentrations. For example, while the observed TP concentrations at the S12A site are significantly different from those at S12D, the ELM has a single concentration for the Reach ID number 53.

Model Performance: Integrative variables

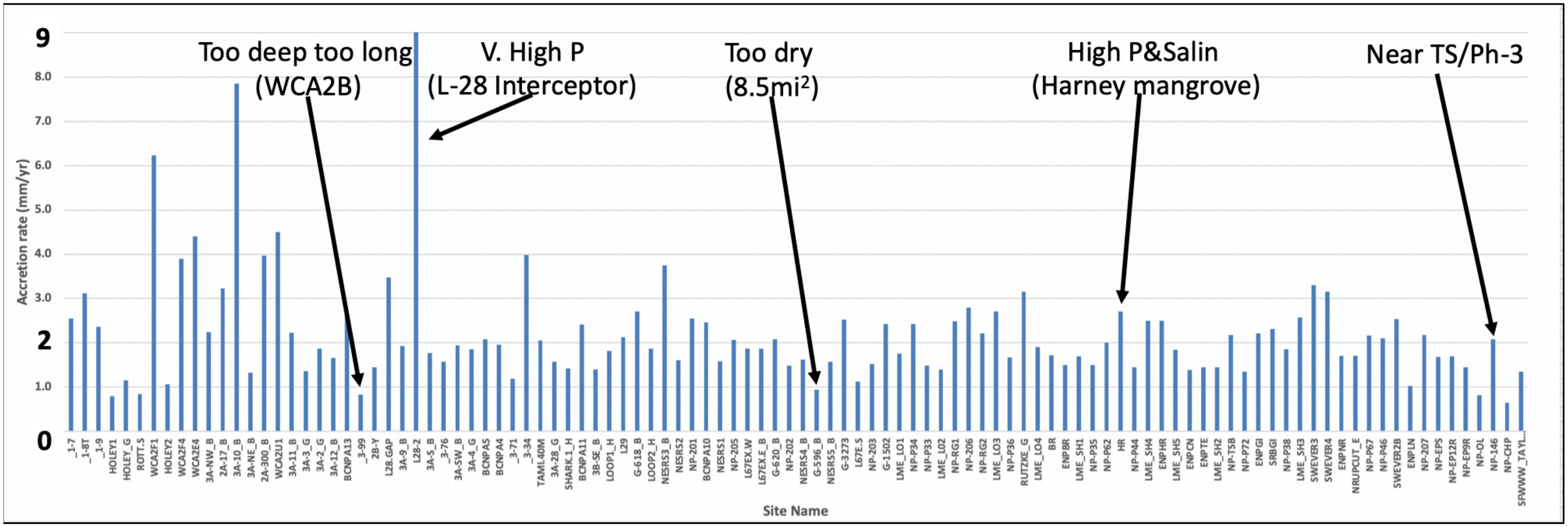
When working with models that truly integrate across the major components of ecosystem structure and function, it becomes clear how ecosystem interactions of water, carbon and phosphorus flow are, truly, finely tuned. Improvements to one system variable can lead to another variable (or variables) behaving beyond observed or expected behaviors. The natural system is indeed a well-balanced "machine", and an integrated ecosystem model must approximate that balance.

Soil dynamics - peat accretion

Decadal-scale soil organic matter accretion is simply the most informative metric that integrates long term wetland ecosystem dynamics, with a healthy wetland being defined by an optimal range of peat accretion (*multiple references*, but see Fitz et al. 2021).

Figure 4 tells the integrative story for this updated ELM v3.2.4: some northern Everglades sites have had high accretion rates due to P eutrophication; others have had low accretion due to baseline P inputs and too-frequent drydowns; others have had the "Goldilocks" just-right combination of environmental drivers. This suite of responses includes sites in the southern Everglades, where there are (upside down estuary) high(ish)-P influences from the marine edges that enhance plant productivity, with concomitant salinity from those marine members that can reduce (or at least not enhance) productivity; of course, dynamic water levels complexify it all.

Figure 4 (next page). Simulated peat accretion rate in the marsh, 1984-2010. Site order is from NW to SE in regional ELM domain. See maps of stage monitoring sites.

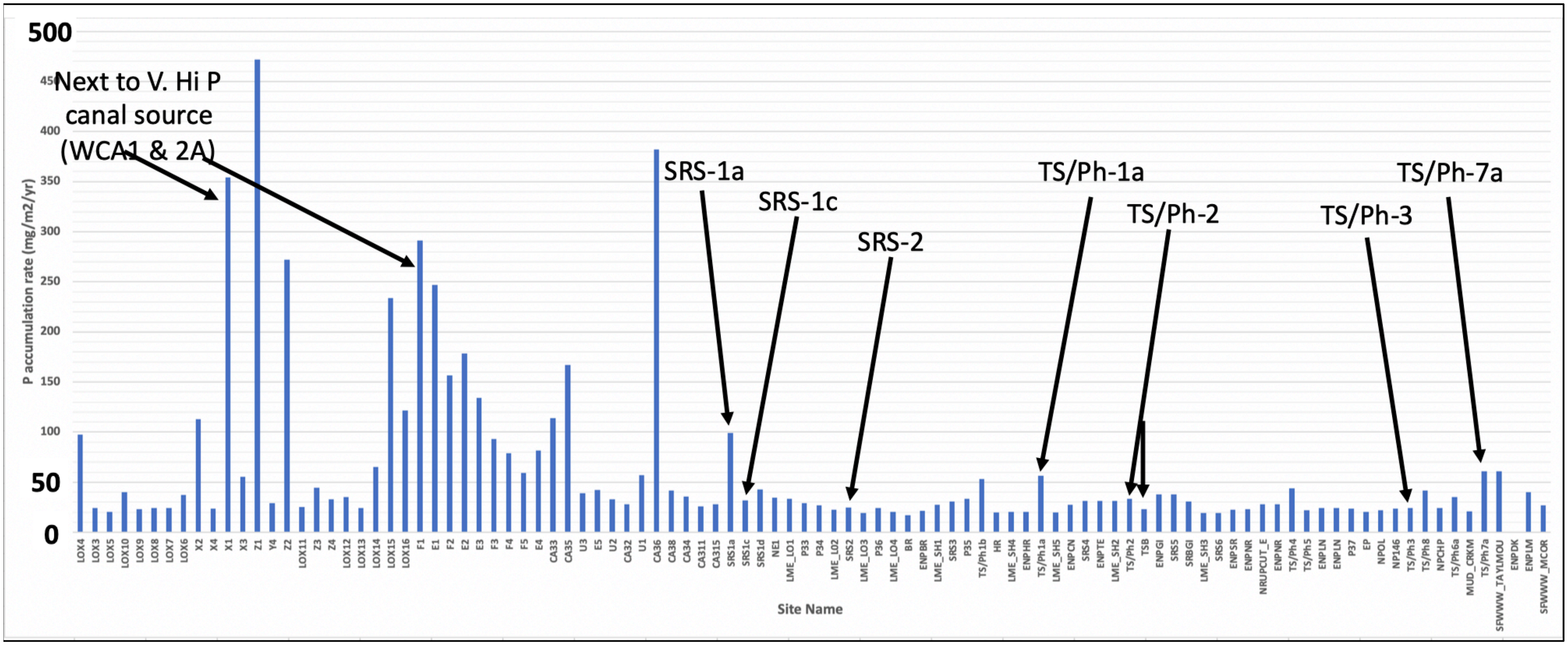

Too deep too long
(WCA2B)
V. High P
(L-28 Interceptor)
Too dry
(8.5mi²)
High P&Salin
(Harney mangrove)
Near TS/Ph-3
Accretion rate (mm/yr)
Site Name

Soil dynamics - P accumulation

Decadal scale P accumulation in the whole ecosystem is one of the most useful metrics for use in evaluating the extent of eutrophication in the Everglades wetlands (see Flower et al. 2019), as it is a cumulative measure of phosphorus in all organic and inorganic storages. Over multiple years, it is almost entirely defined by the accumulation in consolidated soil, thus is generally considered as a soil characteristic across decades. We have considered circa 50 mg m^2 y^{-1} to be the threshold of "probable" eutrophication, and 100 mg m^2 y^{-1} to be the threshold of "likely" eutrophication (Osborne et al. 2017).

Figure 5 tells the story for this second integrative soil metric for this updated ELM v3.2.4: some northern Everglades sites have had high P accumulation rates due to high P loads; other sites removed from P loading show a range of lower P accumulation depending on source proximity and other driving characteristics. This suite of responses includes sites in the southern Everglades, where there are (upside down estuary) high(ish)-P influences from the marine edges that show enhanced P accumulation. The hurricane-induced influxes of P into coastal sediments are not considered in the ELM structure.

Figure 5 (next page). Simulated P accumulation rate in the marsh, 1984-2010. Site order is from NW to SE in regional ELM domain. See maps of water quality monitoring sites.



Next to V. Hi P canal source (WCA1 & 2A)
SRS-1a
SRS-1c
SRS-2
TS/Ph-1a
TS/Ph-2
TS/Ph-3
TS/Ph-7a
P accumulation rate (mg/m2/yr)
Site Name
500
450
400
350
300
250
200
150
100
50
0
LOX4
LOX3
LOX5
LOX10
LOX9
LOX8
LOX7
LOX6
X2
X4
X1
X3
Z1
Y4
Z2
LOX11
Z3
Z4
LOX12
LOX13
LOX14
LOX15
LOX16
F1
E1
F2
E2
E3
F3
F4
F5
E4
CA33
CA35
U3
E5
U2
CA32
U1
CA36
CA38
CA34
CA311
CA315
SRS1a
SRS1c
SRS1d
NE1
LME_LO1
P33
P34
LME_LO2
SRS2
LME_LO3
P36
LME_LO4
BR
ENPBR
LME_SH1
SRS3
P35
TS/Ph1b
HR
LME_SH4
ENPHR
TS/Ph1a
LME_SH5
ENPCN
SRS4
ENPTE
LME_SH2
TS/Ph2
TSB
ENPGI
SRS5
SRBGI
LME_SH3
SRS6
ENPSR
ENPNR
NRUPCUT_E
ENPNR
TS/Ph4
TS/Ph5
ENPLN
ENPLN
P37
EP
NPOL
NP146
TS/Ph3
TS/Ph8
NPCHP
TS/Ph6a
MUD_CRKM
TS/Ph7a
SFWWW_TAYLMOU
ENPDK
ENPLM
SFWWW_MCOR

New empirical modules: diatoms and fish

Diatom succession

In 2019, we developed a model for estimating transitions of periphytic diatom communities in response to conductivity (salinity) and short-intermediate term P eutrophication status (P concentration in periphyton mats) during wet and dry seasons. Based on multivariate statistical relationships found by Mazzei (see Mazzei et al. 2020), we developed a flexible, non-spatial model using Stella^{TM} software, allowing easy exploration of the most effective ways to calculate and communicate the community dynamic responses (Figure 6).

We encoded those relationships into the spatial ELM framework, and Mazzei et al. (2019) used that prototype implementation to explore responses under baseline and future scenarios. As discussed in the Model Refinement: Biological parameters section above, at the time we considered the ELM predictive bias in surface water and floc P concentrations to potentially lead to some (unknown) level of bias in this diatom succession predictions. The documented improvement in ELM performance leads us to advance the diatom model for higher levels of analysis and application.

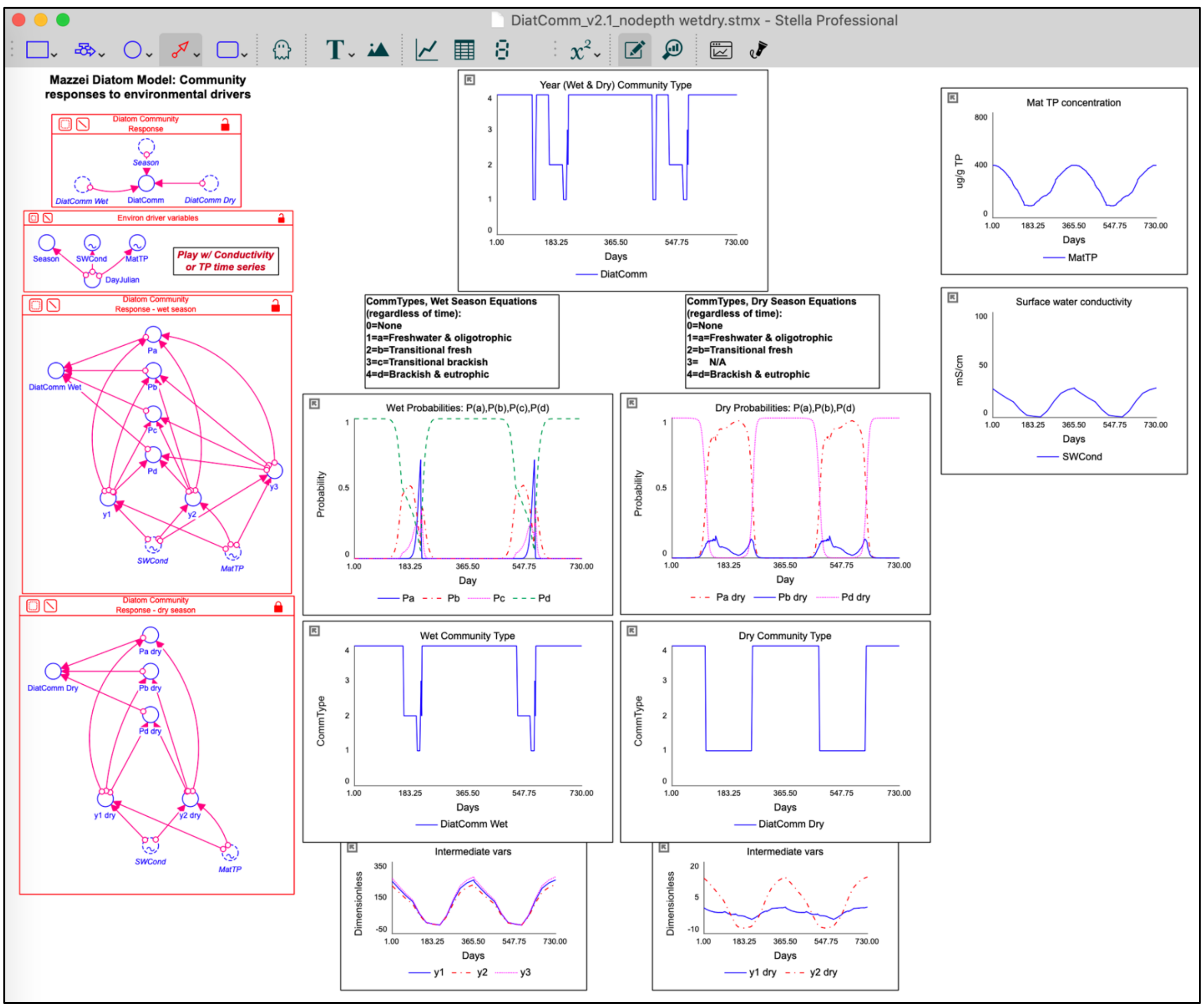


Figure 6. Screenshot of the variables and example temporal dynamics in the Stella model, under an

arbitrary scenario of TP concentrations and salinities/conductivities. This Stella implementation was used to explore the non-spatial system behaviors, and subsequent encoded into the ELM spatial framework.

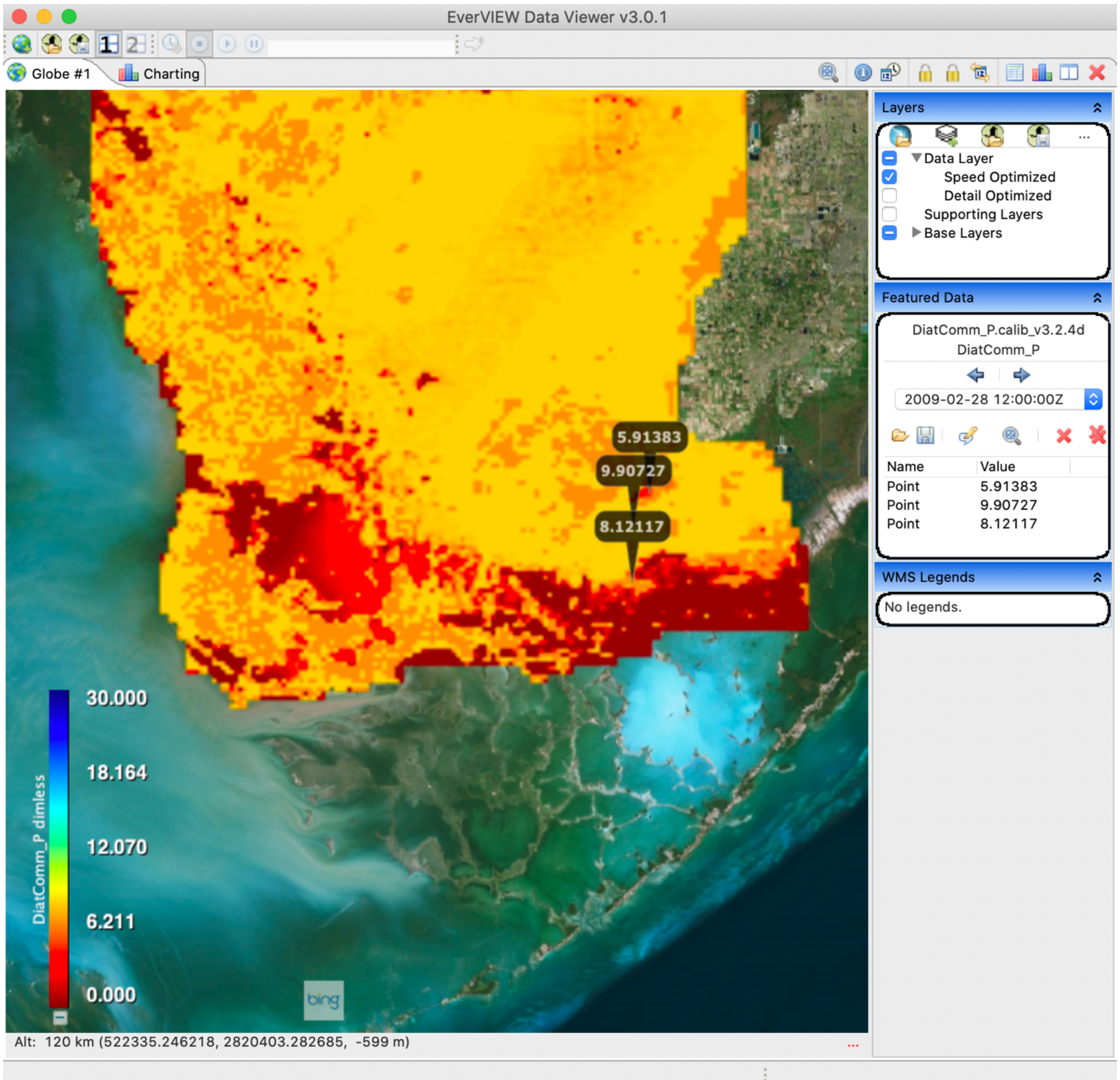


Figure 7. Probabilities of occurrence for the local diatom communities , during a 1-d snapshot in late Feb 2009 during historical 1984-2010 simulation. Using the EverView software, 3 ad-hoc sites were selected by mouse-clicks, and show the frame's snapshot values for each site.

Fish density

To model the fish response to hydrology and phosphorus, we added a statistically derived model of estimating small, freshwater fish density that was developed and evaluated by Catano and Trexler (2014), using their Equation 2 (their page 79):

Fish_Dens = (fish_K + fish_a * TP) / (1 + exp(-fish_r*(Fish_DSD - fish_M))) with parameter estimates (Table 2, pg 81) for Total Fish (for above Eqn):

fish_K = 2.095 {#/m2] Maximum fish density (carrying capacity)

fish_r =0.0113 [1/Days] Intrinsic rate of growth (indiv.l female offspring per indiv. female per day = ind/(ind x day))

fish_M =26.11 [Days] Correction for the point of inflection in empirical model

fish_a =0.0024 [dimless] Fitting parameter in empirical model

and ELM-simulated variables are:

TP is simulated, variable periph TP [ug/g]. See earlier section on ELM parameter updates for floc-periphyton P relationship used in ELM

Fish_DSD is simulated, variable Days Since last Drydown [d]

exp(Fish_Dens) is simulated, variable fish density [#/m2]

We encoded the above, parameterized, equation to apply to all model grid cells in the domain, with the Fish_DSD counter resetting to zero (0.0 d) when surface water depth is less than the below depth threshold, and the Fish_DSD counter does not start incrementing until the depth exceeds that threshold for a specified number of days (Trexler pers. comm.), parameterized below:

GP_FishWdry= 5.0 [cm] Water depth threshold above which the day-counter of Fish_DSD commences

GP_FishIntvl= 30 [d] Min interval that depth exceeds the depth threshold before initiating counter of Fish_DSD

For this beta version prototype of the fish density model, we simply provide the output results for expert assessment, and potential refinement within the ELM framework. Because the spatial domain of this empirical model did not include Big Cypress nor mangrove regions, we made an approximate spatial mask for visualization and any potential summary statistic involving the simulated results.

While the ELM can output a variety of variables and formats[1], we highly recommend that "non-modeler" collaborators use the excellent software developed by the USGS: EverView (https://www.jem.gov/Tools). A single netCDF formatted output file can be used to animate the spatial time series, select multiple points to view time series, and conduct a variety of analyses. Figures 8 and 9 show example spatial and temporal fish density outputs for the ELM v3.2.4 historical (calibration) run from 1984-2010.

[1] The ELM outputs a large number of variables, selected by the modeler-user at runtime. These outputs may be plain-text point time series at user-selected time intervals, plain-text Indicator-Region time series at user-selected time intervals, generic binary snapshots of the spatial domain at user-selected time intervals (multiple files depending on time interval), and netCDF self-documenting spatial time series at user-selected time intervals (single netCDF file per variable). See ELM User Guide chapter in Fitz and Paudel (2012).

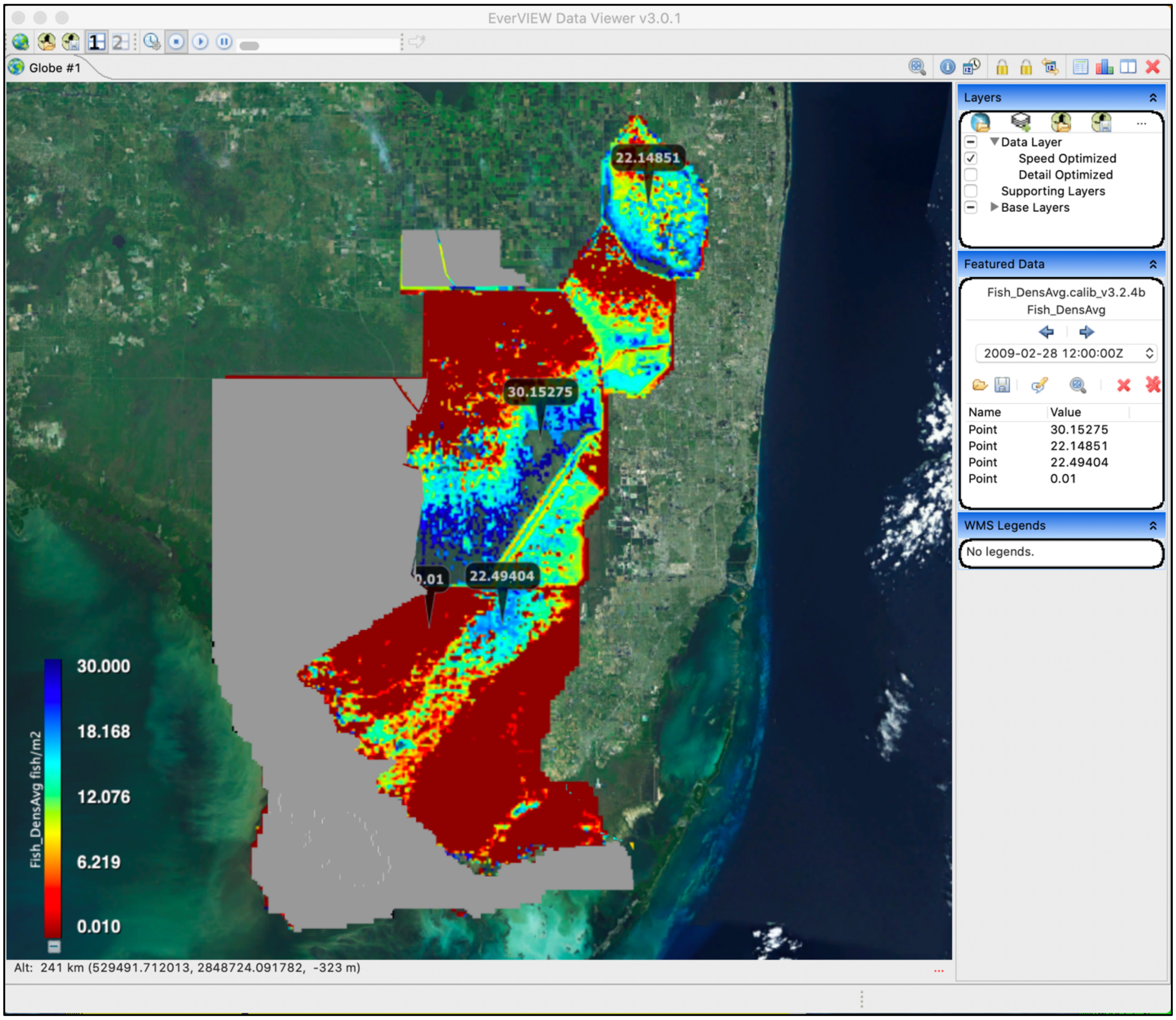


Figure 8. Fish density, showing a snapshot of the 30-d mean values for Feb 2009 during historical 1984-2010 simulation. Using the EverView software, 4 ad-hoc sites were selected by mouse-clicks, and show the frame's snapshot values for each site. Those individual snapshot values are, in turn, used to label the point time series graphs in Figure 9.

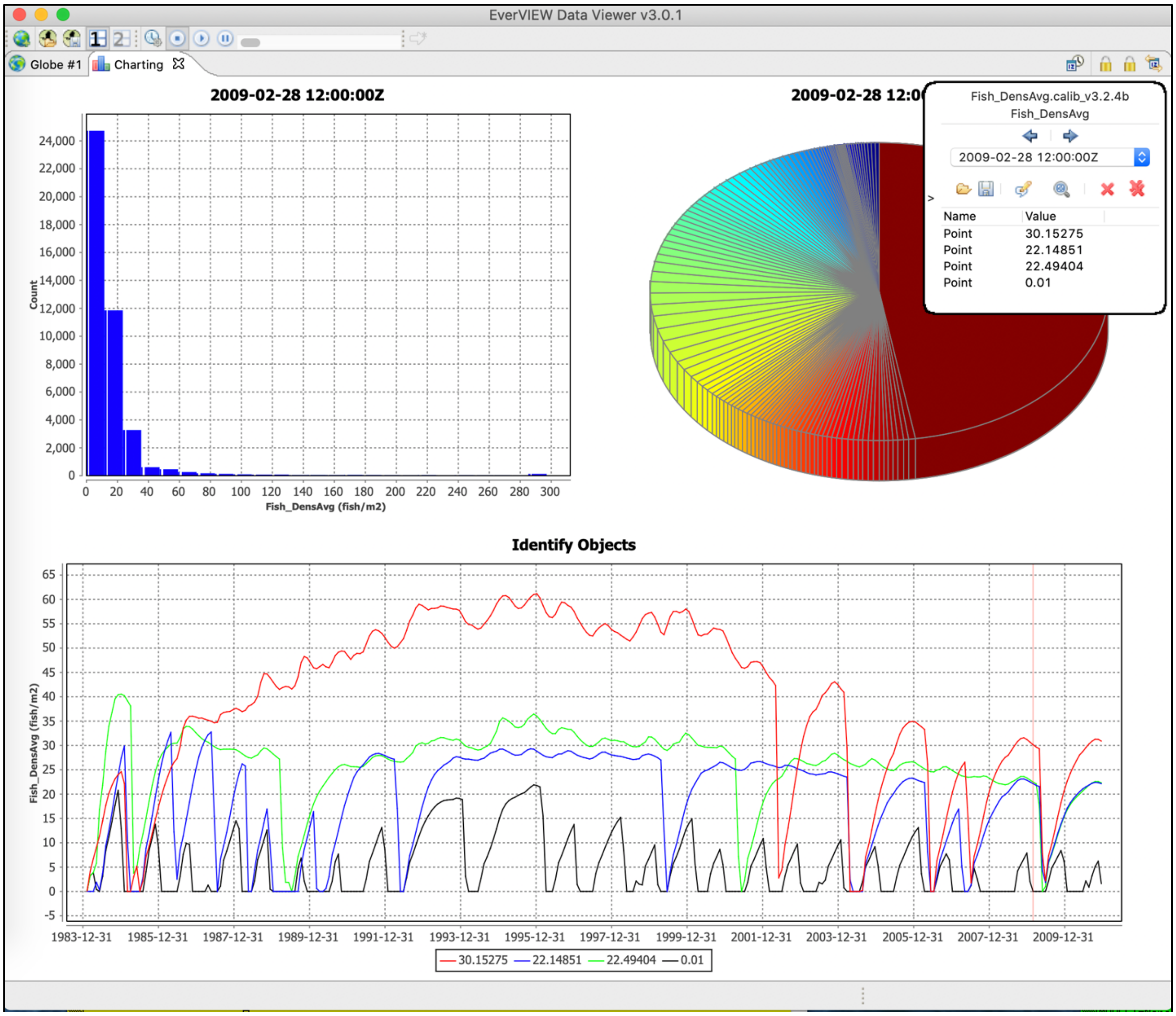


Figure 9. Fish density, showing four time series plots of the 30-d mean values during historical 1984-2010 simulation. Using the EverView software, the sites were selected by mouse-clicks, locations shown in Figure 8. Usually, the upper bar chart and (partially obscured) pie chart aren't too informative for our purposes. Annual undulations are related to P load dynamics; moreover, one can see that red line (in WCA3A near L67, 30.15 label) tended to increase through 1990's with gradual P increase in the system. Other sites have a range of responses to days-since-drydown, and P in periphyton/floc.

New integrative summary: ecosystem carbon fluxes

We added new, simple code to express output data on ecosystem carbon fluxes involved summing (periphyton + macrophyte) Net Total Primary Production (NTPP_C), summing (floc + soil) Total Soil Decomposition (TSDecomp_C), and expressing the difference of those for Net Organic Matter Carbon Ecosystem Exchange (NOMCEE).

NTPP_C is Net Total Primary Production - Carbon: daily sums of ELM simulated net uptake of C in algae (periphyton) & macrophytes (trees, emergent vegetation), carbon units.

TSDecomp_C is Total Soil Decomposition - Carbon: daily sums of ELM simulated Total (consolidated and flocculent) Soil Decomposition, carbon units.

In ELM, we use (globally fixed for simplicity) C:OM parameters for macrophytes and periphyton: (HP_PHBIO_IC_CTOOM[allHabs] = HP_NPHBIO_IC_CTOOM[allHabs] = GP_ALG_C_TO_OM = 0.48. In simulation, mortality of periphyton & macrophyte C goes to soil OM or to floc OM (using C:OM parameters, destination depends on source); while decomposition is calculated for these separate OM stocks, decomposition of this (soil and floc) OM is converted to C for these ecosystem C flux summaries.

NOMCEE is Net Organic Matter Carbon Ecosystem Exchange: daily calculations of,
NOMCEE = NTPP_C - TSDecomp_C.

Note that NOMCEE's sign is opposite of normal atmospheric science conventions (e.g., Net Ecosystem Exchange, NEE is positive with C fluxing to atmosphere).

Note also that ELM calculates periphyton gross primary production and respiration, but does not calculate macrophyte respiration (complex, rarely measured, especially for whole-plant etc.). Thus, for consistency we do not include periphyton (nor macrophyte) respiration for these calculations.

Because NOMCEE does not include respiration from plants (nor consumers), for these purposes, ***total ecosystem respiration is the difference between (measured) Net Ecosystem Exchange (NEE) and (simulated) Net Organic Matter Carbon Ecosystem Exchange (NOMCEE)***. We found that NOMCEE is greatly dominated by NTPP_C.

For this beta version prototype of the ecosystem carbon flux summaries, we simply provide the output results for expert assessment, and potential refinement within the ELM framework. While the ELM can output a variety of variables and formats[2], we highly recommend that "non-modeler" collaborators use the excellent software developed by the USGS: EverView (https://www.jem.gov/Tools). A single netCDF formatted output file can be used to animate the spatial time series, select multiple points to view time series, and conduct a variety of analyses. Figures 10 and 11 show example spatial and temporal NOMCEE outputs for the ELM v3.2.4 historical (calibration) run from 1984-2010.

We anticipate using comparisons to FCE C flux tower data (Malone, *pers. comm.*, Malone et al. 2022) to consider further ELM refinements, particularly with respect to the fast-processes of ecosystem fluxes and their cumulative effect on longer time scale integrative ecosystem characteristics.

[2] The ELM outputs a large number of variables, selected by the modeler-user at runtime. These outputs may be plain-text point time series at user-selected time intervals, plain-text Indicator-Region time series at user-selected time intervals, generic binary snapshots of the spatial domain at user-selected time intervals (multiple files depending on time interval), and netCDF self-documenting spatial time series at user-selected time intervals (single netCDF file per variable). See ELM User Guide chapter in Fitz and Paudel (2012).

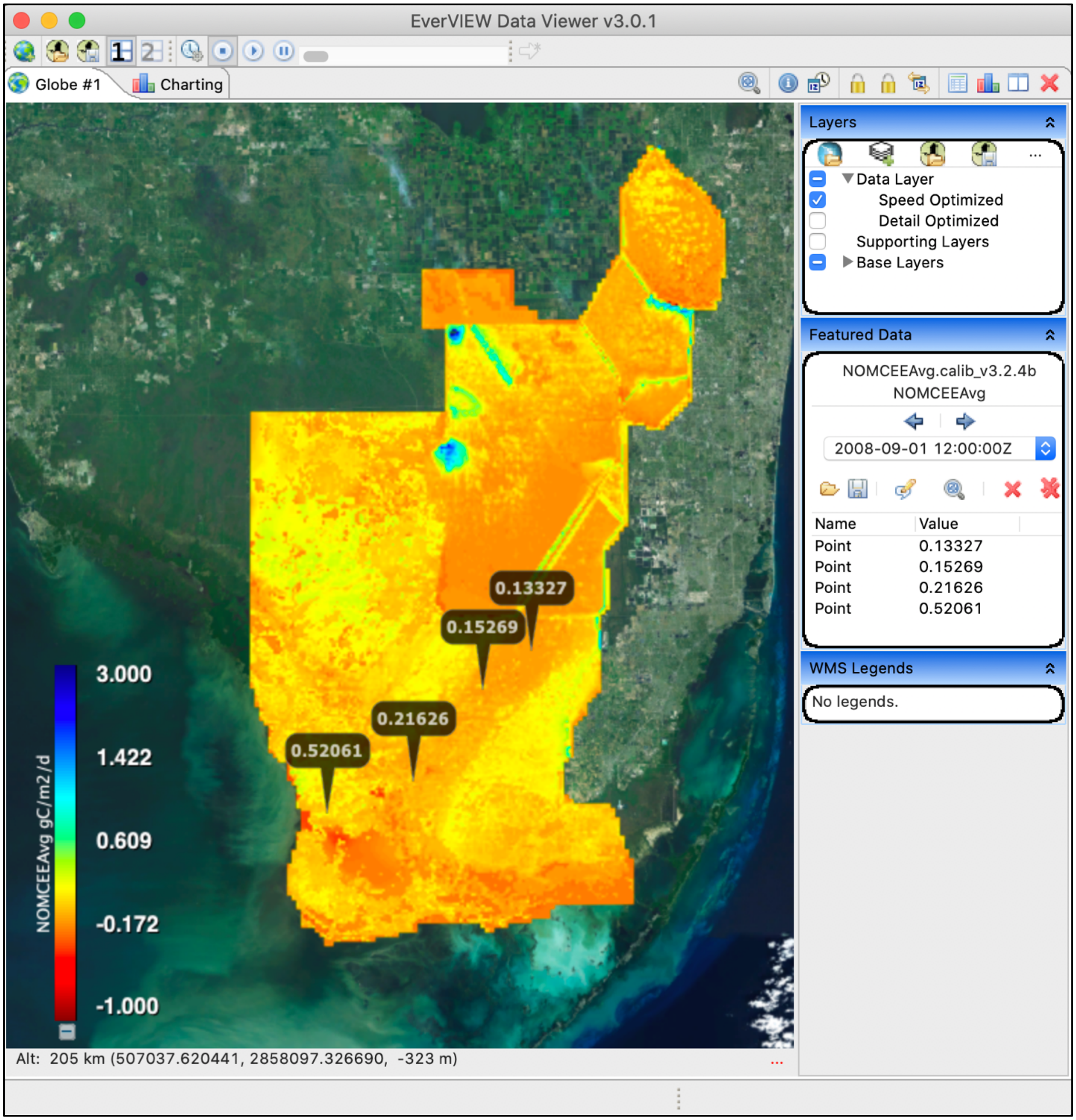


Figure 10. Net Organic Matter Carbon Ecosystem Exchange (NOMCEE), showing a snapshot of the 30-d mean values for Aug 2008 during historical 1984-2010 simulation. Using the EverView software, 4 ad-hoc sites were selected by mouse-clicks, and show the frame's snapshot values for each site. Those individual snapshot values are, in turn, used to label the point time series graphs in Figure 11.

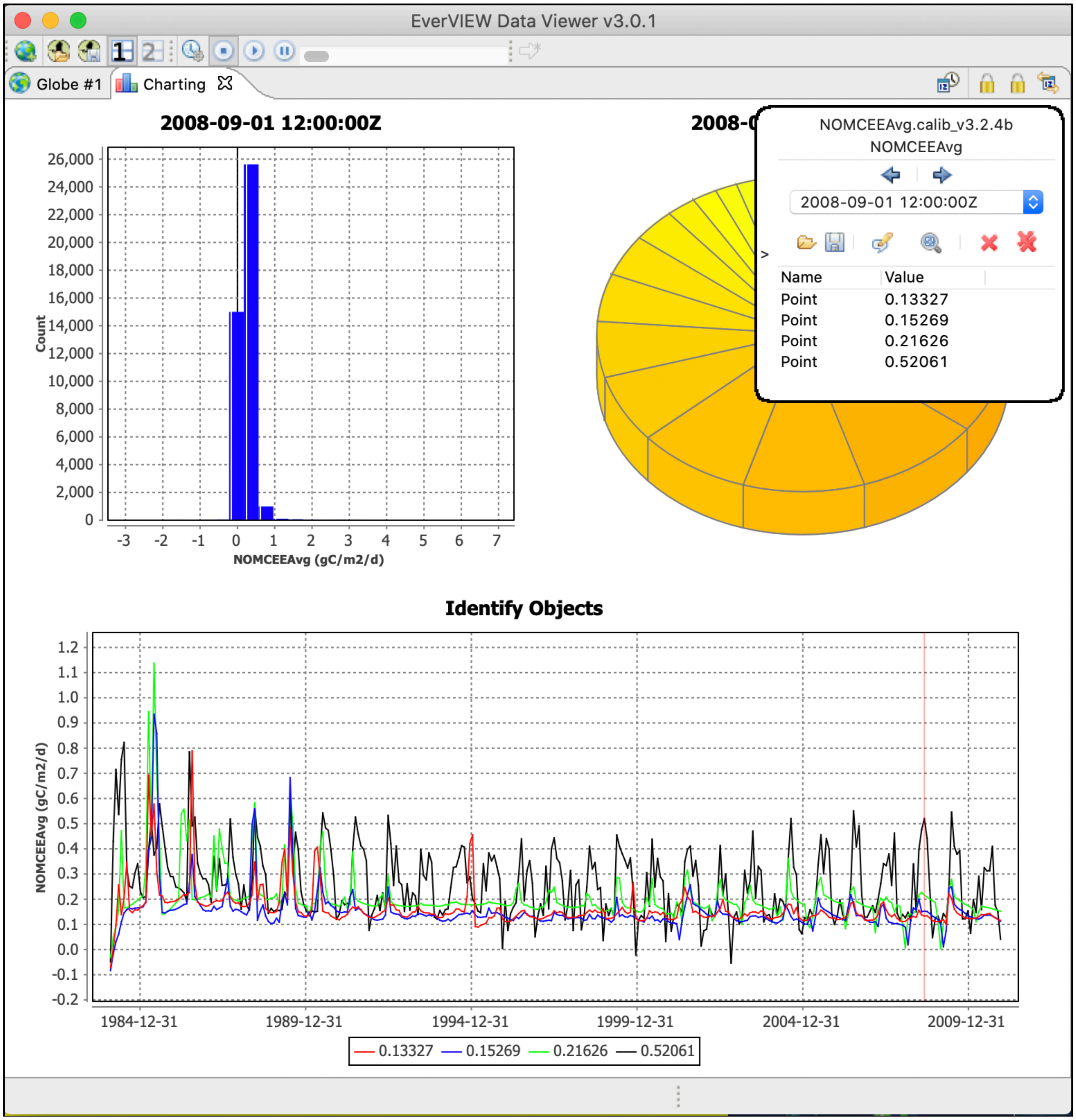


Figure 11. Net Organic Matter Carbon Ecosystem Exchange (NOMCEE), showing four time series plots of the 30-d mean values during historical 1984-2010 simulation. Using the EverView software, the sites were selected by mouse-clicks, locations shown in Figure 10. Usually, the upper bar chart and (partially obscured) pie chart aren't too informative for our purposes. In the time series, one can see that the red line (most upstream in SRS, 0.133 label) tended to decrease through the 1980's and 1990's before STA's reduced P loads. And the black line (most downstream, in mangroves near Gulf, 0.520 label) generally had higher, and variable, values.

Future Plans

For future years of this collaboration, one of our priorities remains to best capture spatio-temporal trends in the relationships among fast-scale P & C pools, and some of the slower-scale pools that tend to integrate those long term fluxes. We will strive to advance additional future scenarios evaluations using the updated ELM v3.2.4, likely driven with available half-century scale (downscaled) GCM ensembles and sea level rise.

References

Anderson, G.H., Smith, T.J., III, and Balentine, K.M., 2014, Land-margin ecosystem hydrologic data for the coastal Everglades, Florida, water years 1996–2012: U.S. Geological Survey Data Series 853, 38 p., *https://dx.doi.org/10.3133/ds853*.

DBHYDRO. 2022. South Florida Water Management District's Environmental database. https://www.sfwmd.gov/science-data/dbhydro Accessed October 2022.

Catano, C.P., and J.C. Trexler. 2014. CERP-MAP Aquatic Fauna Model Development. pg. 78-104 in: Trexler, J.C. 2014. MAP Activity Title: Refining the Prey Base Fish Performance Measure, submitted to USACE. 104pp.

Fitz, H.C., and B. Trimble. 2006. Documentation of the Everglades Landscape Model: ELM v2.5. South Florida Water Management District. http://www.ecolandmod.com/publications. (Reviewed by independent expert panel, review report at http://www.ecolandmod.com/publications) 664 pages.

Fitz, H.C., and R. Paudel. 2012. Documentation of the Everglades Landscape Model: ELM v2.8.4. Ft. Lauderdale Research and Education Center, University of Florida. http://www.ecolandmod.com/publications. 364 pp.

Fitz, C., R. Paudel, Y. Khare, and T. Van Lent. 2021. Landscape Soil Carbon Sequestration Under Scenarios of Climate Change and CERP. 2021 Greater Everglades Ecosystem Restoration Science Conference. Virtual Conference via Zoom, April 2021.

Fitz, H. C. 2021. Refinements to the Everglades Landscape Model: ELM v3.2.1. LTER: Coastal Oligotrophic Ecosystem Research - Integrated Modeling, Year 1 Final Report. EcoLandMod, Inc. Fort Pierce, FL. http://www.ecolandmod.com/publications. 298 pp.

Flower, H., M. Rains, C. Fitz, W. Orem, S. Newman, T. Osborne, K. Reddy, and J. Obeysekera. 2019. Shifting ground: Landscape-scale modeling of biogeochemical processes under climate change in the Florida Everglades. Environmental Management 64:416-435. doi: 10.1007/s00267-019-01200-8

Gaiser, E. E., D. L. Childers, R. D. Jones, J. H. Richards, L. J. Scinto, and J. C. Trexler. 2006. Periphyton responses to eutrophication in the Florida Everglades: Cross- system patterns of structural and compositional change. Limnology and Oceanography **51**:617-630.

Gaiser, E., D. Childers. 2021. Water Quality Data (Extensive) from the Shark River Slough, Everglades National Park (FCE LTER), from October 2000 to Present. Environmental Data Initiative. https://doi.org/10.6073/pasta/c0e834e8e1bf4050db6a9967ec99b4b7.

Malone, S. L., J. Zhao, J. S. Kominoski, G. Starr, C. L. Staudhammer, P. C. Olivas, J. C. Cummings, and S. F. Oberbauer. 2022. Integrating Aquatic Metabolism and Net Ecosystem CO2 Balance in Short- and Long-Hydroperiod Subtropical Freshwater Wetlands. Ecosystems 25:567-585. https://doi.org/10.1007/s10021-021-00672-2

Mazzei, V., C. Fitz, and E. Gaiser. April 2019. Community-level modeling of periphytic diatoms in response to changing salinity and phosphorus gradients using the Everglades Landscape Model 2019 Greater Everglades Ecosystem Restoration Science Conference. Coral Springs, FL.

Mazzei, V., B. J. Wilson, S. Servais, S. P. Charles, J. S. Kominoski, and E. E. Gaiser. 2020. Periphyton as an indicator of saltwater intrusion into freshwater wetlands: insights from experimental manipulations. Ecological Applications 30:e02067. https://doi.org/10.1002/eap.2067

Osborne, T. Z., H. C. Fitz, and S. E. Davis. 2017. Restoring the foundation of the Everglades ecosystem: assessment of edaphic responses to hydrologic restoration scenarios. Restoration Ecology 25, No. S1, pp. S59–S70. doi: 10.1111/rec.12496

Troxler, T. 2021a. Water Quality Data (Extensive) from the Taylor Slough, Everglades National Park (FCE LTER), from April 1996 to Present. Environmental Data Initiative. https://doi.org/10.6073/pasta/c72b8eaeb519914fdba14fa4bfbb0228.

Troxler, T. 2021b. Water Quality Data (Extensive) from the Taylor Slough, Everglades National Park (FCE LTER), South Florida from July 1999 to Present. Environmental Data Initiative. https://doi.org/10.6073/pasta/c142808f3d583c826e7b1f0c123a8cb9.

Appendix A, Figures A.1 – A.106. Plots of stage hydrographs and their associated Cumulative Frequency Distributions (CFD) for the period of record 1984-2010 at each monitoring location. The sequence of the figures is based on geographic location of each monitoring site-page, starting in the northwest, moving towards the southeast. See Figure 1 for a map of the sites in the southern Everglades.

The red dashed line in the stage hydrographs is the model grid cell's land surface elevation, which is a time-varying output variable of the model. The model grid cell column and row locations are shown in parentheses (col_row) of each plot's title.

Due to a bug/feature in the postprocessing code that generates these graphics, there are ***some sites that have a continuous, or occasional, 0.5m observed value of stage elevation, clearly along a horizontal line above any other value**. **Please ignore*** this obvious linear anomaly that is due to code complexity in relation to episodic observed missing data...

Each site-page has four figures:

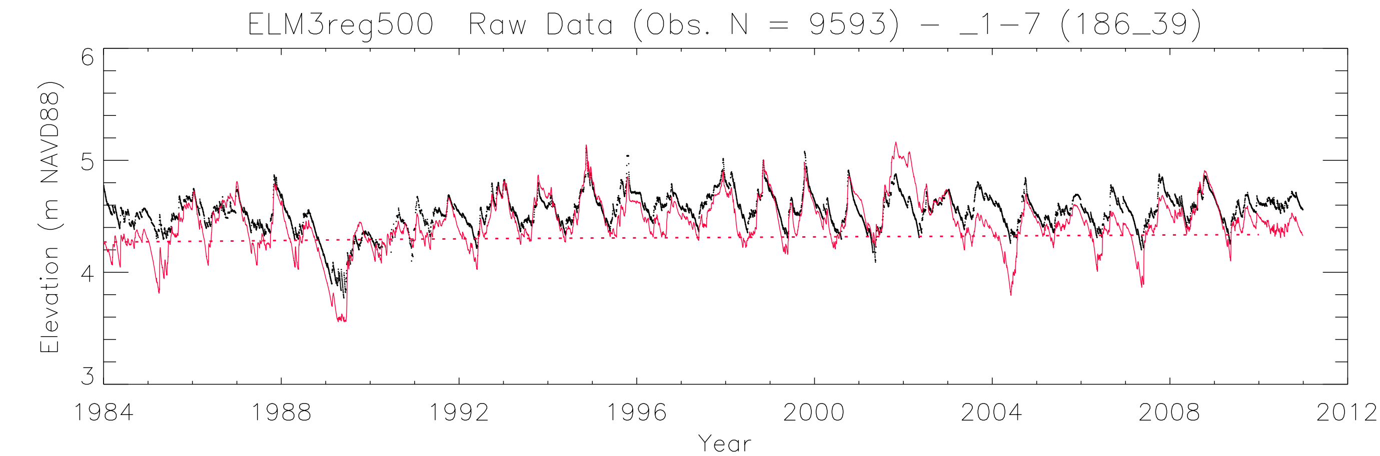
a) All data, with no temporal aggregation, of daily observations (black dots) and model results (red line).

b) All data were aggregated into arithmetic mean values by wet and dry seasons within water years; the continuous lines pass through mean of all daily data points for each season; the mean of paired simulated & observed values are shown in red boxes and black diamonds, respectively; the 95% Confidence Interval (CI) of the paired means are shown by the "__" symbols in the red for the model and black for the observed data.

c) All data aggregated into arithmetic mean values by water year, with the same treatment as in plot b).

d) The cumulative frequency distributions of the simulated and observed (raw, un-aggregated) data; the 95% confidence interval for observed data is shown in the dashed black lines. Note that only paired simulated and observed data points are used.

.... 106 pages of graphs follow......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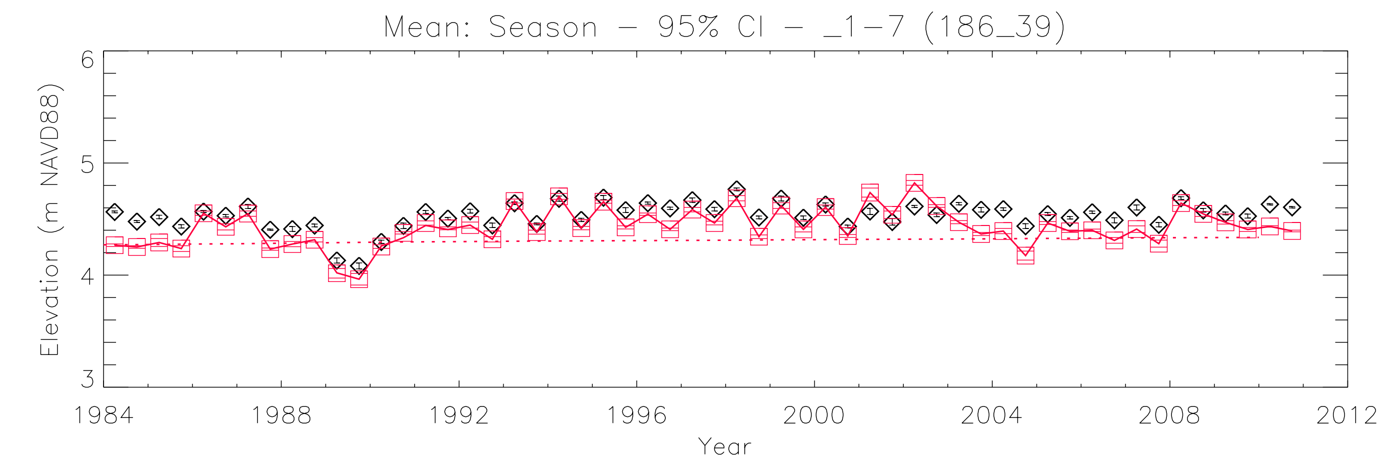
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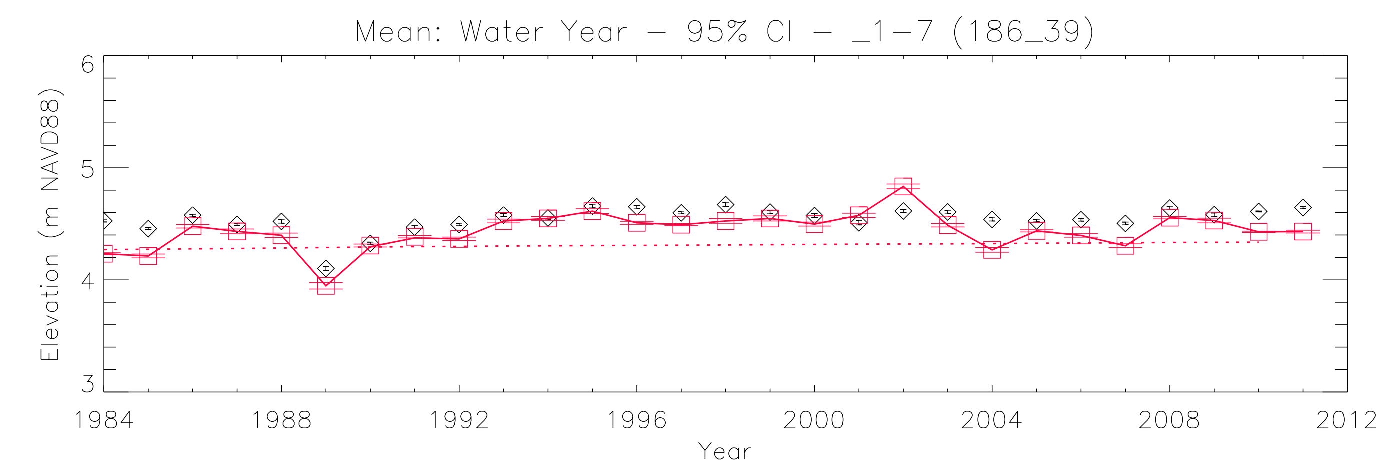
Year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Elevation (m NAVD88)
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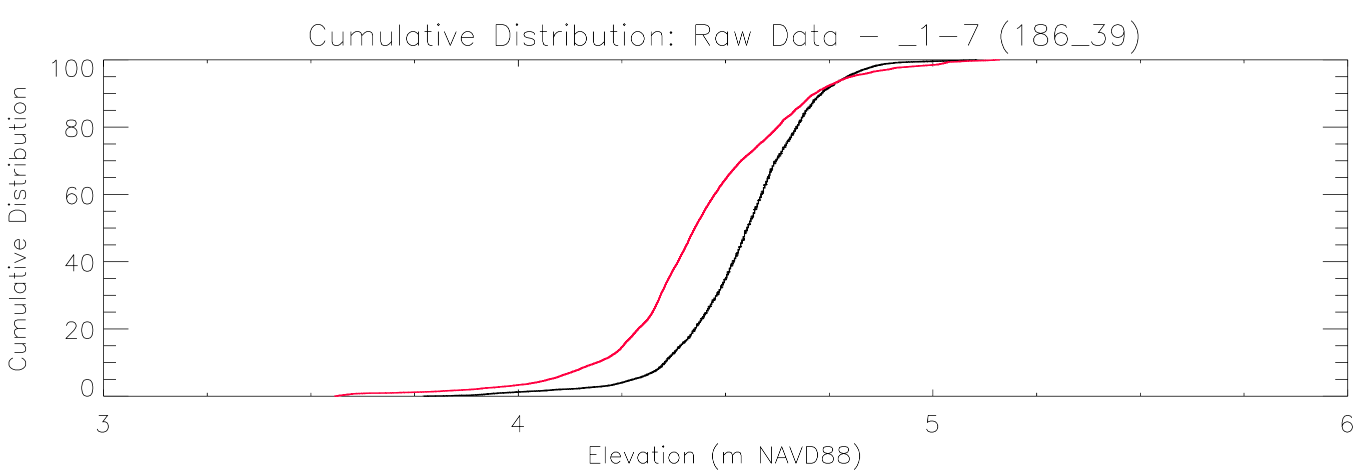
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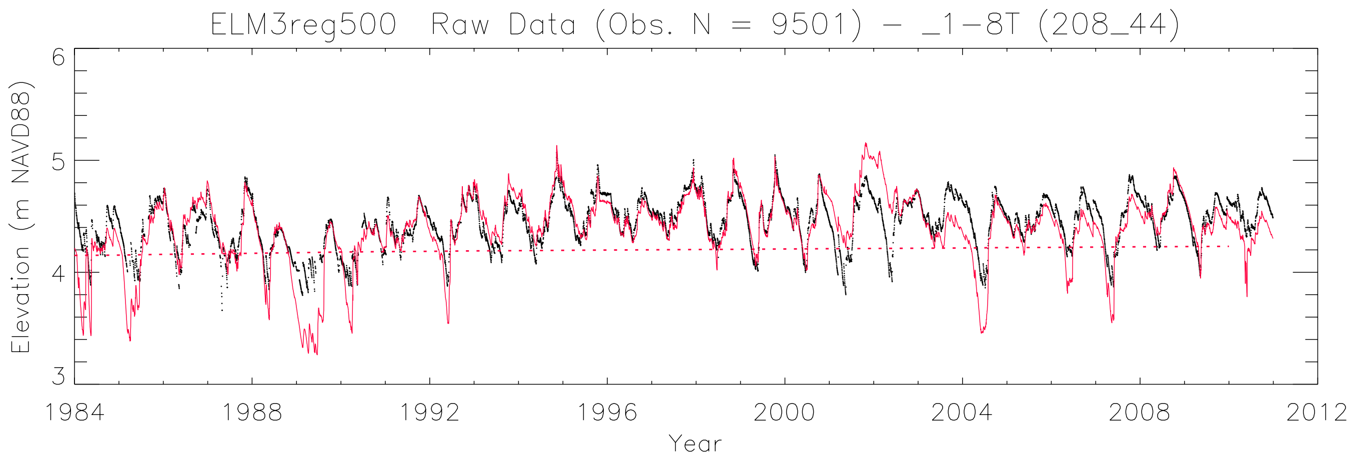
Elevation (m NAVD88)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Elevation (m NAVD88)
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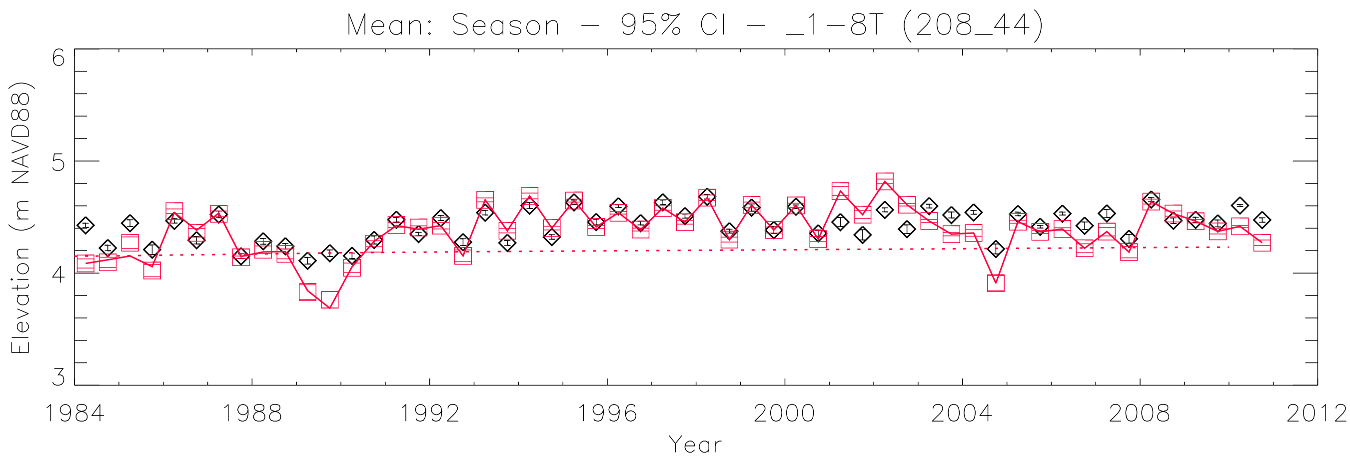
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Elevation (m NAVD88)
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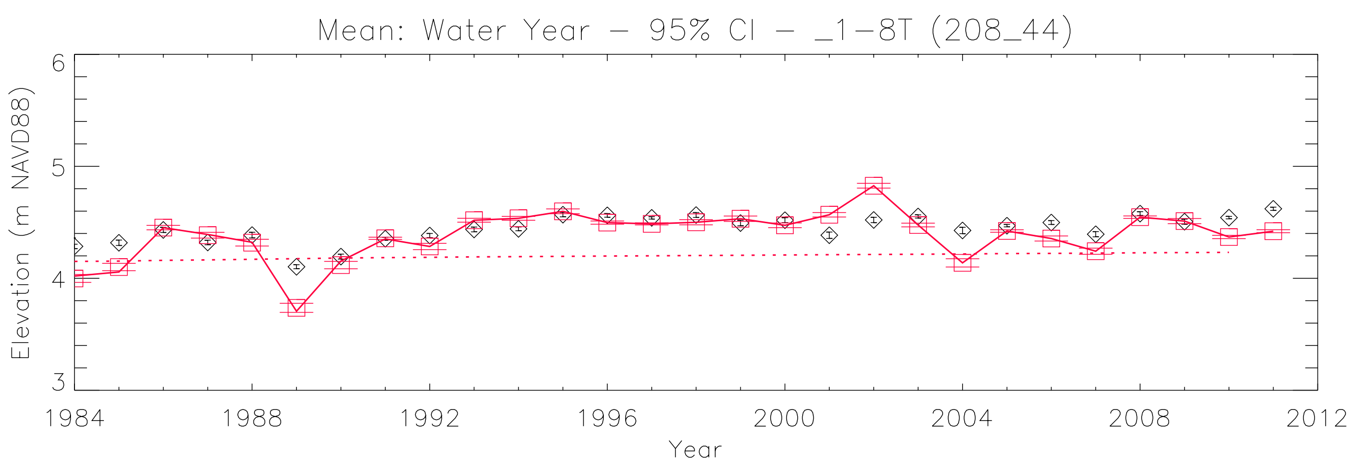
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Elevation (m NAVD88)
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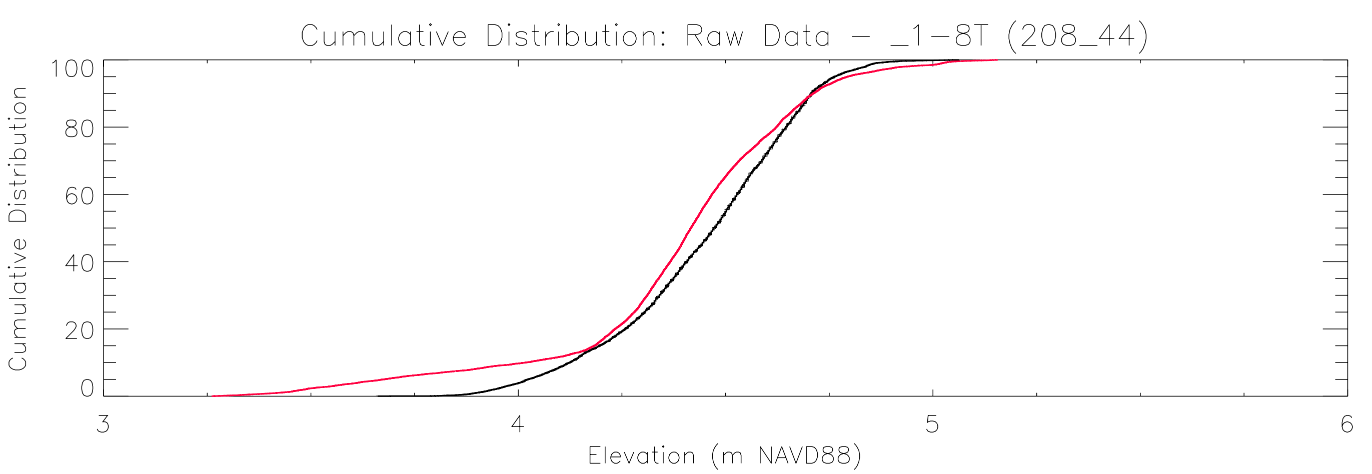
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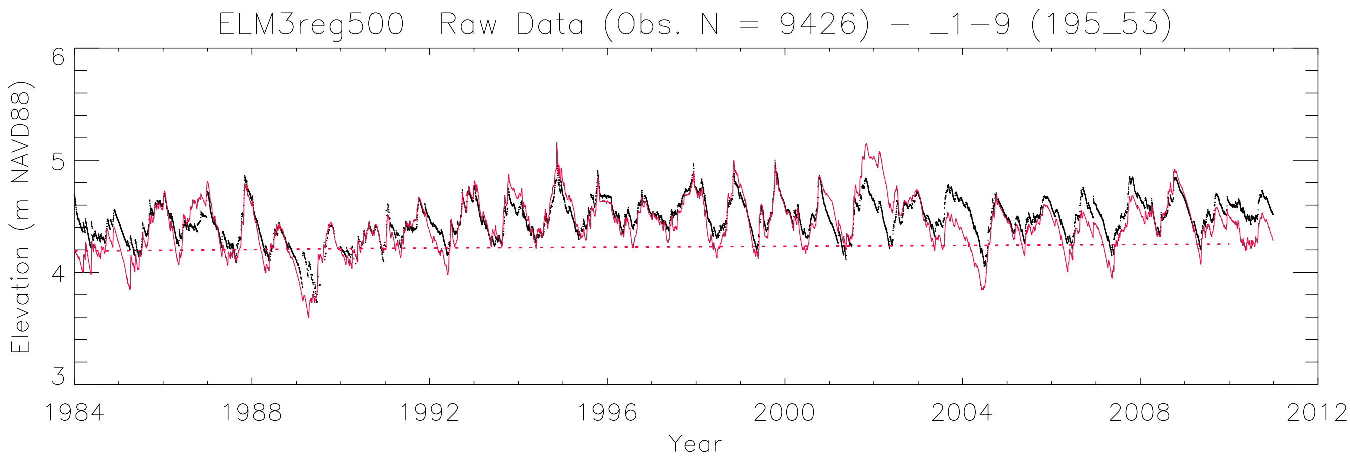
Elevation (m NAVD88)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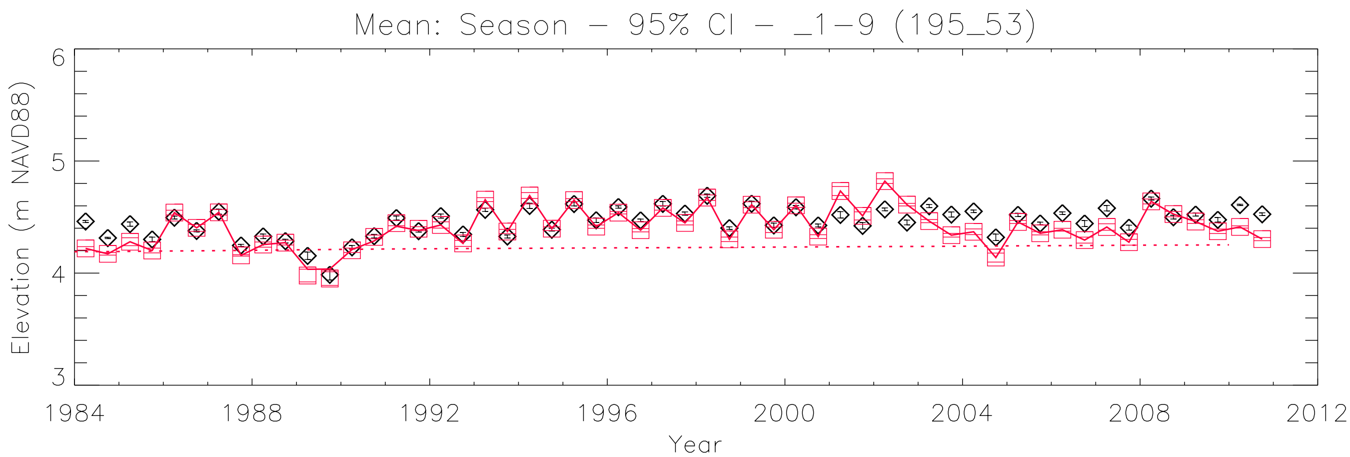
Year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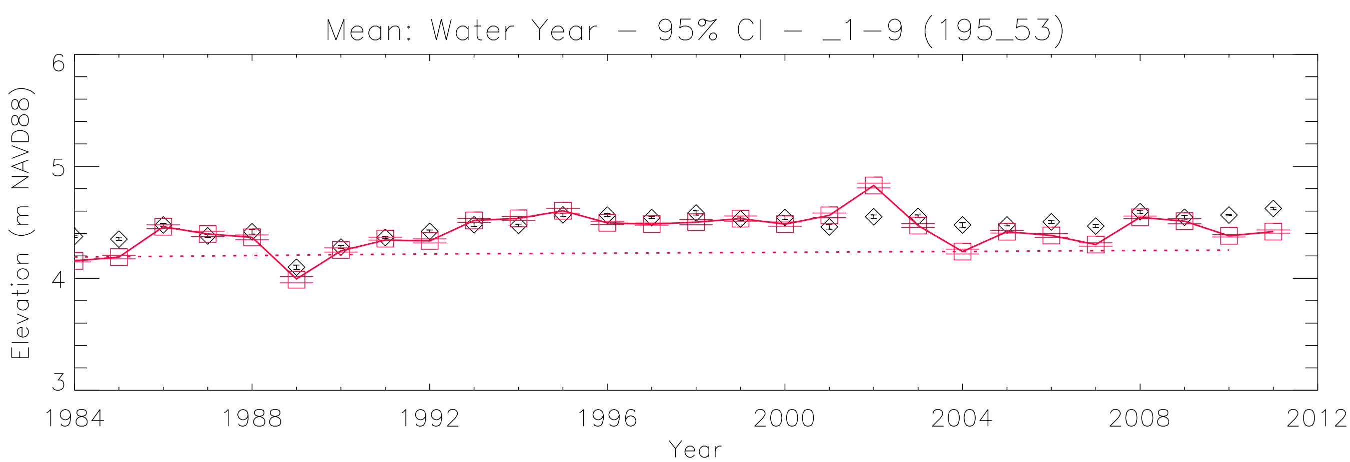
Elevation (m NAVD88)
Year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Elevation (m NAVD88)
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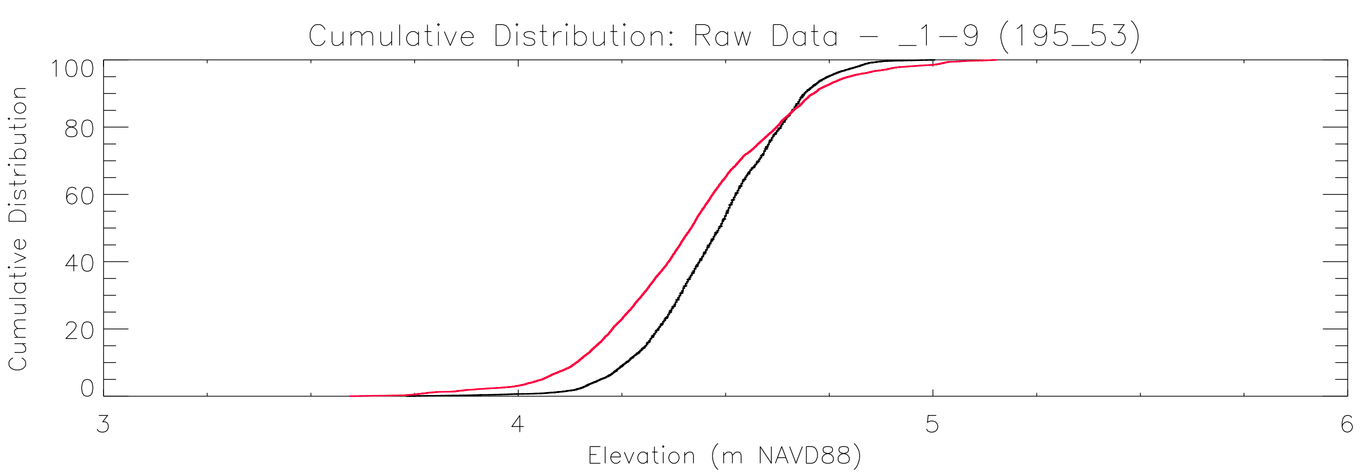
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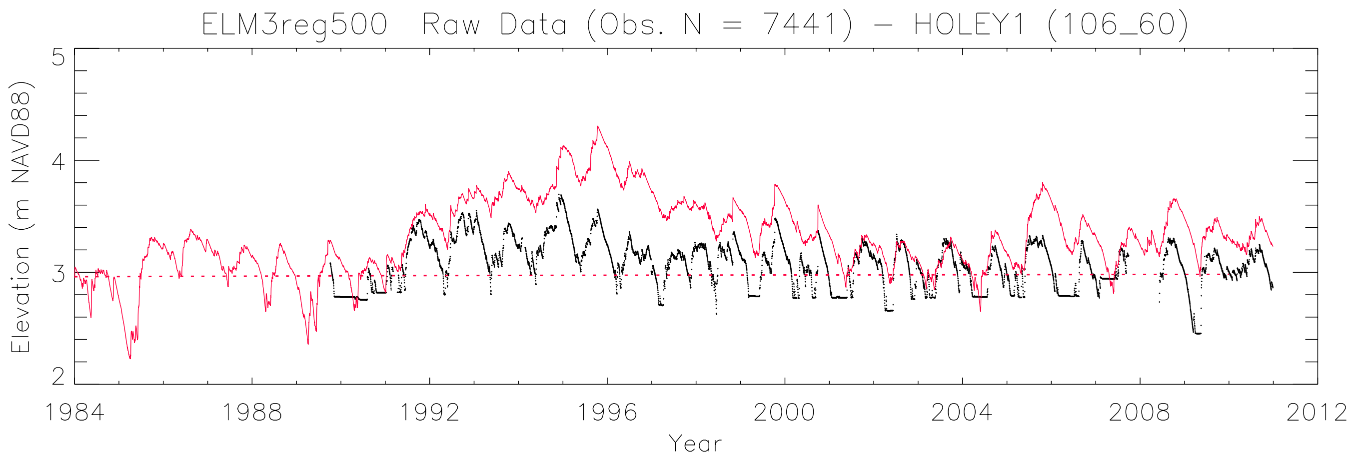
Cumulative Distribution
Elevation (m NAVD88)



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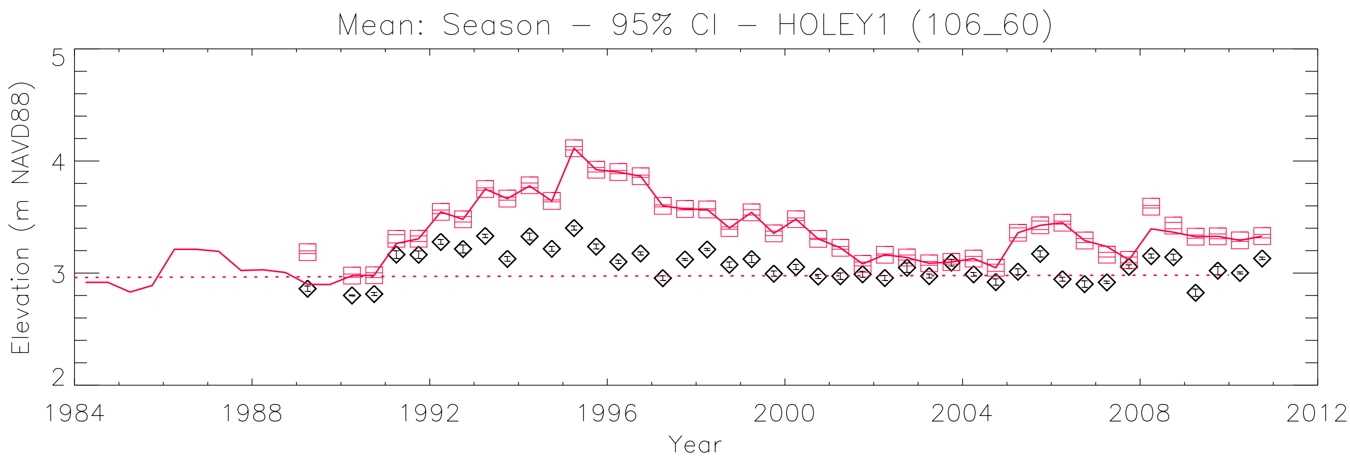
Year



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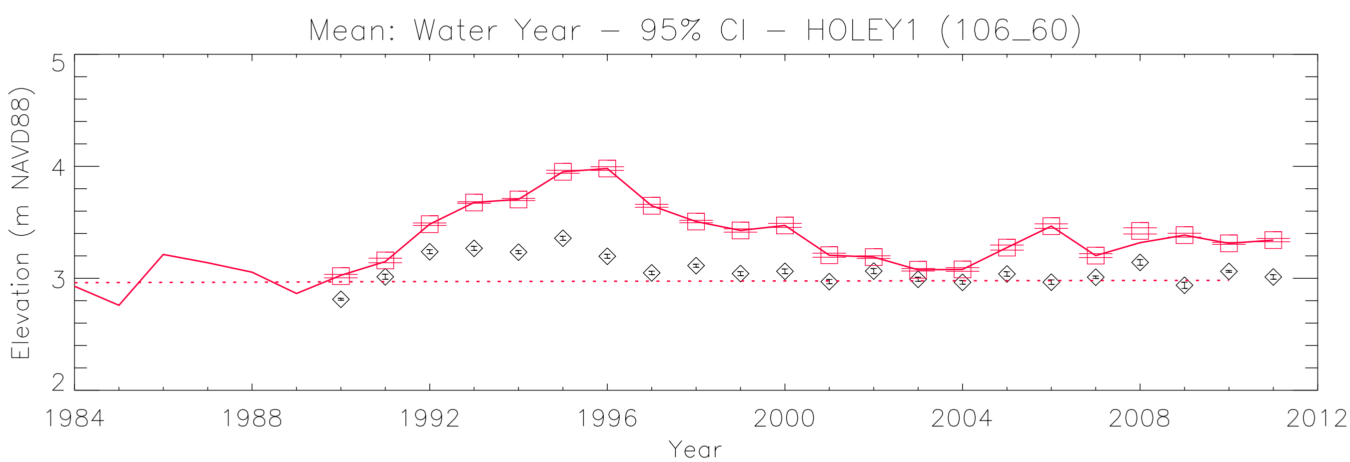
Elevation (m NAVD88)
Year



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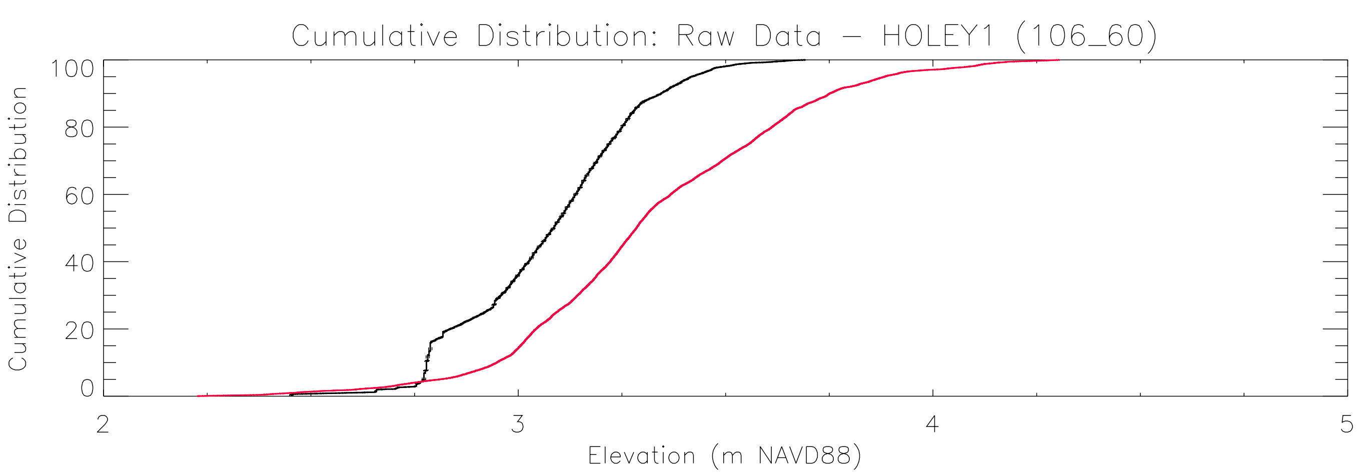
Elevation (m NAVD88)
Year



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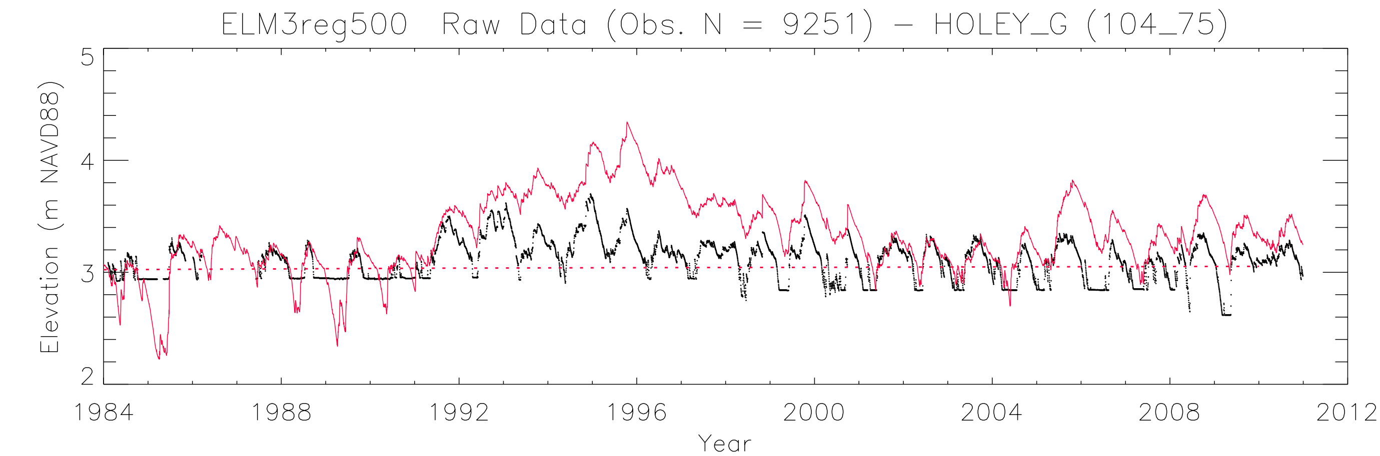
Cumulative Distribution
Elevation (m NAVD88)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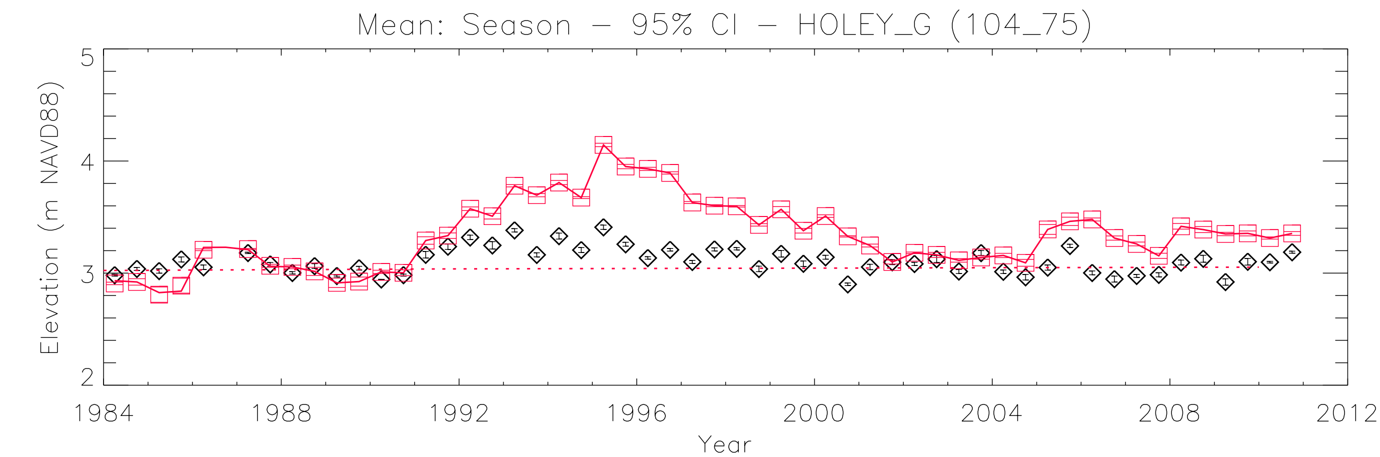
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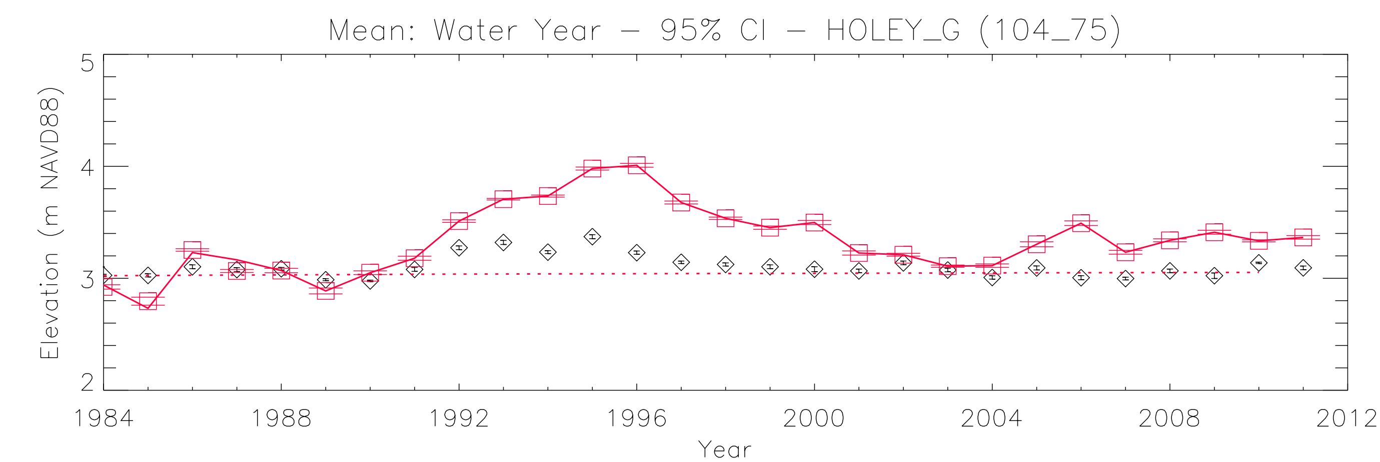
Year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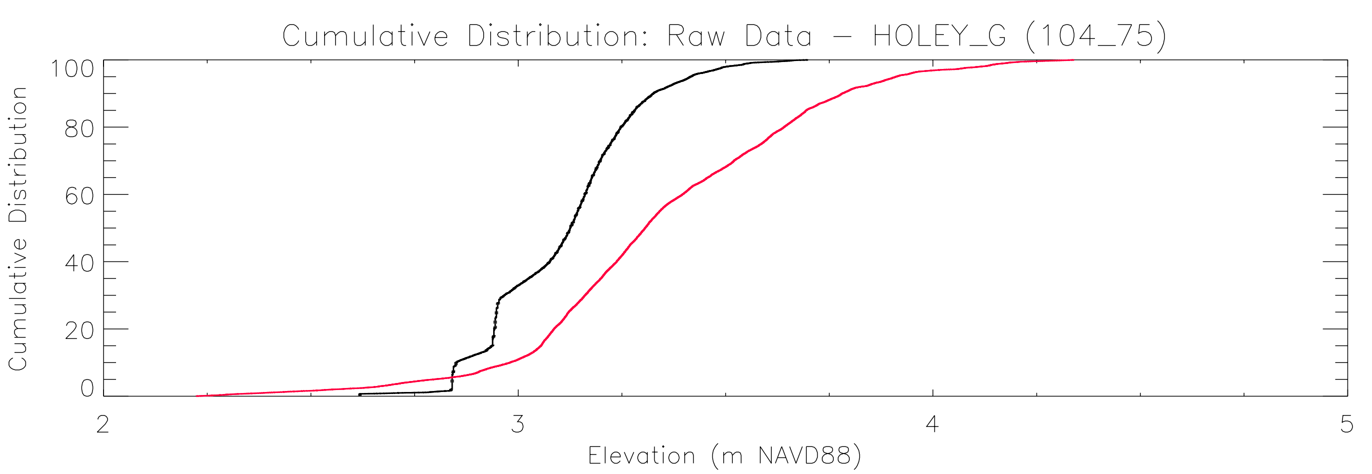
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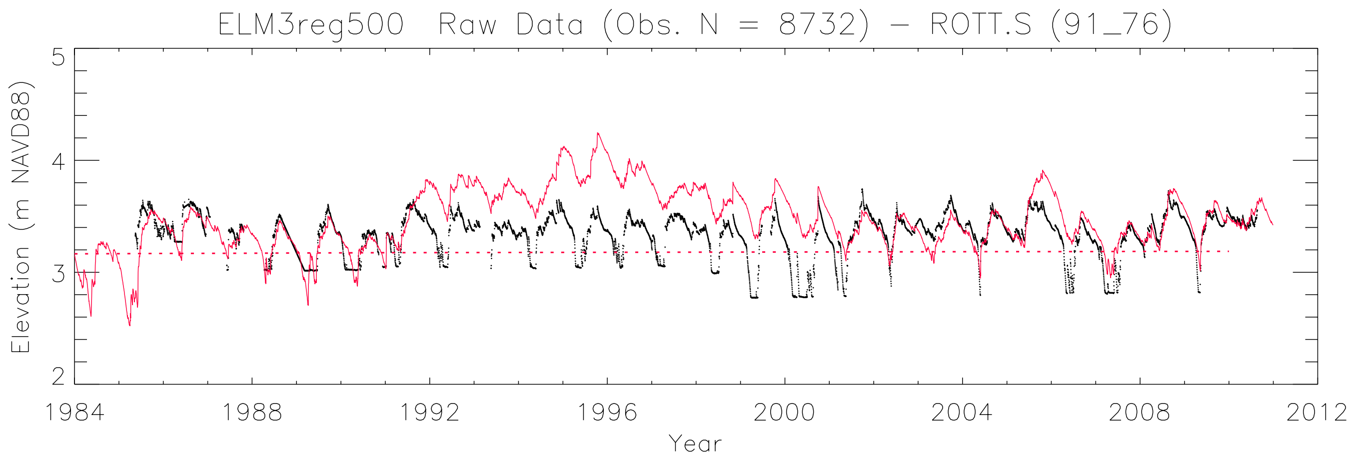
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 8732) - ROTT.S (91_76)
Elevation (m NAVD88)
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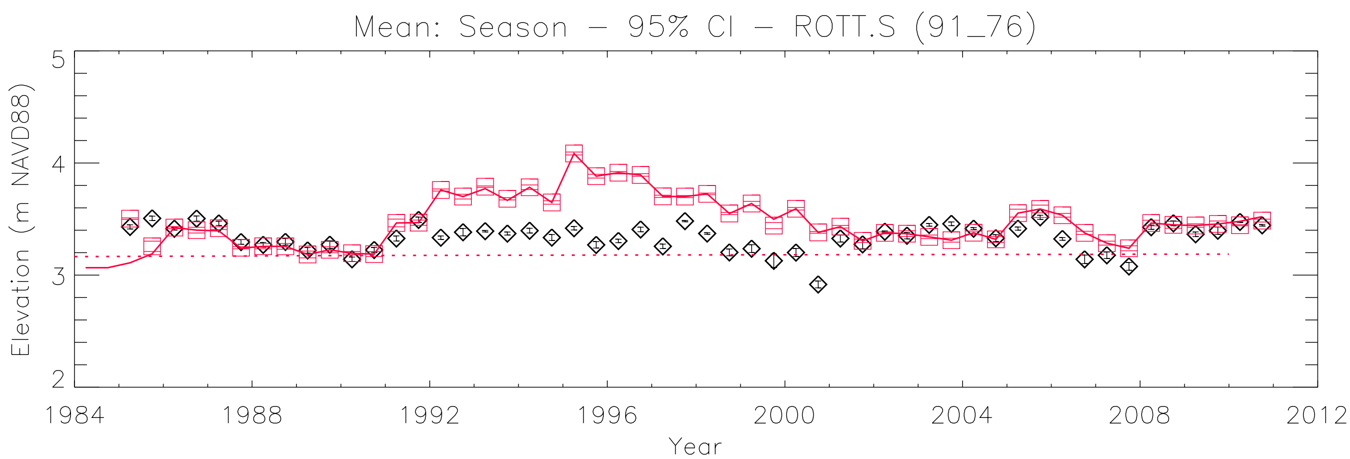
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Elevation (m NAVD88)
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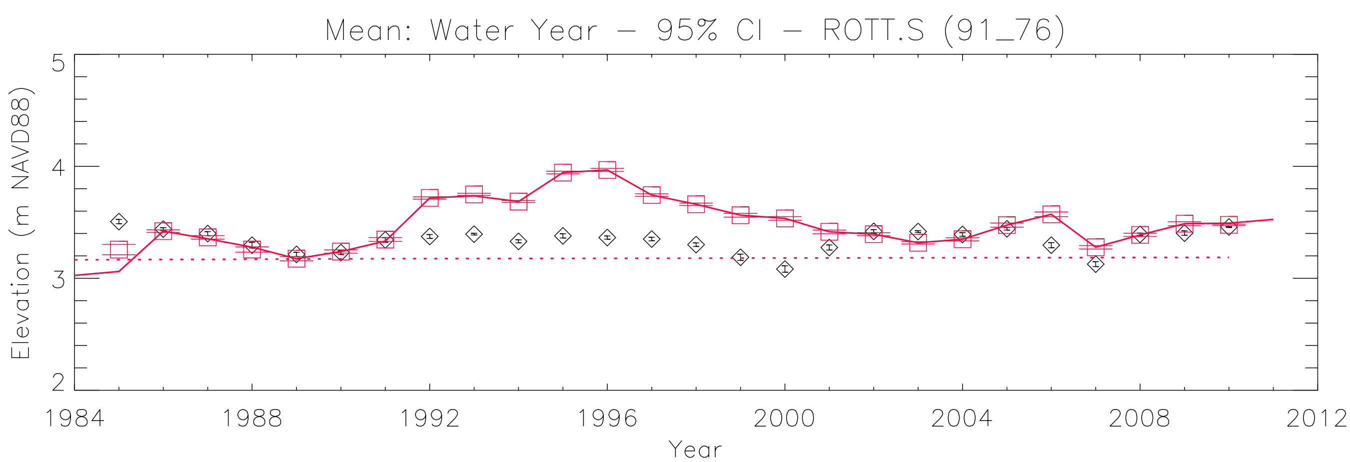
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Elevation (m NAVD88)
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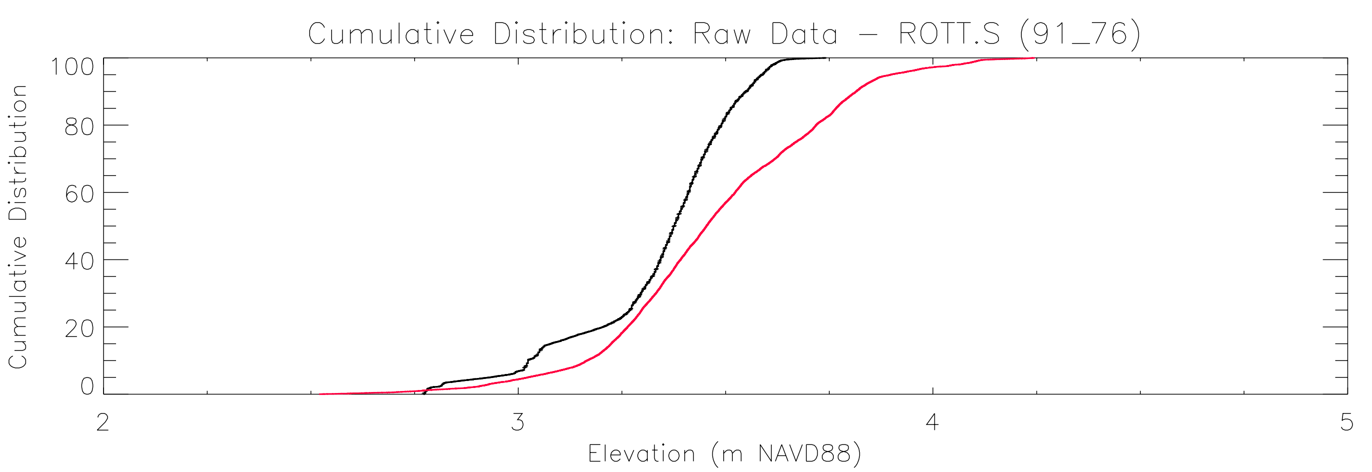
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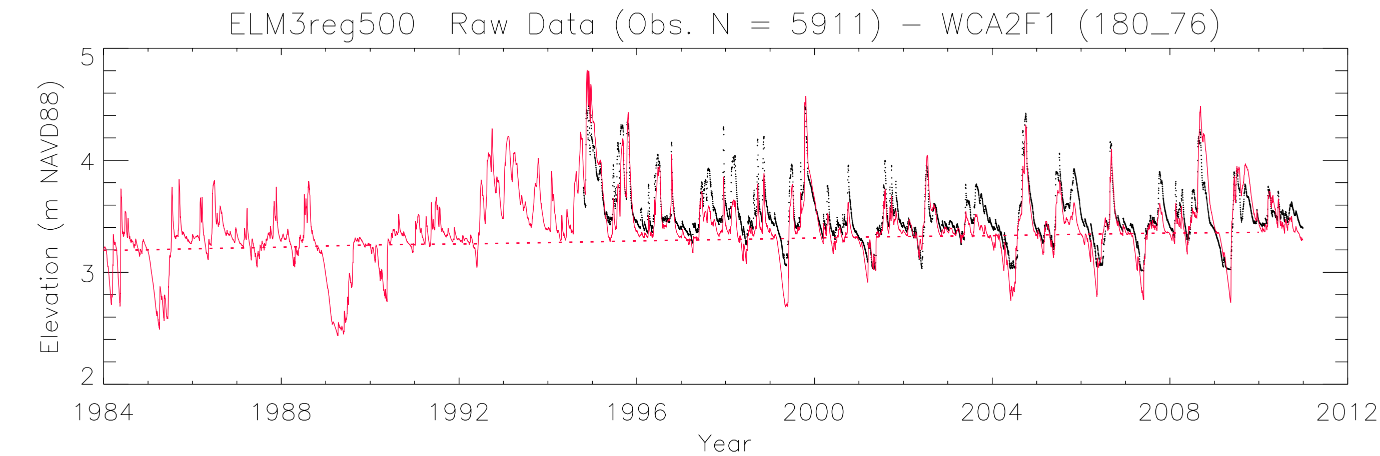
Cumulative Distribution
Elevation (m NAVD88)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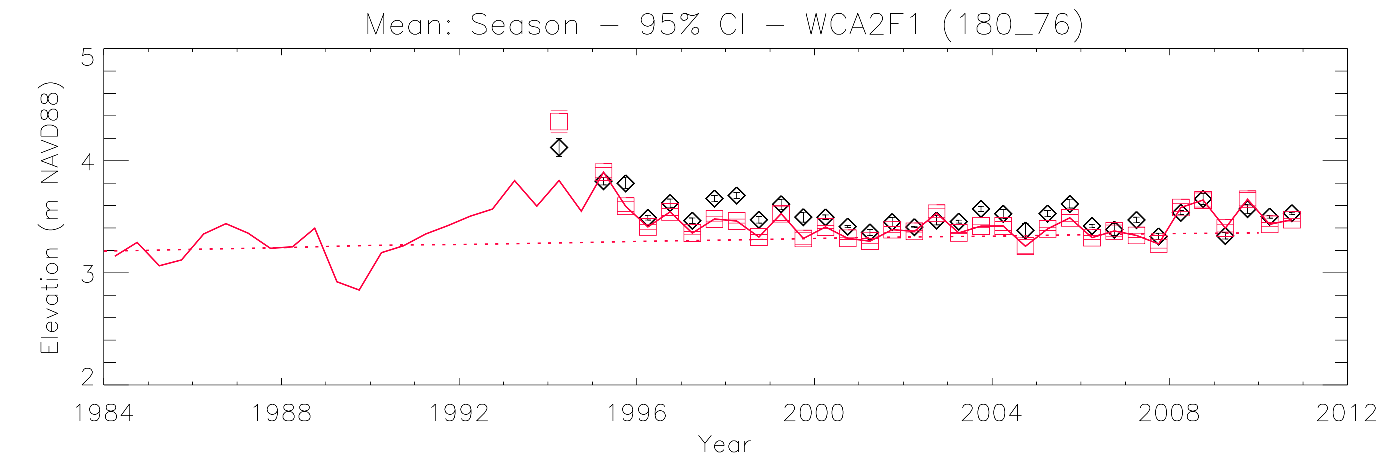
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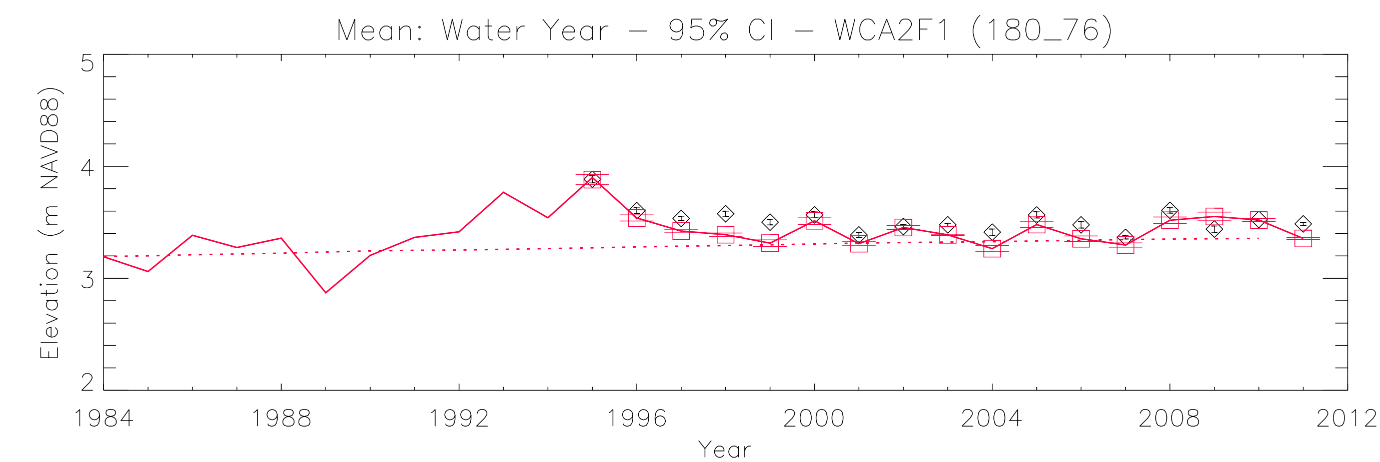
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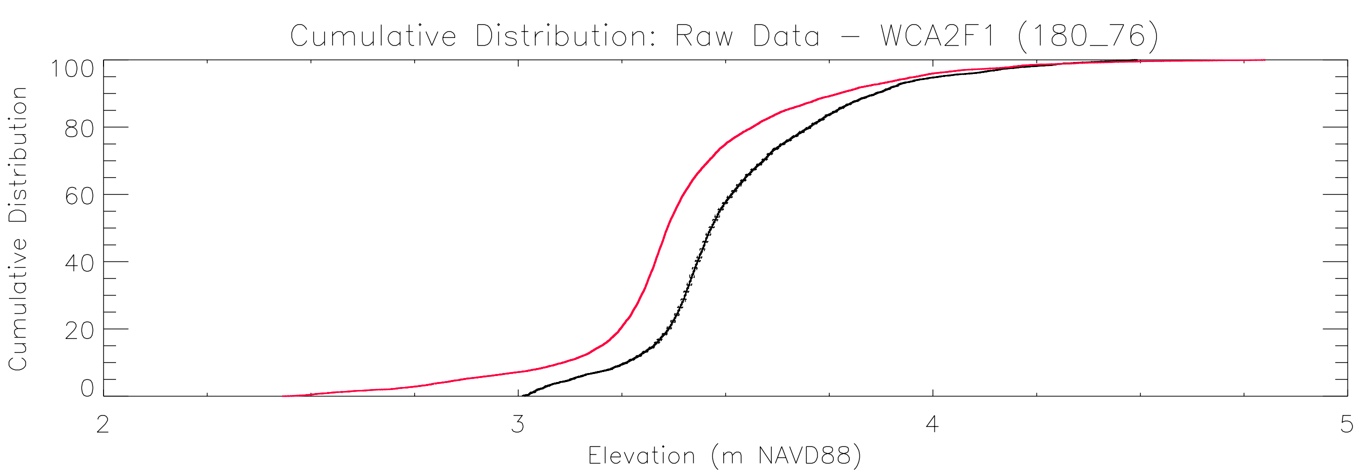
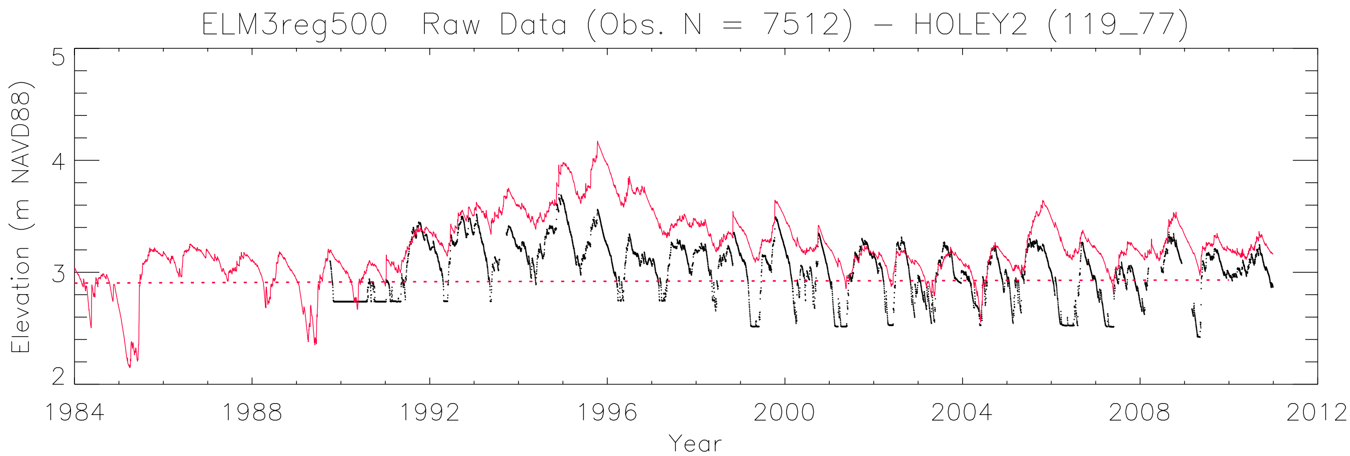
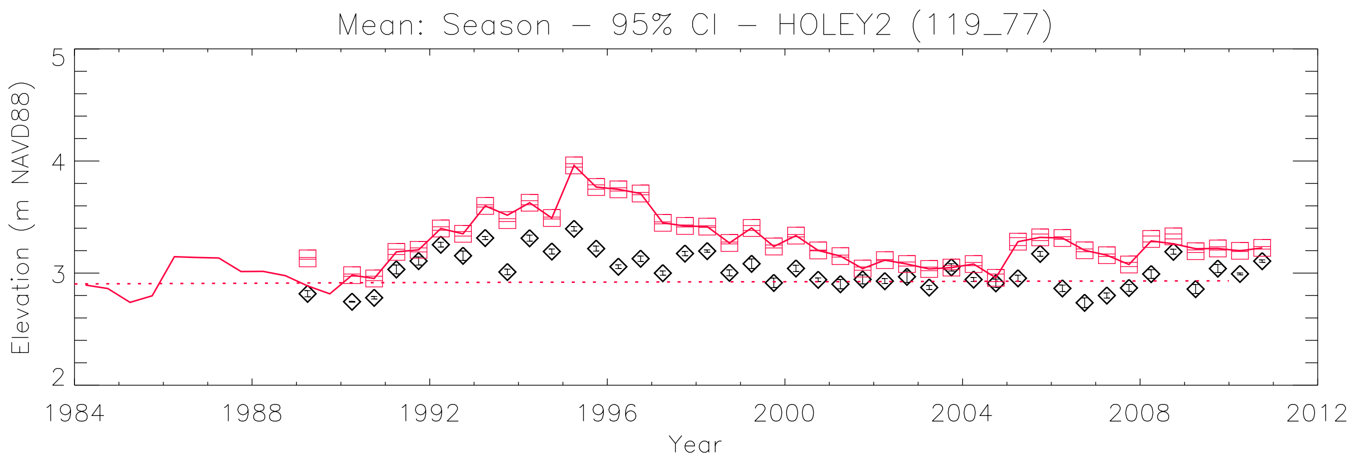
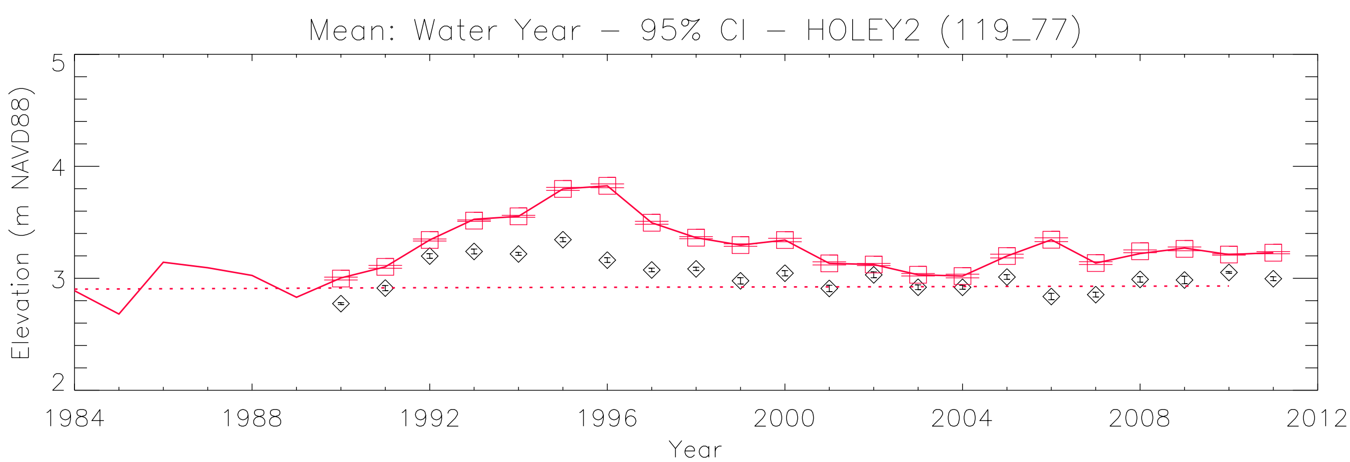
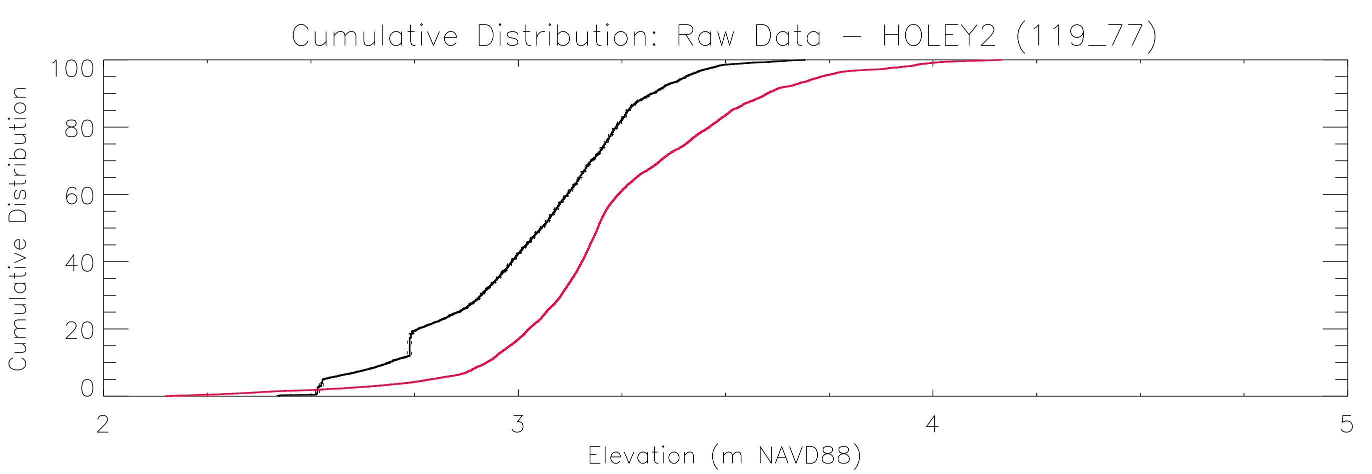
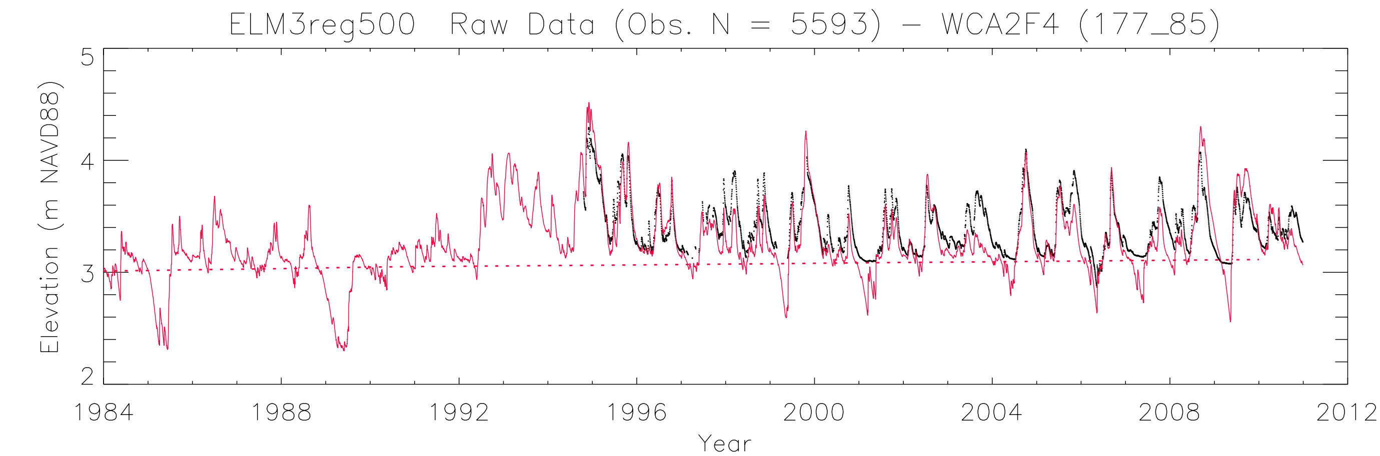

Cumulative Distribution: Raw Data – WCA2F1 (180_76)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
2
3
4
5

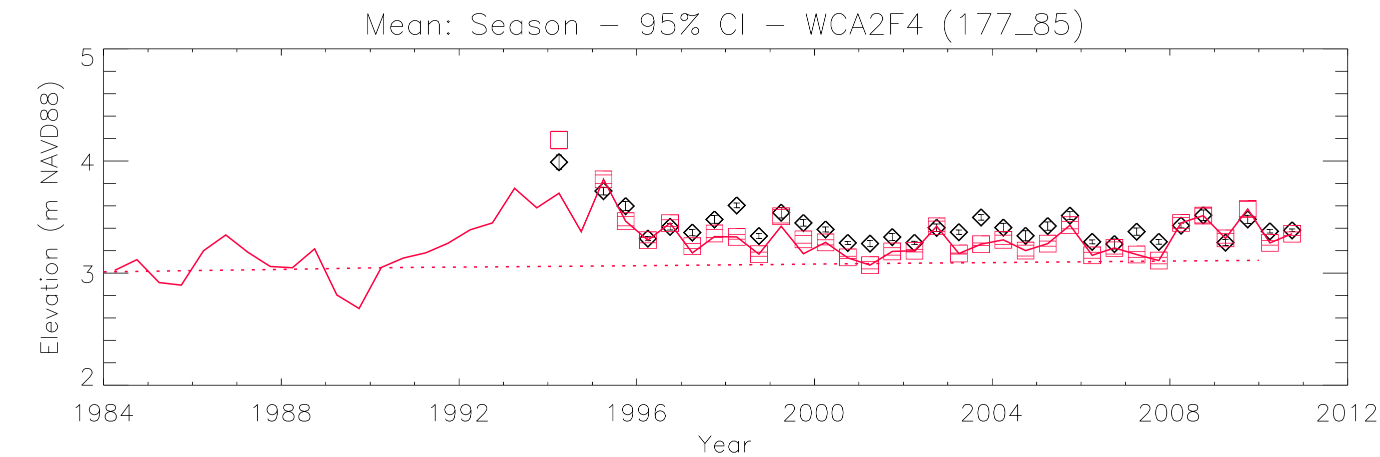

ELM3reg500 Raw Data (Obs. N = 7512) – HOLEY2 (119_77)
Elevation (m NAVD88)
Year

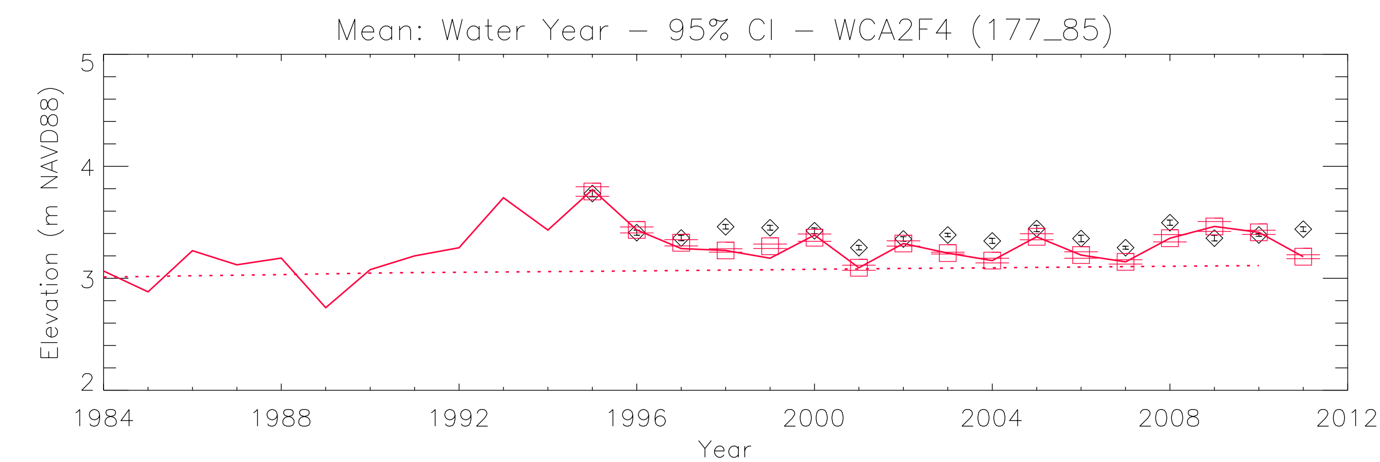

Mean: Season – 95% CI – HOLEY2 (119_77)
Elevation (m NAVD88)
Year

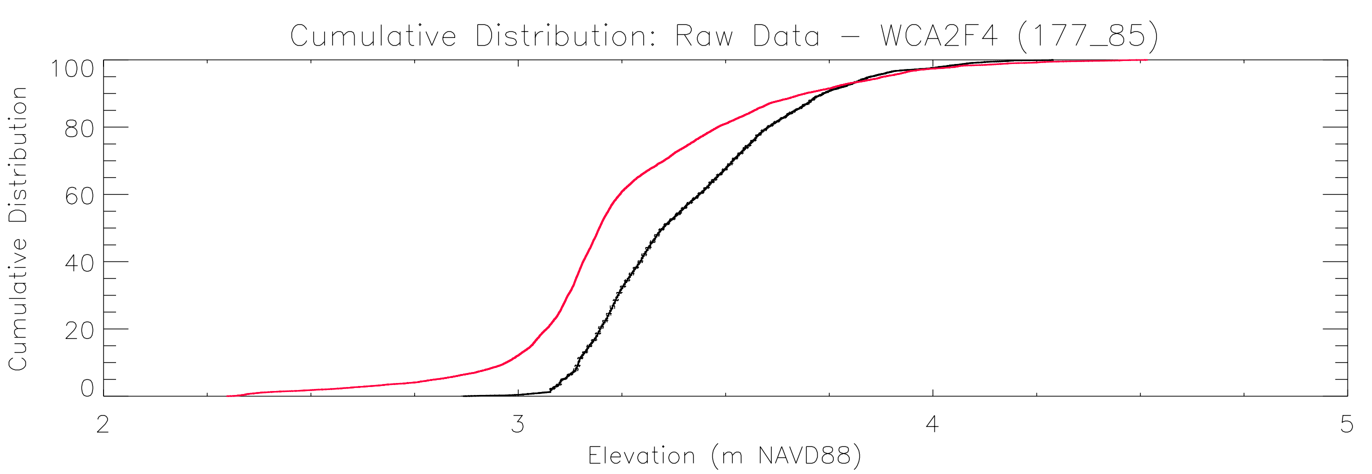

Mean: Water Year – 95% CI – HOLEY2 (119_77)
Elevation (m NAVD88)
Year

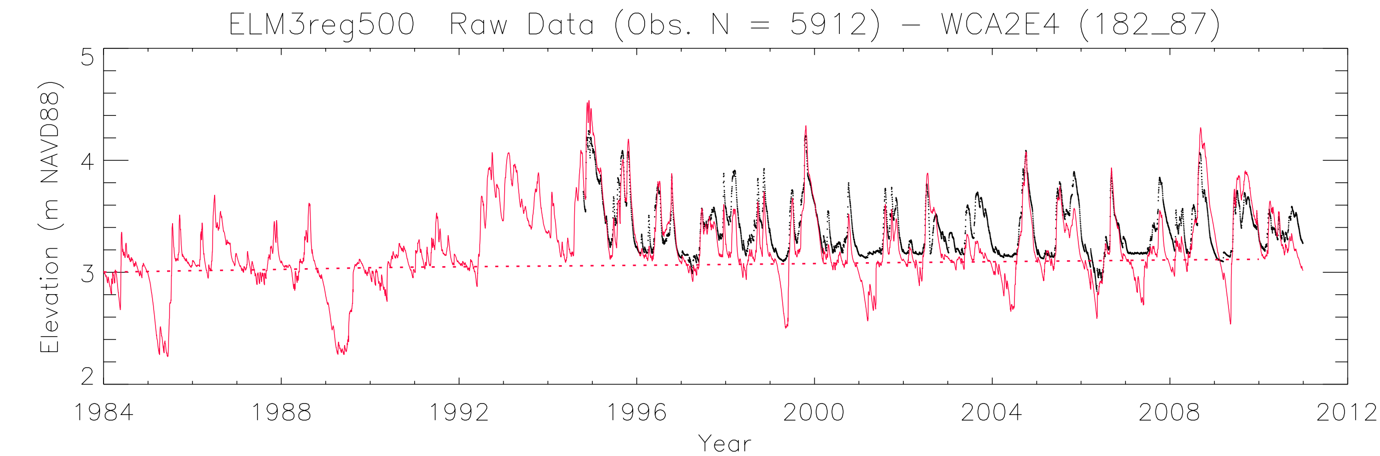

Cumulative Distribution: Raw Data – HOLEY2 (119_77)
Cumulative Distribution
Elevation (m NAVD88)

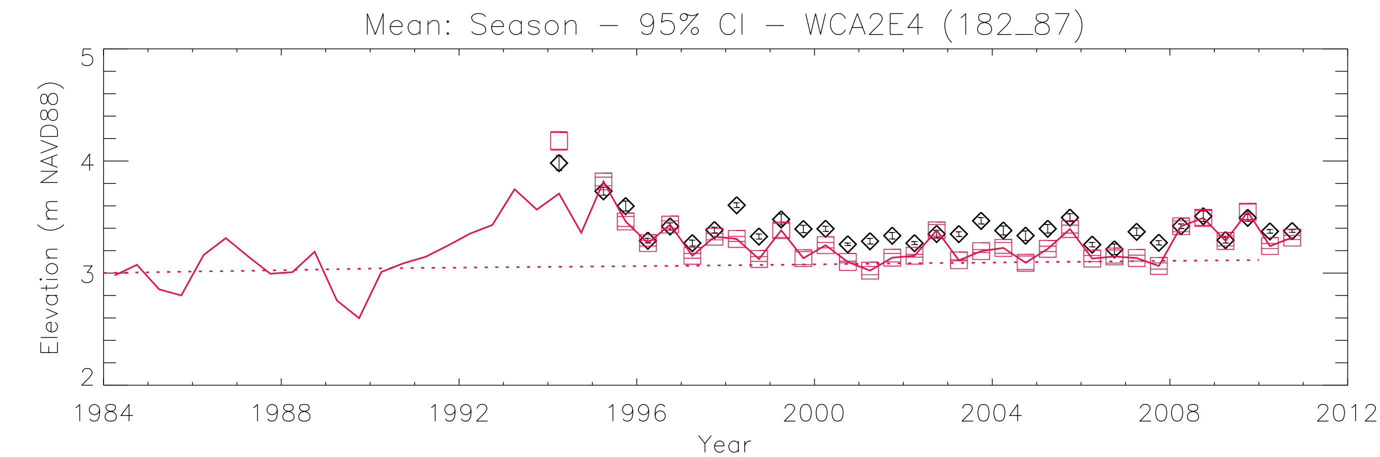

ELM3reg500 Raw Data (Obs. N = 5593) – WCA2F4 (177_85)
Elevation (m NAVD88)
Year

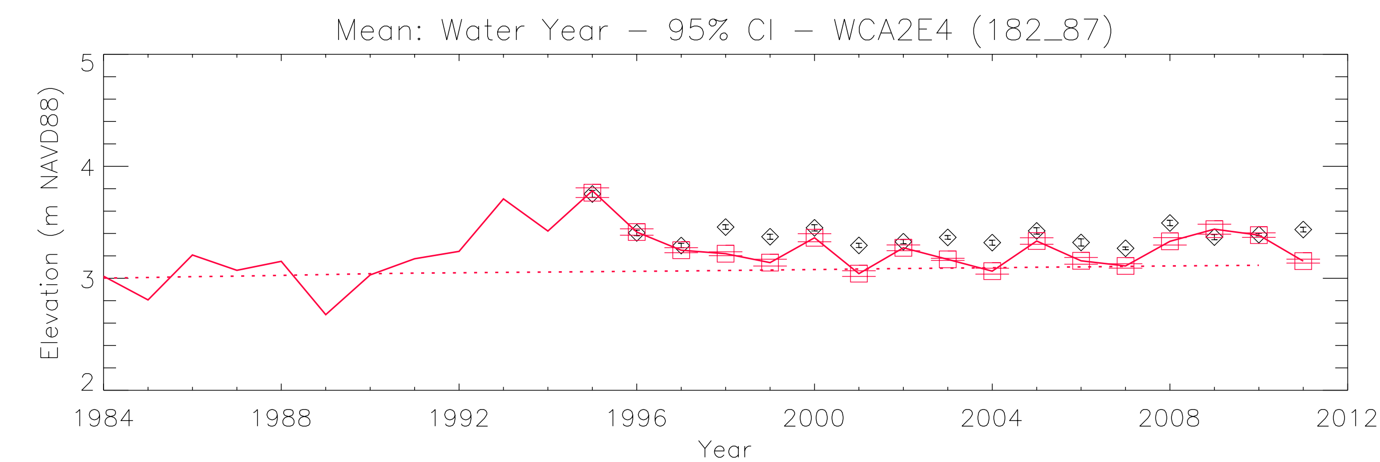

Mean: Season – 95% CI – WCA2F4 (177_85)
Elevation (m NAVD88)
Year

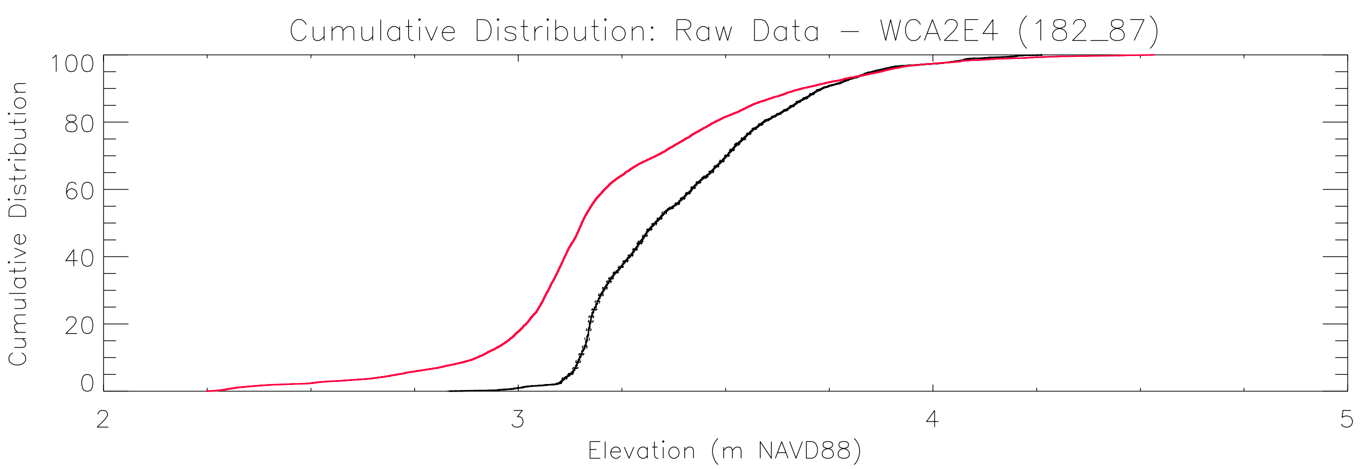

Mean: Water Year – 95% CI – WCA2F4 (177_85)
Elevation (m NAVD88)
Year

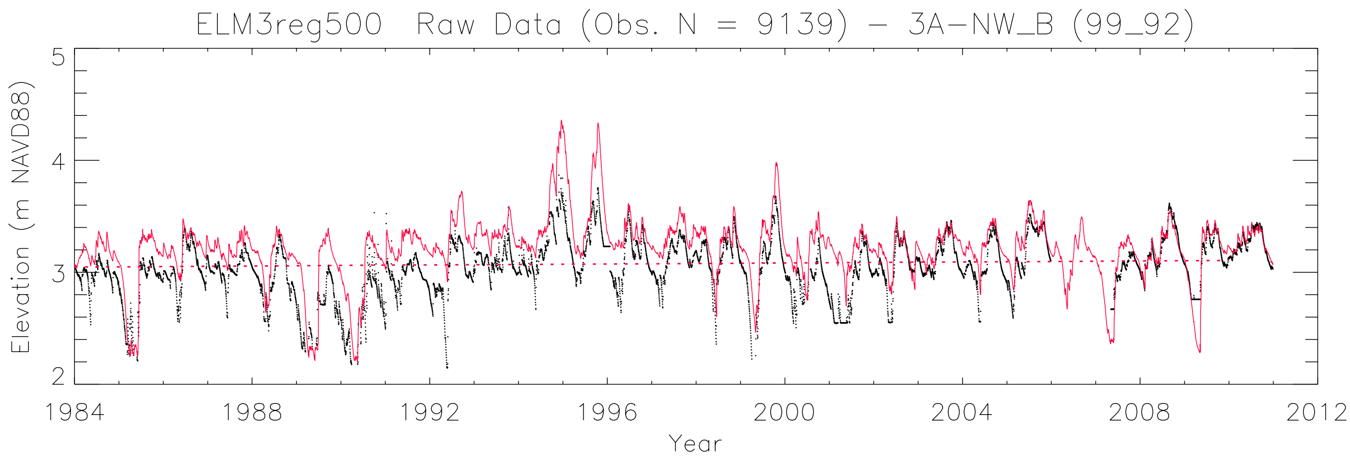

Cumulative Distribution: Raw Data – WCA2F4 (177_85)
Cumulative Distribution
Elevation (m NAVD88)

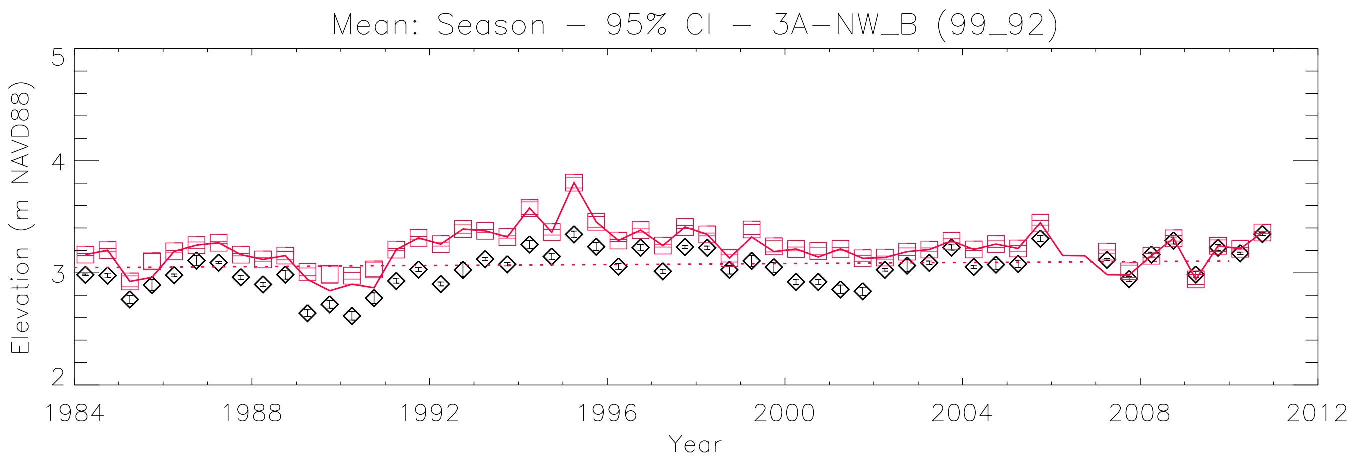

ELM3reg500 Raw Data (Obs. N = 5912) – WCA2E4 (182_87)
Elevation (m NAVD88)
Year

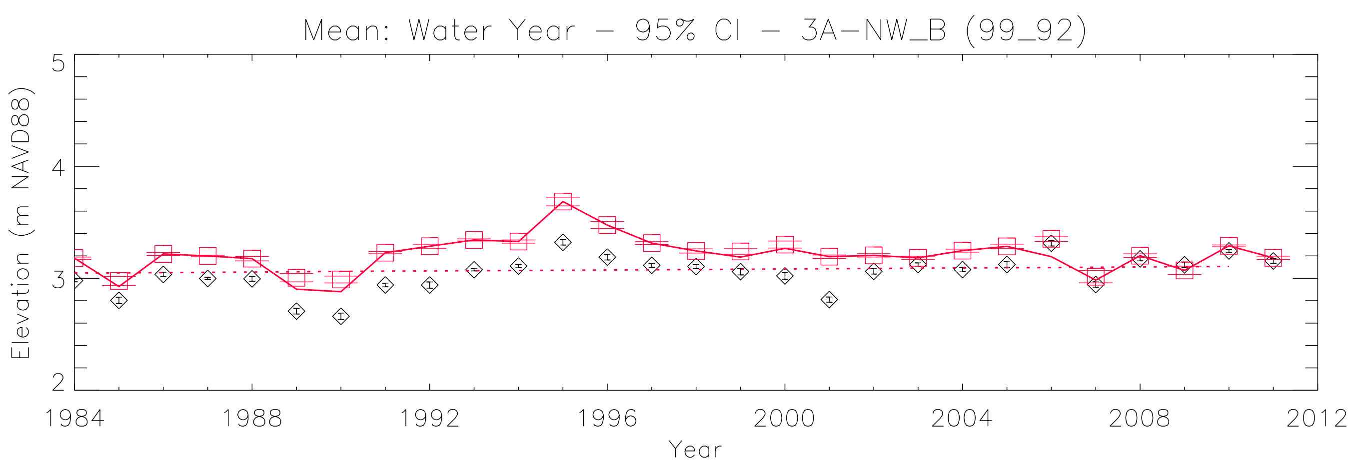

Mean: Season – 95% CI – WCA2E4 (182_87)
Elevation (m NAVD88)
Year

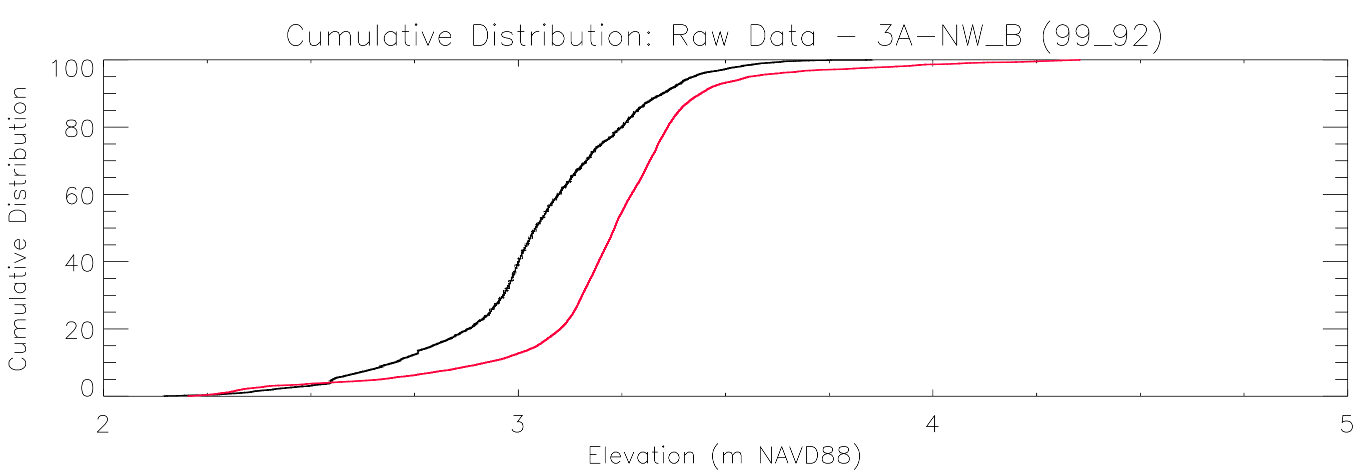

Mean: Water Year – 95% CI – WCA2E4 (182_87)
Elevation (m NAVD88)
Year

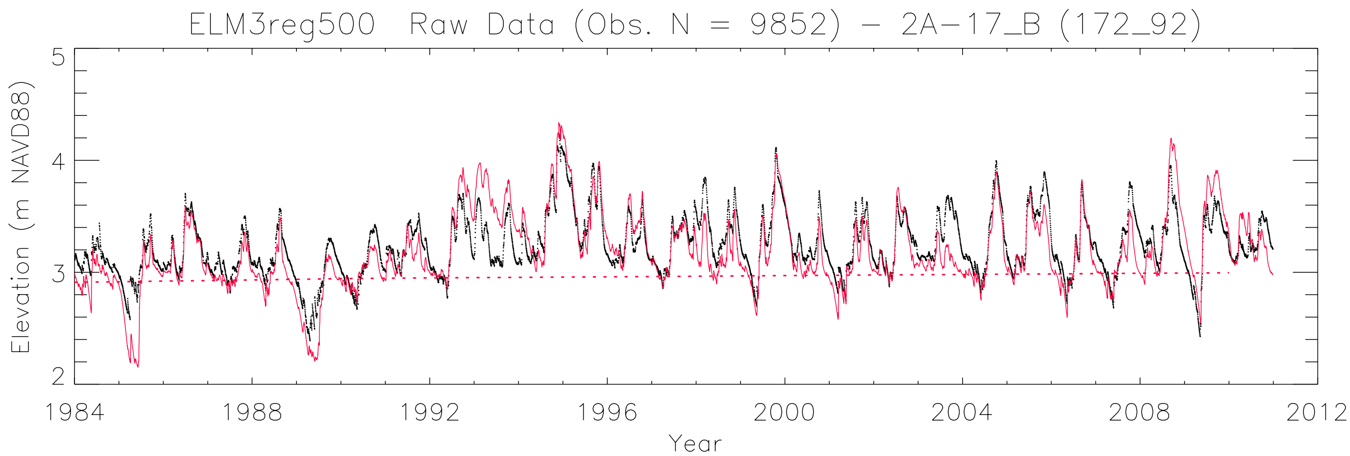

Cumulative Distribution: Raw Data – WCA2E4 (182_87)
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 9139) - 3A-NW_B (99_92)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012

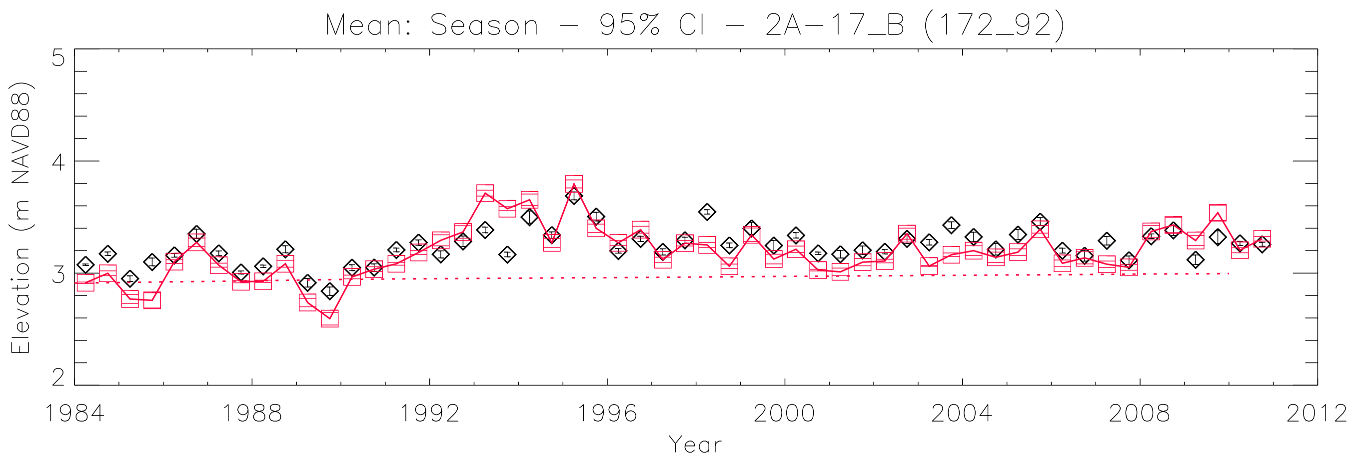

Mean: Season - 95% CI - 3A-NW_B (99_92)
Elevation (m NAVD88)
Year


Mean: Water Year - 95% CI - 3A-NW_B (99_92)
Elevation (m NAVD88)
Year

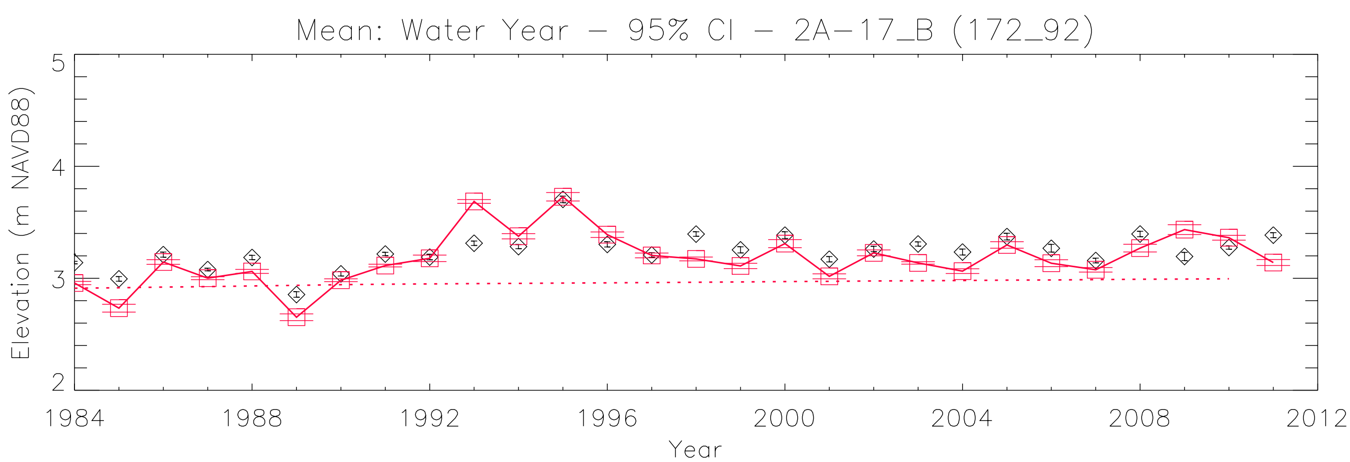

Cumulative Distribution: Raw Data - 3A-NW_B (99_92)
Cumulative Distribution
Elevation (m NAVD88)



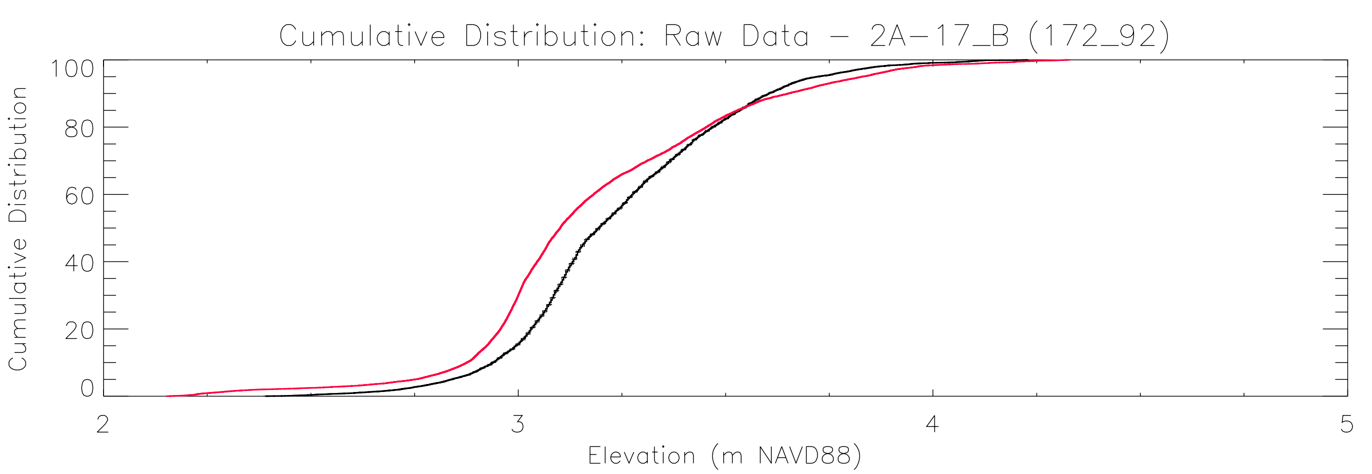
ELM3reg500 Raw Data (Obs. N = 9852) - 2A-17_B (172_92)
Elevation (m NAVD88)
Year



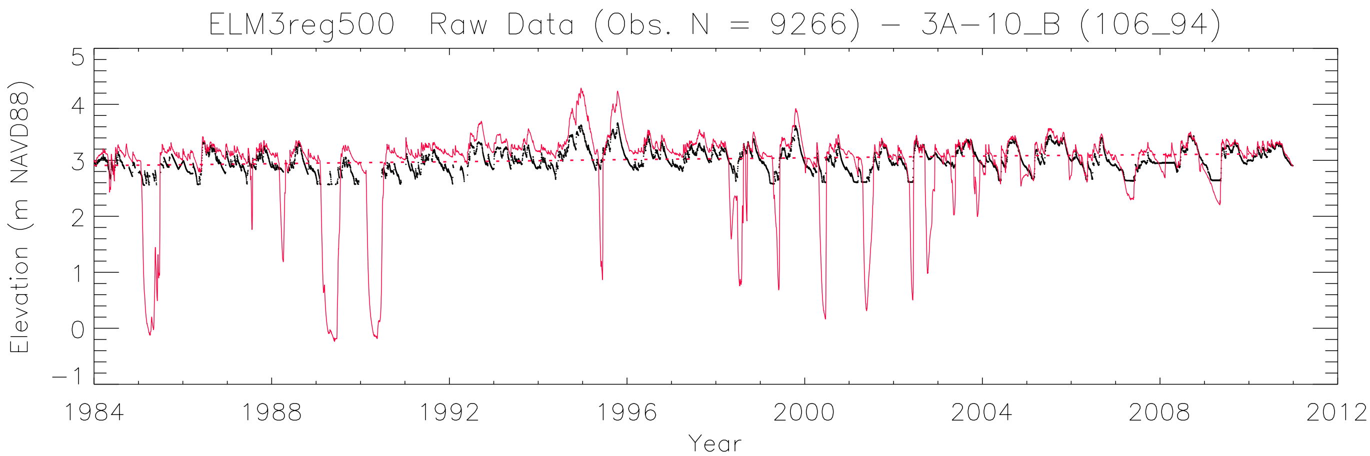
Mean: Season - 95% CI - 2A-17_B (172_92)
Elevation (m NAVD88)
Year

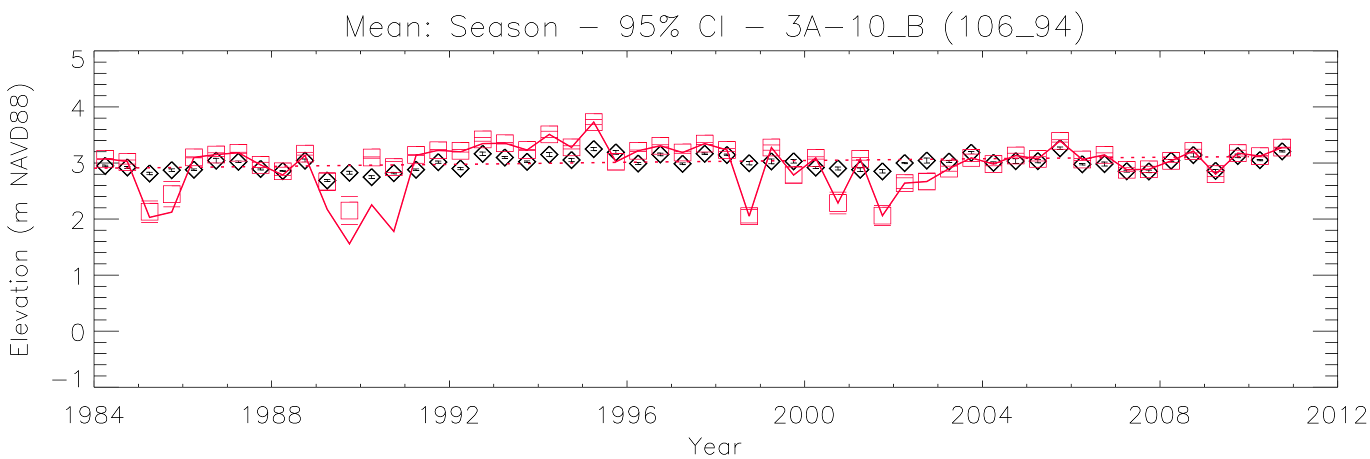


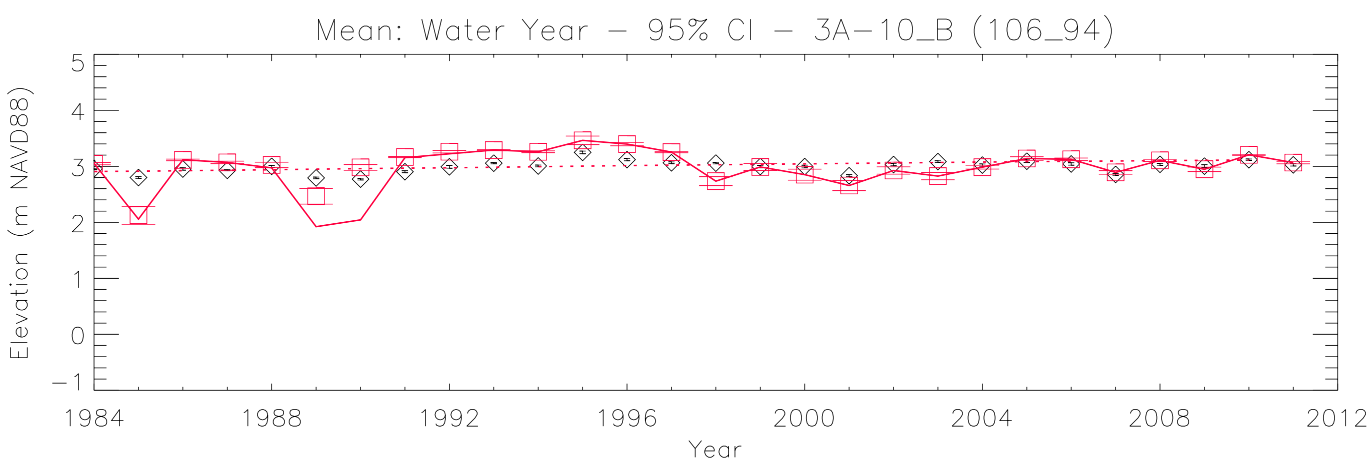
Mean: Water Year - 95% CI - 2A-17_B (172_92)
Elevation (m NAVD88)
Year

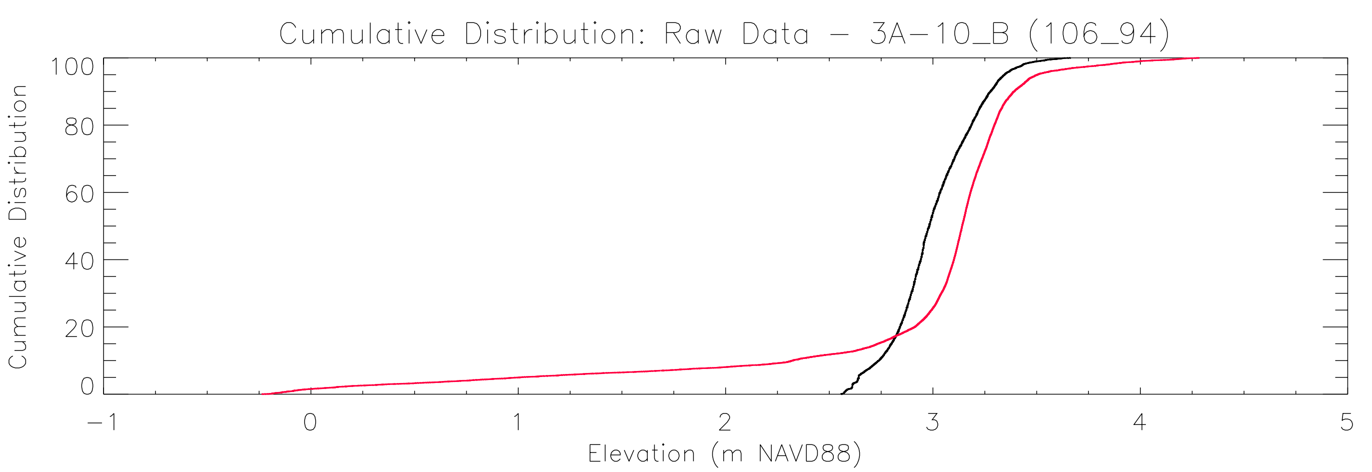


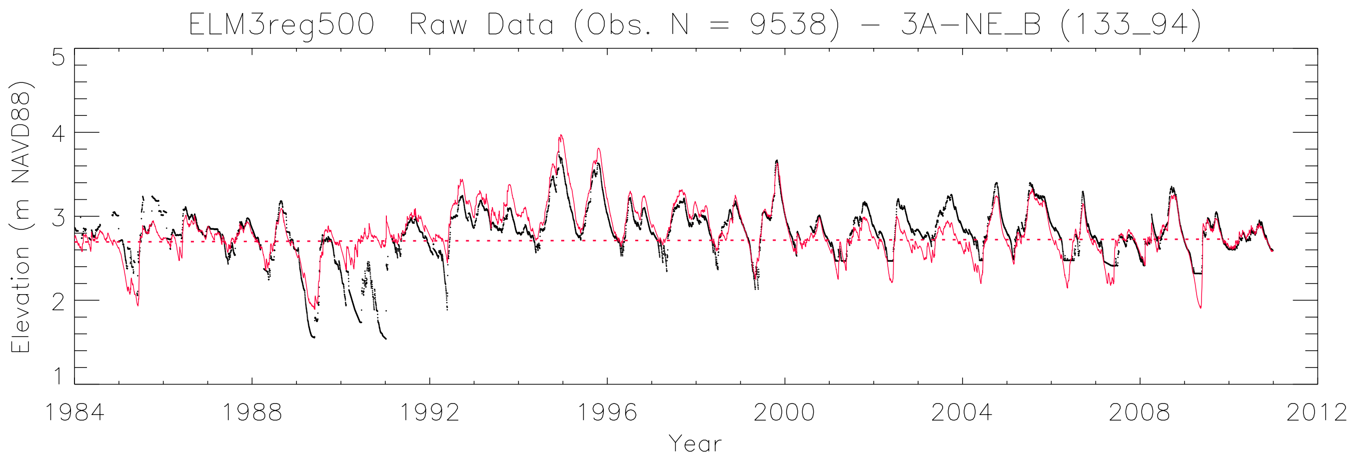
Cumulative Distribution: Raw Data - 2A-17_B (172_92)
Cumulative Distribution
Elevation (m NAVD88)

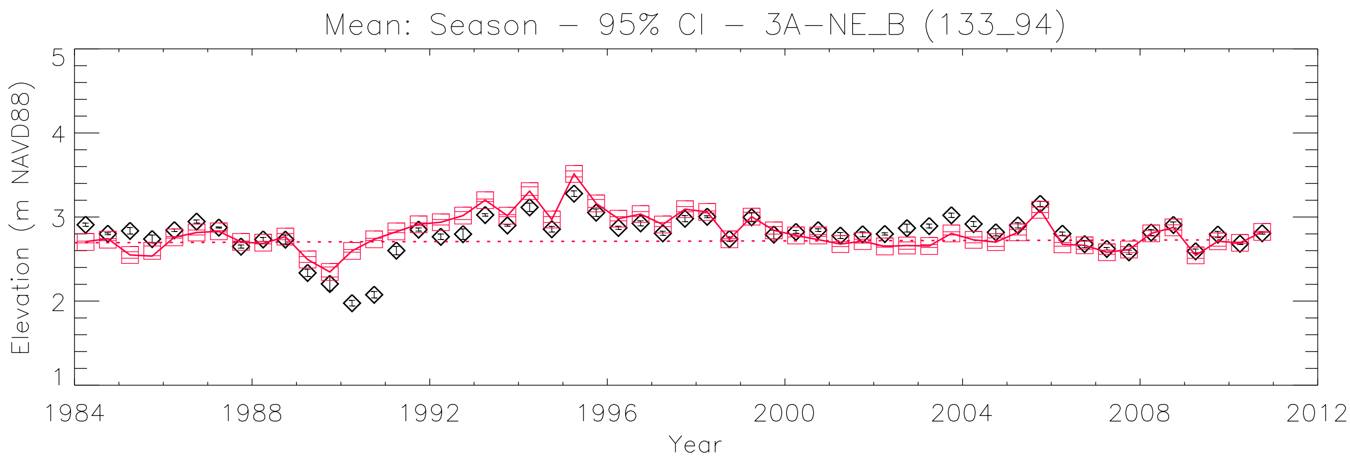

ELM3reg500 Raw Data (Obs. N = 9266) – 3A–10_B (106_94)
Elevation (m NAVD88)
Year
5
4
3
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

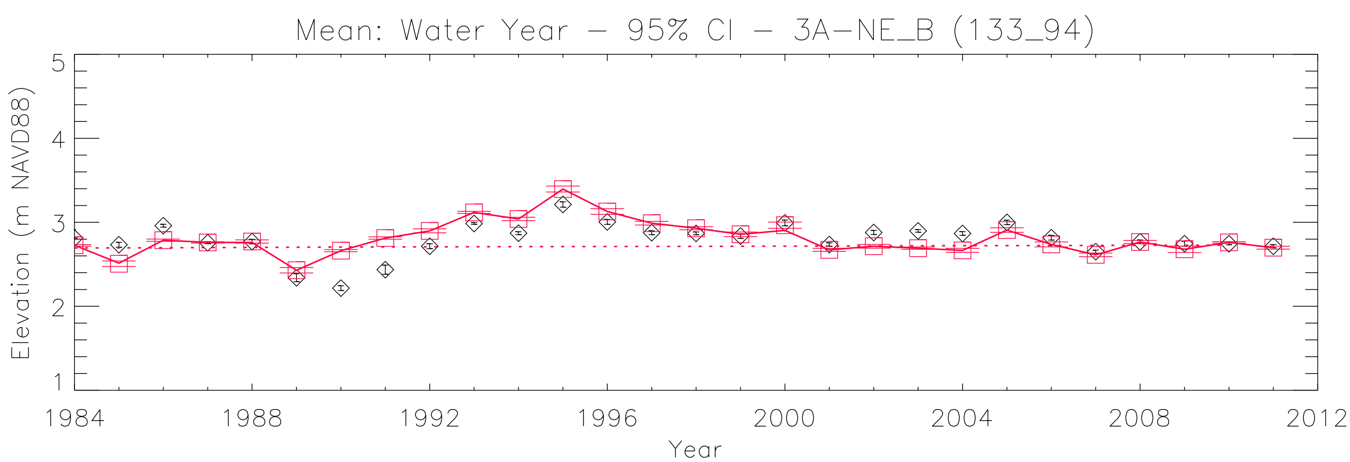

Mean: Season – 95% CI – 3A–10_B (106_94)
Elevation (m NAVD88)
Year
5
4
3
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

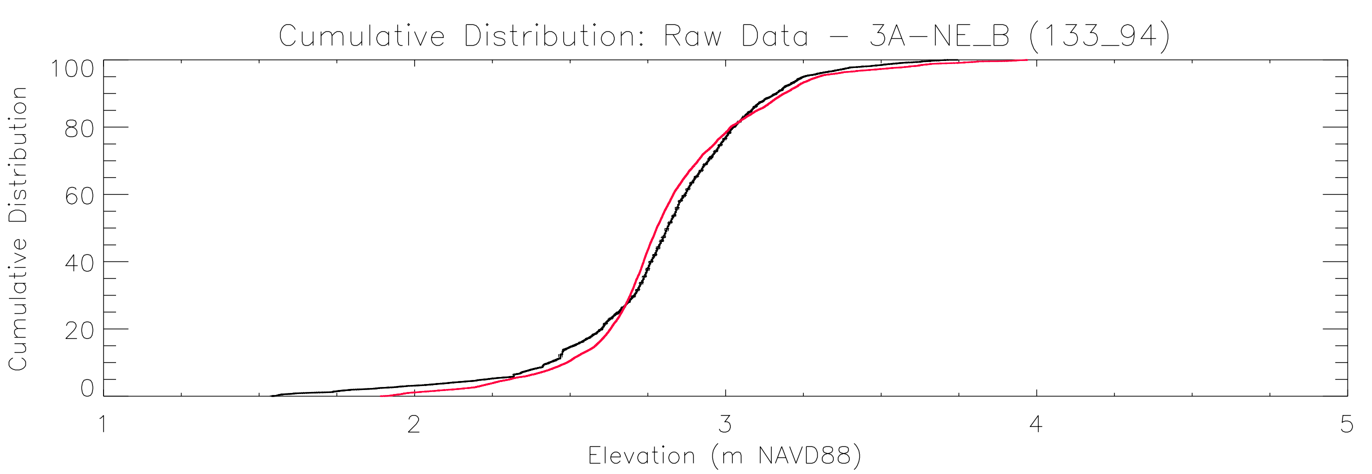

Mean: Water Year – 95% CI – 3A–10_B (106_94)
Elevation (m NAVD88)
Year
5
4
3
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

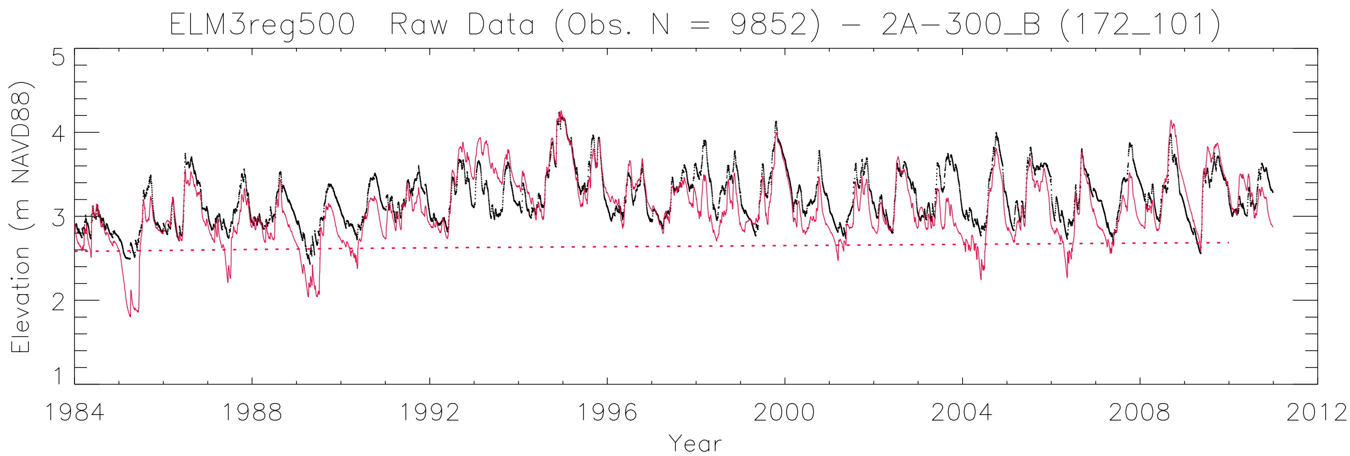

Cumulative Distribution: Raw Data – 3A–10_B (106_94)
Cumulative Distribution
Elevation (m NAVD88)
100
80
60
40
20
0
–1
0
1
2
3
4
5

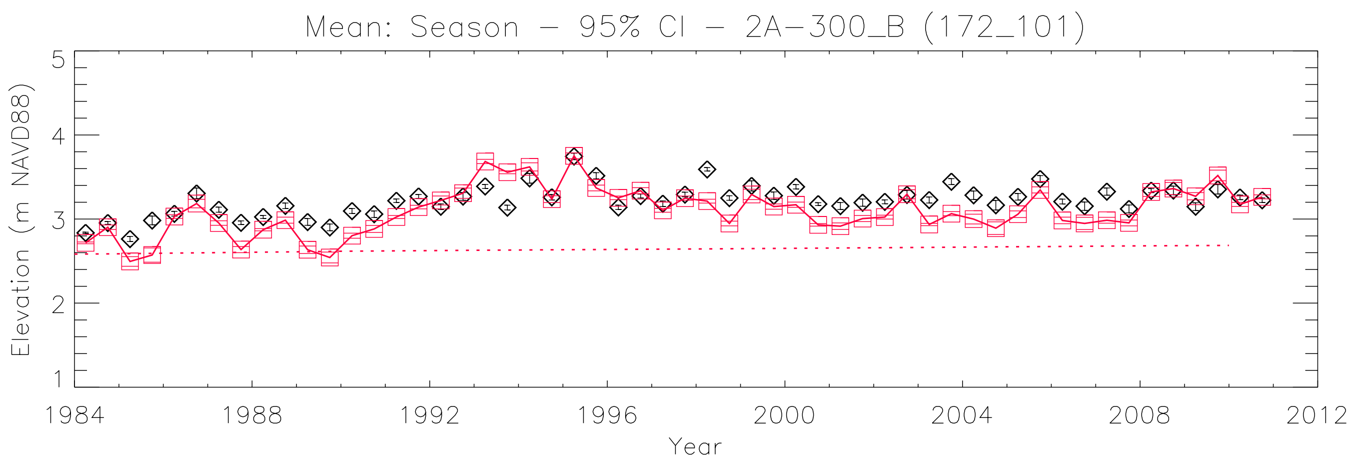

ELM3reg500 Raw Data (Obs. N = 9538) – 3A–NE_B (133_94)
Elevation (m NAVD88)
Year

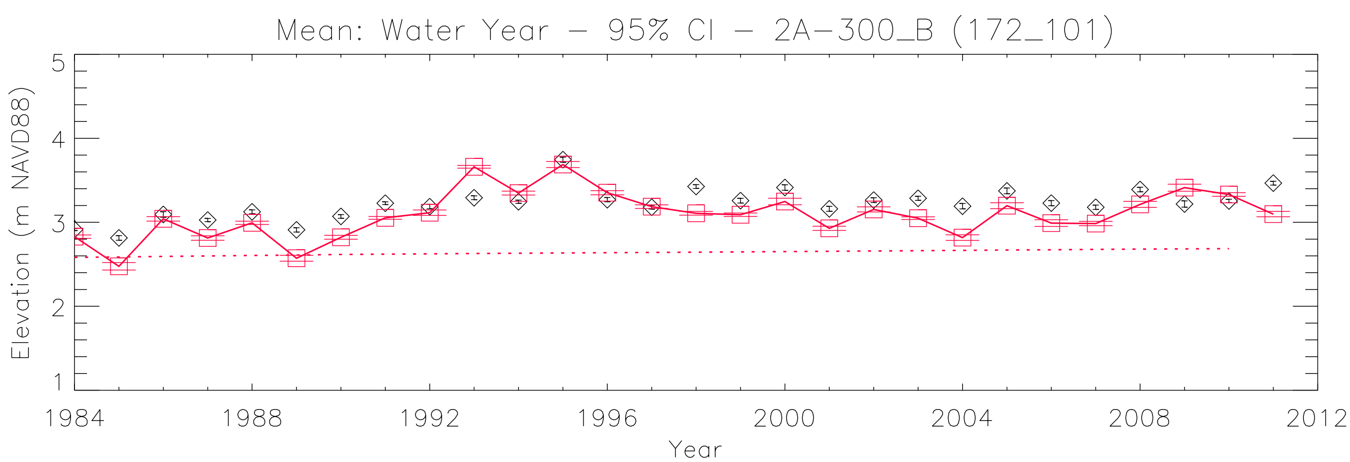

Mean: Season – 95% CI – 3A–NE_B (133_94)
Elevation (m NAVD88)
Year

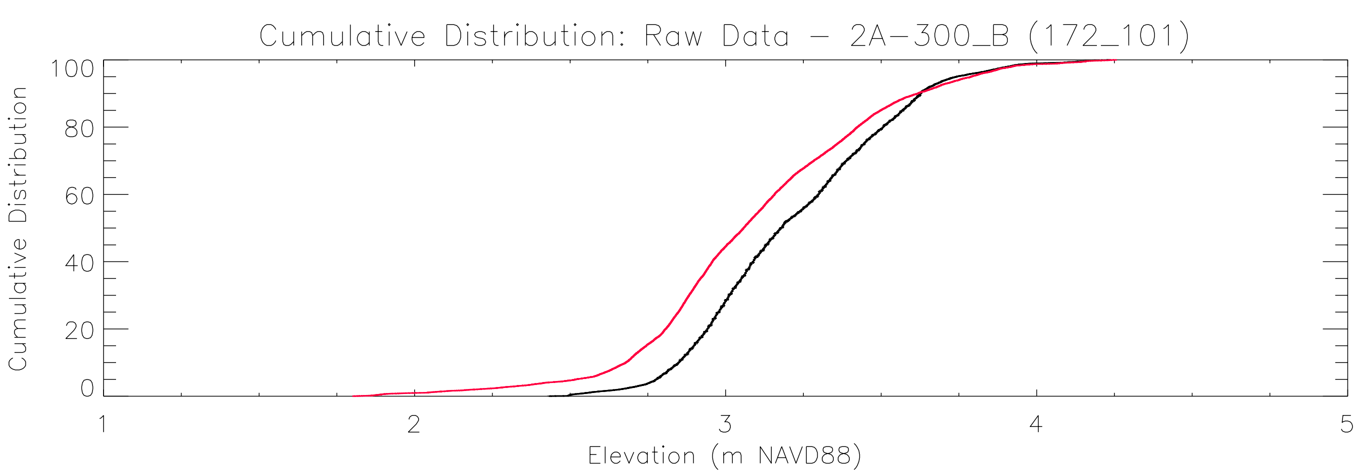

Mean: Water Year – 95% CI – 3A–NE_B (133_94)
Elevation (m NAVD88)
Year

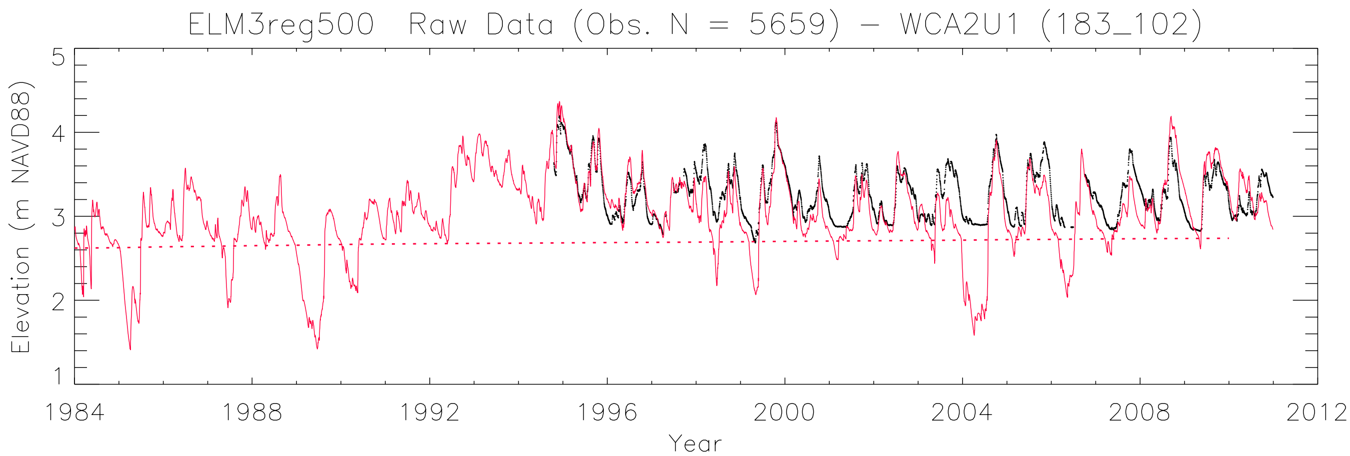

Cumulative Distribution: Raw Data – 3A–NE_B (133_94)
Cumulative Distribution
Elevation (m NAVD88)

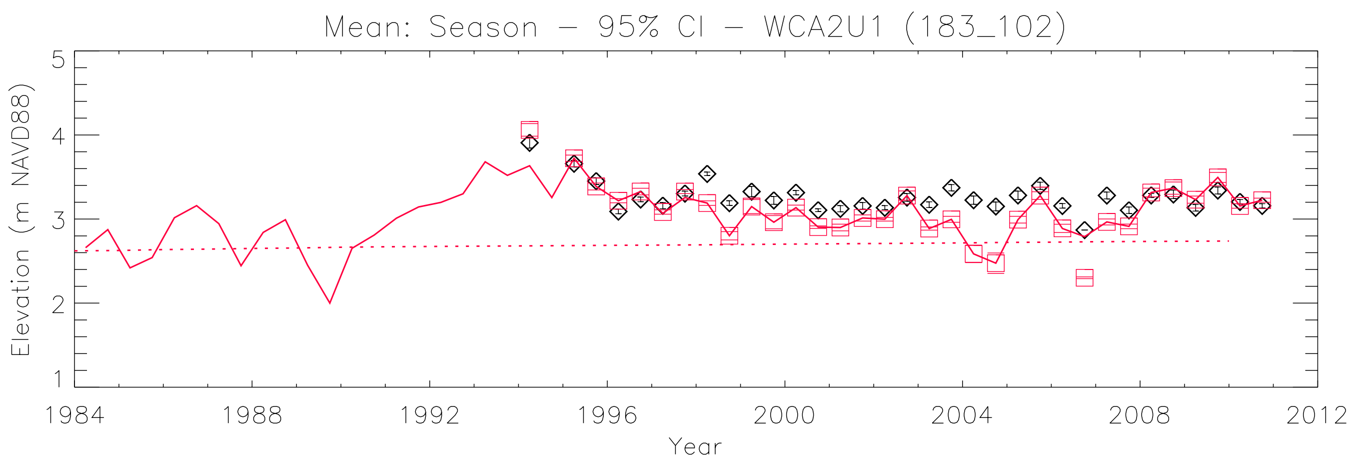

ELM3reg500 Raw Data (Obs. N = 9852) – 2A–300_B (172_101)
Elevation (m NAVD88)
Year

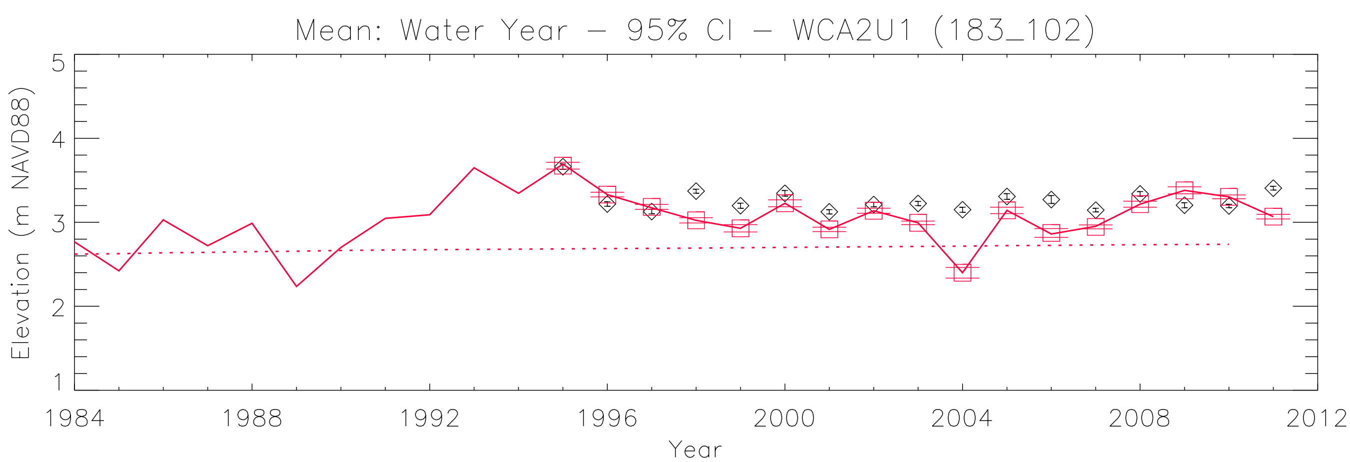

Mean: Season – 95% CI – 2A–300_B (172_101)
Elevation (m NAVD88)
Year

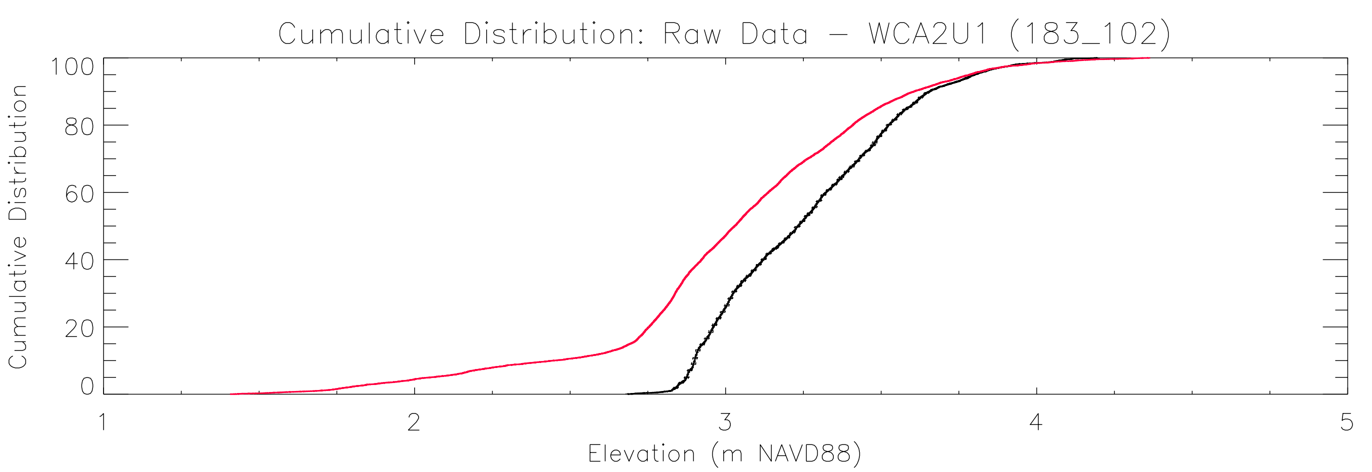

Mean: Water Year – 95% CI – 2A–300_B (172_101)
Elevation (m NAVD88)
Year

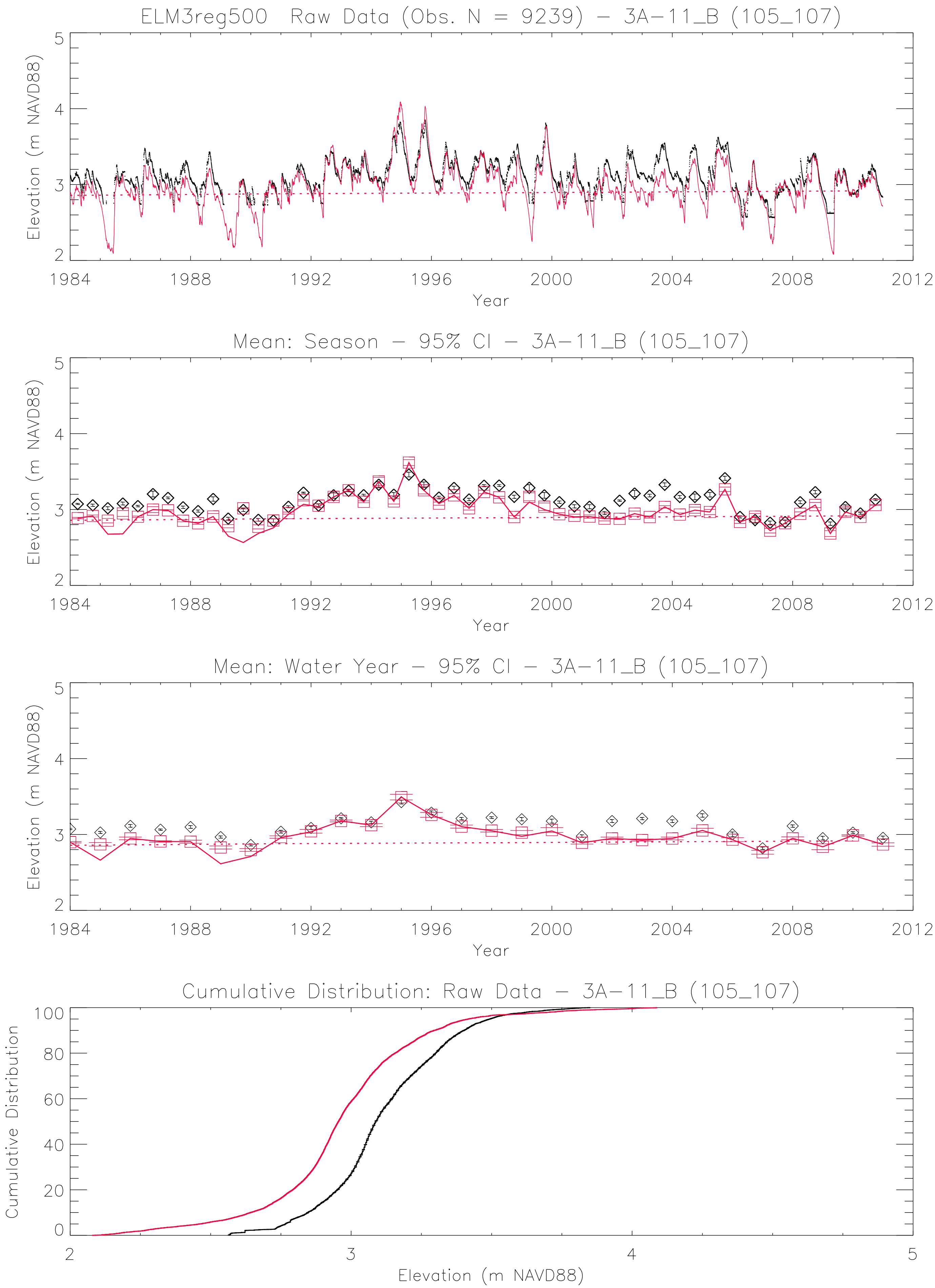

Cumulative Distribution: Raw Data – 2A–300_B (172_101)
Cumulative Distribution
Elevation (m NAVD88)

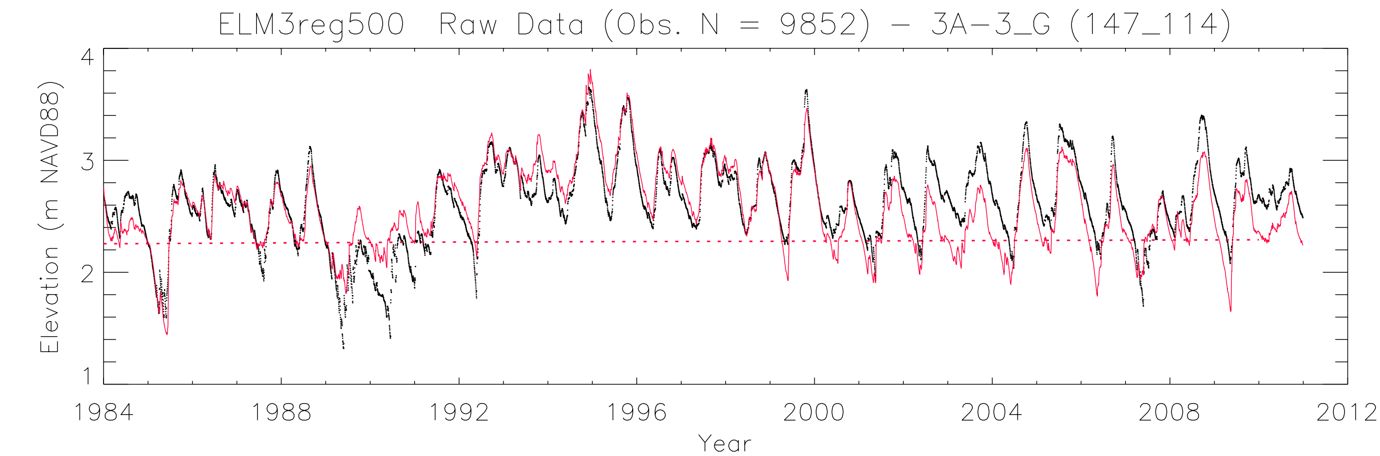

ELM3reg500 Raw Data (Obs. N = 5659) – WCA2U1 (183_102)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012

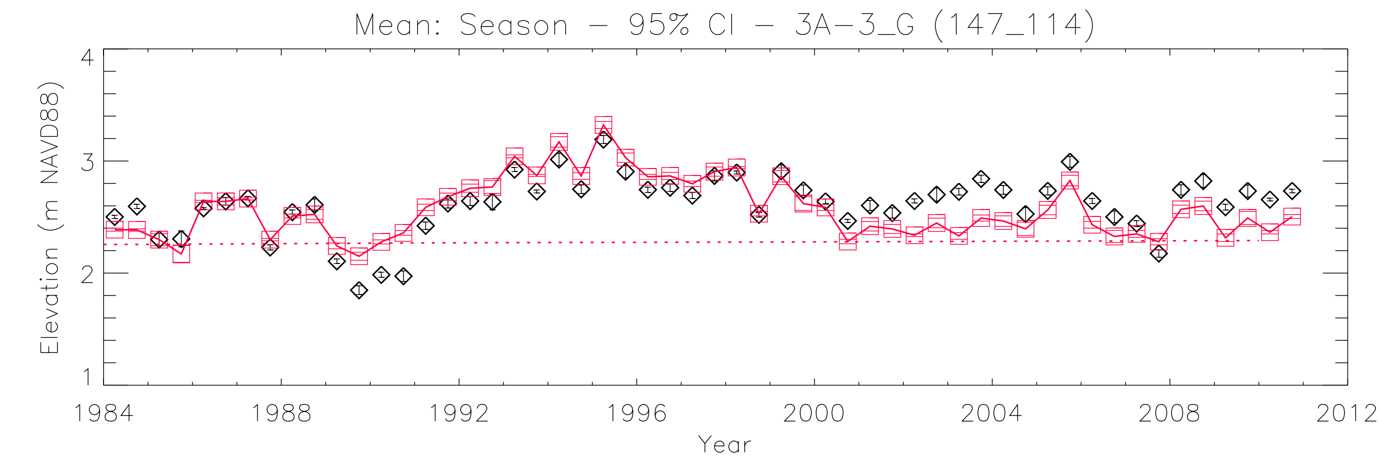

Mean: Season – 95% CI – WCA2U1 (183_102)
Elevation (m NAVD88)
Year

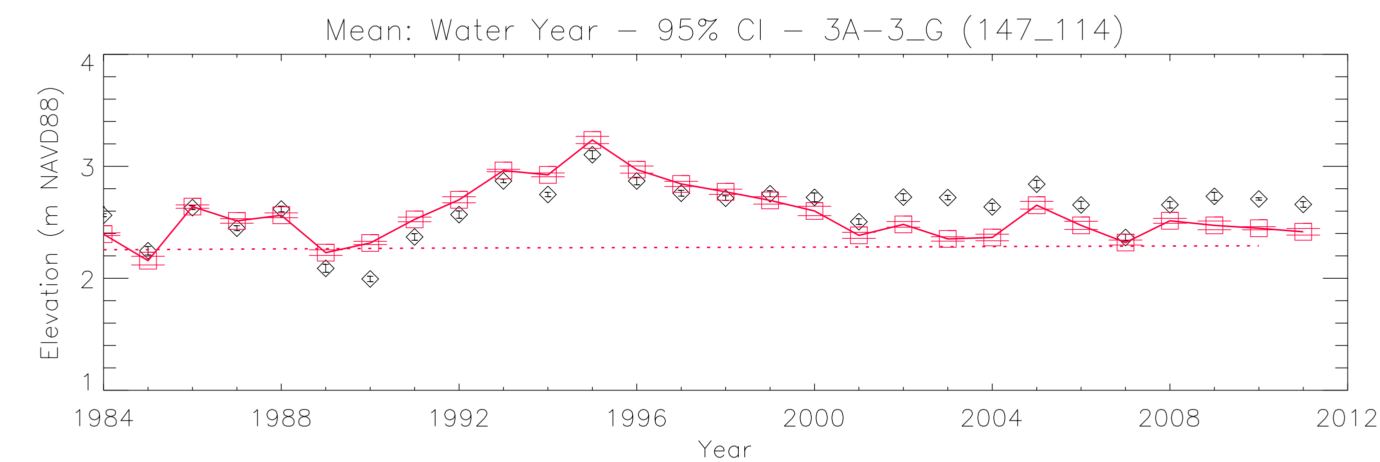

Mean: Water Year – 95% CI – WCA2U1 (183_102)
Elevation (m NAVD88)
Year

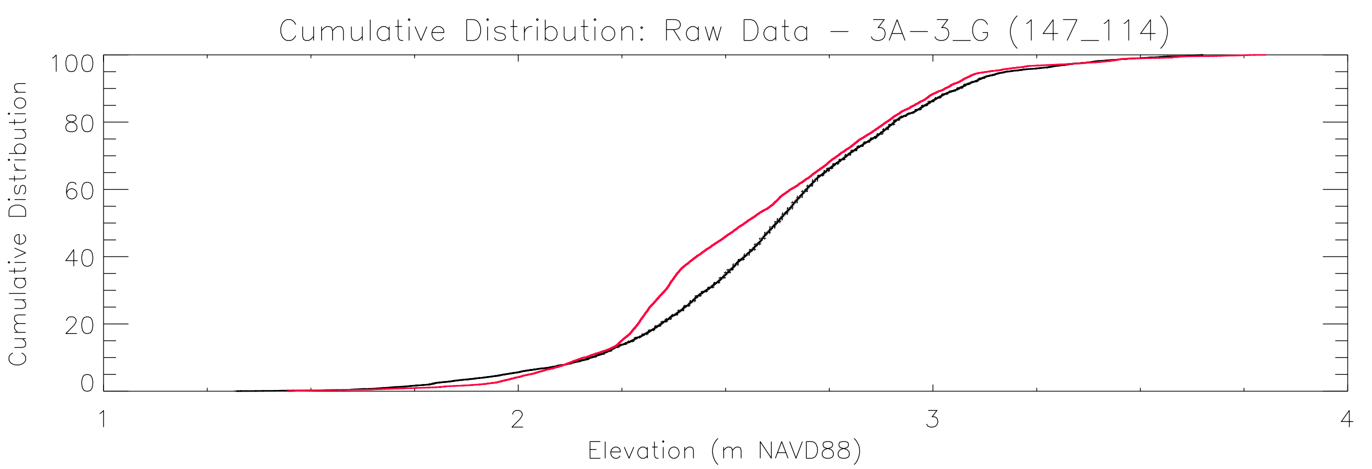

Cumulative Distribution: Raw Data – WCA2U1 (183_102)
Cumulative Distribution
Elevation (m NAVD88)

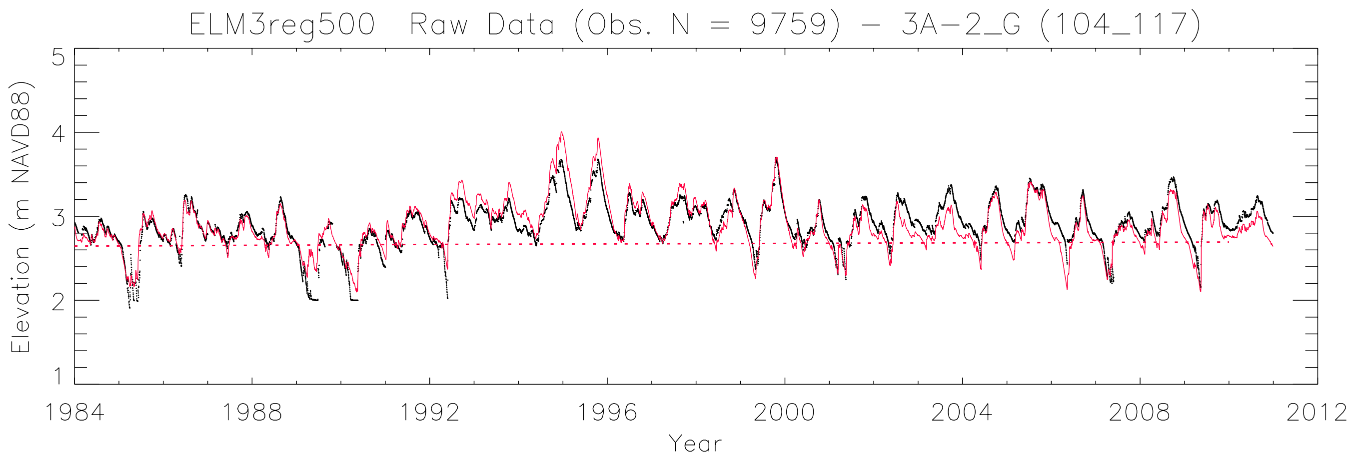

ELM3reg500 Raw Data (Obs. N = 9239) – 3A–11_B (105_107)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – 3A–11_B (105_107)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – 3A–11_B (105_107)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – 3A–11_B (105_107)
Cumulative Distribution
Elevation (m NAVD88)

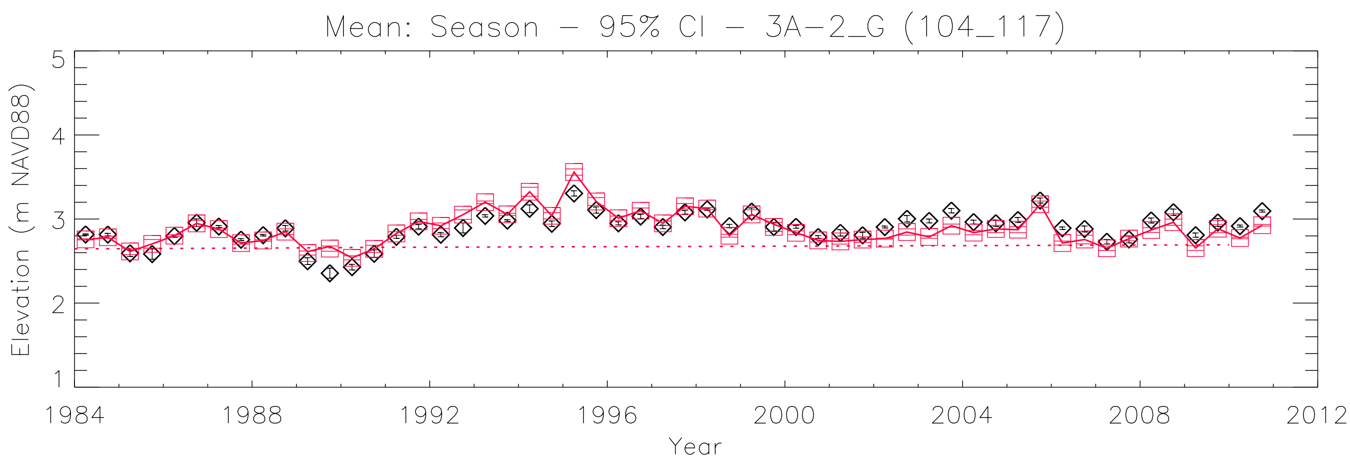

ELM3reg500 Raw Data (Obs. N = 9852) – 3A-3_G (147_114)
Elevation (m NAVD88)
Year

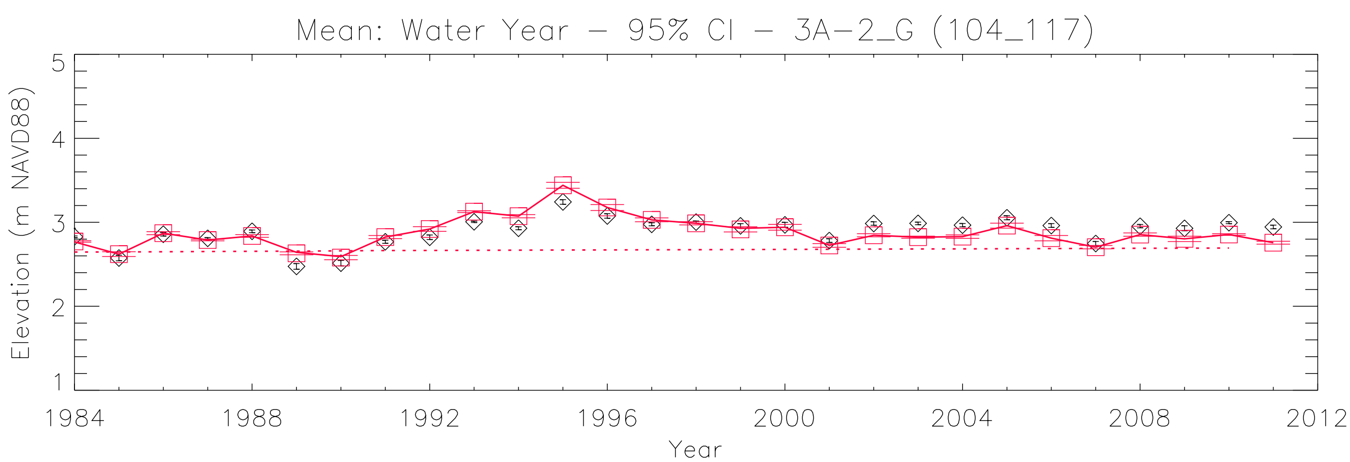

Mean: Season – 95% CI – 3A-3_G (147_114)
Elevation (m NAVD88)
Year

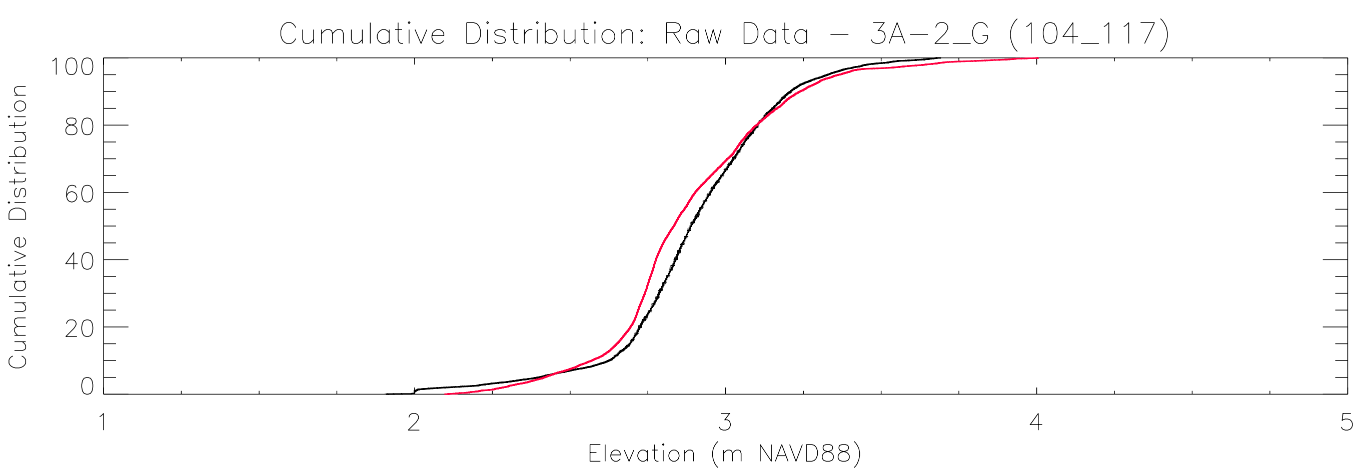

Mean: Water Year – 95% CI – 3A-3_G (147_114)
Elevation (m NAVD88)
Year

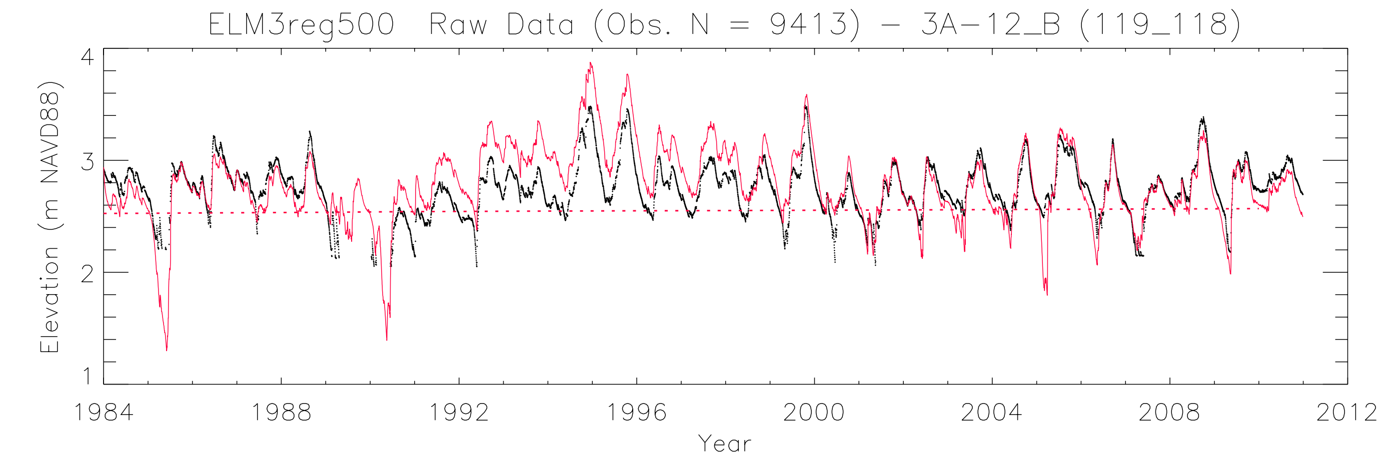

Cumulative Distribution: Raw Data – 3A-3_G (147_114)
Cumulative Distribution
Elevation (m NAVD88)

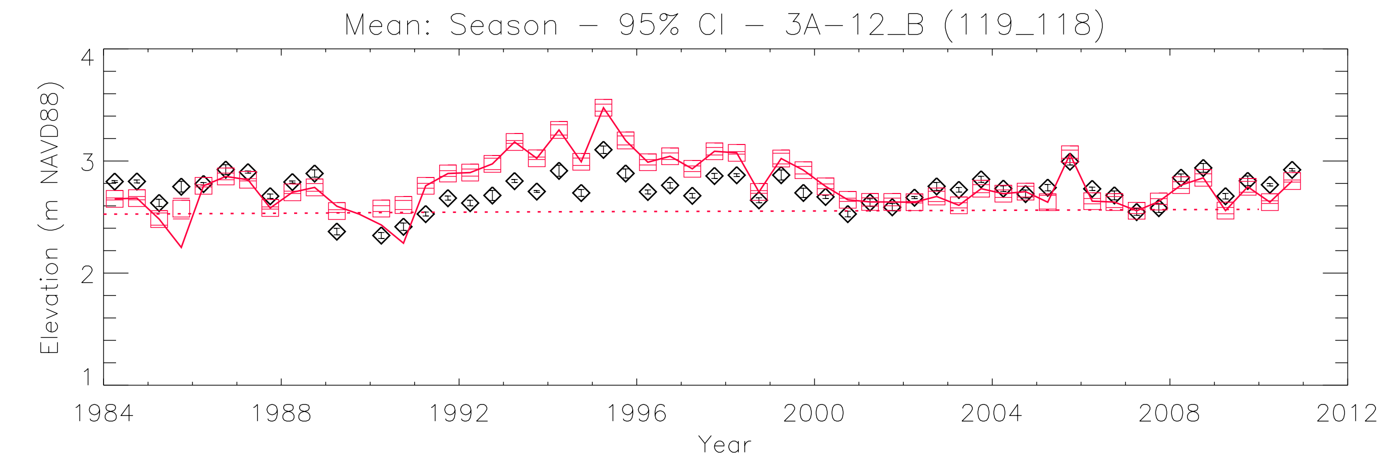

ELM3reg500 Raw Data (Obs. N = 9759) - 3A-2_G (104_117)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012

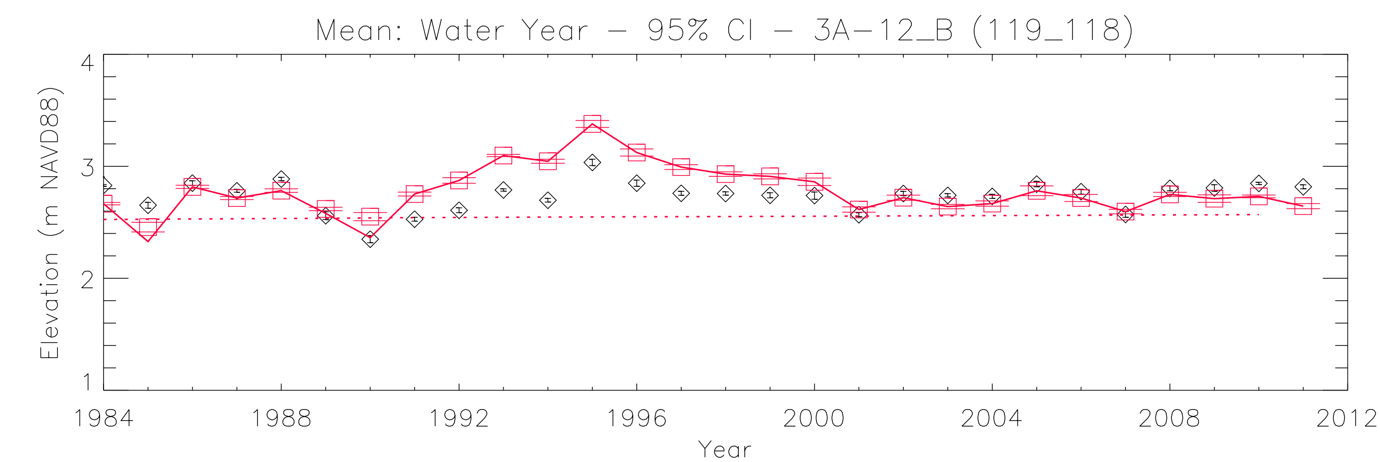

Mean: Season - 95% CI - 3A-2_G (104_117)
Elevation (m NAVD88)
Year

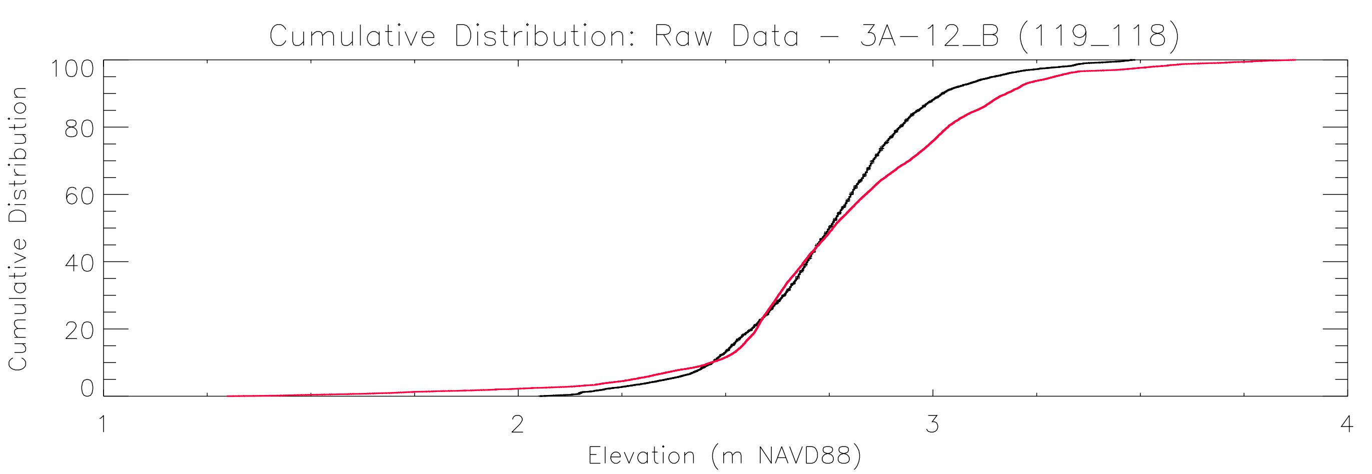

Mean: Water Year - 95% CI - 3A-2_G (104_117)
Elevation (m NAVD88)
Year

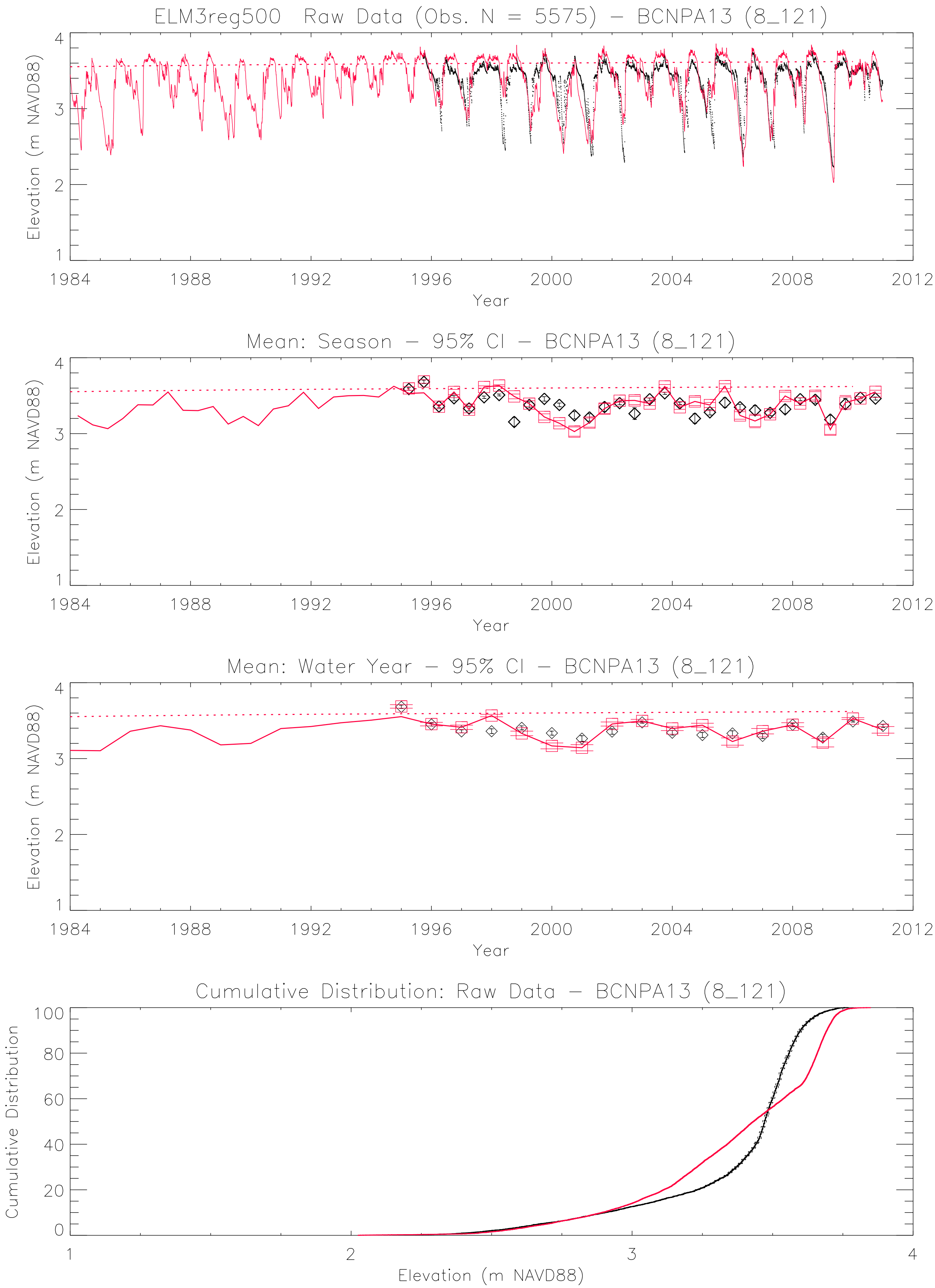

Cumulative Distribution: Raw Data - 3A-2_G (104_117)
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 9413) − 3A−12_B (119_118)
Elevation (m NAVD88)
Year

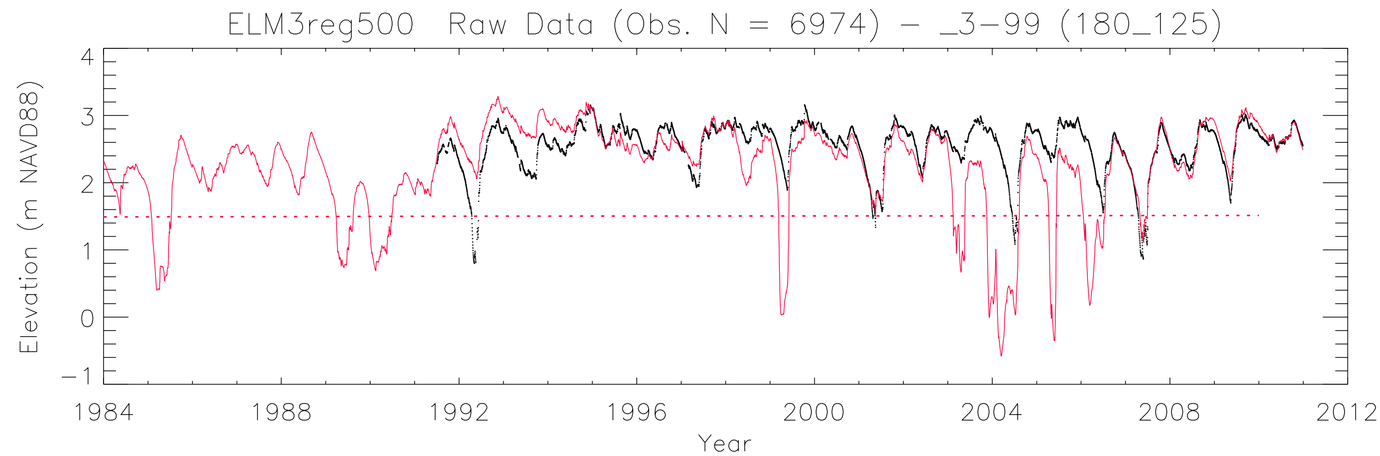

Mean: Season − 95% CI − 3A−12_B (119_118)
Elevation (m NAVD88)
Year

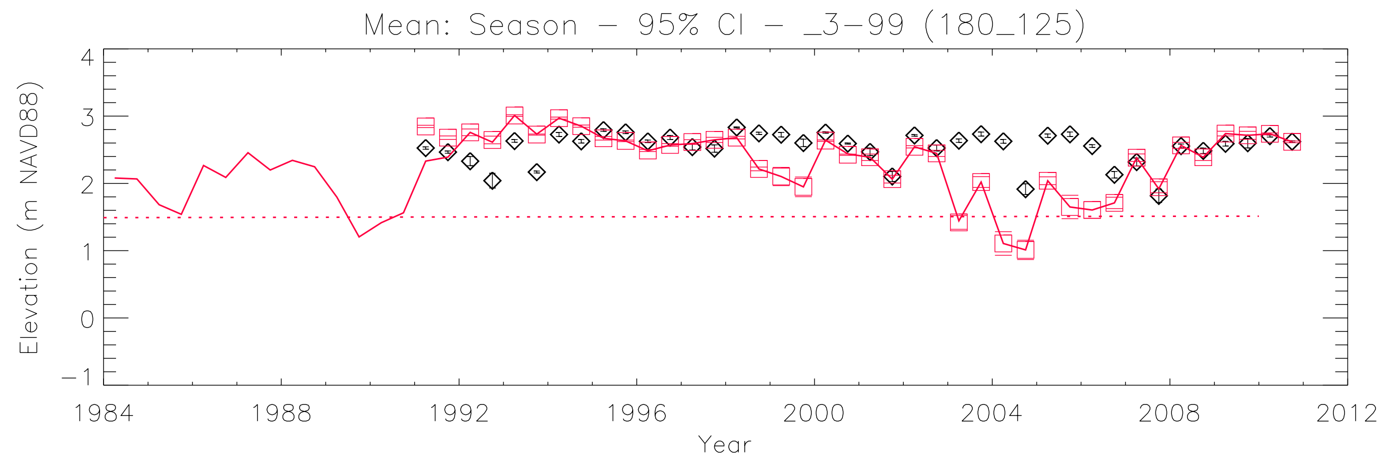

Mean: Water Year − 95% CI − 3A−12_B (119_118)
Elevation (m NAVD88)
Year

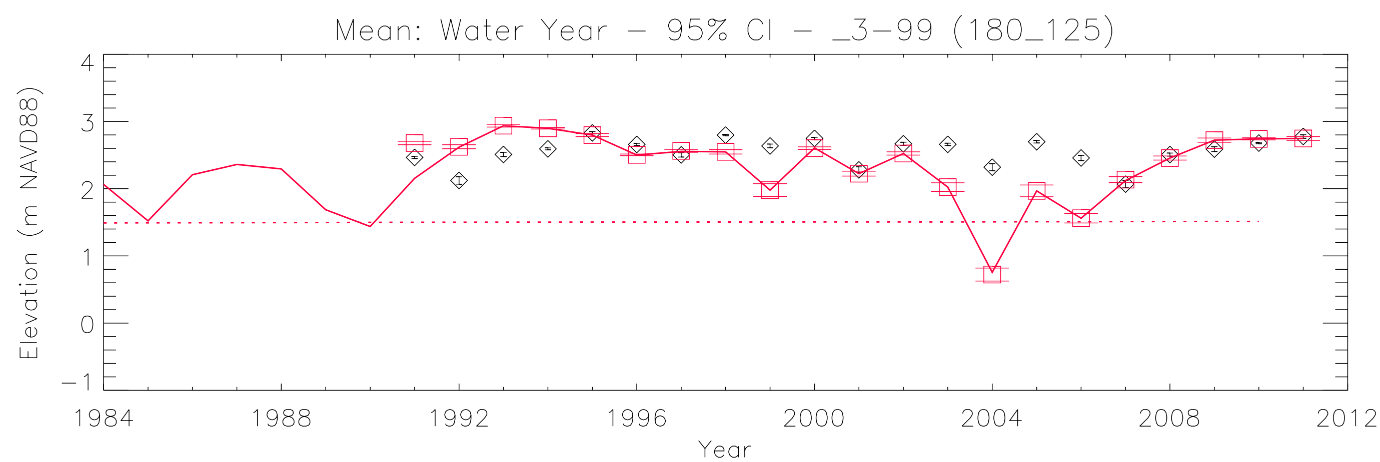

Cumulative Distribution: Raw Data − 3A−12_B (119_118)
Cumulative Distribution
Elevation (m NAVD88)

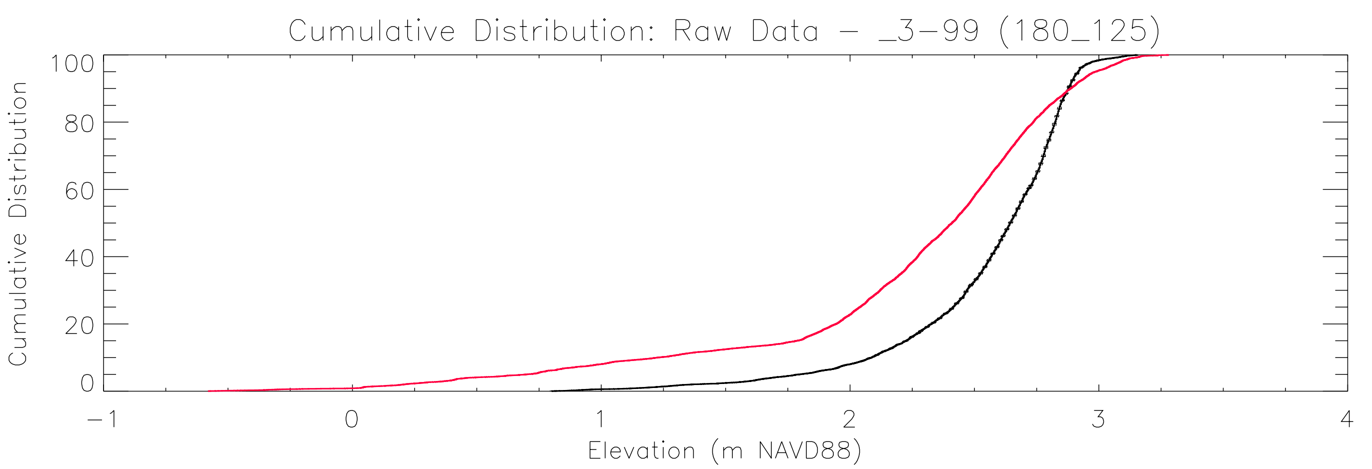


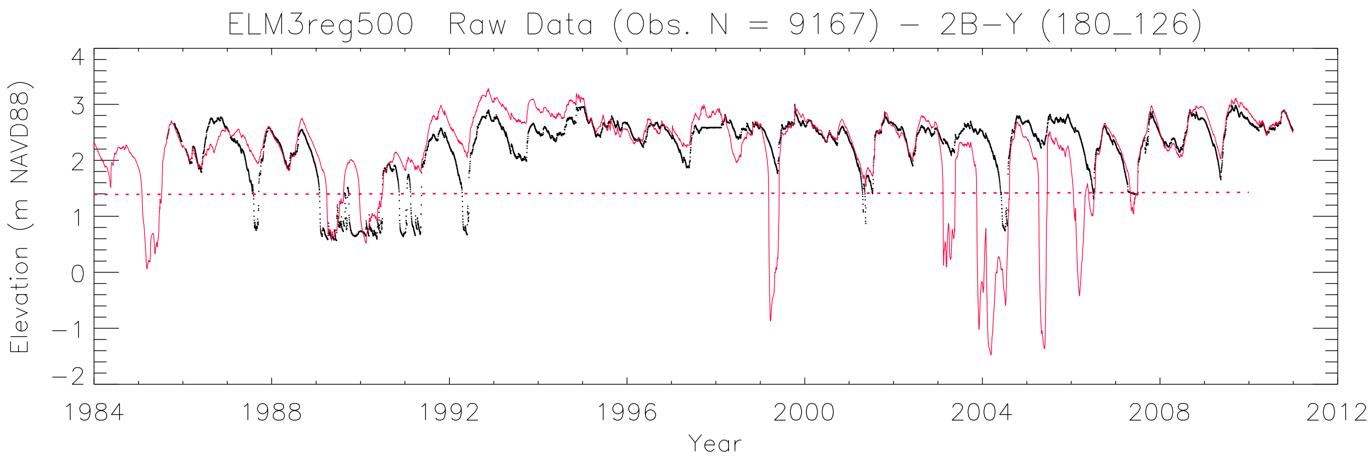
ELM3reg500 Raw Data (Obs. N = 5575) – BCNPA13 (8_121)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – BCNPA13 (8_121)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – BCNPA13 (8_121)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – BCNPA13 (8_121)
Cumulative Distribution
Elevation (m NAVD88)

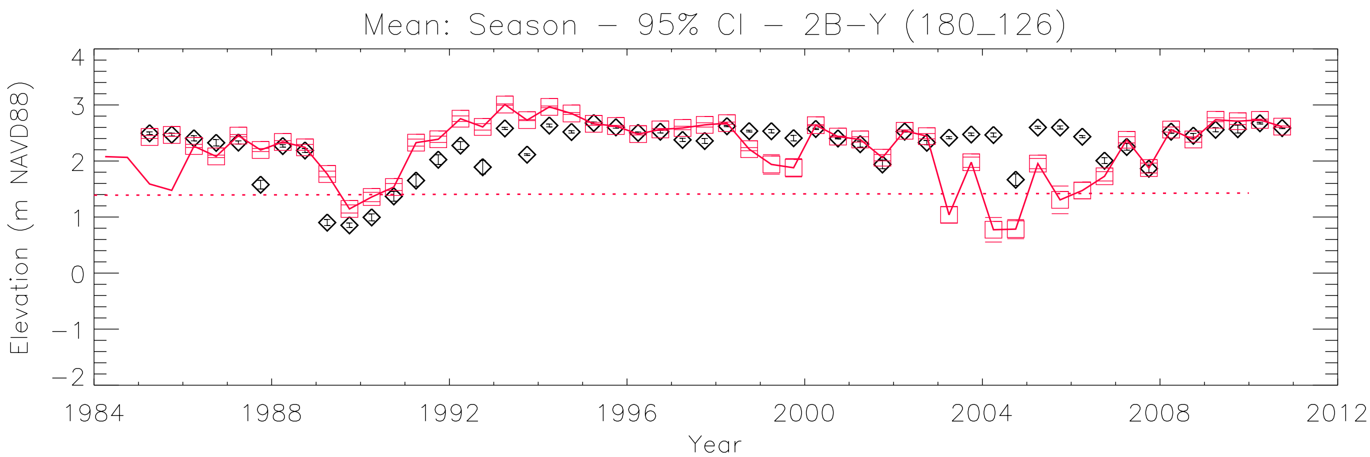

ELM3reg500 Raw Data (Obs. N = 6974) – _3-99 (180_125)
Elevation (m NAVD88)
Year

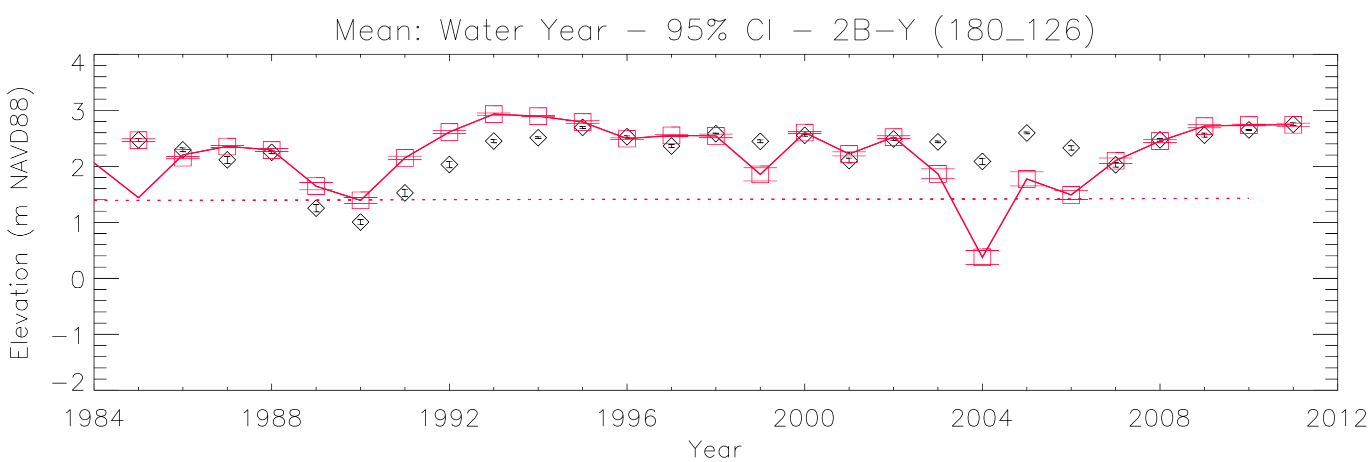

Mean: Season – 95% CI – _3-99 (180_125)
Elevation (m NAVD88)
Year

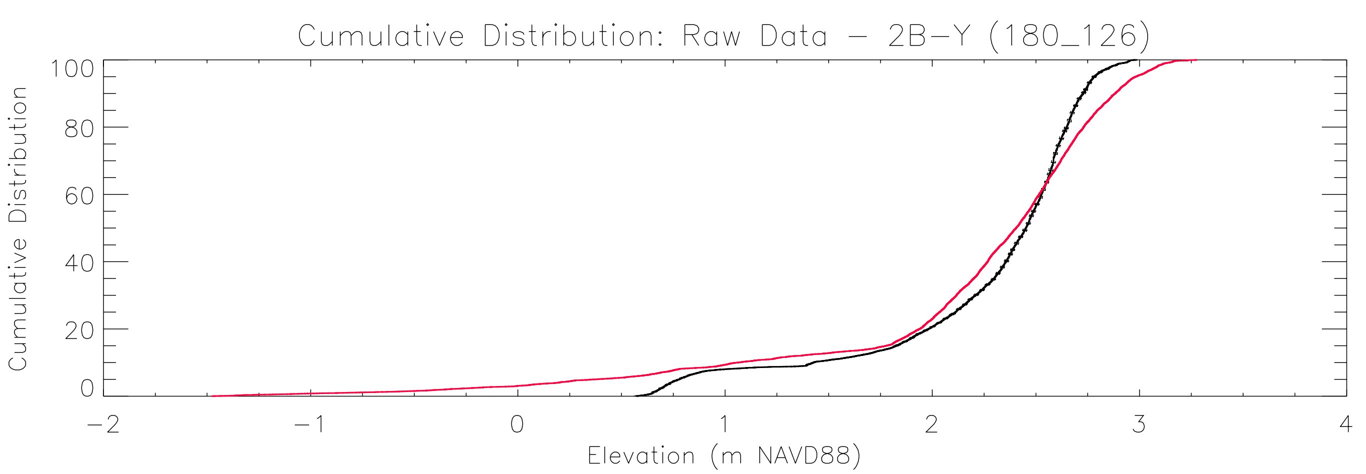

Mean: Water Year – 95% CI – _3-99 (180_125)
Elevation (m NAVD88)
Year

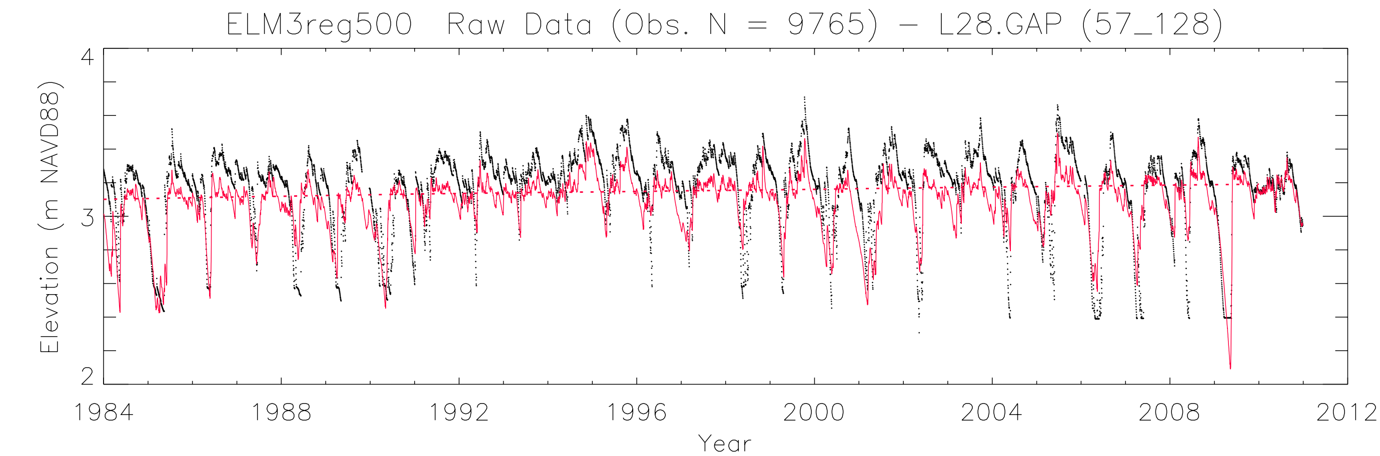

Cumulative Distribution: Raw Data – _3-99 (180_125)
Cumulative Distribution
Elevation (m NAVD88)

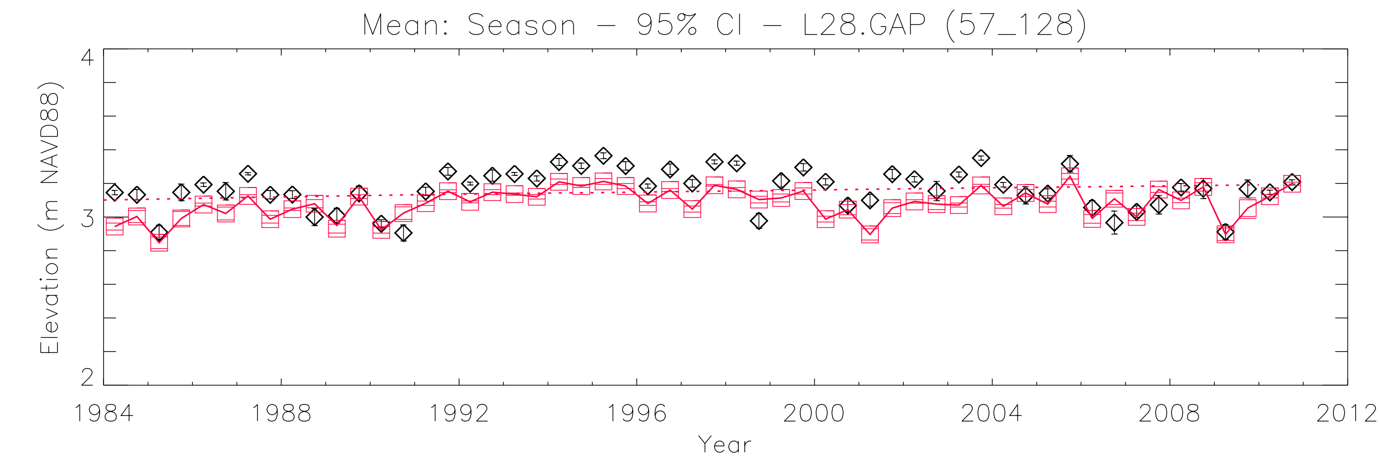

ELM3reg500 Raw Data (Obs. N = 9167) – 2B-Y (180_126)
Elevation (m NAVD88)
4
3
2
1
0
–1
–2
1984
1988
1992
1996
2000
2004
2008
2012
Year

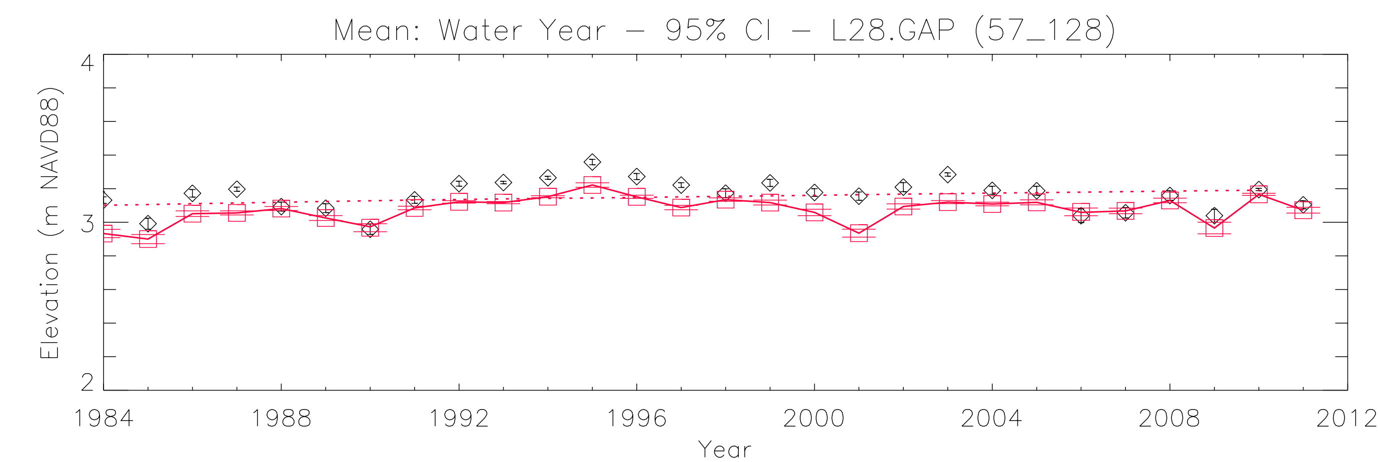

Mean: Season – 95% CI – 2B-Y (180_126)
Elevation (m NAVD88)
4
3
2
1
0
–1
–2
1984
1988
1992
1996
2000
2004
2008
2012
Year

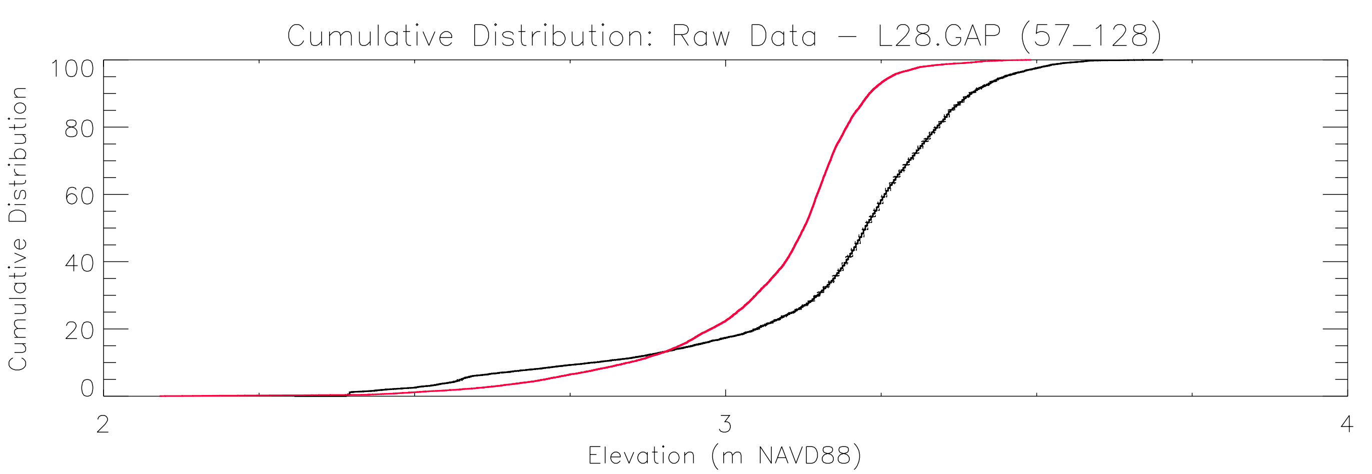

Mean: Water Year – 95% CI – 2B-Y (180_126)
Elevation (m NAVD88)
4
3
2
1
0
–1
–2
1984
1988
1992
1996
2000
2004
2008
2012
Year


Cumulative Distribution: Raw Data – 2B-Y (180_126)
Cumulative Distribution
100
80
60
40
20
0
–2
–1
0
1
2
3
4
Elevation (m NAVD88)

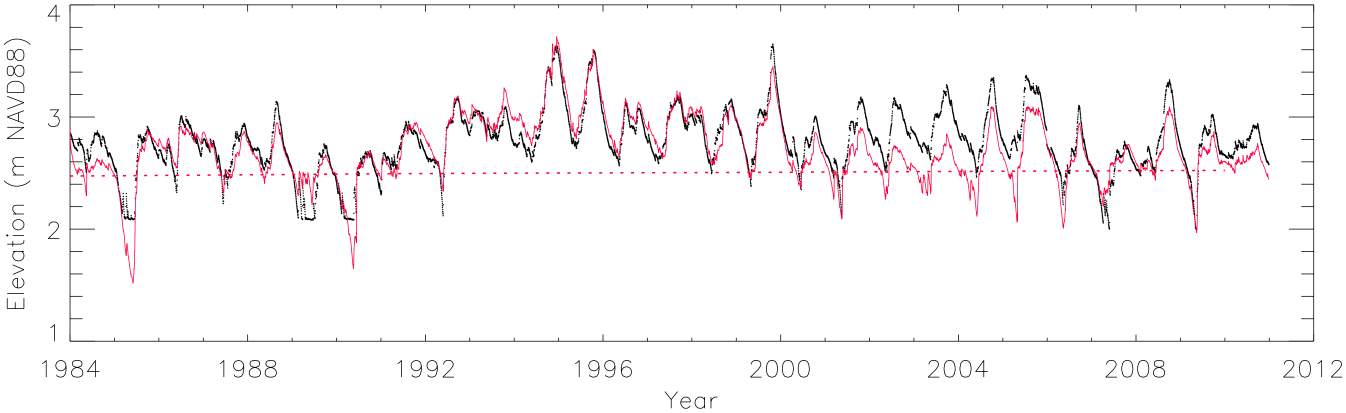

ELM3reg500 Raw Data (Obs. N = 9765) – L28.GAP (57_128)
Elevation (m NAVD88)
4
3
2
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Season – 95% CI – L28.GAP (57_128)
Elevation (m NAVD88)
4
3
2
1984
1988
1992
1996
2000
2004
2008
2012
Year

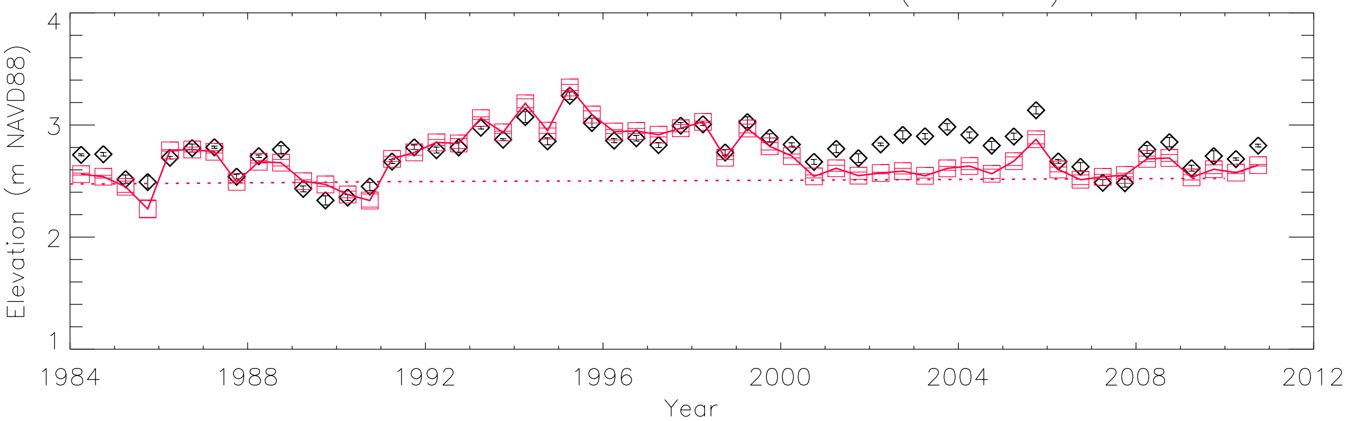

Mean: Water Year – 95% CI – L28.GAP (57_128)
Elevation (m NAVD88)
4
3
2
1984
1988
1992
1996
2000
2004
2008
2012
Year


Cumulative Distribution: Raw Data – L28.GAP (57_128)
Cumulative Distribution
100
80
60
40
20
0
2
3
4
Elevation (m NAVD88)

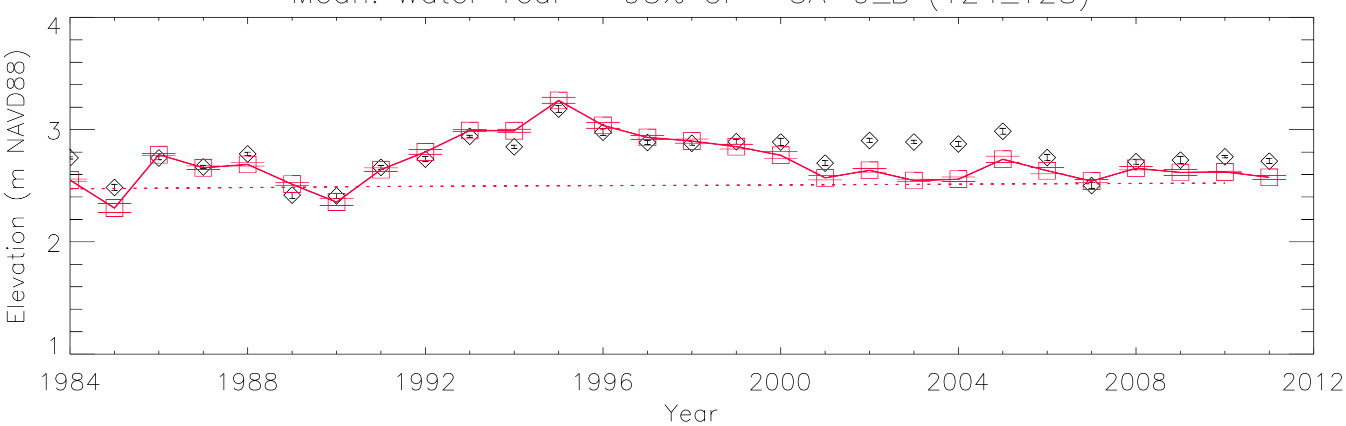
ELM3reg500 Raw Data (Obs. N = 9852) – 3A-9_B (124_128)



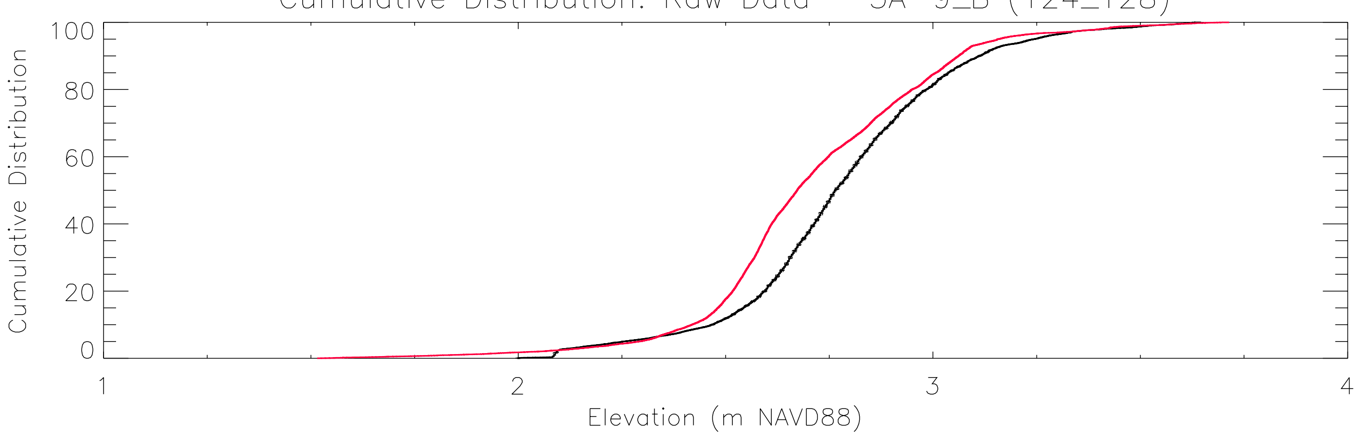
Mean: Season – 95% CI – 3A-9_B (124_128)

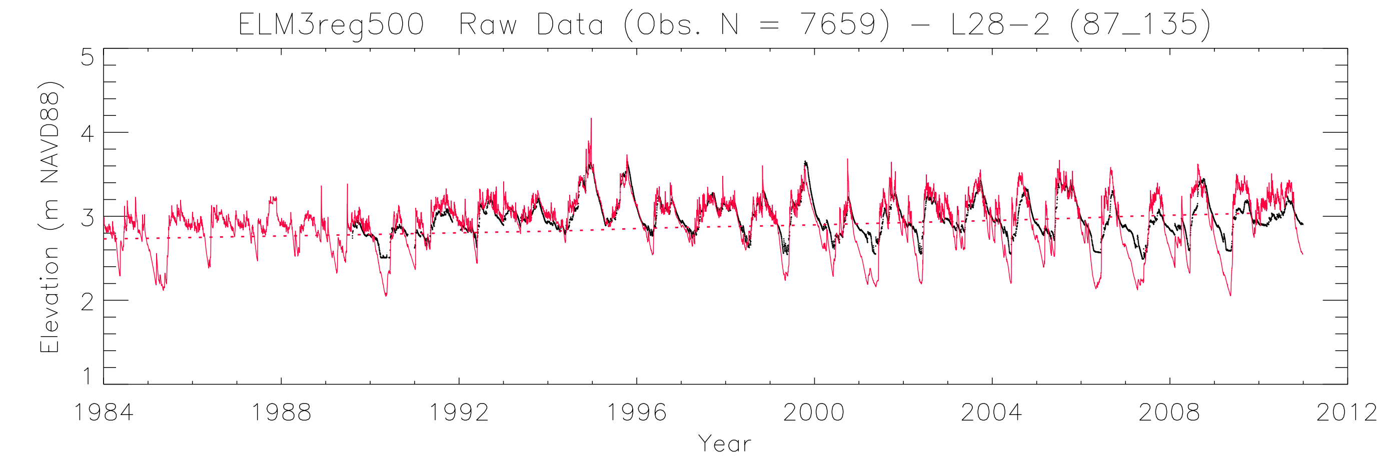


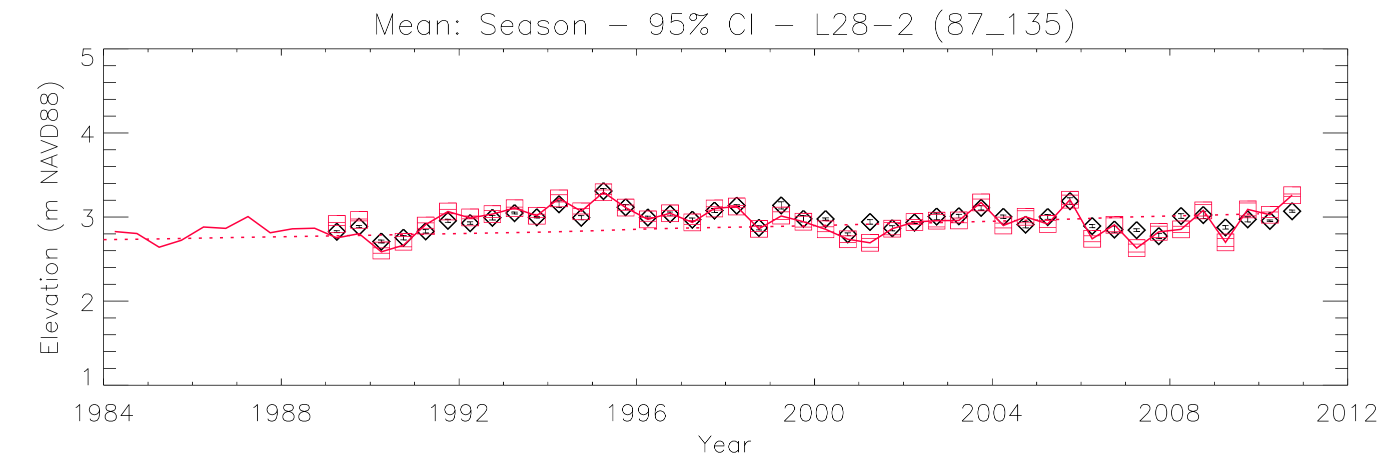
Mean: Water Year – 95% CI – 3A-9_B (124_128)

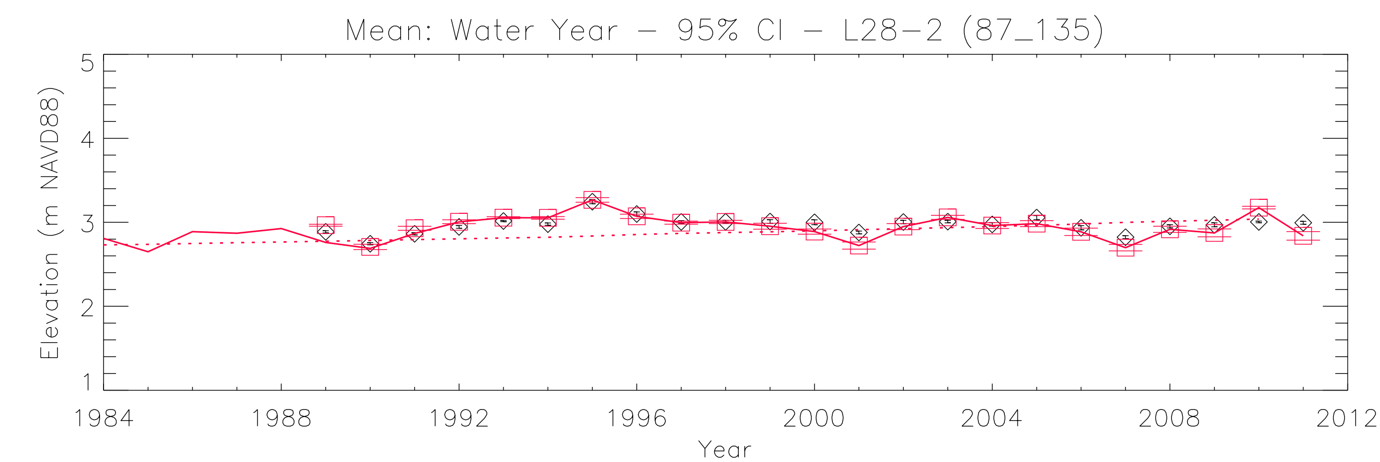


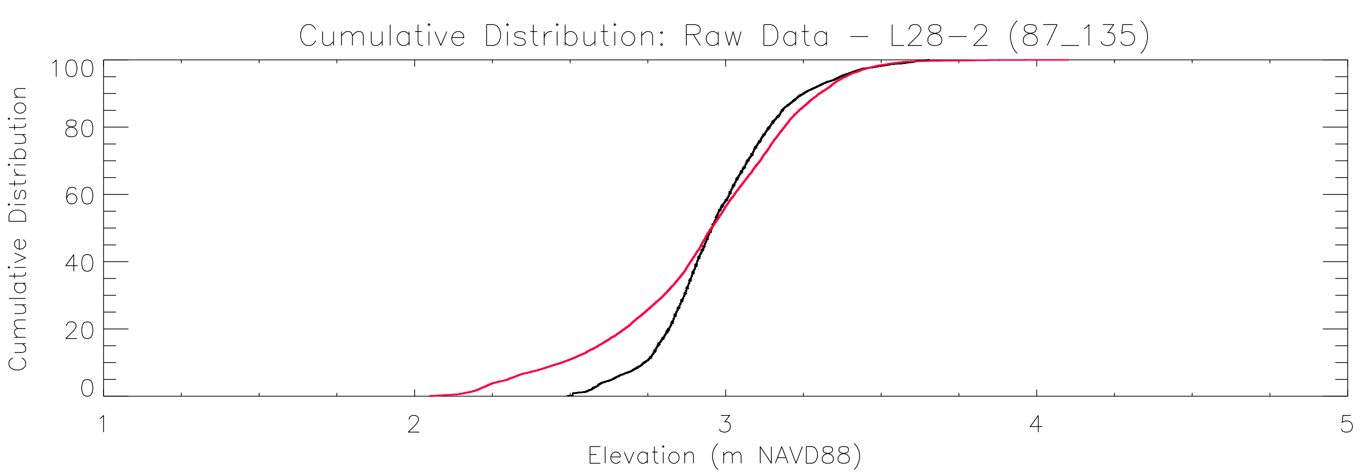
Cumulative Distribution: Raw Data – 3A-9_B (124_128)

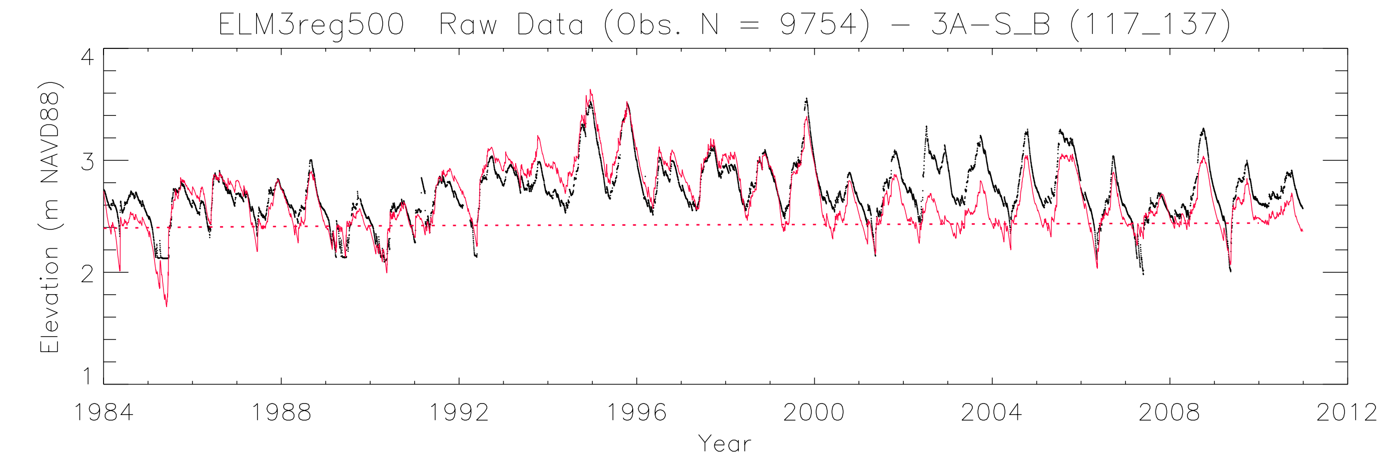



ELM3reg500 Raw Data (Obs. N = 7659) – L28–2 (87_135)
Elevation (m NAVD88)
Year

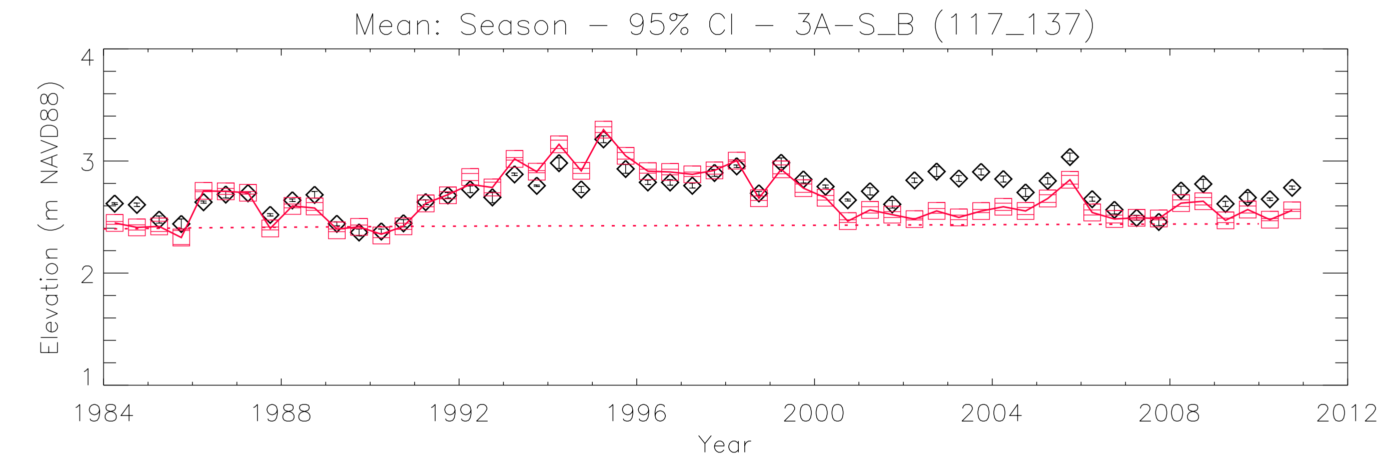

Mean: Season – 95% CI – L28–2 (87_135)
Elevation (m NAVD88)
Year


Mean: Water Year – 95% CI – L28–2 (87_135)
Elevation (m NAVD88)
Year

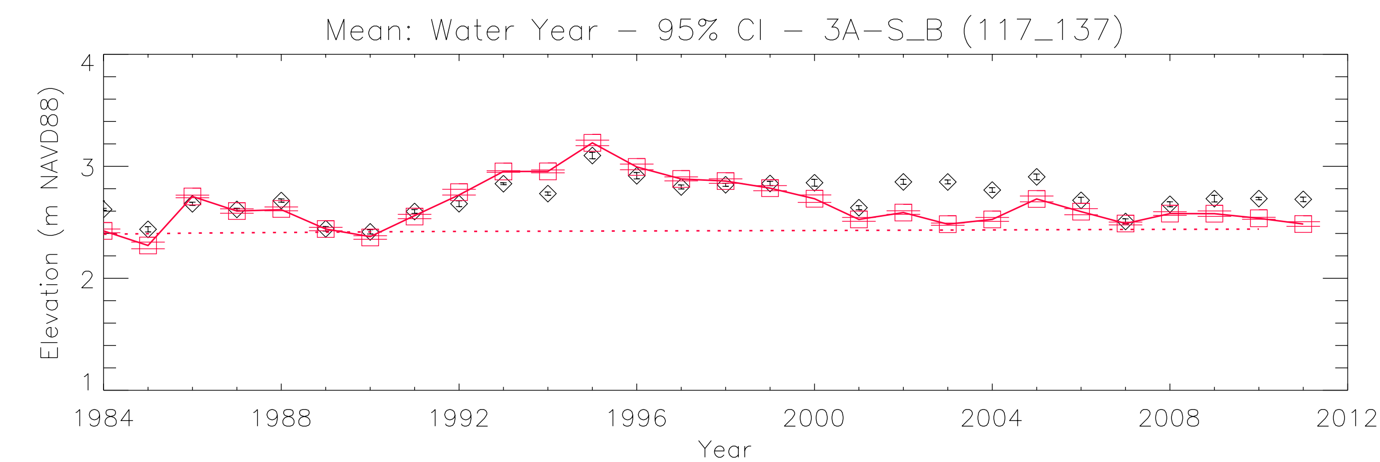

Cumulative Distribution: Raw Data – L28–2 (87_135)
Cumulative Distribution
Elevation (m NAVD88)



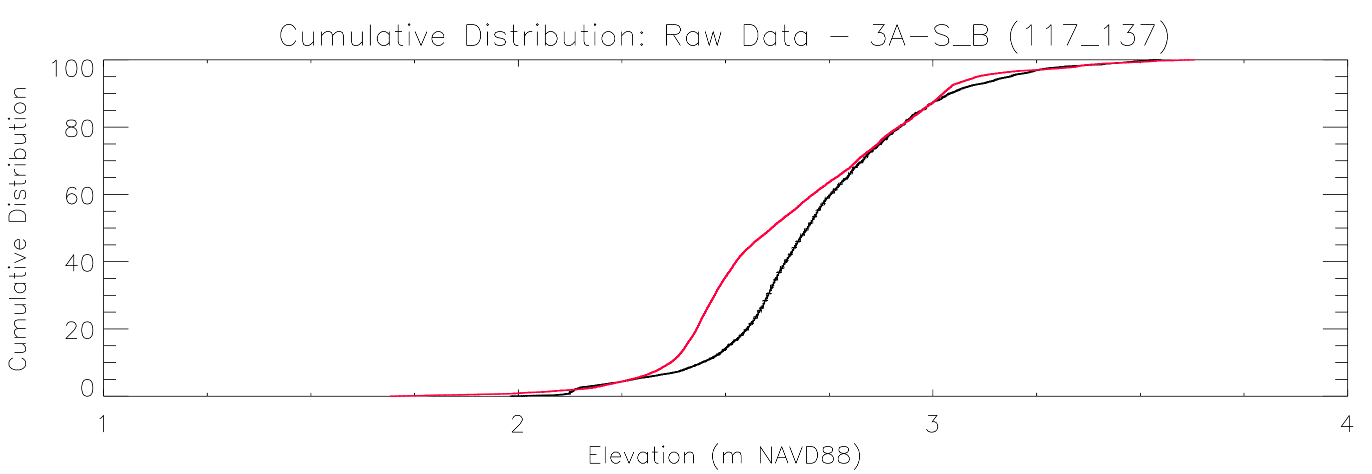
ELM3reg500 Raw Data (Obs. N = 9754) − 3A−S_B (117_137)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year



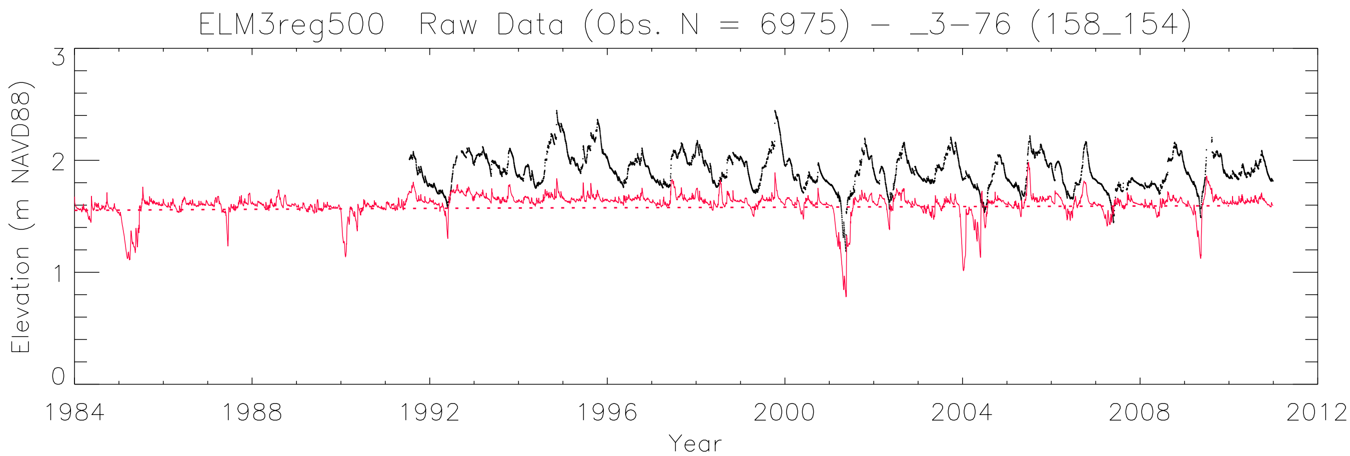
Mean: Season − 95% CI − 3A−S_B (117_137)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year

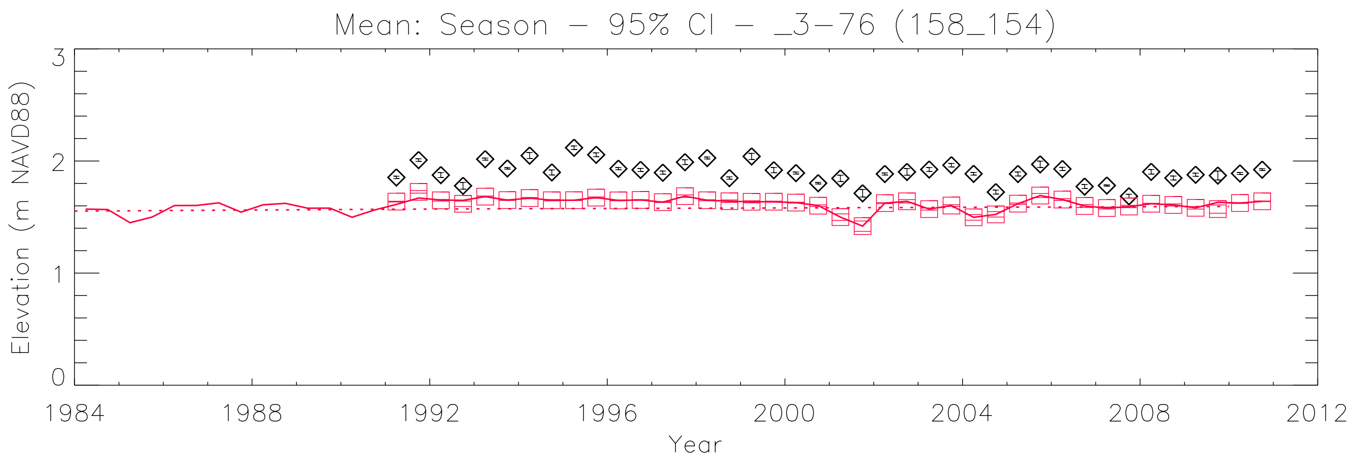


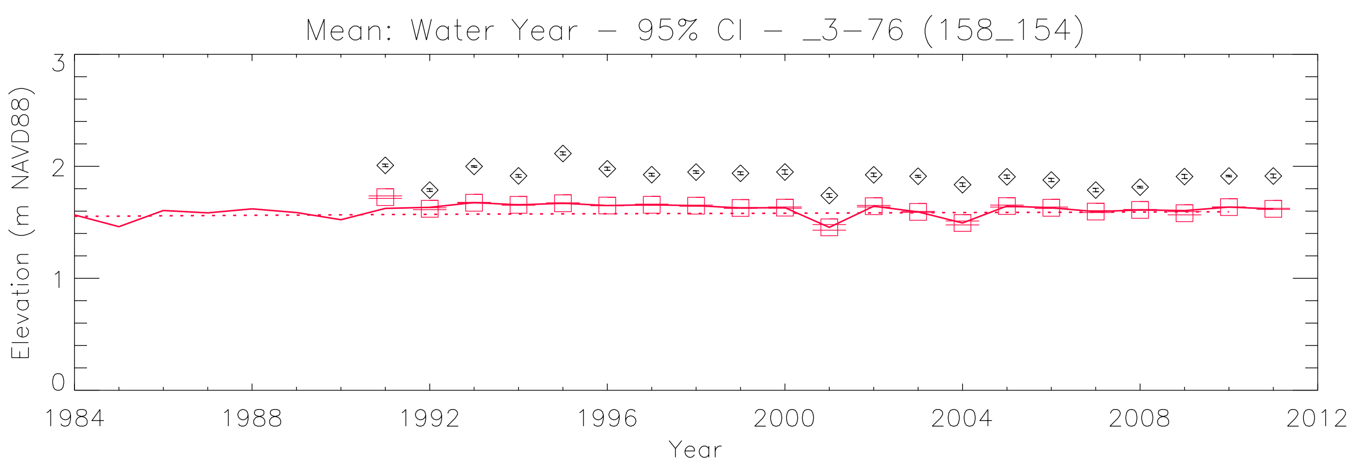
Mean: Water Year − 95% CI − 3A−S_B (117_137)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year

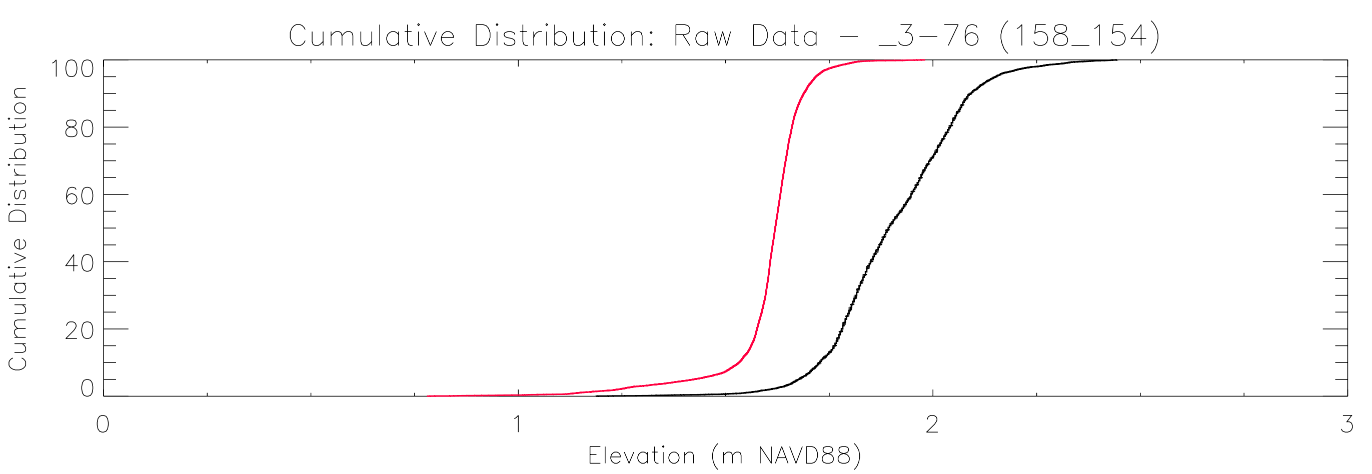


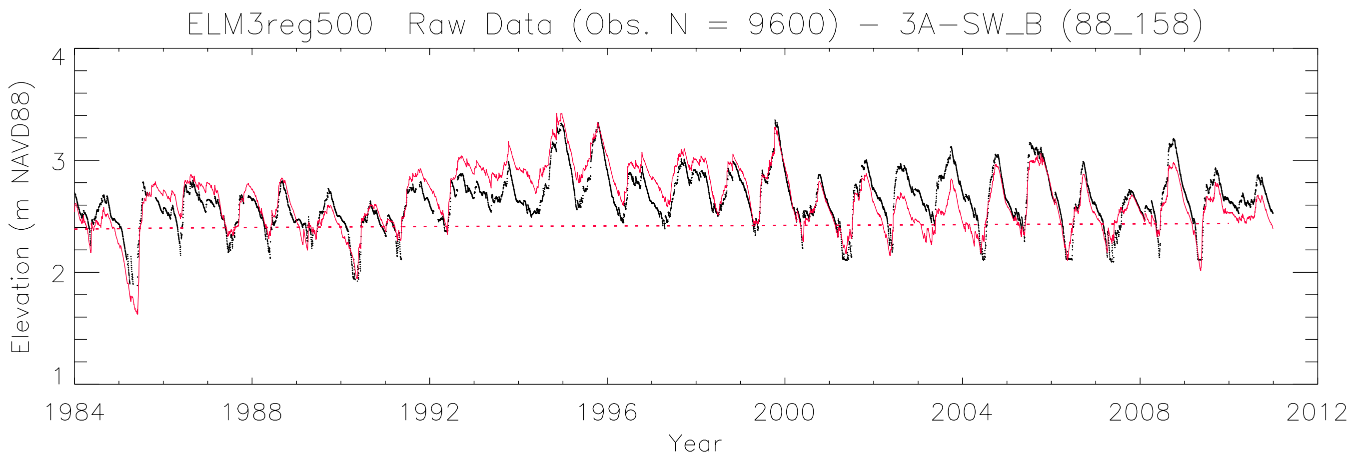
Cumulative Distribution: Raw Data − 3A−S_B (117_137)
Cumulative Distribution
0
20
40
60
80
100
1
2
3
4
Elevation (m NAVD88)

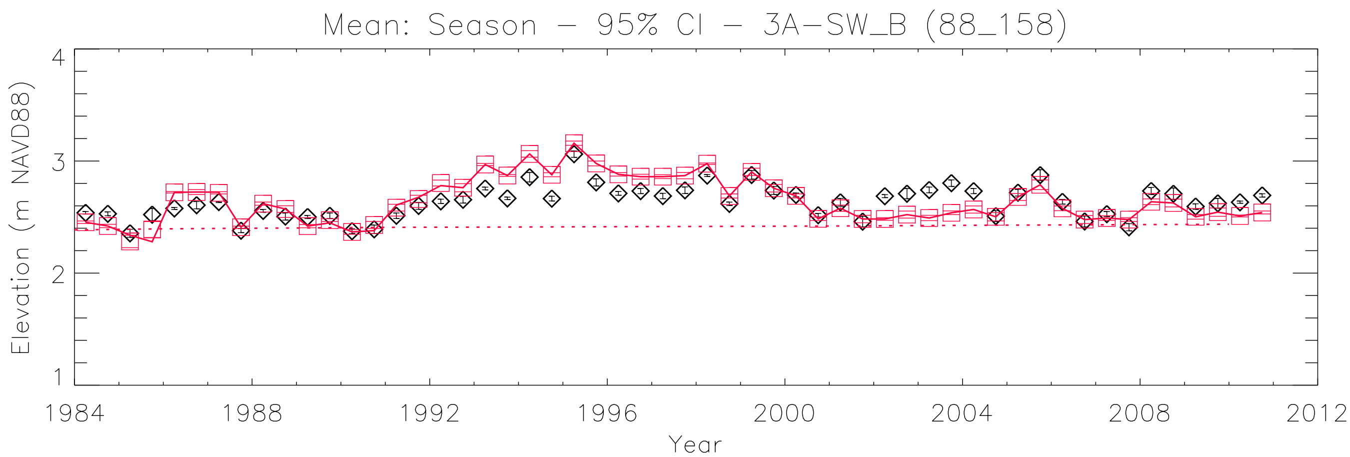

ELM3reg500 Raw Data (Obs. N = 6975) – _3-76 (158_154)
Elevation (m NAVD88)
Year

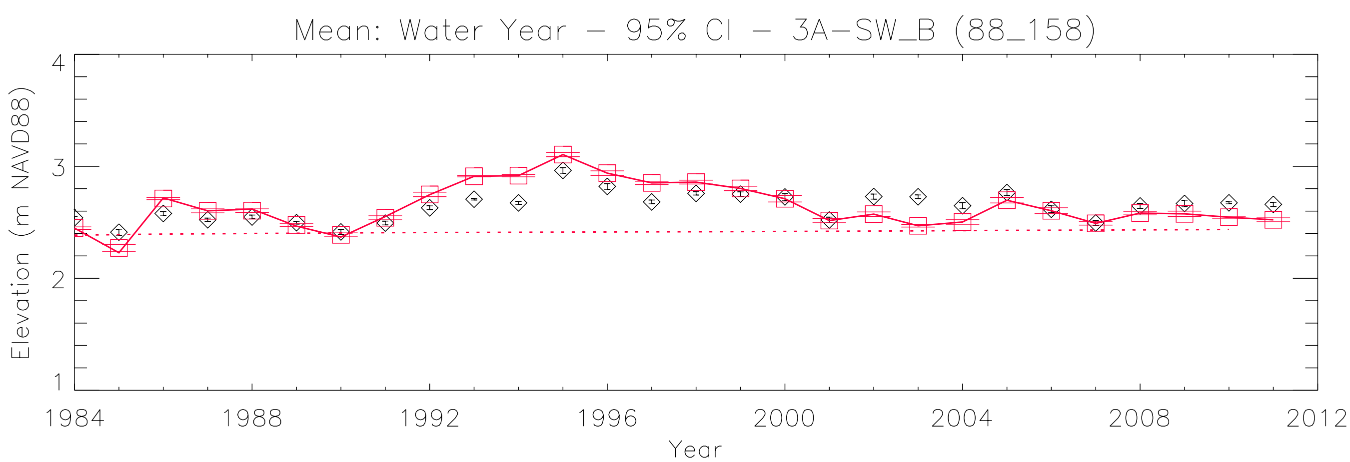

Mean: Season – 95% CI – _3-76 (158_154)
Elevation (m NAVD88)
Year

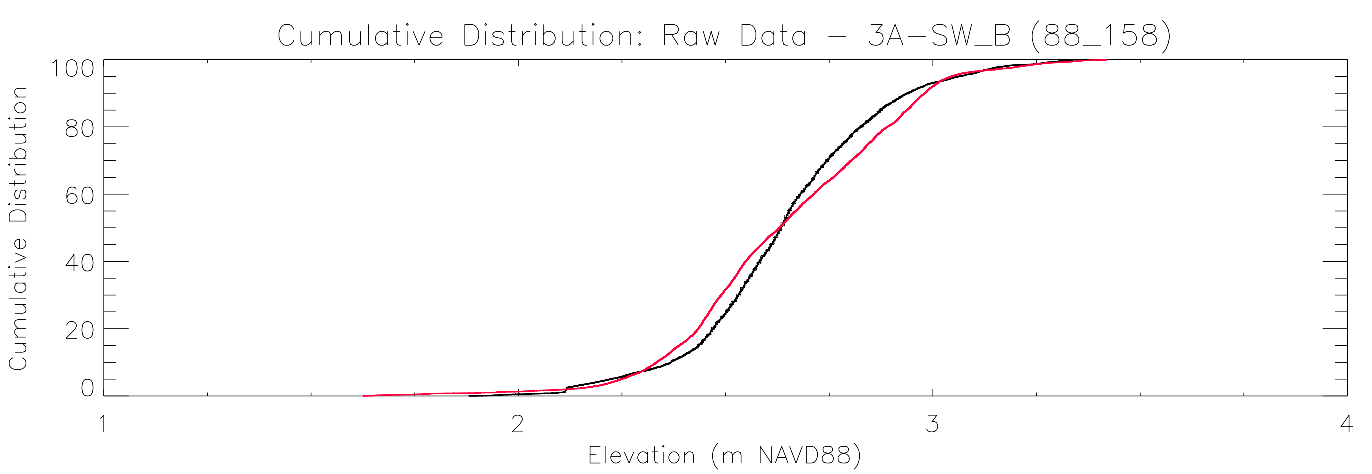

Mean: Water Year – 95% CI – _3-76 (158_154)
Elevation (m NAVD88)
Year

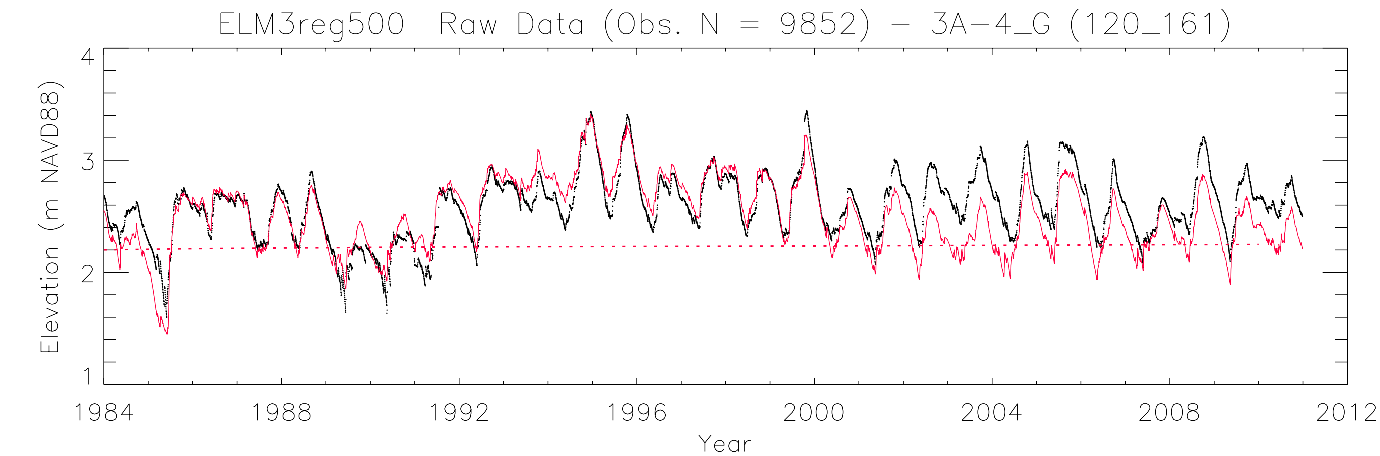

Cumulative Distribution: Raw Data – _3-76 (158_154)
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 9600) – 3A–SW_B (88_158)
Elevation (m NAVD88)
Year

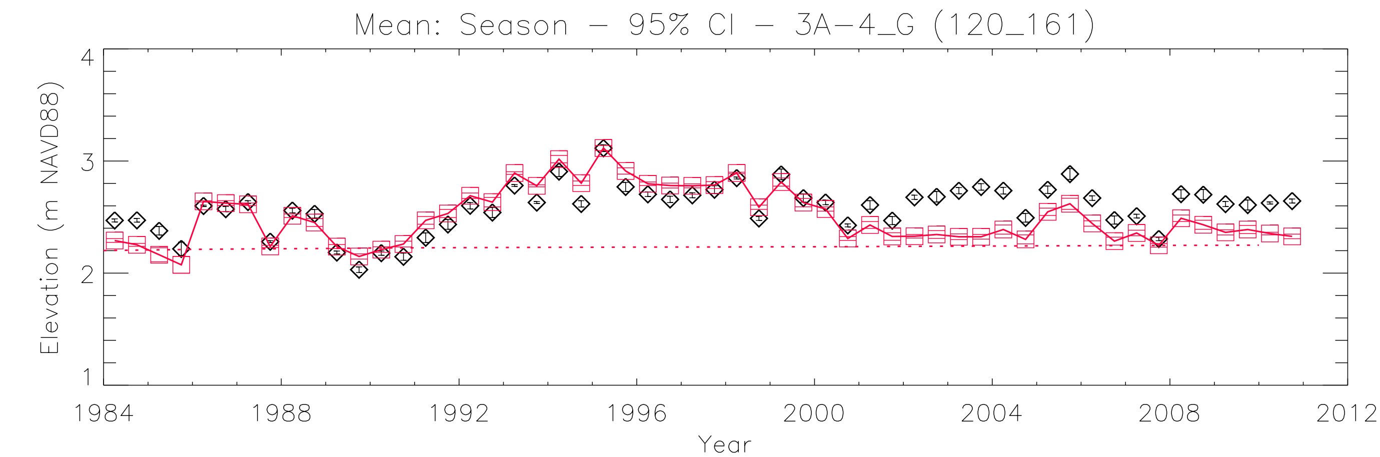

Mean: Season – 95% CI – 3A–SW_B (88_158)
Elevation (m NAVD88)
Year


Mean: Water Year – 95% CI – 3A–SW_B (88_158)
Elevation (m NAVD88)
Year

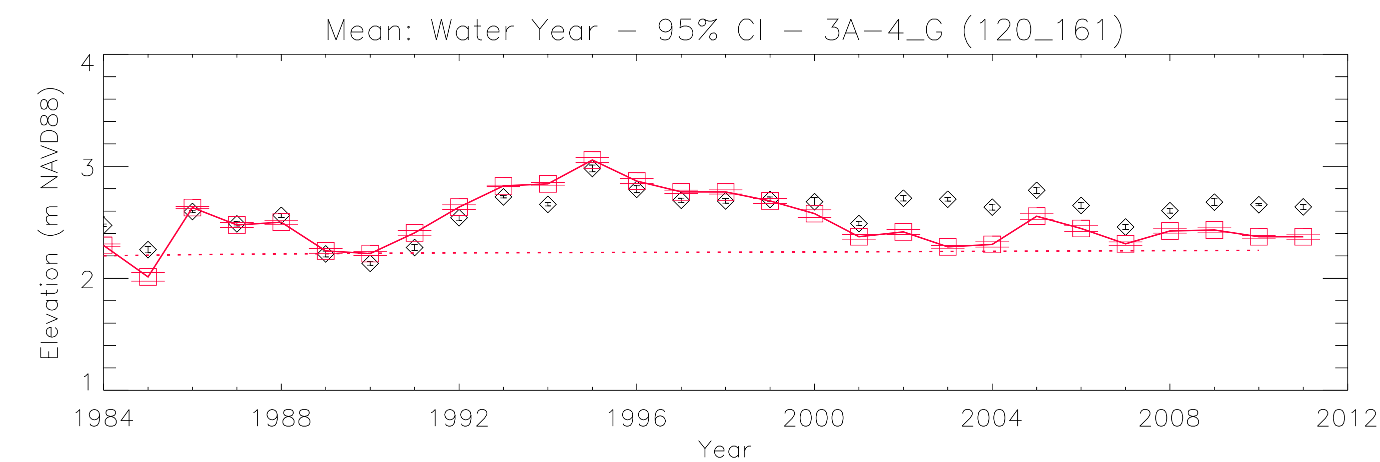

Cumulative Distribution: Raw Data – 3A–SW_B (88_158)
Cumulative Distribution
Elevation (m NAVD88)



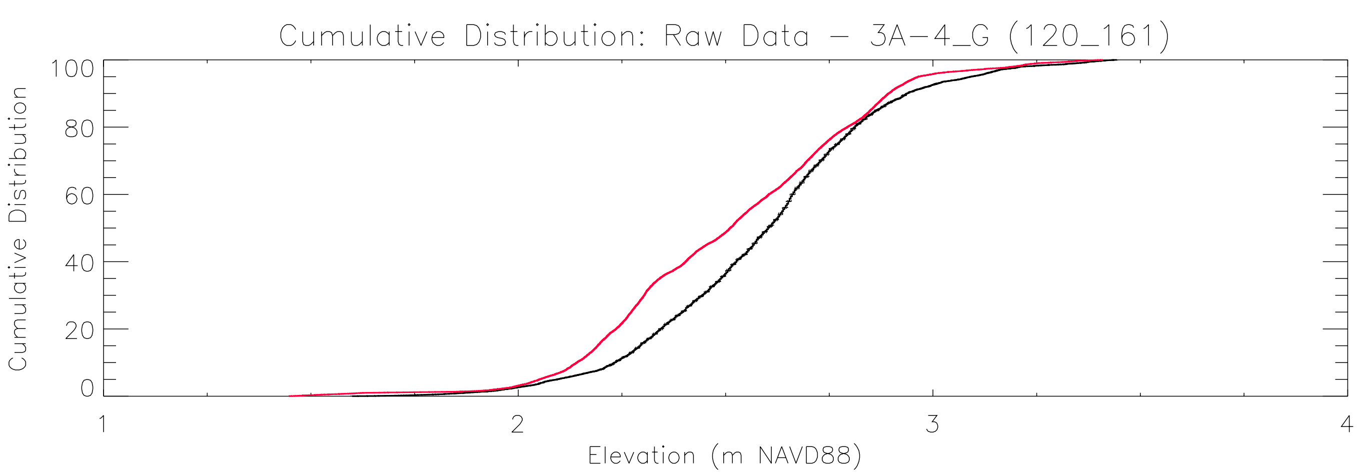
ELM3reg500 Raw Data (Obs. N = 9852) – 3A–4_G (120_161)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year



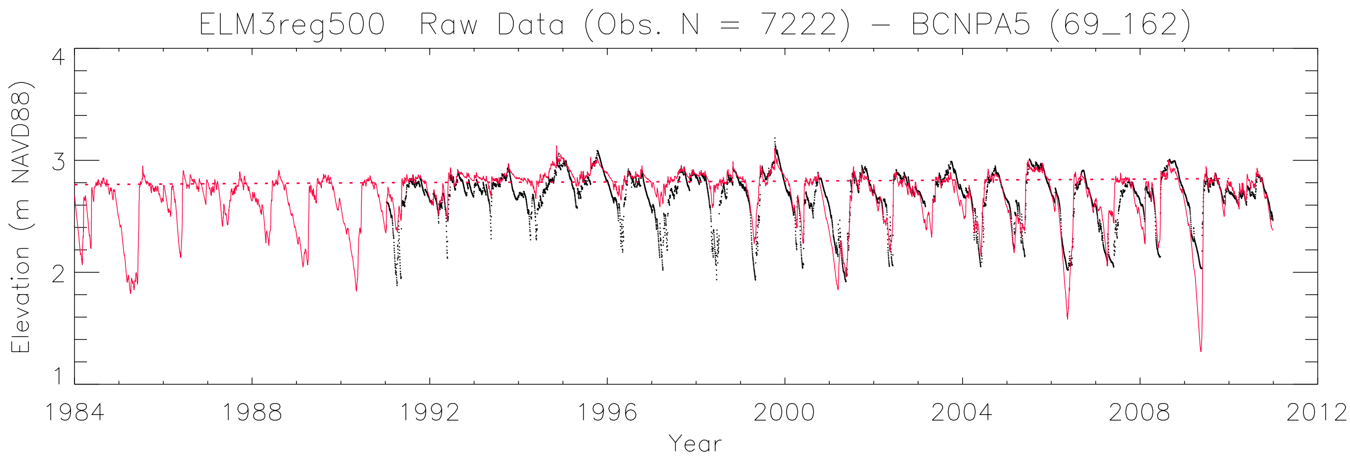
Mean: Season – 95% CI – 3A–4_G (120_161)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year

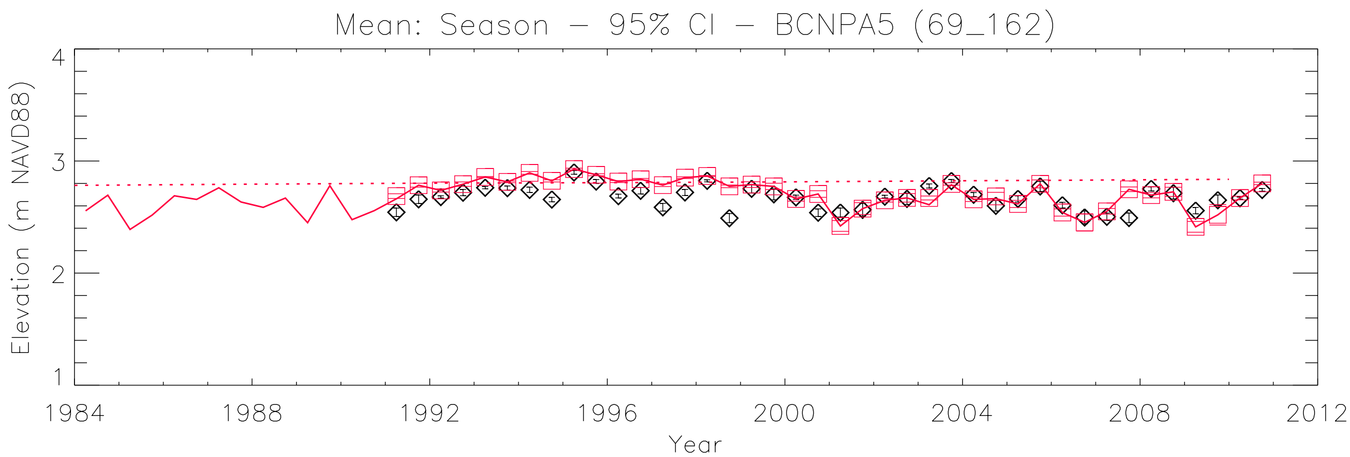


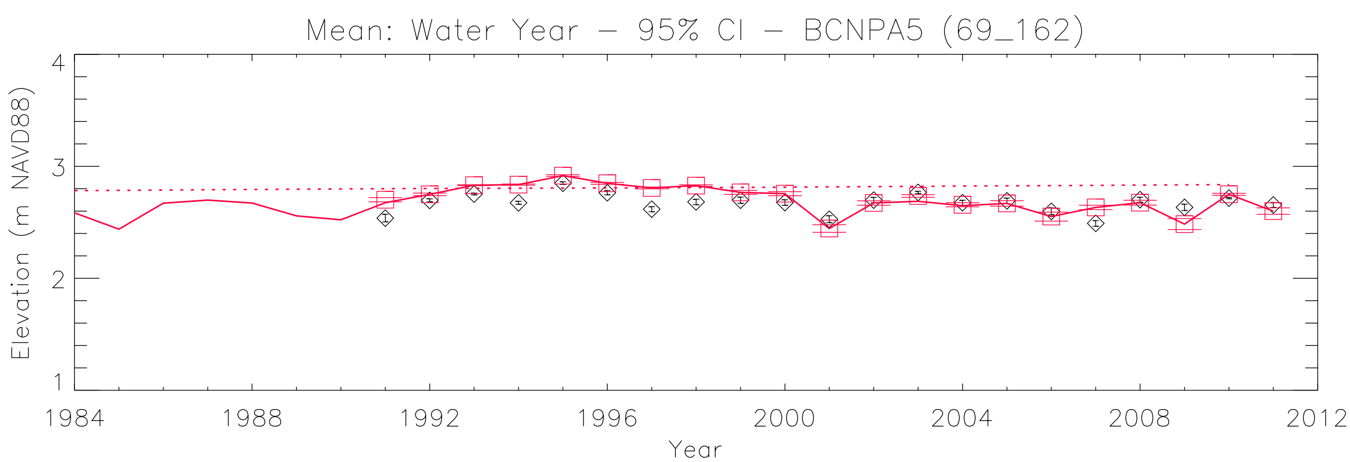
Mean: Water Year – 95% CI – 3A–4_G (120_161)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year

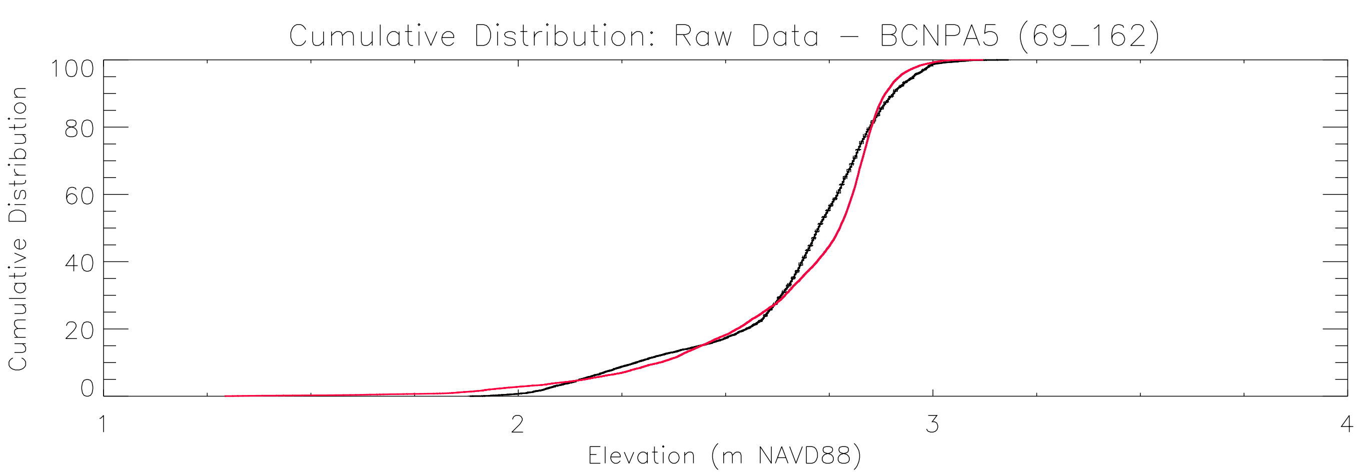


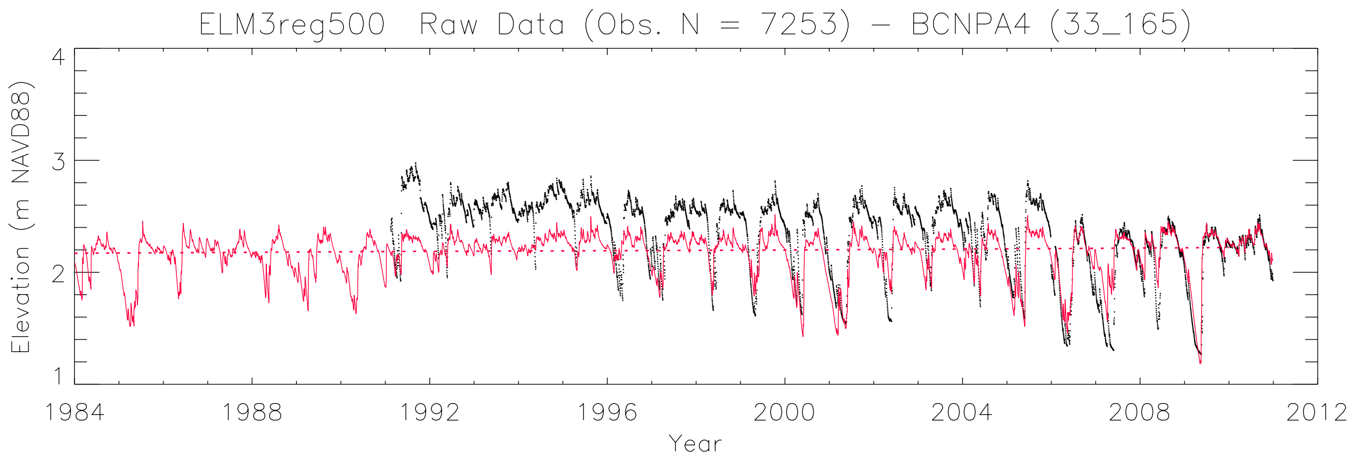
Cumulative Distribution: Raw Data – 3A–4_G (120_161)
Cumulative Distribution
0
20
40
60
80
100
1
2
3
4
Elevation (m NAVD88)

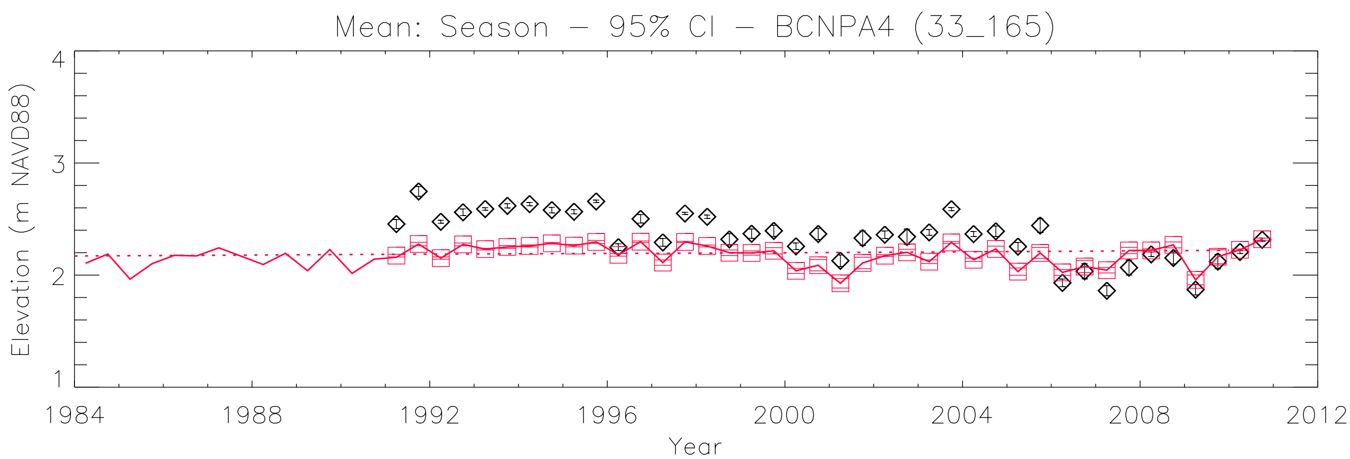

ELM3reg500 Raw Data (Obs. N = 7222) − BCNPA5 (69_162)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012

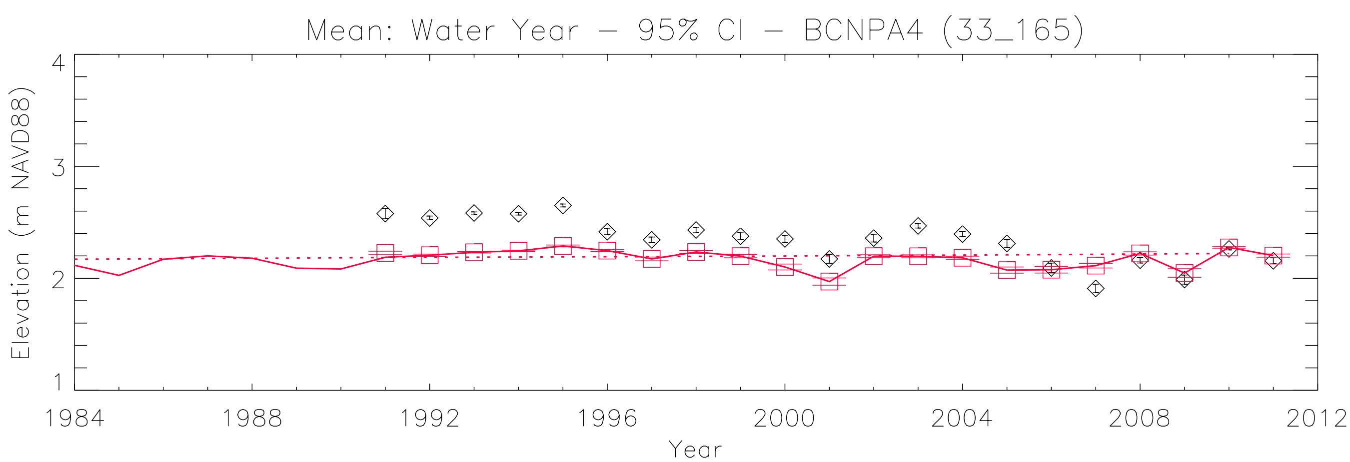

Mean: Season − 95% CI − BCNPA5 (69_162)
Elevation (m NAVD88)
Year

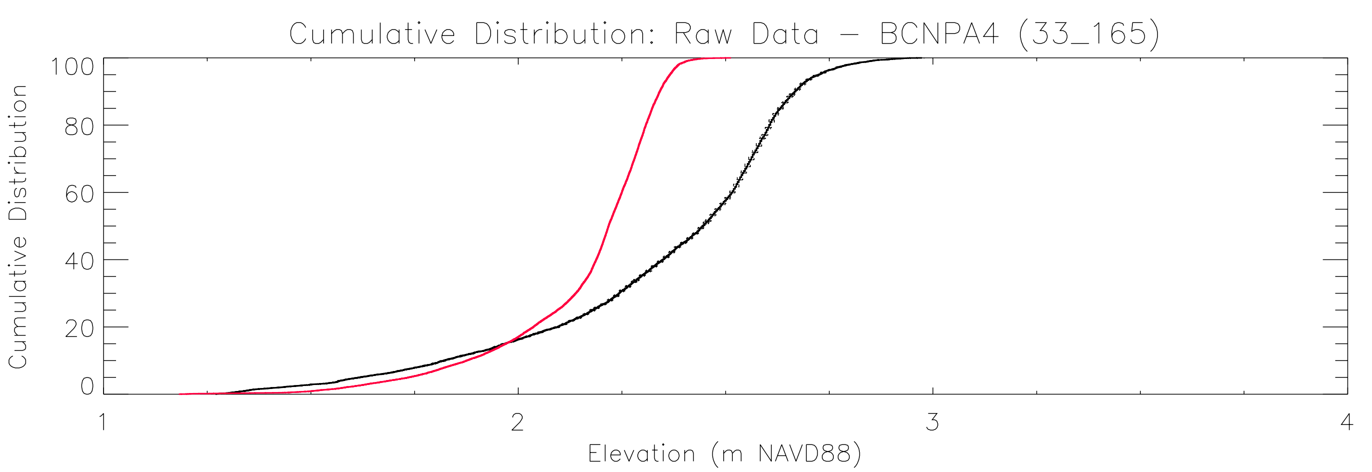

Mean: Water Year − 95% CI − BCNPA5 (69_162)
Elevation (m NAVD88)
Year

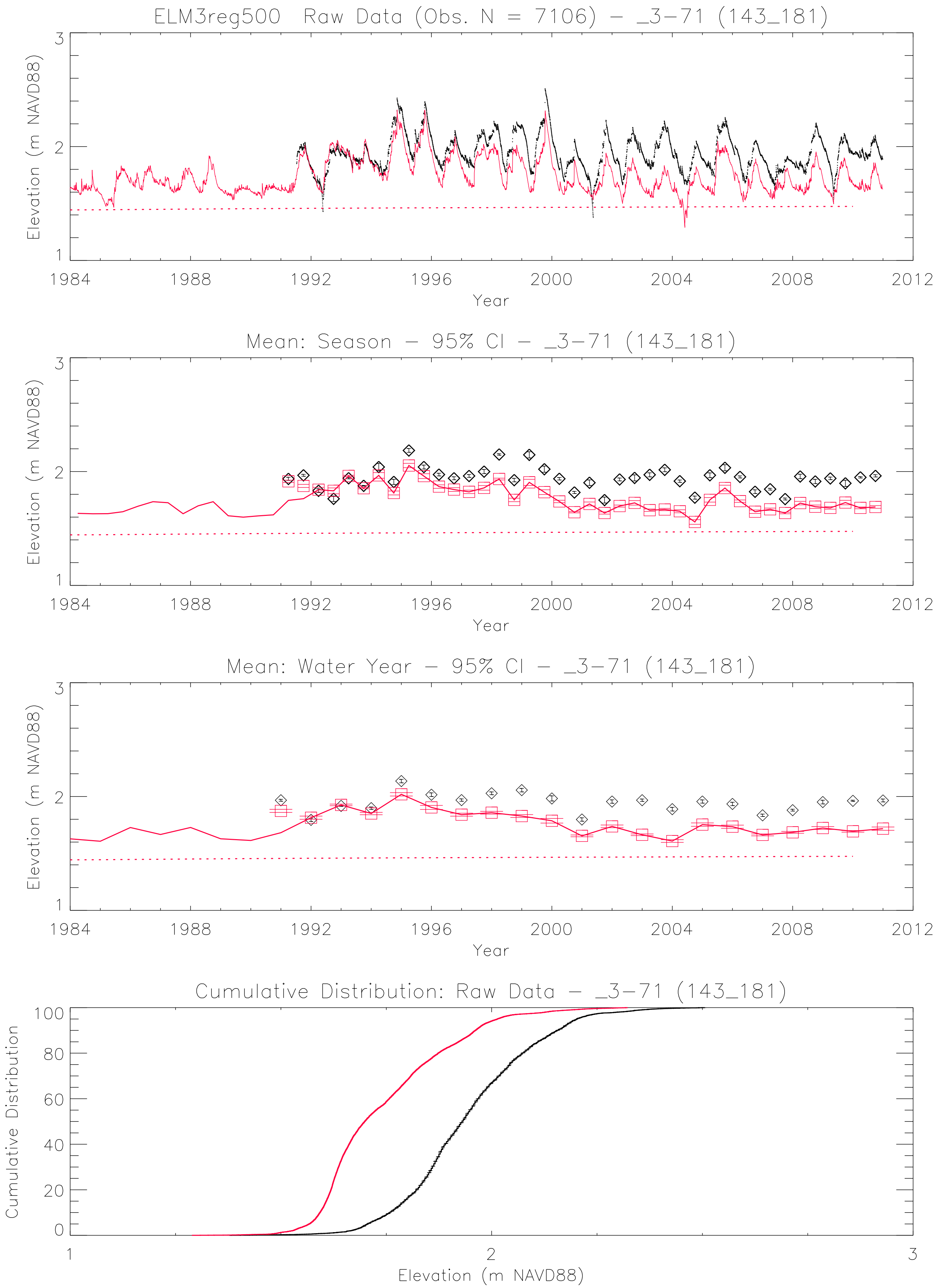

Cumulative Distribution: Raw Data − BCNPA5 (69_162)
Cumulative Distribution
Elevation (m NAVD88)

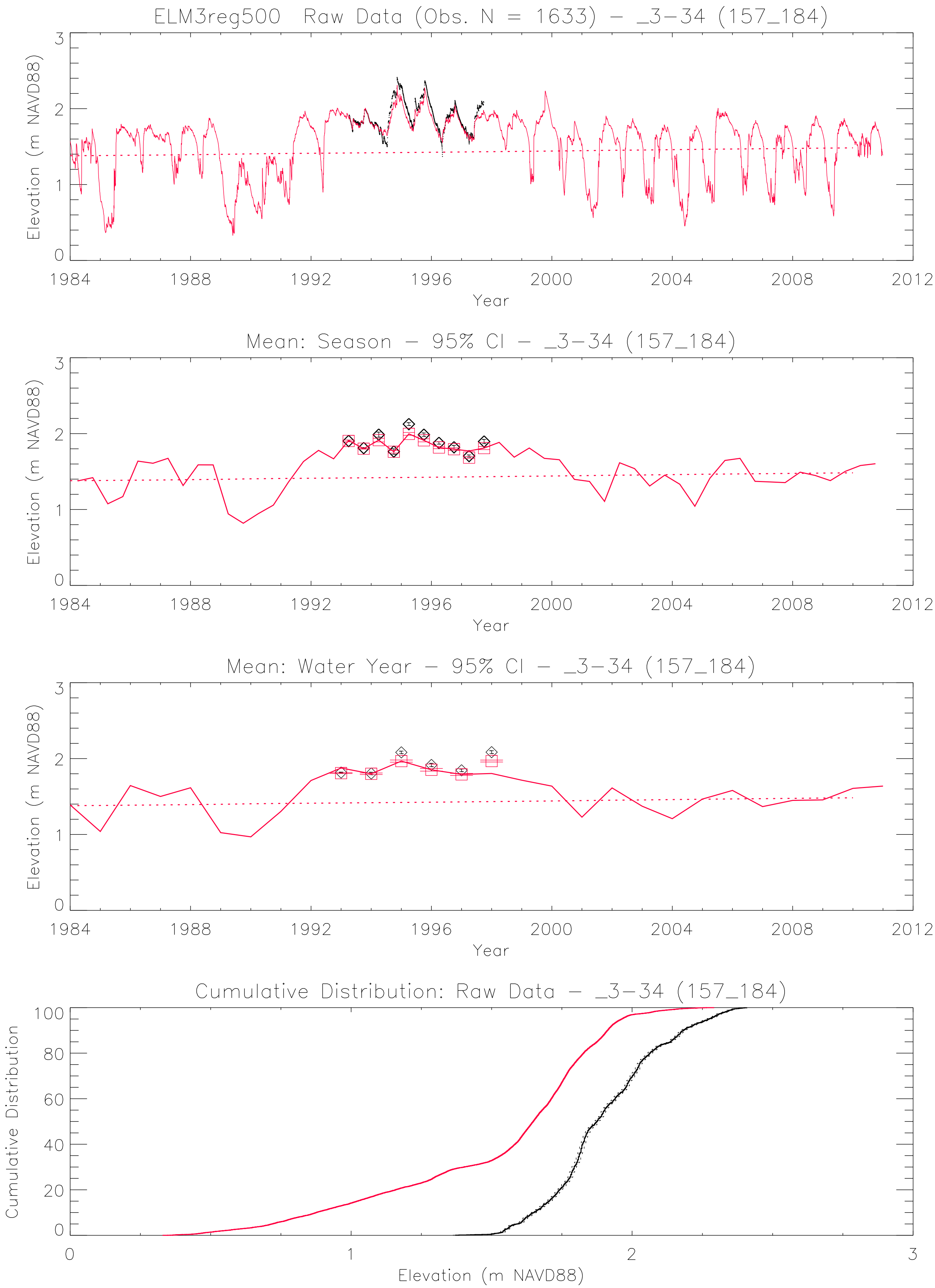

ELM3reg500 Raw Data (Obs. N = 7253) – BCNPA4 (33_165)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012


Mean: Season – 95% CI – BCNPA4 (33_165)
Elevation (m NAVD88)
Year

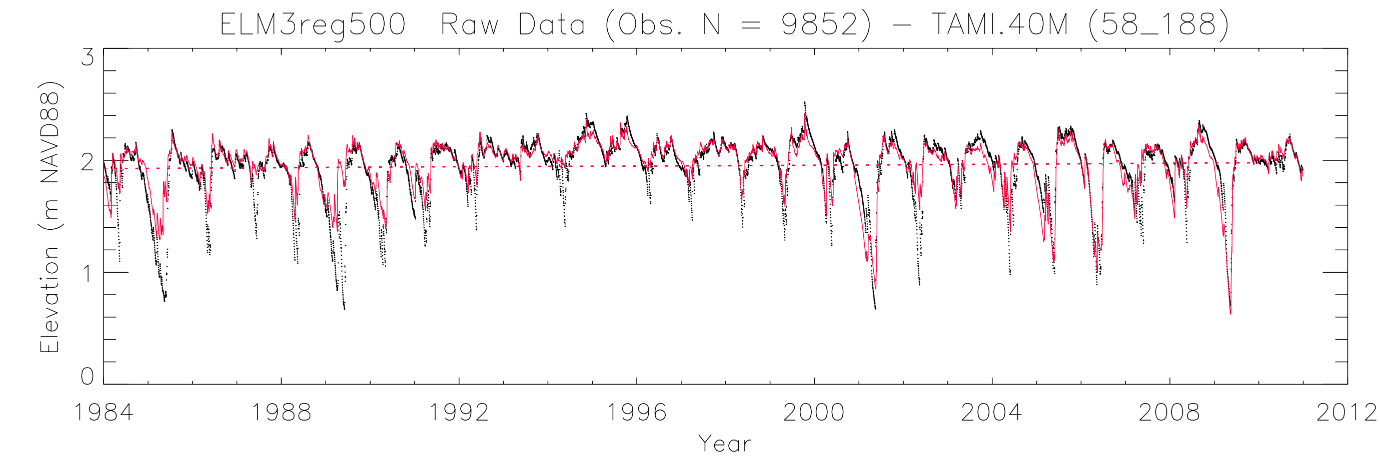

Mean: Water Year – 95% CI – BCNPA4 (33_165)
Elevation (m NAVD88)
Year

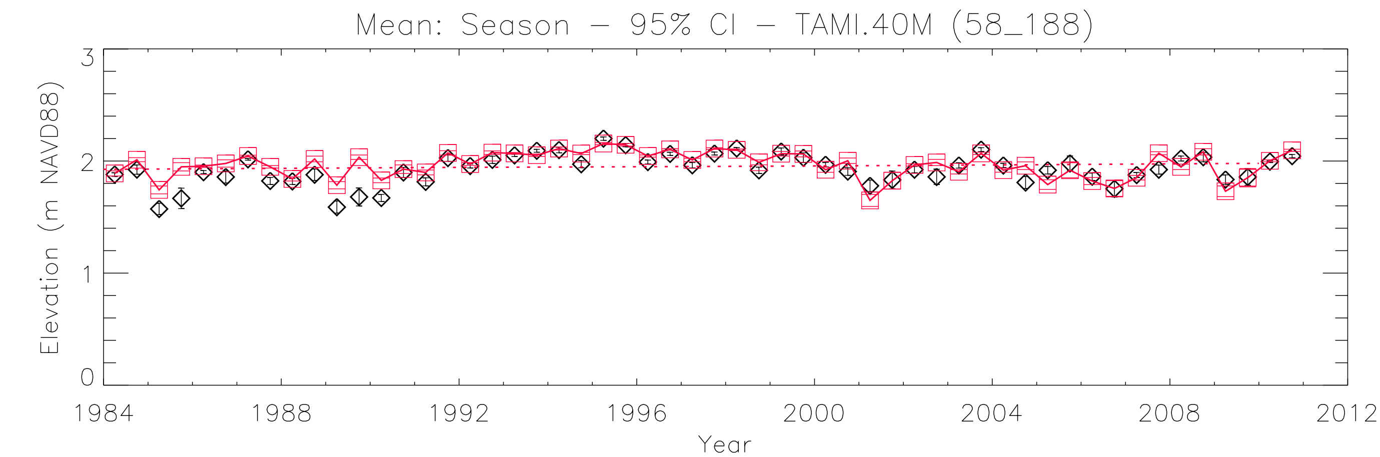

Cumulative Distribution: Raw Data – BCNPA4 (33_165)
Cumulative Distribution
Elevation (m NAVD88)

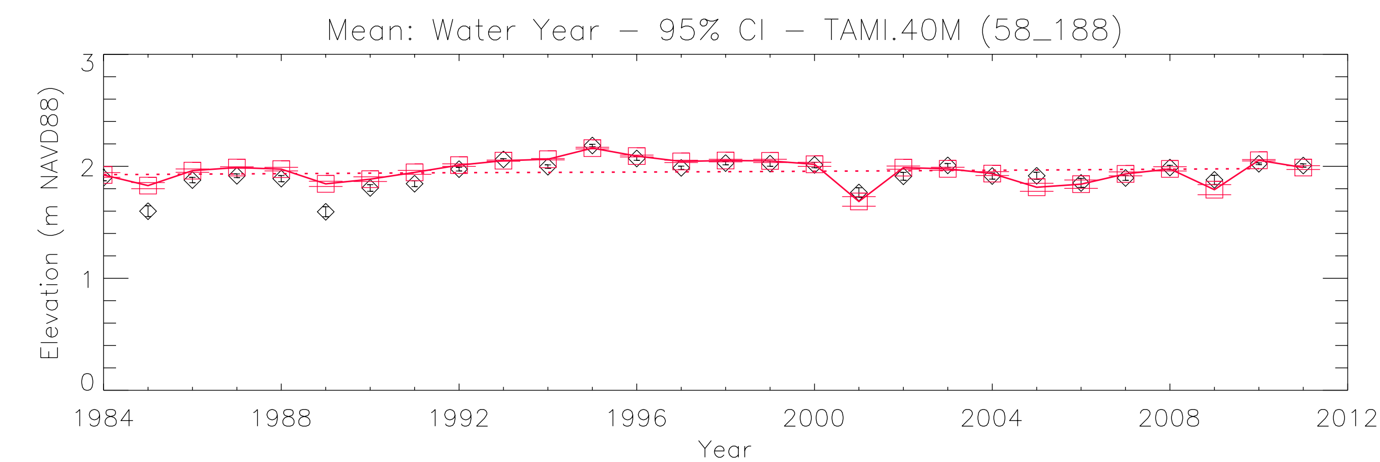

ELM3reg500 Raw Data (Obs. N = 7106) – _3–71 (143_181)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – _3–71 (143_181)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – _3–71 (143_181)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – _3–71 (143_181)
Cumulative Distribution
Elevation (m NAVD88)

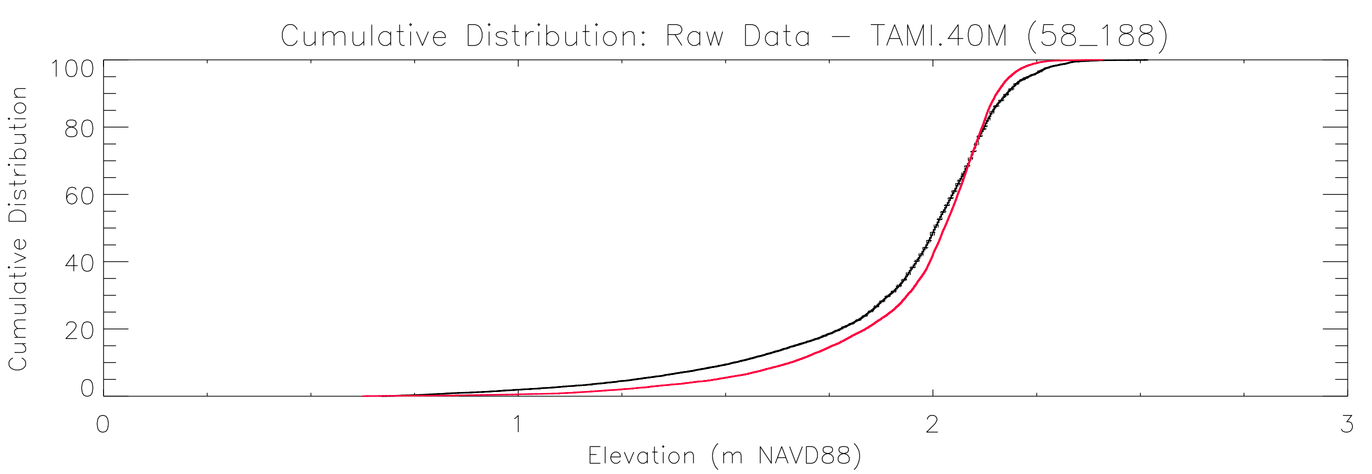


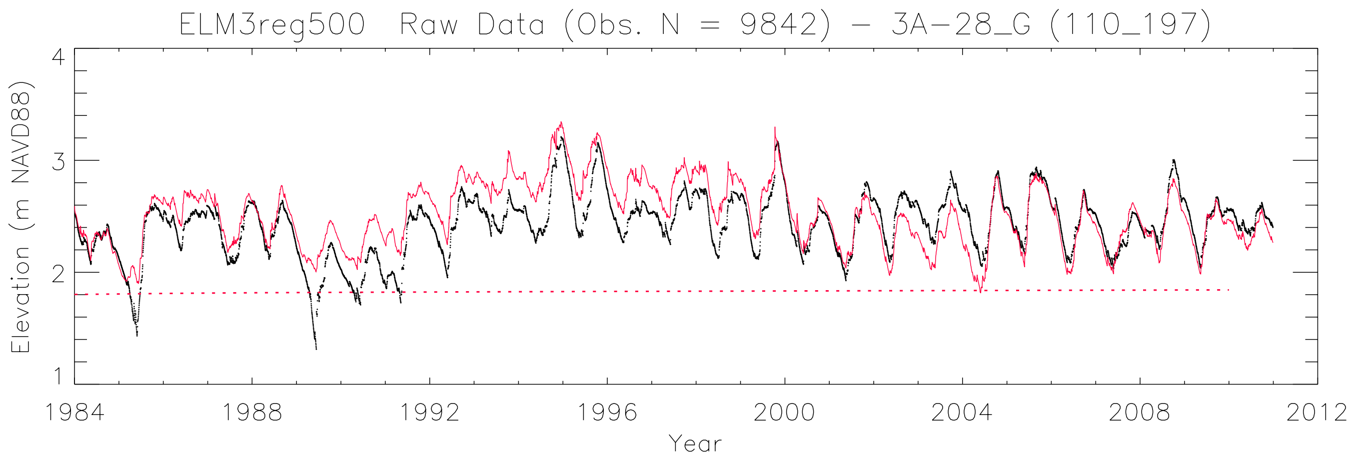
ELM3reg500 Raw Data (Obs. N = 1633) – _3–34 (157_184)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – _3–34 (157_184)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – _3–34 (157_184)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – _3–34 (157_184)
Cumulative Distribution
Elevation (m NAVD88)

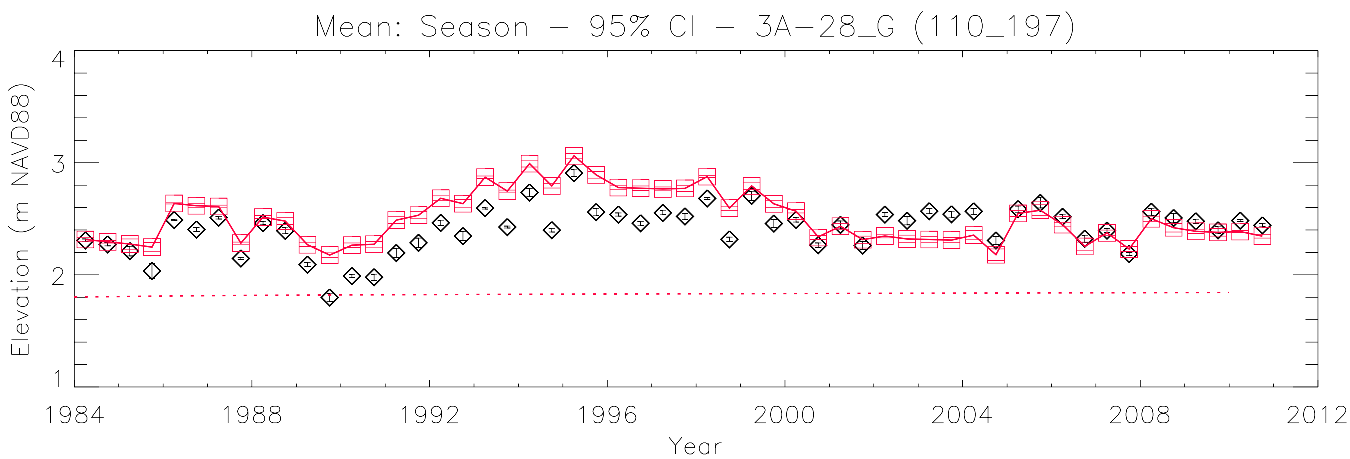

ELM3reg500 Raw Data (Obs. N = 9852) – TAMI.40M (58_188)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

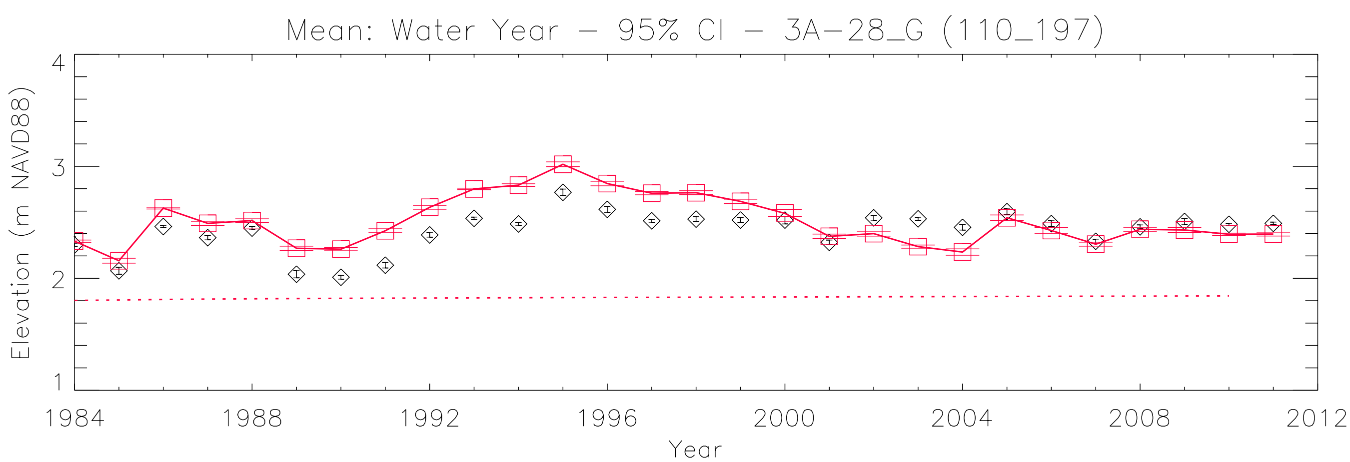

Mean: Season – 95% CI – TAMI.40M (58_188)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

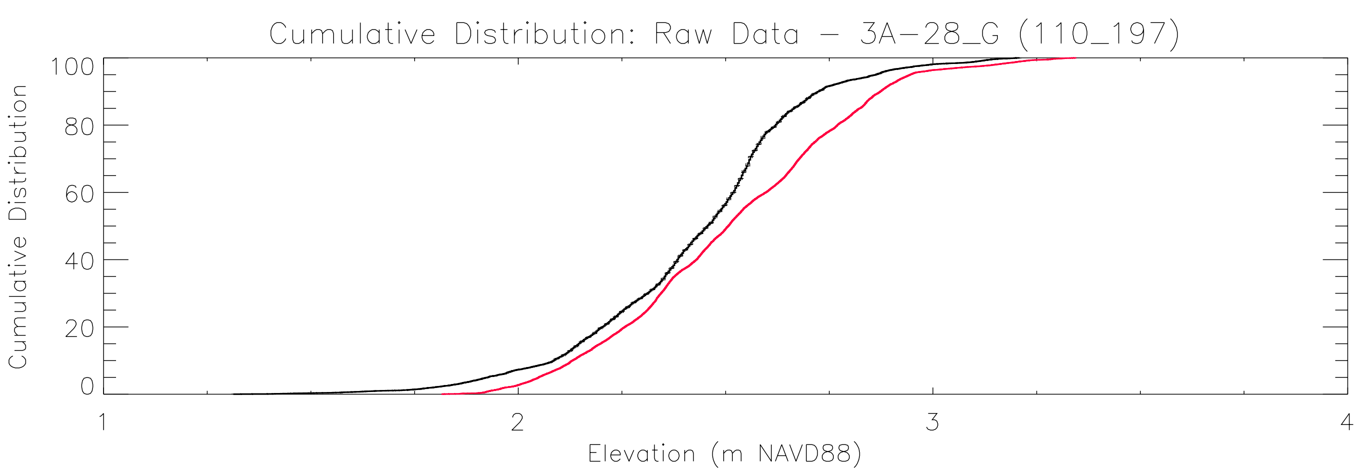

Mean: Water Year – 95% CI – TAMI.40M (58_188)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

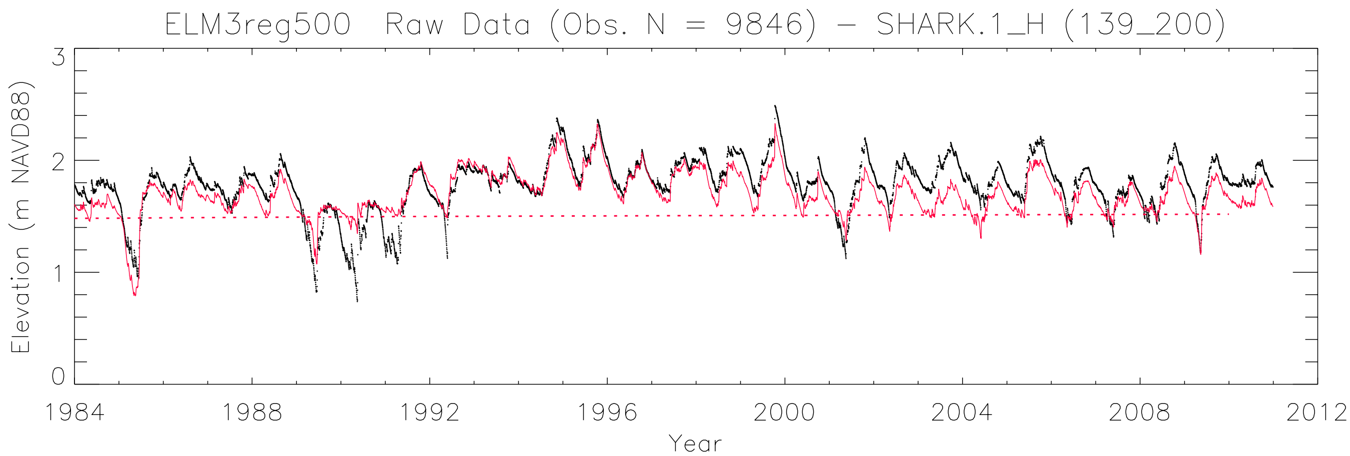

Cumulative Distribution: Raw Data – TAMI.40M (58_188)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
0
1
2
3

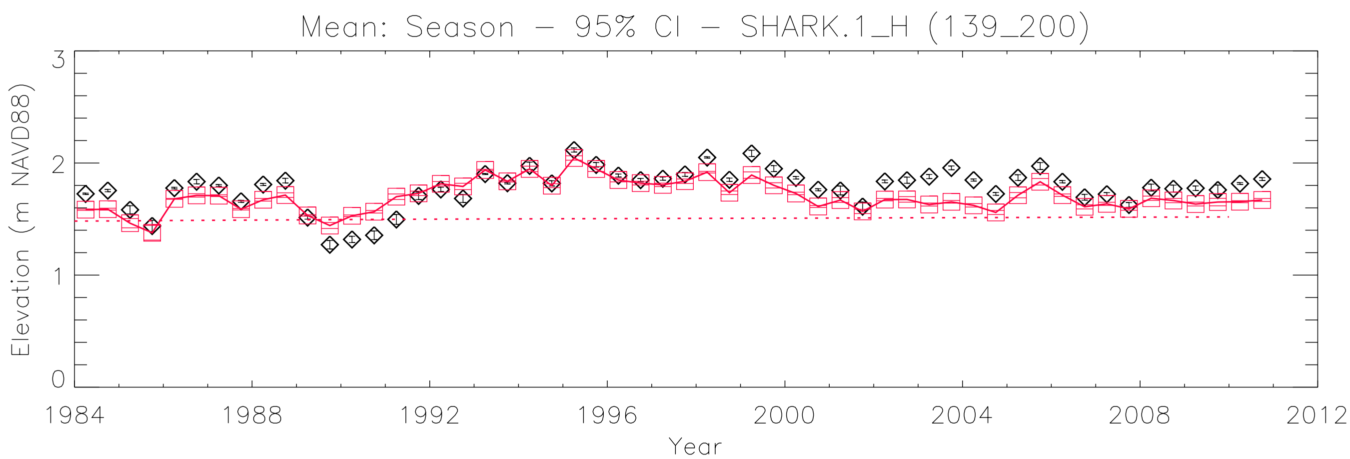

ELM3reg500 Raw Data (Obs. N = 9842) – 3A–28_G (110_197)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year

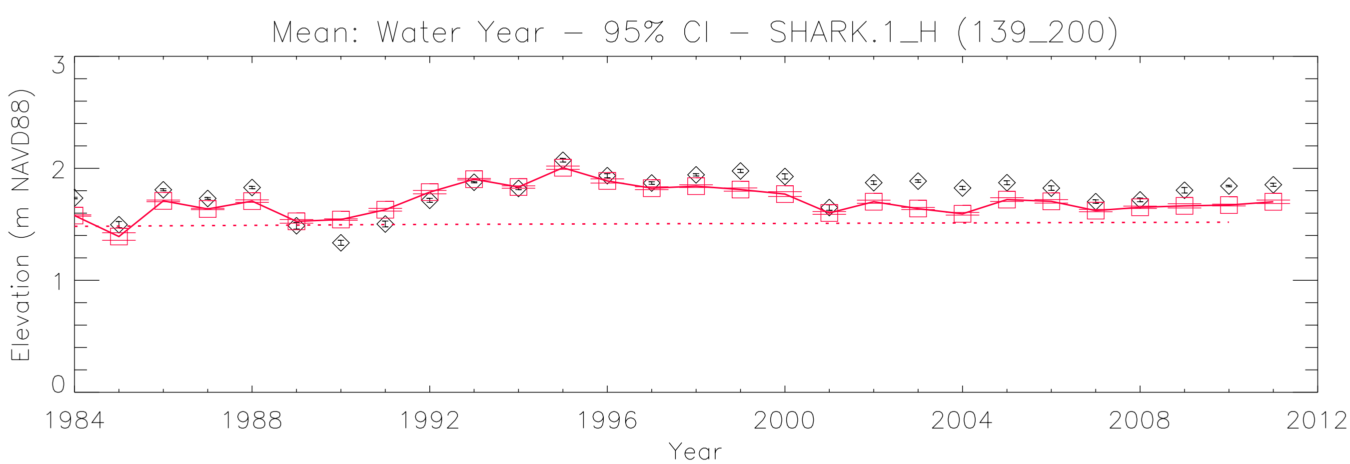

Mean: Season – 95% CI – 3A–28_G (110_197)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year

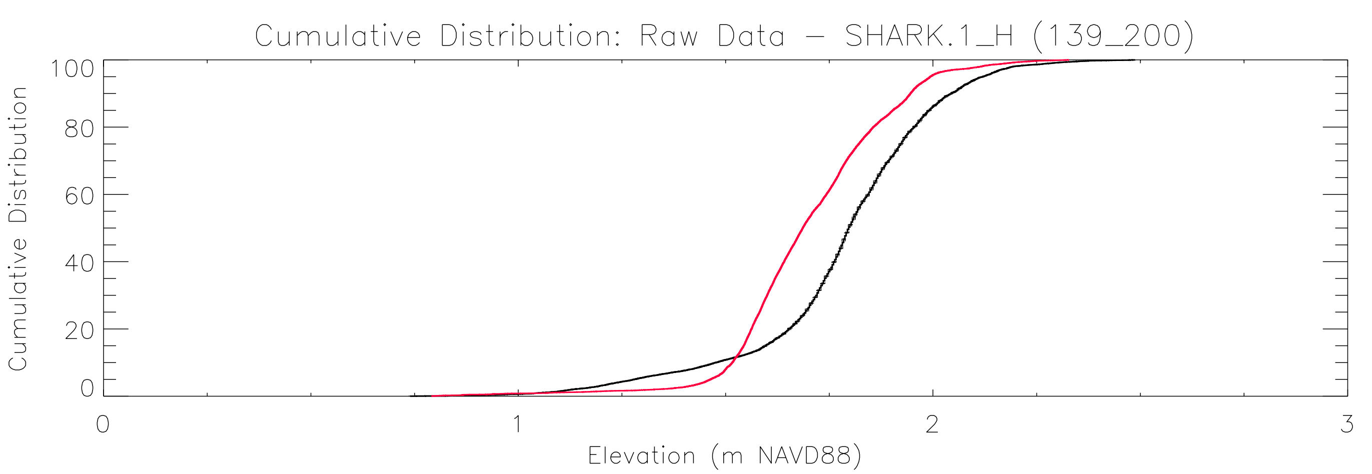

Mean: Water Year – 95% CI – 3A–28_G (110_197)
Elevation (m NAVD88)
1
2
3
4
1984
1988
1992
1996
2000
2004
2008
2012
Year

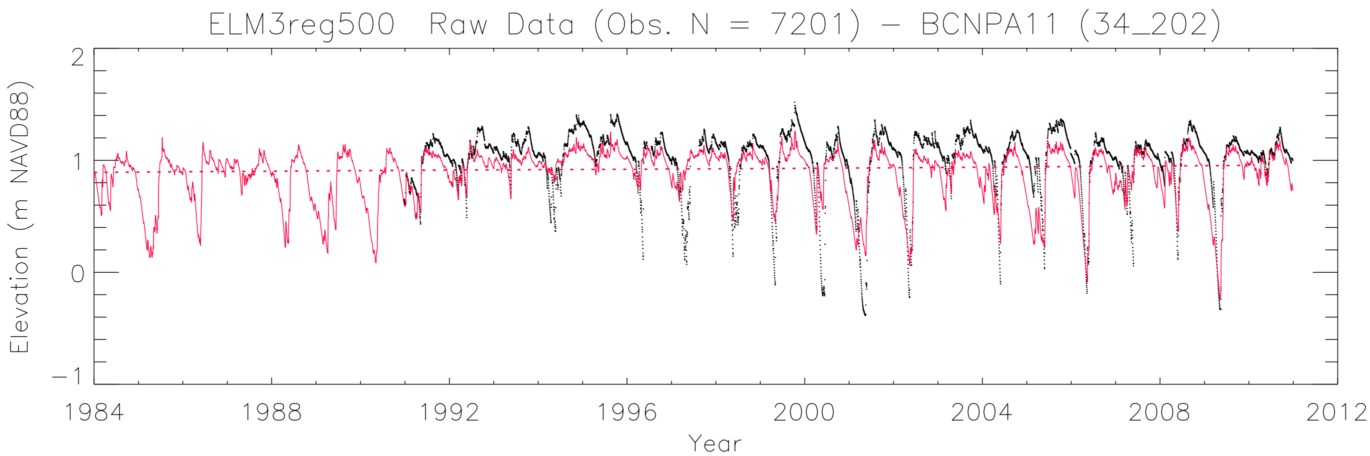

Cumulative Distribution: Raw Data – 3A–28_G (110_197)
Cumulative Distribution
0
20
40
60
80
100
1
2
3
4
Elevation (m NAVD88)

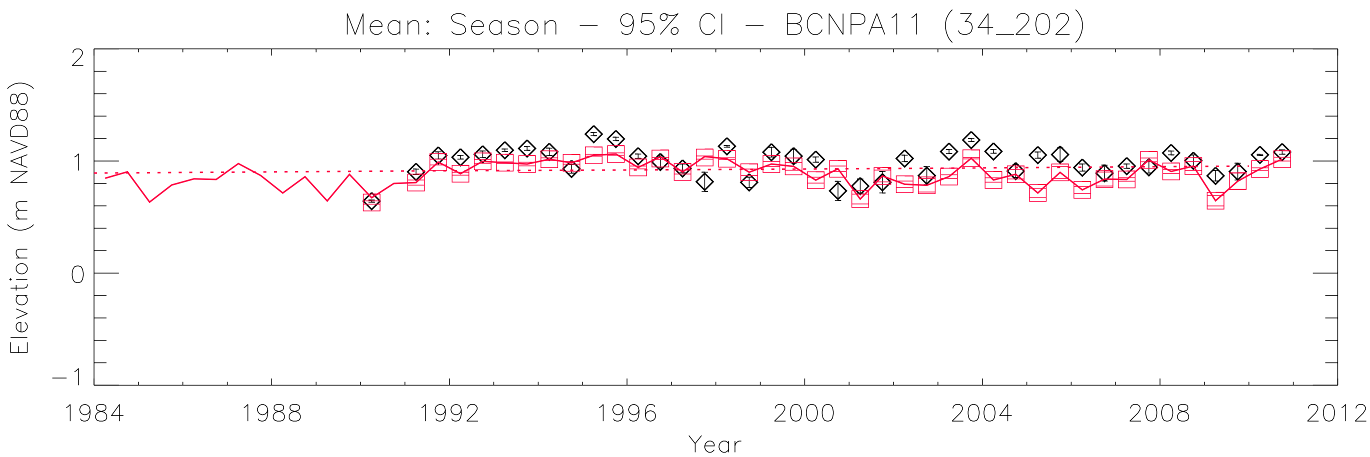

ELM3reg500 Raw Data (Obs. N = 9846) – SHARK.1_H (139_200)
Elevation (m NAVD88)
Year

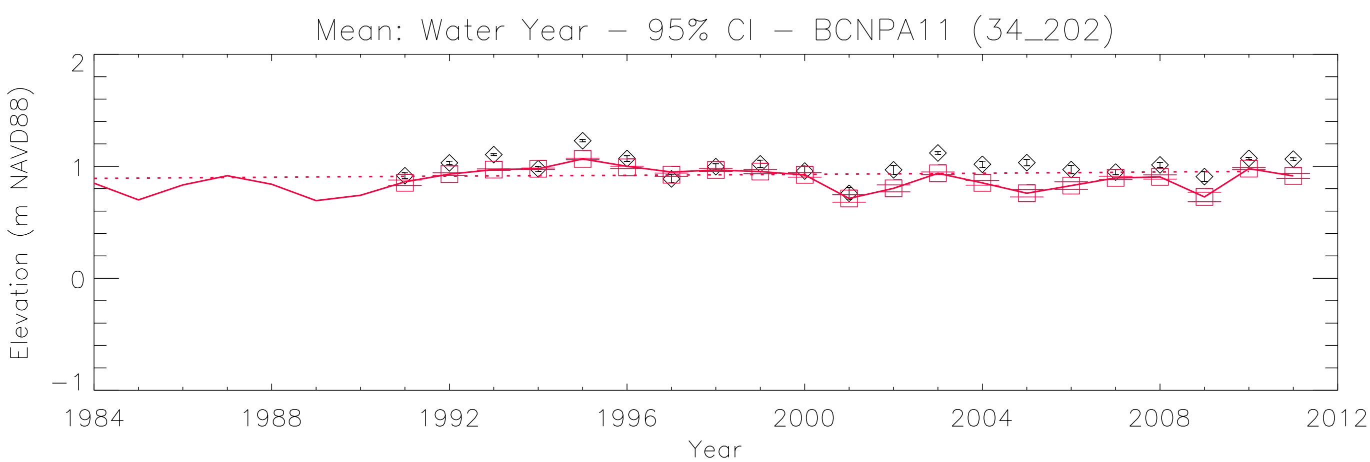

Mean: Season – 95% CI – SHARK.1_H (139_200)
Elevation (m NAVD88)
Year

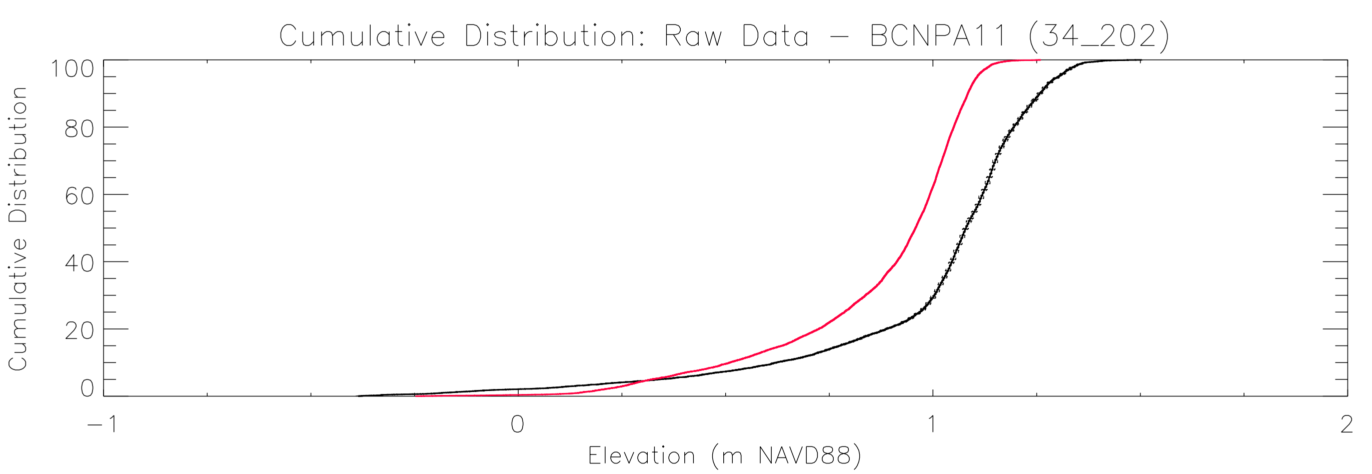

Mean: Water Year – 95% CI – SHARK.1_H (139_200)
Elevation (m NAVD88)
Year

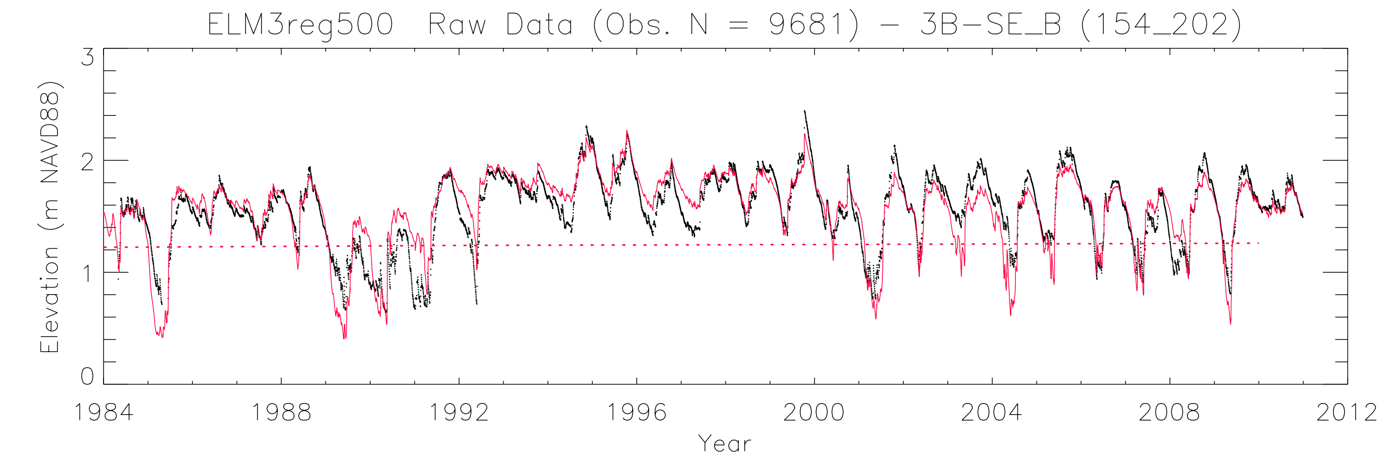

Cumulative Distribution: Raw Data – SHARK.1_H (139_200)
Cumulative Distribution
Elevation (m NAVD88)

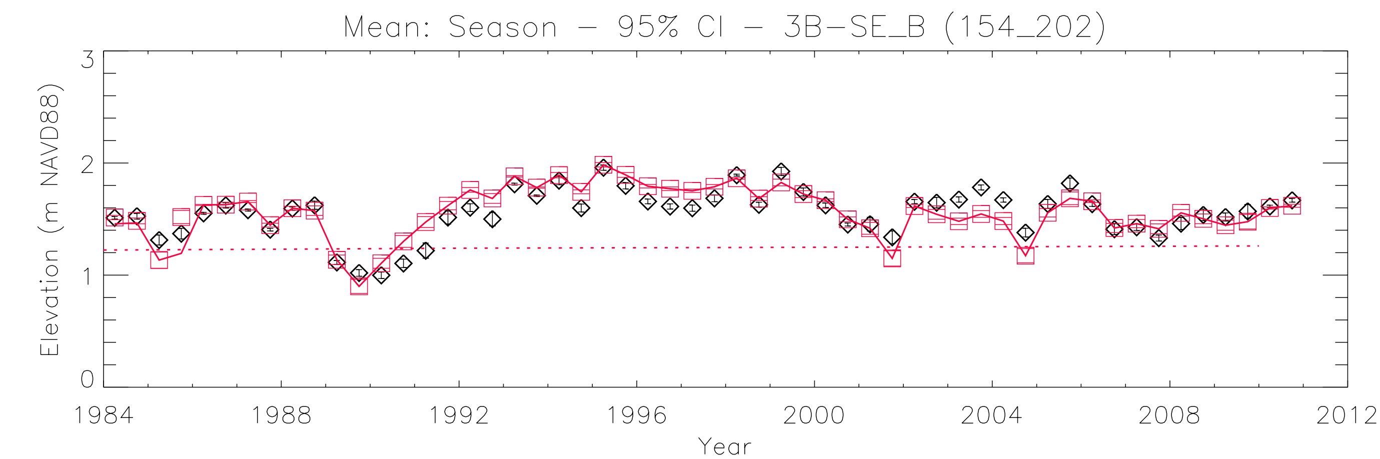

ELM3reg500 Raw Data (Obs. N = 7201) – BCNPA11 (34_202)
Elevation (m NAVD88)
Year
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

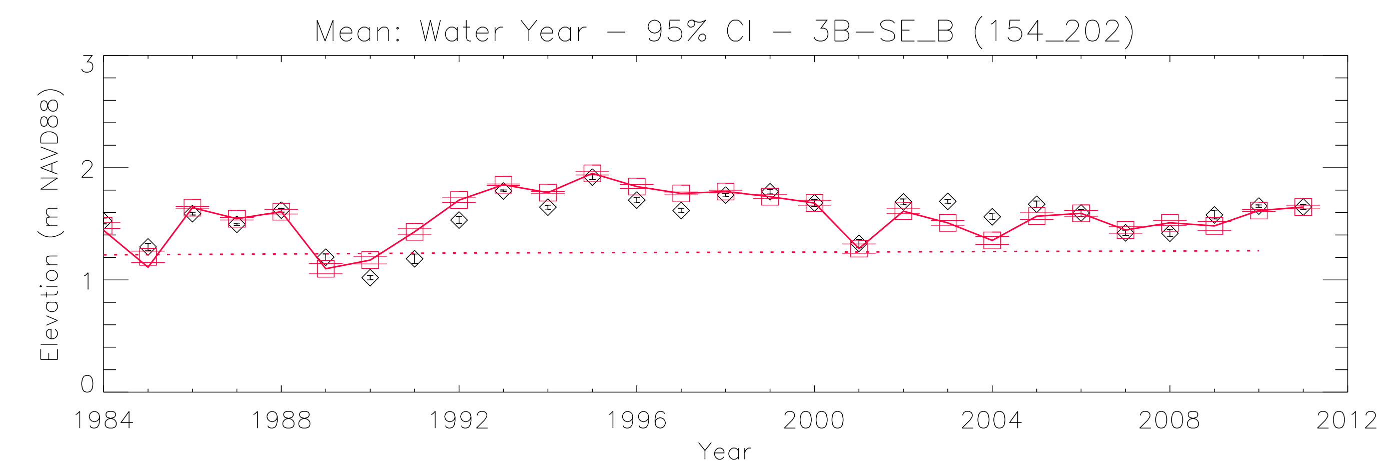

Mean: Season – 95% CI – BCNPA11 (34_202)
Elevation (m NAVD88)
Year
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

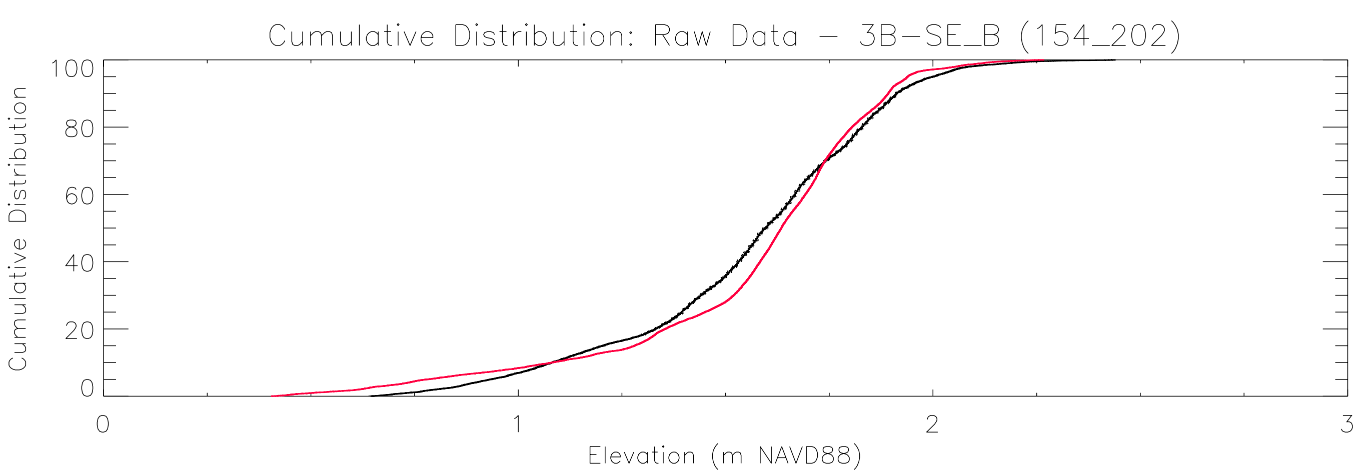

Mean: Water Year – 95% CI – BCNPA11 (34_202)
Elevation (m NAVD88)
Year
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

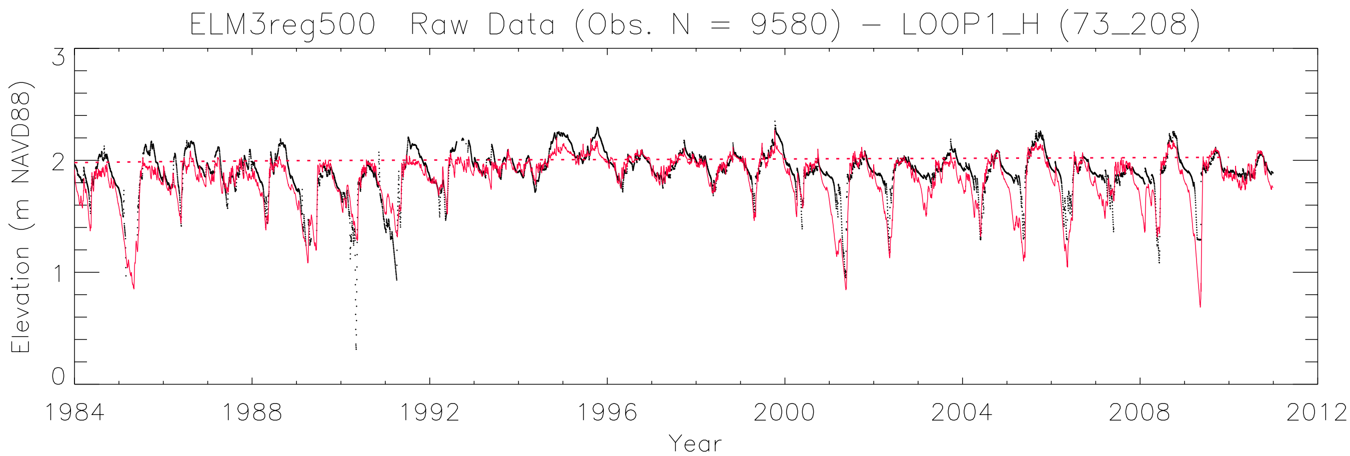

Cumulative Distribution: Raw Data – BCNPA11 (34_202)
Cumulative Distribution
Elevation (m NAVD88)
100
80
60
40
20
0
–1
0
1
2

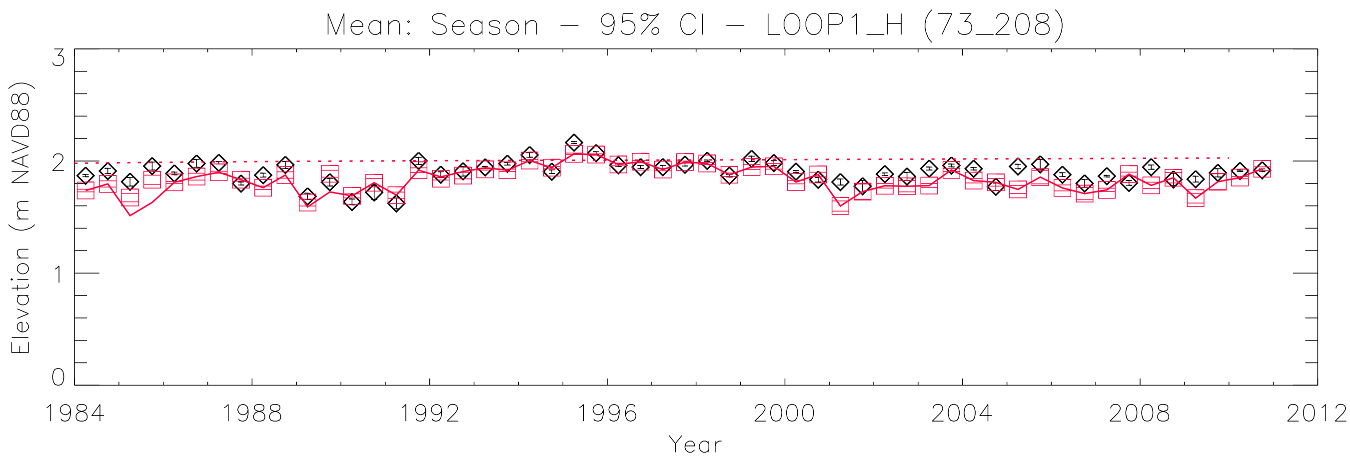

ELM3reg500 Raw Data (Obs. N = 9681) − 3B−SE_B (154_202)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

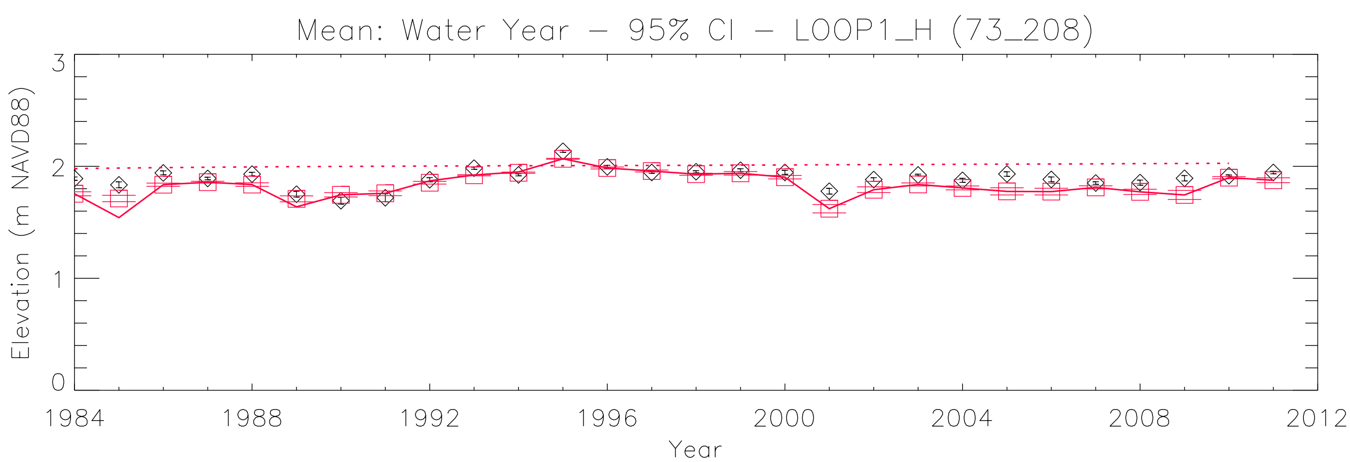

Mean: Season − 95% CI − 3B−SE_B (154_202)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

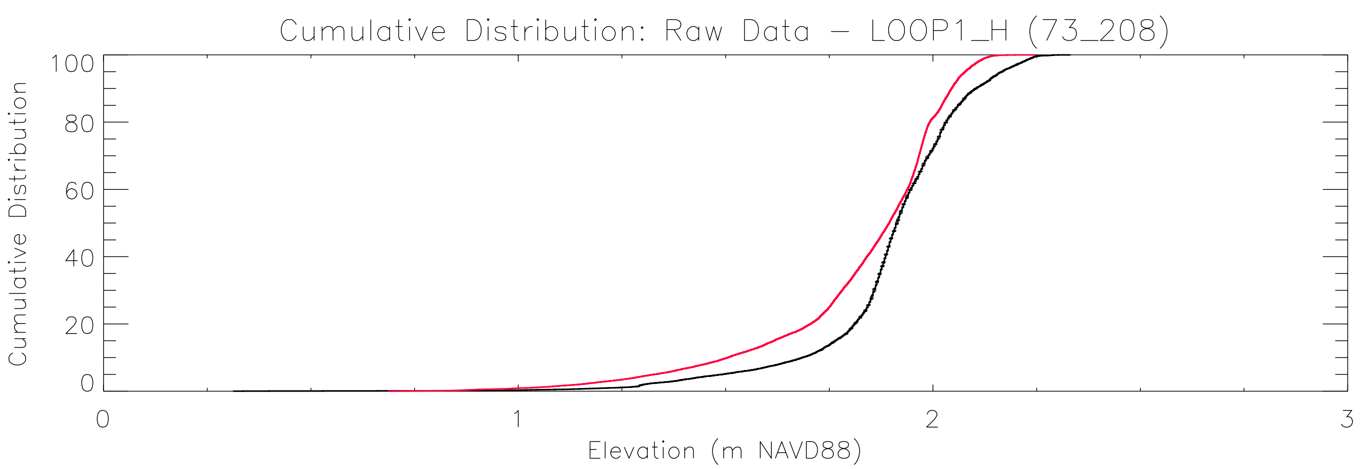

Mean: Water Year − 95% CI − 3B−SE_B (154_202)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

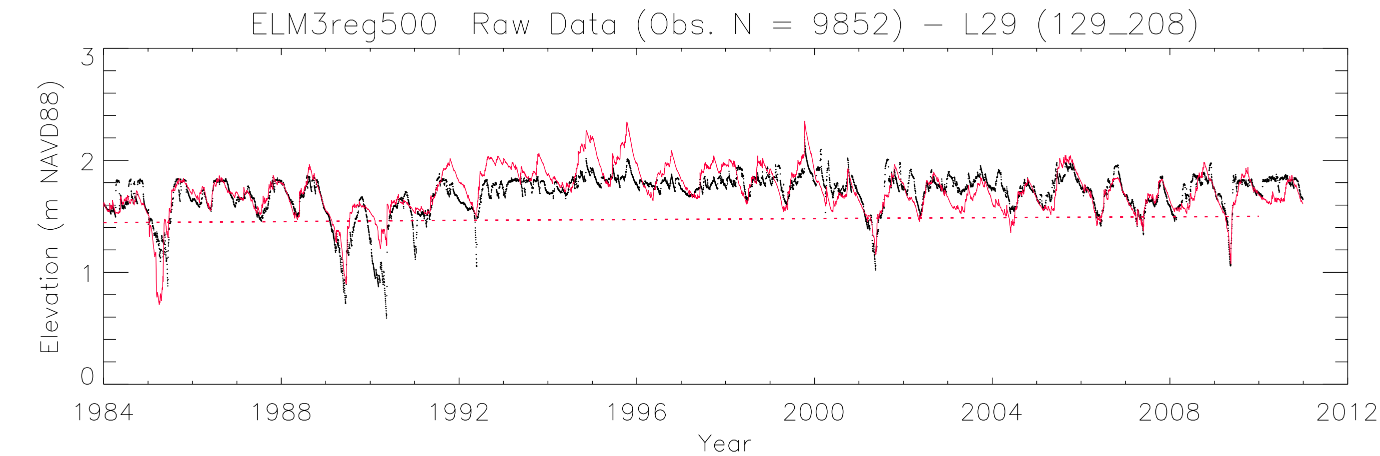

Cumulative Distribution: Raw Data − 3B−SE_B (154_202)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
0
1
2
3

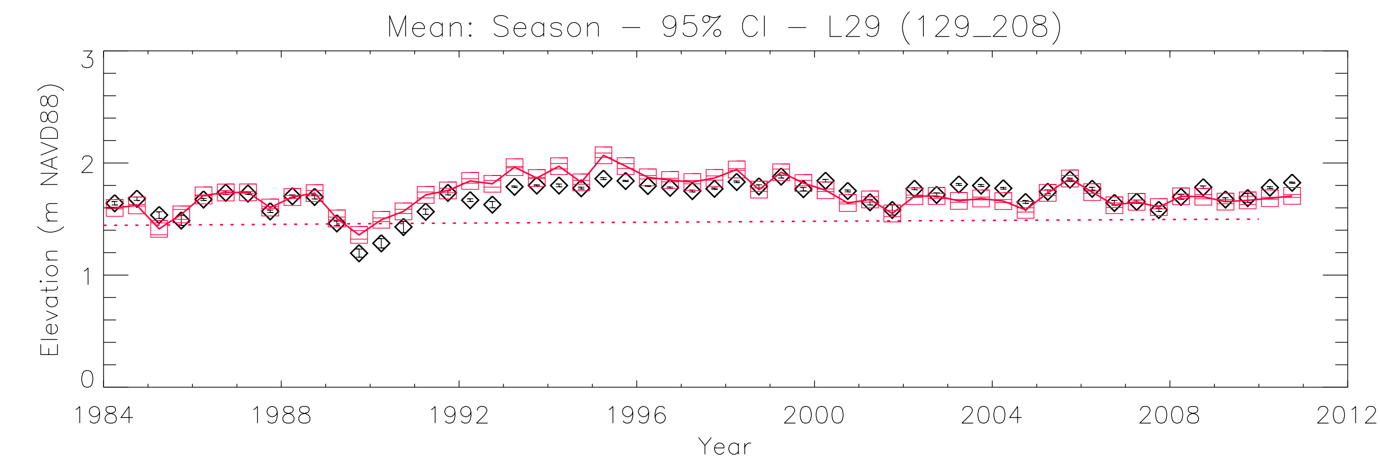

ELM3reg500 Raw Data (Obs. N = 9580) - LOOP1_H (73_208)
Elevation (m NAVD88)
Year

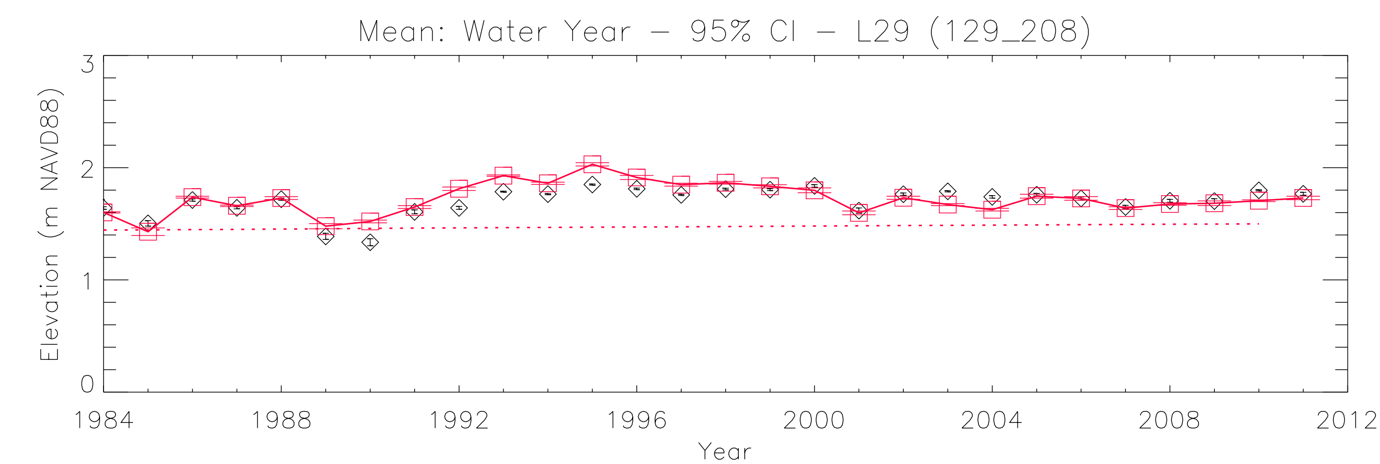

Mean: Season - 95% CI - LOOP1_H (73_208)
Elevation (m NAVD88)
Year

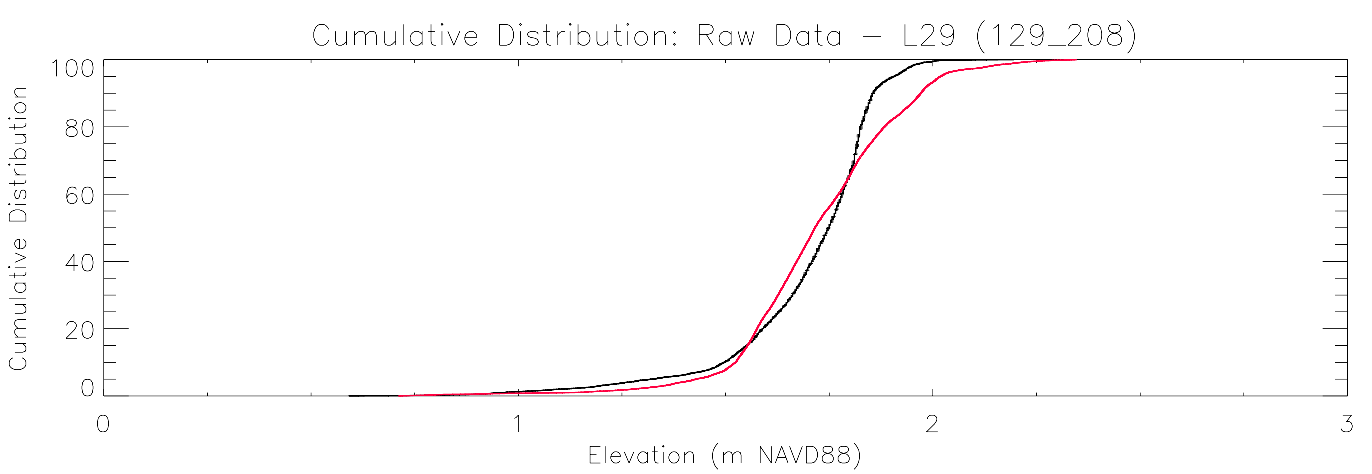

Mean: Water Year - 95% CI - LOOP1_H (73_208)
Elevation (m NAVD88)
Year

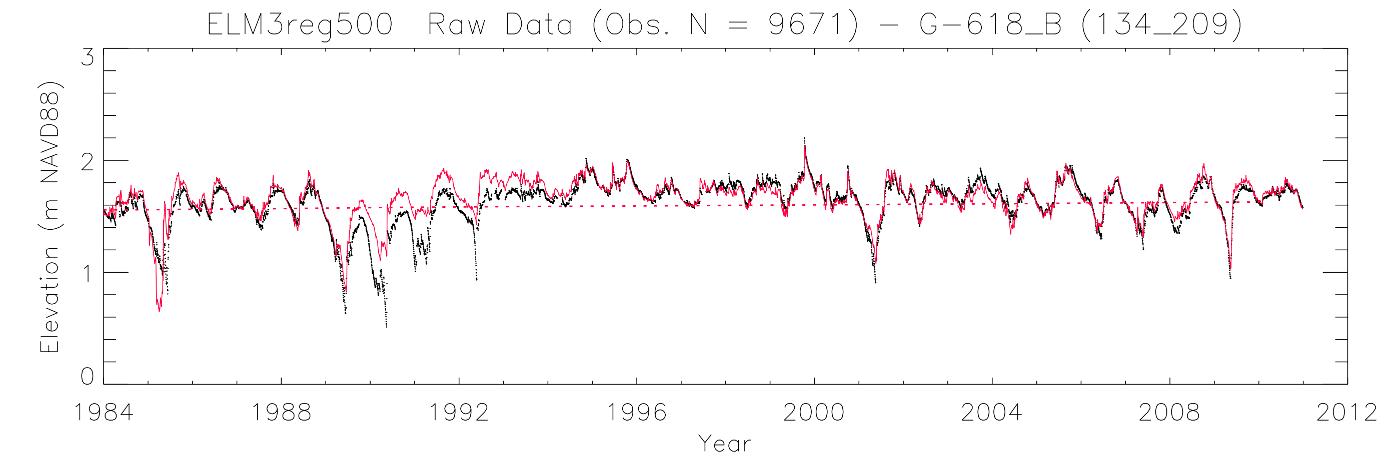

Cumulative Distribution: Raw Data - LOOP1_H (73_208)
Cumulative Distribution
Elevation (m NAVD88)

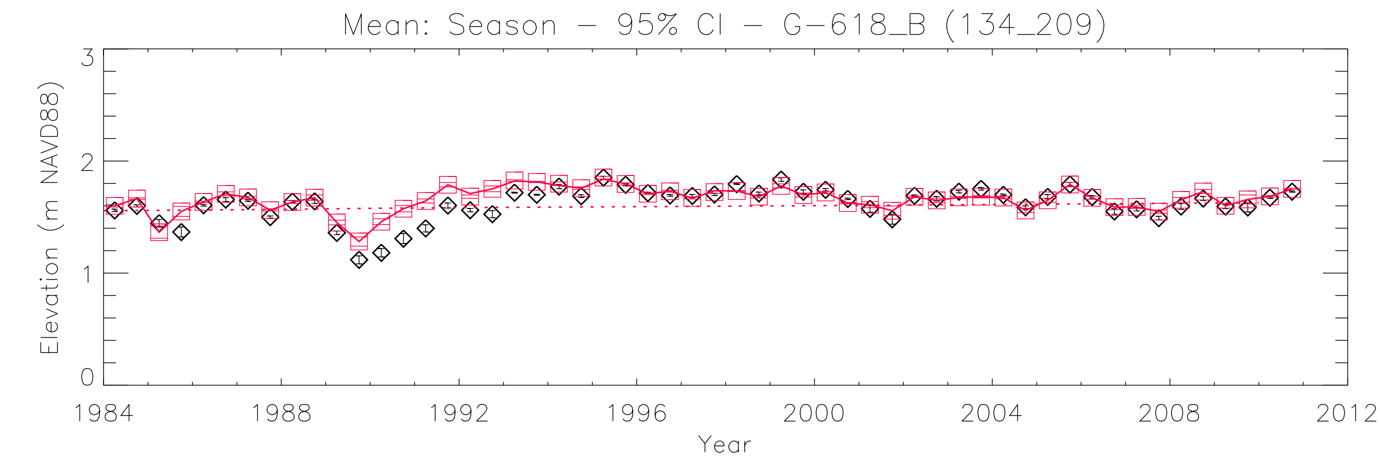

ELM3reg500 Raw Data (Obs. N = 9852) – L29 (129_208)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

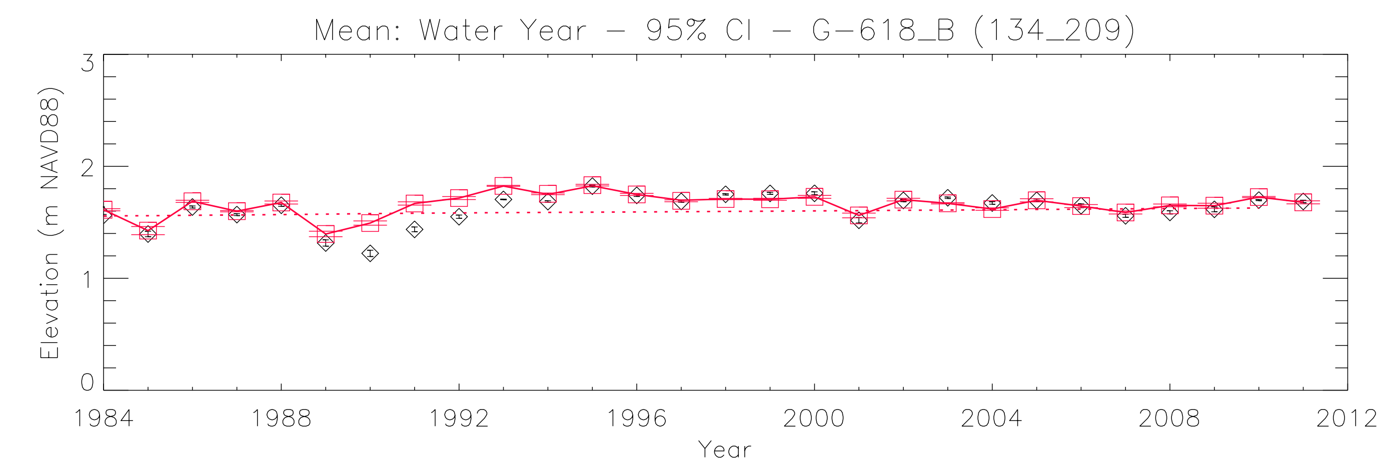

Mean: Season – 95% CI – L29 (129_208)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

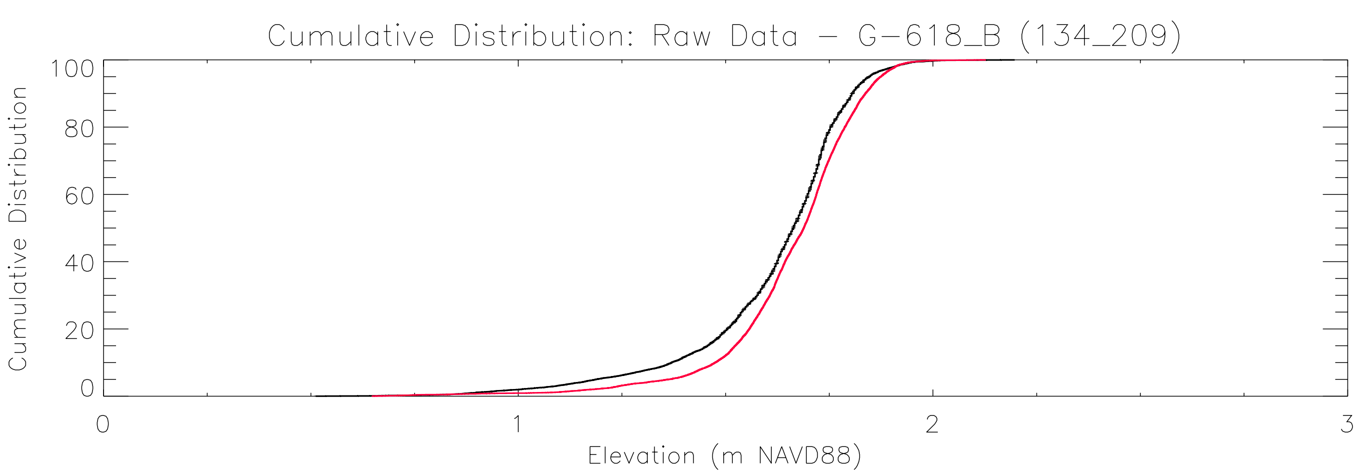

Mean: Water Year – 95% CI – L29 (129_208)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

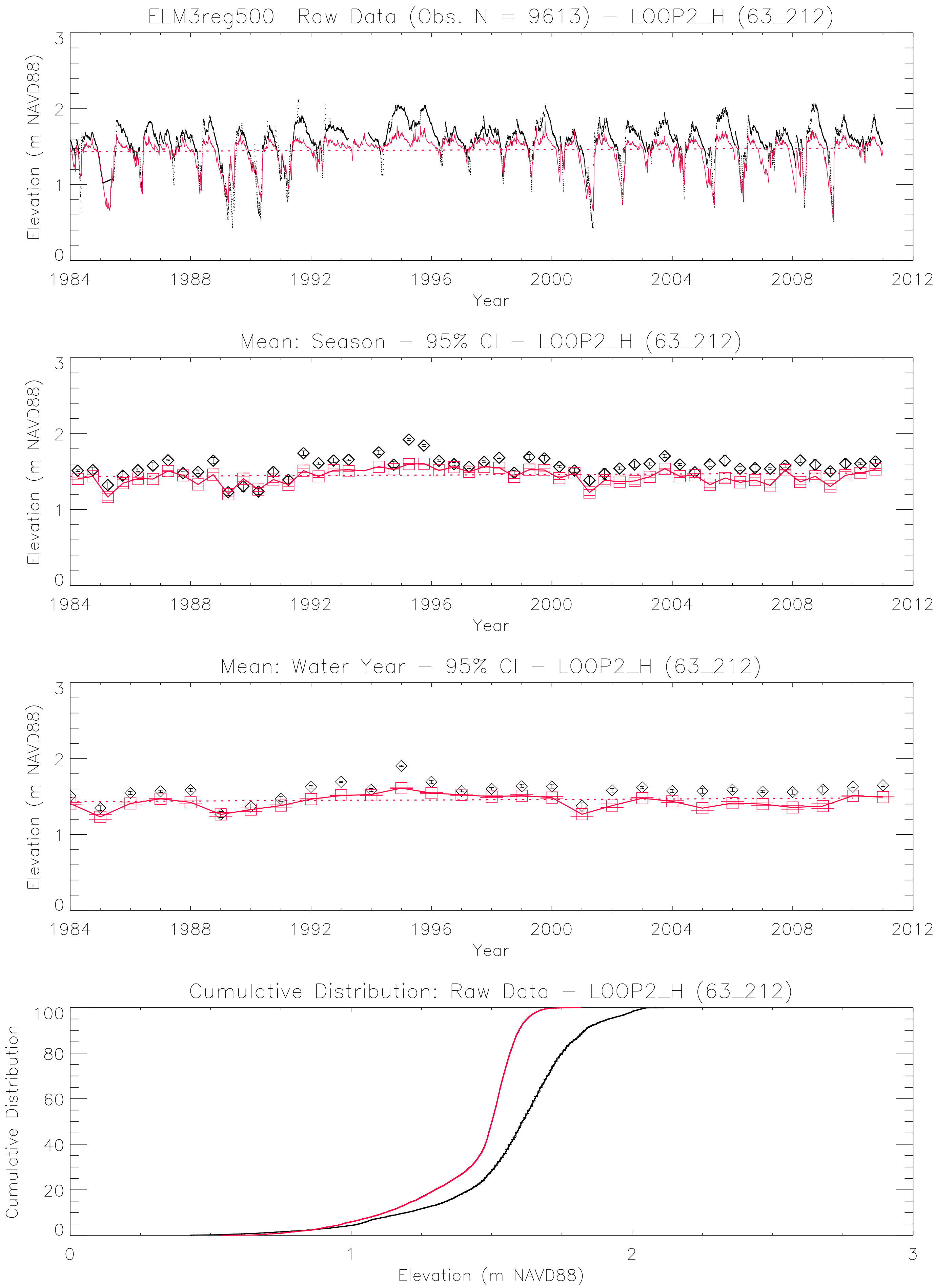

Cumulative Distribution: Raw Data – L29 (129_208)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
0
1
2
3

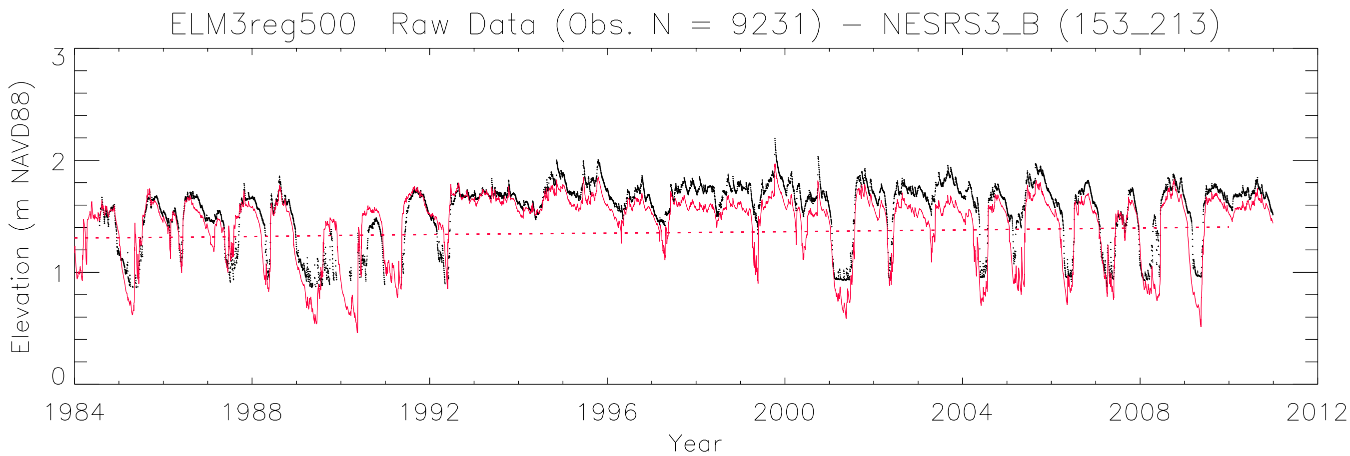

ELM3reg500 Raw Data (Obs. N = 9671) - G-618_B (134_209)
Elevation (m NAVD88)
Year

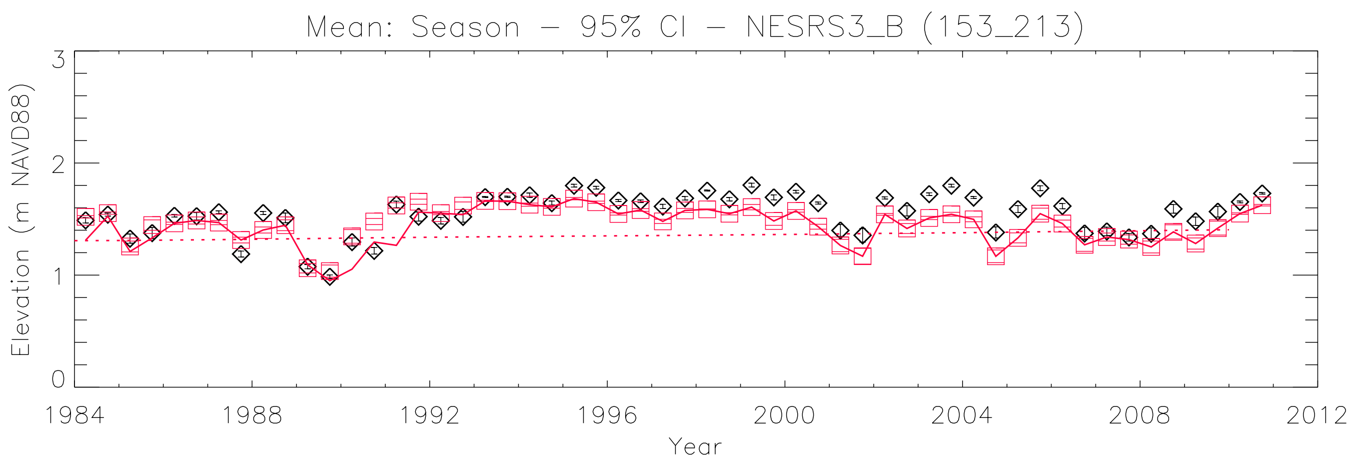

Mean: Season - 95% CI - G-618_B (134_209)
Elevation (m NAVD88)
Year

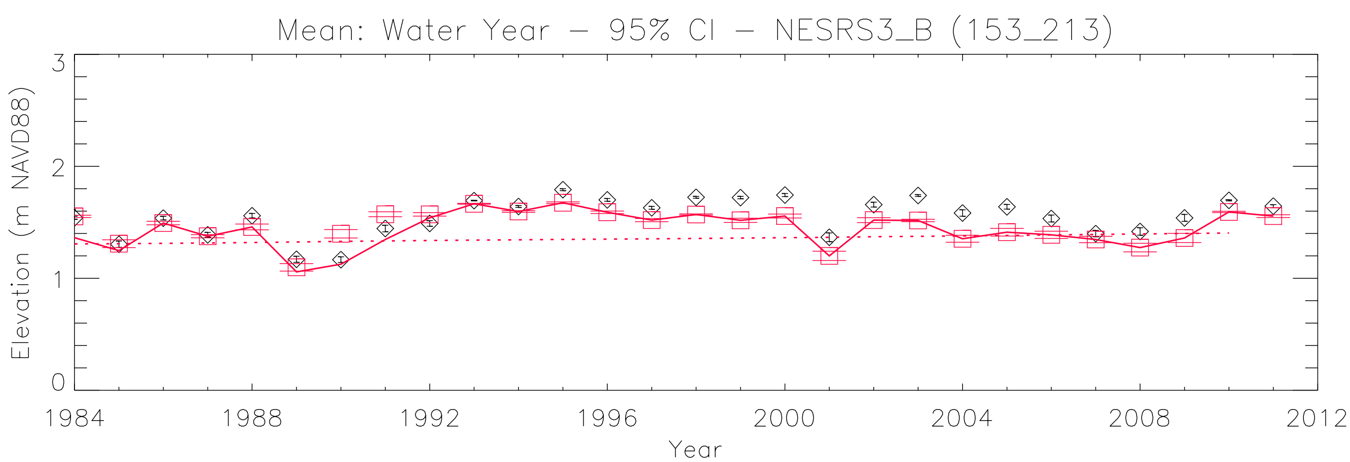

Mean: Water Year - 95% CI - G-618_B (134_209)
Elevation (m NAVD88)
Year

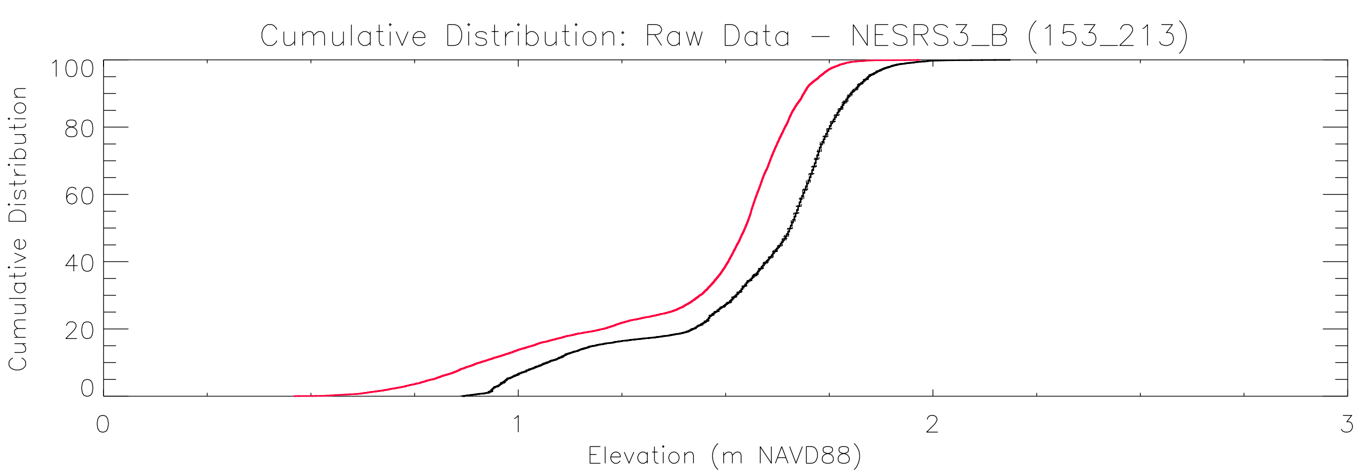

Cumulative Distribution: Raw Data - G-618_B (134_209)
Cumulative Distribution
Elevation (m NAVD88)

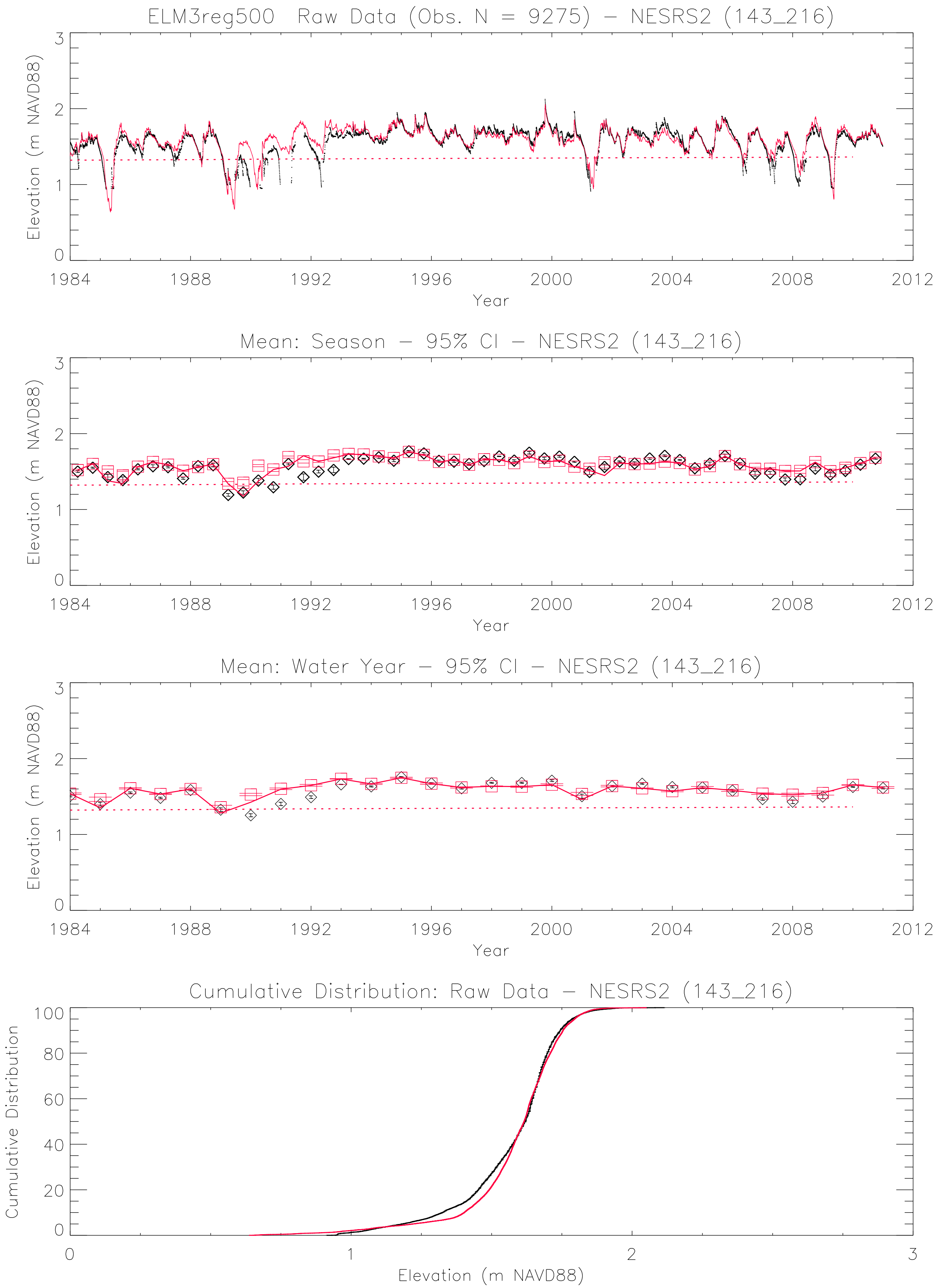

ELM3reg500 Raw Data (Obs. N = 9613) – LOOP2_H (63_212)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – LOOP2_H (63_212)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – LOOP2_H (63_212)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – LOOP2_H (63_212)
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 9231) – NESRS3_B (153_213)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

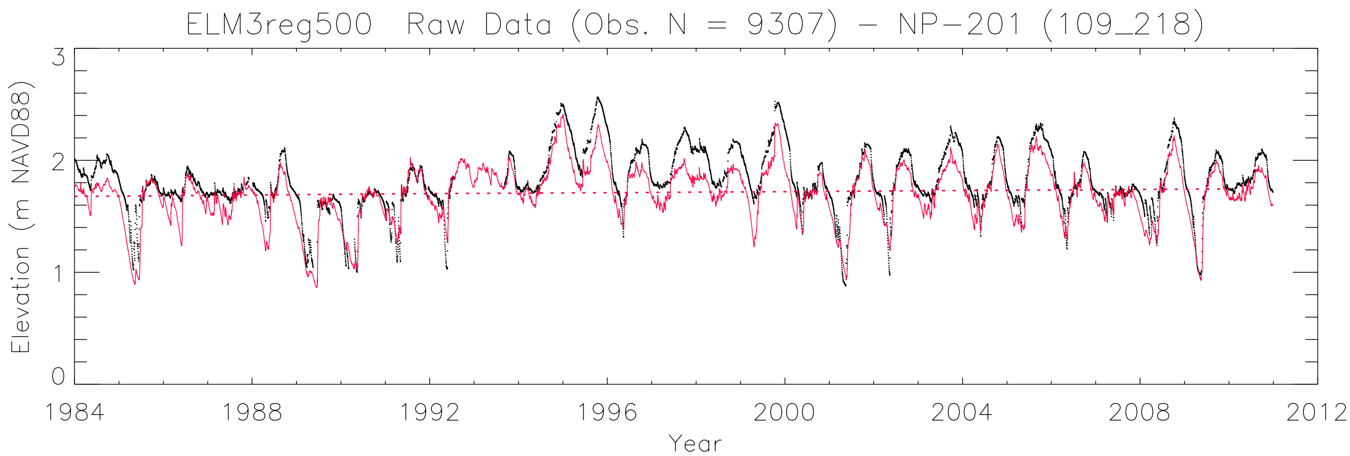

Mean: Season – 95% CI – NESRS3_B (153_213)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012


Mean: Water Year – 95% CI – NESRS3_B (153_213)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

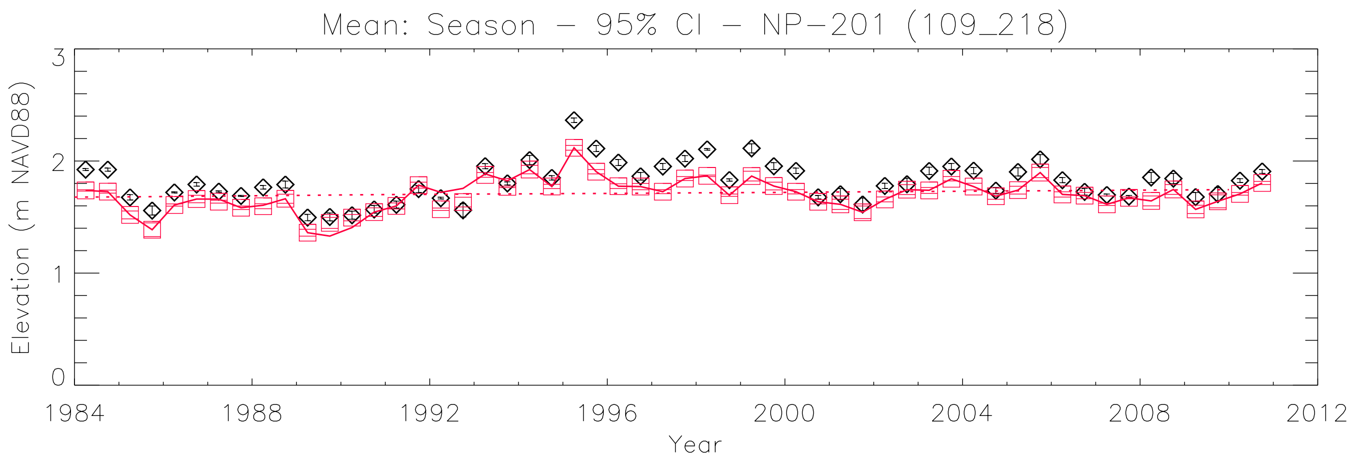

Cumulative Distribution: Raw Data – NESRS3_B (153_213)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
0
1
2
3



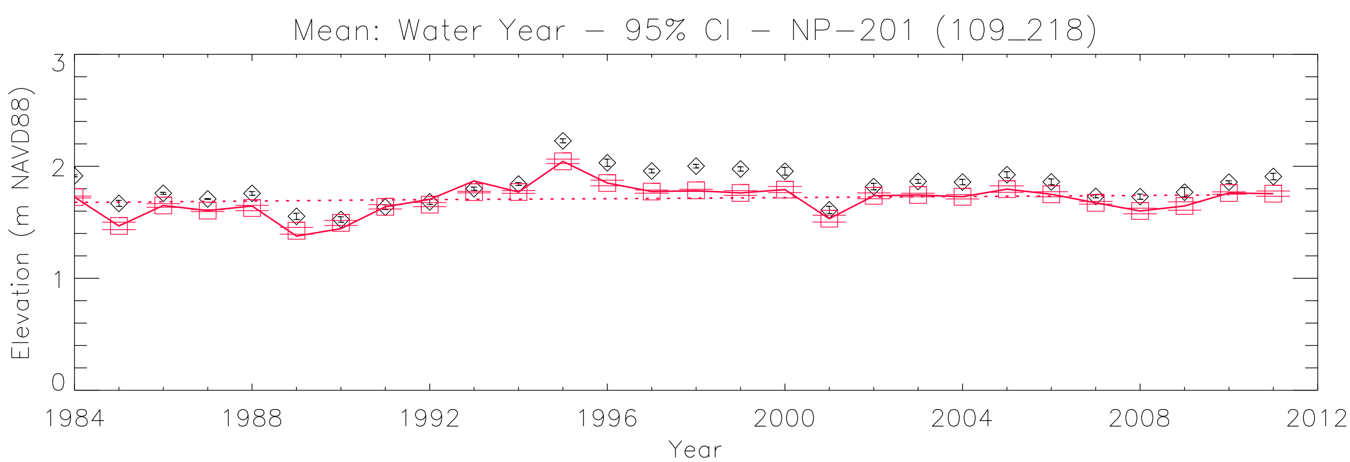
ELM3reg500 Raw Data (Obs. N = 9275) – NESRS2 (143_216)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – NESRS2 (143_216)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – NESRS2 (143_216)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – NESRS2 (143_216)
Cumulative Distribution
Elevation (m NAVD88)



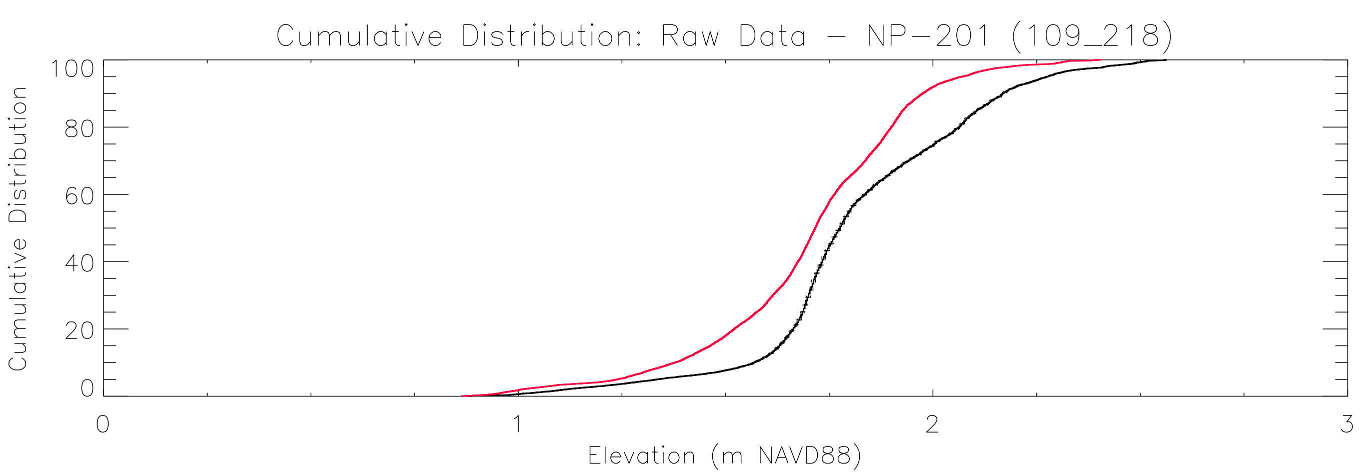
ELM3reg500 Raw Data (Obs. N = 9307) - NP-201 (109_218)
Elevation (m NAVD88)
Year



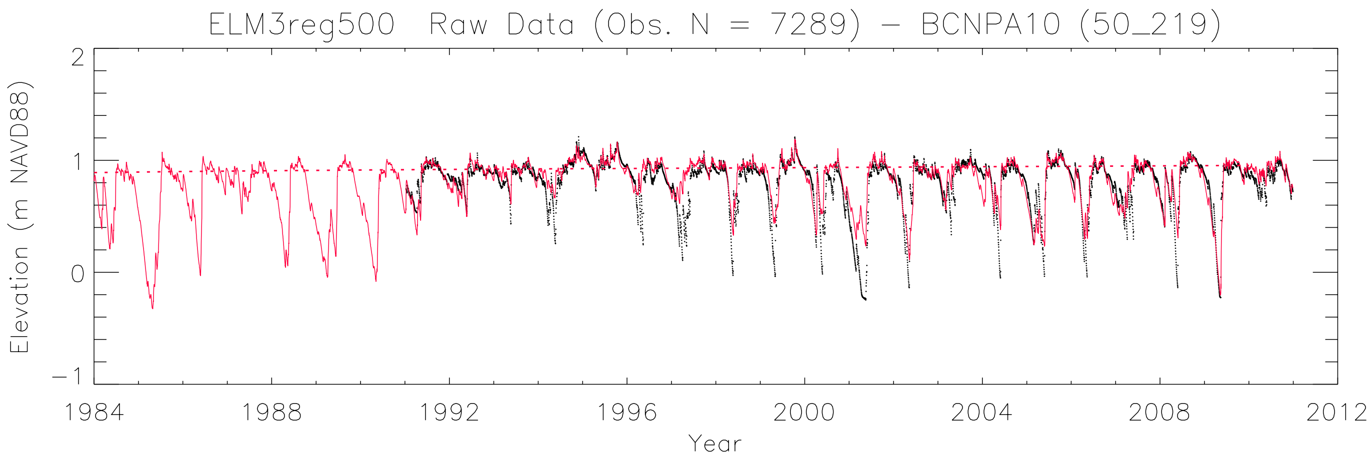
Mean: Season - 95% CI - NP-201 (109_218)
Elevation (m NAVD88)
Year

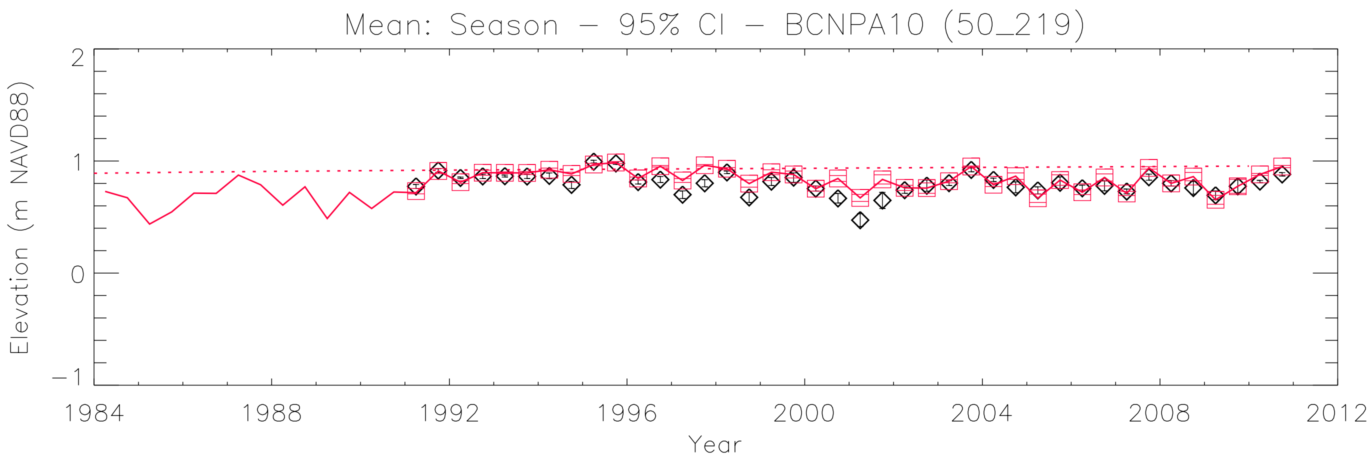


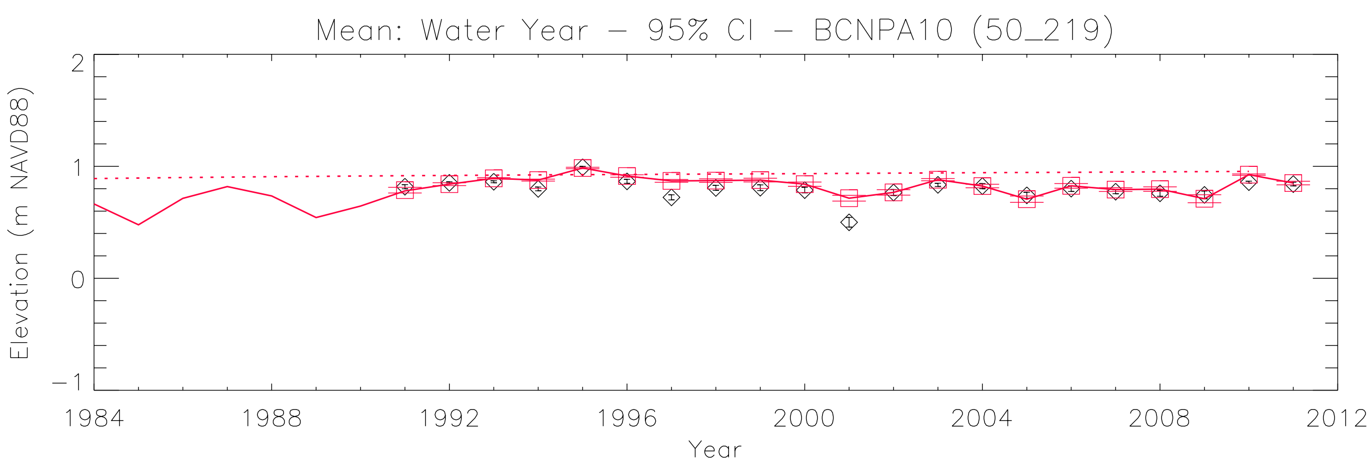
Mean: Water Year - 95% CI - NP-201 (109_218)
Elevation (m NAVD88)
Year

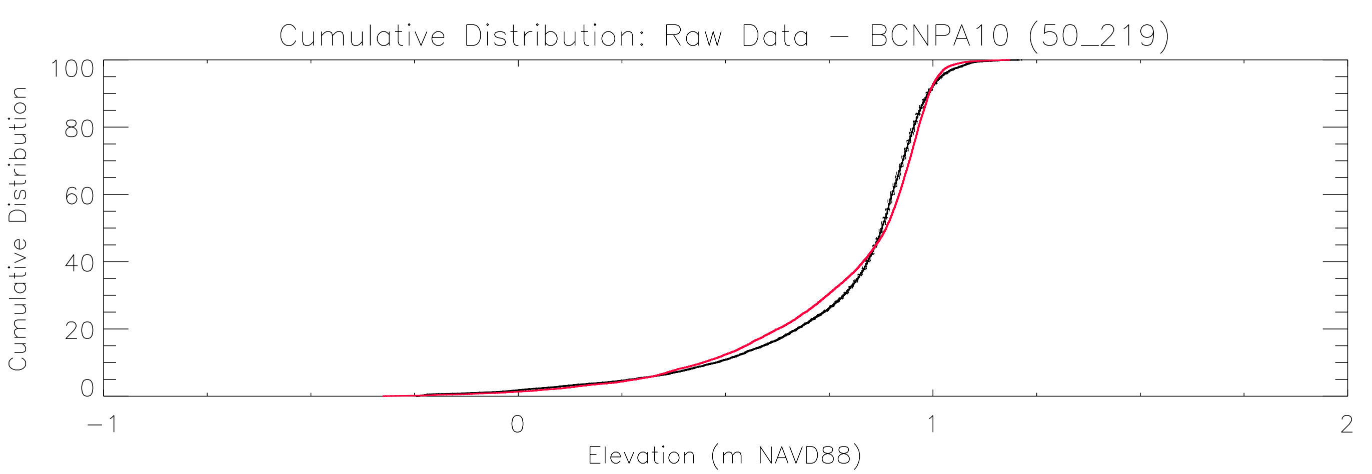


Cumulative Distribution: Raw Data - NP-201 (109_218)
Cumulative Distribution
Elevation (m NAVD88)

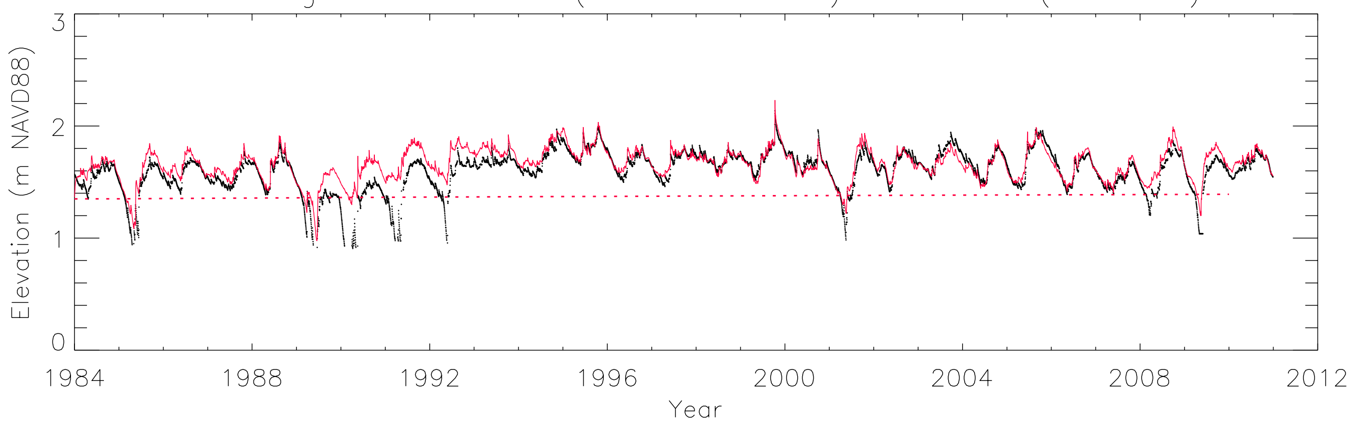

ELM3reg500 Raw Data (Obs. N = 7289) – BCNPA10 (50_219)
Elevation (m NAVD88)
Year


Mean: Season – 95% CI – BCNPA10 (50_219)
Elevation (m NAVD88)
Year

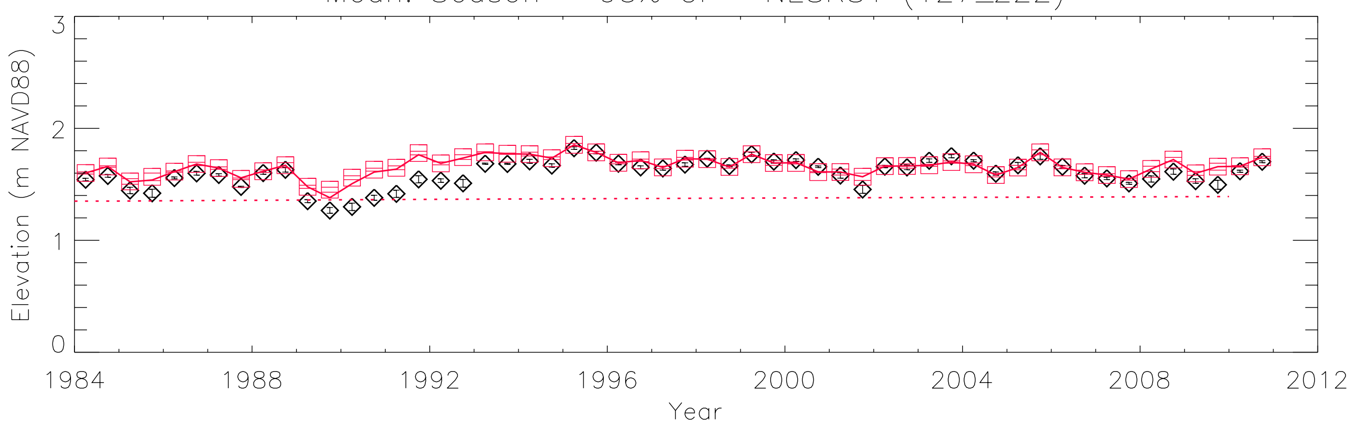

Mean: Water Year – 95% CI – BCNPA10 (50_219)
Elevation (m NAVD88)
Year


Cumulative Distribution: Raw Data – BCNPA10 (50_219)
Cumulative Distribution
Elevation (m NAVD88)

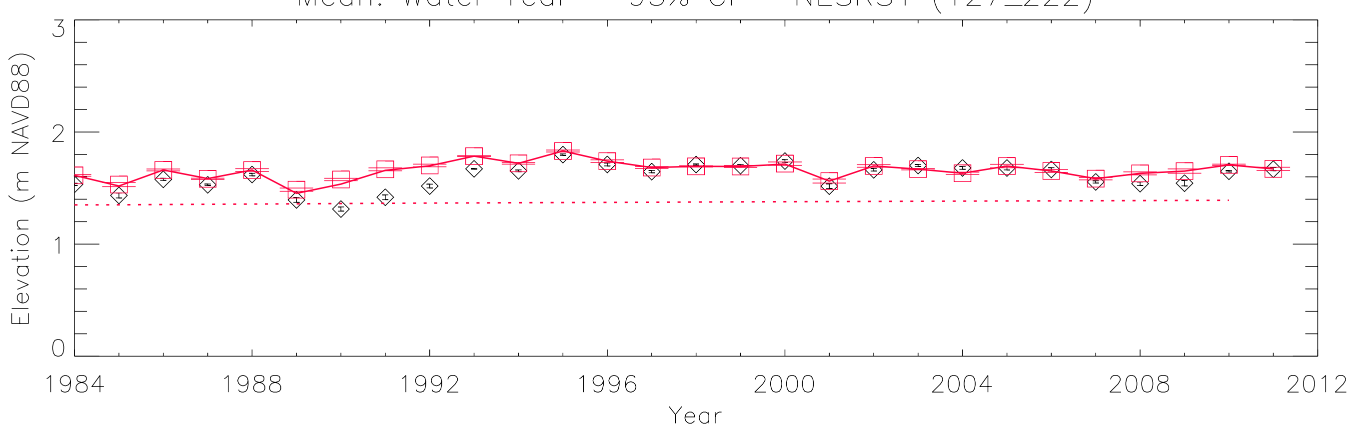
ELM3reg500 Raw Data (Obs. N = 9647) – NESRS1 (127_222)



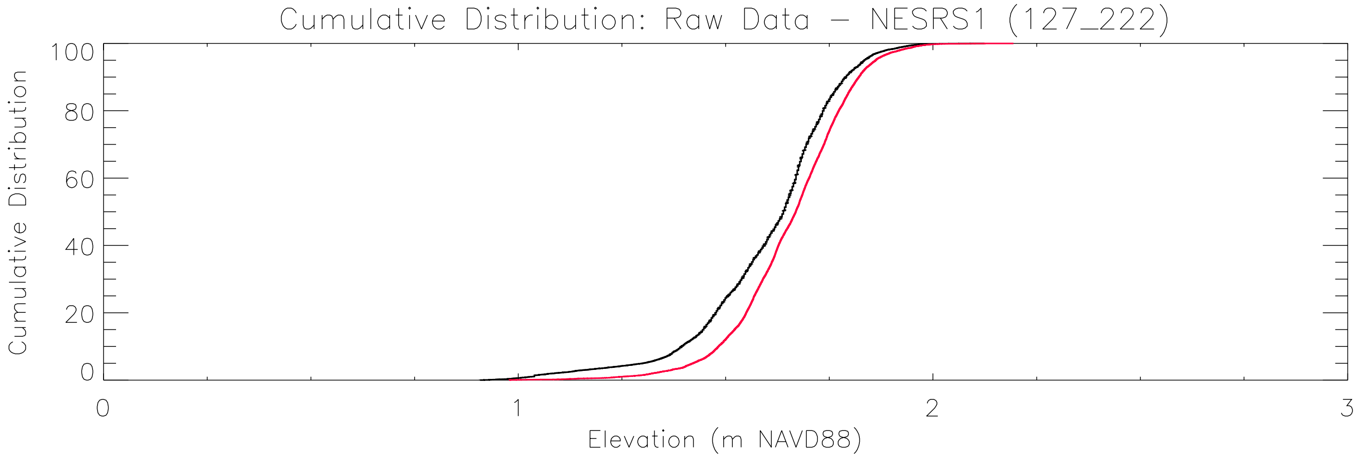
Mean: Season – 95% CI – NESRS1 (127_222)

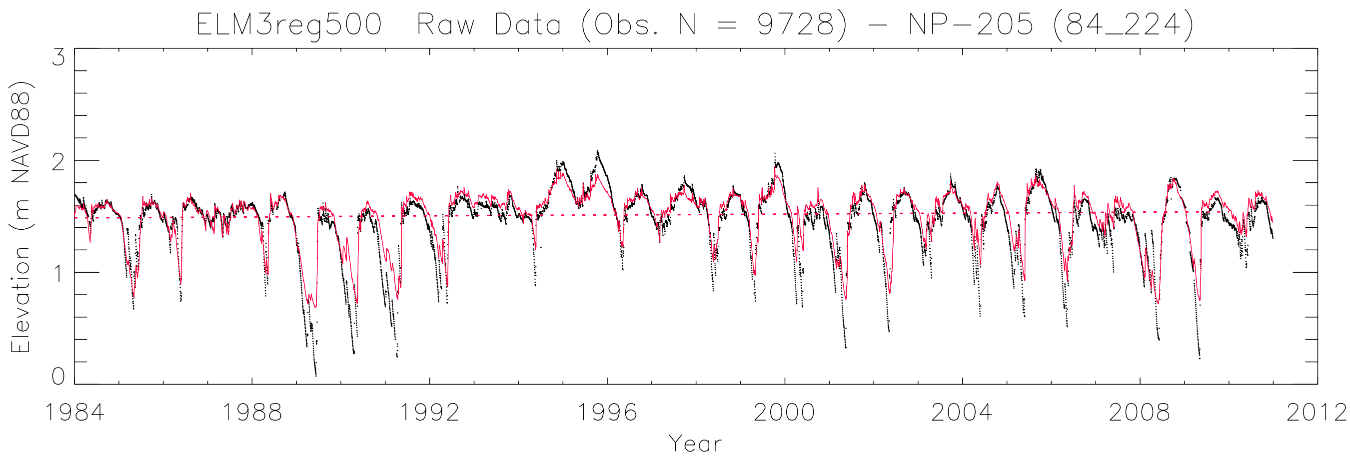


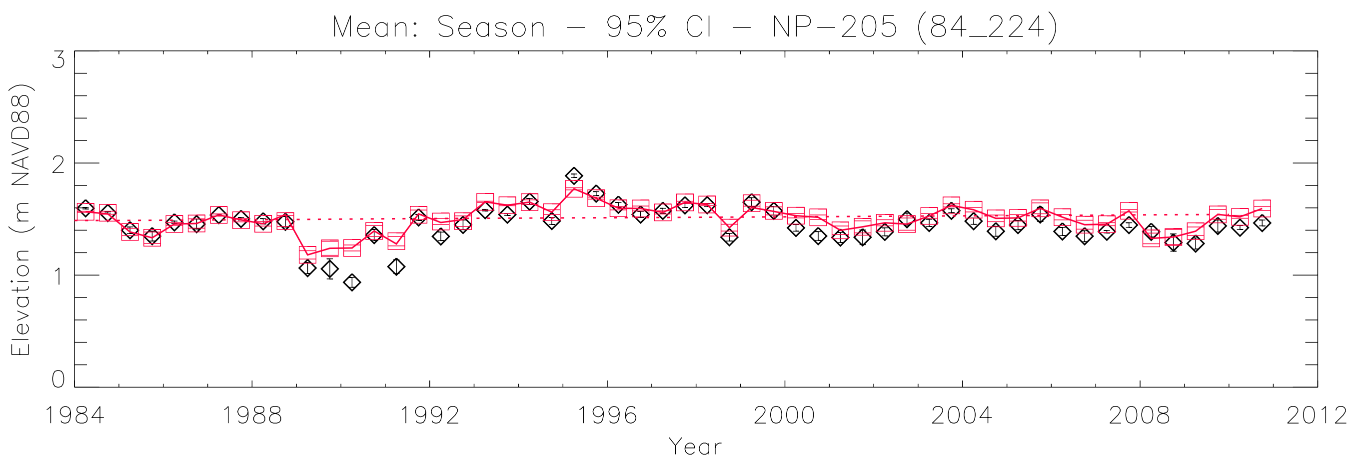
Mean: Water Year – 95% CI – NESRS1 (127_222)

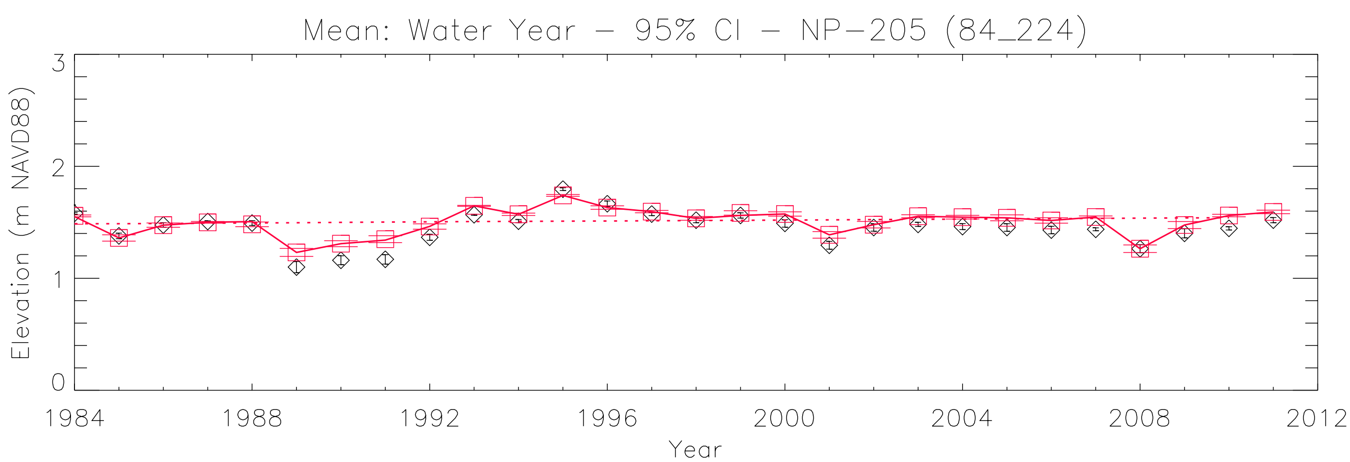


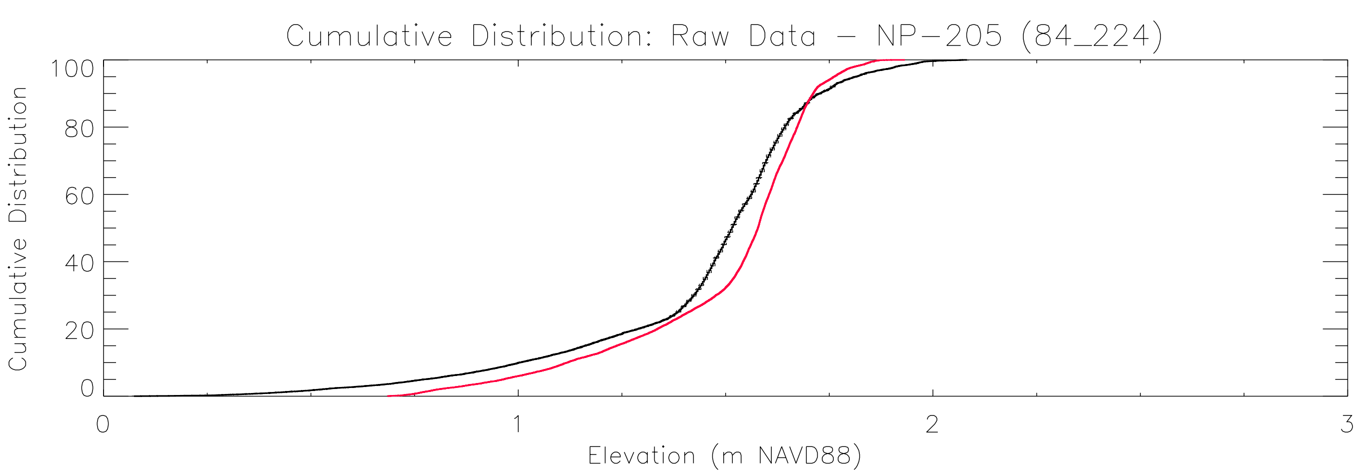
Cumulative Distribution: Raw Data – NESRS1 (127_222)

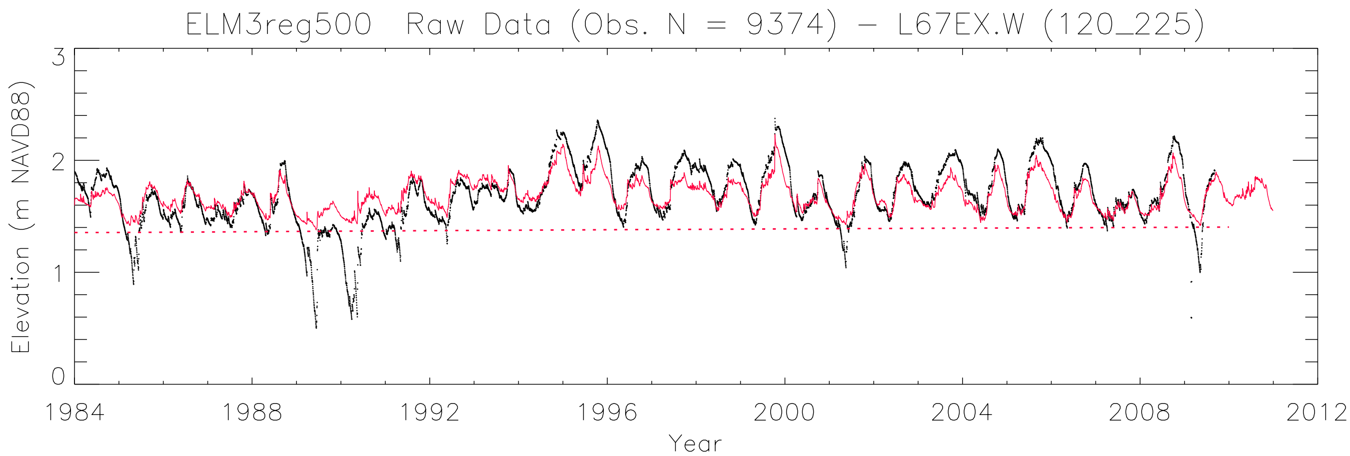



ELM3reg500 Raw Data (Obs. N = 9728) – NP–205 (84_224)
Elevation (m NAVD88)
Year

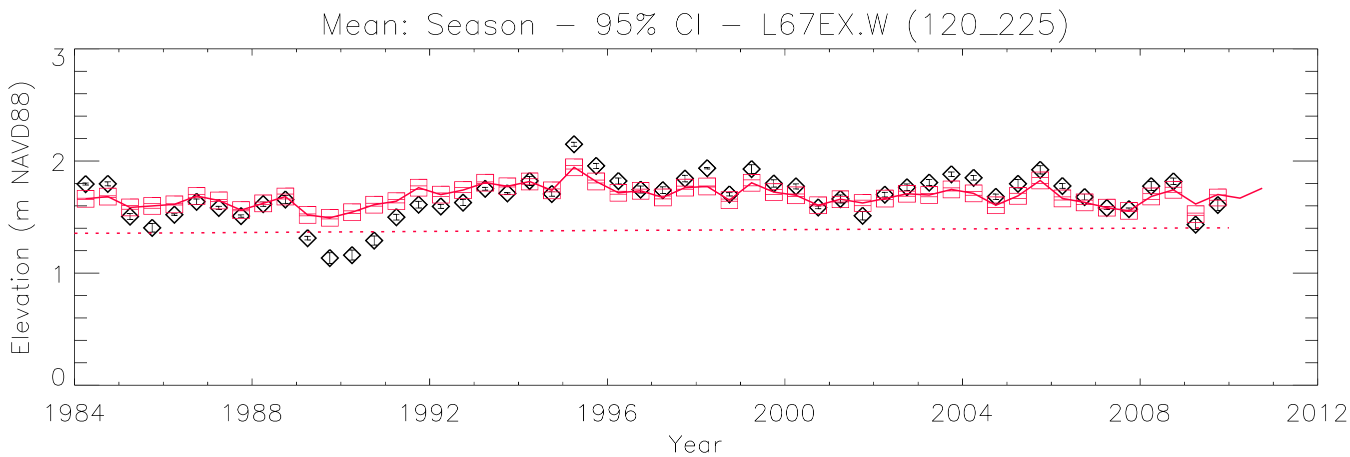

Mean: Season – 95% CI – NP–205 (84_224)
Elevation (m NAVD88)
Year


Mean: Water Year – 95% CI – NP–205 (84_224)
Elevation (m NAVD88)
Year

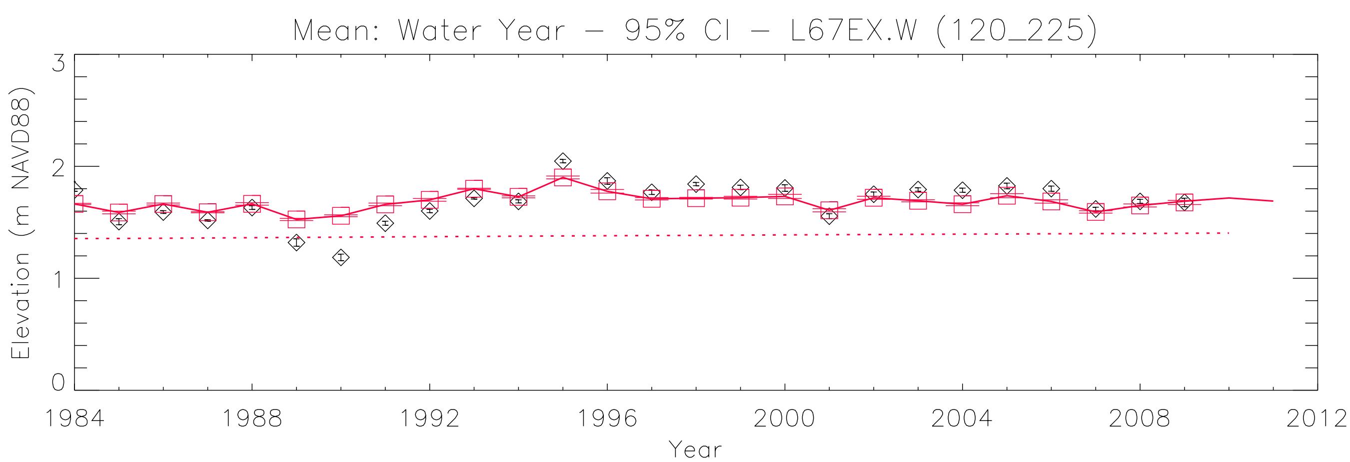

Cumulative Distribution: Raw Data – NP–205 (84_224)
Cumulative Distribution
Elevation (m NAVD88)



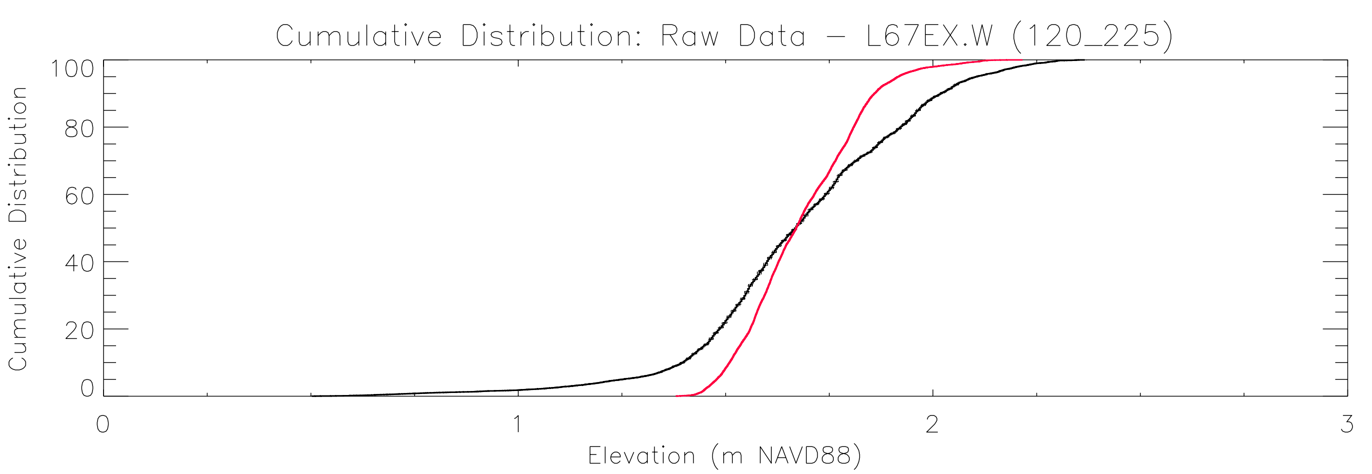
ELM3reg500 Raw Data (Obs. N = 9374) - L67EX.W (120_225)
Elevation (m NAVD88)
Year



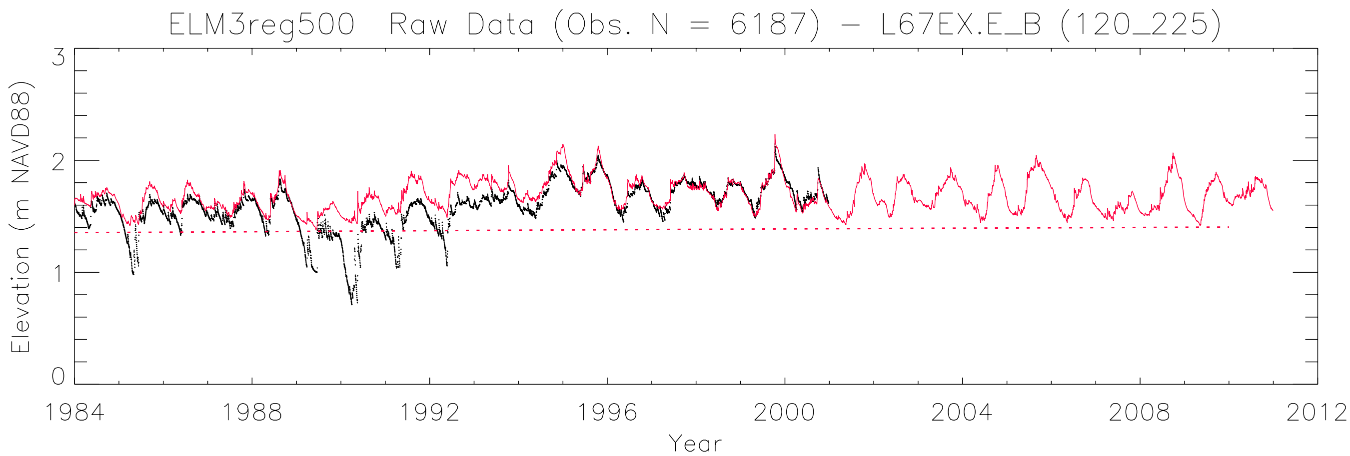
Mean: Season - 95% CI - L67EX.W (120_225)
Elevation (m NAVD88)
Year

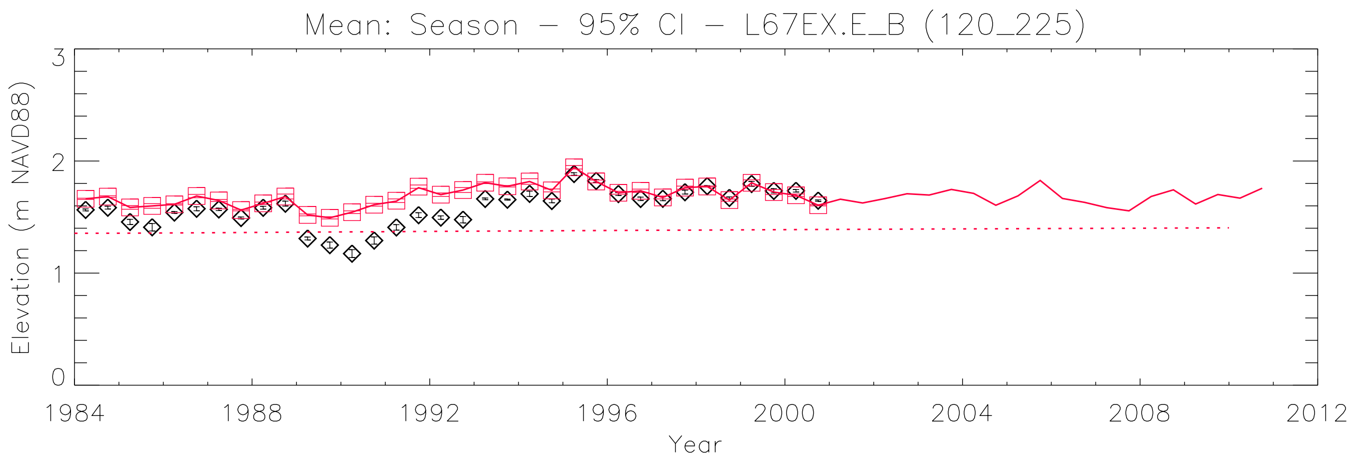


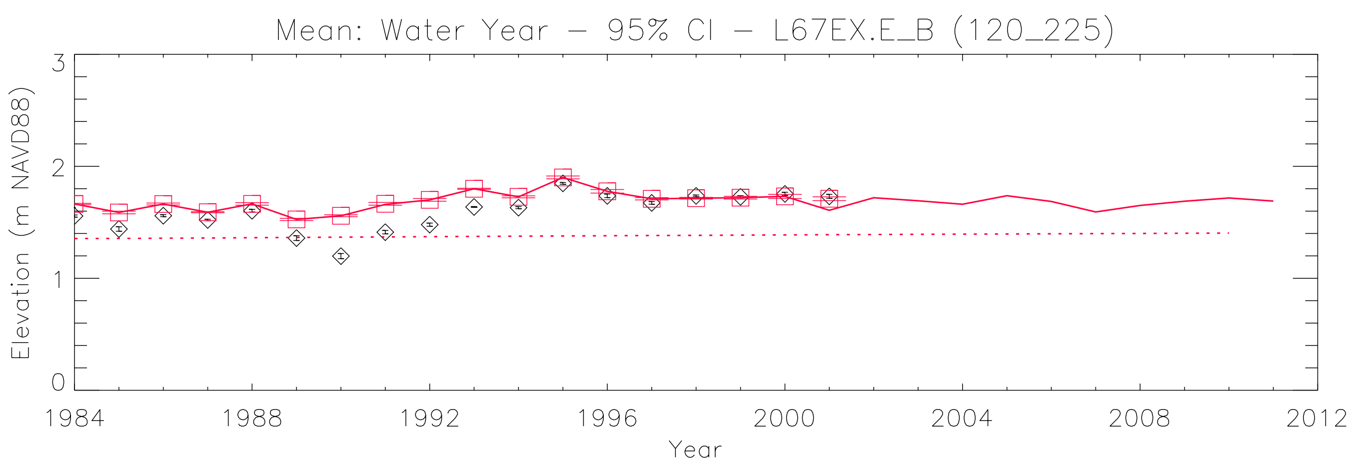
Mean: Water Year - 95% CI - L67EX.W (120_225)
Elevation (m NAVD88)
Year

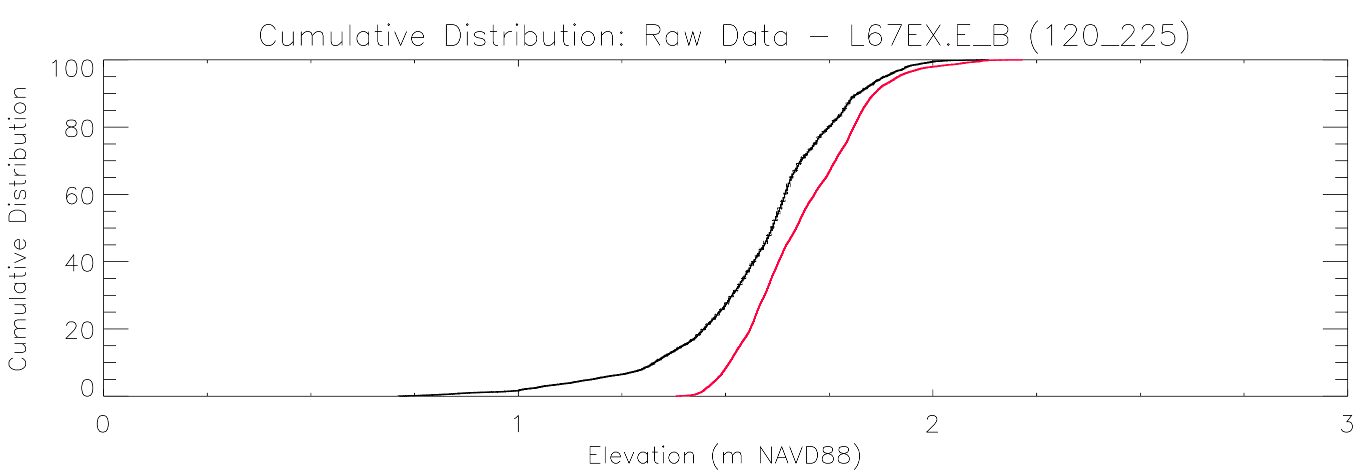


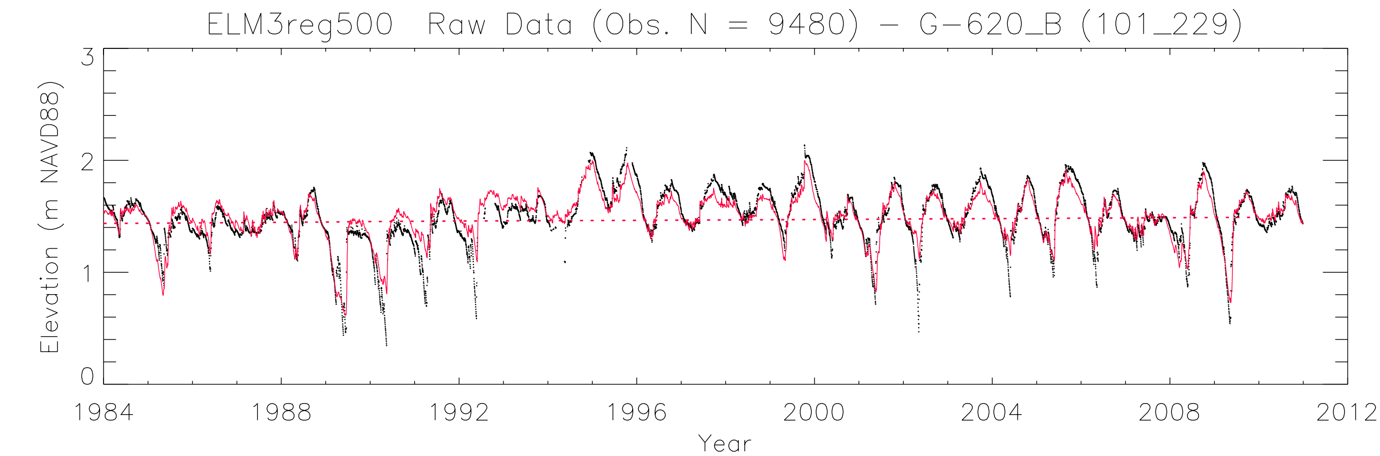
Cumulative Distribution: Raw Data - L67EX.W (120_225)
Cumulative Distribution
Elevation (m NAVD88)

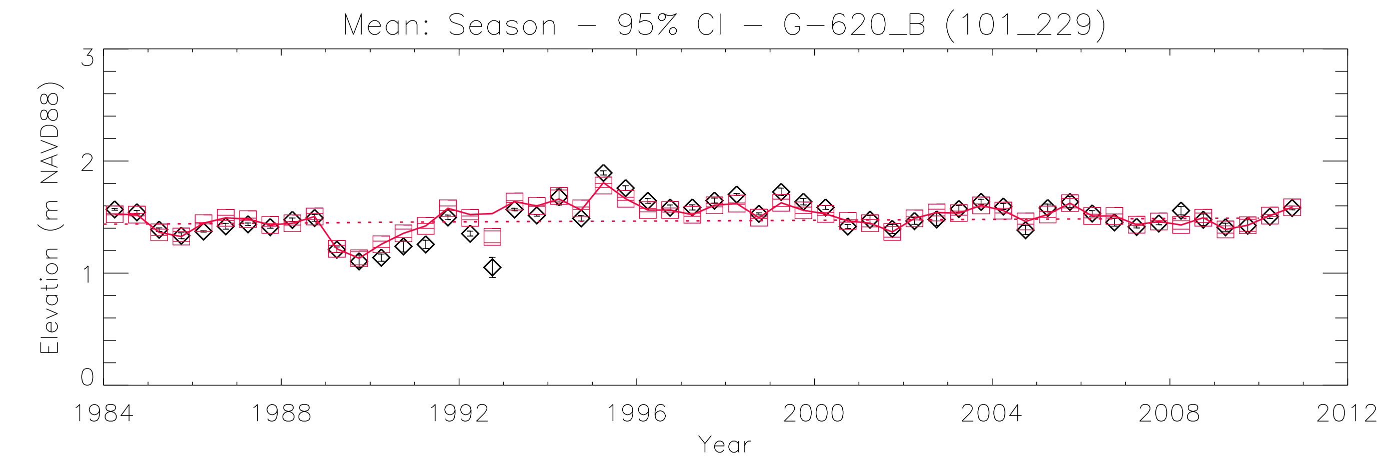

ELM3reg500 Raw Data (Obs. N = 6187) - L67EX.E_B (120_225)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

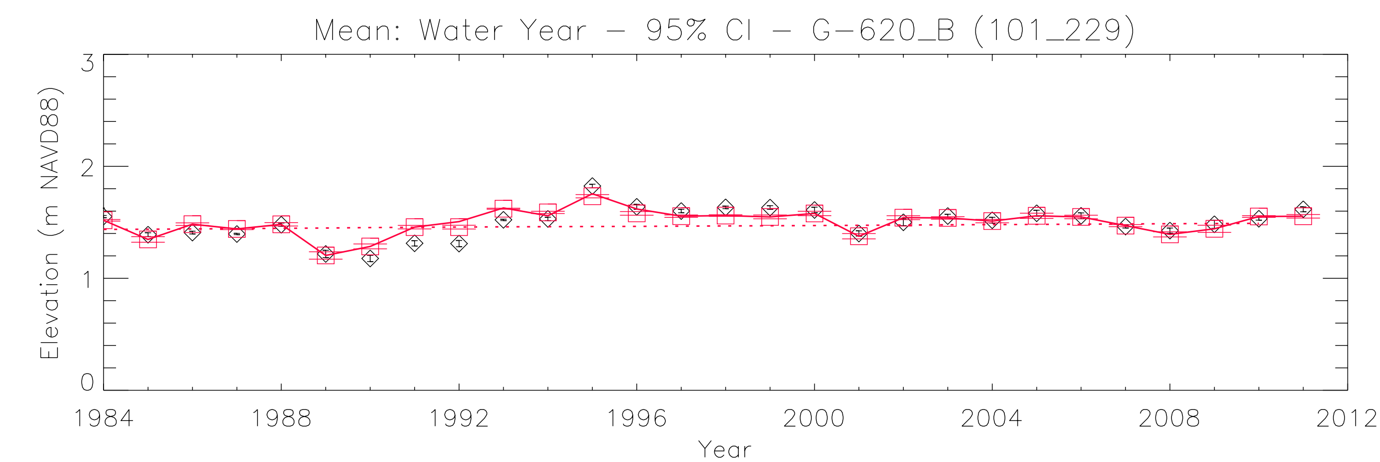

Mean: Season - 95% CI - L67EX.E_B (120_225)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

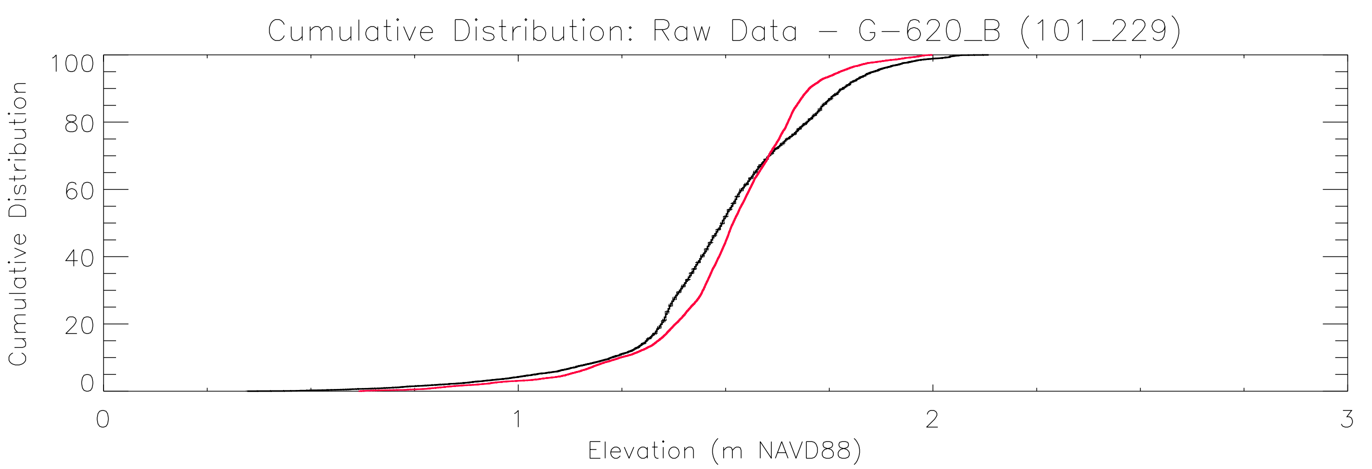

Mean: Water Year - 95% CI - L67EX.E_B (120_225)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

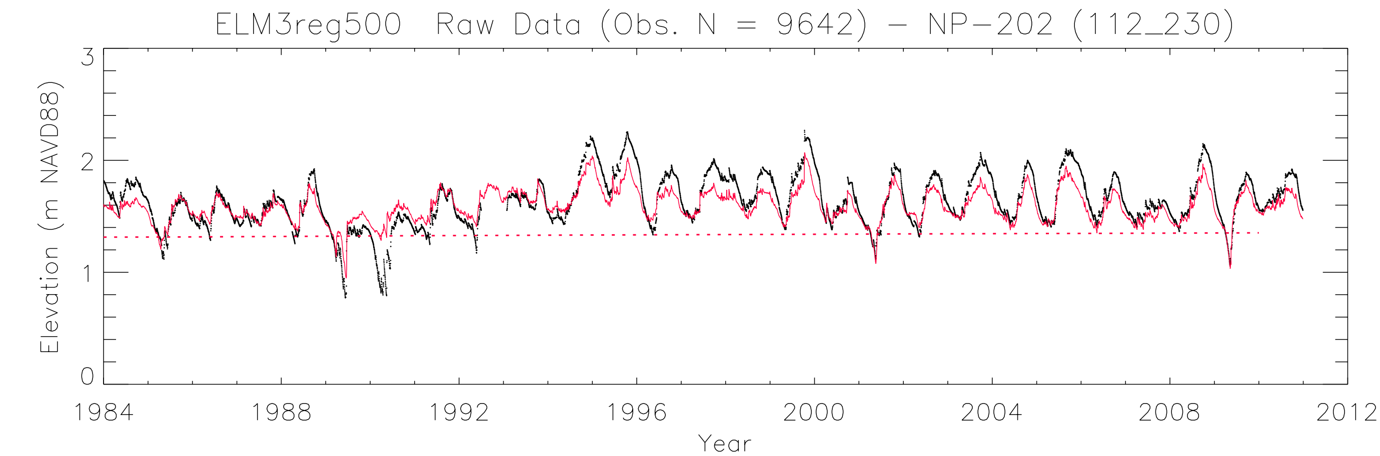

Cumulative Distribution: Raw Data - L67EX.E_B (120_225)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
0
1
2
3


ELM3reg500 Raw Data (Obs. N = 9480) - G-620_B (101_229)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

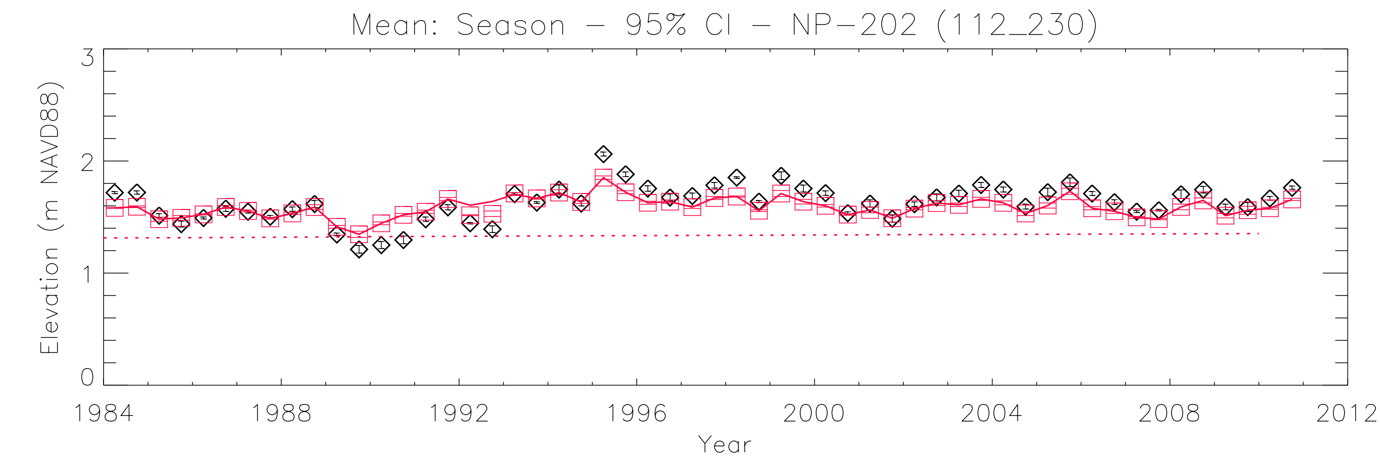

Mean: Season - 95% CI - G-620_B (101_229)
Elevation (m NAVD88)
Year


Mean: Water Year - 95% CI - G-620_B (101_229)
Elevation (m NAVD88)
Year

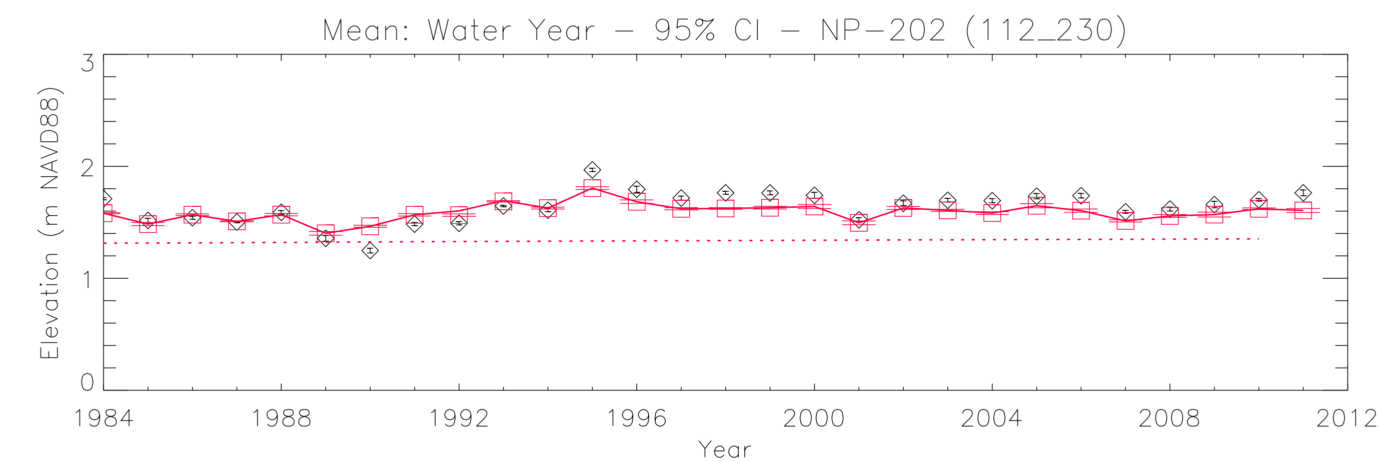

Cumulative Distribution: Raw Data - G-620_B (101_229)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
0
1
2
3



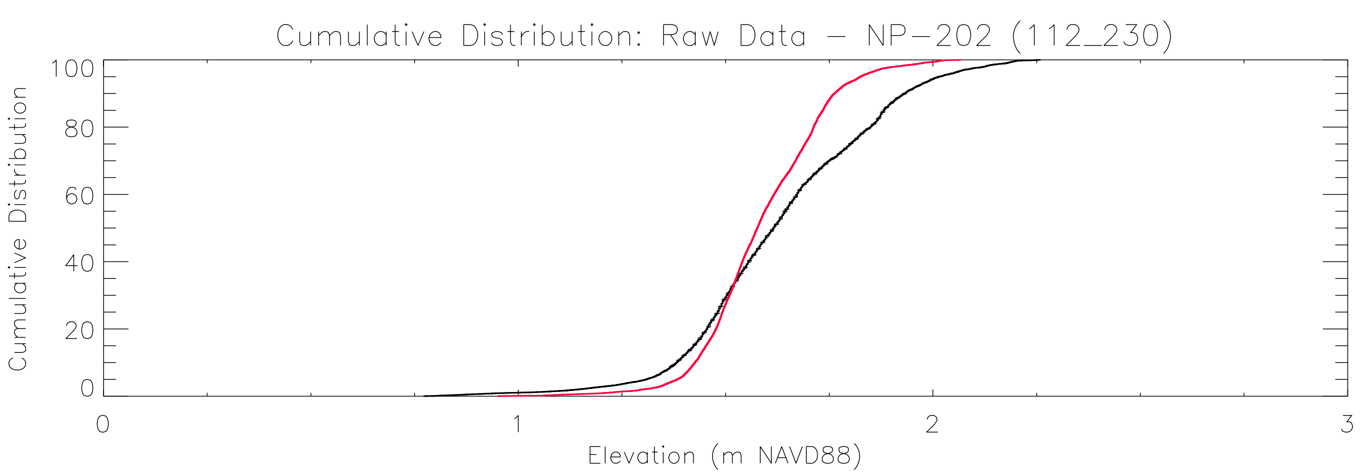
ELM3reg500 Raw Data (Obs. N = 9642) – NP-202 (112_230)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012



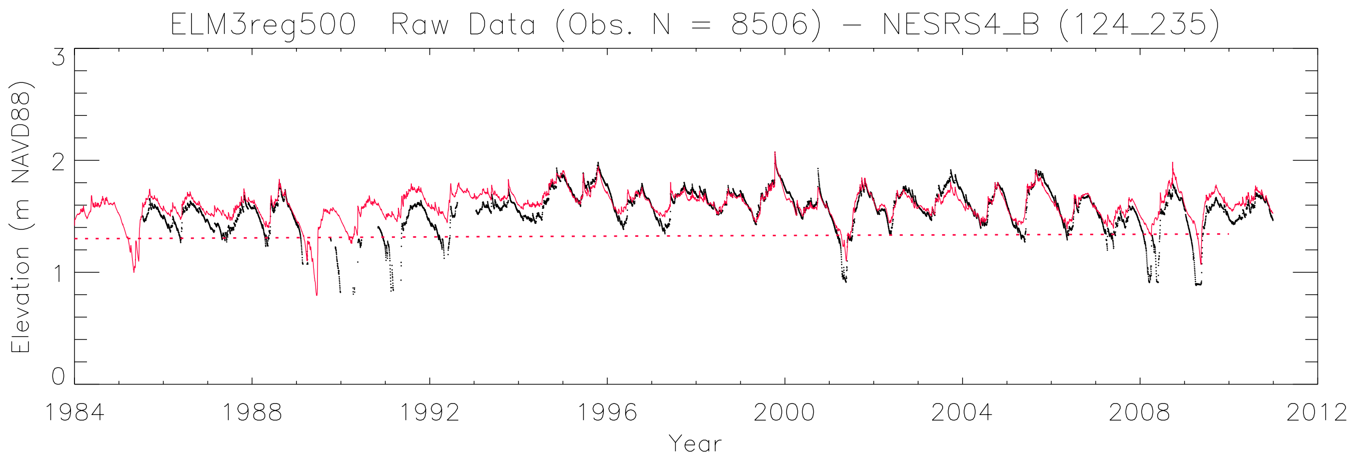
Mean: Season – 95% CI – NP-202 (112_230)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

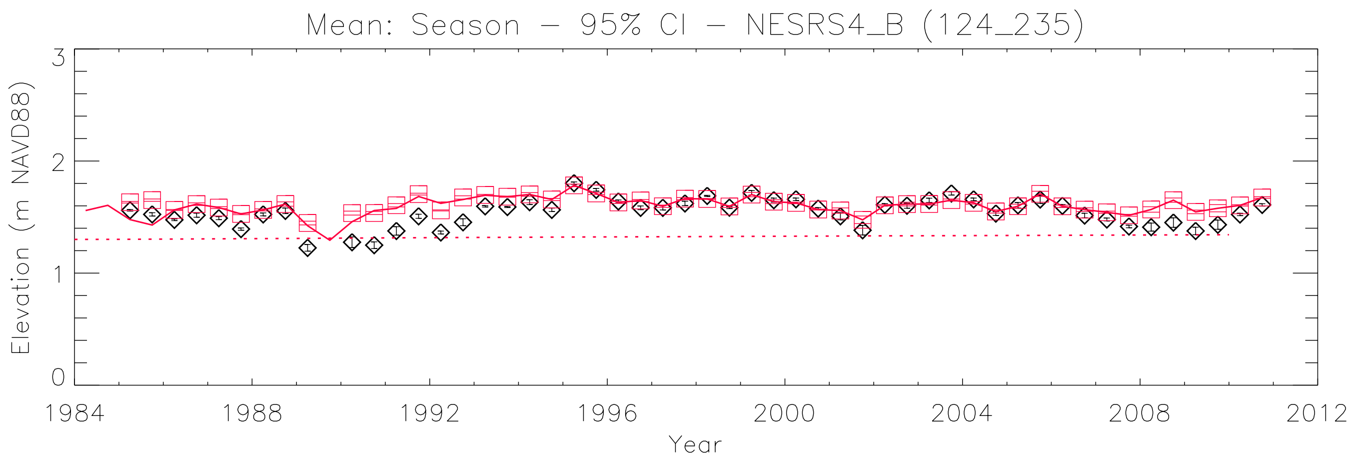


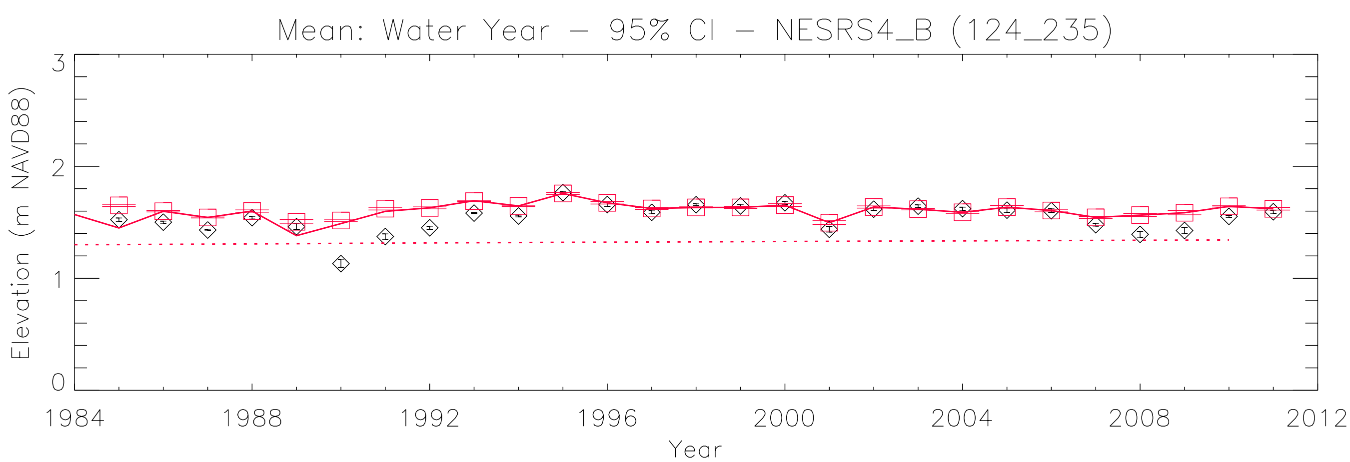
Mean: Water Year – 95% CI – NP-202 (112_230)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

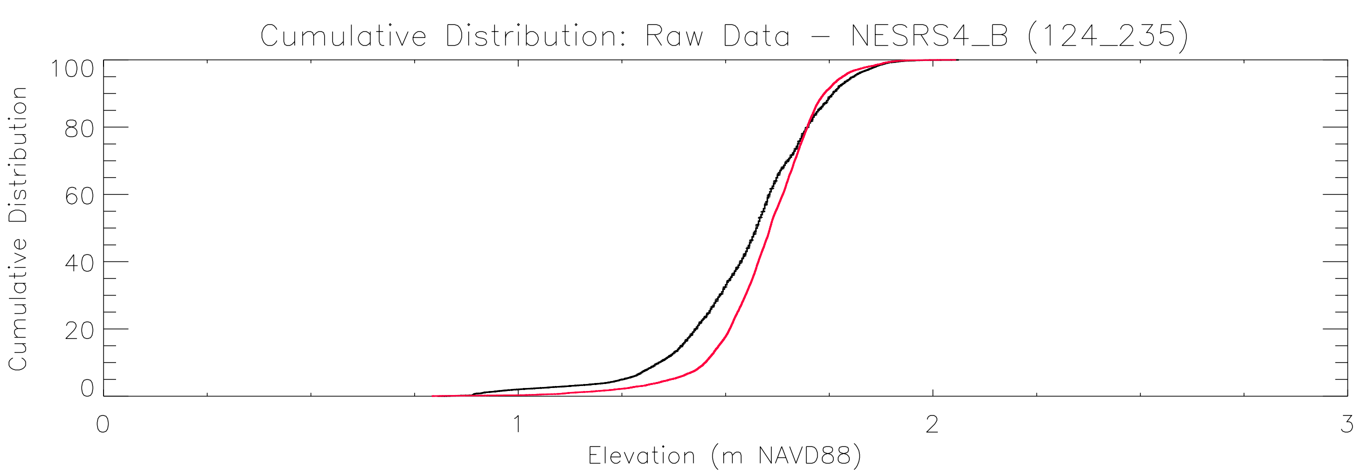


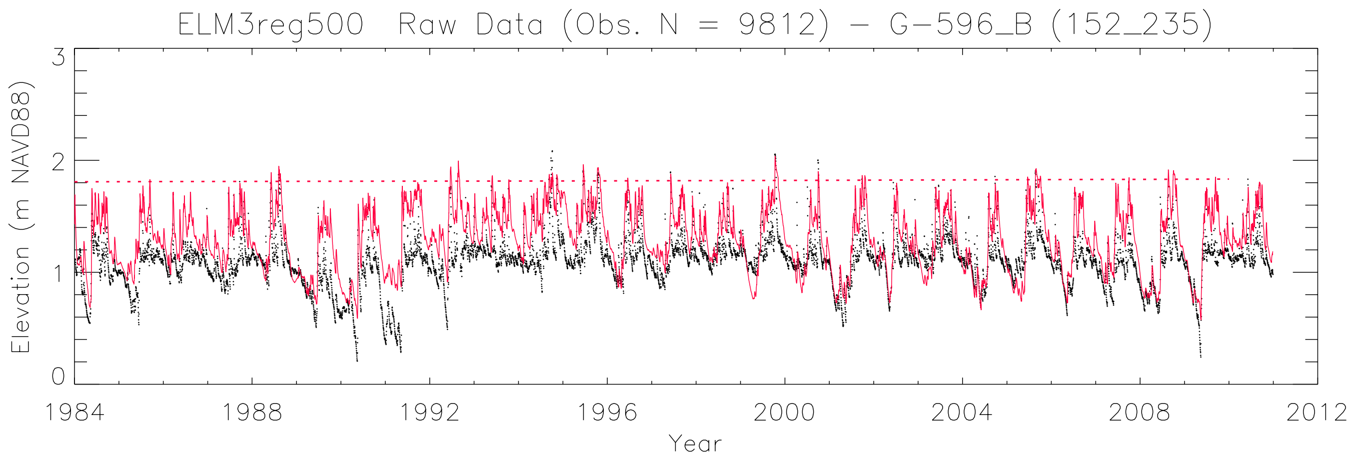
Cumulative Distribution: Raw Data – NP-202 (112_230)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
0
1
2
3

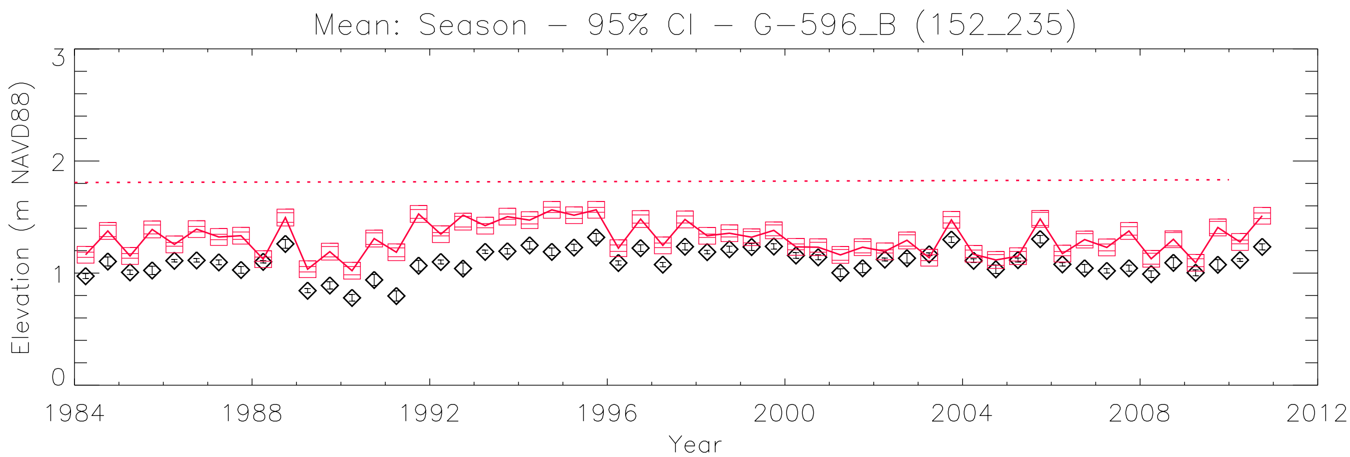

ELM3reg500 Raw Data (Obs. N = 8506) – NESRS4_B (124_235)
Elevation (m NAVD88)
Year

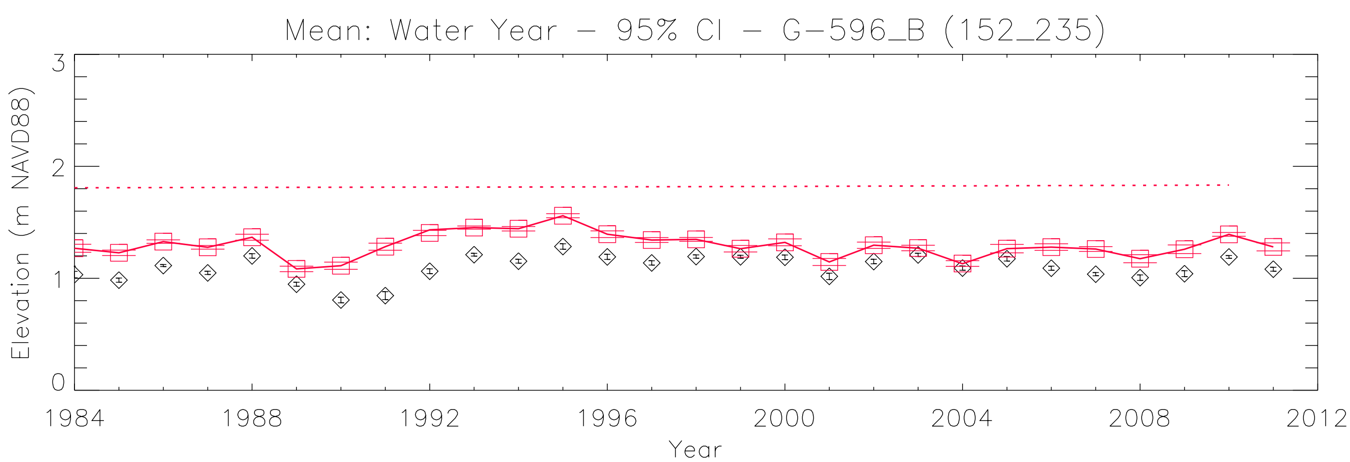

Mean: Season – 95% CI – NESRS4_B (124_235)
Elevation (m NAVD88)
Year

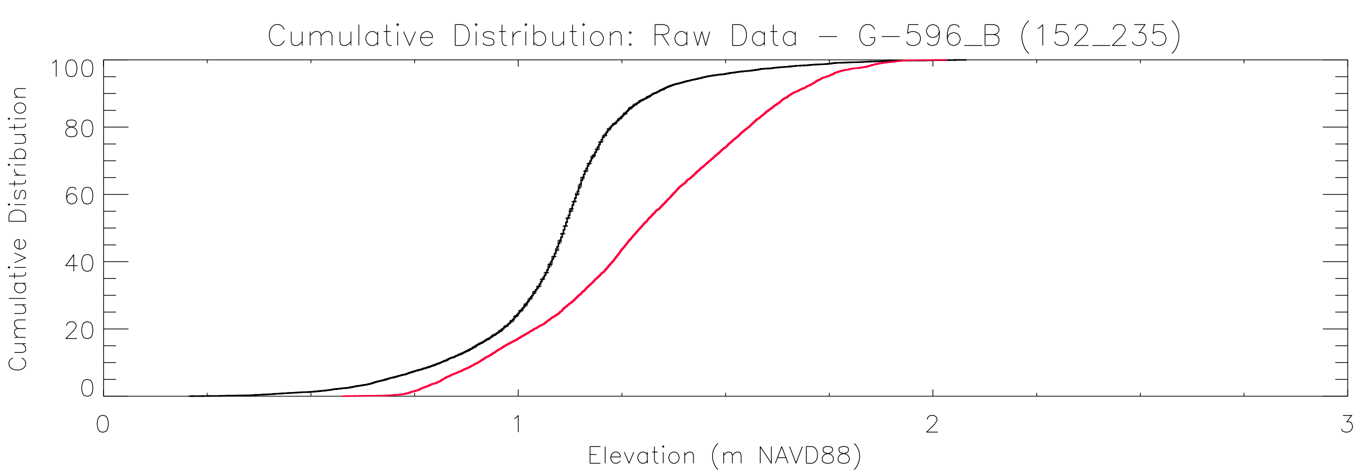

Mean: Water Year – 95% CI – NESRS4_B (124_235)
Elevation (m NAVD88)
Year

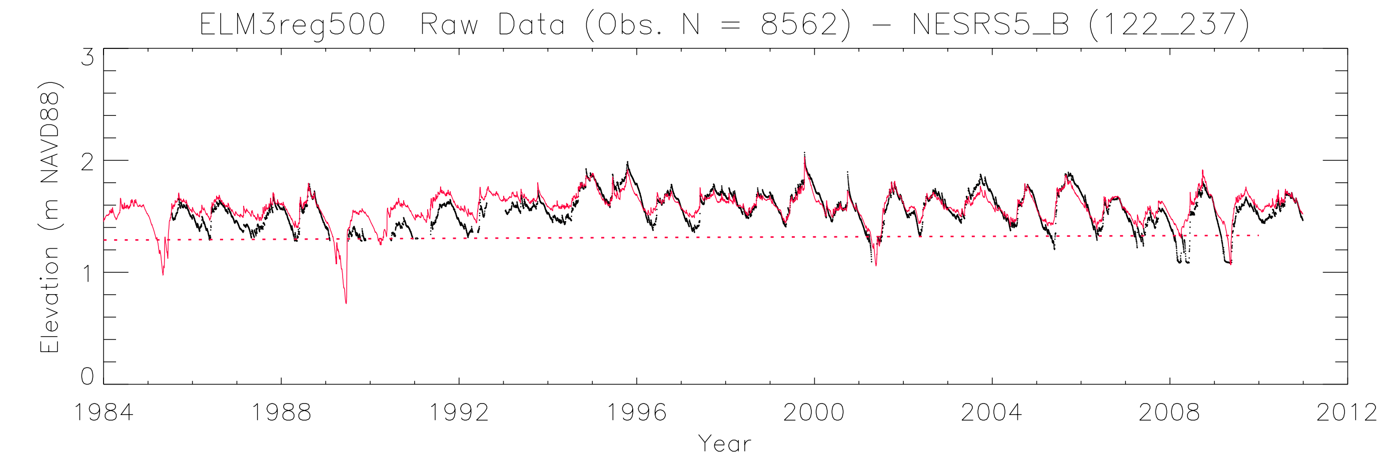

Cumulative Distribution: Raw Data – NESRS4_B (124_235)
Cumulative Distribution
Elevation (m NAVD88)

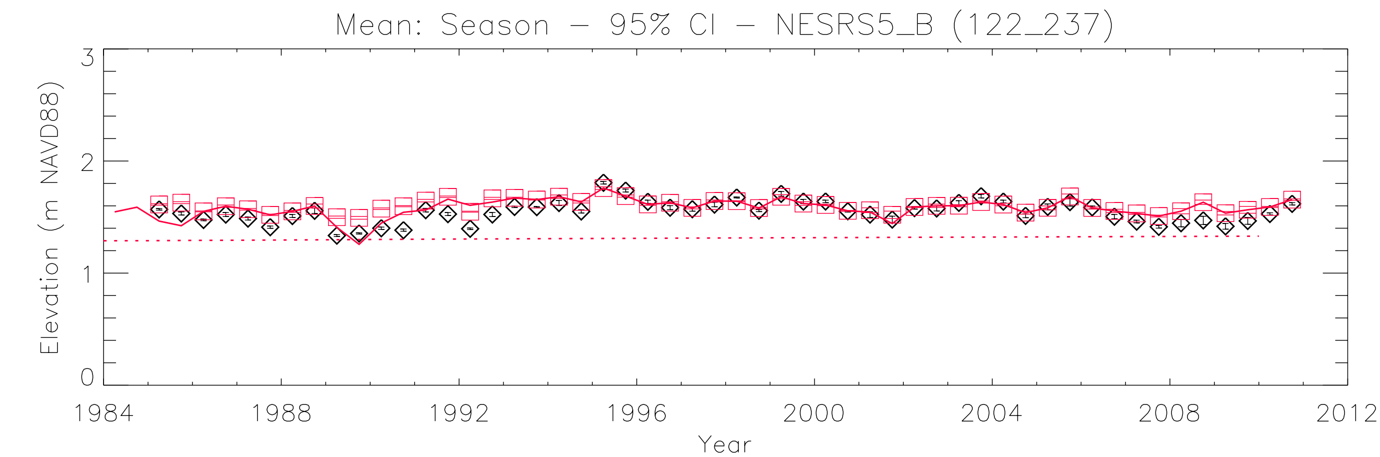

ELM3reg500 Raw Data (Obs. N = 9812) – G-596_B (152_235)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

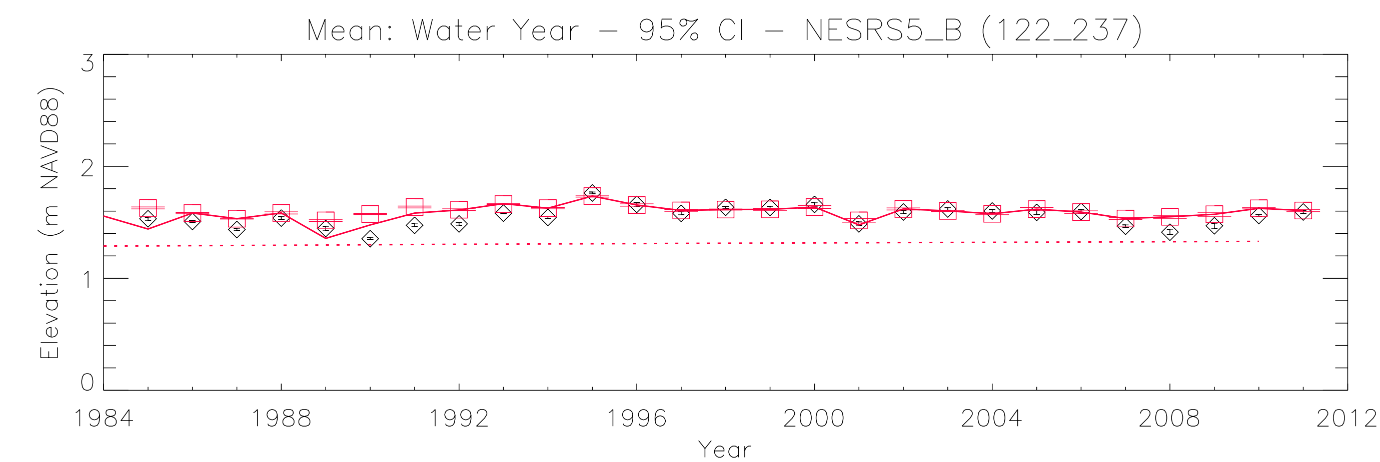

Mean: Season – 95% CI – G-596_B (152_235)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

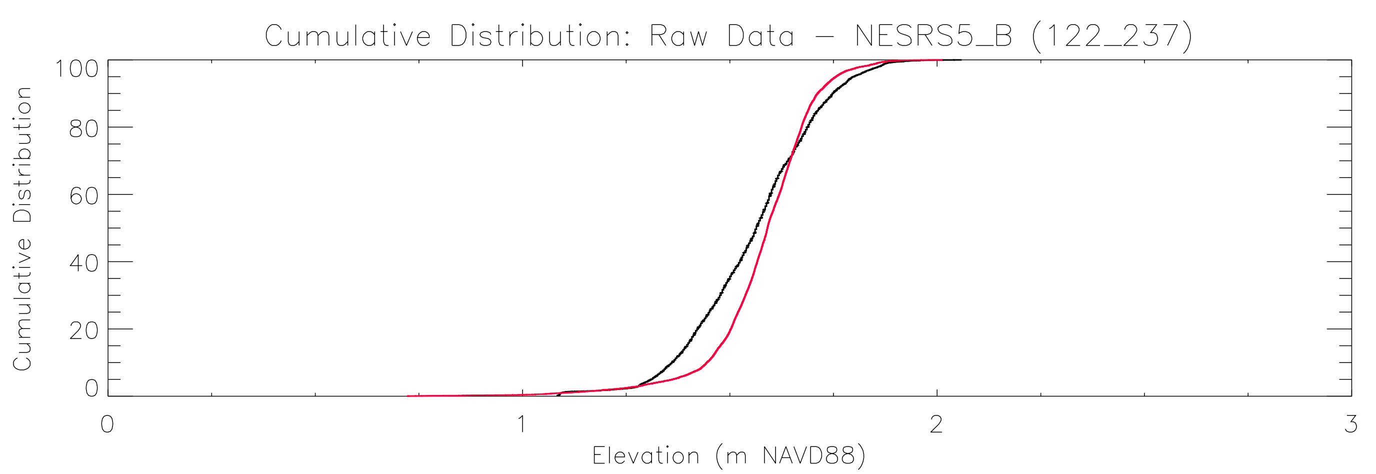

Mean: Water Year – 95% CI – G-596_B (152_235)
Elevation (m NAVD88)
Year
0
1
2
3
1984
1988
1992
1996
2000
2004
2008
2012

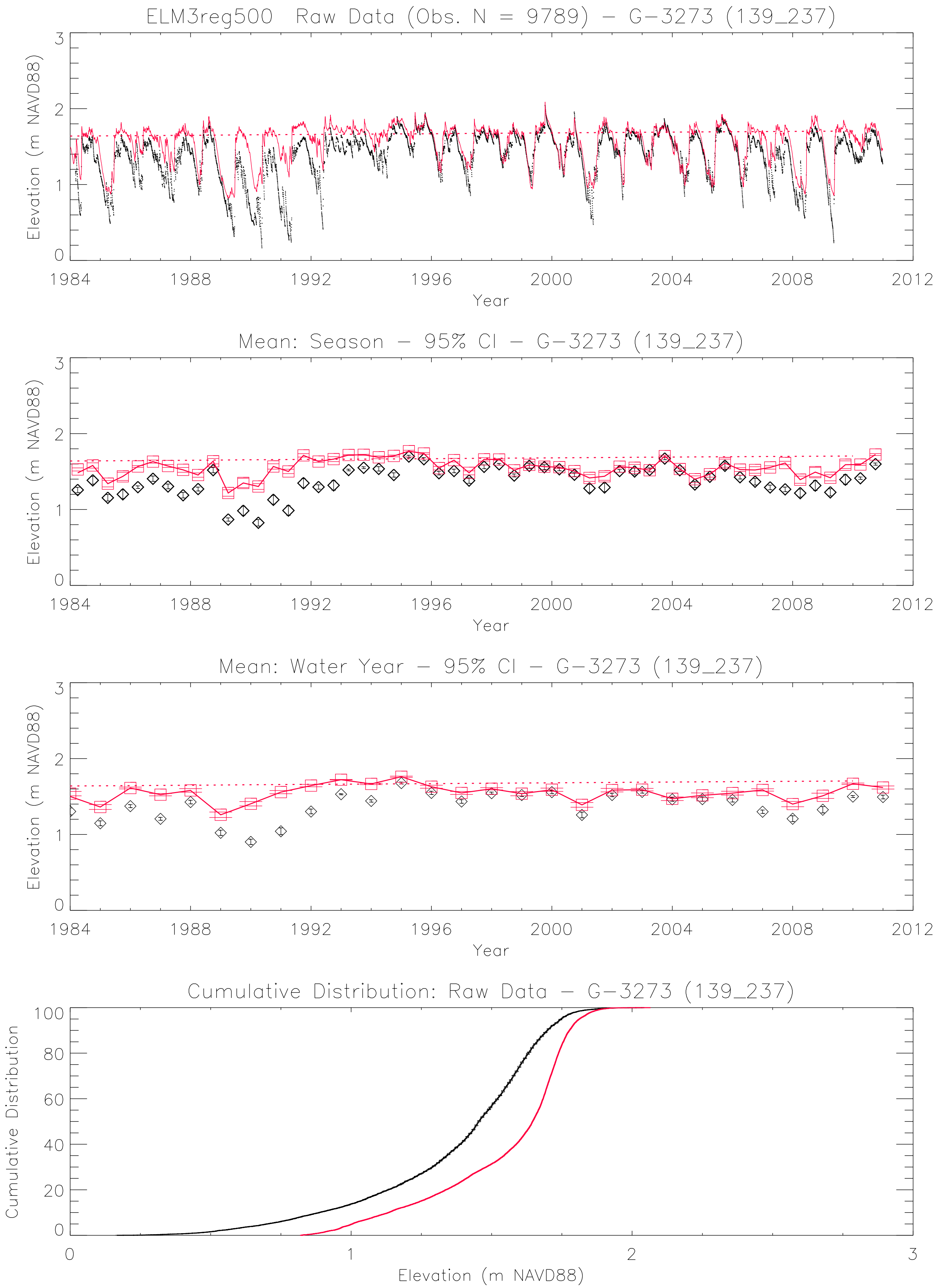

Cumulative Distribution: Raw Data – G-596_B (152_235)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
0
1
2
3


ELM3reg500 Raw Data (Obs. N = 8562) – NESRS5_B (122_237)
Elevation (m NAVD88)
Year

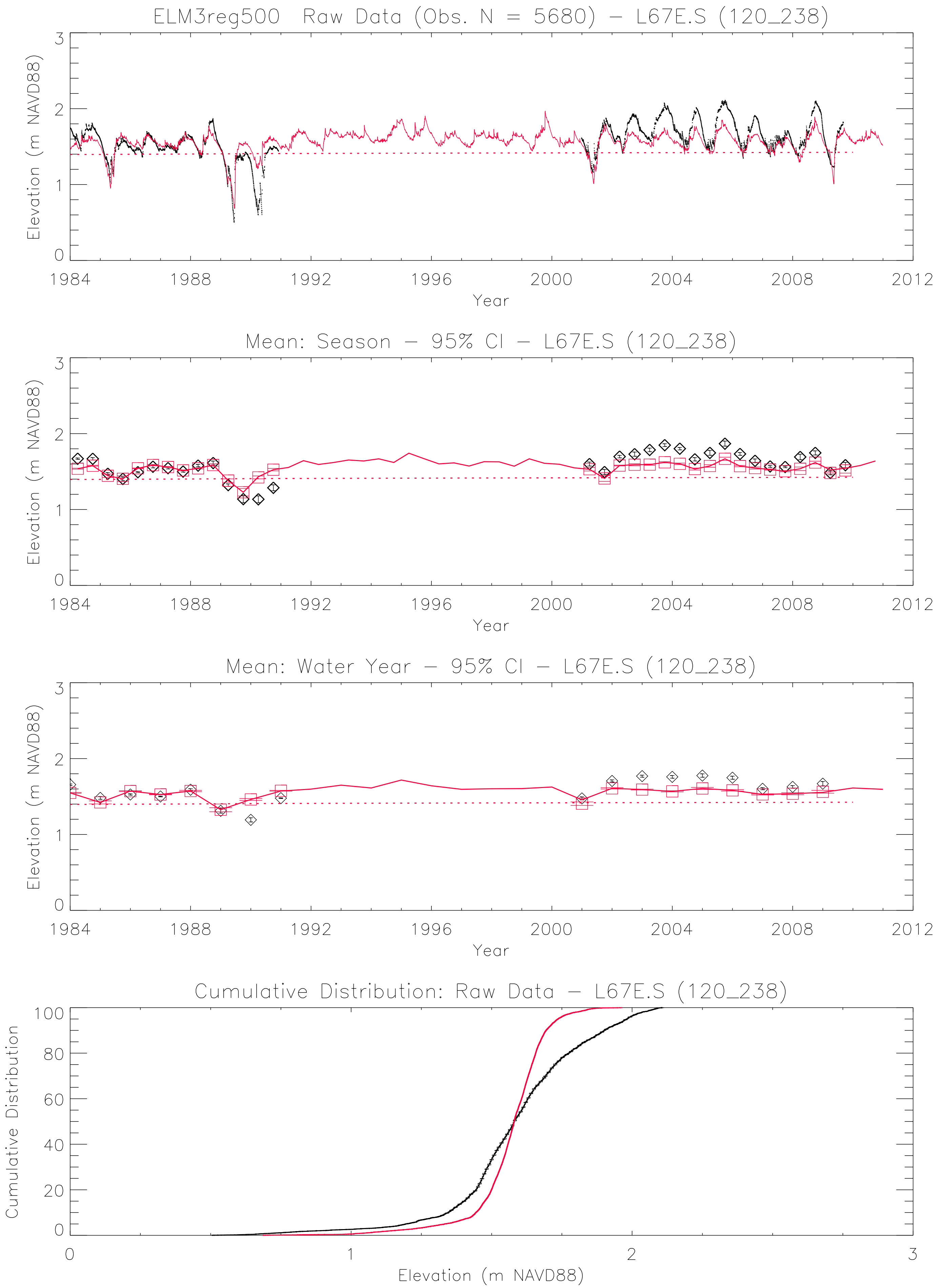

Mean: Season – 95% CI – NESRS5_B (122_237)
Elevation (m NAVD88)
Year

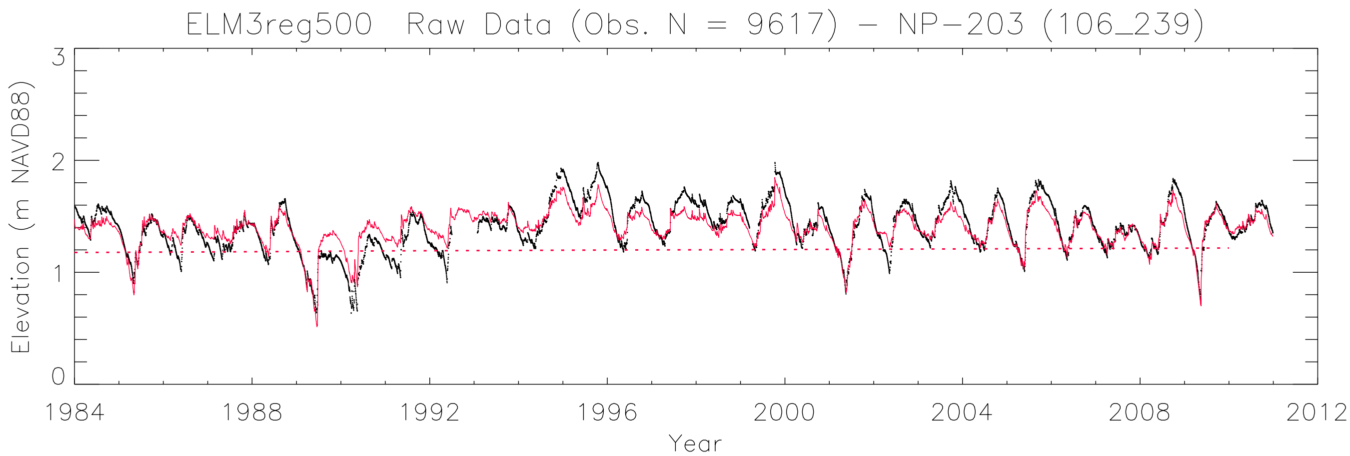

Mean: Water Year – 95% CI – NESRS5_B (122_237)
Elevation (m NAVD88)
Year

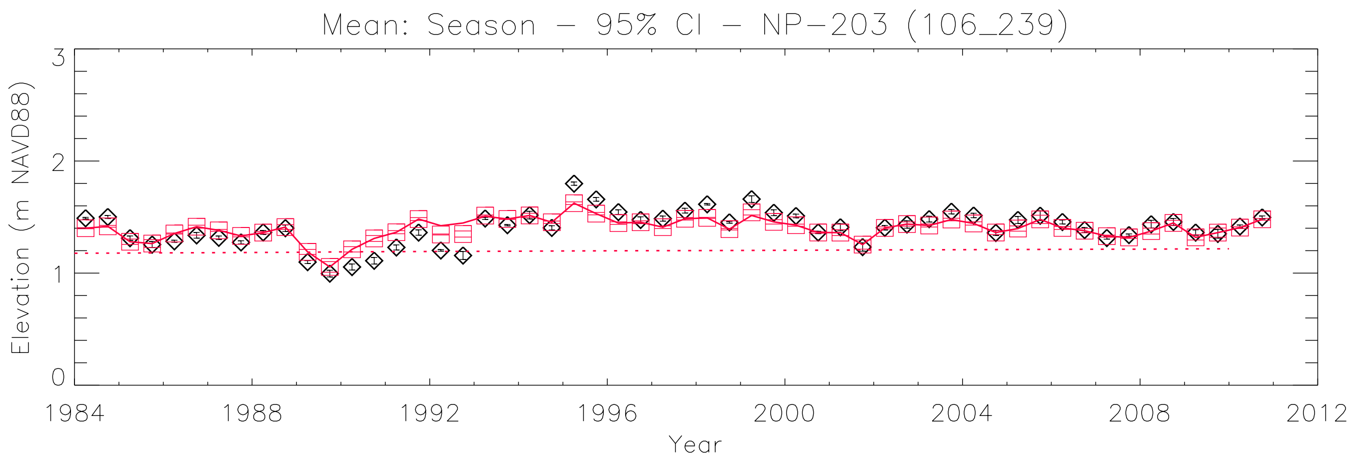

Cumulative Distribution: Raw Data – NESRS5_B (122_237)
Cumulative Distribution
Elevation (m NAVD88)

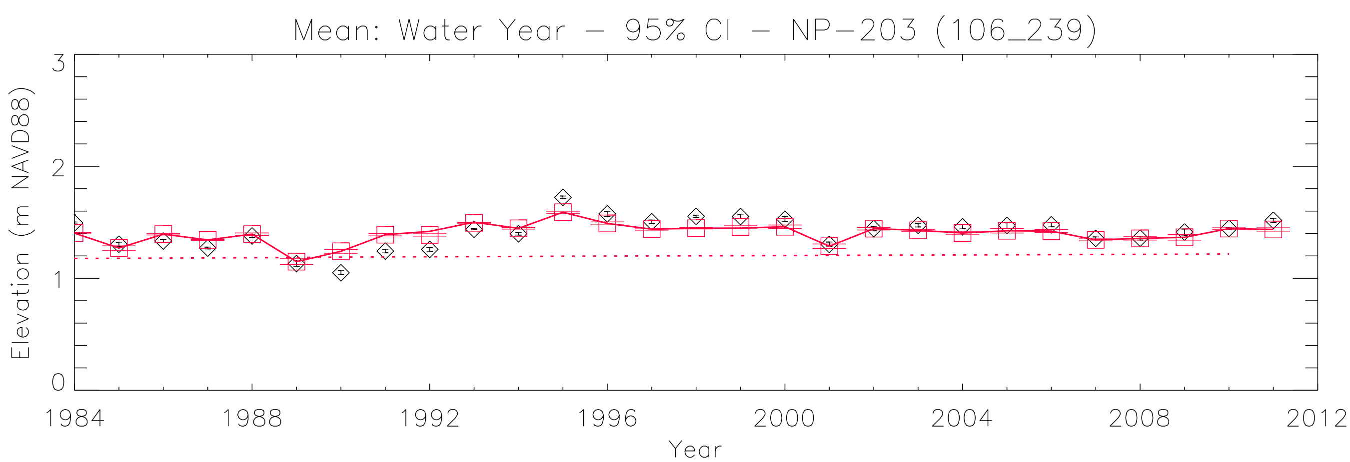


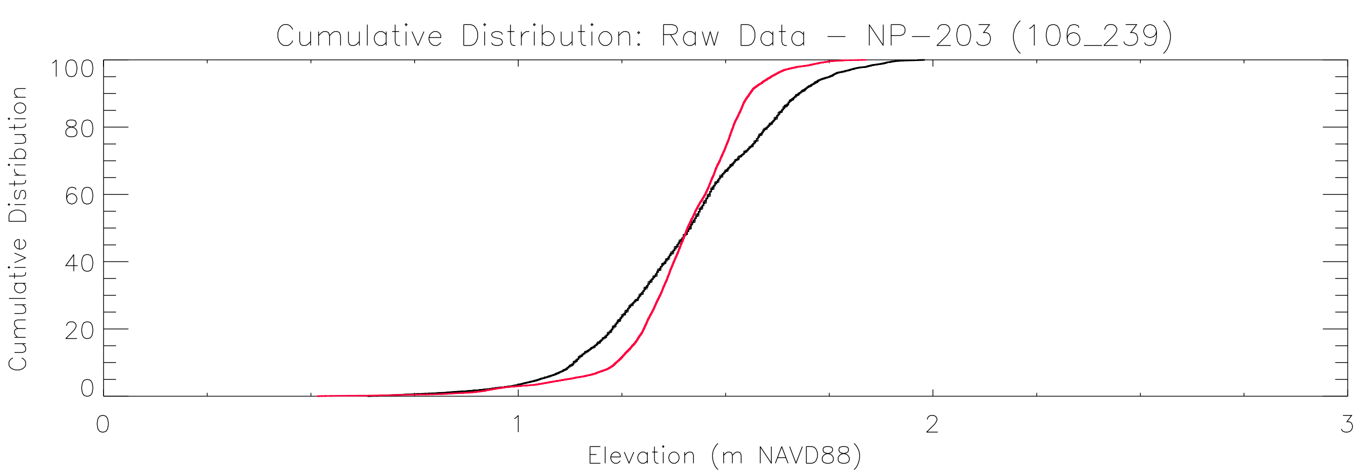
ELM3reg500 Raw Data (Obs. N = 9789) – G–3273 (139_237)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – G–3273 (139_237)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – G–3273 (139_237)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – G–3273 (139_237)
Cumulative Distribution
Elevation (m NAVD88)

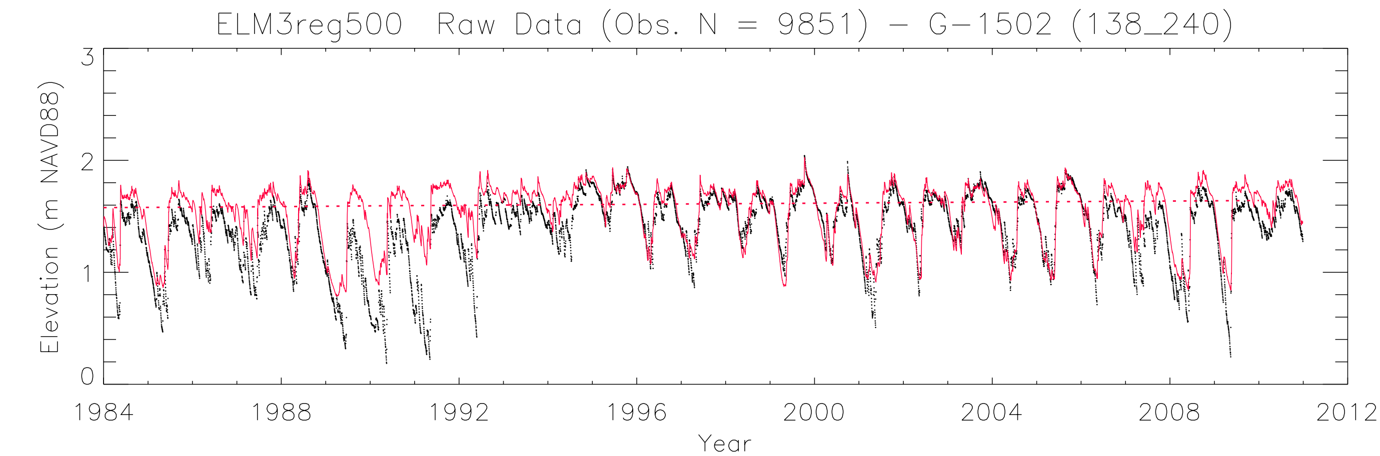

ELM3reg500 Raw Data (Obs. N = 5680) – L67E.S (120_238)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – L67E.S (120_238)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – L67E.S (120_238)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – L67E.S (120_238)
Cumulative Distribution
Elevation (m NAVD88)

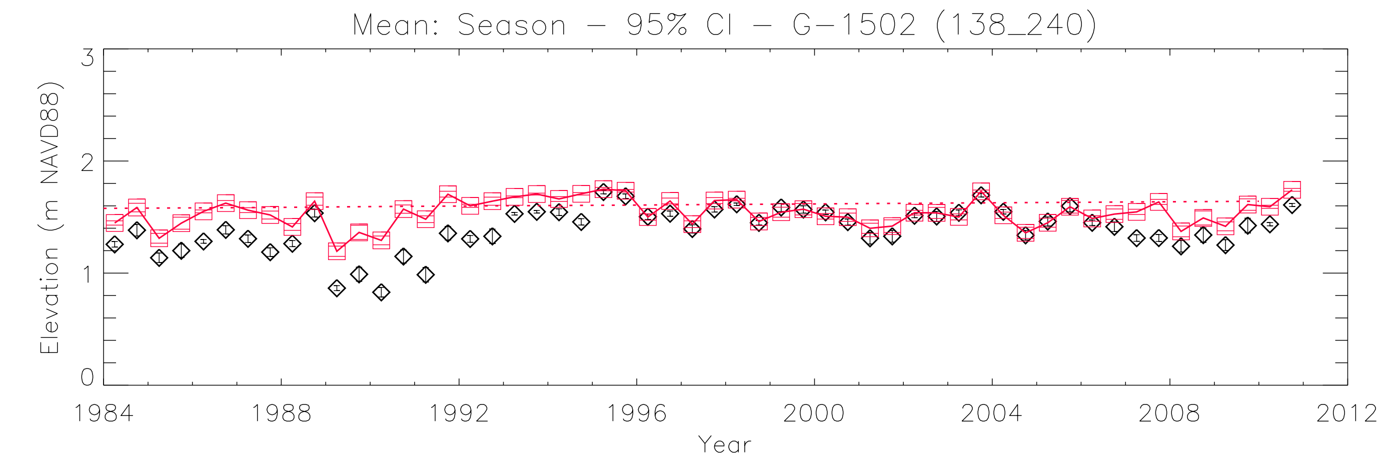

ELM3reg500 Raw Data (Obs. N = 9617) – NP–203 (106_239)
Elevation (m NAVD88)
Year

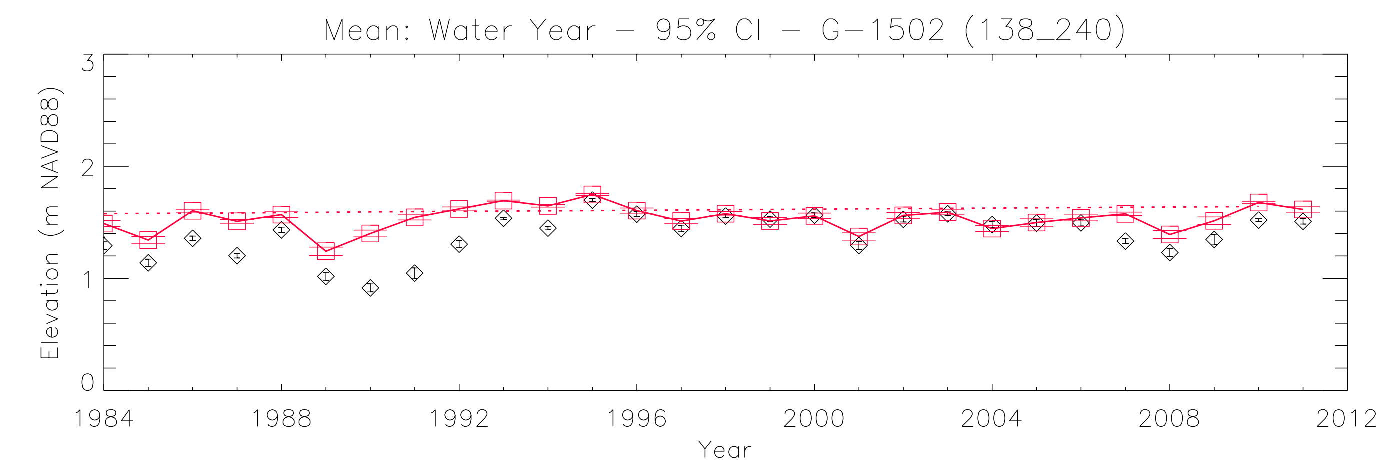

Mean: Season – 95% CI – NP–203 (106_239)
Elevation (m NAVD88)
Year

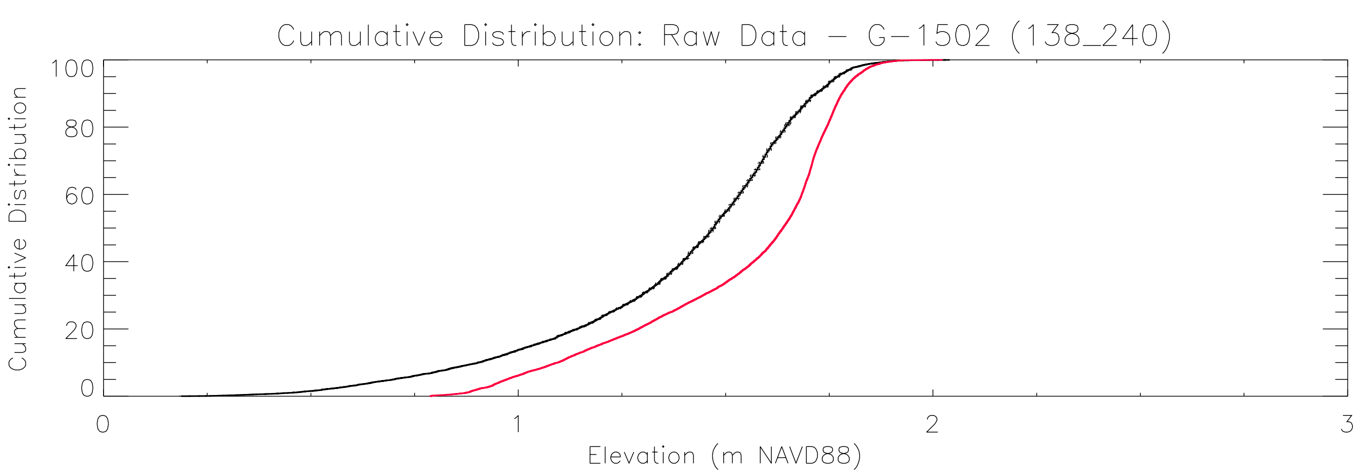

Mean: Water Year – 95% CI – NP–203 (106_239)
Elevation (m NAVD88)
Year

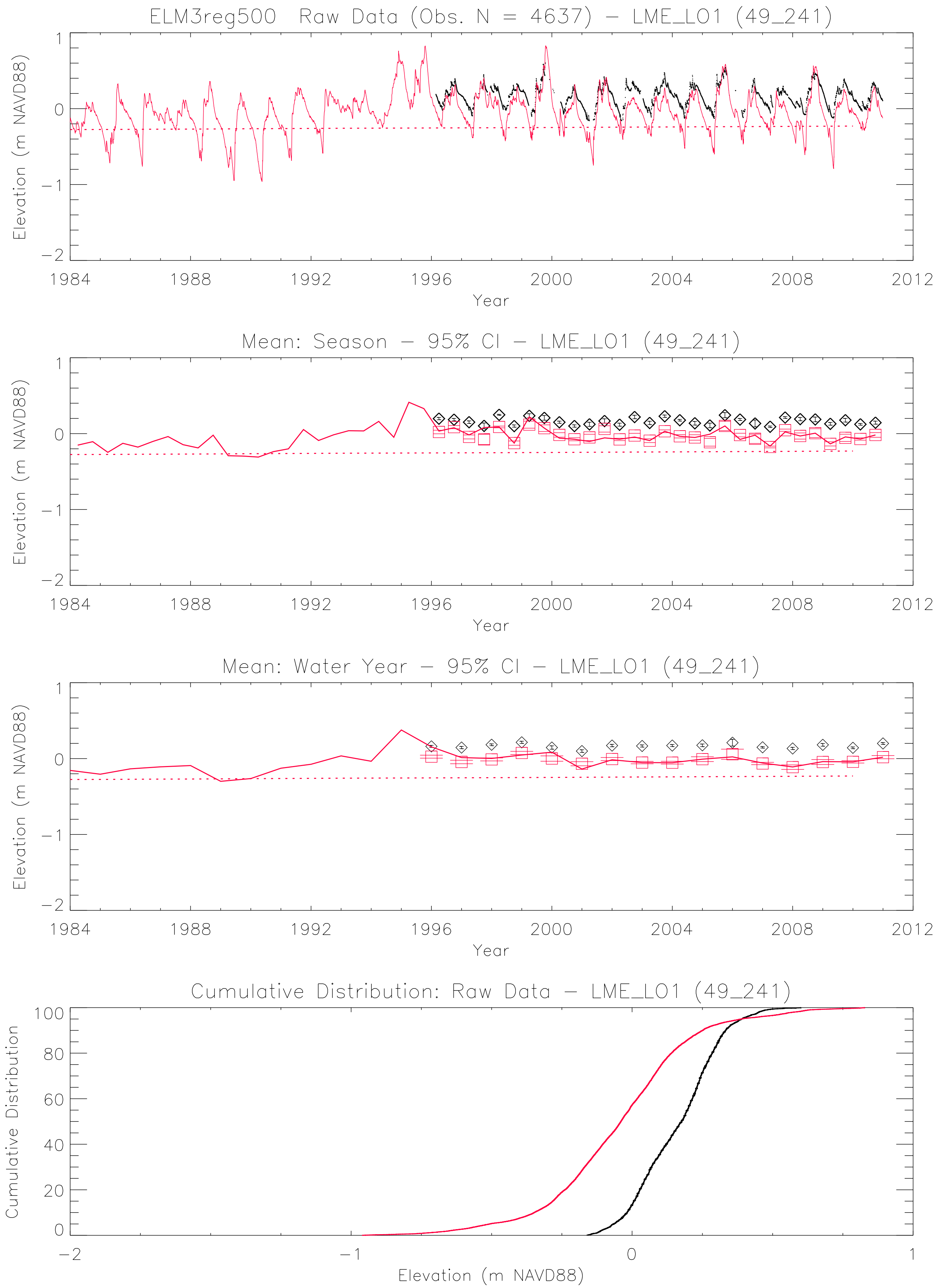

Cumulative Distribution: Raw Data – NP–203 (106_239)
Cumulative Distribution
Elevation (m NAVD88)

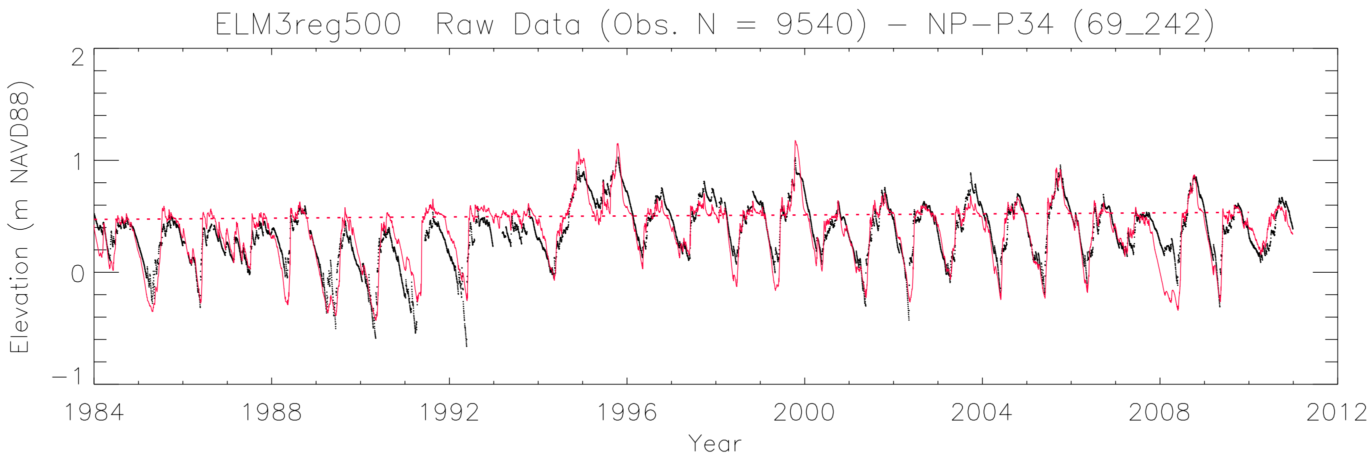

ELM3reg500 Raw Data (Obs. N = 9851) – G-1502 (138_240)
Elevation (m NAVD88)
Year

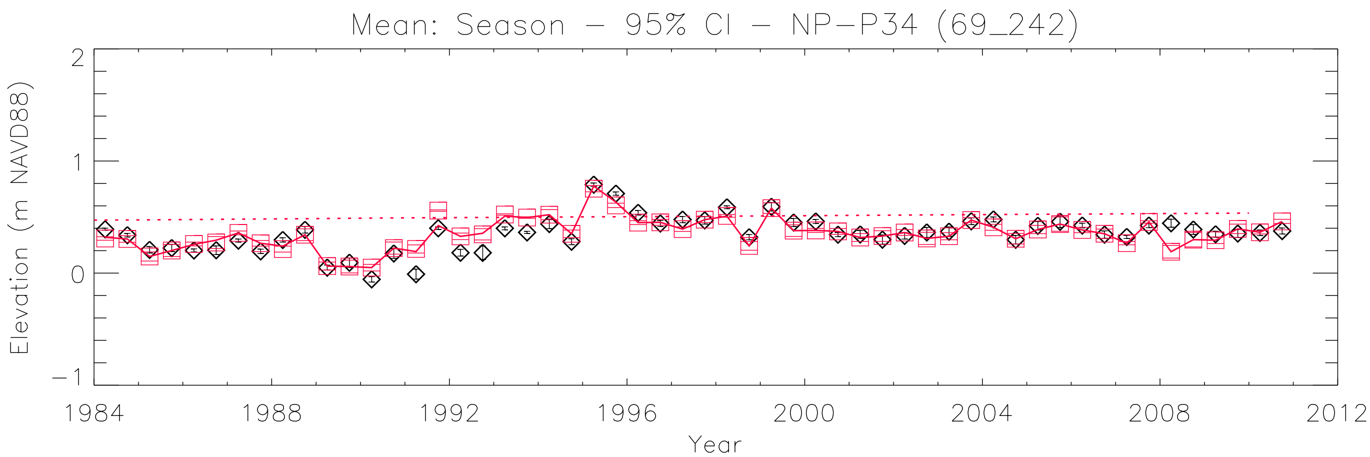

Mean: Season – 95% CI – G-1502 (138_240)
Elevation (m NAVD88)
Year

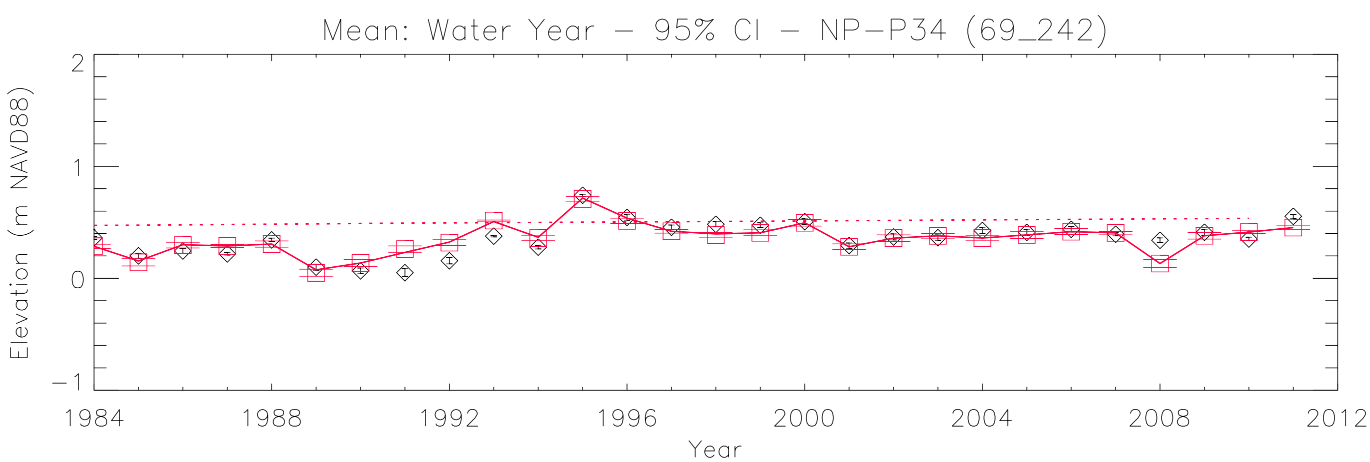

Mean: Water Year – 95% CI – G-1502 (138_240)
Elevation (m NAVD88)
Year

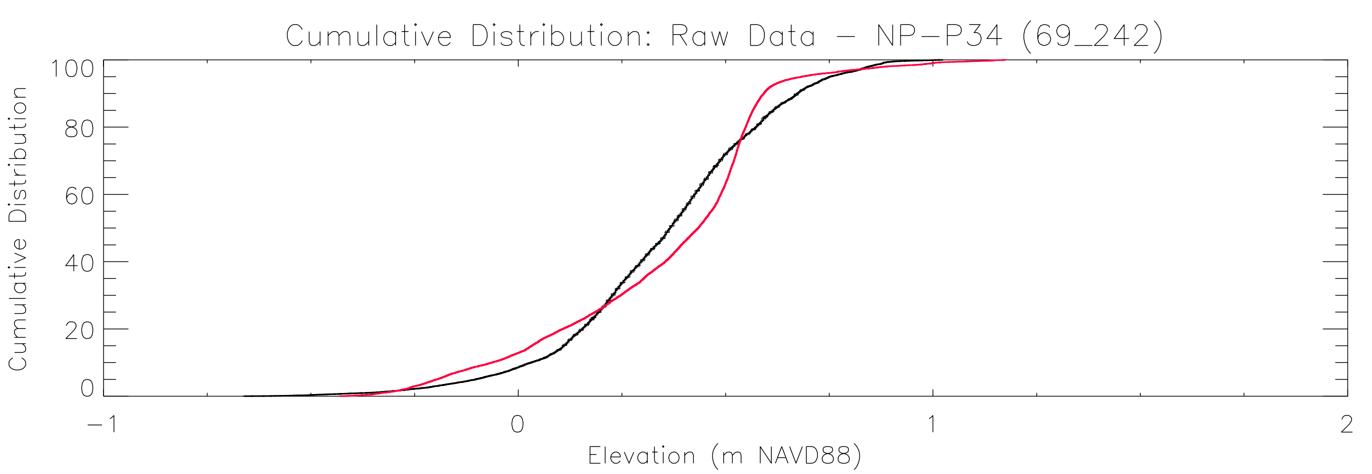

Cumulative Distribution: Raw Data – G-1502 (138_240)
Cumulative Distribution
Elevation (m NAVD88)

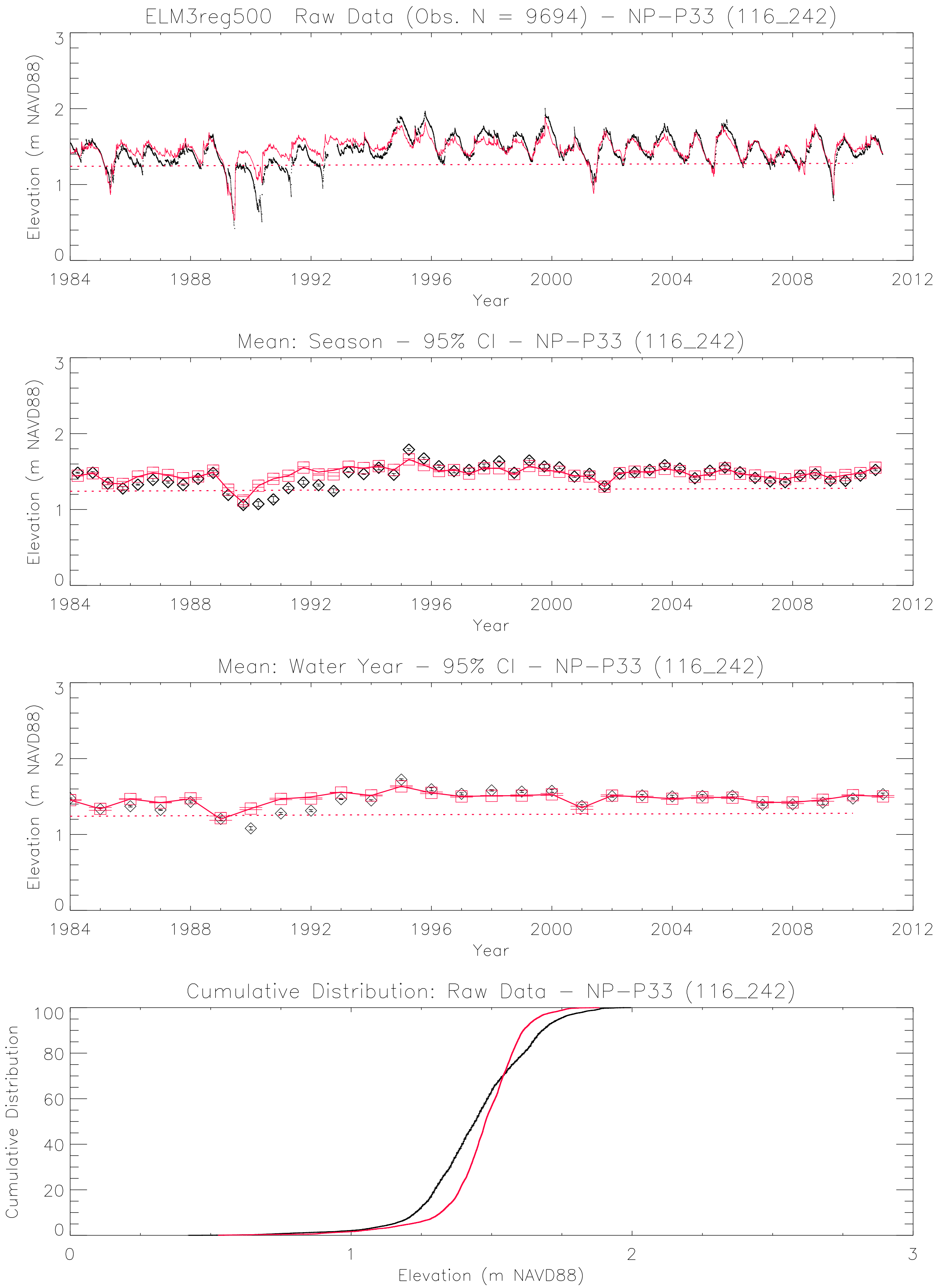

ELM3reg500 Raw Data (Obs. N = 4637) – LME_LO1 (49_241)
Elevation (m NAVD88)
1
0
−1
−2
1984
1988
1992
1996
2000
2004
2008
2012
Year
Mean: Season – 95% CI – LME_LO1 (49_241)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – LME_LO1 (49_241)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – LME_LO1 (49_241)
Cumulative Distribution
100
80
60
40
20
0
−2
−1
0
1
Elevation (m NAVD88)

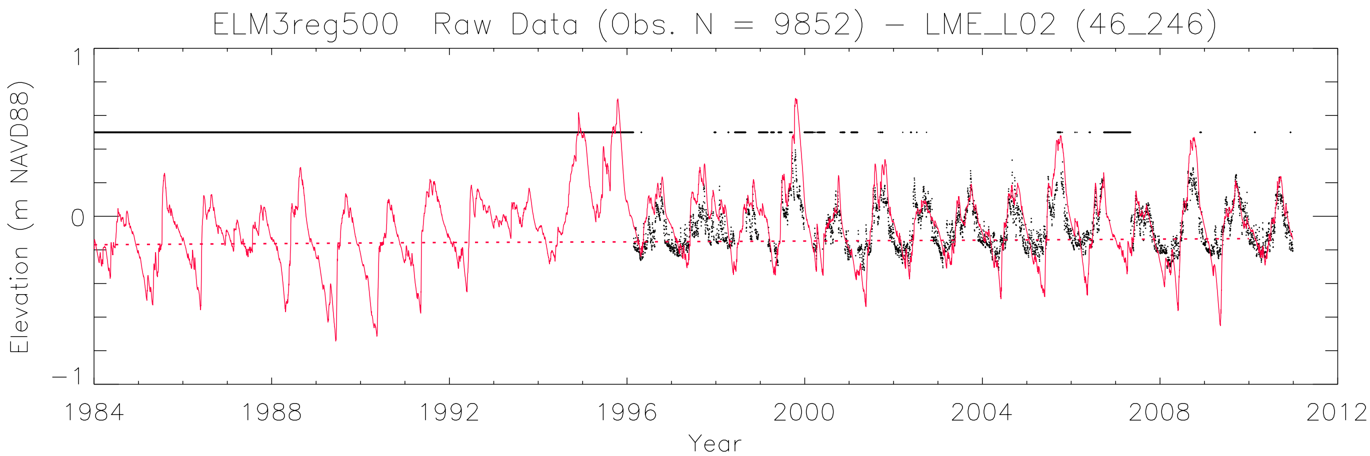

ELM3reg500 Raw Data (Obs. N = 9540) – NP–P34 (69_242)
Elevation (m NAVD88)
Year

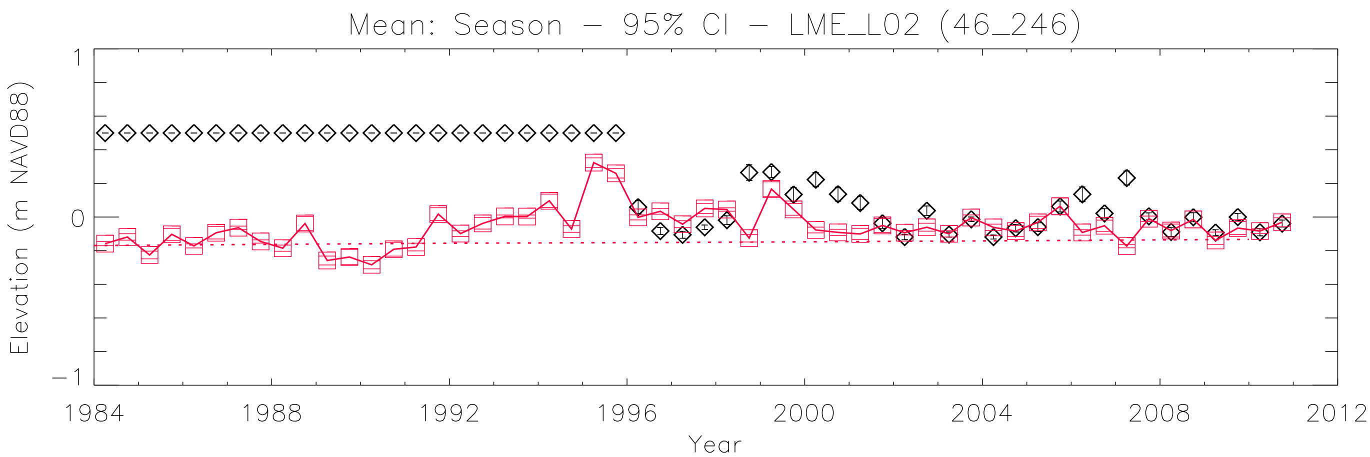

Mean: Season – 95% CI – NP–P34 (69_242)
Elevation (m NAVD88)
Year

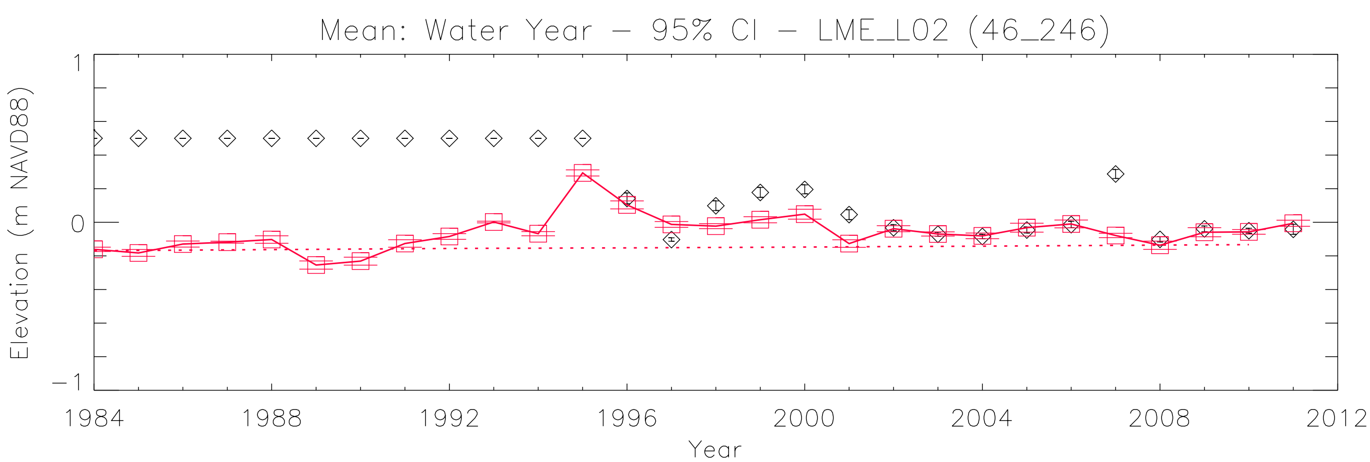

Mean: Water Year – 95% CI – NP–P34 (69_242)
Elevation (m NAVD88)
Year

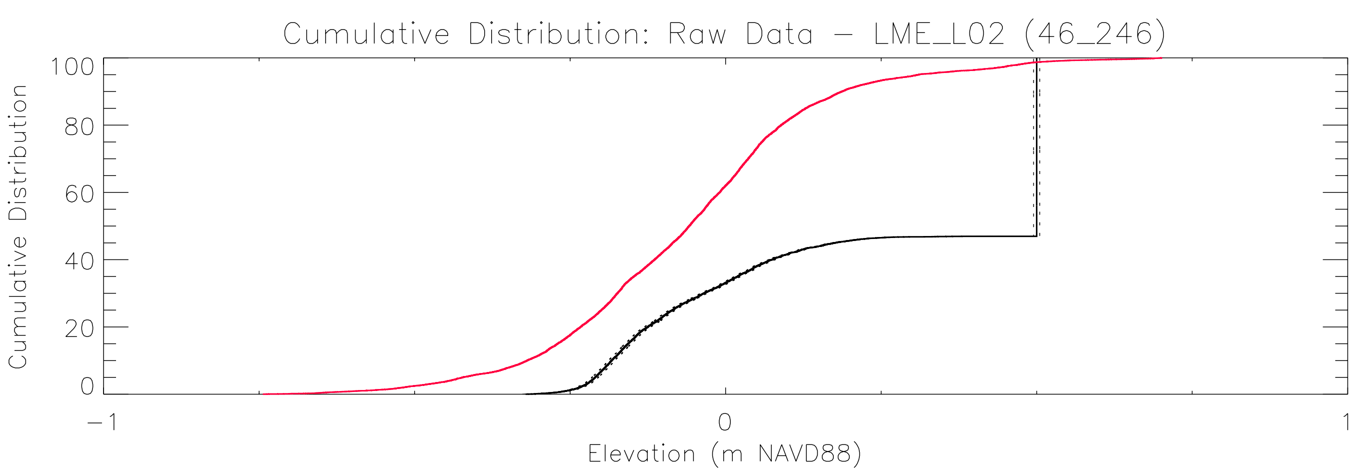

Cumulative Distribution: Raw Data – NP–P34 (69_242)
Cumulative Distribution
Elevation (m NAVD88)

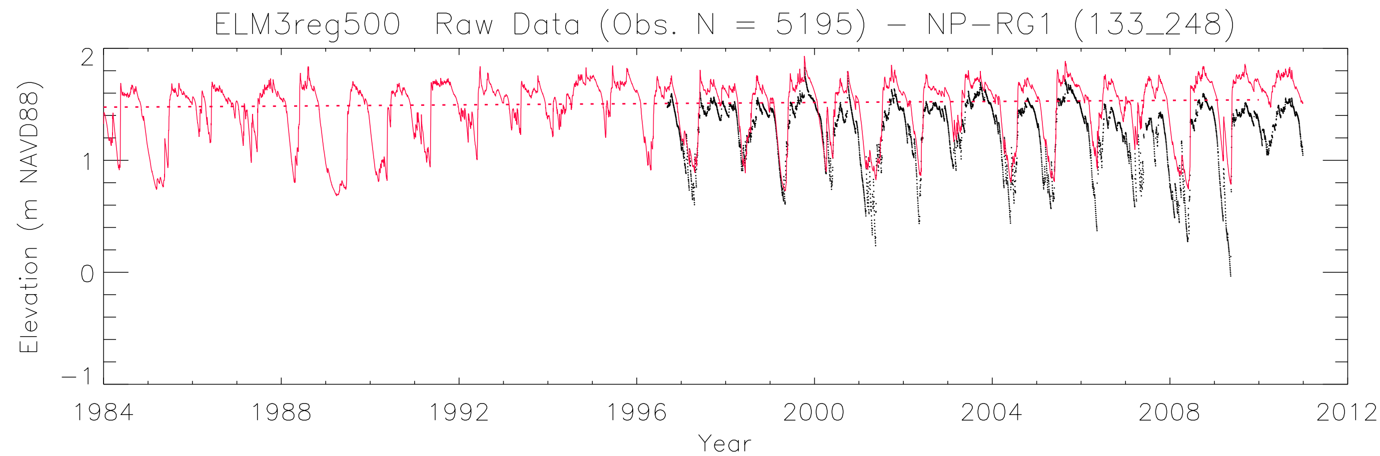

ELM3reg500 Raw Data (Obs. N = 9694) – NP–P33 (116_242)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – NP–P33 (116_242)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – NP–P33 (116_242)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – NP–P33 (116_242)
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 9852) – LME_L02 (46_246)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012

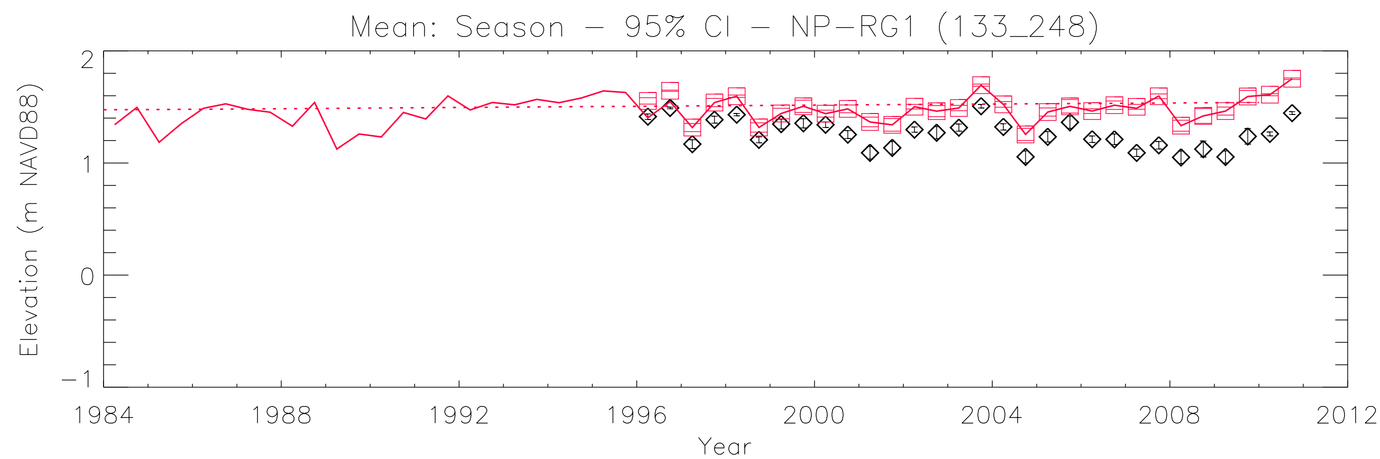

Mean: Season – 95% CI – LME_L02 (46_246)
Elevation (m NAVD88)
Year


Mean: Water Year – 95% CI – LME_L02 (46_246)
Elevation (m NAVD88)
Year

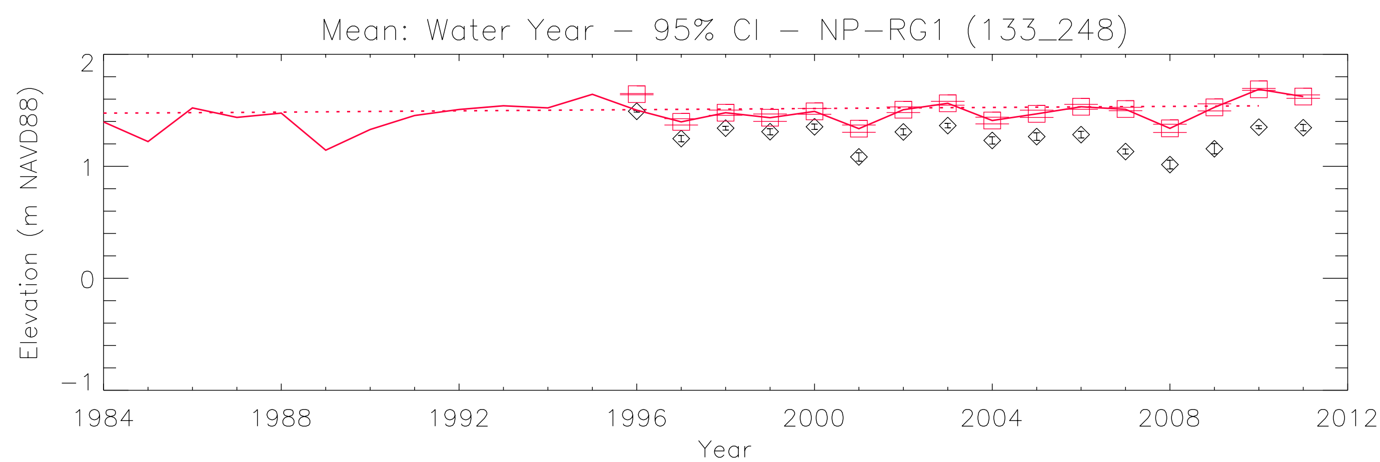

Cumulative Distribution: Raw Data – LME_L02 (46_246)
Cumulative Distribution
Elevation (m NAVD88)



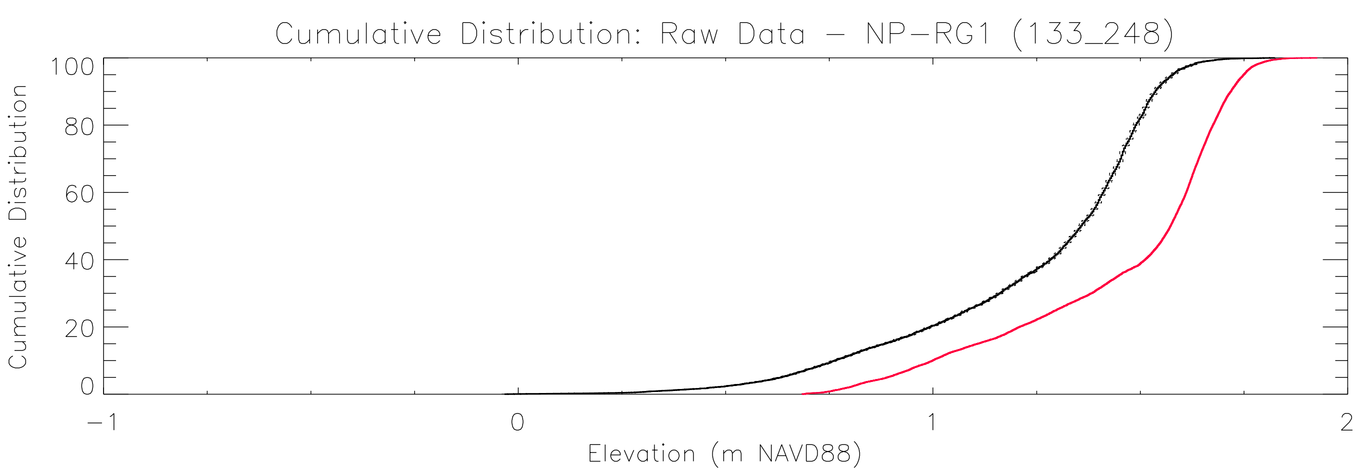
ELM3reg500 Raw Data (Obs. N = 5195) – NP–RG1 (133_248)
Elevation (m NAVD88)
Year
-1
0
1
2
1984
1988
1992
1996
2000
2004
2008
2012



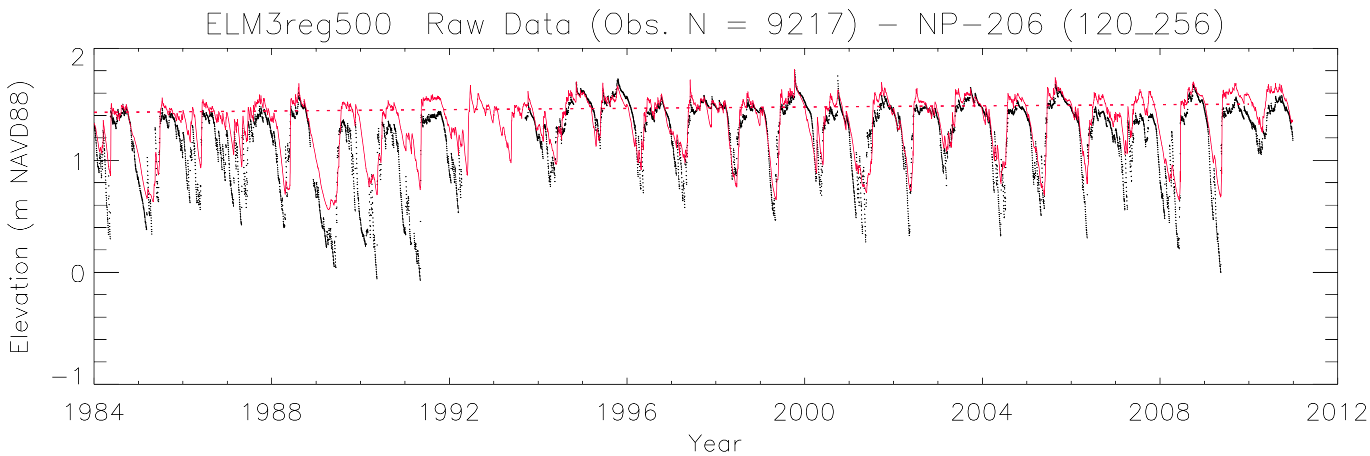
Mean: Season – 95% CI – NP–RG1 (133_248)
Elevation (m NAVD88)
Year
-1
0
1
2
1984
1988
1992
1996
2000
2004
2008
2012

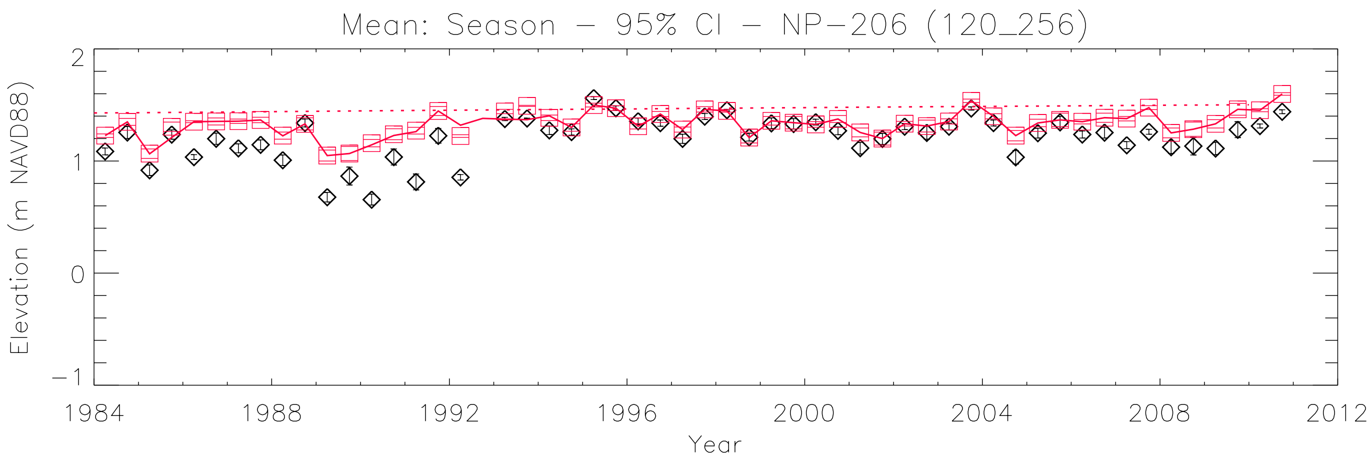


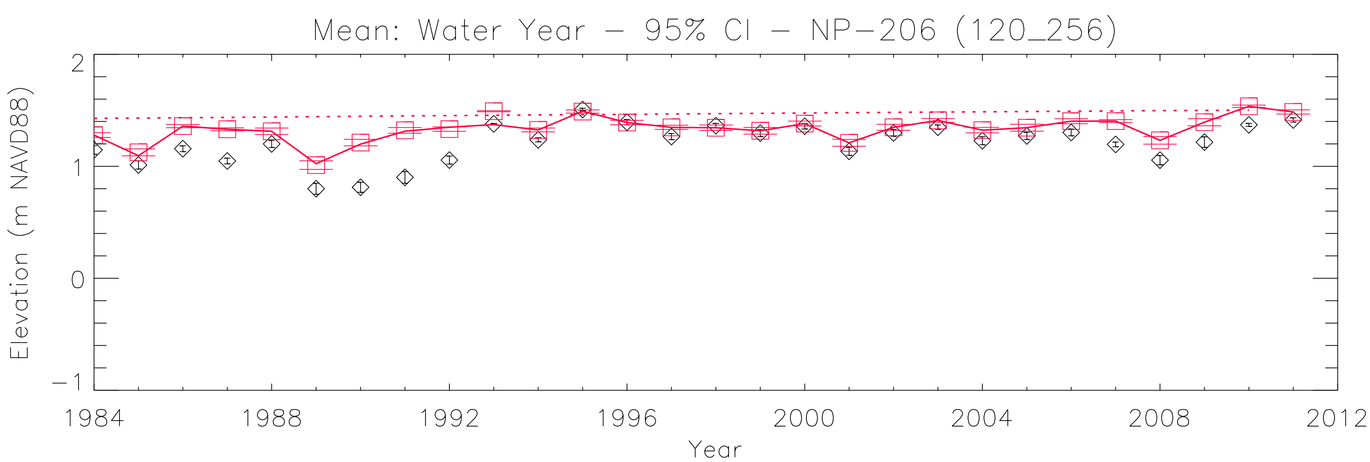
Mean: Water Year – 95% CI – NP–RG1 (133_248)
Elevation (m NAVD88)
Year
-1
0
1
2
1984
1988
1992
1996
2000
2004
2008
2012

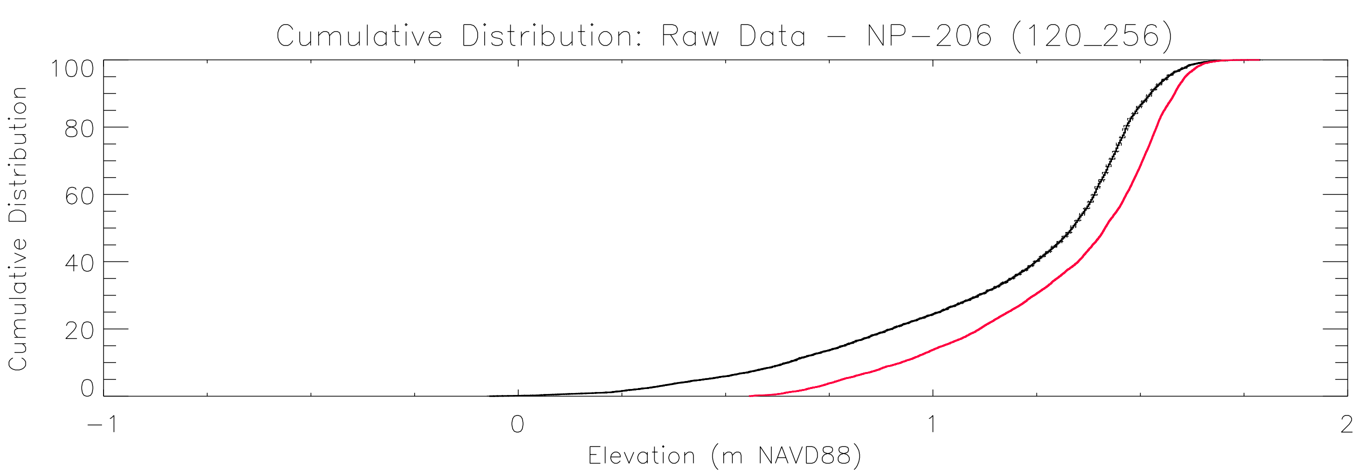


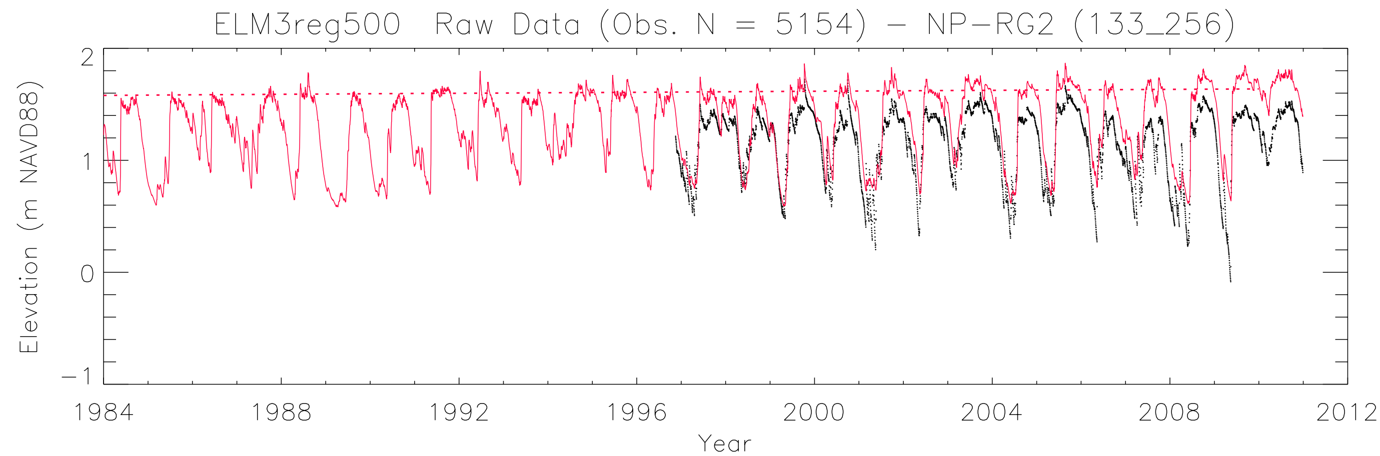
Cumulative Distribution: Raw Data – NP–RG1 (133_248)
Cumulative Distribution
Elevation (m NAVD88)
0
20
40
60
80
100
-1
0
1
2

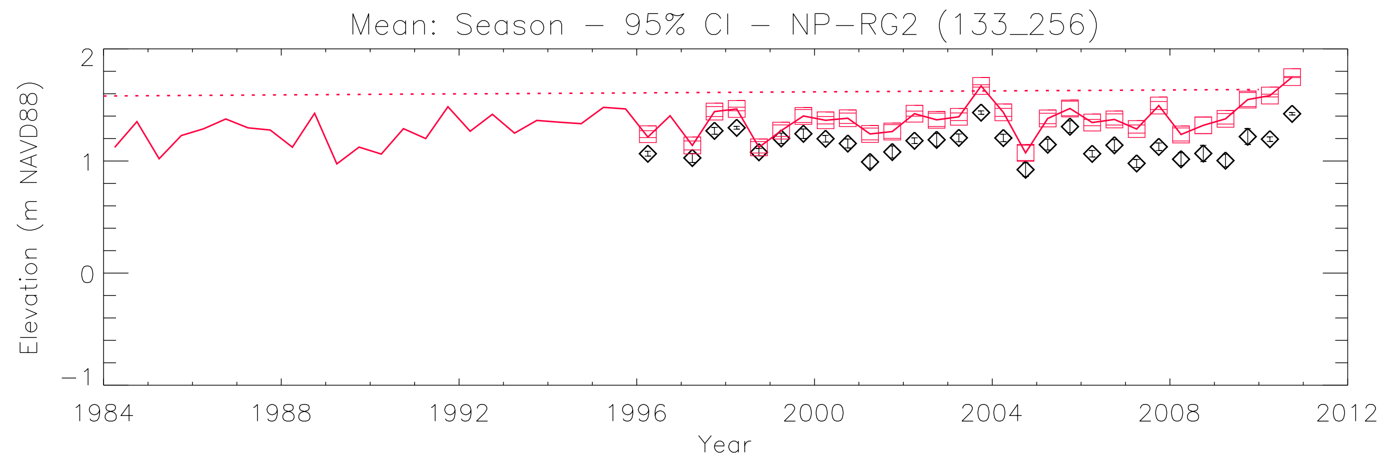

ELM3reg500 Raw Data (Obs. N = 9217) – NP–206 (120_256)
Elevation (m NAVD88)
Year
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

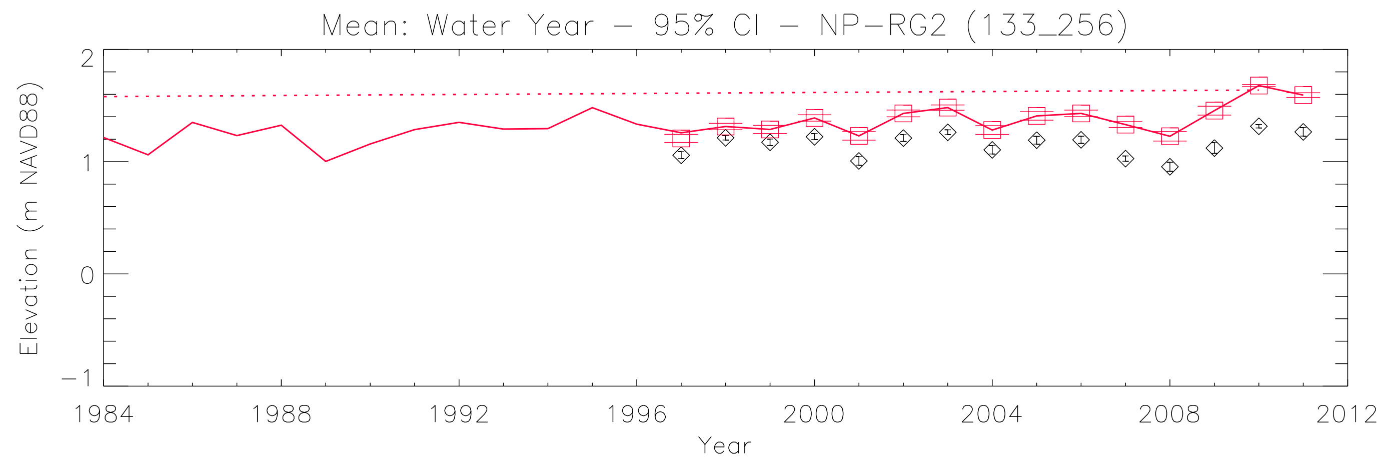

Mean: Season – 95% CI – NP–206 (120_256)
Elevation (m NAVD88)
Year
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

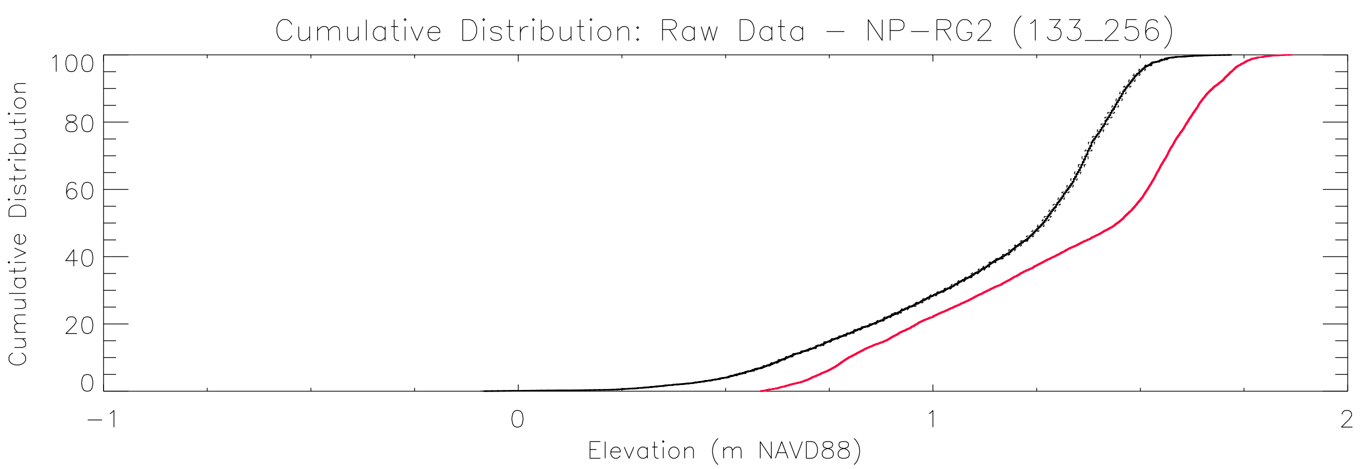

Mean: Water Year – 95% CI – NP–206 (120_256)
Elevation (m NAVD88)
Year
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

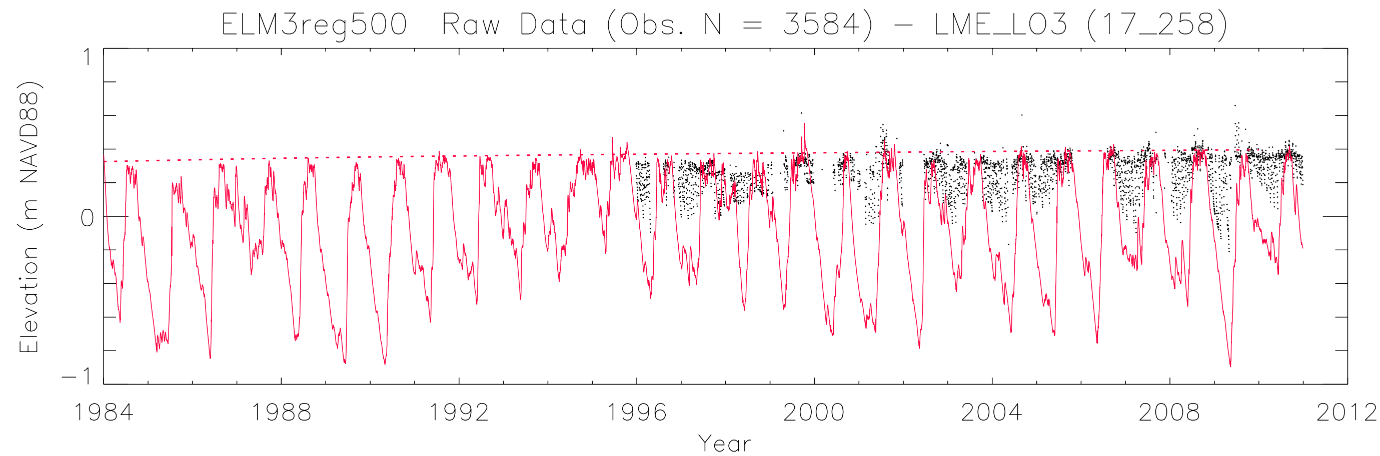

Cumulative Distribution: Raw Data – NP–206 (120_256)
Cumulative Distribution
Elevation (m NAVD88)
100
80
60
40
20
0
–1
0
1
2


ELM3reg500 Raw Data (Obs. N = 5154) – NP–RG2 (133_256)
Elevation (m NAVD88)
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

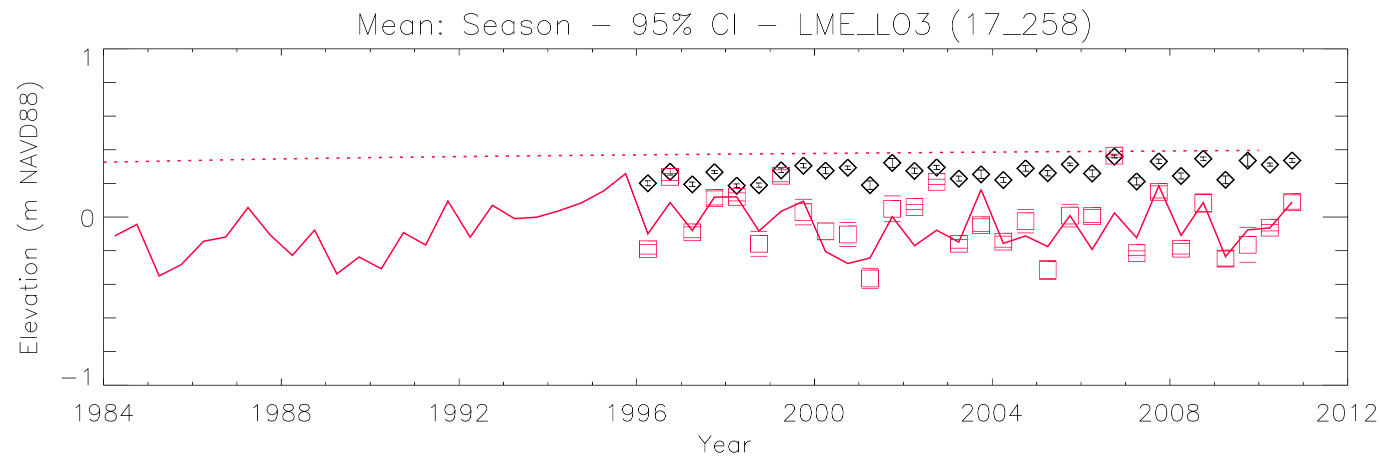

Mean: Season – 95% CI – NP–RG2 (133_256)
Elevation (m NAVD88)
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year – 95% CI – NP–RG2 (133_256)
Elevation (m NAVD88)
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

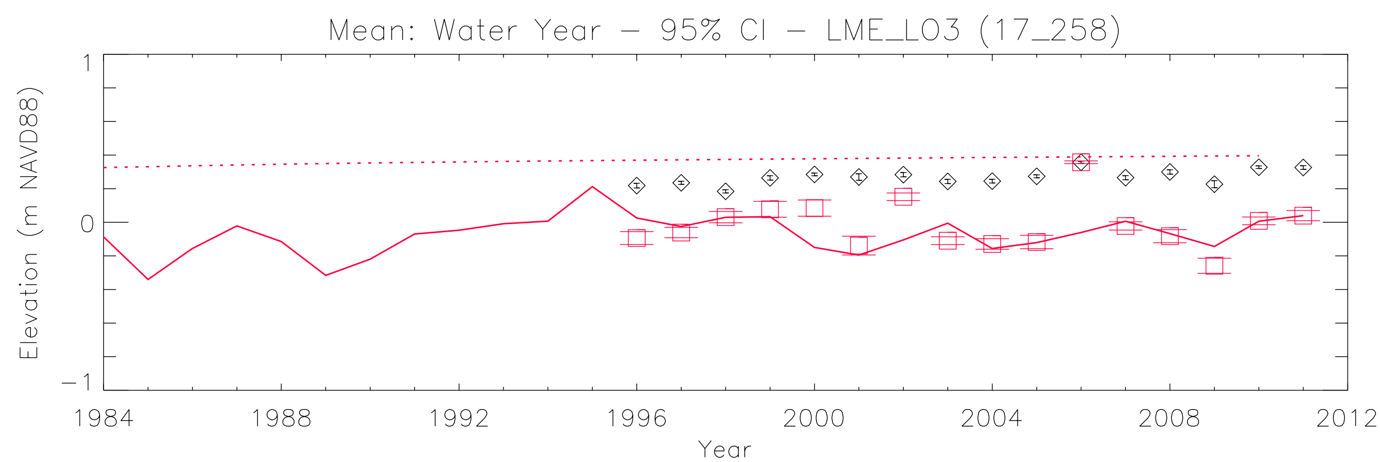

Cumulative Distribution: Raw Data – NP–RG2 (133_256)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
2
Elevation (m NAVD88)



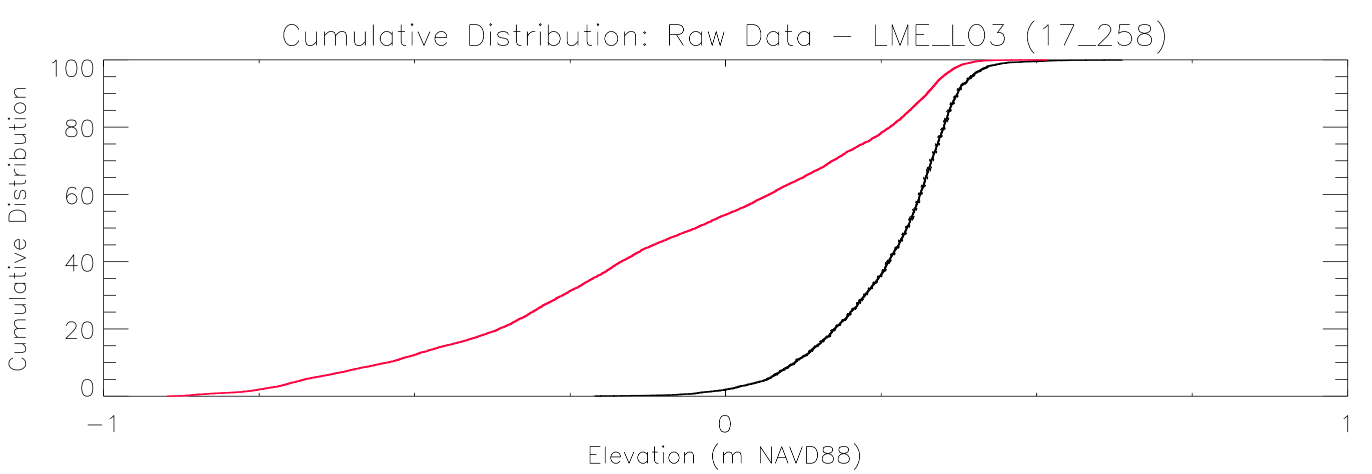
ELM3reg500 Raw Data (Obs. N = 3584) – LME_LO3 (17_258)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year



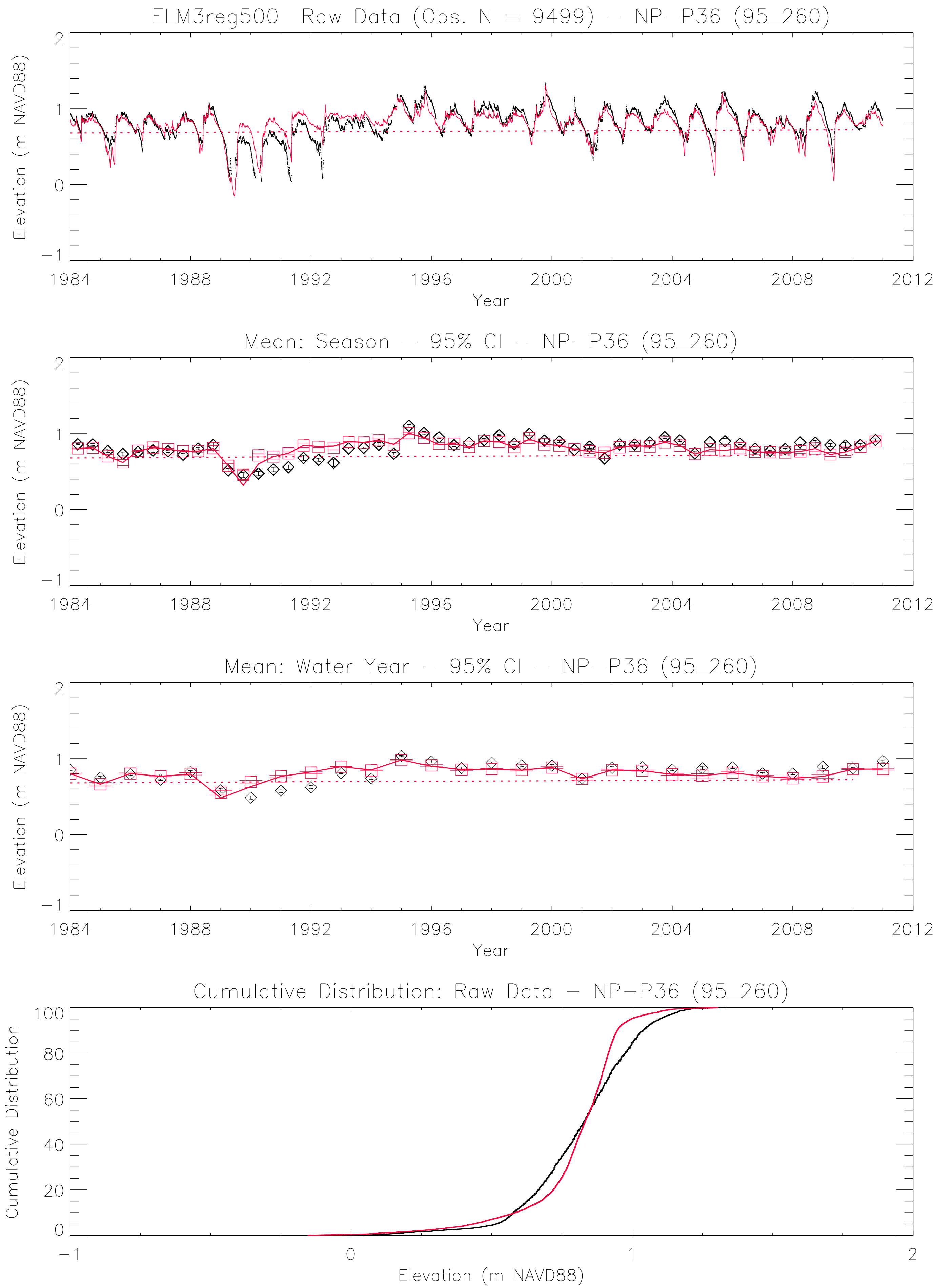
Mean: Season – 95% CI – LME_LO3 (17_258)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

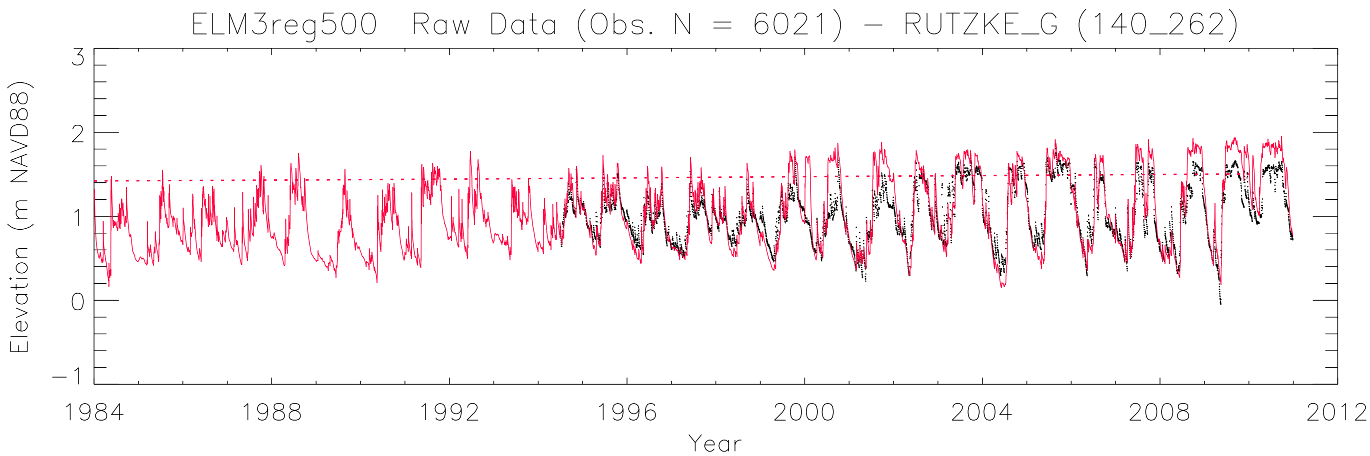


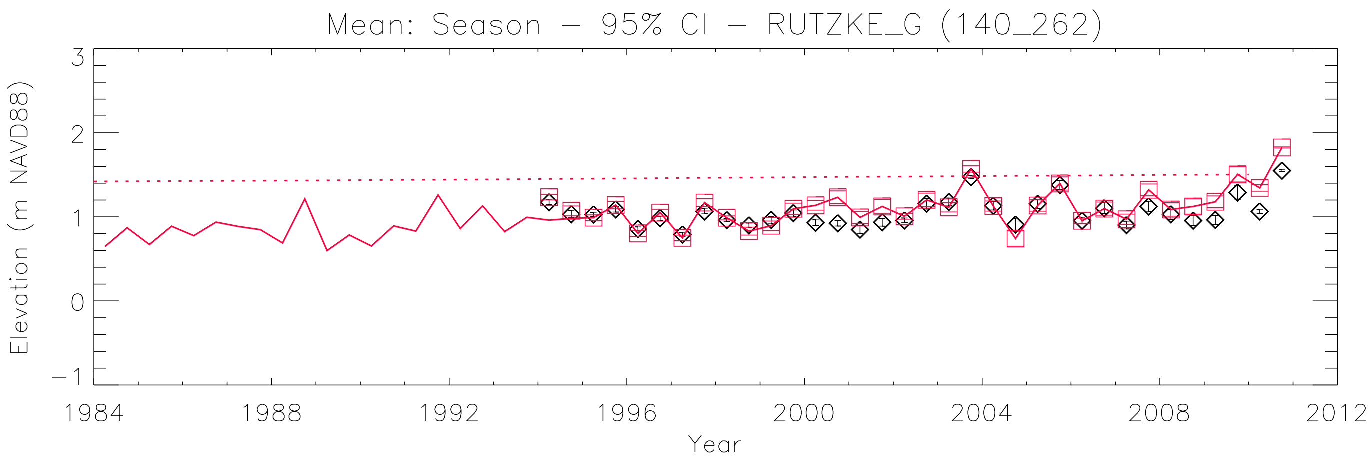
Mean: Water Year – 95% CI – LME_LO3 (17_258)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

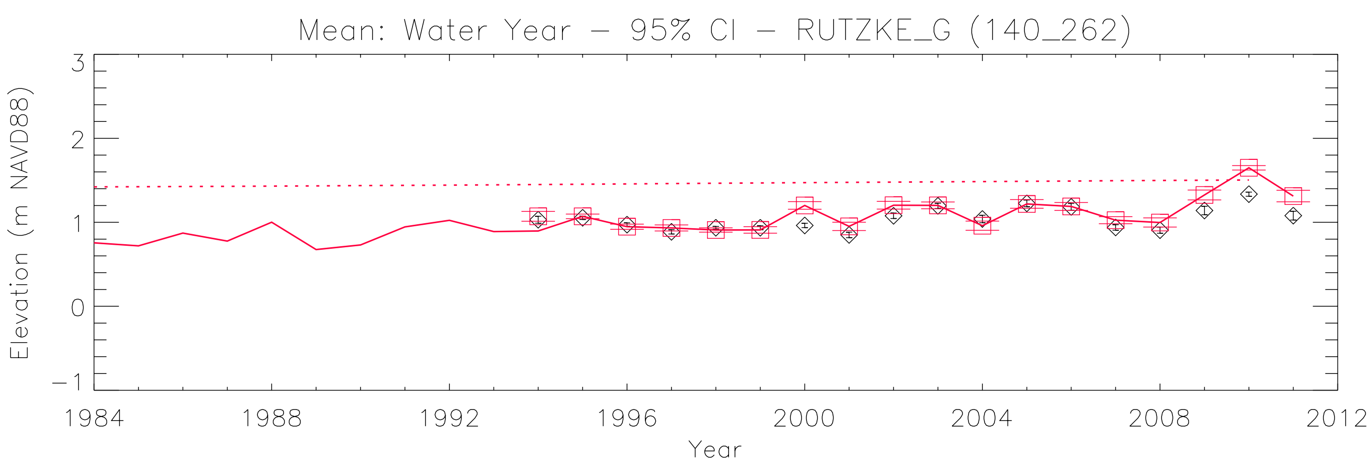


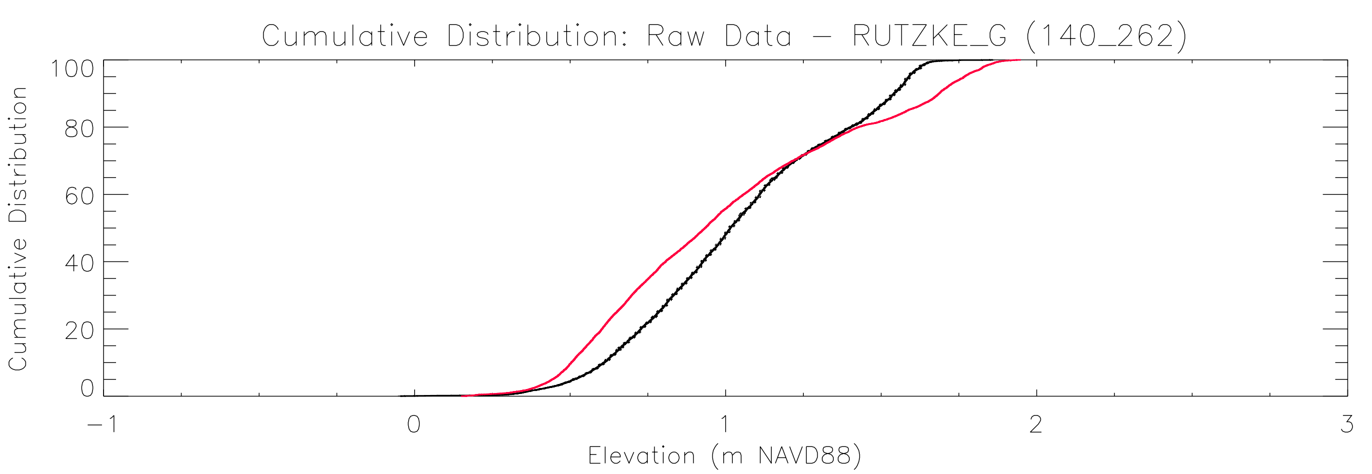
Cumulative Distribution: Raw Data – LME_LO3 (17_258)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

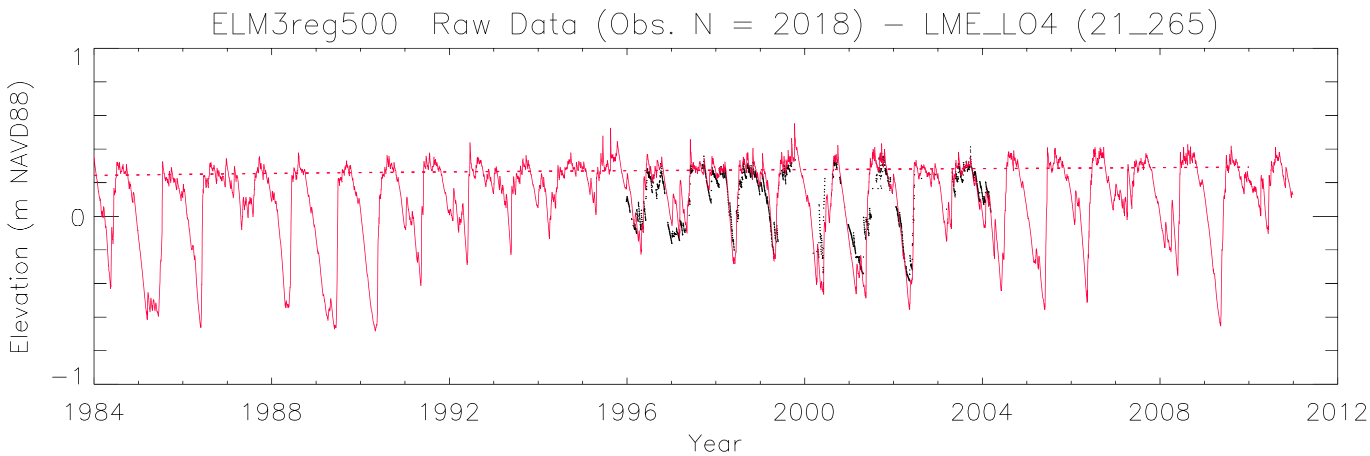

ELM3reg500 Raw Data (Obs. N = 9499) – NP–P36 (95_260)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – NP–P36 (95_260)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – NP–P36 (95_260)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – NP–P36 (95_260)
Cumulative Distribution
Elevation (m NAVD88)

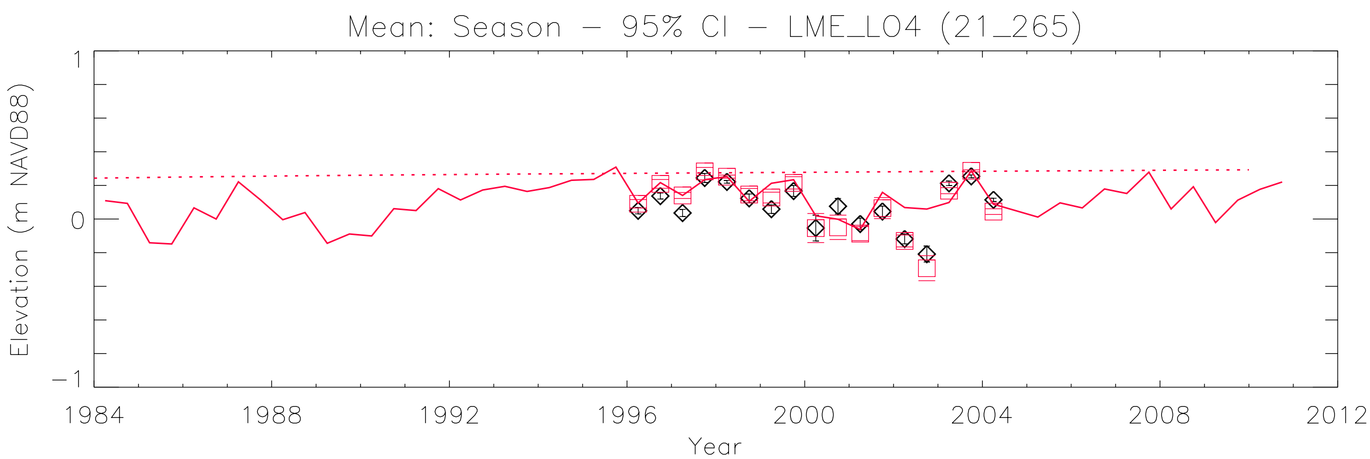

ELM3reg500 Raw Data (Obs. N = 6021) – RUTZKE_G (140_262)
Elevation (m NAVD88)
Year
1984 1988 1992 1996 2000 2004 2008 2012
-1 0 1 2 3

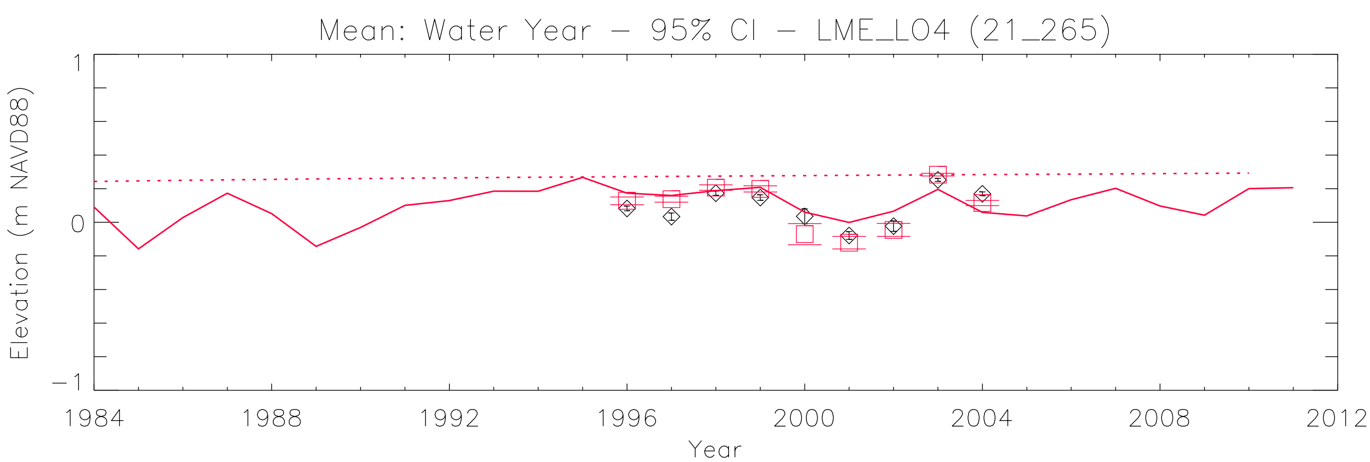

Mean: Season – 95% CI – RUTZKE_G (140_262)
Elevation (m NAVD88)
Year
1984 1988 1992 1996 2000 2004 2008 2012
-1 0 1 2 3

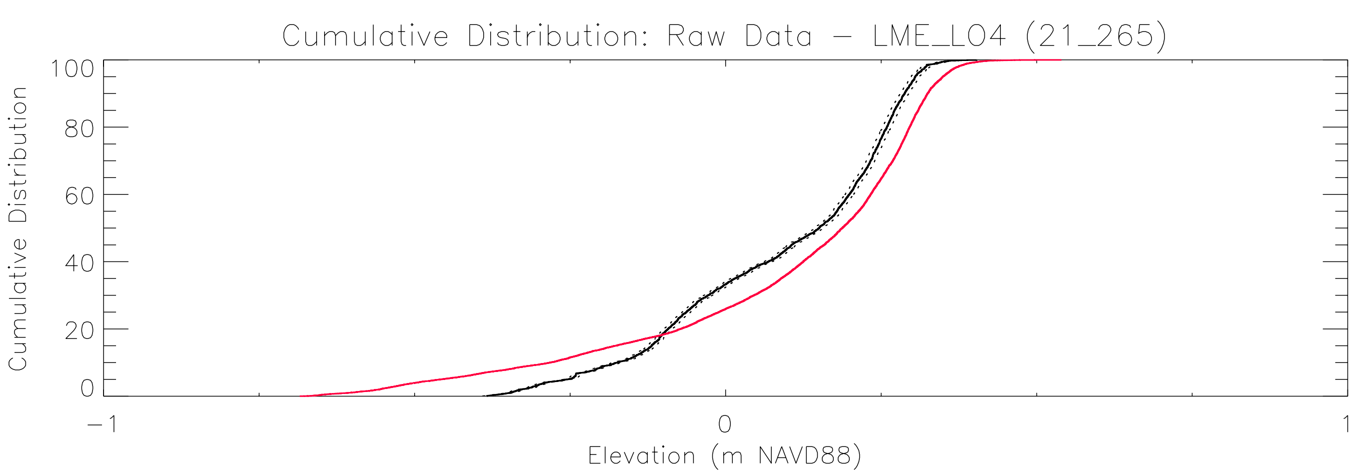

Mean: Water Year – 95% CI – RUTZKE_G (140_262)
Elevation (m NAVD88)
Year
1984 1988 1992 1996 2000 2004 2008 2012
-1 0 1 2 3

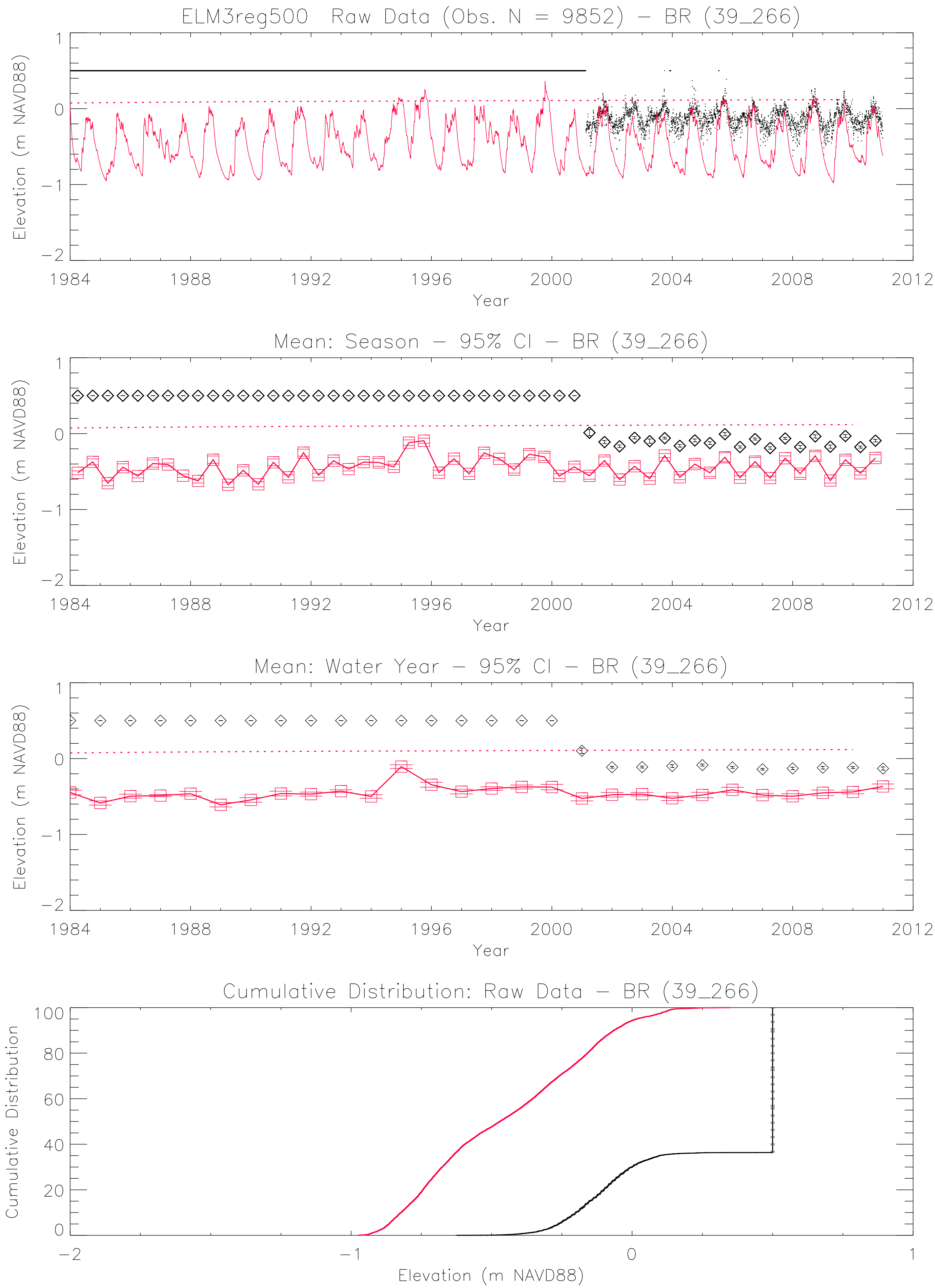

Cumulative Distribution: Raw Data – RUTZKE_G (140_262)
Cumulative Distribution
Elevation (m NAVD88)
0 20 40 60 80 100
-1 0 1 2 3

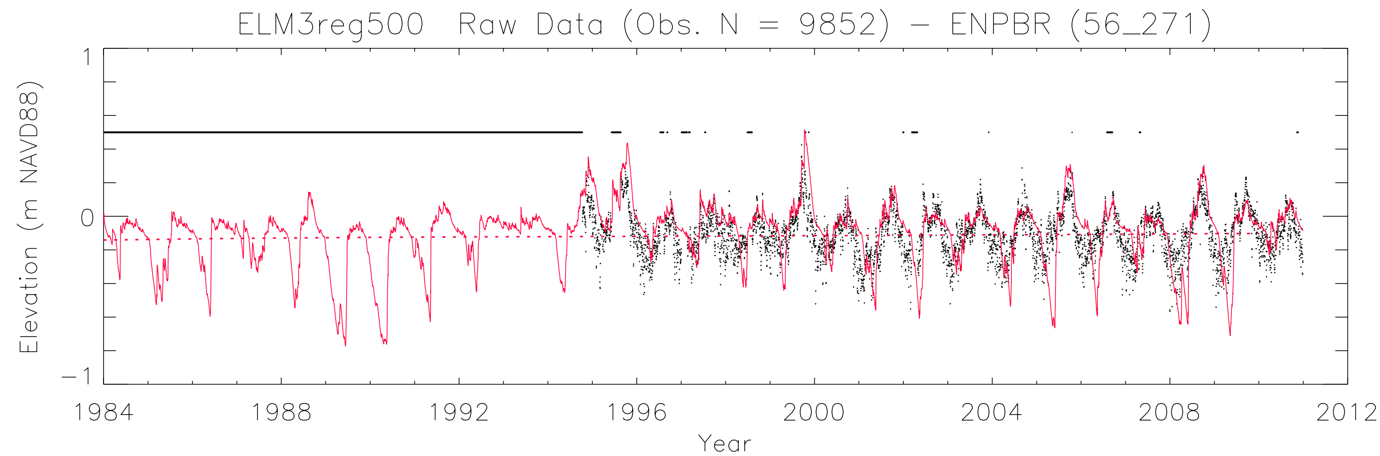

ELM3reg500 Raw Data (Obs. N = 2018) − LME_LO4 (21_265)
Elevation (m NAVD88)
1
0
−1
1984
1988
1992
1996
2000
2004
2008
2012
Year

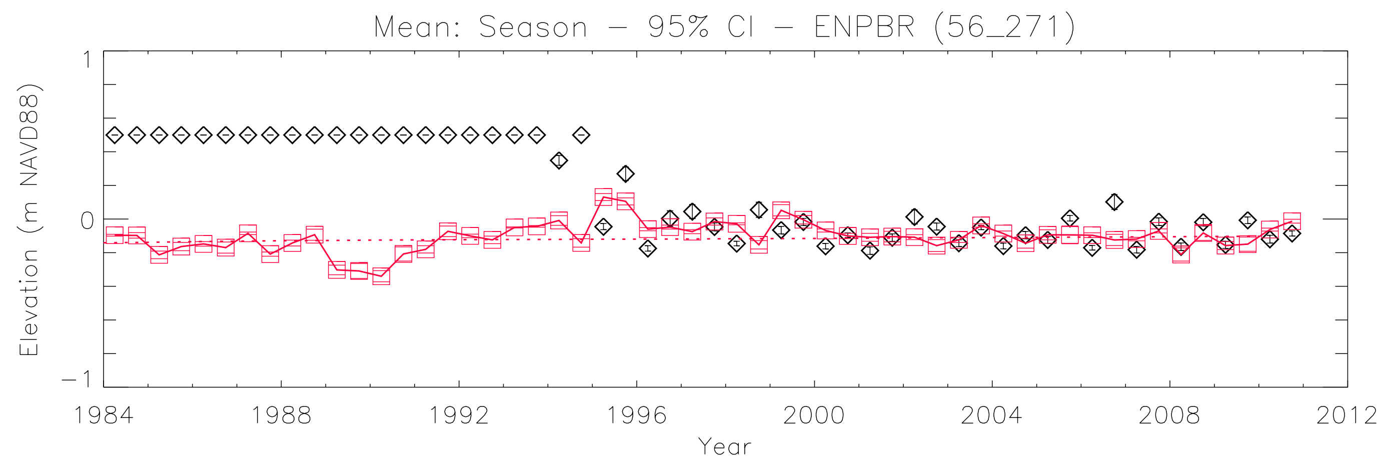

Mean: Season − 95% CI − LME_LO4 (21_265)
Elevation (m NAVD88)
1
0
−1
1984
1988
1992
1996
2000
2004
2008
2012
Year

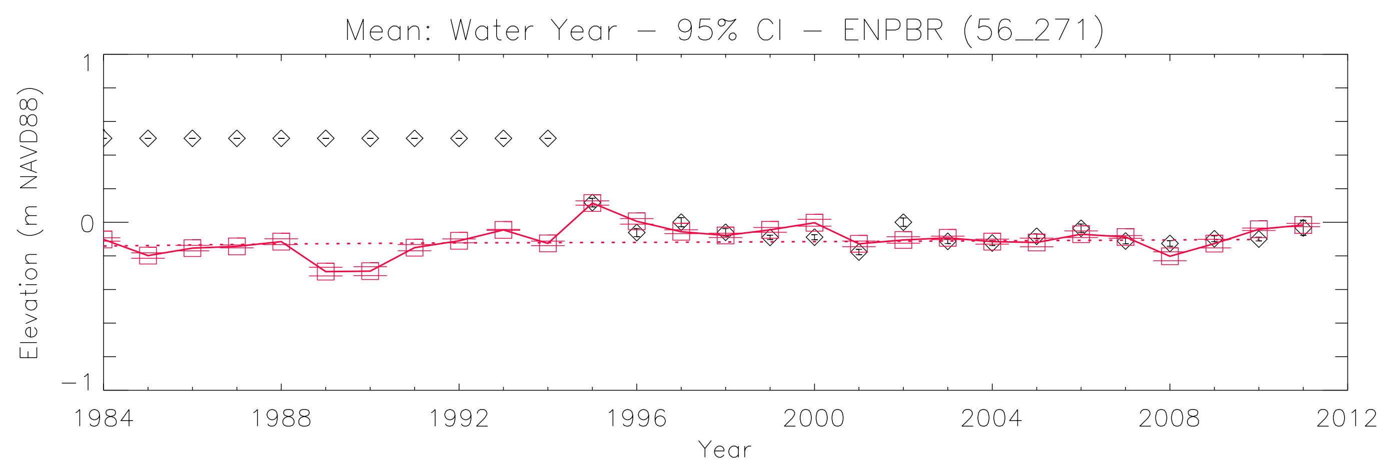

Mean: Water Year − 95% CI − LME_LO4 (21_265)
Elevation (m NAVD88)
1
0
−1
1984
1988
1992
1996
2000
2004
2008
2012
Year

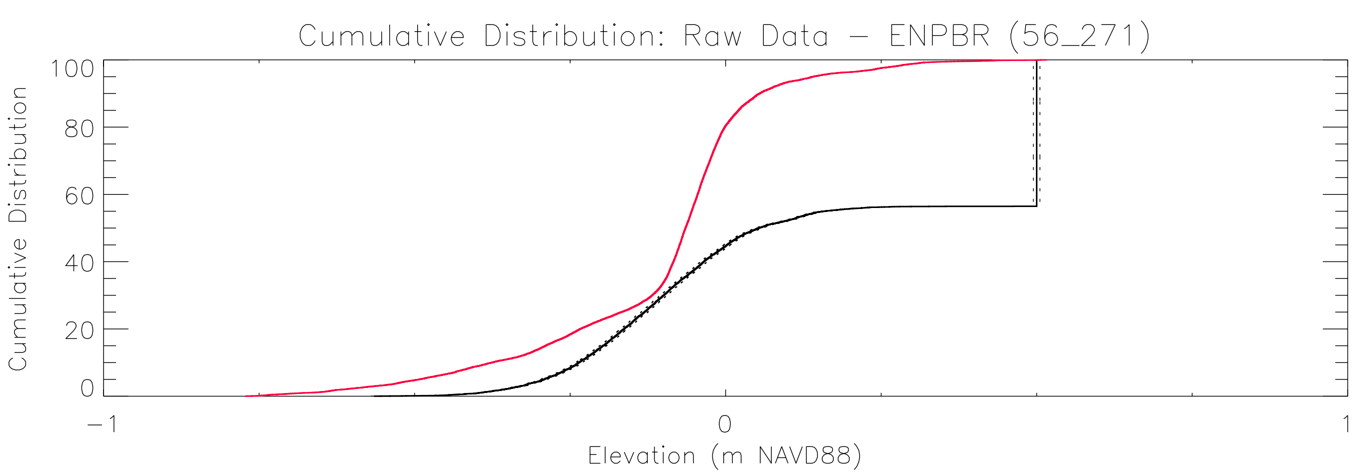

Cumulative Distribution: Raw Data − LME_LO4 (21_265)
Cumulative Distribution
100
80
60
40
20
0
−1
0
1
Elevation (m NAVD88)

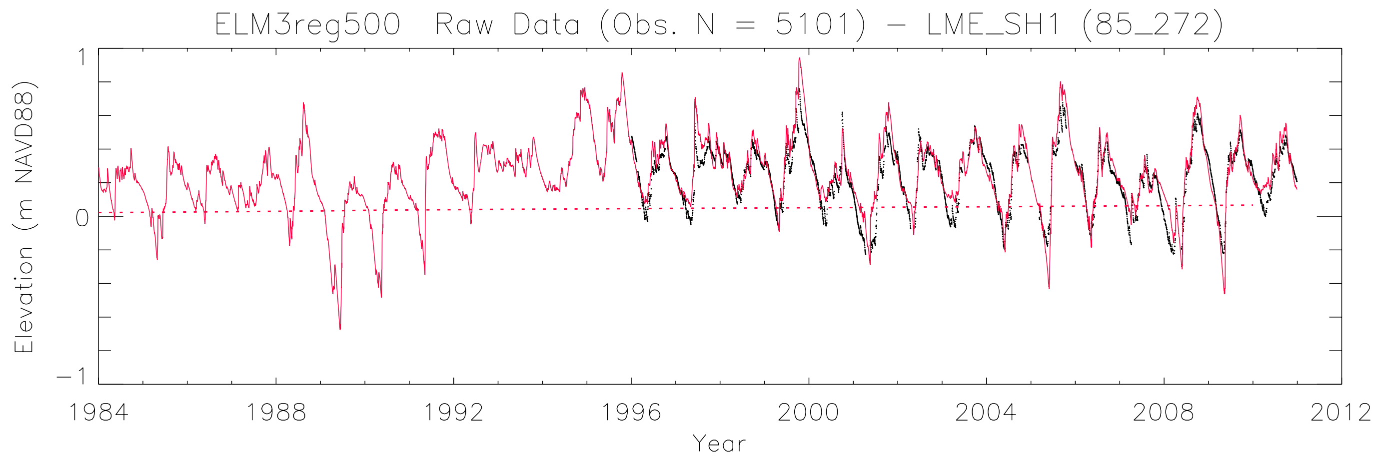

ELM3reg500 Raw Data (Obs. N = 9852) – BR (39_266)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – BR (39_266)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – BR (39_266)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – BR (39_266)
Cumulative Distribution
Elevation (m NAVD88)

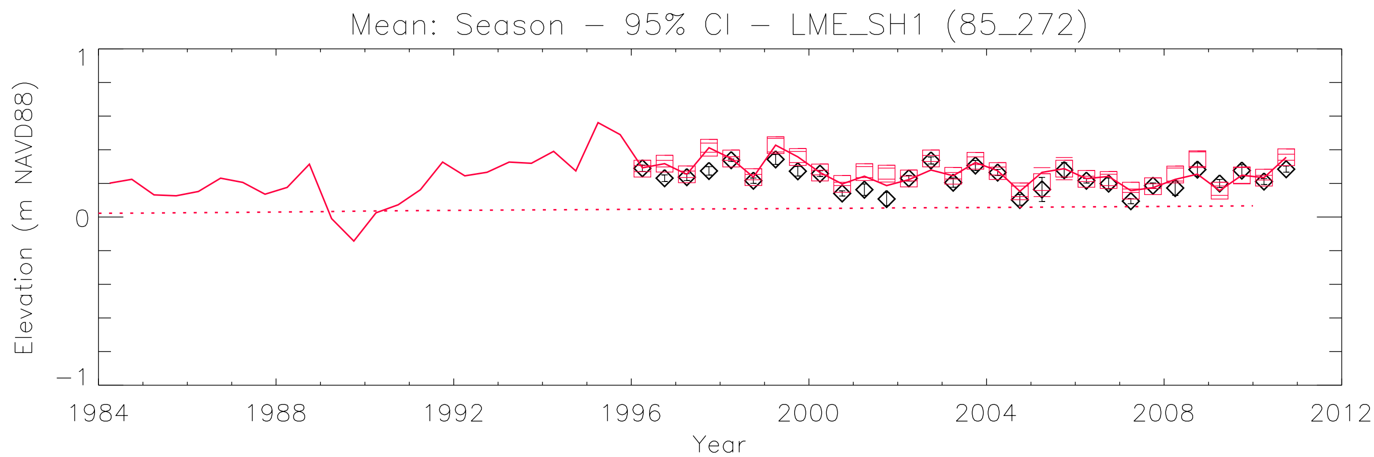

ELM3reg500 Raw Data (Obs. N = 9852) – ENPBR (56_271)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

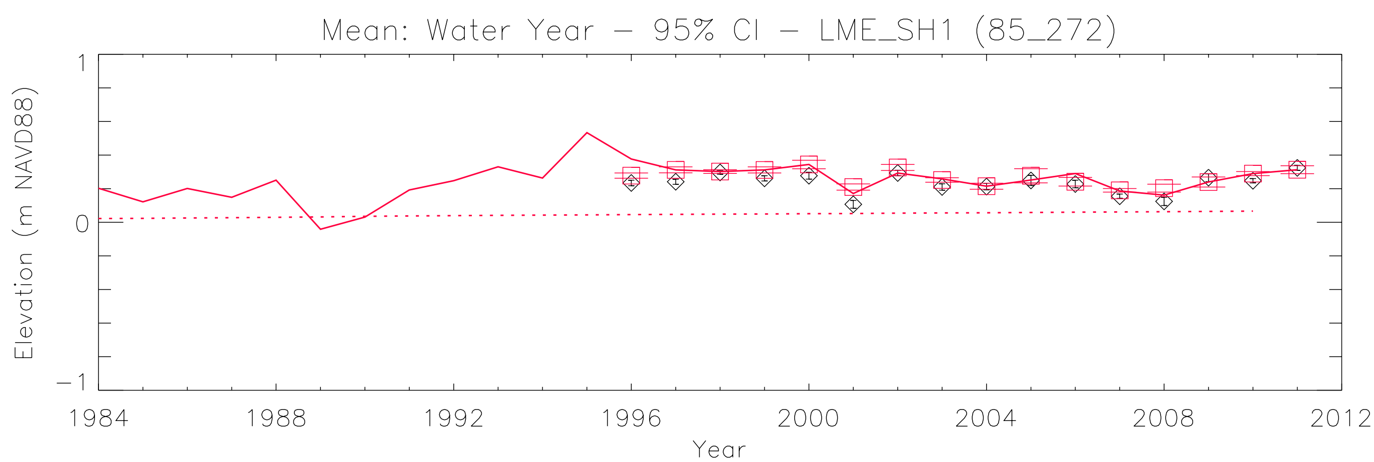

Mean: Season – 95% CI – ENPBR (56_271)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

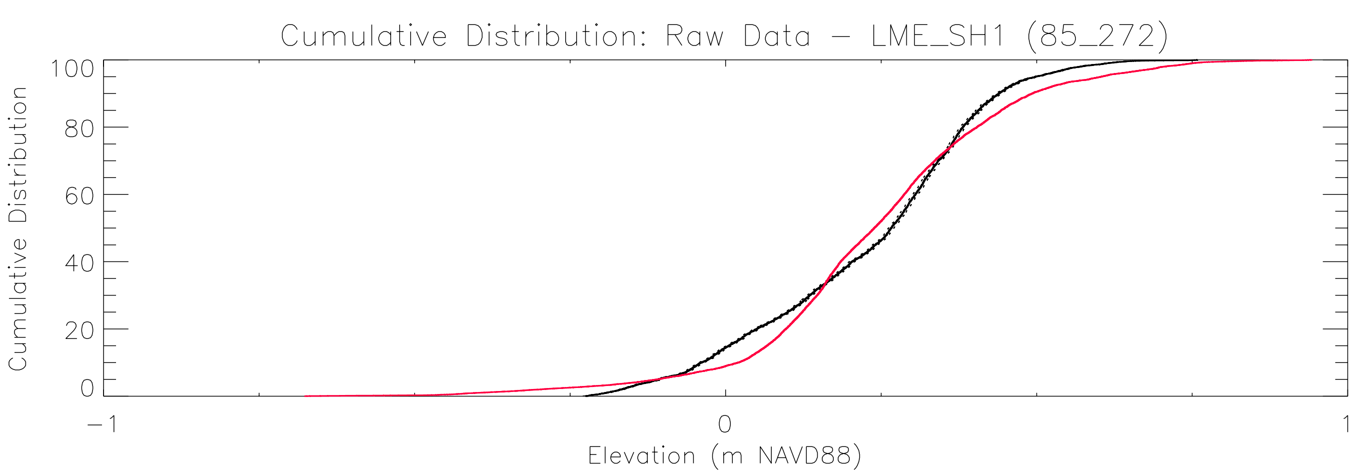

Mean: Water Year – 95% CI – ENPBR (56_271)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

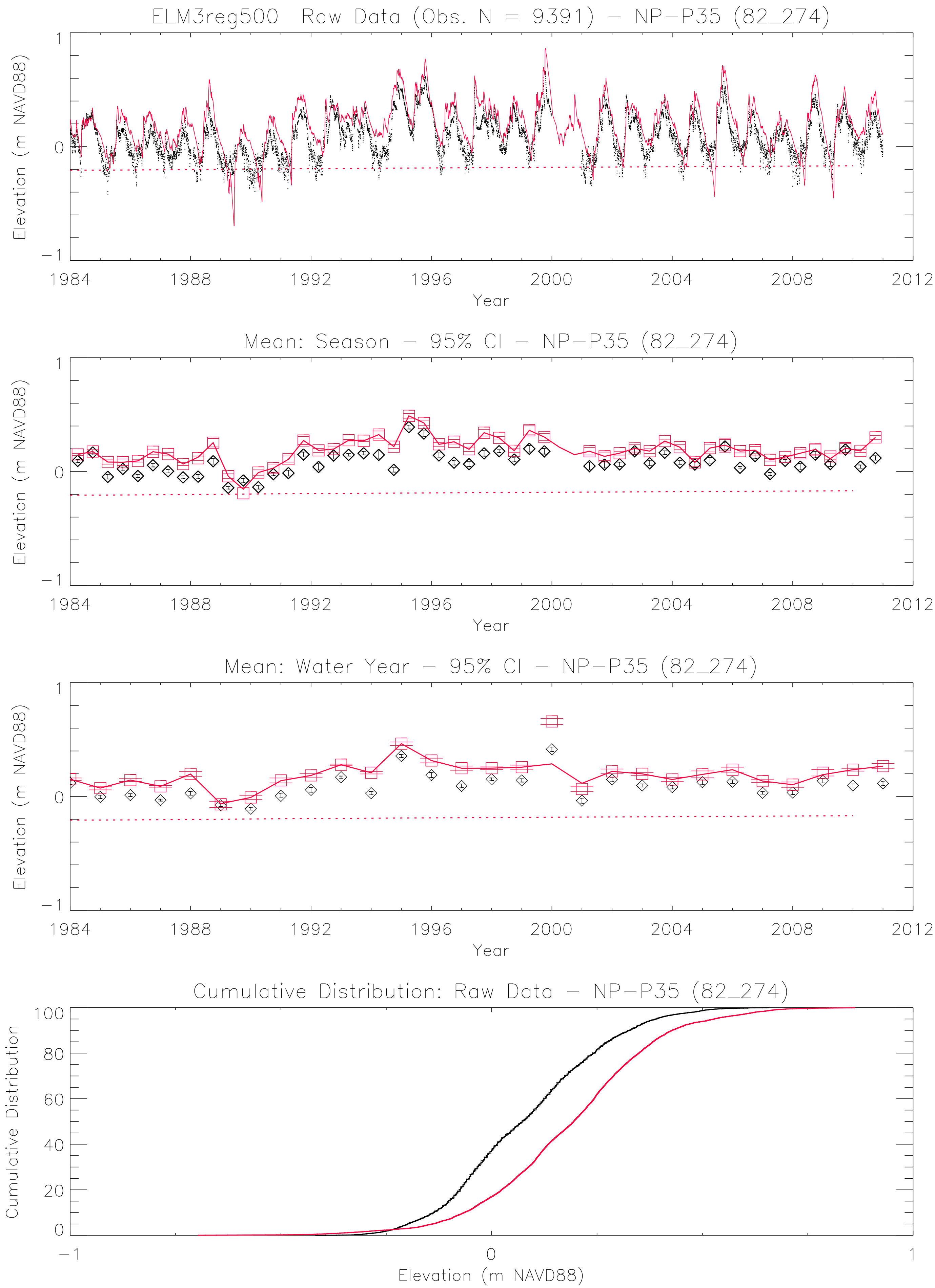

Cumulative Distribution: Raw Data – ENPBR (56_271)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

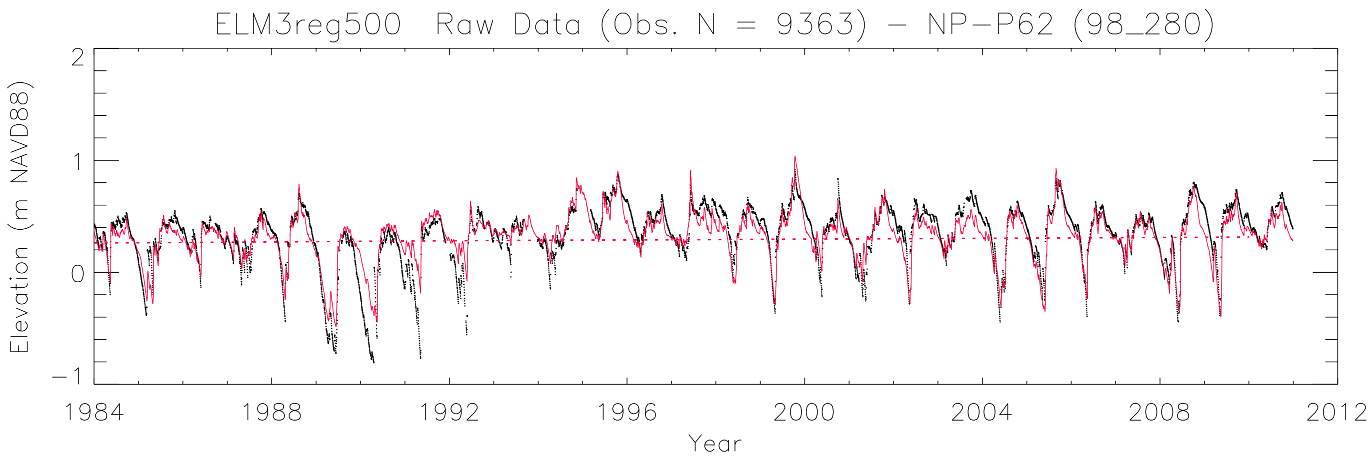

ELM3reg500 Raw Data (Obs. N = 5101) – LME_SH1 (85_272)
Elevation (m NAVD88)
Year
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

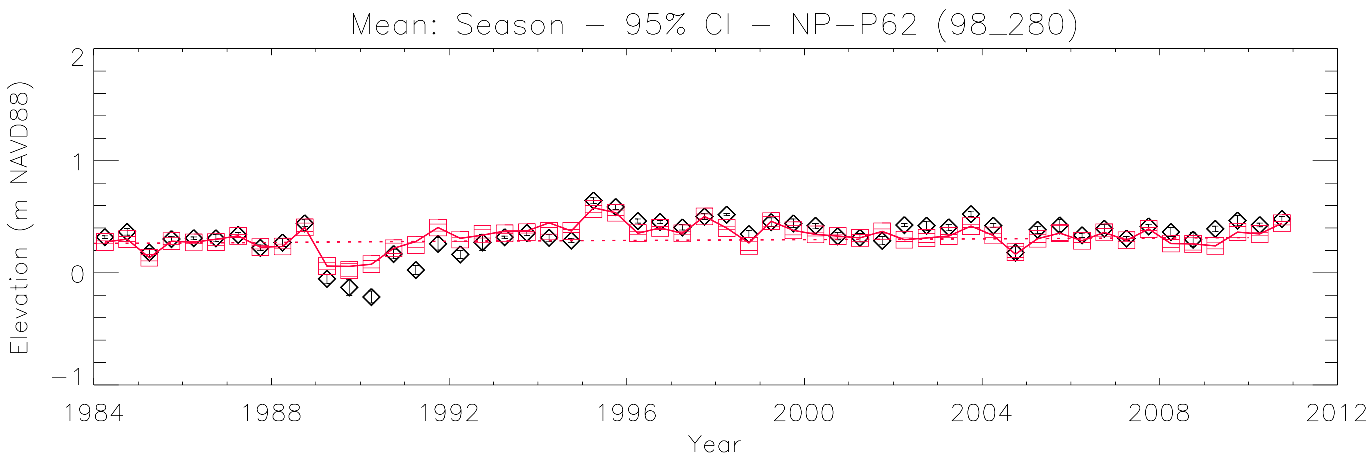

Mean: Season – 95% CI – LME_SH1 (85_272)
Elevation (m NAVD88)
Year
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

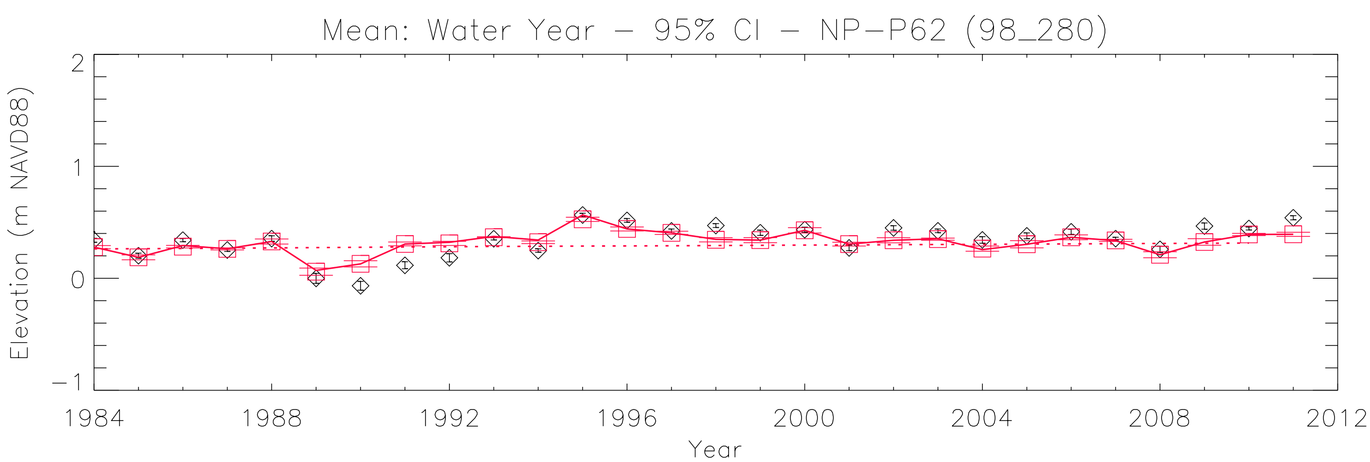

Mean: Water Year – 95% CI – LME_SH1 (85_272)
Elevation (m NAVD88)
Year
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

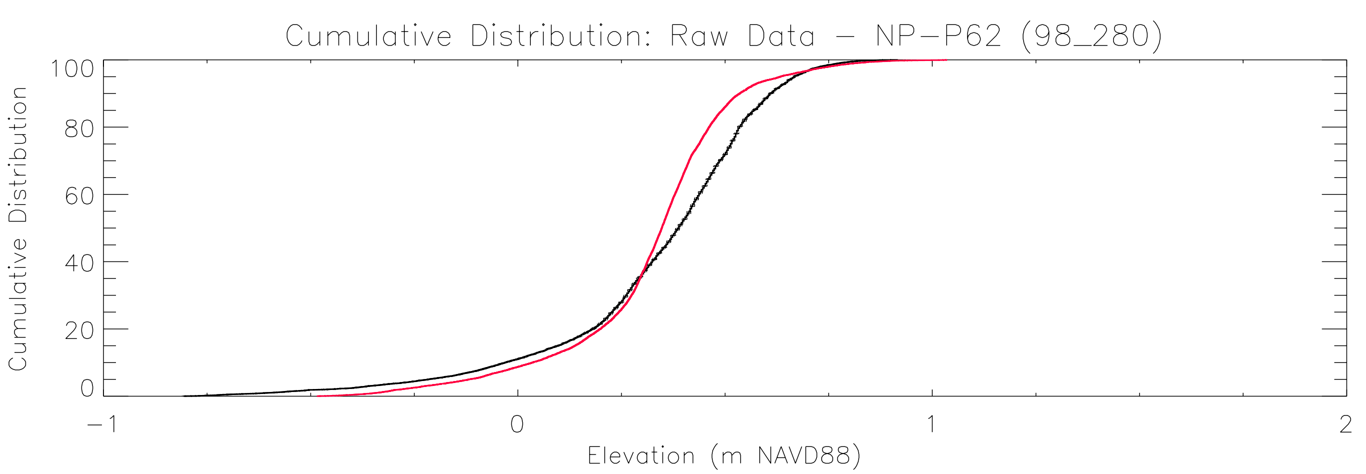

Cumulative Distribution: Raw Data – LME_SH1 (85_272)
Cumulative Distribution
Elevation (m NAVD88)
100
80
60
40
20
0
–1
0
1

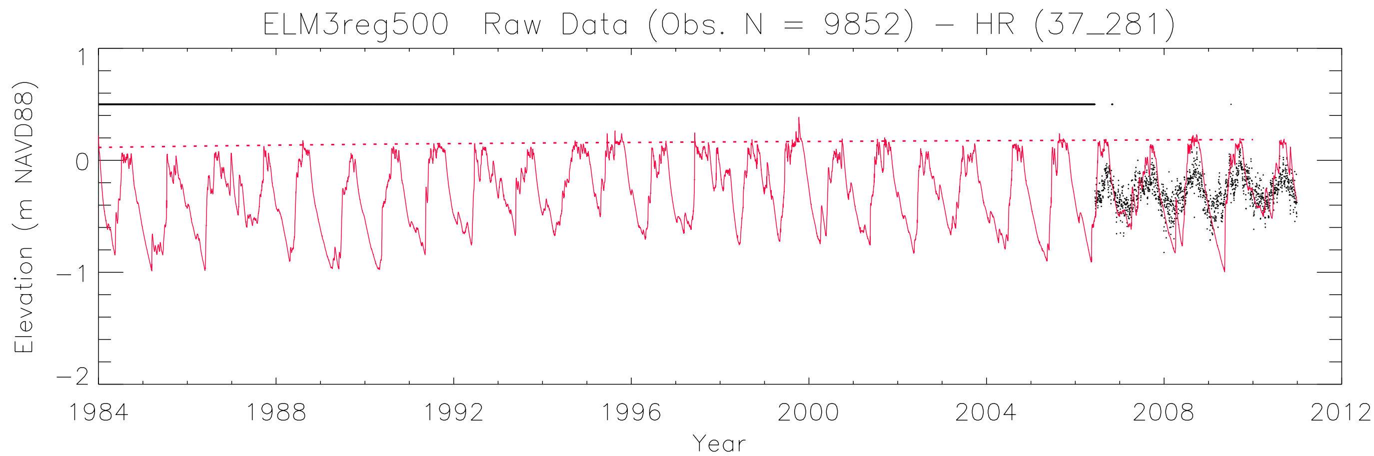

ELM3reg500 Raw Data (Obs. N = 9391) – NP-P35 (82_274)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – NP-P35 (82_274)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – NP-P35 (82_274)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – NP-P35 (82_274)
Cumulative Distribution
Elevation (m NAVD88)

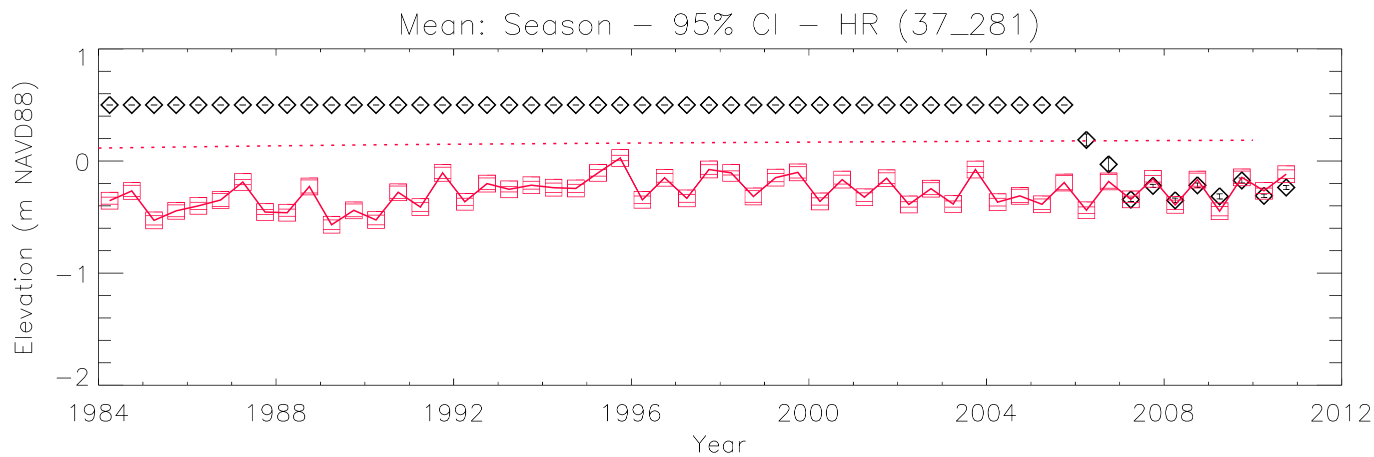

ELM3reg500 Raw Data (Obs. N = 9363) – NP–P62 (98_280)
Elevation (m NAVD88)
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

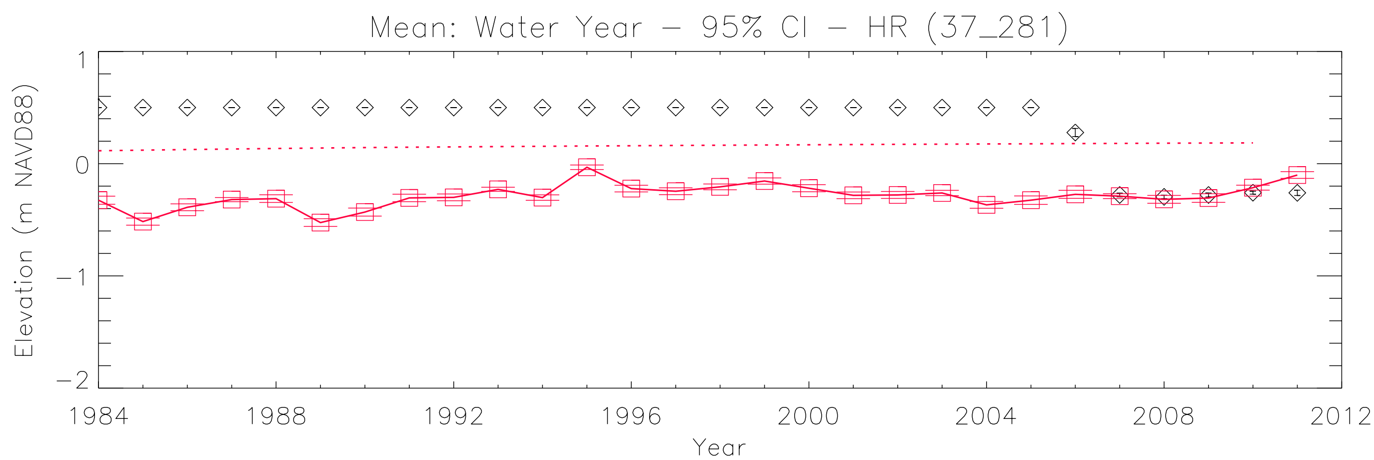

Mean: Season – 95% CI – NP–P62 (98_280)
Elevation (m NAVD88)
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

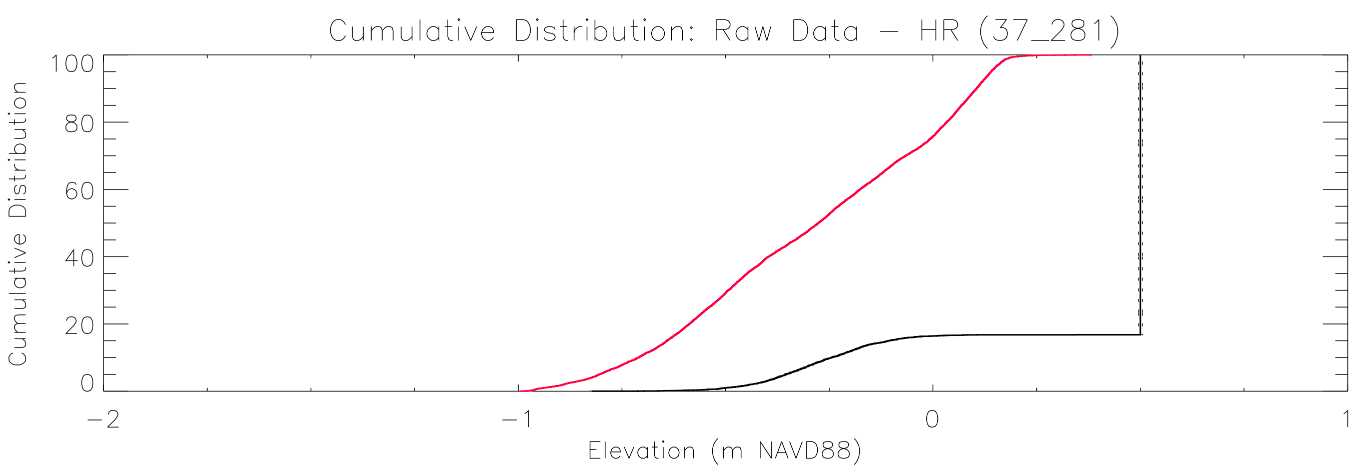

Mean: Water Year – 95% CI – NP–P62 (98_280)
Elevation (m NAVD88)
2
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

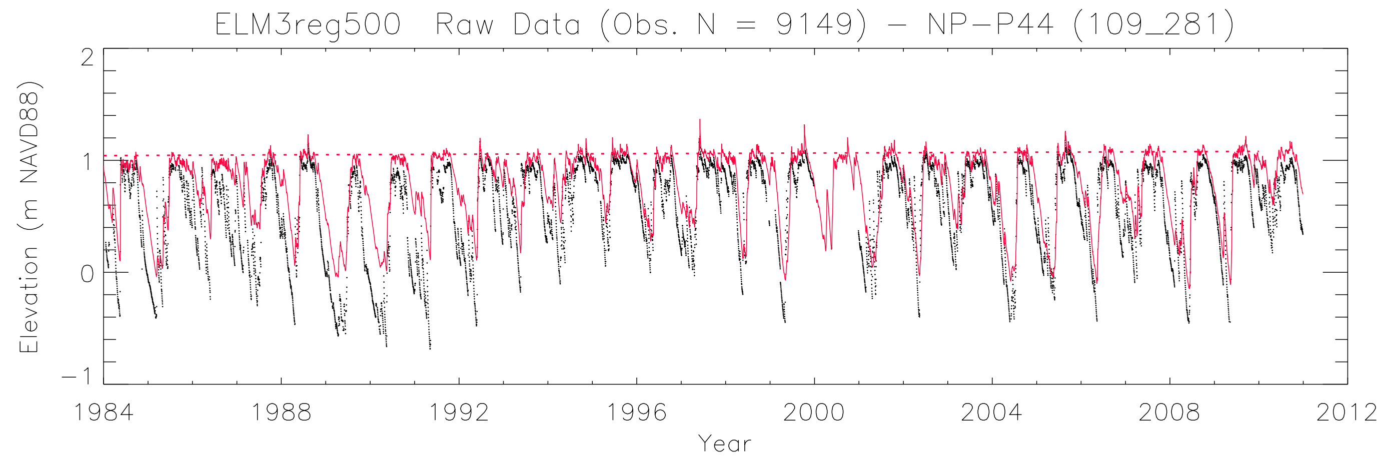

Cumulative Distribution: Raw Data – NP–P62 (98_280)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
2
Elevation (m NAVD88)

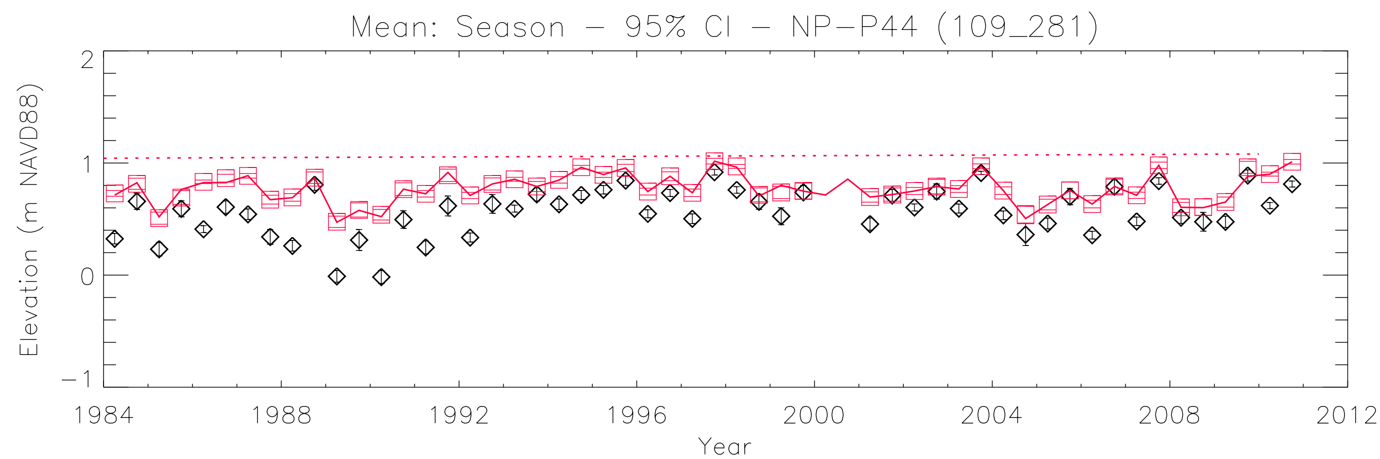

ELM3reg500 Raw Data (Obs. N = 9852) – HR (37_281)
Elevation (m NAVD88)
Year

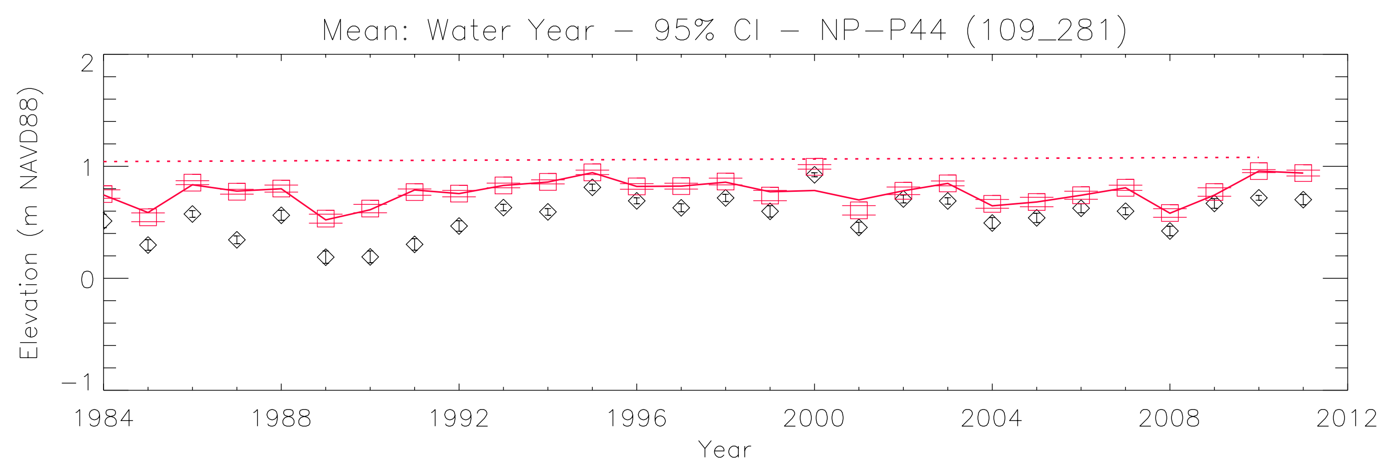

Mean: Season – 95% CI – HR (37_281)
Elevation (m NAVD88)
Year

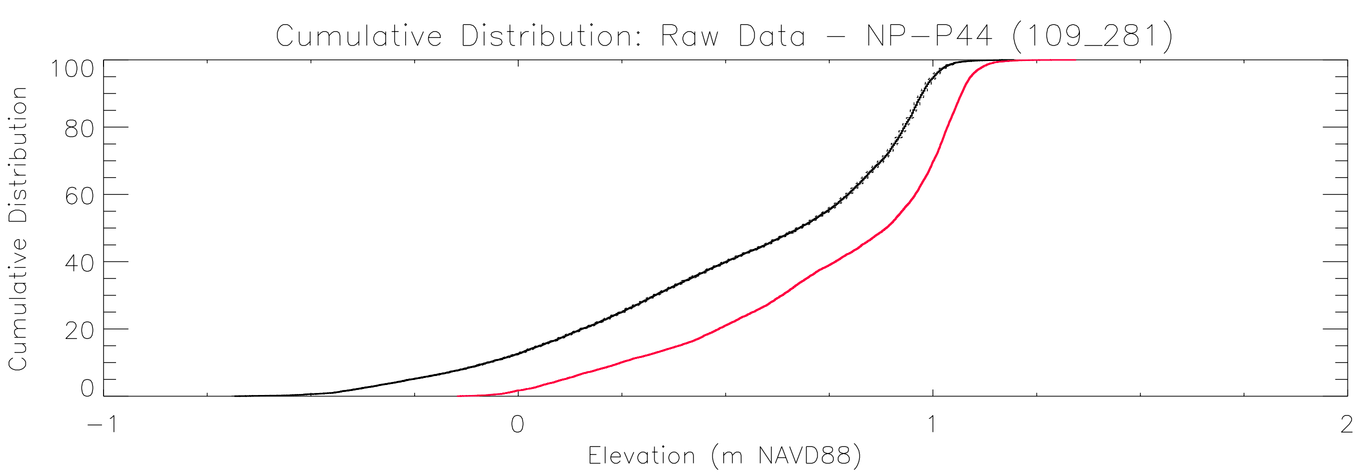

Mean: Water Year – 95% CI – HR (37_281)
Elevation (m NAVD88)
Year

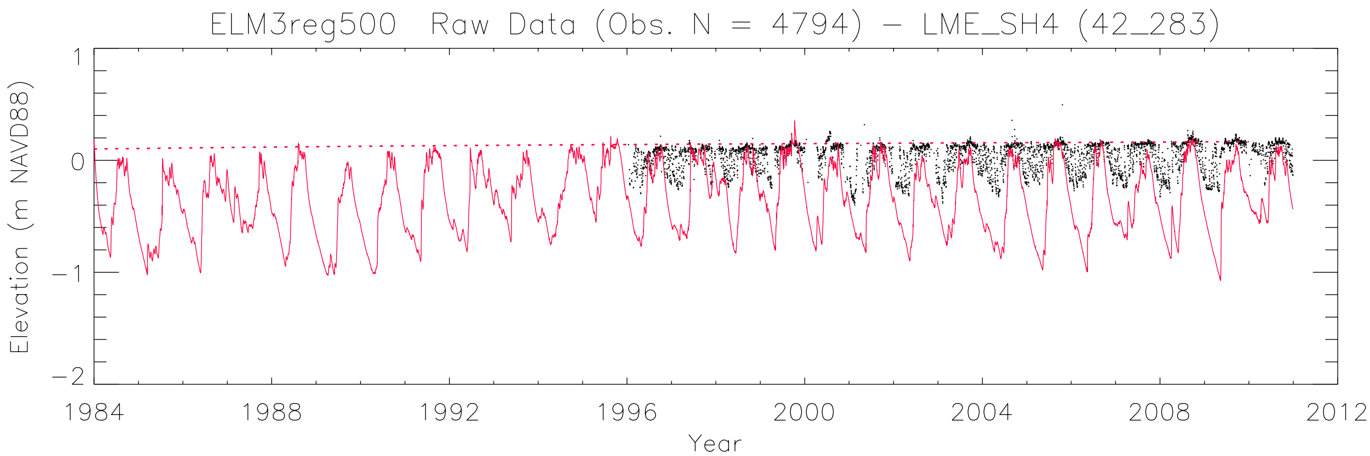

Cumulative Distribution: Raw Data – HR (37_281)
Cumulative Distribution
Elevation (m NAVD88)

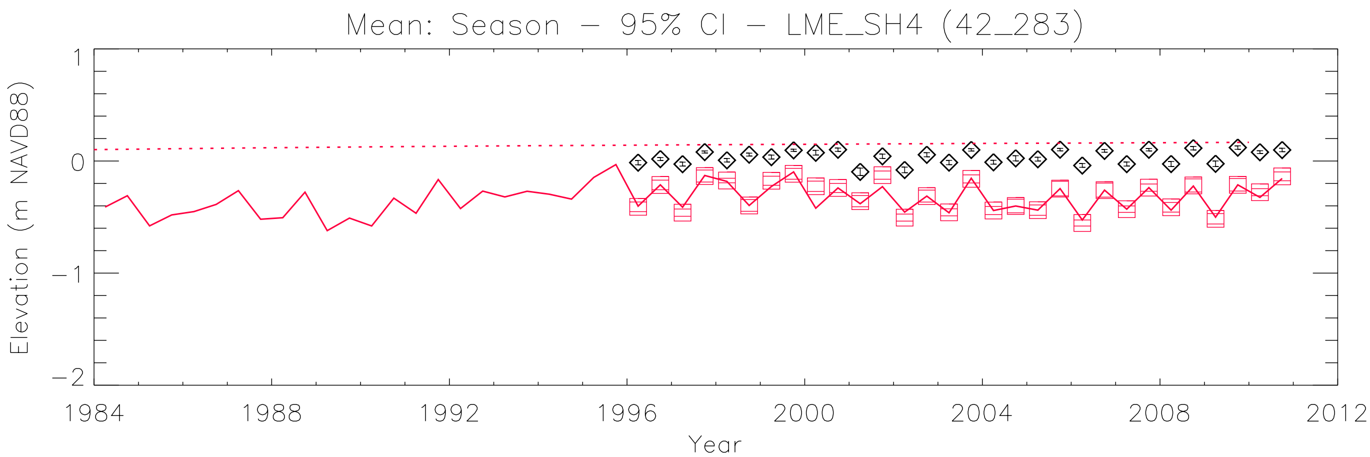

ELM3reg500 Raw Data (Obs. N = 9149) – NP–P44 (109_281)
Elevation (m NAVD88)
Year

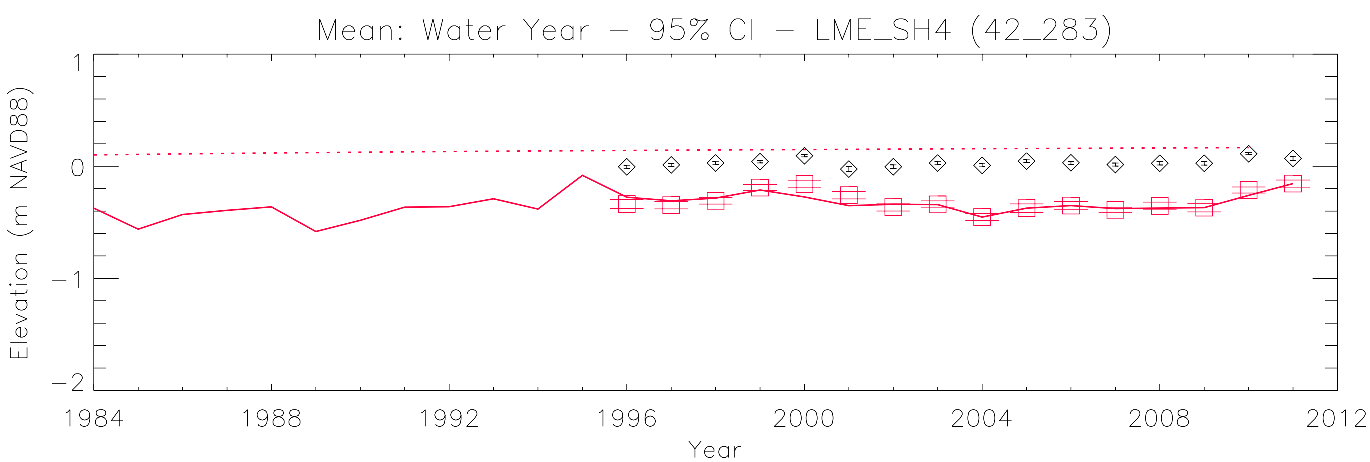

Mean: Season – 95% CI – NP–P44 (109_281)
Elevation (m NAVD88)
Year

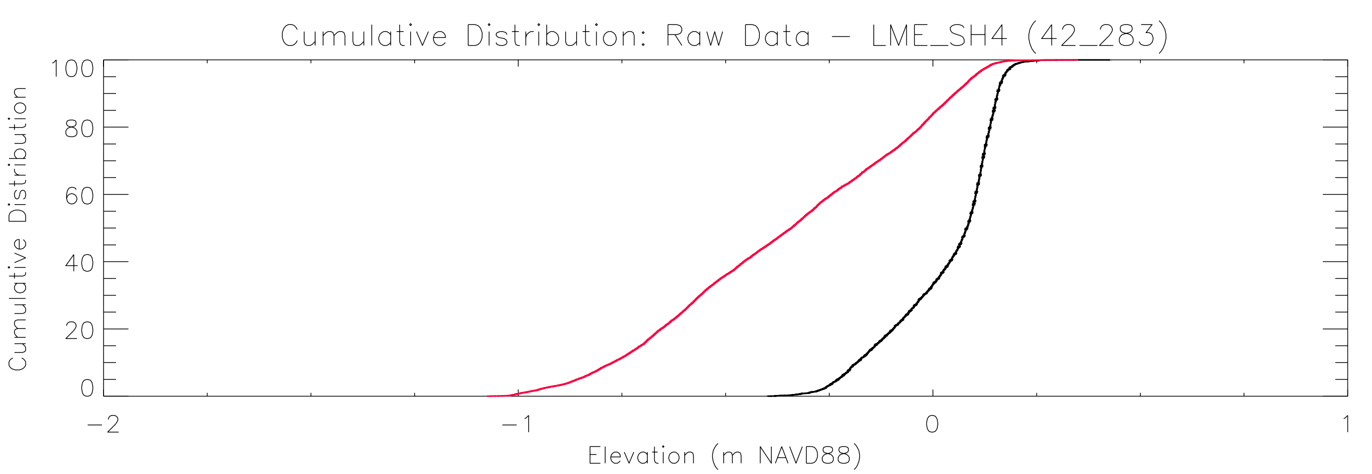

Mean: Water Year – 95% CI – NP–P44 (109_281)
Elevation (m NAVD88)
Year

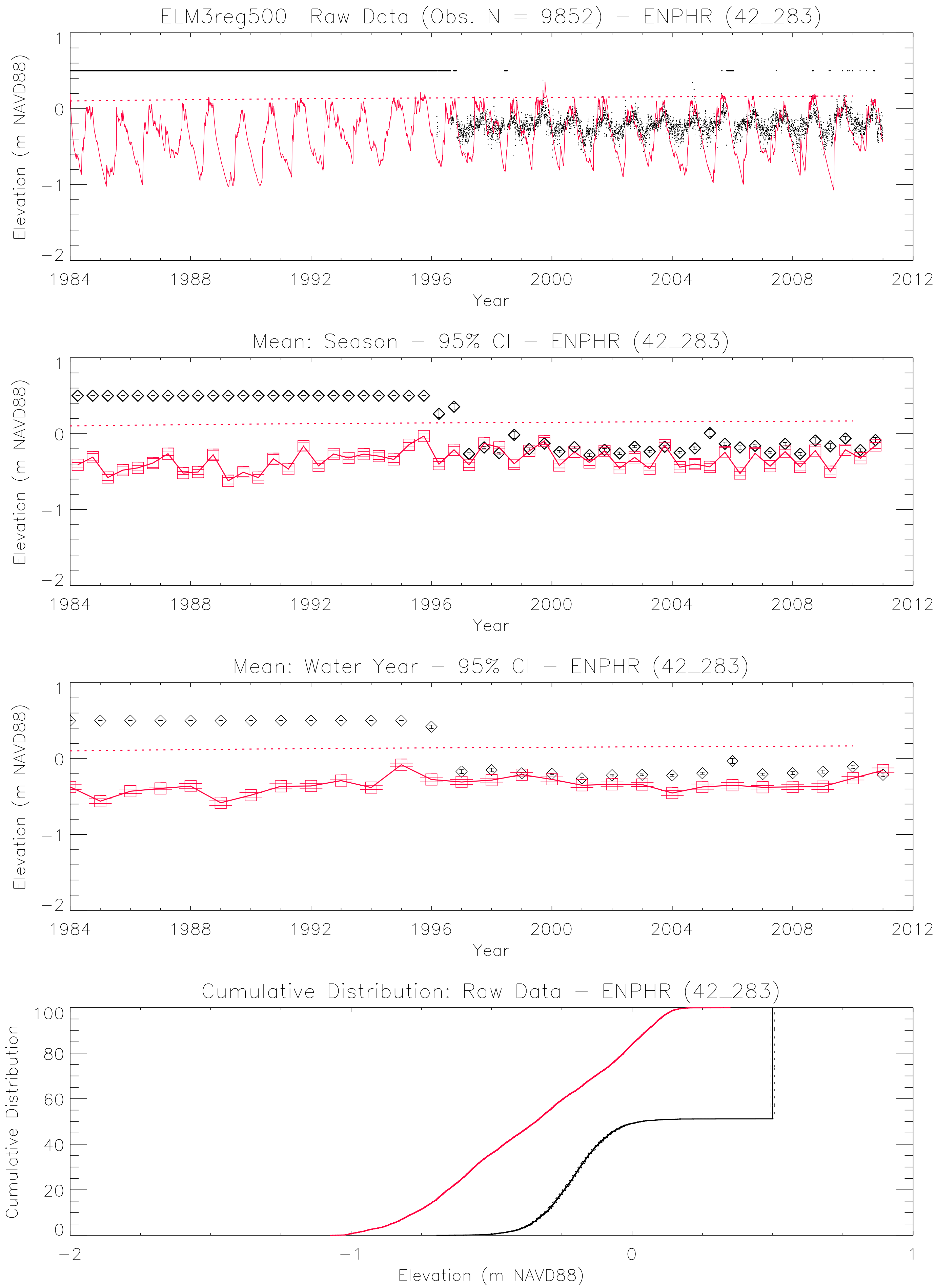

Cumulative Distribution: Raw Data – NP–P44 (109_281)
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 4794) – LME_SH4 (42_283)
Elevation (m NAVD88)
Year
1
0
−1
−2
1984
1988
1992
1996
2000
2004
2008
2012


Mean: Season – 95% CI – LME_SH4 (42_283)
Elevation (m NAVD88)
Year
1
0
−1
−2
1984
1988
1992
1996
2000
2004
2008
2012

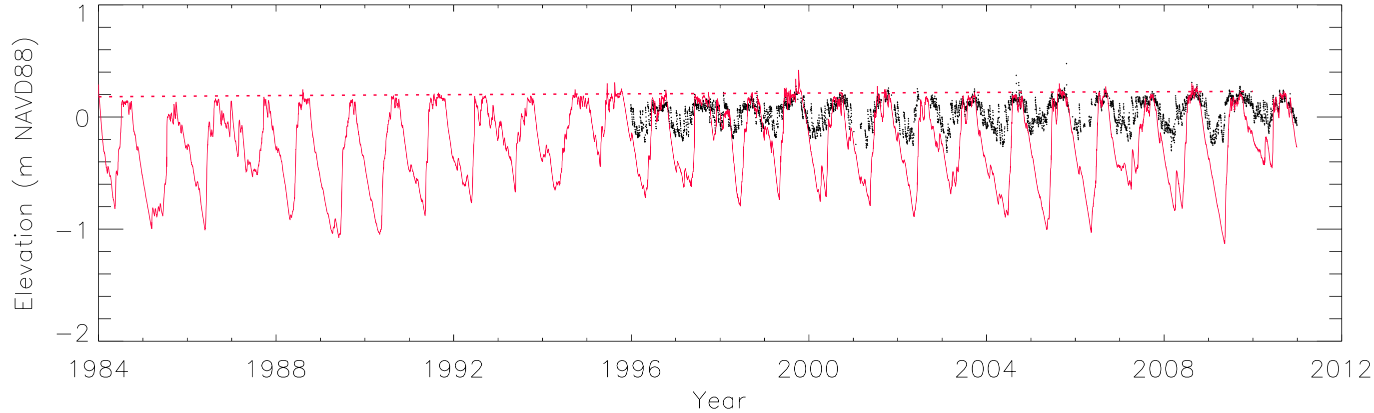

Mean: Water Year – 95% CI – LME_SH4 (42_283)
Elevation (m NAVD88)
Year
1
0
−1
−2
1984
1988
1992
1996
2000
2004
2008
2012


Cumulative Distribution: Raw Data – LME_SH4 (42_283)
Cumulative Distribution
Elevation (m NAVD88)
100
80
60
40
20
0
−2
−1
0
1

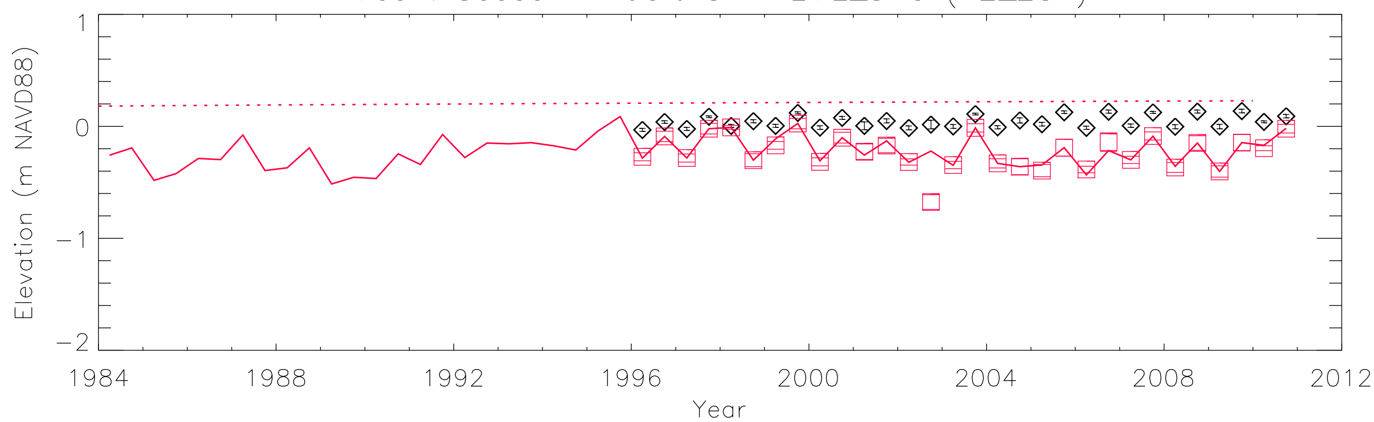


ELM3reg500 Raw Data (Obs. N = 9852) − ENPHR (42_283)
Elevation (m NAVD88)
Year
Mean: Season − 95% CI − ENPHR (42_283)
Elevation (m NAVD88)
Year
Mean: Water Year − 95% CI − ENPHR (42_283)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data − ENPHR (42_283)
Cumulative Distribution
Elevation (m NAVD88)

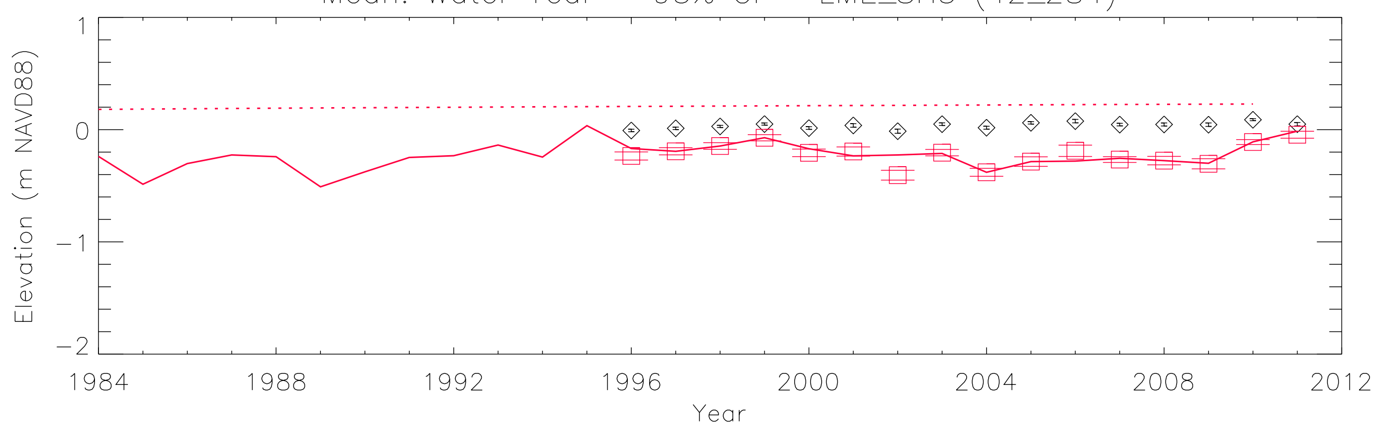
ELM3reg500 Raw Data (Obs. N = 4982) – LME_SH5 (42_284)



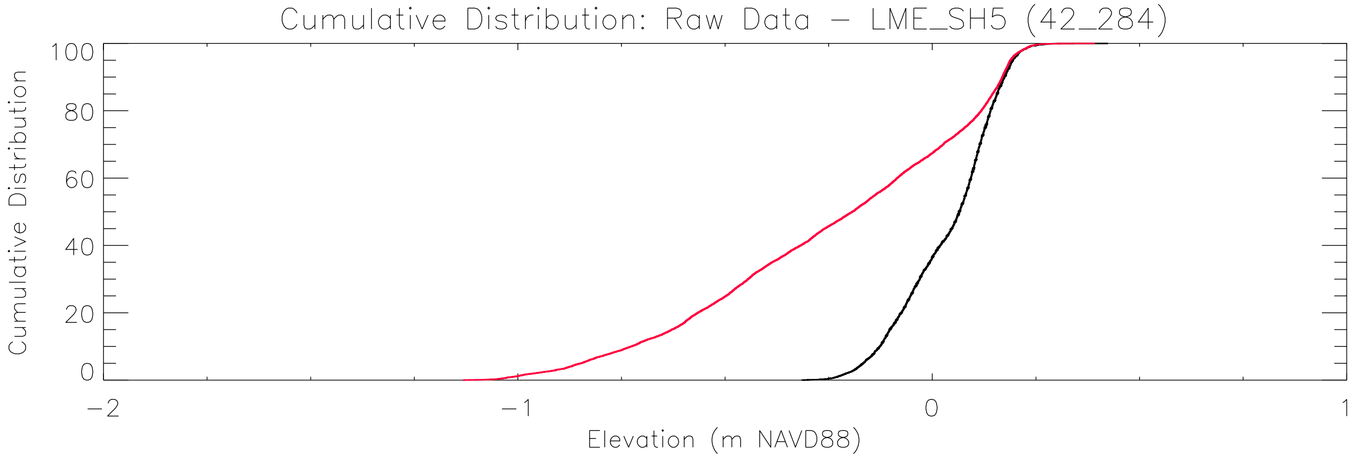
Mean: Season – 95% CI – LME_SH5 (42_284)

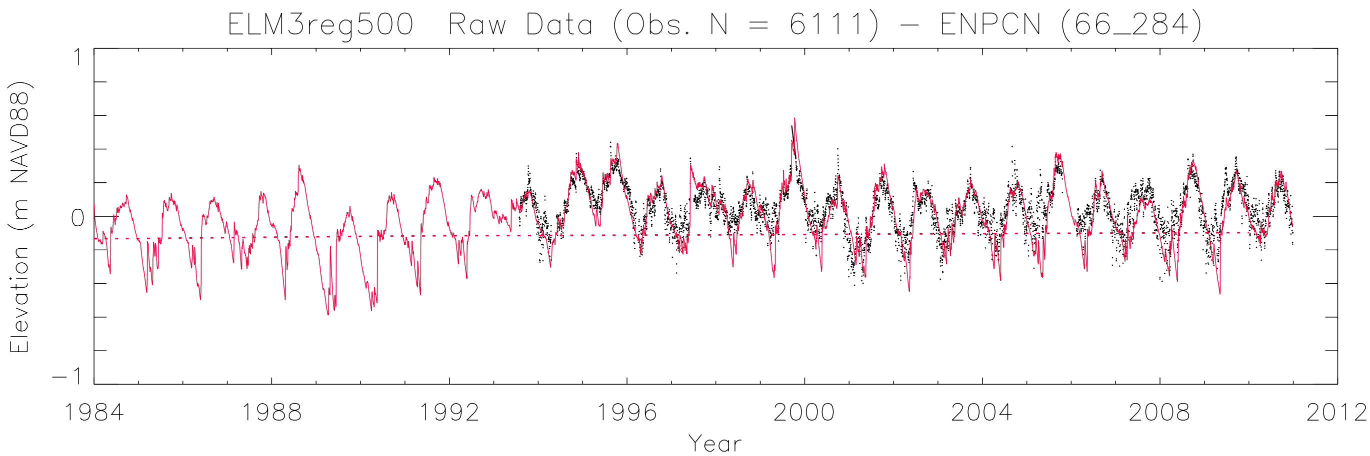


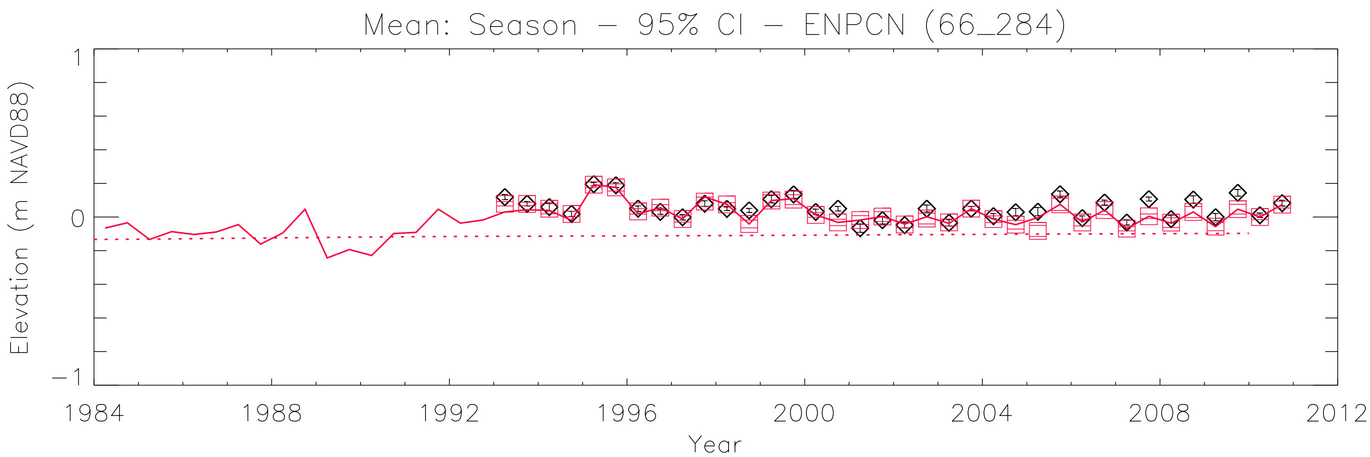
Mean: Water Year – 95% CI – LME_SH5 (42_284)

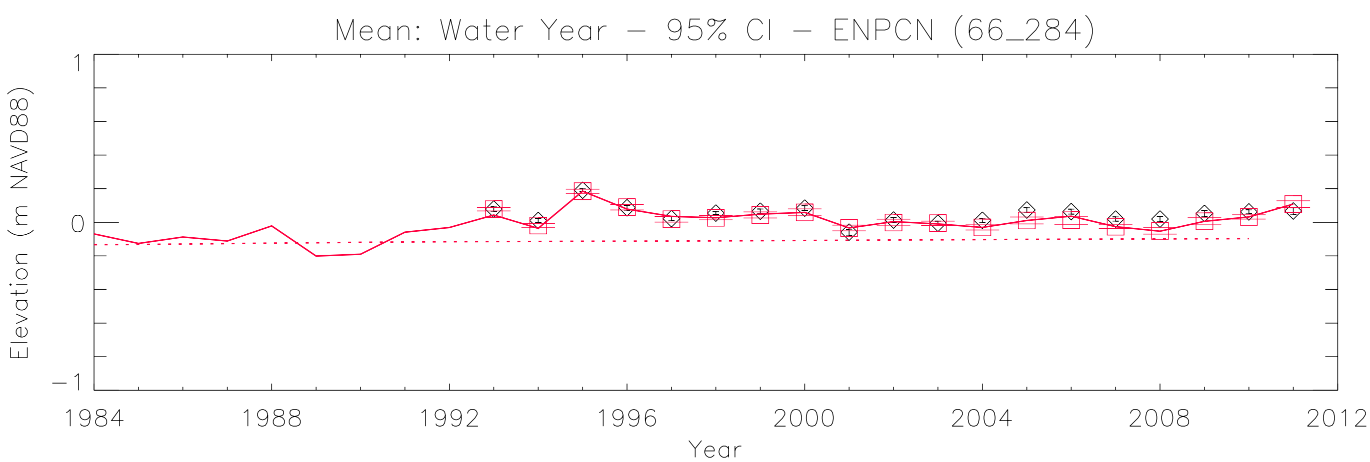


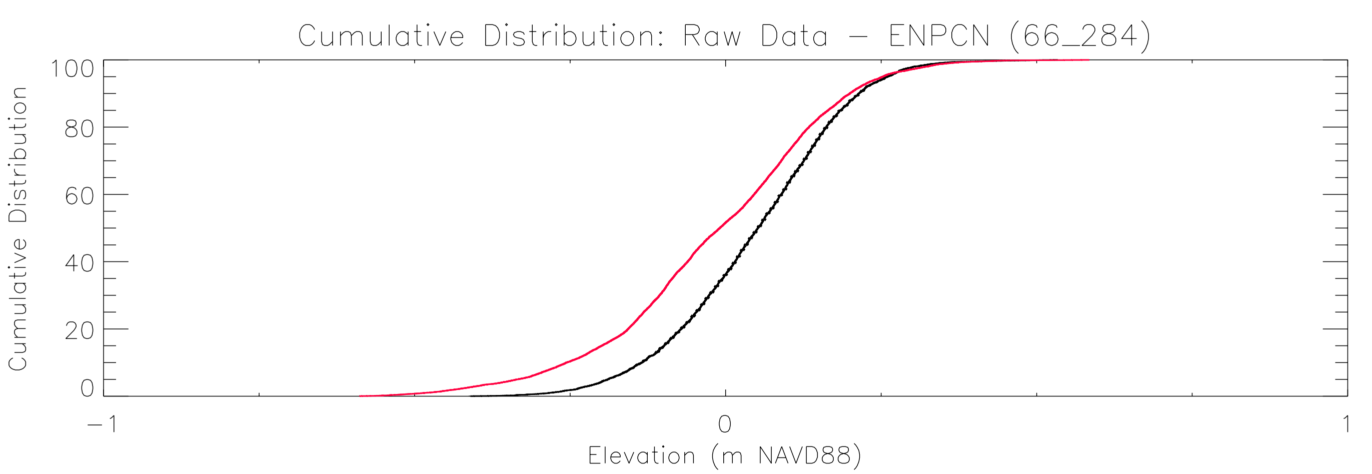
Cumulative Distribution: Raw Data – LME_SH5 (42_284)

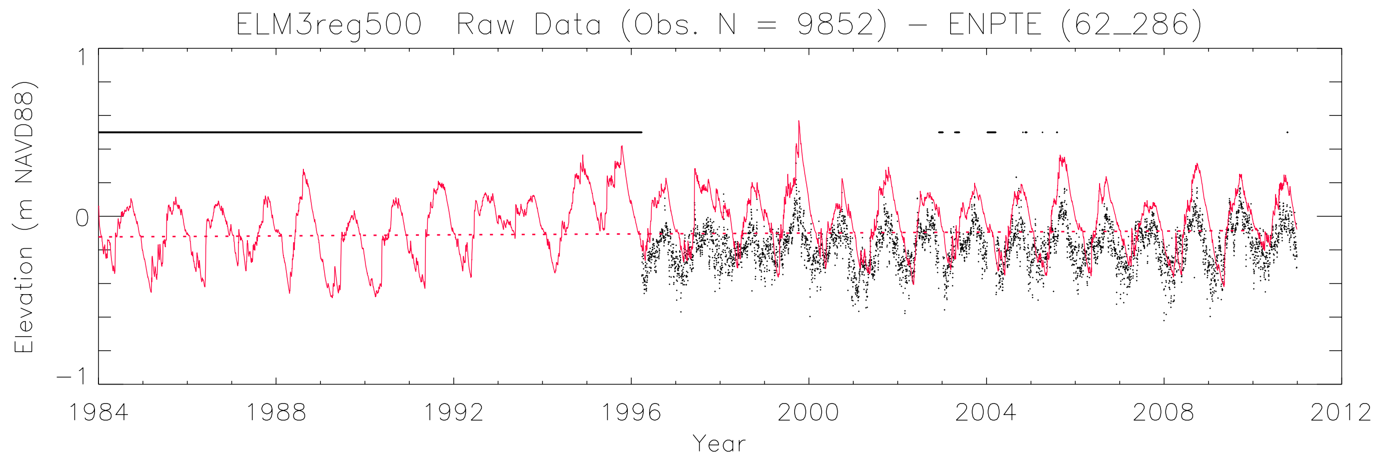


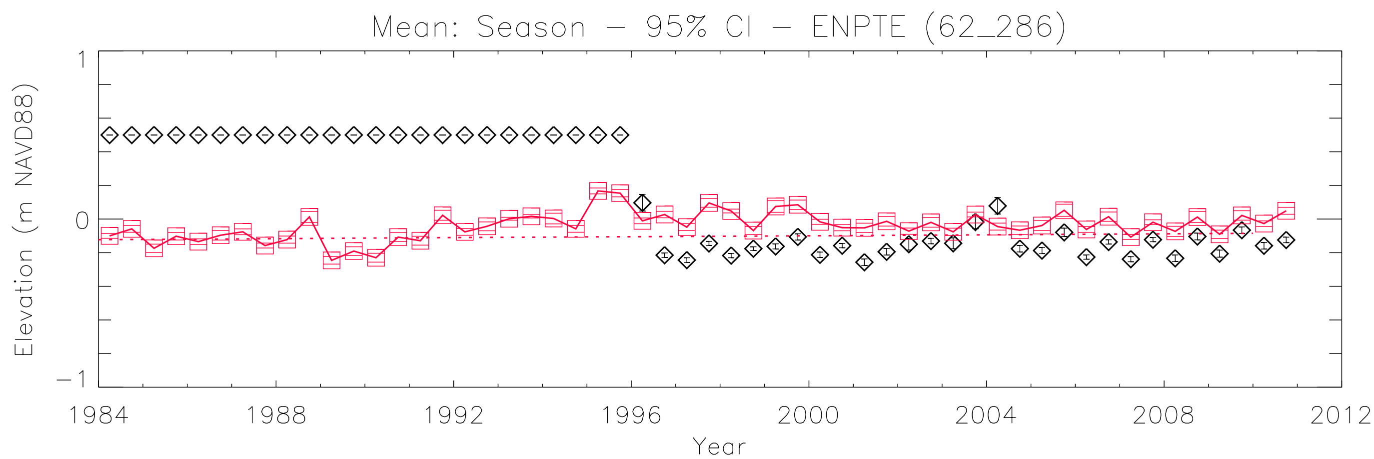

ELM3reg500 Raw Data (Obs. N = 6111) – ENPCN (66_284)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

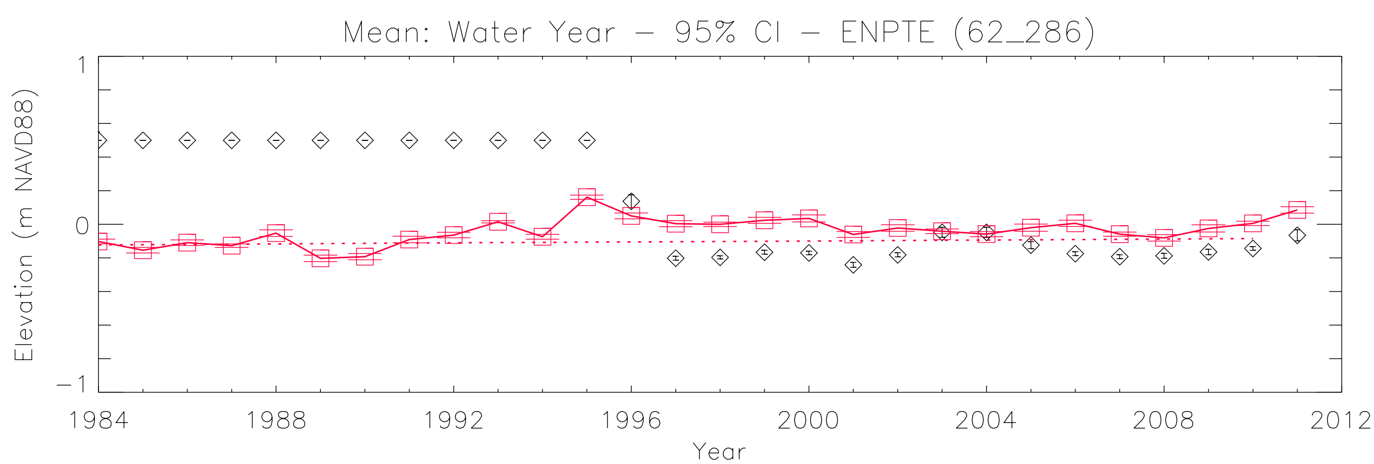

Mean: Season – 95% CI – ENPCN (66_284)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

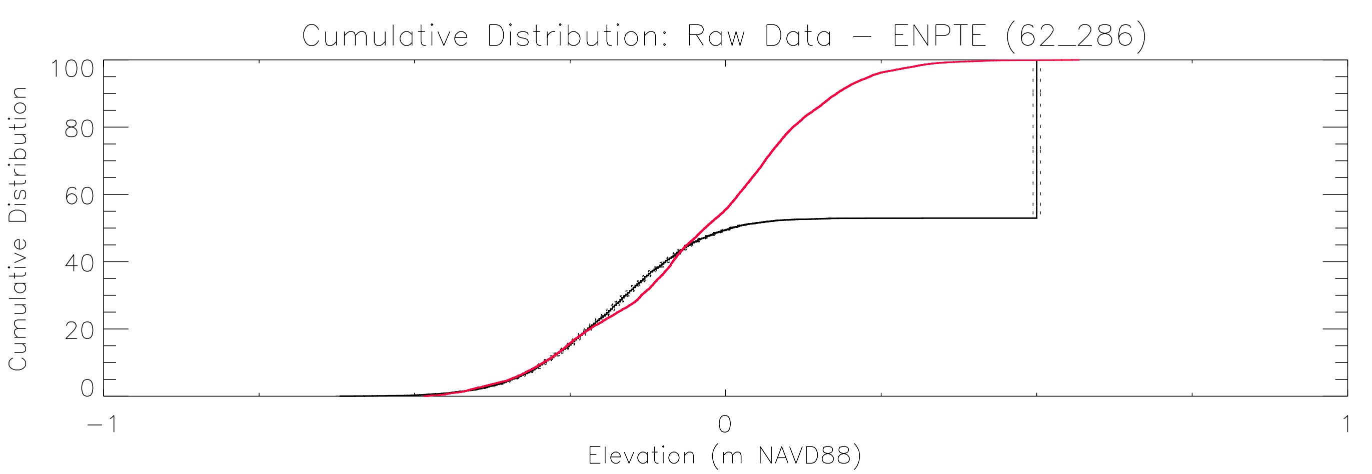

Mean: Water Year – 95% CI – ENPCN (66_284)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

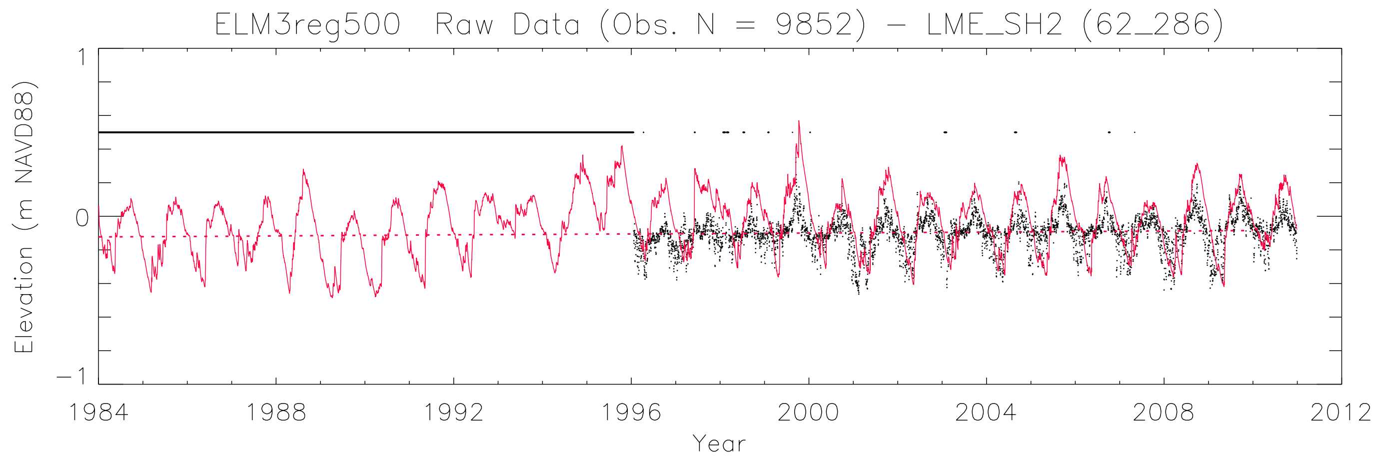

Cumulative Distribution: Raw Data – ENPCN (66_284)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

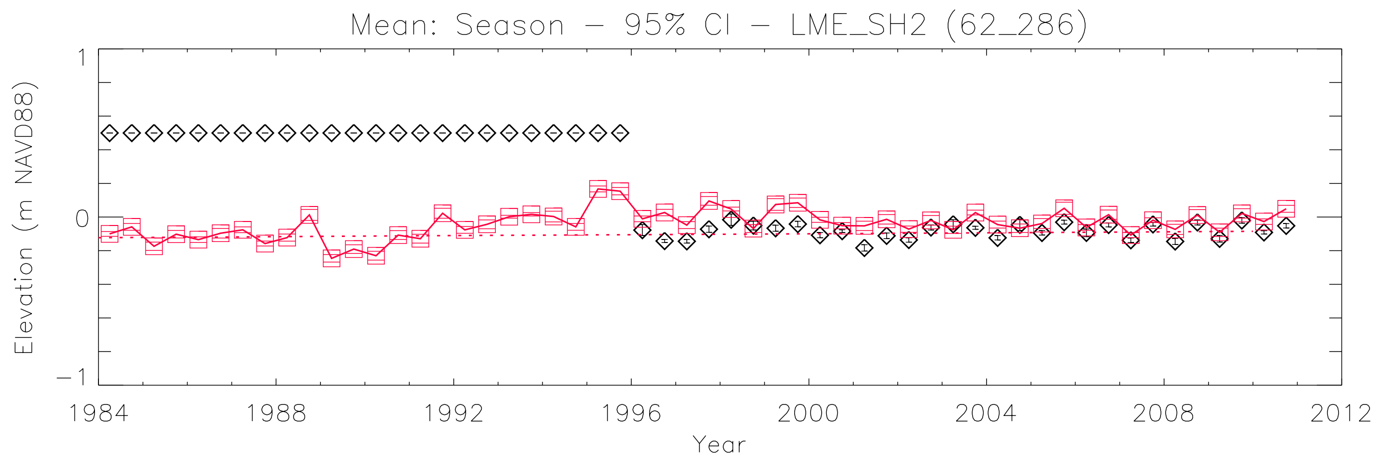

ELM3reg500 Raw Data (Obs. N = 9852) – ENPTE (62_286)
Elevation (m NAVD88)
Year

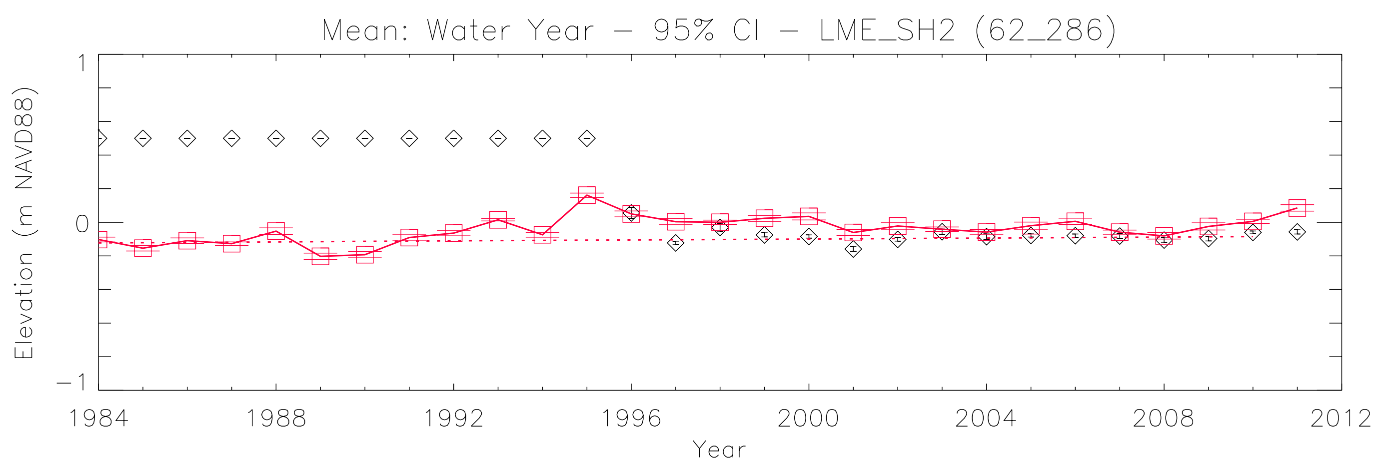

Mean: Season – 95% CI – ENPTE (62_286)
Elevation (m NAVD88)
Year

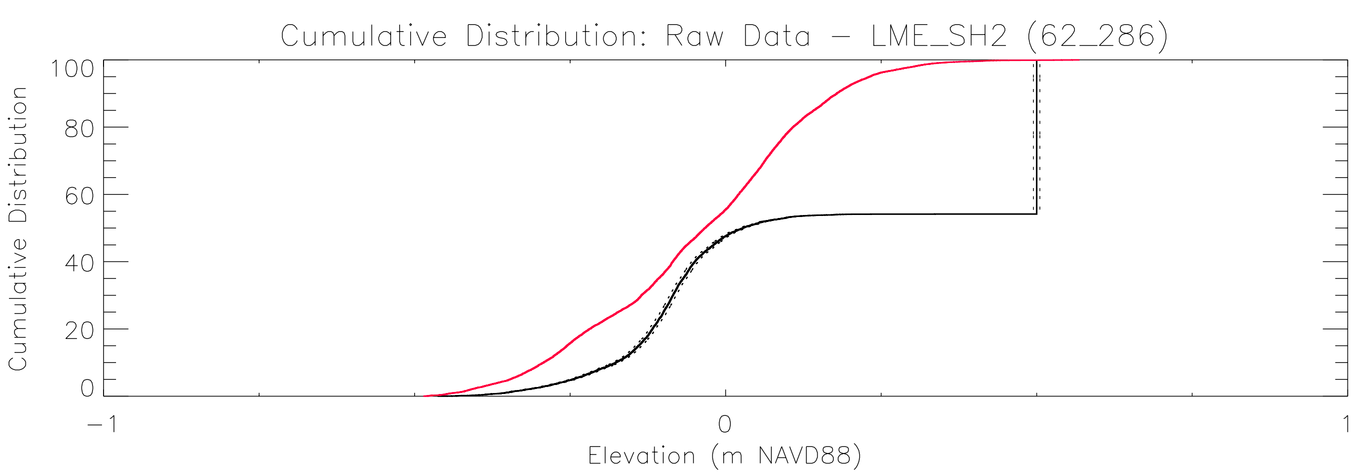

Mean: Water Year – 95% CI – ENPTE (62_286)
Elevation (m NAVD88)
Year

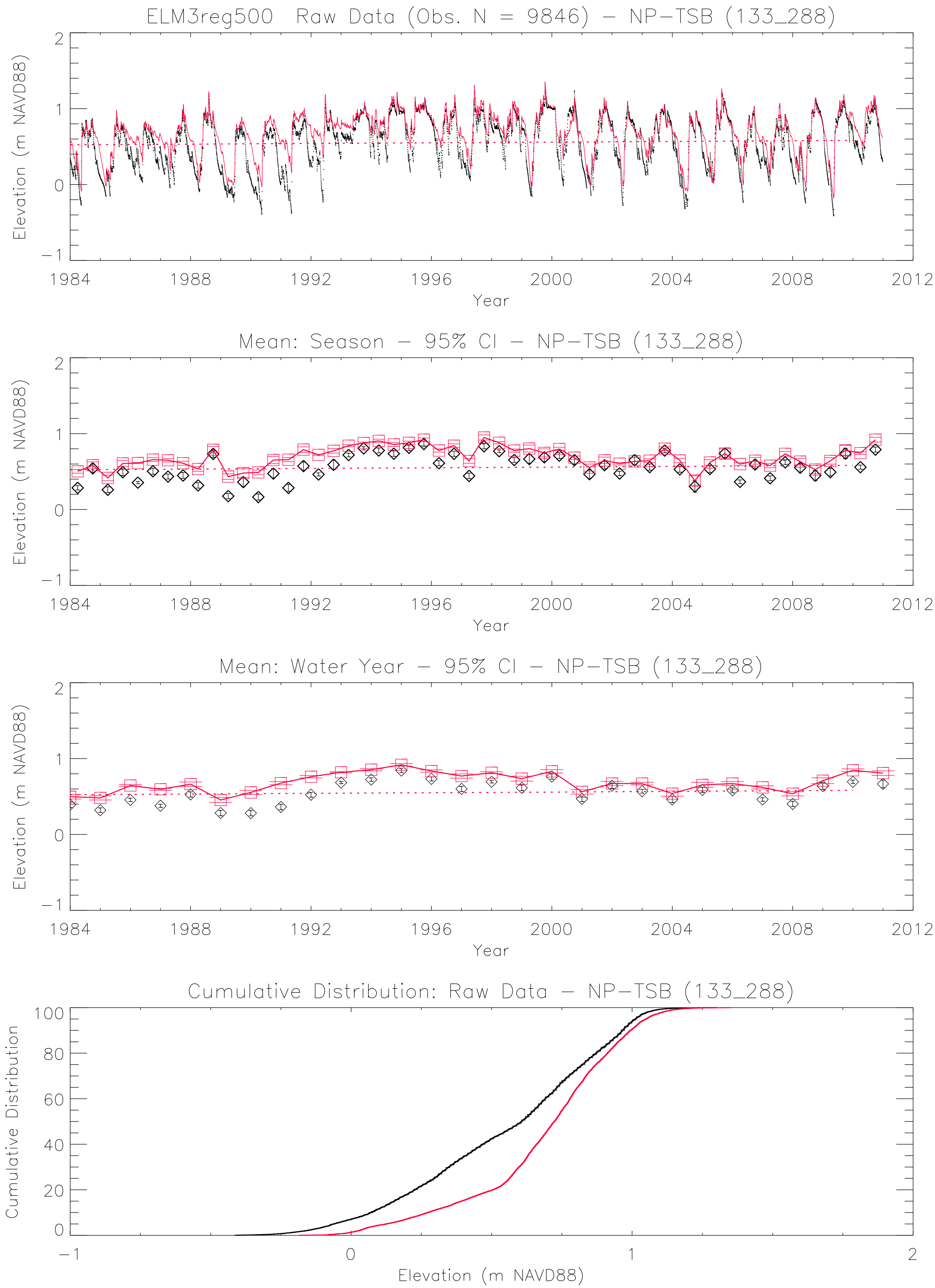

Cumulative Distribution: Raw Data – ENPTE (62_286)
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 9852) – LME_SH2 (62_286)
Elevation (m NAVD88)
Year

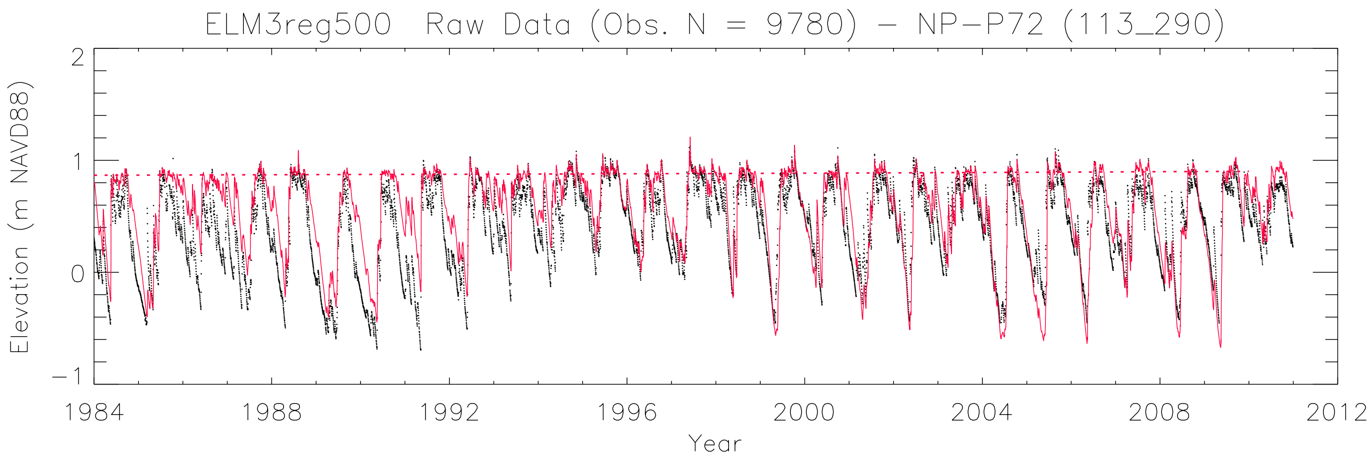

Mean: Season – 95% CI – LME_SH2 (62_286)
Elevation (m NAVD88)
Year


Mean: Water Year – 95% CI – LME_SH2 (62_286)
Elevation (m NAVD88)
Year

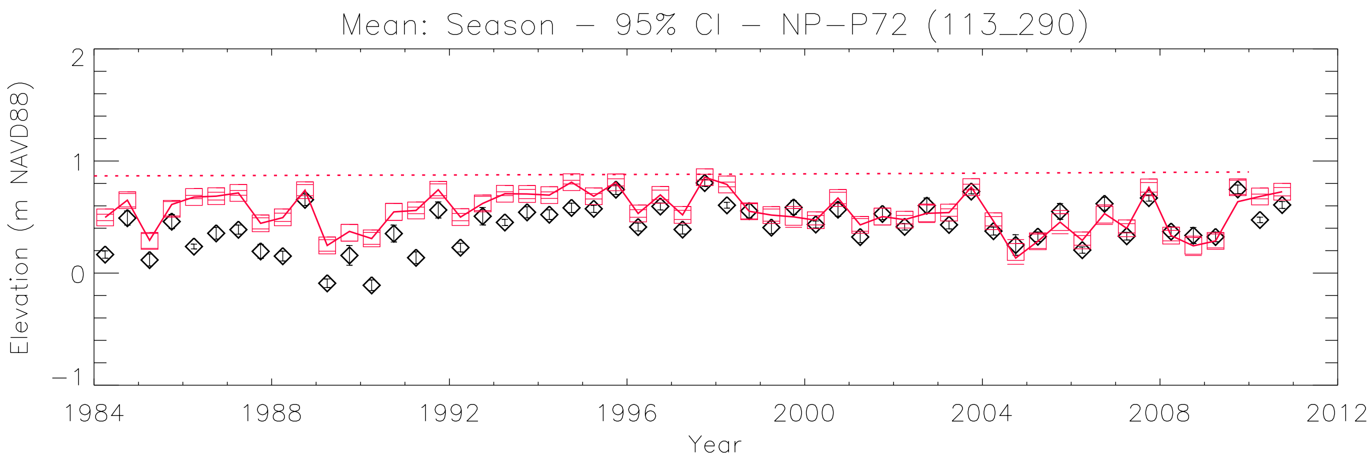

Cumulative Distribution: Raw Data – LME_SH2 (62_286)
Cumulative Distribution
Elevation (m NAVD88)



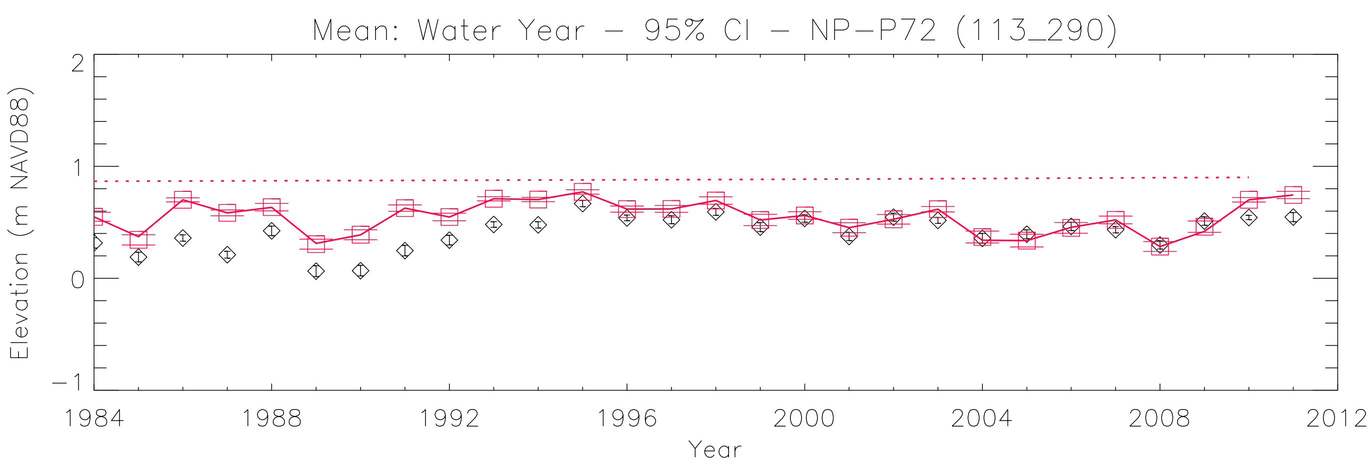
ELM3reg500 Raw Data (Obs. N = 9846) – NP–TSB (133_288)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – NP–TSB (133_288)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – NP–TSB (133_288)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – NP–TSB (133_288)
Cumulative Distribution
Elevation (m NAVD88)



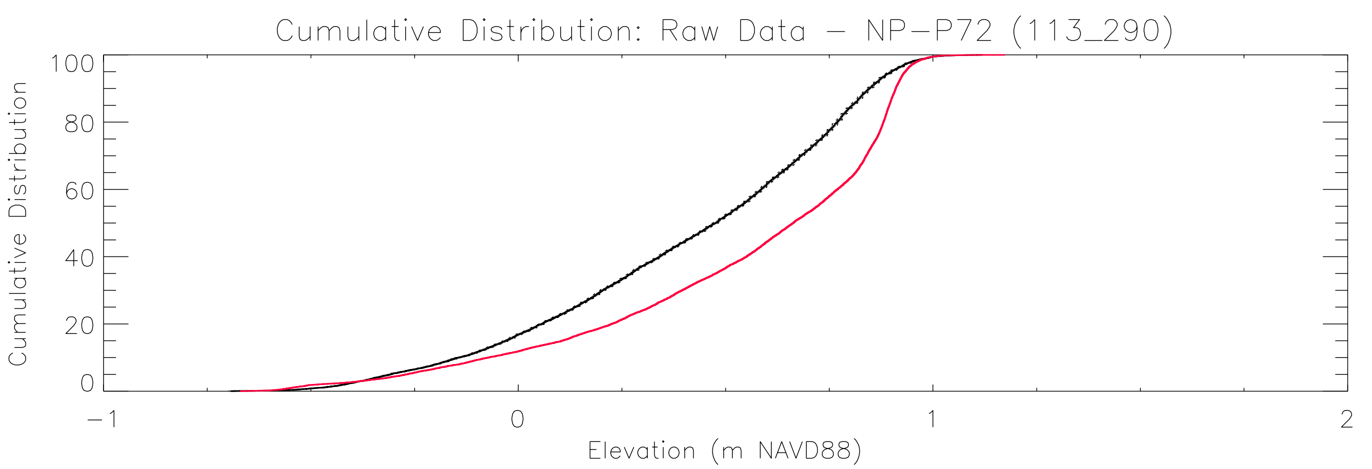
ELM3reg500 Raw Data (Obs. N = 9780) – NP–P72 (113_290)
Elevation (m NAVD88)
Year



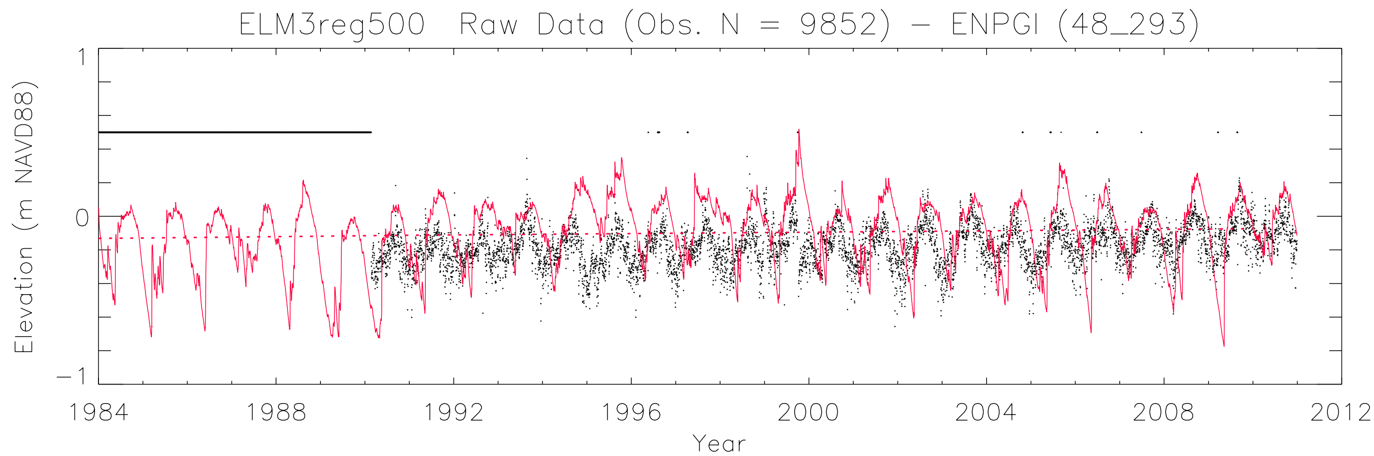
Mean: Season – 95% CI – NP–P72 (113_290)
Elevation (m NAVD88)
Year

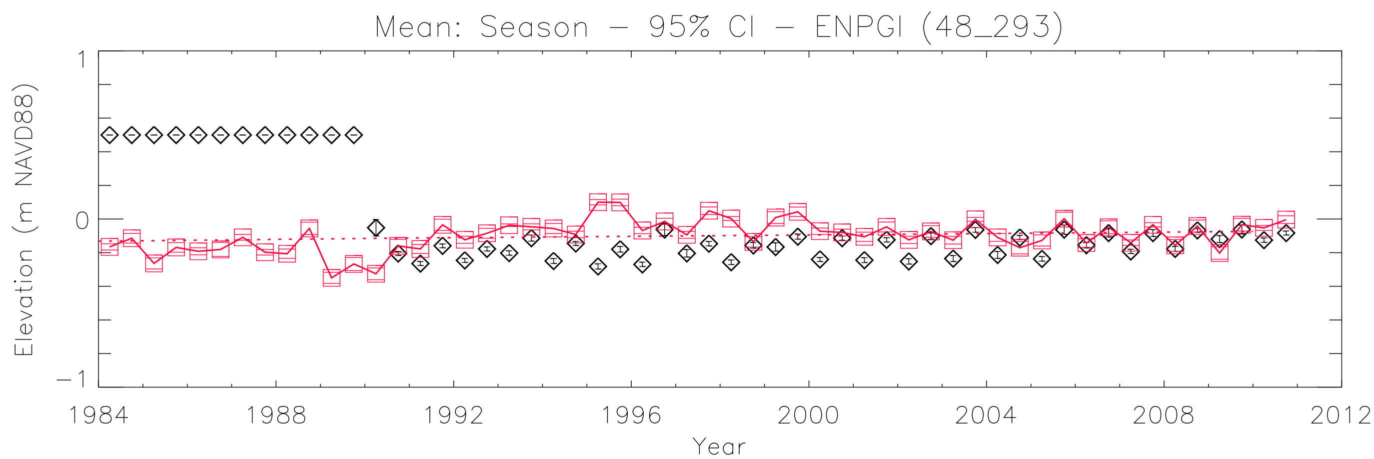


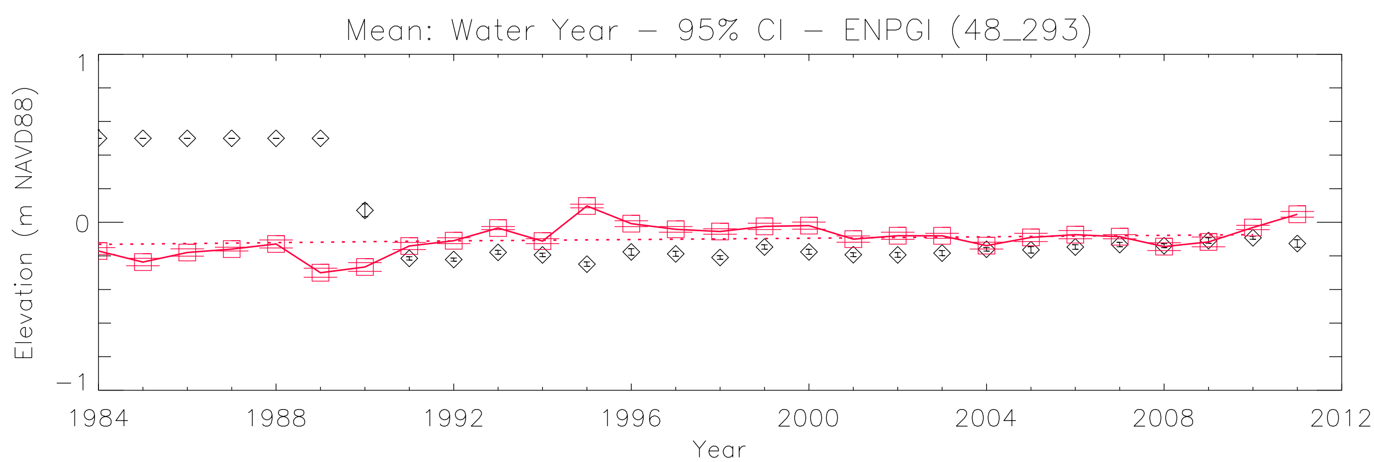
Mean: Water Year – 95% CI – NP–P72 (113_290)
Elevation (m NAVD88)
Year

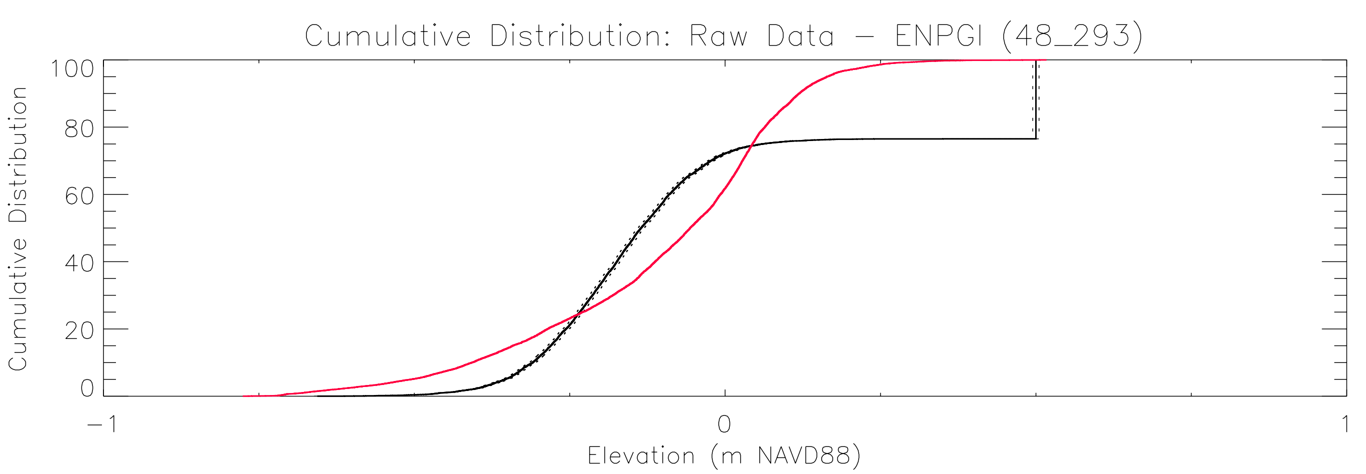


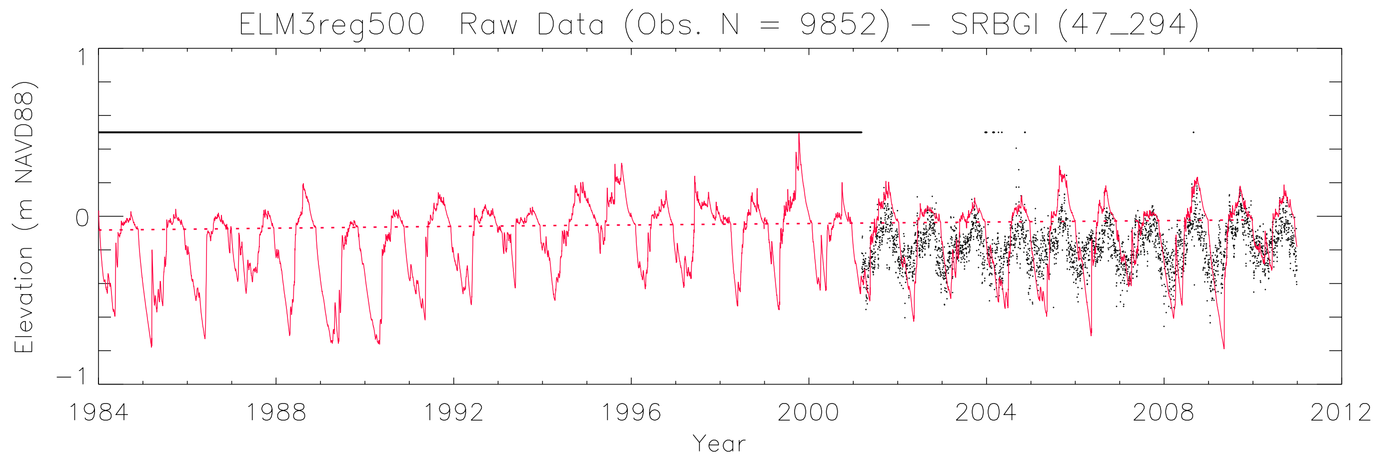
Cumulative Distribution: Raw Data – NP–P72 (113_290)
Cumulative Distribution
Elevation (m NAVD88)

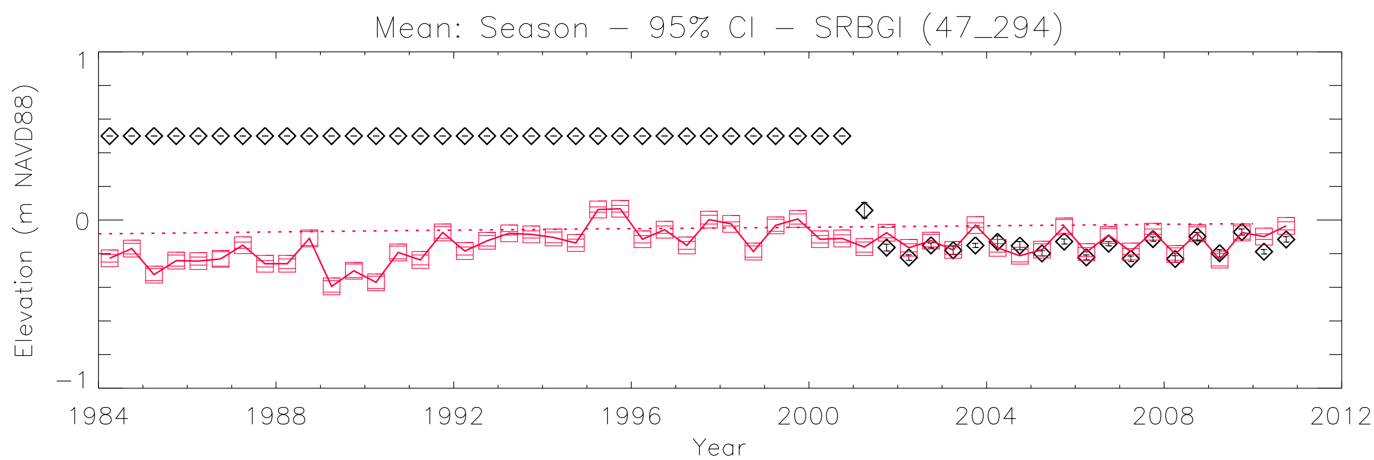

ELM3reg500 Raw Data (Obs. N = 9852) – ENPGI (48_293)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

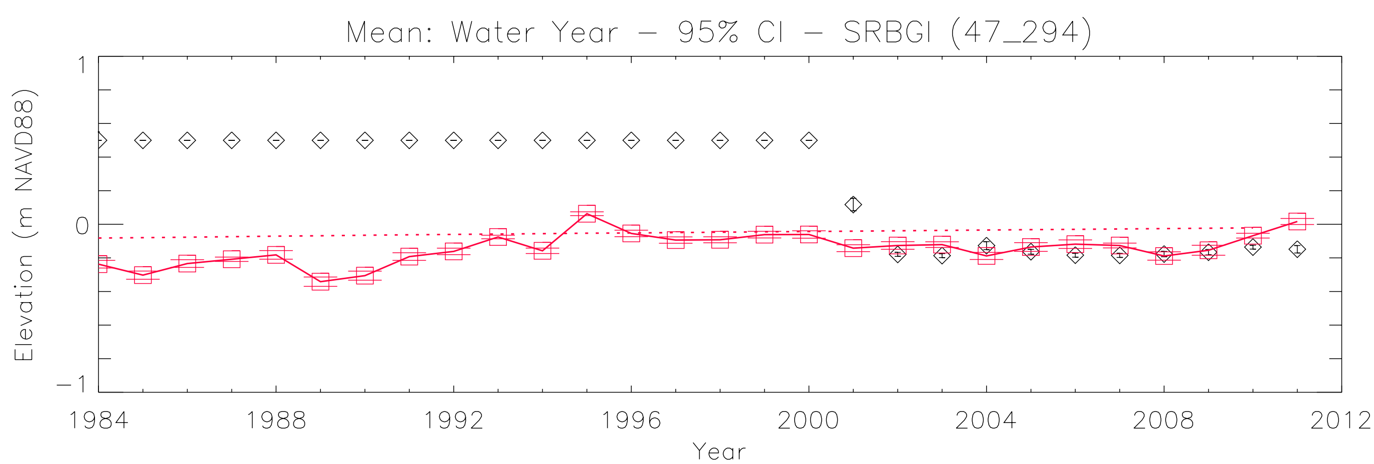

Mean: Season – 95% CI – ENPGI (48_293)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

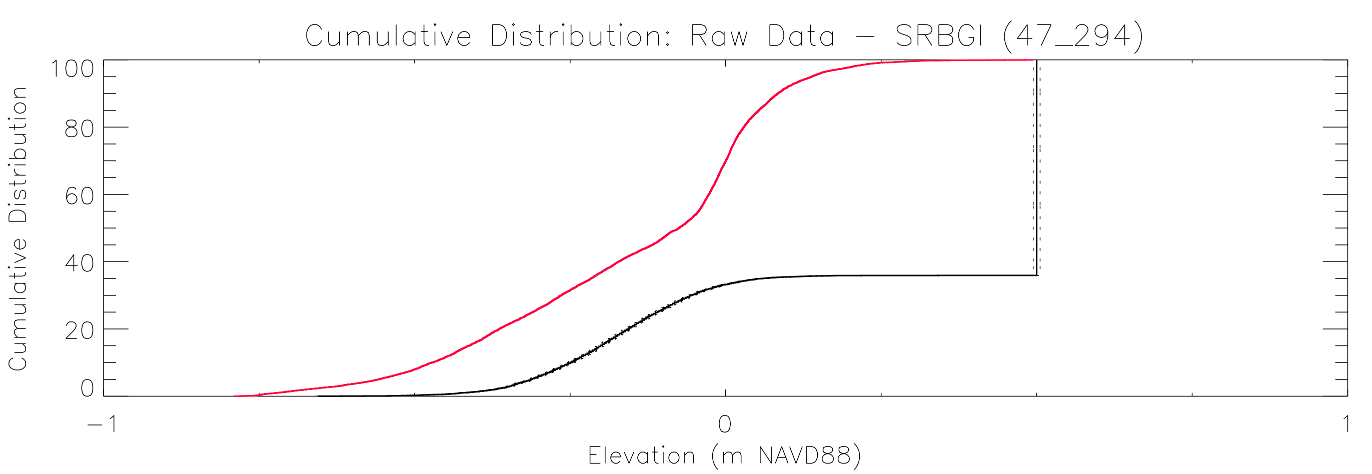

Mean: Water Year – 95% CI – ENPGI (48_293)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

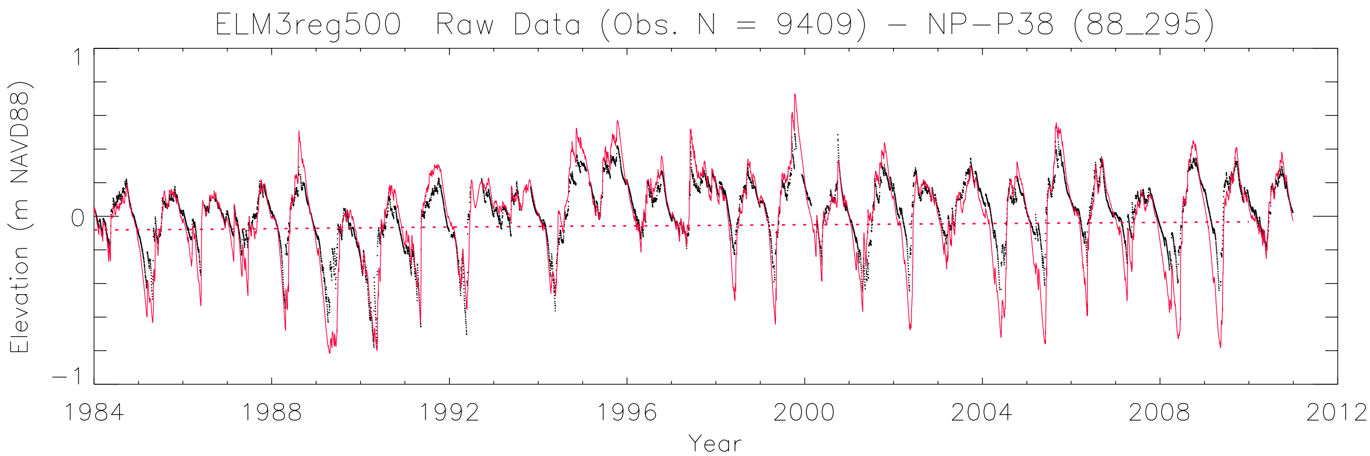

Cumulative Distribution: Raw Data – ENPGI (48_293)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

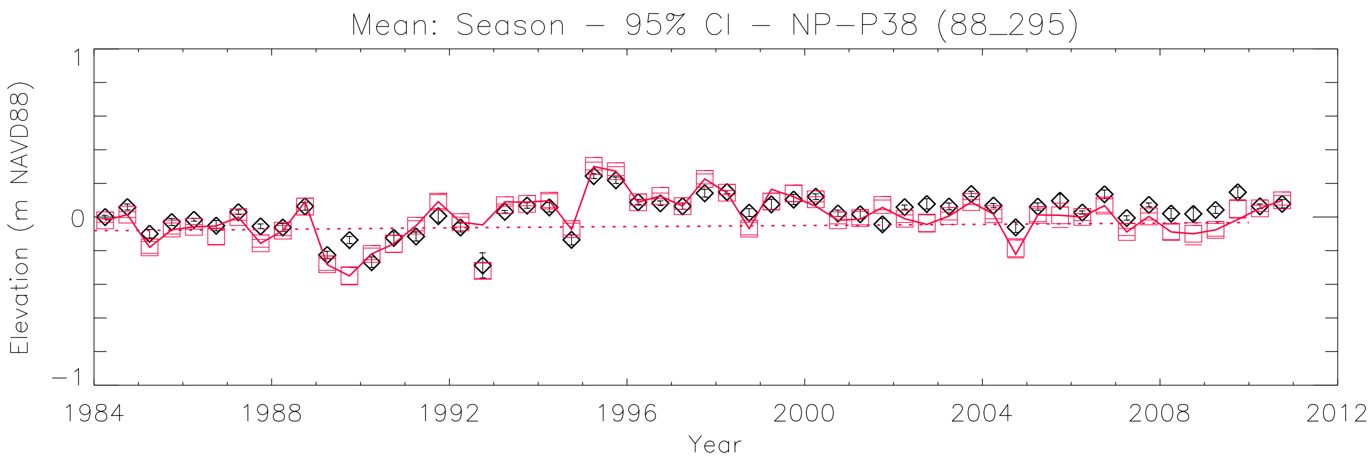

ELM3reg500 Raw Data (Obs. N = 9852) – SRBGI (47_294)
Elevation (m NAVD88)
Year
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

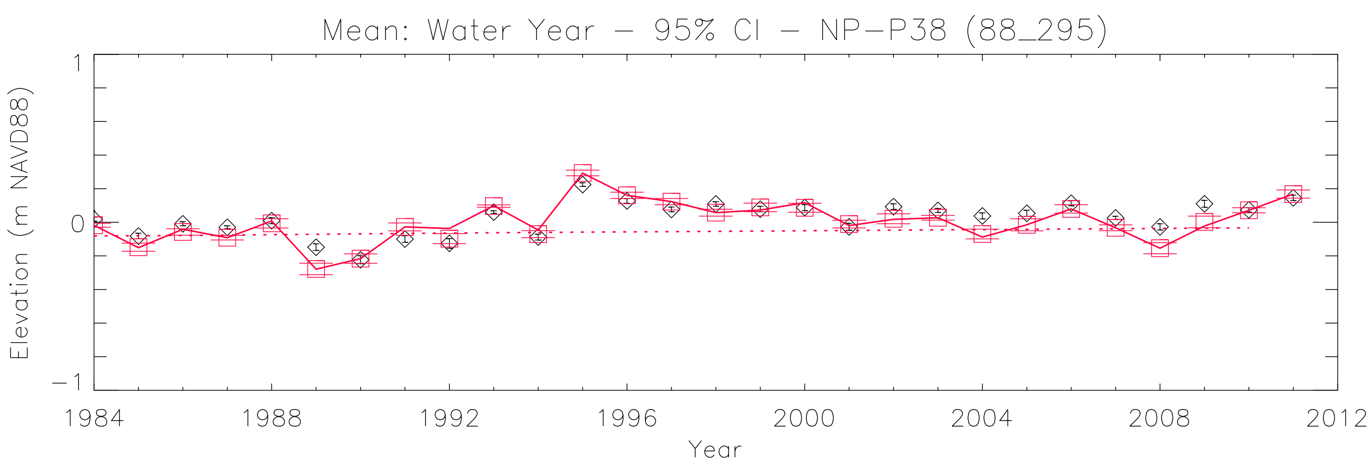

Mean: Season – 95% CI – SRBGI (47_294)
Elevation (m NAVD88)
Year
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

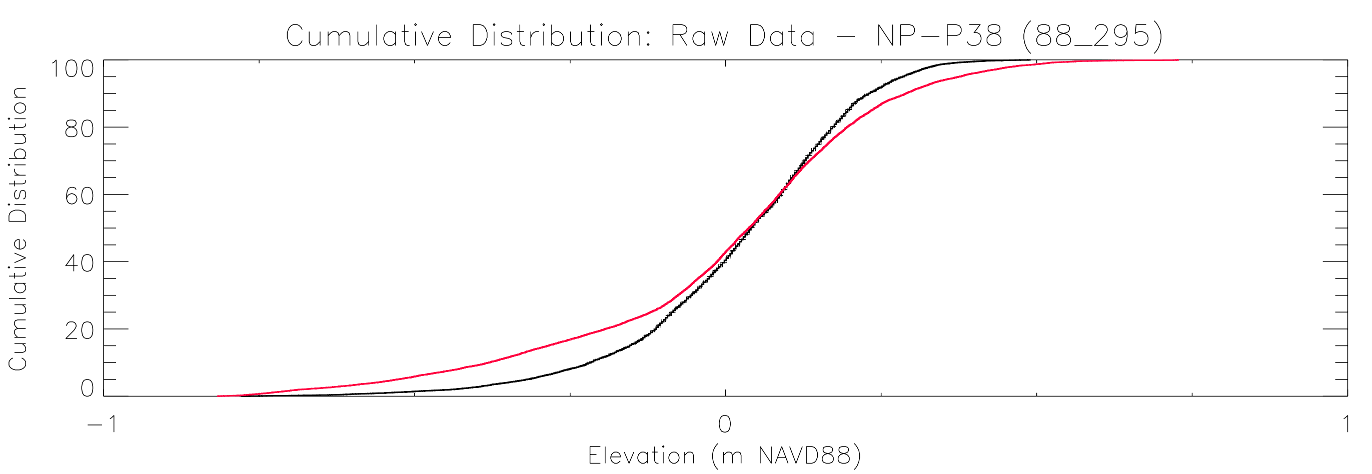

Mean: Water Year – 95% CI – SRBGI (47_294)
Elevation (m NAVD88)
Year
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012

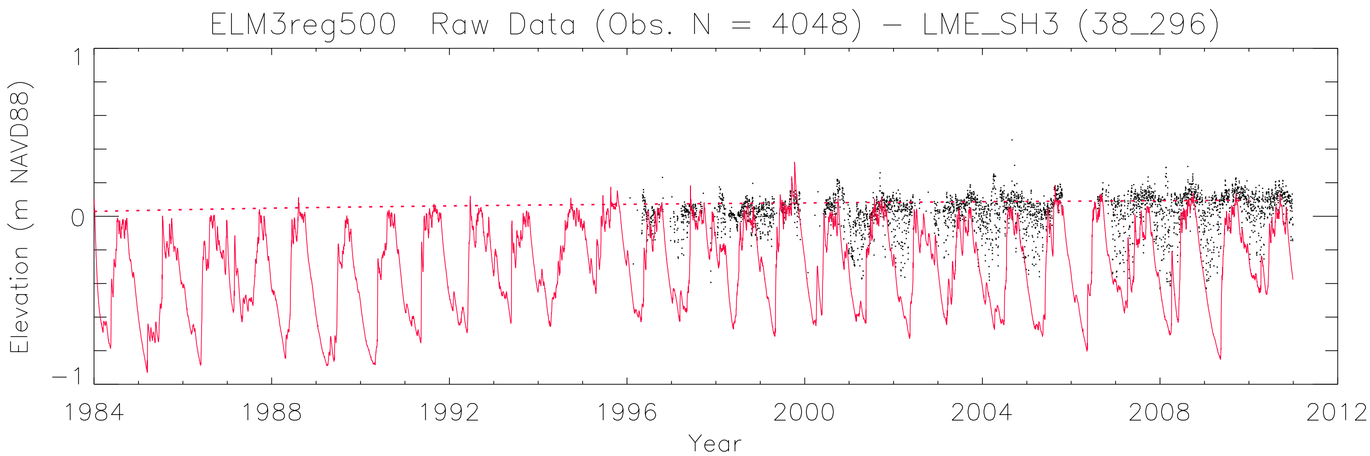

Cumulative Distribution: Raw Data – SRBGI (47_294)
Cumulative Distribution
Elevation (m NAVD88)
100
80
60
40
20
0
–1
0
1


ELM3reg500 Raw Data (Obs. N = 9409) − NP−P38 (88_295)
Elevation (m NAVD88)
Year

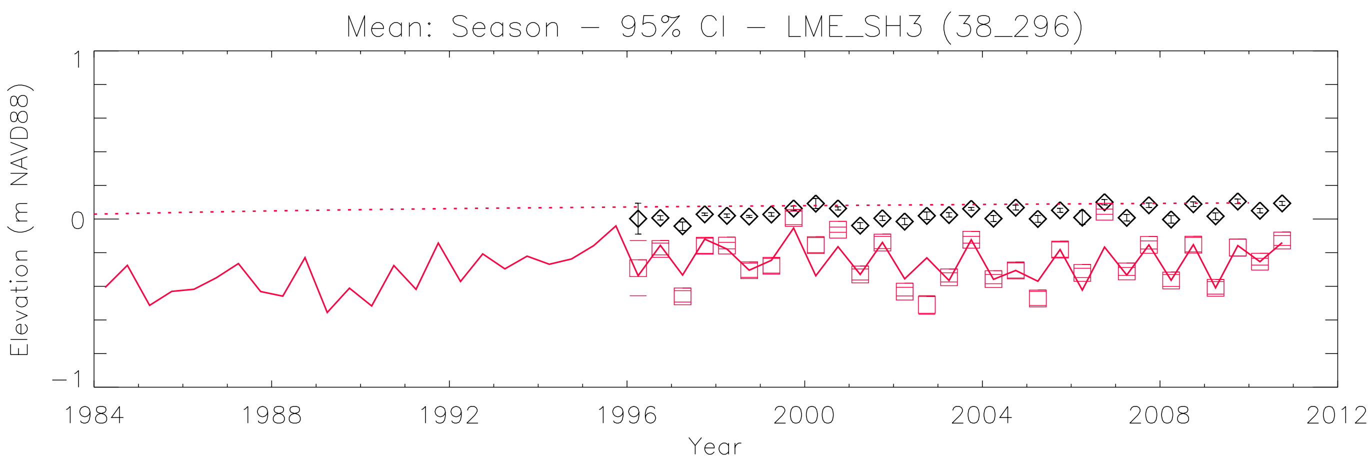

Mean: Season − 95% CI − NP−P38 (88_295)
Elevation (m NAVD88)
Year


Mean: Water Year − 95% CI − NP−P38 (88_295)
Elevation (m NAVD88)
Year

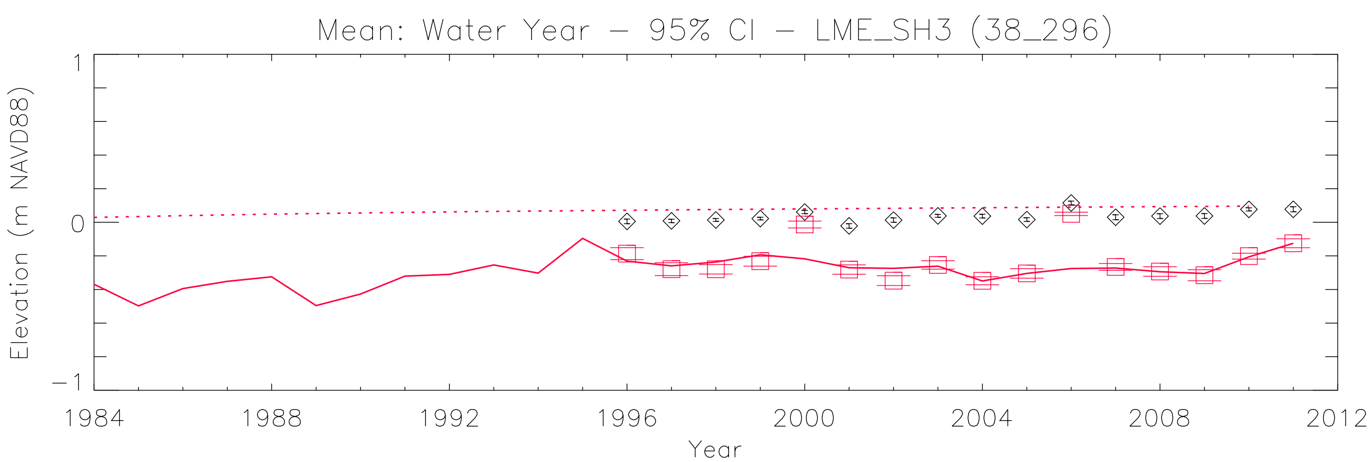

Cumulative Distribution: Raw Data − NP−P38 (88_295)
Cumulative Distribution
Elevation (m NAVD88)



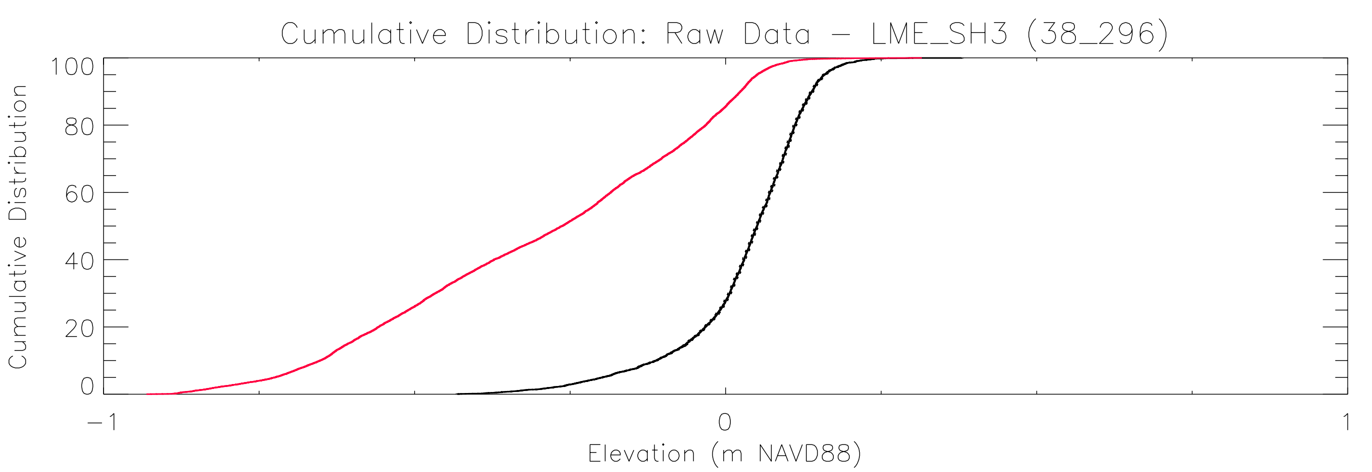
ELM3reg500 Raw Data (Obs. N = 4048) – LME_SH3 (38_296)
Elevation (m NAVD88)
Year



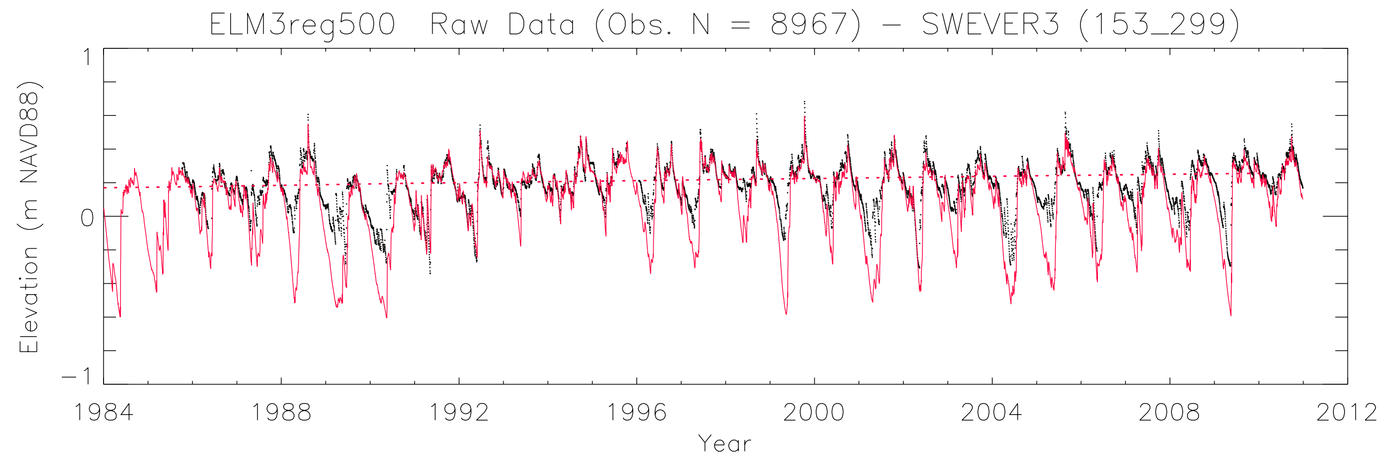
Mean: Season – 95% CI – LME_SH3 (38_296)
Elevation (m NAVD88)
Year

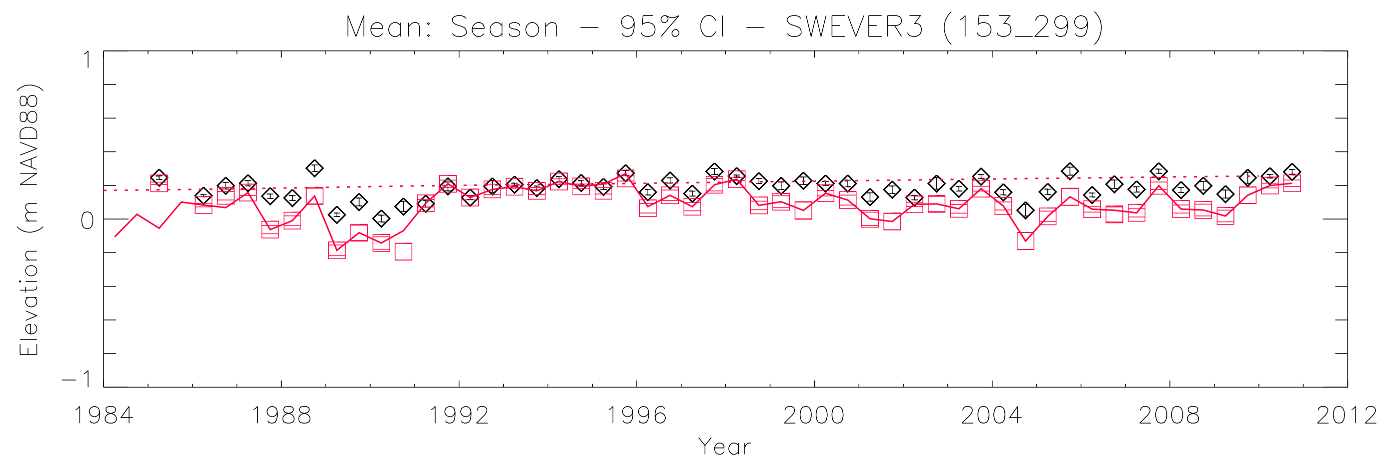


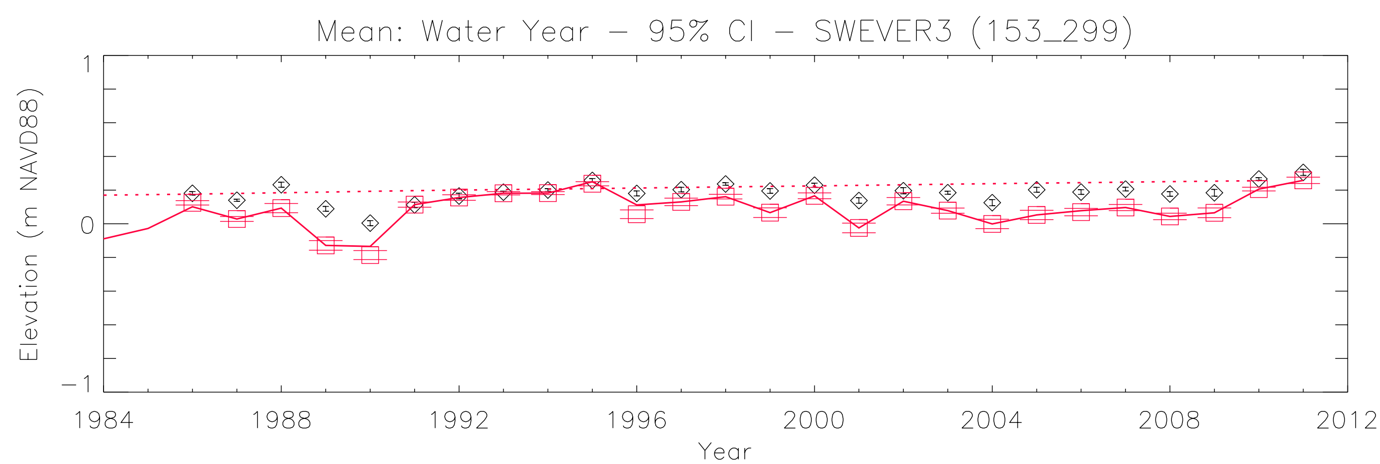
Mean: Water Year – 95% CI – LME_SH3 (38_296)
Elevation (m NAVD88)
Year

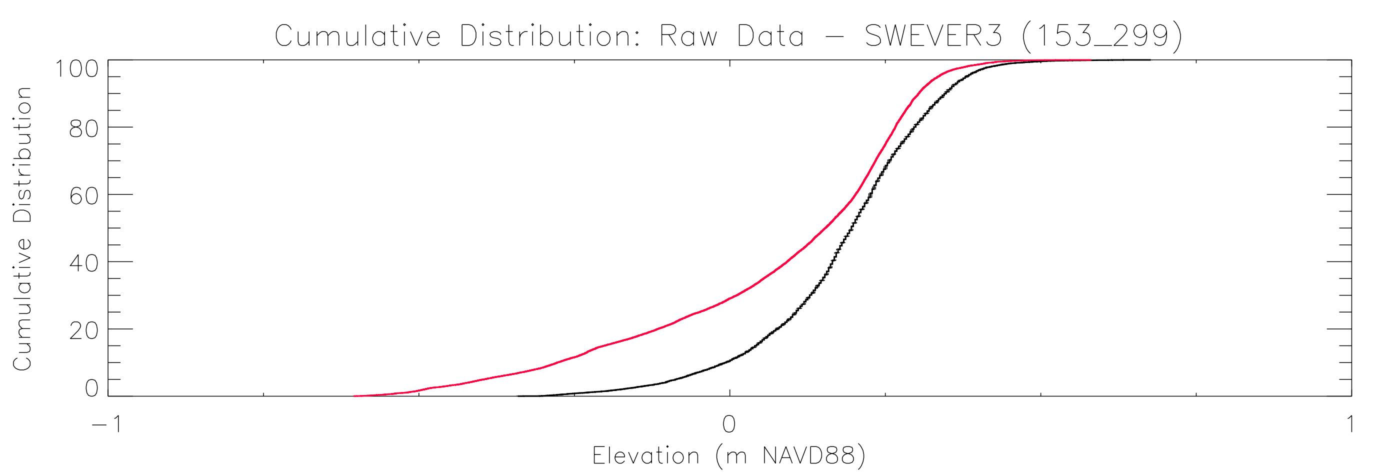


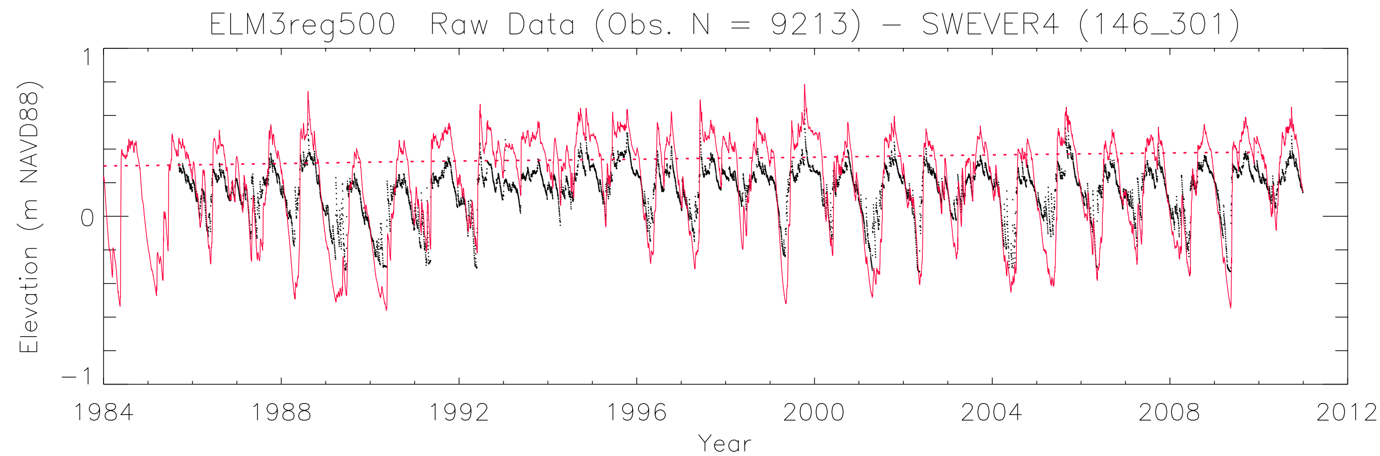
Cumulative Distribution: Raw Data – LME_SH3 (38_296)
Cumulative Distribution
Elevation (m NAVD88)

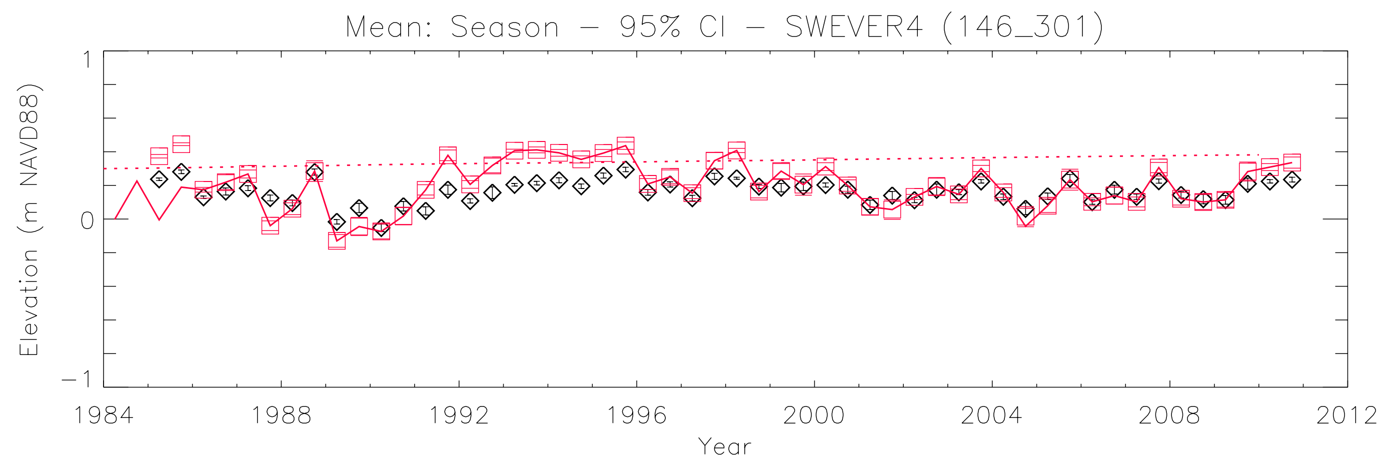

ELM3reg500 Raw Data (Obs. N = 8967) – SWEVER3 (153_299)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

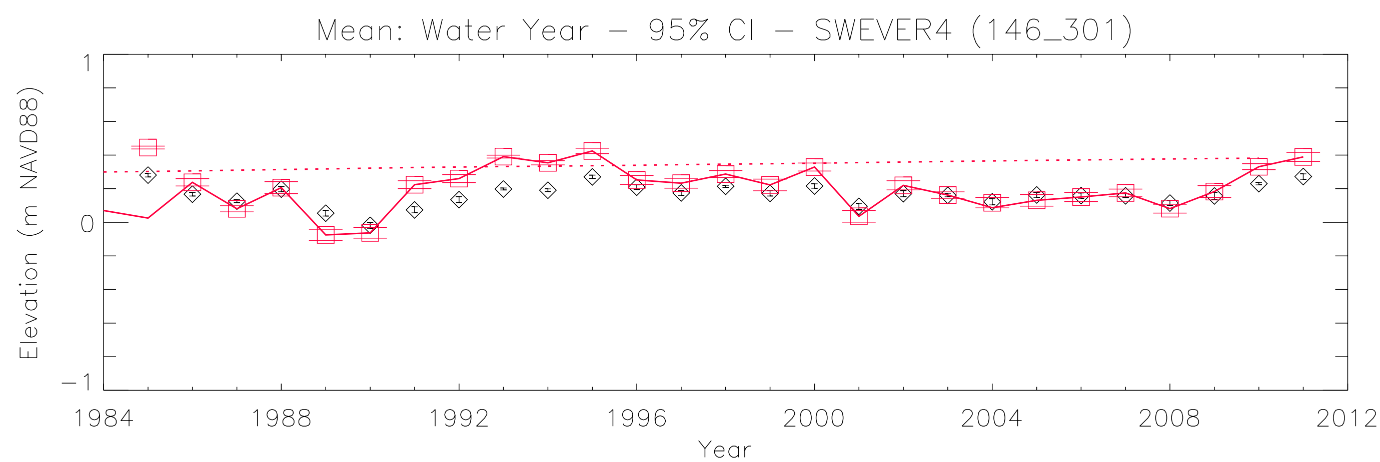

Mean: Season – 95% CI – SWEVER3 (153_299)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

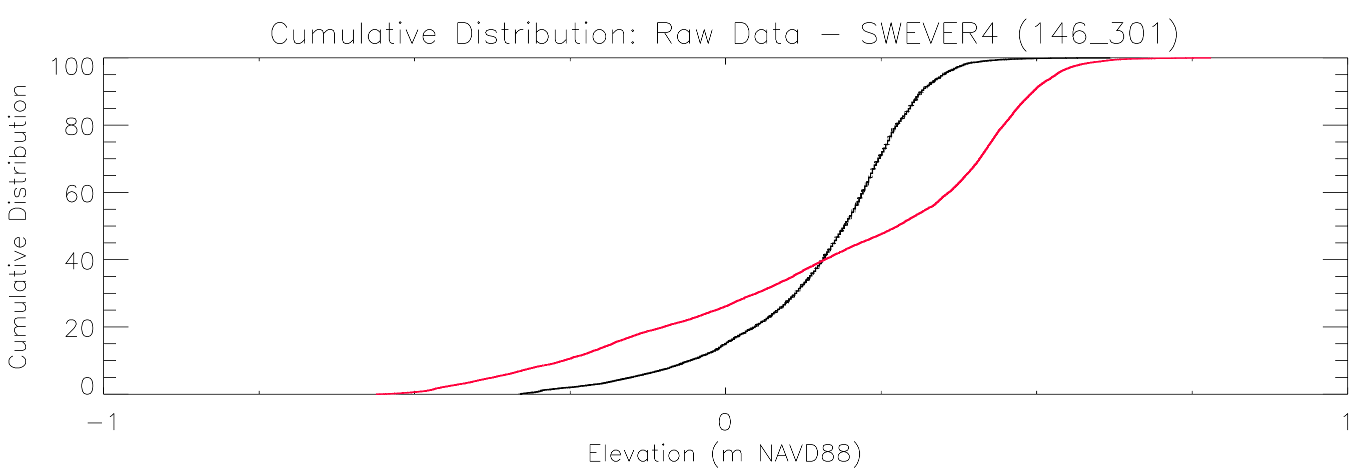

Mean: Water Year – 95% CI – SWEVER3 (153_299)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

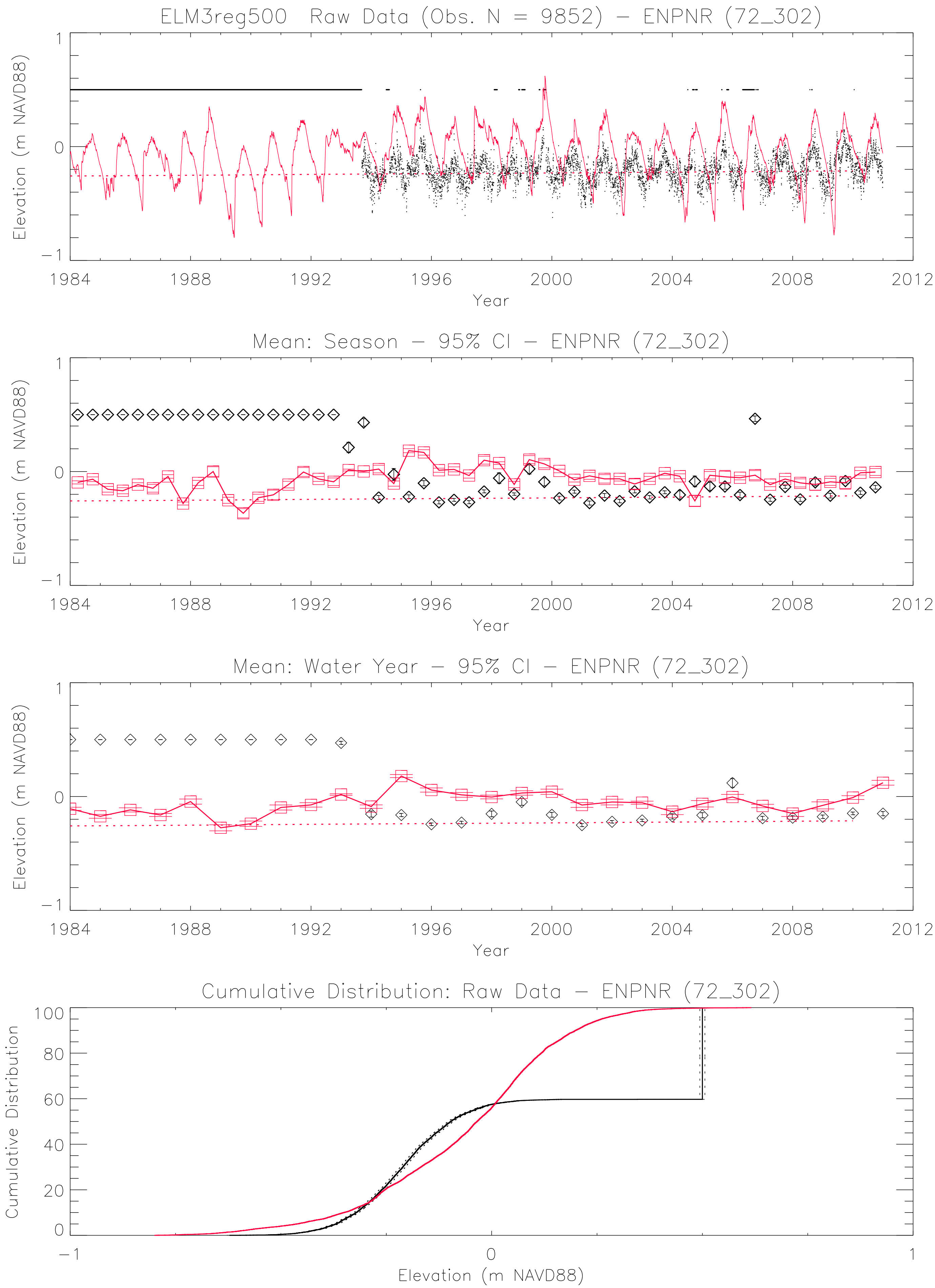

Cumulative Distribution: Raw Data – SWEVER3 (153_299)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

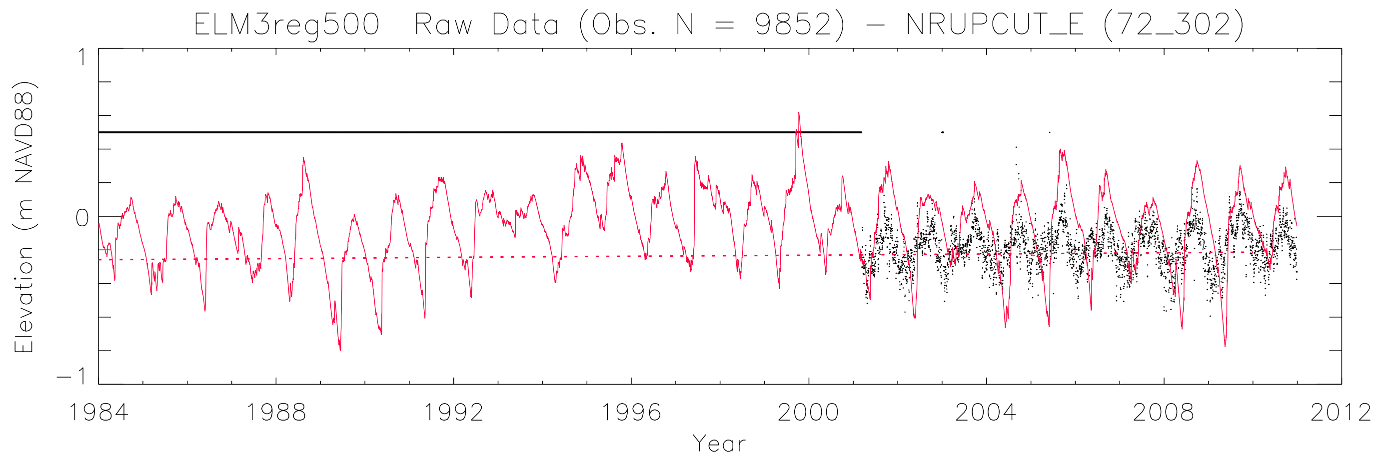

ELM3reg500 Raw Data (Obs. N = 9213) – SWEVER4 (146_301)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

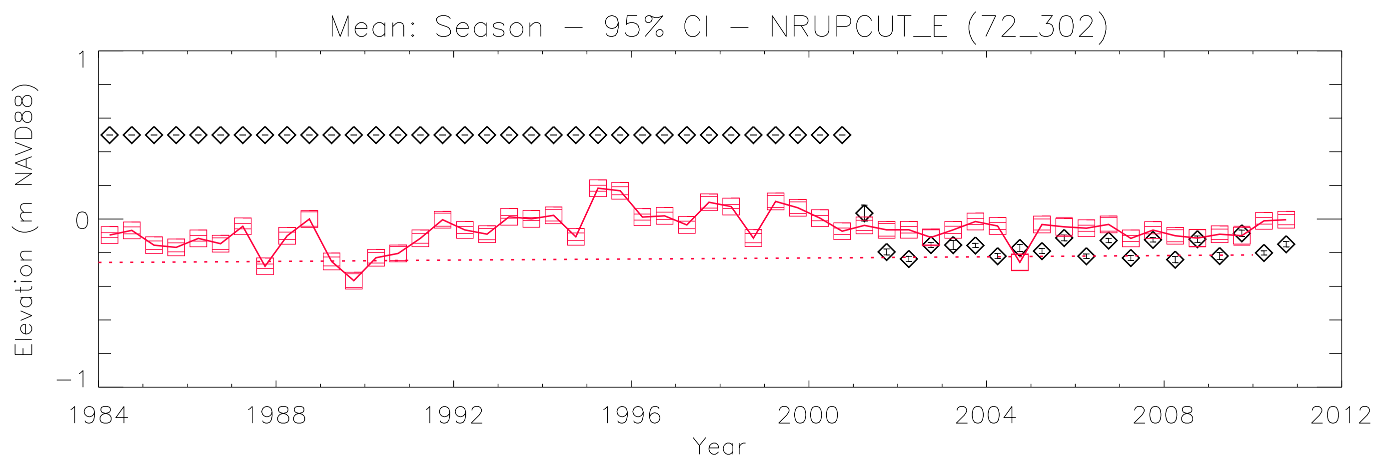

Mean: Season – 95% CI – SWEVER4 (146_301)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

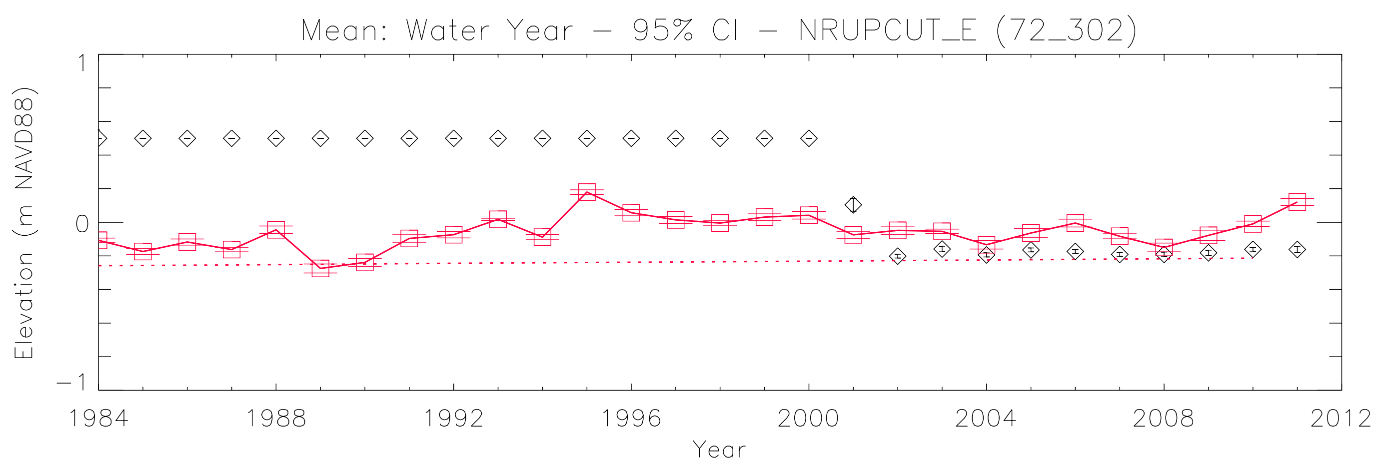

Mean: Water Year – 95% CI – SWEVER4 (146_301)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

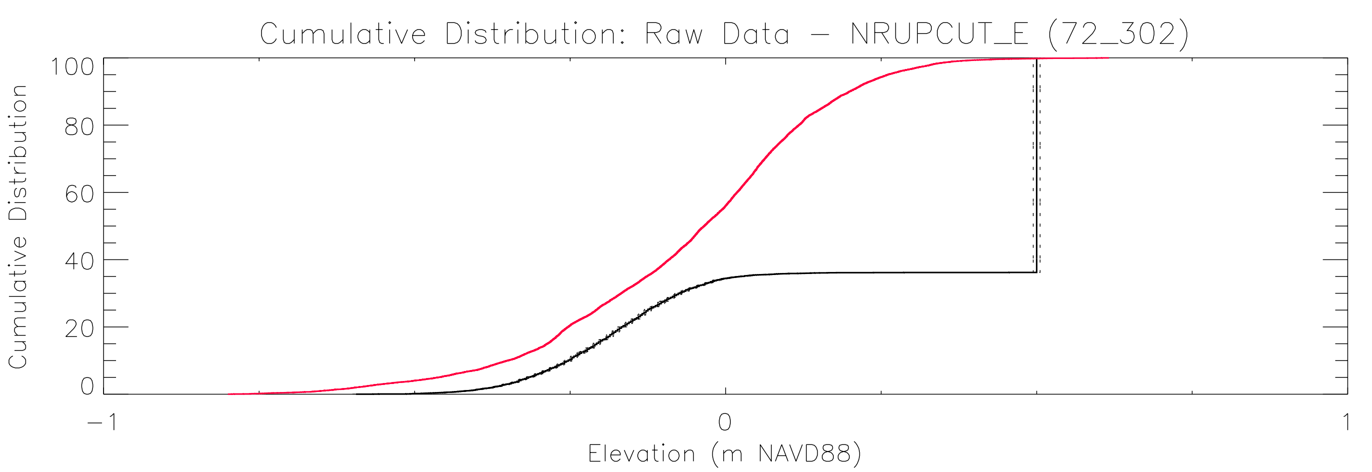

Cumulative Distribution: Raw Data – SWEVER4 (146_301)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

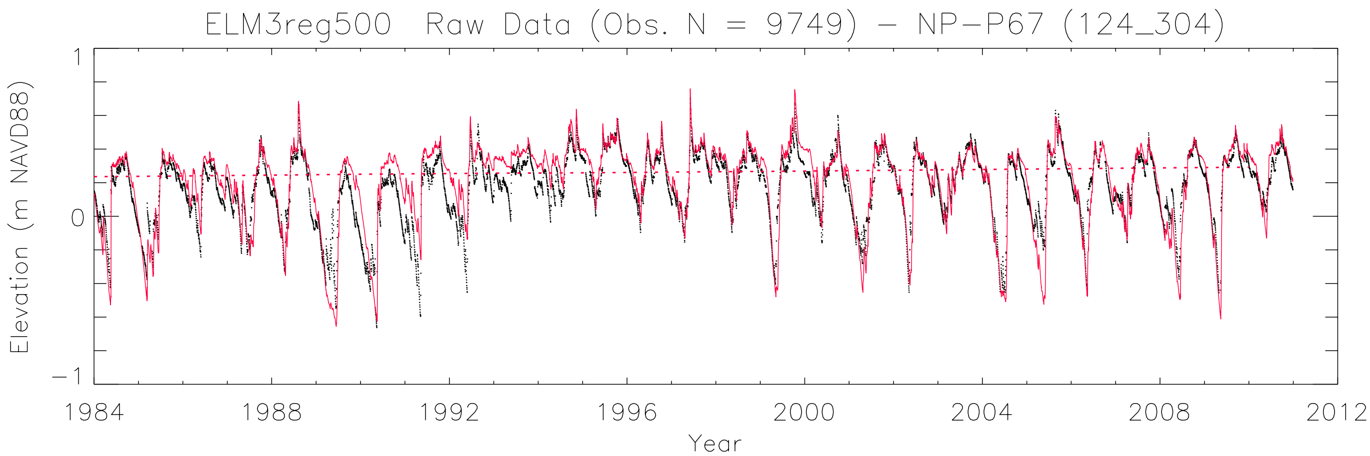

ELM3reg500 Raw Data (Obs. N = 9852) – ENPNR (72_302)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – ENPNR (72_302)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – ENPNR (72_302)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – ENPNR (72_302)
Cumulative Distribution
Elevation (m NAVD88)

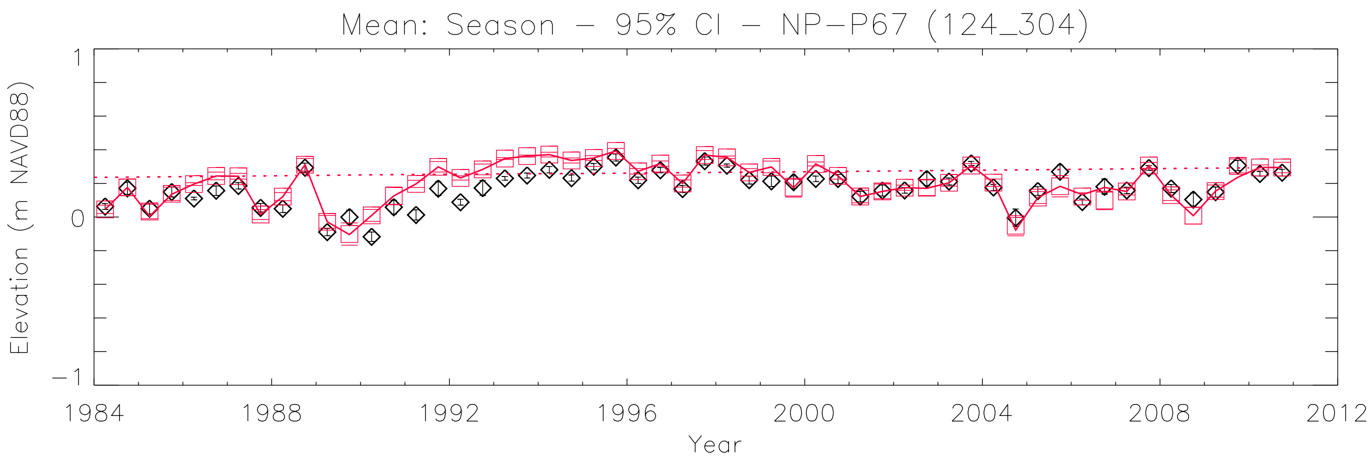

ELM3reg500 Raw Data (Obs. N = 9852) – NRUPCUT_E (72_302)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

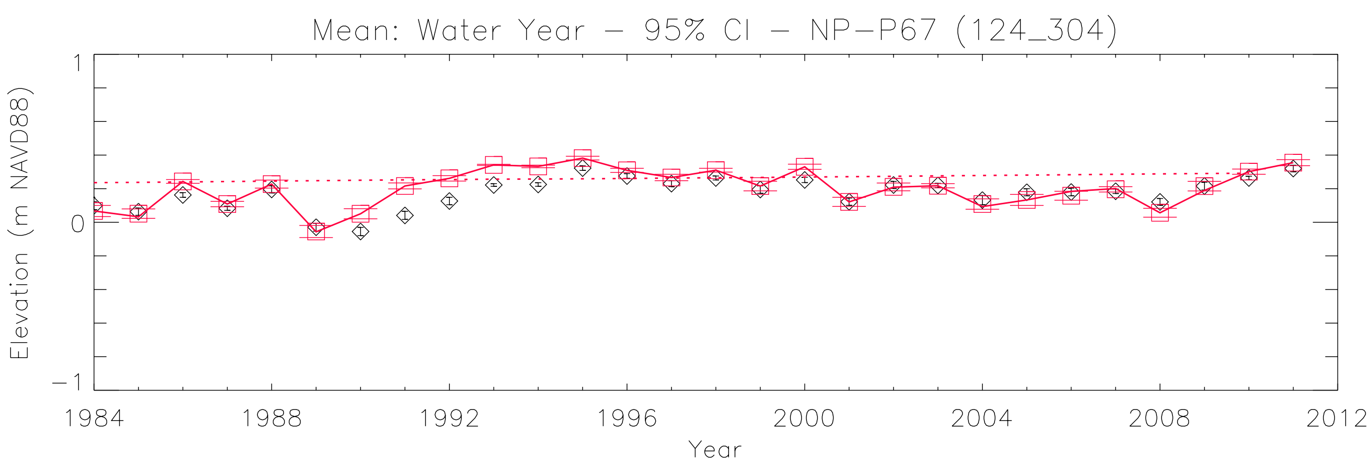

Mean: Season – 95% CI – NRUPCUT_E (72_302)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

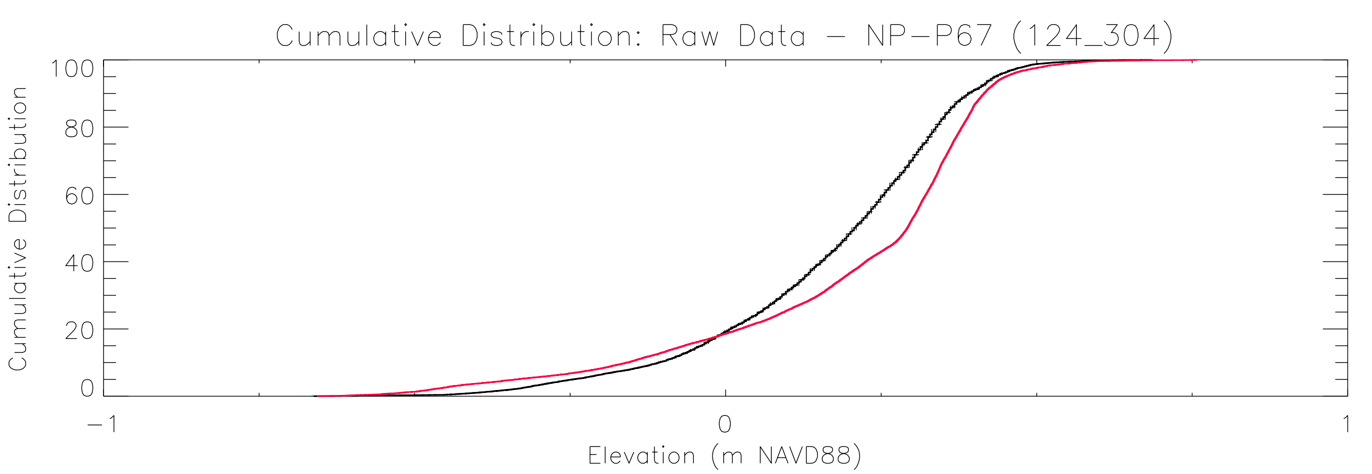

Mean: Water Year – 95% CI – NRUPCUT_E (72_302)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

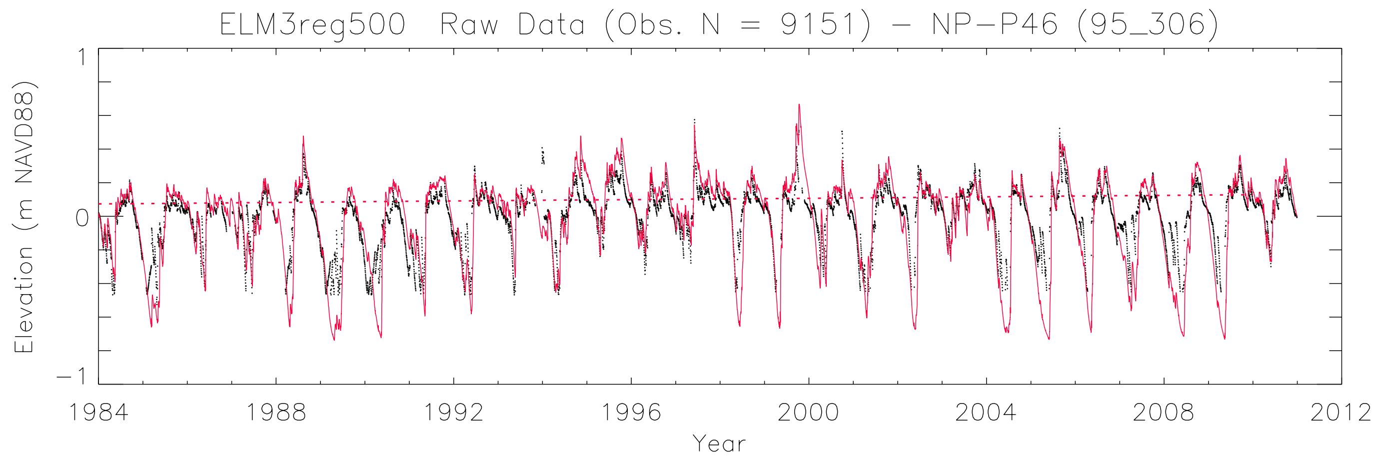

Cumulative Distribution: Raw Data – NRUPCUT_E (72_302)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

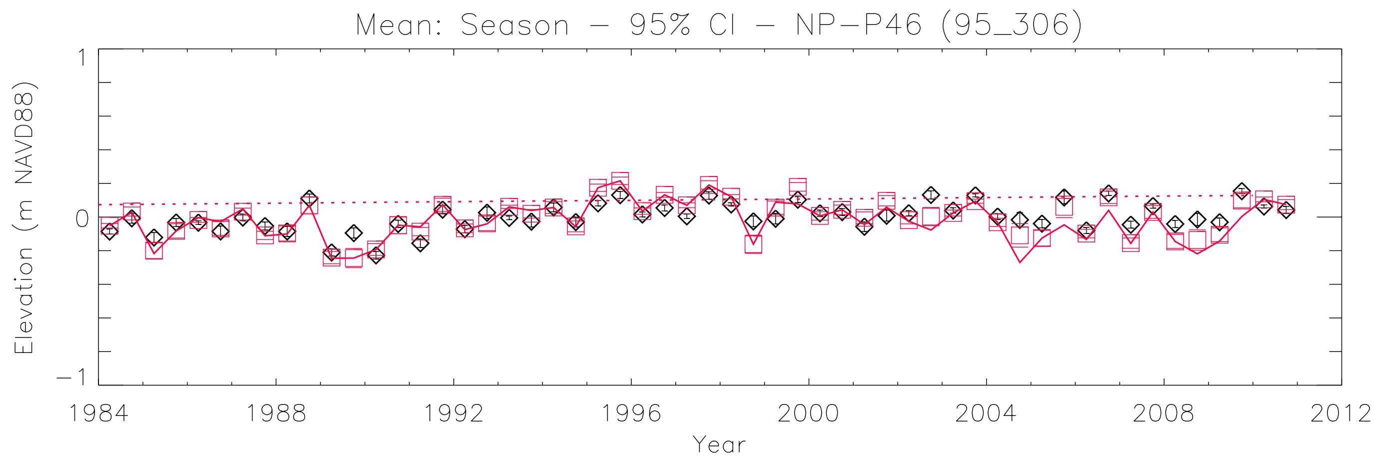

ELM3reg500 Raw Data (Obs. N = 9749) – NP–P67 (124_304)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

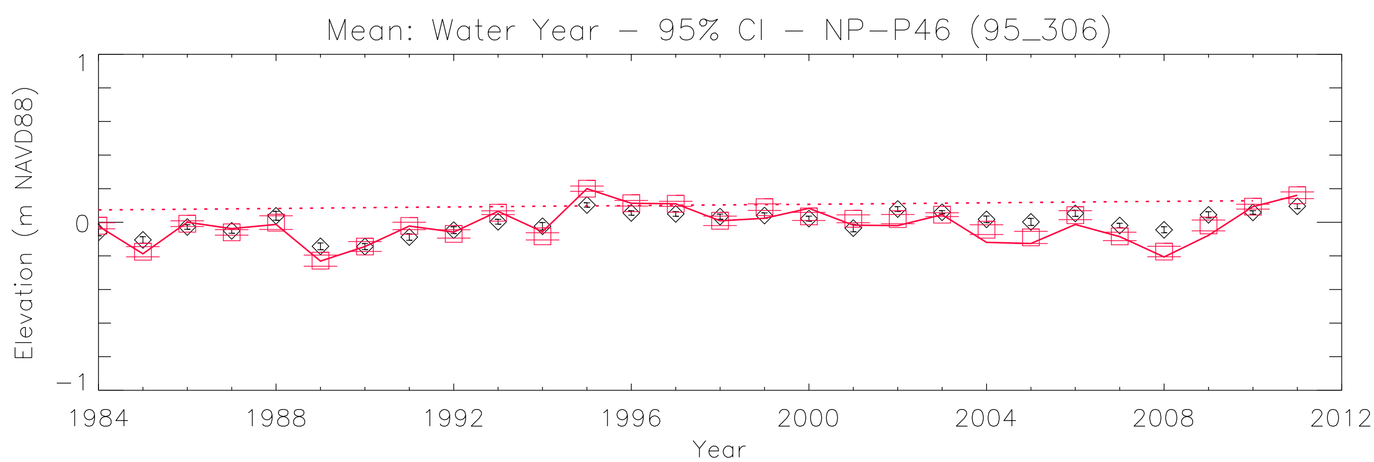

Mean: Season – 95% CI – NP–P67 (124_304)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

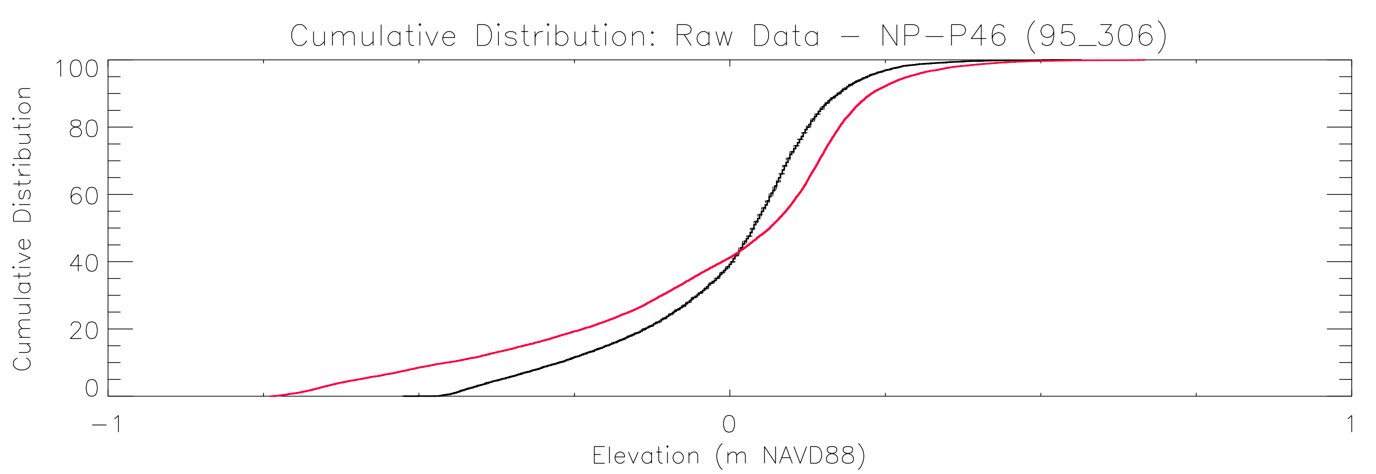

Mean: Water Year – 95% CI – NP–P67 (124_304)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

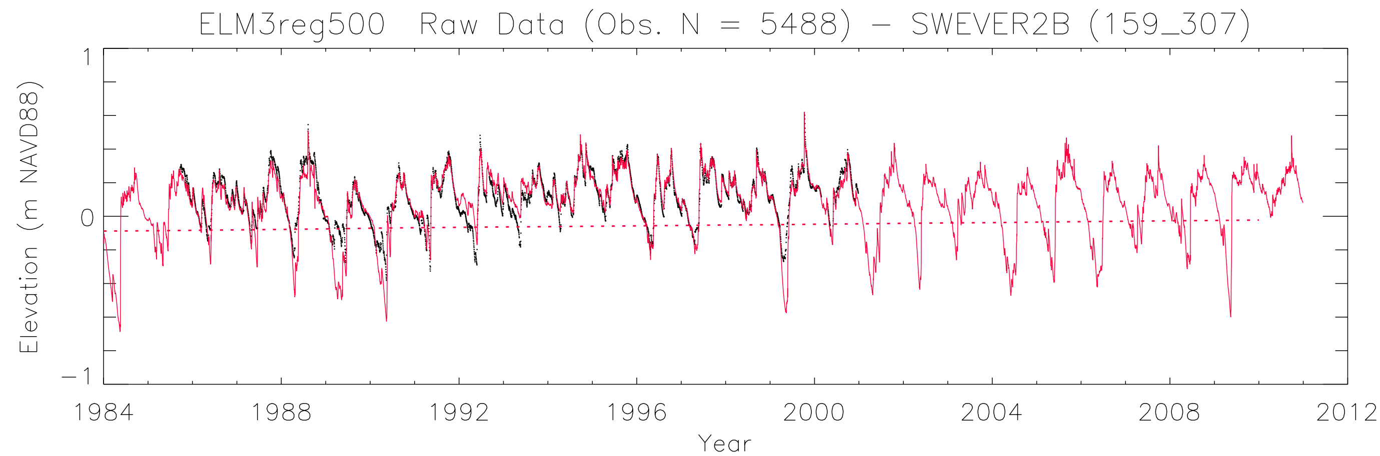

Cumulative Distribution: Raw Data – NP–P67 (124_304)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

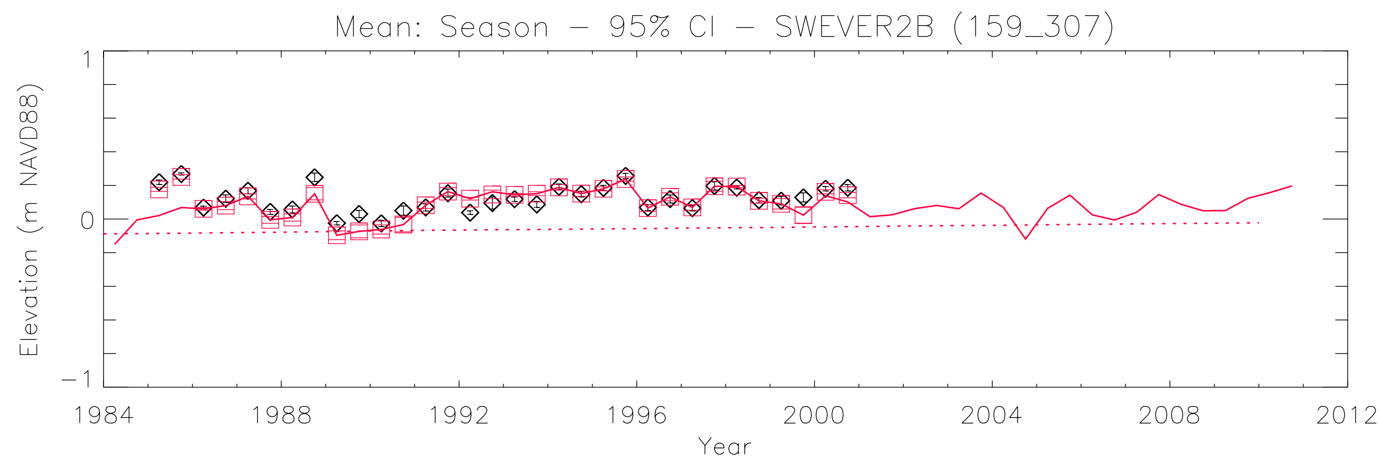

ELM3reg500 Raw Data (Obs. N = 9151) – NP–P46 (95_306)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012

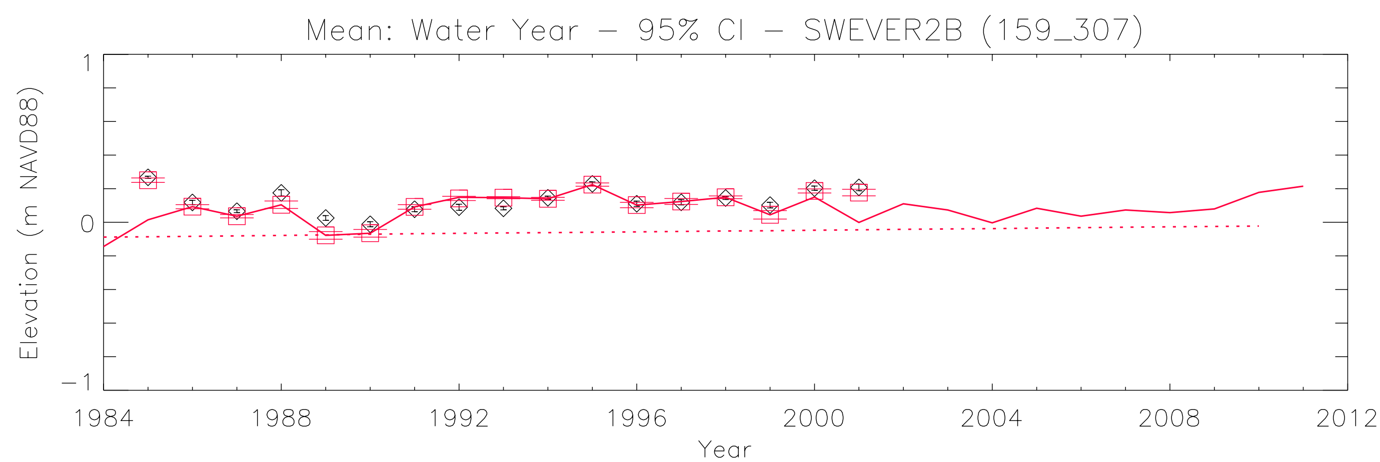

Mean: Season – 95% CI – NP–P46 (95_306)
Elevation (m NAVD88)
Year

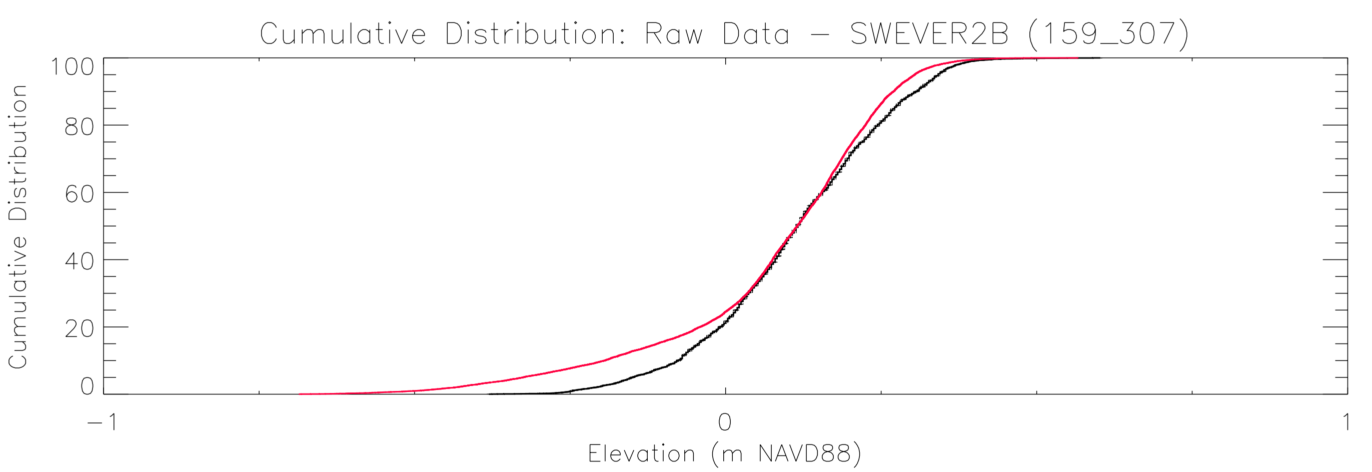

Mean: Water Year – 95% CI – NP–P46 (95_306)
Elevation (m NAVD88)
Year

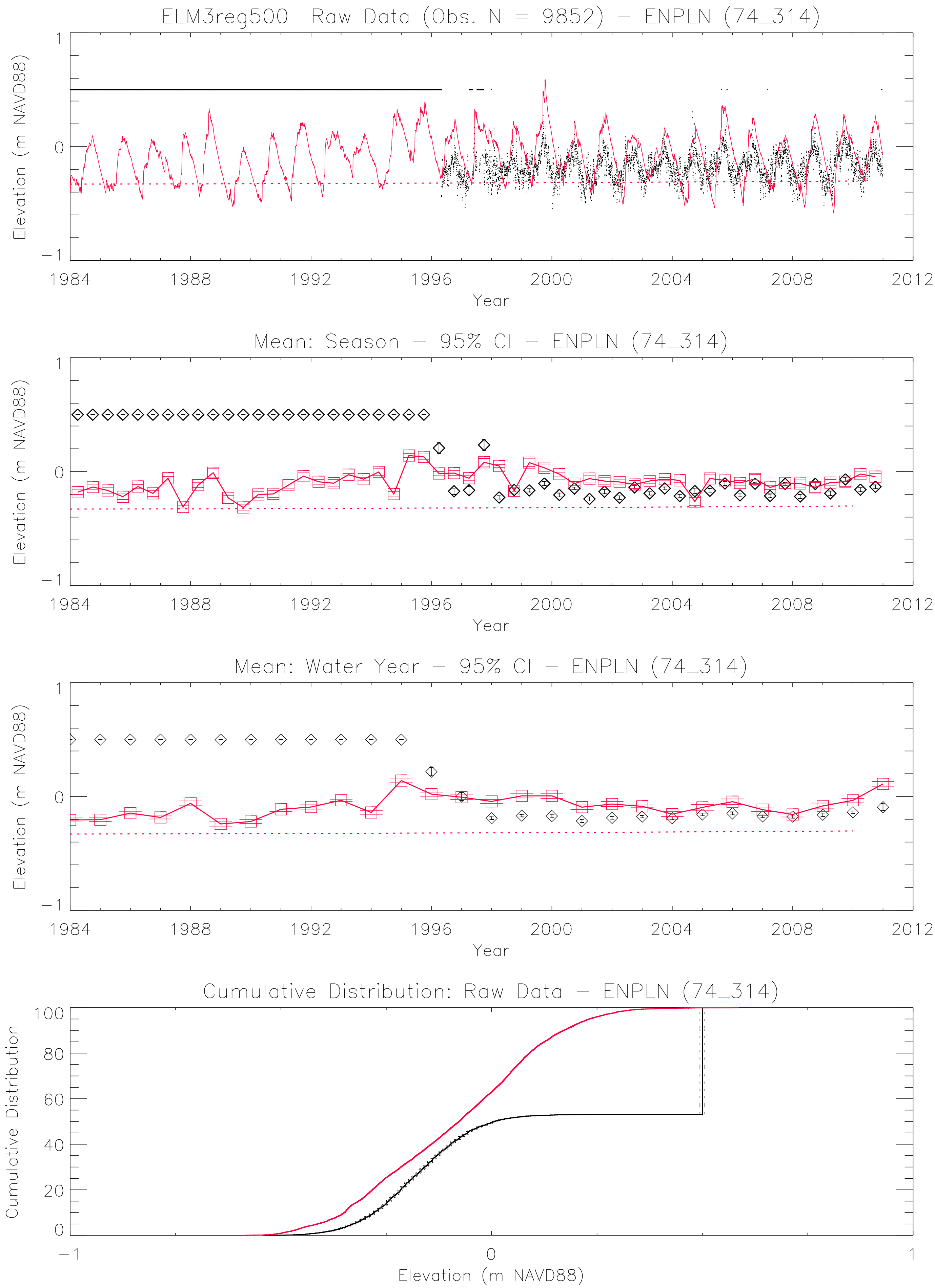

Cumulative Distribution: Raw Data – NP–P46 (95_306)
Cumulative Distribution
Elevation (m NAVD88)


ELM3reg500 Raw Data (Obs. N = 5488) – SWEVER2B (159_307)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

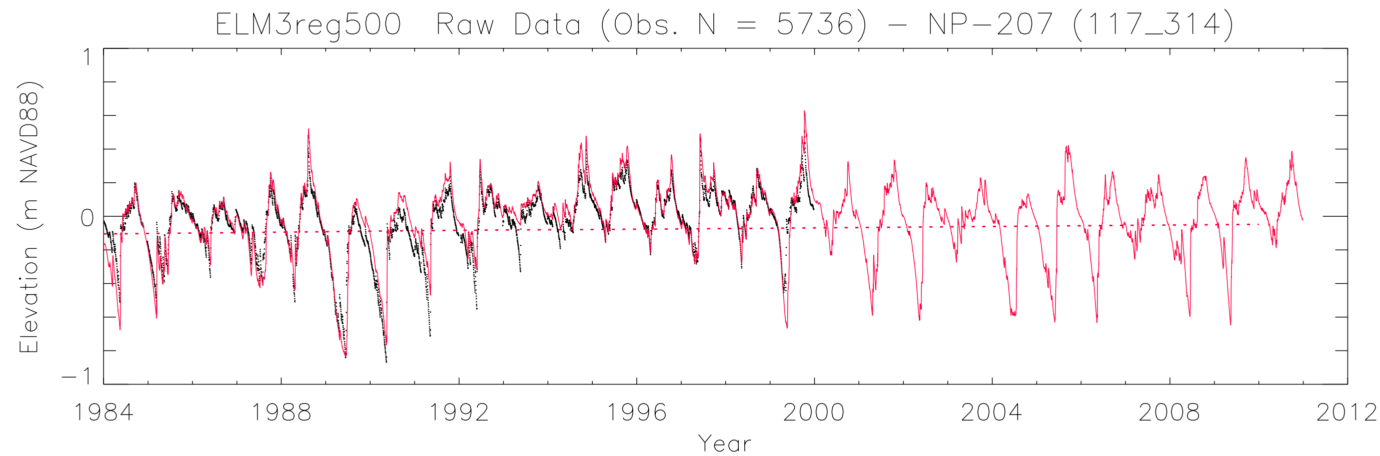

Mean: Season – 95% CI – SWEVER2B (159_307)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

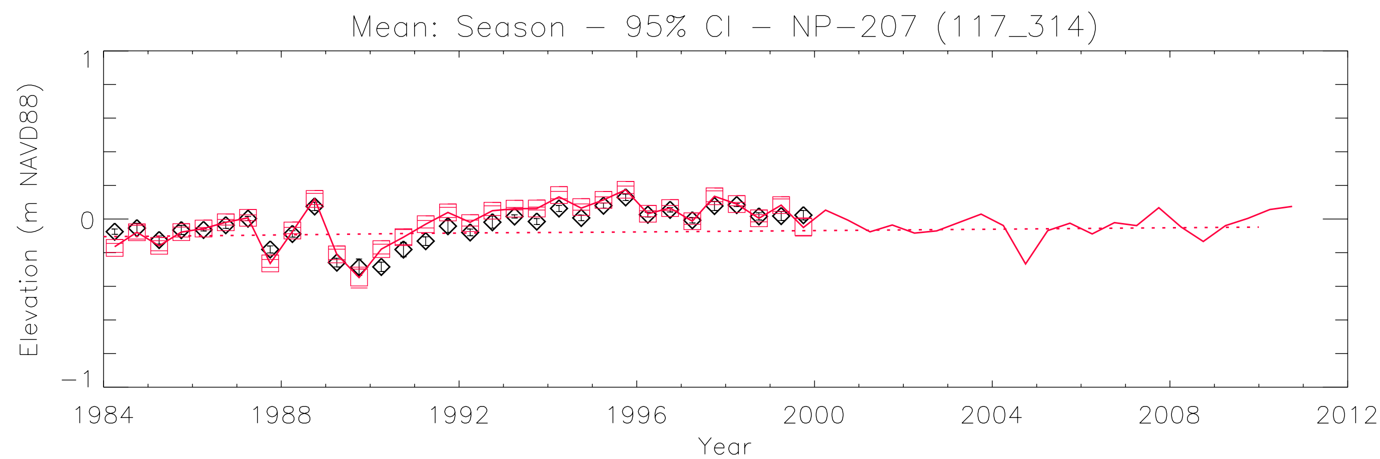

Mean: Water Year – 95% CI – SWEVER2B (159_307)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

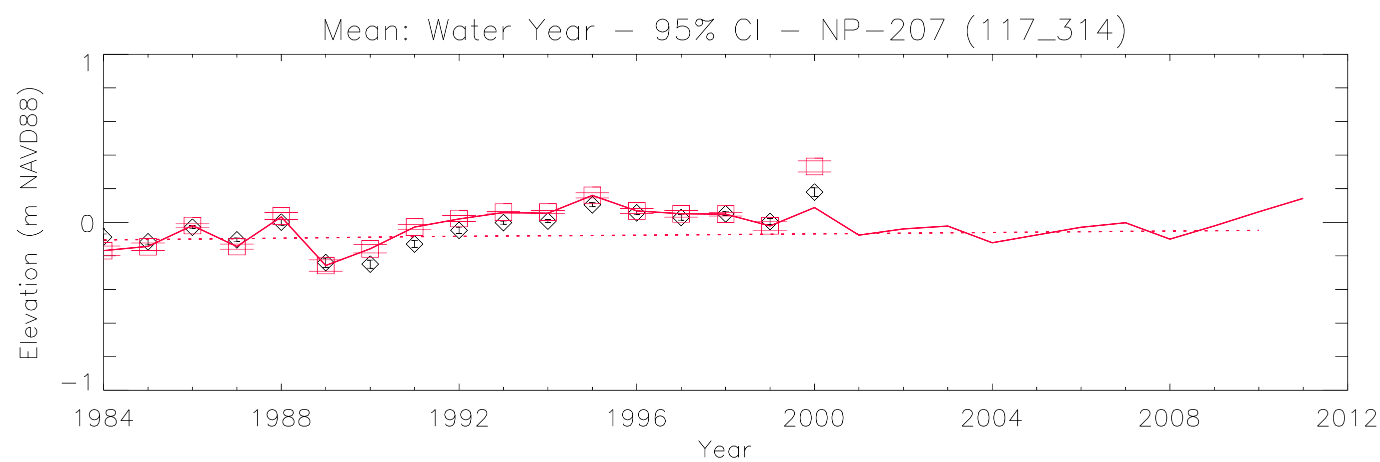

Cumulative Distribution: Raw Data – SWEVER2B (159_307)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

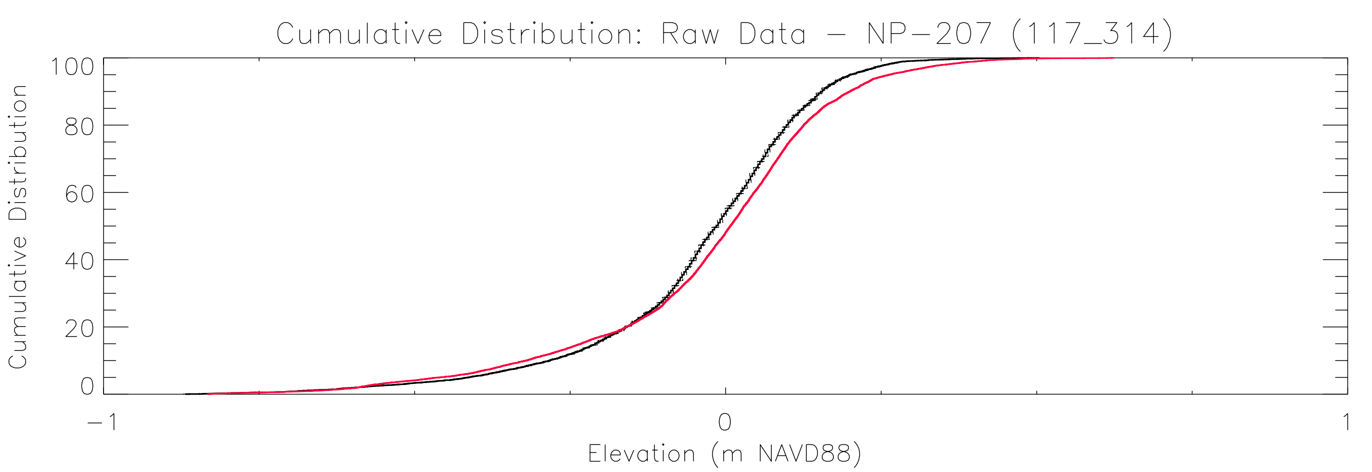


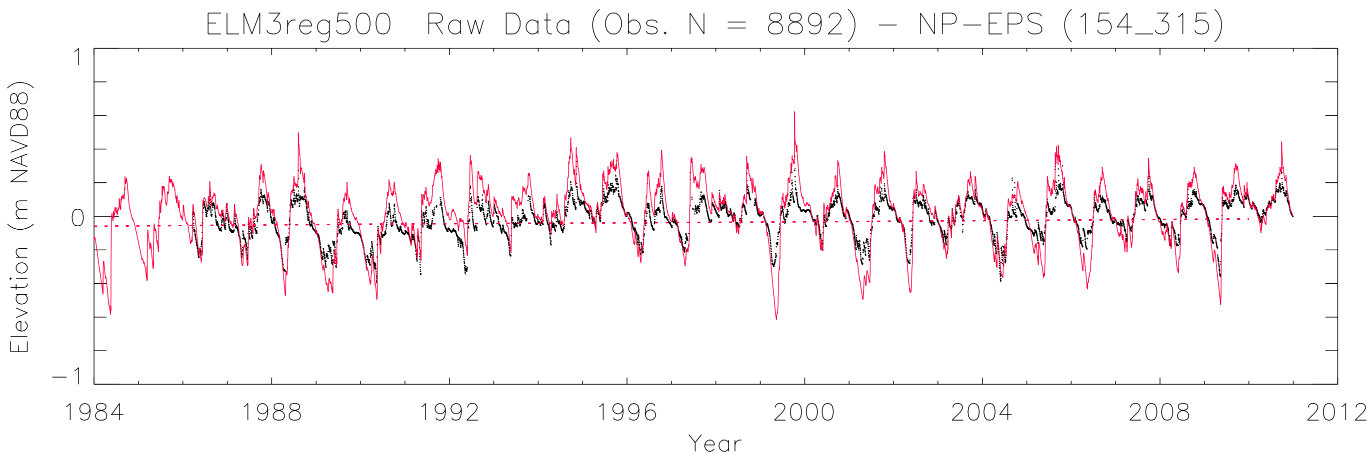
ELM3reg500 Raw Data (Obs. N = 9852) – ENPLN (74_314)
Elevation (m NAVD88)
Year
Mean: Season – 95% CI – ENPLN (74_314)
Elevation (m NAVD88)
Year
Mean: Water Year – 95% CI – ENPLN (74_314)
Elevation (m NAVD88)
Year
Cumulative Distribution: Raw Data – ENPLN (74_314)
Cumulative Distribution
Elevation (m NAVD88)

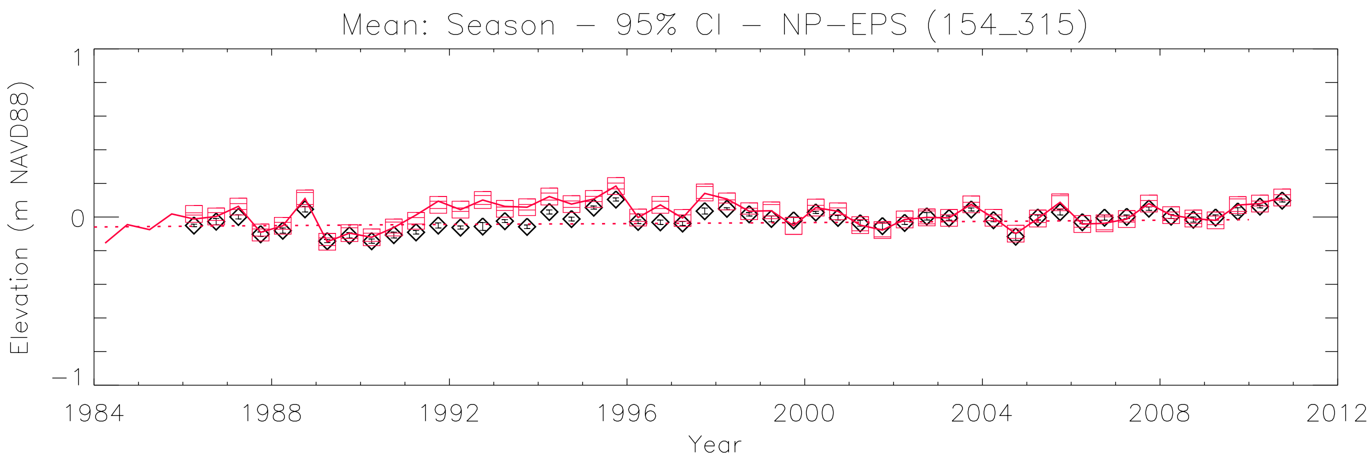

ELM3reg500 Raw Data (Obs. N = 5736) – NP-207 (117_314)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

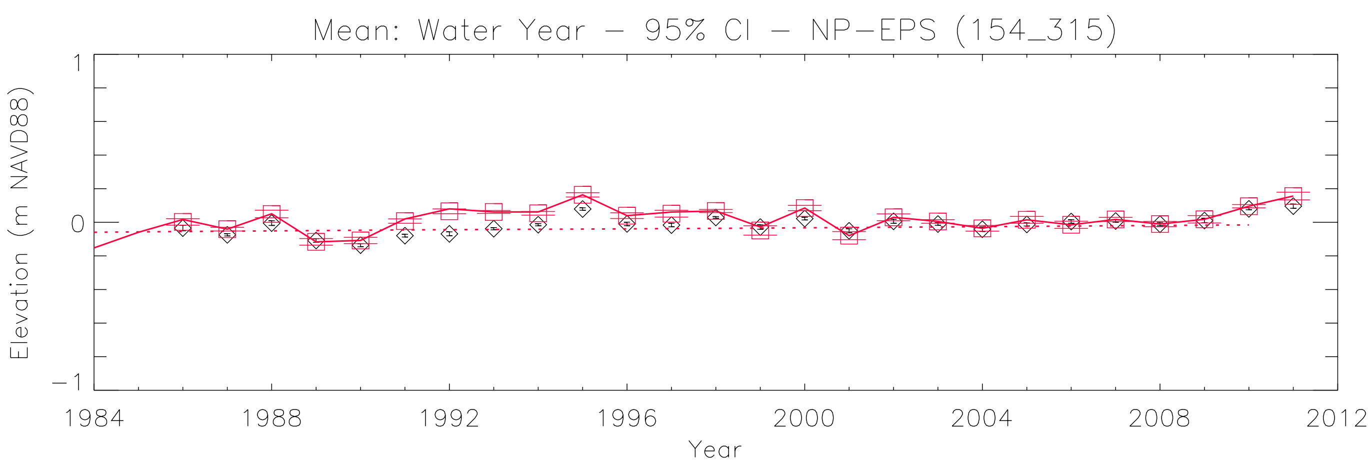

Mean: Season – 95% CI – NP–207 (117_314)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

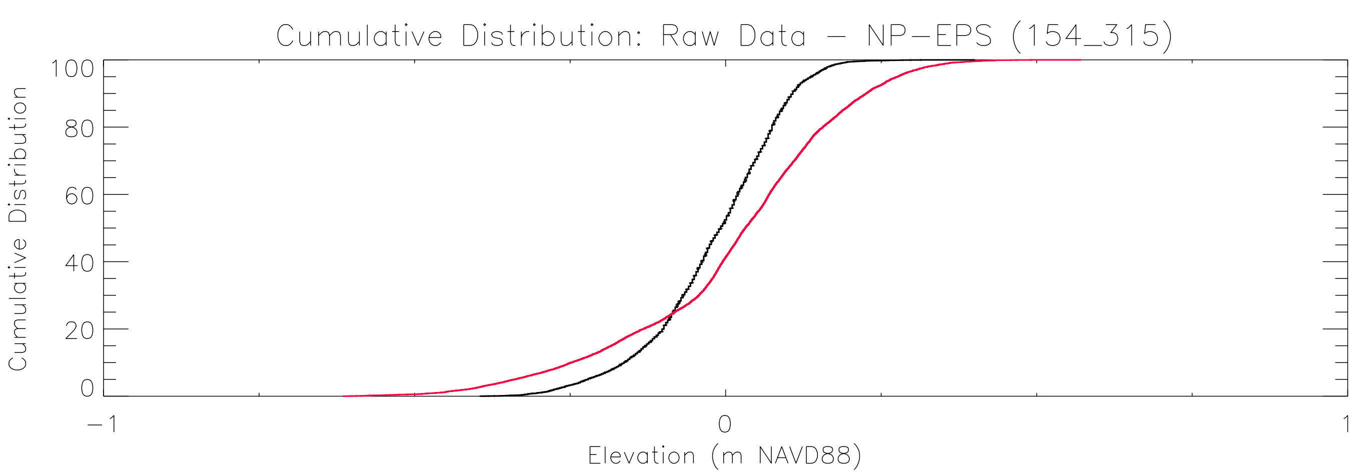

Mean: Water Year – 95% CI – NP–207 (117_314)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

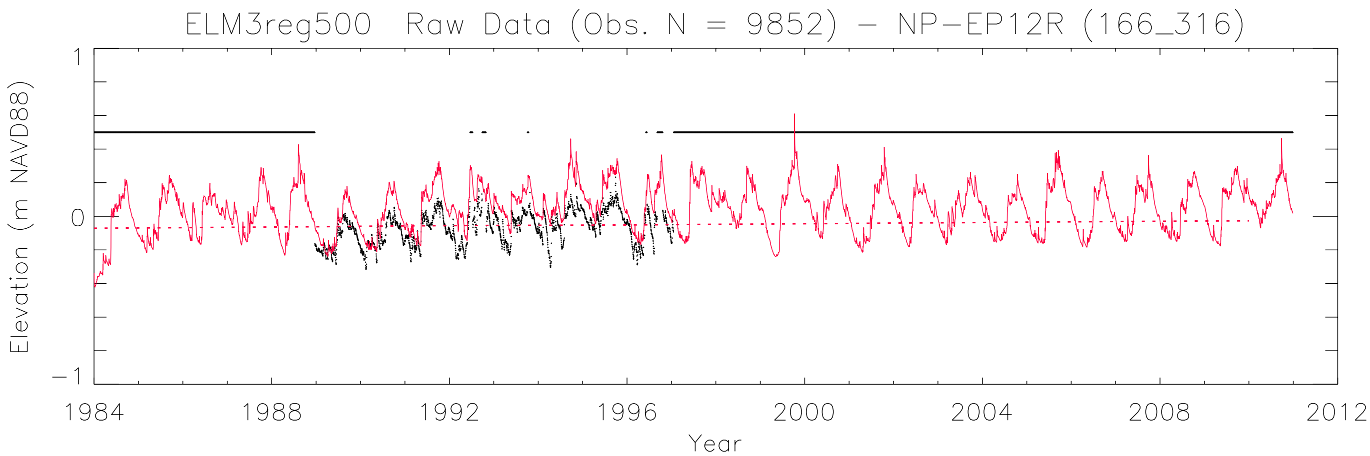

Cumulative Distribution: Raw Data – NP–207 (117_314)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

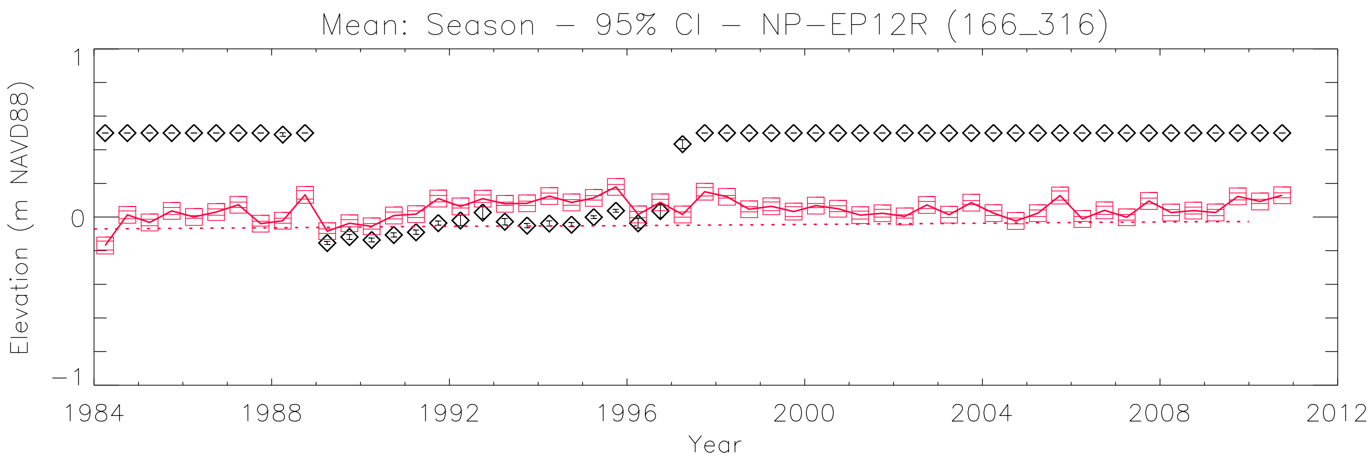

ELM3reg500 Raw Data (Obs. N = 8892) – NP–EPS (154_315)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

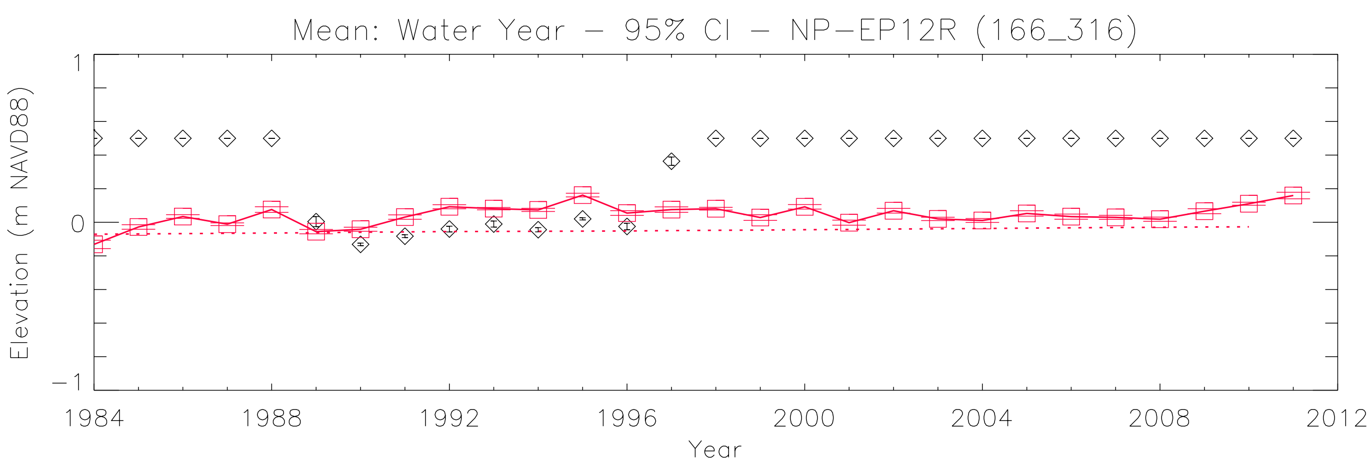

Mean: Season – 95% CI – NP–EPS (154_315)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

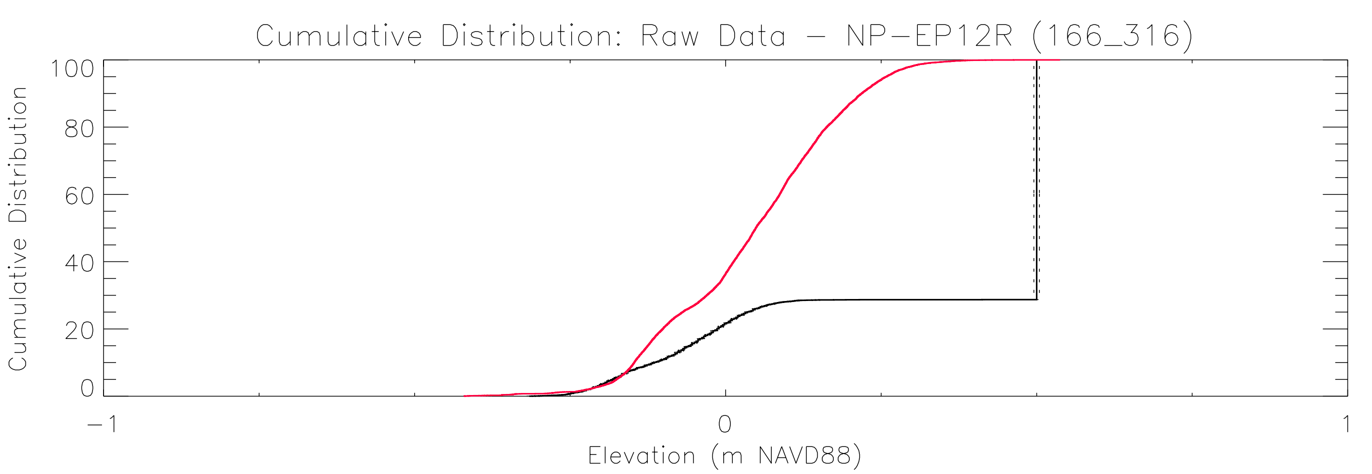

Mean: Water Year – 95% CI – NP–EPS (154_315)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

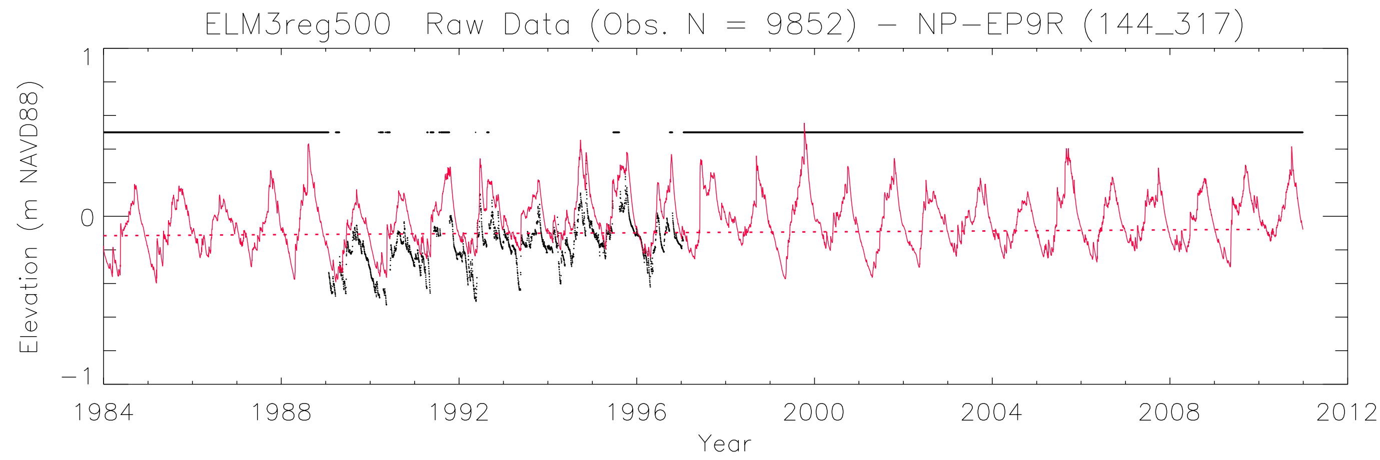

Cumulative Distribution: Raw Data – NP–EPS (154_315)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

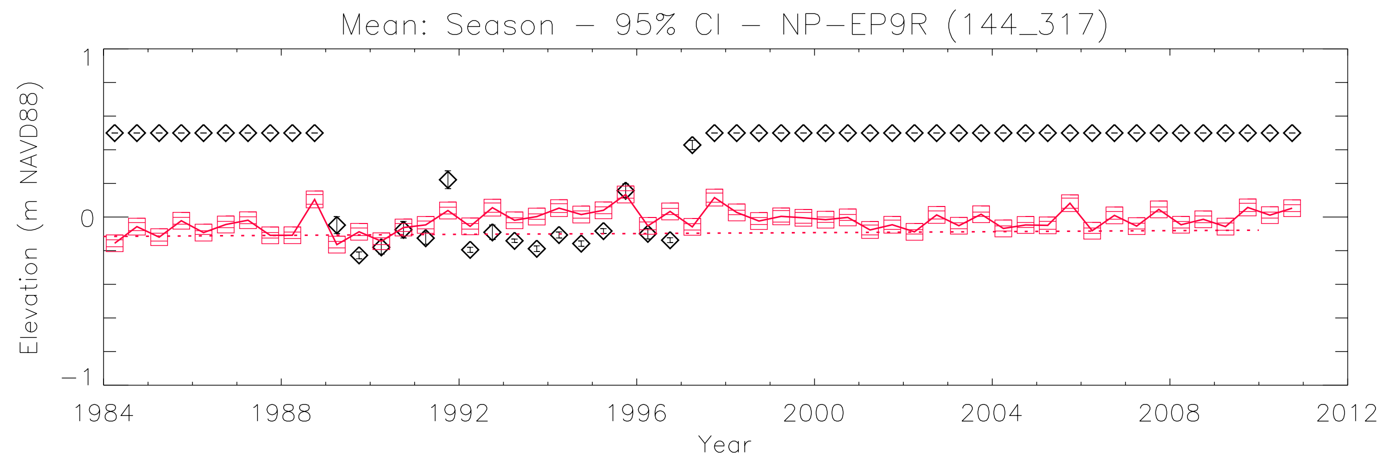

ELM3reg500 Raw Data (Obs. N = 9852) − NP−EP12R (166_316)
Elevation (m NAVD88)
Year

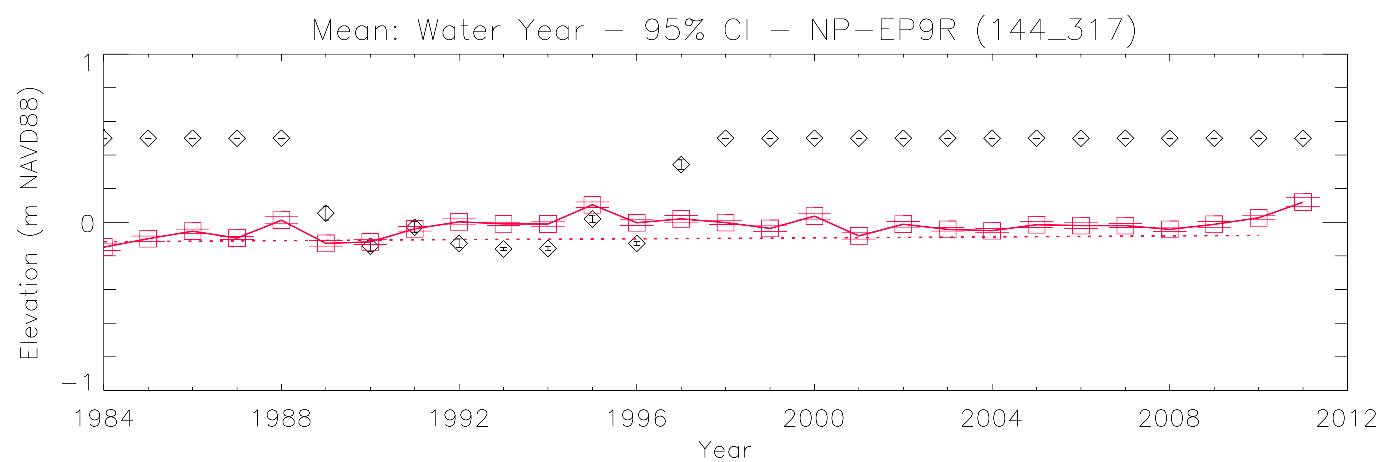

Mean: Season − 95% CI − NP−EP12R (166_316)
Elevation (m NAVD88)
Year

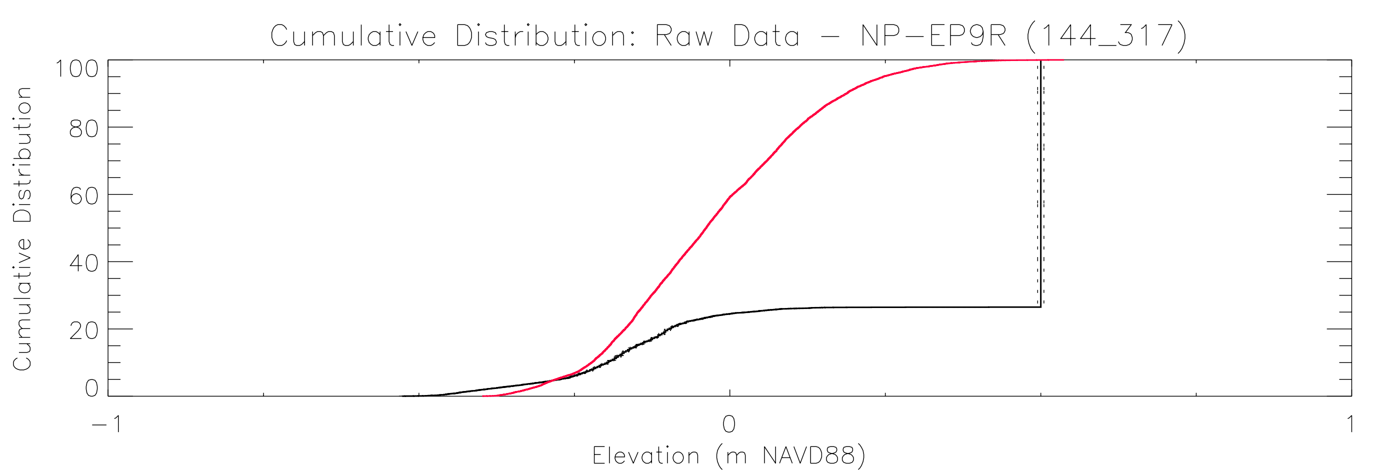

Mean: Water Year − 95% CI − NP−EP12R (166_316)
Elevation (m NAVD88)
Year

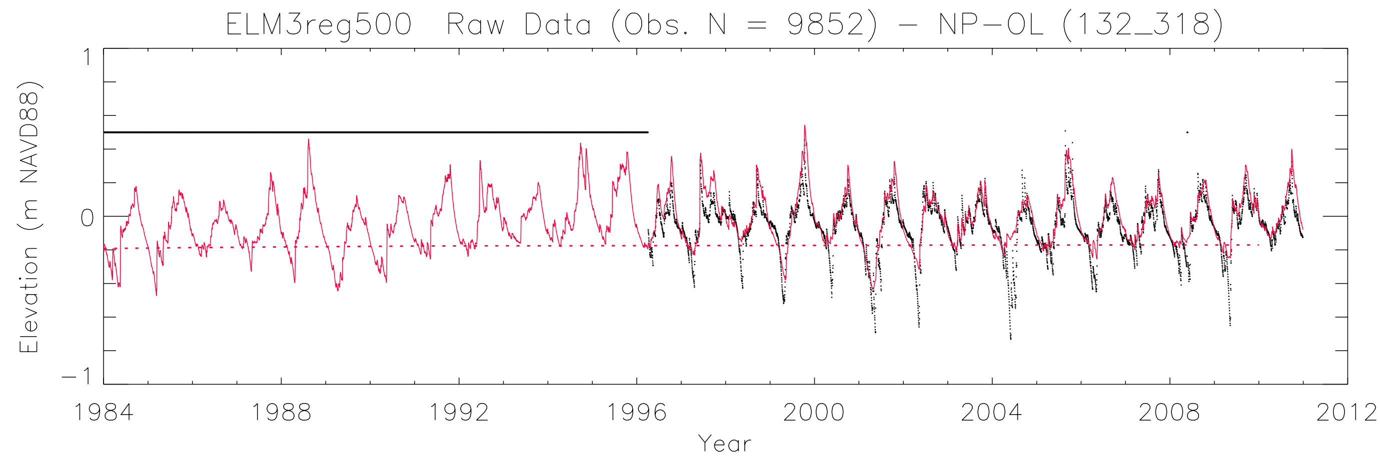

Cumulative Distribution: Raw Data − NP−EP12R (166_316)
Cumulative Distribution
Elevation (m NAVD88)

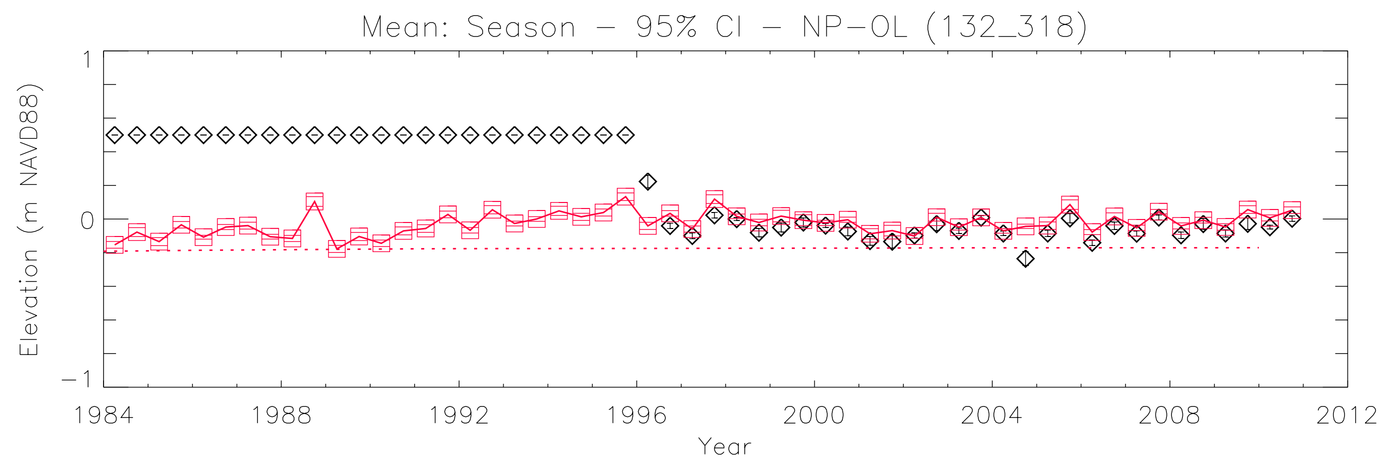

ELM3reg500 Raw Data (Obs. N = 9852) – NP–EP9R (144_317)
Elevation (m NAVD88)
Year

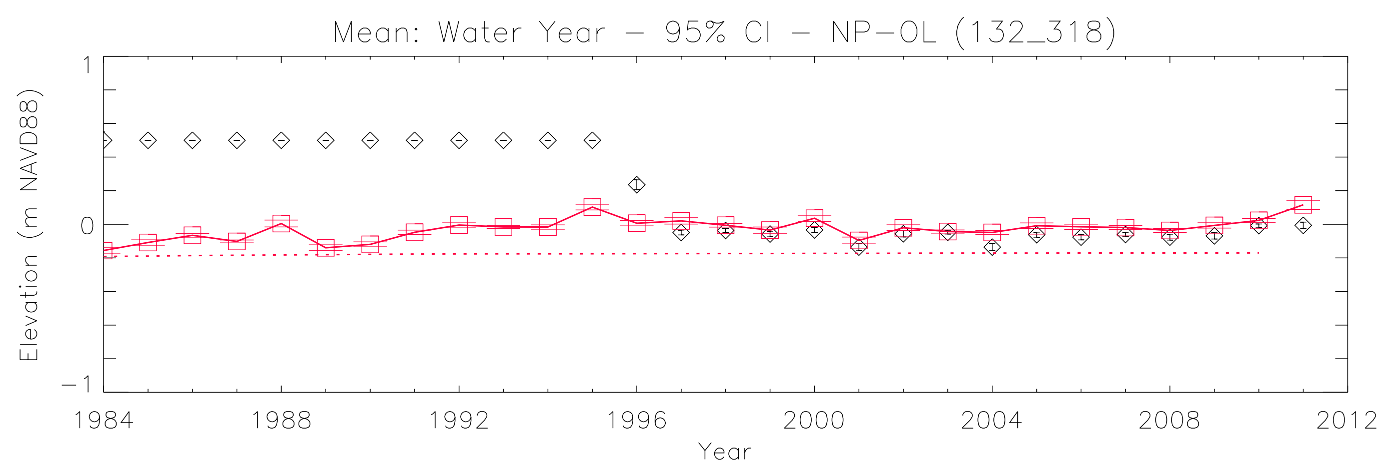

Mean: Season – 95% CI – NP–EP9R (144_317)
Elevation (m NAVD88)
Year

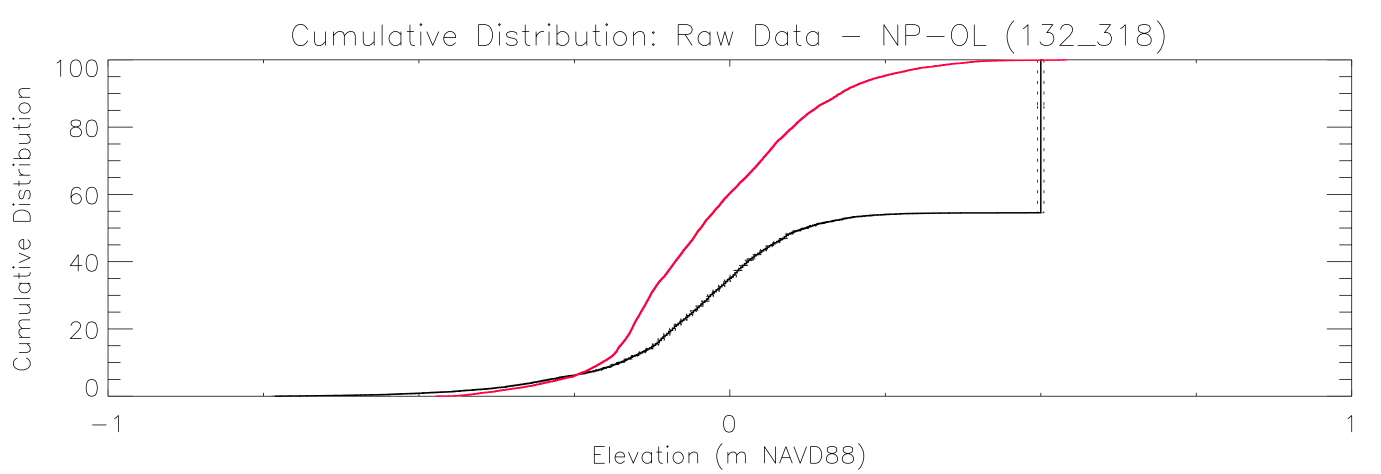

Mean: Water Year – 95% CI – NP–EP9R (144_317)
Elevation (m NAVD88)
Year

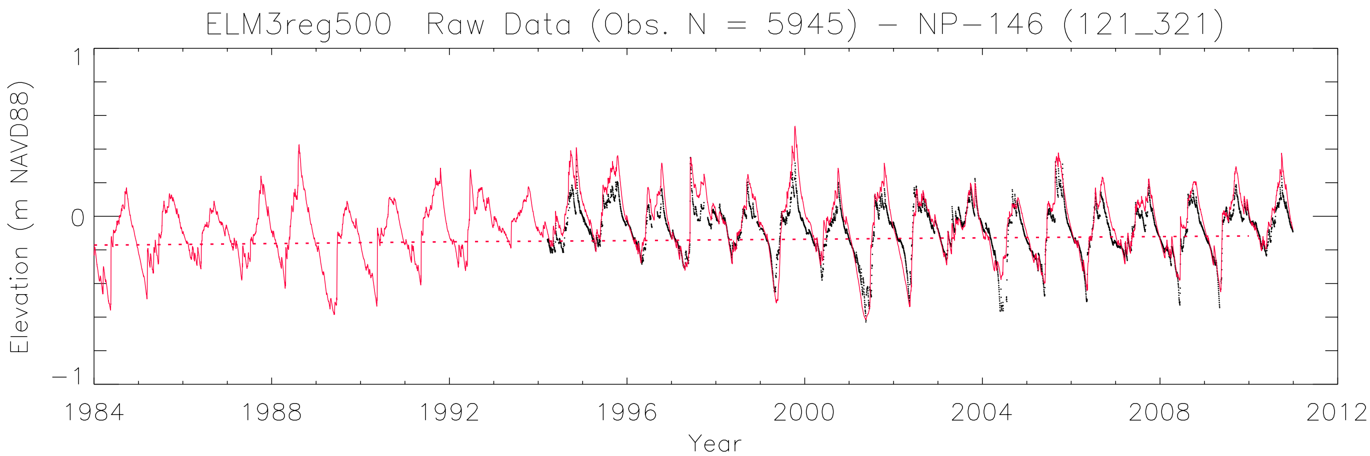

Cumulative Distribution: Raw Data – NP–EP9R (144_317)
Cumulative Distribution
Elevation (m NAVD88)

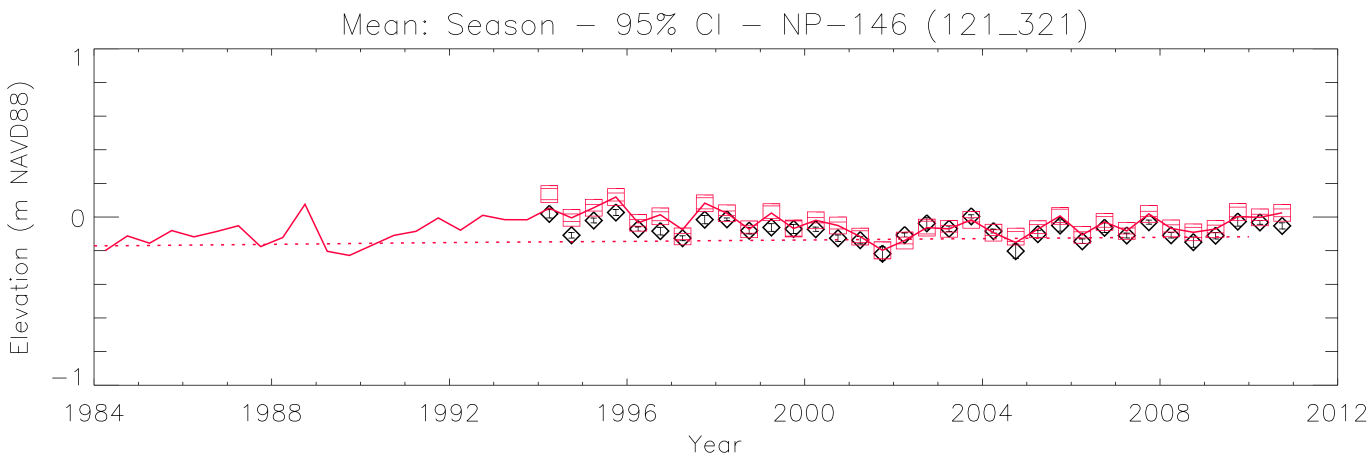

ELM3reg500 Raw Data (Obs. N = 9852) – NP–OL (132_318)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

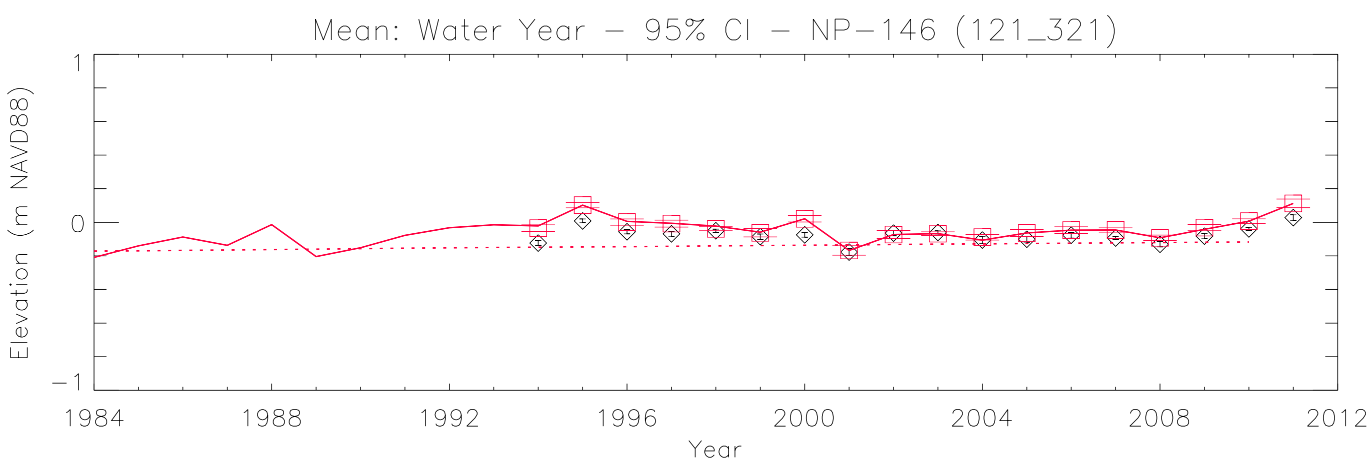

Mean: Season – 95% CI – NP–OL (132_318)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

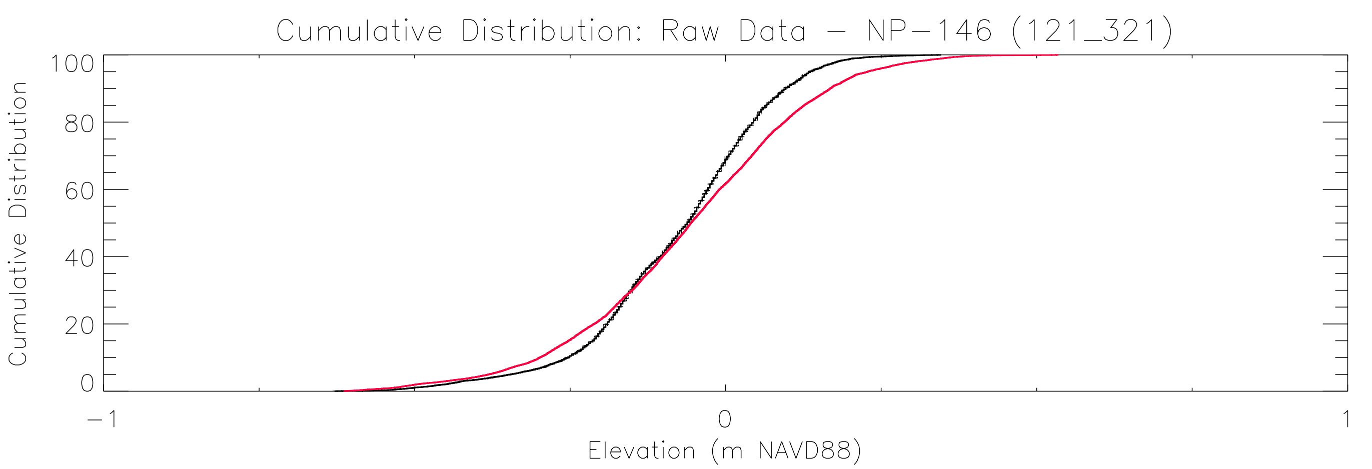

Mean: Water Year – 95% CI – NP–OL (132_318)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

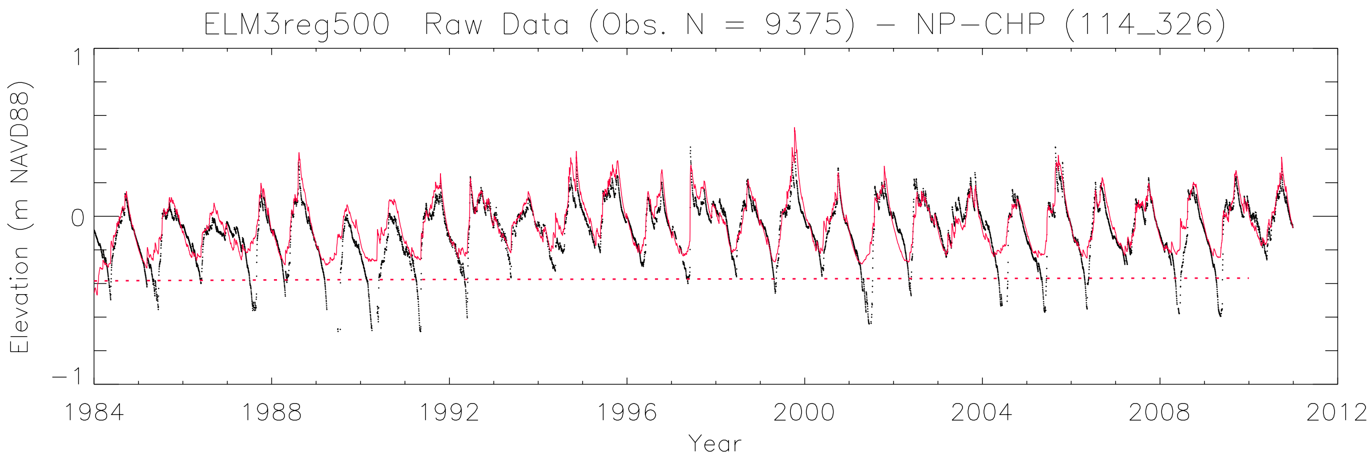

Cumulative Distribution: Raw Data – NP–OL (132_318)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

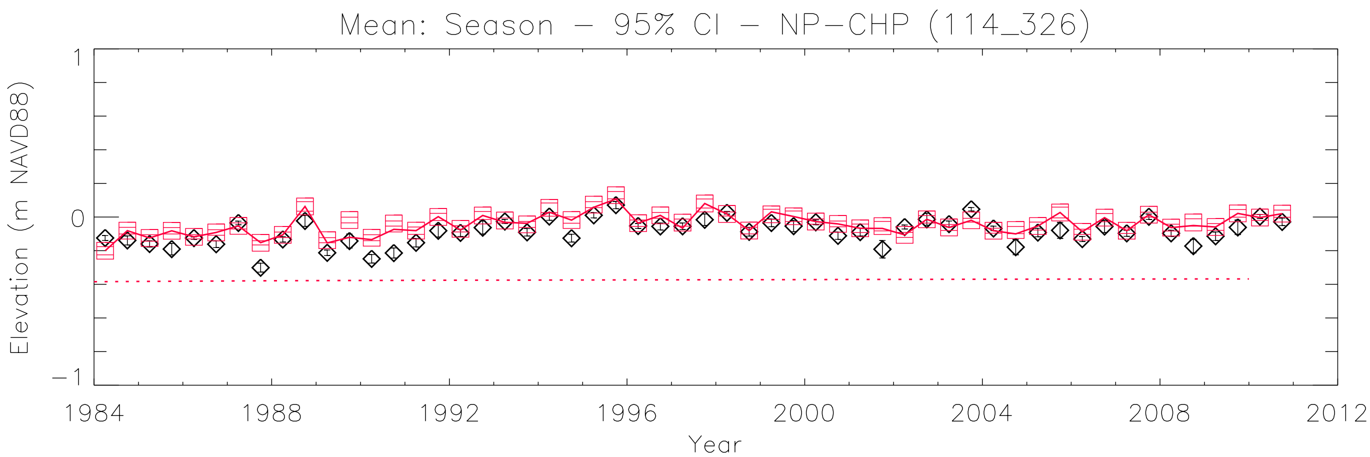

ELM3reg500 Raw Data (Obs. N = 5945) – NP-146 (121_321)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

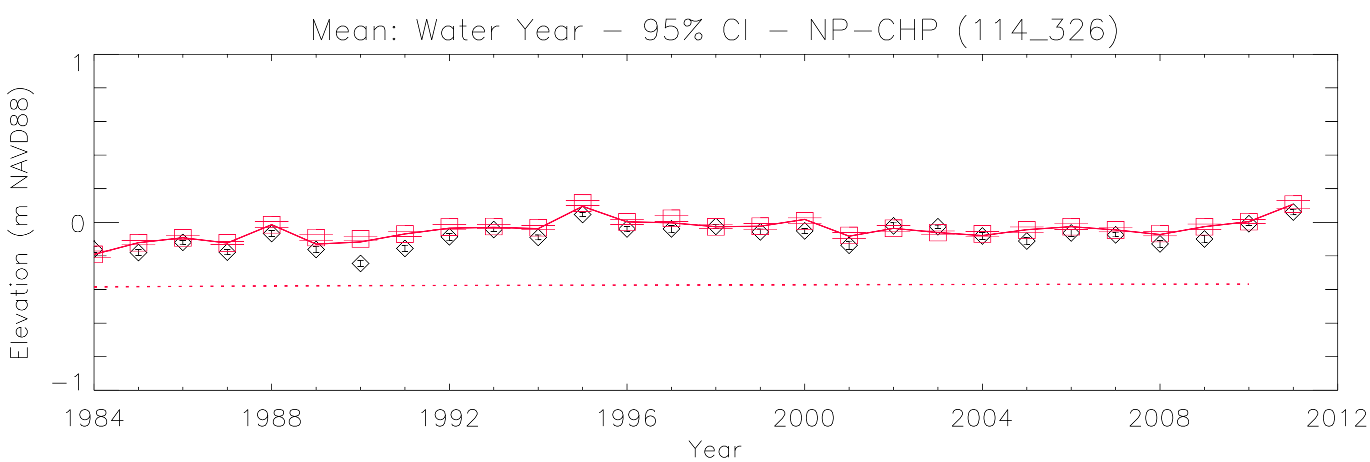

Mean: Season – 95% CI – NP-146 (121_321)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

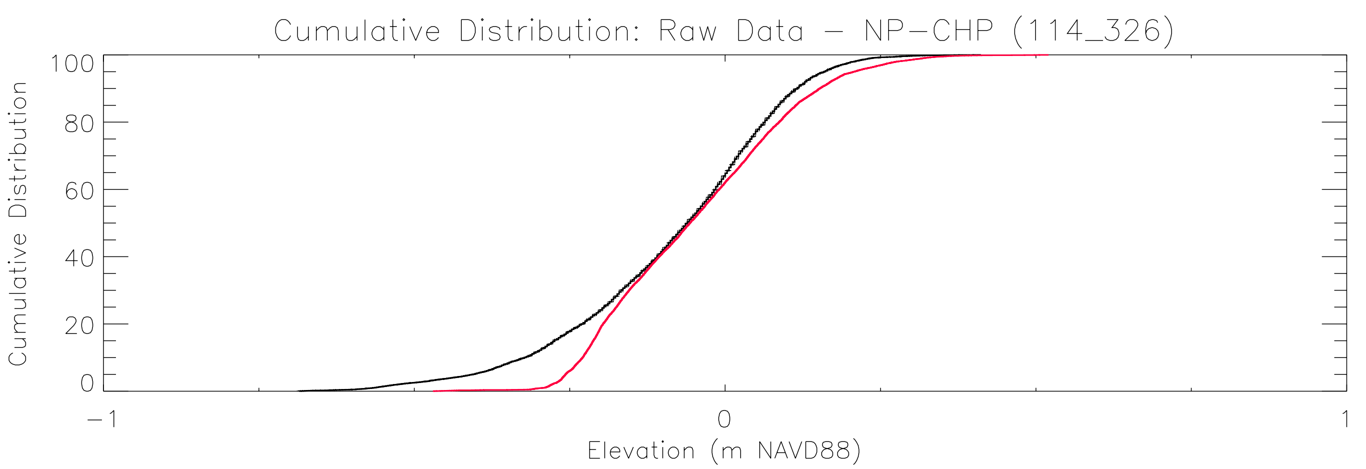

Mean: Water Year – 95% CI – NP-146 (121_321)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year

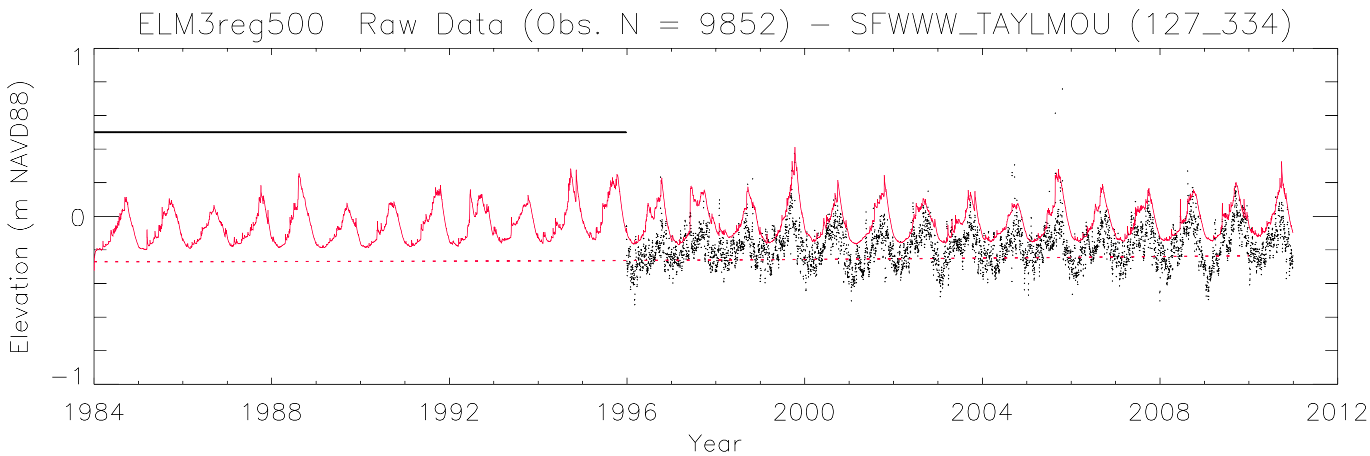

Cumulative Distribution: Raw Data – NP-146 (121_321)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

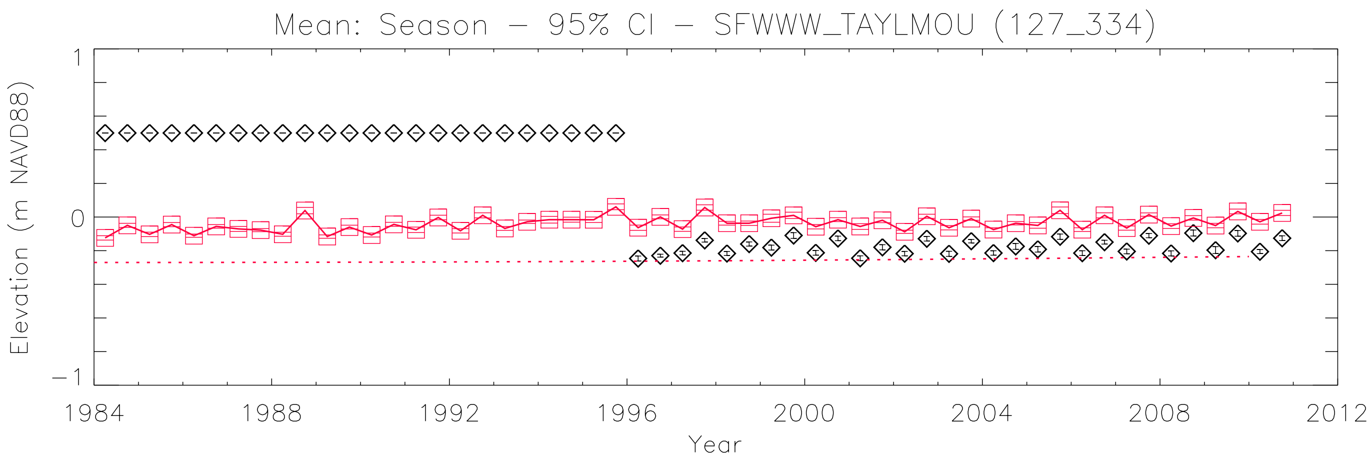

ELM3reg500 Raw Data (Obs. N = 9375) − NP−CHP (114_326)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012
1
0
−1

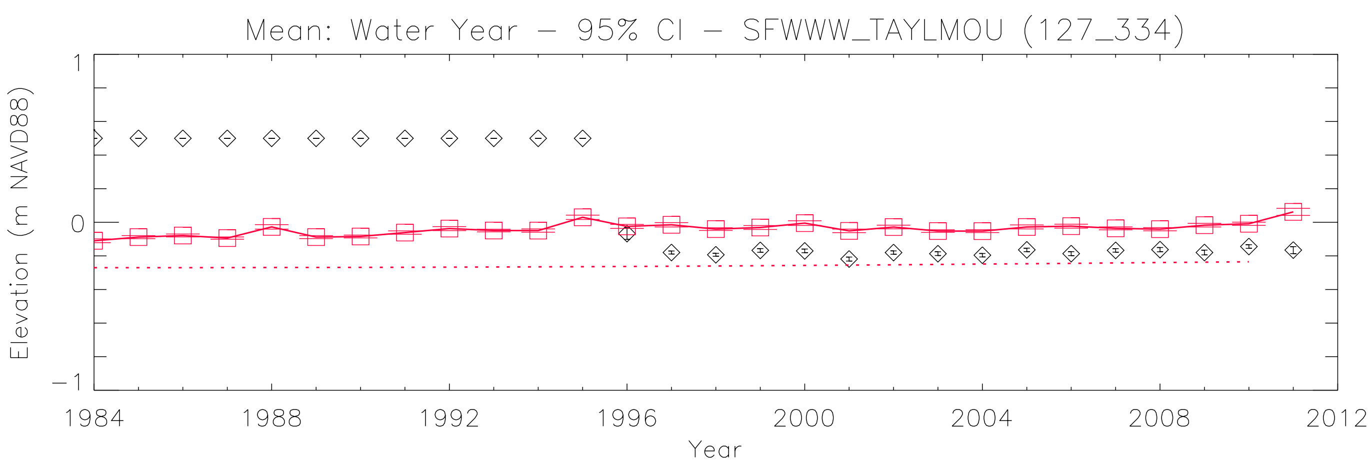

Mean: Season − 95% CI − NP−CHP (114_326)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012
1
0
−1

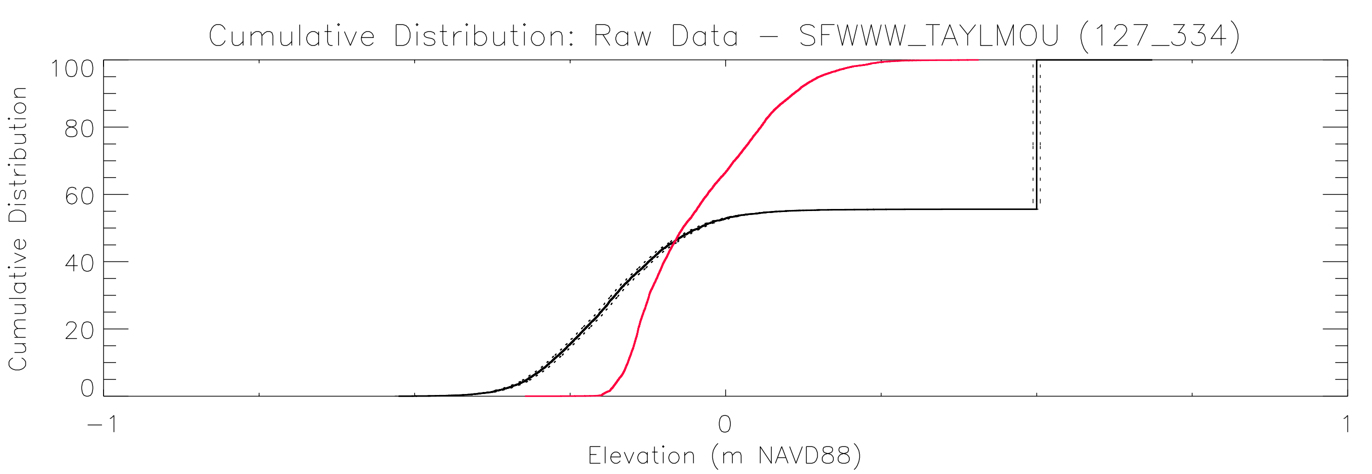

Mean: Water Year − 95% CI − NP−CHP (114_326)
Elevation (m NAVD88)
Year
1984
1988
1992
1996
2000
2004
2008
2012
1
0
−1


Cumulative Distribution: Raw Data − NP−CHP (114_326)
Cumulative Distribution
Elevation (m NAVD88)
100
80
60
40
20
0
−1
0
1


ELM3reg500 Raw Data (Obs. N = 9852) – SFWWW_TAYLMOU (127_334)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Season – 95% CI – SFWWW_TAYLMOU (127_334)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year – 95% CI – SFWWW_TAYLMOU (127_334)
Elevation (m NAVD88)
1
0
–1
1984
1988
1992
1996
2000
2004
2008
2012
Year


Cumulative Distribution: Raw Data – SFWWW_TAYLMOU (127_334)
Cumulative Distribution
100
80
60
40
20
0
–1
0
1
Elevation (m NAVD88)

Appendix B, Figures B.1 – B.94. Time series plots of water column total phosphorus (TP) concentration and their associated Cumulative Frequency Distributions (CFD) for the period of record 1984-2010 at each monitoring location. The sequence of the figures is based on geographic location of marsh sites, starting in northwest, moving towards the southeast; following the set of plots of all marsh sites, the canal monitoring sites are similarly sequenced. See Figure 1 for a map of the sites in the southern Everglades.

The constant dashed line indicates the usual TP field sampling Detection Limit (DL = 4 ug l^{-1} for most of the model period of record). The model grid cell column and row locations (col_row) or canal/river reach identifier (single integer) are shown in parentheses of each plot's title.

Each site-page has four figures:

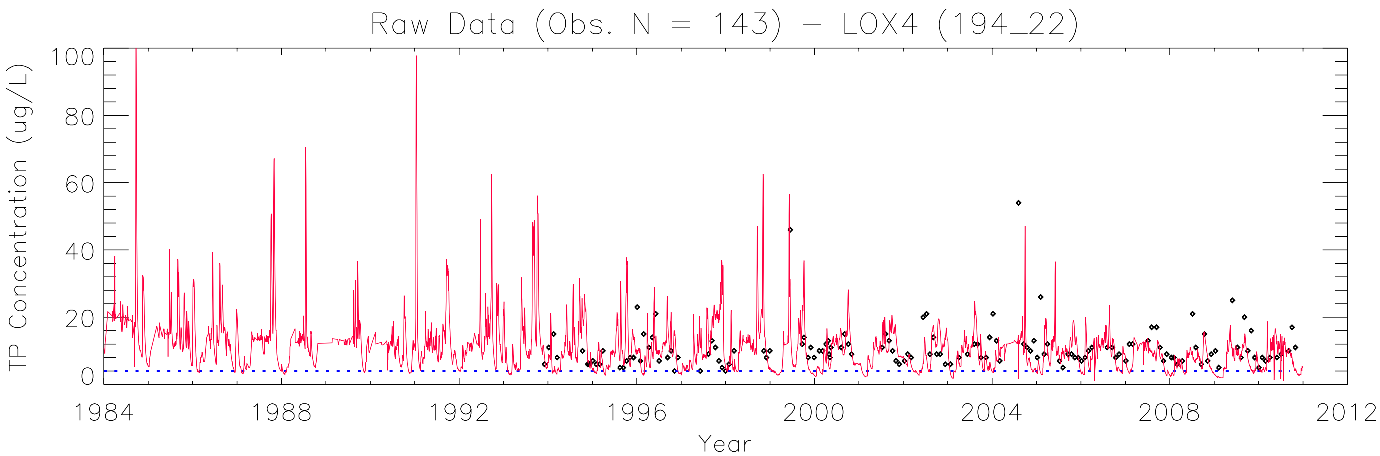
a) All data, with no temporal aggregation, of daily observations (black dots) and model results (red line).

b) All data were aggregated into arithmetic mean values by wet and dry seasons within water years; the continuous lines pass through mean of all daily data points for each season; the mean of paired simulated & observed values are shown in red boxes and black diamonds, respectively; the 95% Confidence Interval (CI) of the paired means are shown by the "__" symbols in the red for the model and black for the observed data.

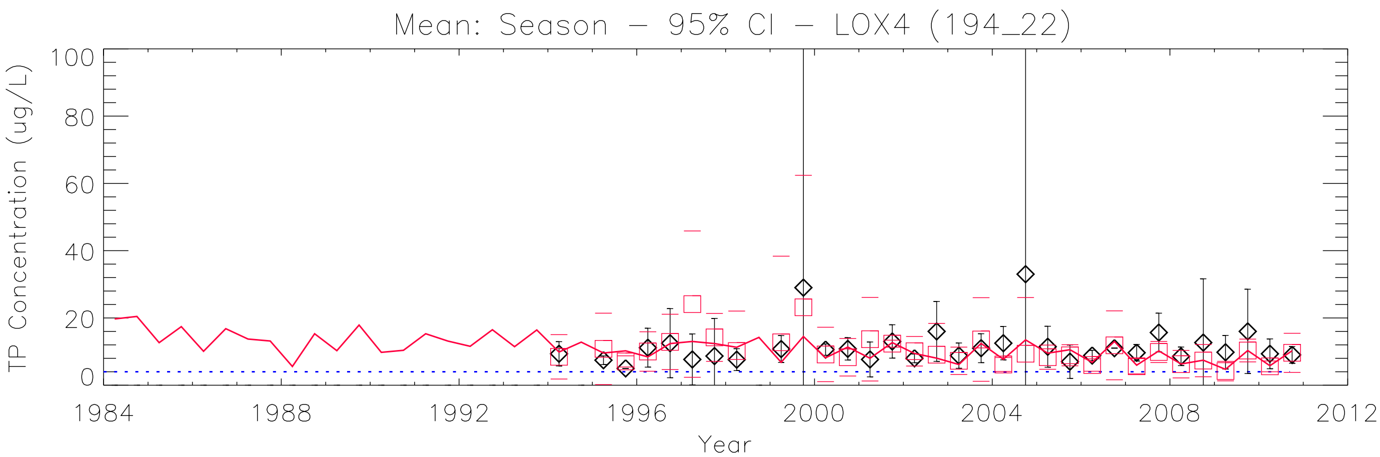
c) All data aggregated into arithmetic mean values by water year, with the same treatment as in plot b).

d) The cumulative frequency distributions of the simulated and observed (raw, un-aggregated) data; the 95% confidence interval for observed data is shown in the dashed black lines. Note that only paired simulated and observed data points are used.

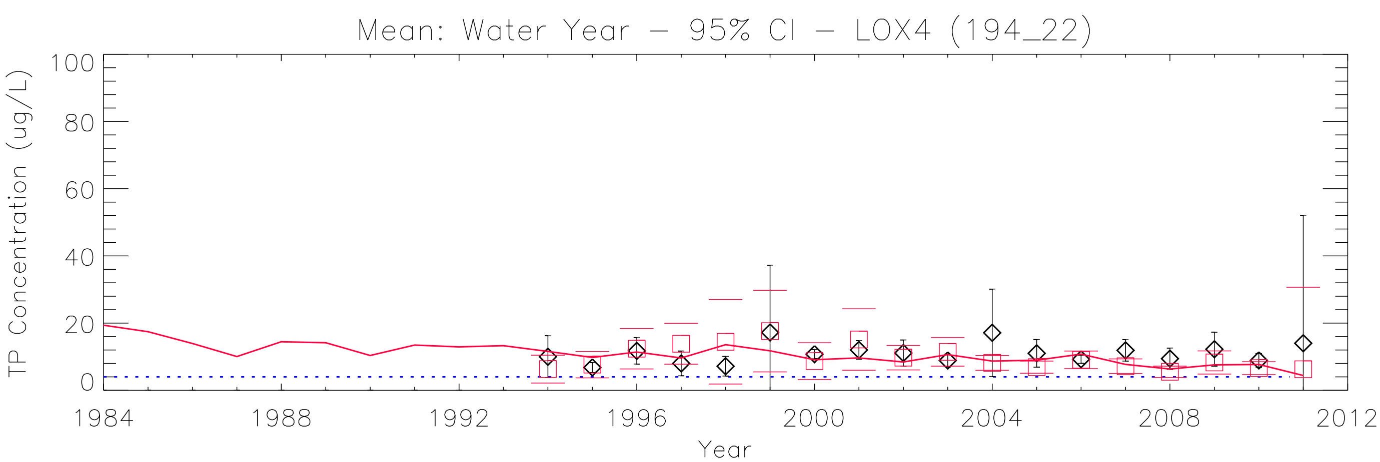
.... 94 pages of graphs follow......



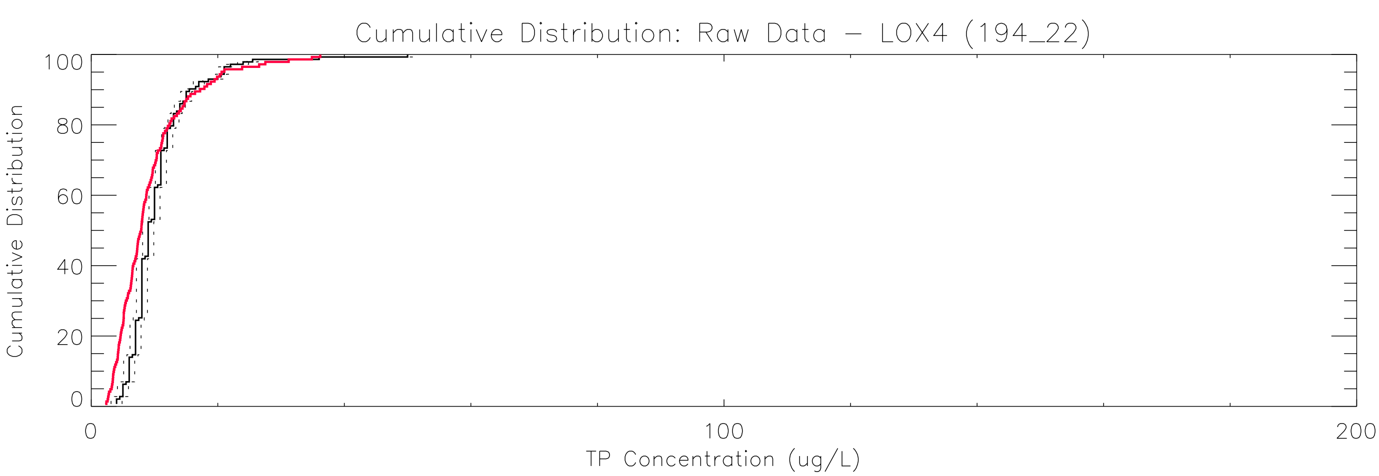
Raw Data (Obs. N = 143) – LOX4 (194_22)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



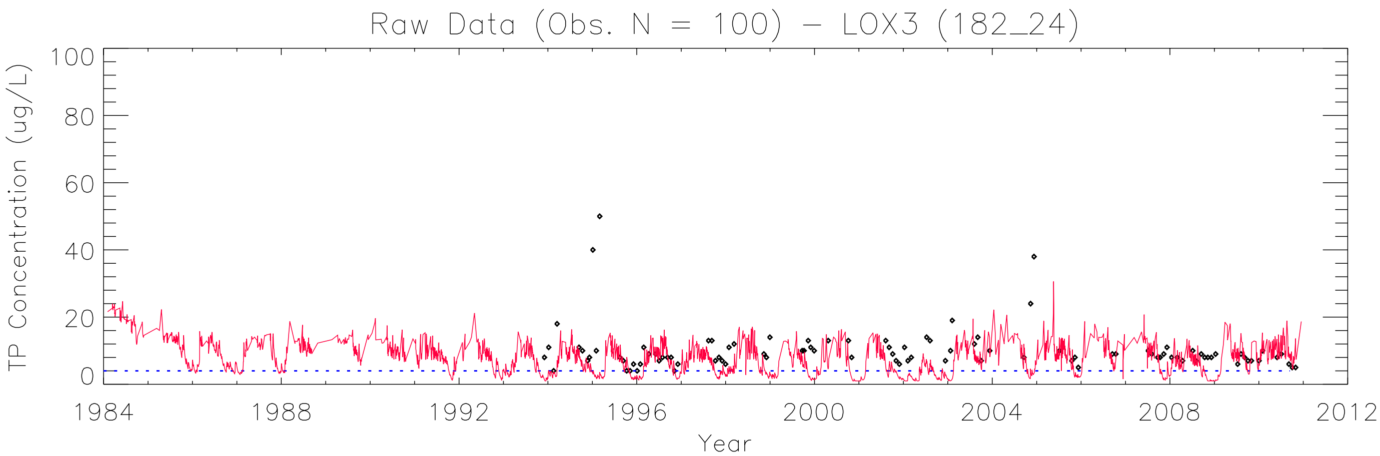
Mean: Season – 95% CI – LOX4 (194_22)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

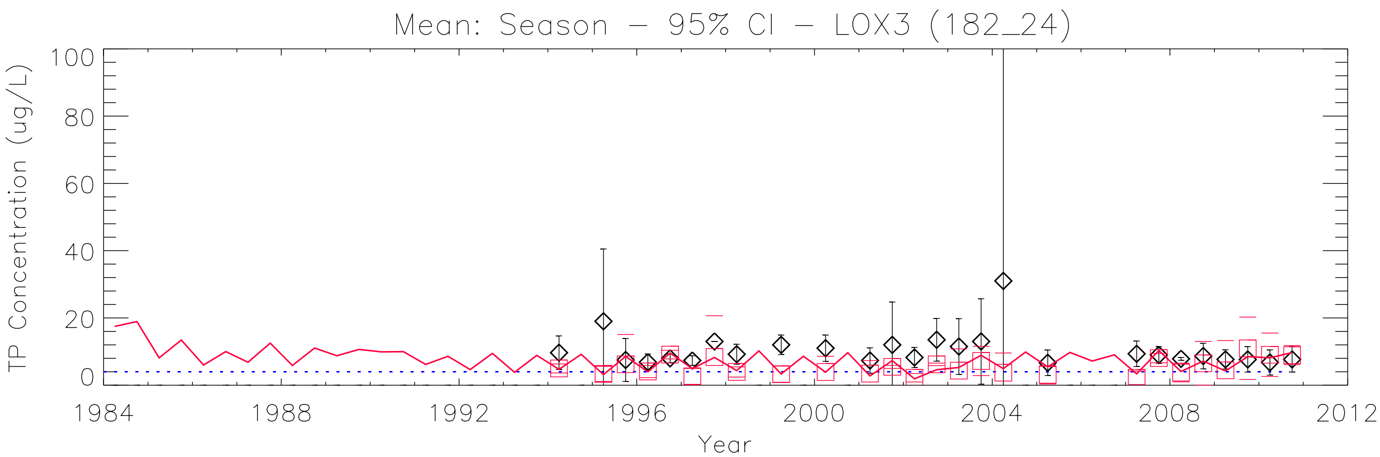


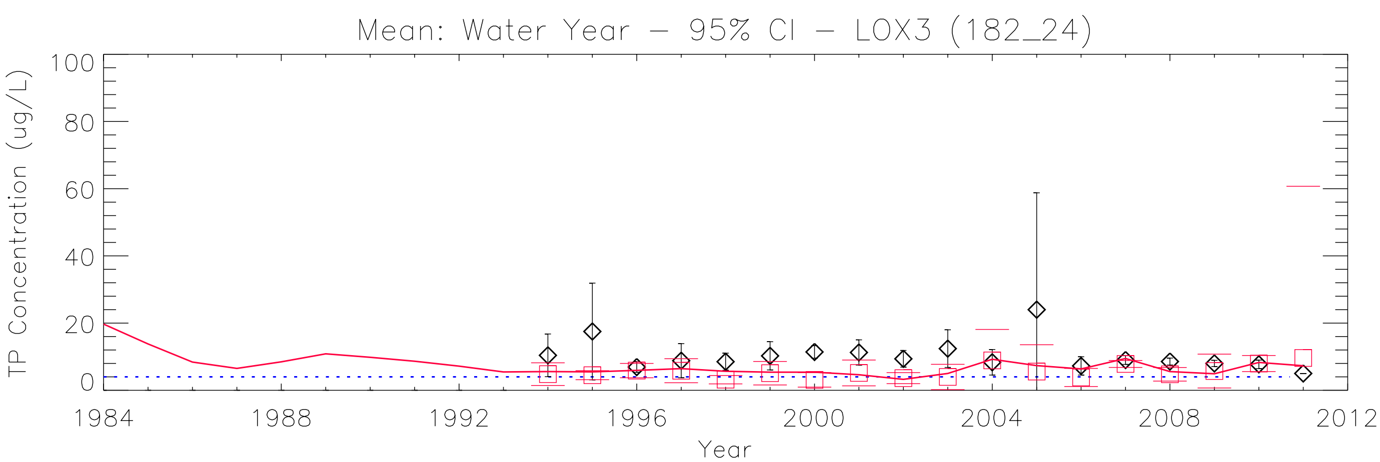
Mean: Water Year – 95% CI – LOX4 (194_22)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

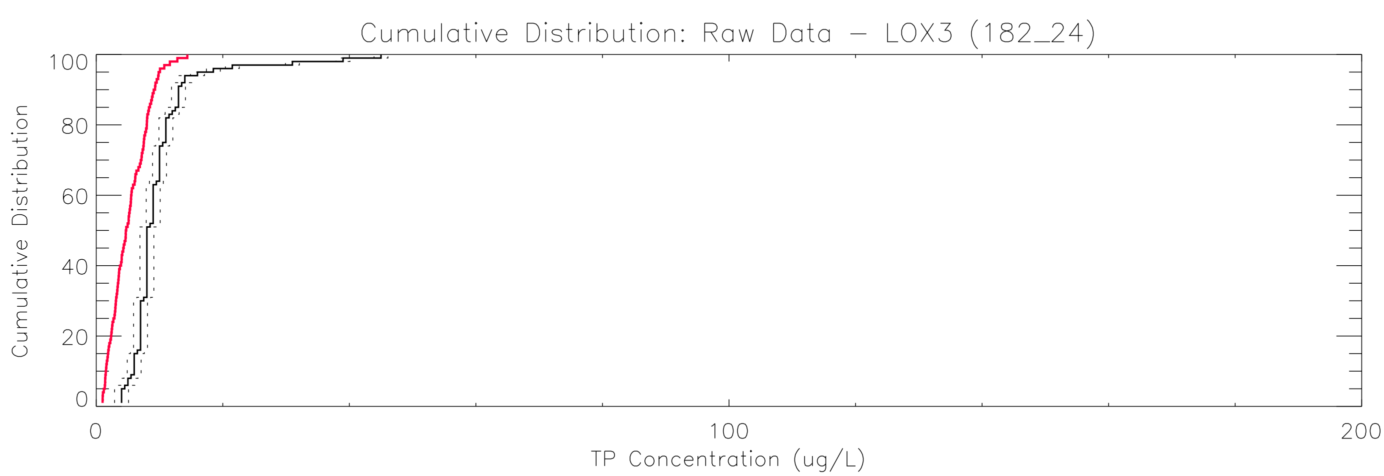


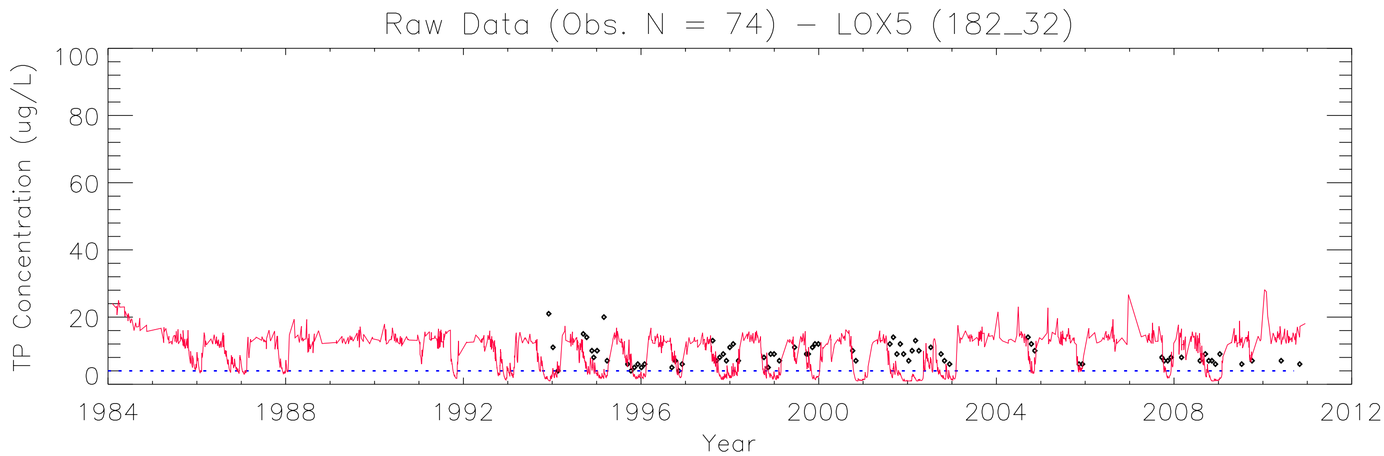
Cumulative Distribution: Raw Data – LOX4 (194_22)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

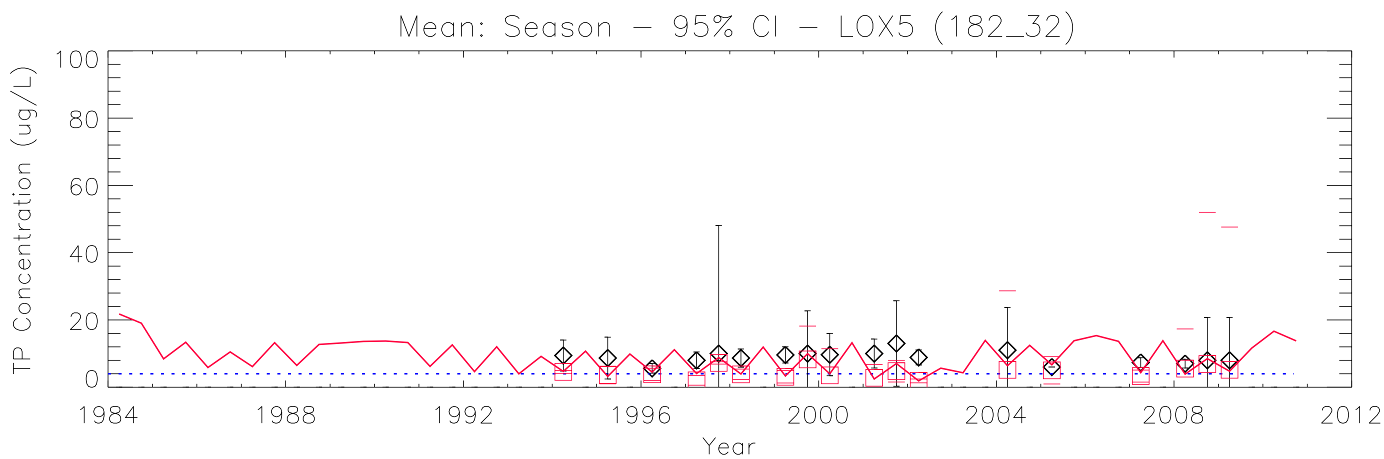

Raw Data (Obs. N = 100) - LOX3 (182_24)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

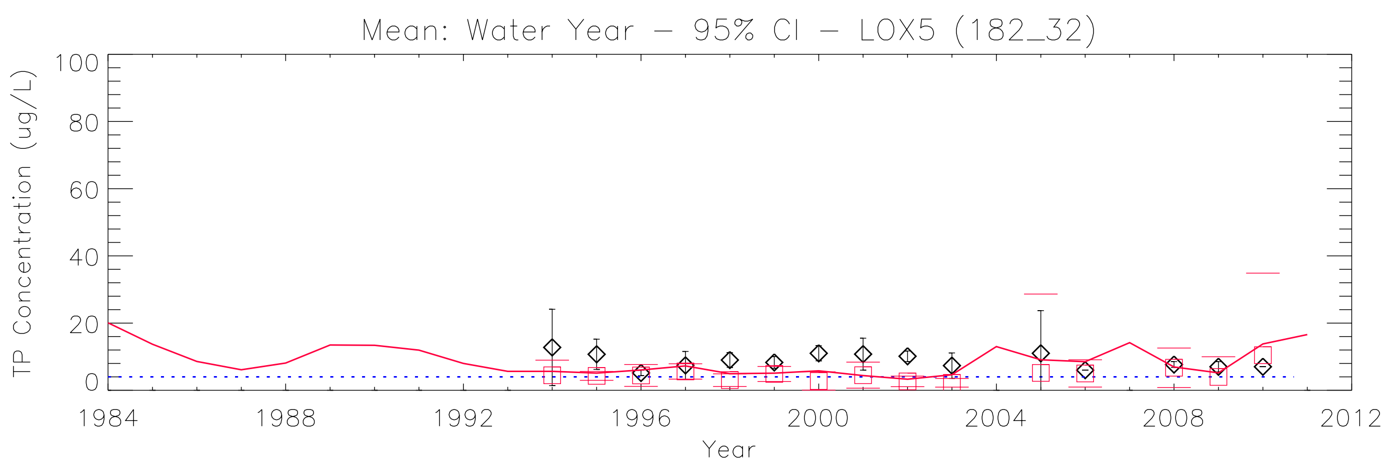

Mean: Season - 95% CI - LOX3 (182_24)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

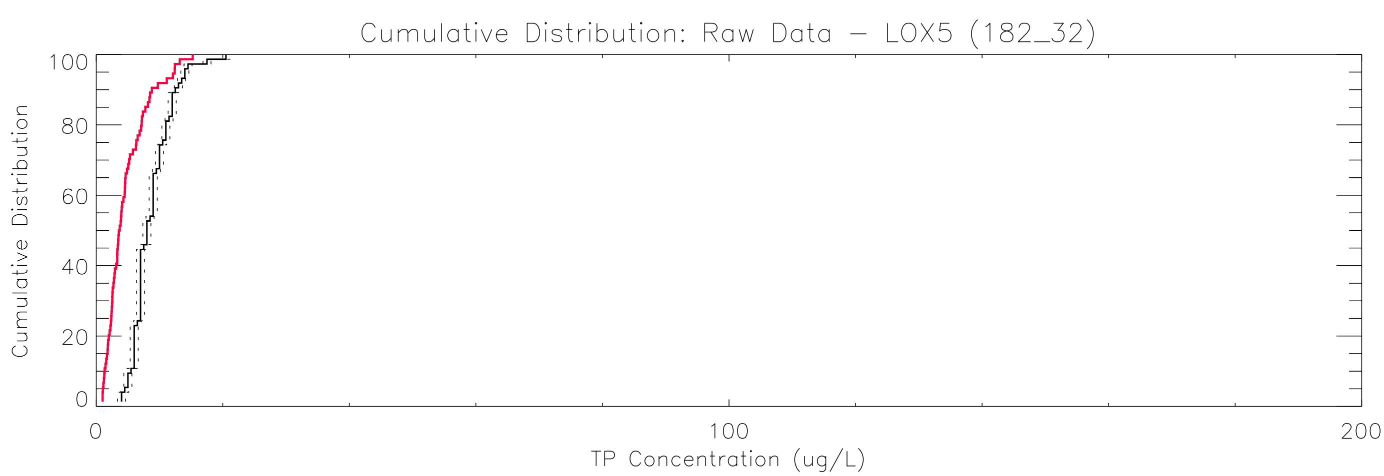

Mean: Water Year - 95% CI - LOX3 (182_24)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

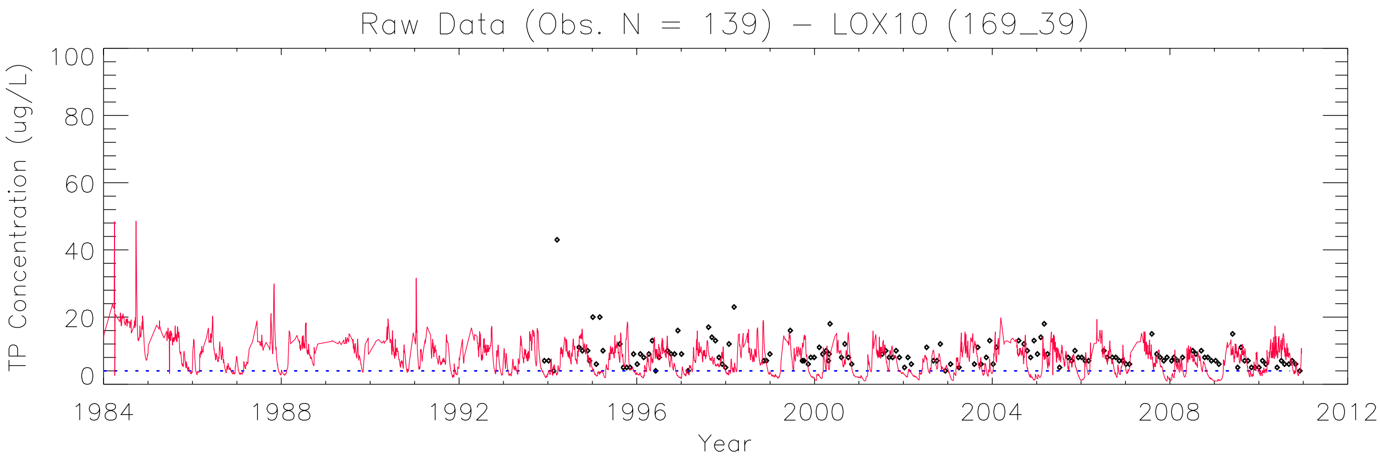

Cumulative Distribution: Raw Data - LOX3 (182_24)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200


Raw Data (Obs. N = 74) – LOX5 (182_32)
TP Concentration (ug/L)
Year

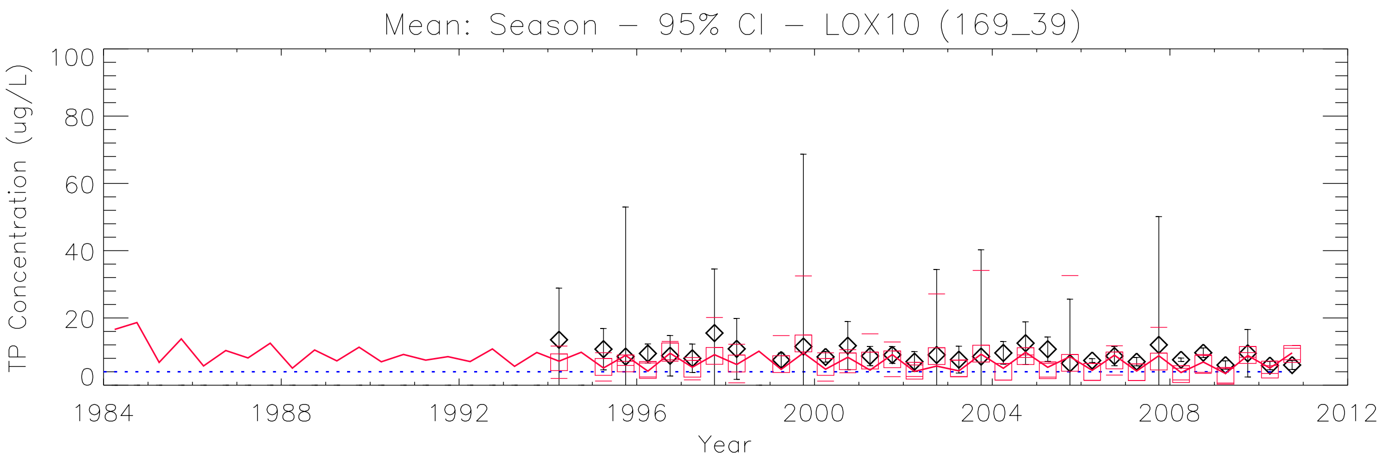

Mean: Season – 95% CI – LOX5 (182_32)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – LOX5 (182_32)
TP Concentration (ug/L)
Year

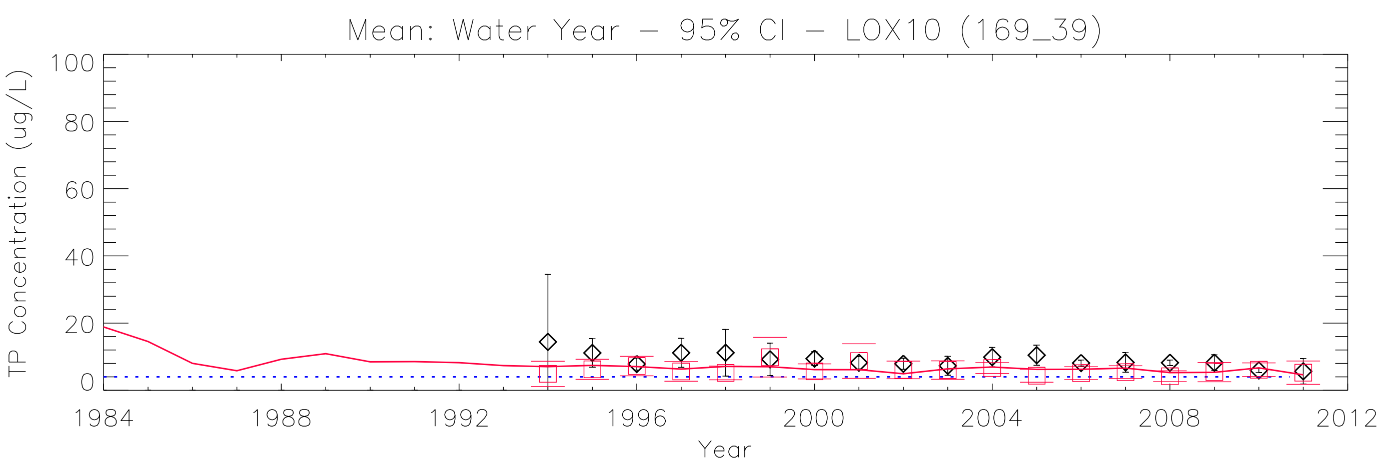

Cumulative Distribution: Raw Data – LOX5 (182_32)
Cumulative Distribution
TP Concentration (ug/L)



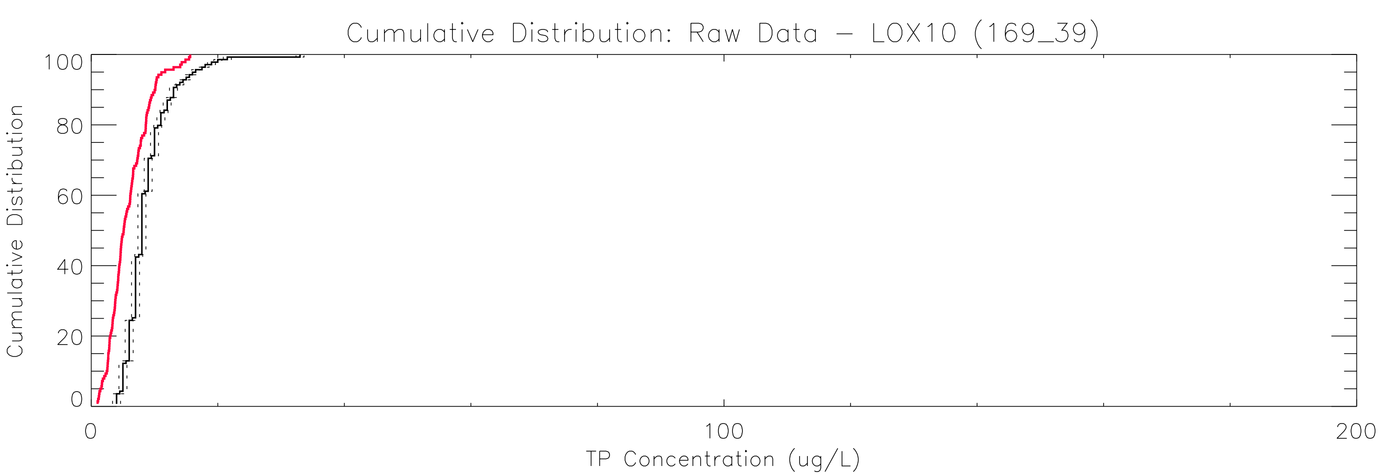
Raw Data (Obs. N = 139) – LOX10 (169_39)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012



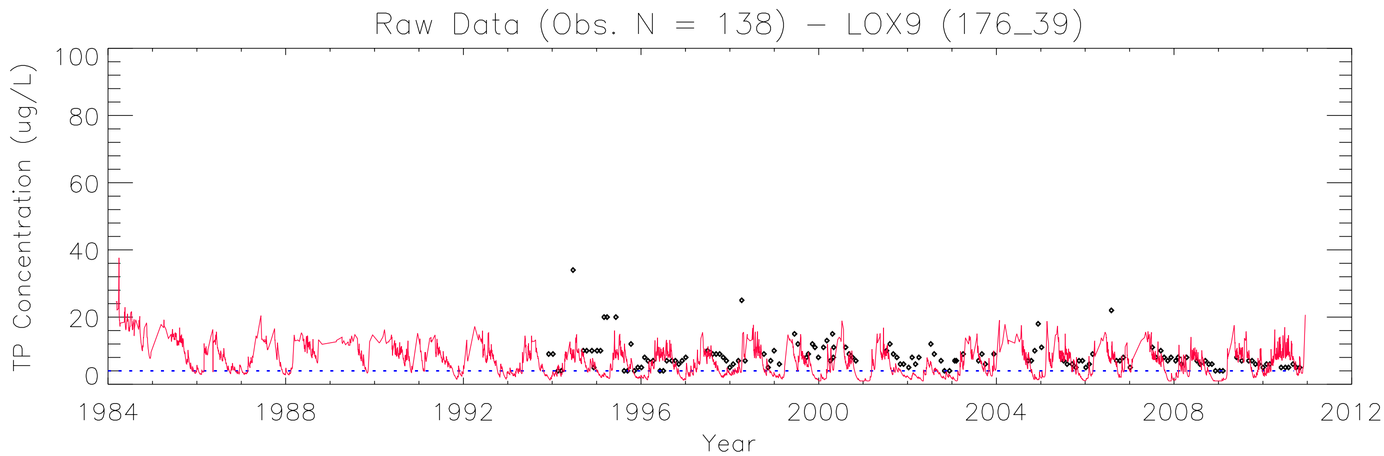
Mean: Season – 95% CI – LOX10 (169_39)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

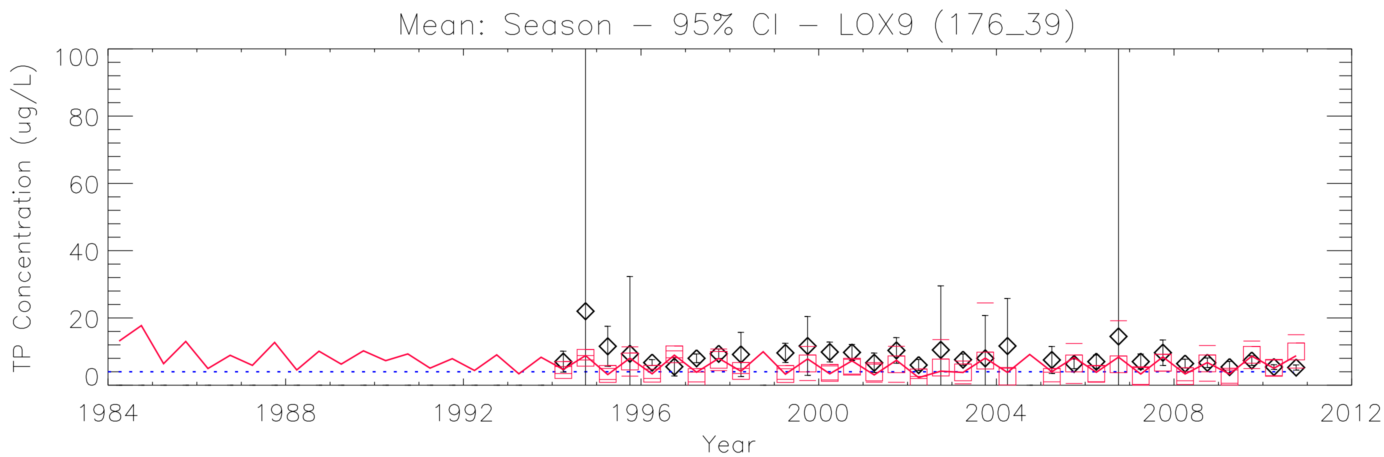


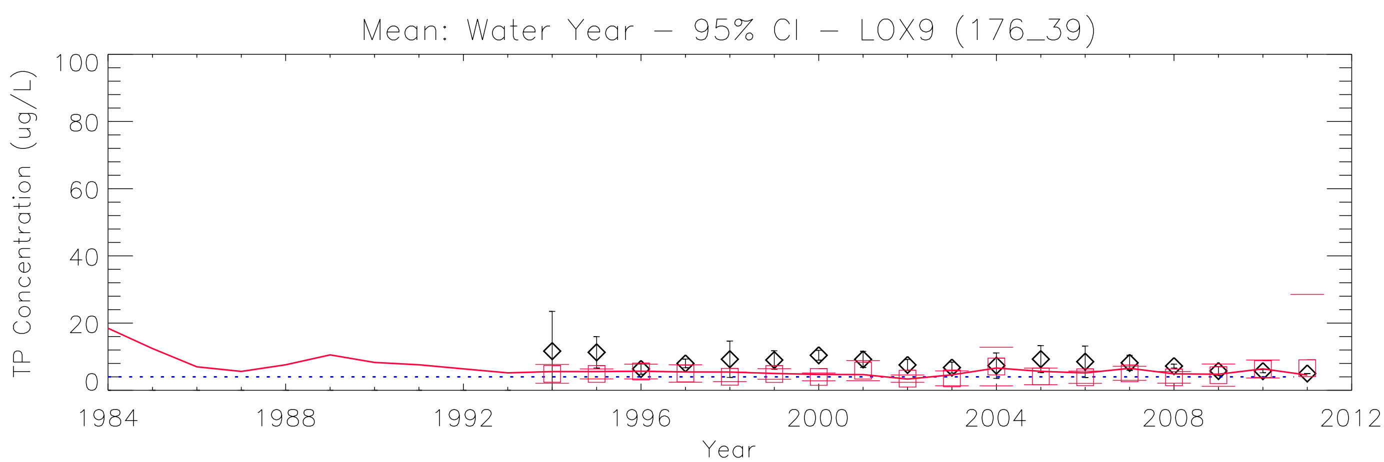
Mean: Water Year – 95% CI – LOX10 (169_39)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

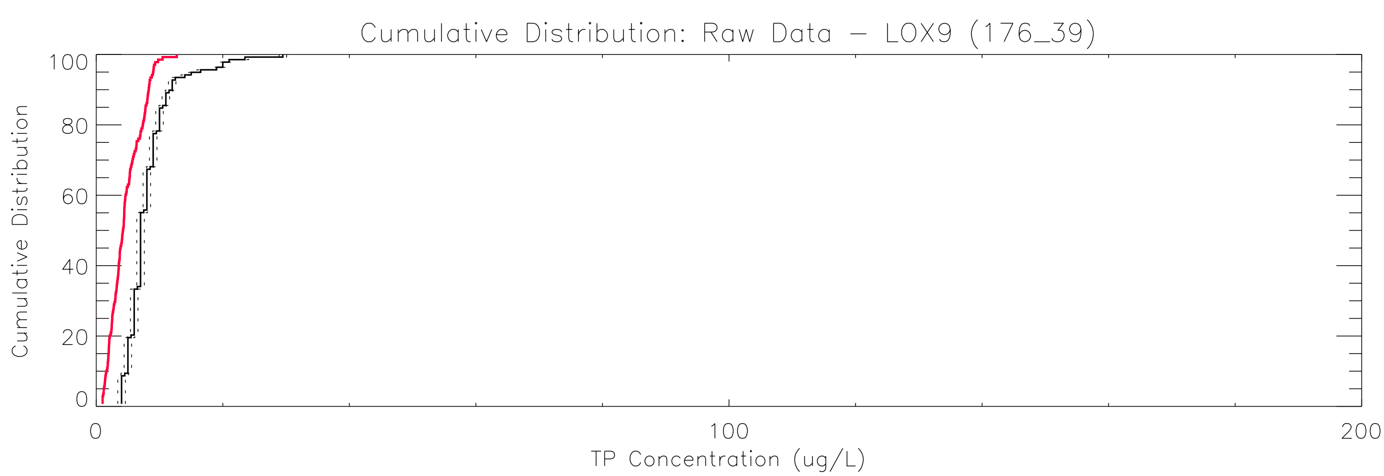


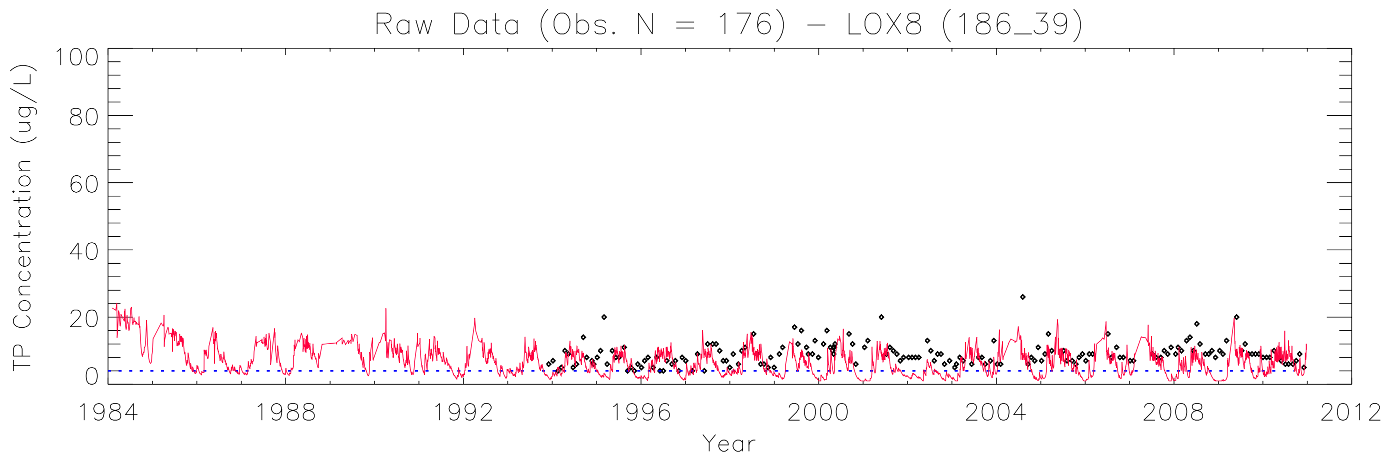
Cumulative Distribution: Raw Data – LOX10 (169_39)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

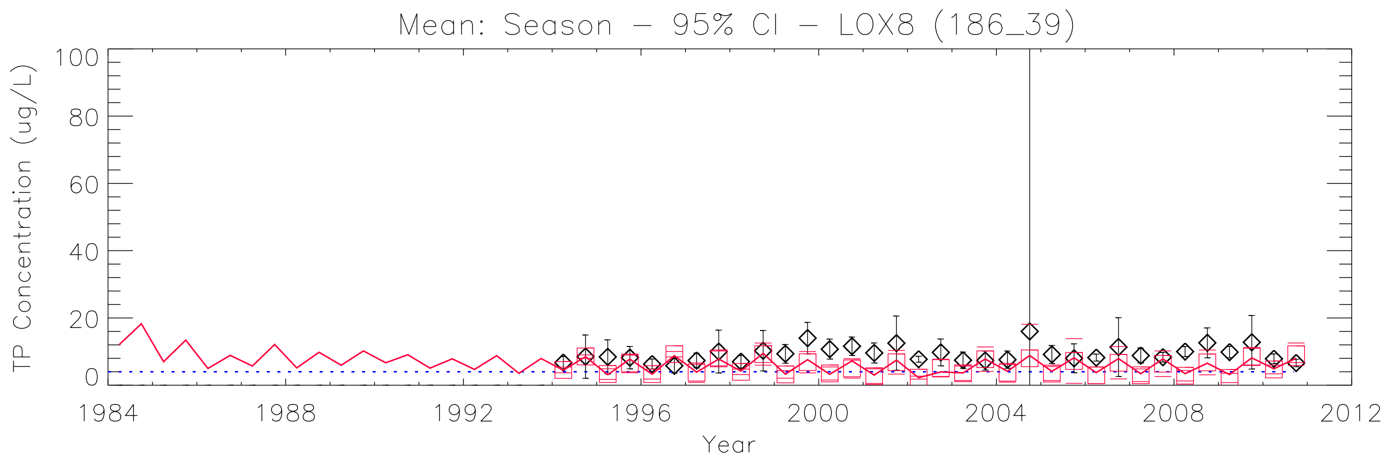

Raw Data (Obs. N = 138) – LOX9 (176_39)
TP Concentration (ug/L)
Year

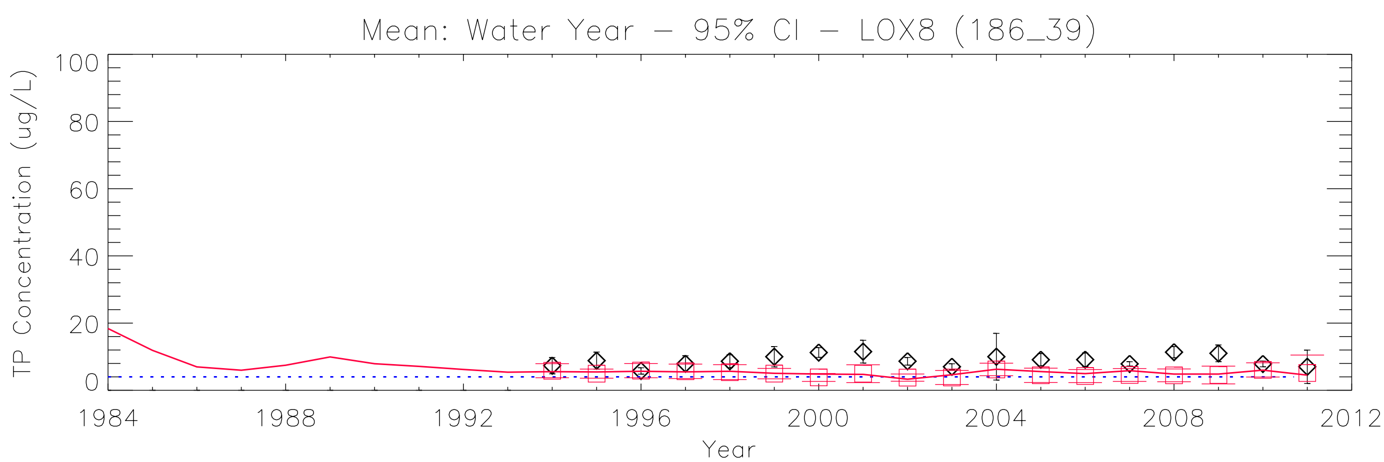

Mean: Season – 95% CI – LOX9 (176_39)
TP Concentration (ug/L)
Year

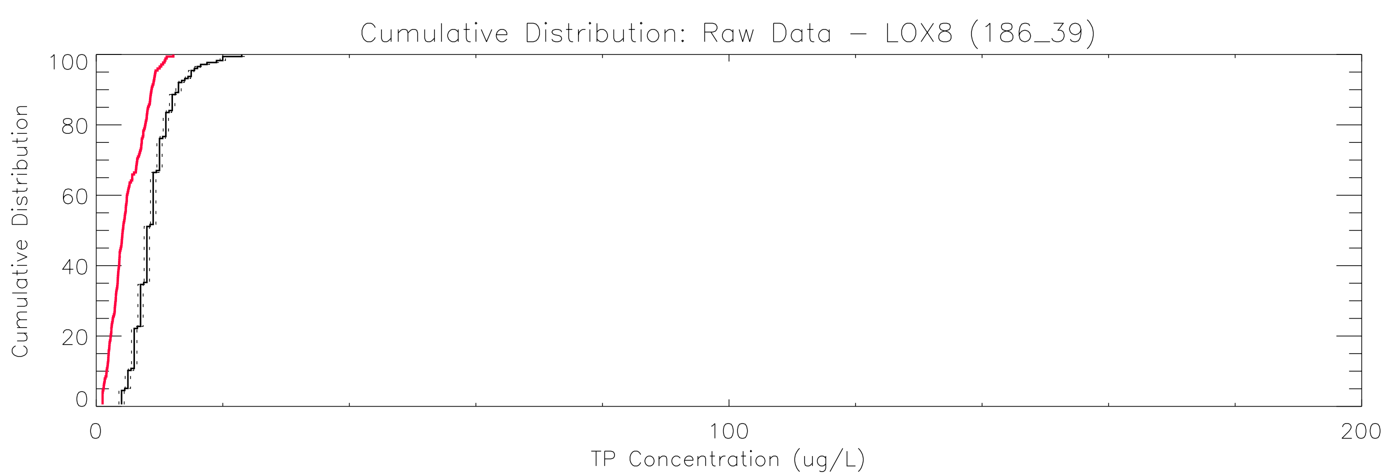

Mean: Water Year – 95% CI – LOX9 (176_39)
TP Concentration (ug/L)
Year

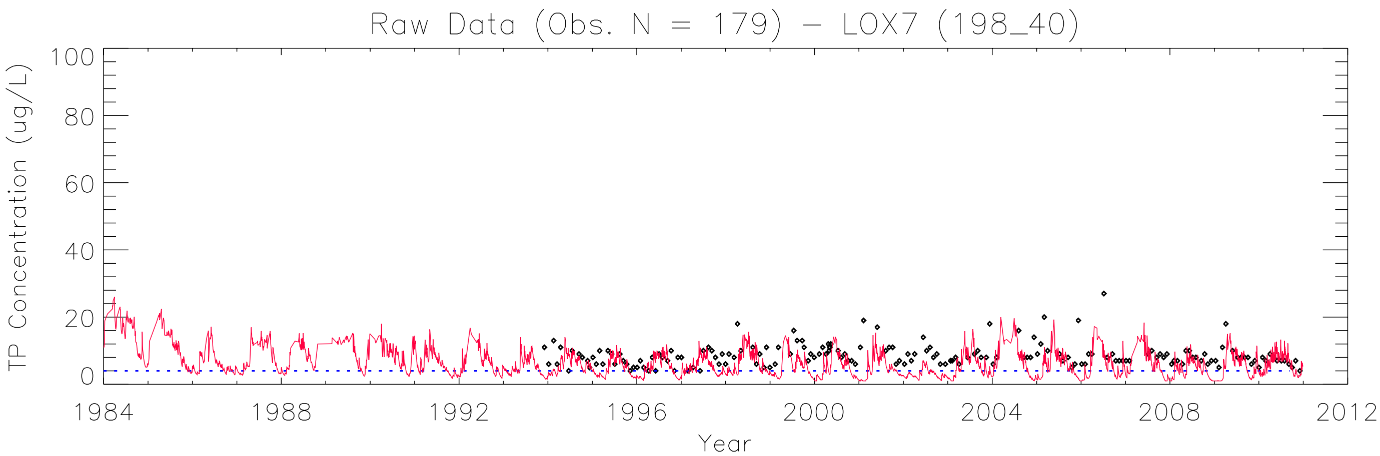

Cumulative Distribution: Raw Data – LOX9 (176_39)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 176) – LOX8 (186_39)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

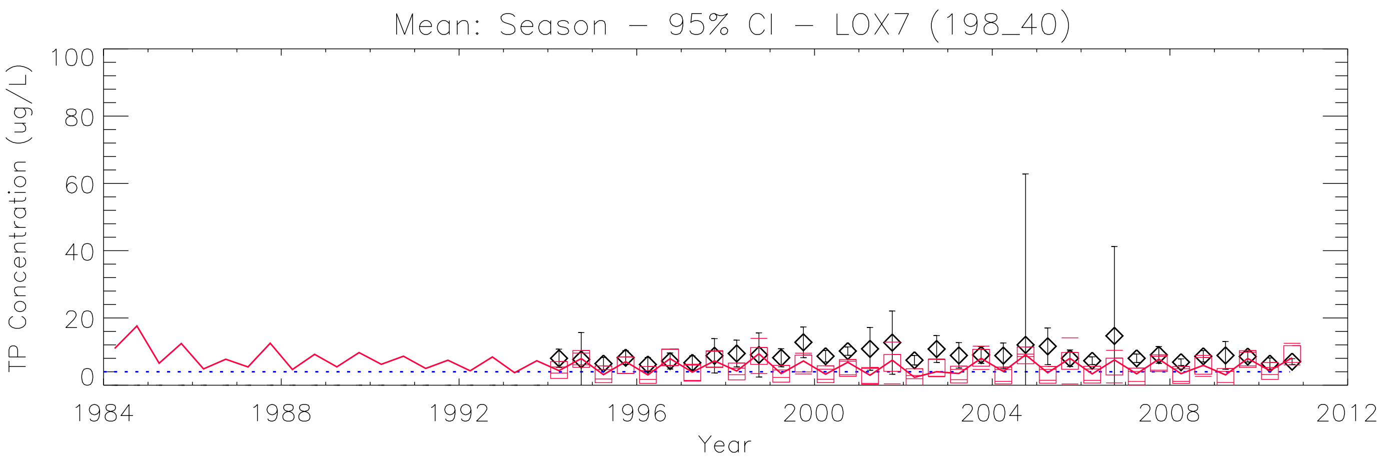

Mean: Season – 95% CI – LOX8 (186_39)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012


Mean: Water Year – 95% CI – LOX8 (186_39)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

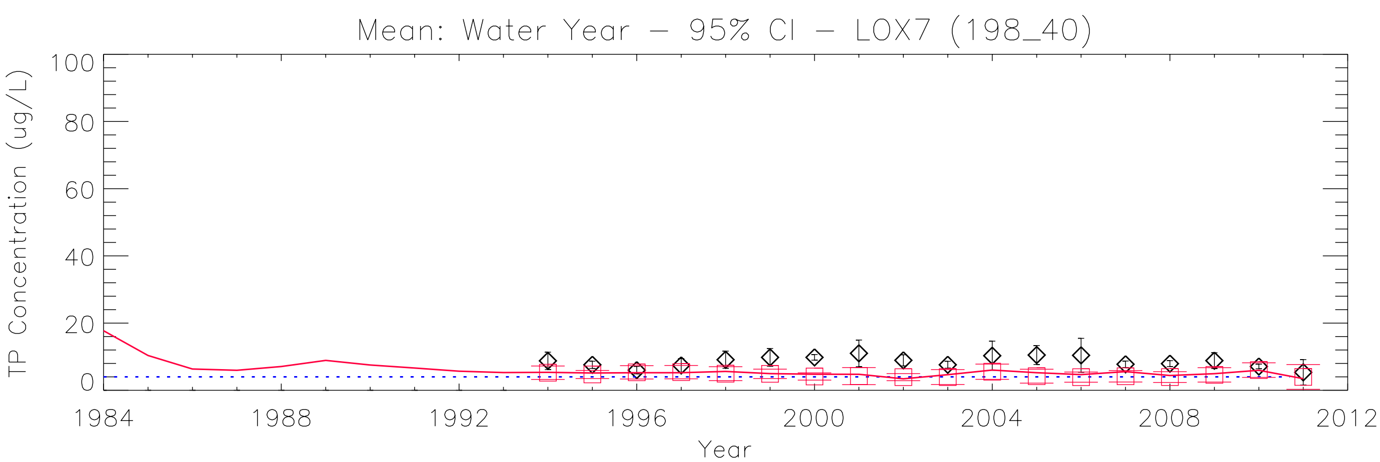

Cumulative Distribution: Raw Data – LOX8 (186_39)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200



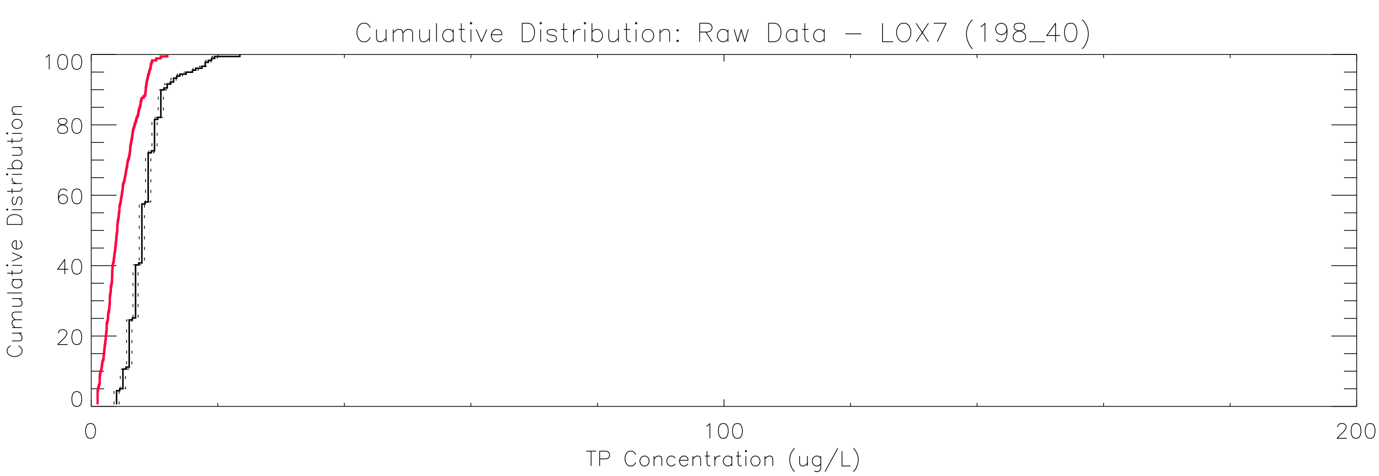
Raw Data (Obs. N = 179) – LOX7 (198_40)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year



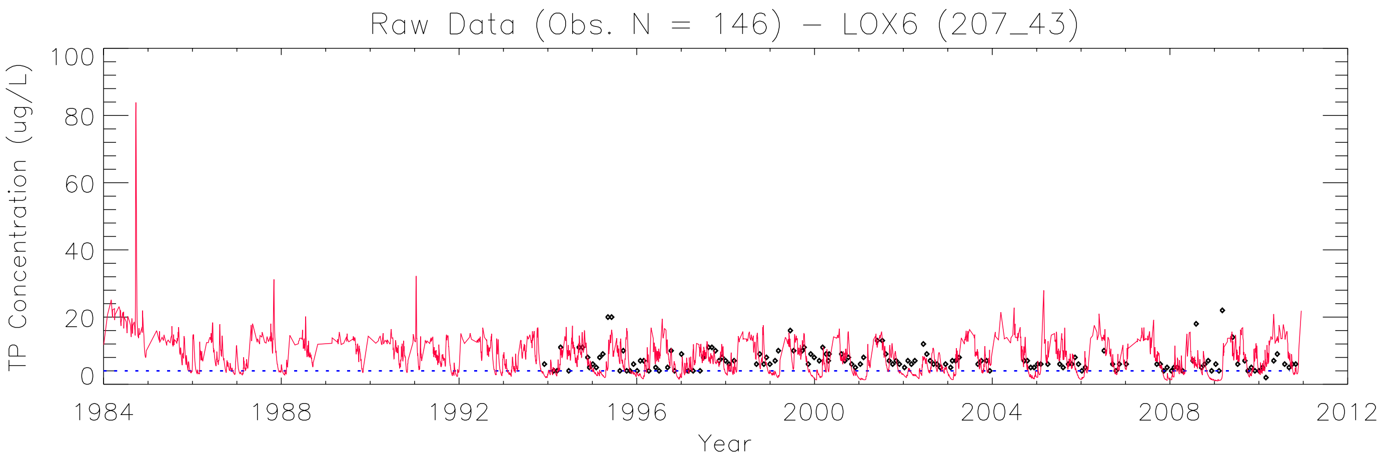
Mean: Season – 95% CI – LOX7 (198_40)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

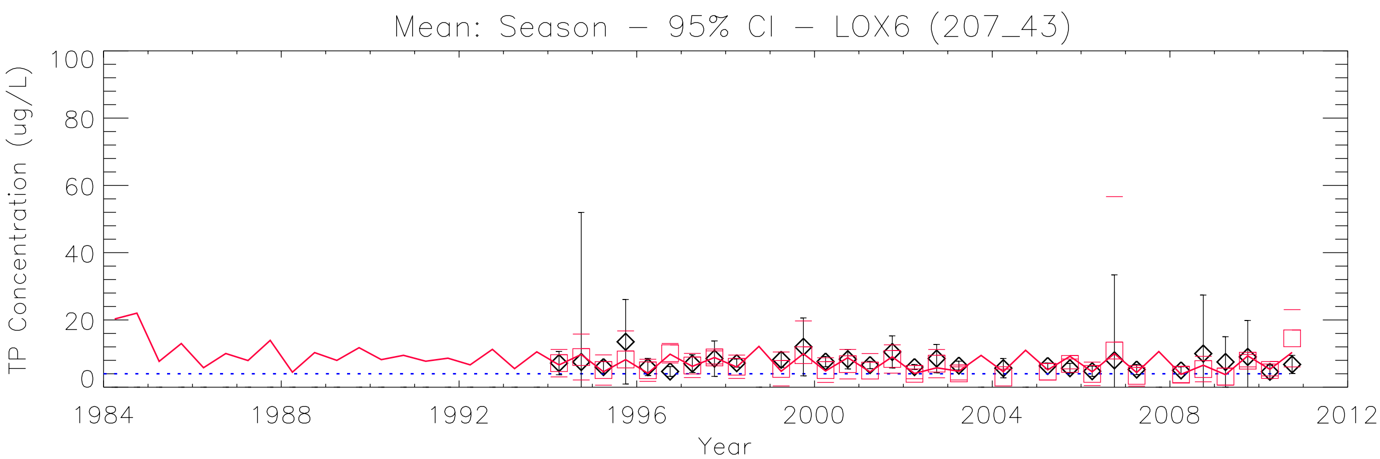


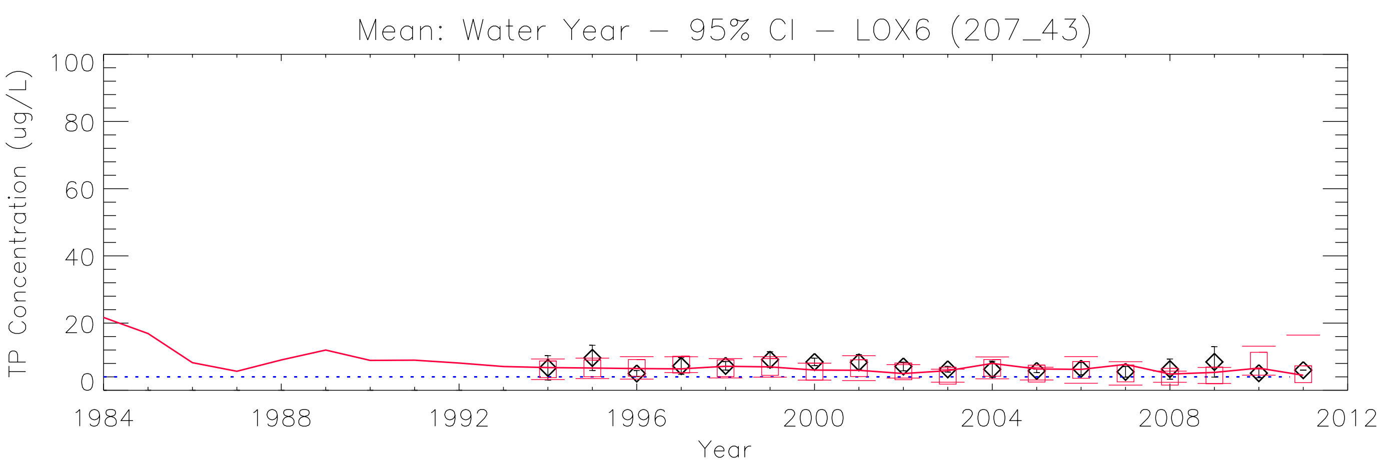
Mean: Water Year – 95% CI – LOX7 (198_40)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

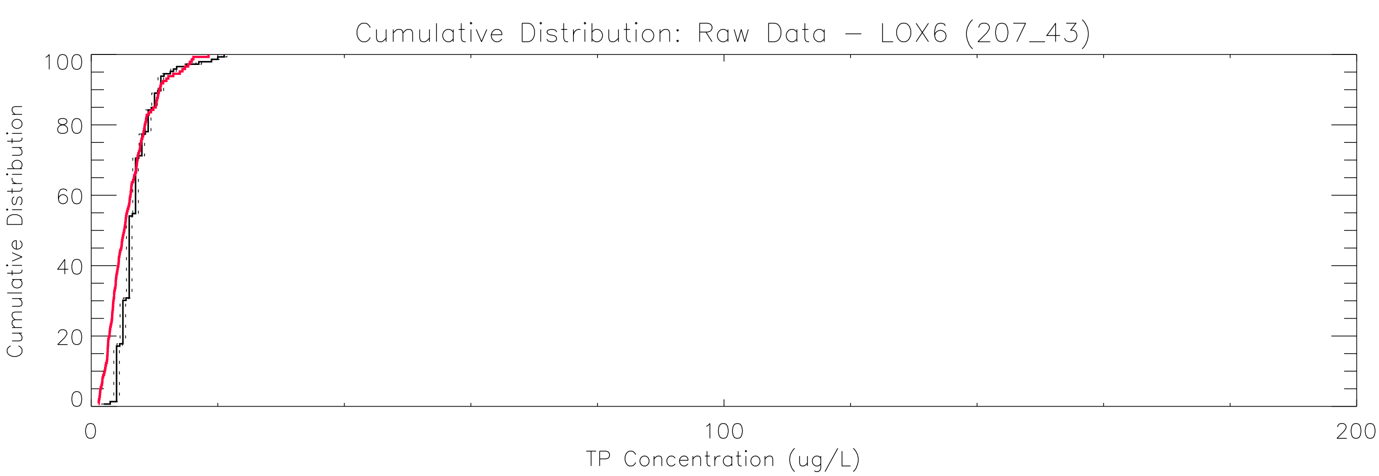


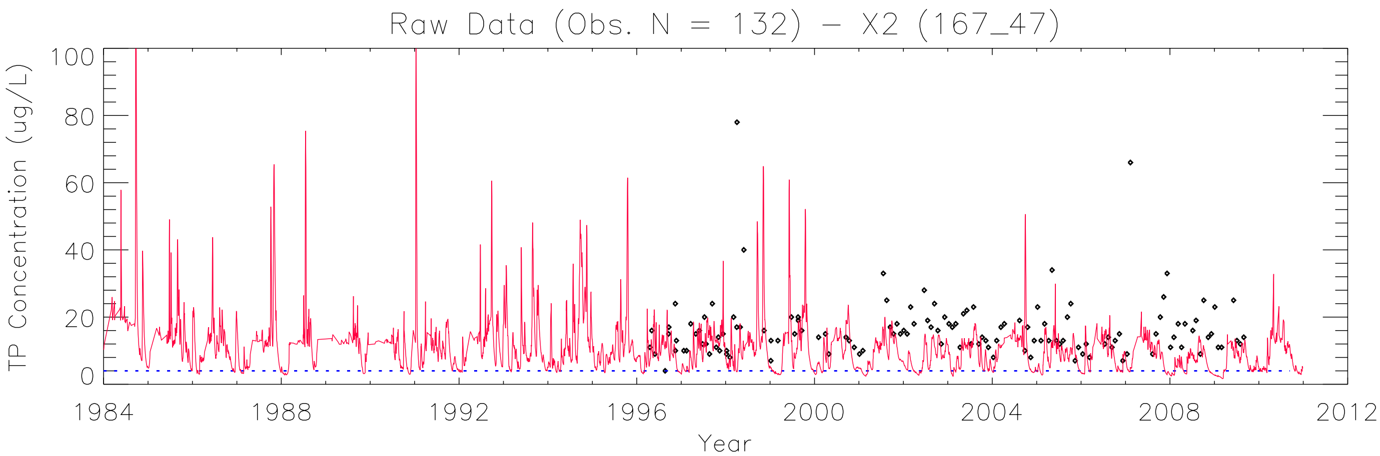
Cumulative Distribution: Raw Data – LOX7 (198_40)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
TP Concentration (ug/L)

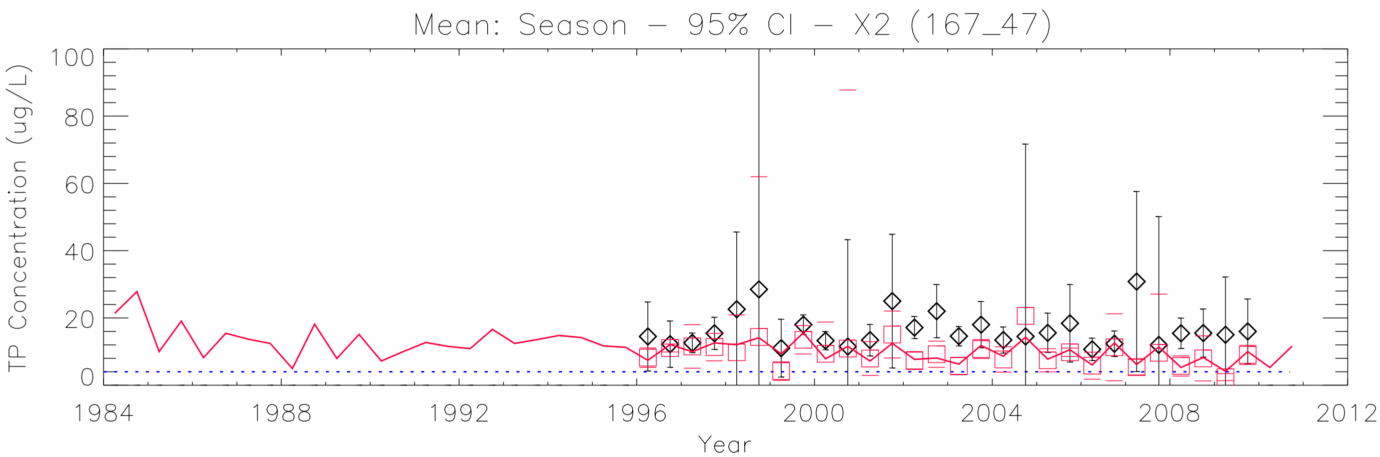

Raw Data (Obs. N = 146) – LOX6 (207_43)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

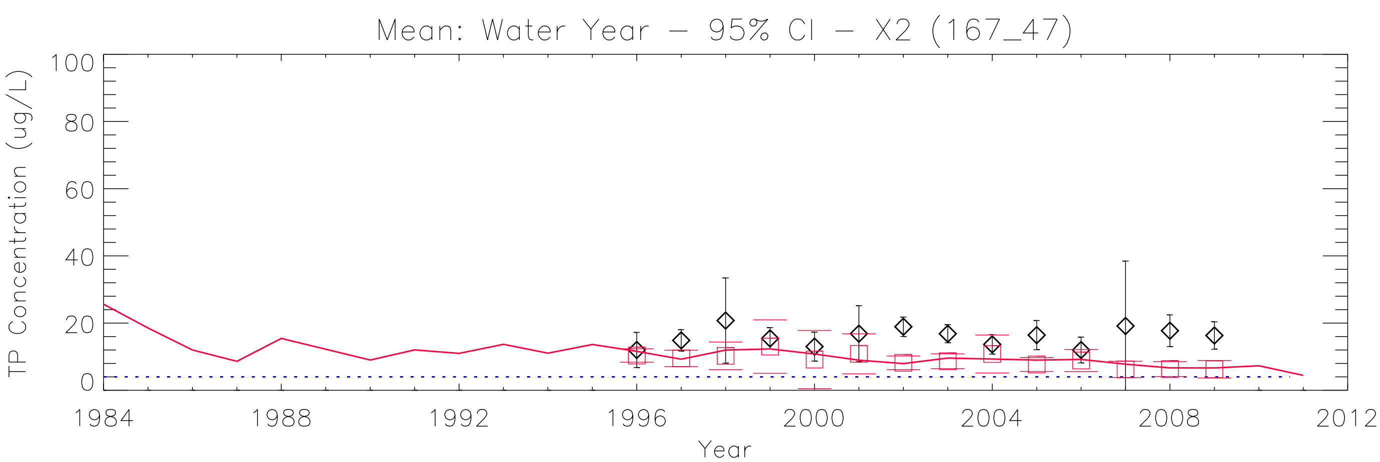

Mean: Season – 95% CI – LOX6 (207_43)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

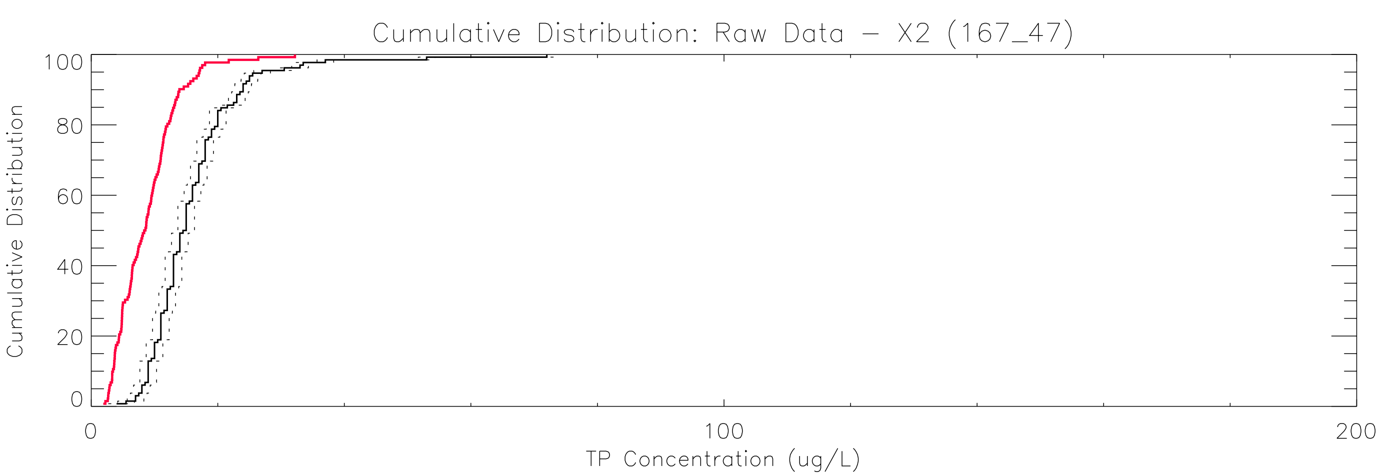

Mean: Water Year – 95% CI – LOX6 (207_43)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

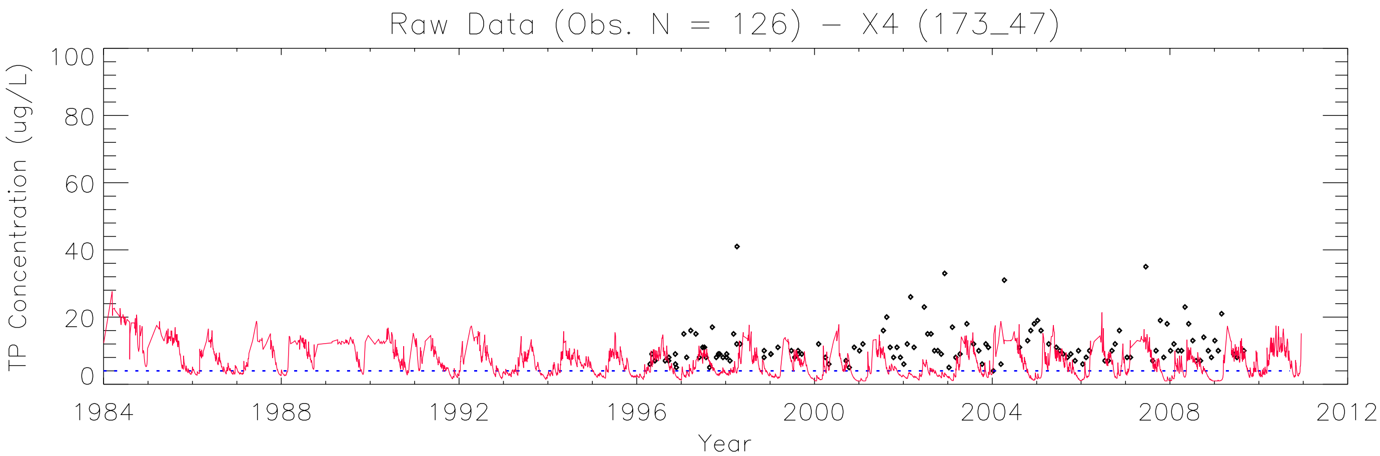

Cumulative Distribution: Raw Data – LOX6 (207_43)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200


Raw Data (Obs. N = 132) – X2 (167_47)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

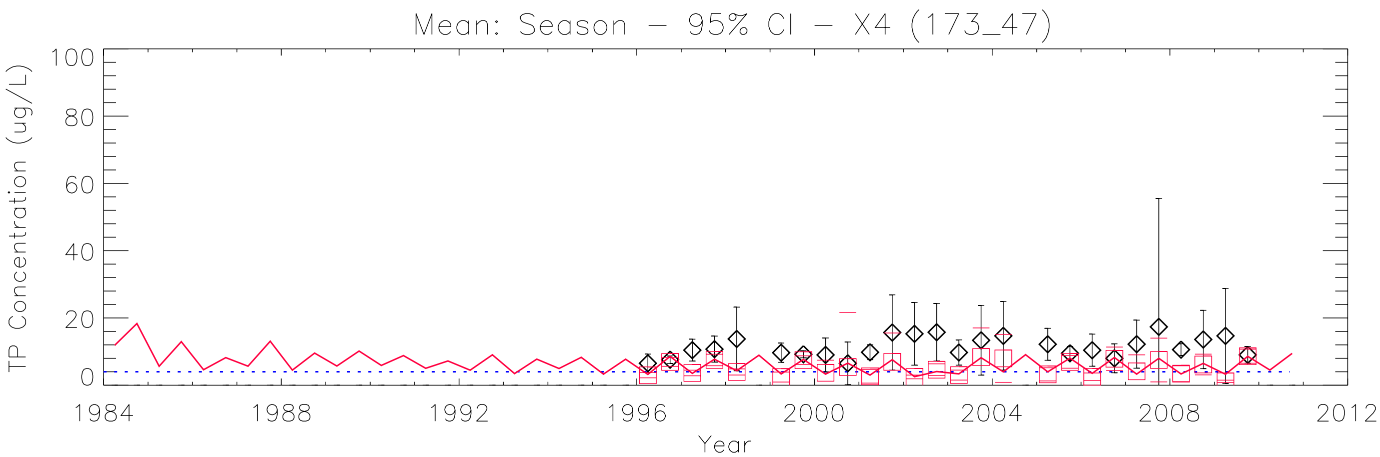

Mean: Season – 95% CI – X2 (167_47)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012


Mean: Water Year – 95% CI – X2 (167_47)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

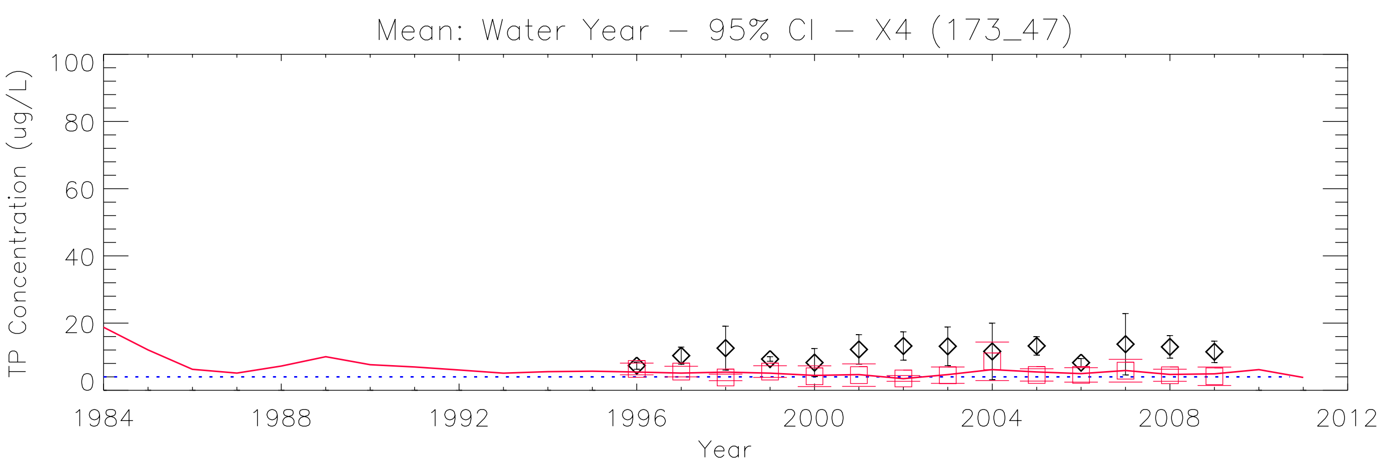

Cumulative Distribution: Raw Data – X2 (167_47)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200



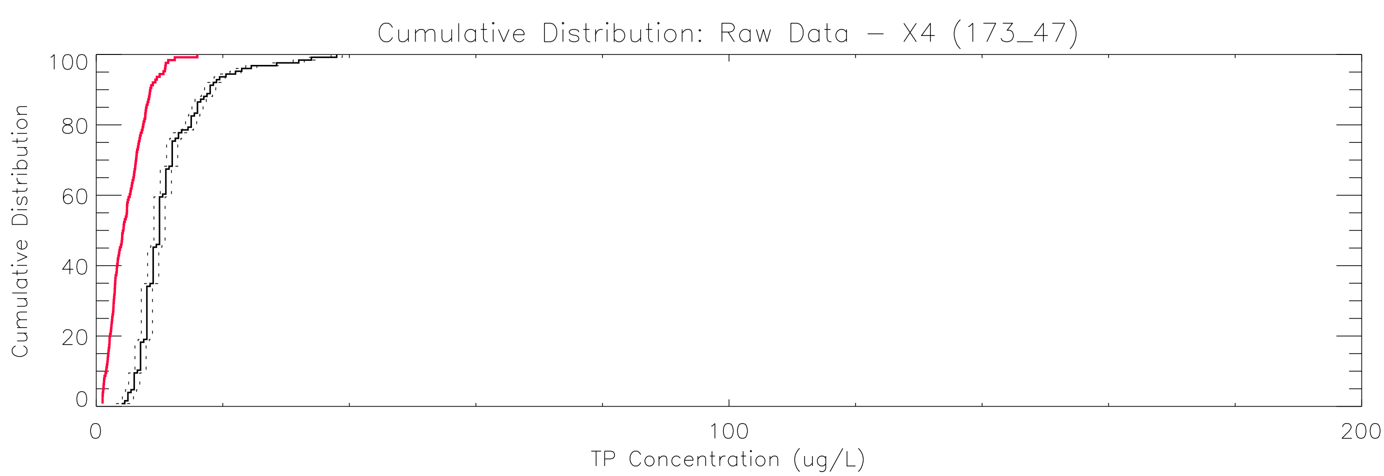
Raw Data (Obs. N = 126) – X4 (173_47)
TP Concentration (ug/L)
Year



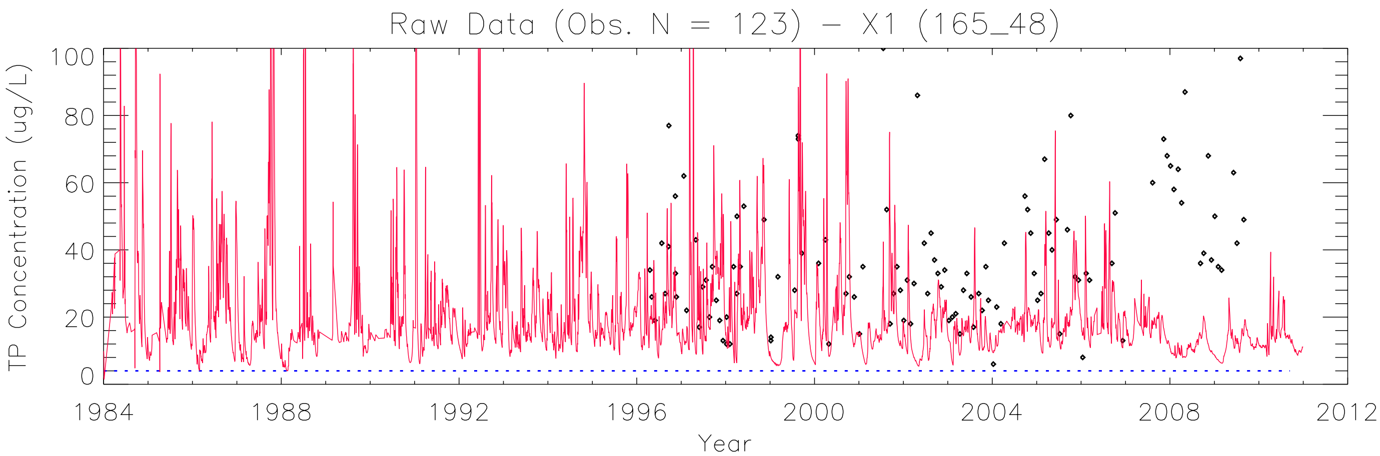
Mean: Season – 95% CI – X4 (173_47)
TP Concentration (ug/L)
Year

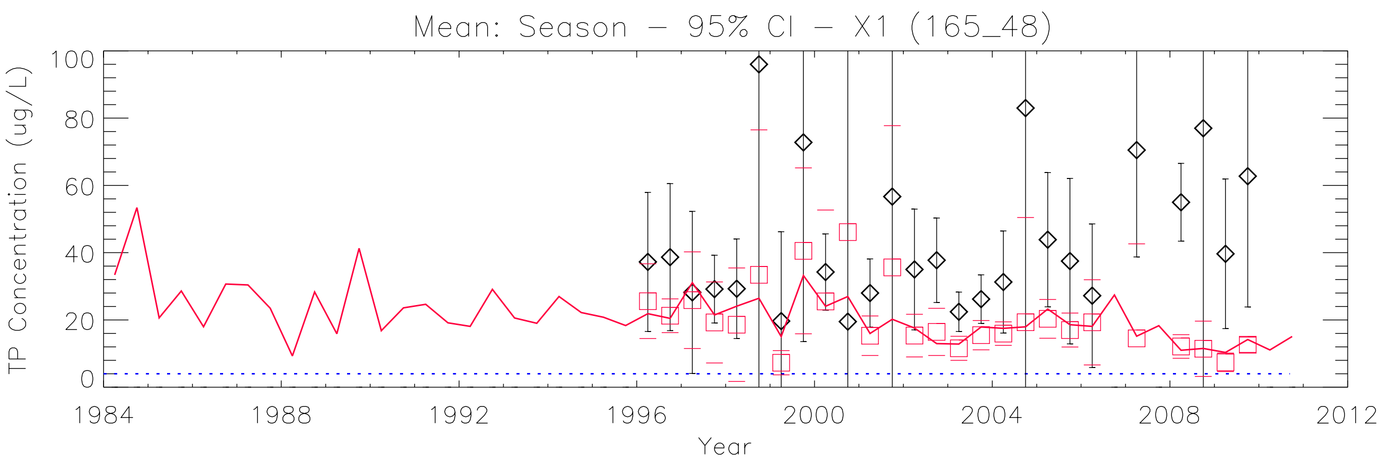


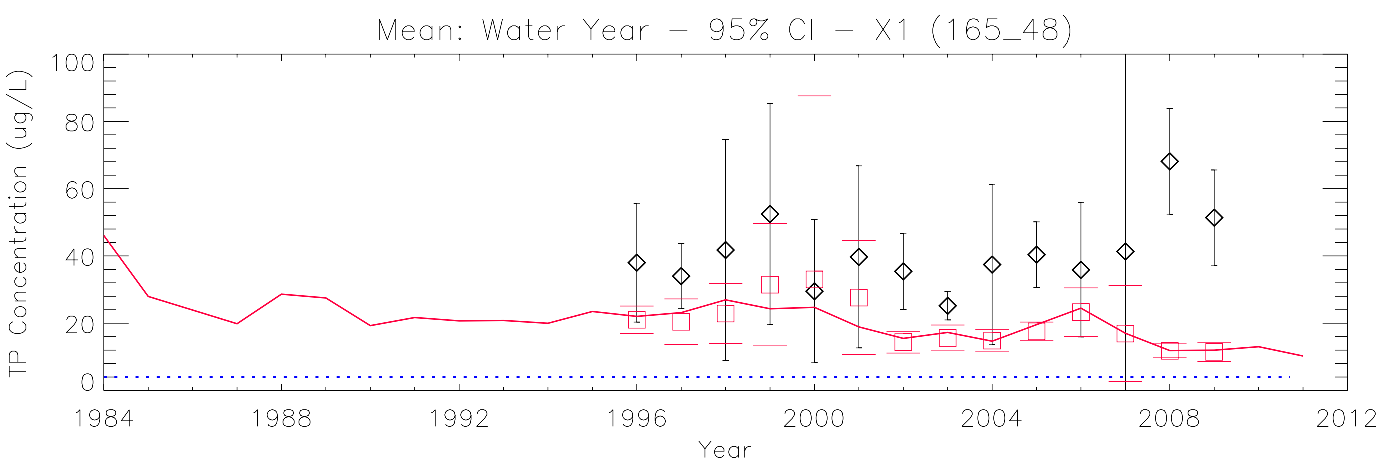
Mean: Water Year – 95% CI – X4 (173_47)
TP Concentration (ug/L)
Year

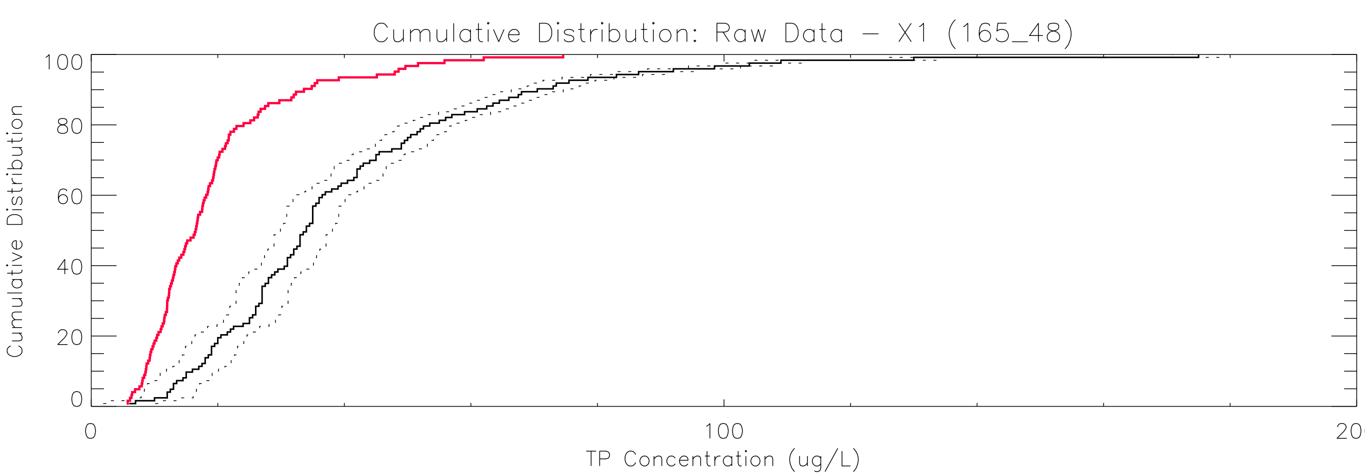


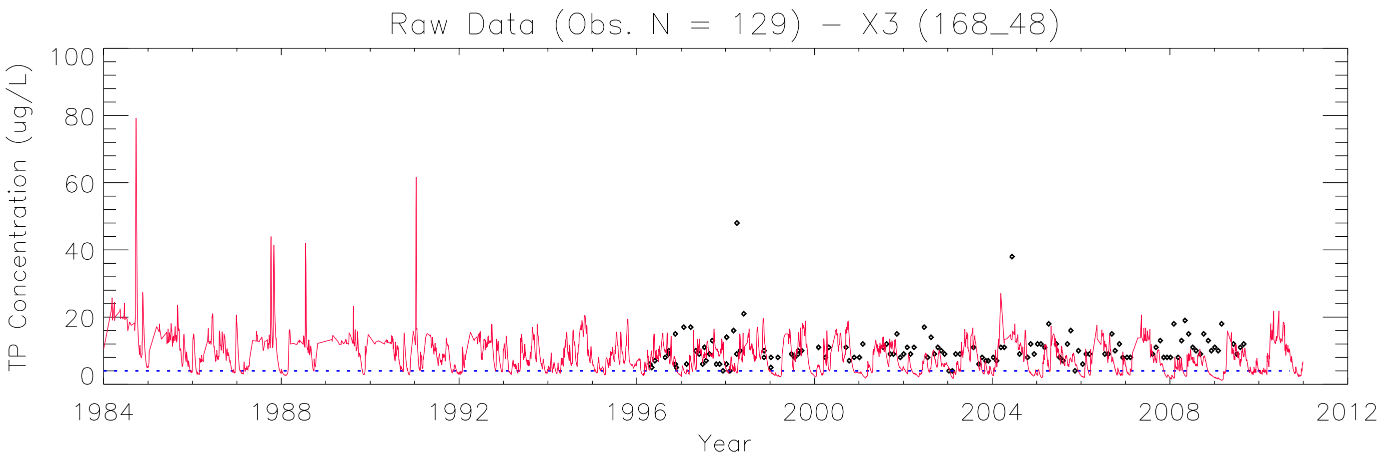
Cumulative Distribution: Raw Data – X4 (173_47)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 123) - X1 (165_48)
TP Concentration (ug/L)
Year

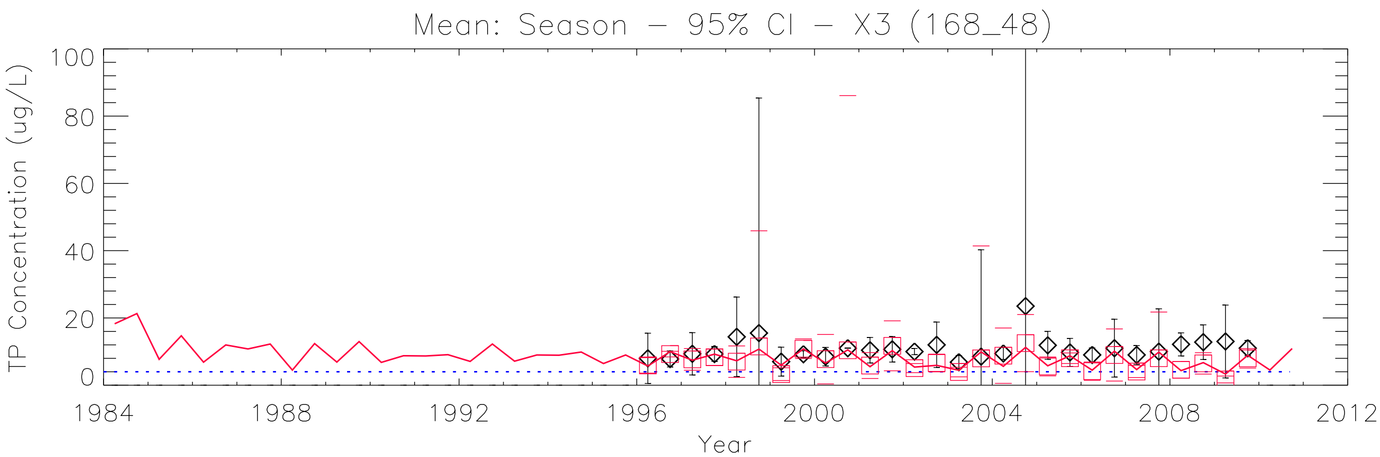

Mean: Season - 95% CI - X1 (165_48)
TP Concentration (ug/L)
Year


Mean: Water Year - 95% CI - X1 (165_48)
TP Concentration (ug/L)
Year

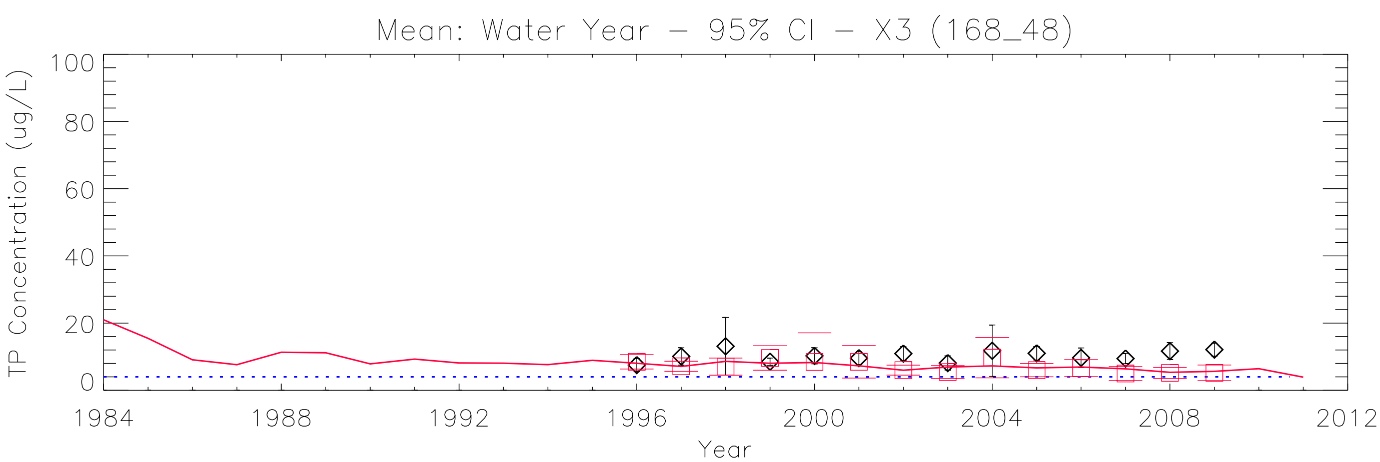

Cumulative Distribution: Raw Data - X1 (165_48)
Cumulative Distribution
TP Concentration (ug/L)



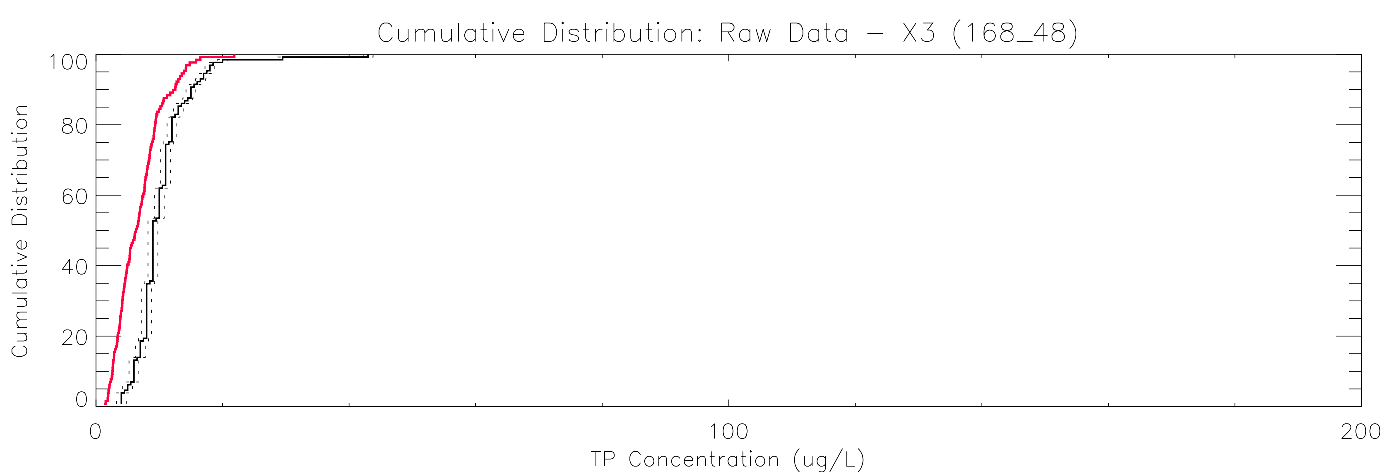
Raw Data (Obs. N = 129) – X3 (168_48)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012



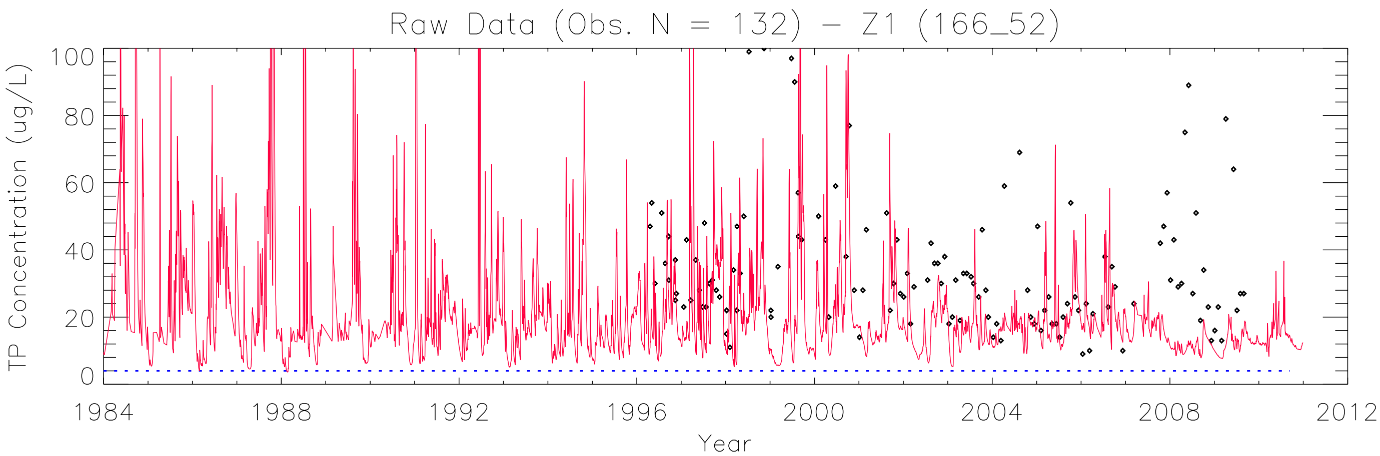
Mean: Season – 95% CI – X3 (168_48)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012



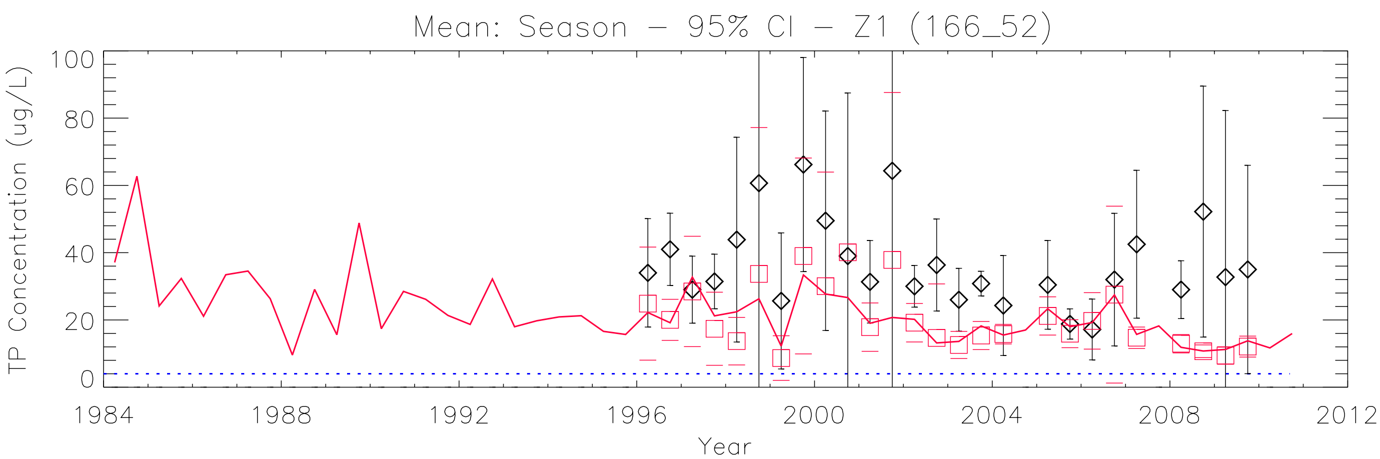
Mean: Water Year – 95% CI – X3 (168_48)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012



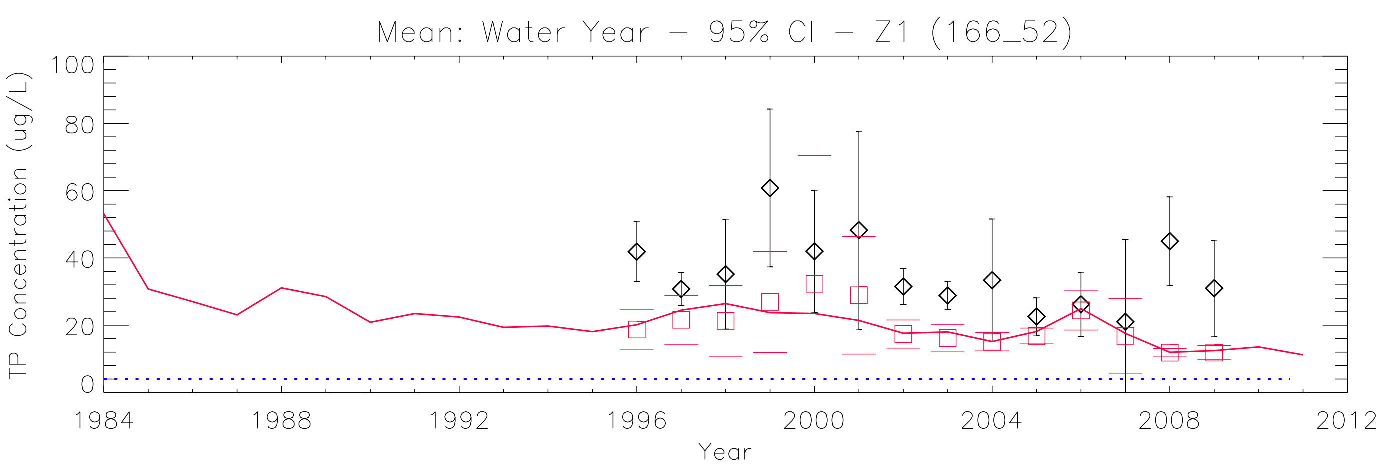
Cumulative Distribution: Raw Data – X3 (168_48)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200



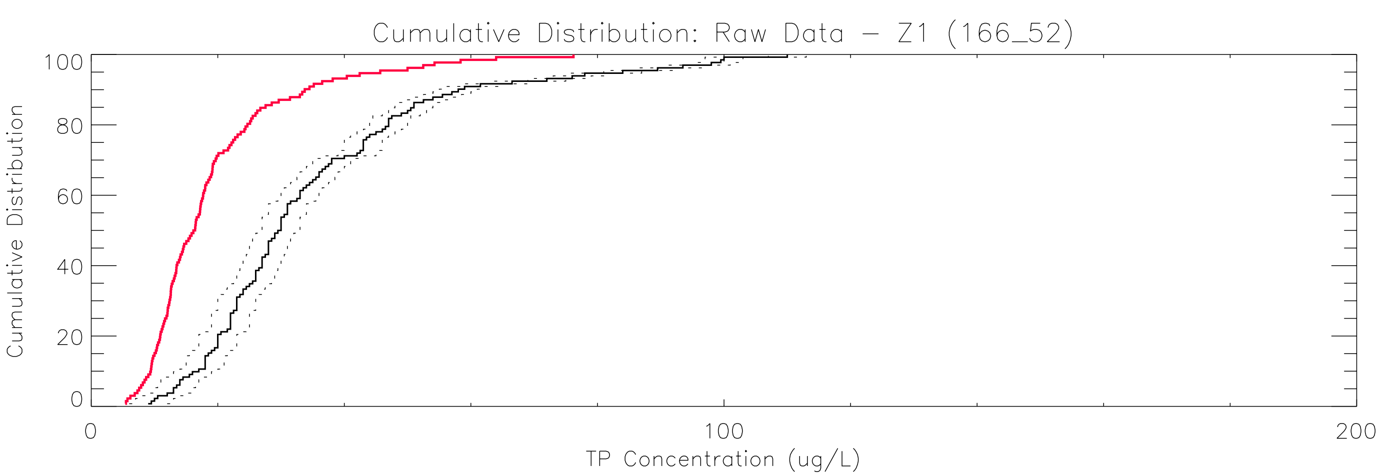
Raw Data (Obs. N = 132) – Z1 (166_52)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



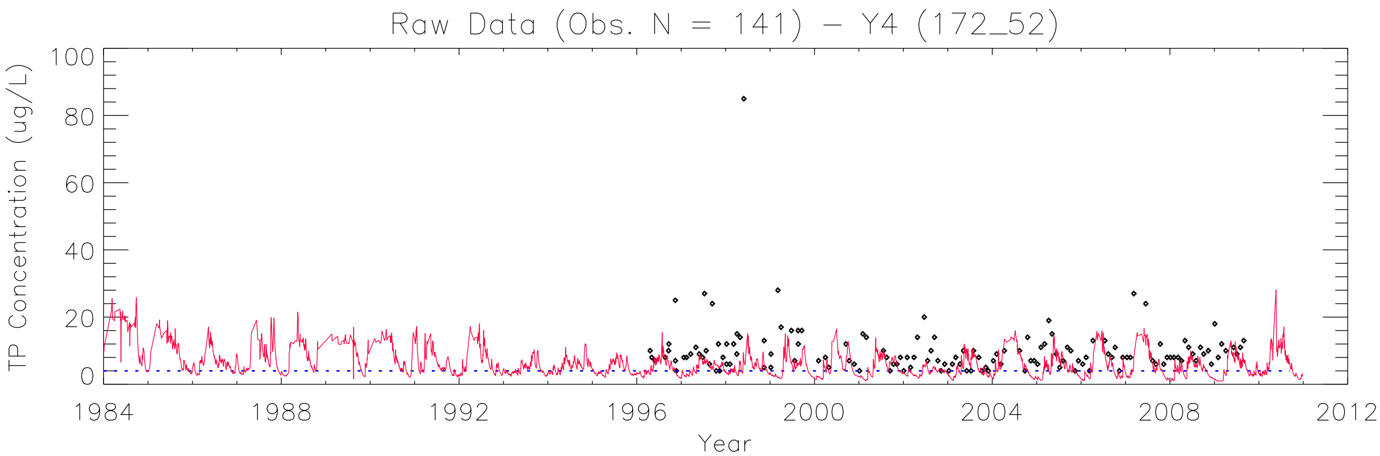
Mean: Season – 95% CI – Z1 (166_52)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

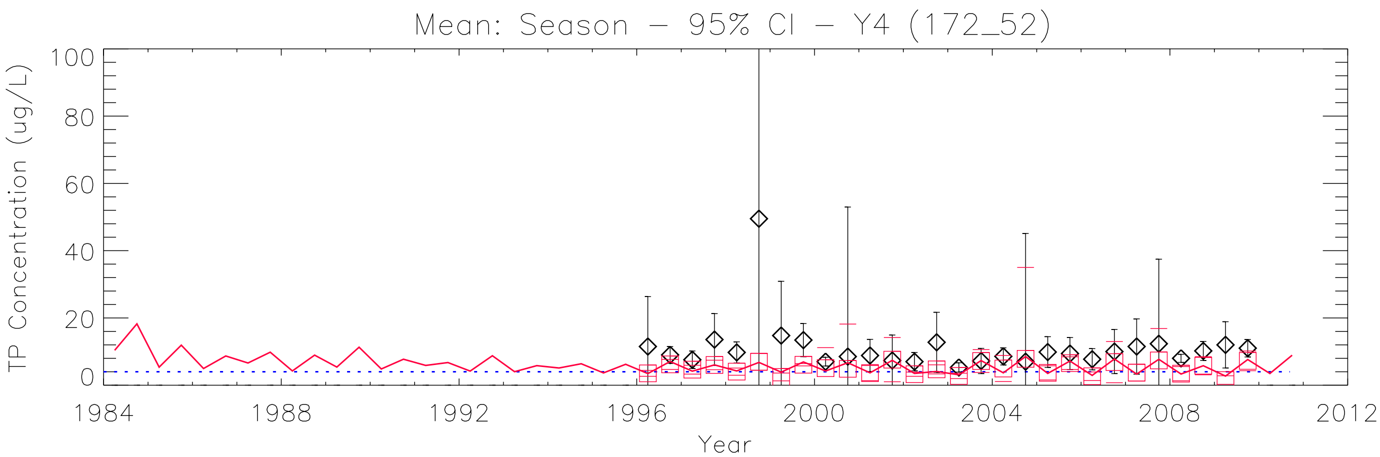


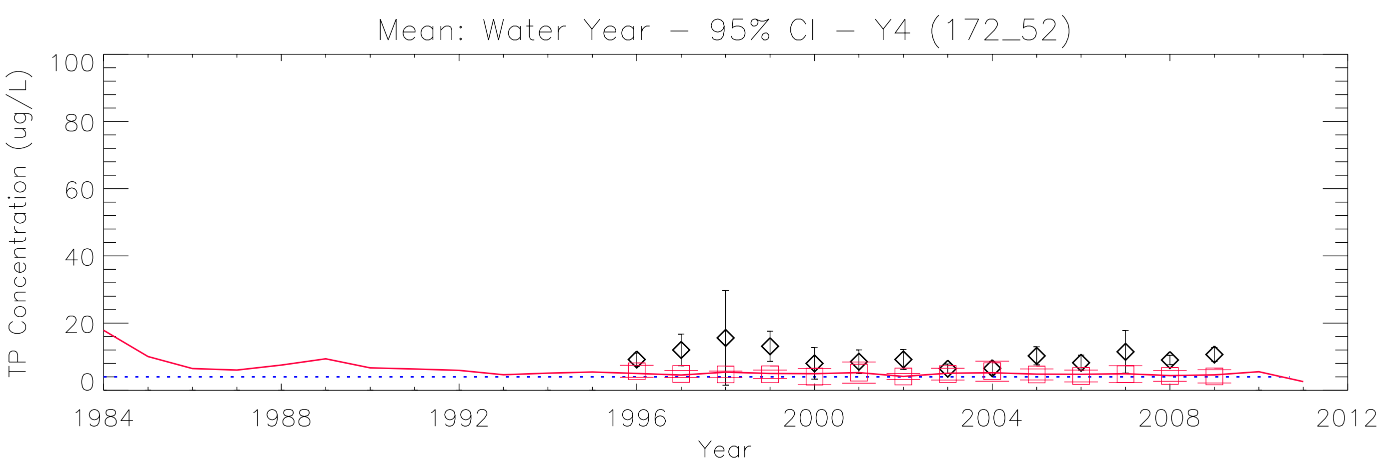
Mean: Water Year – 95% CI – Z1 (166_52)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

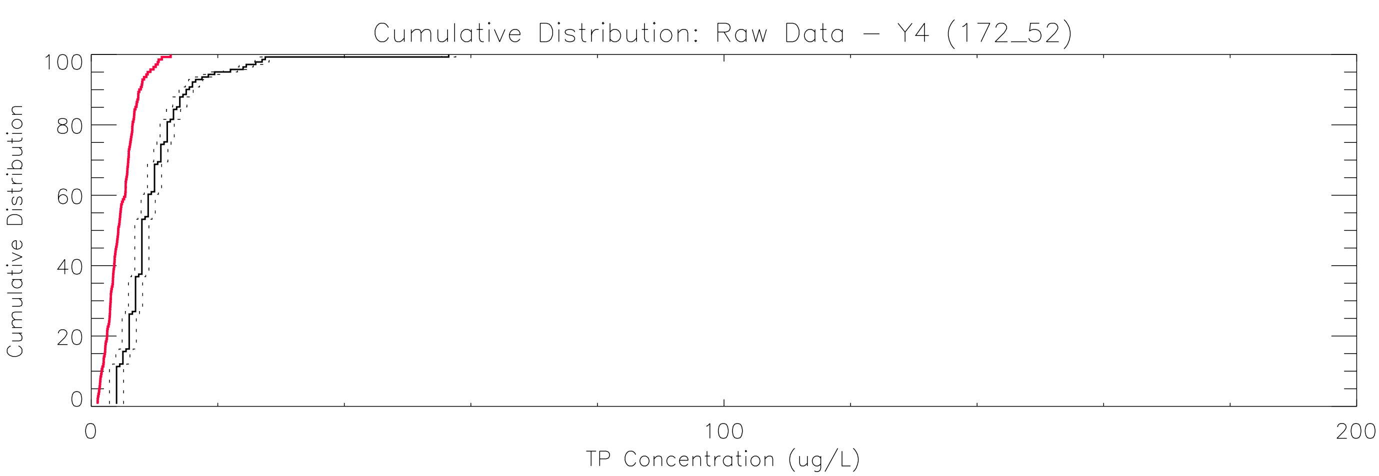


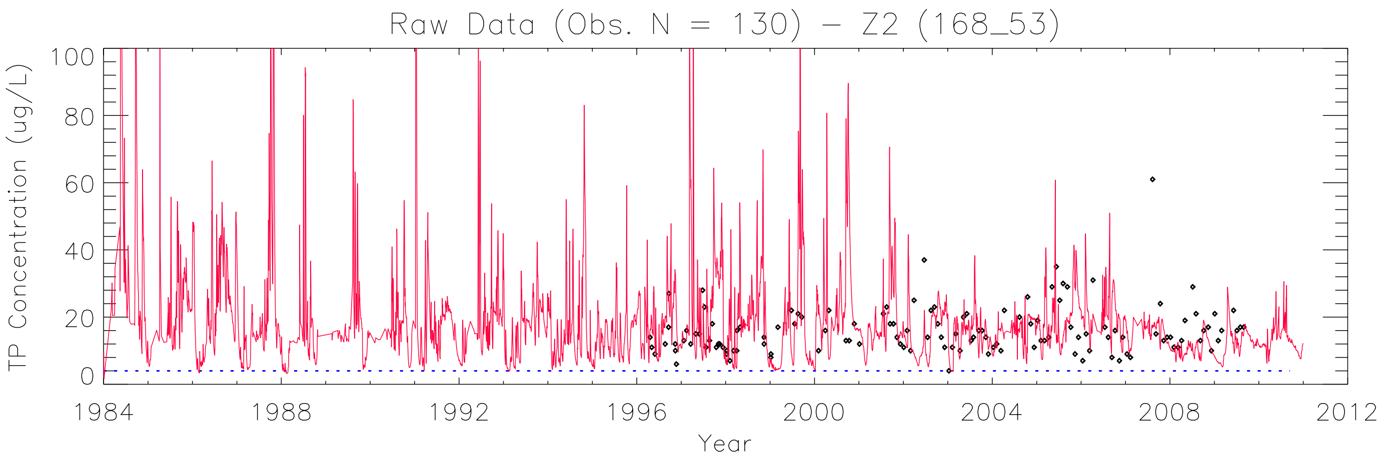
Cumulative Distribution: Raw Data – Z1 (166_52)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

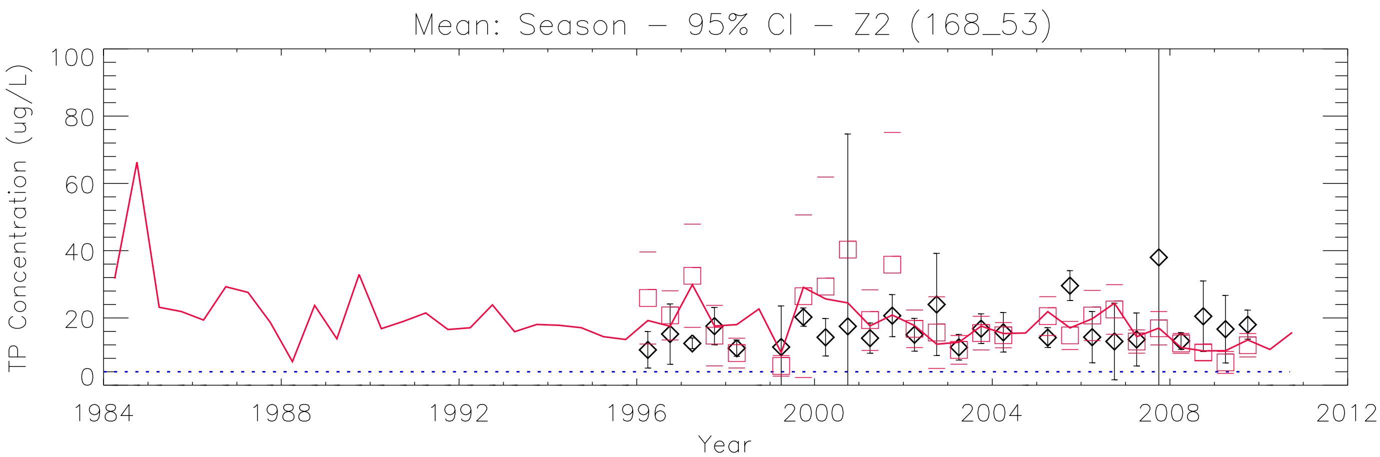

Raw Data (Obs. N = 141) – Y4 (172_52)
TP Concentration (ug/L)
Year

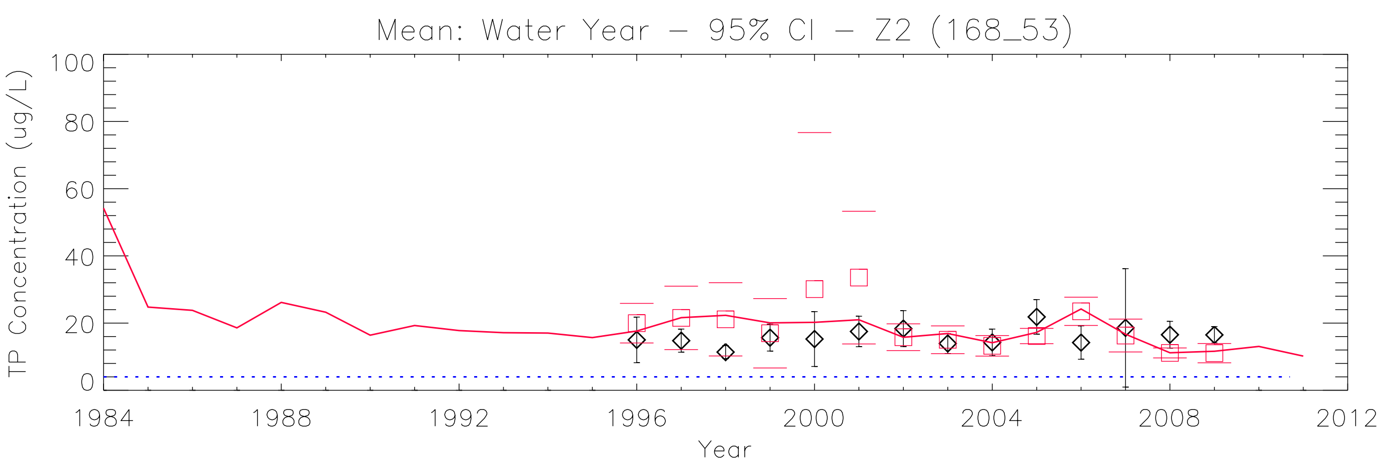

Mean: Season – 95% CI – Y4 (172_52)
TP Concentration (ug/L)
Year

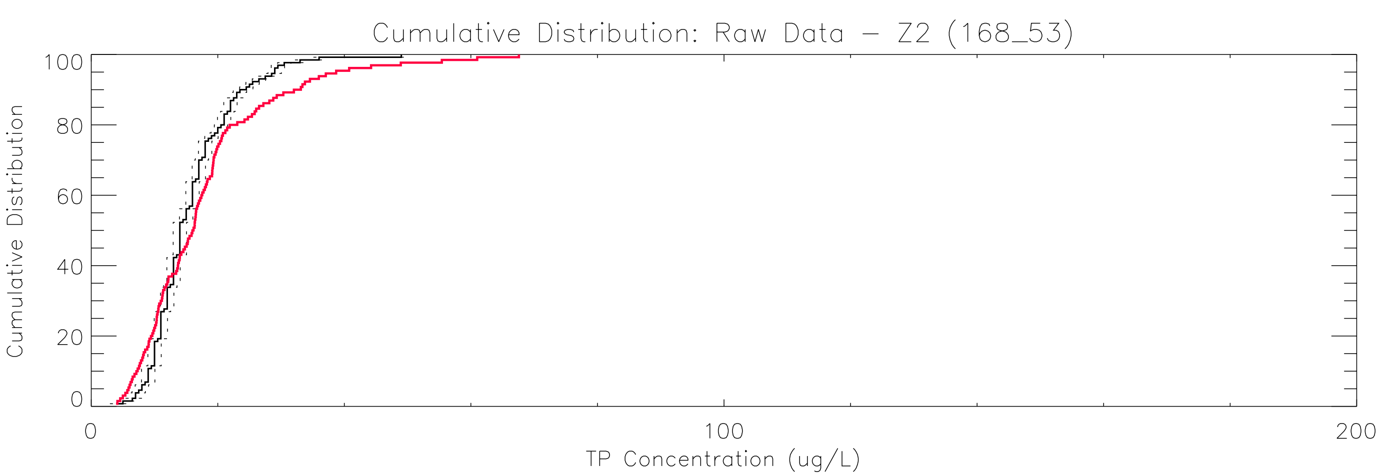

Mean: Water Year – 95% CI – Y4 (172_52)
TP Concentration (ug/L)
Year

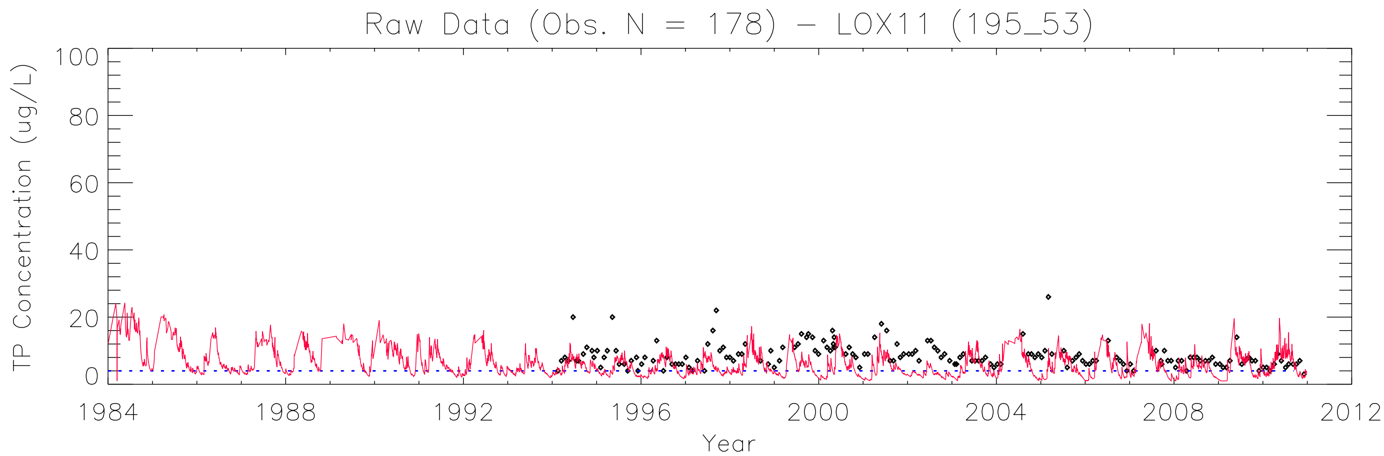

Cumulative Distribution: Raw Data – Y4 (172_52)
Cumulative Distribution
TP Concentration (ug/L)

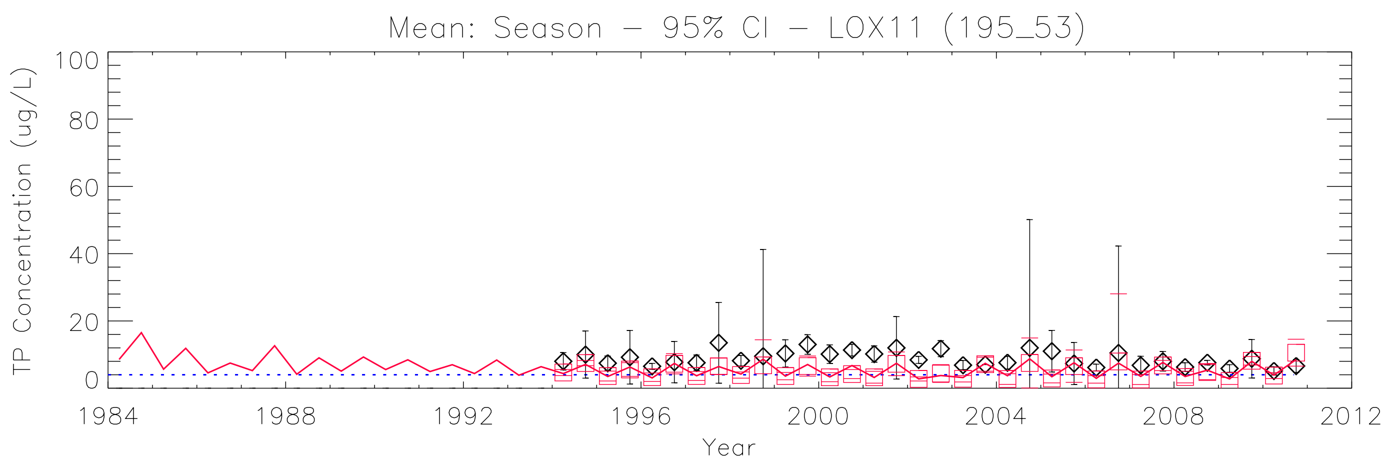

Raw Data (Obs. N = 130) – Z2 (168_53)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

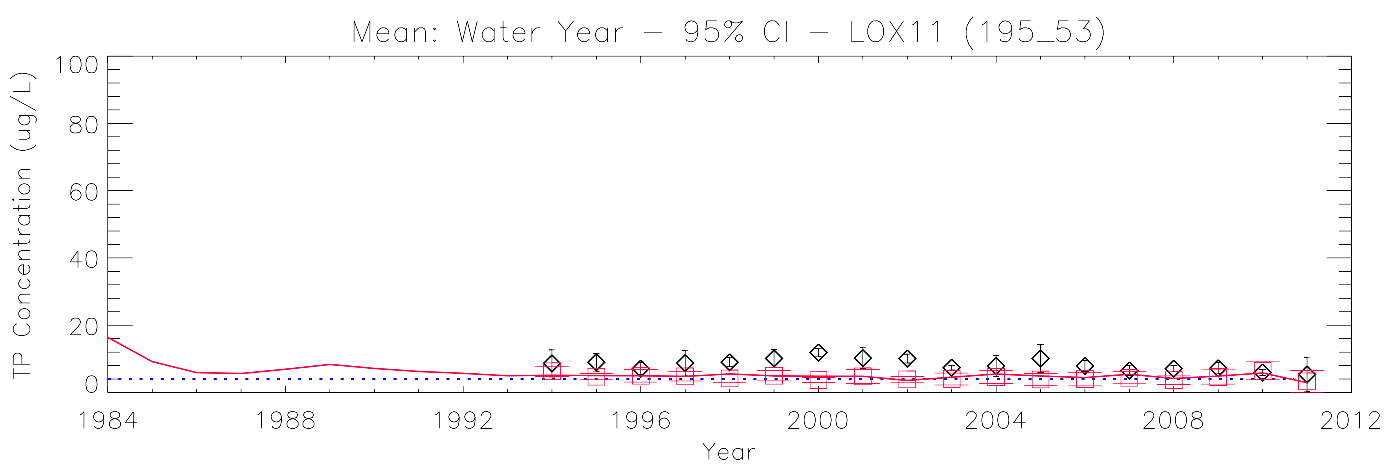

Mean: Season – 95% CI – Z2 (168_53)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

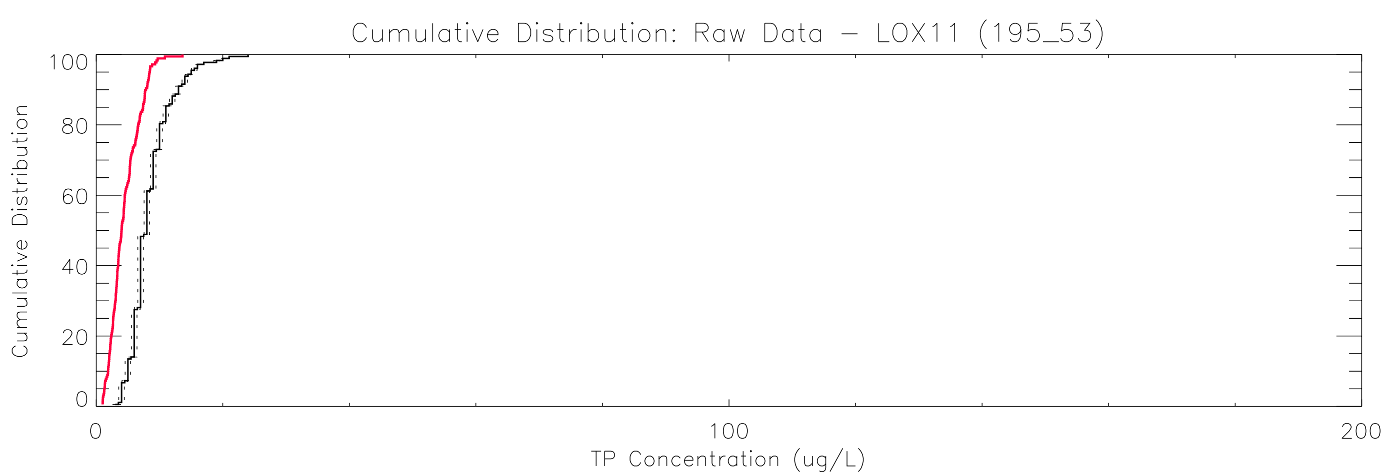

Mean: Water Year – 95% CI – Z2 (168_53)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

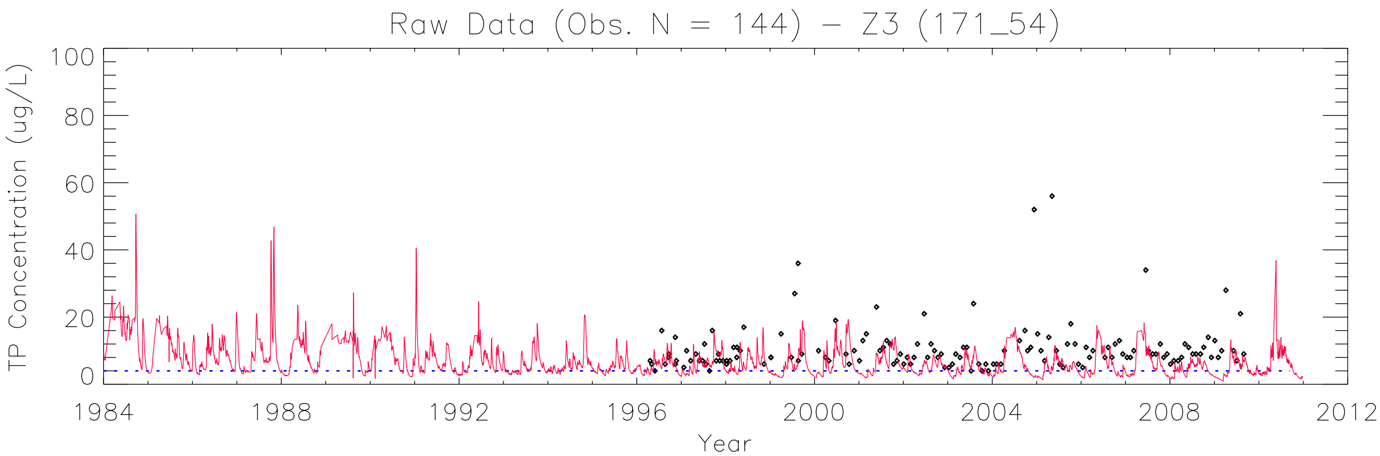

Cumulative Distribution: Raw Data – Z2 (168_53)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

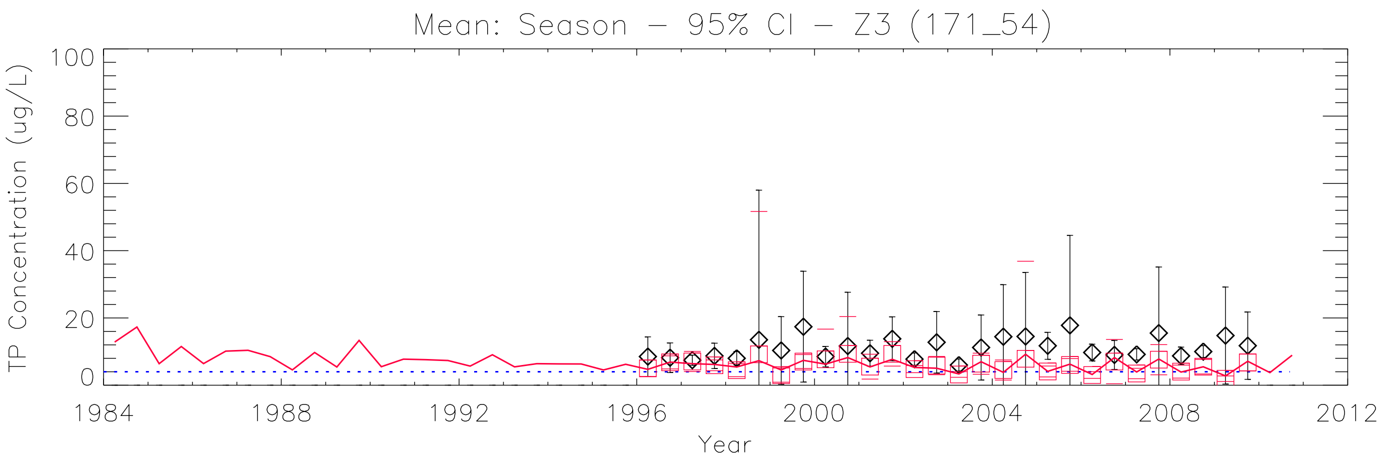

Raw Data (Obs. N = 178) – LOX11 (195_53)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

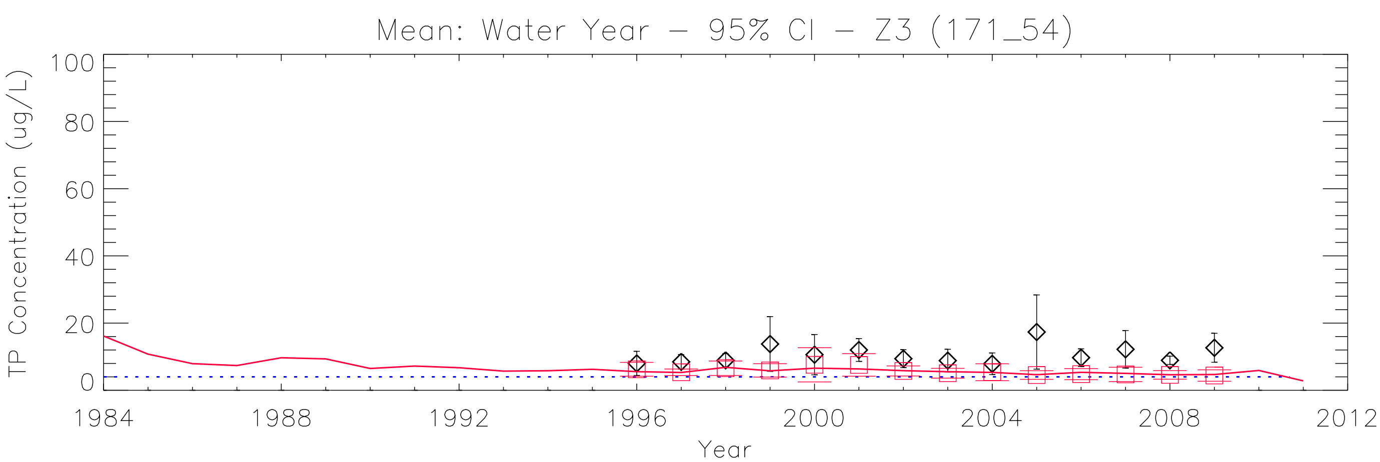

Mean: Season – 95% CI – LOX11 (195_53)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

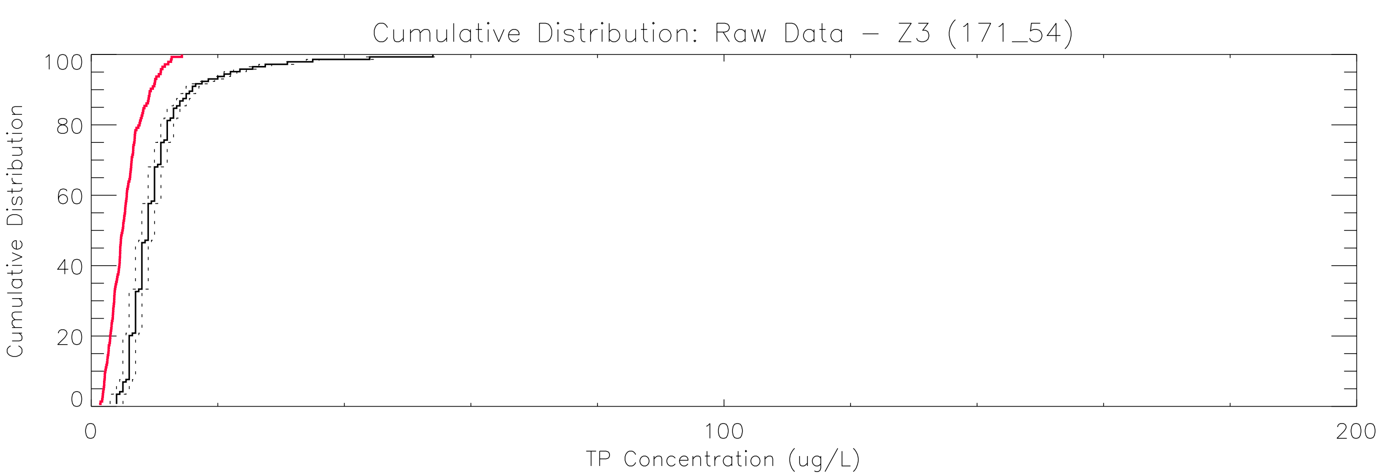

Mean: Water Year – 95% CI – LOX11 (195_53)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

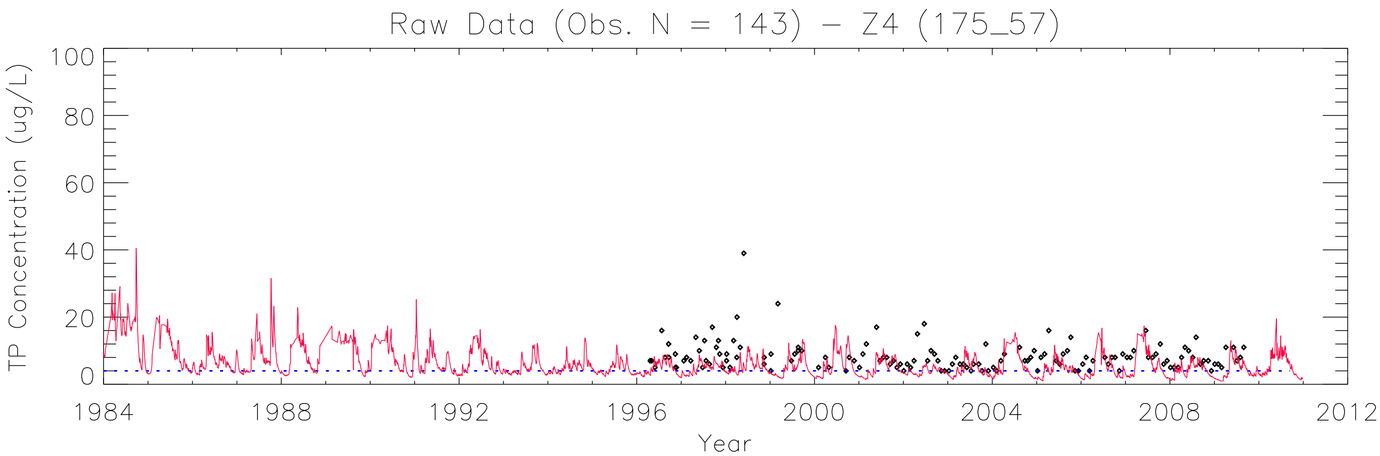

Cumulative Distribution: Raw Data – LOX11 (195_53)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

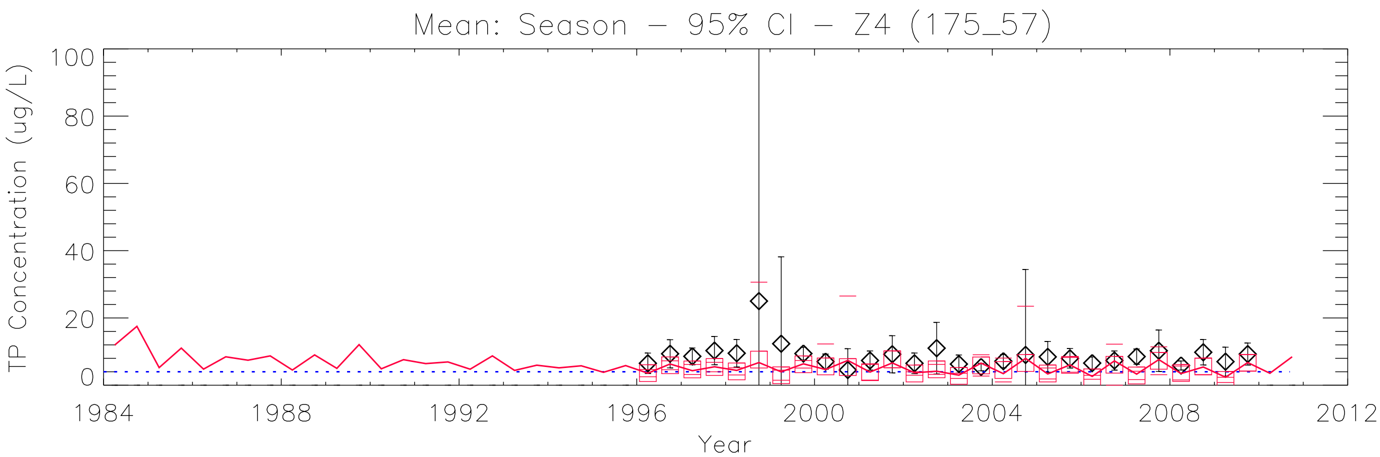

Raw Data (Obs. N = 144) – Z3 (171_54)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

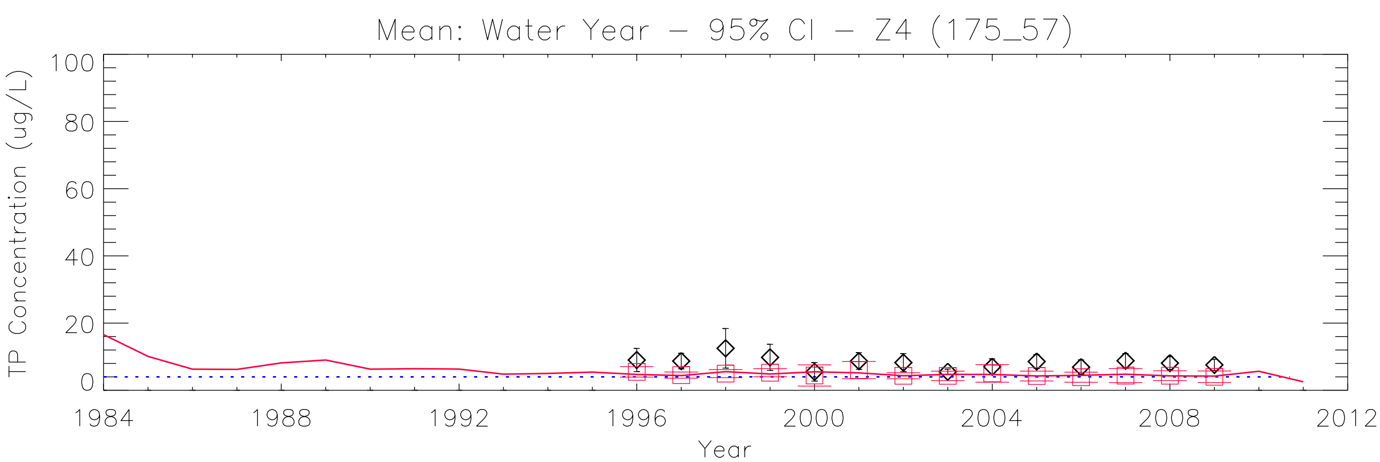

Mean: Season – 95% CI – Z3 (171_54)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

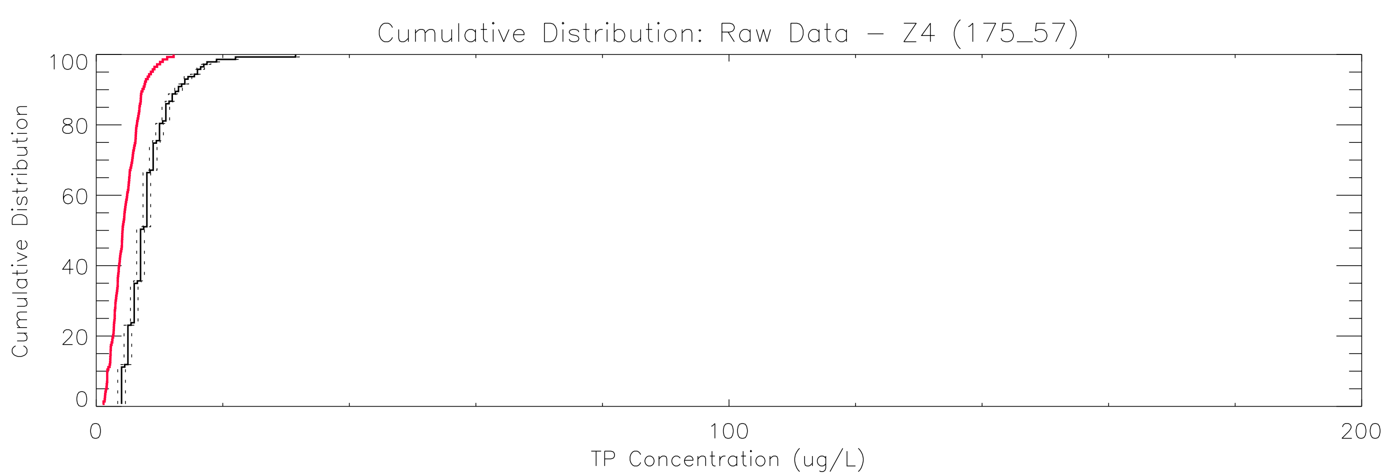

Mean: Water Year – 95% CI – Z3 (171_54)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

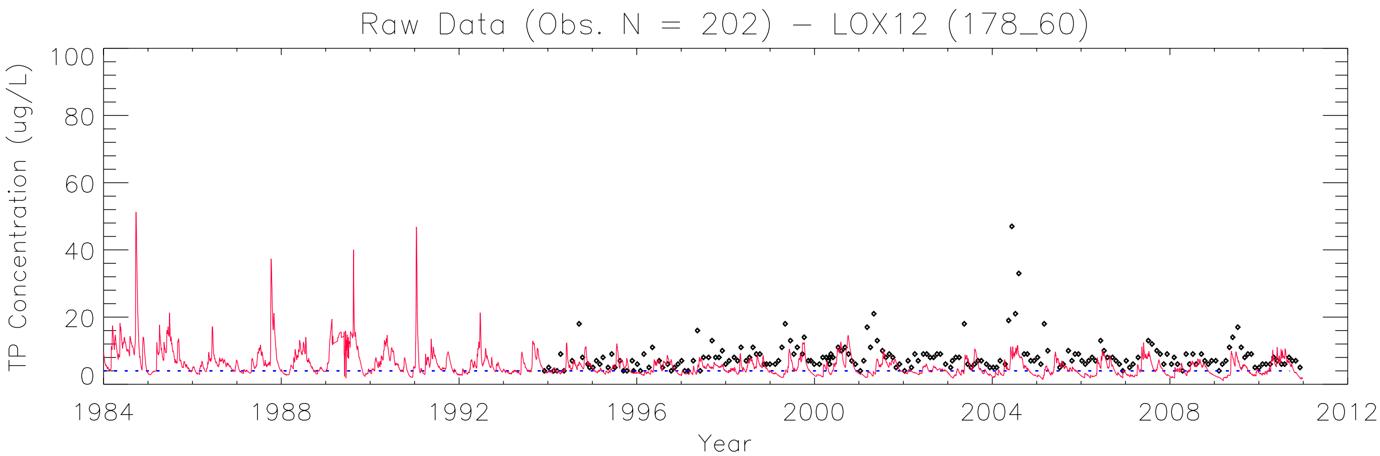

Cumulative Distribution: Raw Data – Z3 (171_54)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

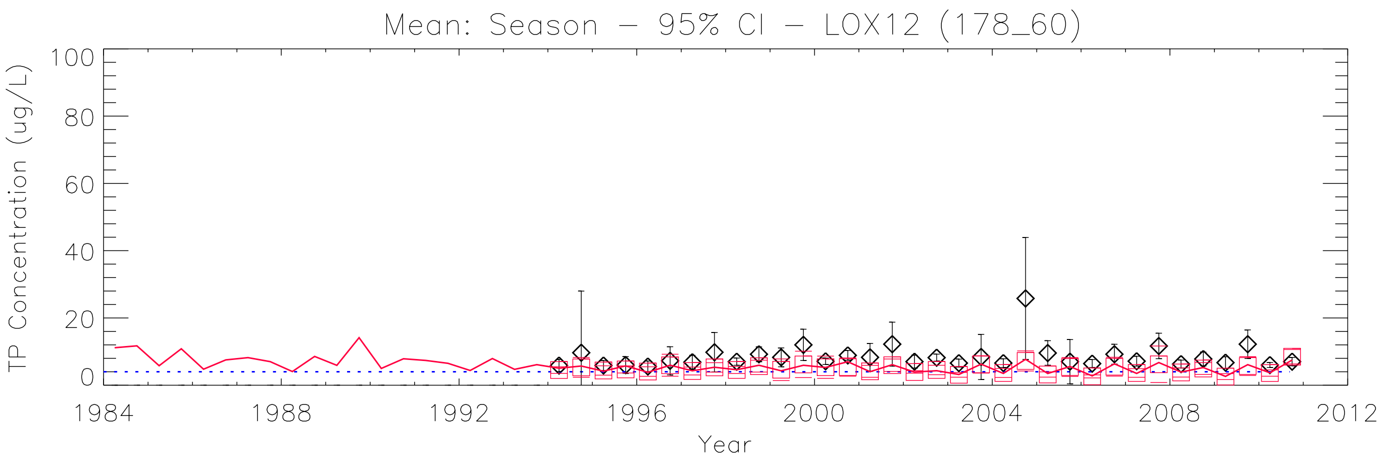

Raw Data (Obs. N = 143) – Z4 (175_57)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

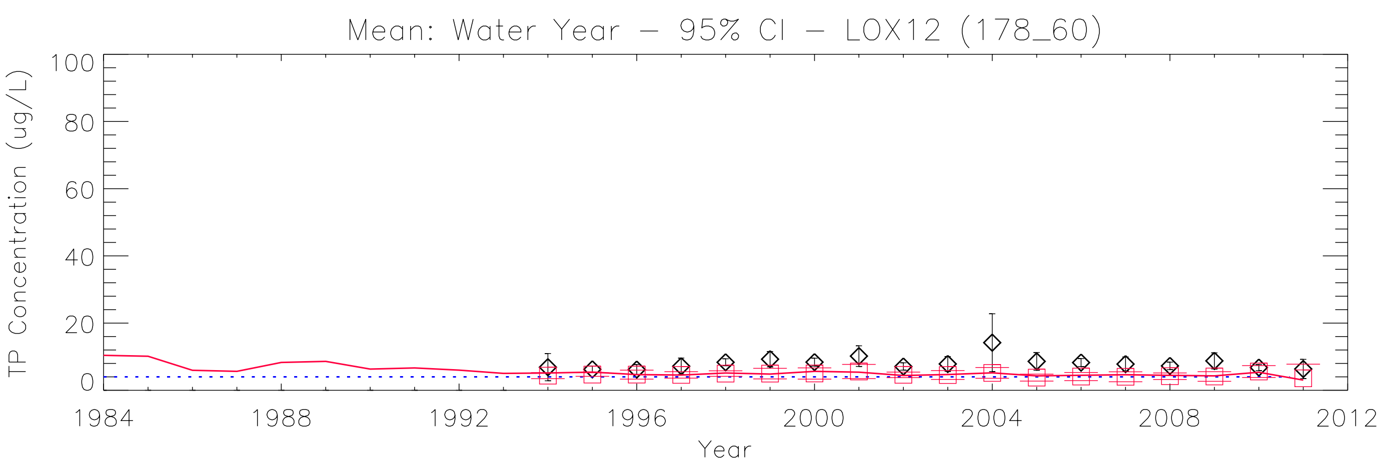

Mean: Season – 95% CI – Z4 (175_57)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

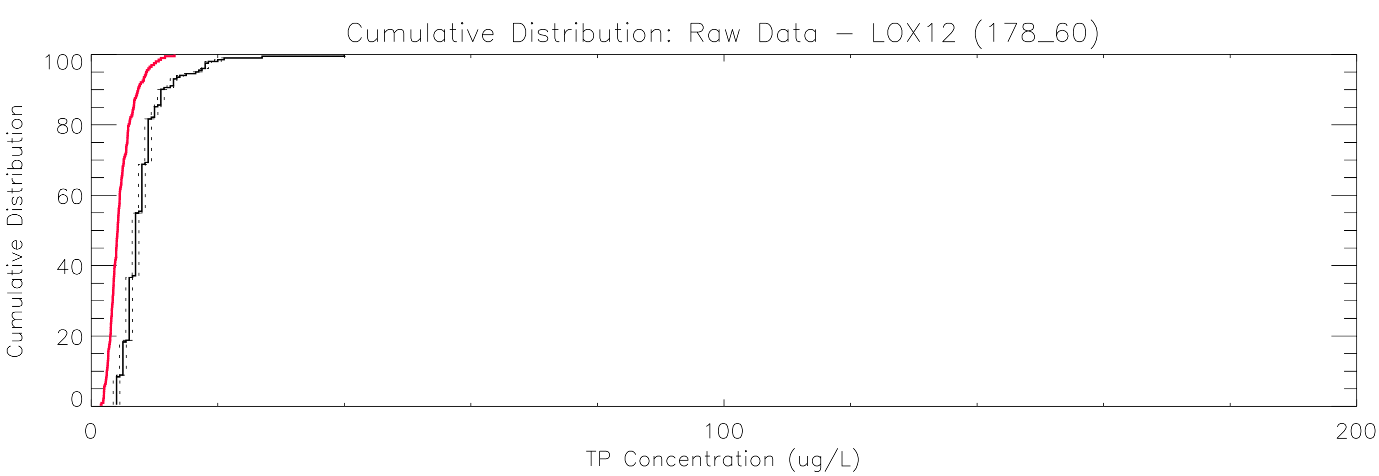

Mean: Water Year – 95% CI – Z4 (175_57)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

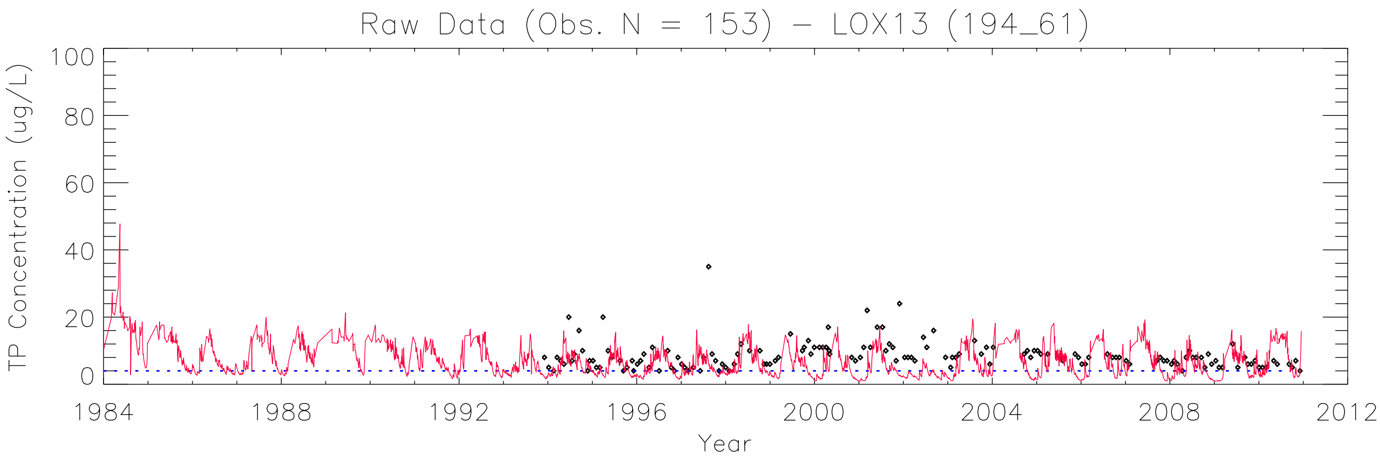

Cumulative Distribution: Raw Data – Z4 (175_57)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

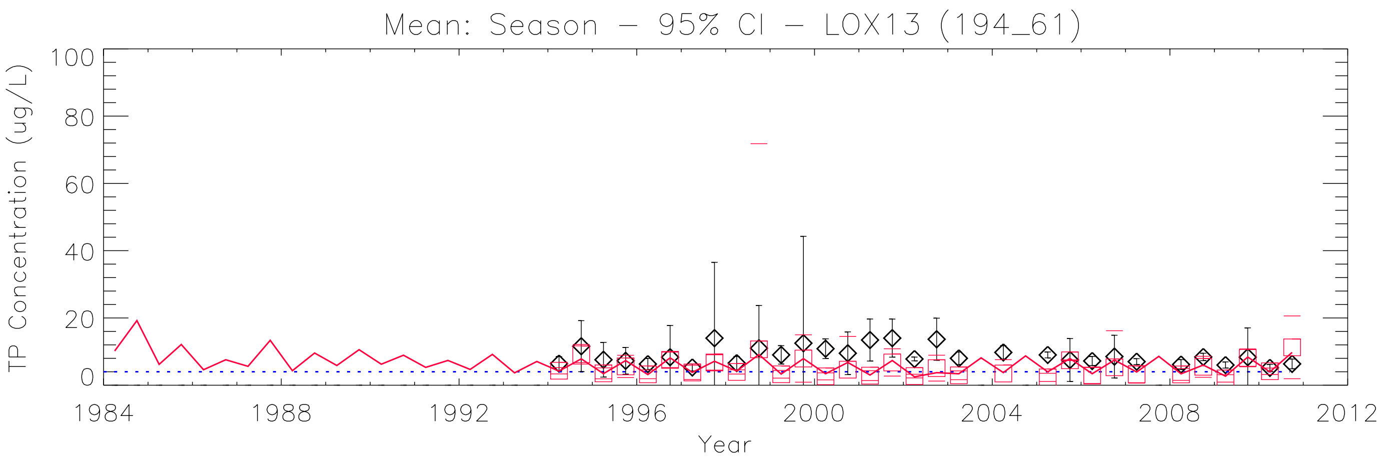

Raw Data (Obs. N = 202) − LOX12 (178_60)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

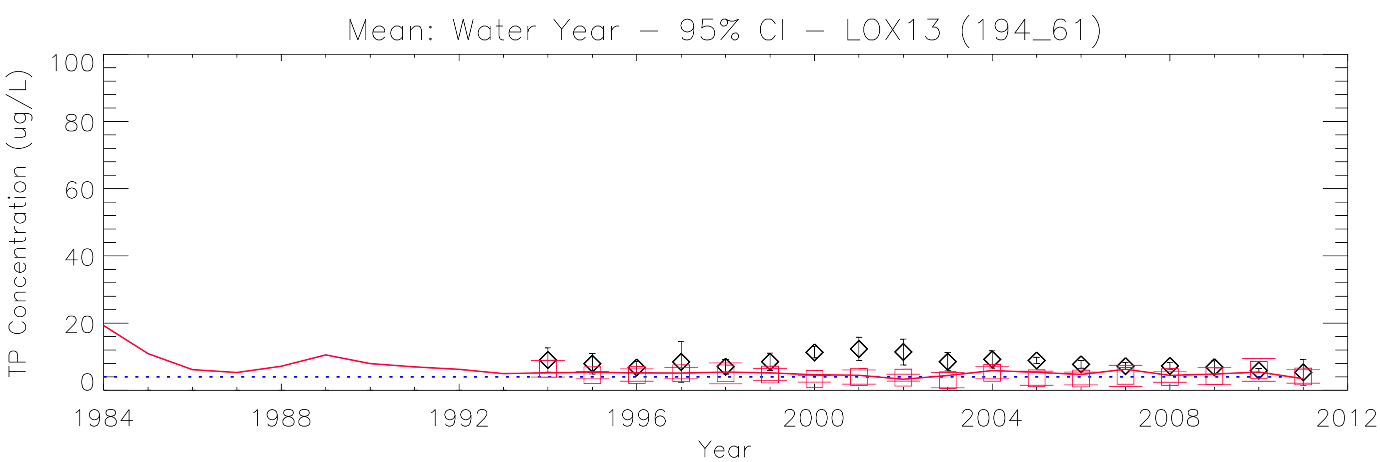

Mean: Season − 95% CI − LOX12 (178_60)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

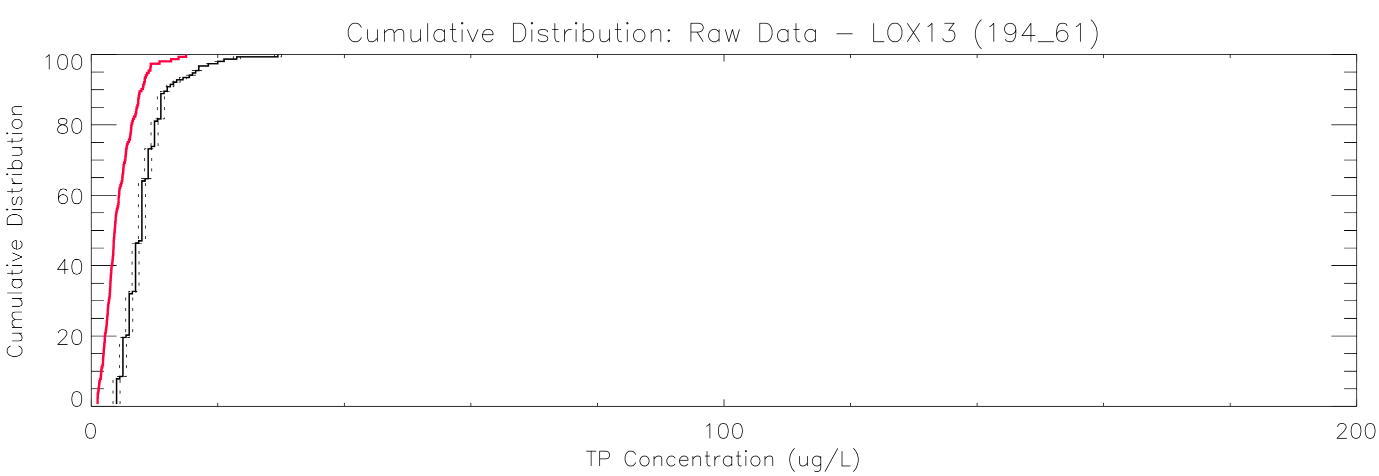

Mean: Water Year − 95% CI − LOX12 (178_60)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

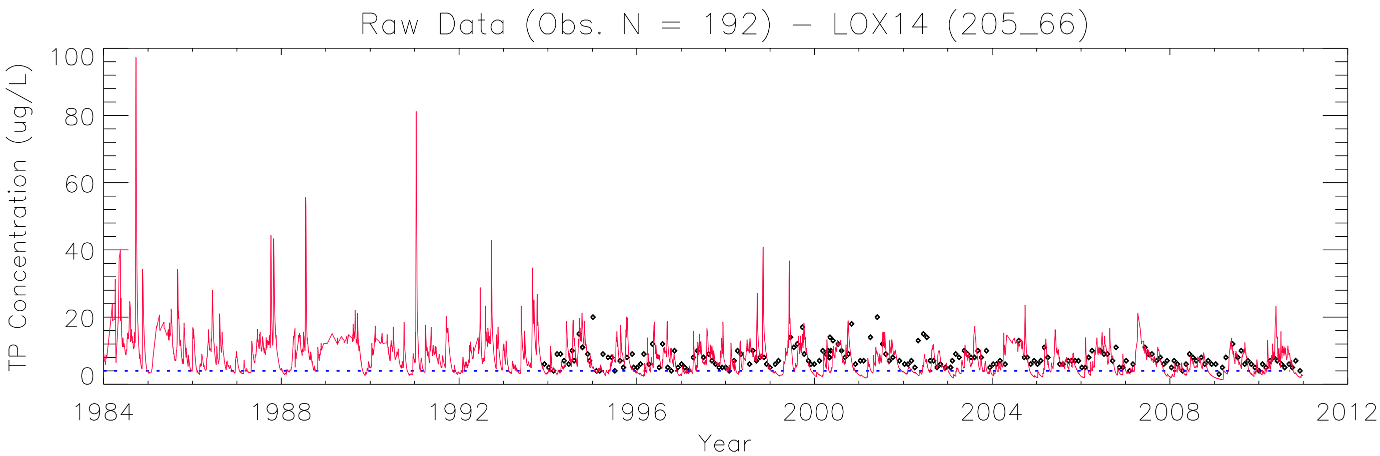

Cumulative Distribution: Raw Data − LOX12 (178_60)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

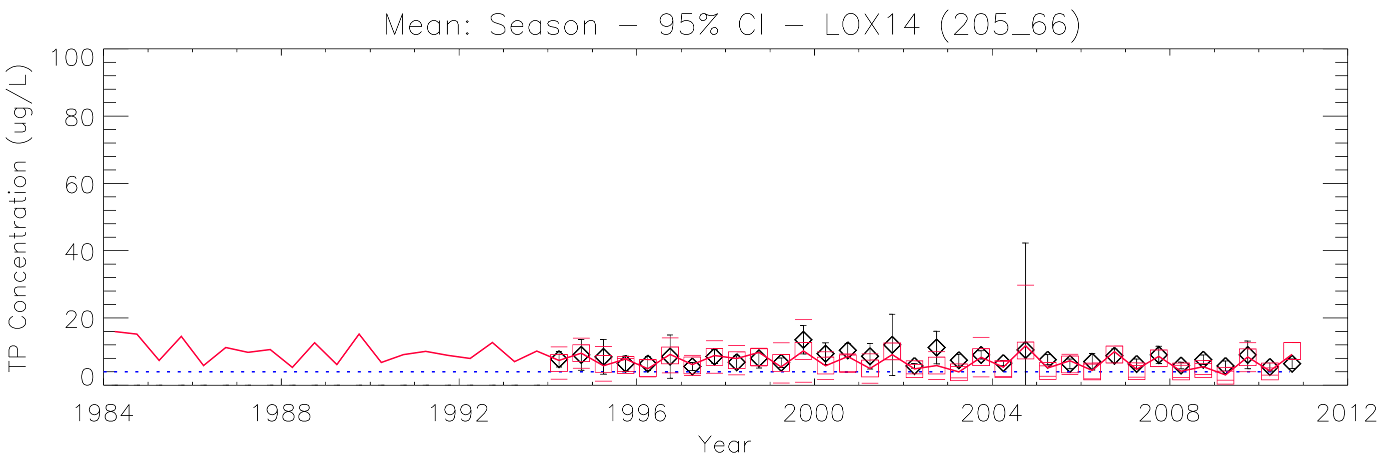

Raw Data (Obs. N = 153) – LOX13 (194_61)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

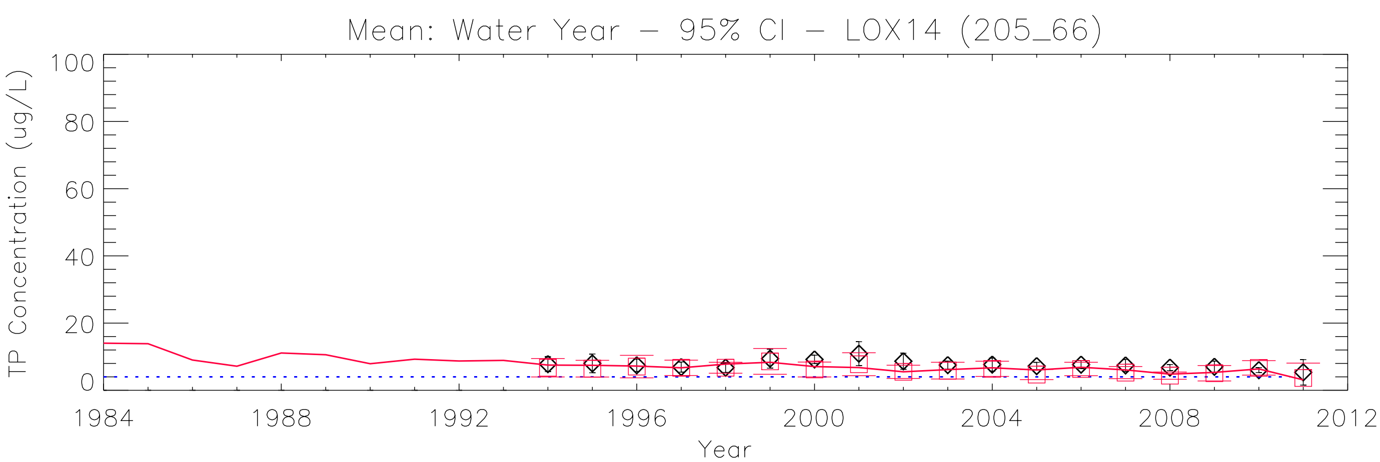

Mean: Season – 95% CI – LOX13 (194_61)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

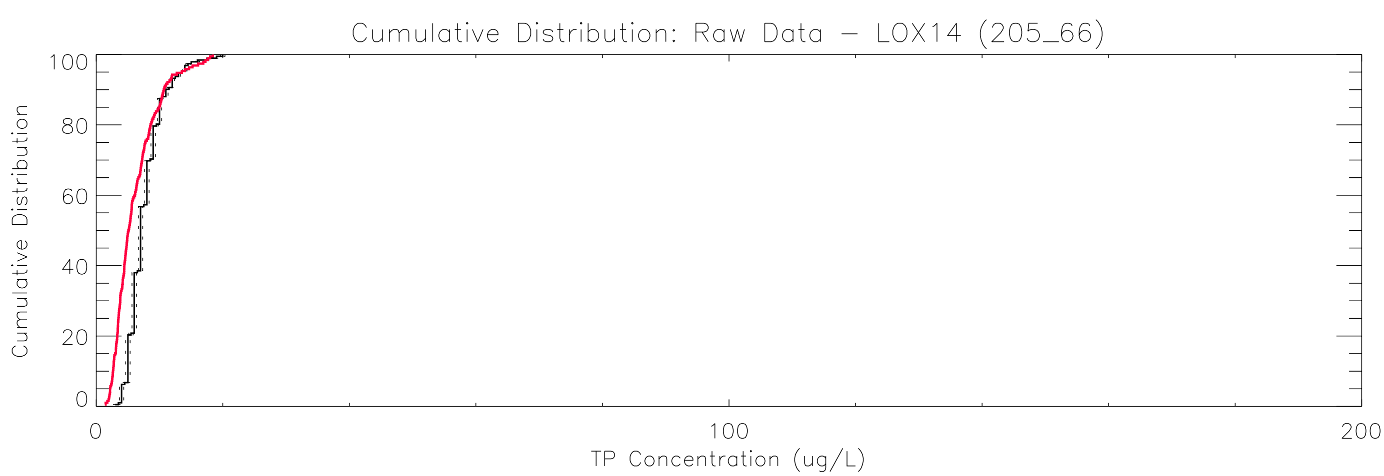

Mean: Water Year – 95% CI – LOX13 (194_61)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

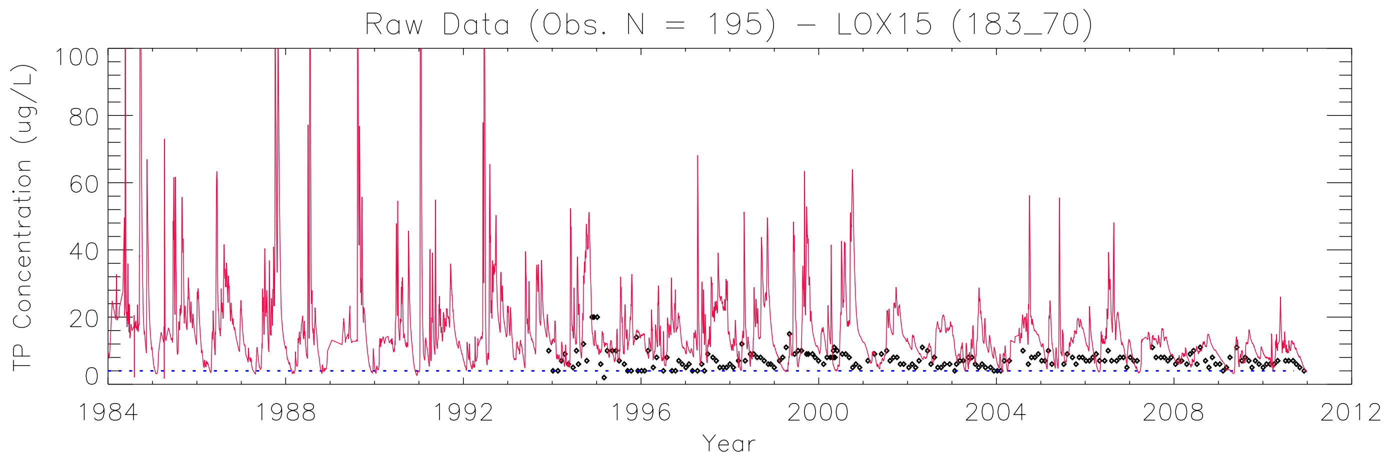

Cumulative Distribution: Raw Data – LOX13 (194_61)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

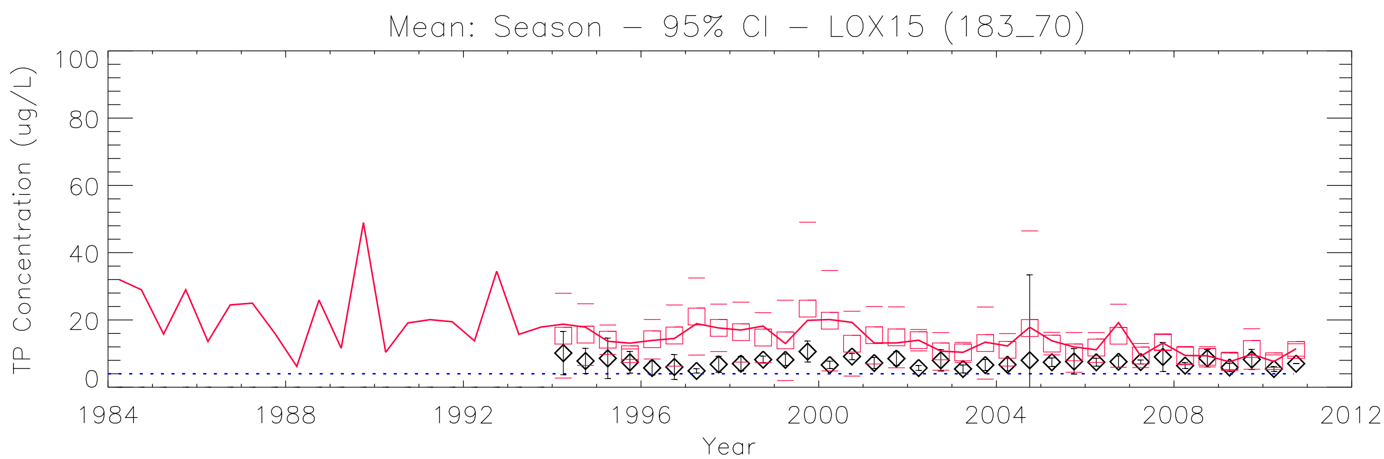

Raw Data (Obs. N = 192) - LOX14 (205_66)
TP Concentration (ug/L)
Year

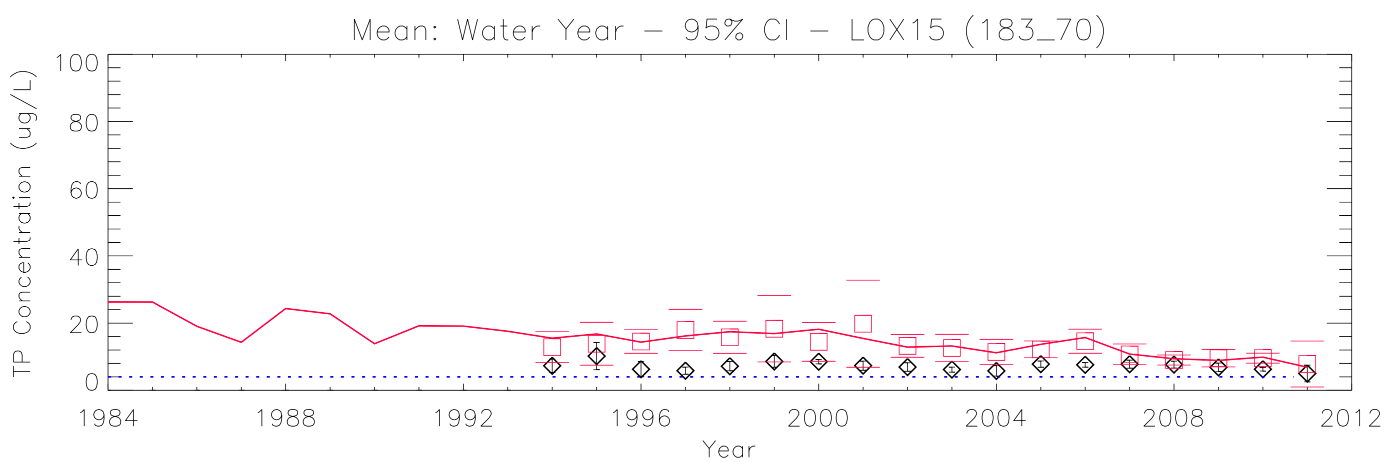

Mean: Season - 95% CI - LOX14 (205_66)
TP Concentration (ug/L)
Year

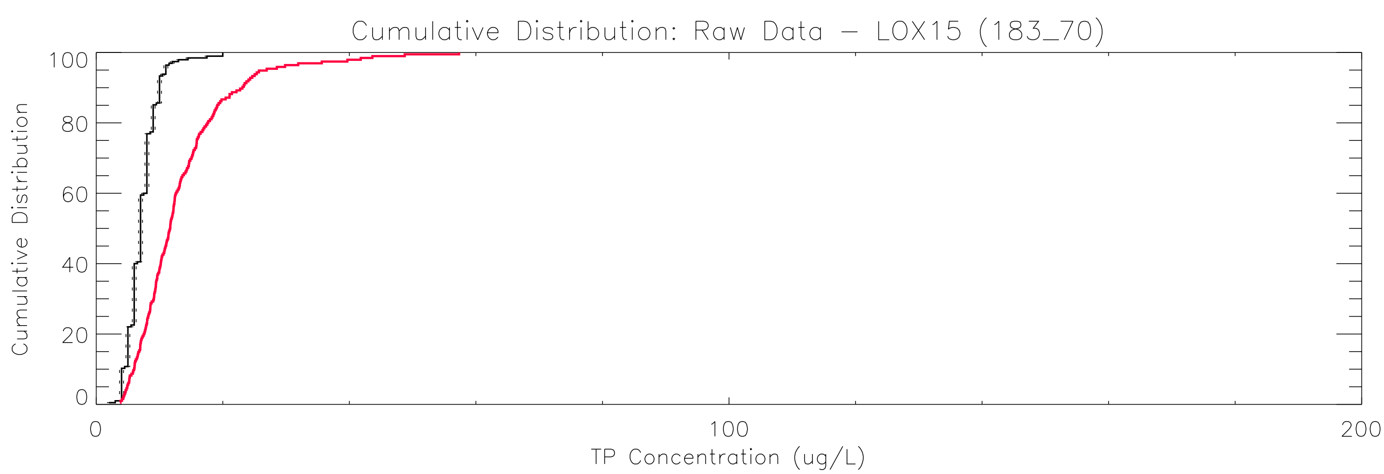

Mean: Water Year - 95% CI - LOX14 (205_66)
TP Concentration (ug/L)
Year

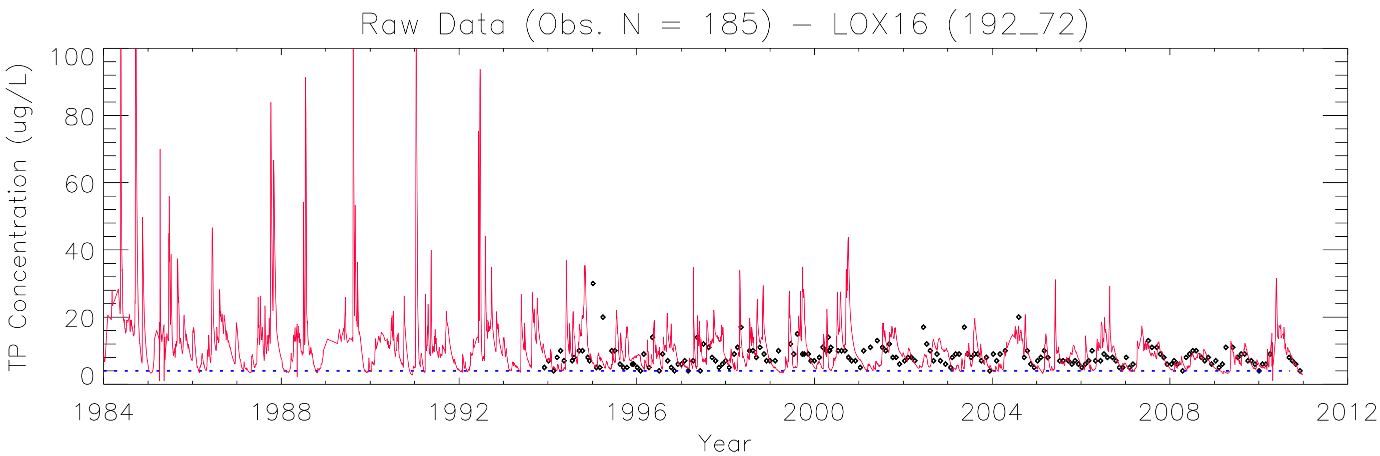

Cumulative Distribution: Raw Data - LOX14 (205_66)
Cumulative Distribution
TP Concentration (ug/L)

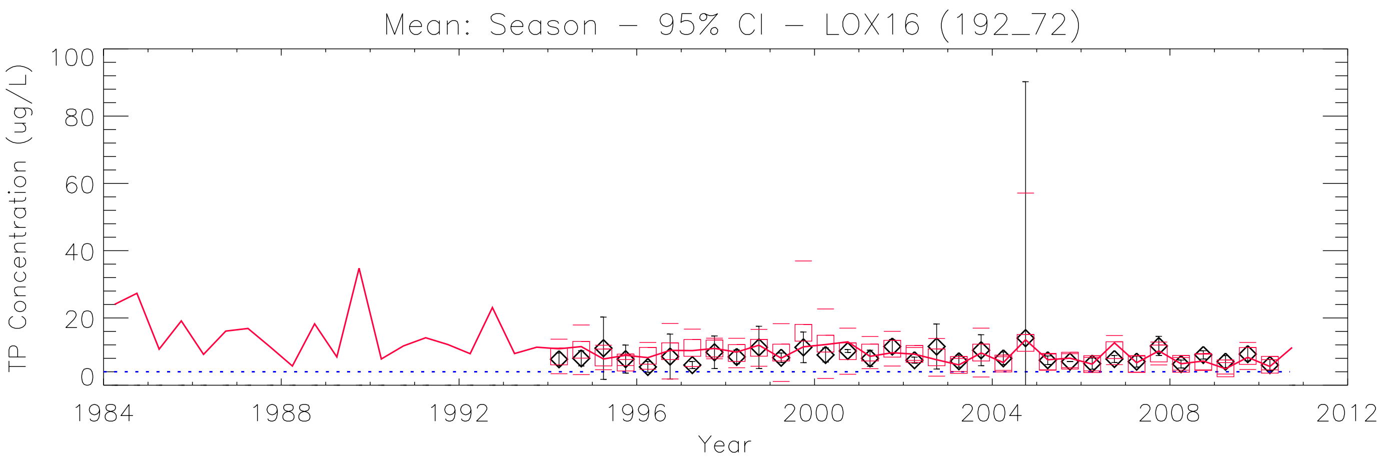

Raw Data (Obs. N = 195) – LOX15 (183_70)
TP Concentration (ug/L)
Year

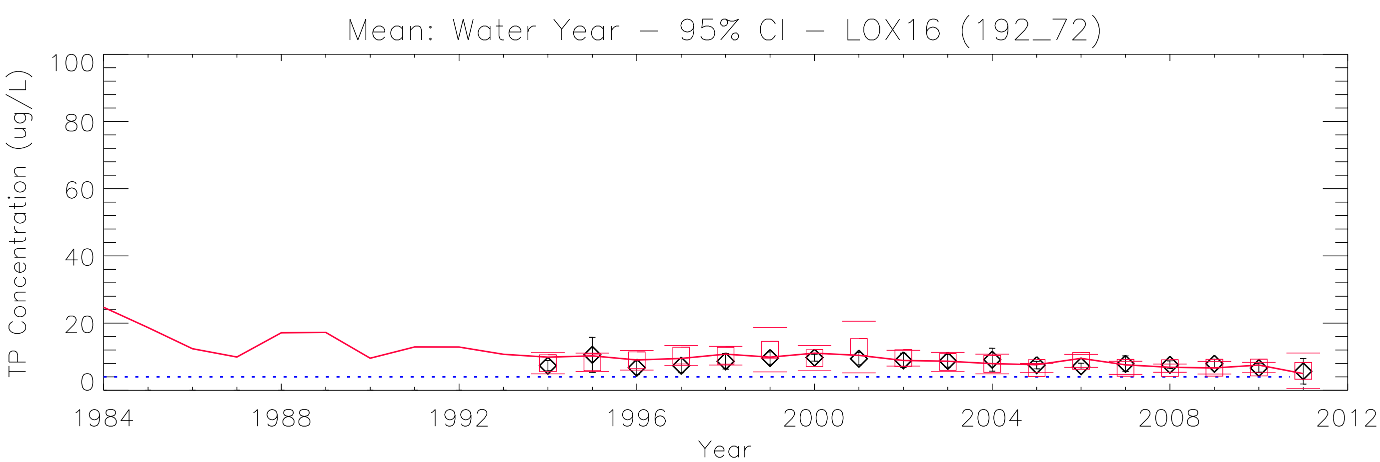

Mean: Season – 95% CI – LOX15 (183_70)
TP Concentration (ug/L)
Year

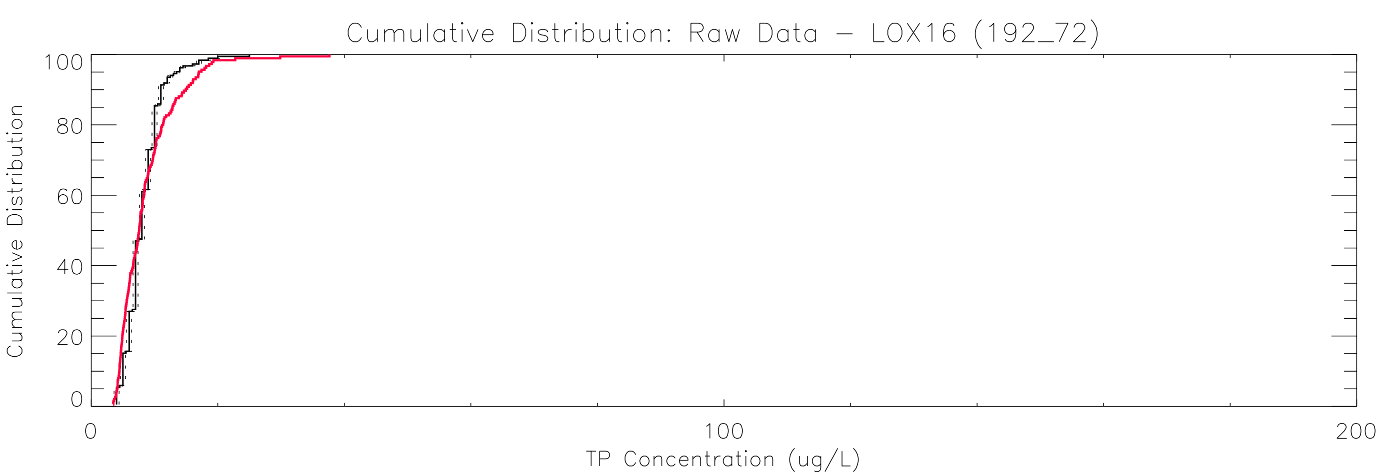

Mean: Water Year – 95% CI – LOX15 (183_70)
TP Concentration (ug/L)
Year

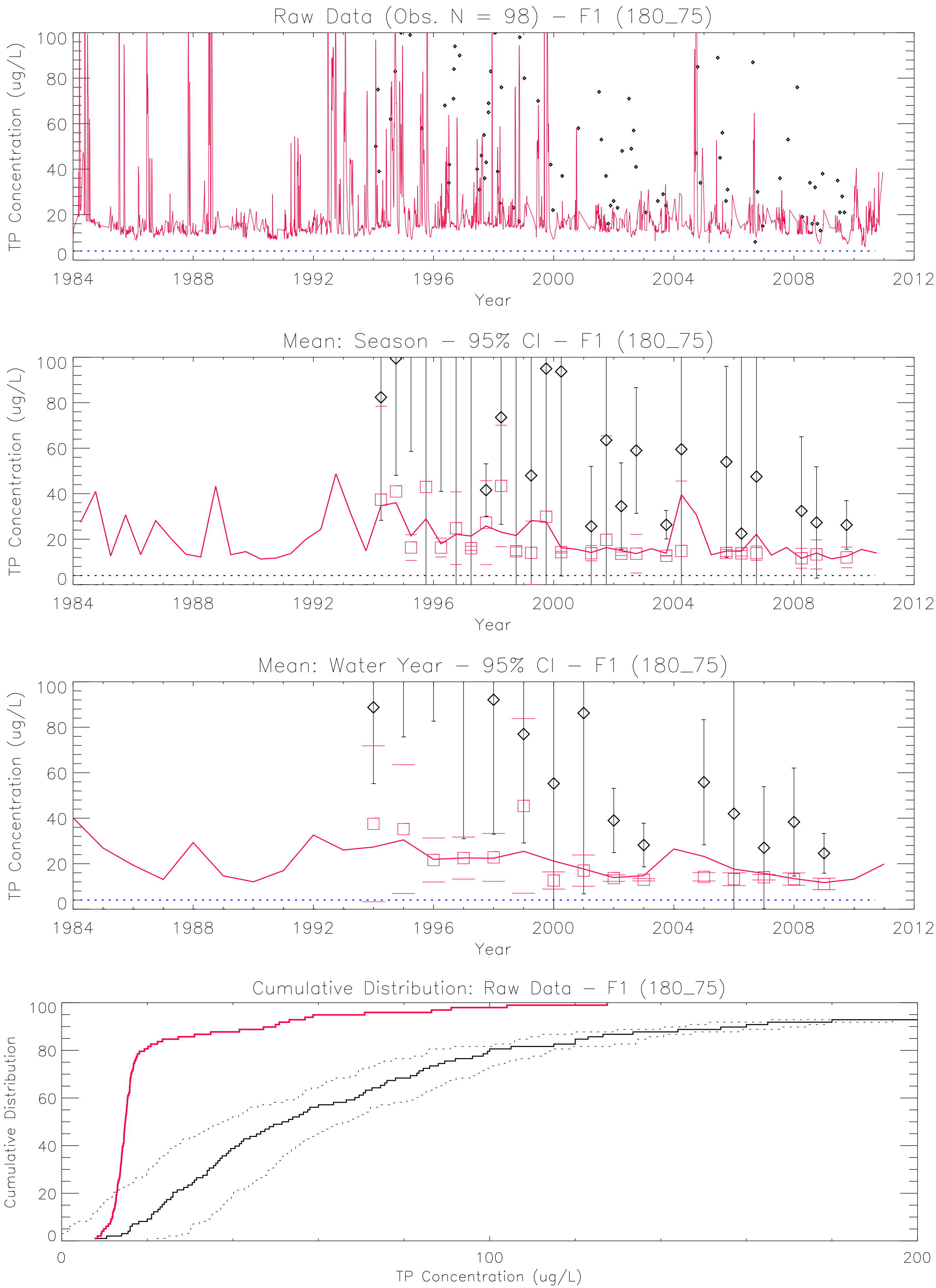

Cumulative Distribution: Raw Data – LOX15 (183_70)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 185) – LOX16 (192_72)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

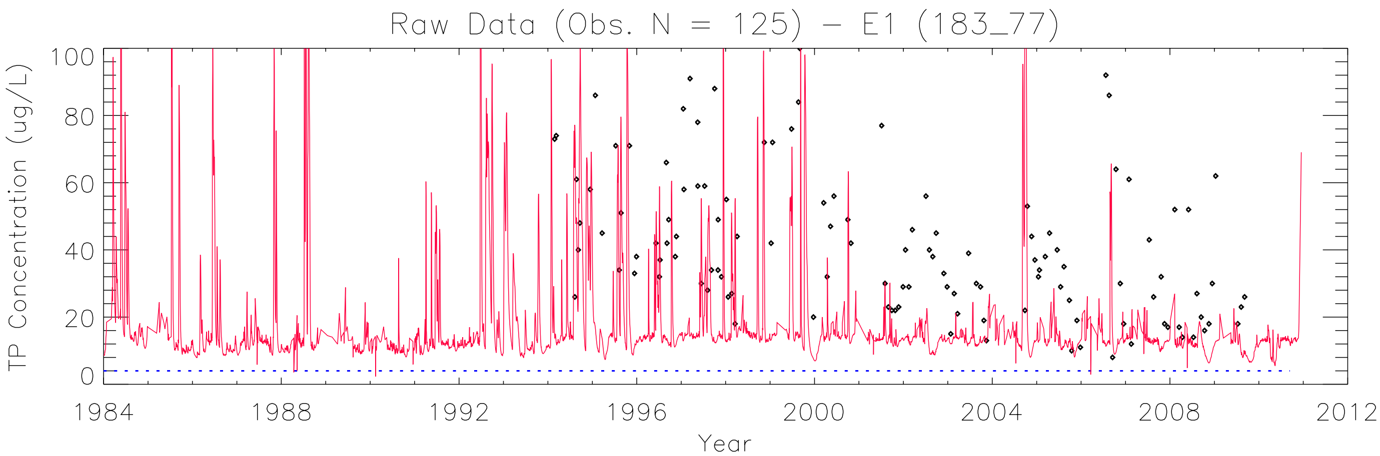

Mean: Season – 95% CI – LOX16 (192_72)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

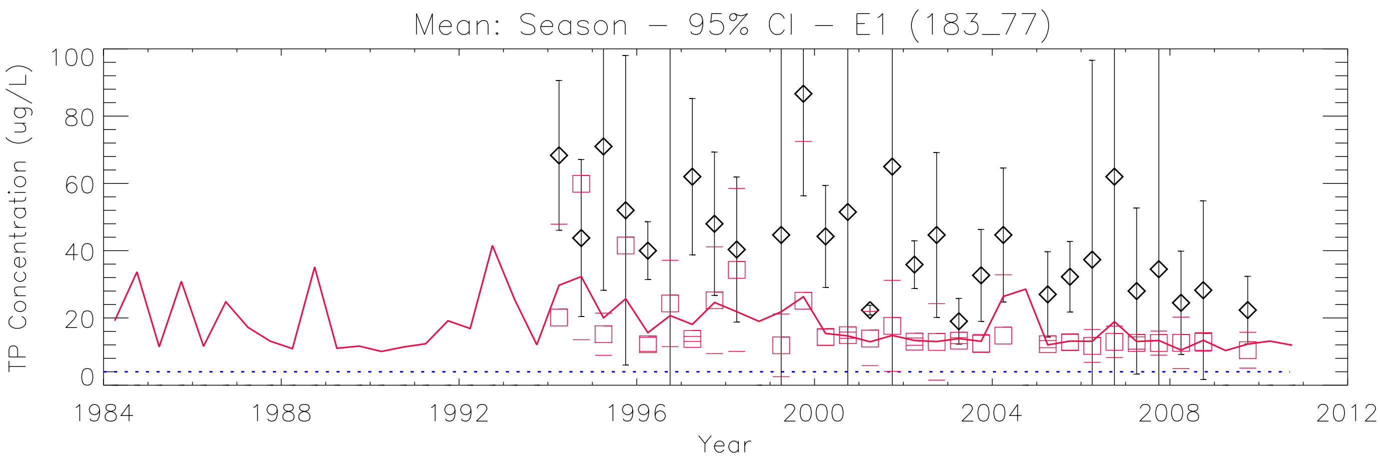

Mean: Water Year – 95% CI – LOX16 (192_72)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

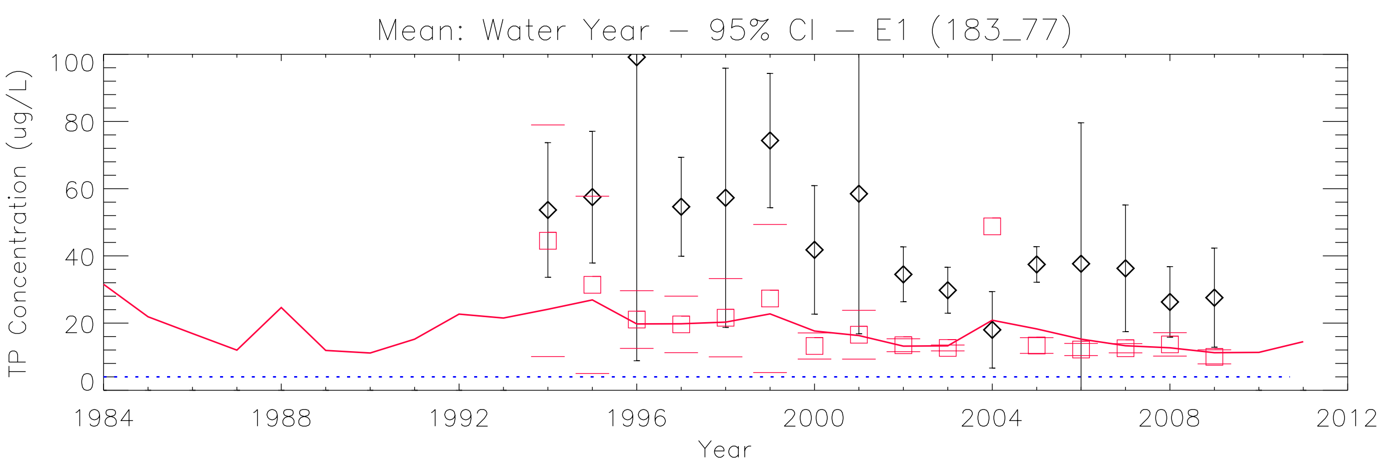

Cumulative Distribution: Raw Data – LOX16 (192_72)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

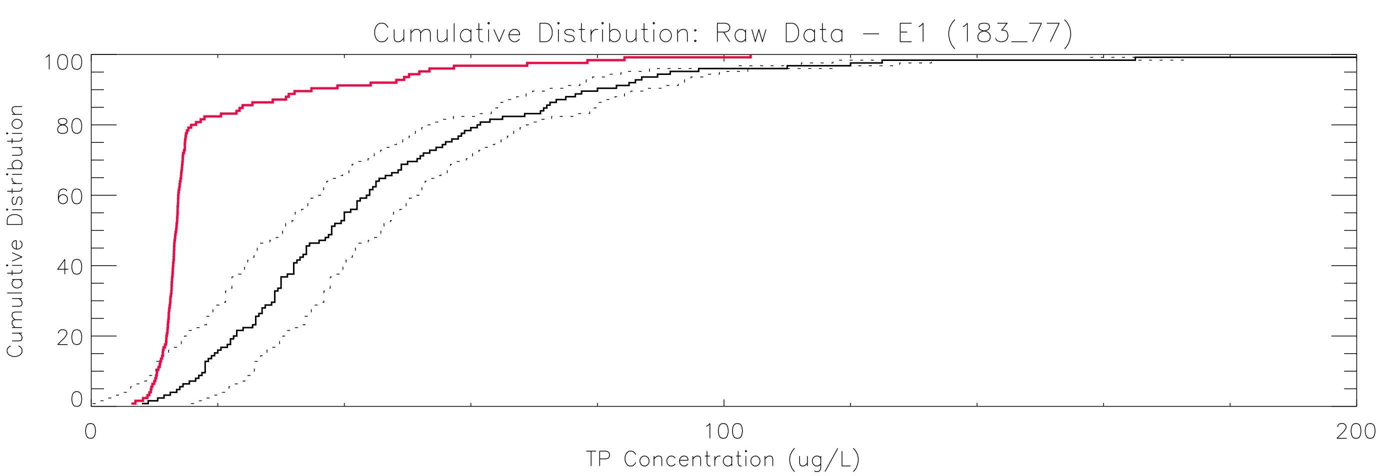


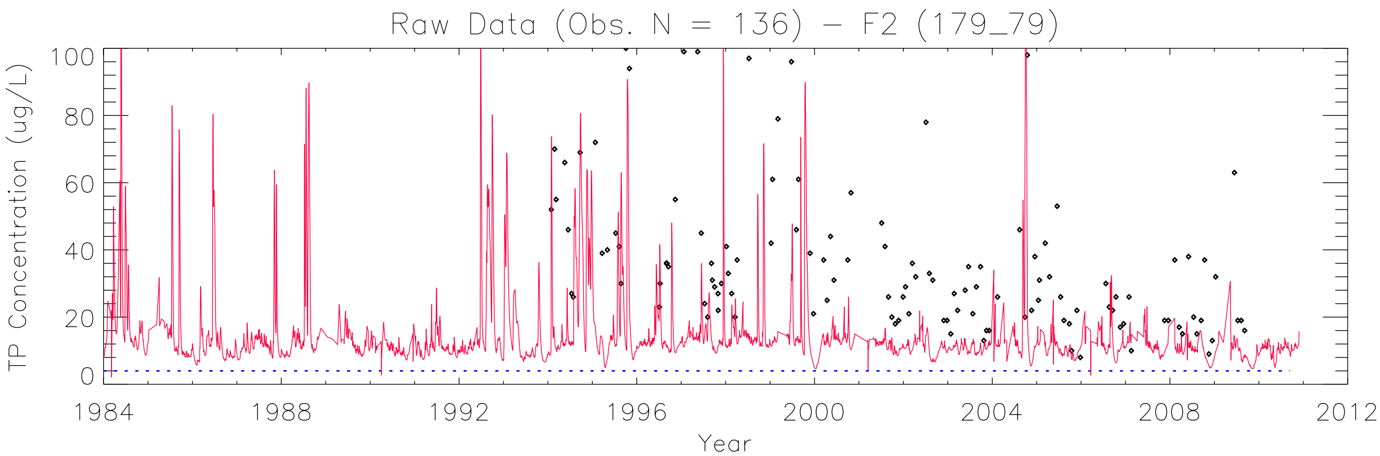
Raw Data (Obs. N = 98) – F1 (180_75)
TP Concentration (ug/L)
Year
Mean: Season – 95% CI – F1 (180_75)
TP Concentration (ug/L)
Year
Mean: Water Year – 95% CI – F1 (180_75)
TP Concentration (ug/L)
Year
Cumulative Distribution: Raw Data – F1 (180_75)
Cumulative Distribution
TP Concentration (ug/L)

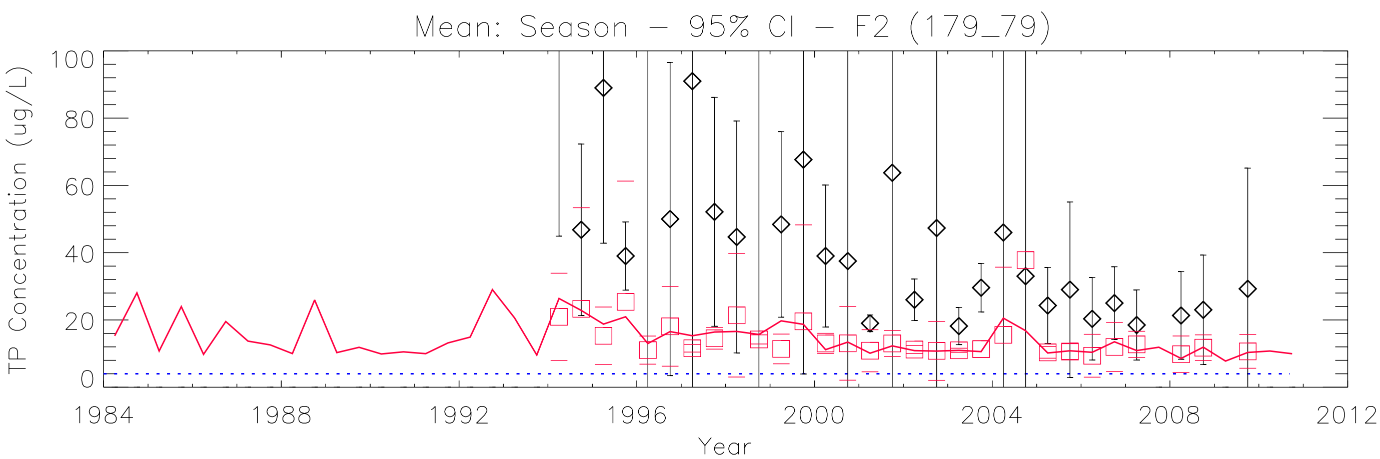

Raw Data (Obs. N = 125) – E1 (183_77)
TP Concentration (ug/L)
Year

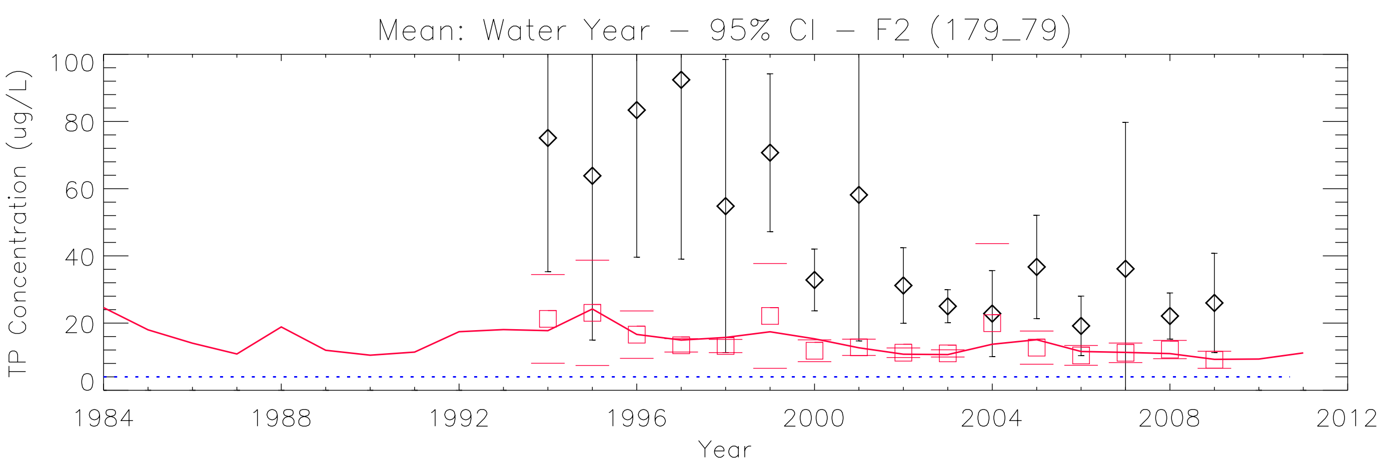

Mean: Season – 95% CI – E1 (183_77)
TP Concentration (ug/L)
Year

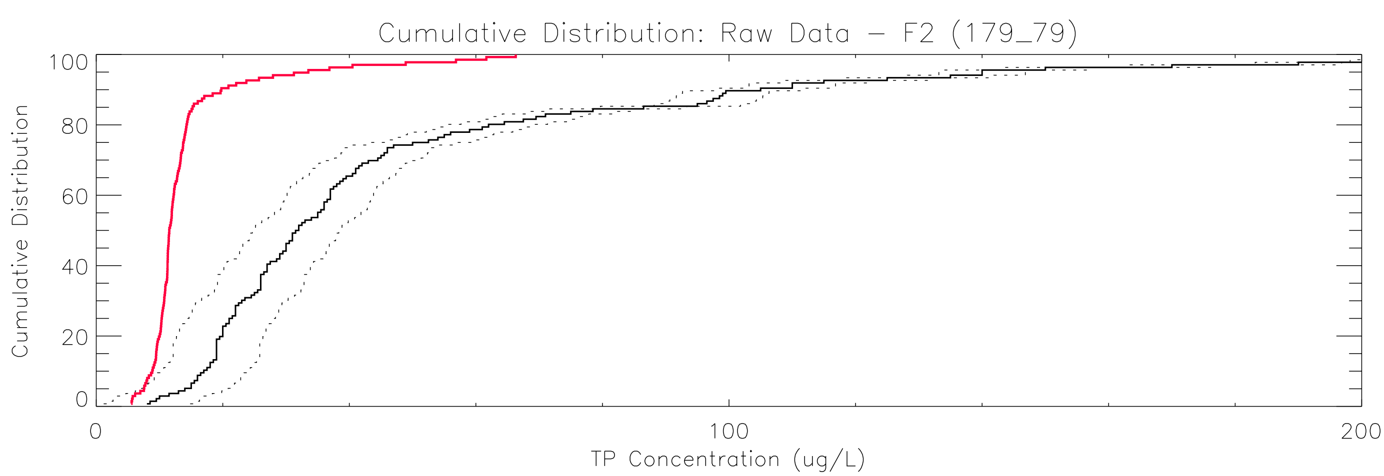

Mean: Water Year – 95% CI – E1 (183_77)
TP Concentration (ug/L)
Year

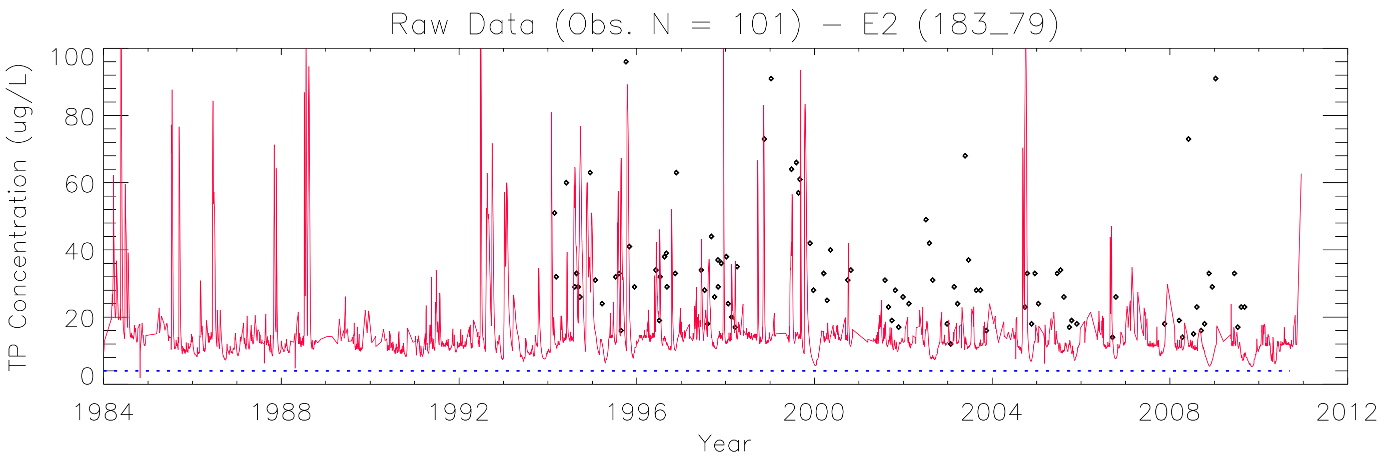

Cumulative Distribution: Raw Data – E1 (183_77)
Cumulative Distribution
TP Concentration (ug/L)

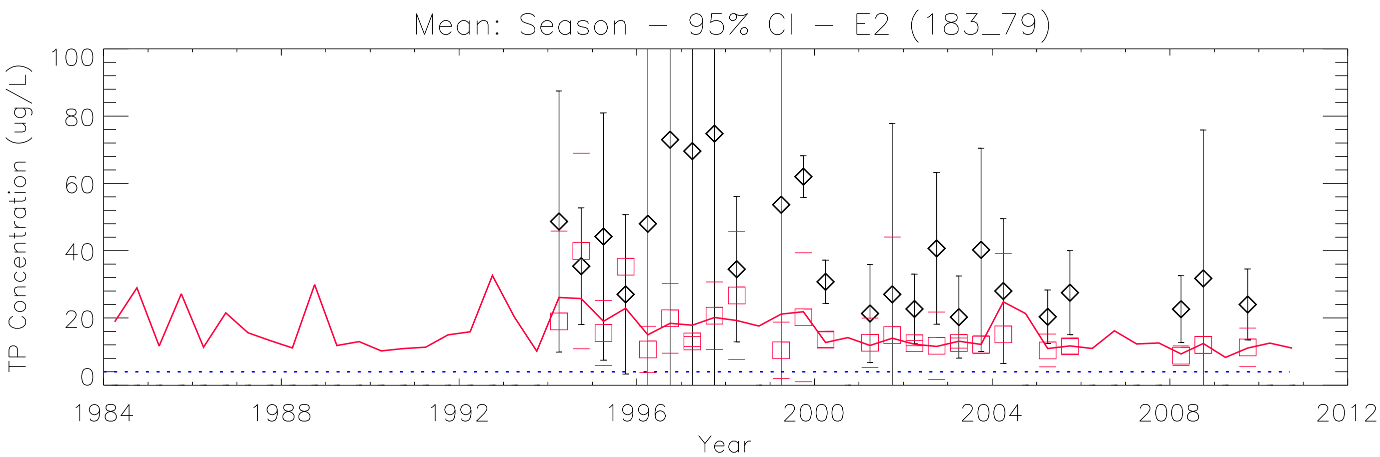

Raw Data (Obs. N = 136) – F2 (179_79)
TP Concentration (ug/L)
Year
0 20 40 60 80 100
1984 1988 1992 1996 2000 2004 2008 2012

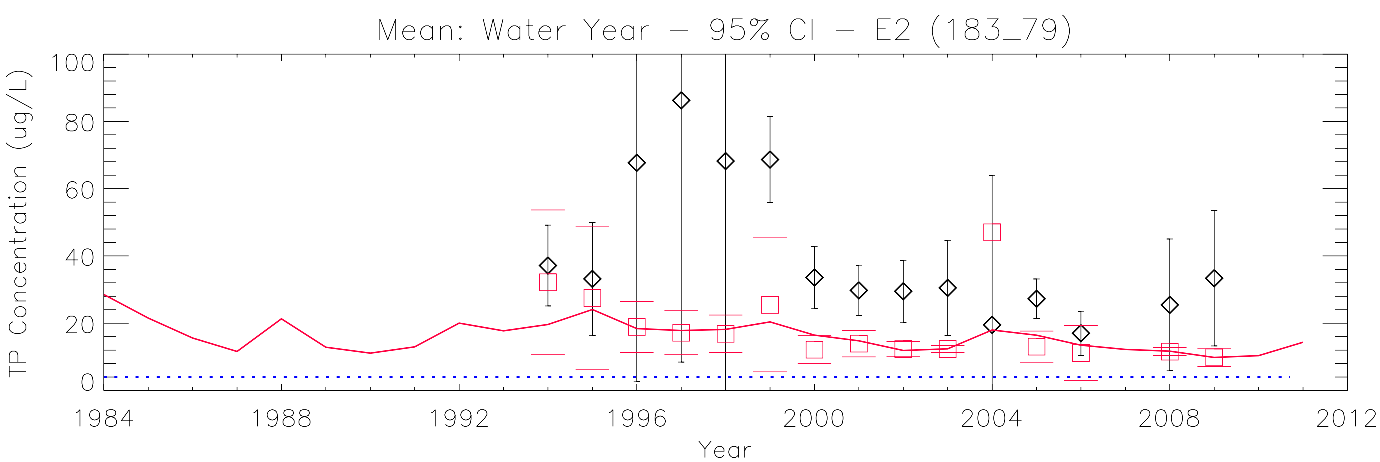

Mean: Season – 95% CI – F2 (179_79)
TP Concentration (ug/L)
Year
0 20 40 60 80 100
1984 1988 1992 1996 2000 2004 2008 2012

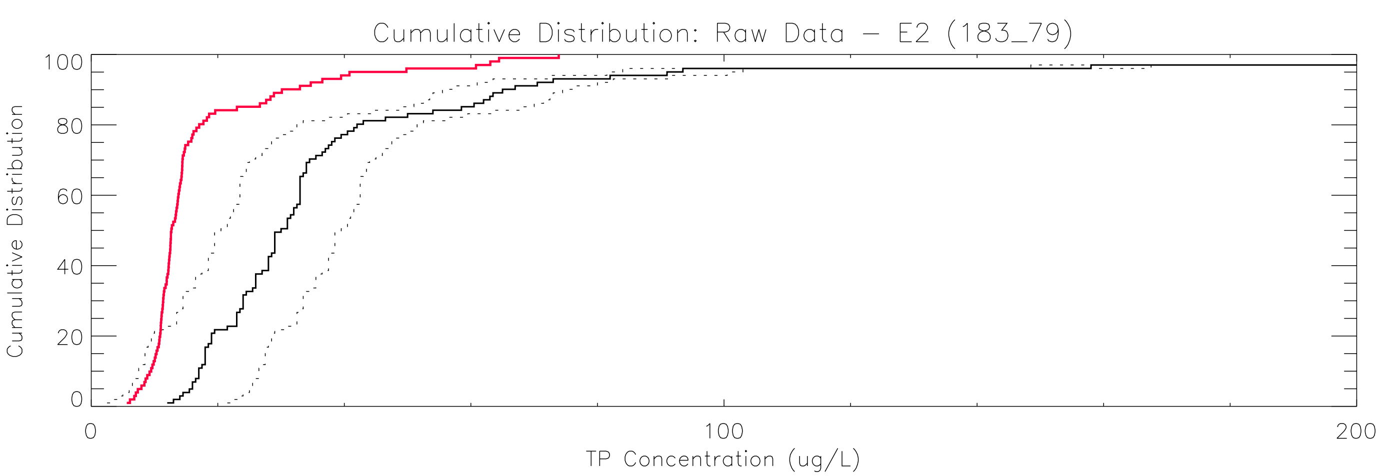

Mean: Water Year – 95% CI – F2 (179_79)
TP Concentration (ug/L)
Year
0 20 40 60 80 100
1984 1988 1992 1996 2000 2004 2008 2012

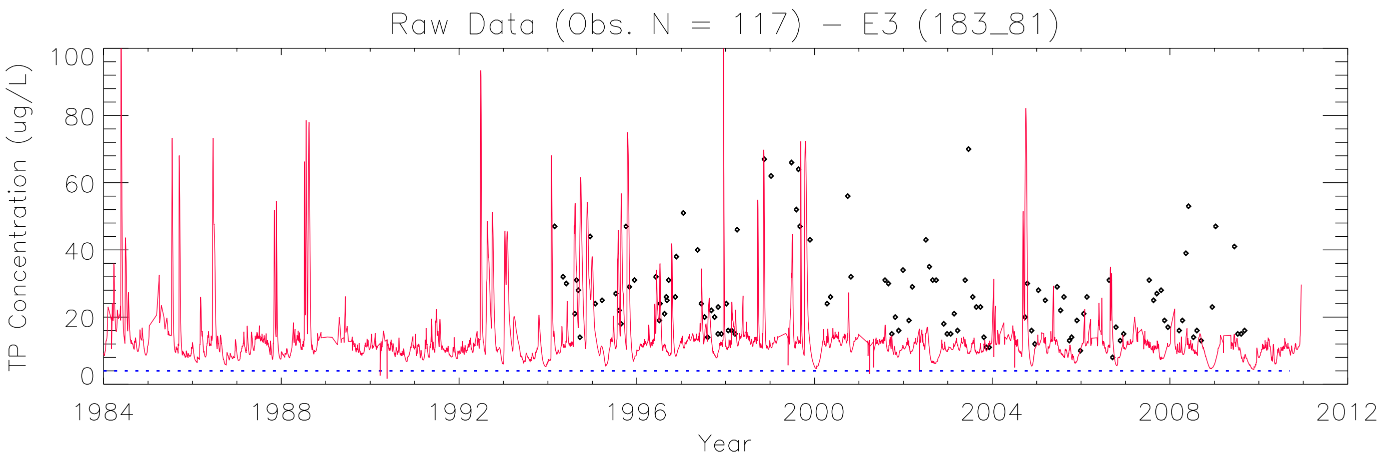

Cumulative Distribution: Raw Data – F2 (179_79)
Cumulative Distribution
TP Concentration (ug/L)
0 20 40 60 80 100
0 100 200

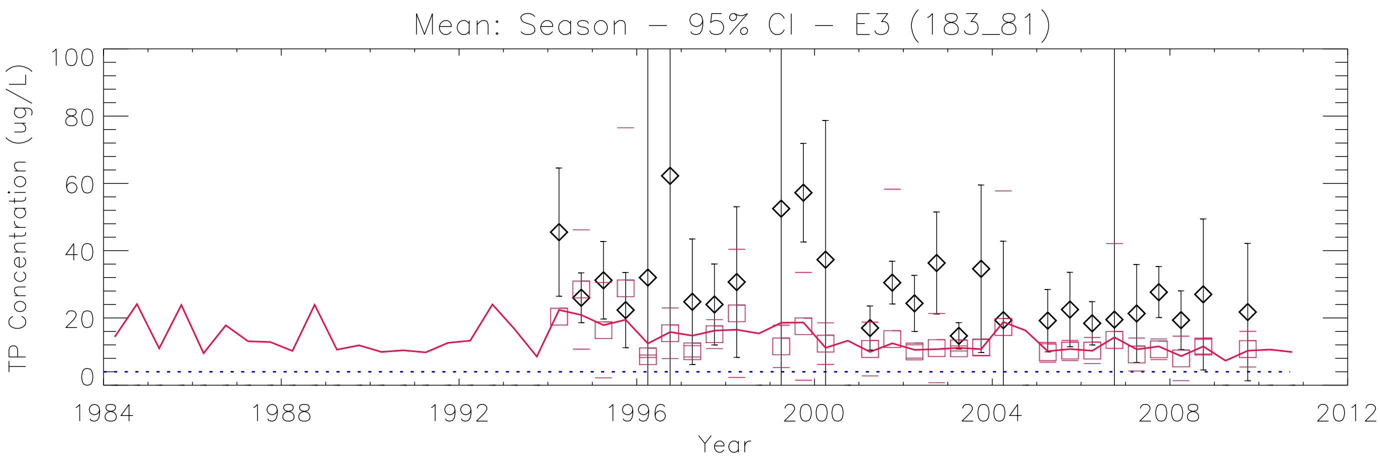

Raw Data (Obs. N = 101) – E2 (183_79)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

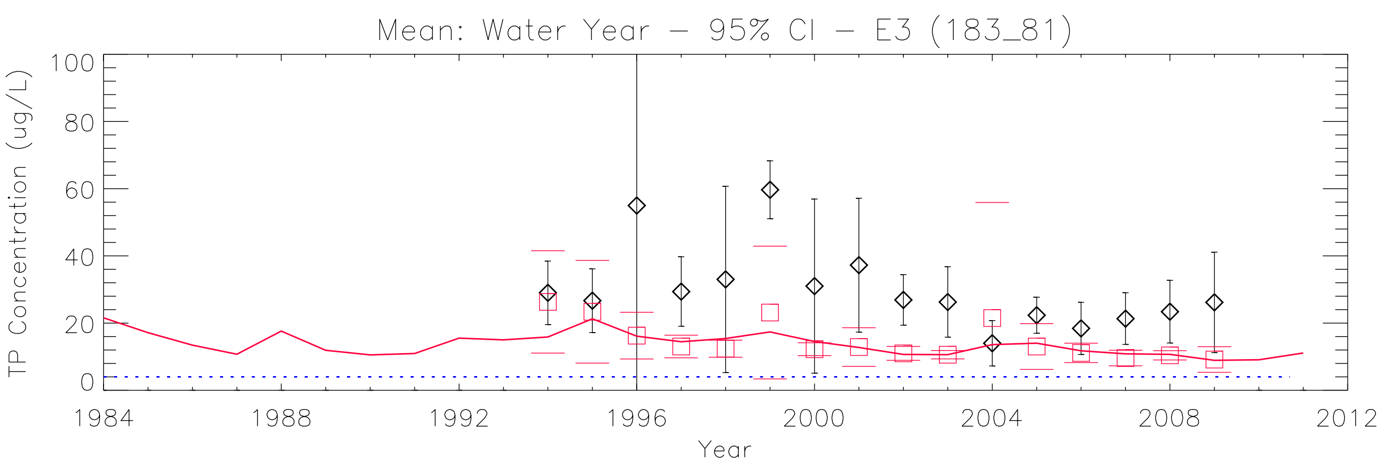

Mean: Season – 95% CI – E2 (183_79)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

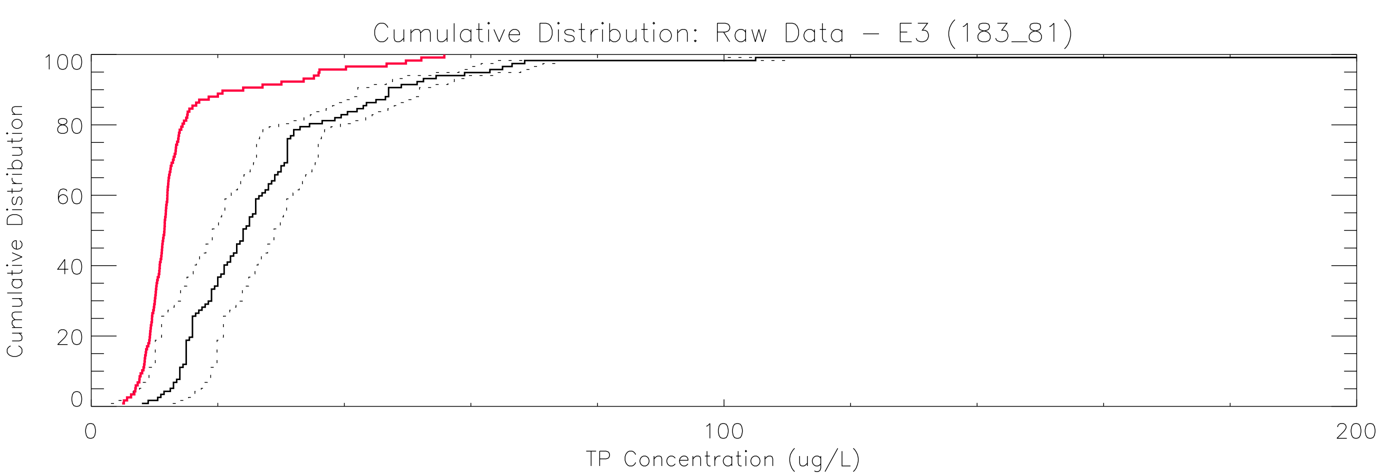

Mean: Water Year – 95% CI – E2 (183_79)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

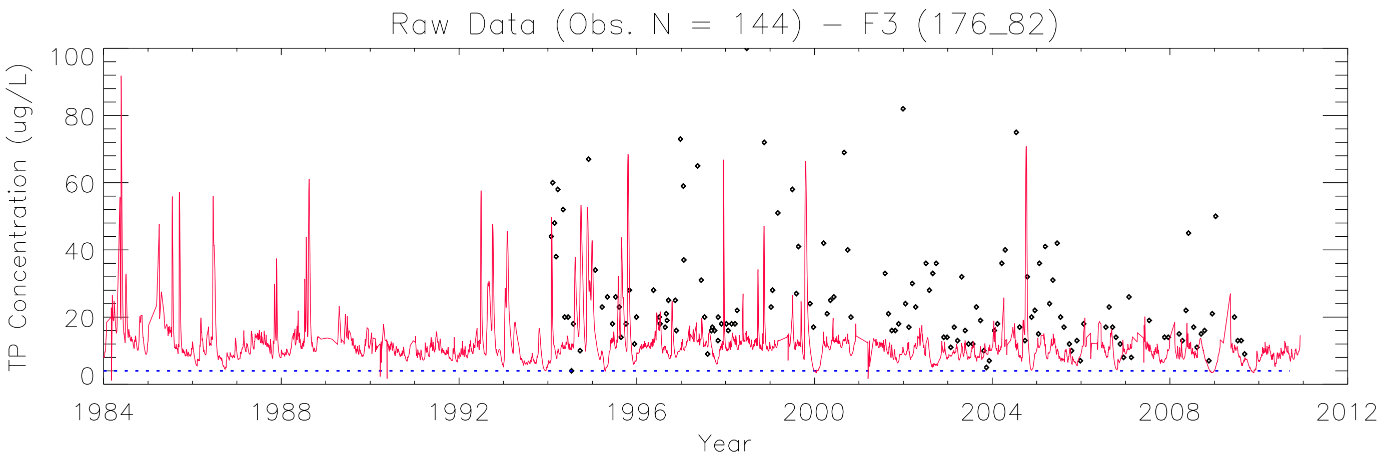

Cumulative Distribution: Raw Data – E2 (183_79)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200


Raw Data (Obs. N = 117) – E3 (183_81)
TP Concentration (ug/L)
Year

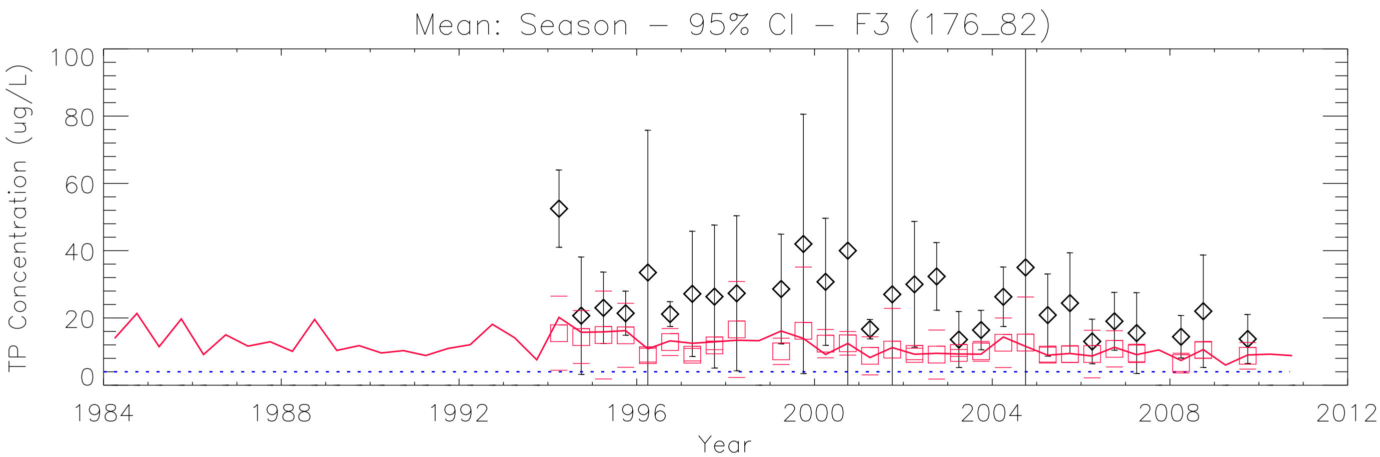

Mean: Season – 95% CI – E3 (183_81)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – E3 (183_81)
TP Concentration (ug/L)
Year

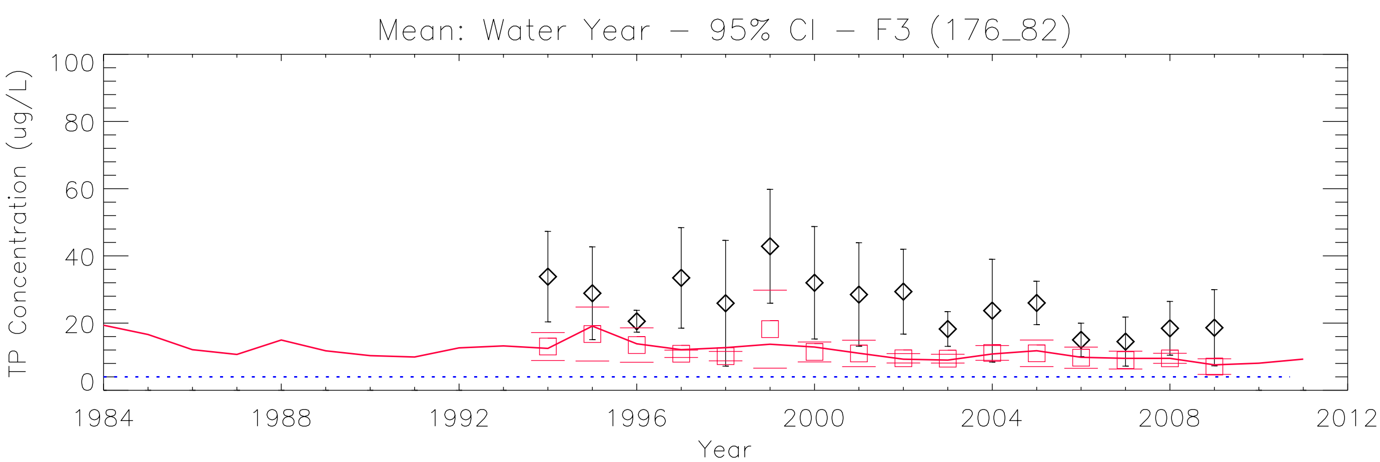

Cumulative Distribution: Raw Data – E3 (183_81)
Cumulative Distribution
TP Concentration (ug/L)



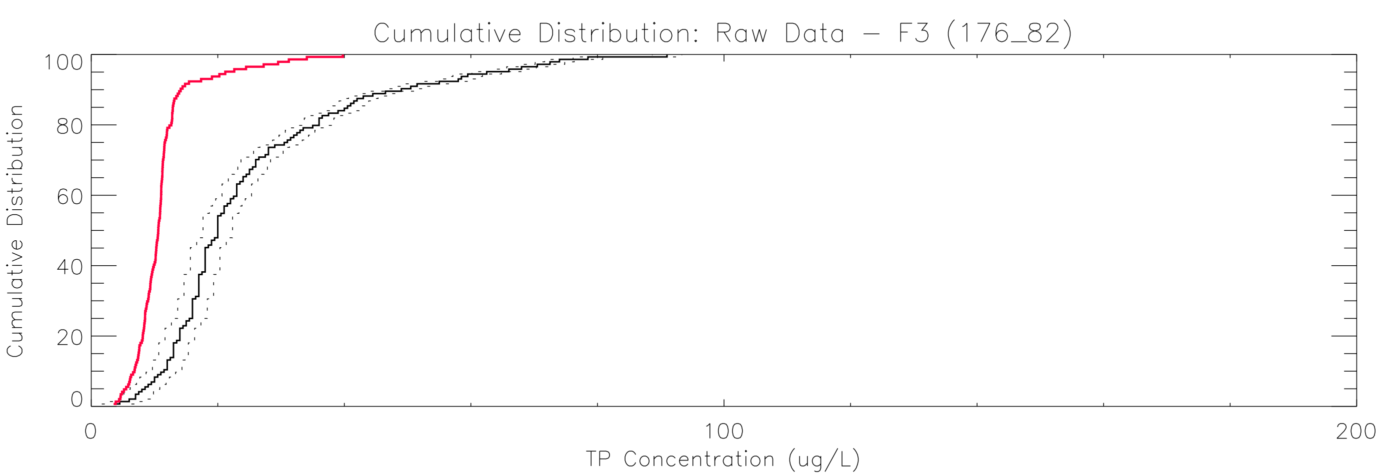
Raw Data (Obs. N = 144) – F3 (176_82)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



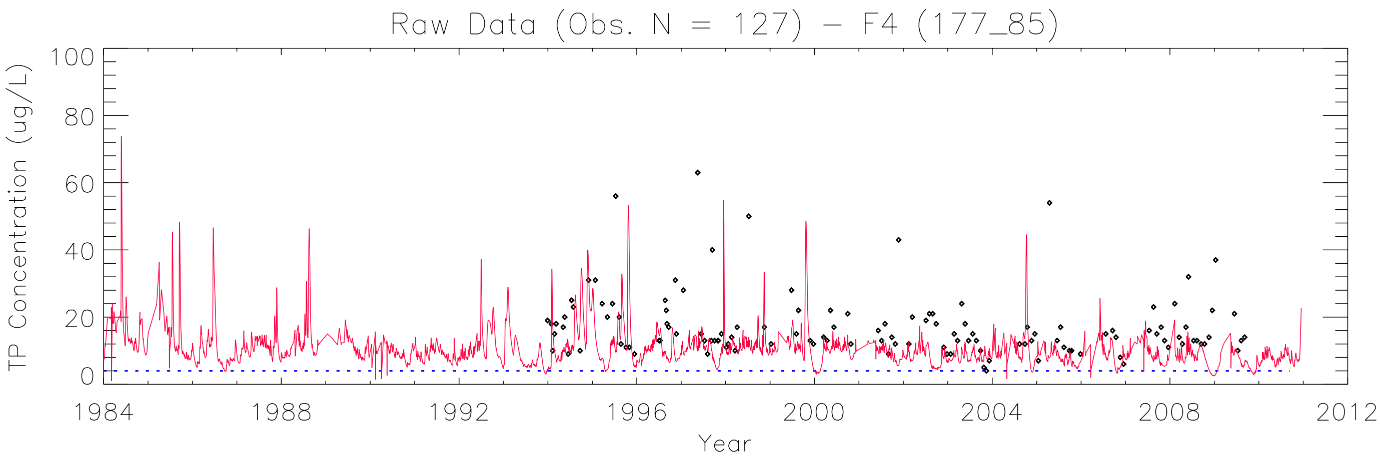
Mean: Season – 95% CI – F3 (176_82)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



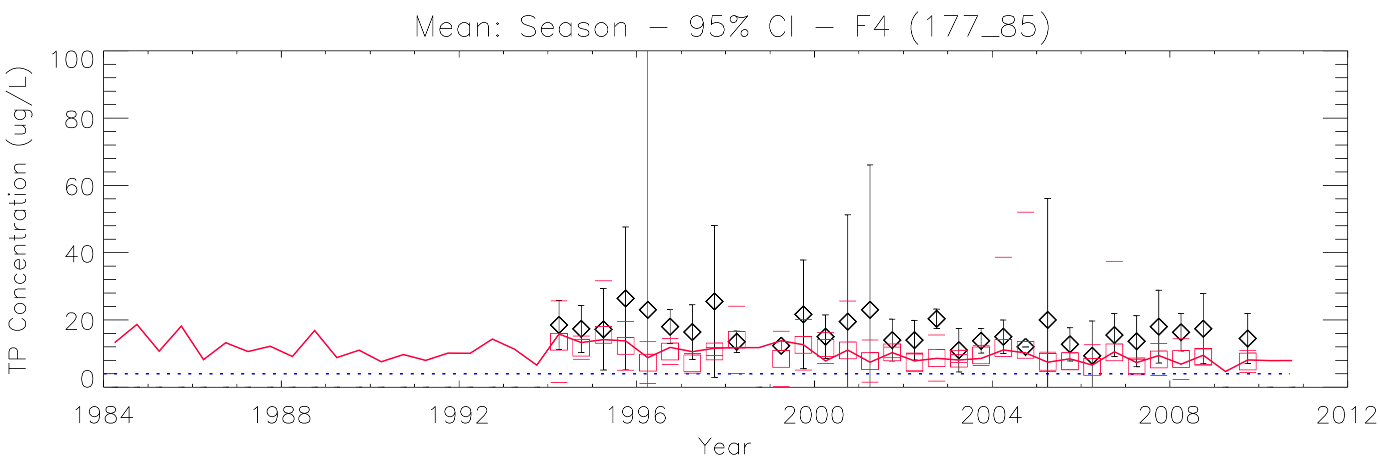
Mean: Water Year – 95% CI – F3 (176_82)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



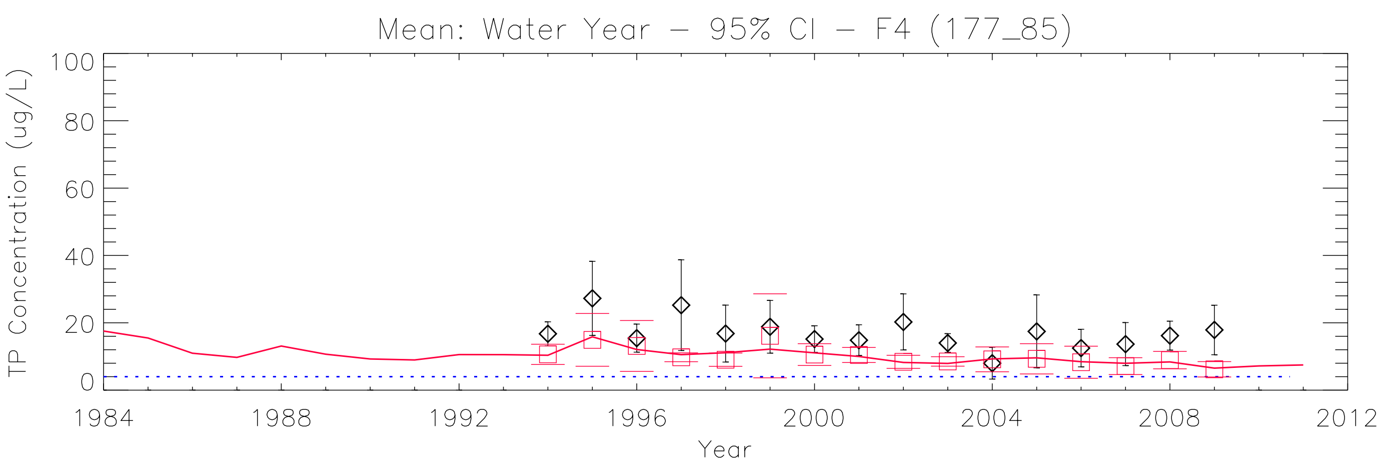
Cumulative Distribution: Raw Data – F3 (176_82)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)



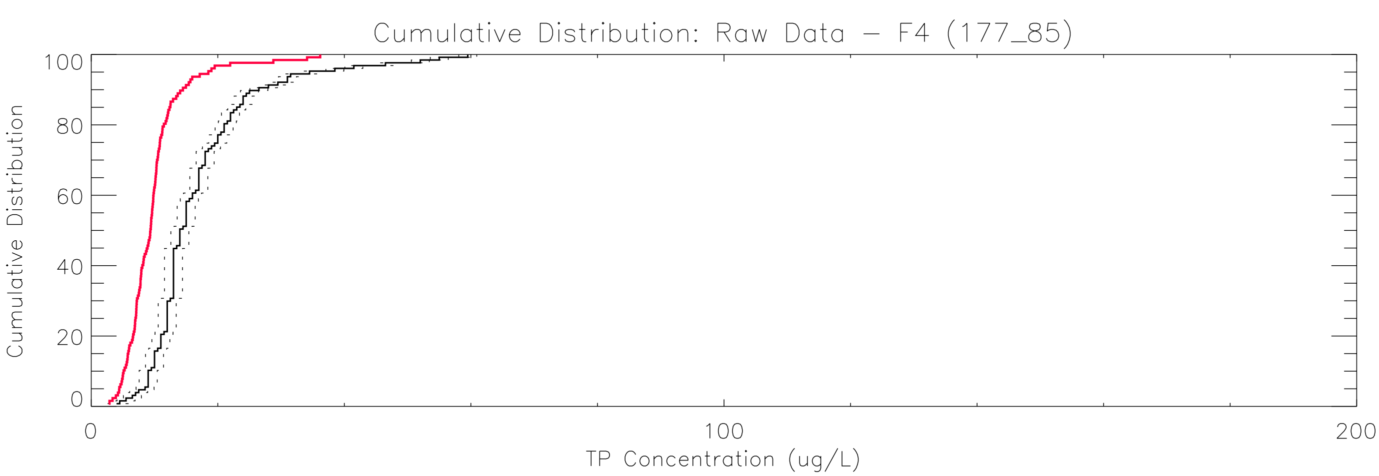
Raw Data (Obs. N = 127) − F4 (177_85)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



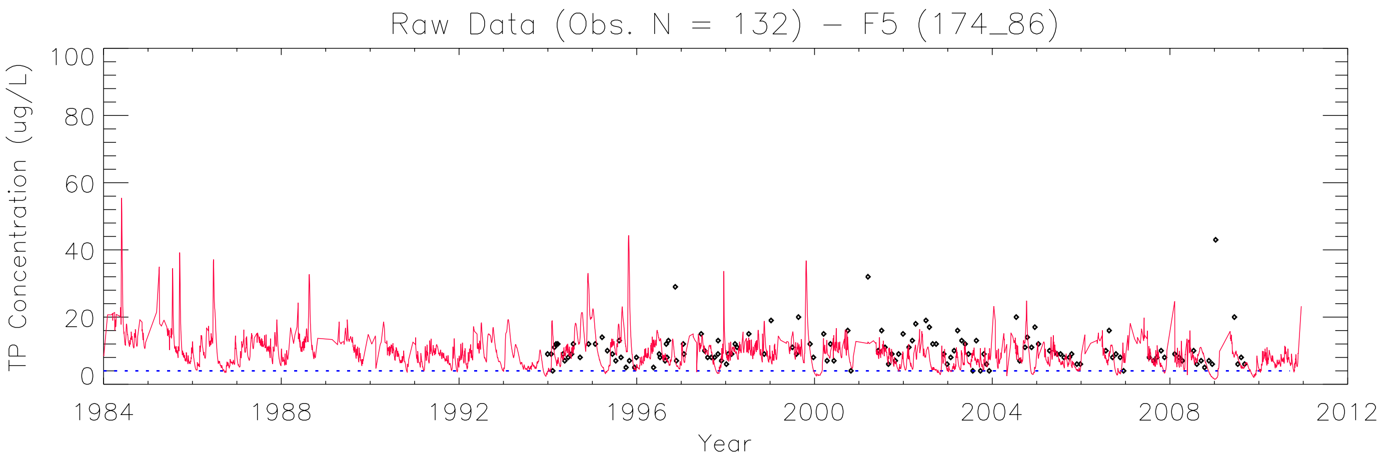
Mean: Season − 95% CI − F4 (177_85)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



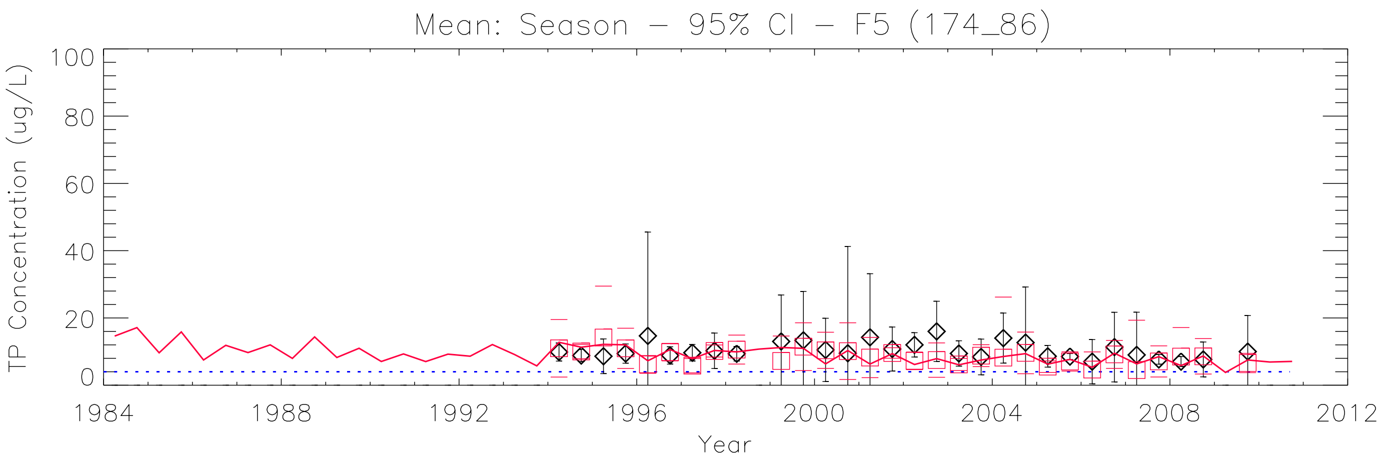
Mean: Water Year − 95% CI − F4 (177_85)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



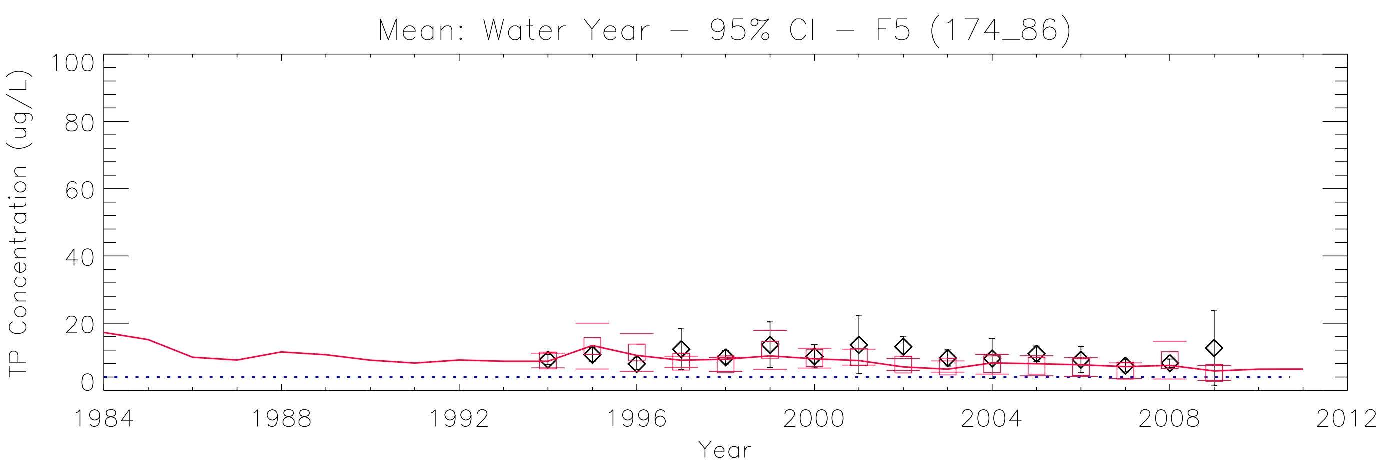
Cumulative Distribution: Raw Data − F4 (177_85)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)



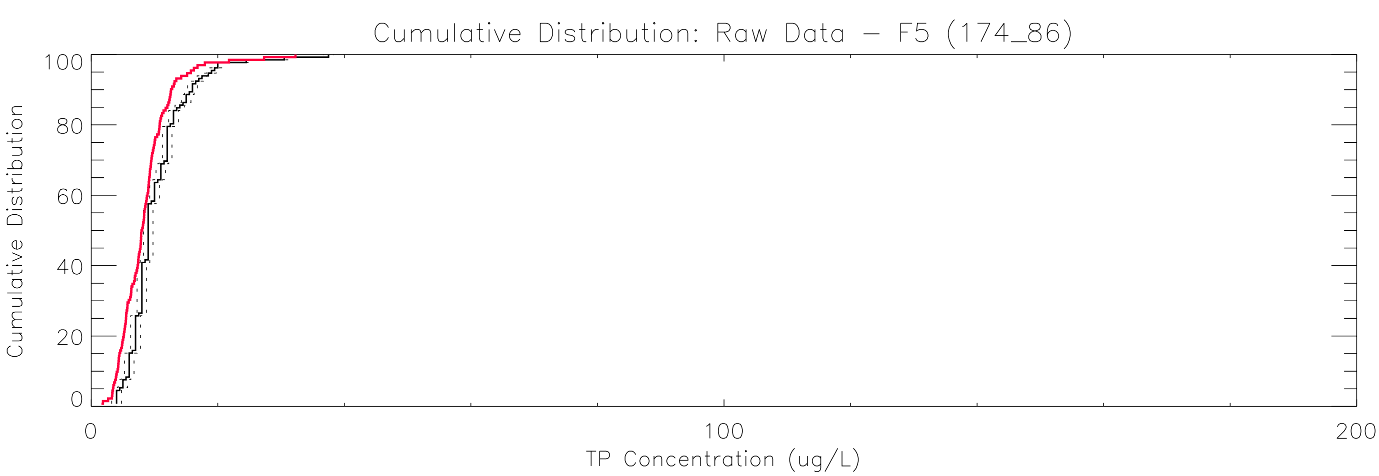
Raw Data (Obs. N = 132) – F5 (174_86)
TP Concentration (ug/L)
Year



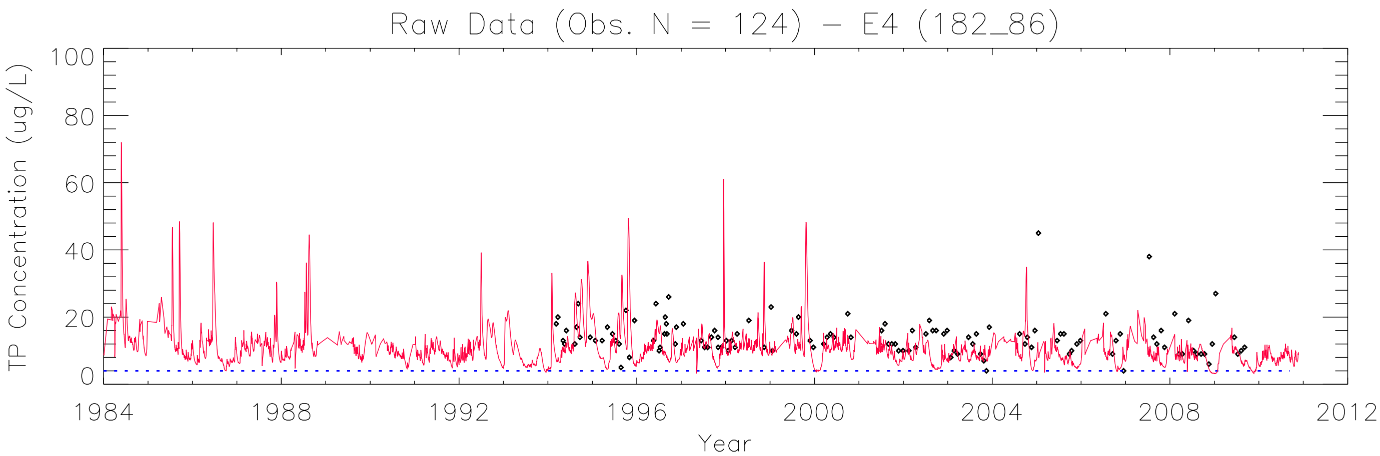
Mean: Season – 95% CI – F5 (174_86)
TP Concentration (ug/L)
Year

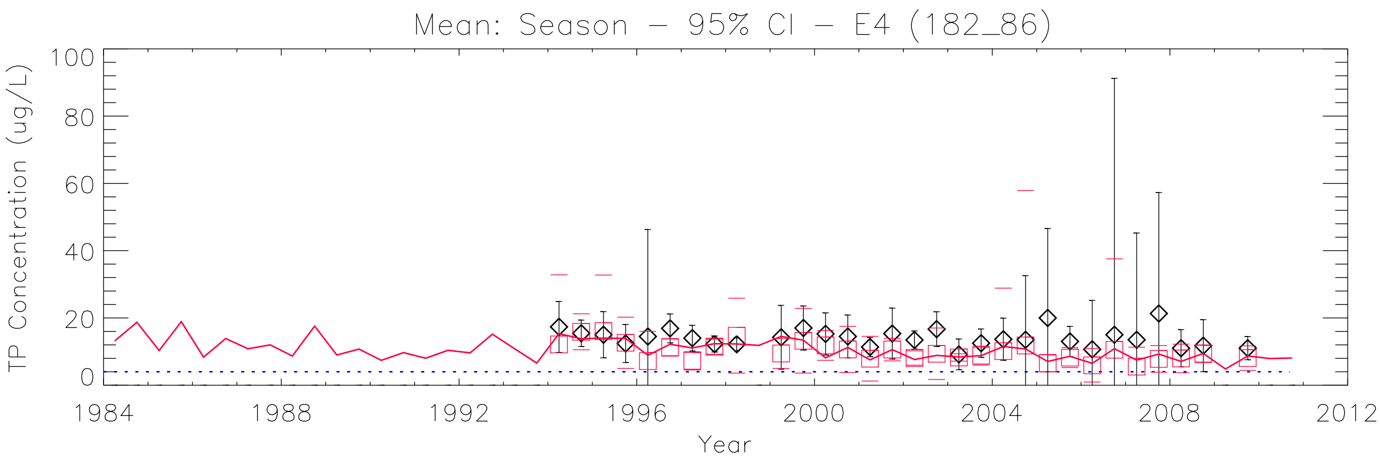


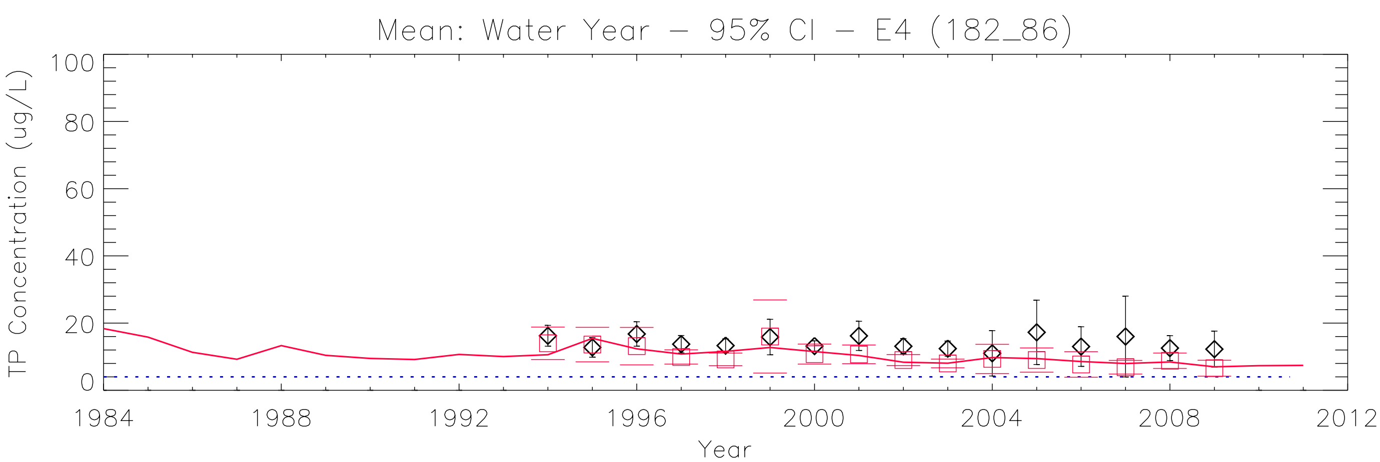
Mean: Water Year – 95% CI – F5 (174_86)
TP Concentration (ug/L)
Year

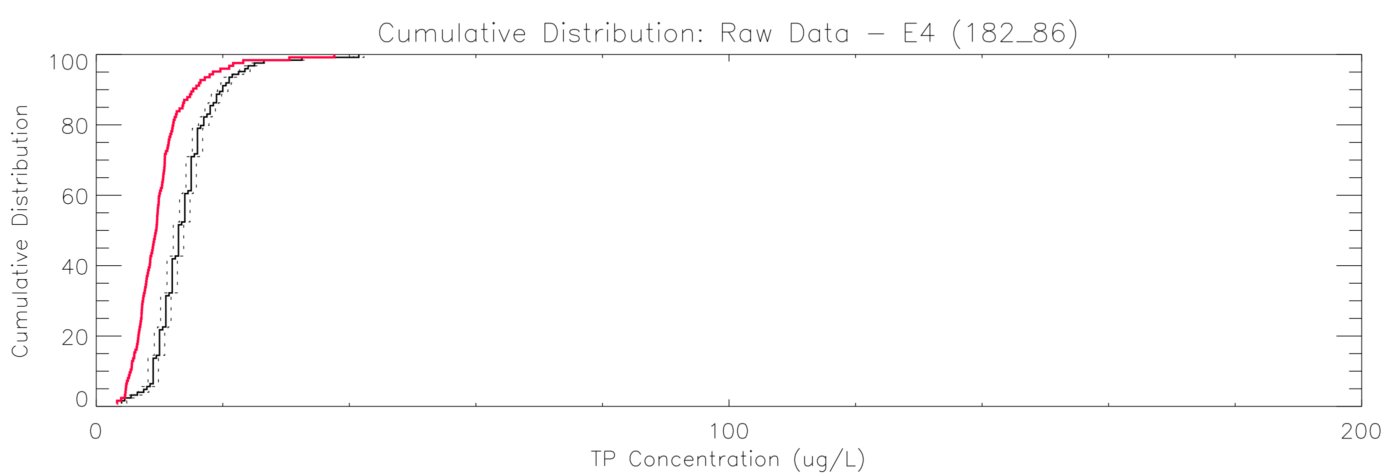


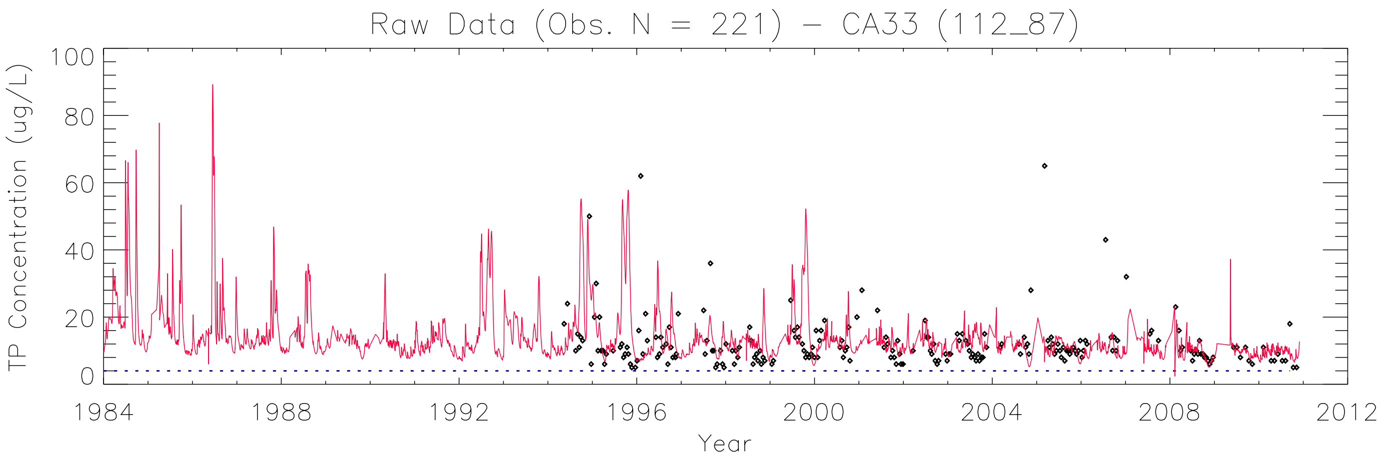
Cumulative Distribution: Raw Data – F5 (174_86)
Cumulative Distribution
TP Concentration (ug/L)

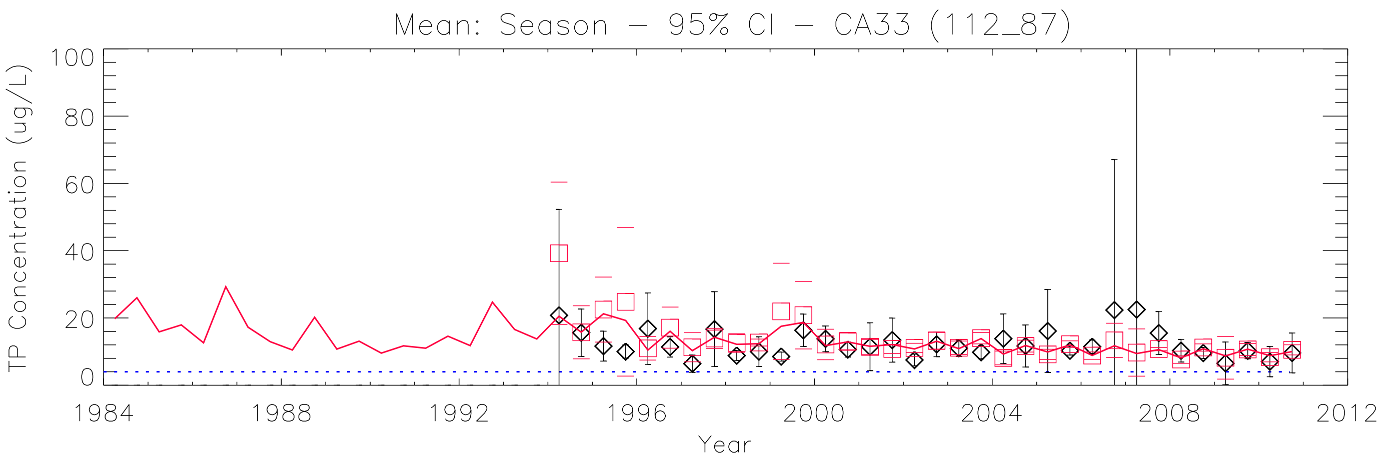

Raw Data (Obs. N = 124) – E4 (182_86)
TP Concentration (ug/L)
Year

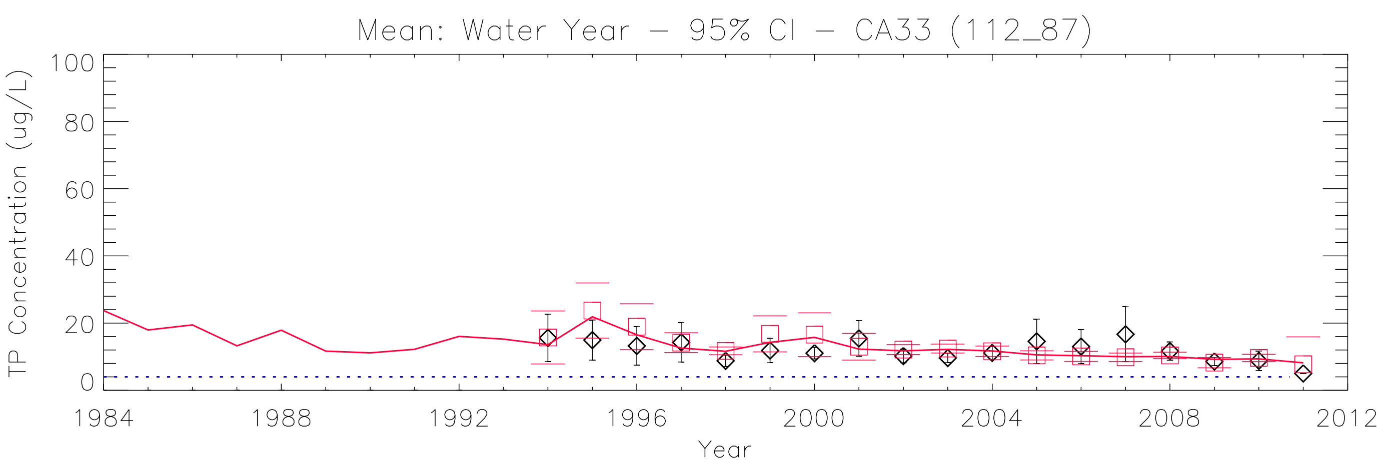

Mean: Season – 95% CI – E4 (182_86)
TP Concentration (ug/L)
Year

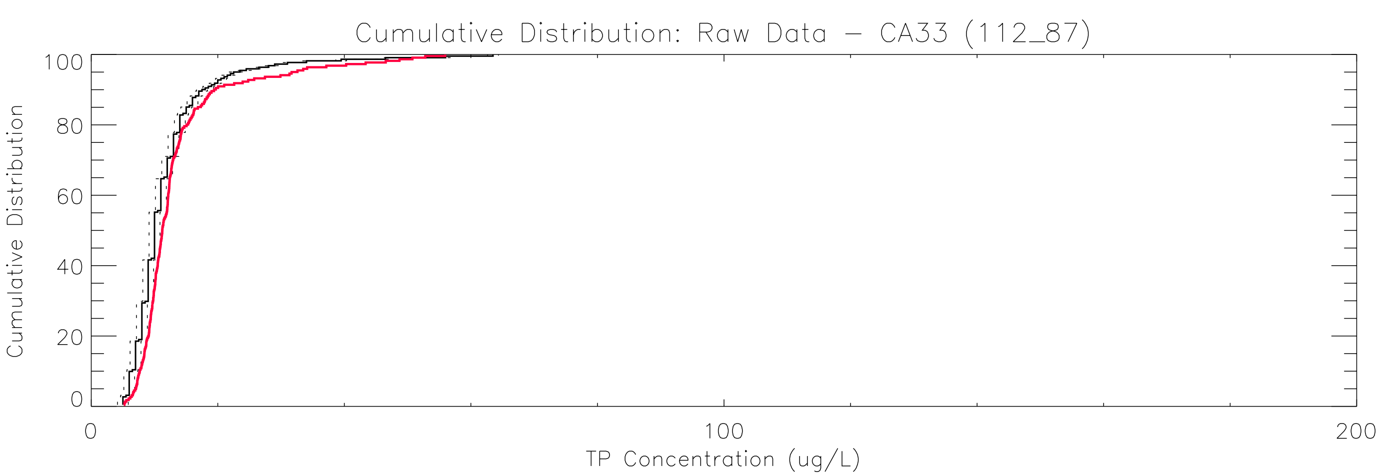

Mean: Water Year – 95% CI – E4 (182_86)
TP Concentration (ug/L)
Year

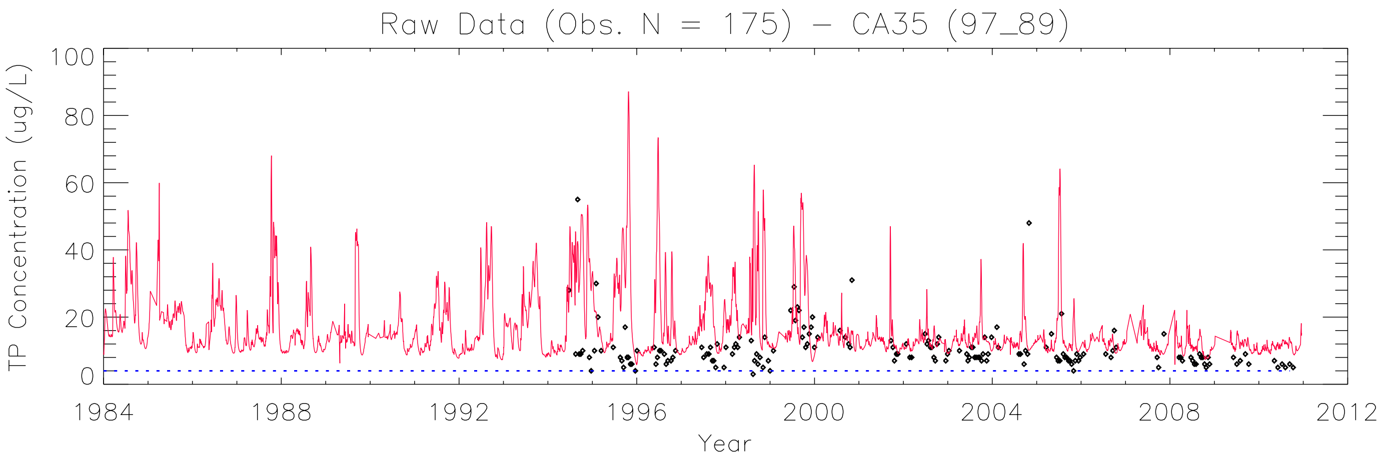

Cumulative Distribution: Raw Data – E4 (182_86)
Cumulative Distribution
TP Concentration (ug/L)

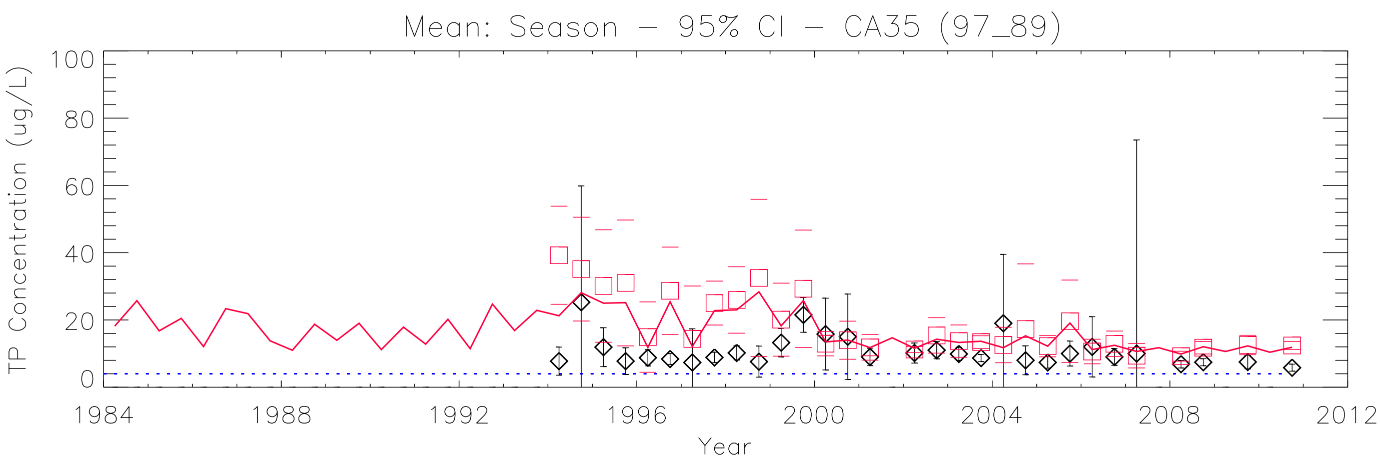

Raw Data (Obs. N = 221) – CA33 (112_87)
TP Concentration (ug/L)
Year

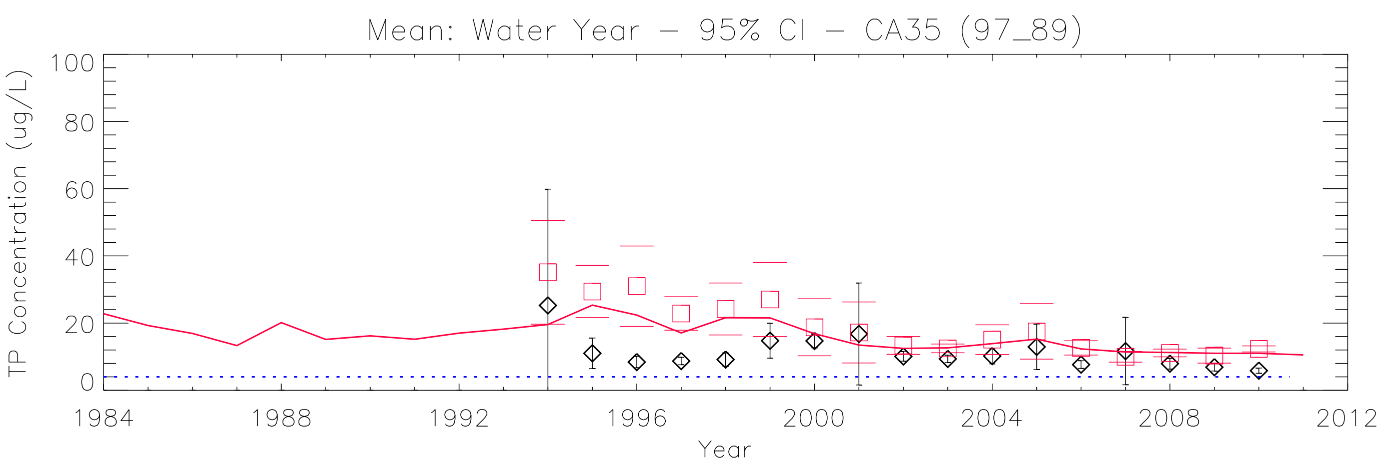

Mean: Season – 95% CI – CA33 (112_87)
TP Concentration (ug/L)
Year

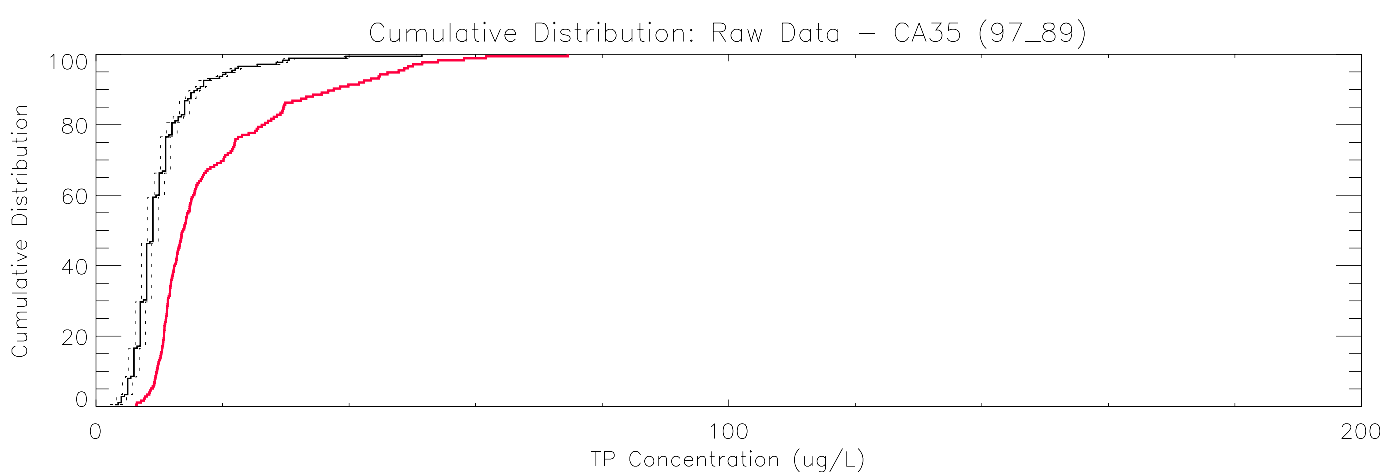

Mean: Water Year – 95% CI – CA33 (112_87)
TP Concentration (ug/L)
Year

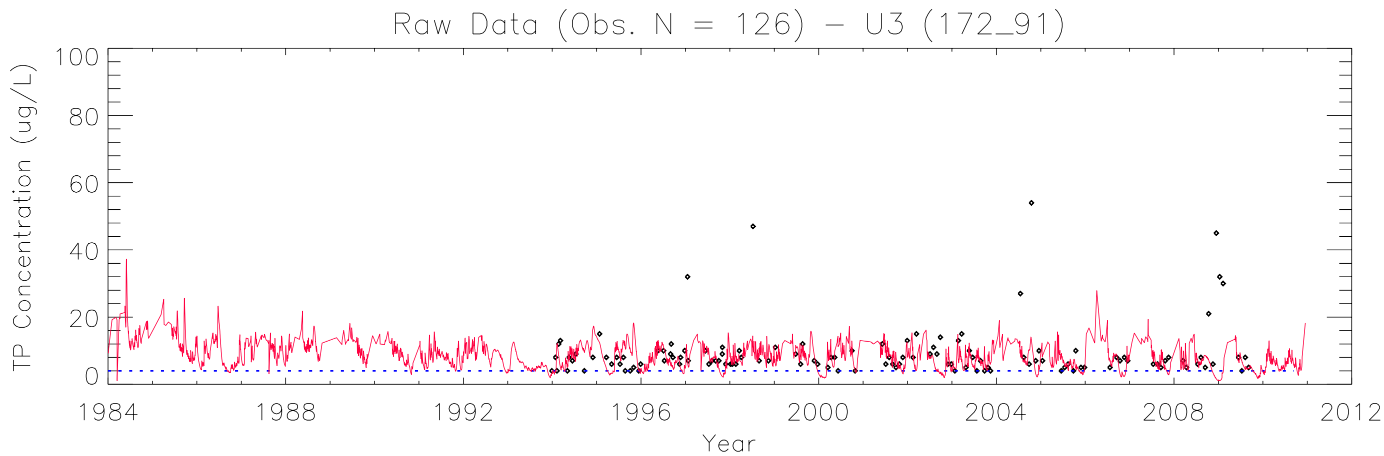

Cumulative Distribution: Raw Data – CA33 (112_87)
Cumulative Distribution
TP Concentration (ug/L)

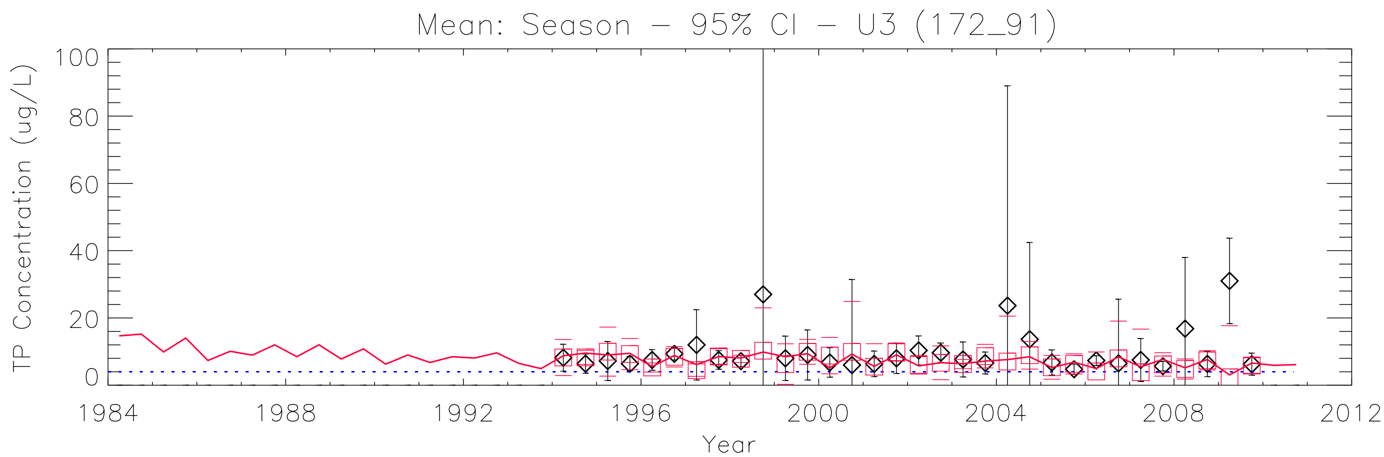

Raw Data (Obs. N = 175) – CA35 (97_89)
TP Concentration (ug/L)
Year

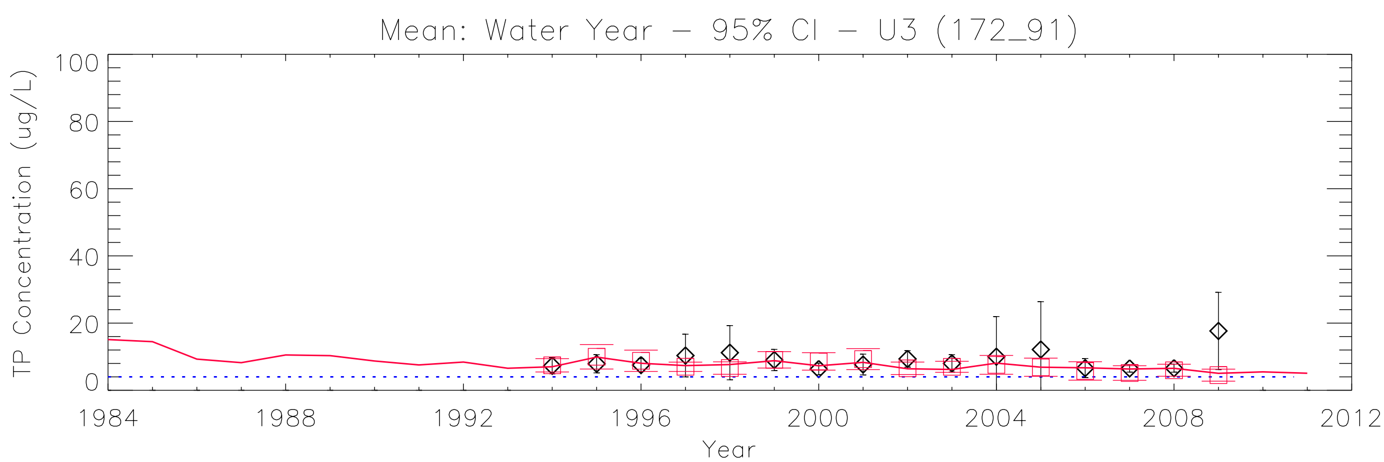

Mean: Season – 95% CI – CA35 (97_89)
TP Concentration (ug/L)
Year

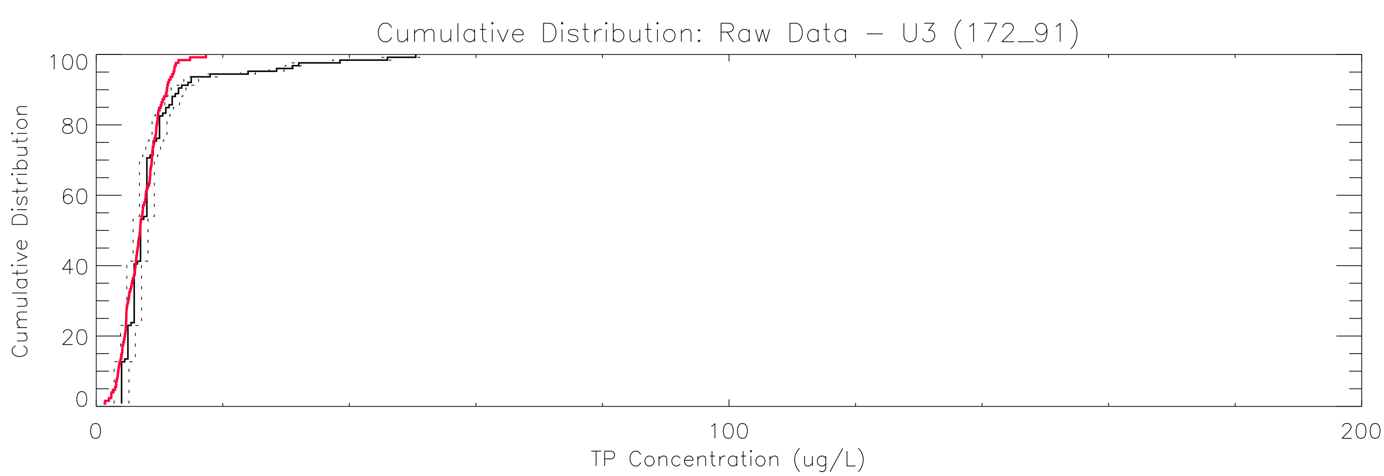

Mean: Water Year – 95% CI – CA35 (97_89)
TP Concentration (ug/L)
Year

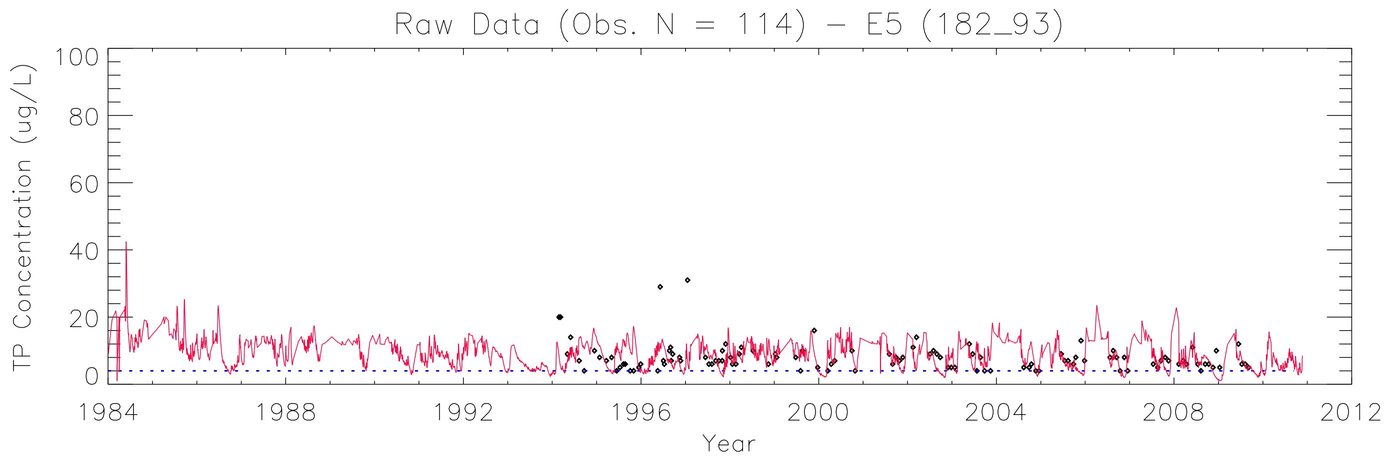

Cumulative Distribution: Raw Data – CA35 (97_89)
Cumulative Distribution
TP Concentration (ug/L)

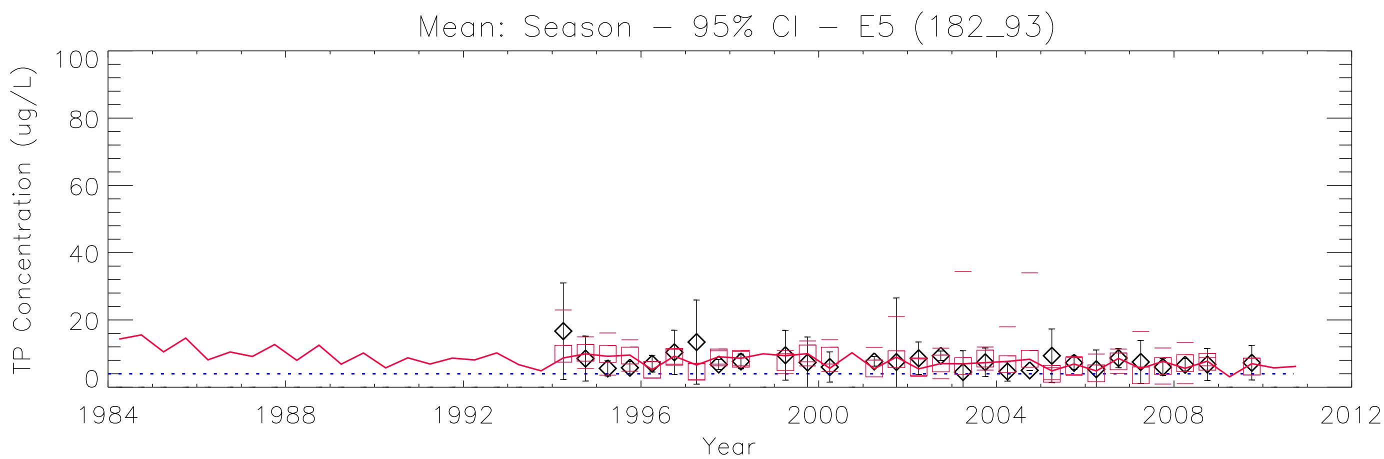

Raw Data (Obs. N = 126) - U3 (172_91)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

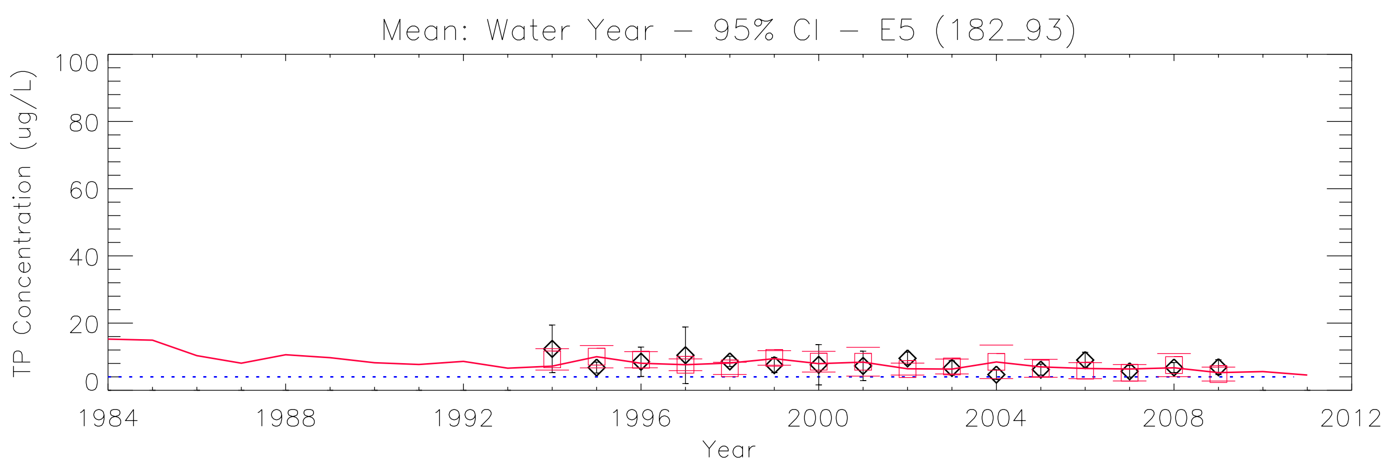

Mean: Season - 95% CI - U3 (172_91)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

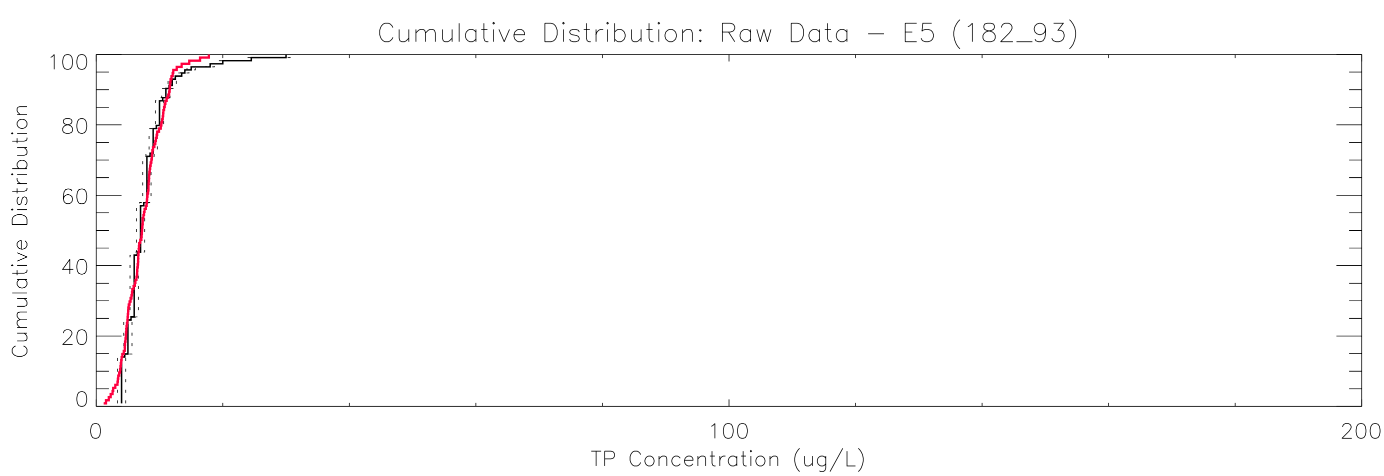

Mean: Water Year - 95% CI - U3 (172_91)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

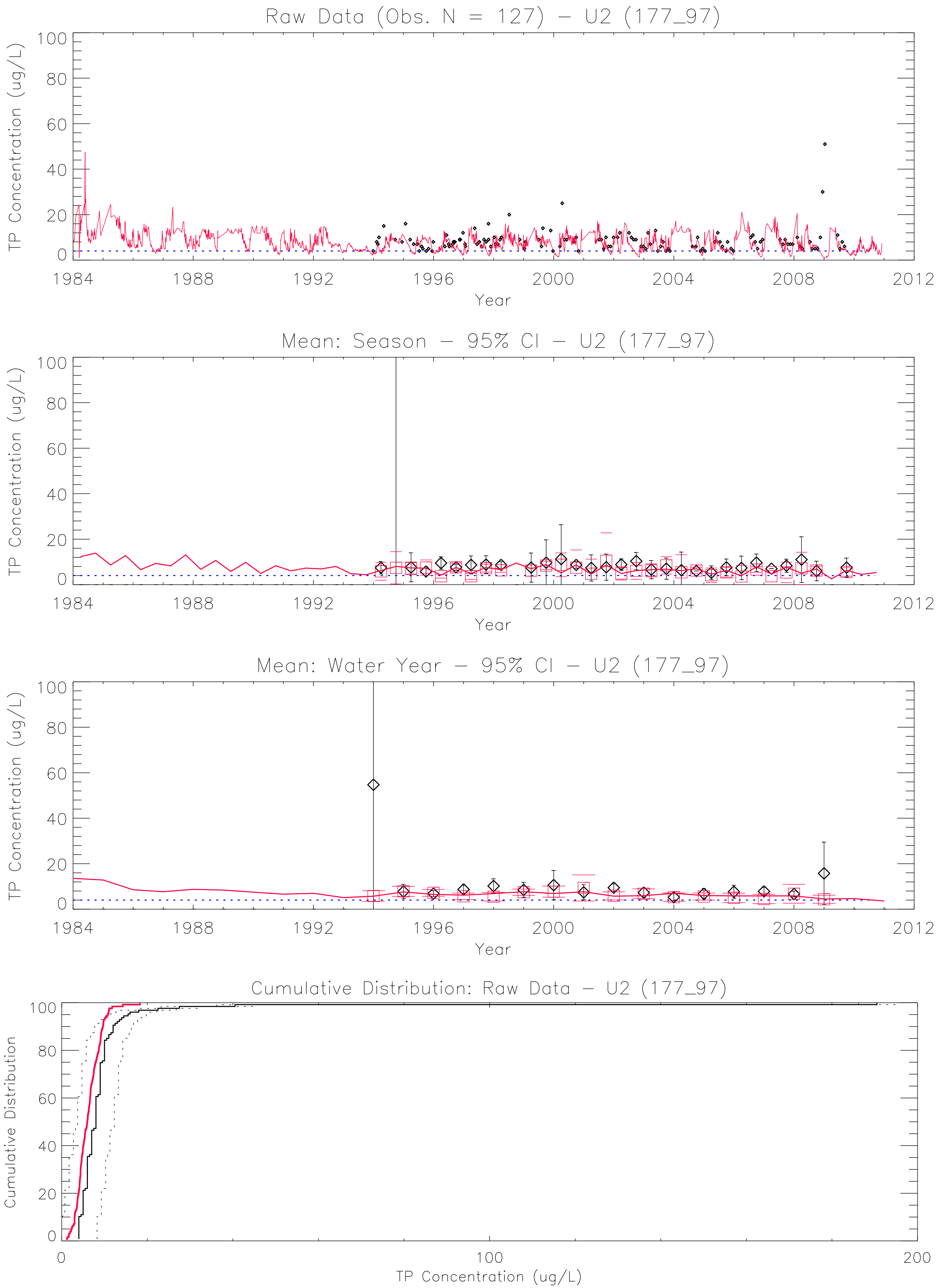

Cumulative Distribution: Raw Data - U3 (172_91)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)


Raw Data (Obs. N = 114) – E5 (182_93)
TP Concentration (ug/L)
Year

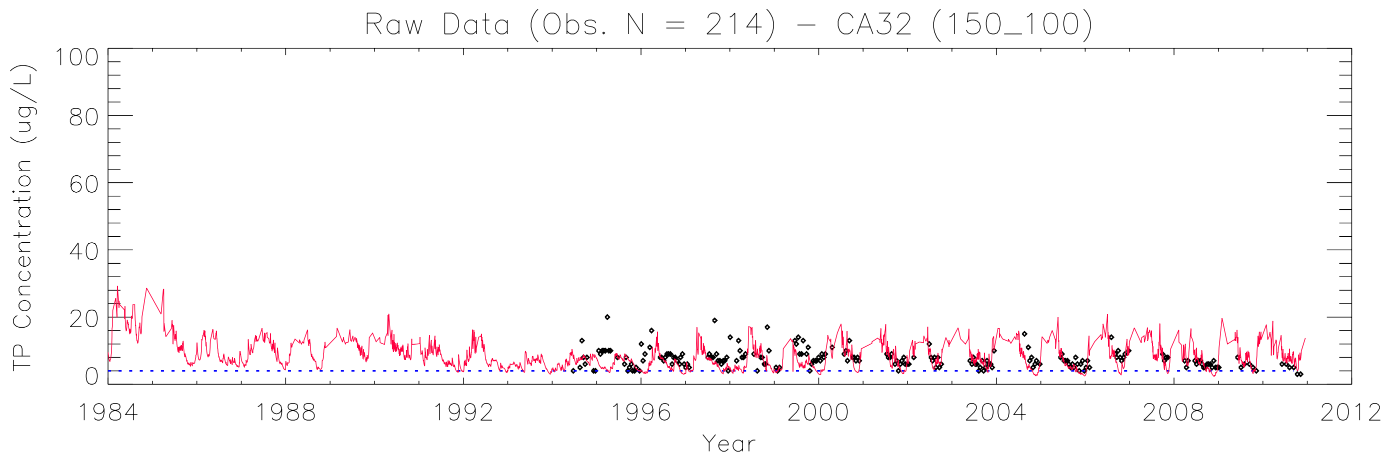

Mean: Season – 95% CI – E5 (182_93)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – E5 (182_93)
TP Concentration (ug/L)
Year

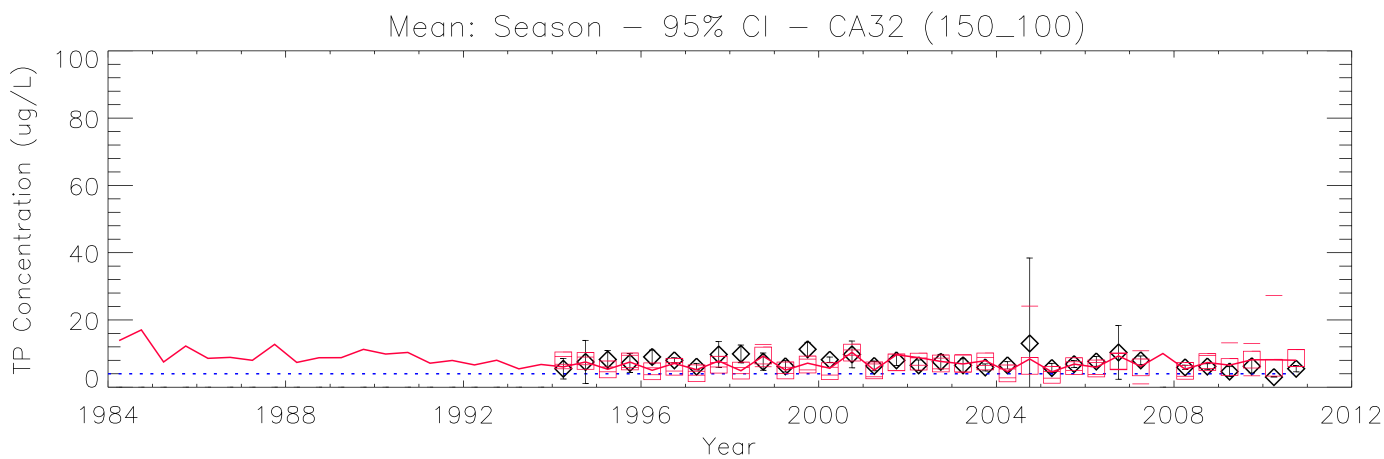

Cumulative Distribution: Raw Data – E5 (182_93)
Cumulative Distribution
TP Concentration (ug/L)



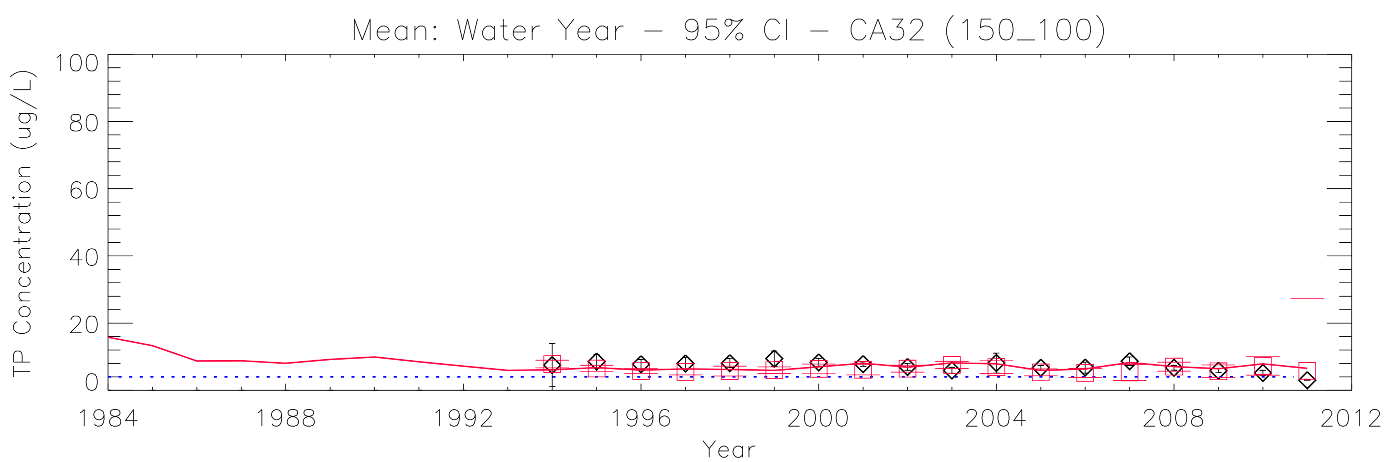
Raw Data (Obs. N = 127) – U2 (177_97)
TP Concentration (ug/L)
Year
Mean: Season – 95% CI – U2 (177_97)
TP Concentration (ug/L)
Year
Mean: Water Year – 95% CI – U2 (177_97)
TP Concentration (ug/L)
Year
Cumulative Distribution: Raw Data – U2 (177_97)
Cumulative Distribution
TP Concentration (ug/L)



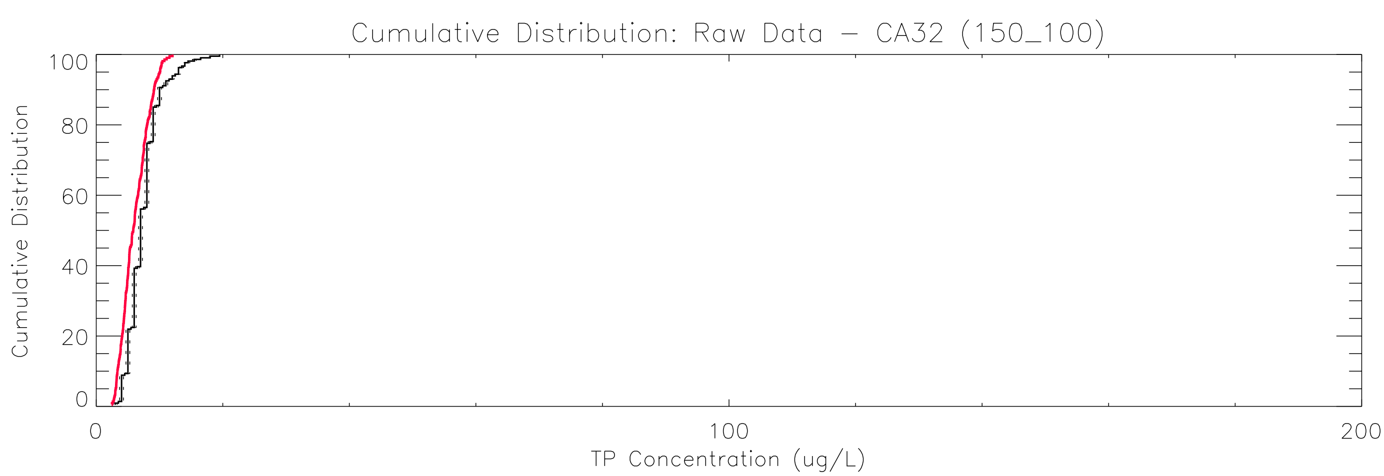
Raw Data (Obs. N = 214) – CA32 (150_100)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



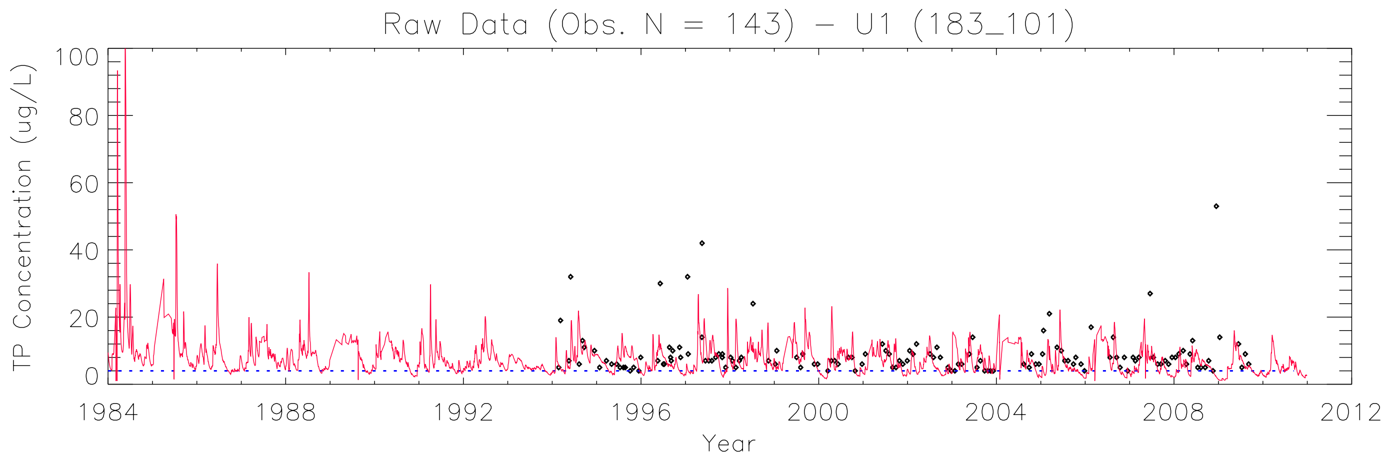
Mean: Season – 95% CI – CA32 (150_100)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

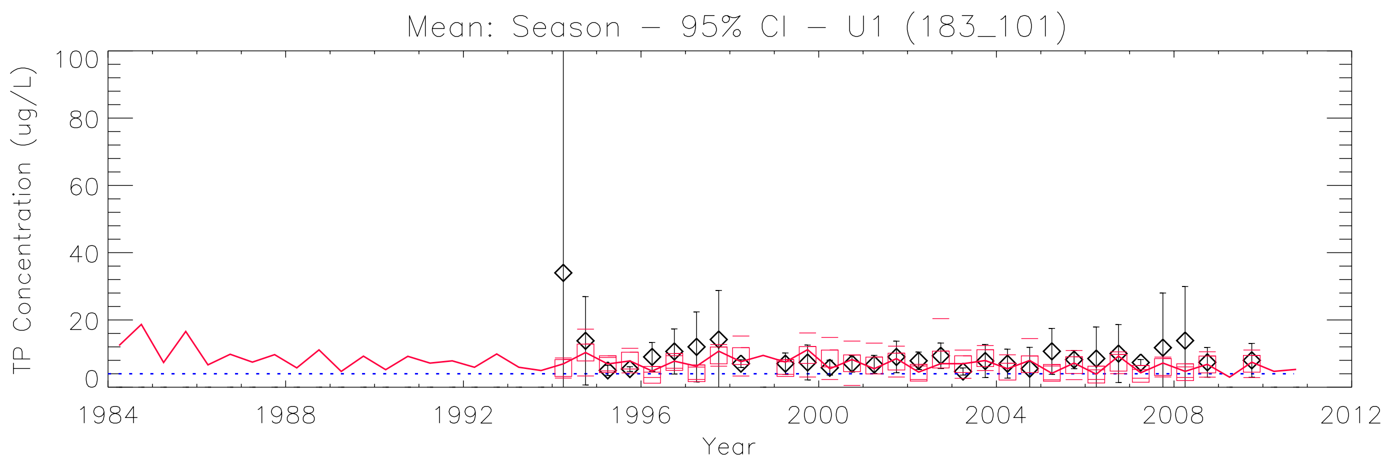


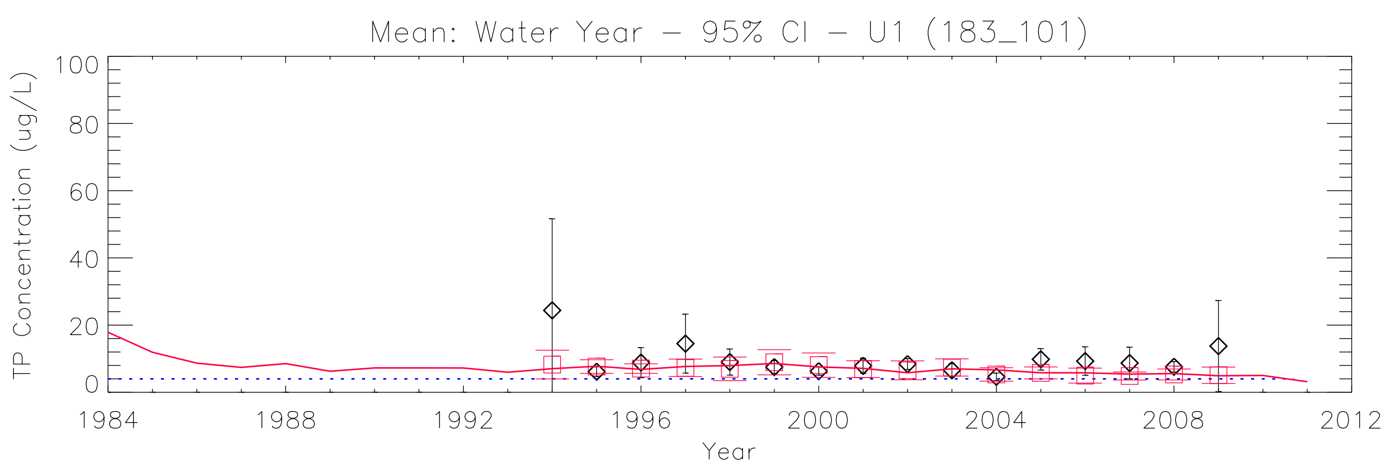
Mean: Water Year – 95% CI – CA32 (150_100)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

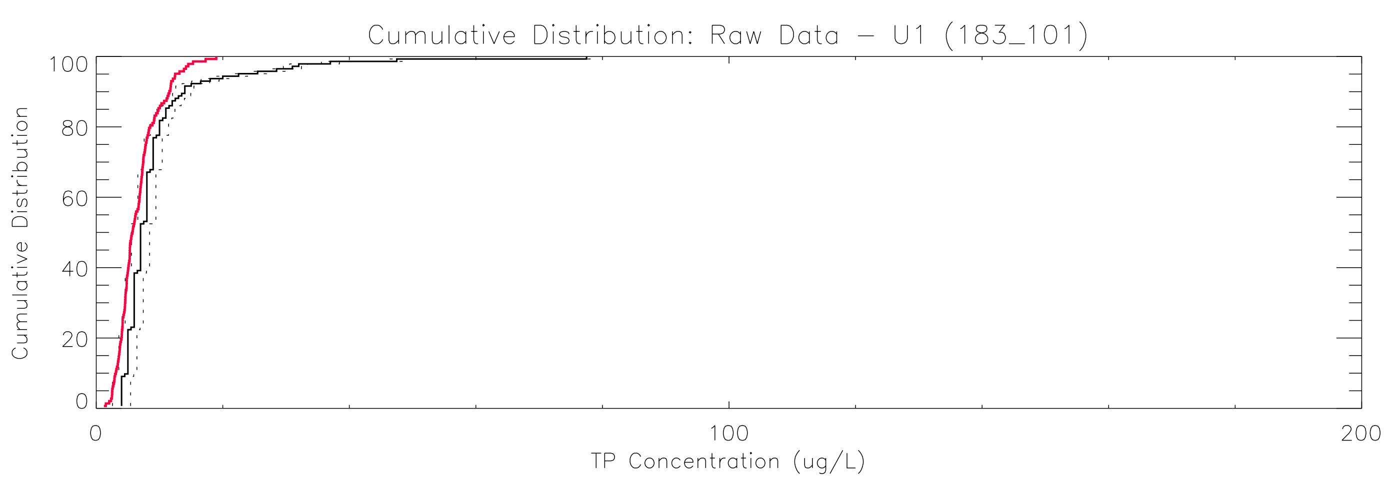


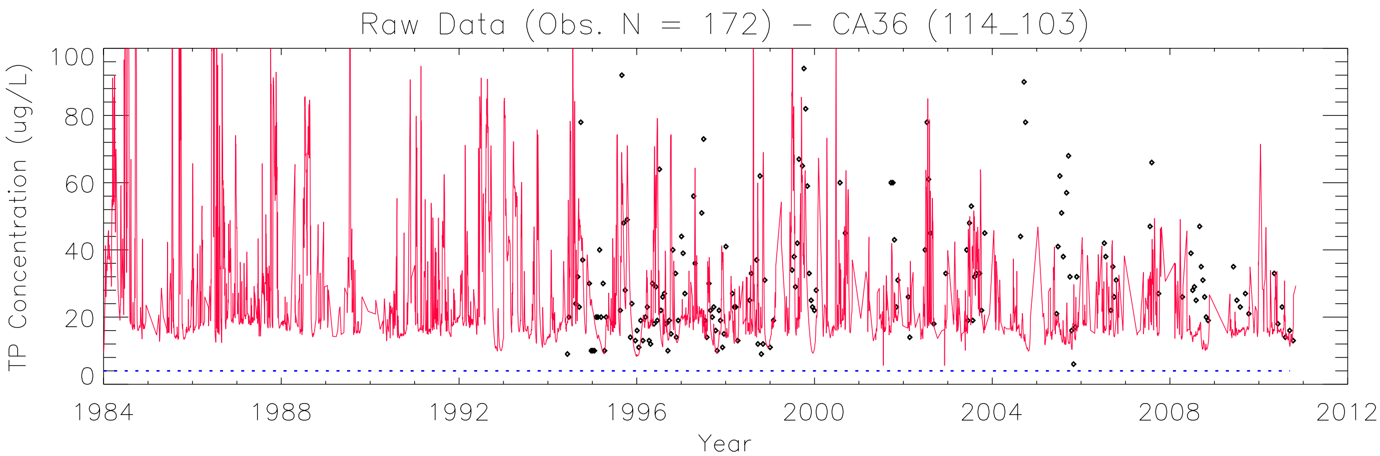
Cumulative Distribution: Raw Data – CA32 (150_100)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

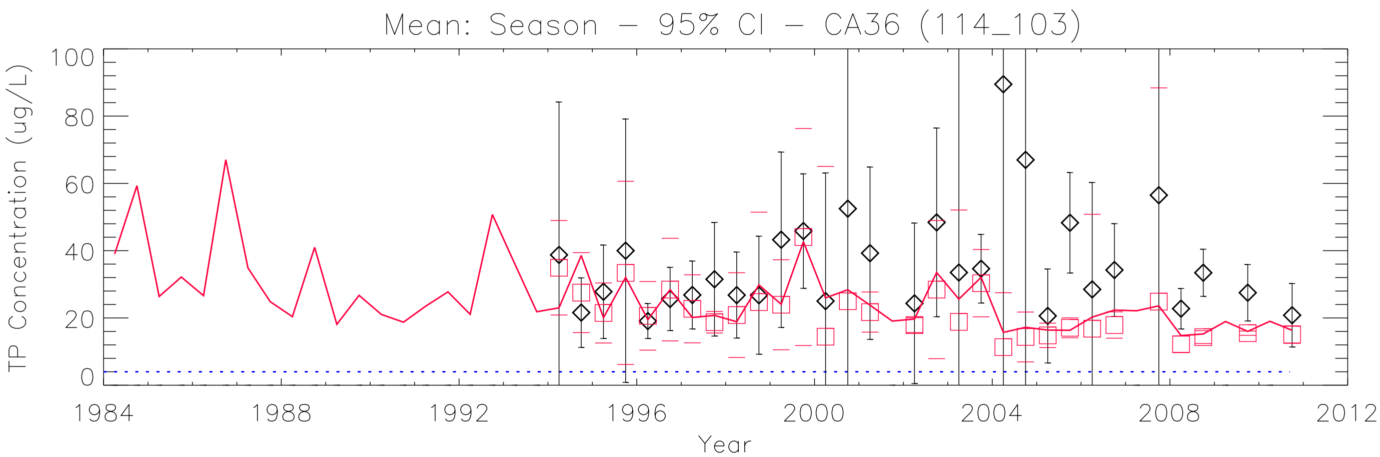

Raw Data (Obs. N = 143) – U1 (183_101)
TP Concentration (ug/L)
Year

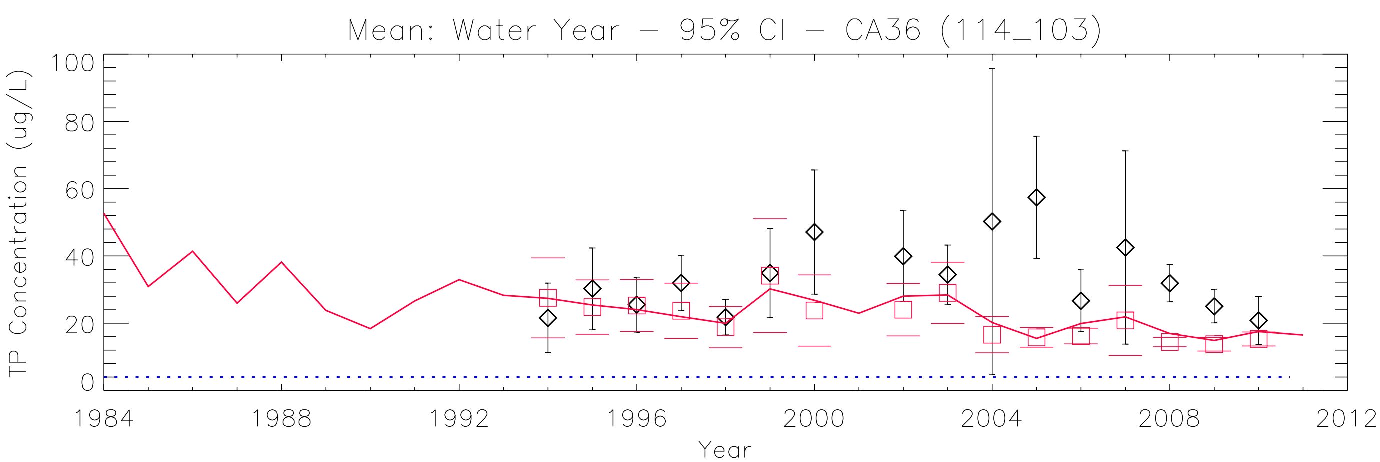

Mean: Season – 95% CI – U1 (183_101)
TP Concentration (ug/L)
Year

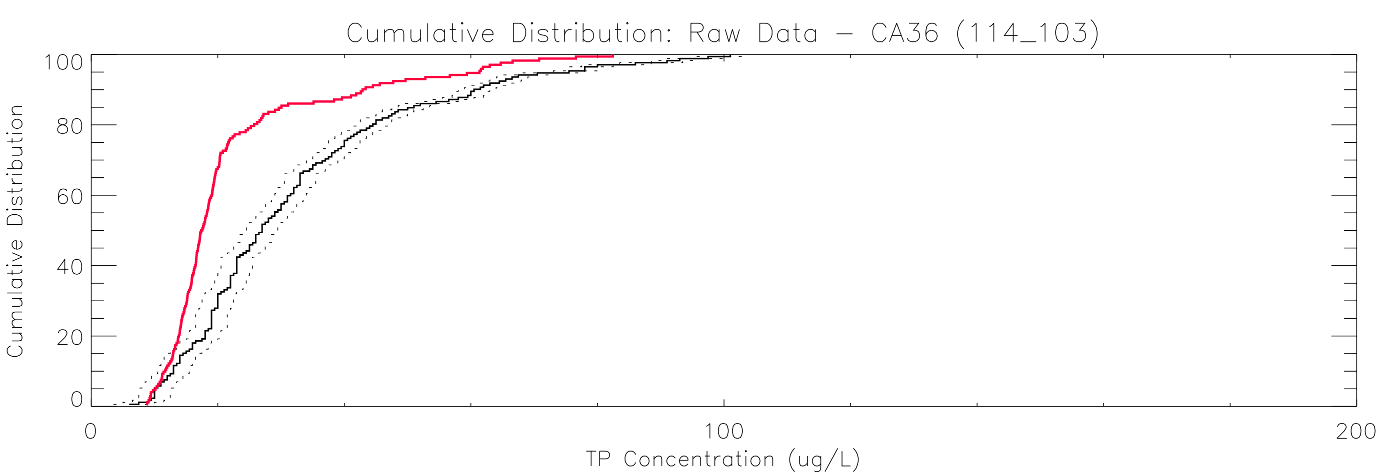

Mean: Water Year – 95% CI – U1 (183_101)
TP Concentration (ug/L)
Year

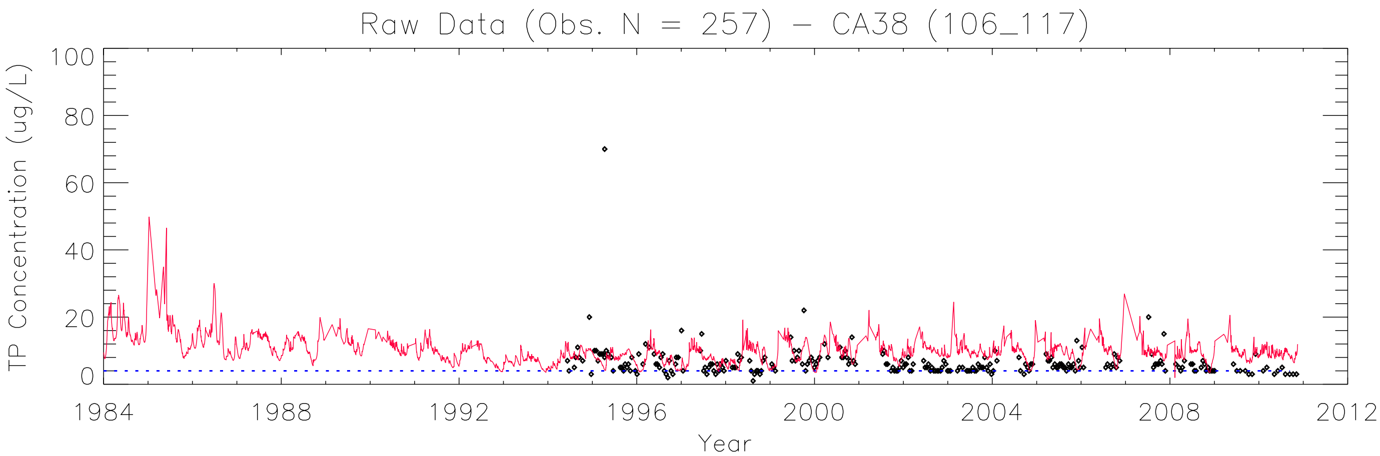

Cumulative Distribution: Raw Data – U1 (183_101)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 172) - CA36 (114_103)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

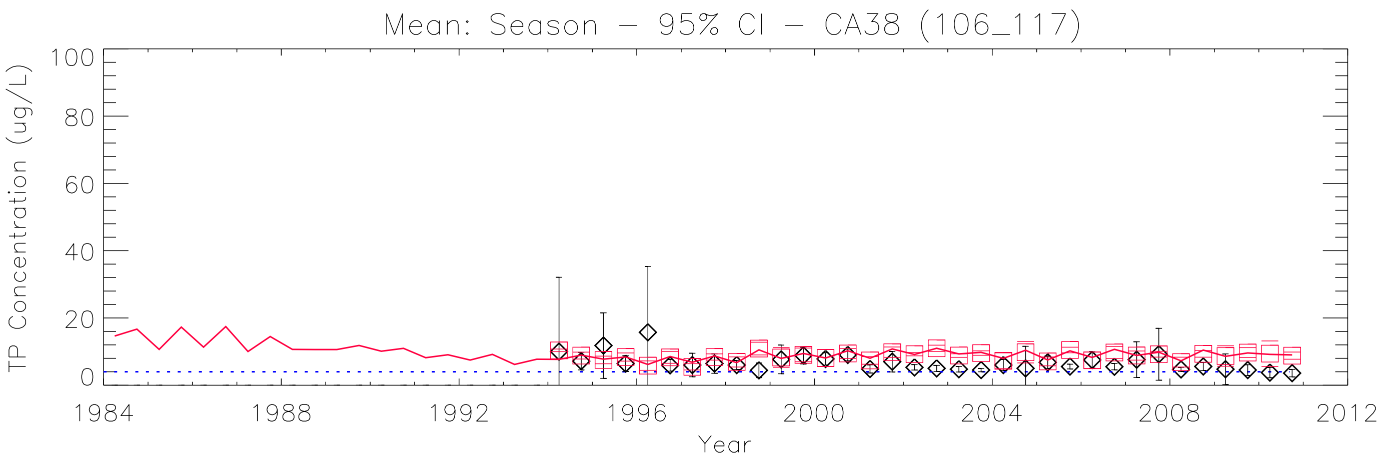

Mean: Season - 95% CI - CA36 (114_103)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012


Mean: Water Year - 95% CI - CA36 (114_103)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

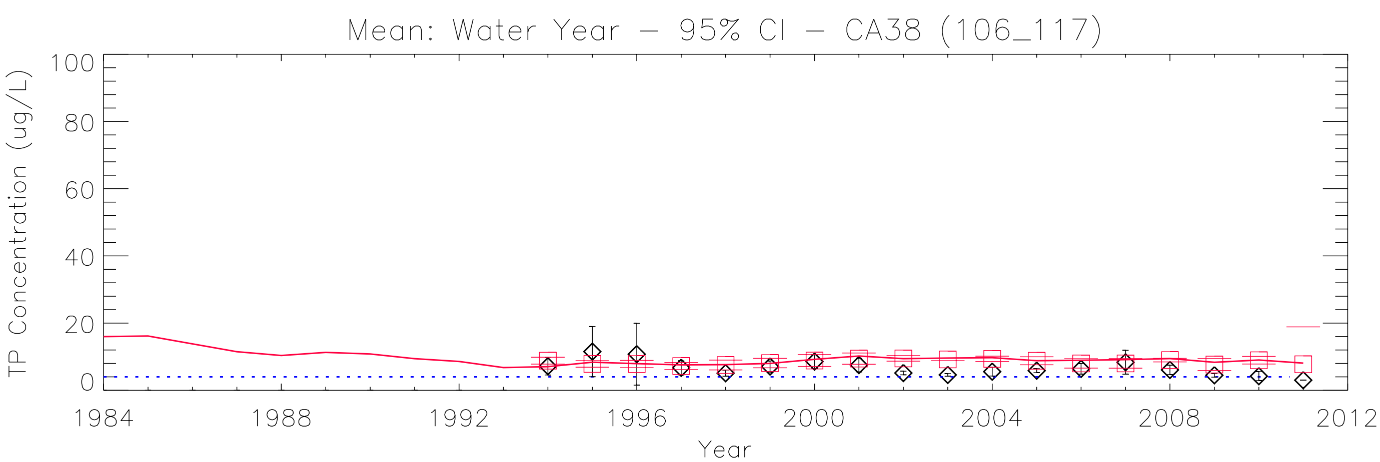

Cumulative Distribution: Raw Data - CA36 (114_103)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200



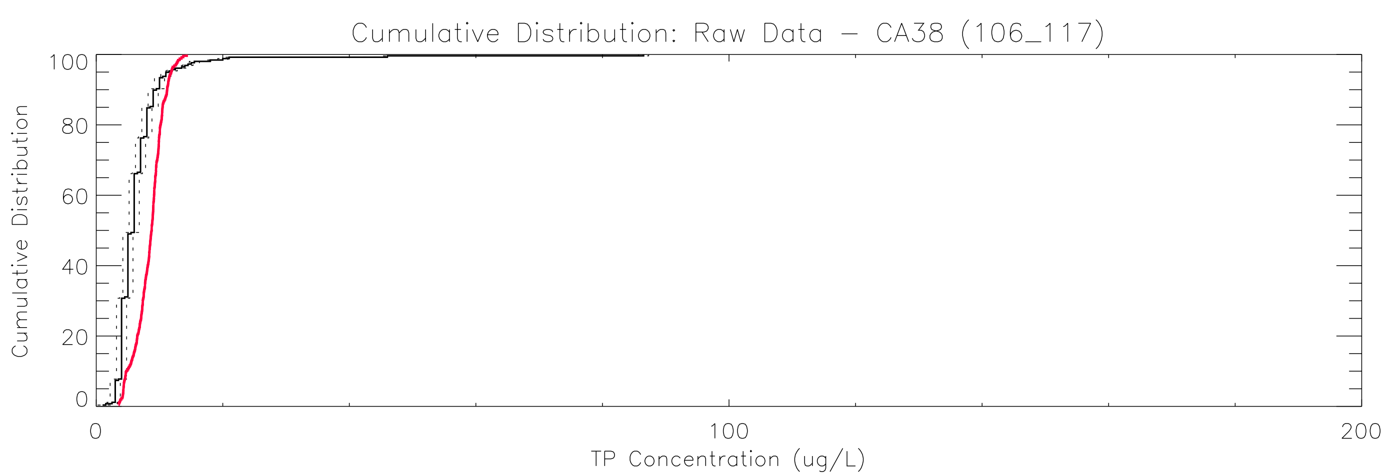
Raw Data (Obs. N = 257) – CA38 (106_117)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



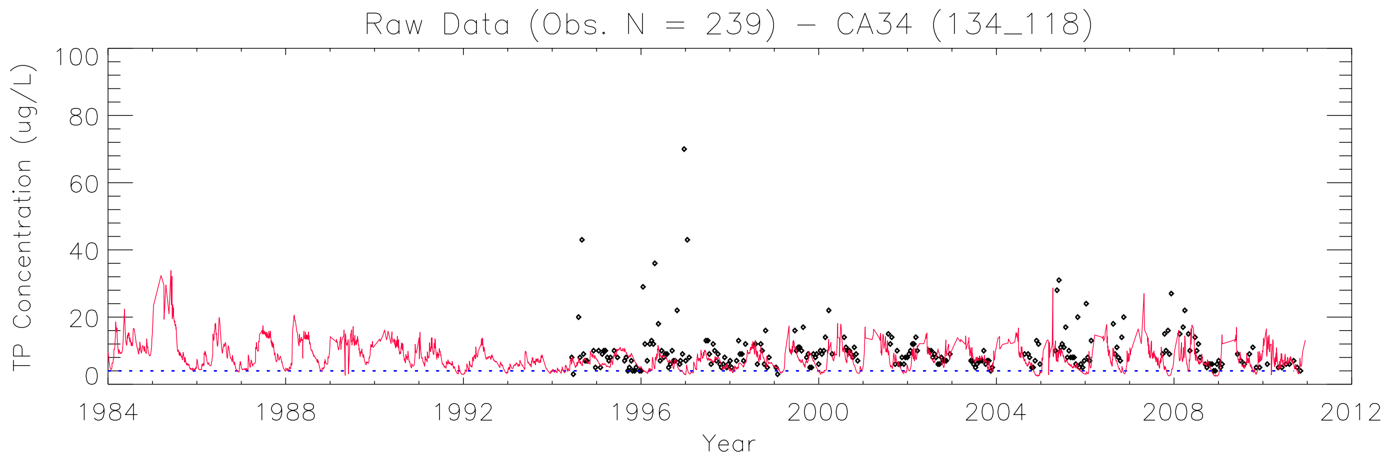
Mean: Season – 95% CI – CA38 (106_117)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



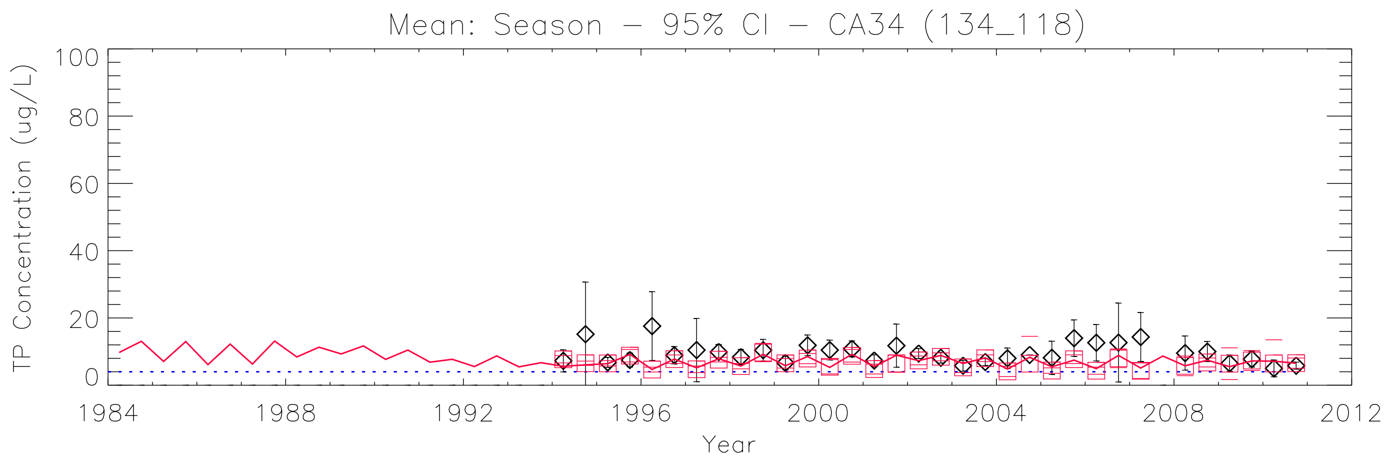
Mean: Water Year – 95% CI – CA38 (106_117)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



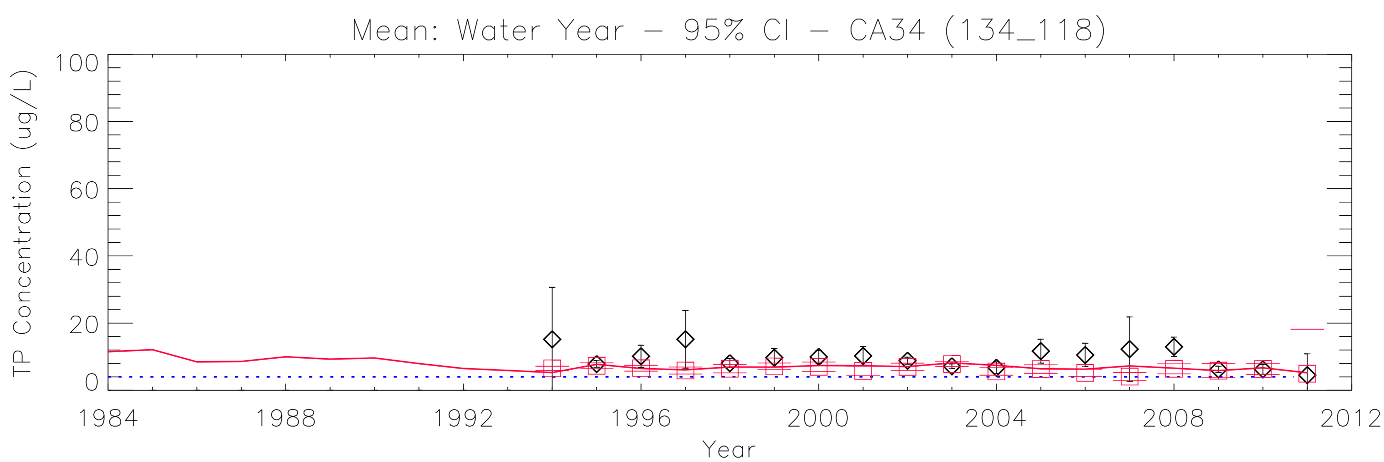
Cumulative Distribution: Raw Data – CA38 (106_117)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)



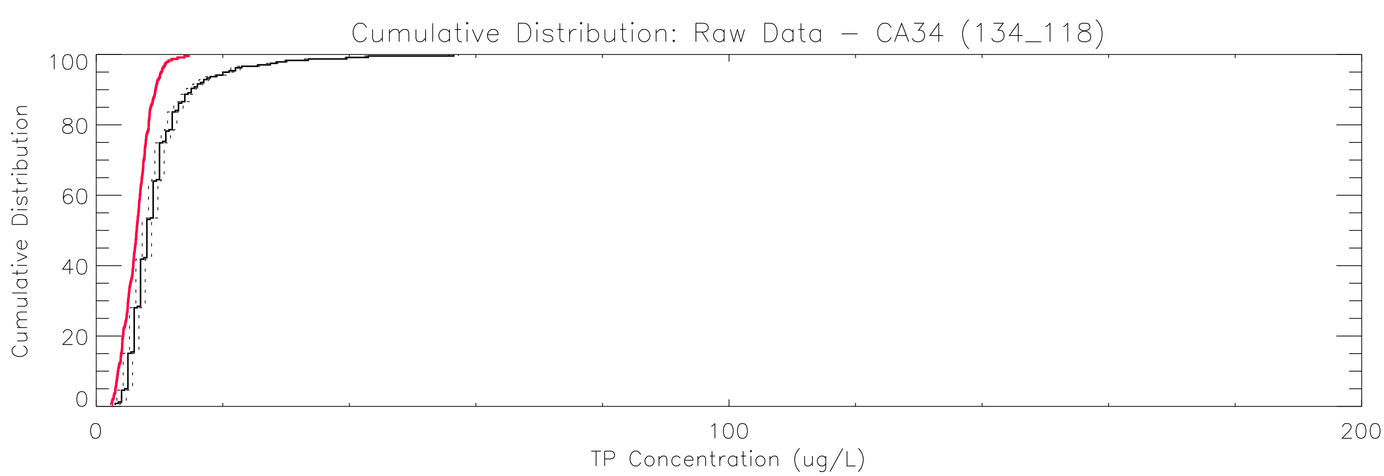
Raw Data (Obs. N = 239) – CA34 (134_118)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year



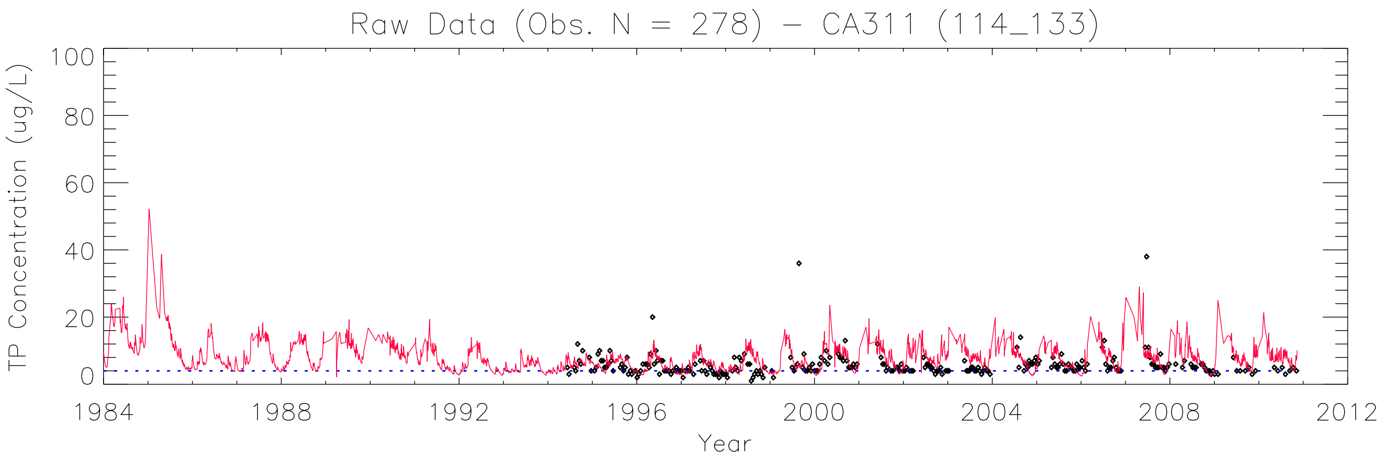
Mean: Season – 95% CI – CA34 (134_118)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

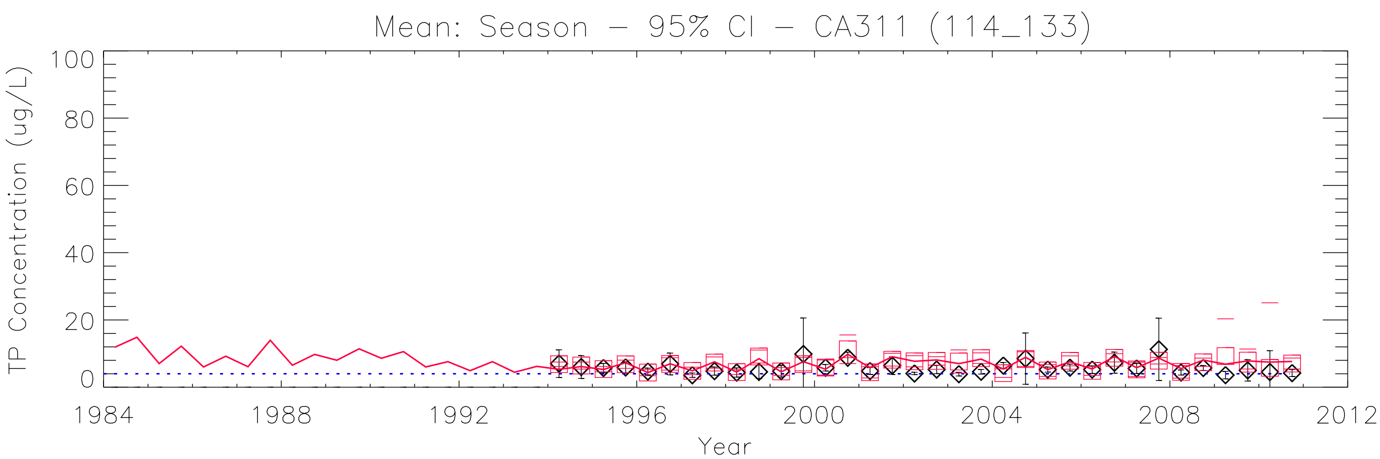


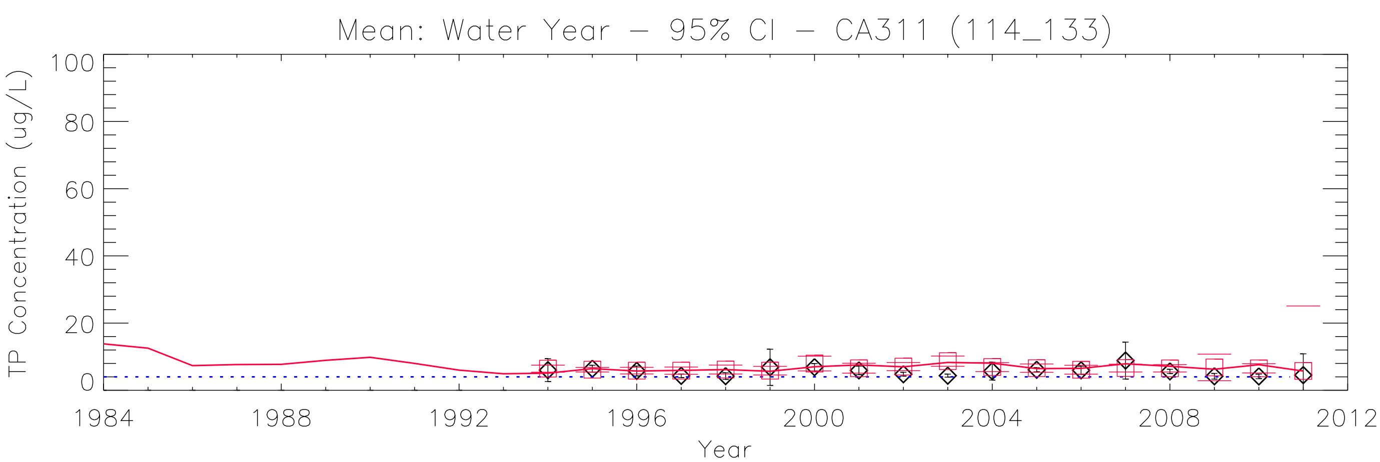
Mean: Water Year – 95% CI – CA34 (134_118)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

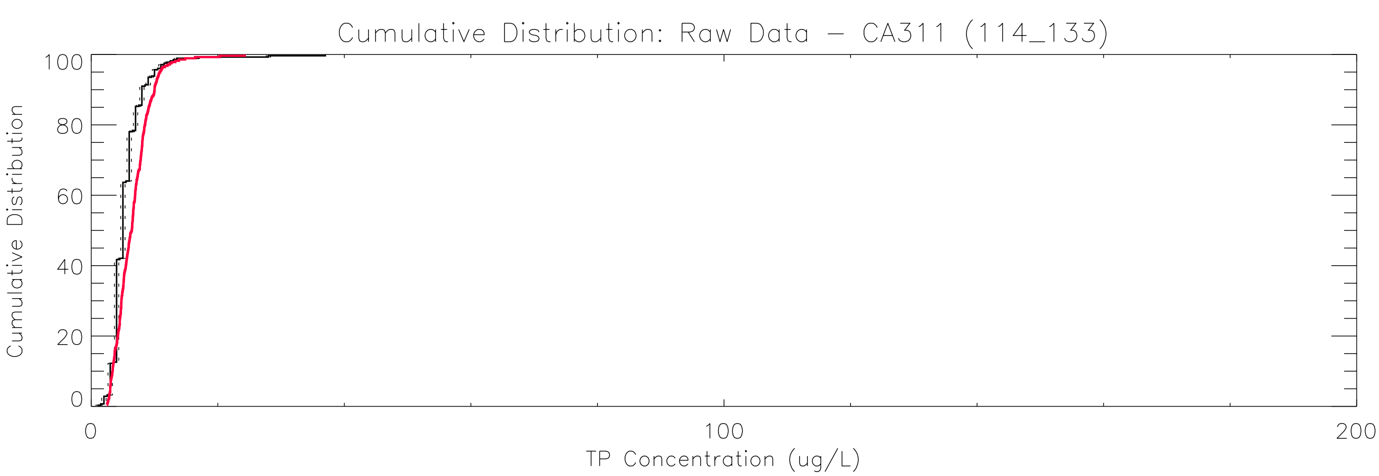


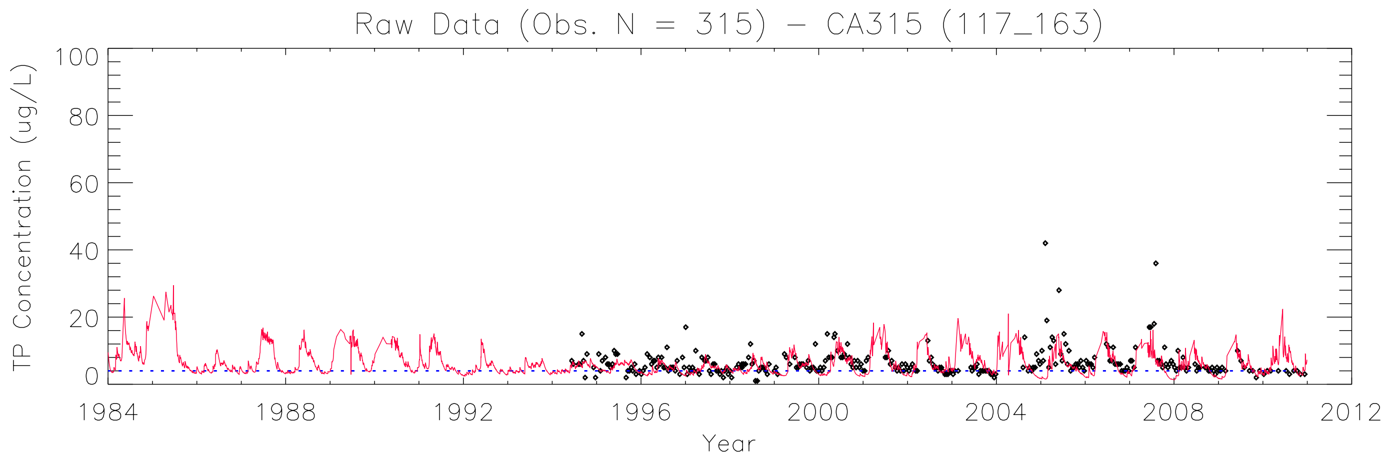
Cumulative Distribution: Raw Data – CA34 (134_118)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

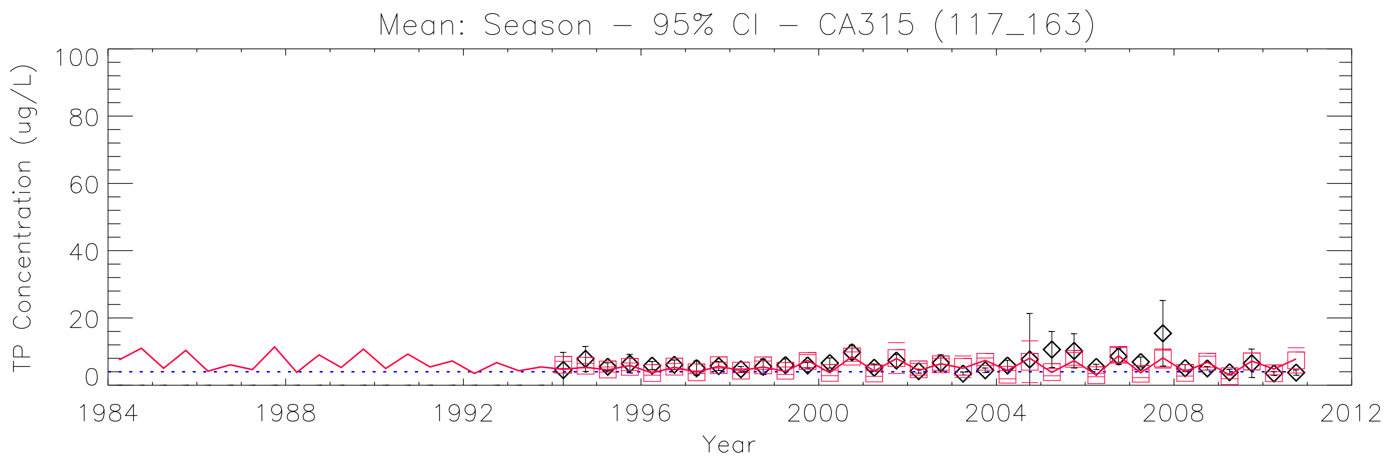

Raw Data (Obs. N = 278) – CA311 (114_133)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

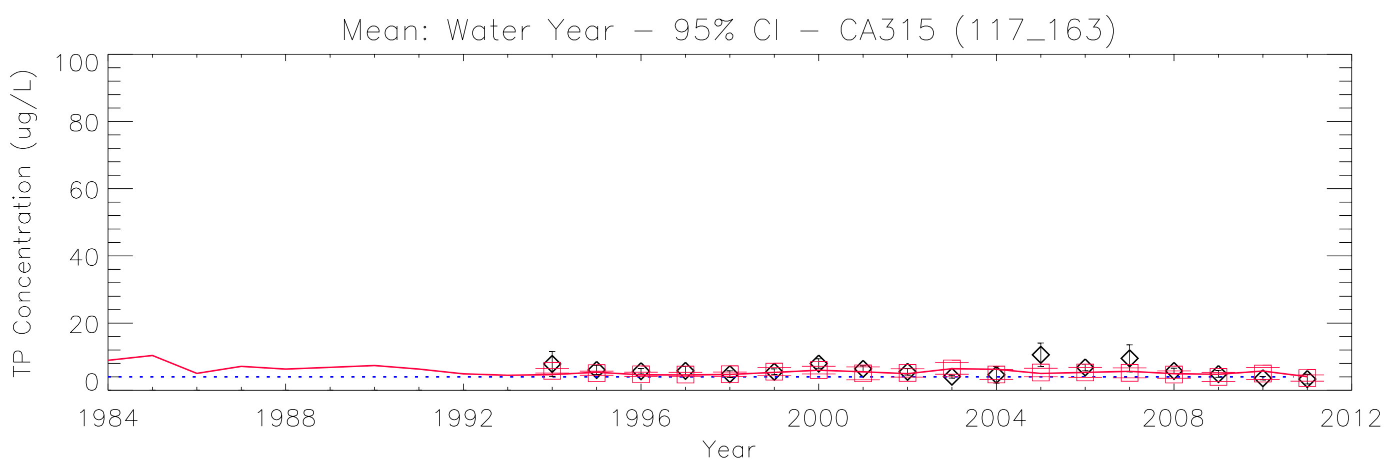

Mean: Season – 95% CI – CA311 (114_133)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

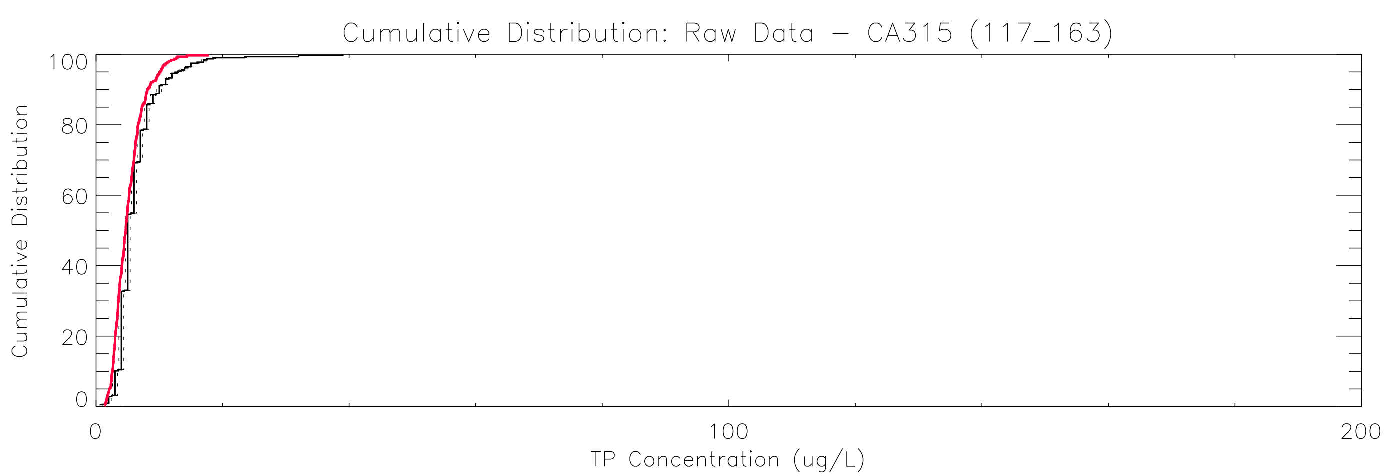

Mean: Water Year – 95% CI – CA311 (114_133)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

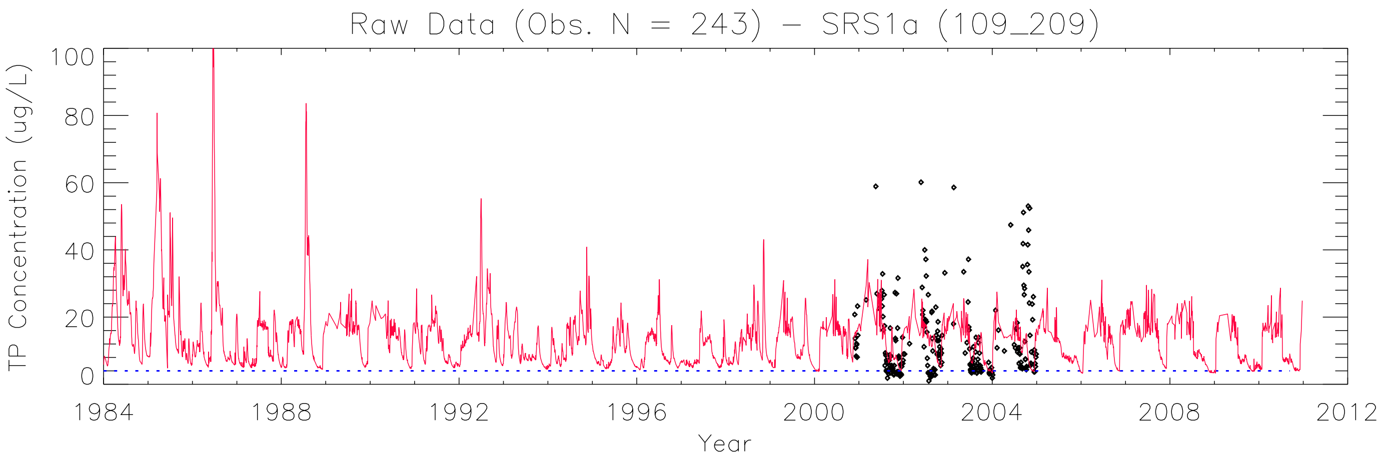

Cumulative Distribution: Raw Data – CA311 (114_133)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
TP Concentration (ug/L)


Raw Data (Obs. N = 315) – CA315 (117_163)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

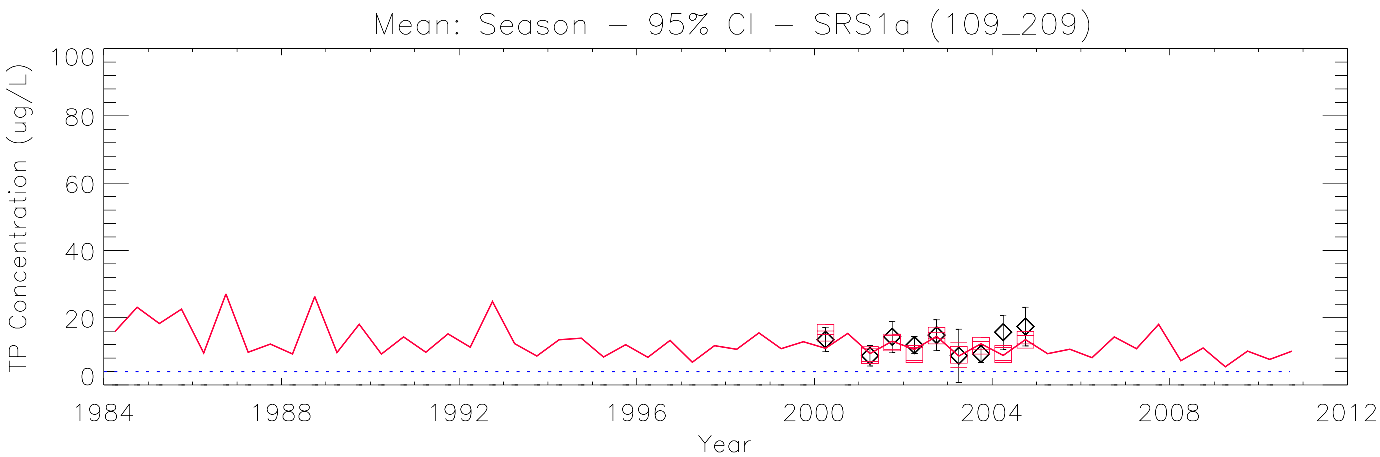

Mean: Season – 95% CI – CA315 (117_163)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012


Mean: Water Year – 95% CI – CA315 (117_163)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

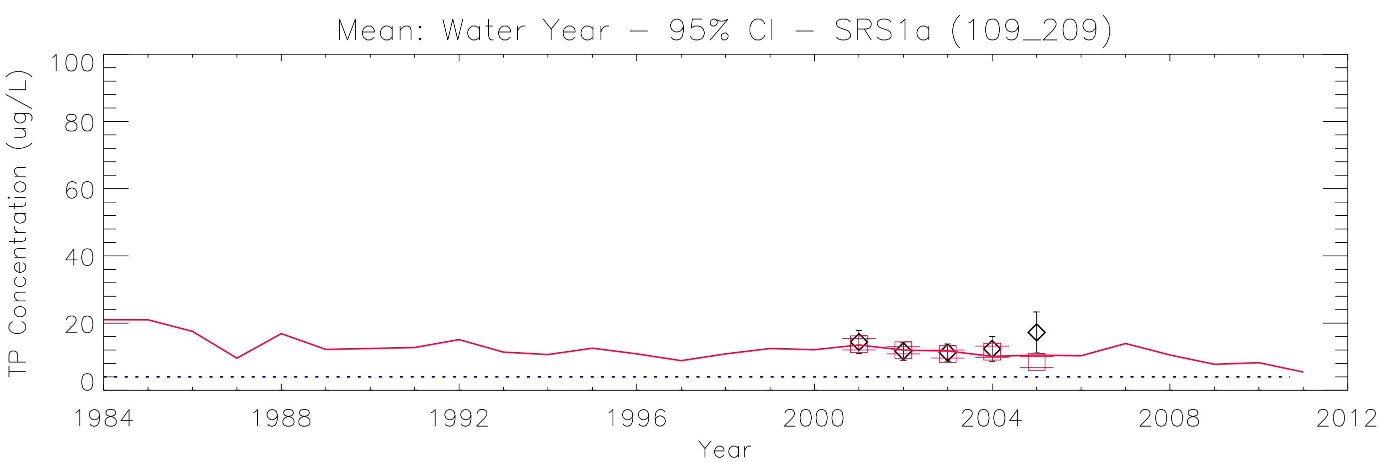

Cumulative Distribution: Raw Data – CA315 (117_163)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200



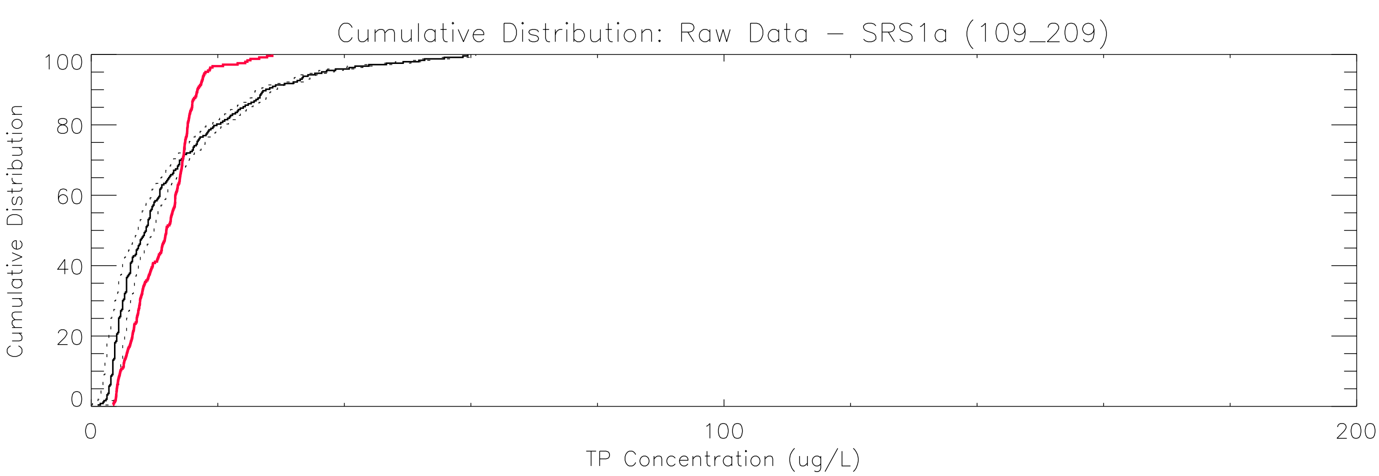
Raw Data (Obs. N = 243) – SRS1a (109_209)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012



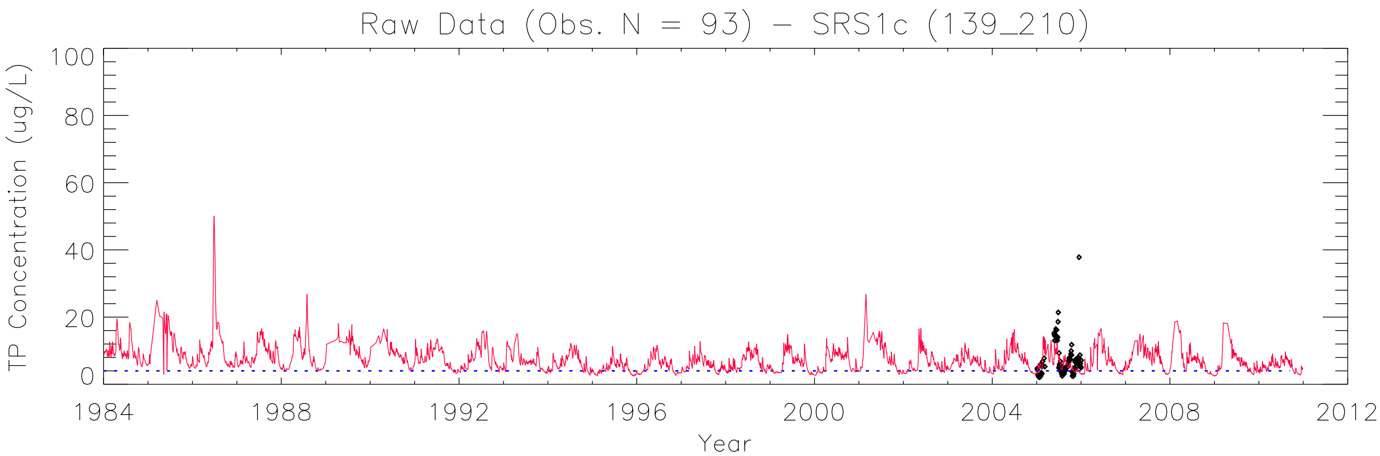
Mean: Season – 95% CI – SRS1a (109_209)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

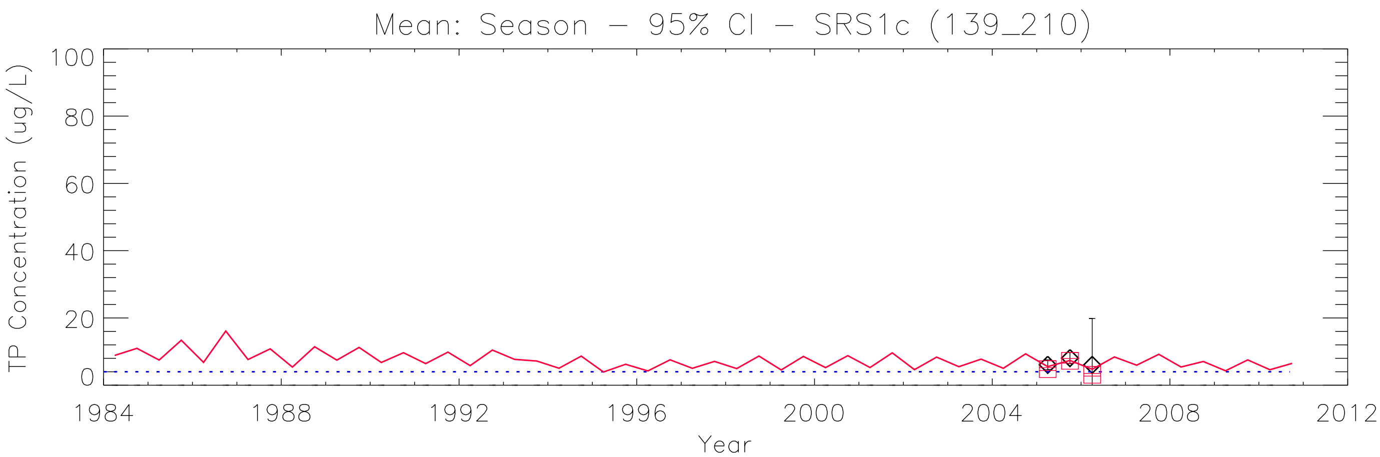


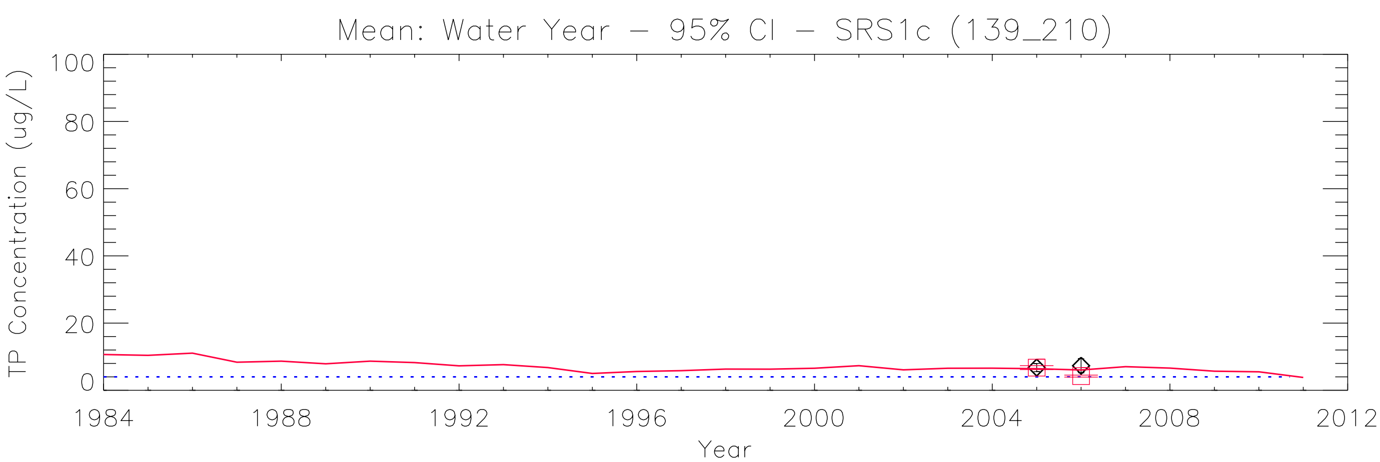
Mean: Water Year – 95% CI – SRS1a (109_209)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

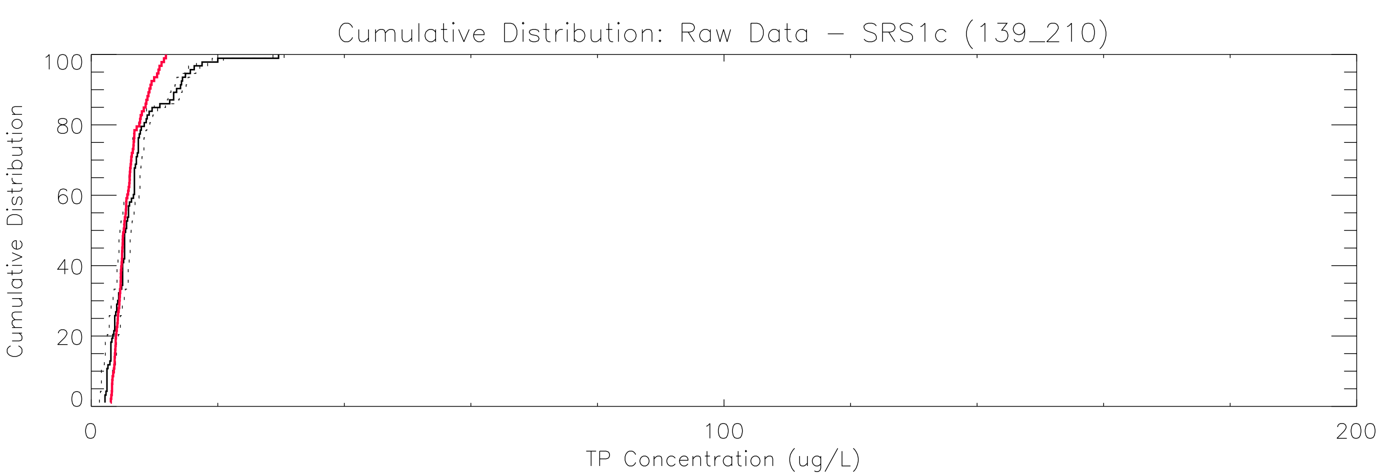


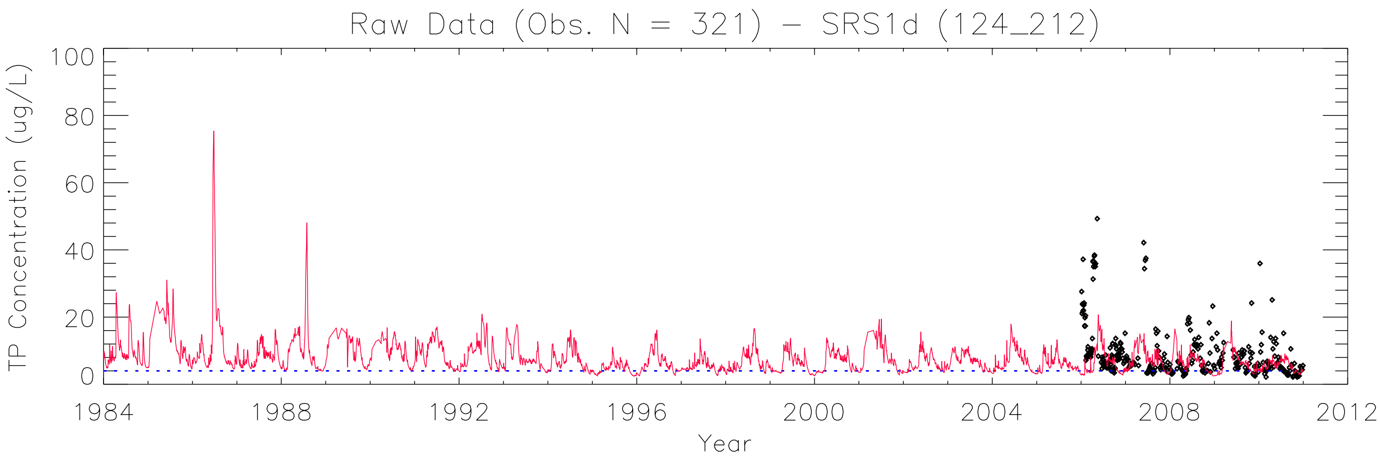
Cumulative Distribution: Raw Data – SRS1a (109_209)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

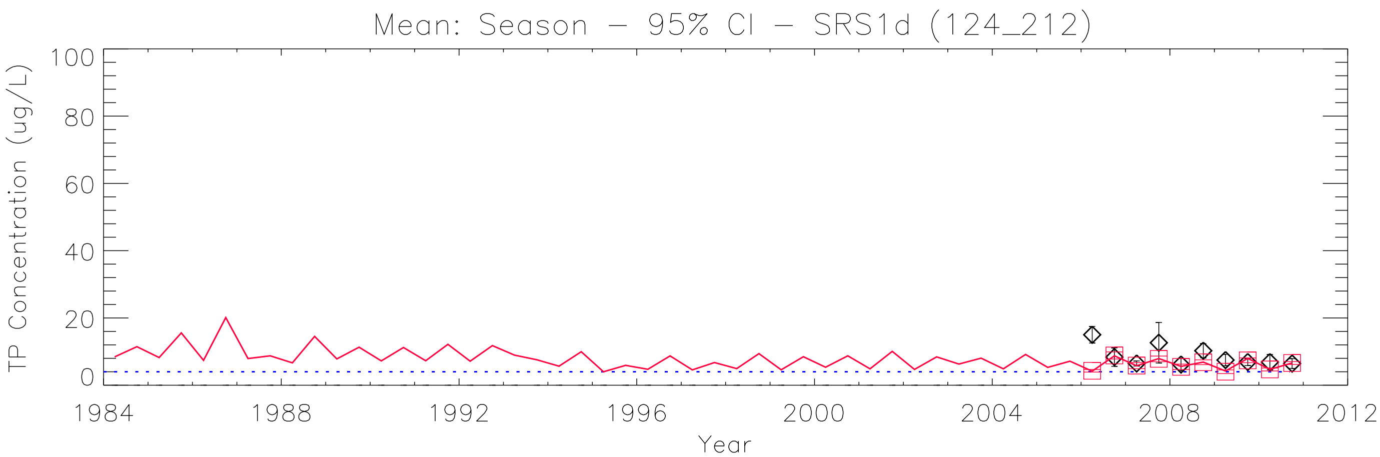

Raw Data (Obs. N = 93) - SRS1c (139_210)
TP Concentration (ug/L)
Year

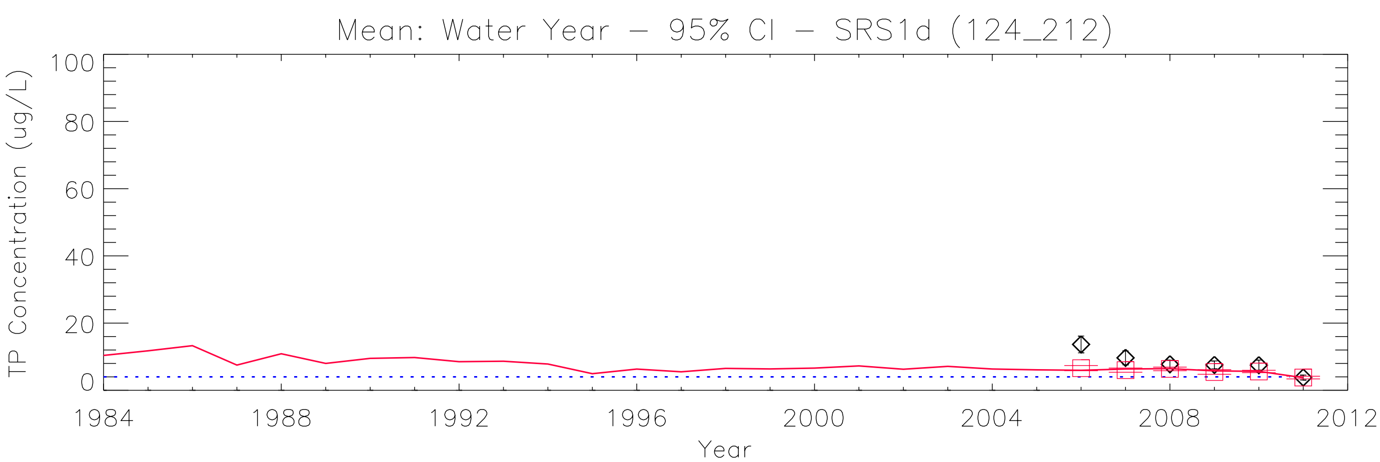

Mean: Season - 95% CI - SRS1c (139_210)
TP Concentration (ug/L)
Year

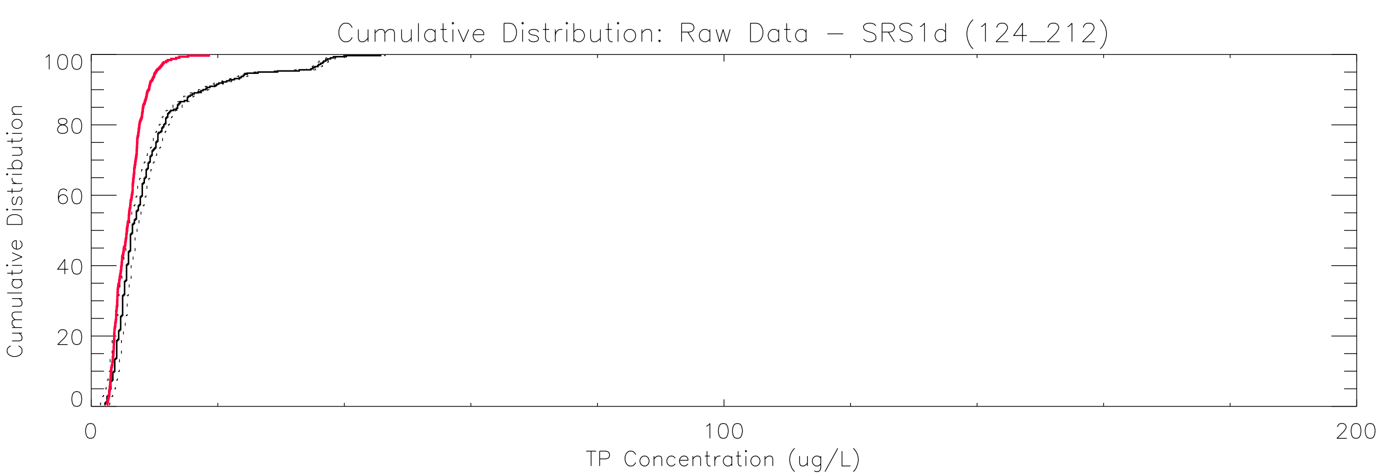

Mean: Water Year - 95% CI - SRS1c (139_210)
TP Concentration (ug/L)
Year

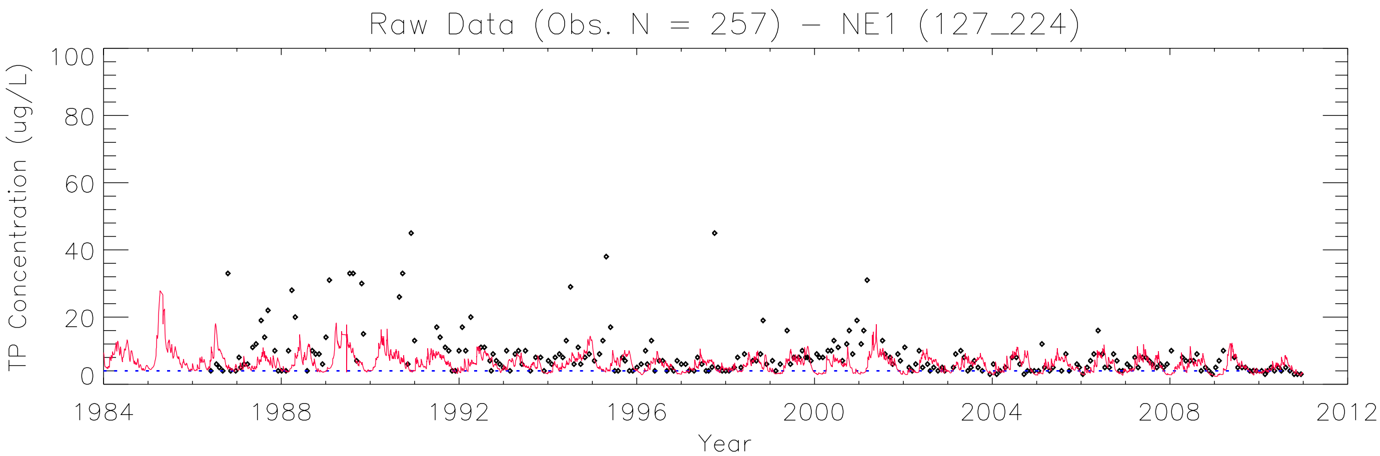

Cumulative Distribution: Raw Data - SRS1c (139_210)
Cumulative Distribution
TP Concentration (ug/L)

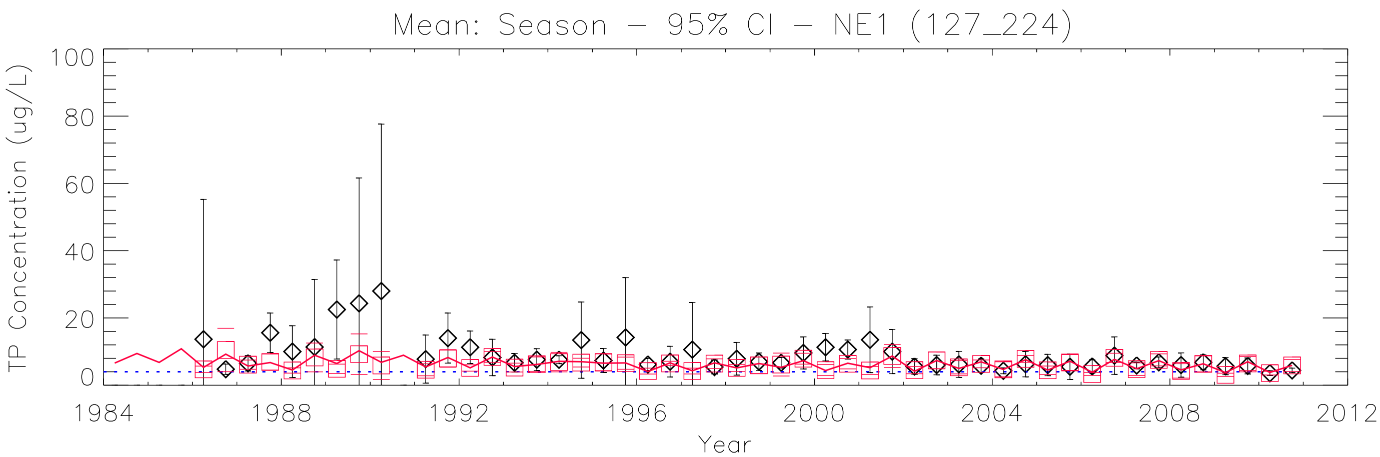

Raw Data (Obs. N = 321) - SRS1d (124_212)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

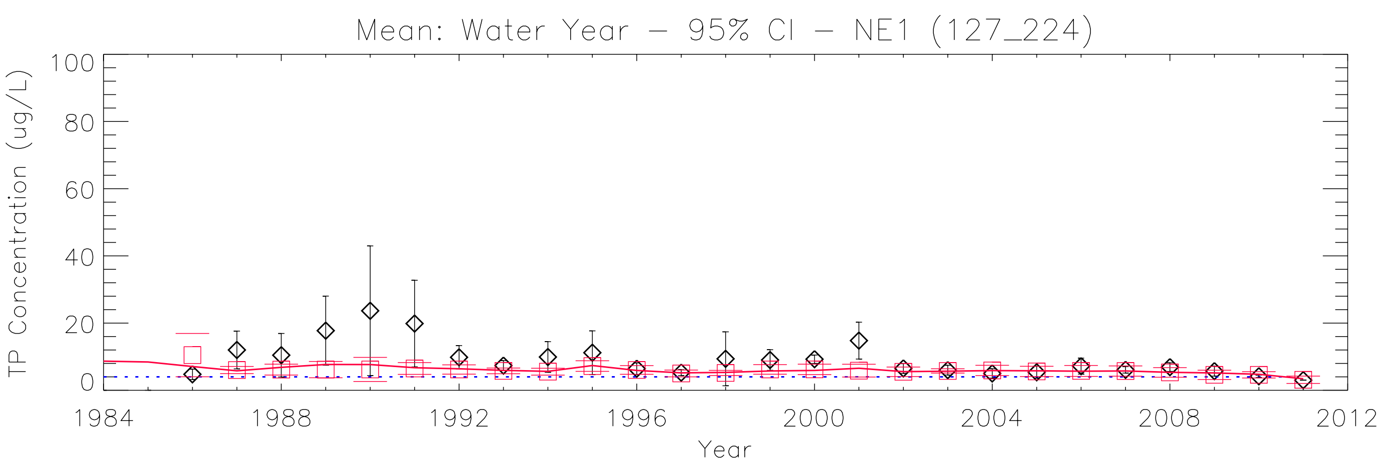

Mean: Season - 95% CI - SRS1d (124_212)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

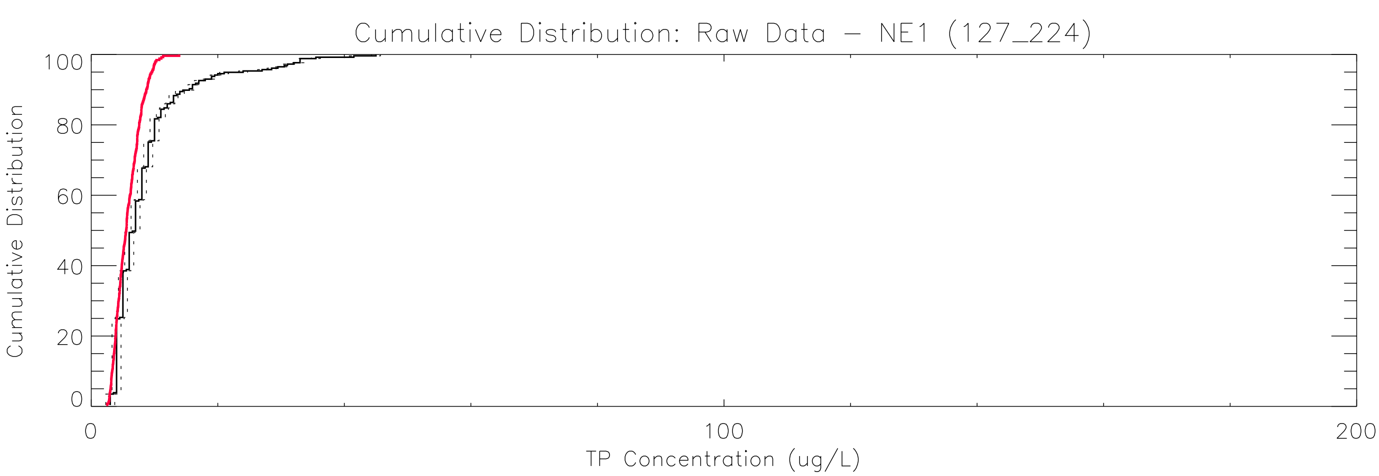

Mean: Water Year - 95% CI - SRS1d (124_212)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

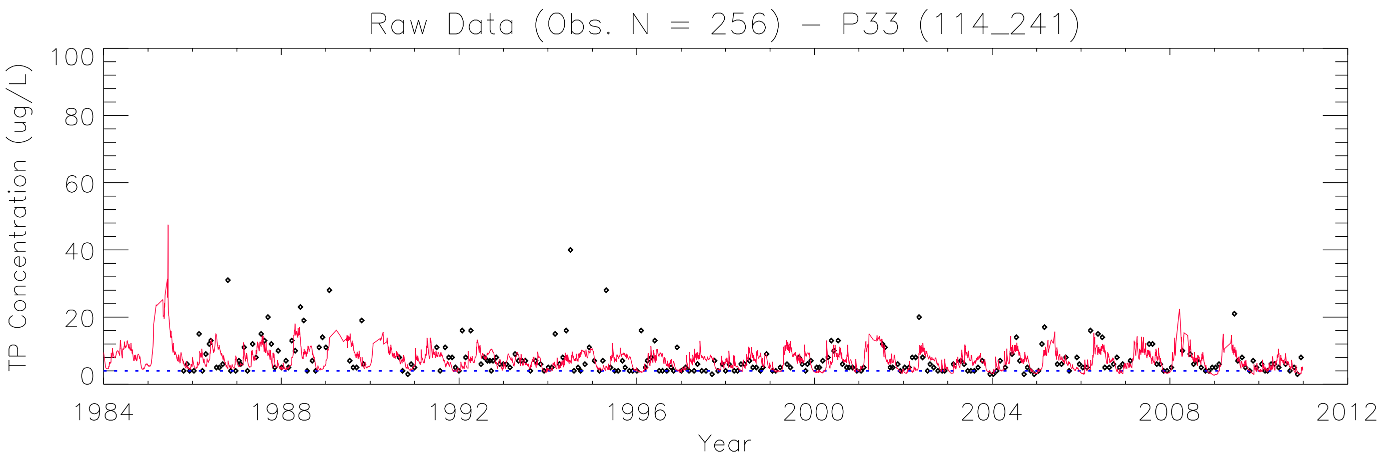

Cumulative Distribution: Raw Data - SRS1d (124_212)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

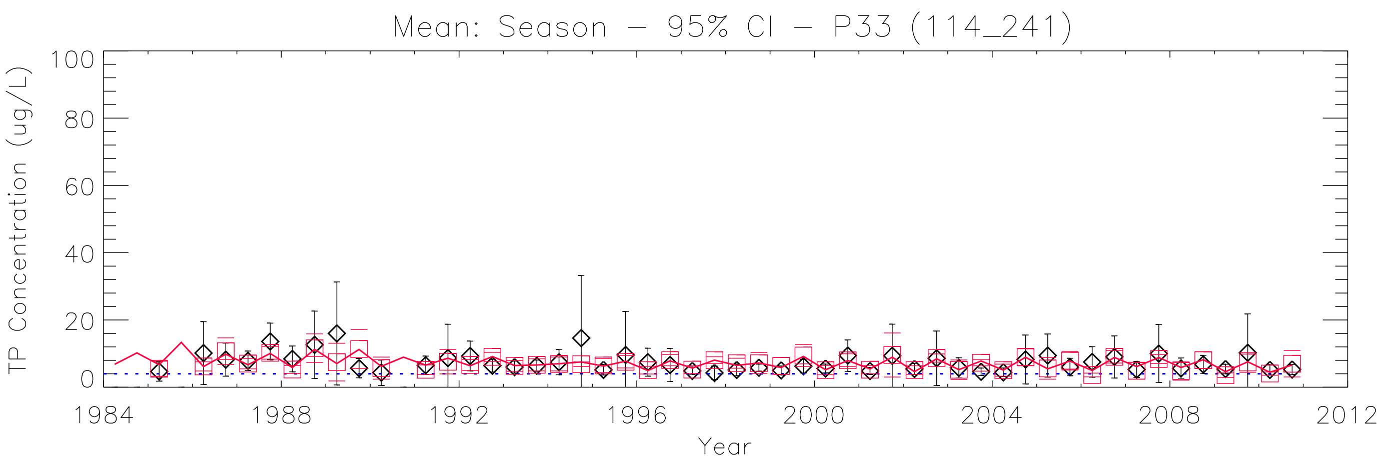

Raw Data (Obs. N = 257) - NE1 (127_224)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

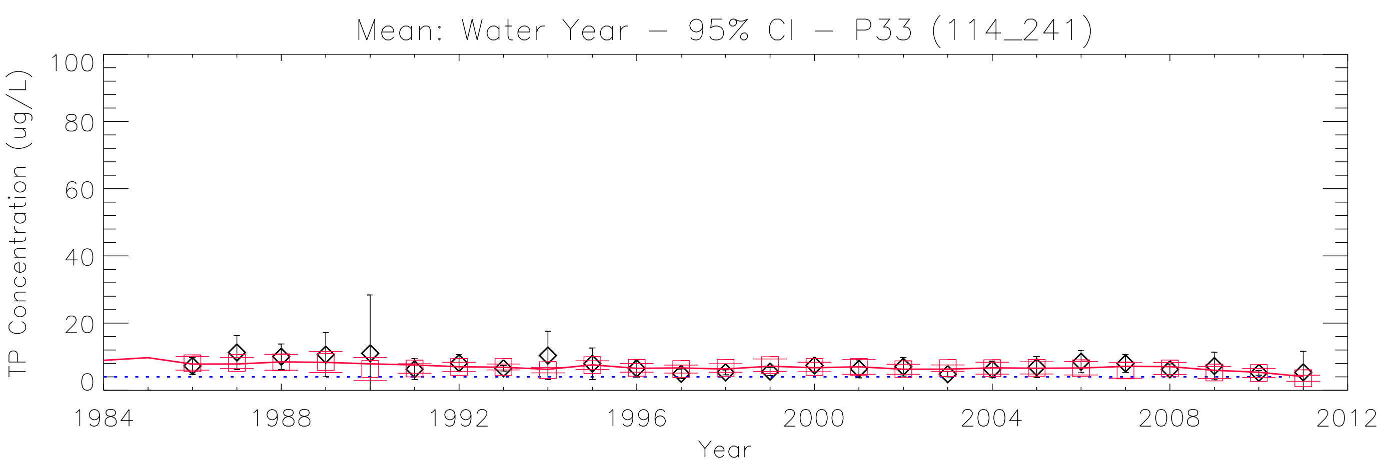

Mean: Season - 95% CI - NE1 (127_224)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

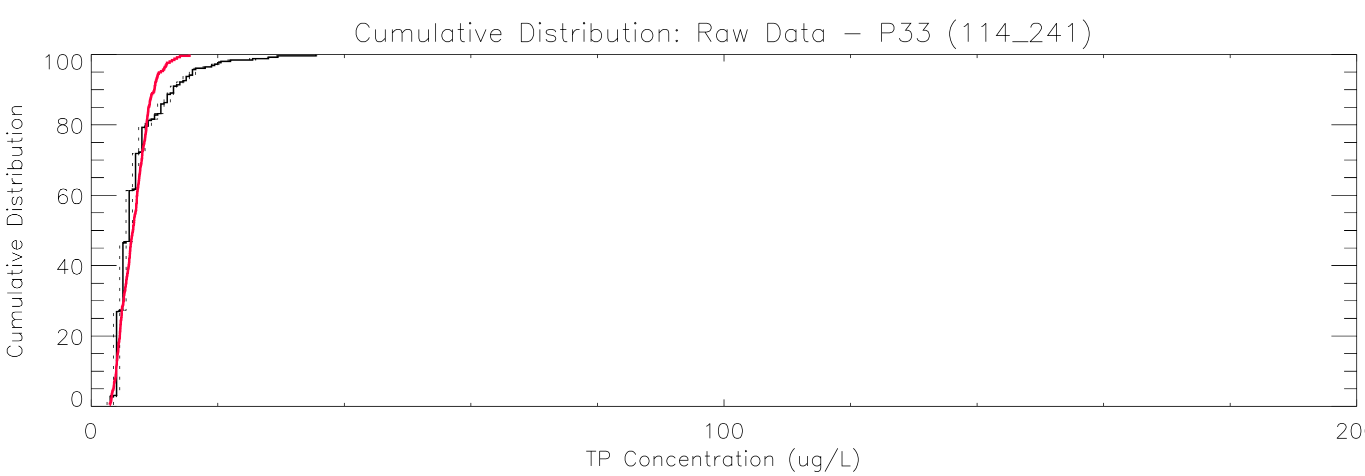

Mean: Water Year - 95% CI - NE1 (127_224)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

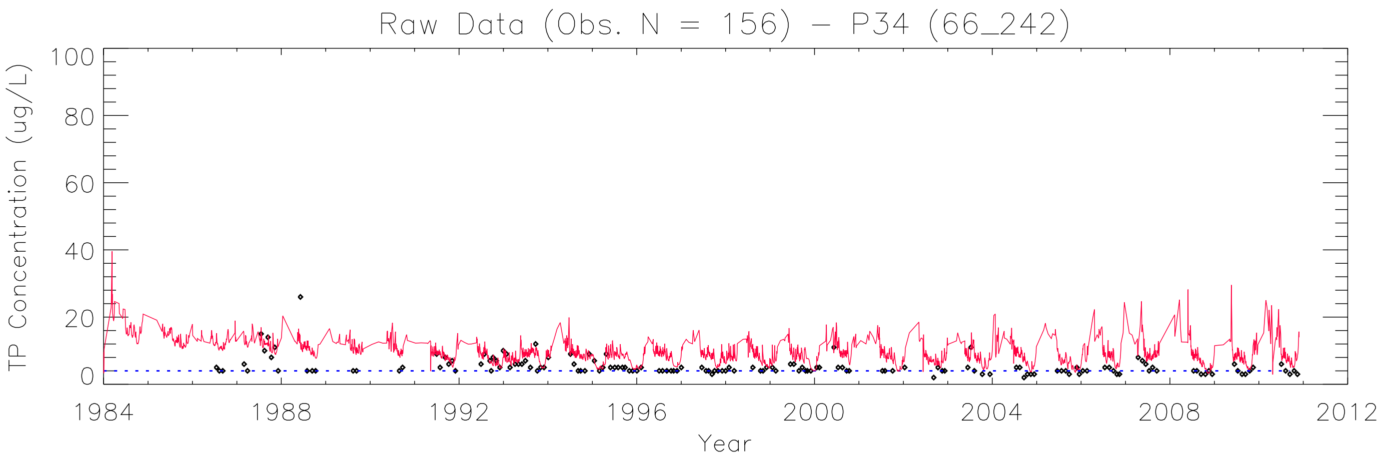

Cumulative Distribution: Raw Data - NE1 (127_224)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

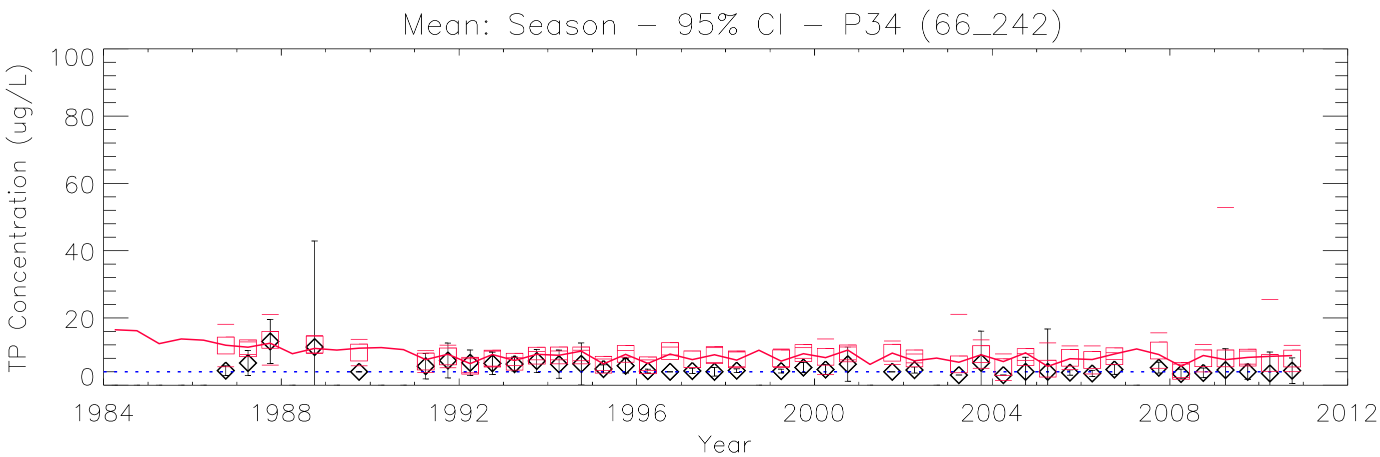

Raw Data (Obs. N = 256) – P33 (114_241)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

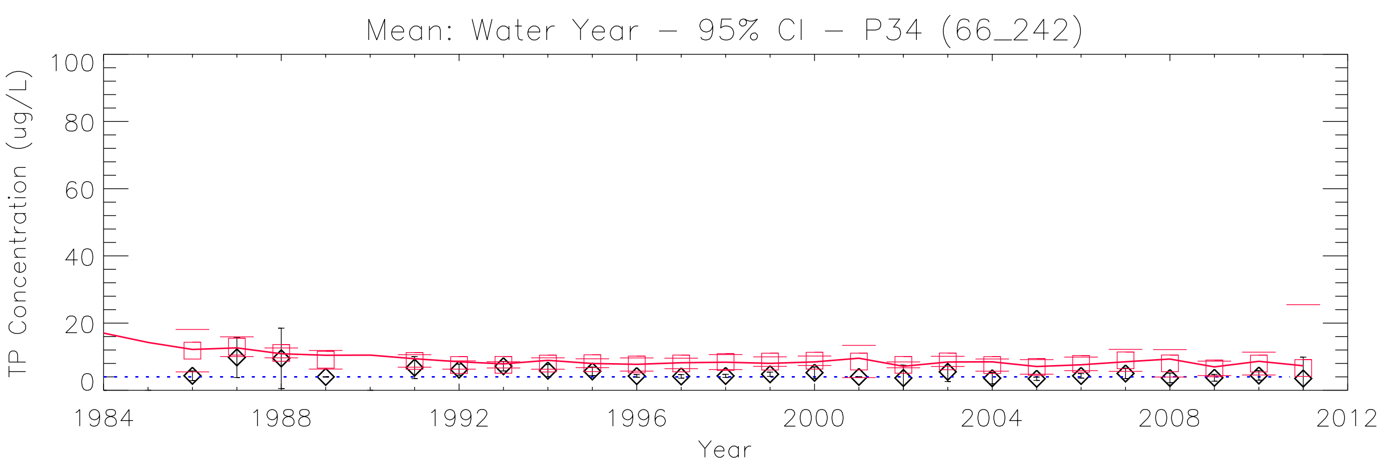

Mean: Season – 95% CI – P33 (114_241)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

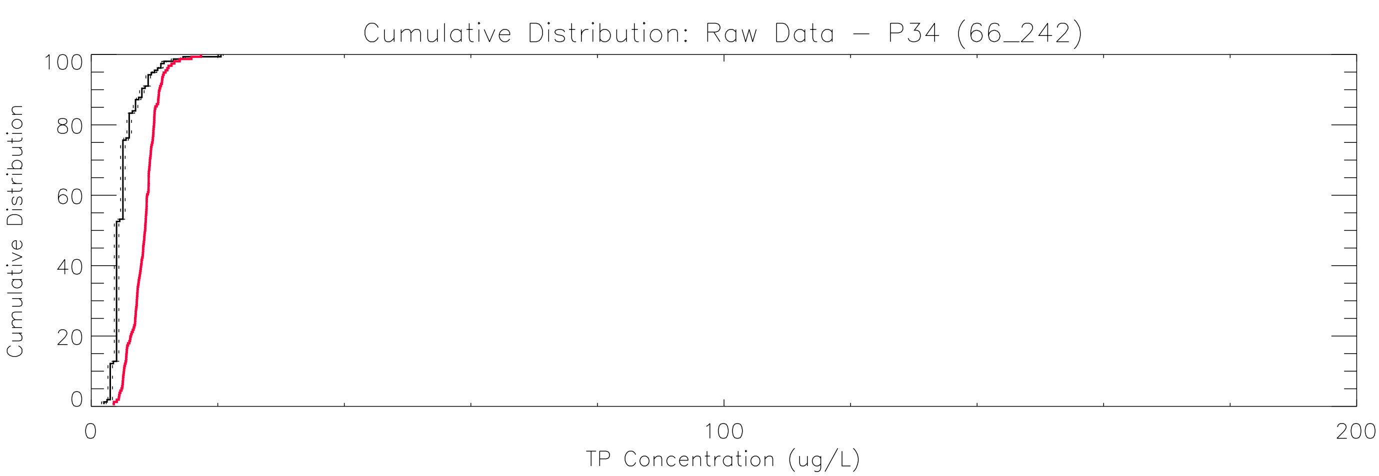

Mean: Water Year – 95% CI – P33 (114_241)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

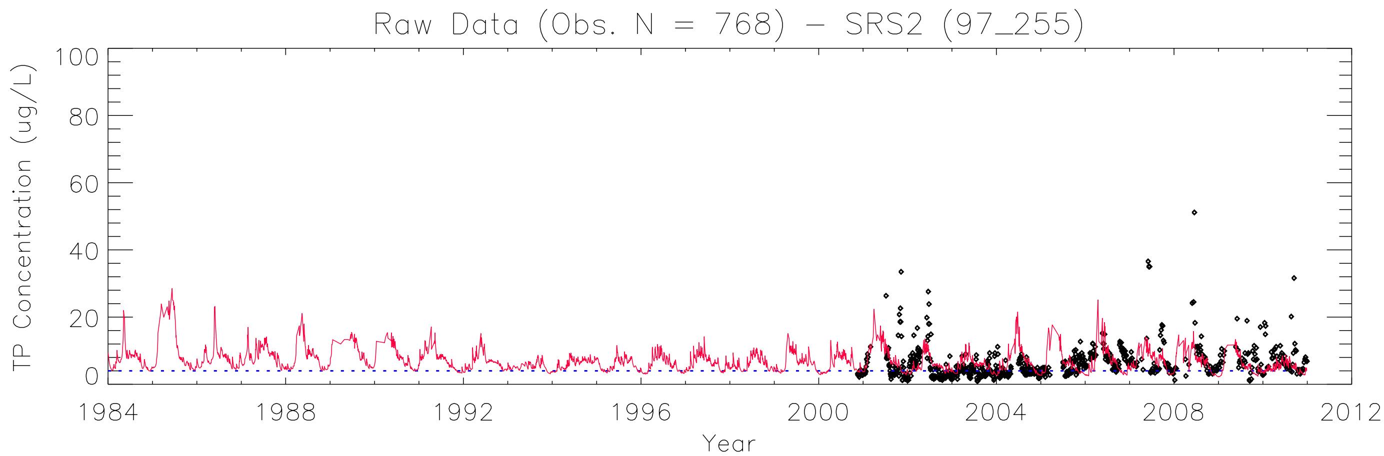

Cumulative Distribution: Raw Data – P33 (114_241)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

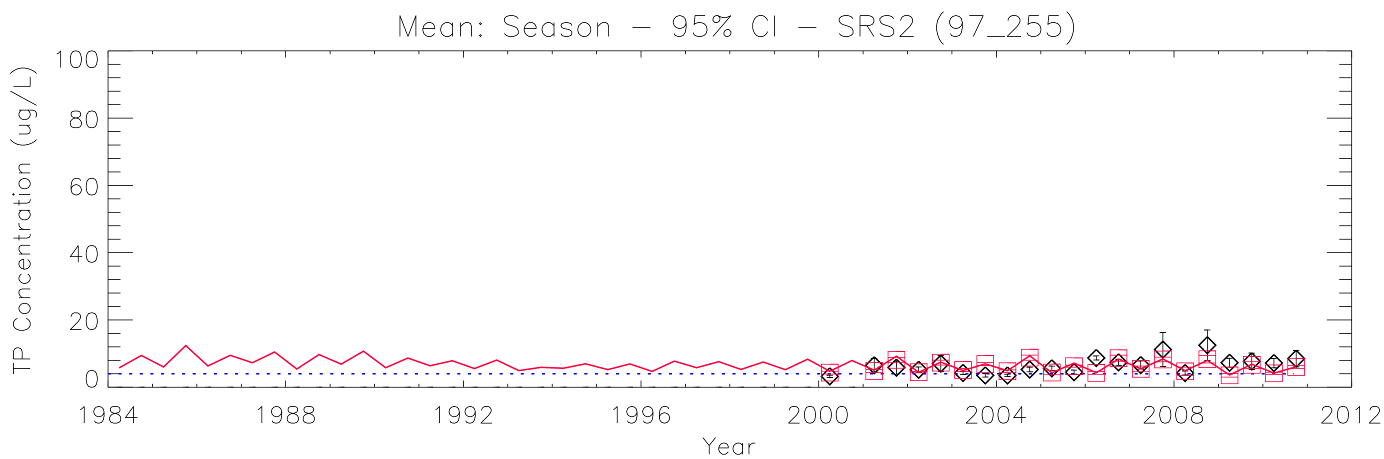

Raw Data (Obs. N = 156) – P34 (66_242)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

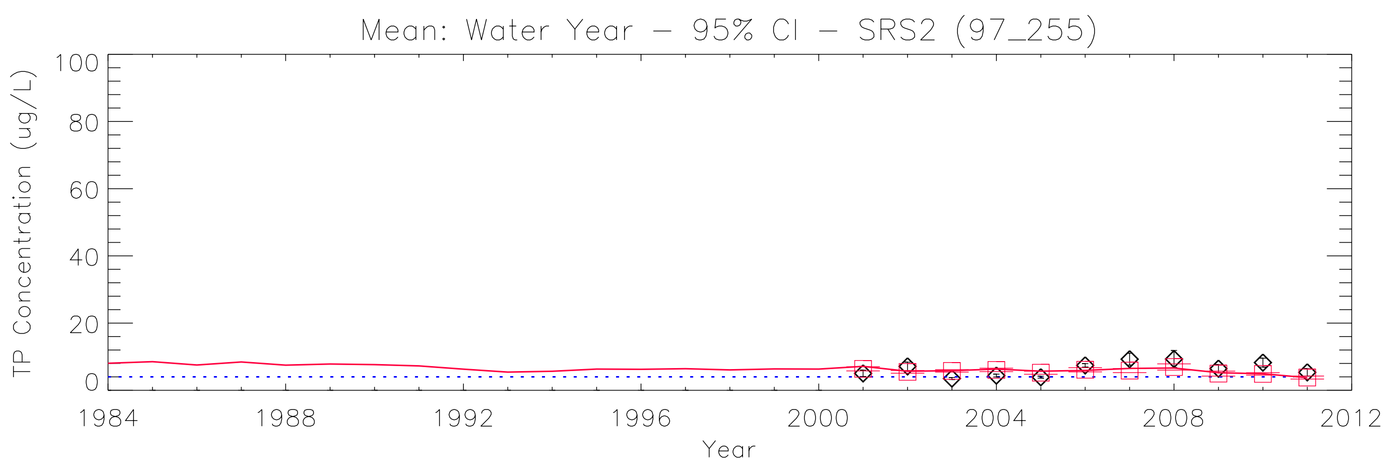

Mean: Season – 95% CI – P34 (66_242)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

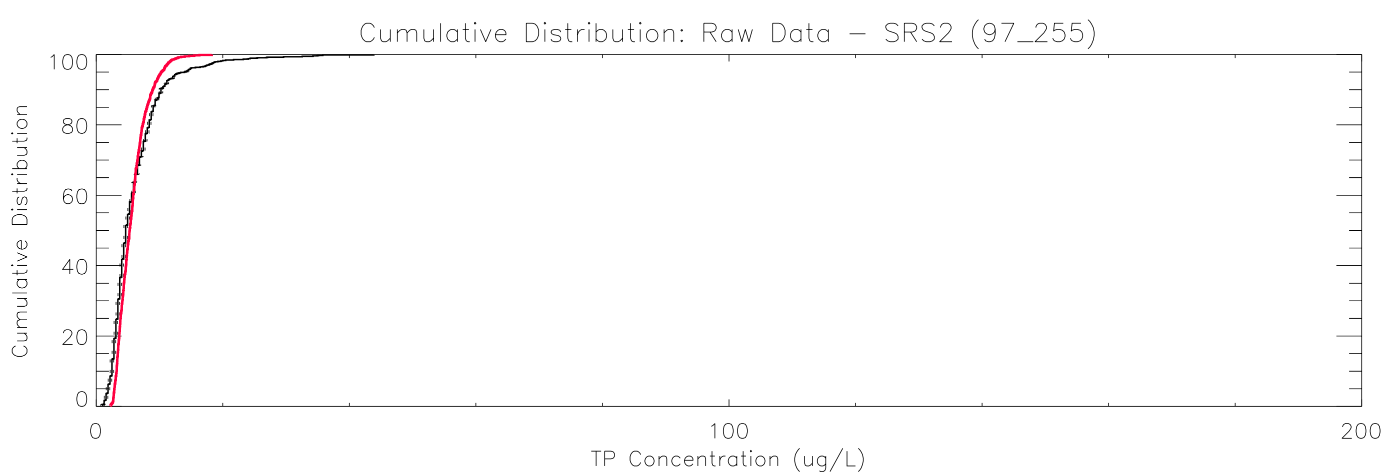

Mean: Water Year – 95% CI – P34 (66_242)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

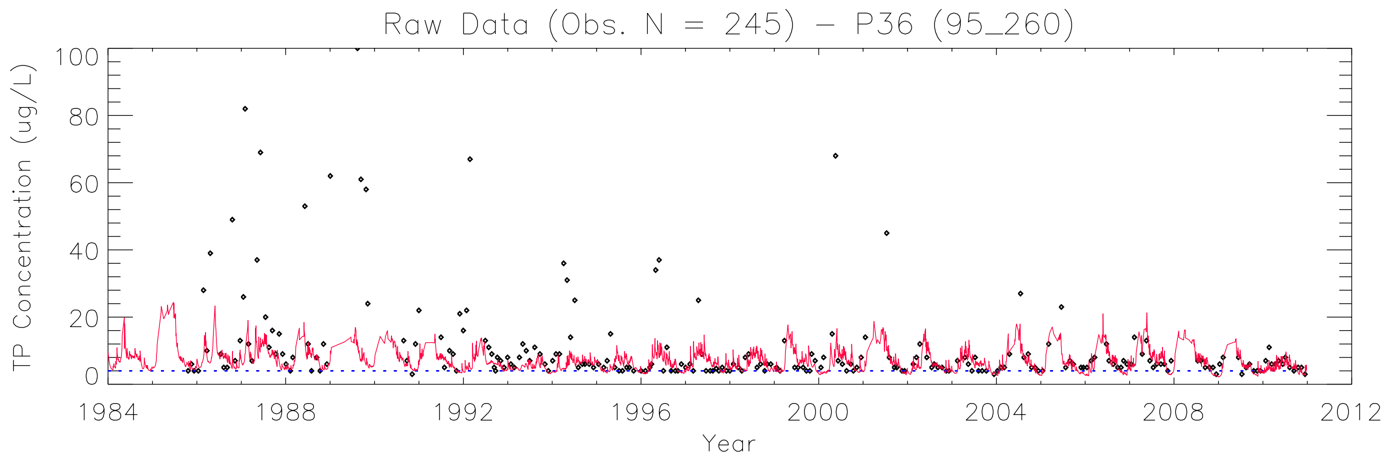

Cumulative Distribution: Raw Data – P34 (66_242)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

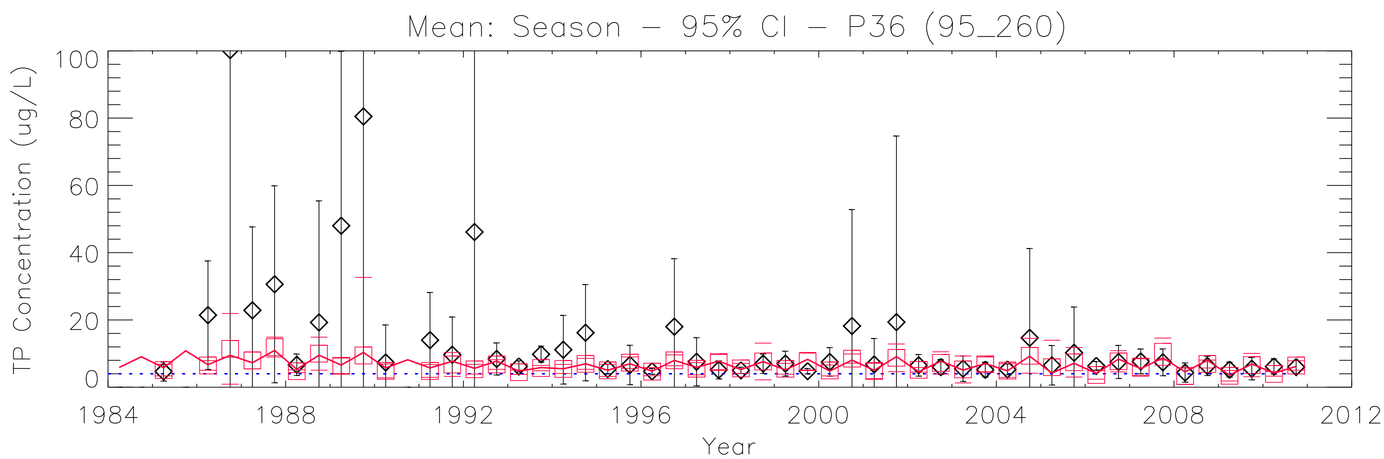

Raw Data (Obs. N = 768) – SRS2 (97_255)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

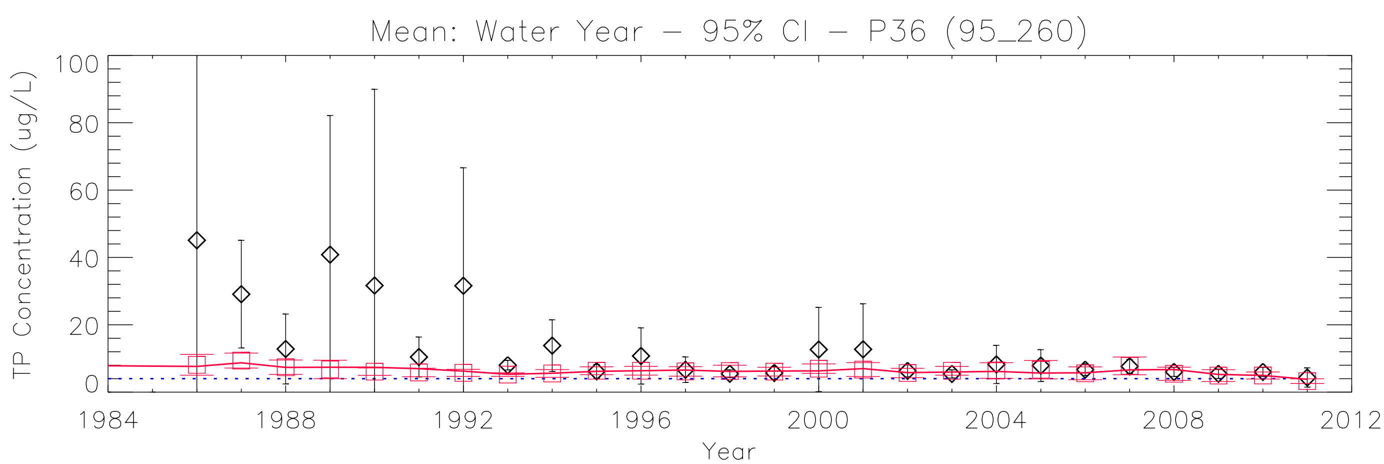

Mean: Season – 95% CI – SRS2 (97_255)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

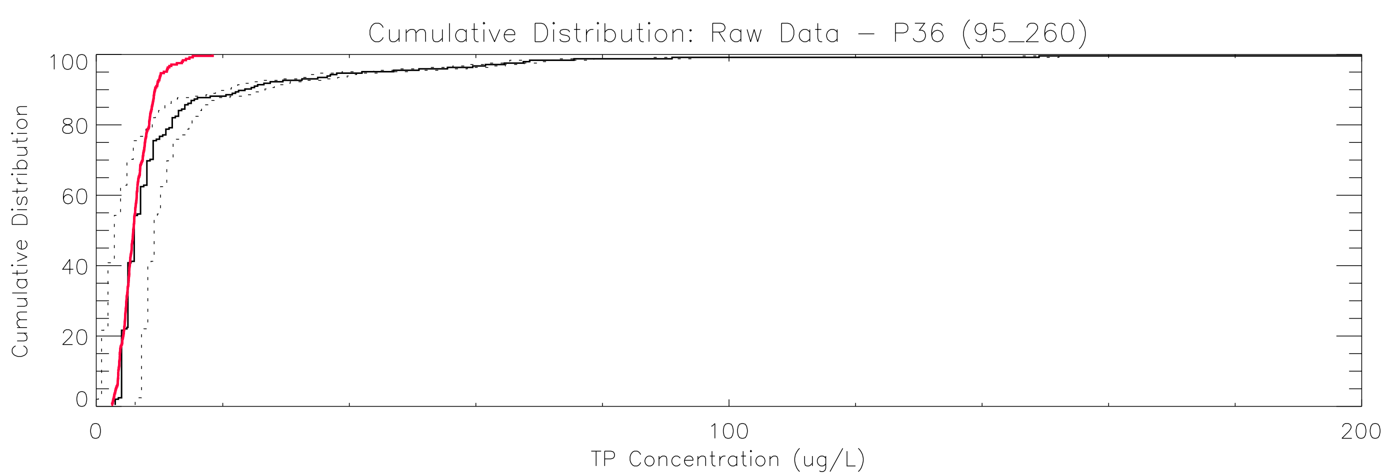

Mean: Water Year – 95% CI – SRS2 (97_255)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

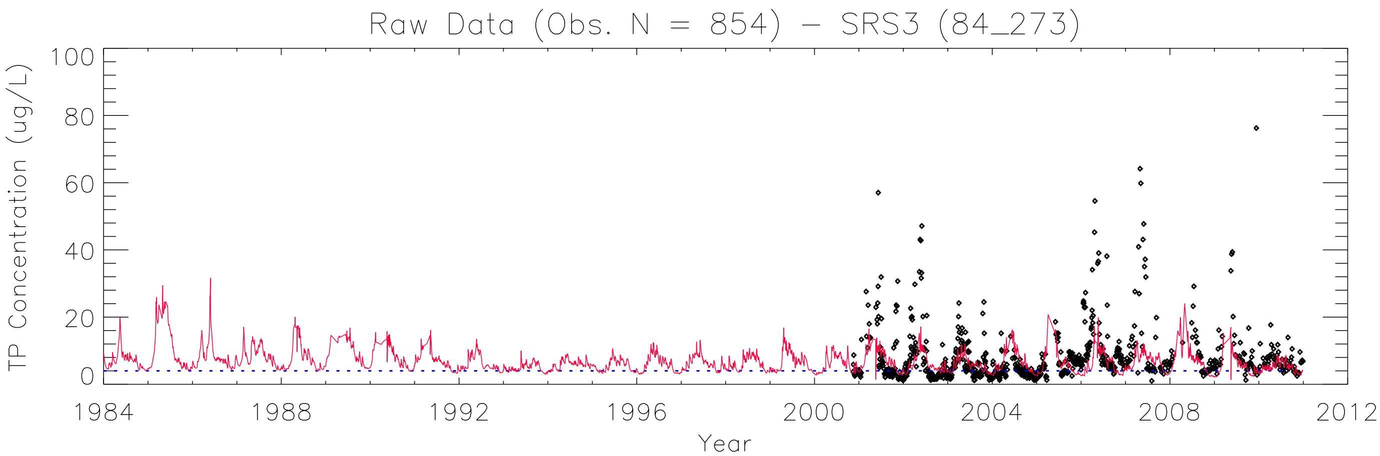

Cumulative Distribution: Raw Data – SRS2 (97_255)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

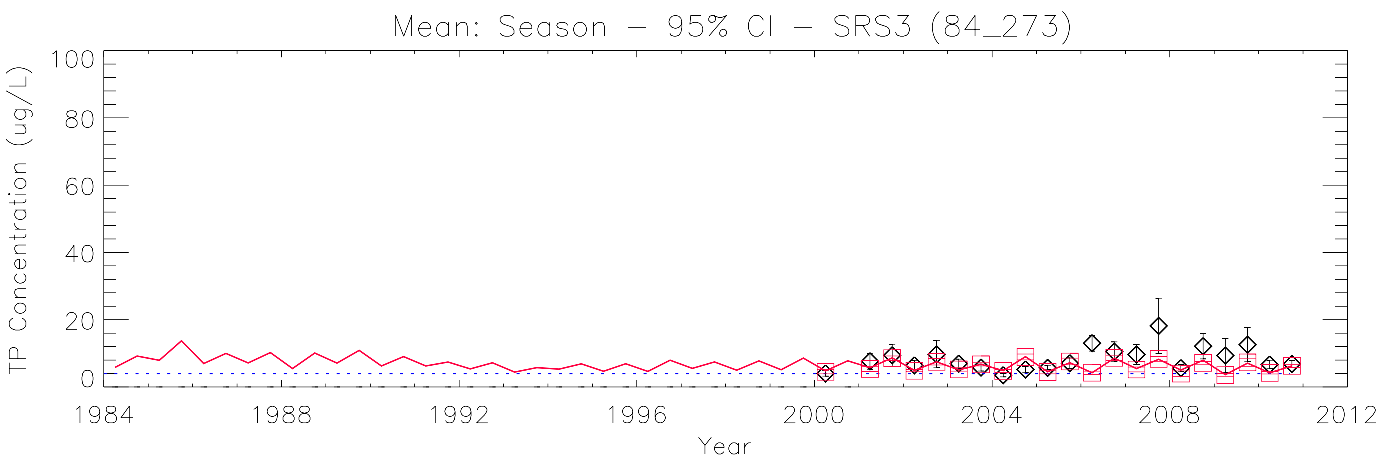

Raw Data (Obs. N = 245) – P36 (95_260)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

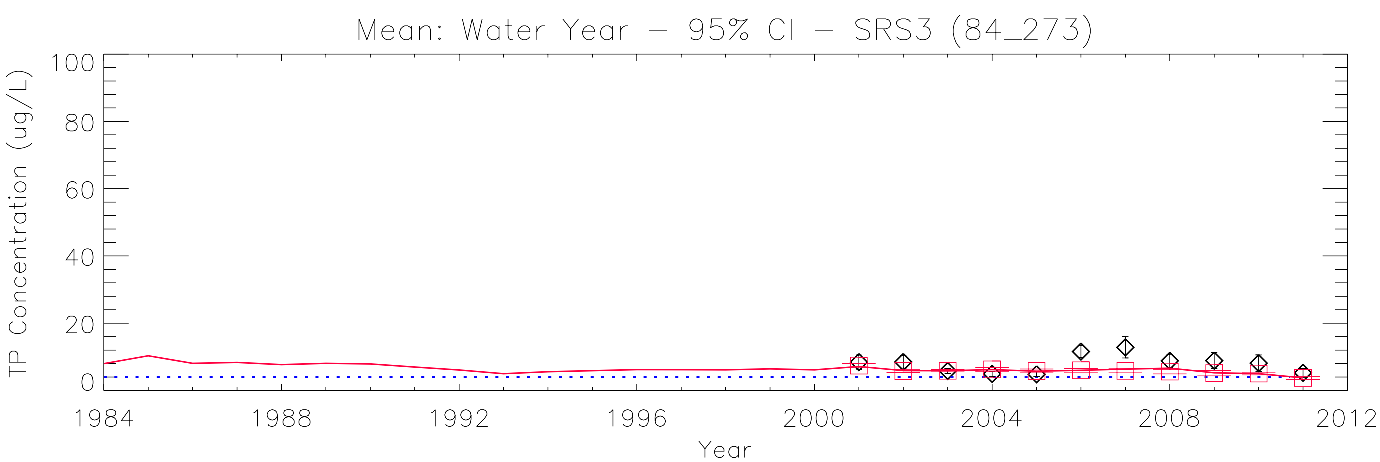

Mean: Season – 95% CI – P36 (95_260)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

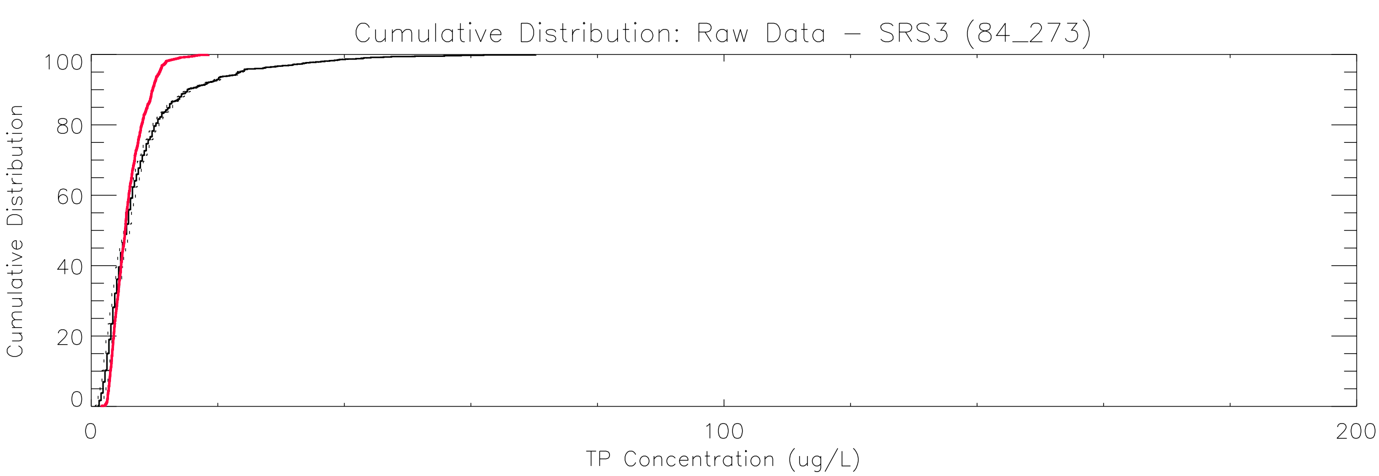

Mean: Water Year – 95% CI – P36 (95_260)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

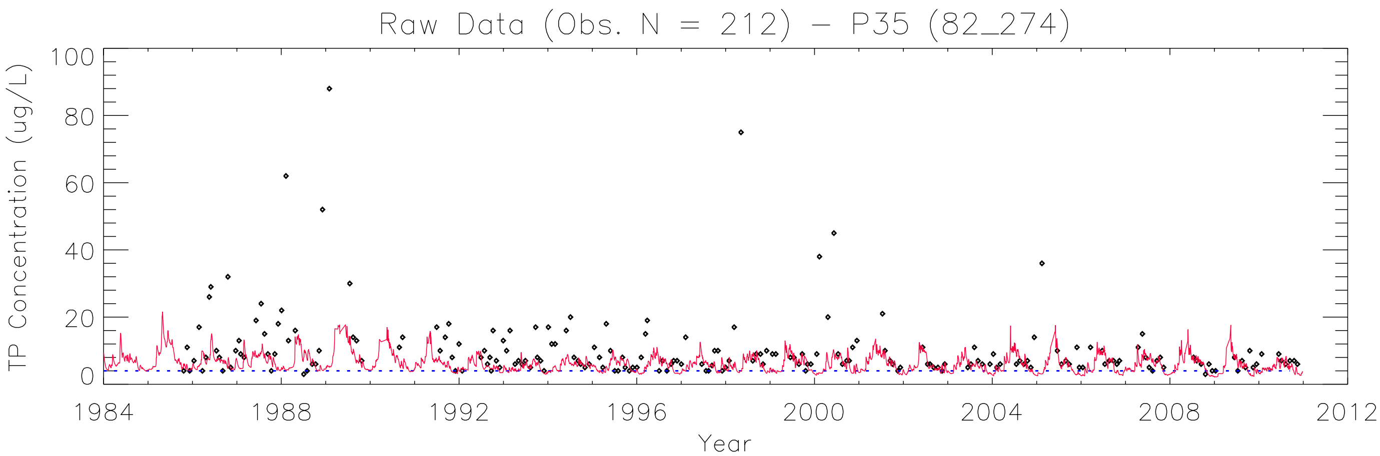

Cumulative Distribution: Raw Data – P36 (95_260)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

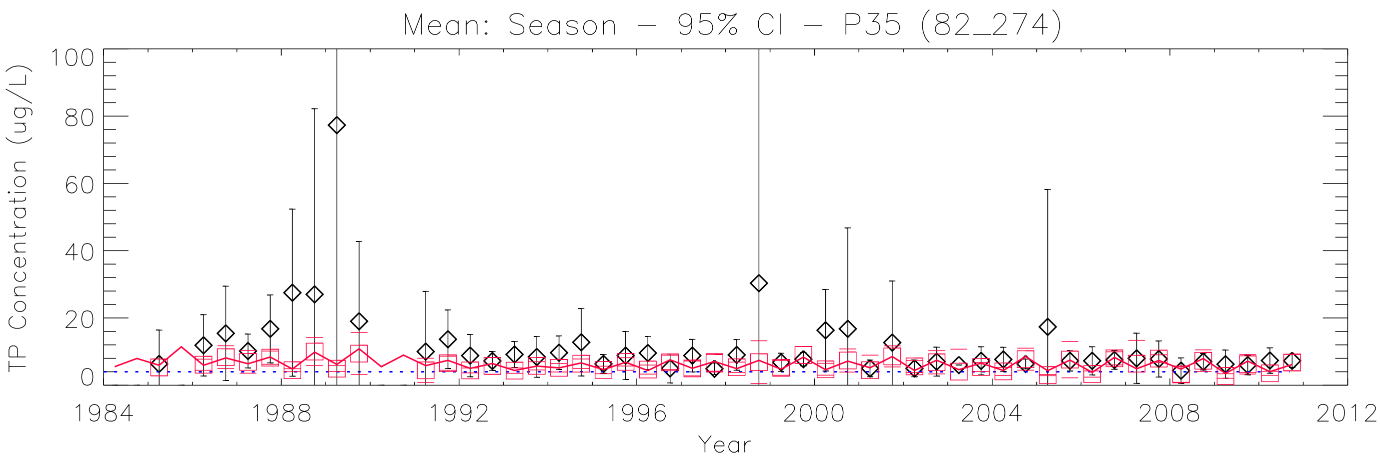

Raw Data (Obs. N = 854) – SRS3 (84_273)
TP Concentration (ug/L)
Year

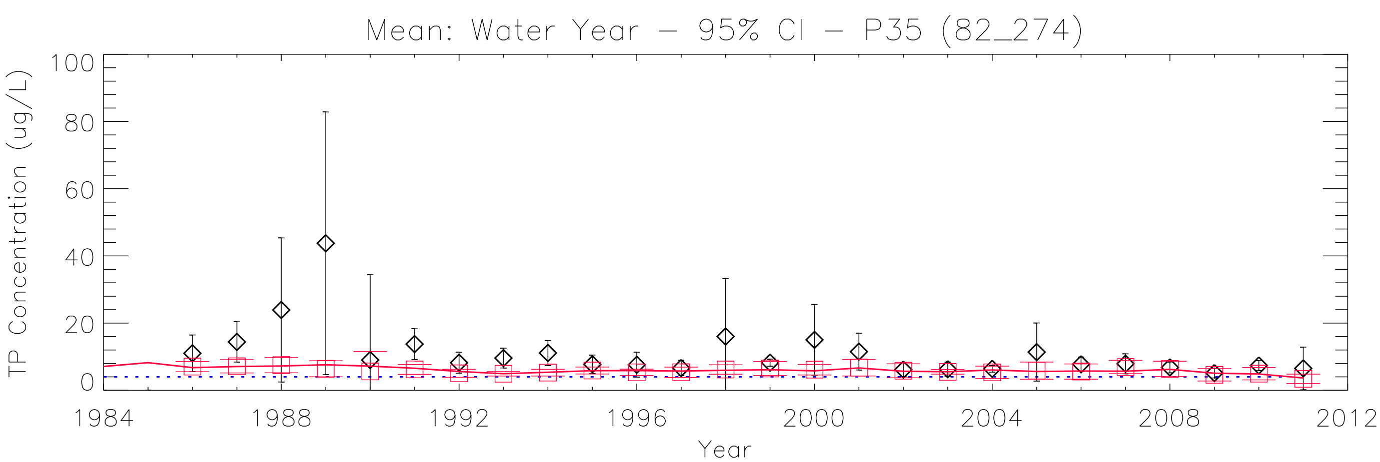

Mean: Season – 95% CI – SRS3 (84_273)
TP Concentration (ug/L)
Year

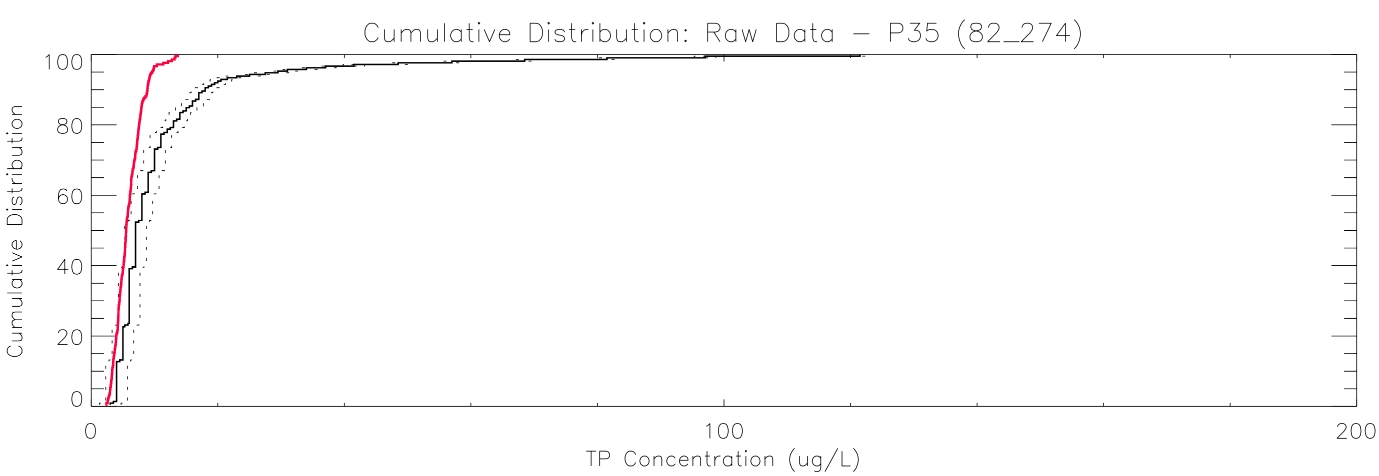

Mean: Water Year – 95% CI – SRS3 (84_273)
TP Concentration (ug/L)
Year

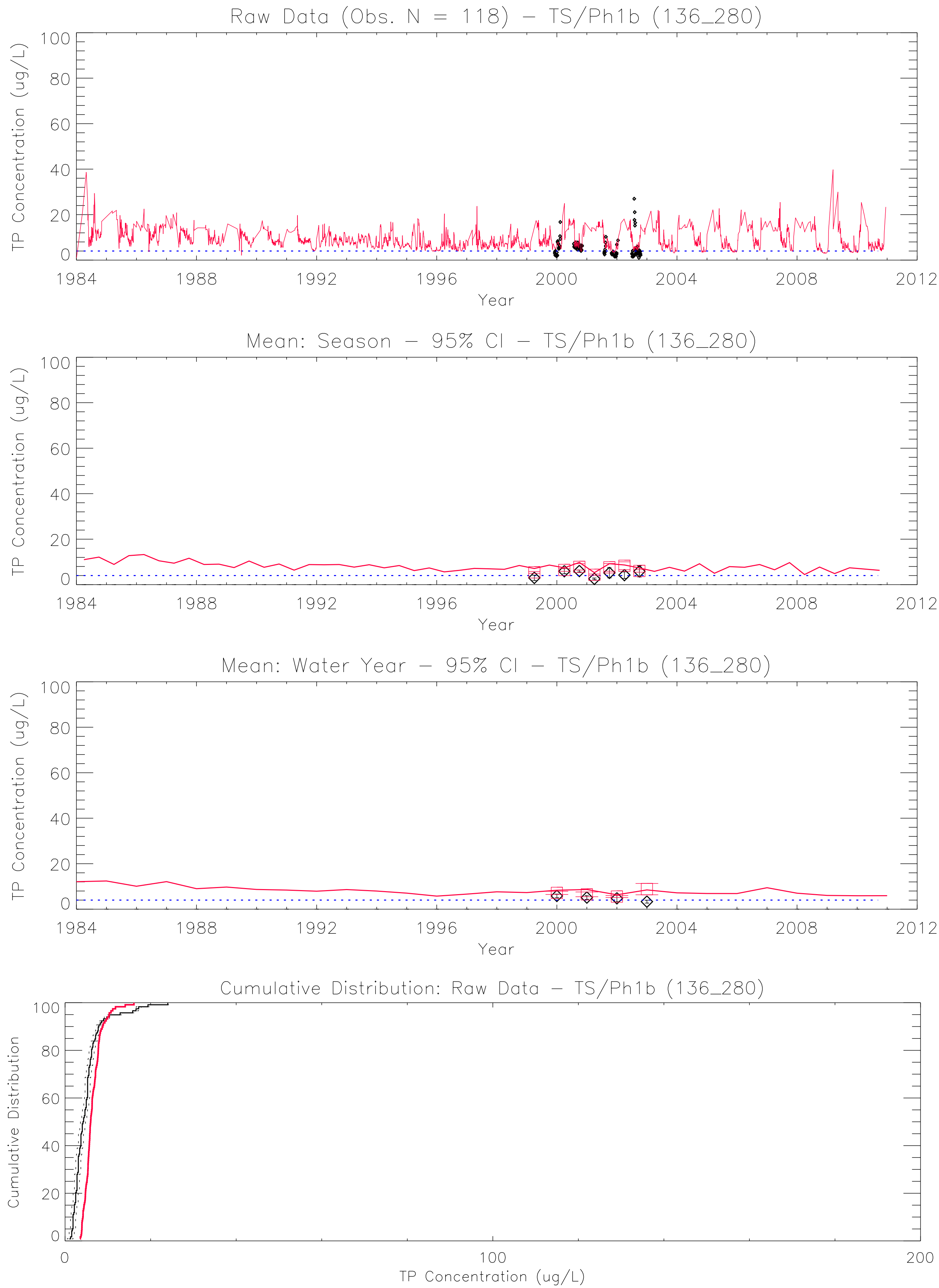

Cumulative Distribution: Raw Data – SRS3 (84_273)
Cumulative Distribution
TP Concentration (ug/L)

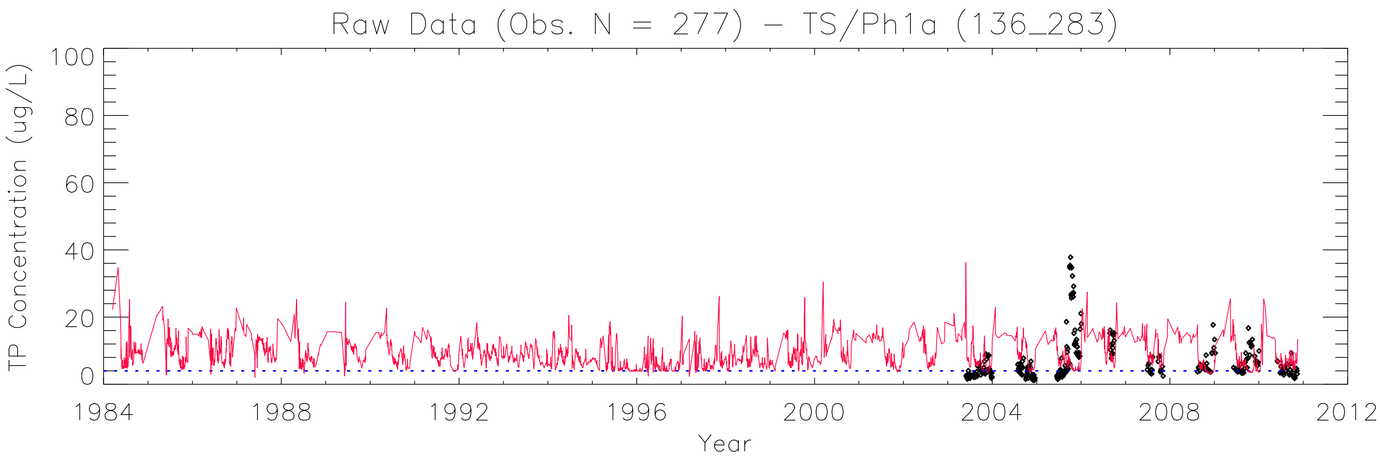

Raw Data (Obs. N = 212) – P35 (82_274)
TP Concentration (ug/L)
Year

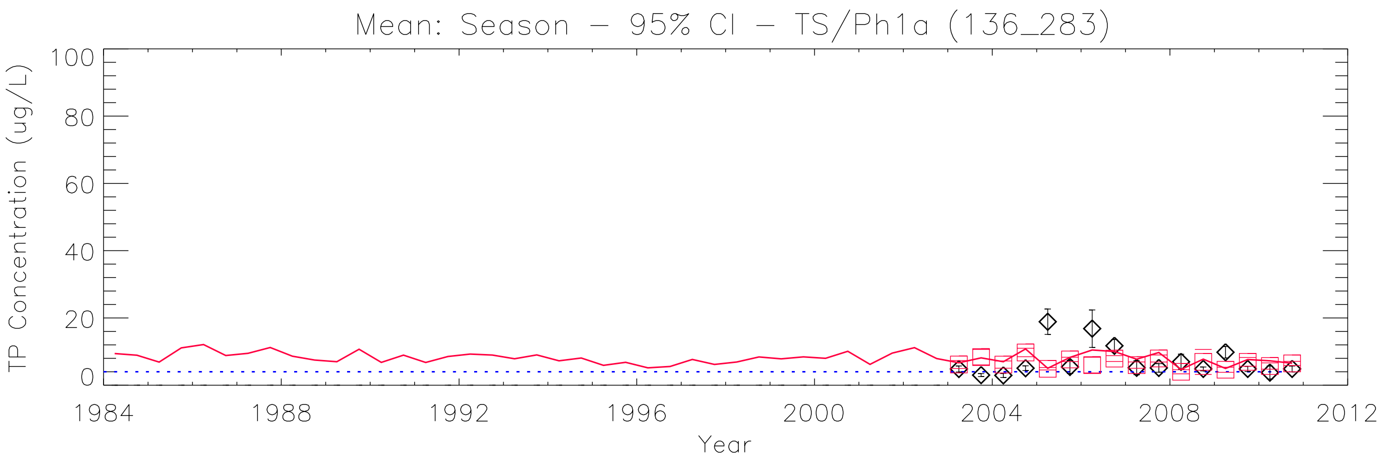

Mean: Season – 95% CI – P35 (82_274)
TP Concentration (ug/L)
Year

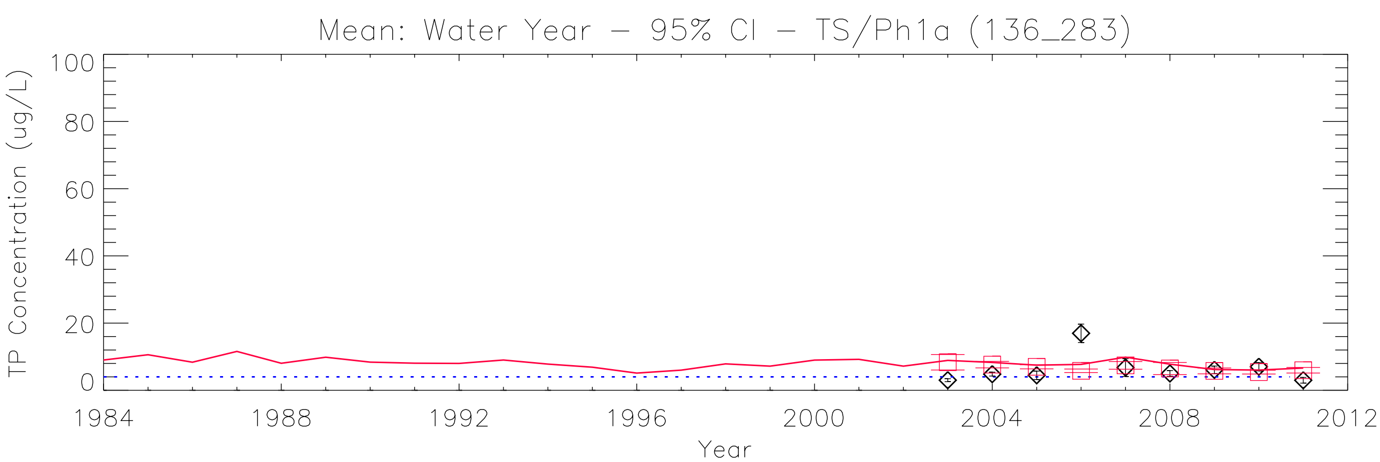

Mean: Water Year – 95% CI – P35 (82_274)
TP Concentration (ug/L)
Year

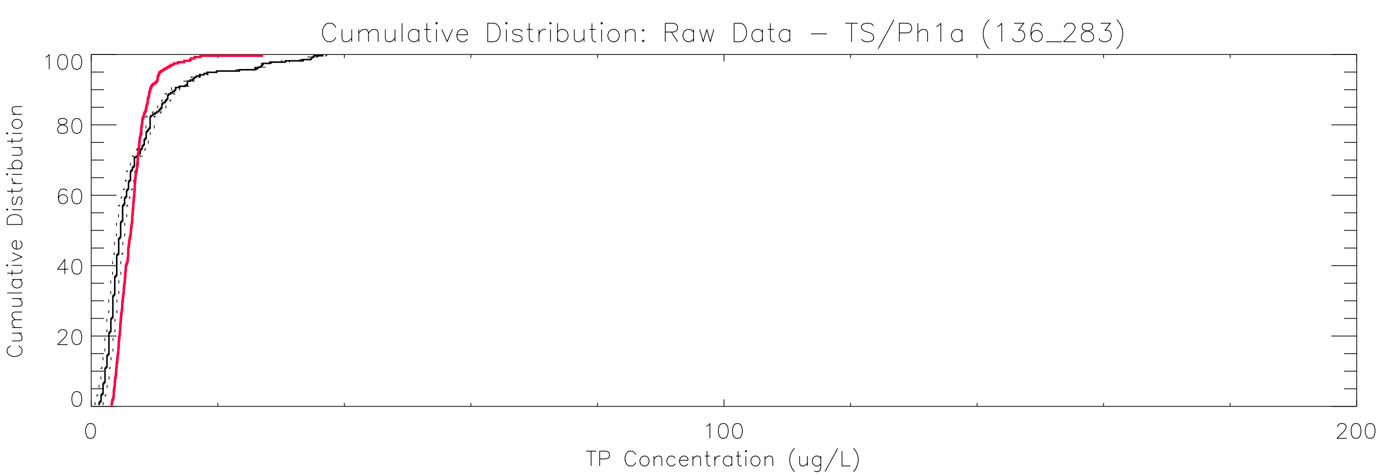

Cumulative Distribution: Raw Data – P35 (82_274)
Cumulative Distribution
TP Concentration (ug/L)

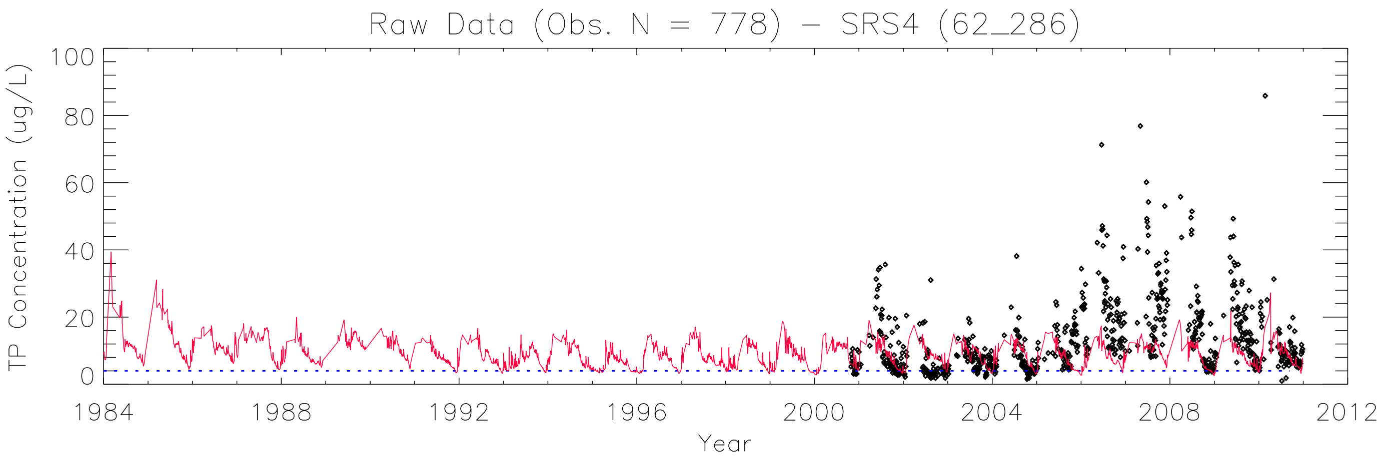

Raw Data (Obs. N = 118) – TS/Ph1b (136_280)
TP Concentration (ug/L)
Year
Mean: Season – 95% CI – TS/Ph1b (136_280)
TP Concentration (ug/L)
Year
Mean: Water Year – 95% CI – TS/Ph1b (136_280)
TP Concentration (ug/L)
Year
Cumulative Distribution: Raw Data – TS/Ph1b (136_280)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 277) − TS/Ph1a (136_283)
TP Concentration (ug/L)
Year

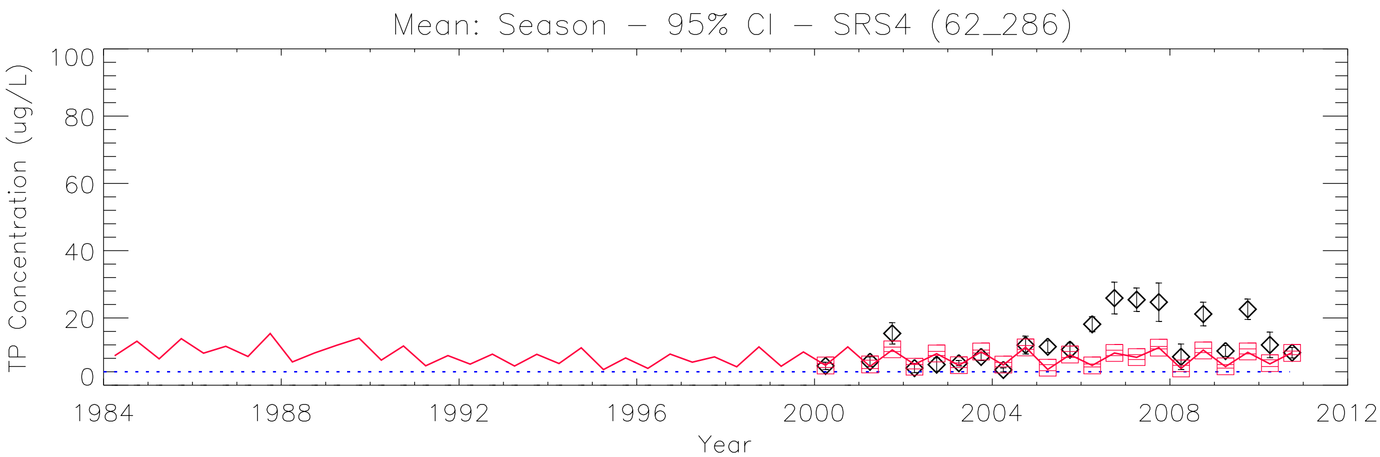

Mean: Season − 95% CI − TS/Ph1a (136_283)
TP Concentration (ug/L)
Year


Mean: Water Year − 95% CI − TS/Ph1a (136_283)
TP Concentration (ug/L)
Year

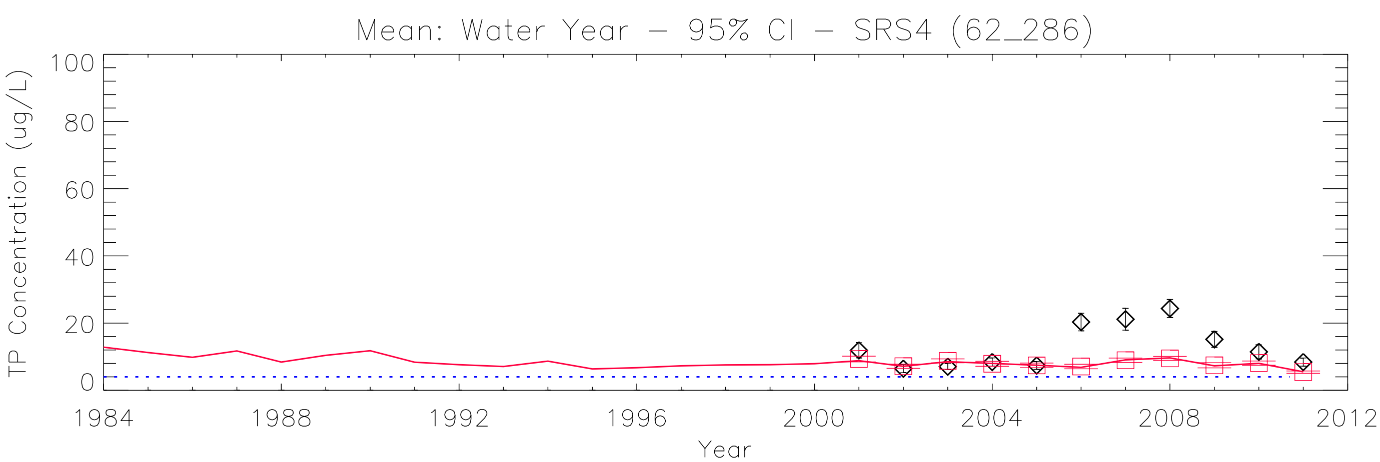

Cumulative Distribution: Raw Data − TS/Ph1a (136_283)
Cumulative Distribution
TP Concentration (ug/L)



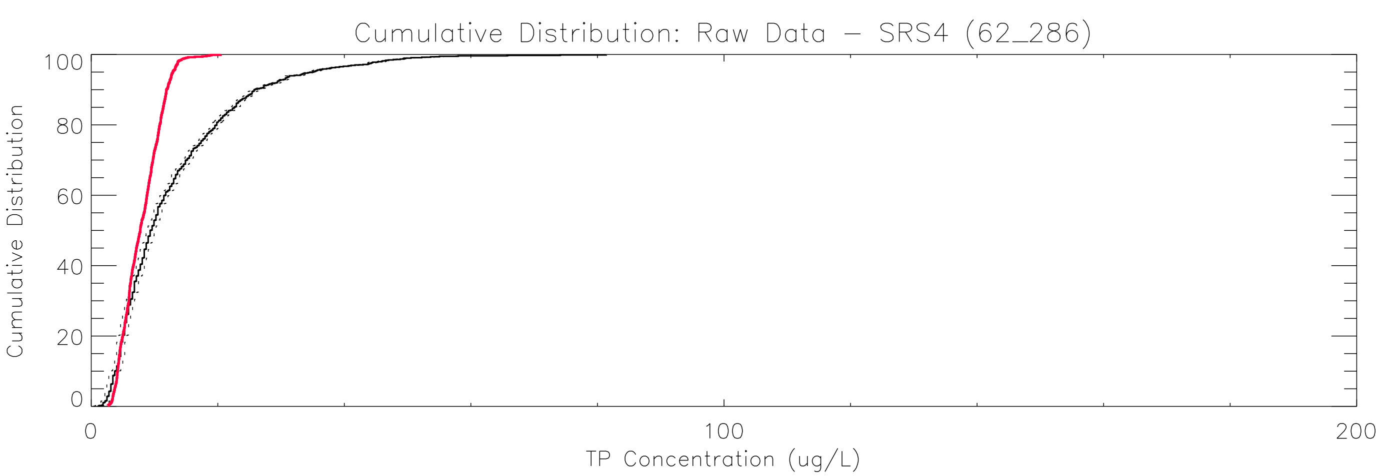
Raw Data (Obs. N = 778) – SRS4 (62_286)
TP Concentration (ug/L)
Year



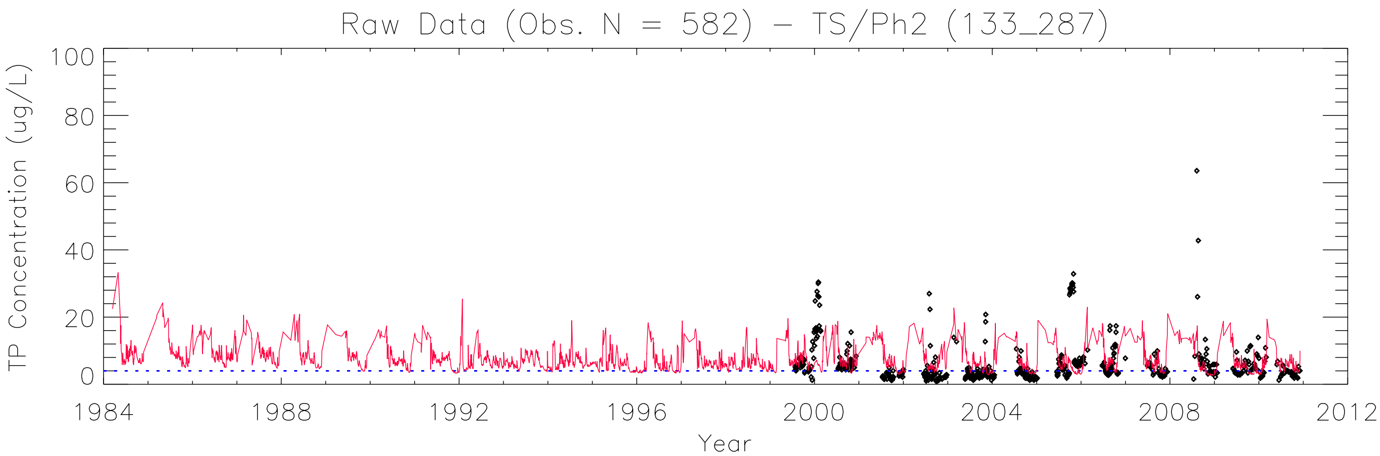
Mean: Season – 95% CI – SRS4 (62_286)
TP Concentration (ug/L)
Year

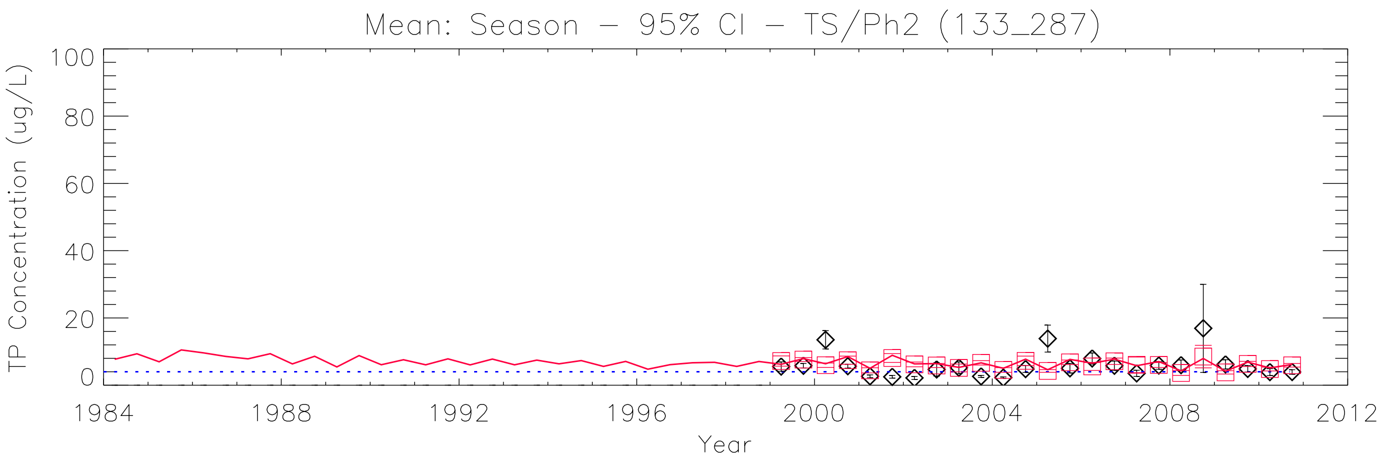


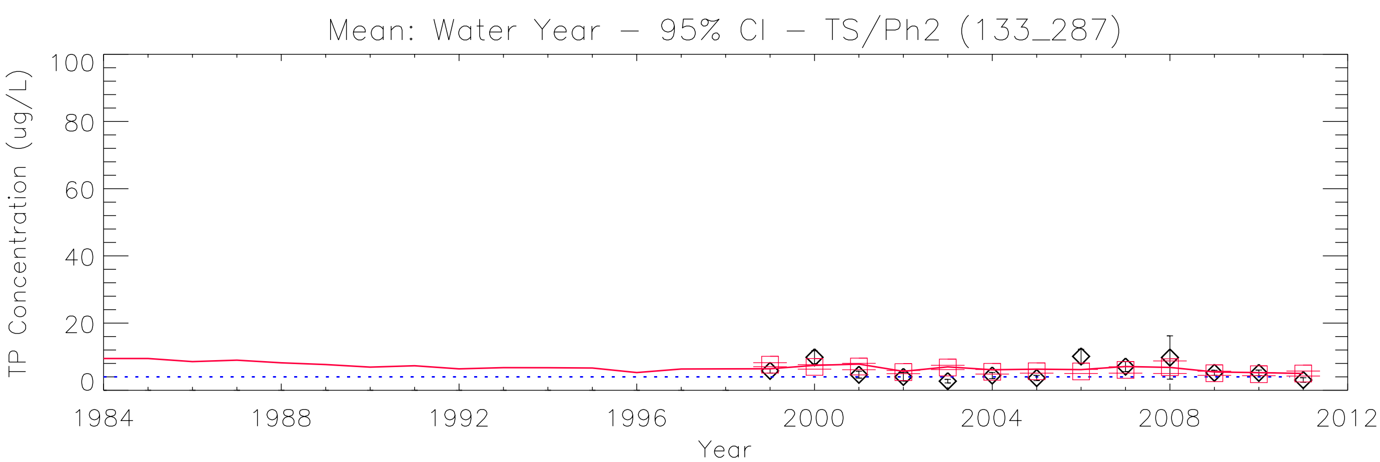
Mean: Water Year – 95% CI – SRS4 (62_286)
TP Concentration (ug/L)
Year

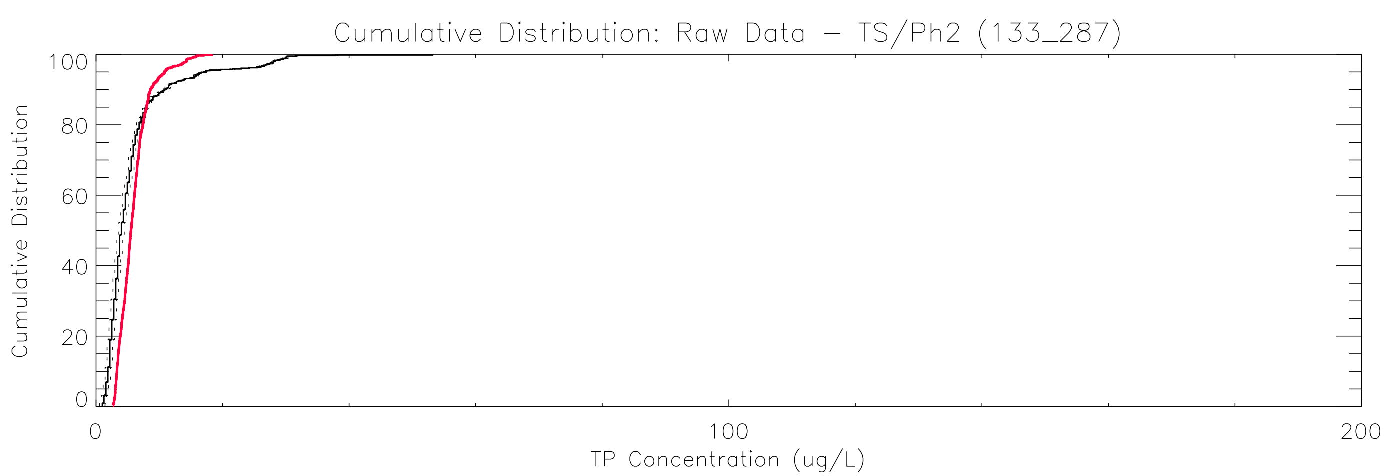


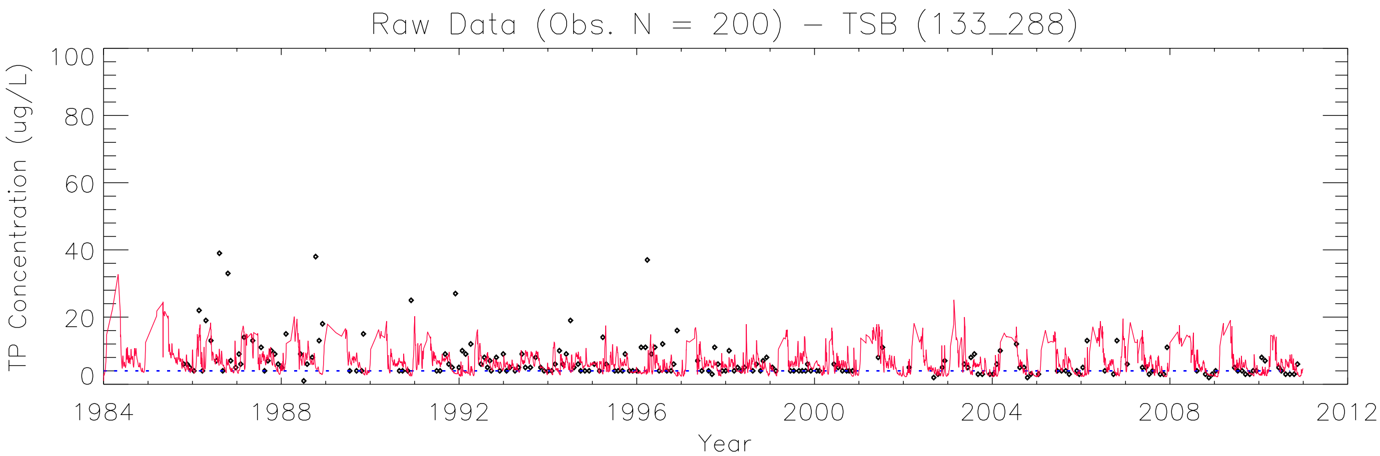
Cumulative Distribution: Raw Data – SRS4 (62_286)
Cumulative Distribution
TP Concentration (ug/L)

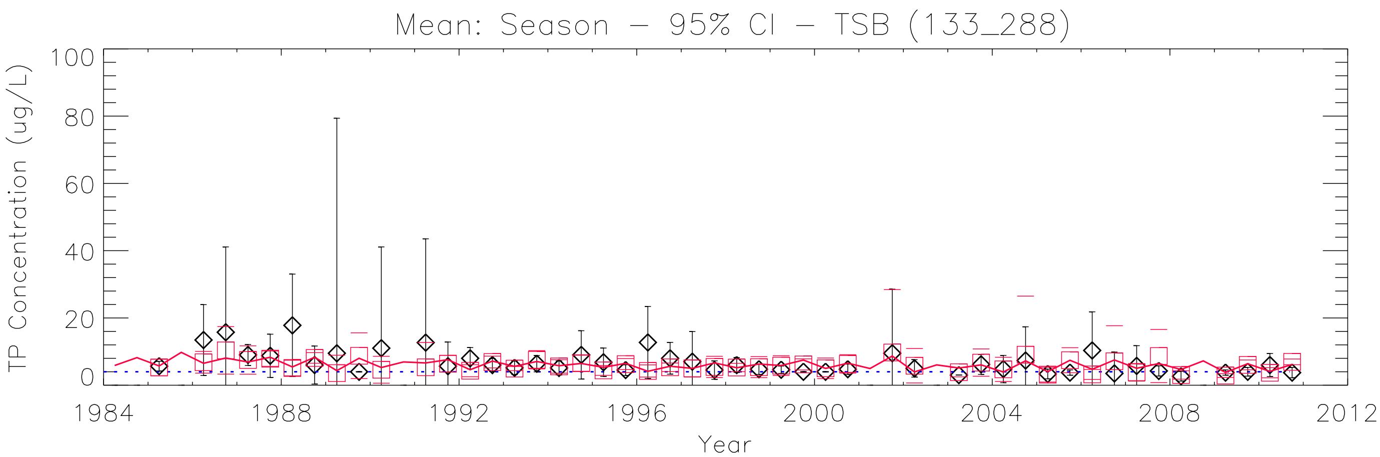

Raw Data (Obs. N = 582) – TS/Ph2 (133_287)
TP Concentration (ug/L)
Year

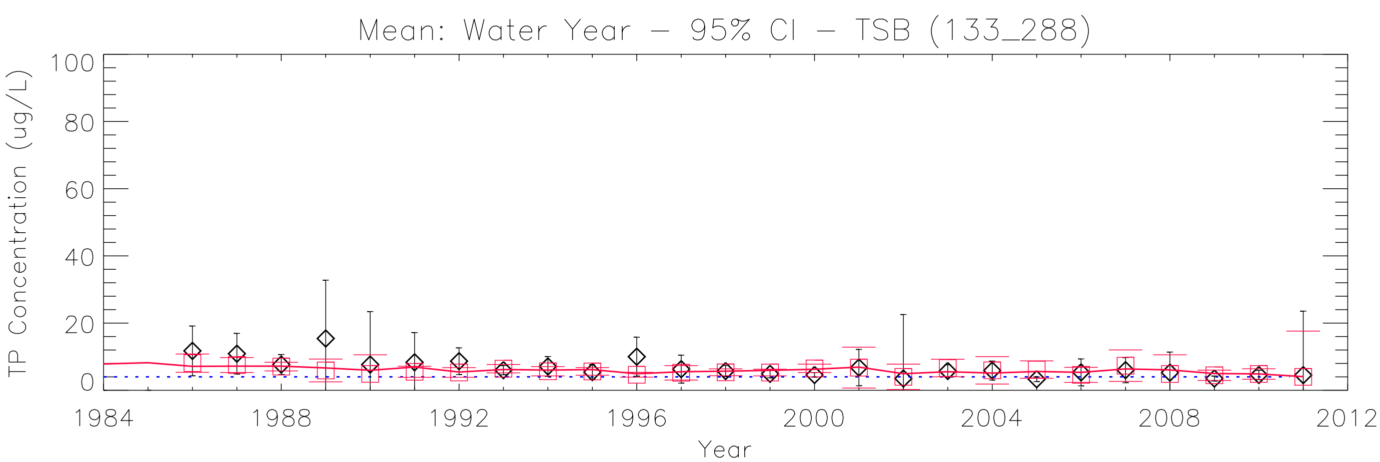

Mean: Season – 95% CI – TS/Ph2 (133_287)
TP Concentration (ug/L)
Year

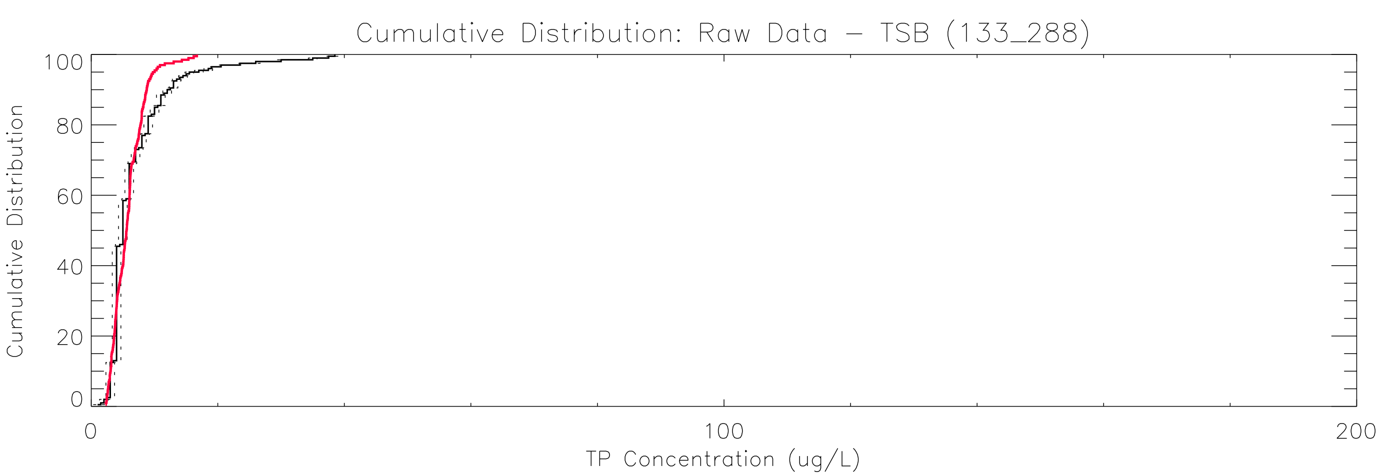

Mean: Water Year – 95% CI – TS/Ph2 (133_287)
TP Concentration (ug/L)
Year

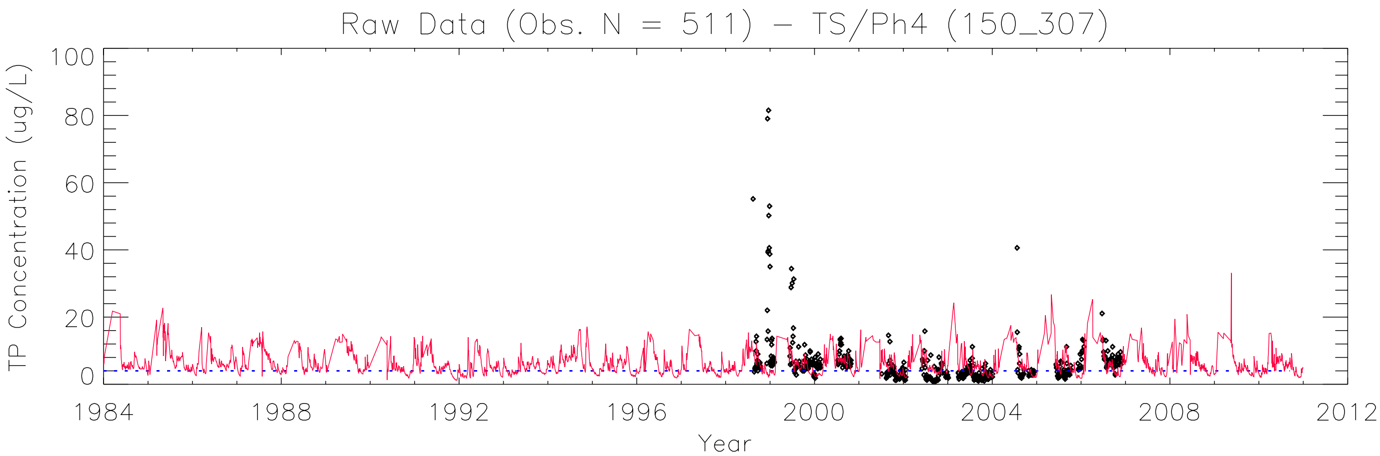

Cumulative Distribution: Raw Data – TS/Ph2 (133_287)
Cumulative Distribution
TP Concentration (ug/L)

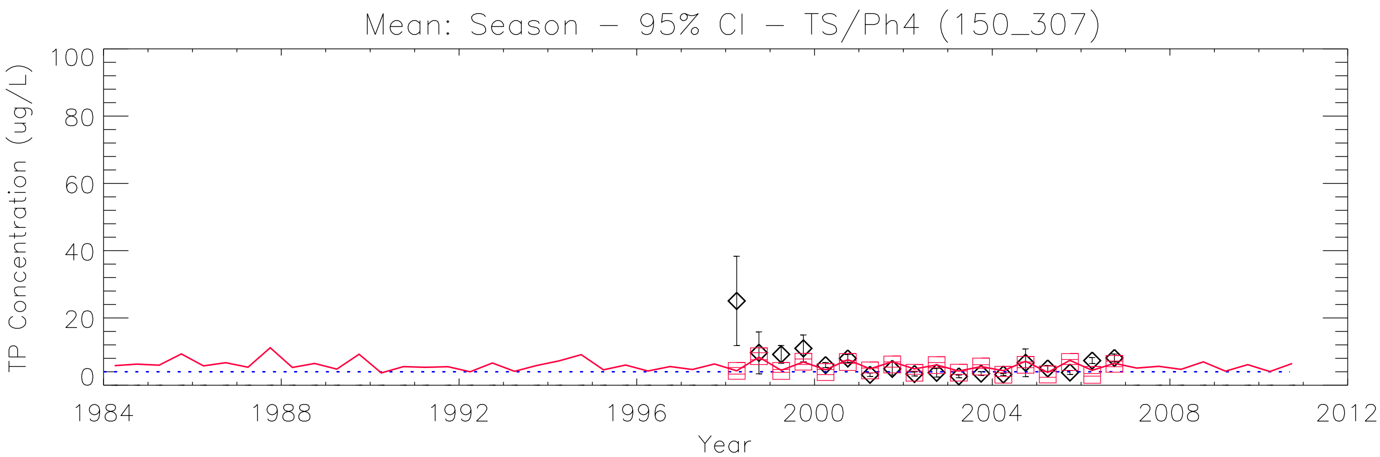

Raw Data (Obs. N = 200) – TSB (133_288)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

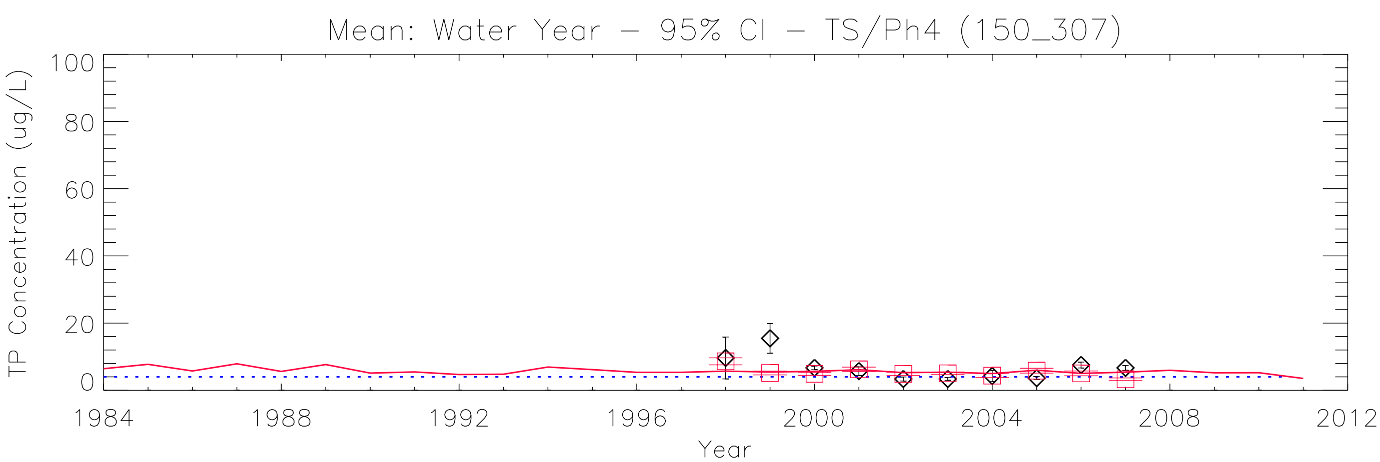

Mean: Season – 95% CI – TSB (133_288)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

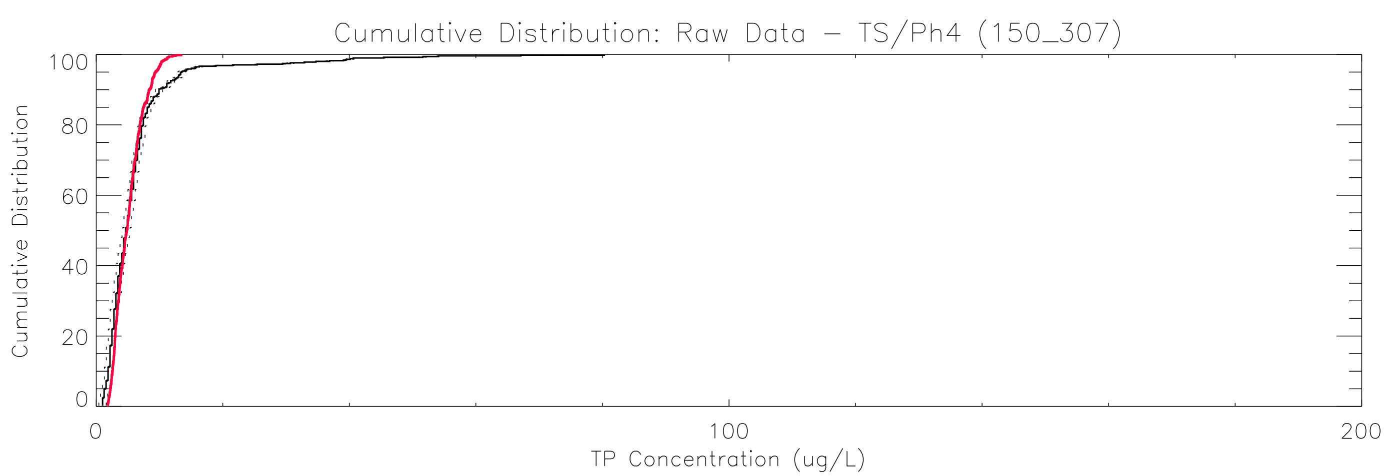

Mean: Water Year – 95% CI – TSB (133_288)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

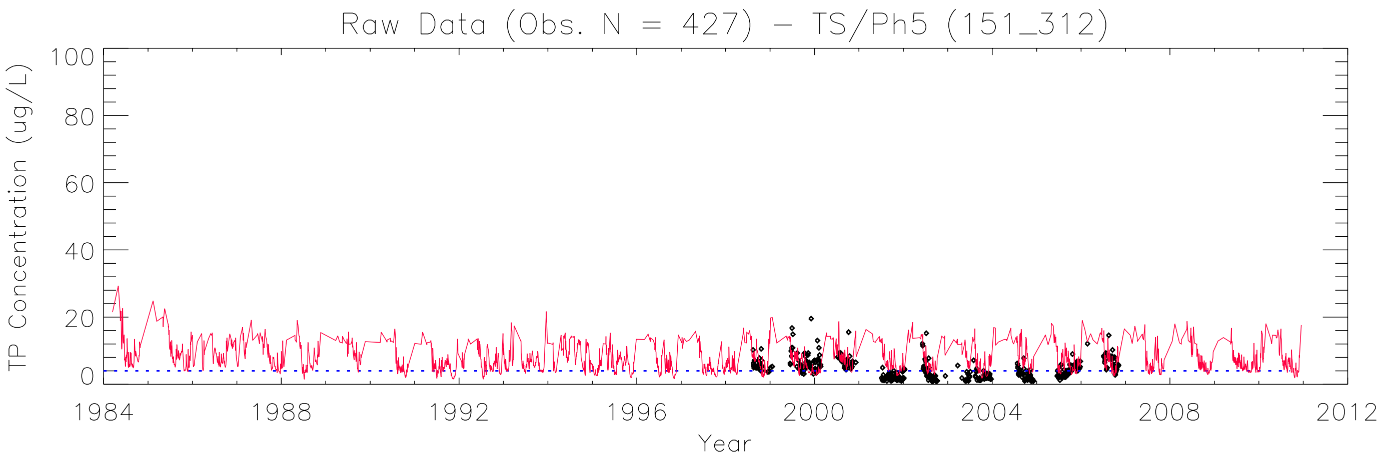

Cumulative Distribution: Raw Data – TSB (133_288)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

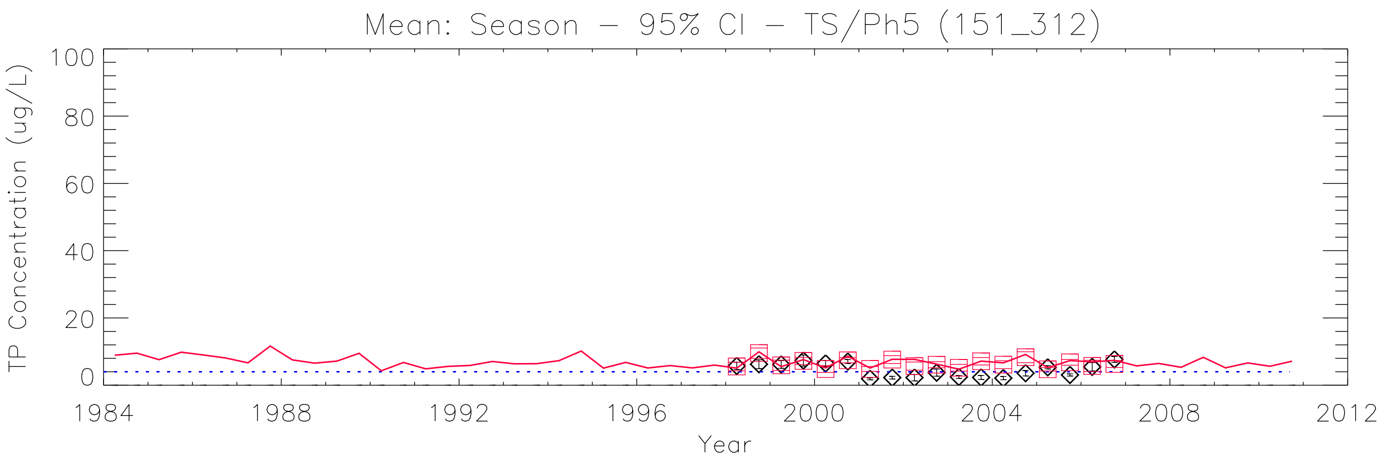

Raw Data (Obs. N = 511) – TS/Ph4 (150_307)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

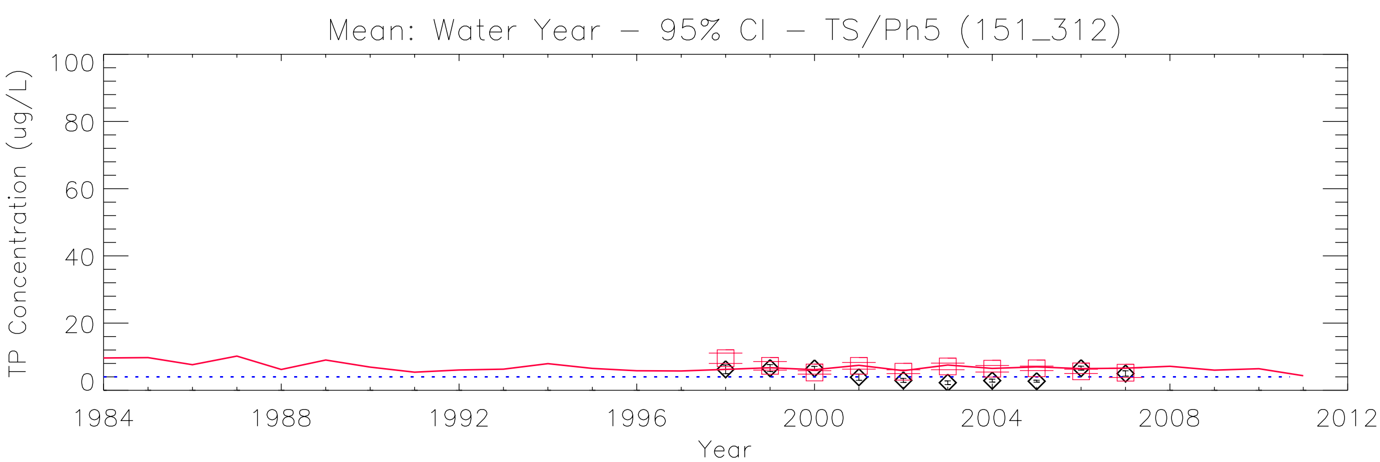

Mean: Season – 95% CI – TS/Ph4 (150_307)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

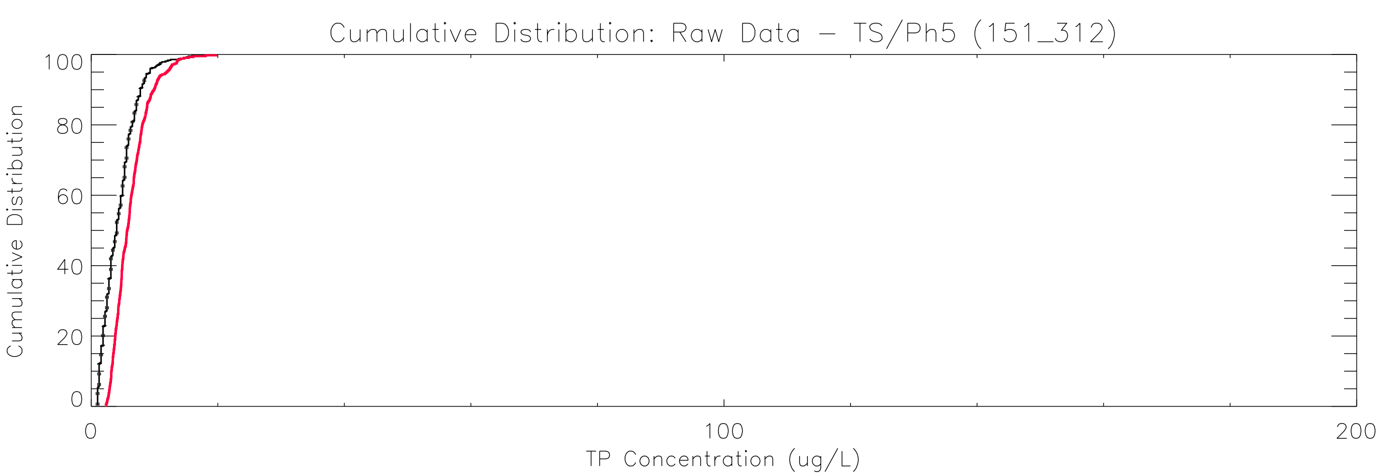

Mean: Water Year – 95% CI – TS/Ph4 (150_307)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

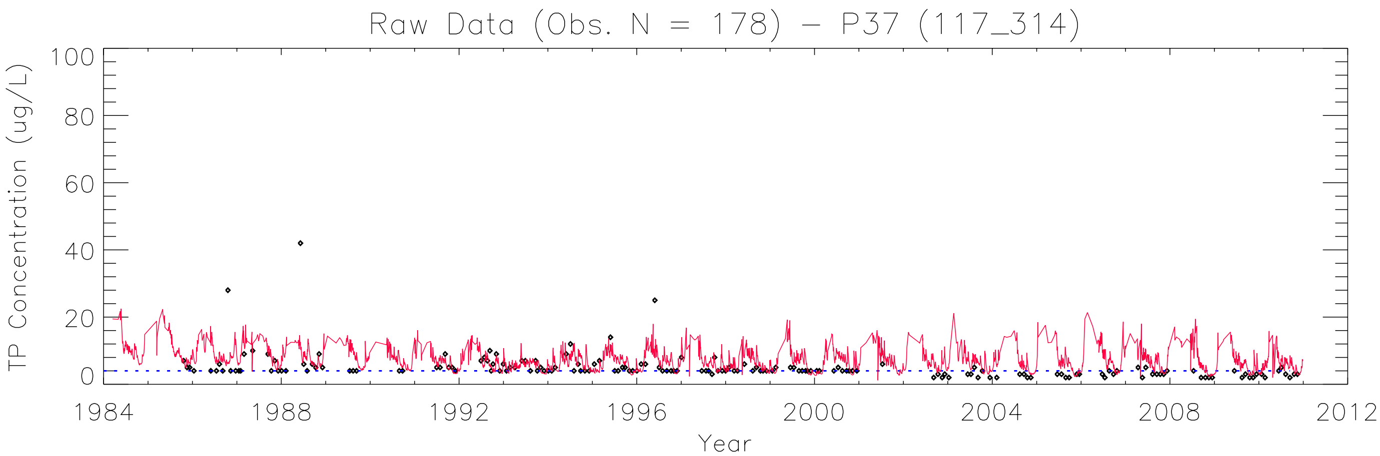

Cumulative Distribution: Raw Data – TS/Ph4 (150_307)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

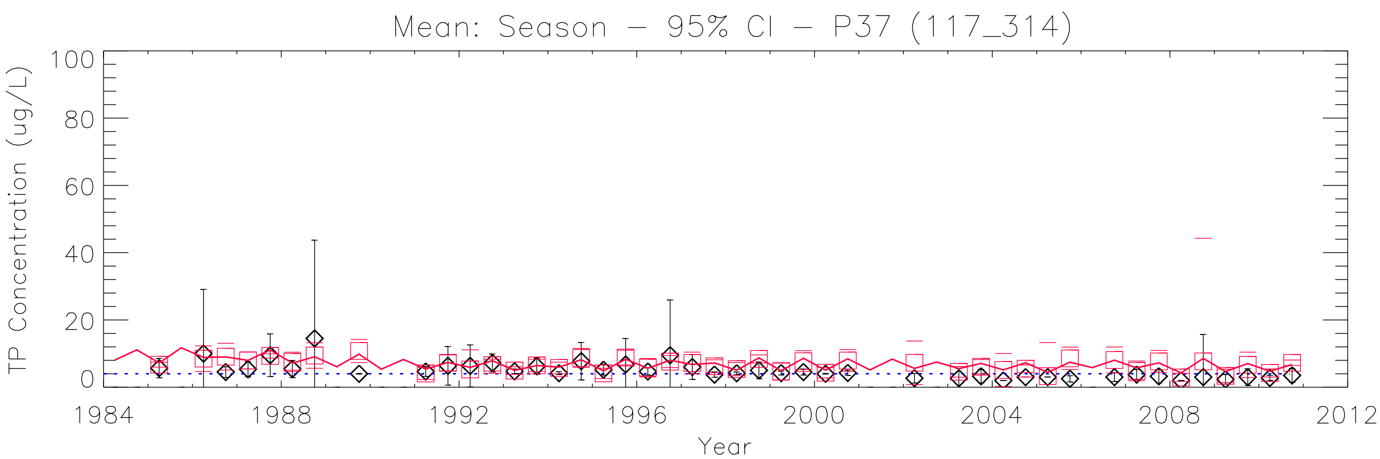

Raw Data (Obs. N = 427) - TS/Ph5 (151_312)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

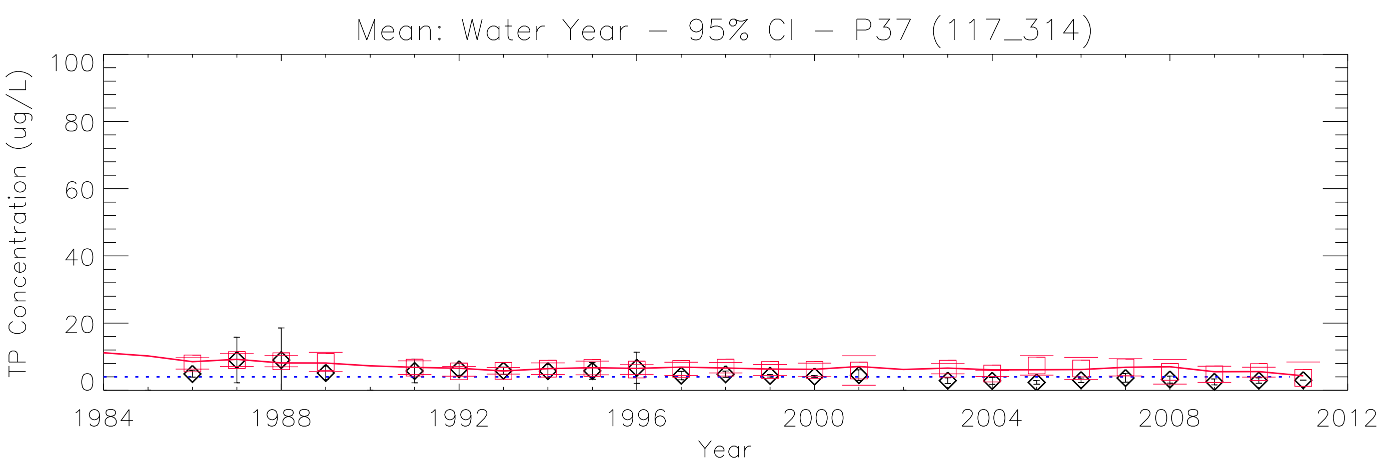

Mean: Season - 95% CI - TS/Ph5 (151_312)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

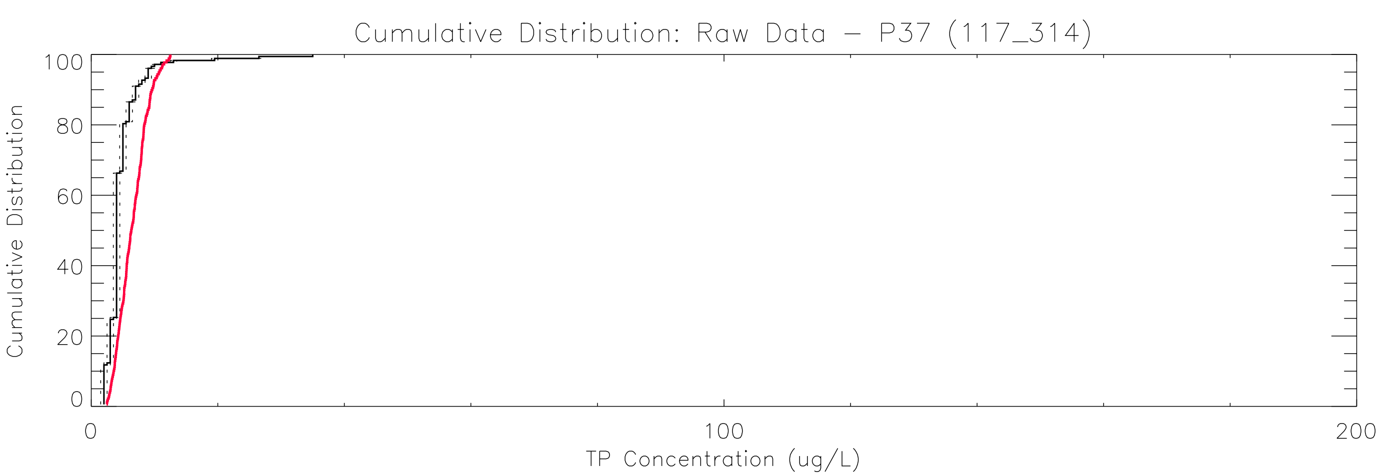

Mean: Water Year - 95% CI - TS/Ph5 (151_312)
TP Concentration (ug/L)
100
80
60
40
20
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

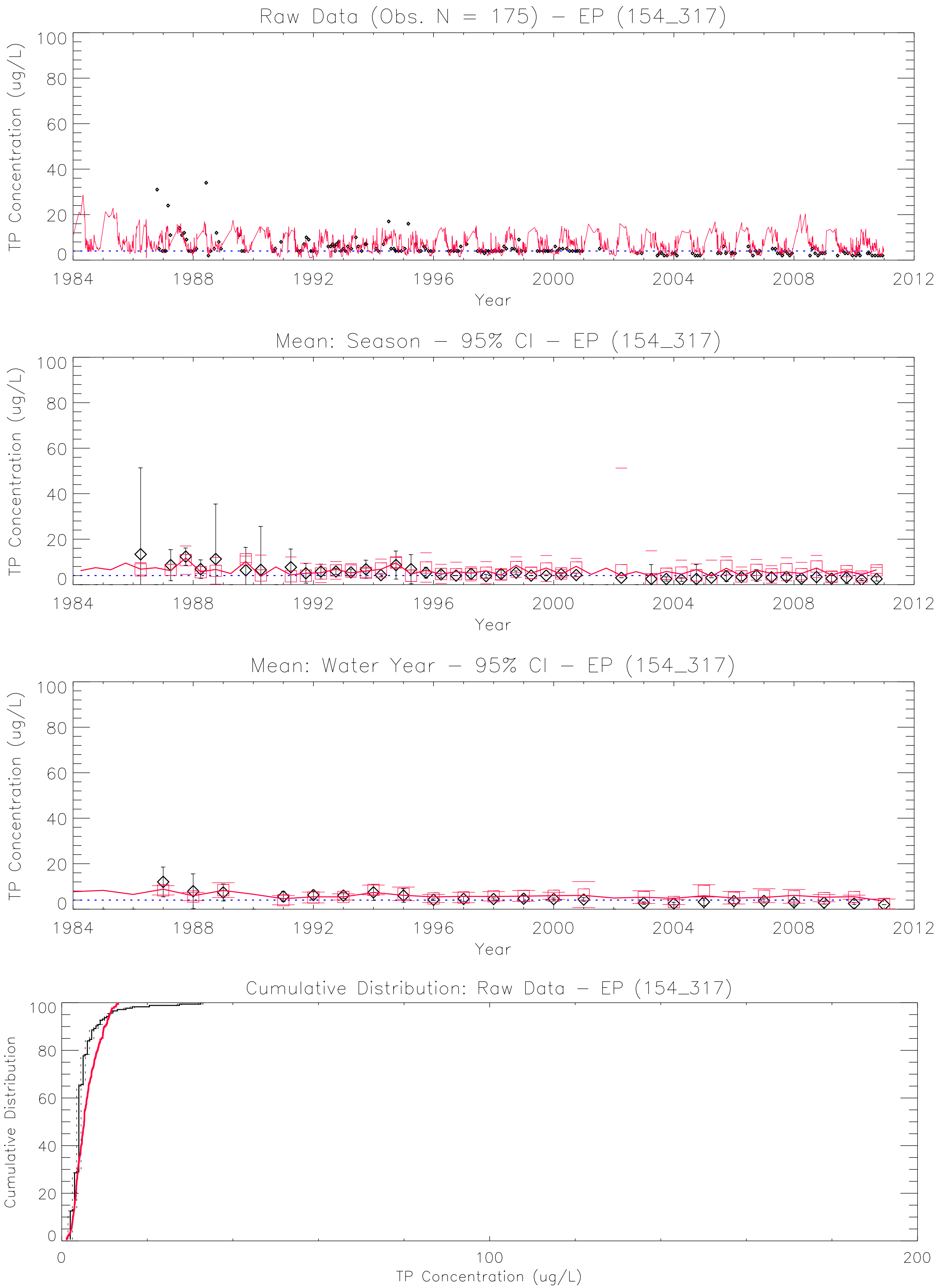

Cumulative Distribution: Raw Data - TS/Ph5 (151_312)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
TP Concentration (ug/L)


Raw Data (Obs. N = 178) – P37 (117_314)
TP Concentration (ug/L)
Year

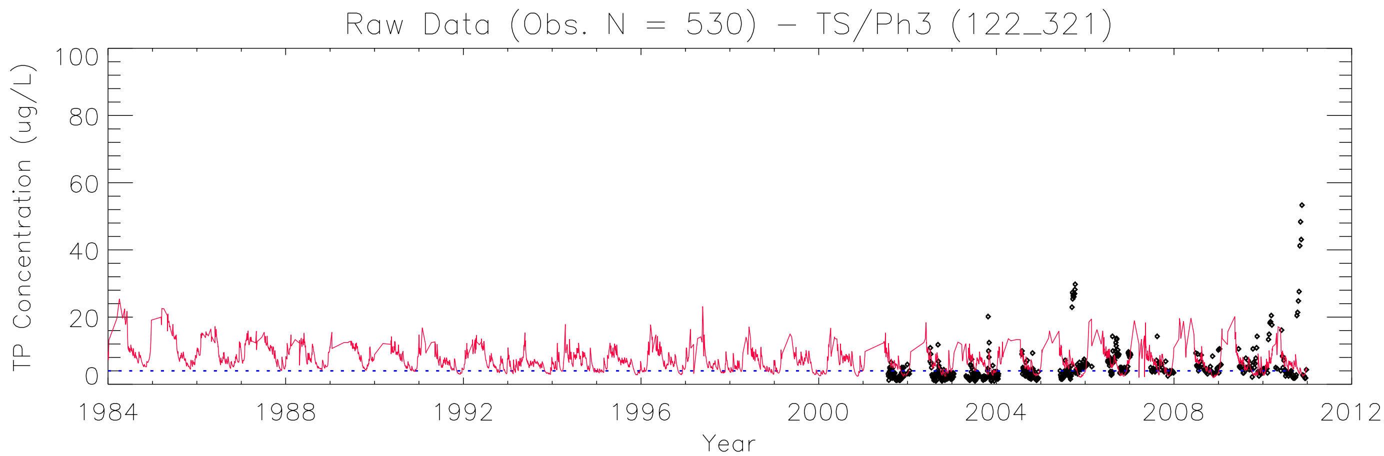

Mean: Season – 95% CI – P37 (117_314)
TP Concentration (ug/L)
Year

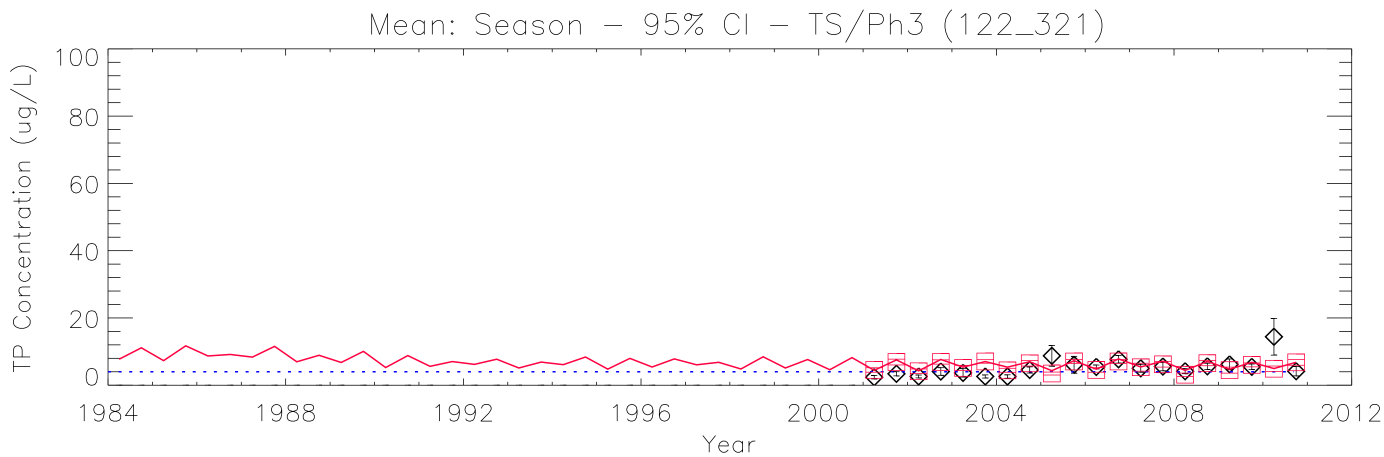

Mean: Water Year – 95% CI – P37 (117_314)
TP Concentration (ug/L)
Year

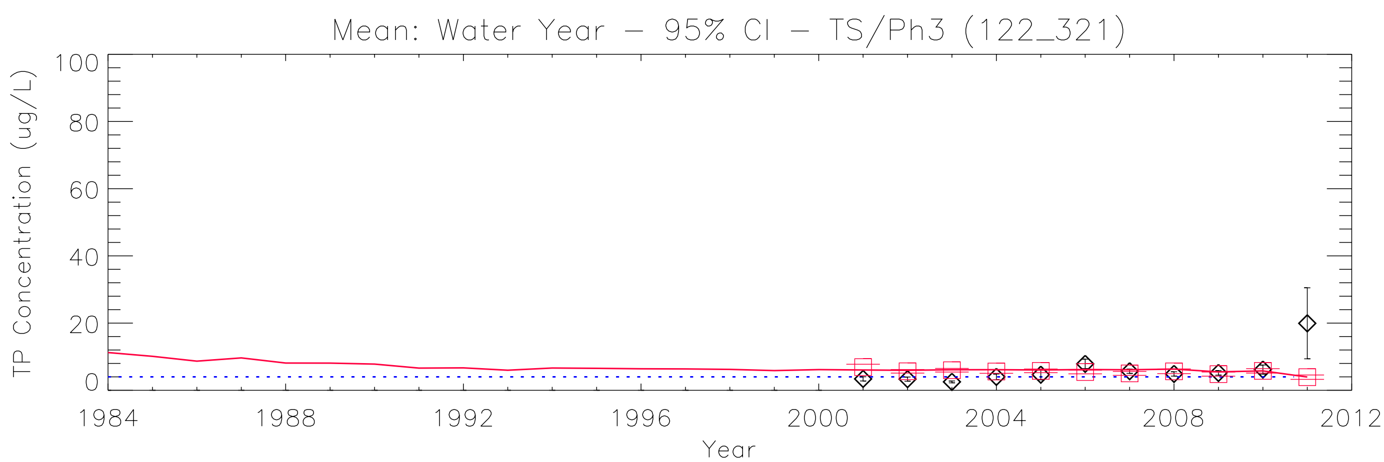

Cumulative Distribution: Raw Data – P37 (117_314)
Cumulative Distribution
TP Concentration (ug/L)

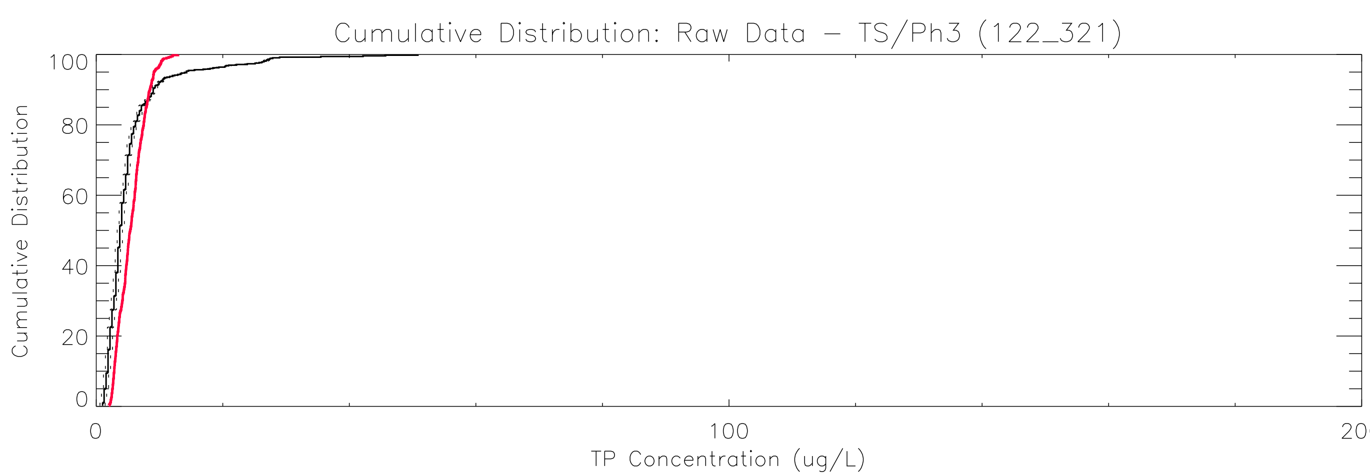


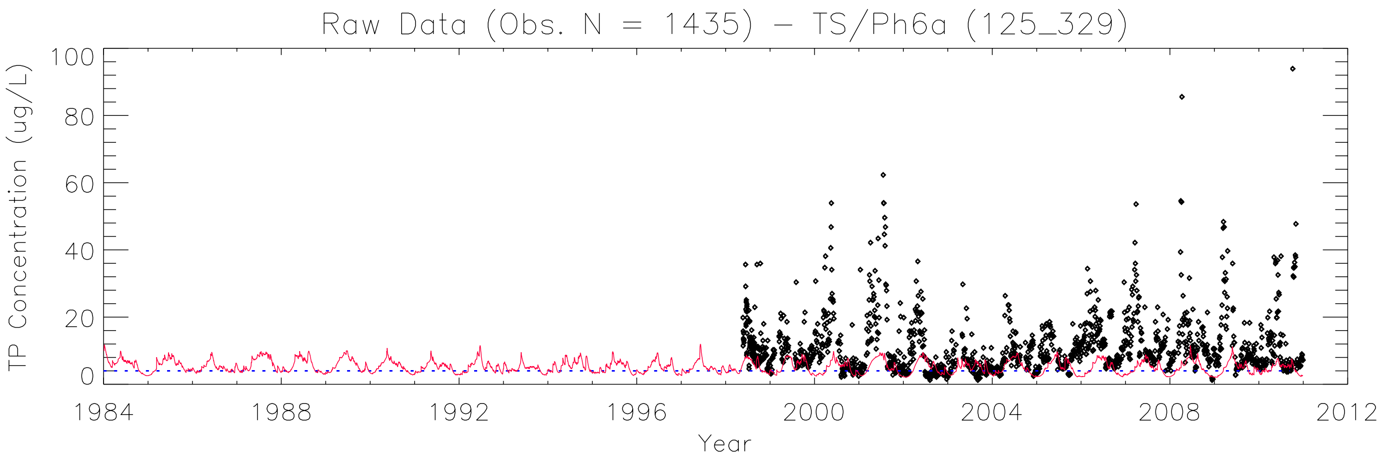
Raw Data (Obs. N = 175) – EP (154_317)
TP Concentration (ug/L)
Year
Mean: Season – 95% CI – EP (154_317)
TP Concentration (ug/L)
Year
Mean: Water Year – 95% CI – EP (154_317)
TP Concentration (ug/L)
Year
Cumulative Distribution: Raw Data – EP (154_317)
Cumulative Distribution
TP Concentration (ug/L)

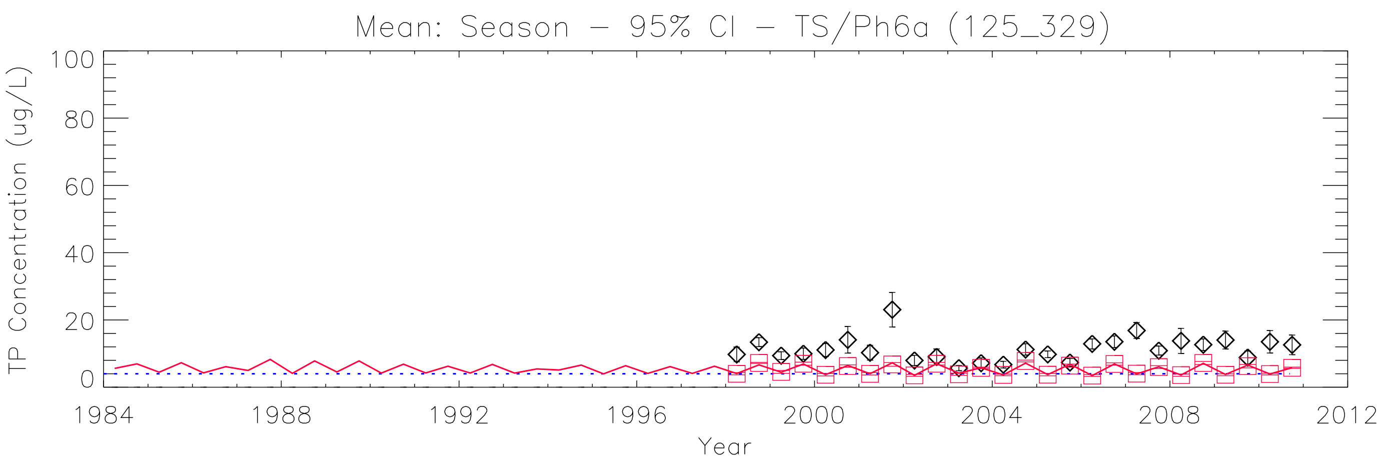

Raw Data (Obs. N = 530) – TS/Ph3 (122_321)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

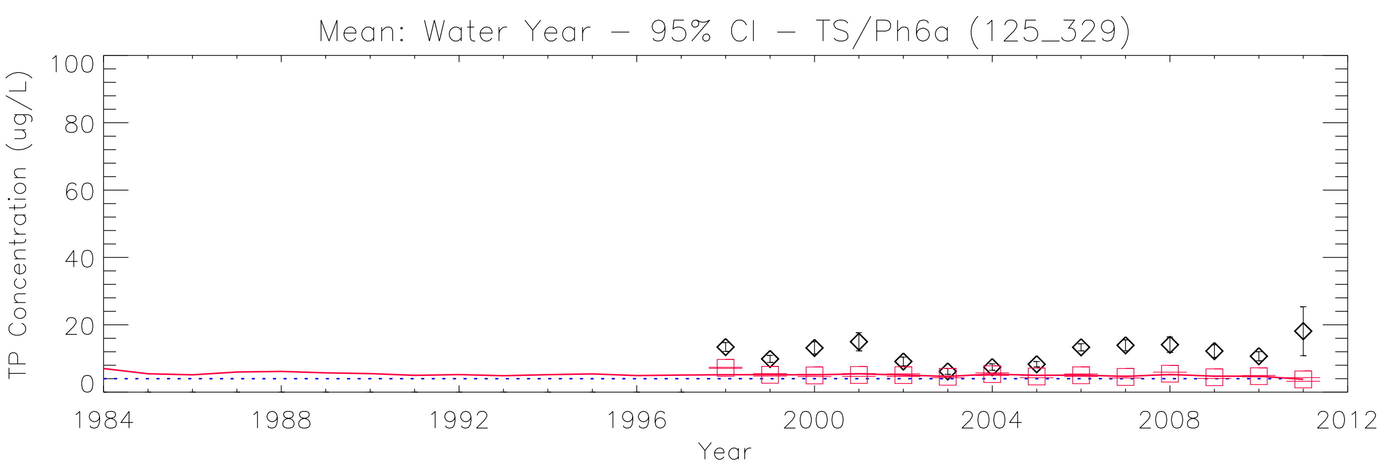

Mean: Season – 95% CI – TS/Ph3 (122_321)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

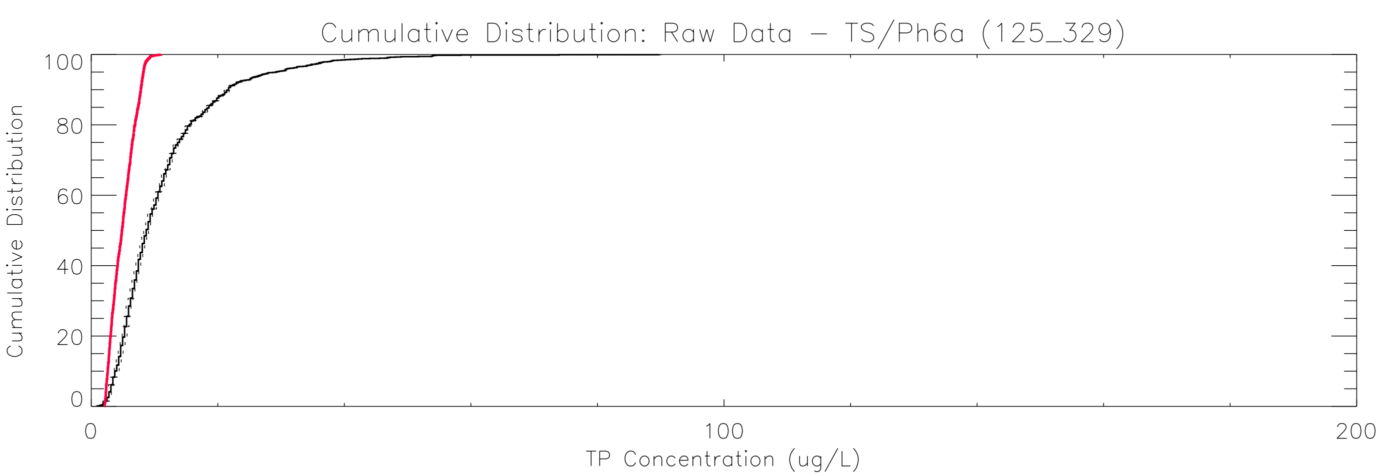

Mean: Water Year – 95% CI – TS/Ph3 (122_321)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

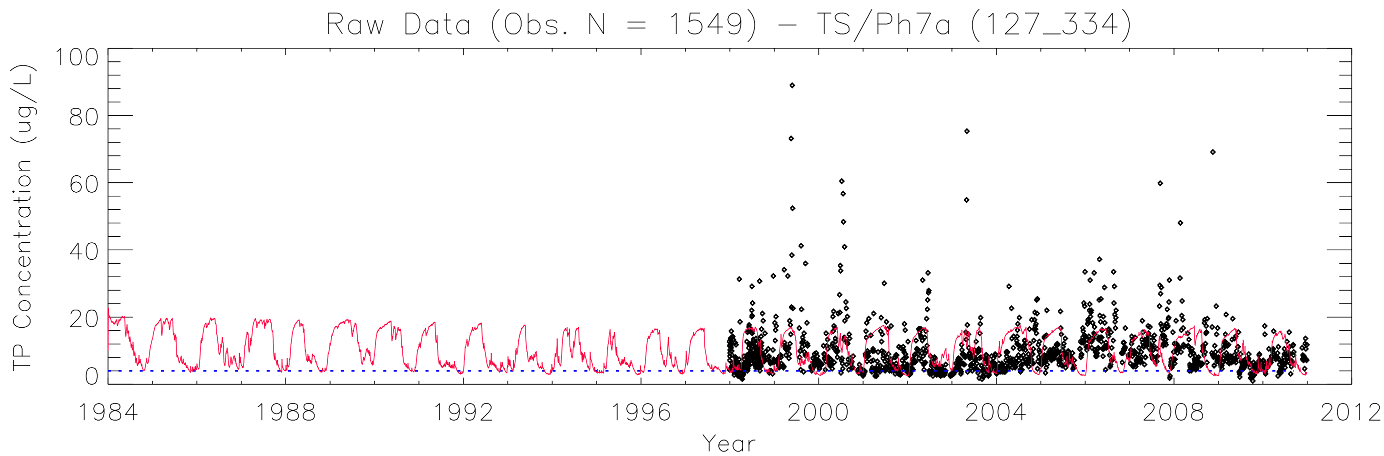

Cumulative Distribution: Raw Data – TS/Ph3 (122_321)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

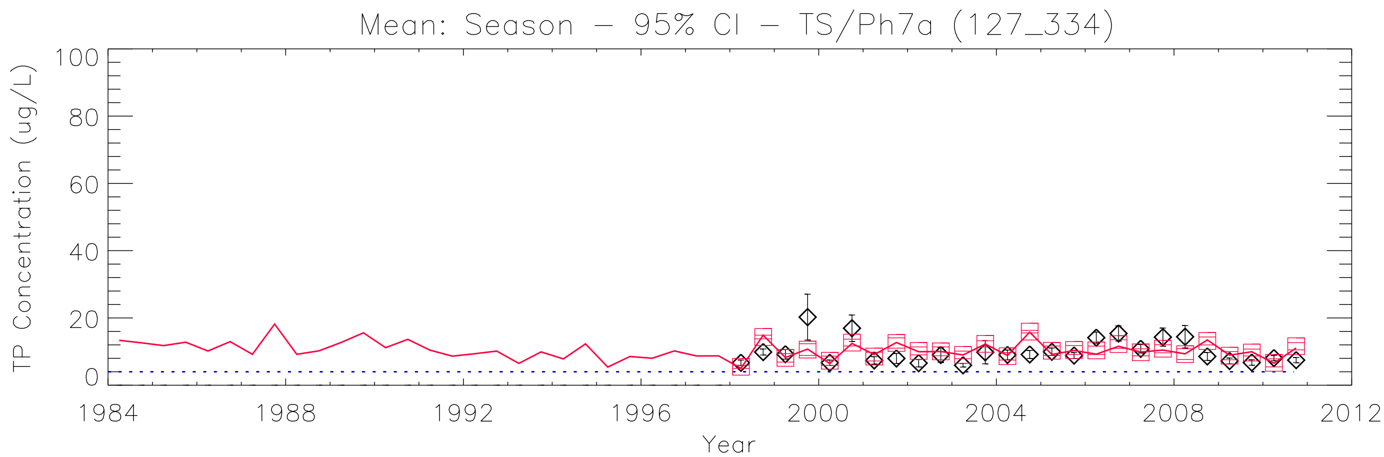

Raw Data (Obs. N = 1435) – TS/Ph6a (125_329)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

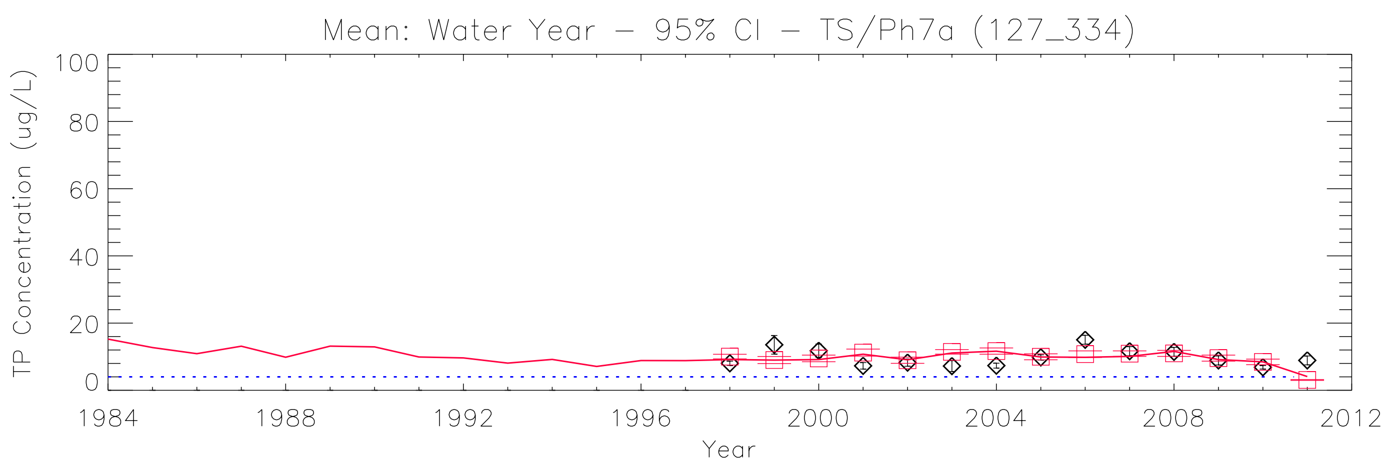

Mean: Season – 95% CI – TS/Ph6a (125_329)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

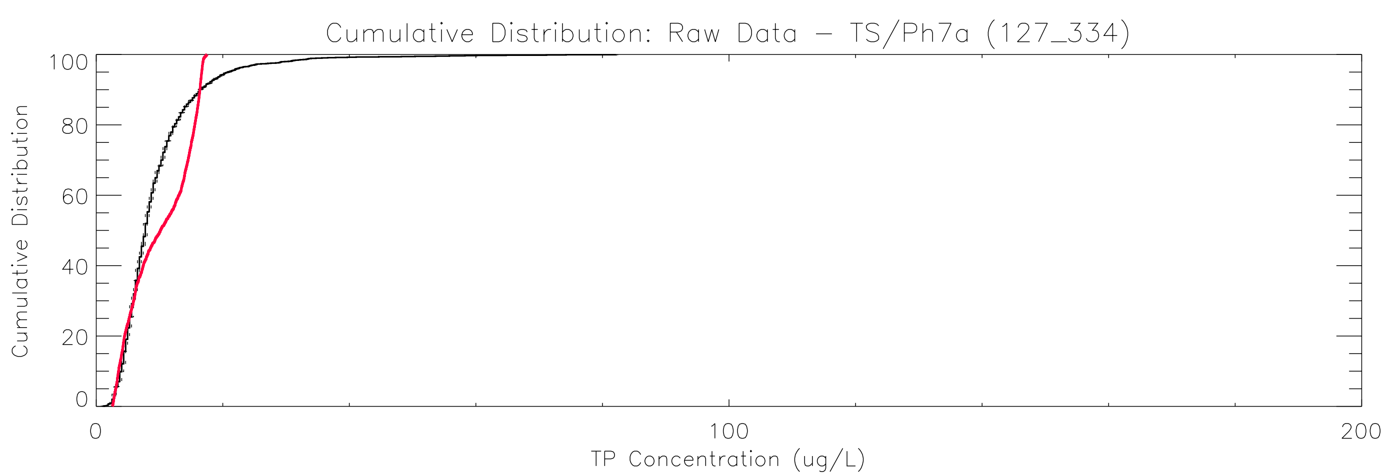

Mean: Water Year – 95% CI – TS/Ph6a (125_329)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

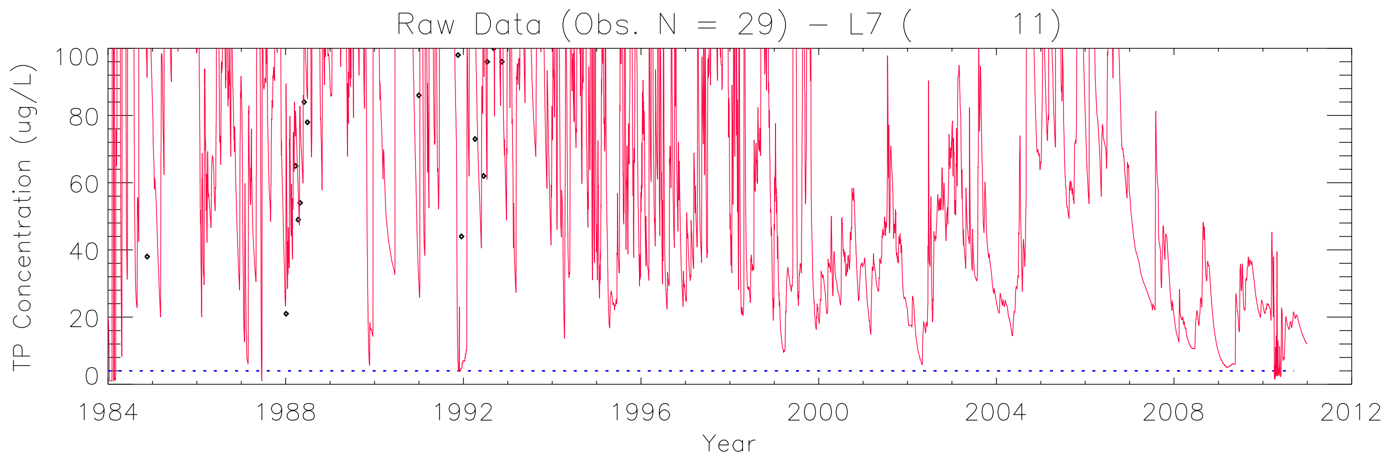

Cumulative Distribution: Raw Data – TS/Ph6a (125_329)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)


Raw Data (Obs. N = 1549) – TS/Ph7a (127_334)
TP Concentration (ug/L)
Year

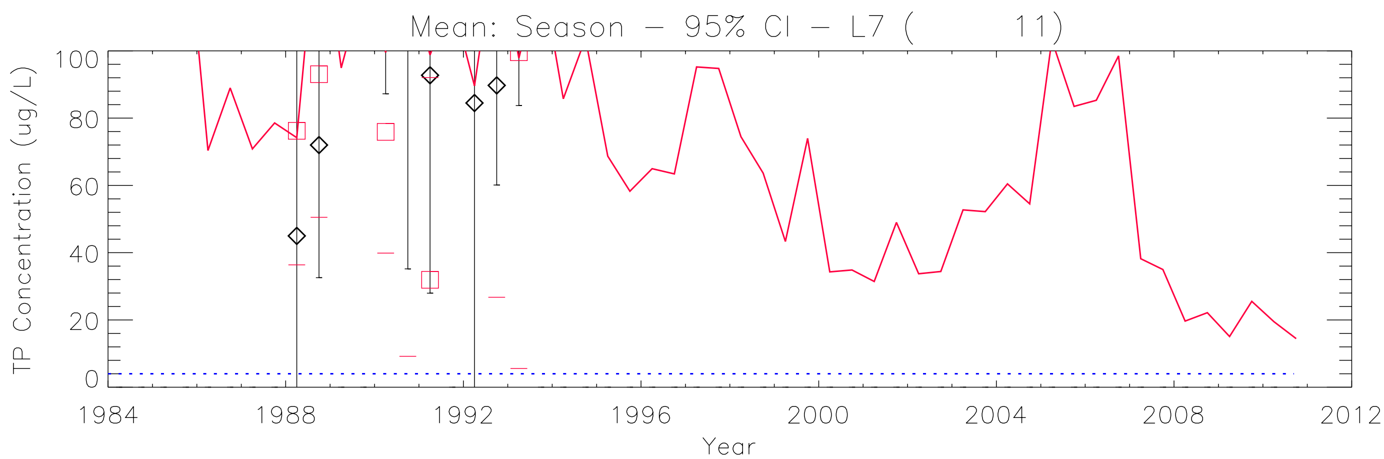

Mean: Season – 95% CI – TS/Ph7a (127_334)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – TS/Ph7a (127_334)
TP Concentration (ug/L)
Year

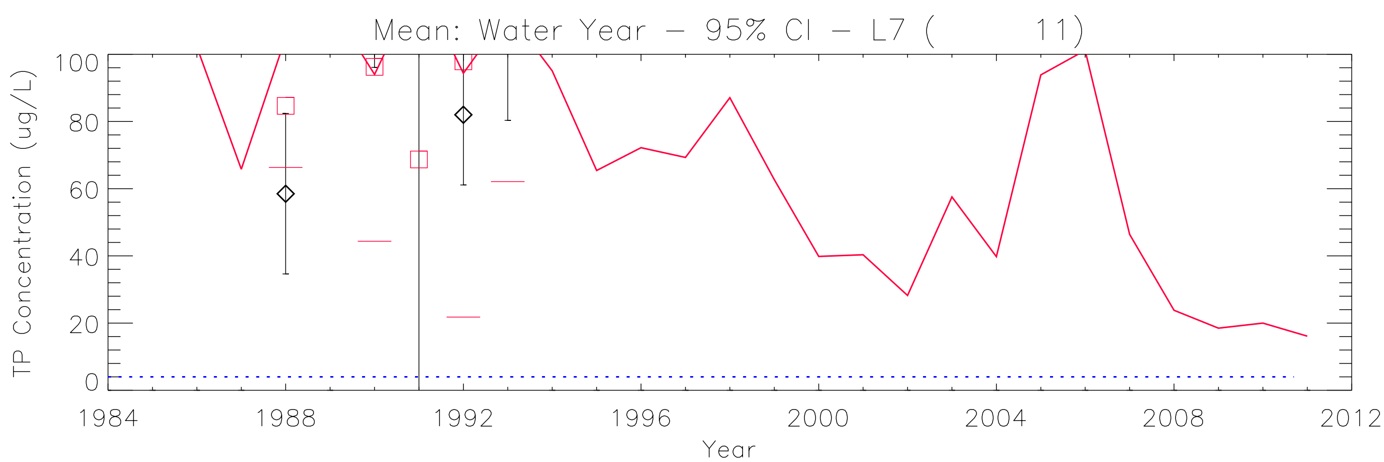

Cumulative Distribution: Raw Data – TS/Ph7a (127_334)
Cumulative Distribution
TP Concentration (ug/L)



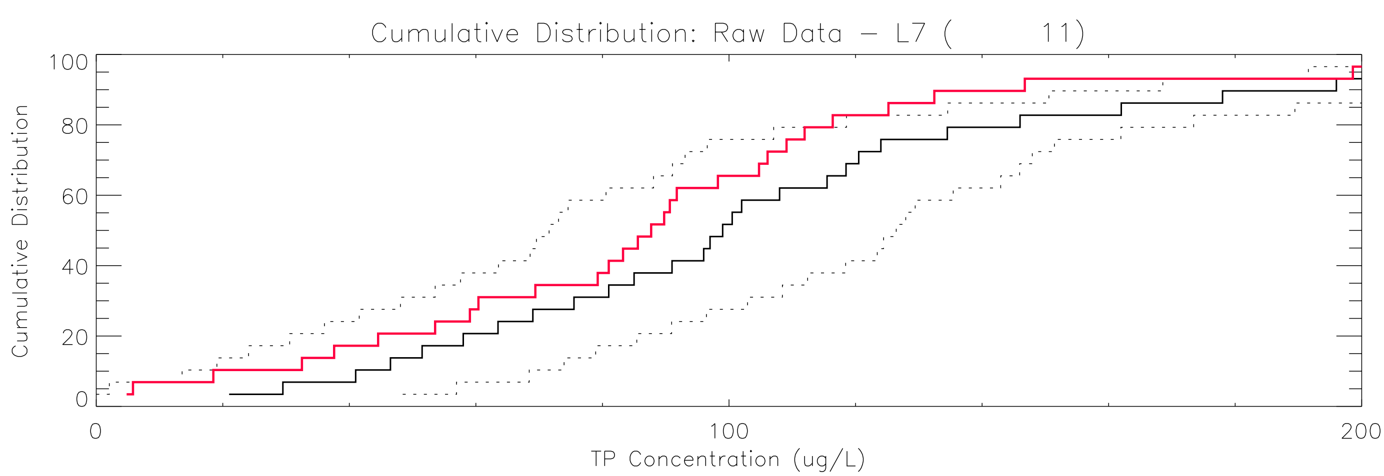
Raw Data (Obs. N = 29) - L7 (11)
TP Concentration (ug/L)
Year



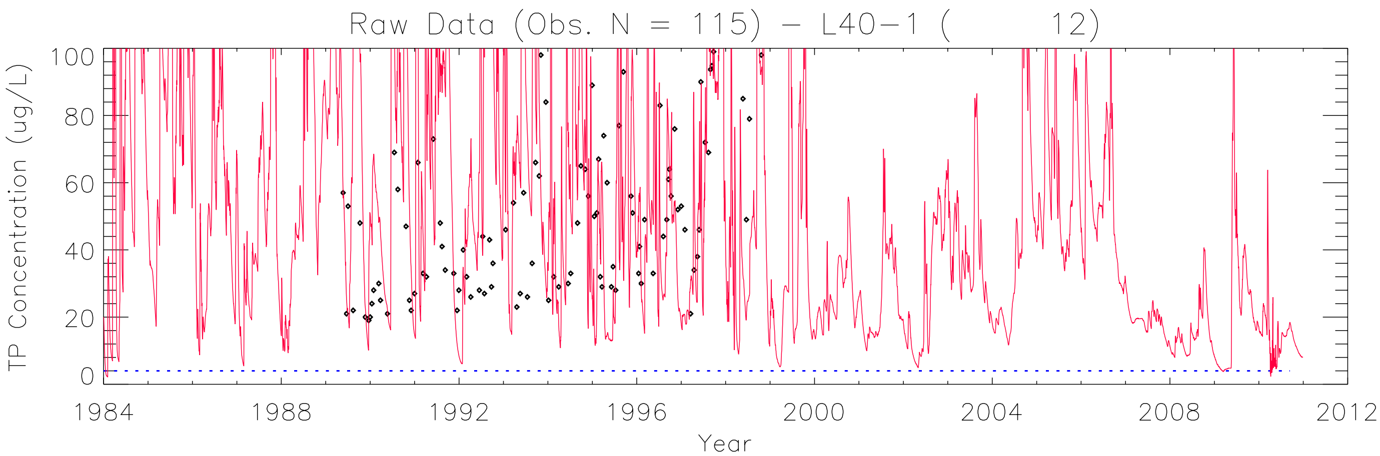
Mean: Season - 95% CI - L7 (11)
TP Concentration (ug/L)
Year

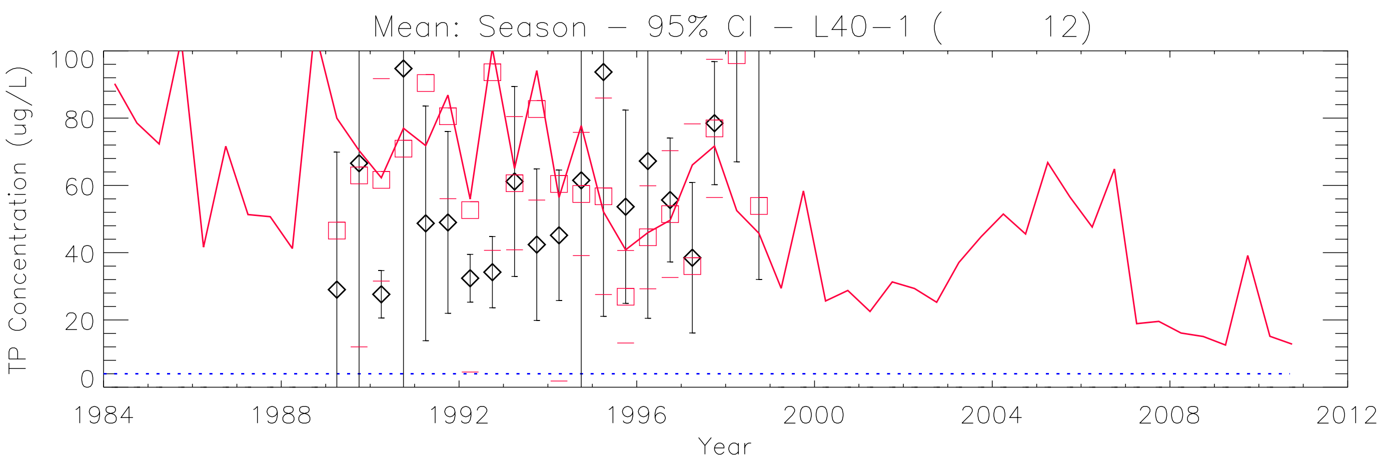


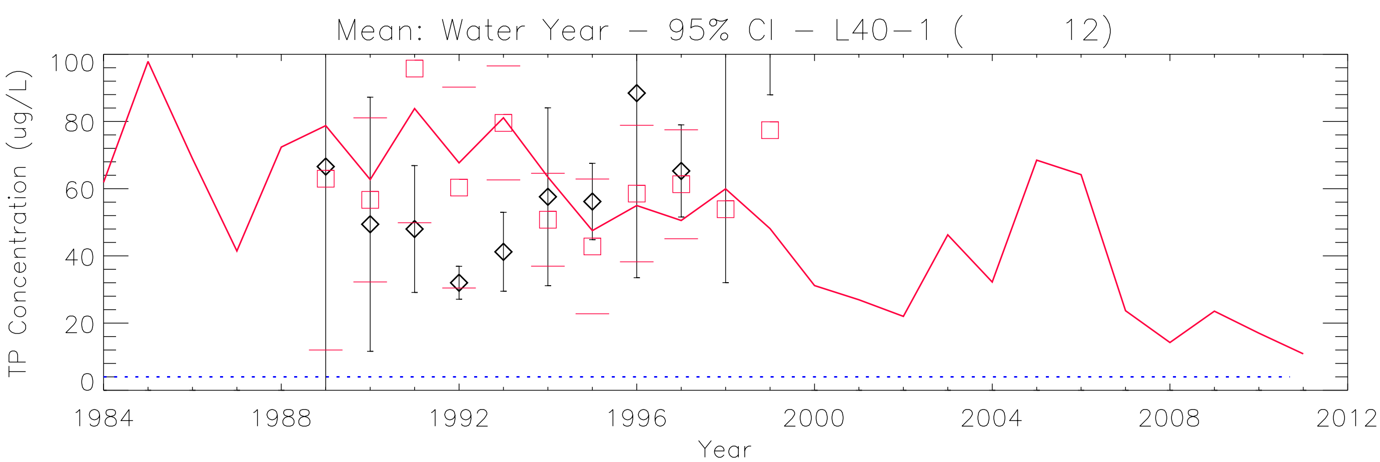
Mean: Water Year - 95% CI - L7 (11)
TP Concentration (ug/L)
Year

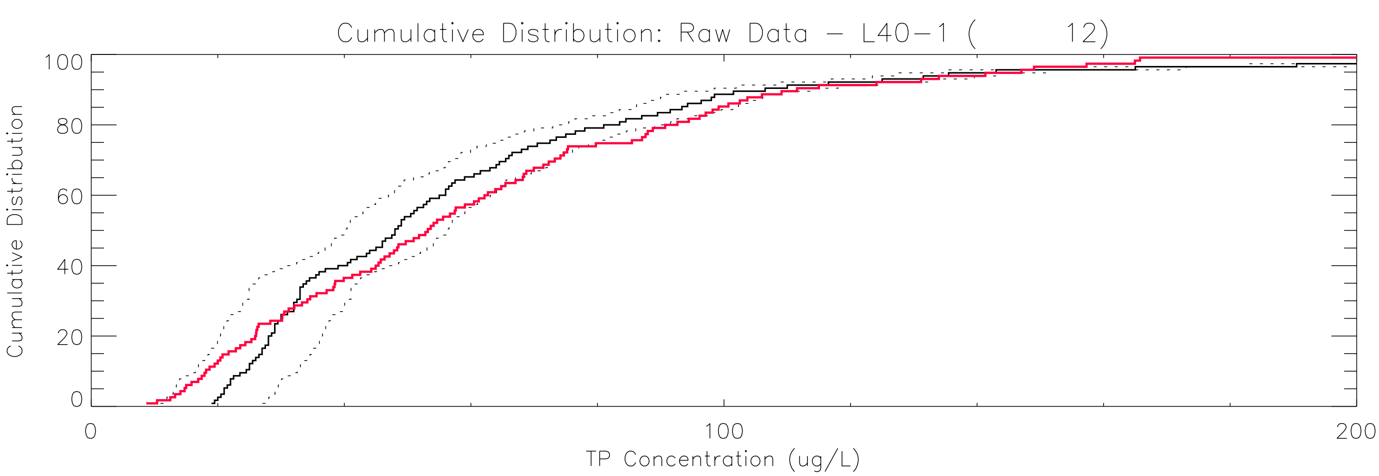


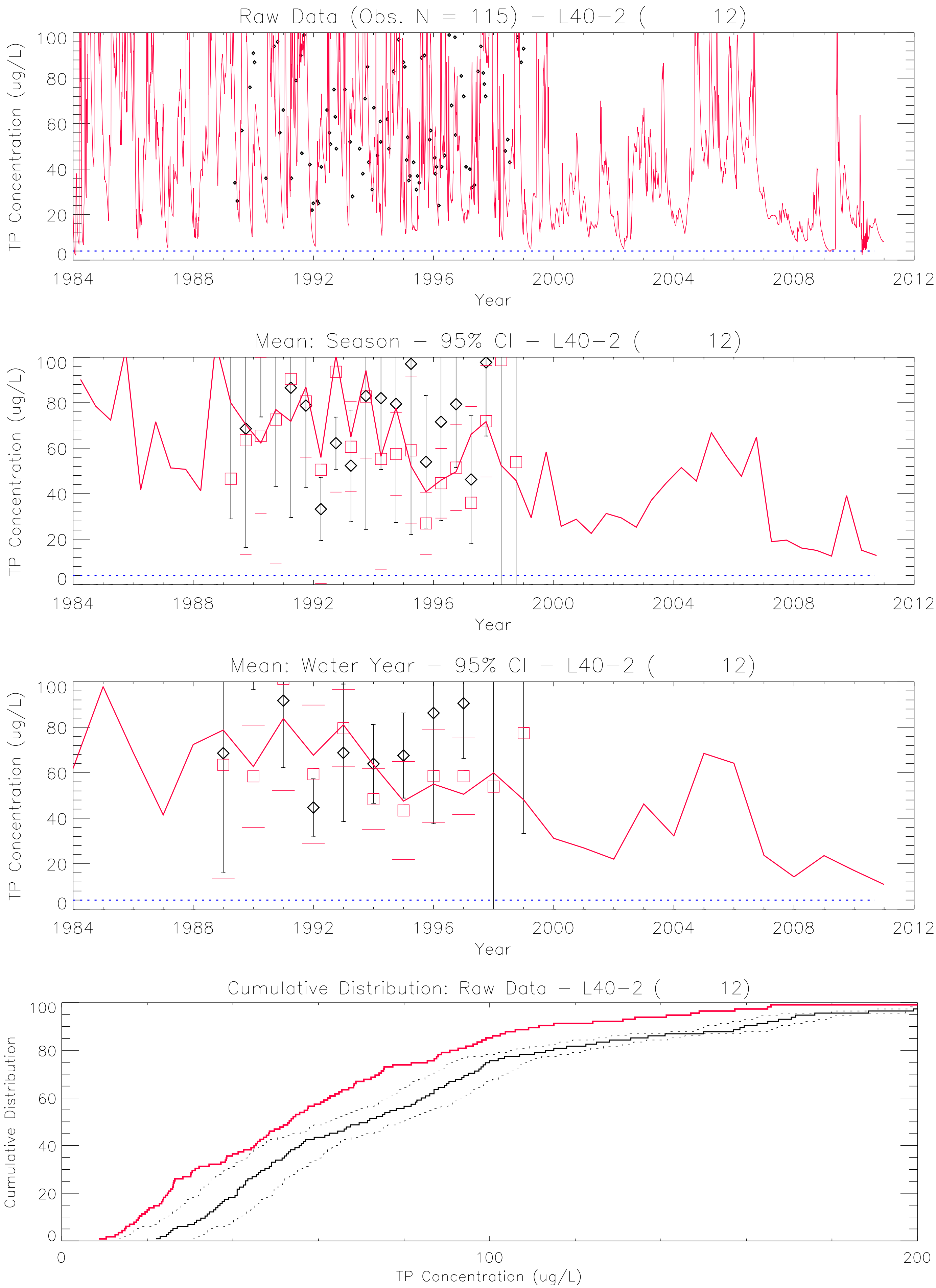
Cumulative Distribution: Raw Data - L7 (11)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 115) – L40–1 (12)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

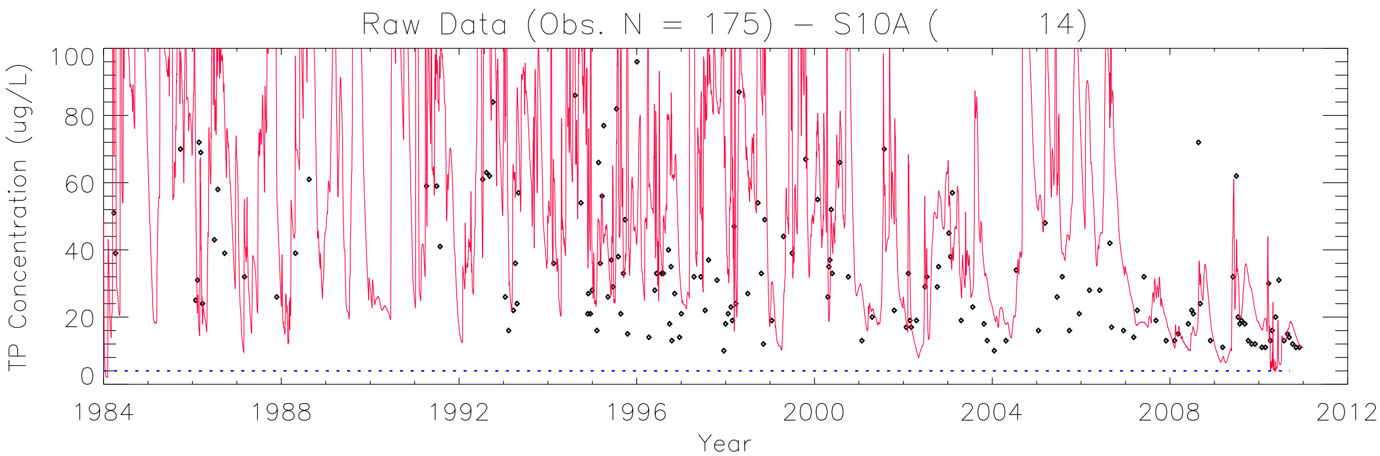

Mean: Season – 95% CI – L40–1 (12)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

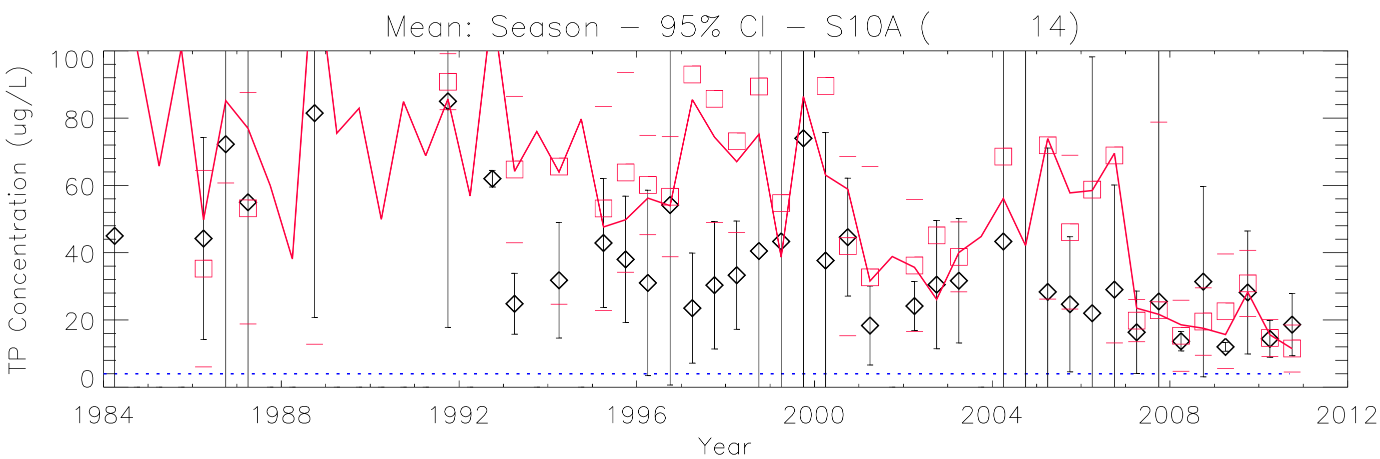

Mean: Water Year – 95% CI – L40–1 (12)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

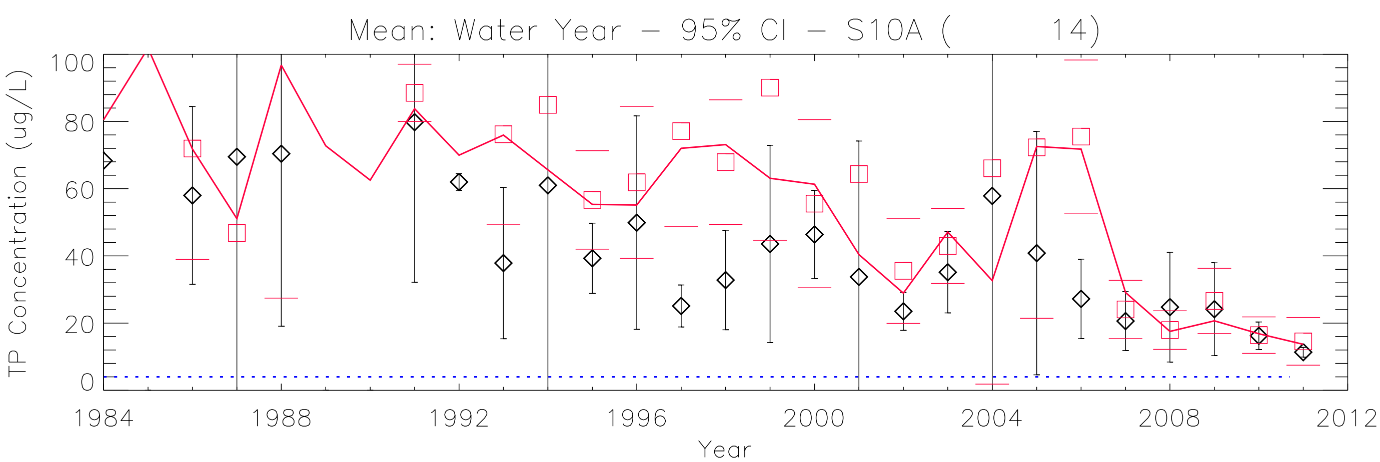

Cumulative Distribution: Raw Data – L40–1 (12)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

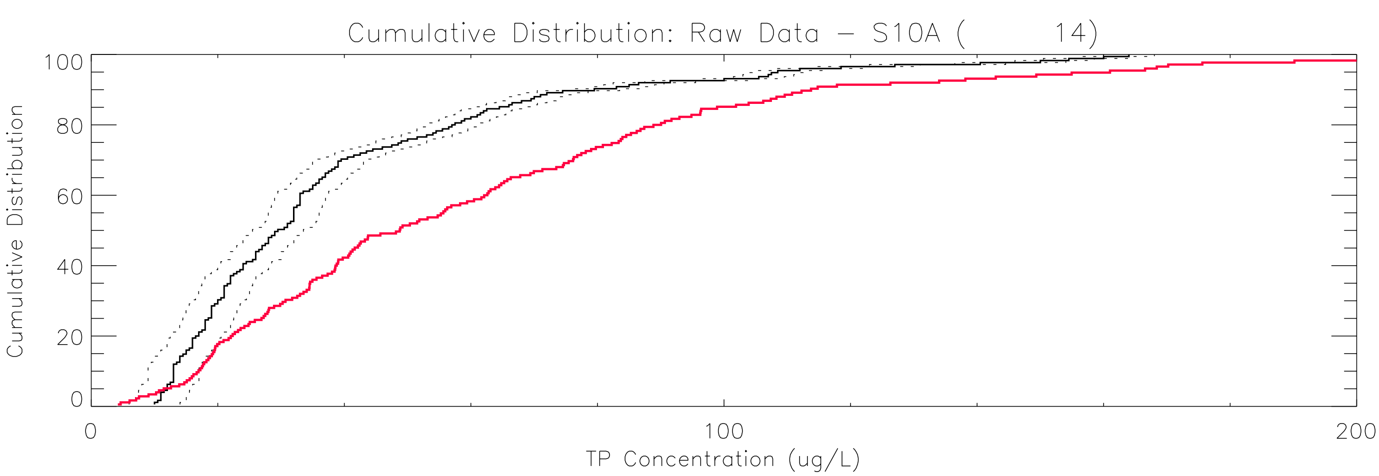


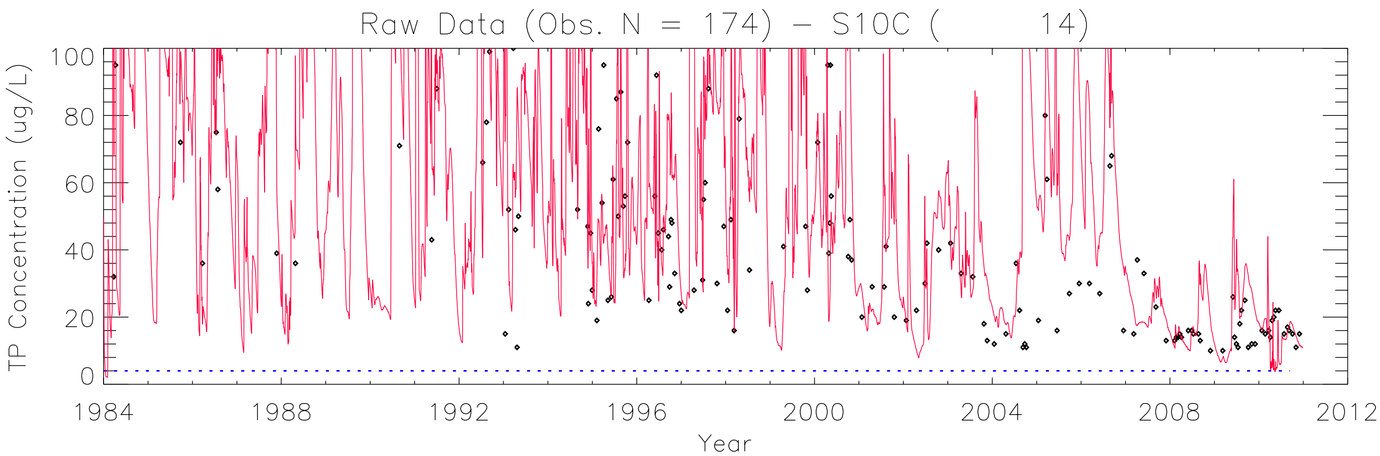
Raw Data (Obs. N = 115) - L40-2 (12)
TP Concentration (ug/L)
Year
Mean: Season - 95% CI - L40-2 (12)
TP Concentration (ug/L)
Year
Mean: Water Year - 95% CI - L40-2 (12)
TP Concentration (ug/L)
Year
Cumulative Distribution: Raw Data - L40-2 (12)
Cumulative Distribution
TP Concentration (ug/L)

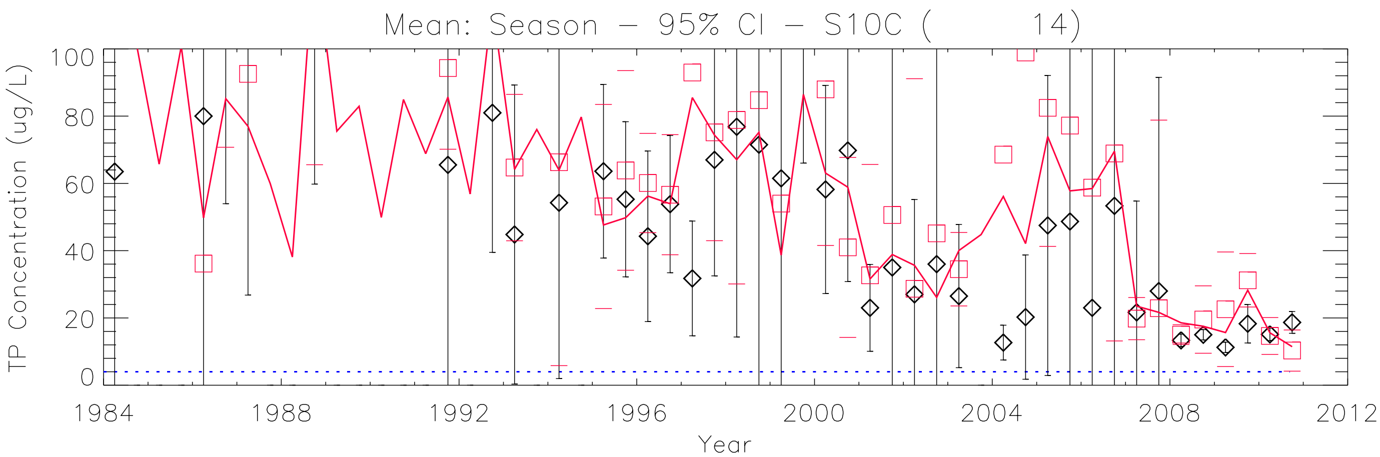

Raw Data (Obs. N = 175) – S10A (14)
TP Concentration (ug/L)
Year

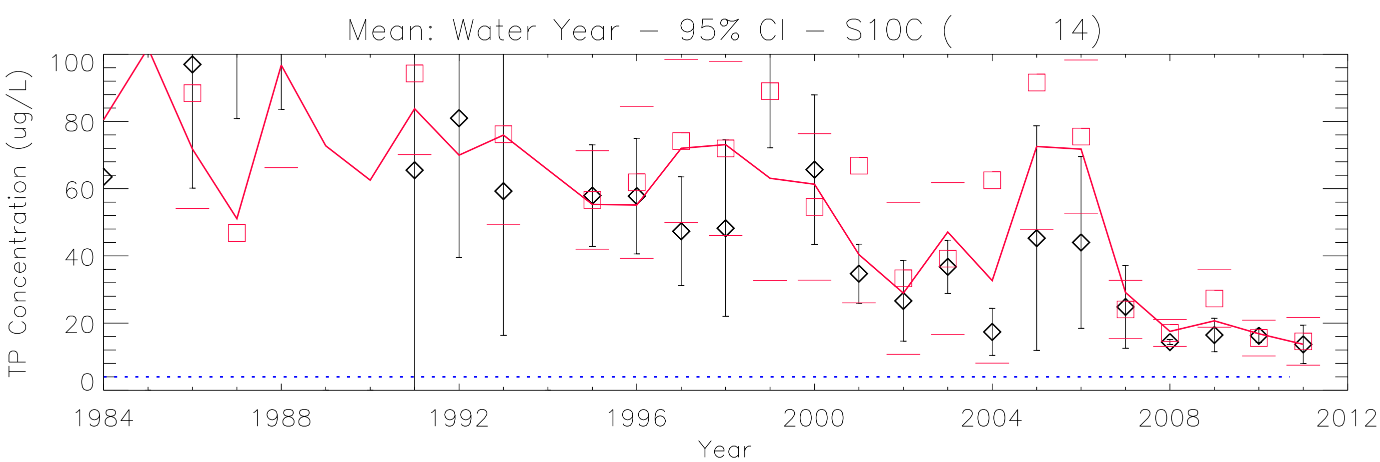

Mean: Season – 95% CI – S10A (14)
TP Concentration (ug/L)
Year

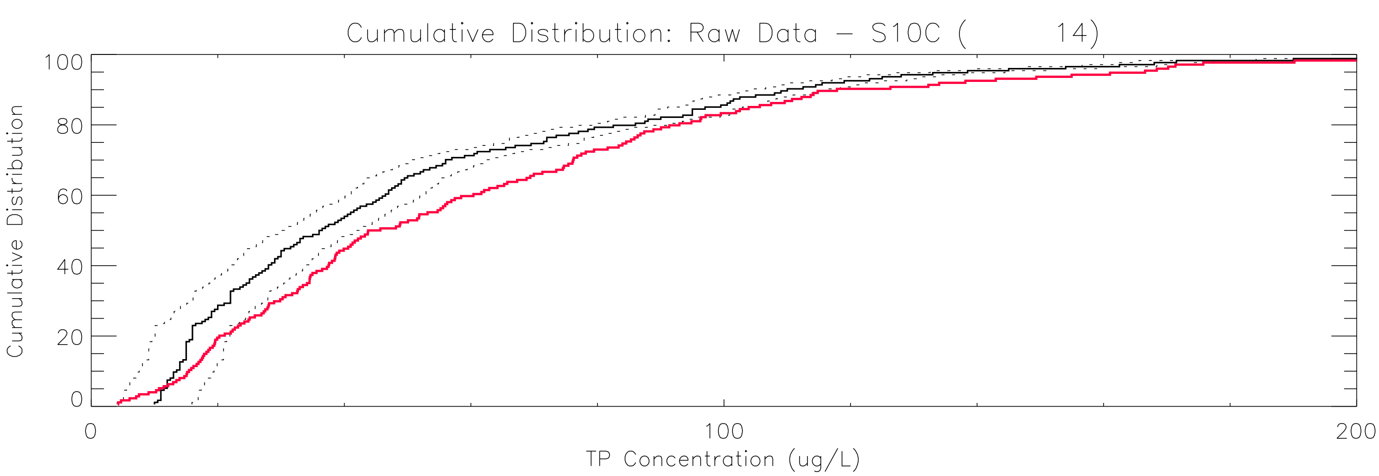

Mean: Water Year – 95% CI – S10A (14)
TP Concentration (ug/L)
Year

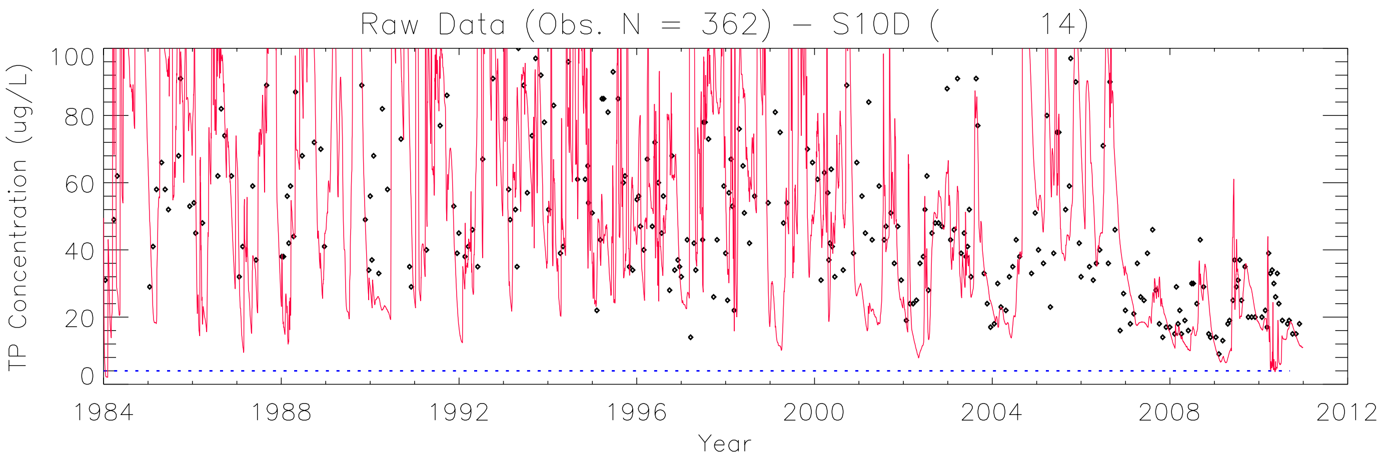

Cumulative Distribution: Raw Data – S10A (14)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 174) – S10C (14)
TP Concentration (ug/L)
Year

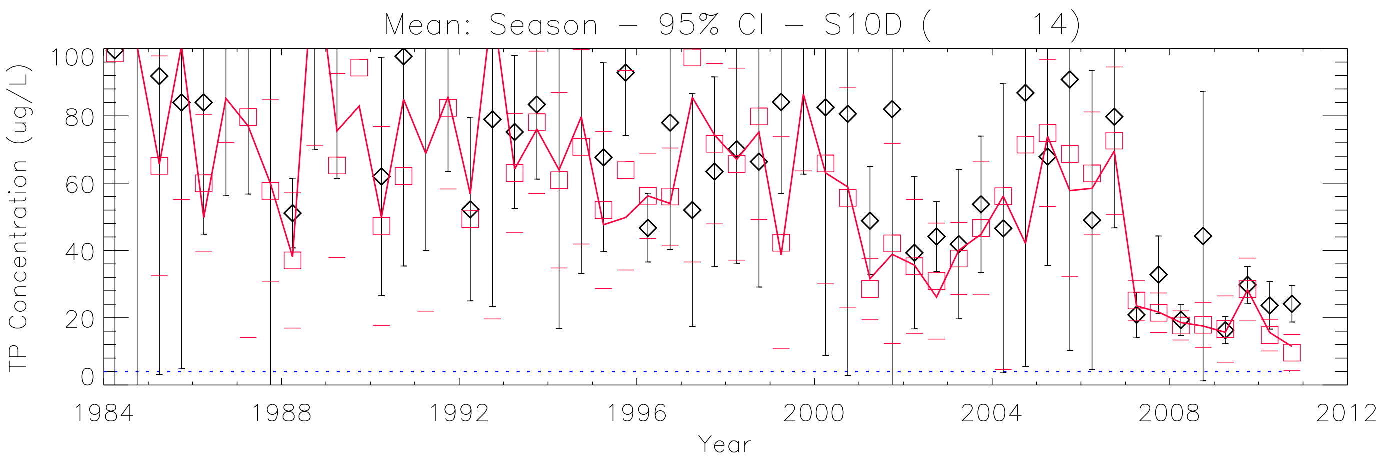

Mean: Season – 95% CI – S10C (14)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – S10C (14)
TP Concentration (ug/L)
Year

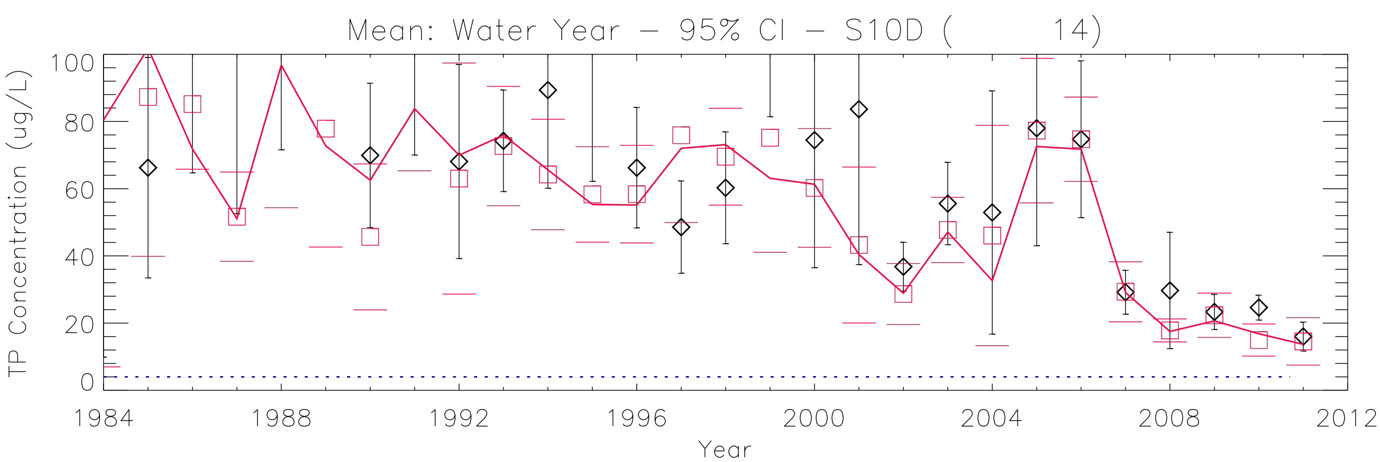

Cumulative Distribution: Raw Data – S10C (14)
Cumulative Distribution
TP Concentration (ug/L)



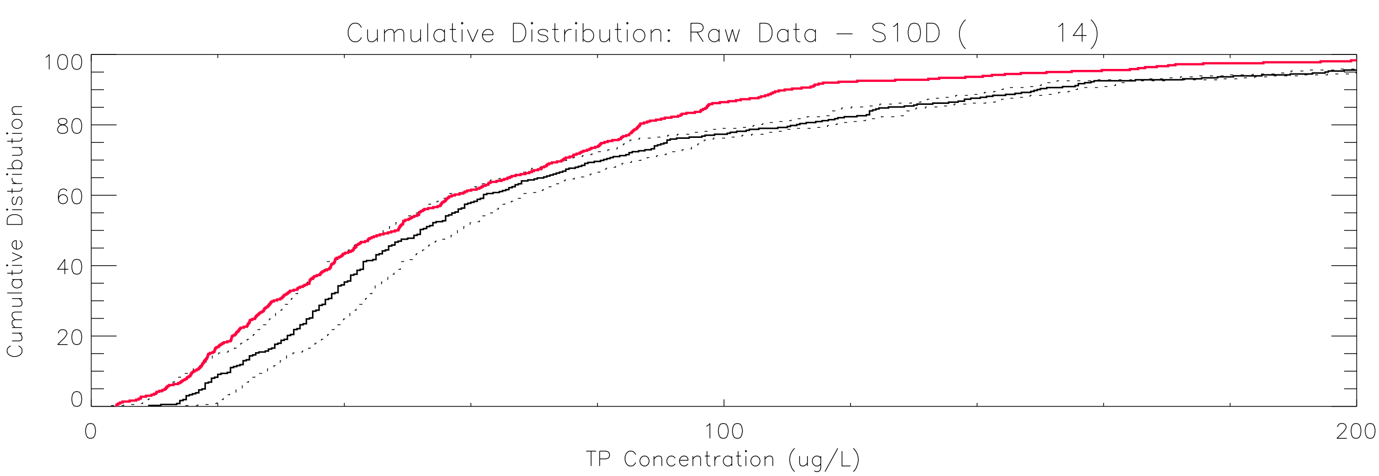
Raw Data (Obs. N = 362) – S10D (14)
TP Concentration (ug/L)
Year



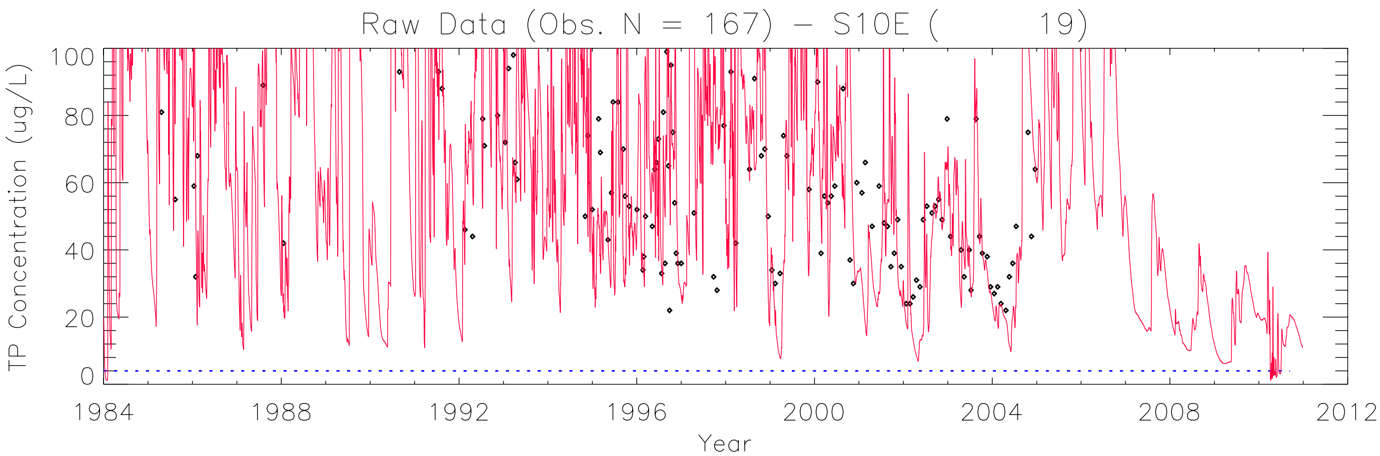
Mean: Season – 95% CI – S10D (14)
TP Concentration (ug/L)
Year

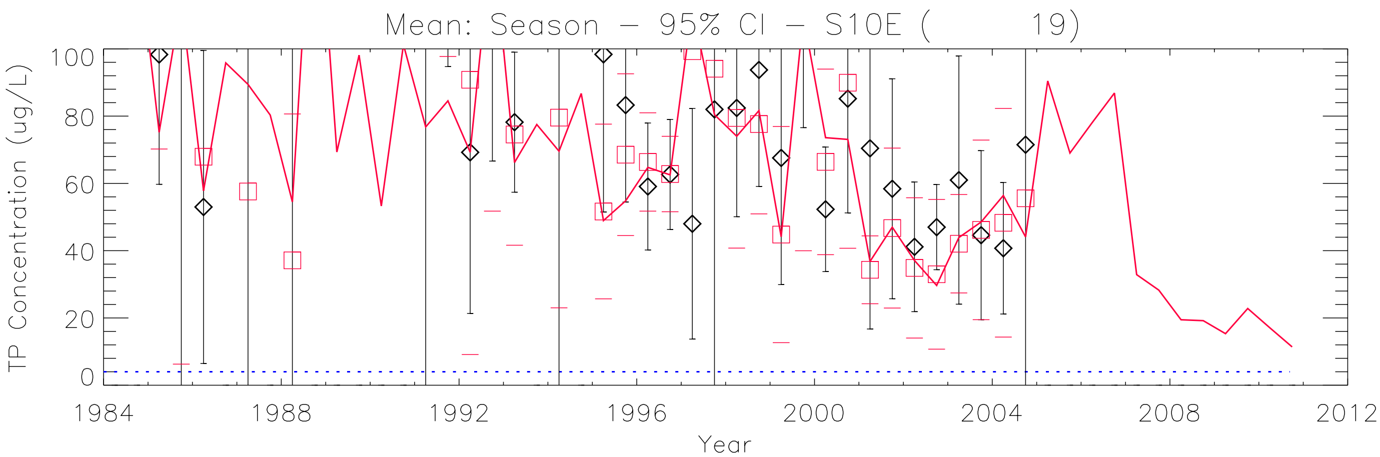


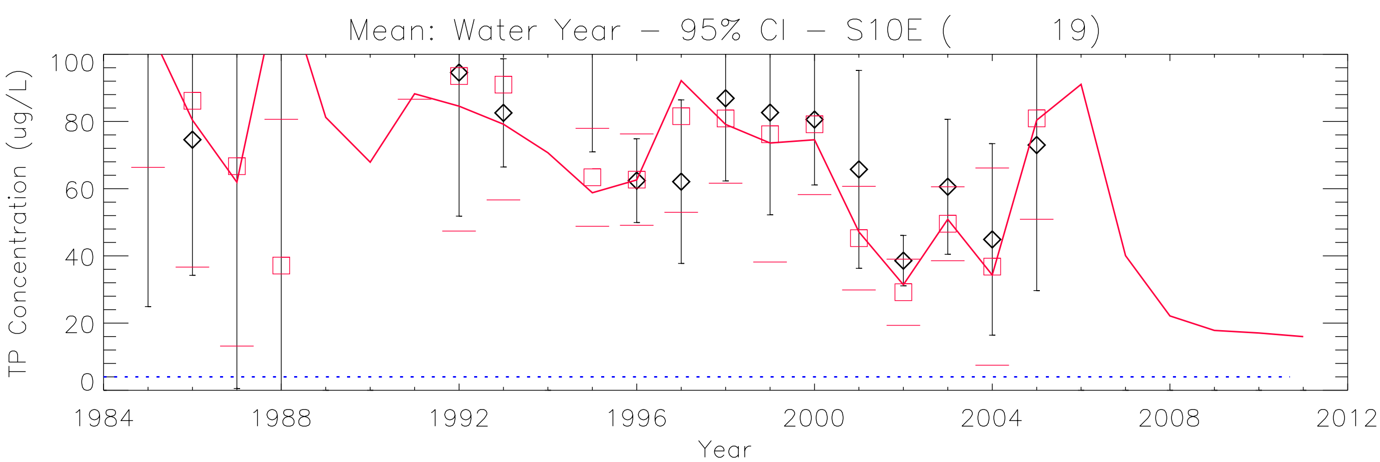
Mean: Water Year – 95% CI – S10D (14)
TP Concentration (ug/L)
Year

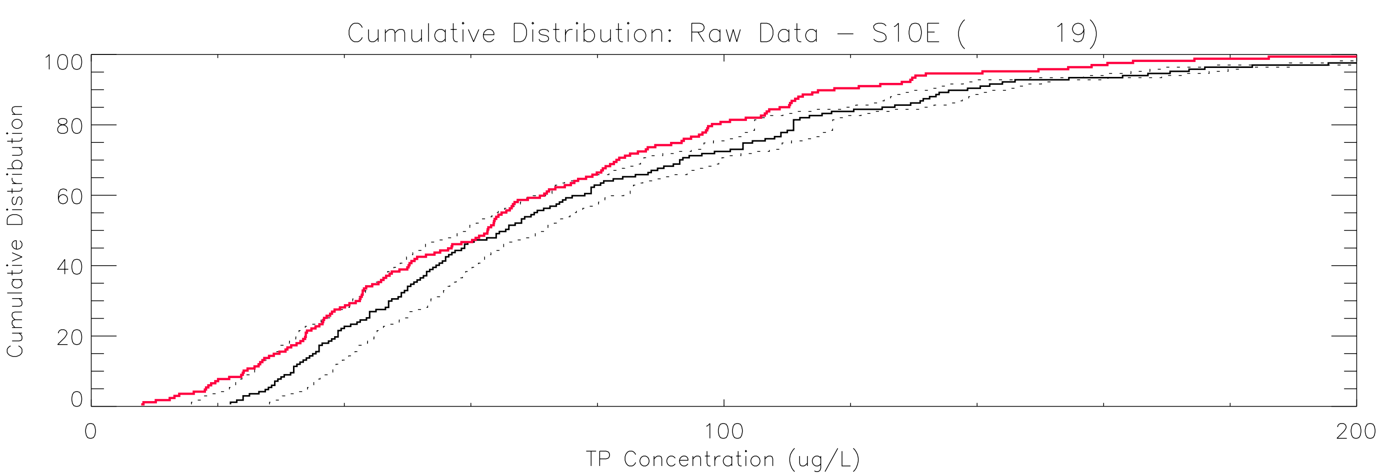


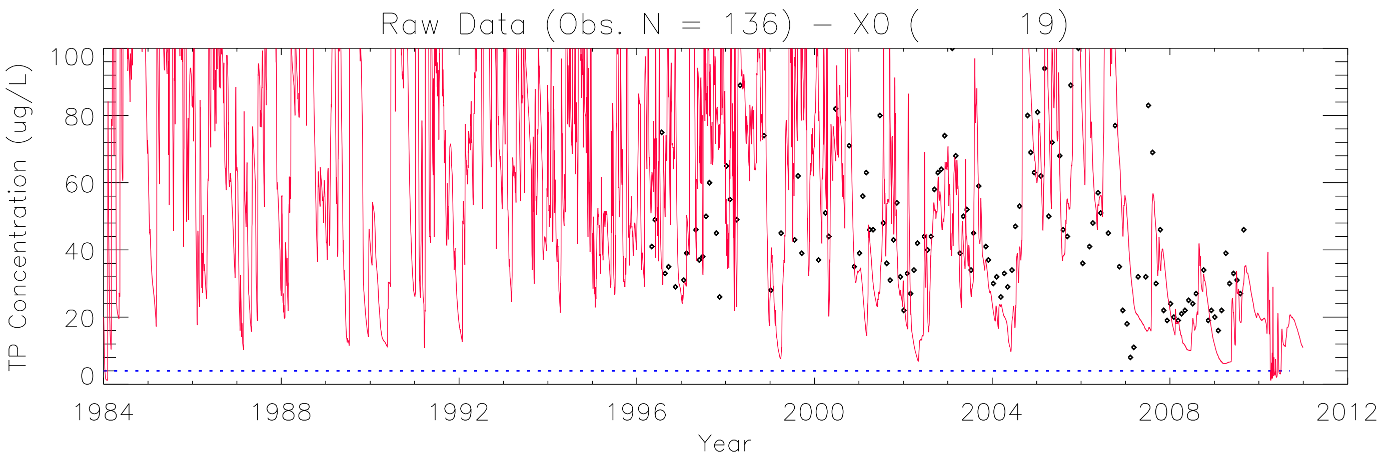
Cumulative Distribution: Raw Data – S10D (14)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 167) – S10E (19)
TP Concentration (ug/L)
Year

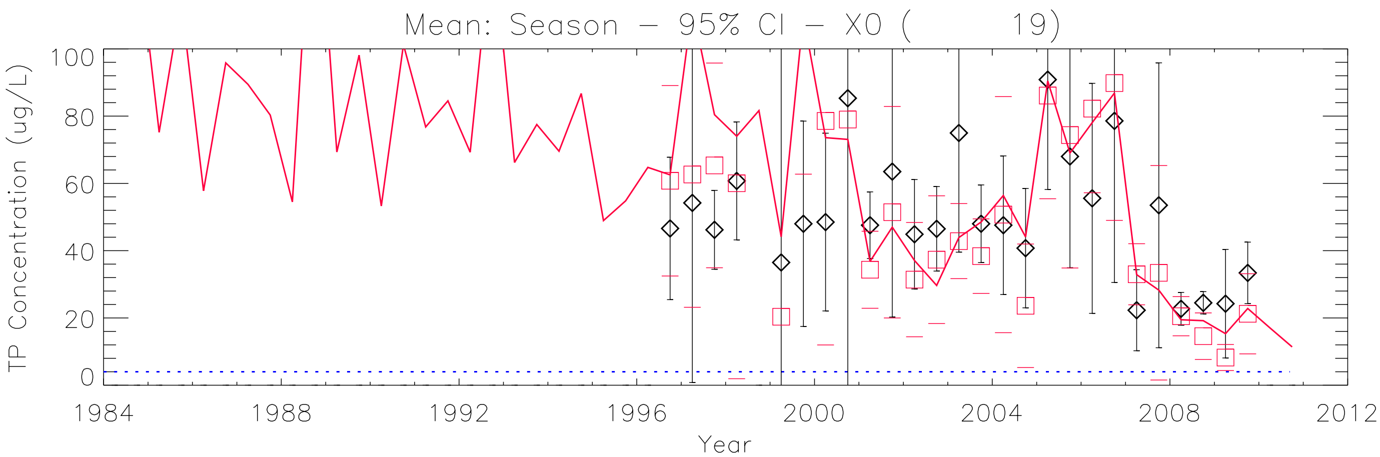

Mean: Season – 95% CI – S10E (19)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – S10E (19)
TP Concentration (ug/L)
Year

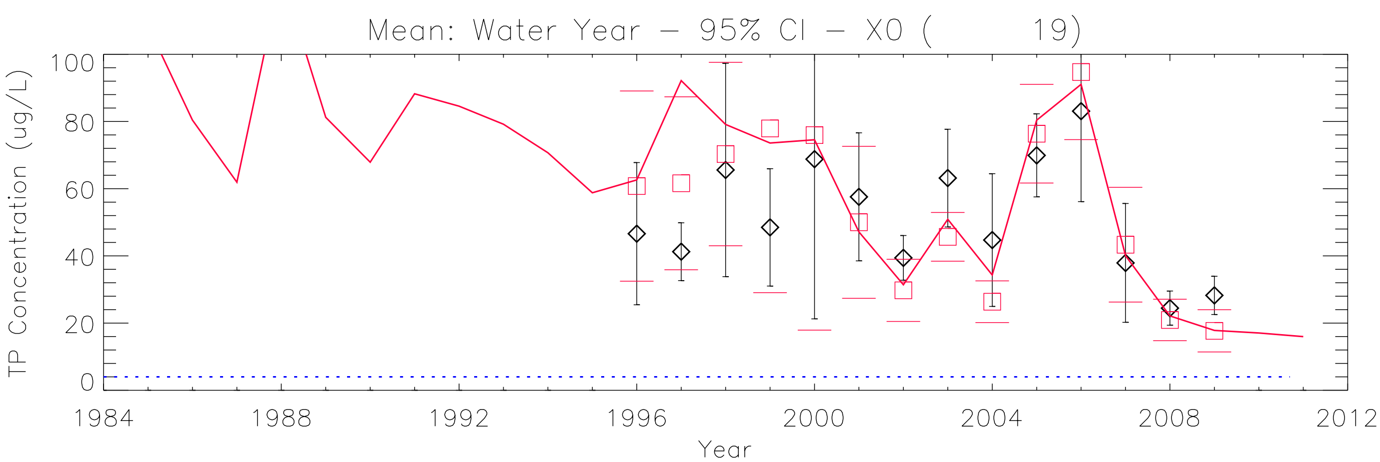

Cumulative Distribution: Raw Data – S10E (19)
Cumulative Distribution
TP Concentration (ug/L)



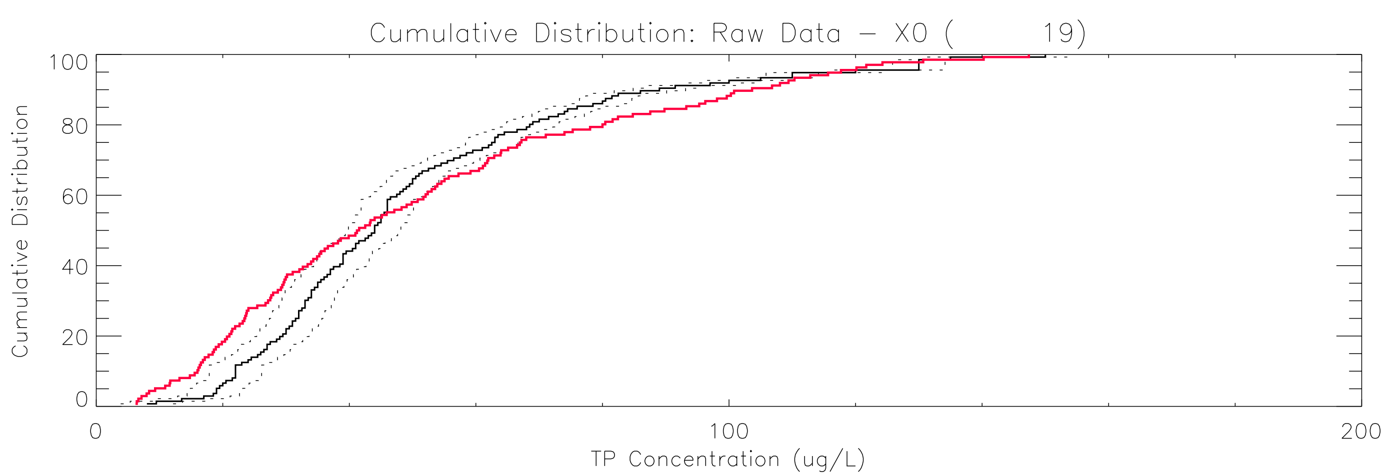
Raw Data (Obs. N = 136) – X0 (19)
TP Concentration (ug/L)
Year



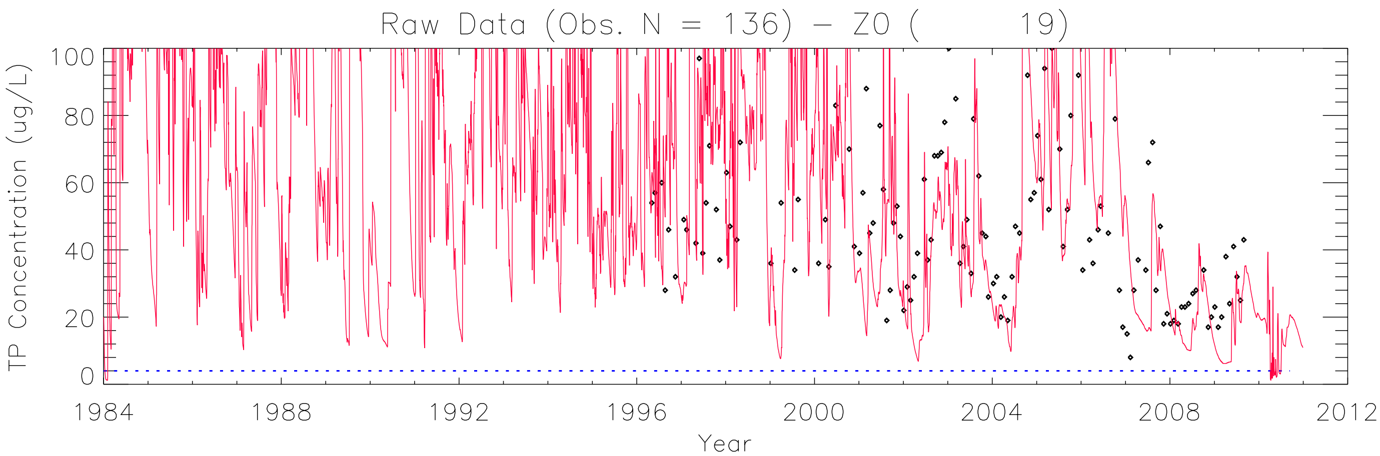
Mean: Season – 95% CI – X0 (19)
TP Concentration (ug/L)
Year

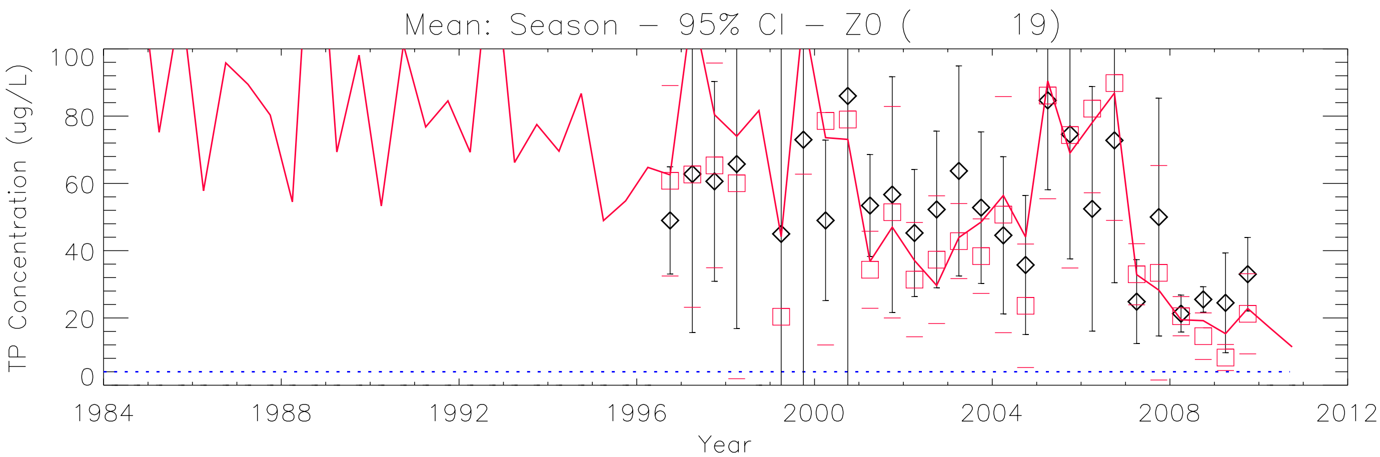


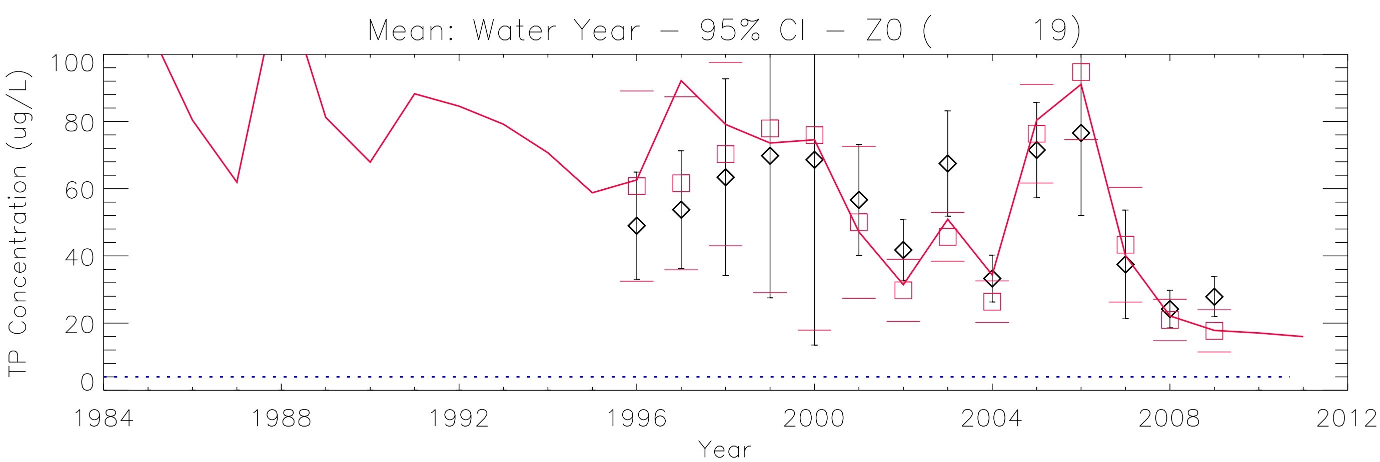
Mean: Water Year – 95% CI – X0 (19)
TP Concentration (ug/L)
Year

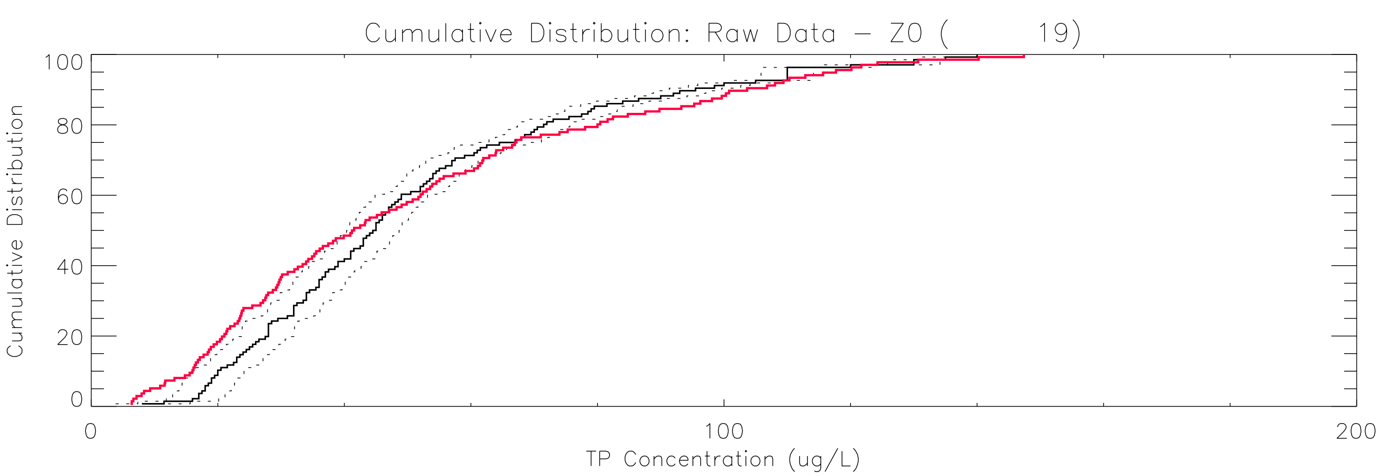


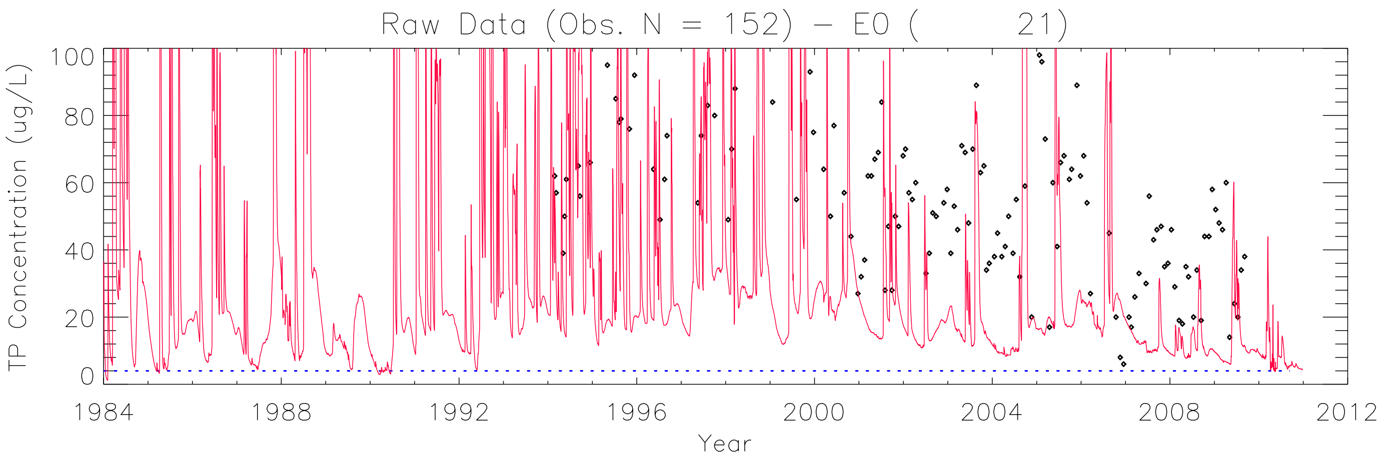
Cumulative Distribution: Raw Data – X0 (19)
Cumulative Distribution
TP Concentration (ug/L)

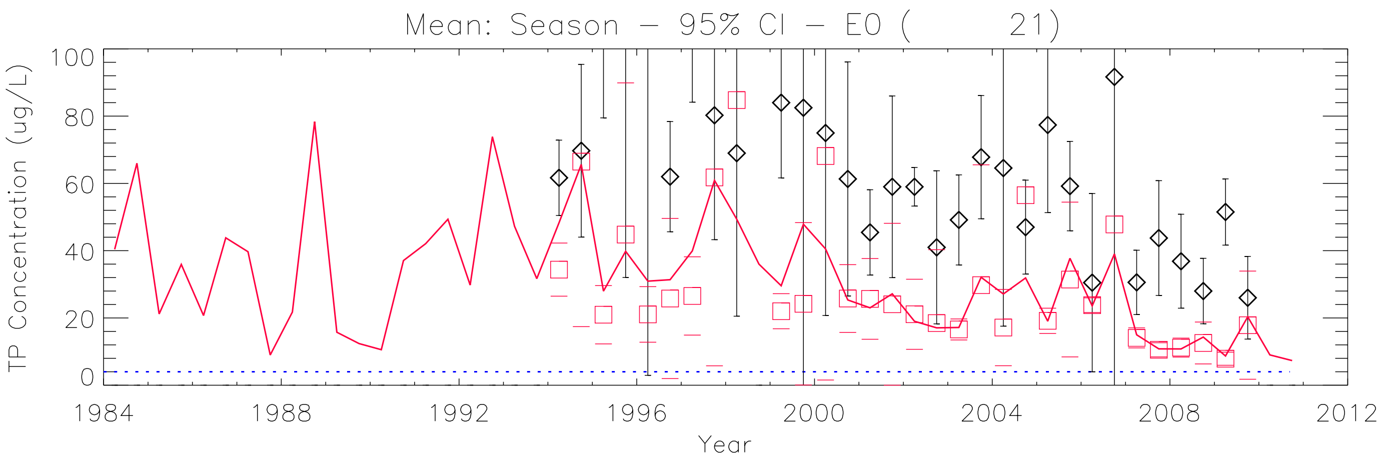

Raw Data (Obs. N = 136) – Z0 (19)
TP Concentration (ug/L)
Year

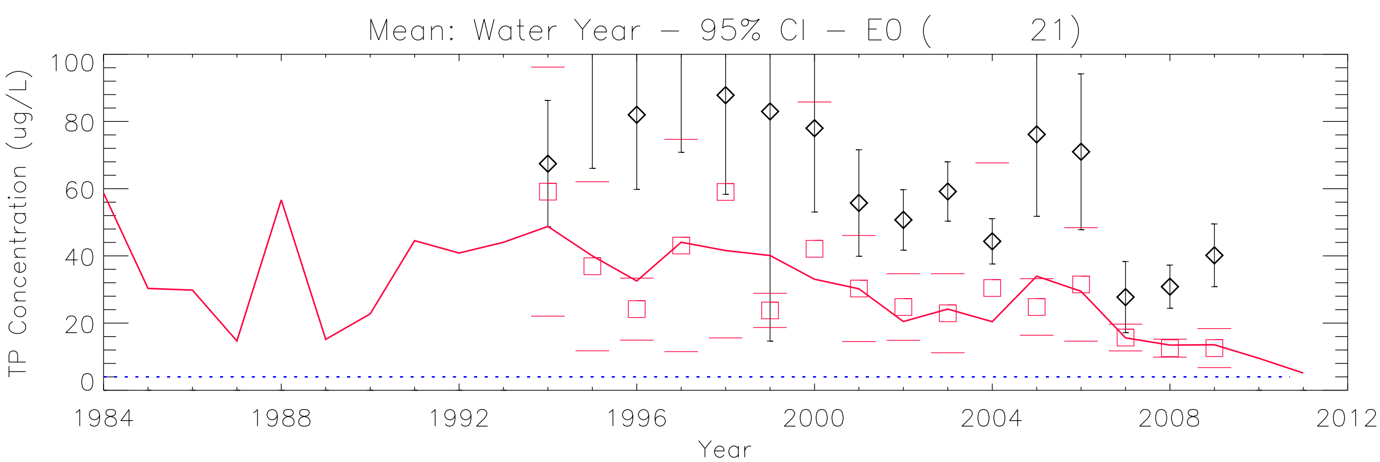

Mean: Season – 95% CI – Z0 (19)
TP Concentration (ug/L)
Year

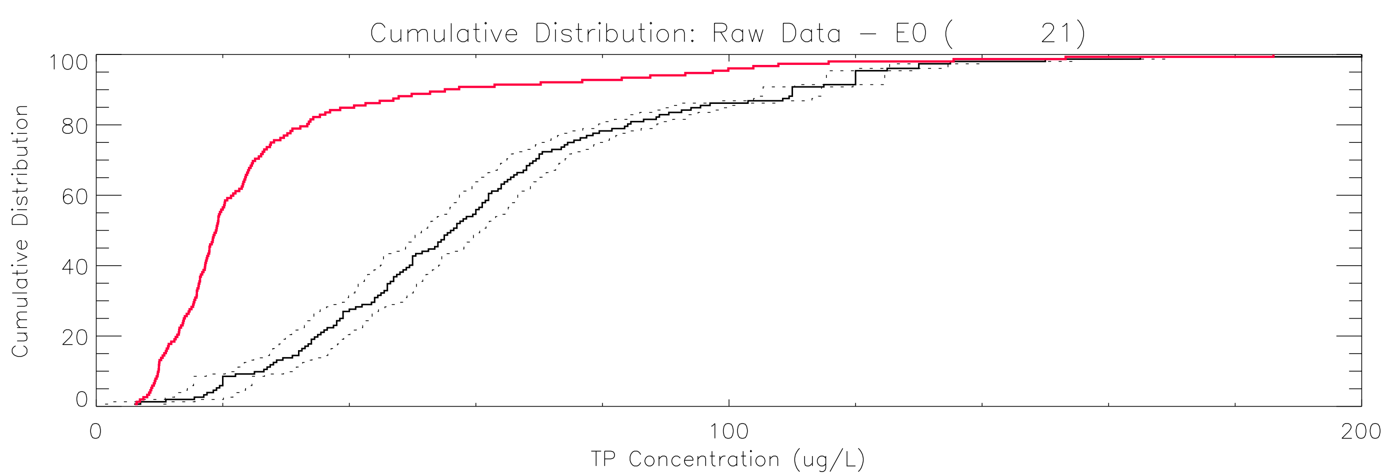

Mean: Water Year – 95% CI – Z0 (19)
TP Concentration (ug/L)
Year

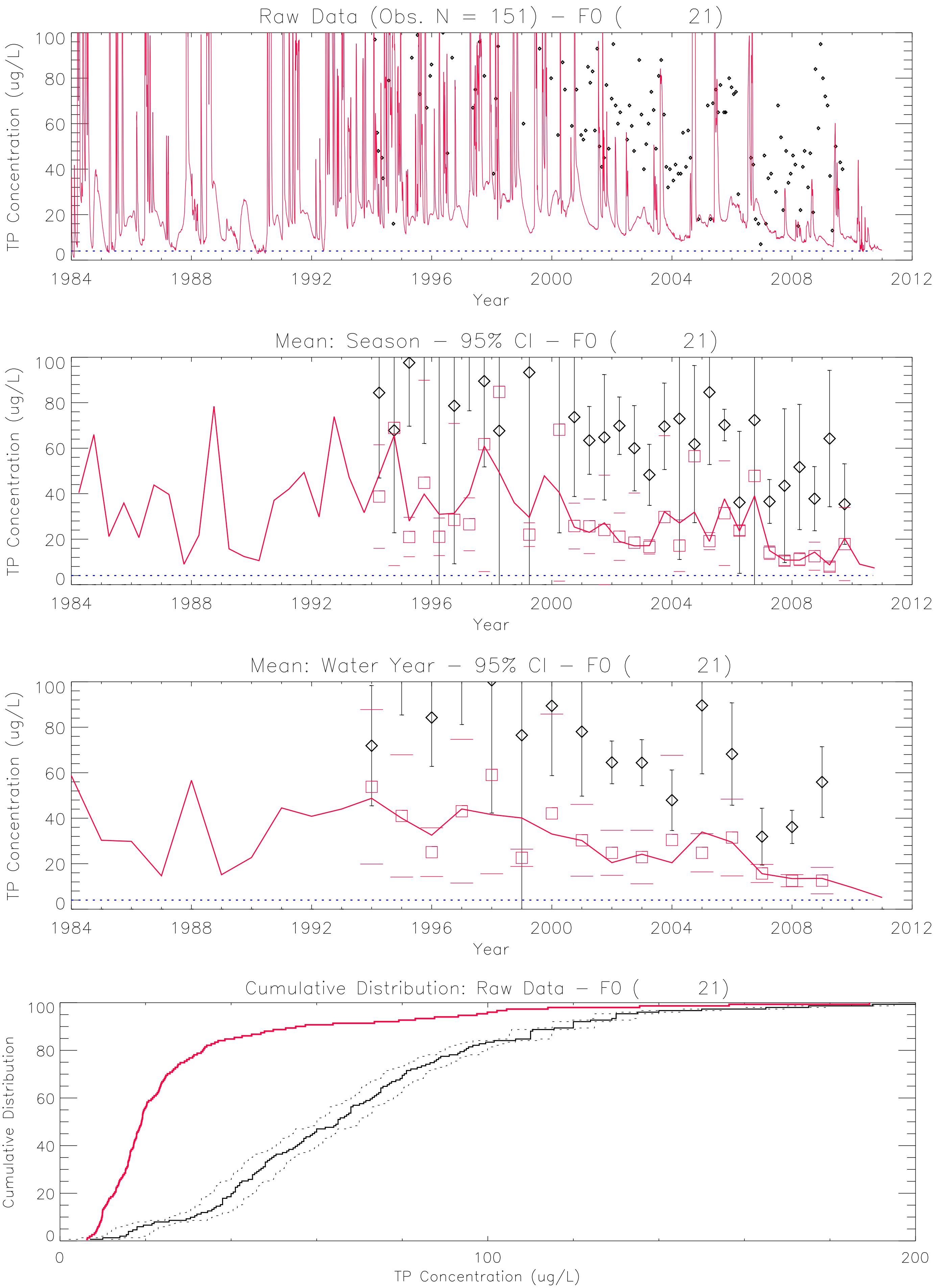

Cumulative Distribution: Raw Data – Z0 (19)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 152) - E0 (21)
TP Concentration (ug/L)
Year

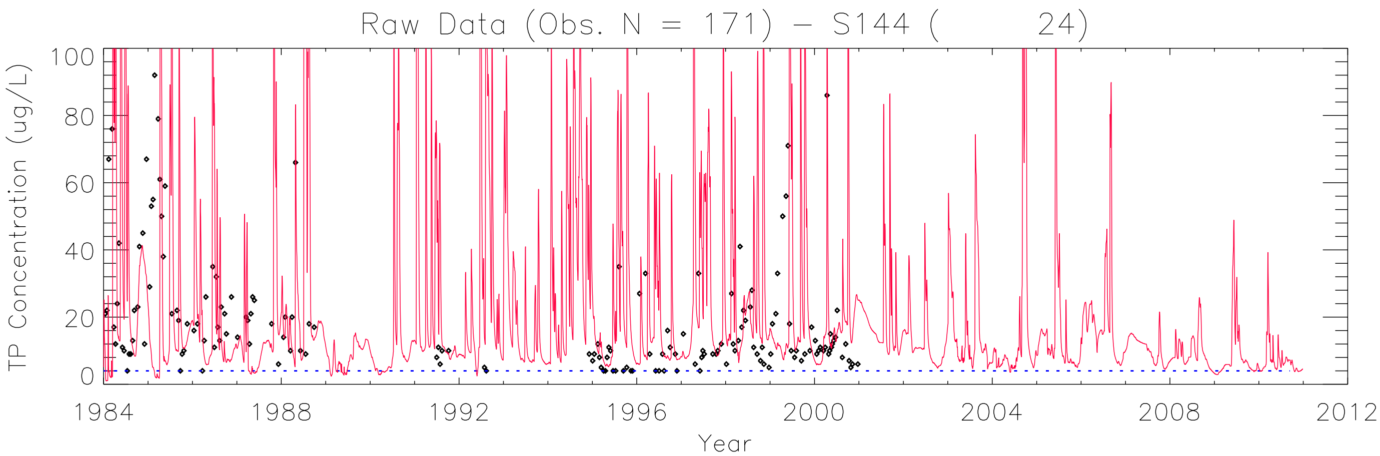

Mean: Season - 95% CI - E0 (21)
TP Concentration (ug/L)
Year


Mean: Water Year - 95% CI - E0 (21)
TP Concentration (ug/L)
Year

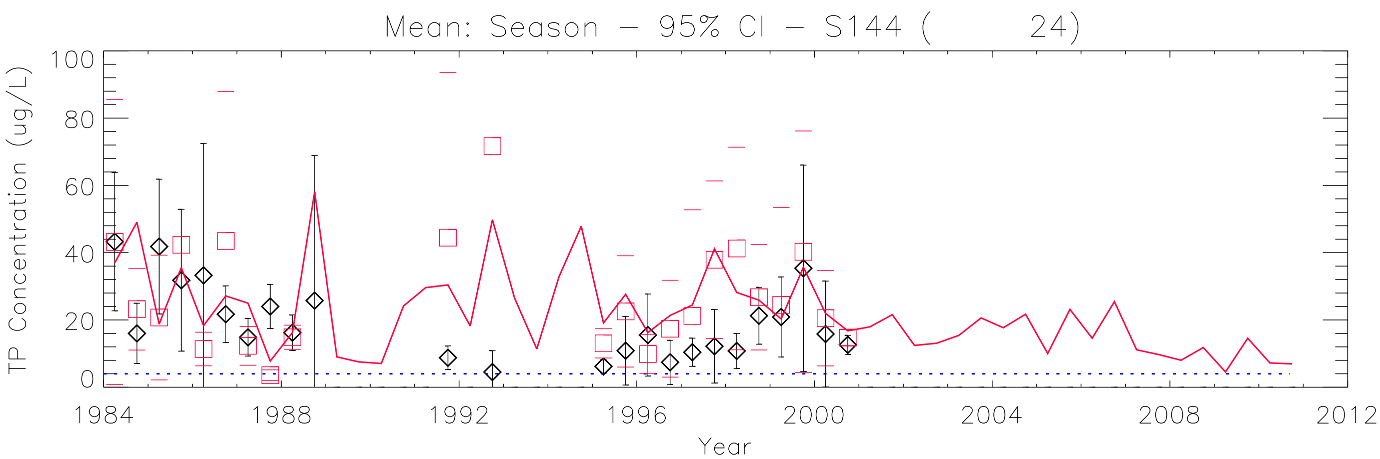

Cumulative Distribution: Raw Data - E0 (21)
Cumulative Distribution
TP Concentration (ug/L)



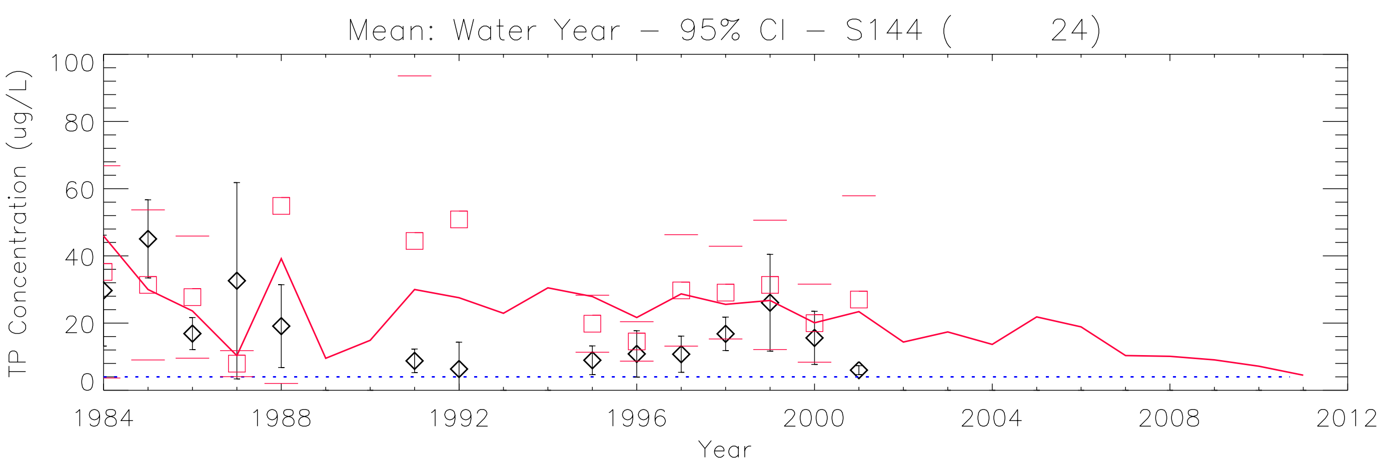
Raw Data (Obs. N = 151) – FO (21)
TP Concentration (ug/L)
Year
Mean: Season – 95% CI – FO (21)
TP Concentration (ug/L)
Year
Mean: Water Year – 95% CI – FO (21)
TP Concentration (ug/L)
Year
Cumulative Distribution: Raw Data – FO (21)
Cumulative Distribution
TP Concentration (ug/L)



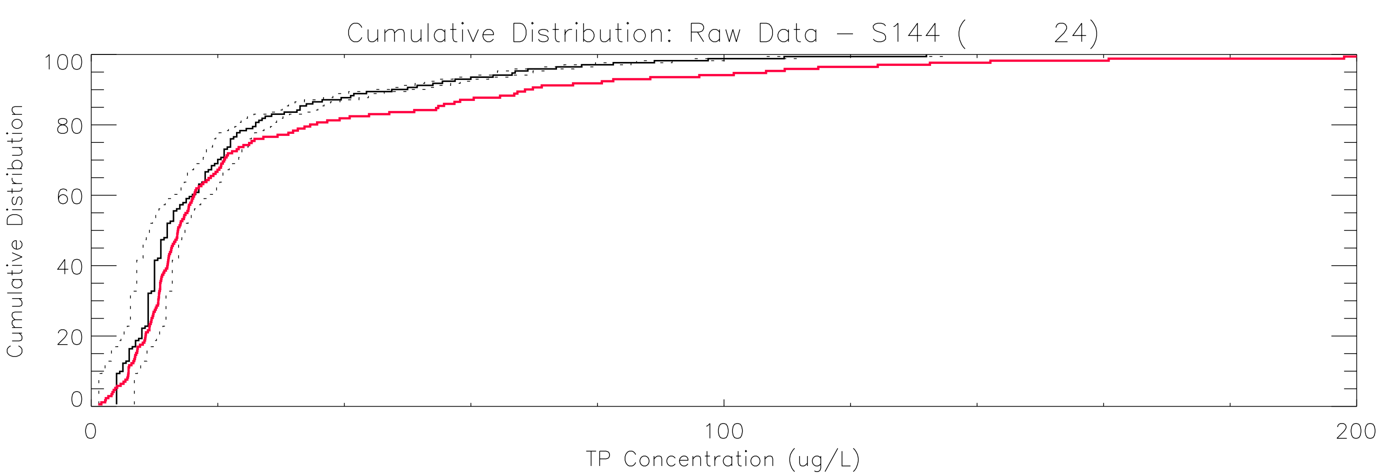
Raw Data (Obs. N = 171) – S144 (24)
TP Concentration (ug/L)
Year



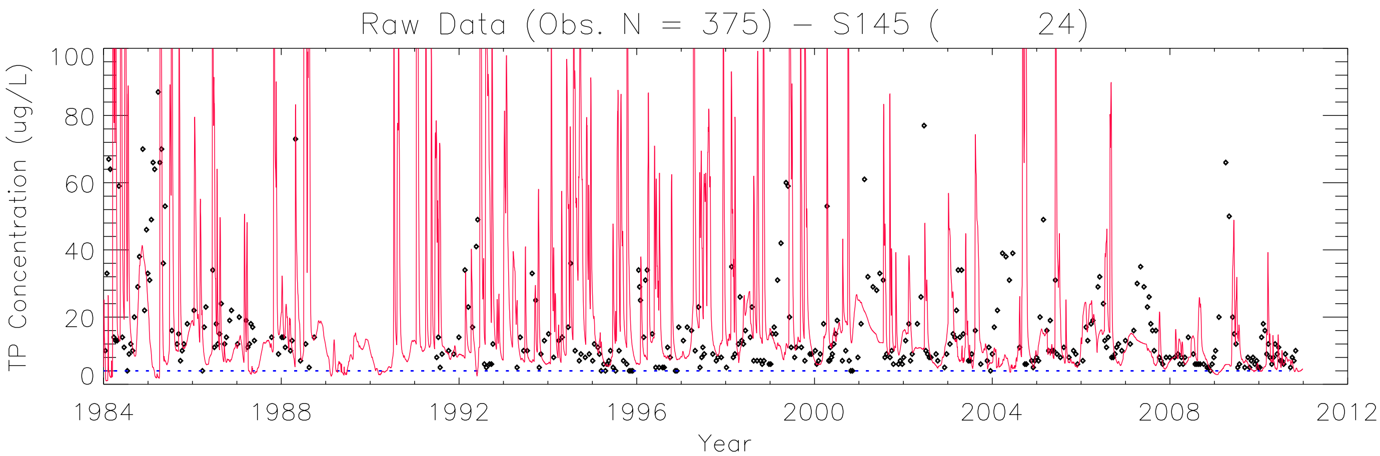
Mean: Season – 95% CI – S144 (24)
TP Concentration (ug/L)
Year



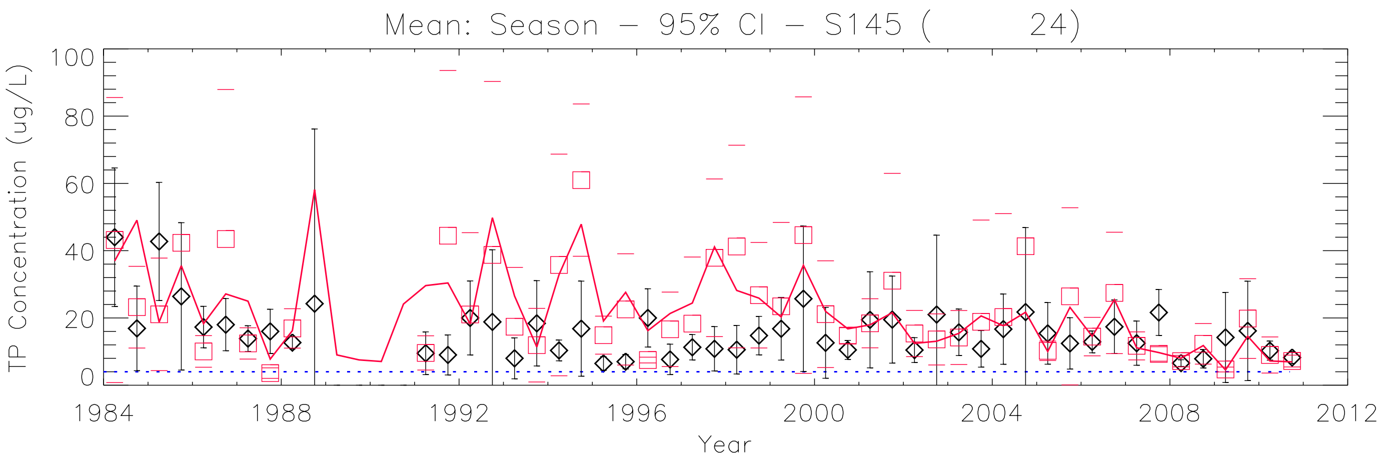
Mean: Water Year – 95% CI – S144 (24)
TP Concentration (ug/L)
Year



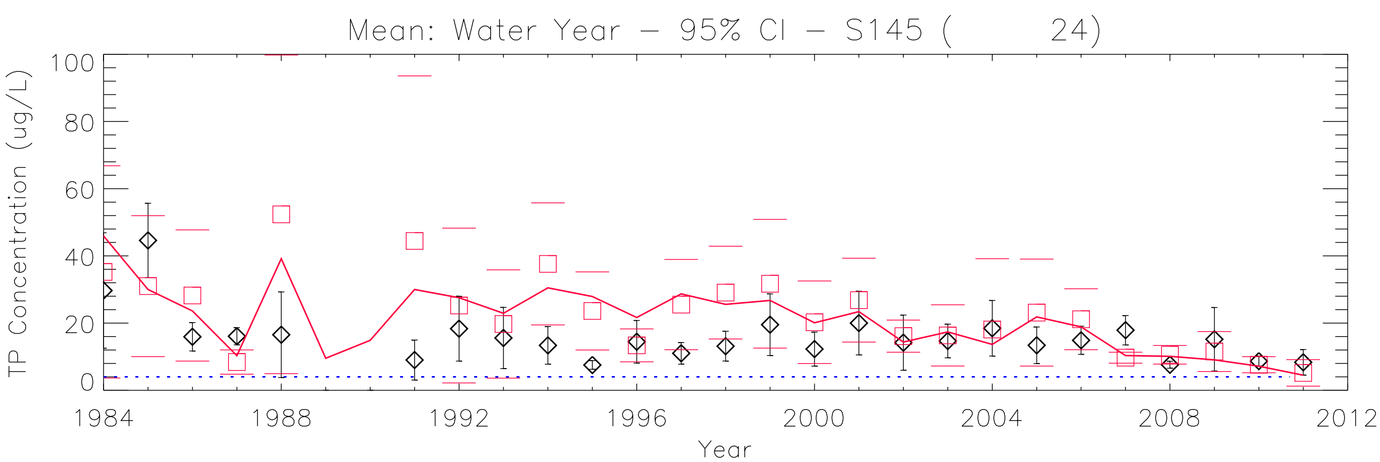
Cumulative Distribution: Raw Data – S144 (24)
Cumulative Distribution
TP Concentration (ug/L)



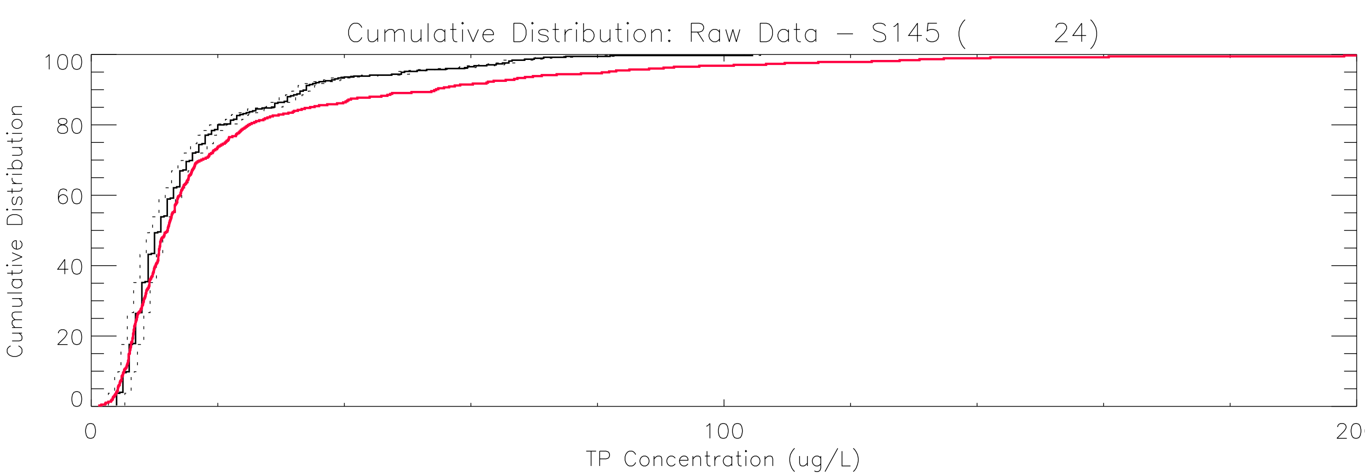
Raw Data (Obs. N = 375) – S145 (24)
TP Concentration (ug/L)
Year



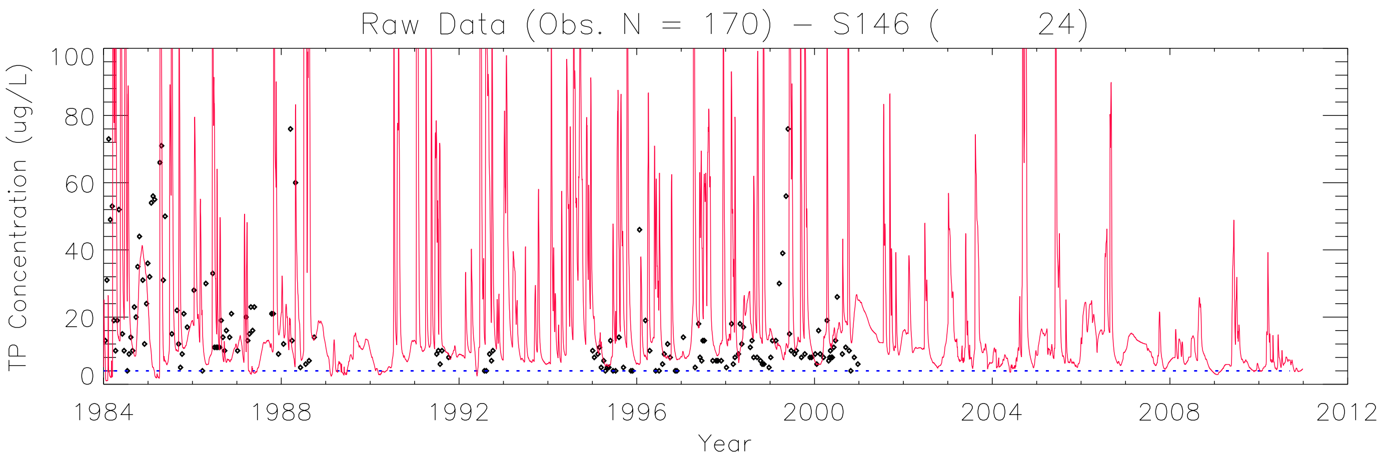
Mean: Season – 95% CI – S145 (24)
TP Concentration (ug/L)
Year

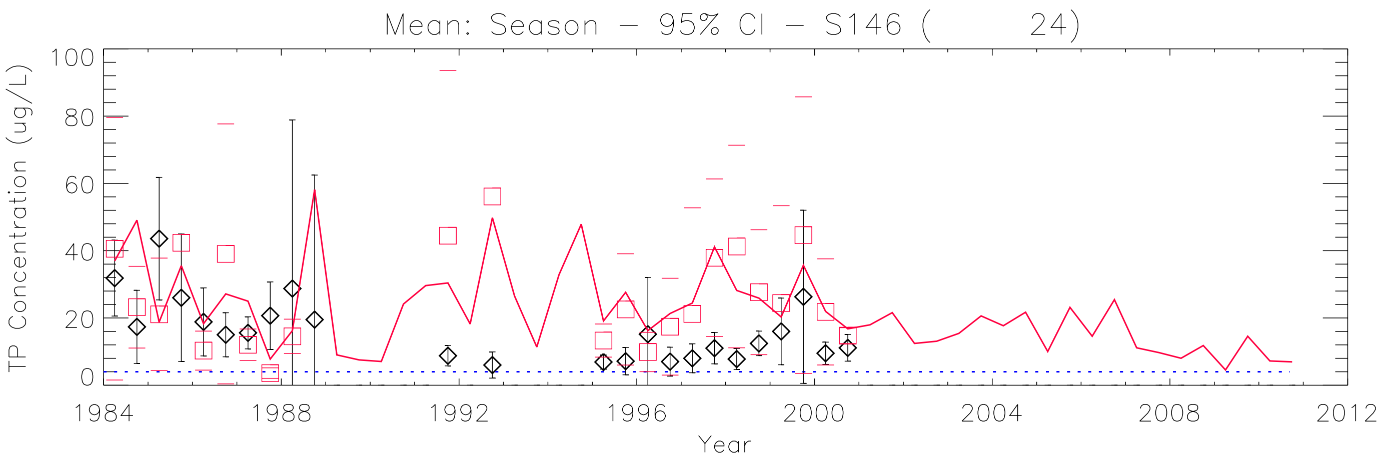


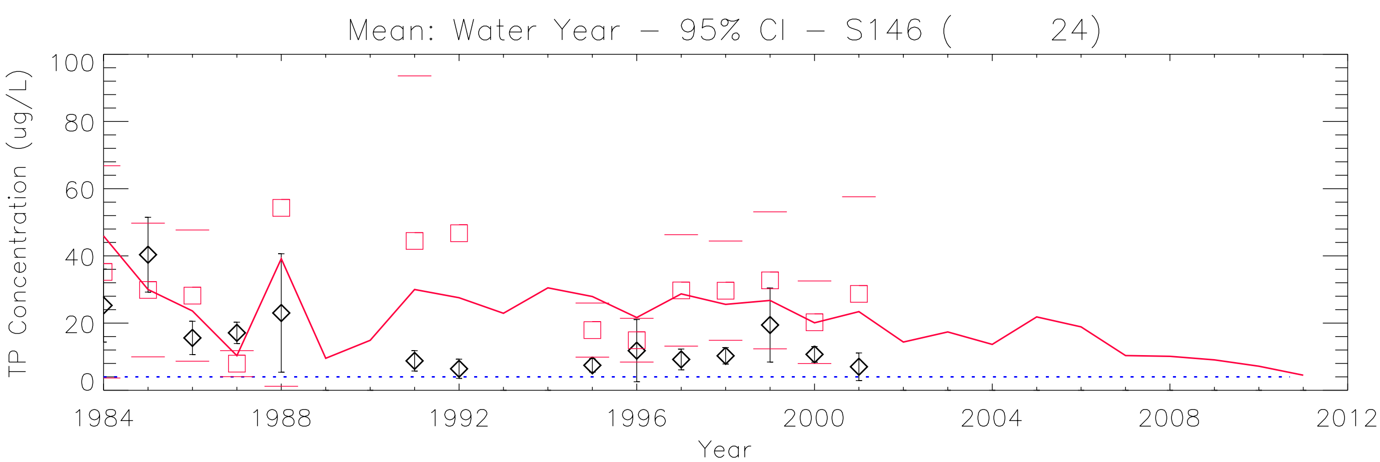
Mean: Water Year – 95% CI – S145 (24)
TP Concentration (ug/L)
Year

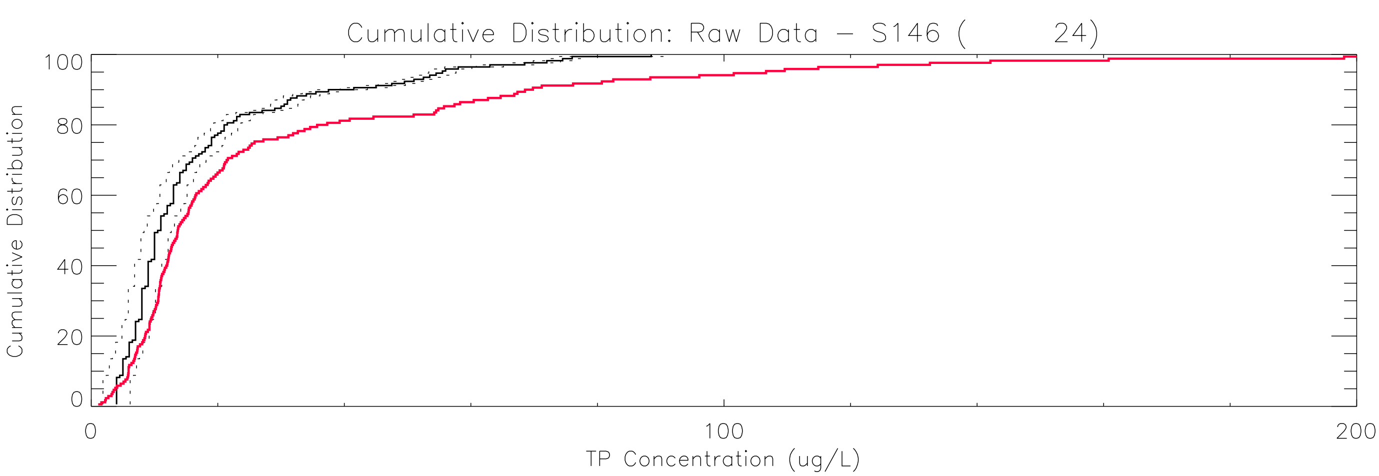


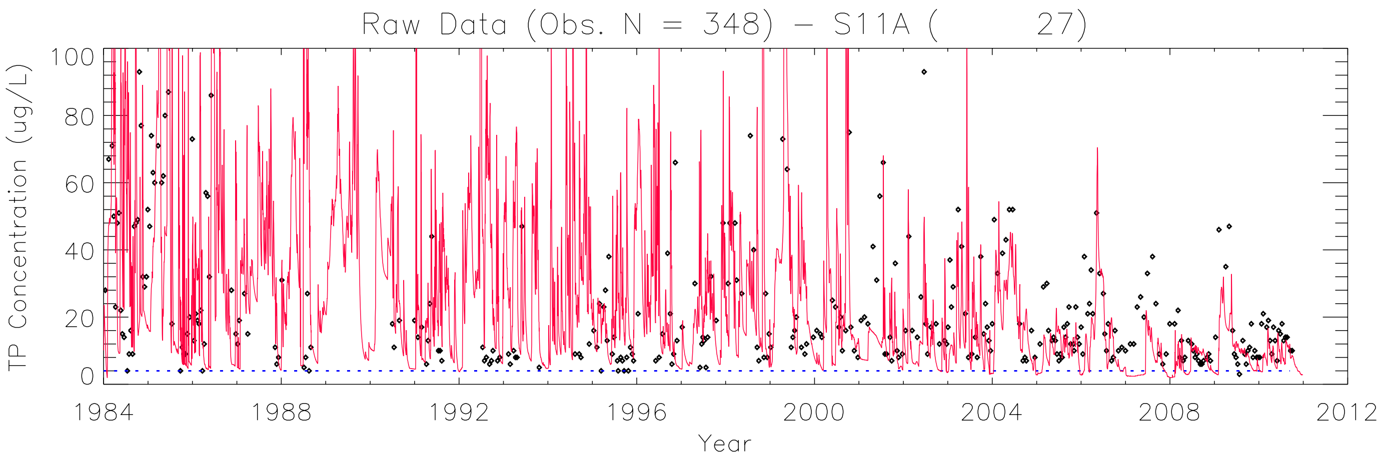
Cumulative Distribution: Raw Data – S145 (24)
Cumulative Distribution
TP Concentration (ug/L)

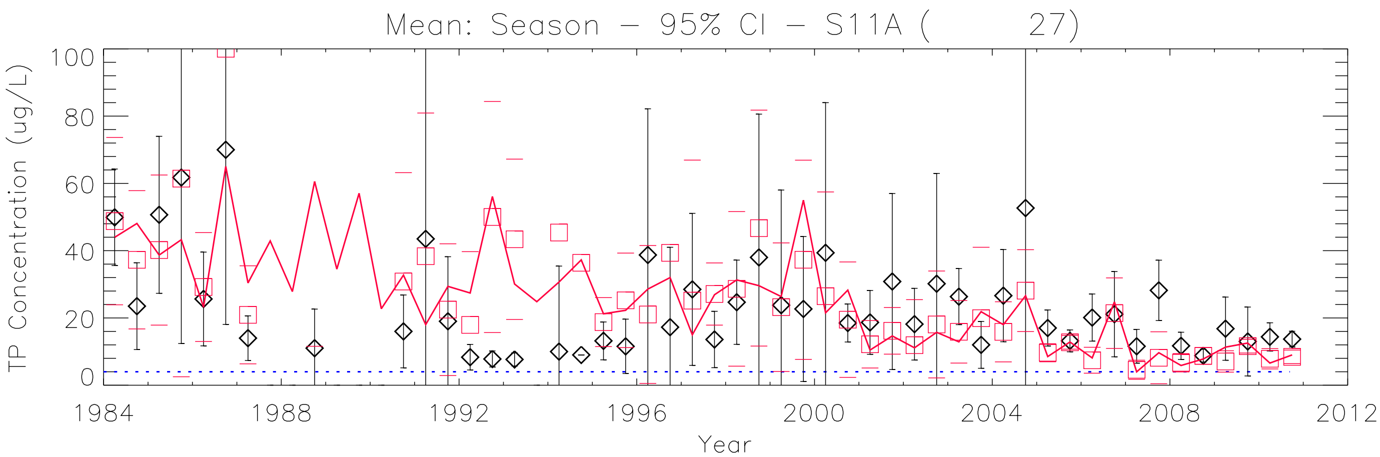

Raw Data (Obs. N = 170) - S146 (24)
TP Concentration (ug/L)
Year

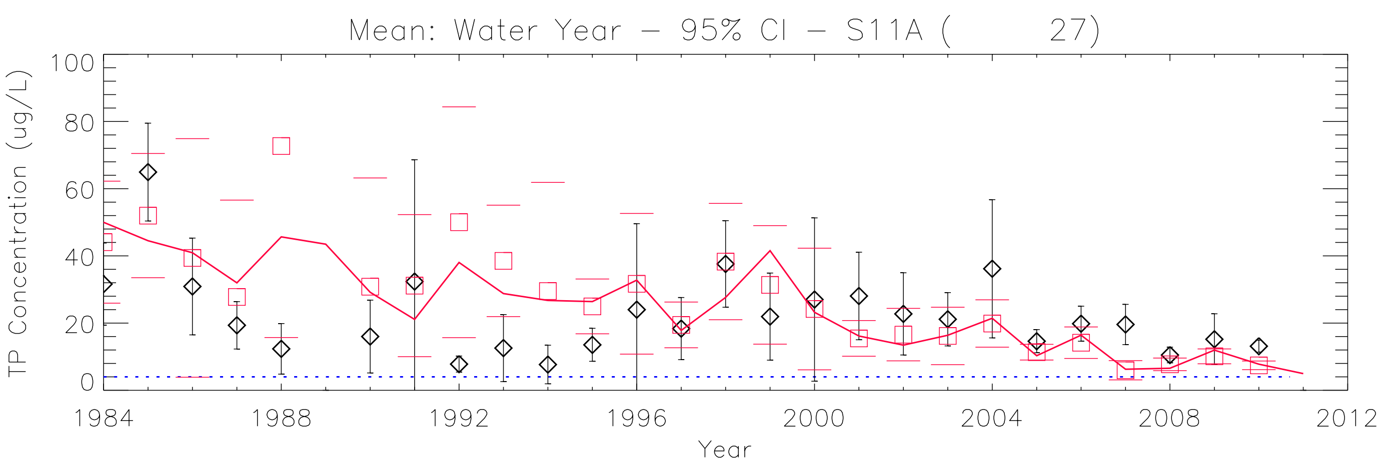

Mean: Season - 95% CI - S146 (24)
TP Concentration (ug/L)
Year

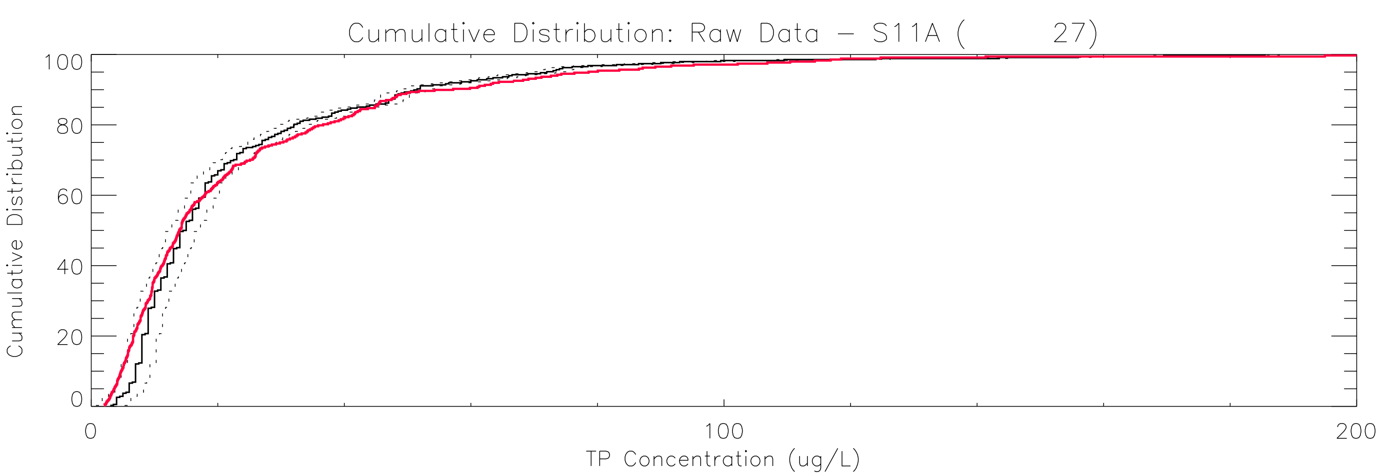

Mean: Water Year - 95% CI - S146 (24)
TP Concentration (ug/L)
Year

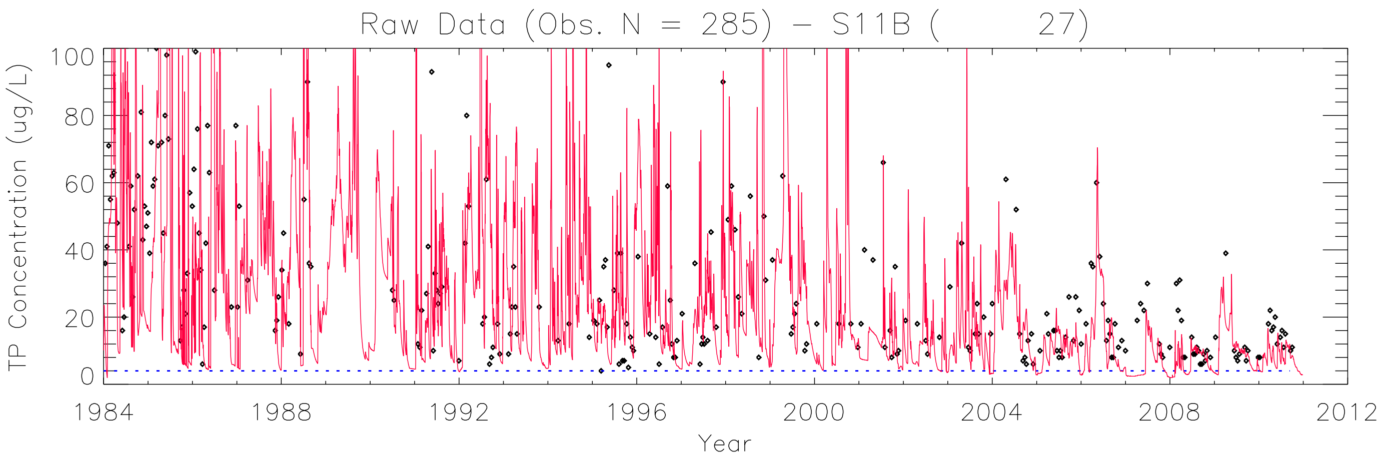

Cumulative Distribution: Raw Data - S146 (24)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 348) – S11A (27)
TP Concentration (ug/L)
Year

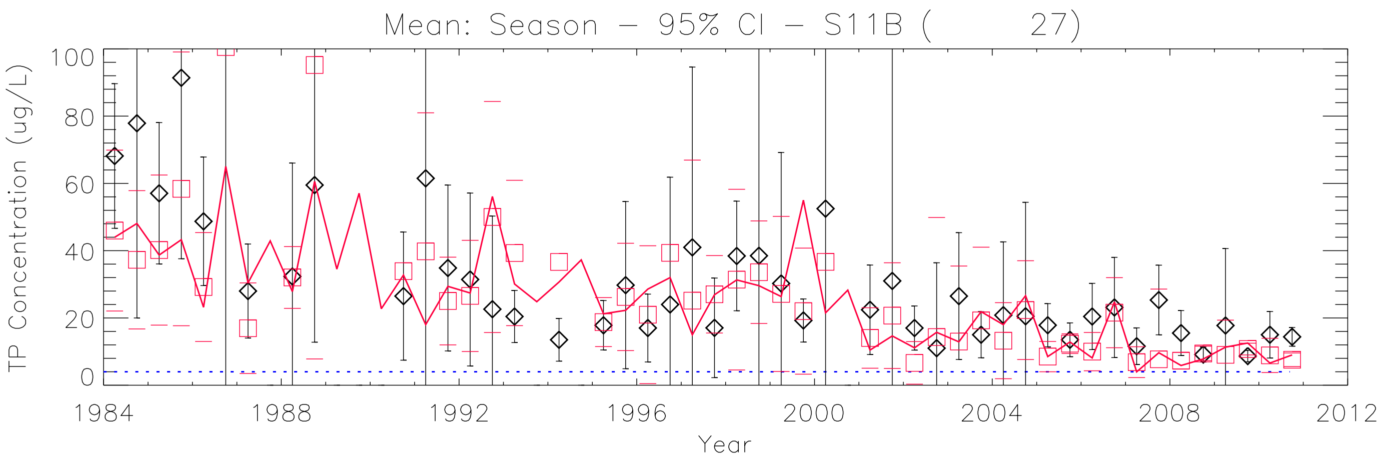

Mean: Season – 95% CI – S11A (27)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – S11A (27)
TP Concentration (ug/L)
Year

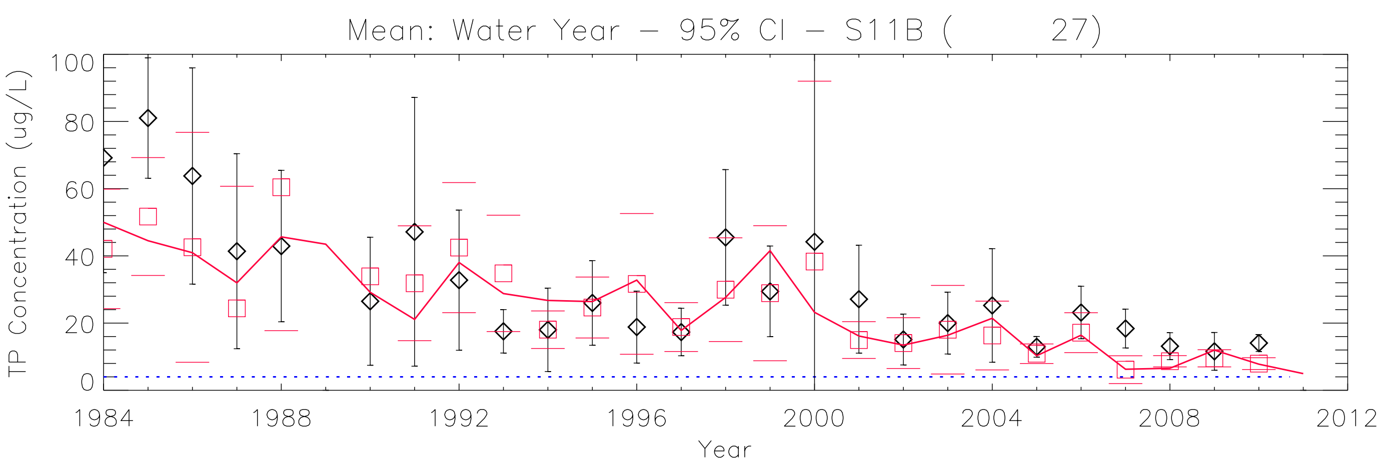

Cumulative Distribution: Raw Data – S11A (27)
Cumulative Distribution
TP Concentration (ug/L)



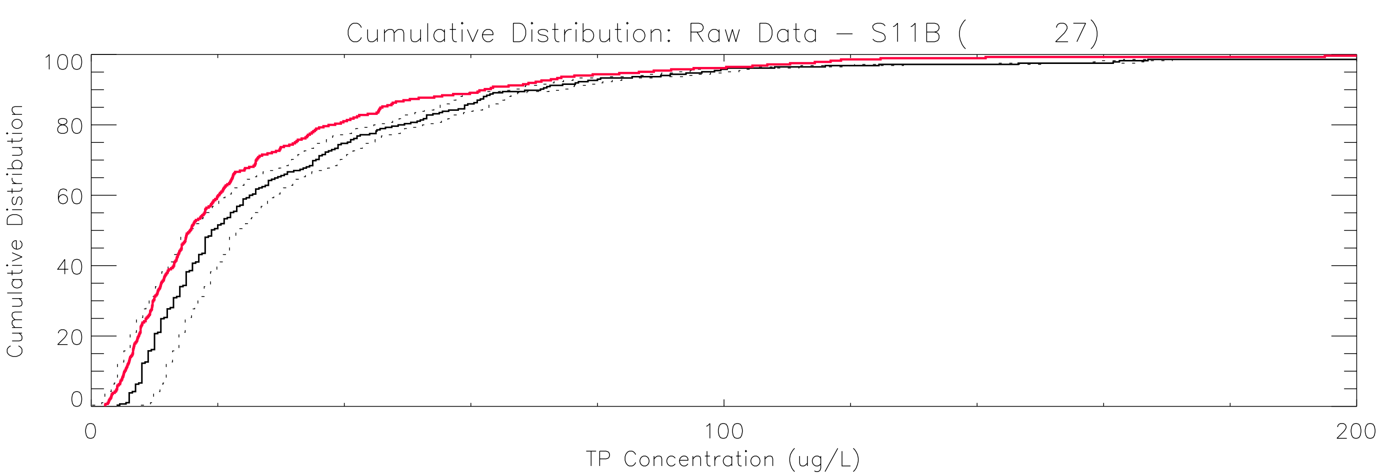
Raw Data (Obs. N = 285) – S11B (27)
TP Concentration (ug/L)
Year



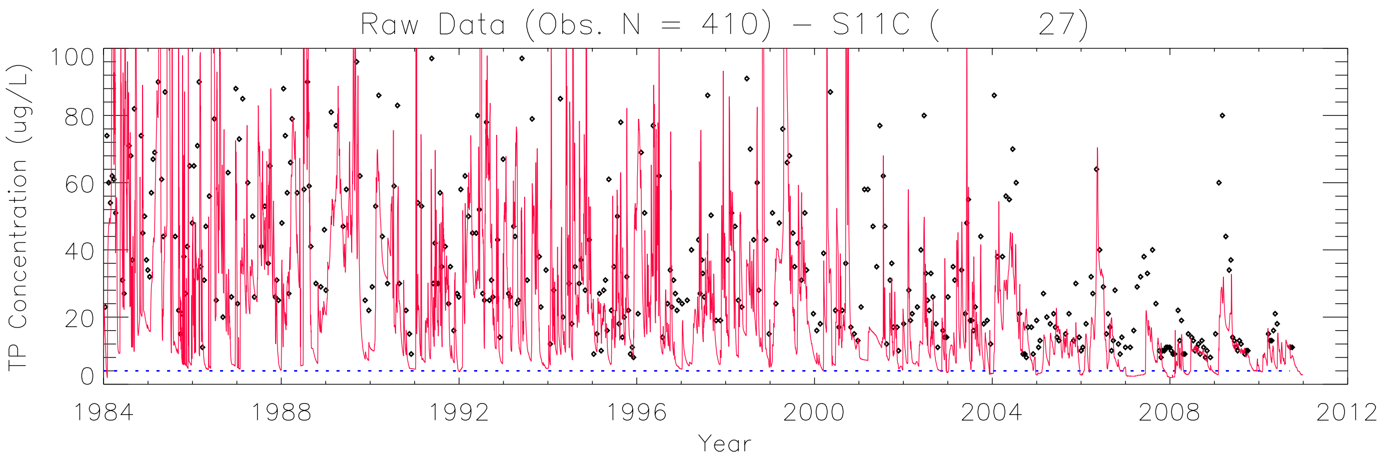
Mean: Season – 95% CI – S11B (27)
TP Concentration (ug/L)
Year

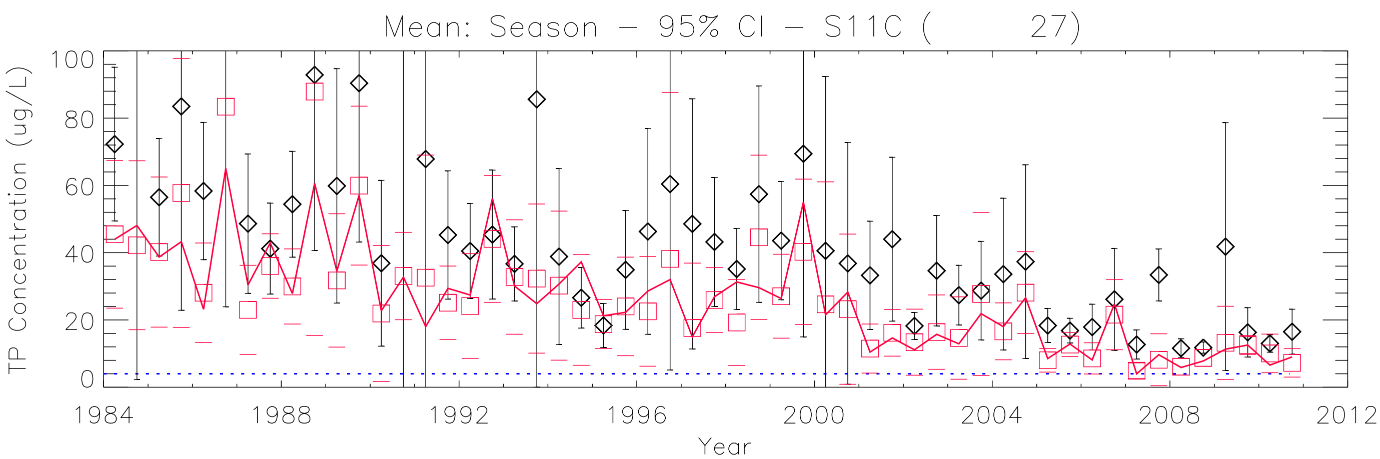


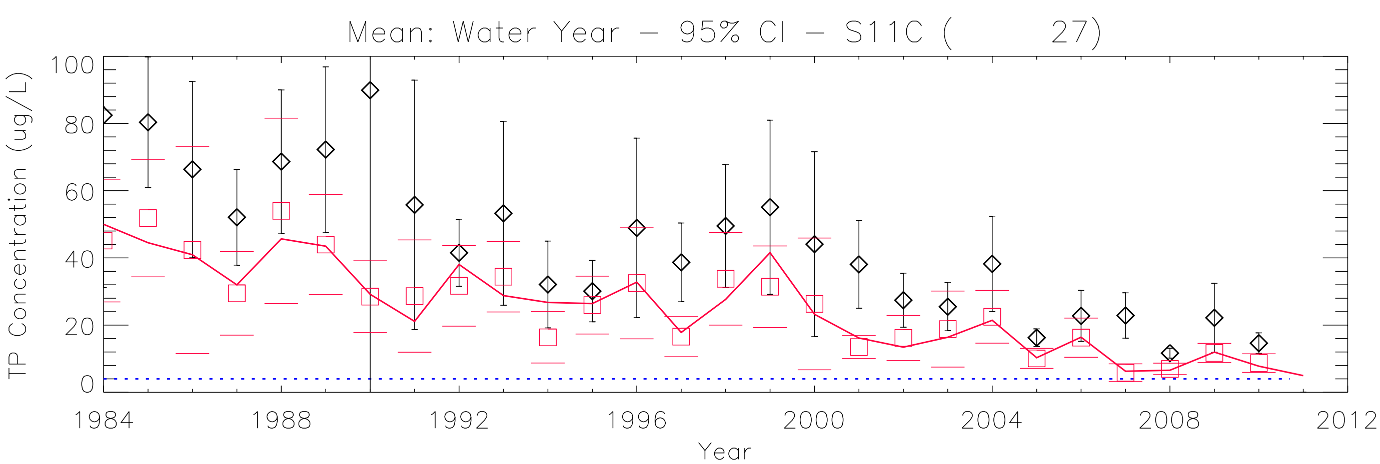
Mean: Water Year – 95% CI – S11B (27)
TP Concentration (ug/L)
Year

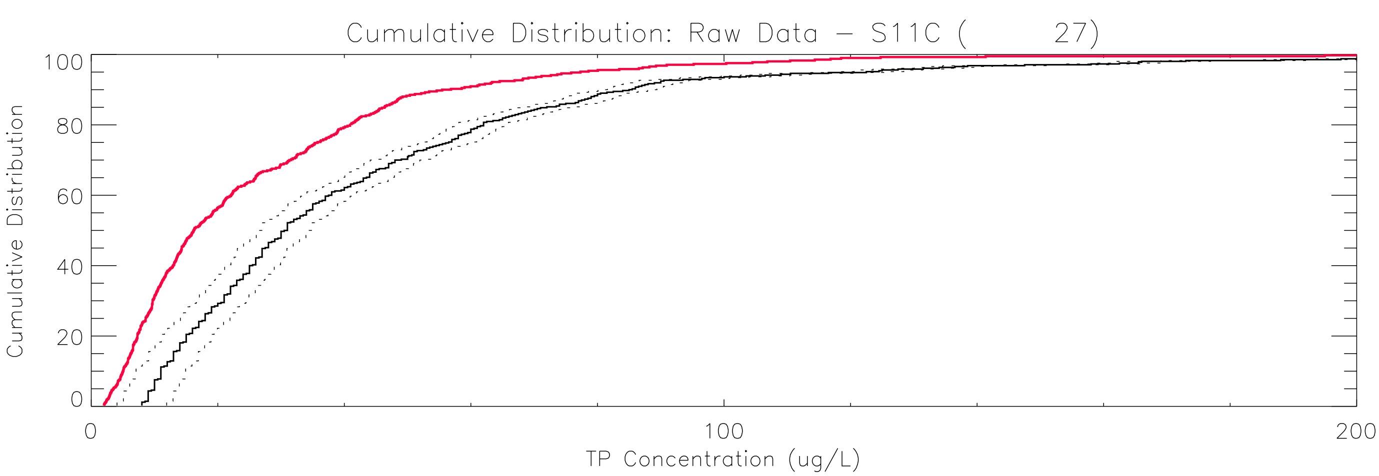


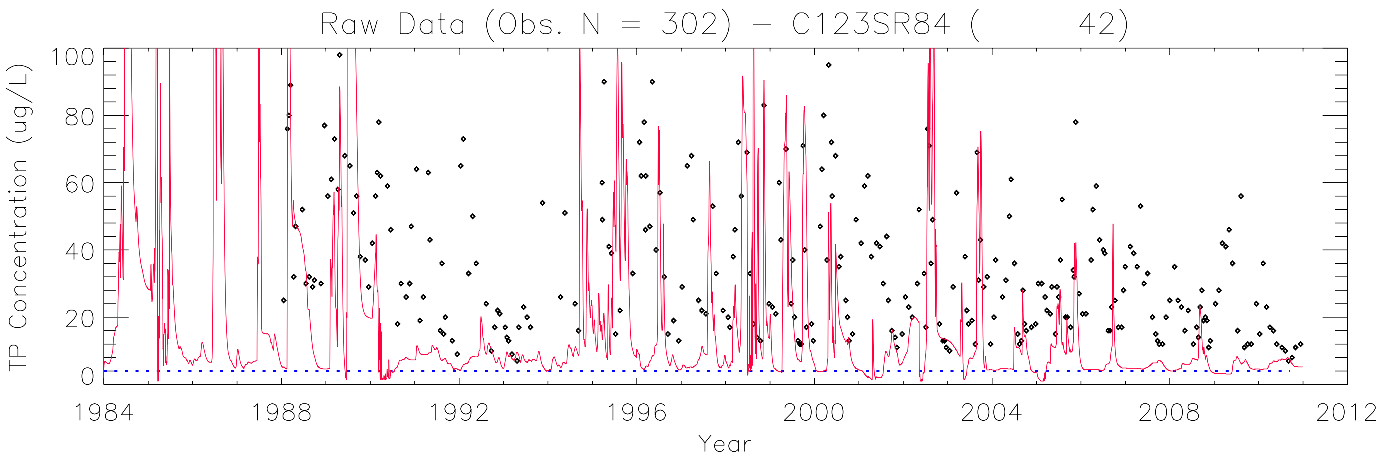
Cumulative Distribution: Raw Data – S11B (27)
Cumulative Distribution
TP Concentration (ug/L)

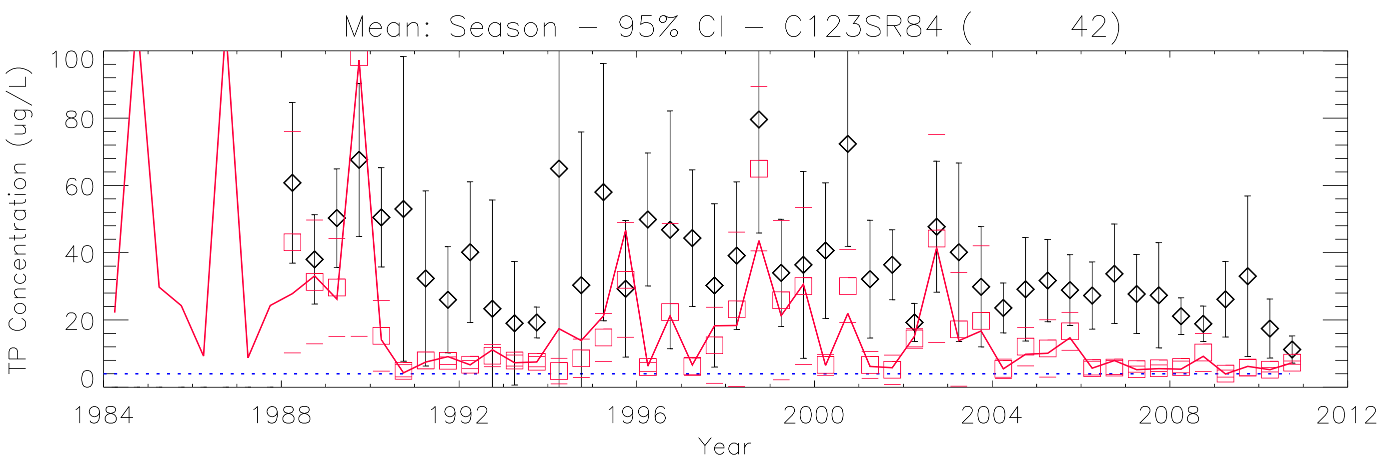

Raw Data (Obs. N = 410) – S11C (27)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

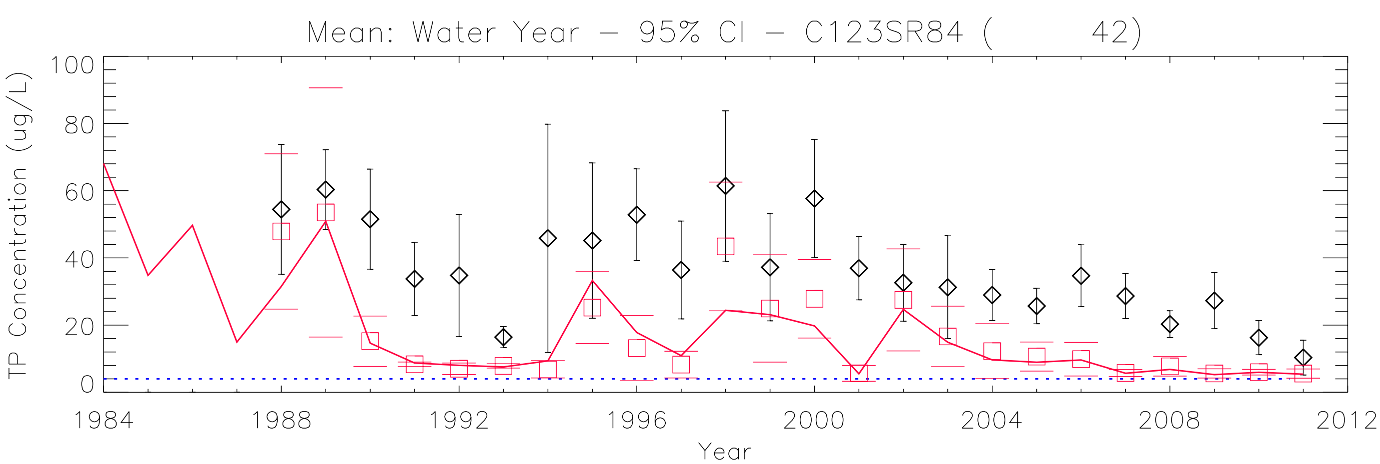

Mean: Season – 95% CI – S11C (27)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

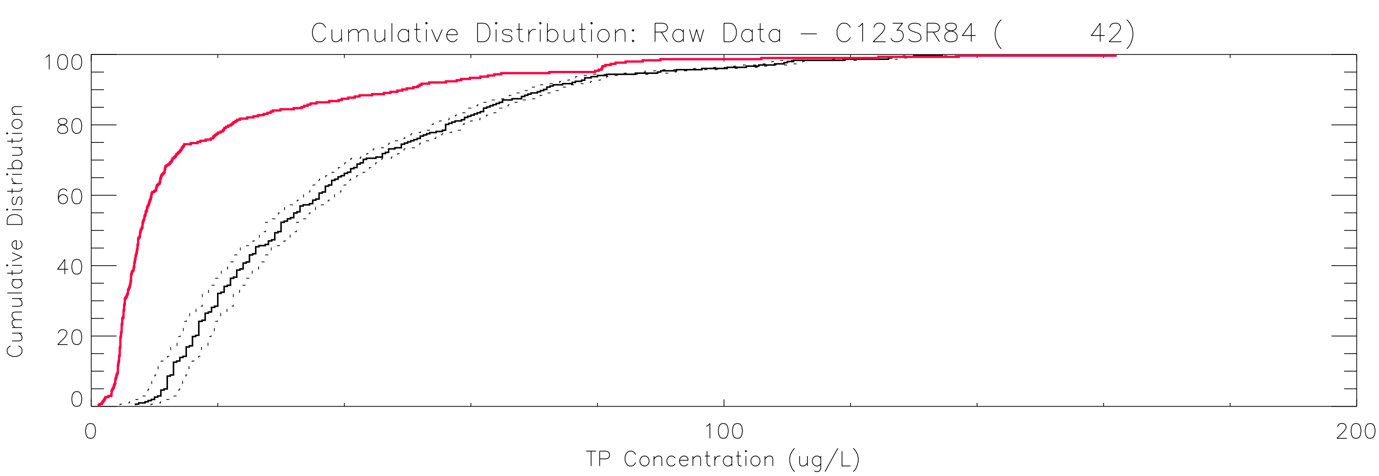

Mean: Water Year – 95% CI – S11C (27)
TP Concentration (ug/L)
Year
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012

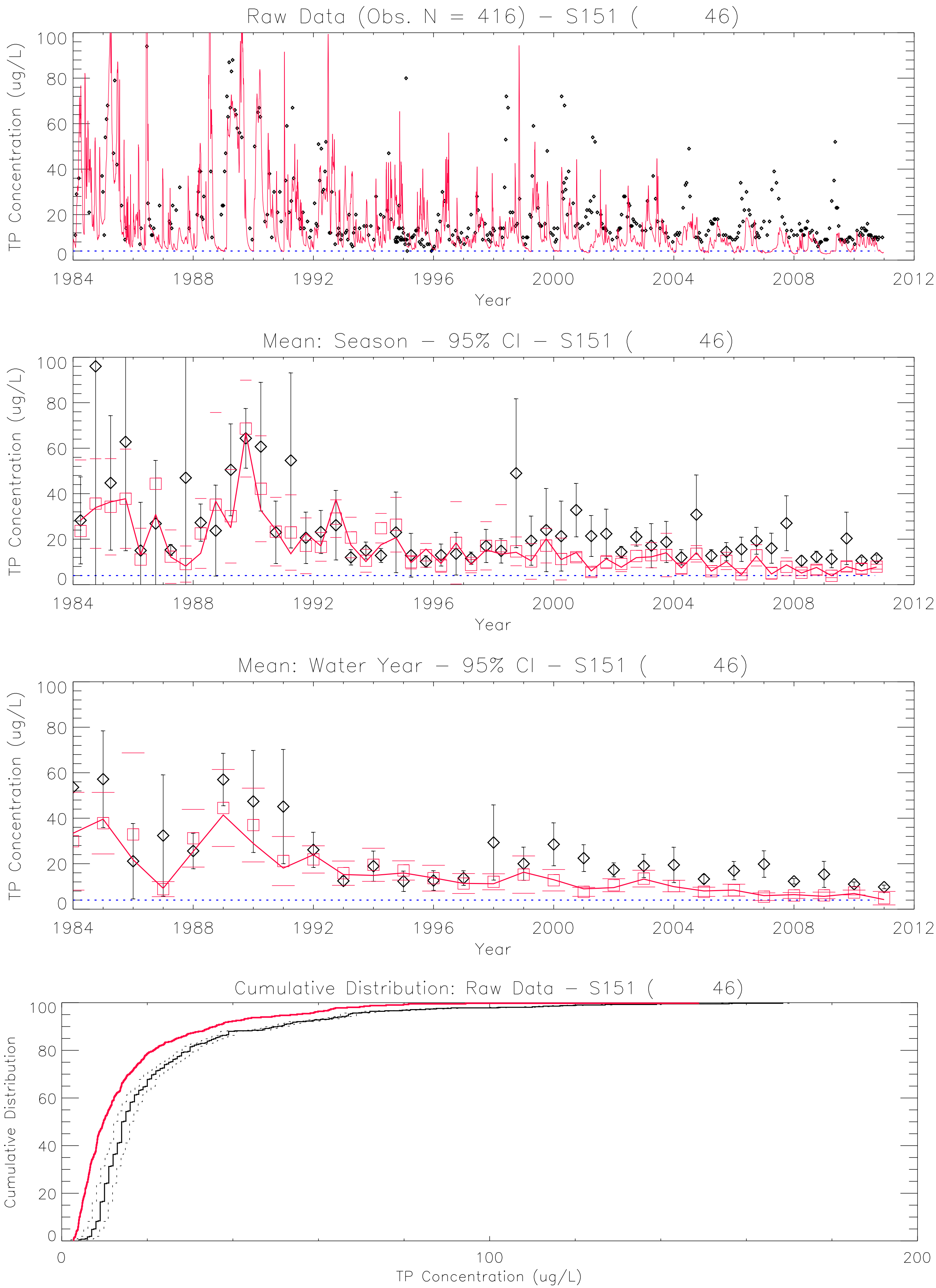

Cumulative Distribution: Raw Data – S11C (27)
Cumulative Distribution
TP Concentration (ug/L)
0
20
40
60
80
100
0
100
200

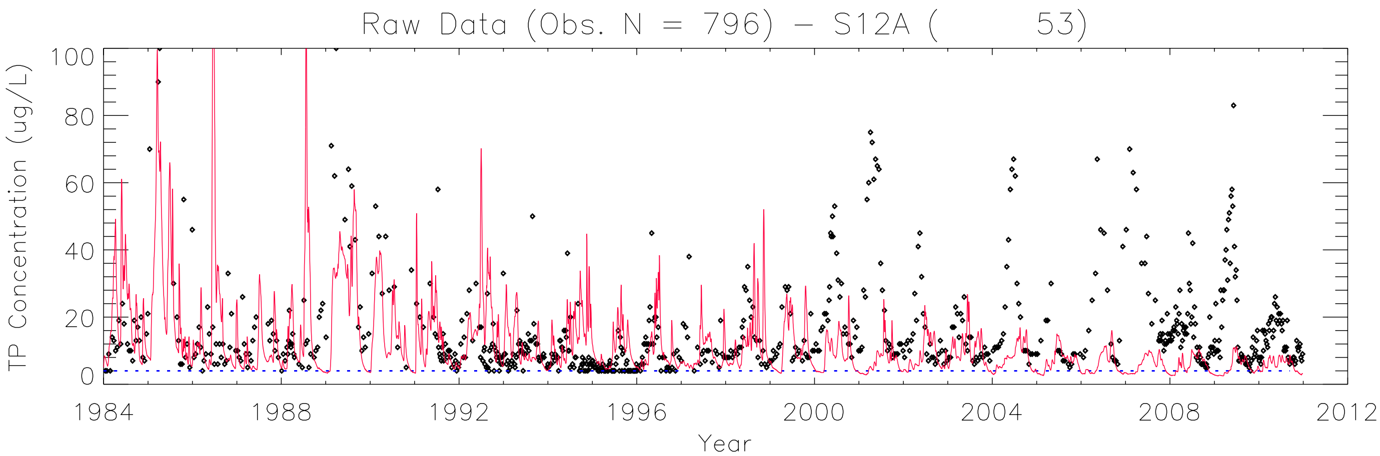

Raw Data (Obs. N = 302) – C123SR84 (42)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

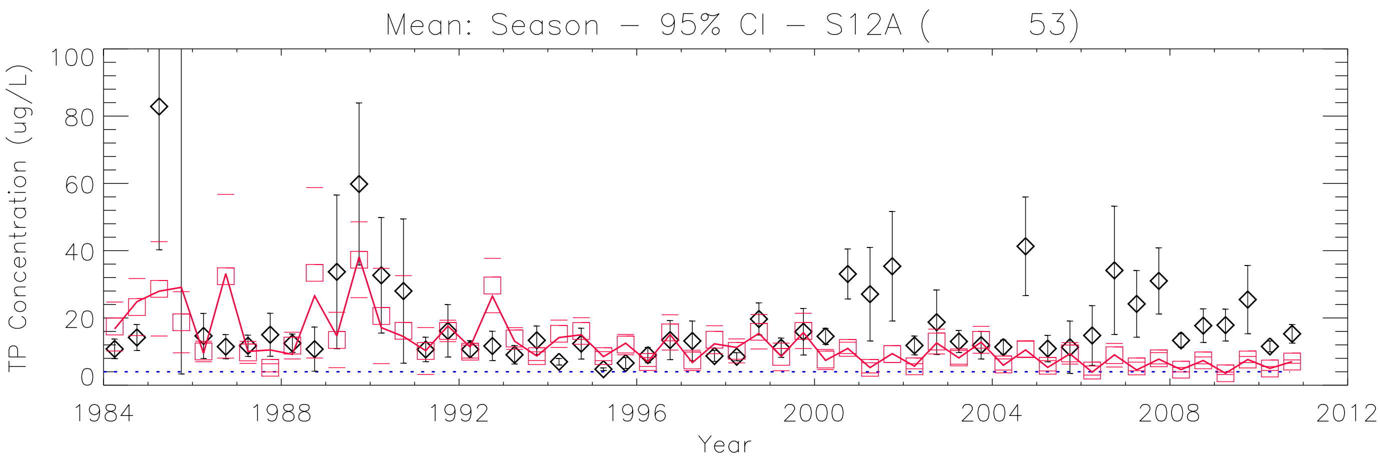

Mean: Season – 95% CI – C123SR84 (42)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

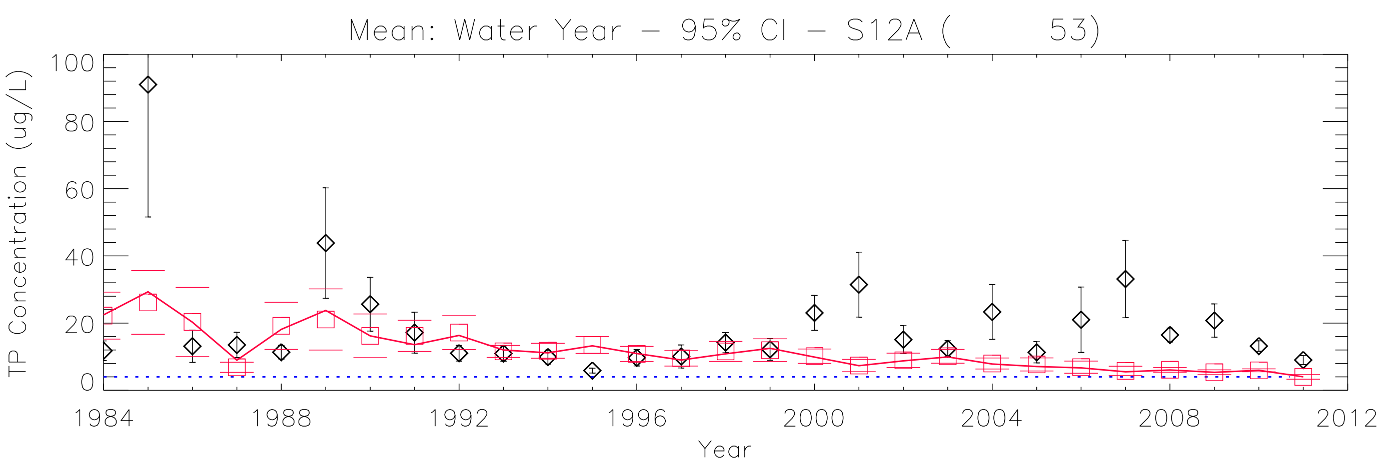

Mean: Water Year – 95% CI – C123SR84 (42)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

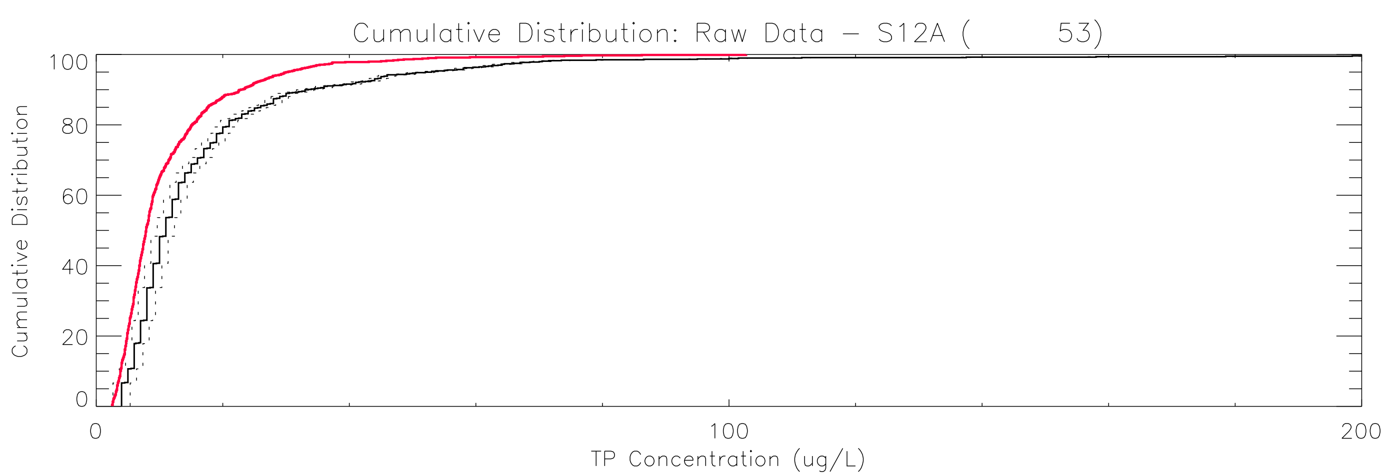

Cumulative Distribution: Raw Data – C123SR84 (42)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

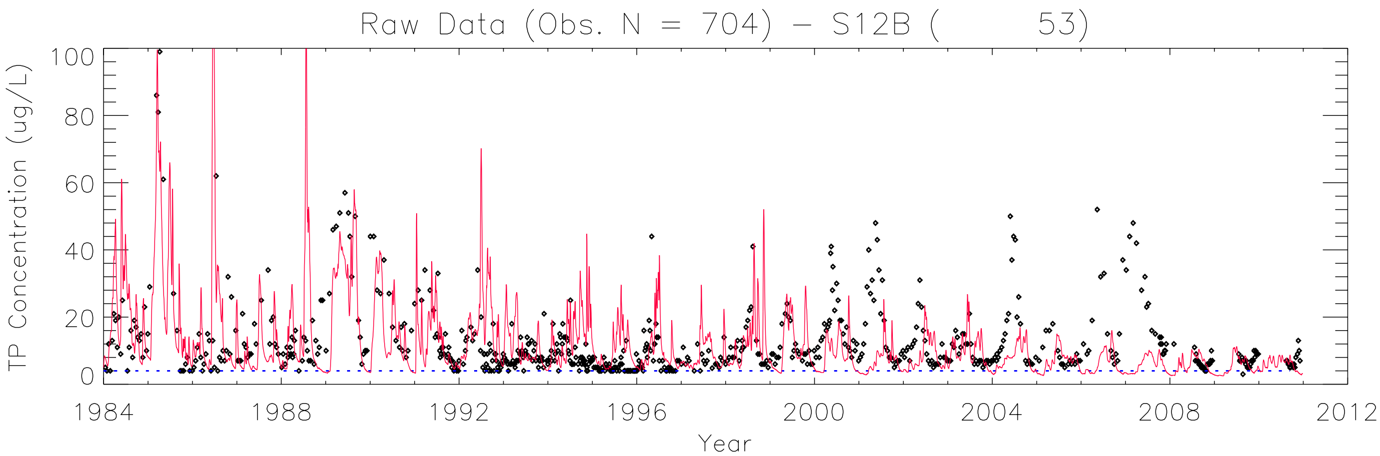

Raw Data (Obs. N = 416) – S151 (46)
TP Concentration (ug/L)
Year
Mean: Season – 95% CI – S151 (46)
TP Concentration (ug/L)
Year
Mean: Water Year – 95% CI – S151 (46)
TP Concentration (ug/L)
Year
Cumulative Distribution: Raw Data – S151 (46)
Cumulative Distribution
TP Concentration (ug/L)

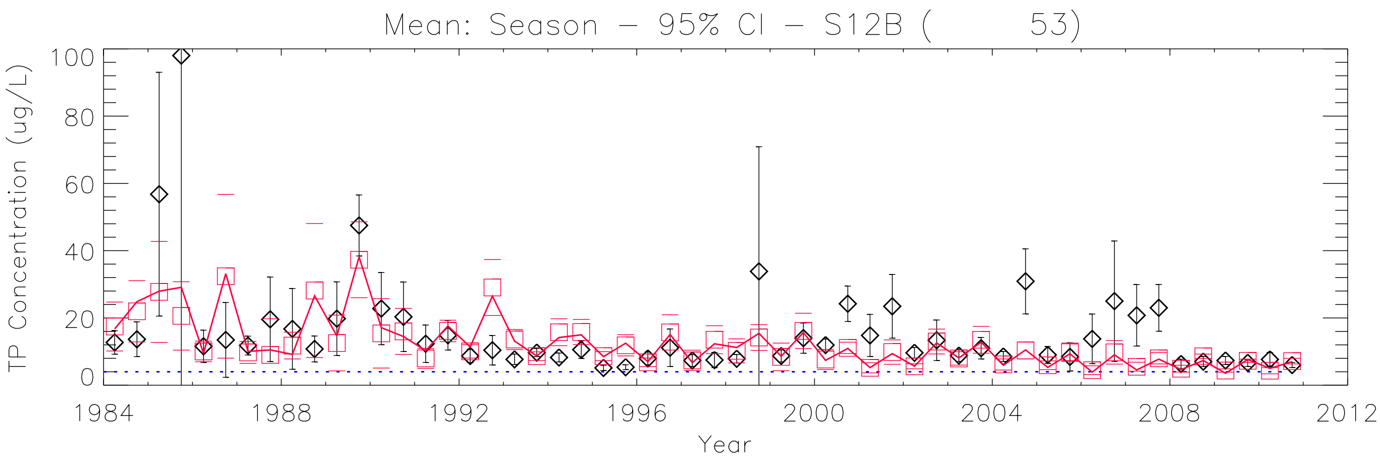

Raw Data (Obs. N = 796) – S12A (53)
TP Concentration (ug/L)
Year

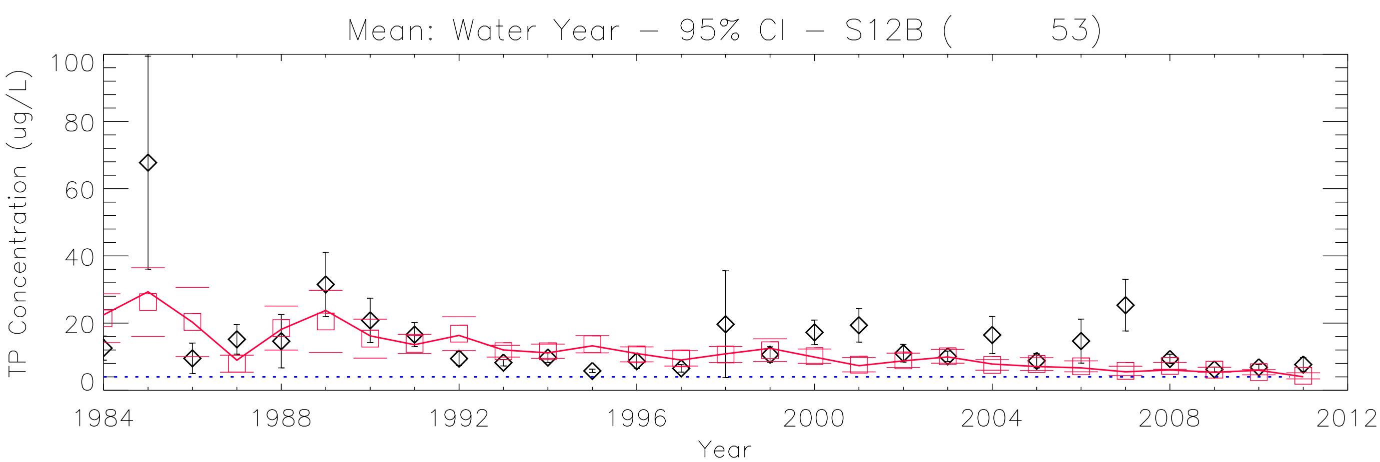

Mean: Season – 95% CI – S12A (53)
TP Concentration (ug/L)
Year

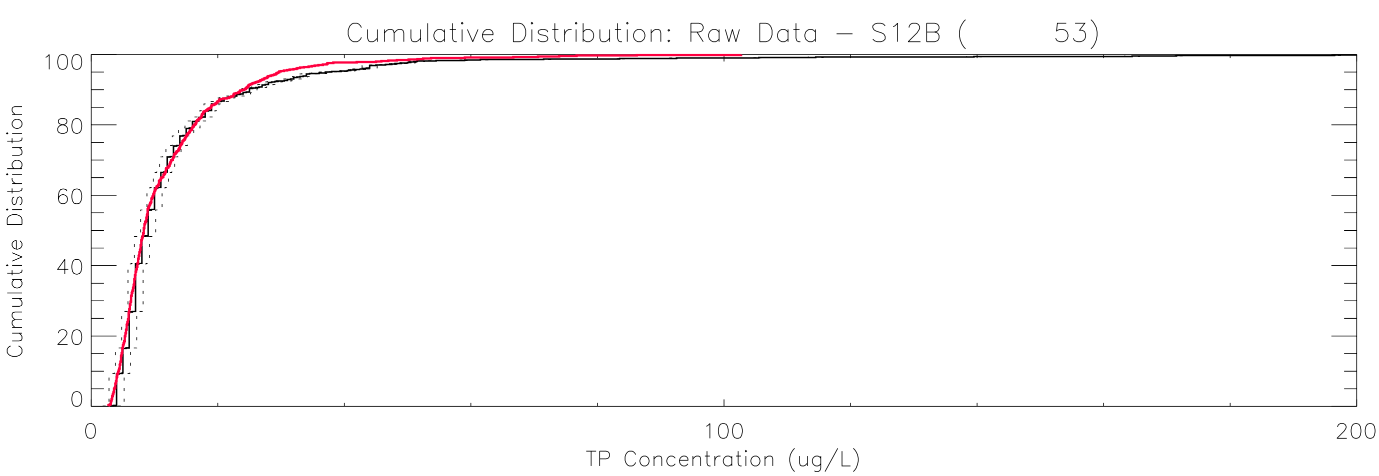

Mean: Water Year – 95% CI – S12A (53)
TP Concentration (ug/L)
Year

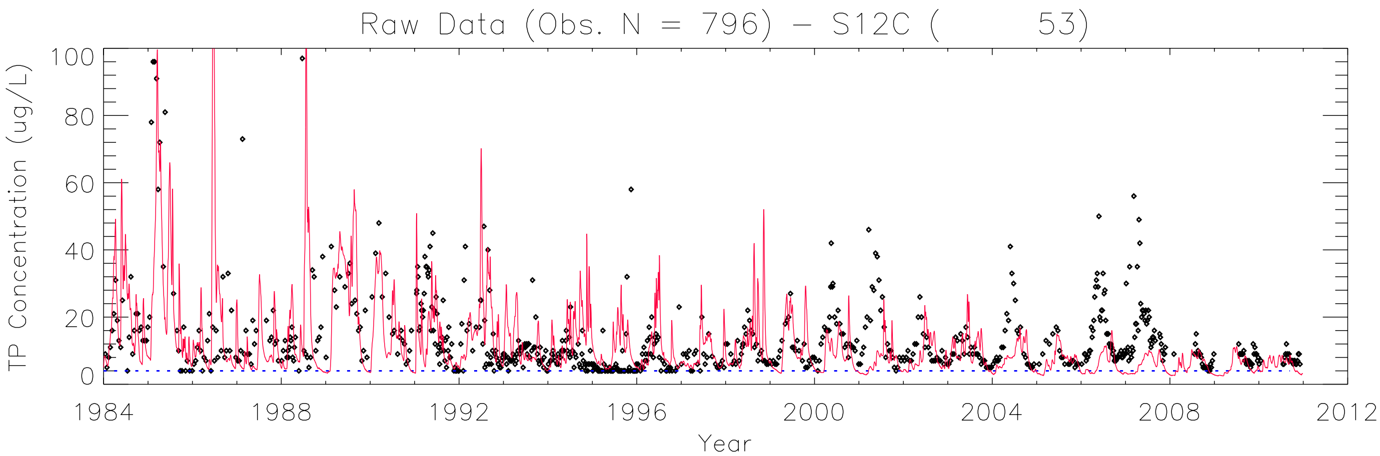

Cumulative Distribution: Raw Data – S12A (53)
Cumulative Distribution
TP Concentration (ug/L)

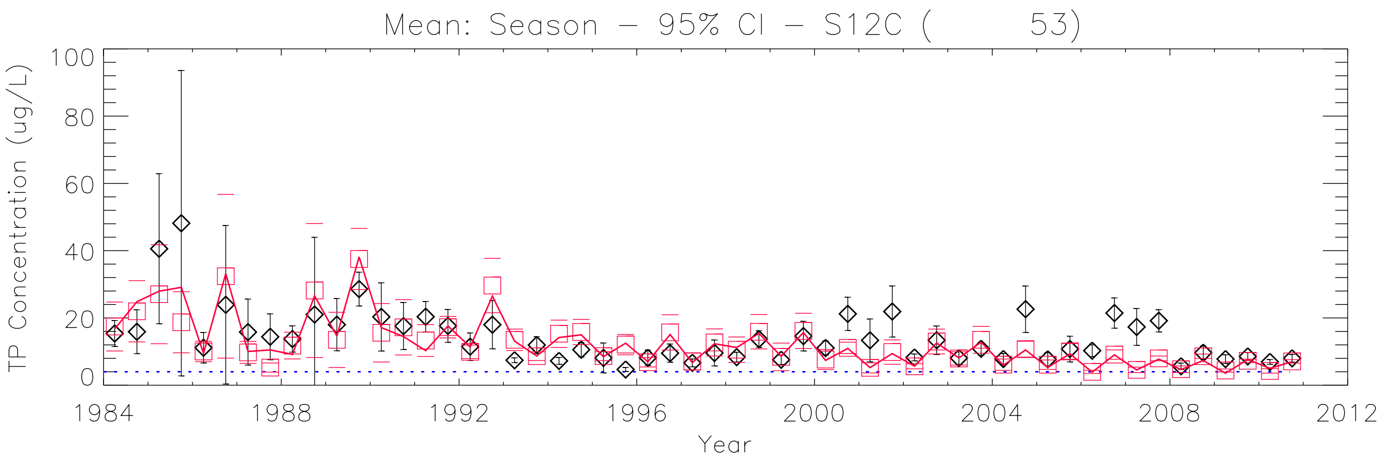

Raw Data (Obs. N = 704) – S12B (53)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

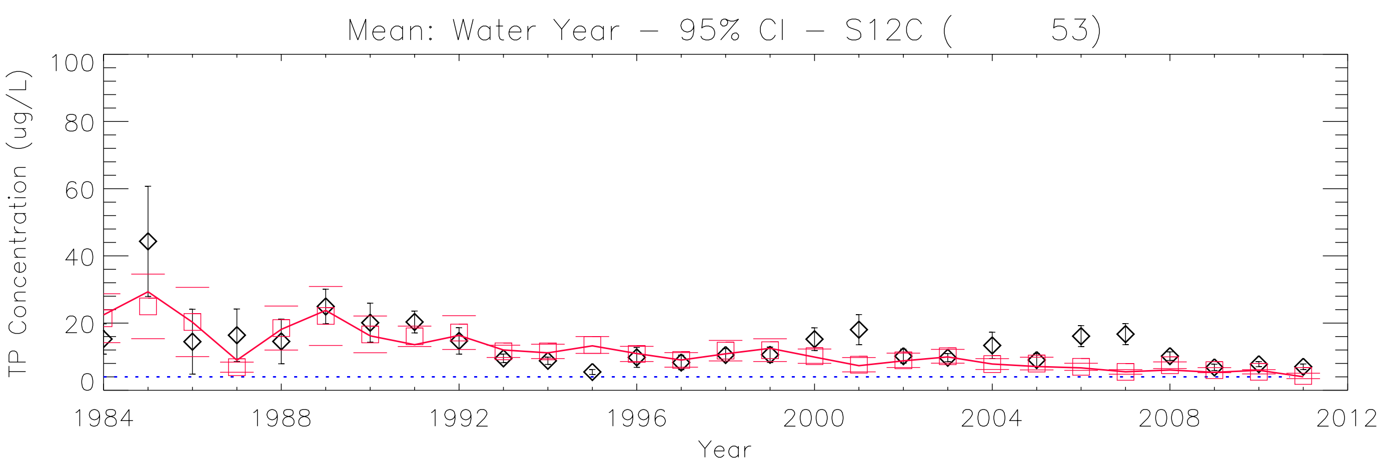

Mean: Season – 95% CI – S12B (53)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

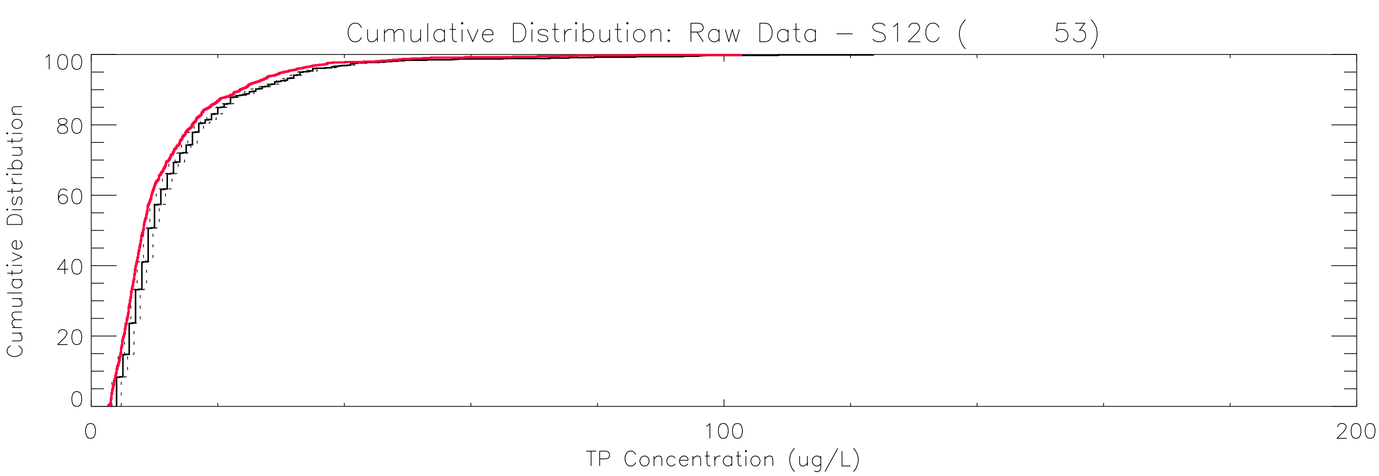

Mean: Water Year – 95% CI – S12B (53)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

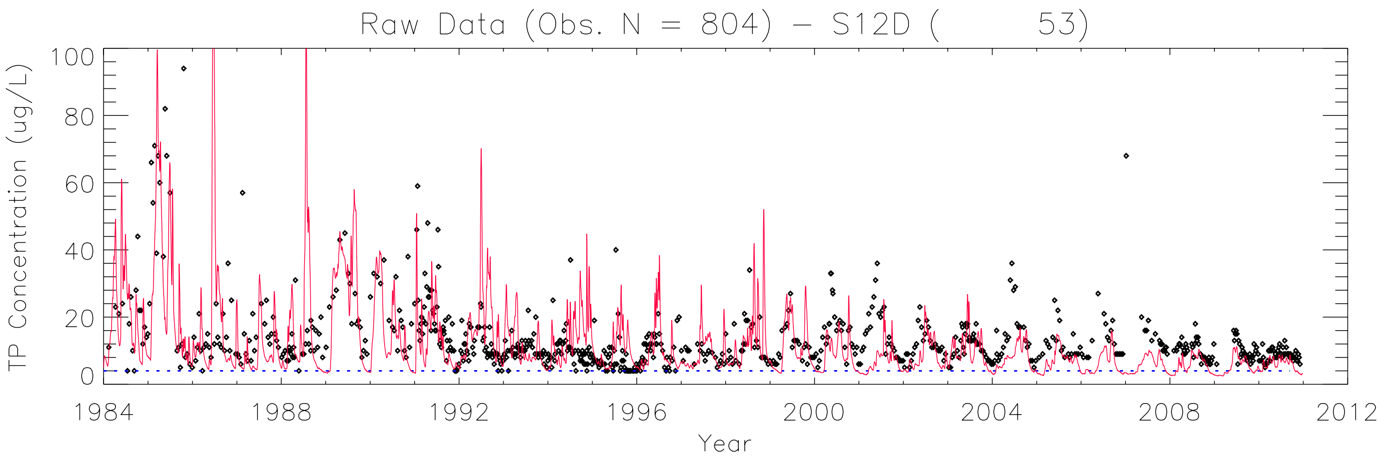

Cumulative Distribution: Raw Data – S12B (53)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)

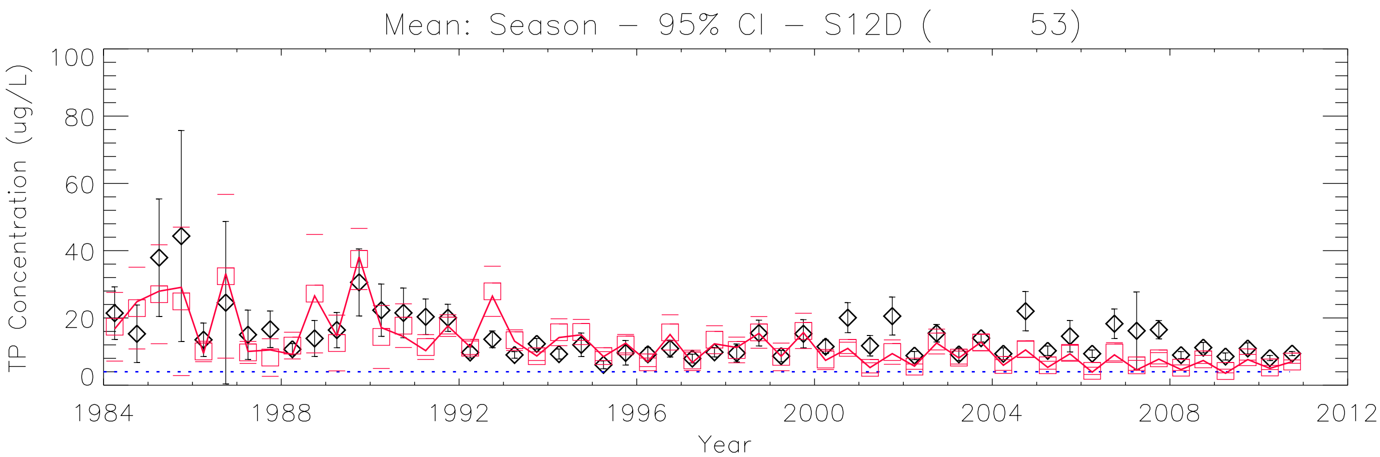

Raw Data (Obs. N = 796) - S12C (53)
TP Concentration (ug/L)
Year

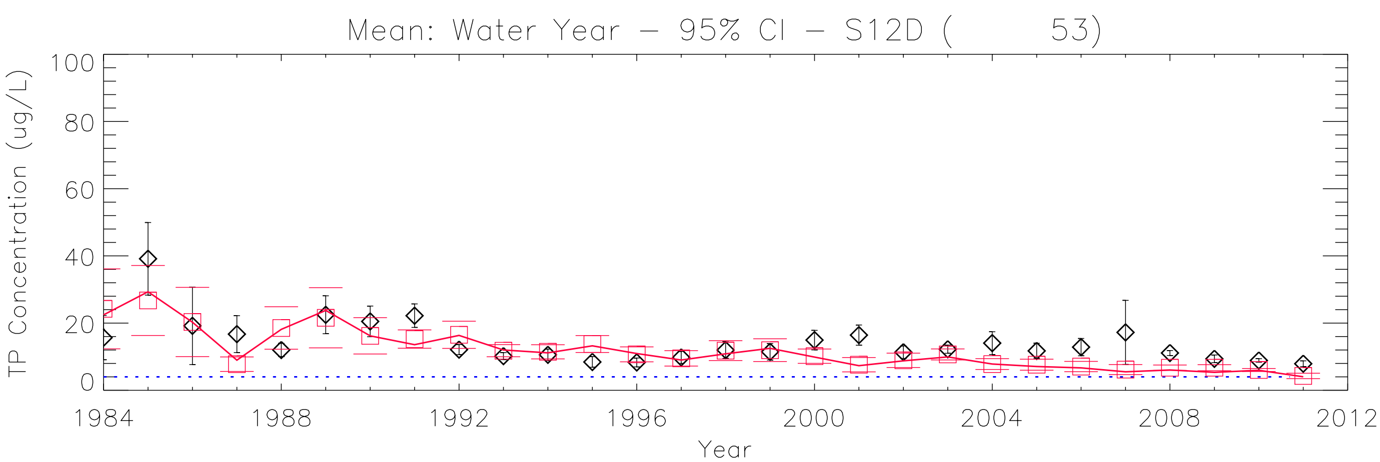

Mean: Season - 95% CI - S12C (53)
TP Concentration (ug/L)
Year

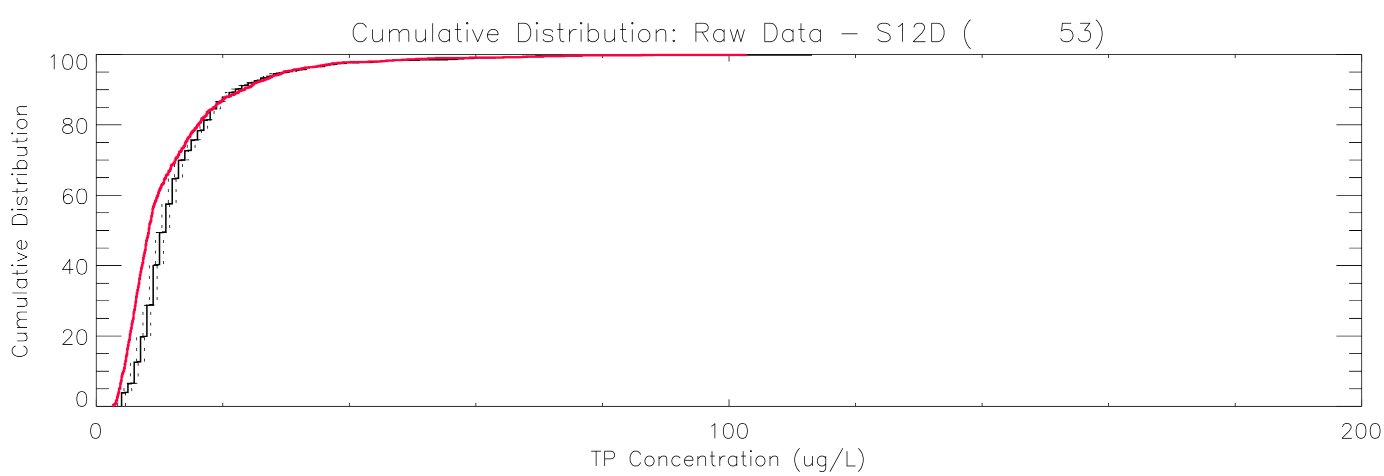

Mean: Water Year - 95% CI - S12C (53)
TP Concentration (ug/L)
Year

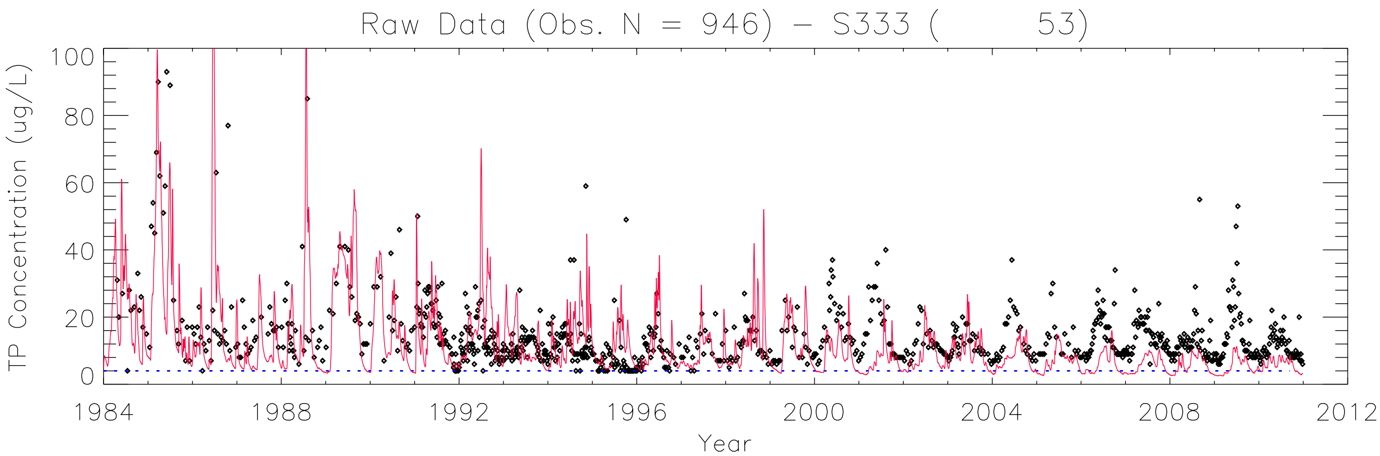

Cumulative Distribution: Raw Data - S12C (53)
Cumulative Distribution
TP Concentration (ug/L)

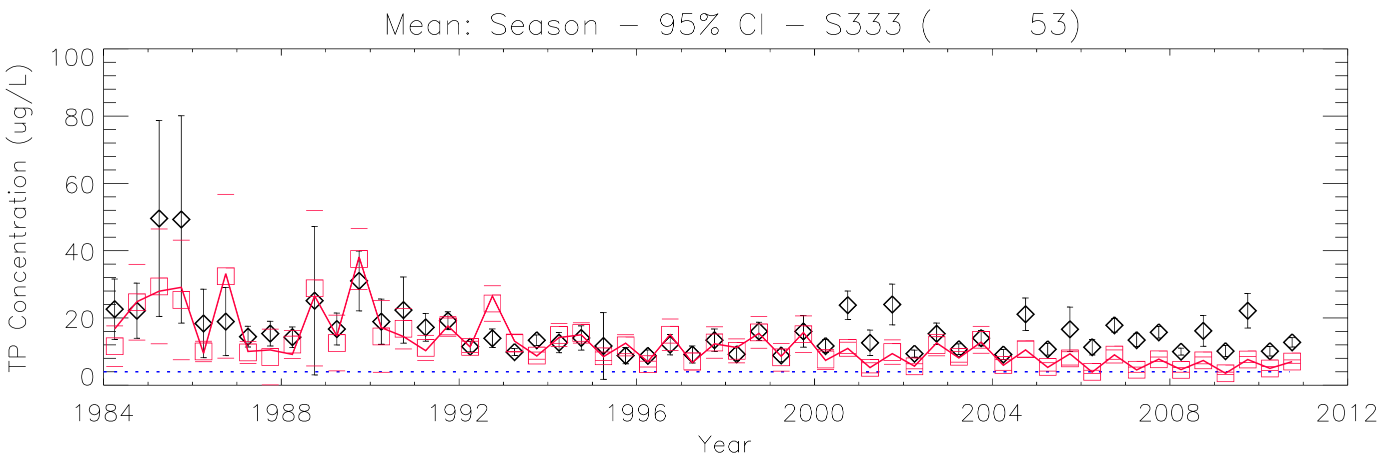

Raw Data (Obs. N = 804) – S12D (53)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

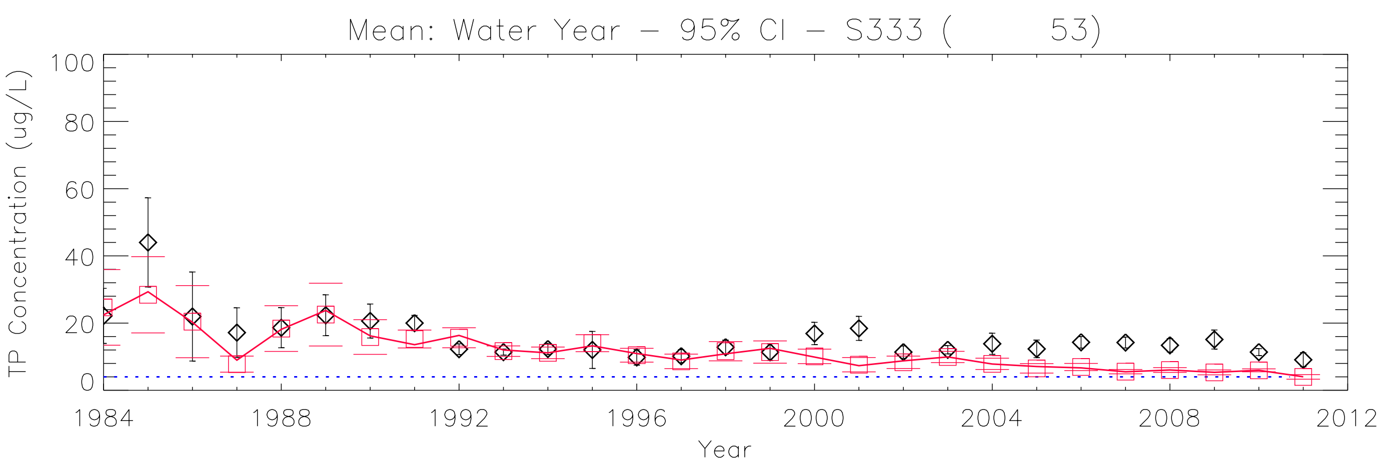

Mean: Season – 95% CI – S12D (53)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

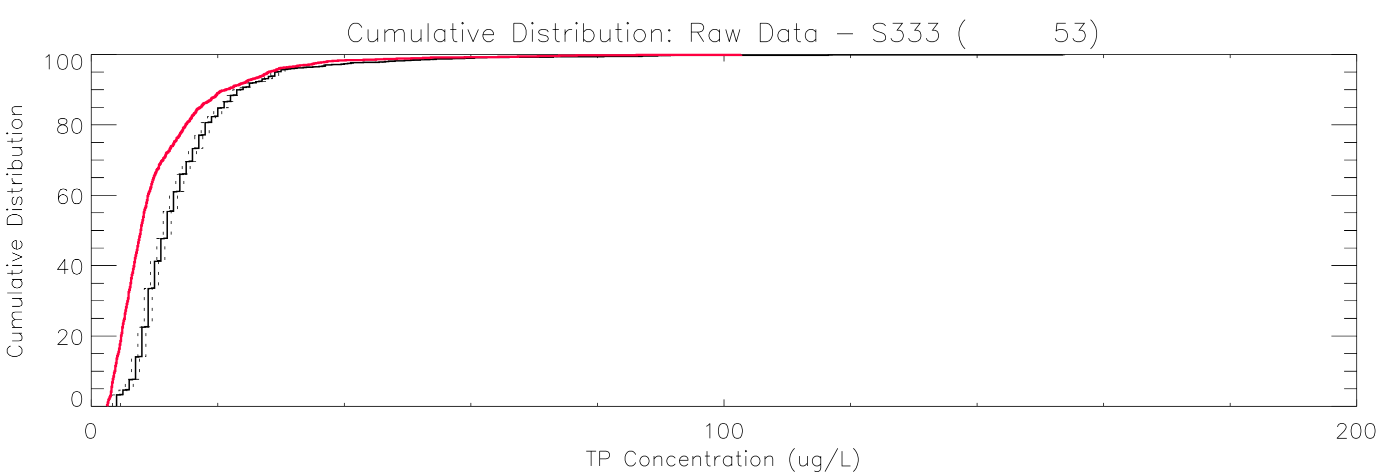

Mean: Water Year – 95% CI – S12D (53)
TP Concentration (ug/L)
0
20
40
60
80
100
1984
1988
1992
1996
2000
2004
2008
2012
Year

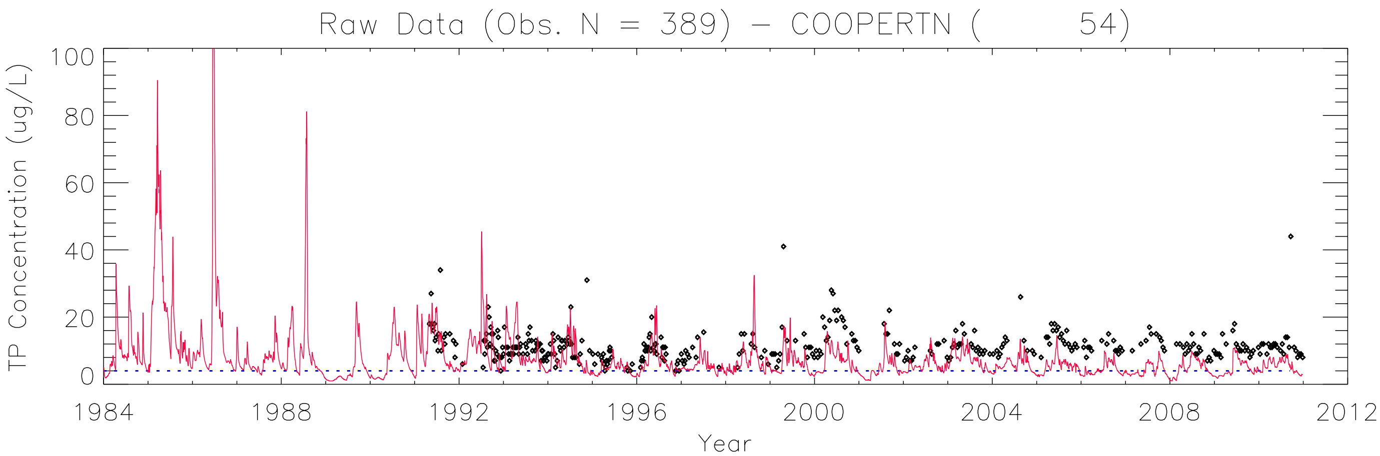

Cumulative Distribution: Raw Data – S12D (53)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
TP Concentration (ug/L)


Raw Data (Obs. N = 946) – S333 (53)
TP Concentration (ug/L)
Year

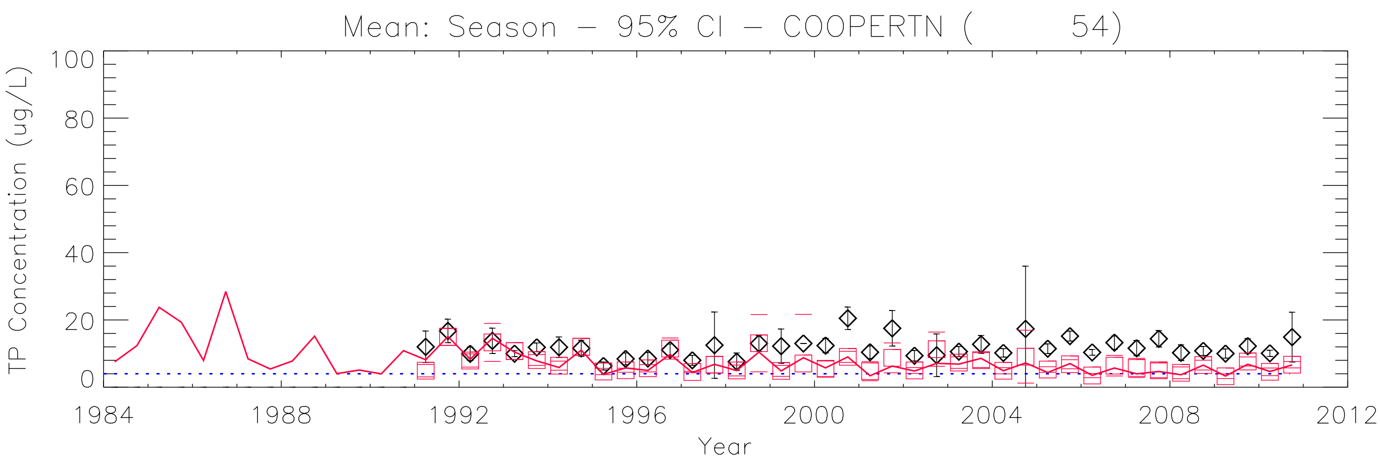

Mean: Season – 95% CI – S333 (53)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – S333 (53)
TP Concentration (ug/L)
Year

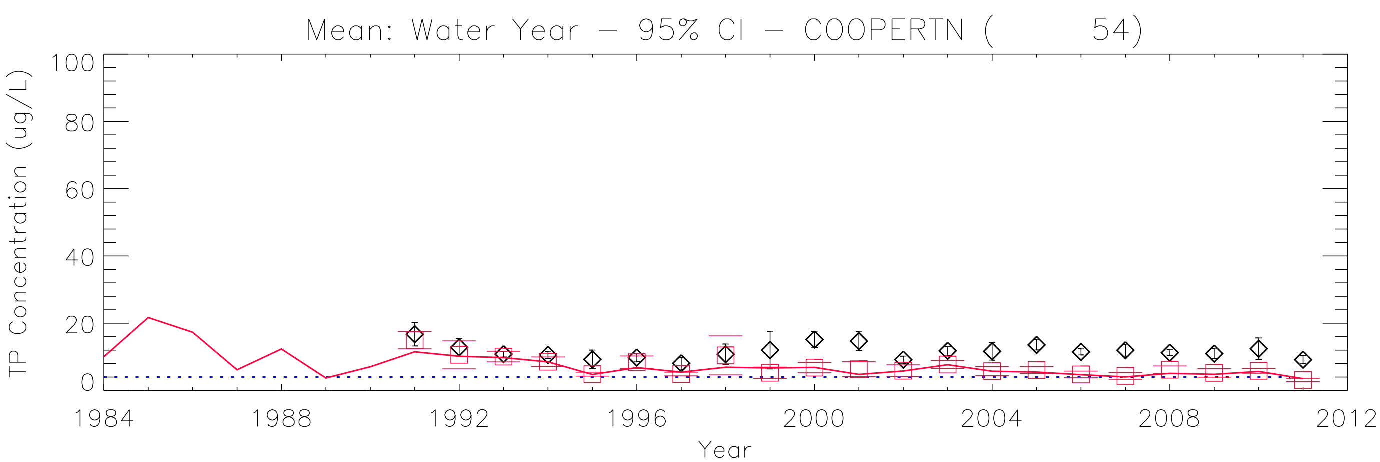

Cumulative Distribution: Raw Data – S333 (53)
Cumulative Distribution
TP Concentration (ug/L)



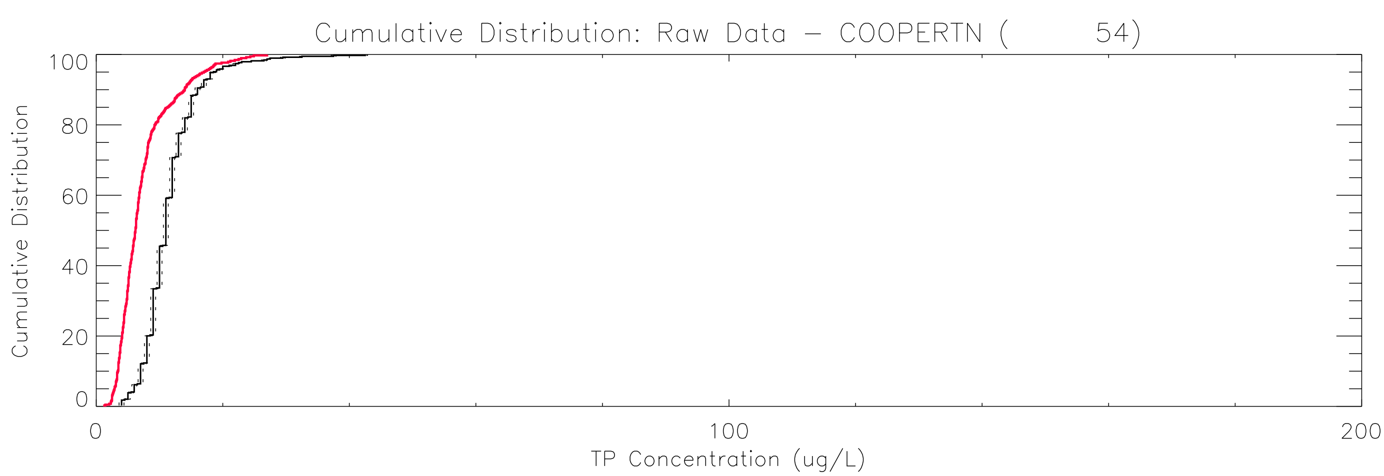
Raw Data (Obs. N = 389) - COOPERTN (54)
TP Concentration (ug/L)
Year



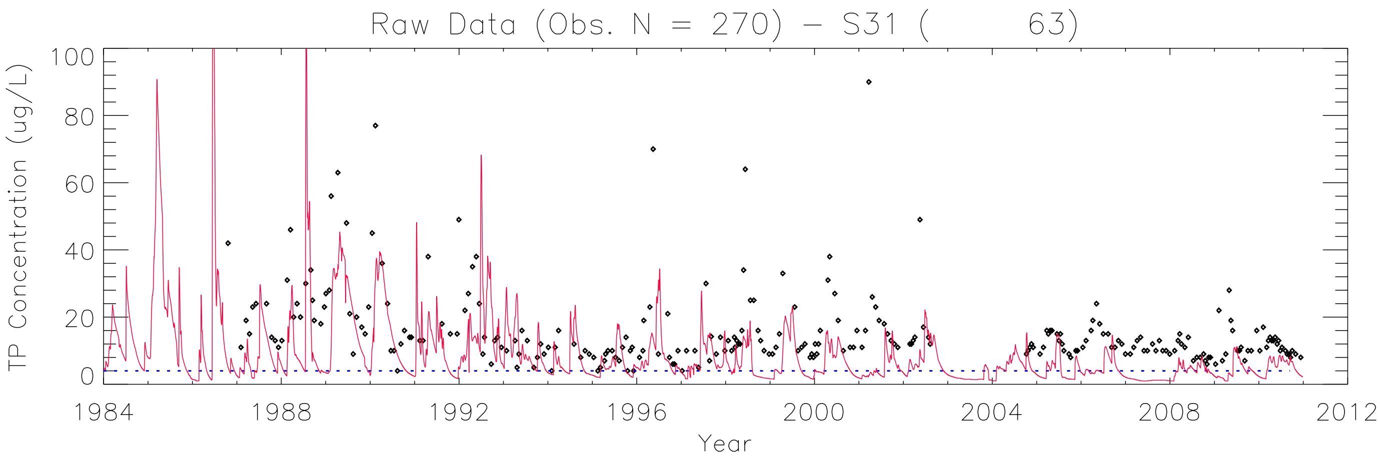
Mean: Season - 95% CI - COOPERTN (54)
TP Concentration (ug/L)
Year

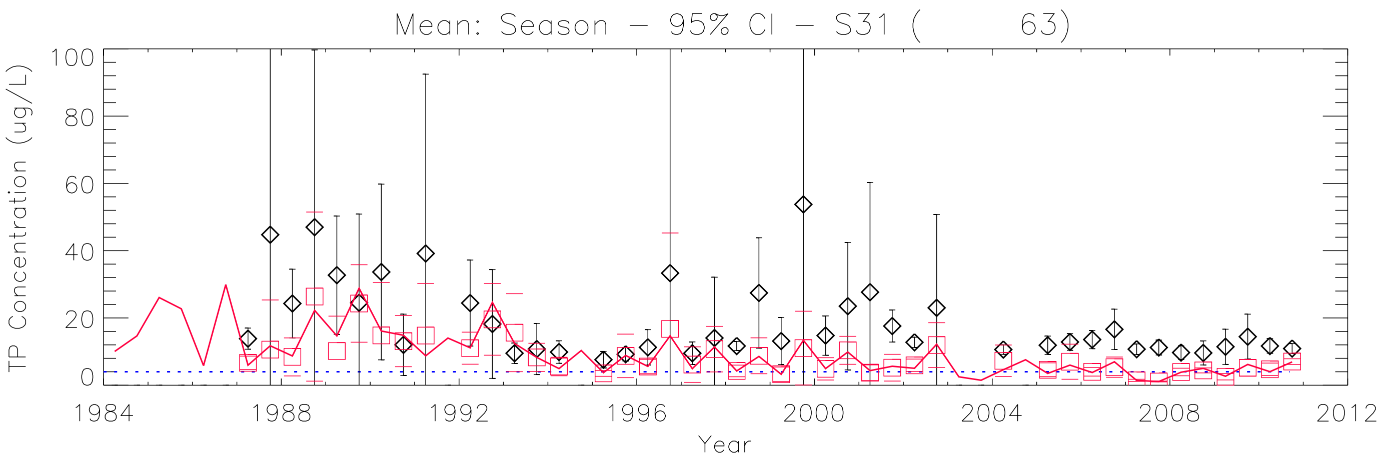


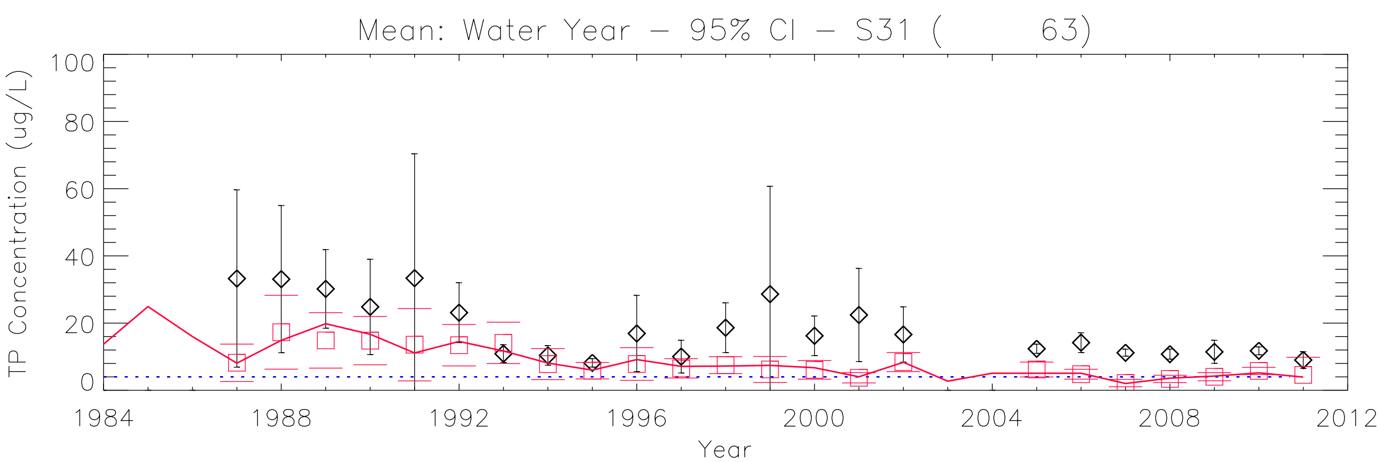
Mean: Water Year - 95% CI - COOPERTN (54)
TP Concentration (ug/L)
Year

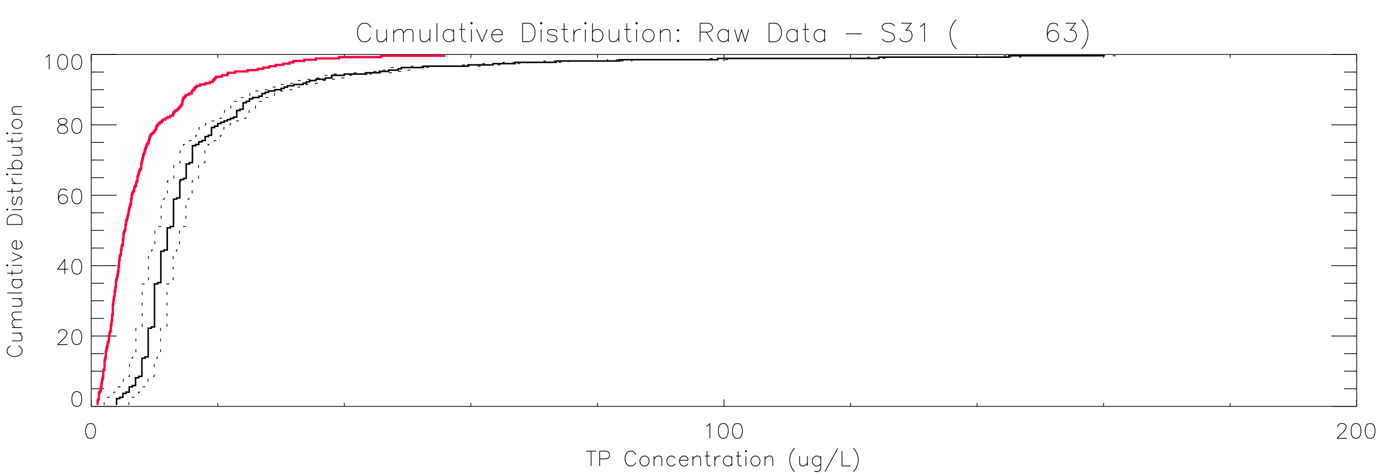


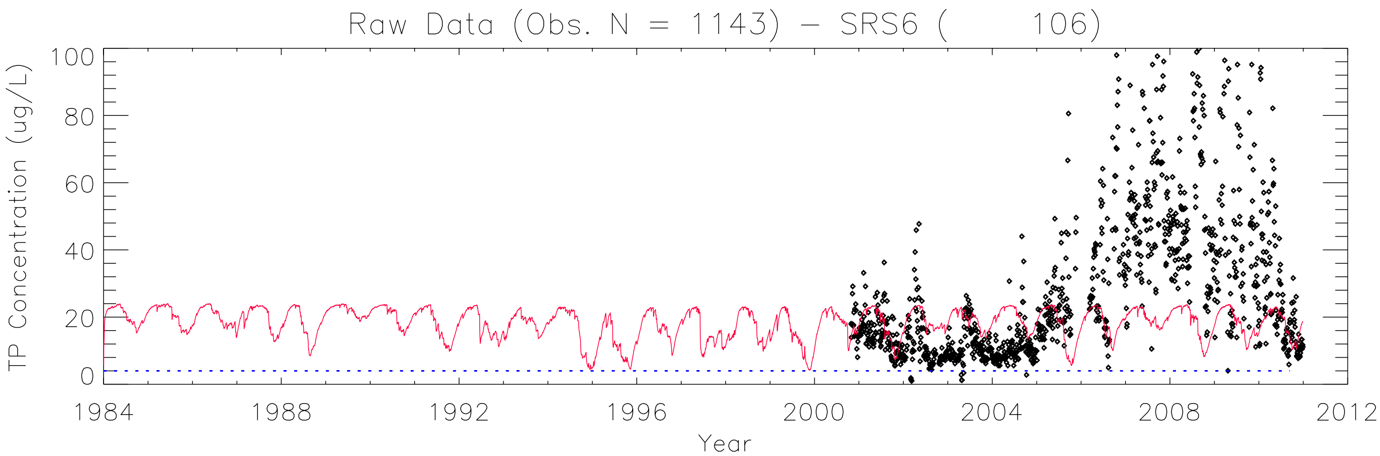
Cumulative Distribution: Raw Data - COOPERTN (54)
Cumulative Distribution
TP Concentration (ug/L)

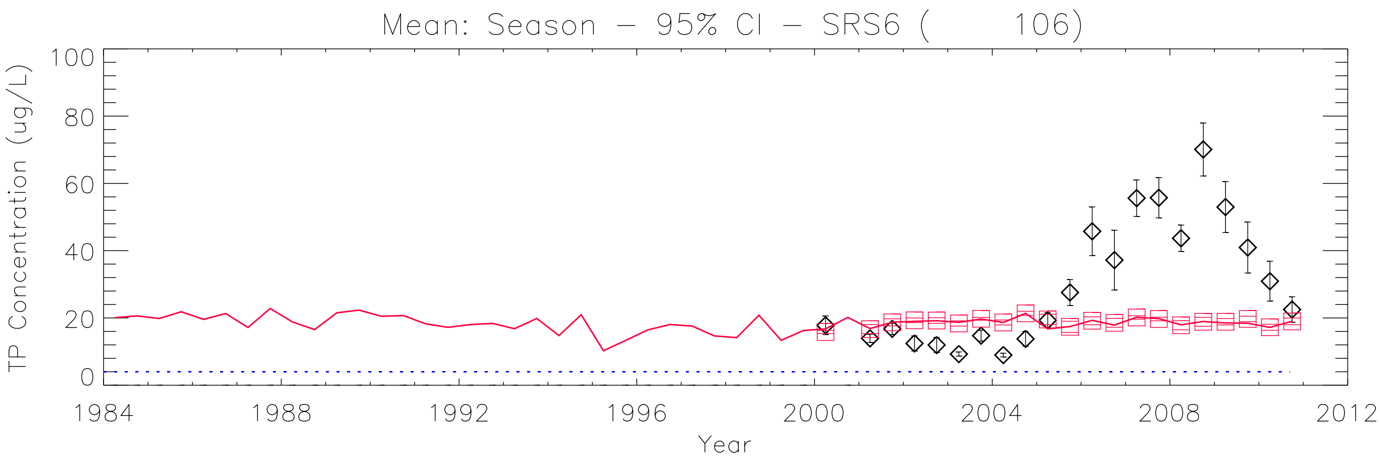

Raw Data (Obs. N = 270) – S31 (63)
TP Concentration (ug/L)
Year

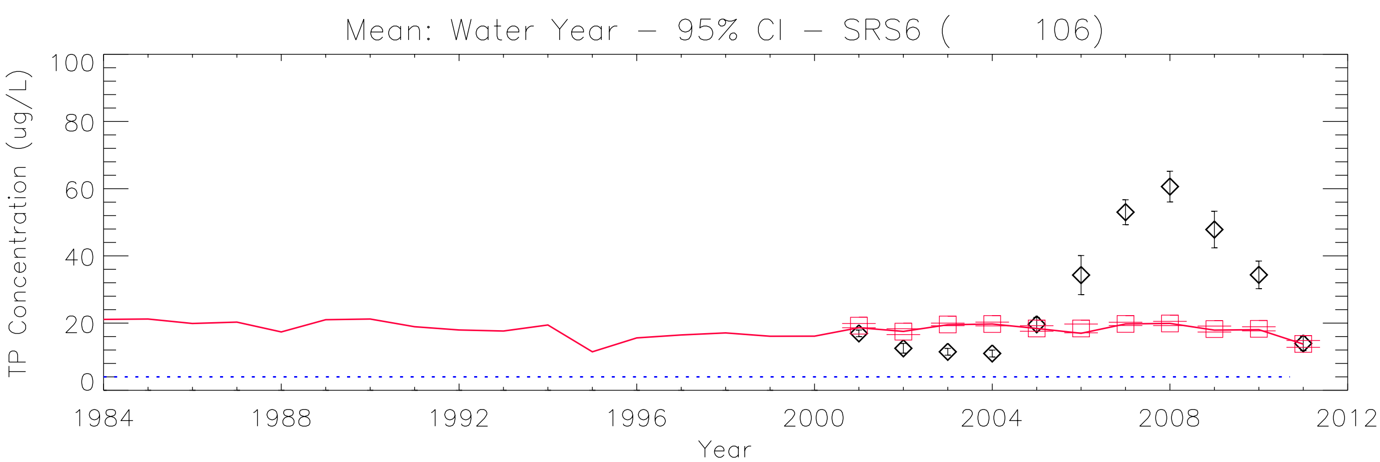

Mean: Season – 95% CI – S31 (63)
TP Concentration (ug/L)
Year

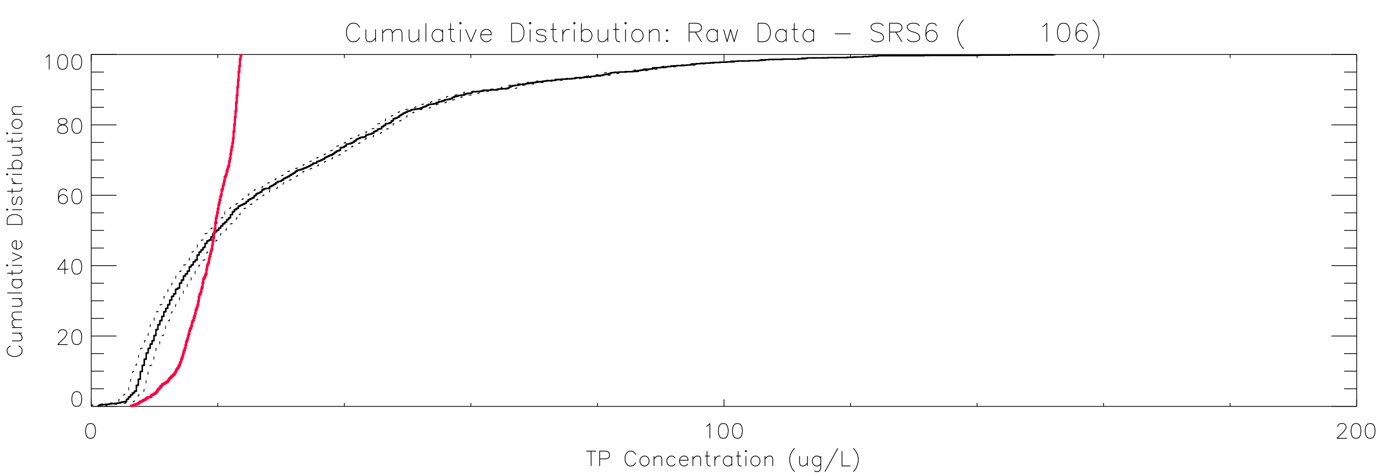

Mean: Water Year – 95% CI – S31 (63)
TP Concentration (ug/L)
Year

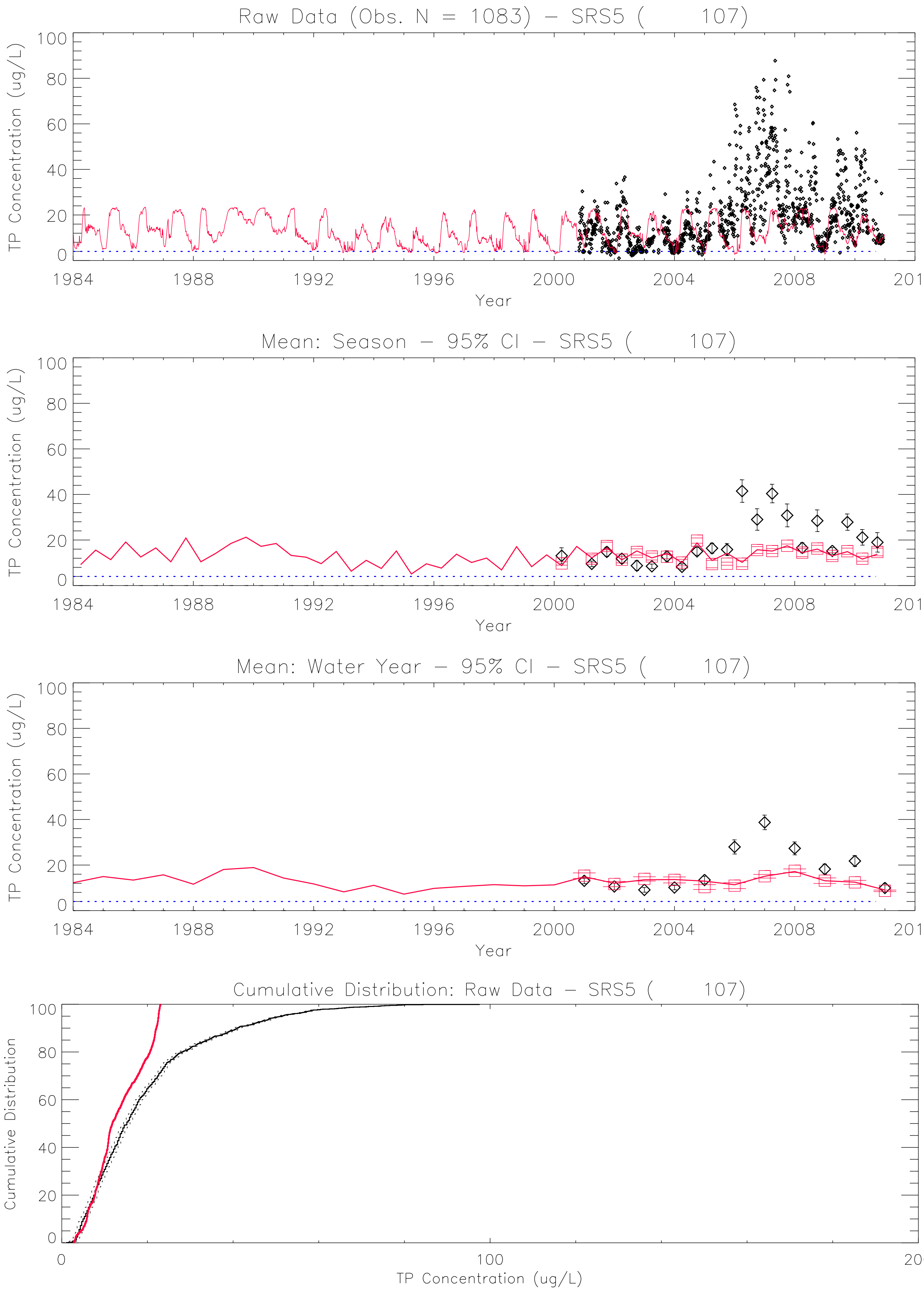

Cumulative Distribution: Raw Data – S31 (63)
Cumulative Distribution
TP Concentration (ug/L)


Raw Data (Obs. N = 1143) – SRS6 (106)
TP Concentration (ug/L)
Year


Mean: Season – 95% CI – SRS6 (106)
TP Concentration (ug/L)
Year


Mean: Water Year – 95% CI – SRS6 (106)
TP Concentration (ug/L)
Year


Cumulative Distribution: Raw Data – SRS6 (106)
Cumulative Distribution
TP Concentration (ug/L)



Raw Data (Obs. N = 1083) – SRS5 (107)
TP Concentration (ug/L)
Year
Mean: Season – 95% CI – SRS5 (107)
TP Concentration (ug/L)
Year
Mean: Water Year – 95% CI – SRS5 (107)
TP Concentration (ug/L)
Year
Cumulative Distribution: Raw Data – SRS5 (107)
Cumulative Distribution
TP Concentration (ug/L)

Appendix C, Figures C.1 – C.107. Time series plots of water column chloride (Cl) concentration and their associated Cumulative Frequency Distributions (CFD) for the period of record 1984-2010 at each monitoring location. The sequence of the figures is based on geographic location of marsh sites, starting in northwest, moving towards the southeast; following the set of plots of all marsh sites, the canal monitoring sites are similarly sequenced. See Figure 1 for a map of the sites in the southern Everglades.

The model grid cell column and row locations (col_row) or canal/river reach identifier (single integer) are shown in parentheses of each plot's title.

Each site-page has four figures:

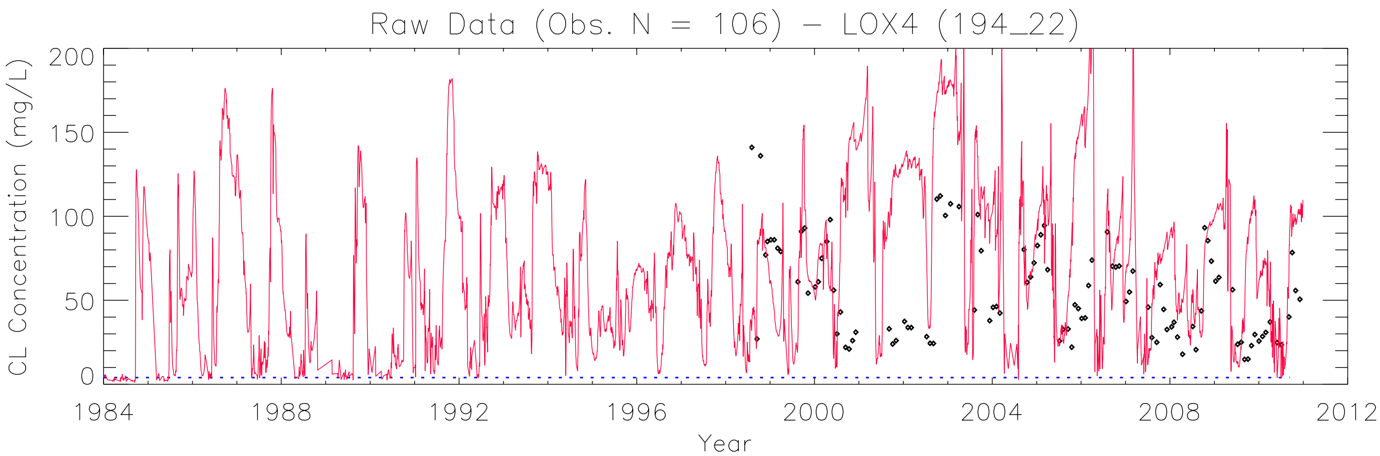
a) All data, with no temporal aggregation, of daily observations (black dots) and model results (red line).

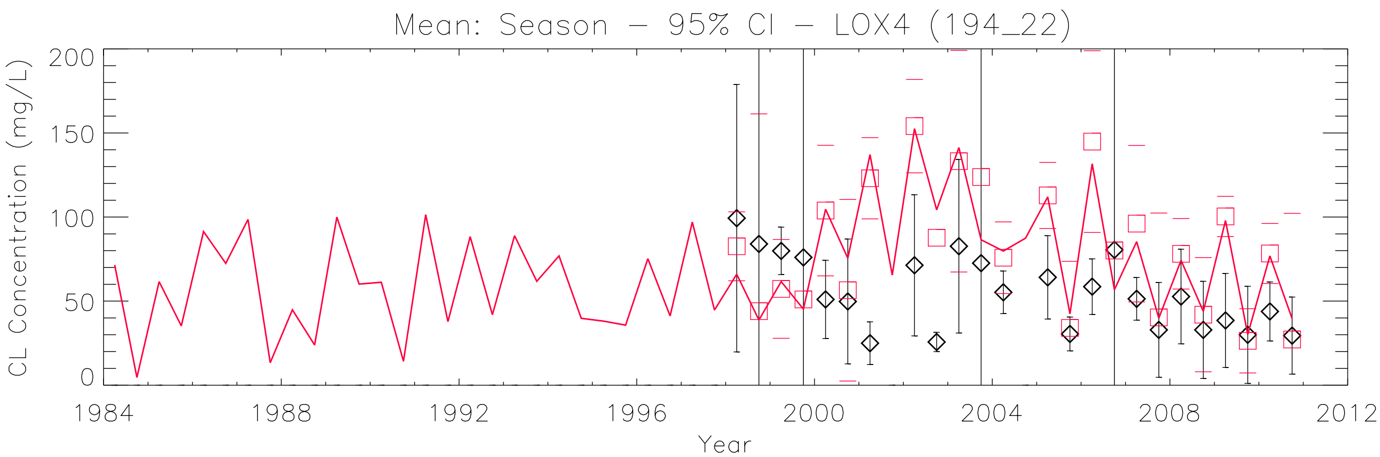
b) All data were aggregated into arithmetic mean values by wet and dry seasons within water years; the continuous lines pass through mean of all daily data points for each season; the mean of paired simulated & observed values are shown in red boxes and black diamonds, respectively; the 95% Confidence Interval (CI) of the paired means are shown by the "__" symbols in the red for the model and black for the observed data.

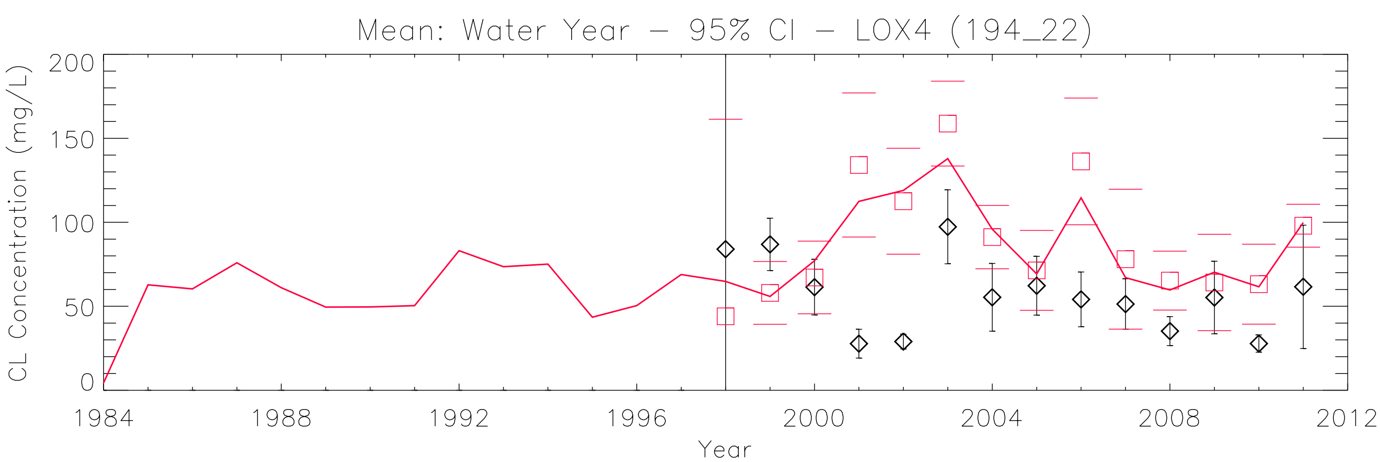
c) All data aggregated into arithmetic mean values by water year, with the same treatment as in plot b).

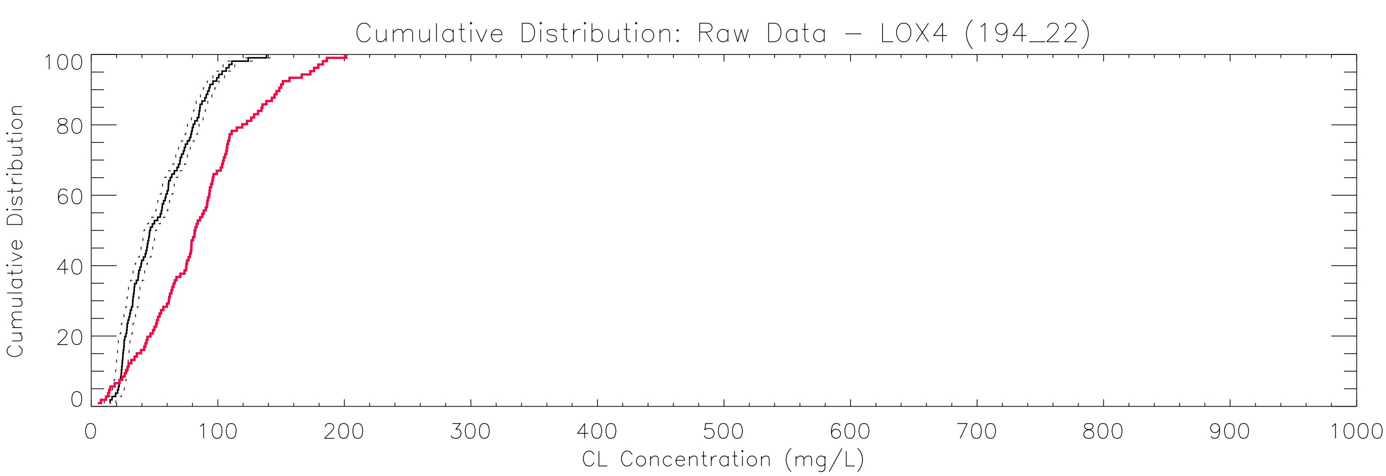
d) The cumulative frequency distributions of the simulated and observed (raw, un-aggregated) data; the 95% confidence interval for observed data is shown in the dashed black lines. Note that only paired simulated and observed data points are used.

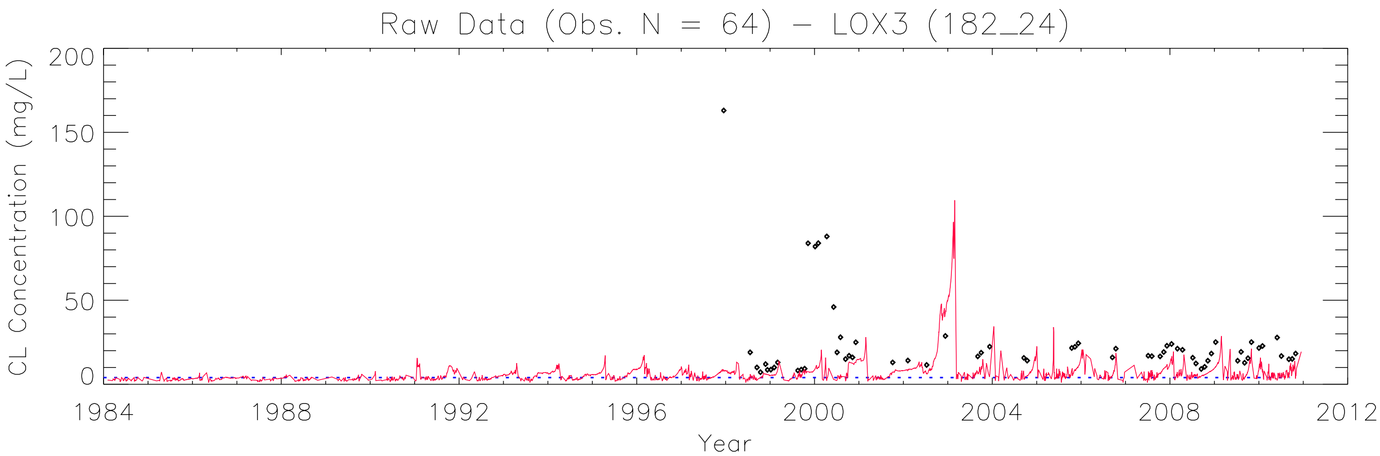
.... 107 pages of graphs follow......

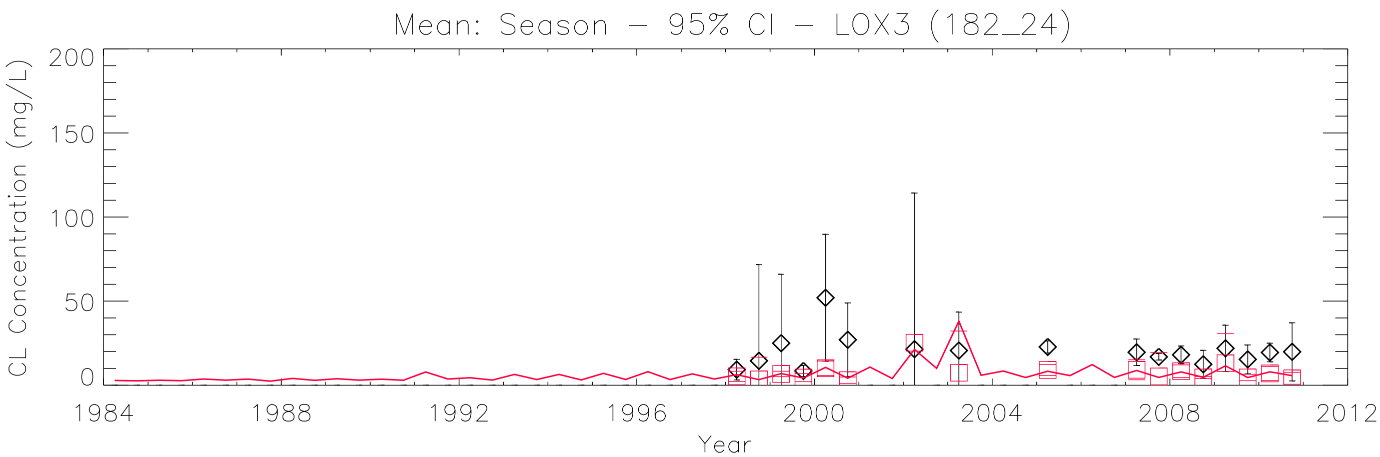

Raw Data (Obs. N = 106) – LOX4 (194_22)
CL Concentration (mg/L)
Year

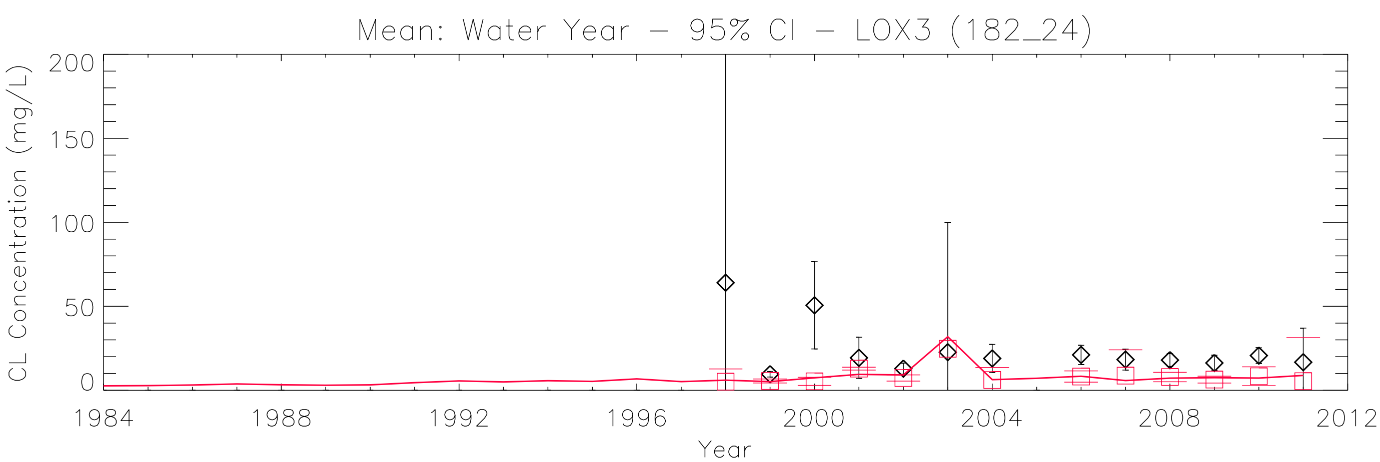

Mean: Season – 95% CI – LOX4 (194_22)
CL Concentration (mg/L)
Year

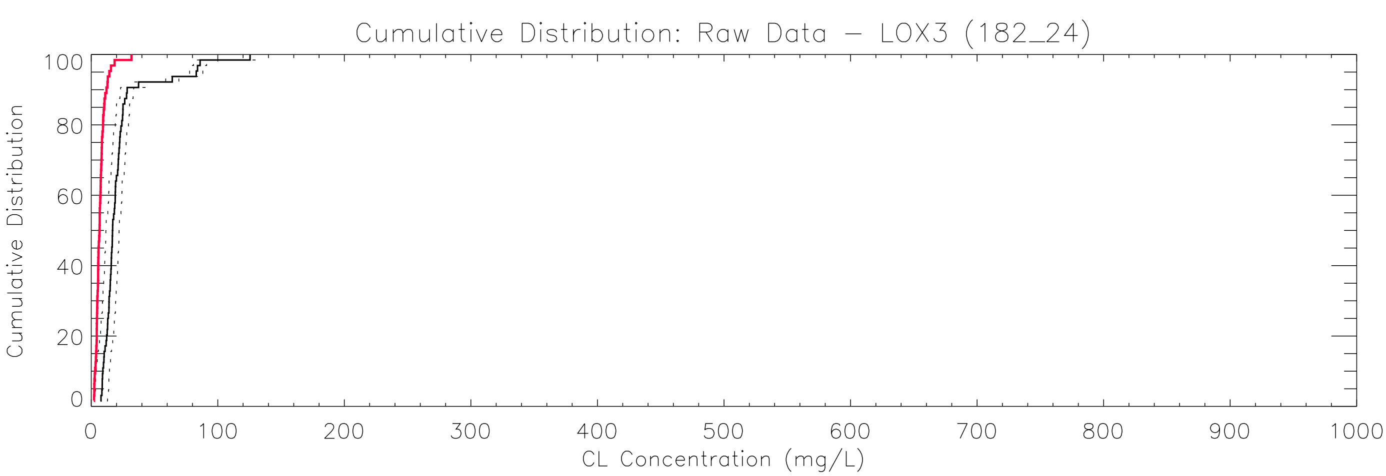

Mean: Water Year – 95% CI – LOX4 (194_22)
CL Concentration (mg/L)
Year

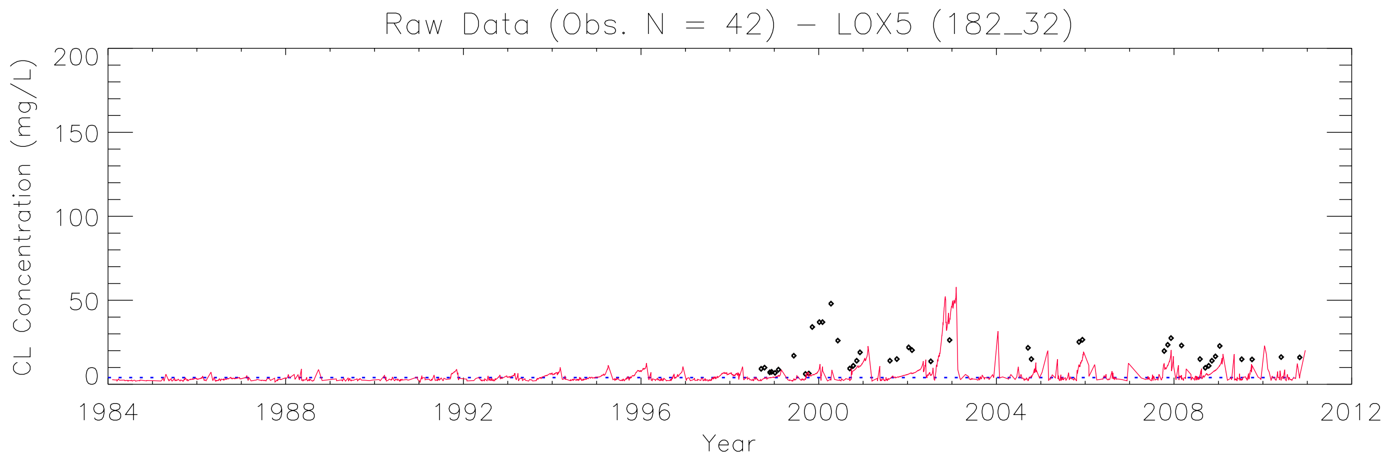

Cumulative Distribution: Raw Data – LOX4 (194_22)
Cumulative Distribution
CL Concentration (mg/L)

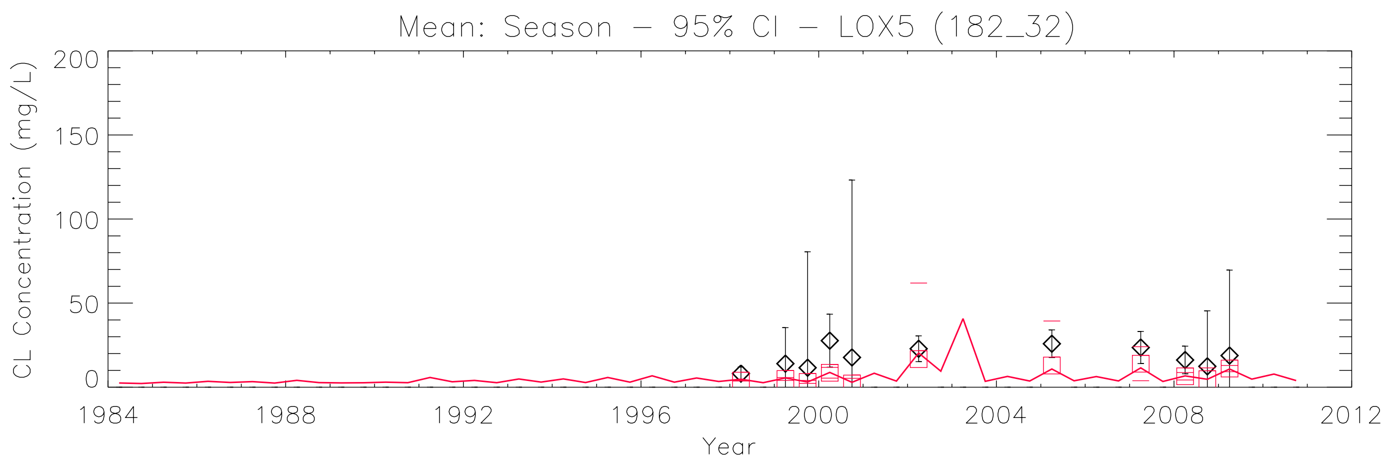

Raw Data (Obs. N = 64) – LOX3 (182_24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

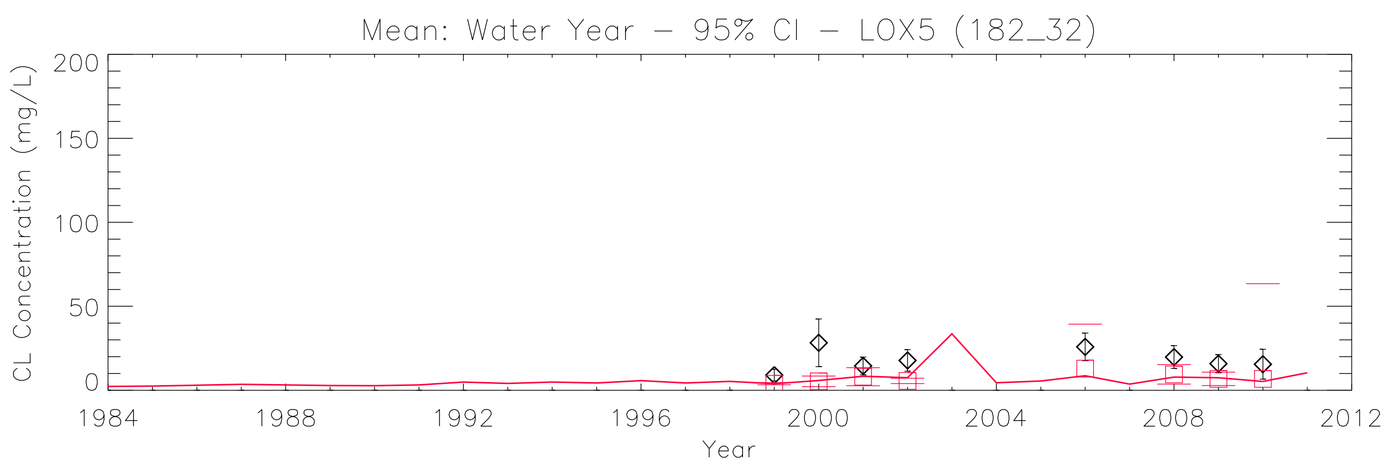

Mean: Season – 95% CI – LOX3 (182_24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

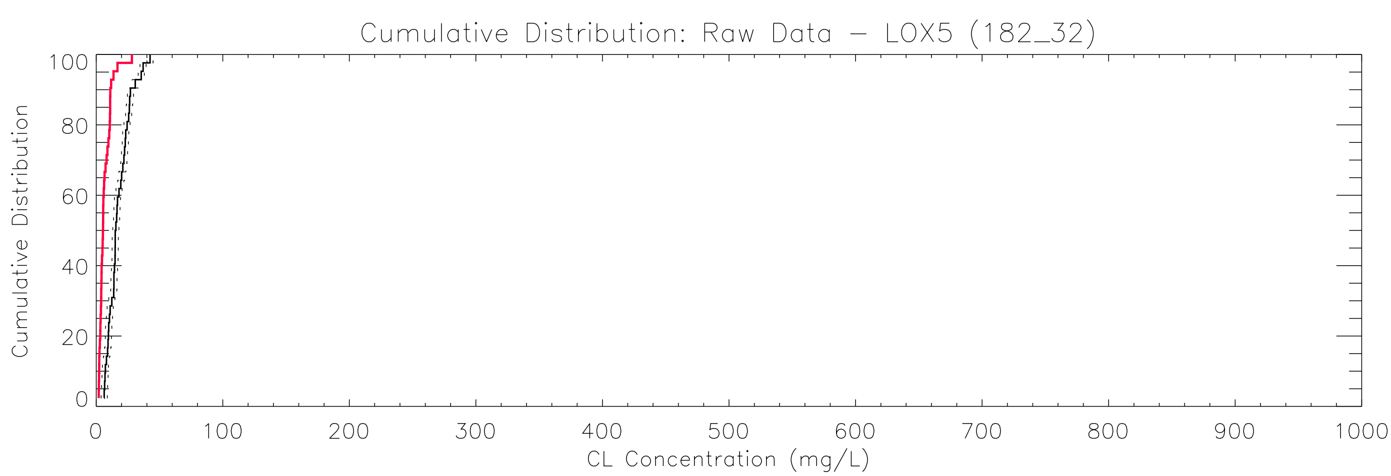

Mean: Water Year – 95% CI – LOX3 (182_24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012


Cumulative Distribution: Raw Data – LOX3 (182_24)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

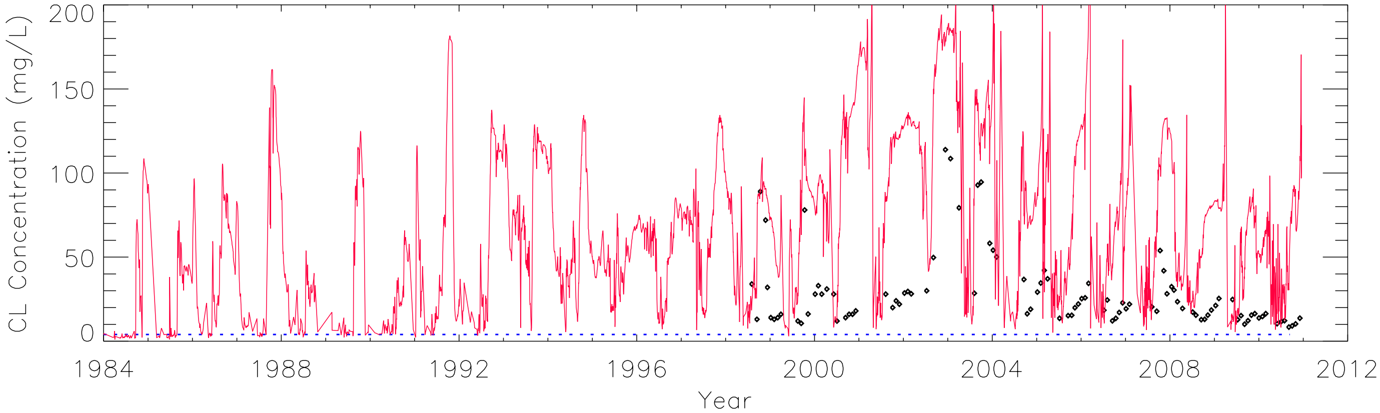

Raw Data (Obs. N = 42) – LOX5 (182_32)
CL Concentration (mg/L)
Year


Mean: Season – 95% CI – LOX5 (182_32)
CL Concentration (mg/L)
Year

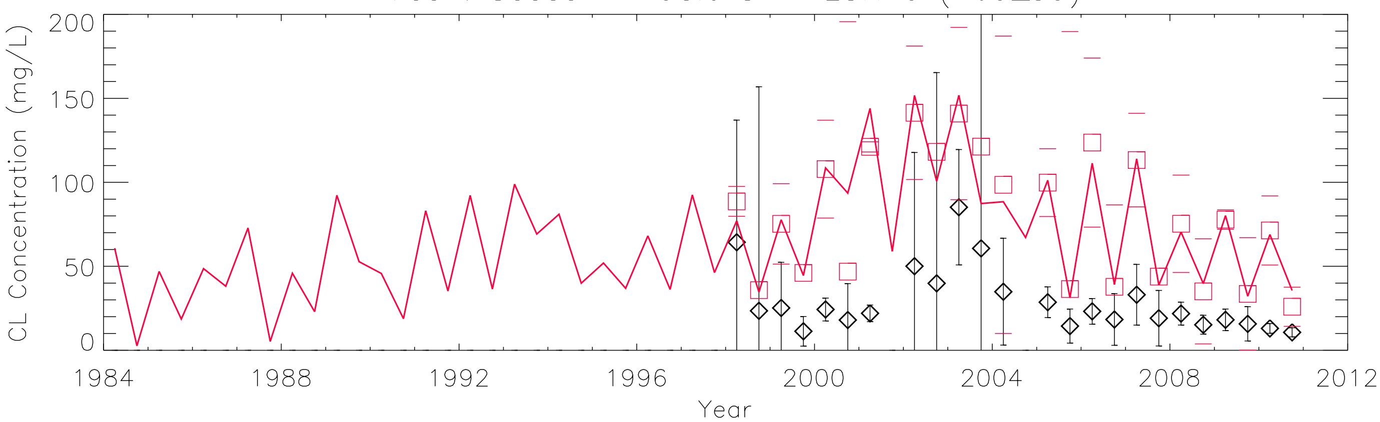

Mean: Water Year – 95% CI – LOX5 (182_32)
CL Concentration (mg/L)
Year


Cumulative Distribution: Raw Data – LOX5 (182_32)
Cumulative Distribution
CL Concentration (mg/L)

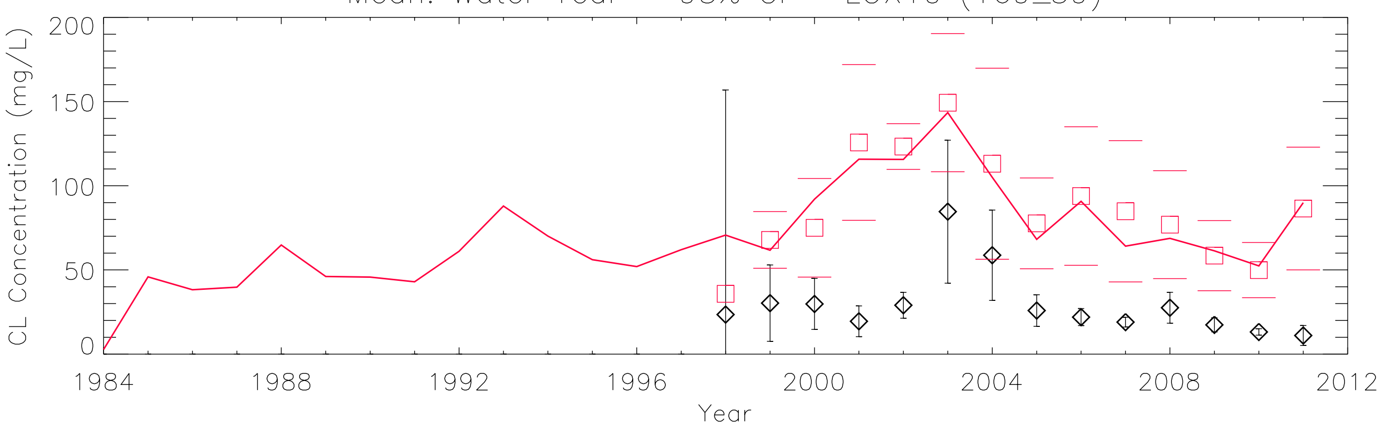
Raw Data (Obs. N = 98) – LOX10 (169_39)



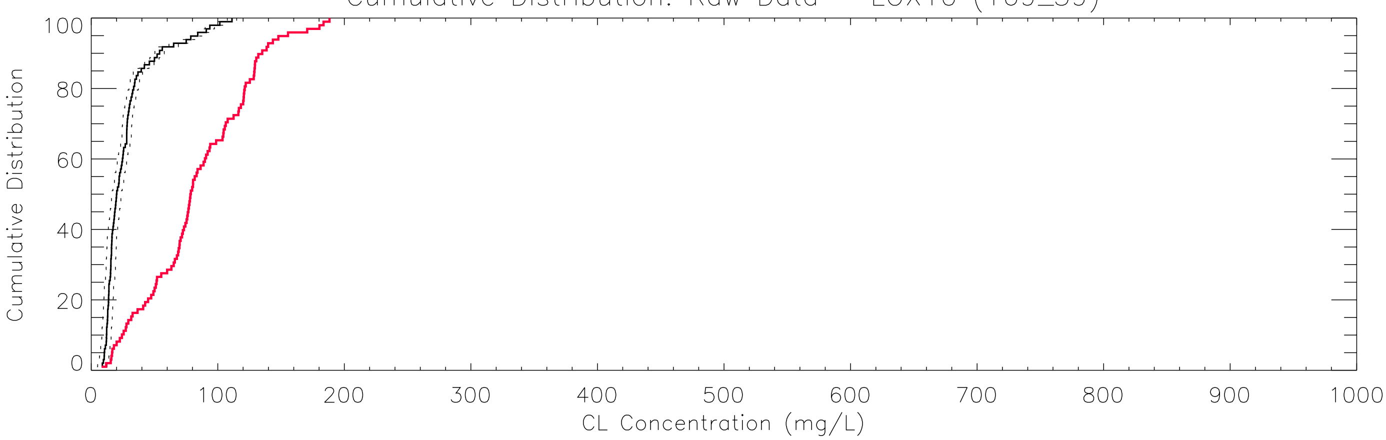
Mean: Season – 95% CI – LOX10 (169_39)

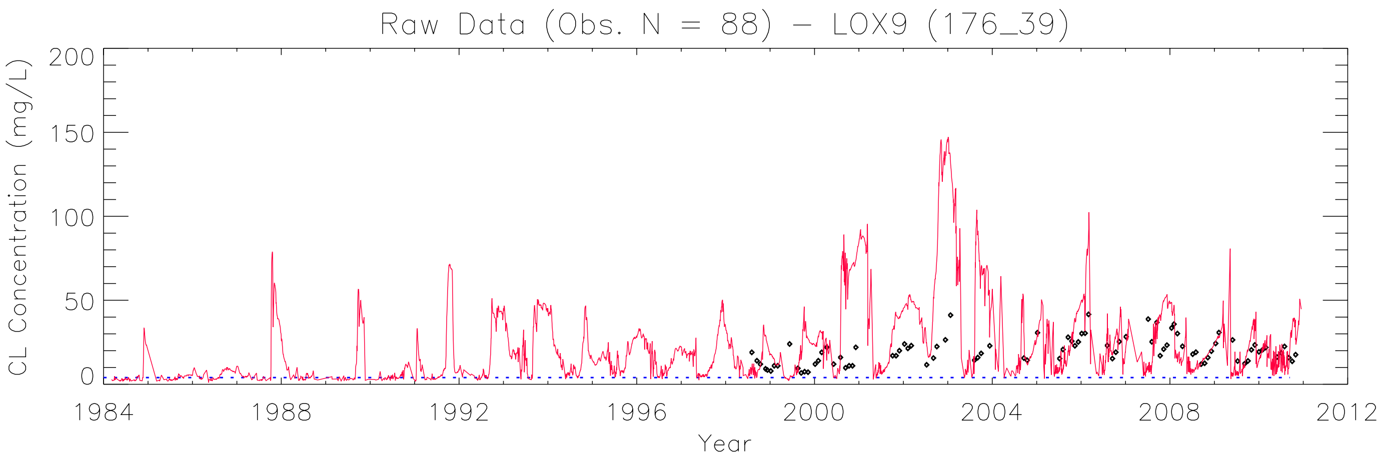


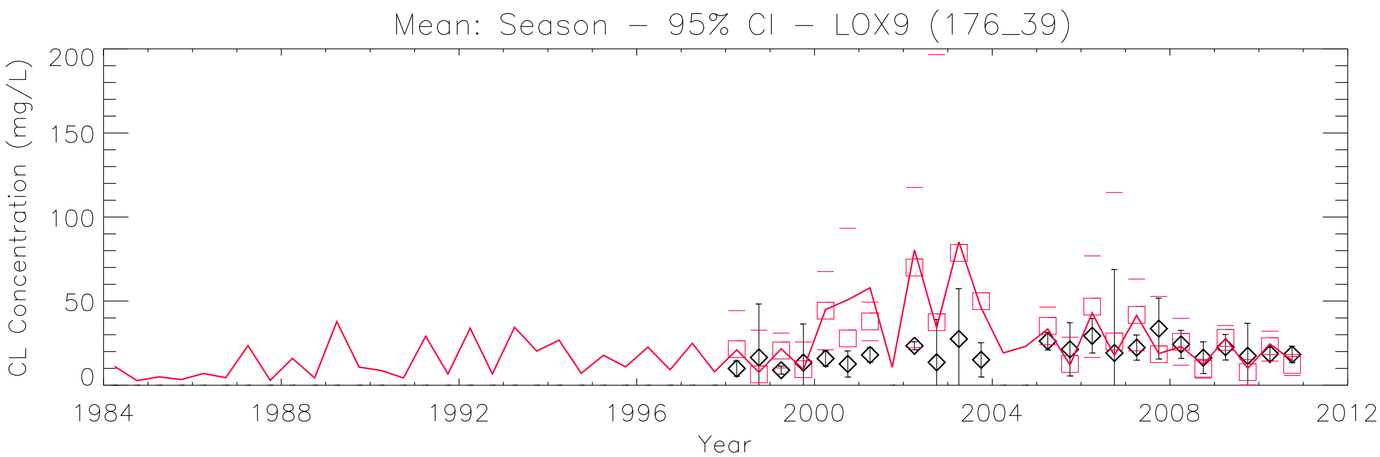
Mean: Water Year – 95% CI – LOX10 (169_39)

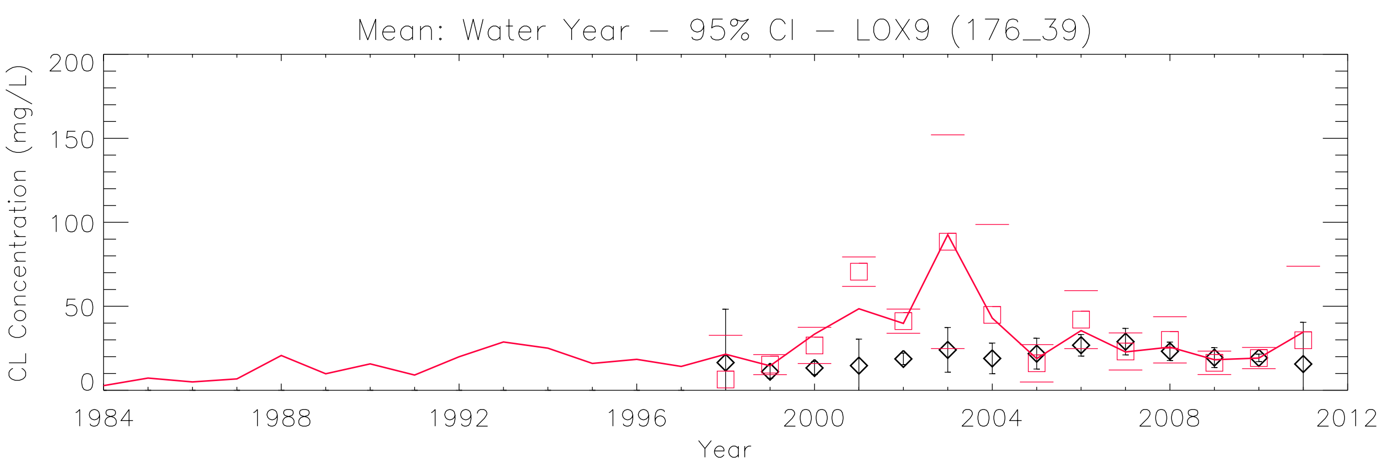


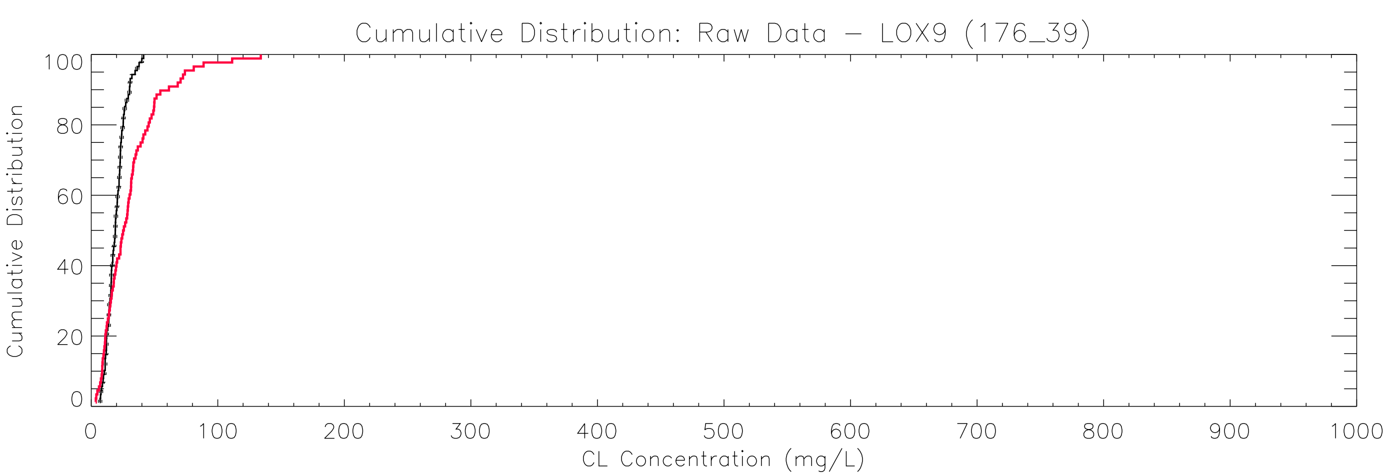
Cumulative Distribution: Raw Data – LOX10 (169_39)

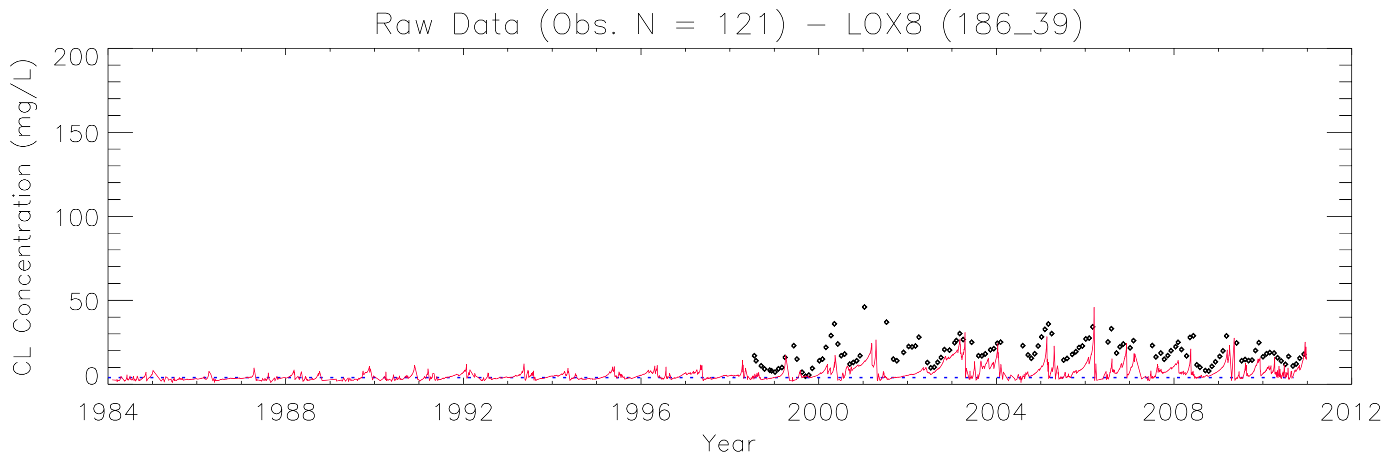


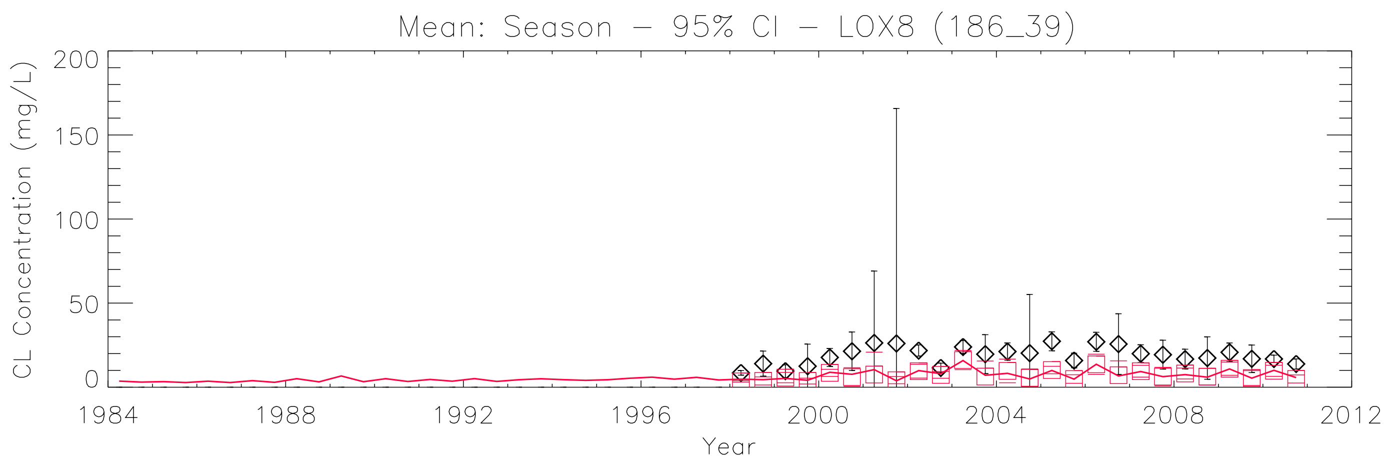

Raw Data (Obs. N = 88) – LOX9 (176_39)
CL Concentration (mg/L)
Year

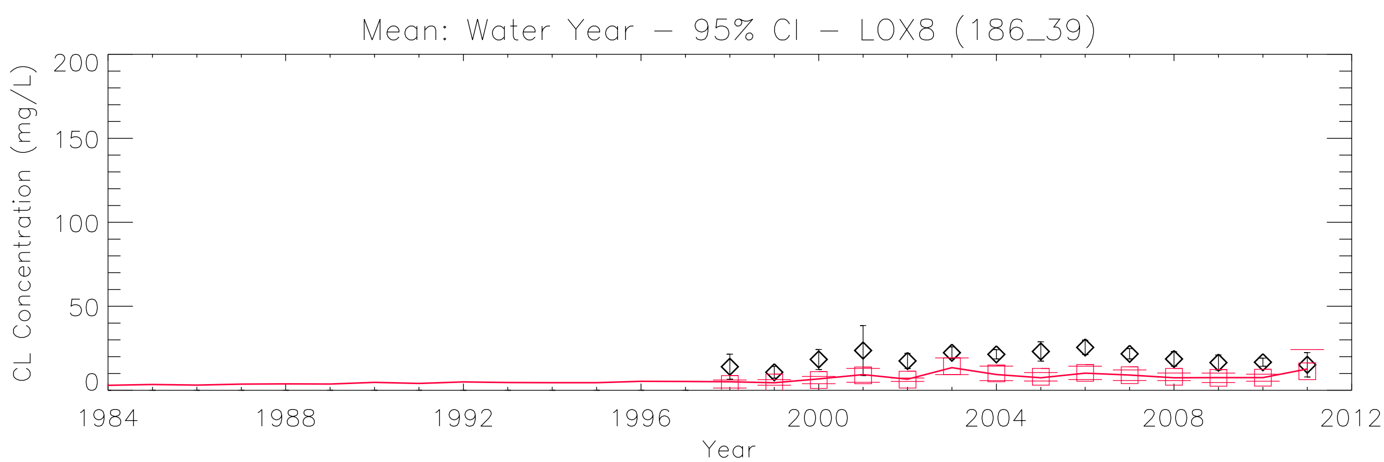

Mean: Season – 95% CI – LOX9 (176_39)
CL Concentration (mg/L)
Year

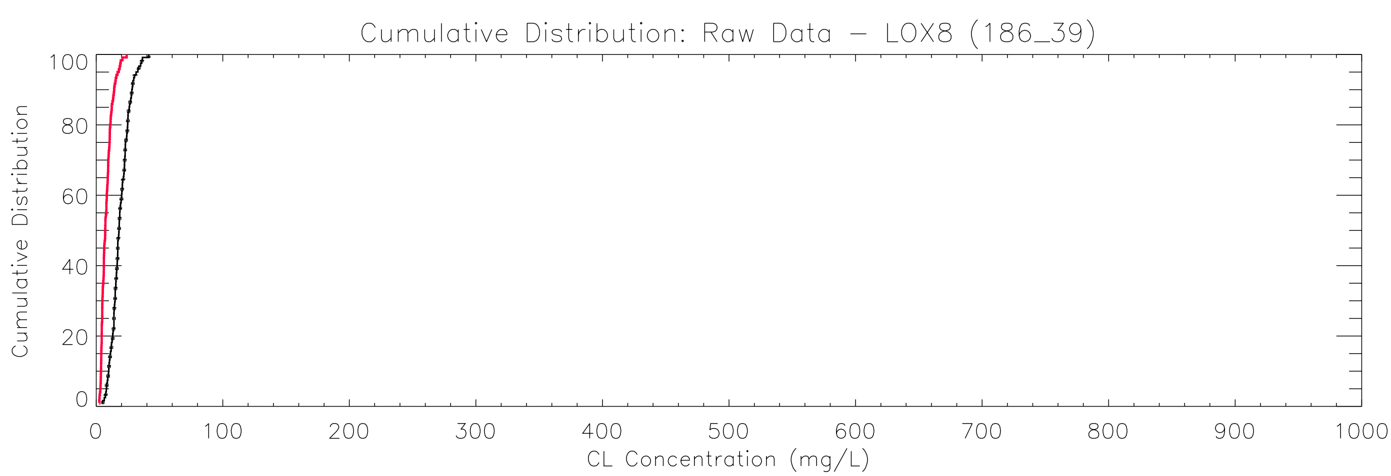

Mean: Water Year – 95% CI – LOX9 (176_39)
CL Concentration (mg/L)
Year


Cumulative Distribution: Raw Data – LOX9 (176_39)
Cumulative Distribution
CL Concentration (mg/L)

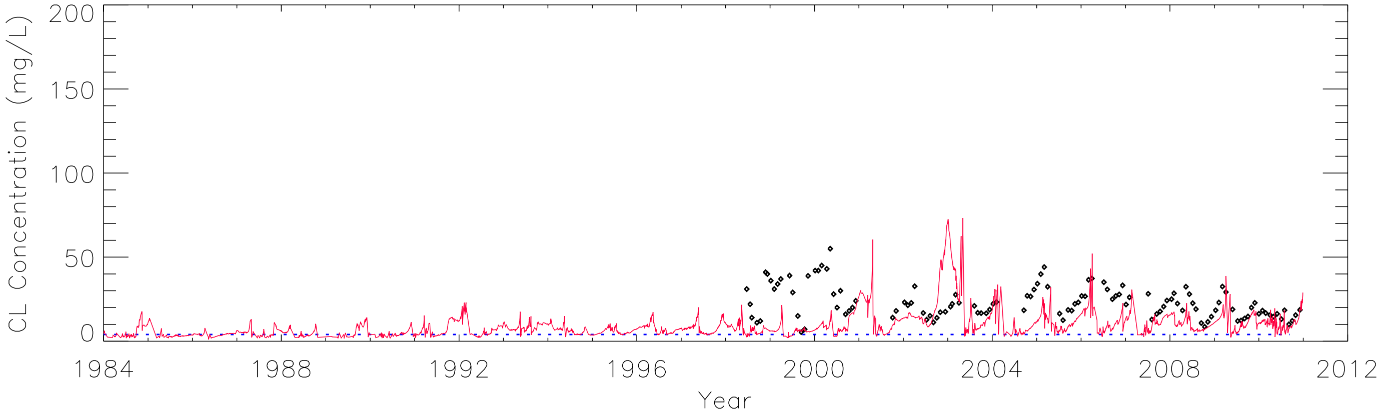

Raw Data (Obs. N = 121) – LOX8 (186_39)
CL Concentration (mg/L)
Year


Mean: Season – 95% CI – LOX8 (186_39)
CL Concentration (mg/L)
Year

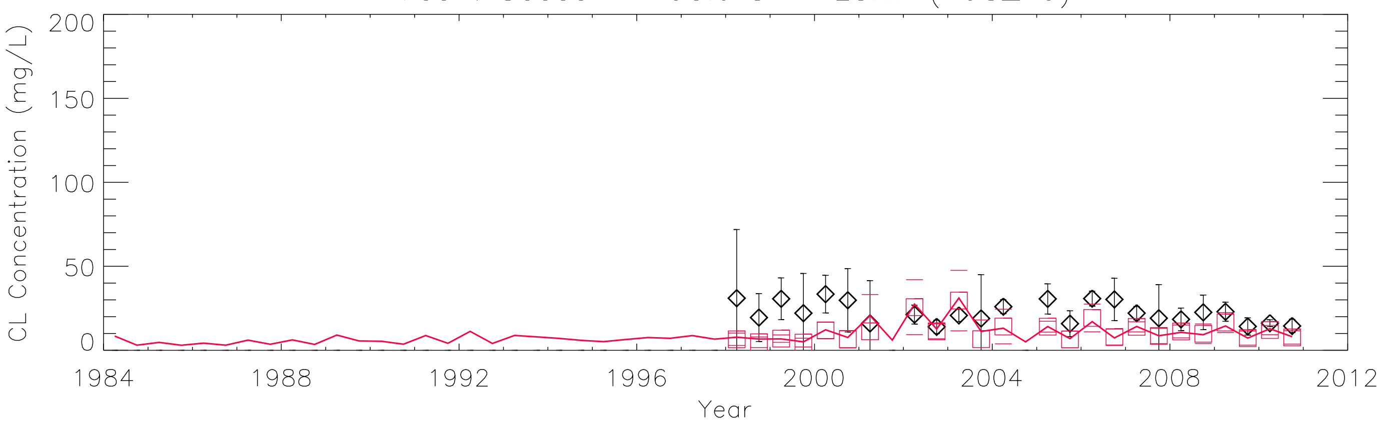

Mean: Water Year – 95% CI – LOX8 (186_39)
CL Concentration (mg/L)
Year


Cumulative Distribution: Raw Data – LOX8 (186_39)
Cumulative Distribution
CL Concentration (mg/L)

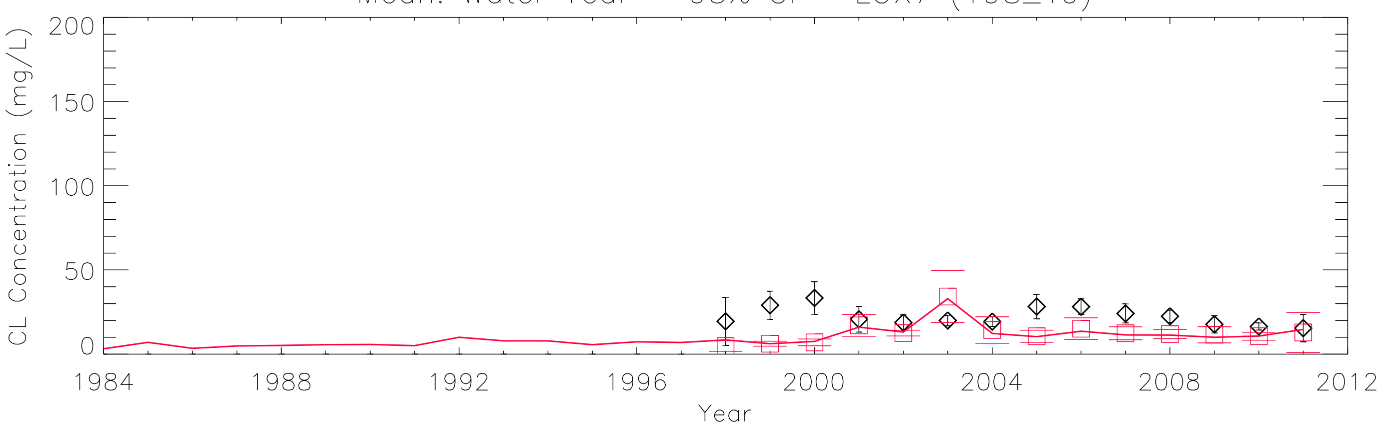
Raw Data (Obs. N = 120) – LOX7 (198_40)



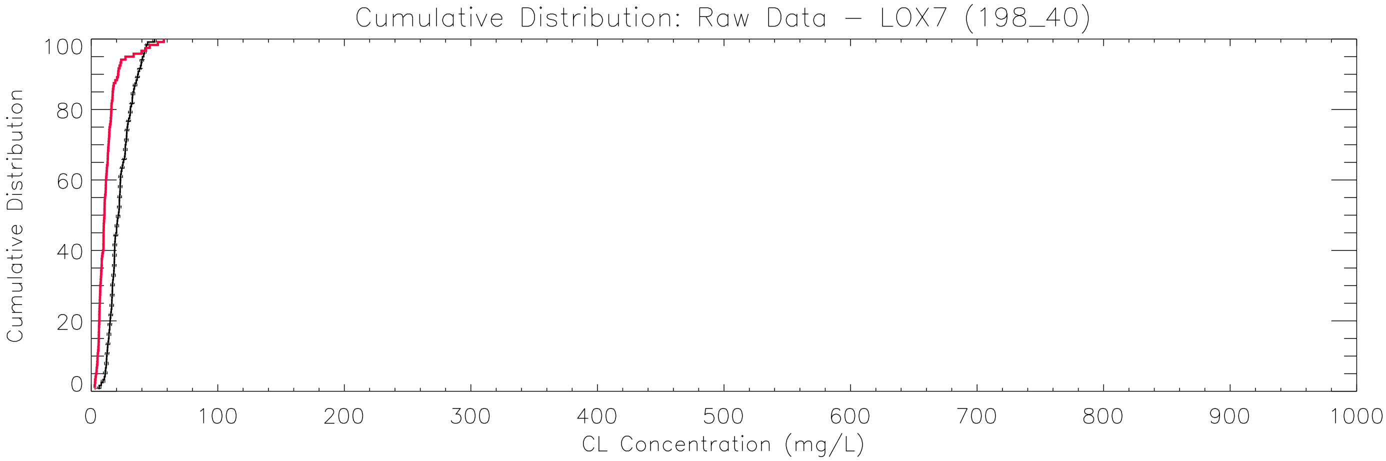
Mean: Season – 95% CI – LOX7 (198_40)

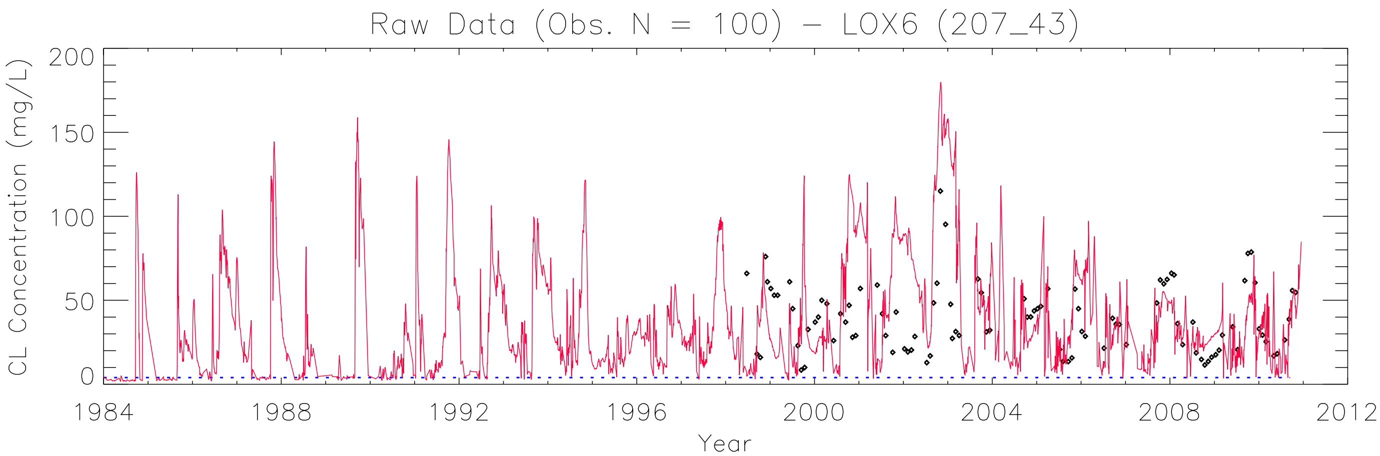


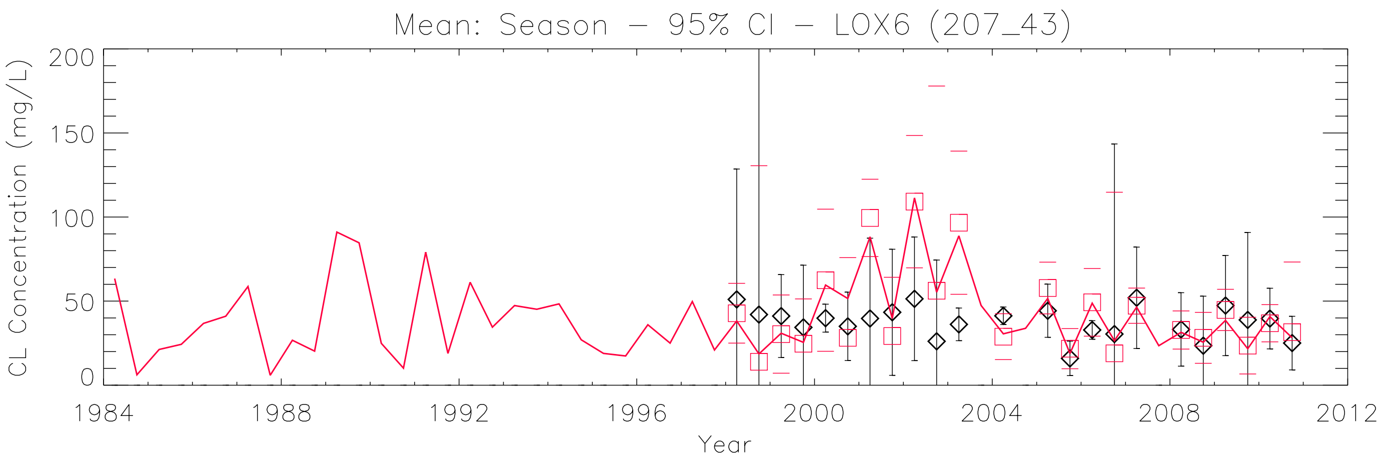
Mean: Water Year – 95% CI – LOX7 (198_40)

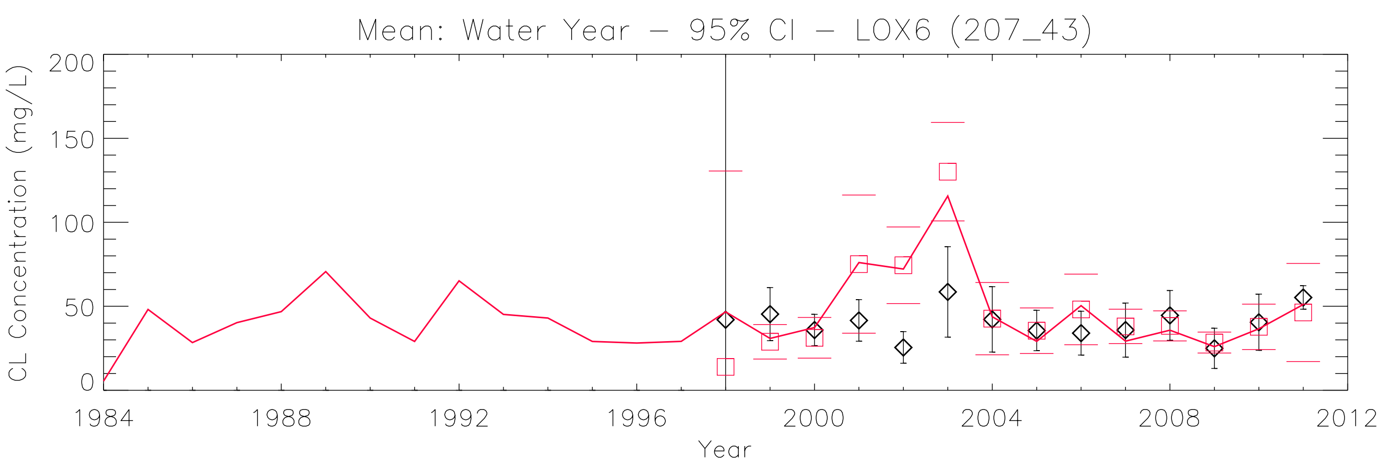


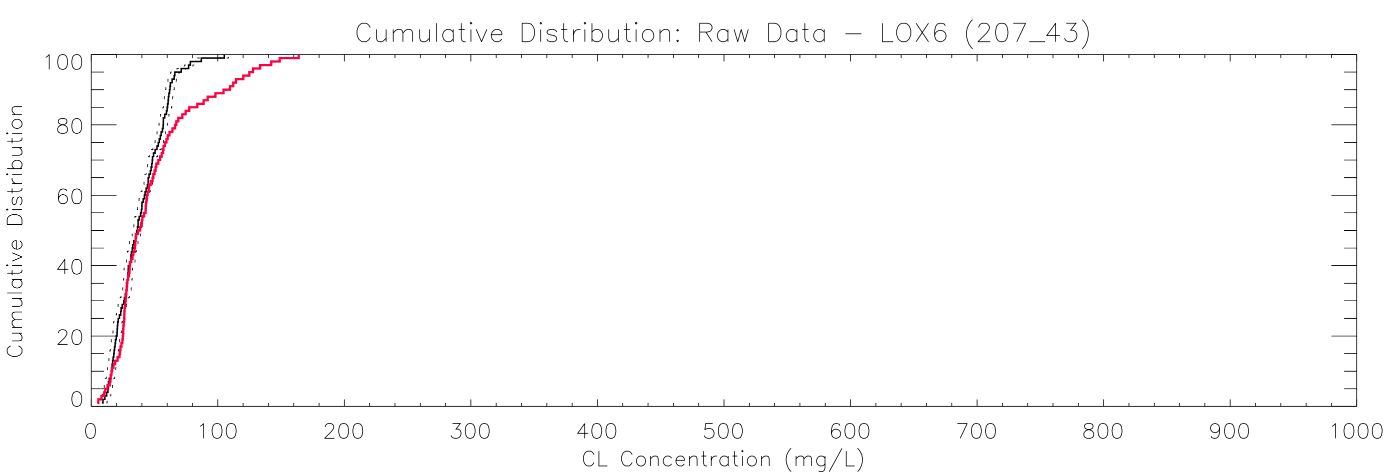
Cumulative Distribution: Raw Data – LOX7 (198_40)

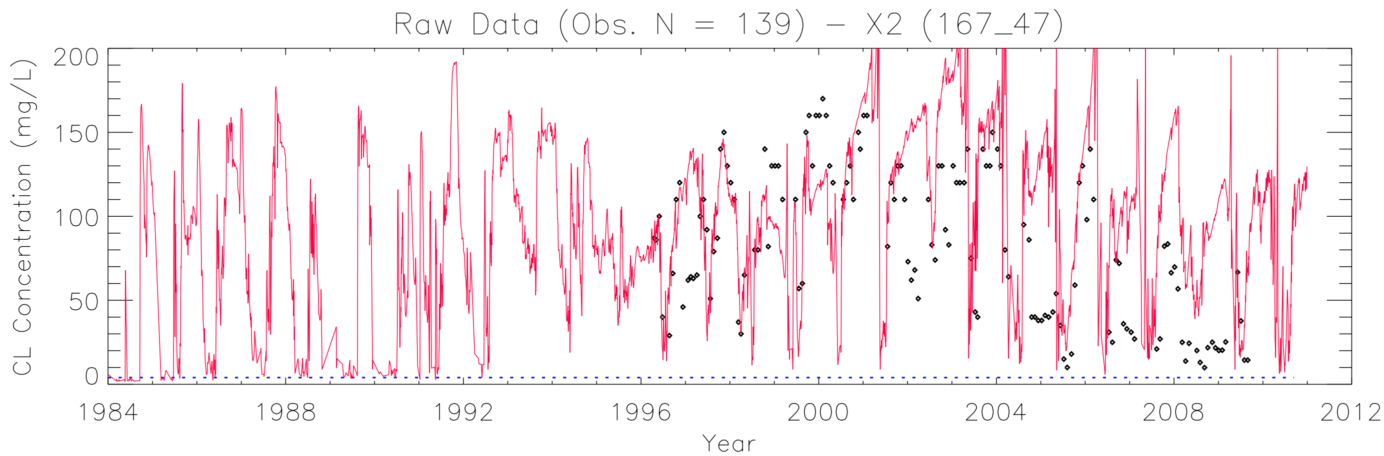


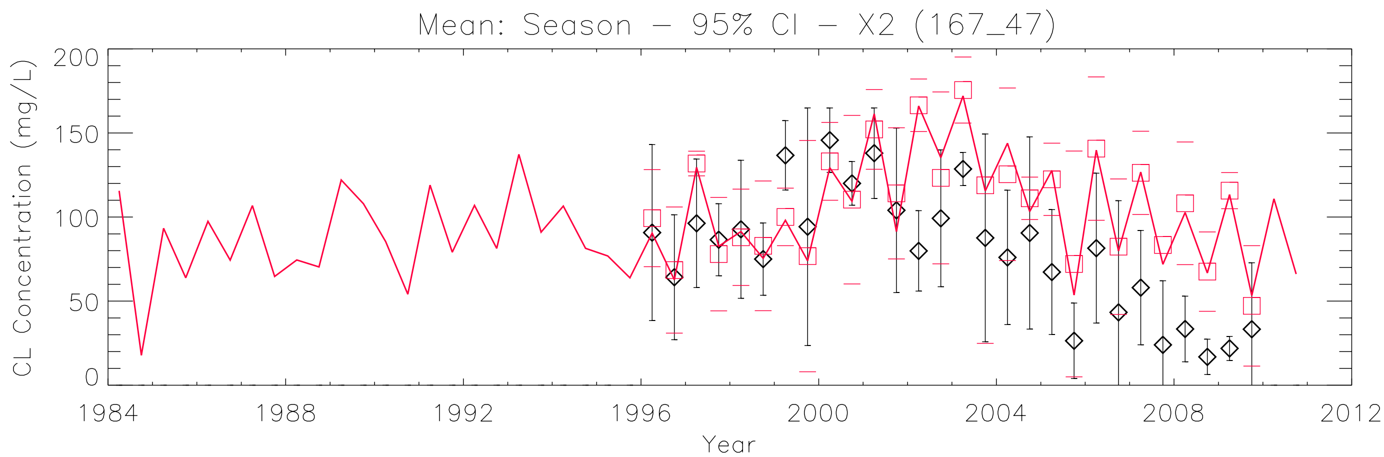

Raw Data (Obs. N = 100) – LOX6 (207_43)
CL Concentration (mg/L)
Year

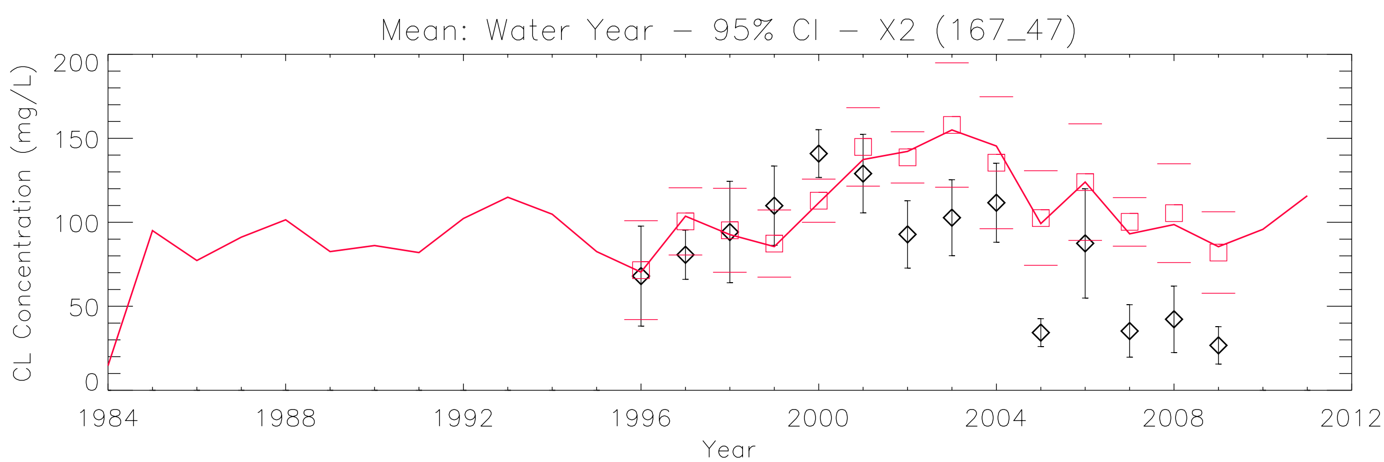

Mean: Season – 95% CI – LOX6 (207_43)
CL Concentration (mg/L)
Year

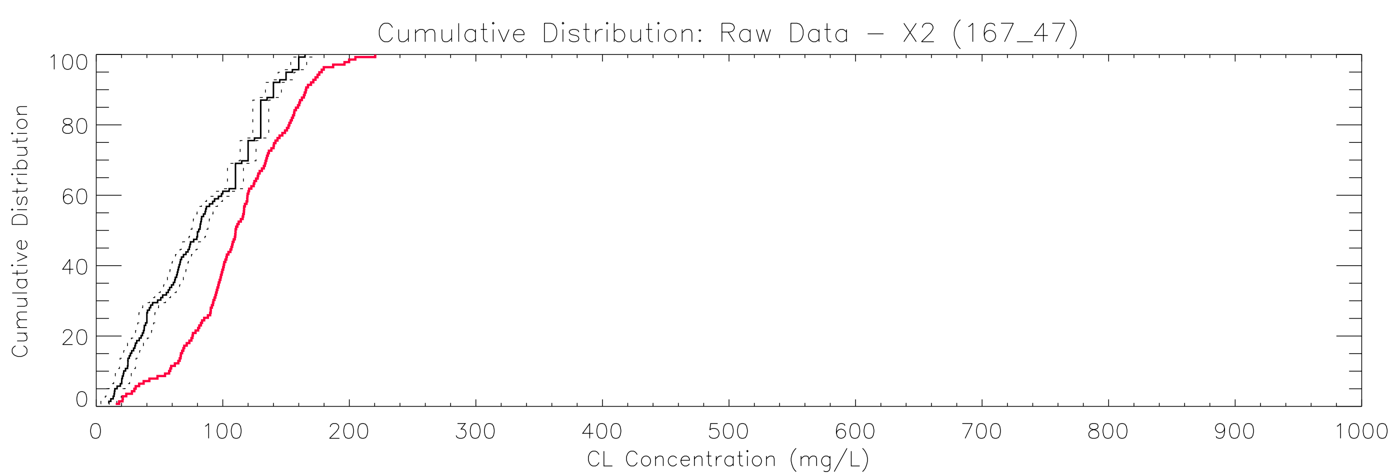

Mean: Water Year – 95% CI – LOX6 (207_43)
CL Concentration (mg/L)
Year

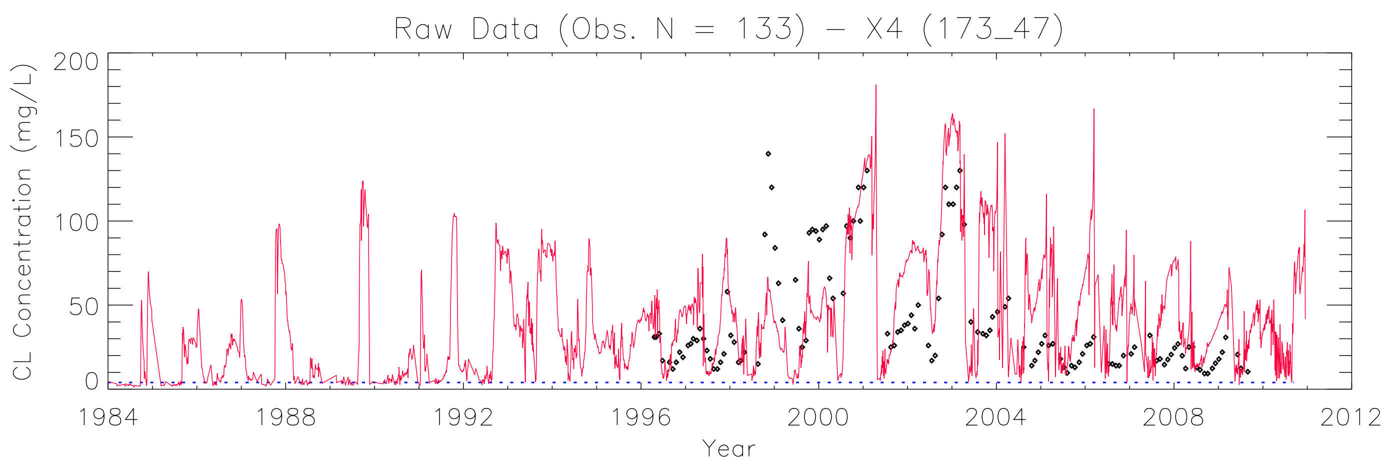

Cumulative Distribution: Raw Data – LOX6 (207_43)
Cumulative Distribution
CL Concentration (mg/L)

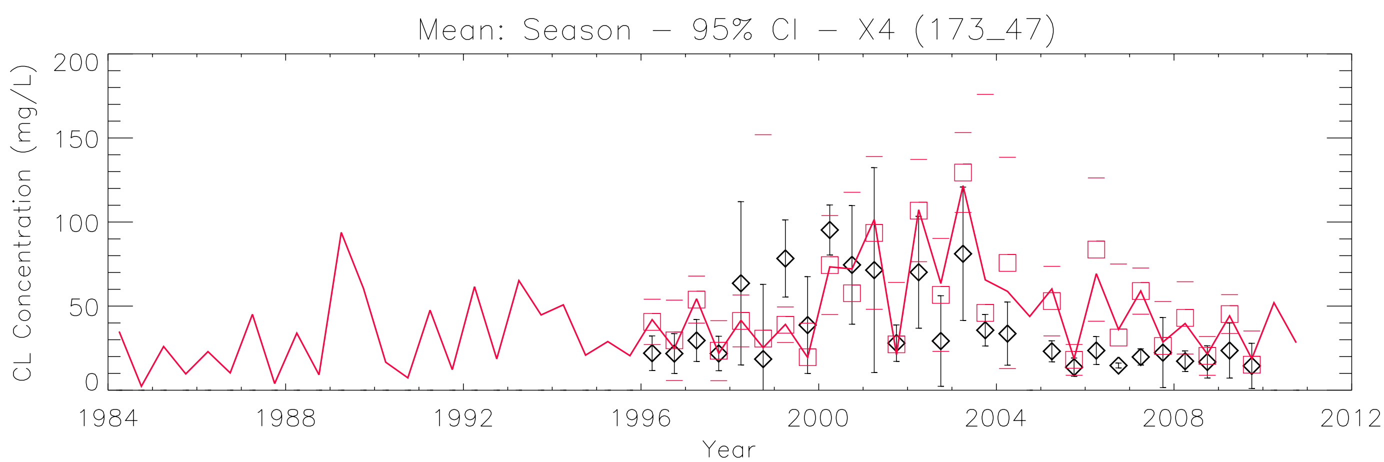

Raw Data (Obs. N = 139) – X2 (167_47)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

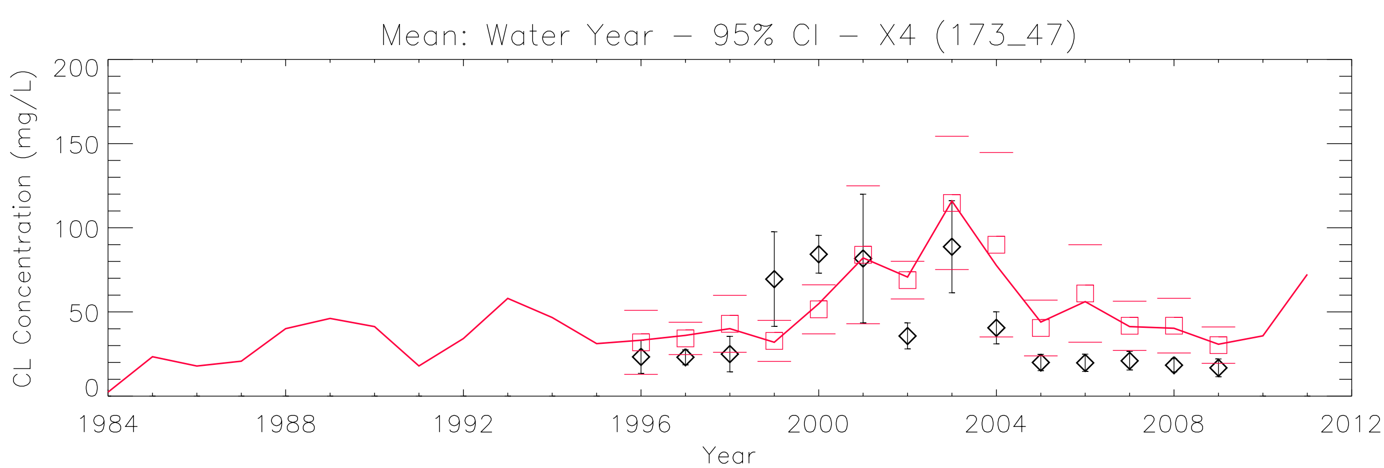

Mean: Season – 95% CI – X2 (167_47)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

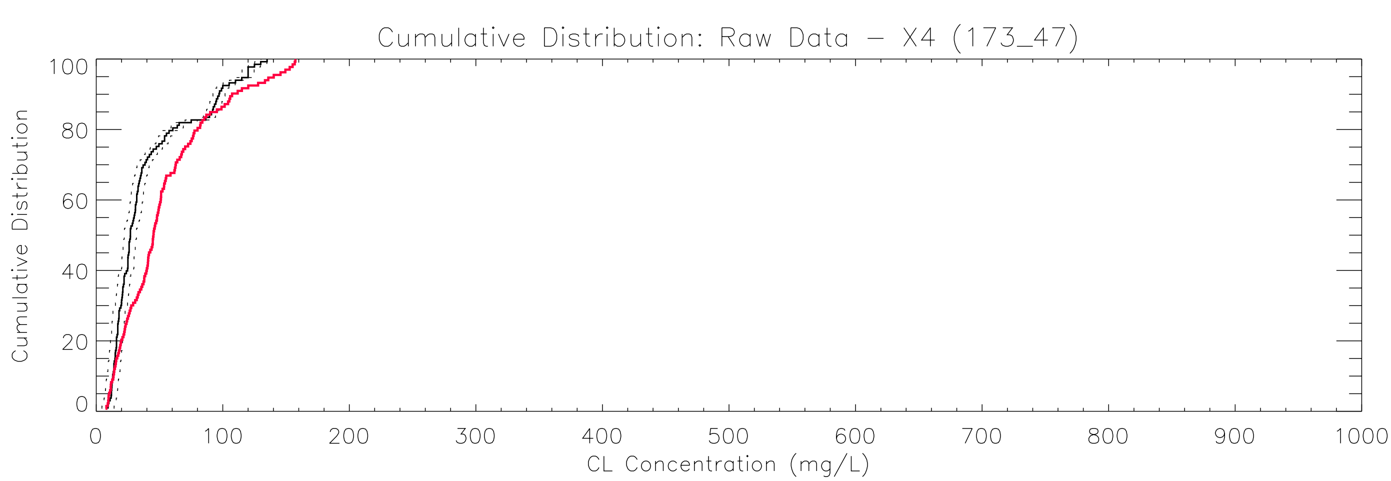

Mean: Water Year – 95% CI – X2 (167_47)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

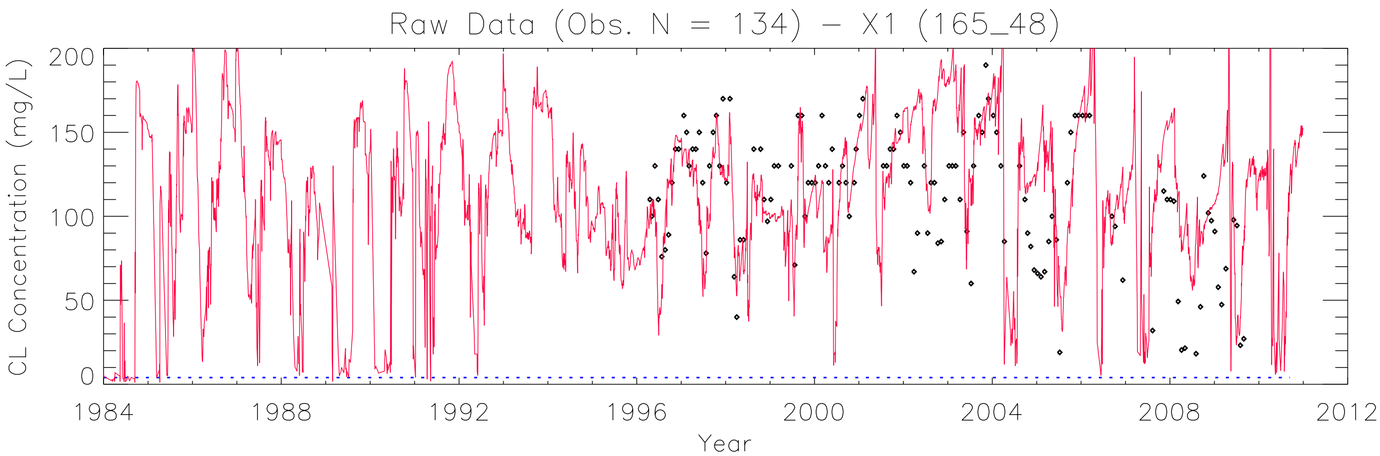

Cumulative Distribution: Raw Data – X2 (167_47)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000


Raw Data (Obs. N = 133) – X4 (173_47)
CL Concentration (mg/L)
Year

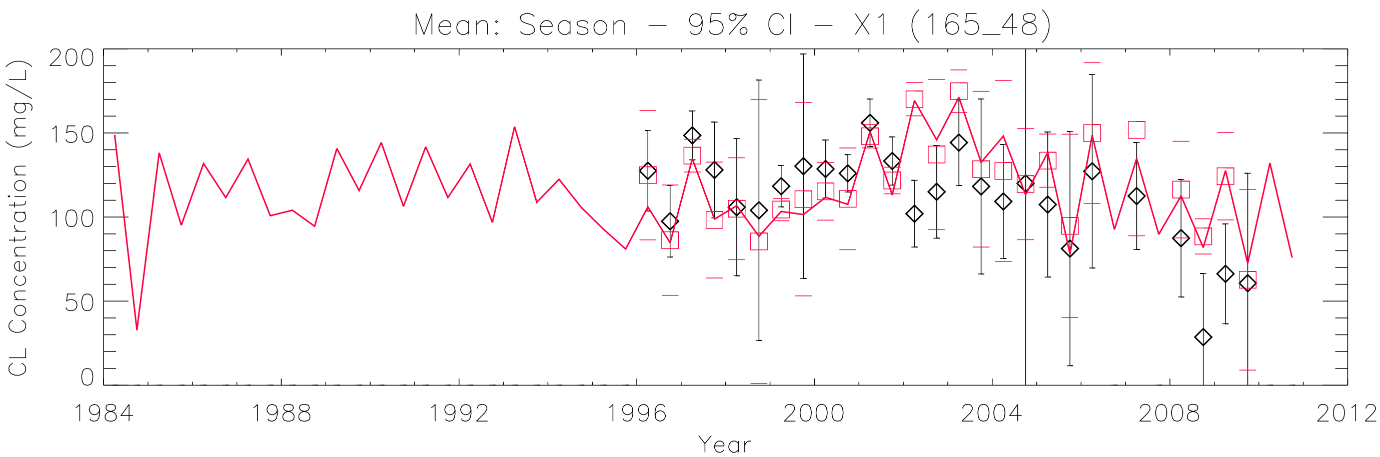

Mean: Season – 95% CI – X4 (173_47)
CL Concentration (mg/L)
Year


Mean: Water Year – 95% CI – X4 (173_47)
CL Concentration (mg/L)
Year

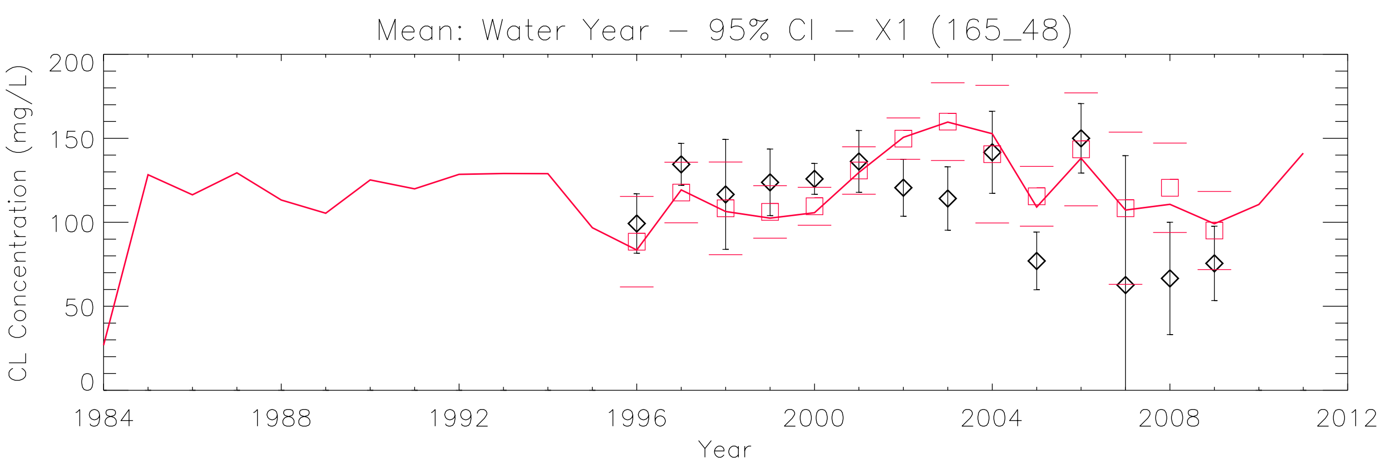

Cumulative Distribution: Raw Data – X4 (173_47)
Cumulative Distribution
CL Concentration (mg/L)



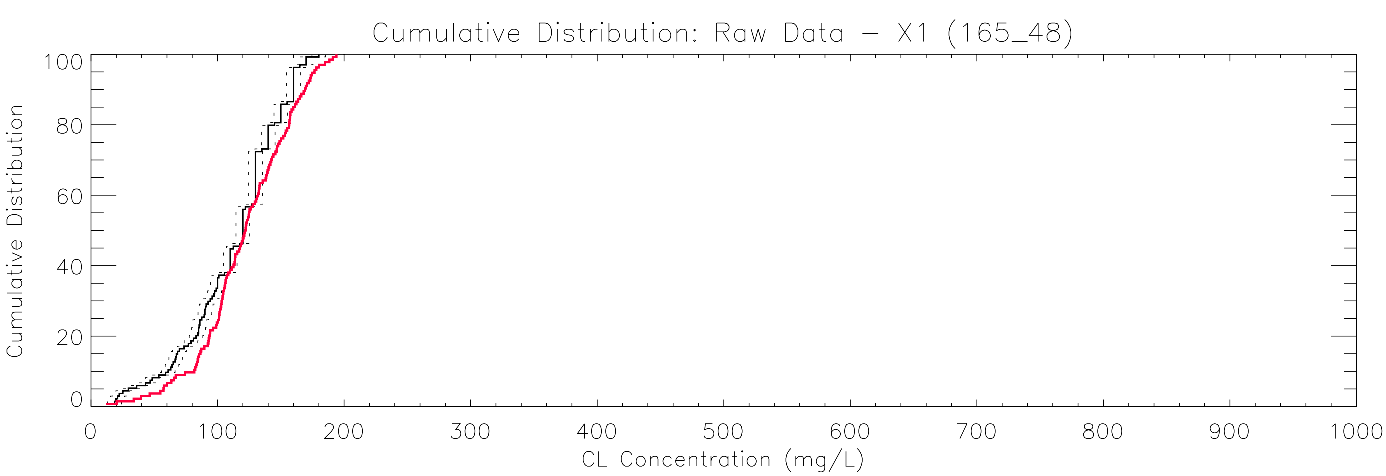
Raw Data (Obs. N = 134) – X1 (165_48)
CL Concentration (mg/L)
Year



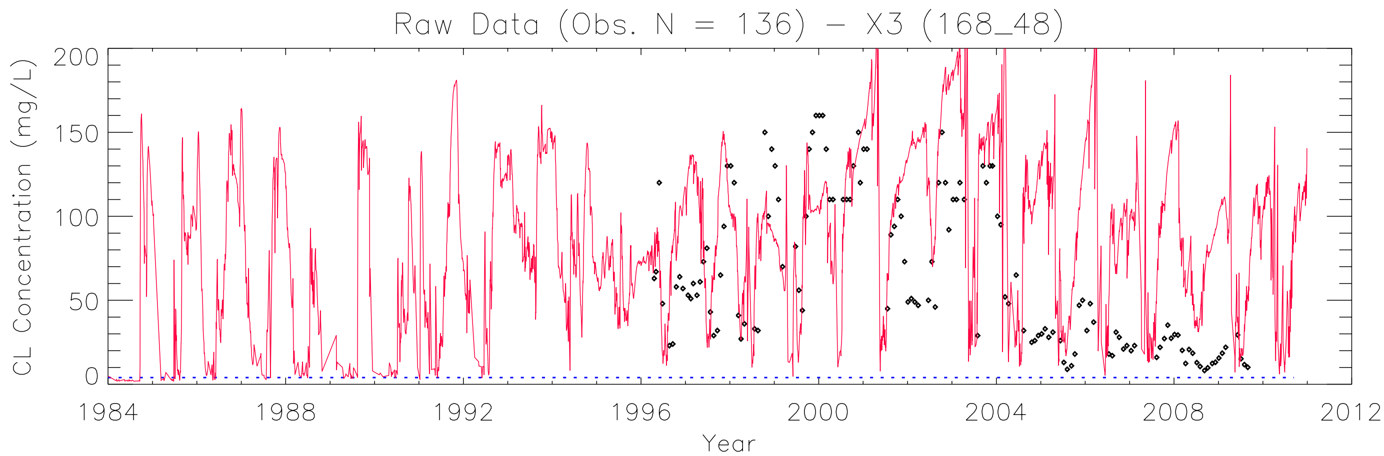
Mean: Season – 95% CI – X1 (165_48)
CL Concentration (mg/L)
Year

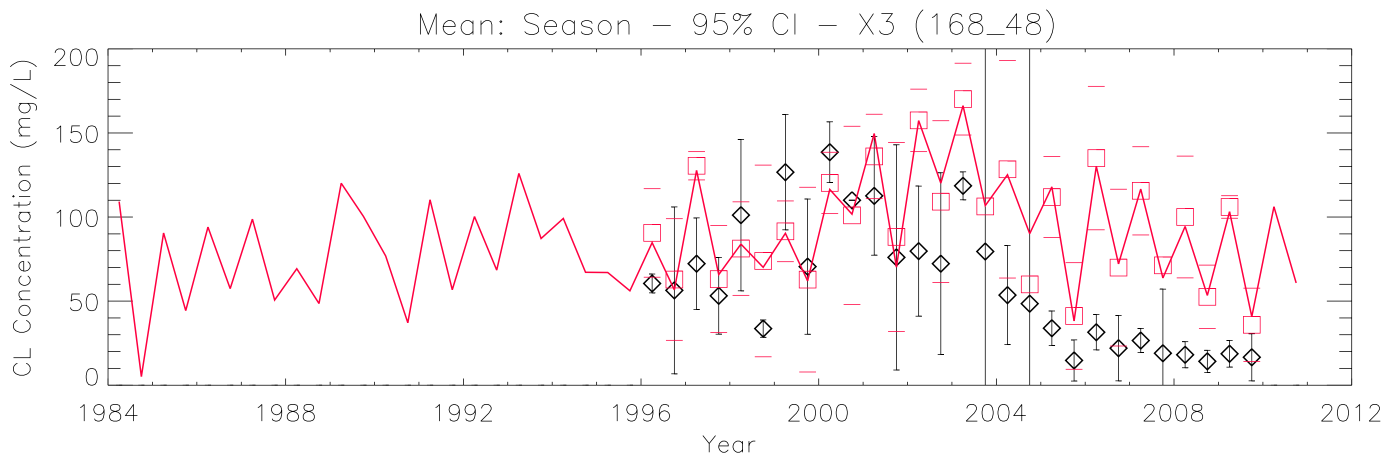


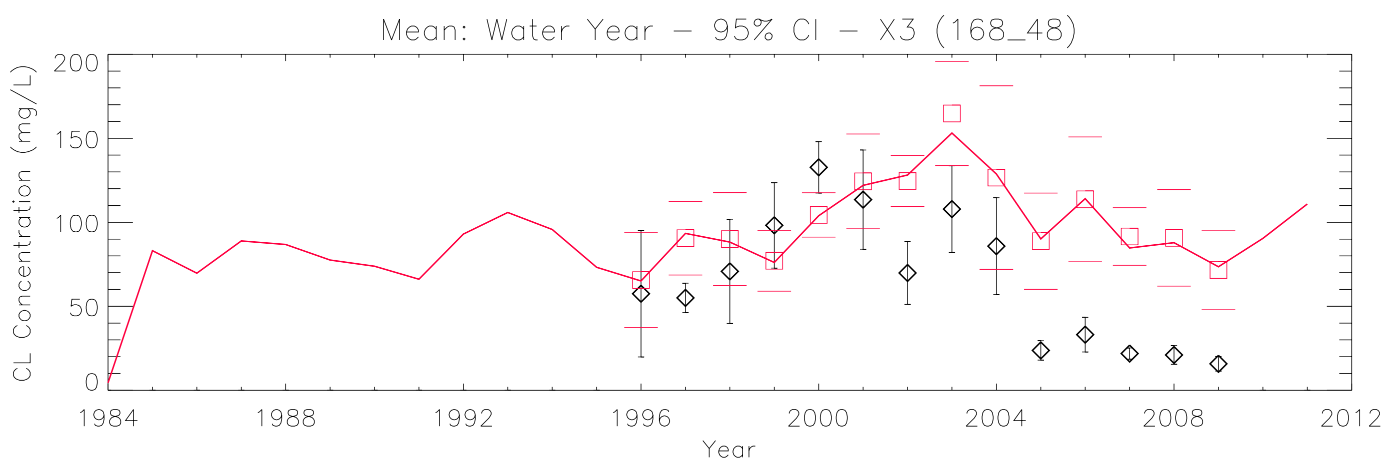
Mean: Water Year – 95% CI – X1 (165_48)
CL Concentration (mg/L)
Year

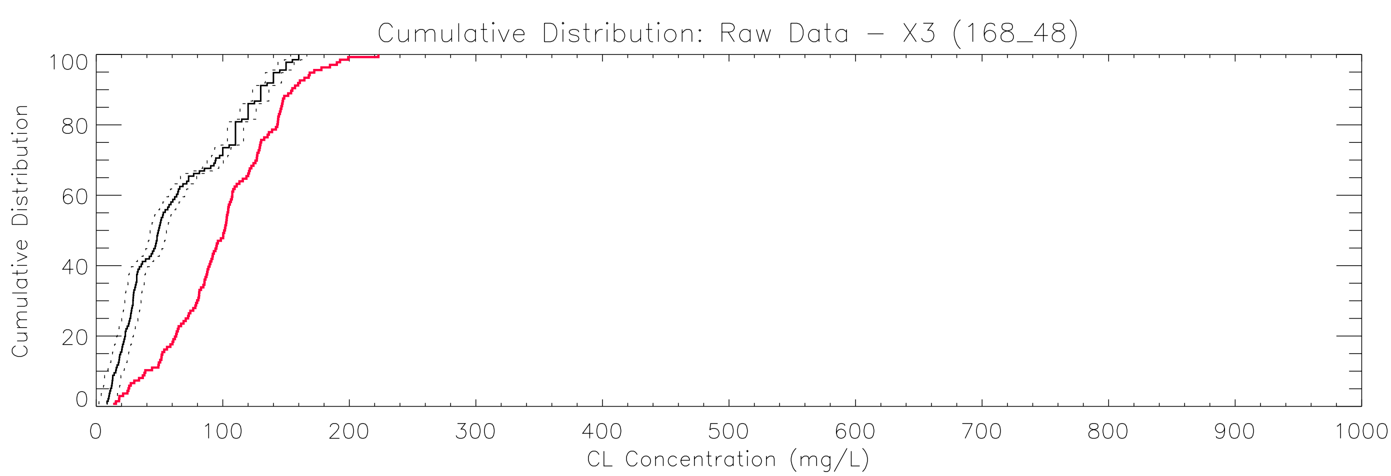


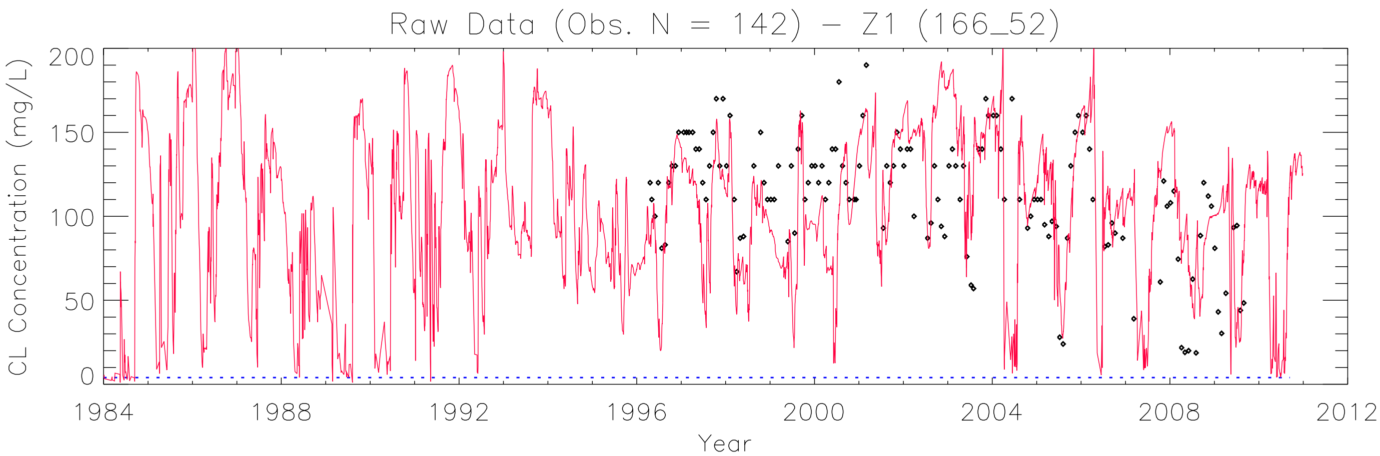
Cumulative Distribution: Raw Data – X1 (165_48)
Cumulative Distribution
CL Concentration (mg/L)


Raw Data (Obs. N = 136) – X3 (168_48)
CL Concentration (mg/L)
Year

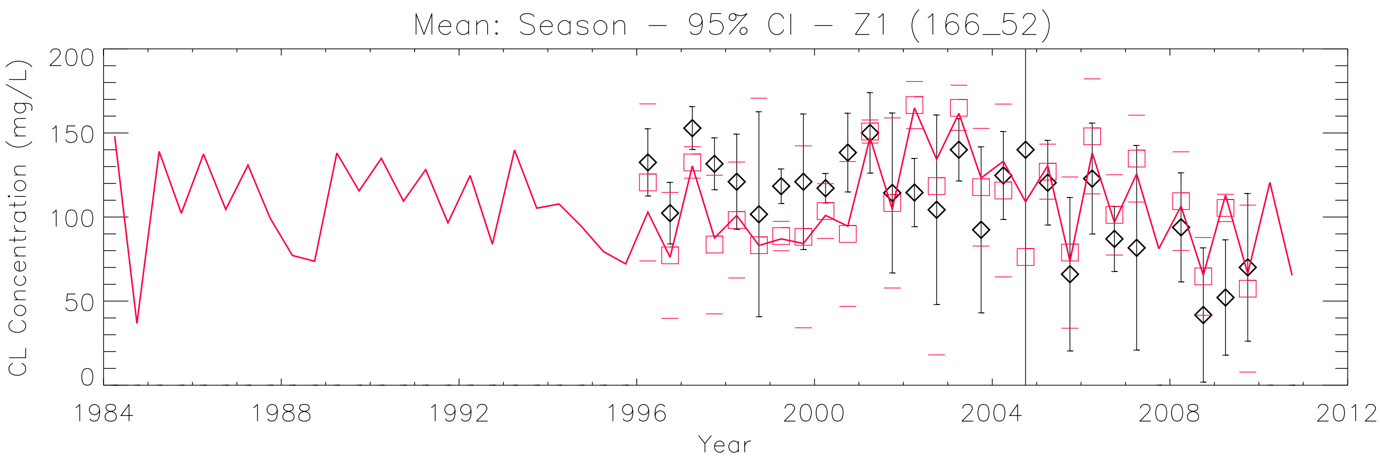

Mean: Season – 95% CI – X3 (168_48)
CL Concentration (mg/L)
Year


Mean: Water Year – 95% CI – X3 (168_48)
CL Concentration (mg/L)
Year

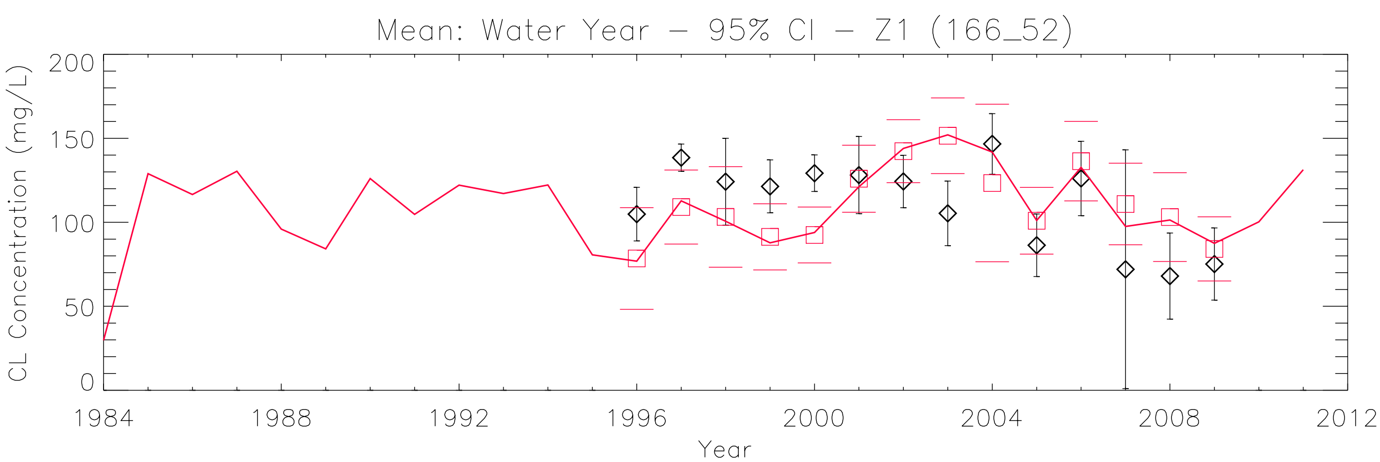

Cumulative Distribution: Raw Data – X3 (168_48)
Cumulative Distribution
CL Concentration (mg/L)



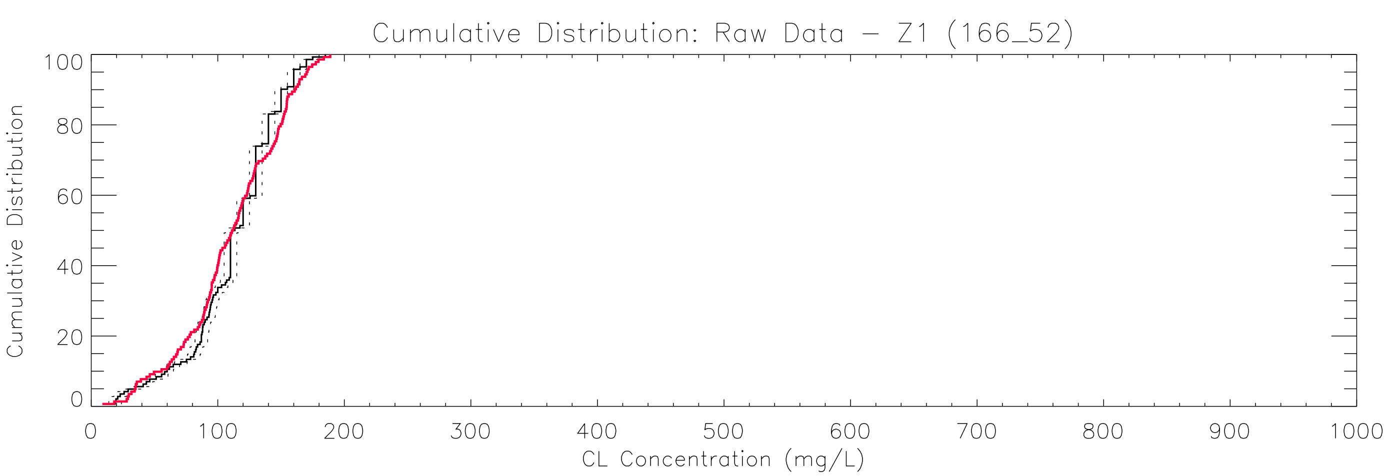
Raw Data (Obs. N = 142) – Z1 (166_52)
CL Concentration (mg/L)
Year



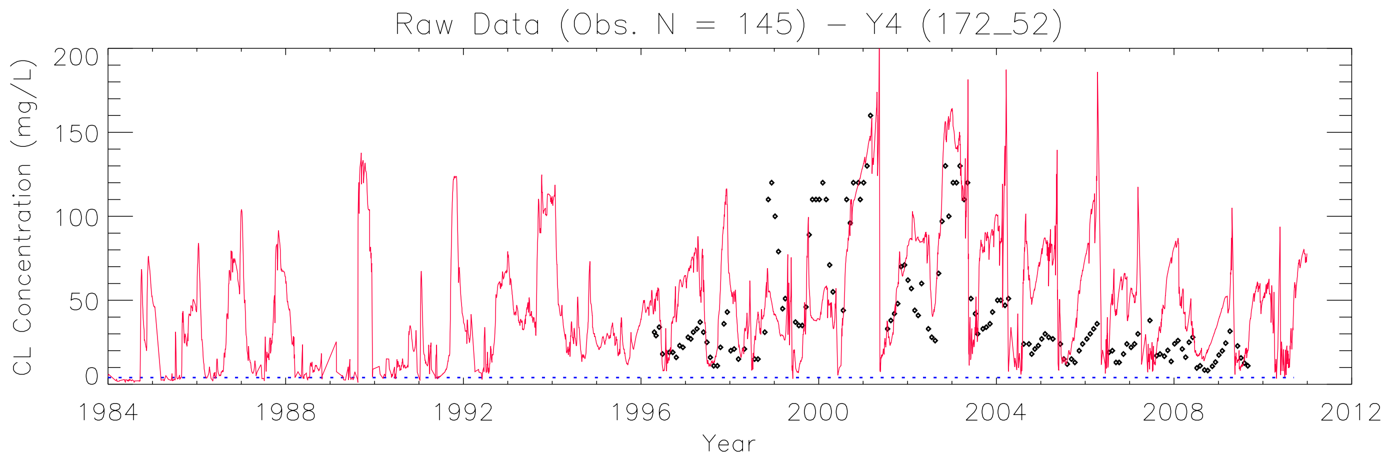
Mean: Season – 95% CI – Z1 (166_52)
CL Concentration (mg/L)
Year

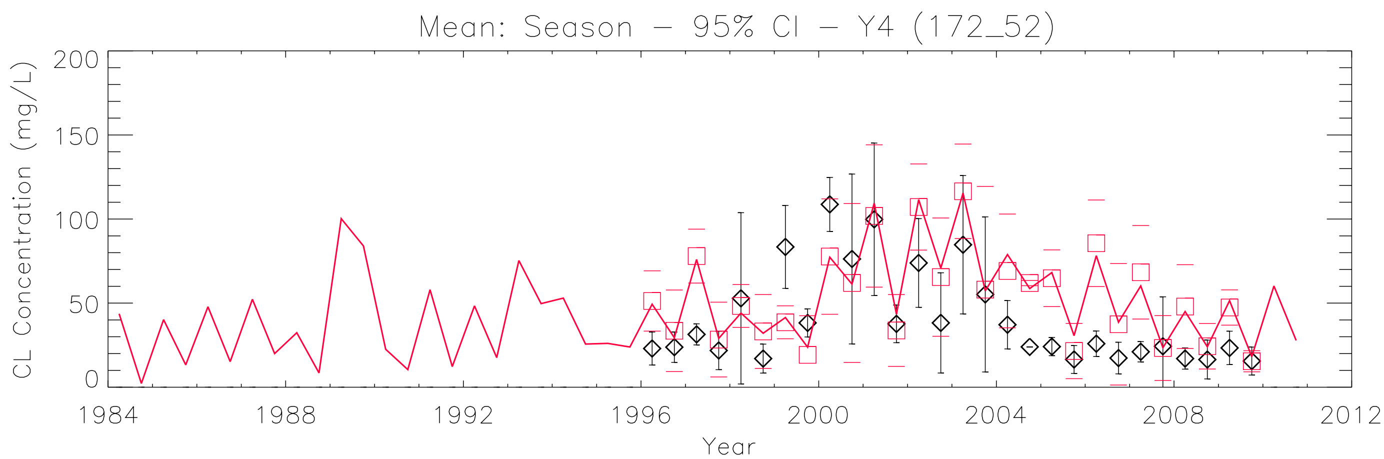


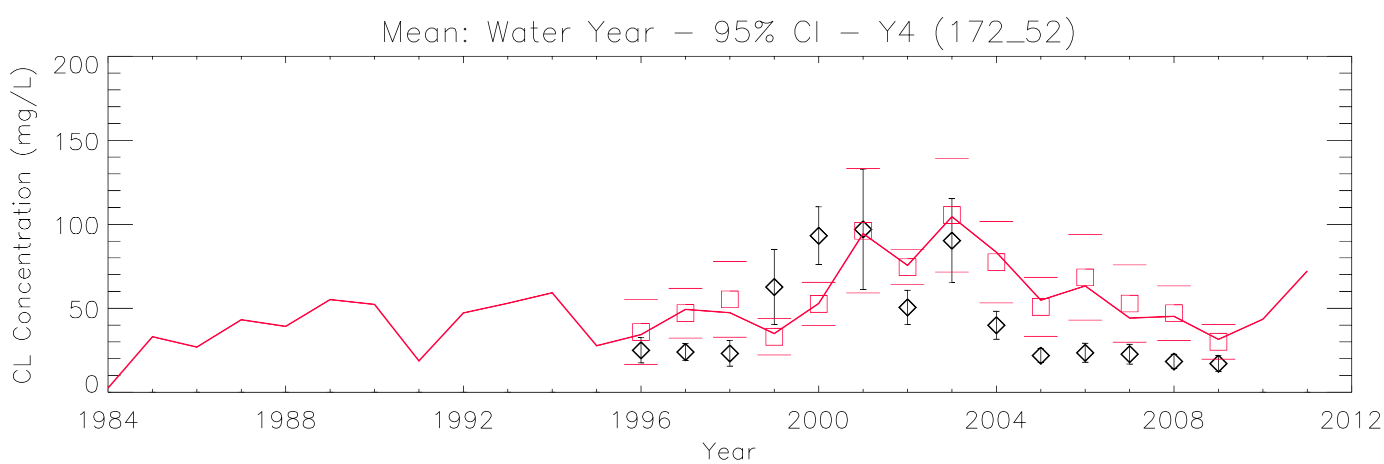
Mean: Water Year – 95% CI – Z1 (166_52)
CL Concentration (mg/L)
Year

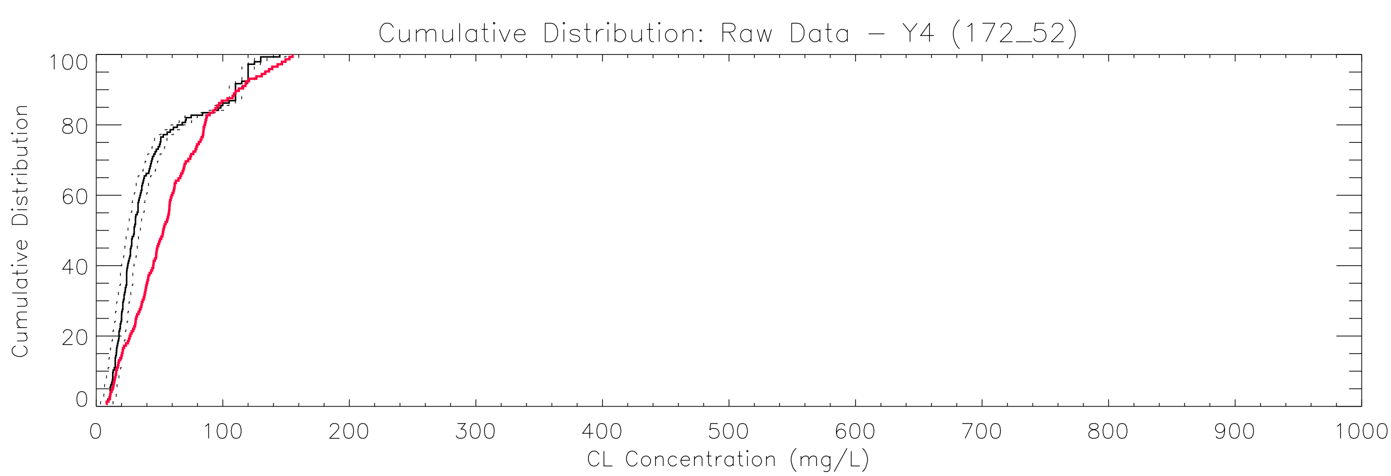


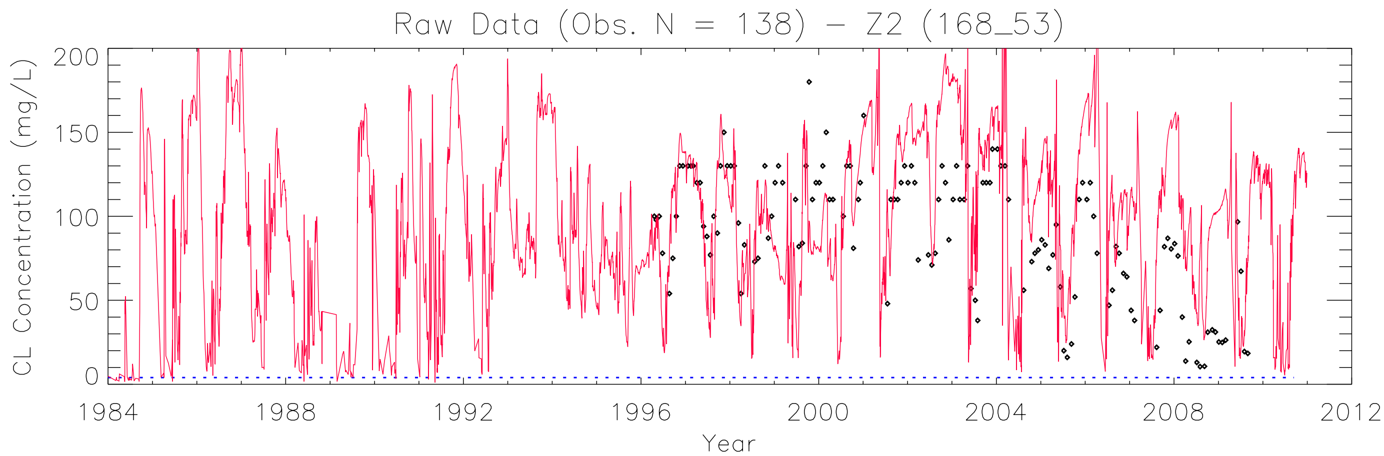
Cumulative Distribution: Raw Data – Z1 (166_52)
Cumulative Distribution
CL Concentration (mg/L)

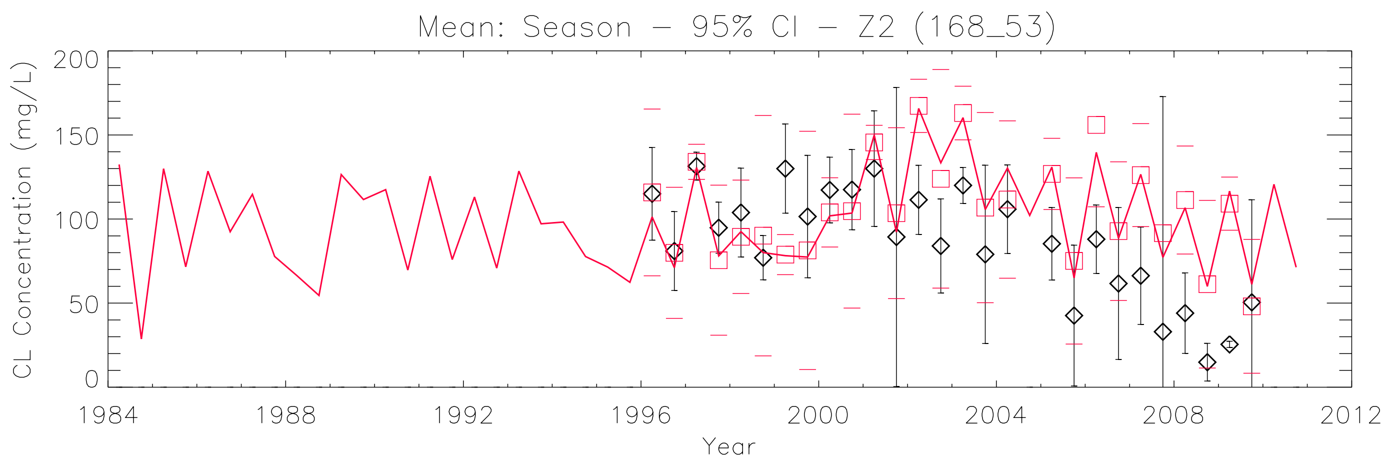

Raw Data (Obs. N = 145) – Y4 (172_52)
CL Concentration (mg/L)
Year

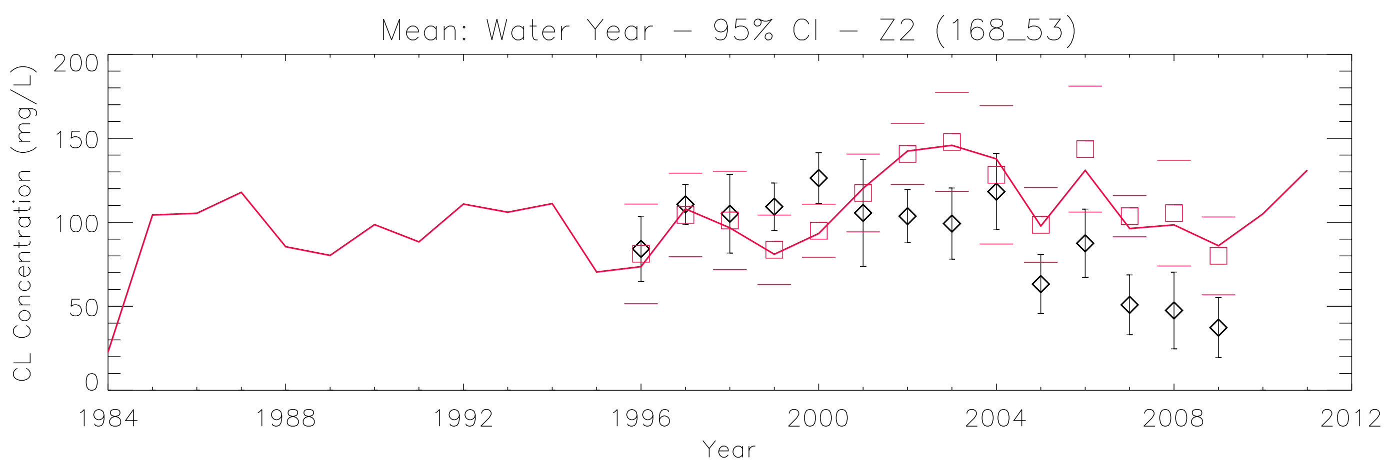

Mean: Season – 95% CI – Y4 (172_52)
CL Concentration (mg/L)
Year

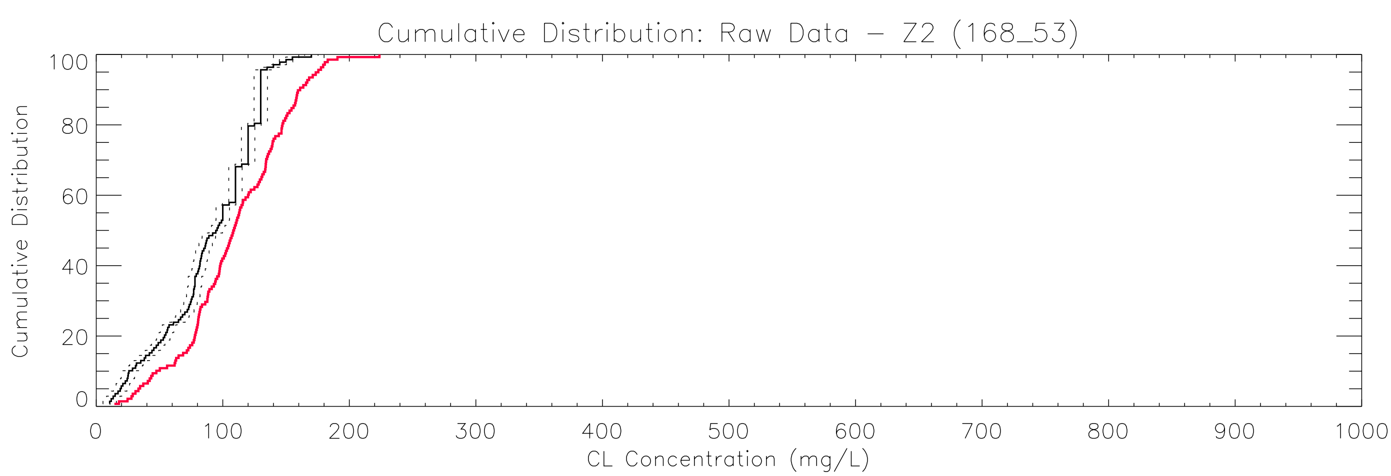

Mean: Water Year – 95% CI – Y4 (172_52)
CL Concentration (mg/L)
Year

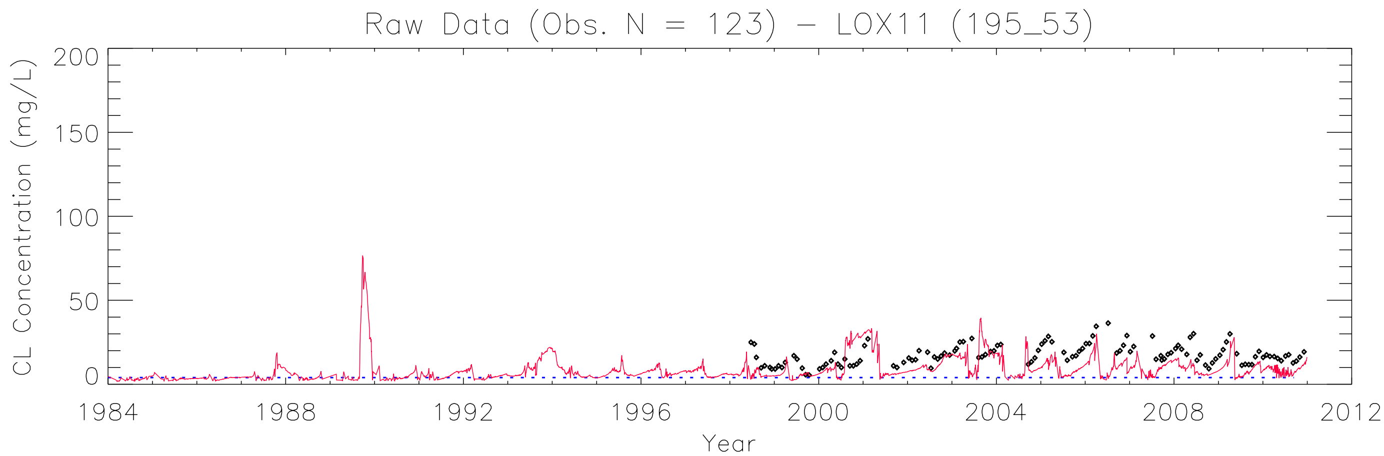

Cumulative Distribution: Raw Data – Y4 (172_52)
Cumulative Distribution
CL Concentration (mg/L)

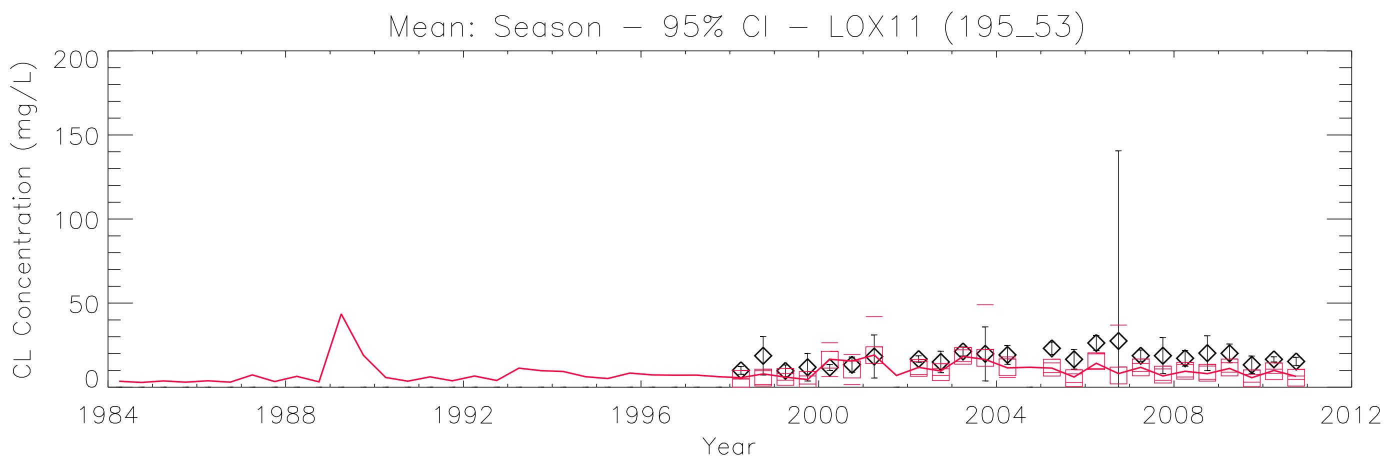

Raw Data (Obs. N = 138) – Z2 (168_53)
CL Concentration (mg/L)
Year

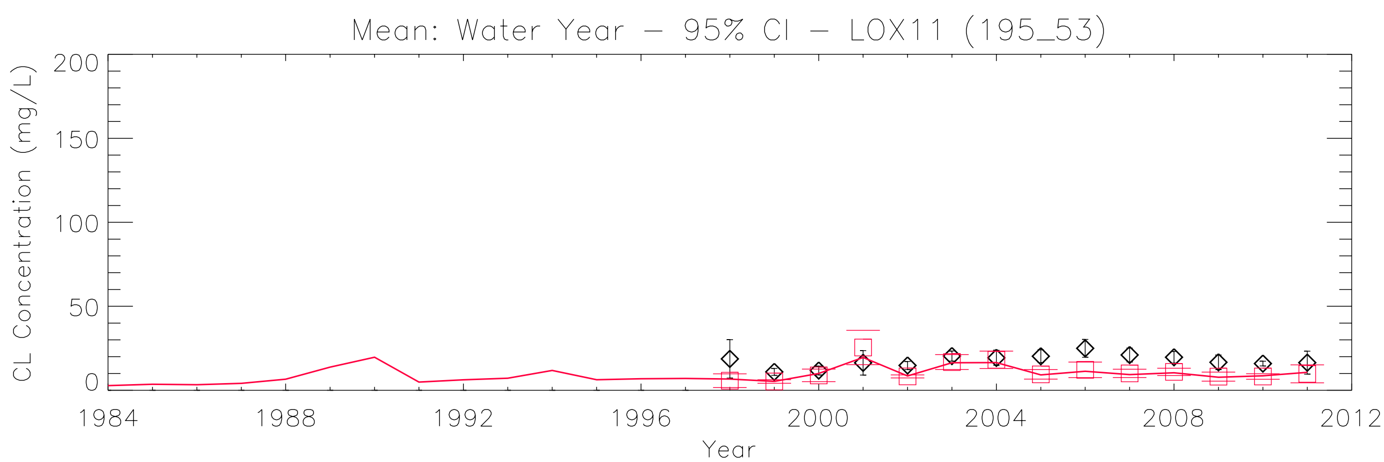

Mean: Season – 95% CI – Z2 (168_53)
CL Concentration (mg/L)
Year

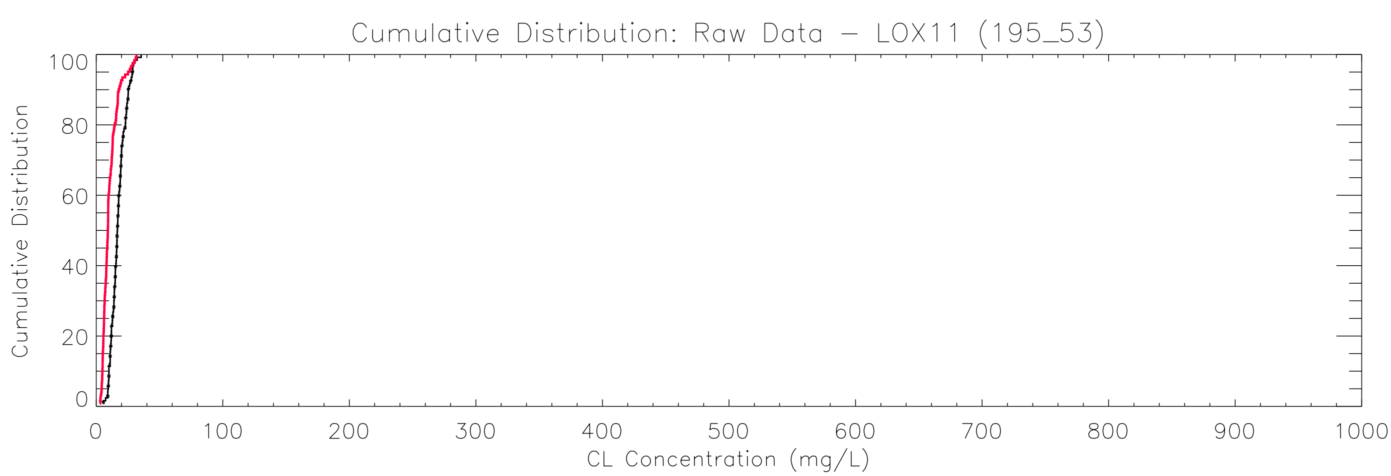

Mean: Water Year – 95% CI – Z2 (168_53)
CL Concentration (mg/L)
Year

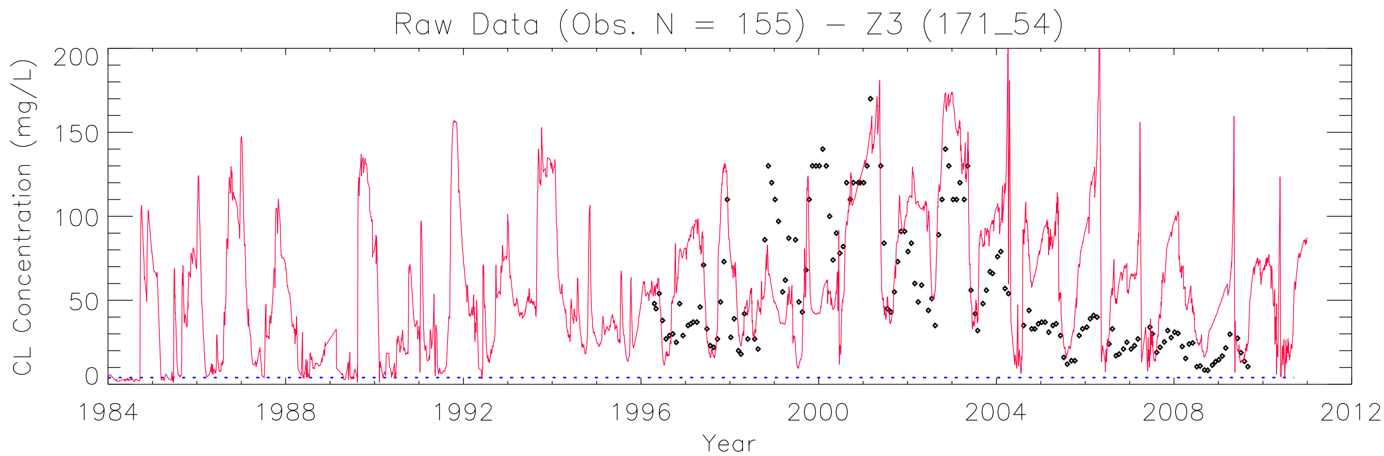

Cumulative Distribution: Raw Data – Z2 (168_53)
Cumulative Distribution
CL Concentration (mg/L)

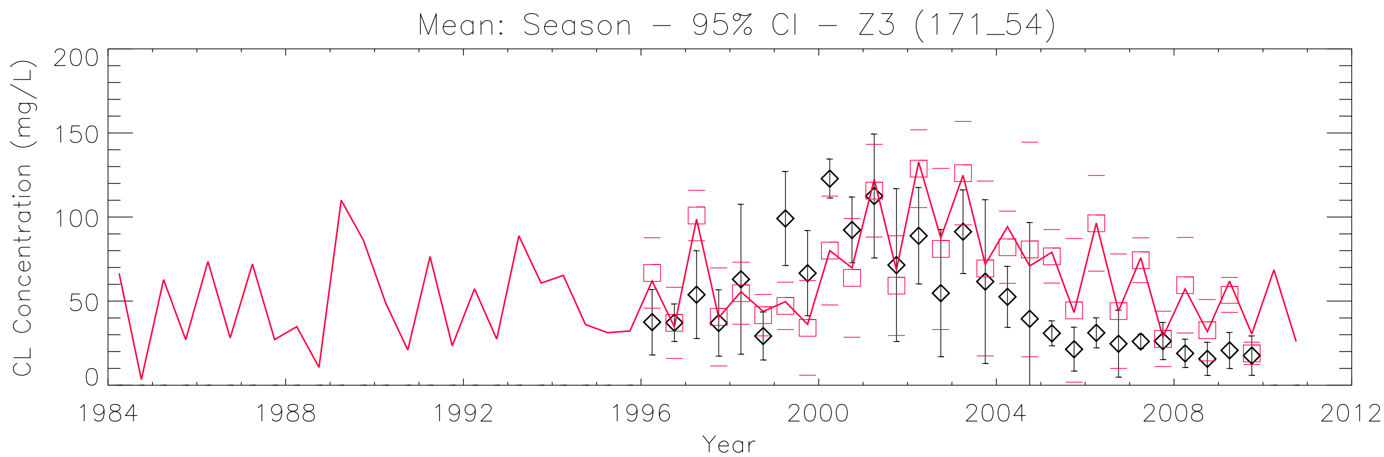

Raw Data (Obs. N = 123) – LOX11 (195_53)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

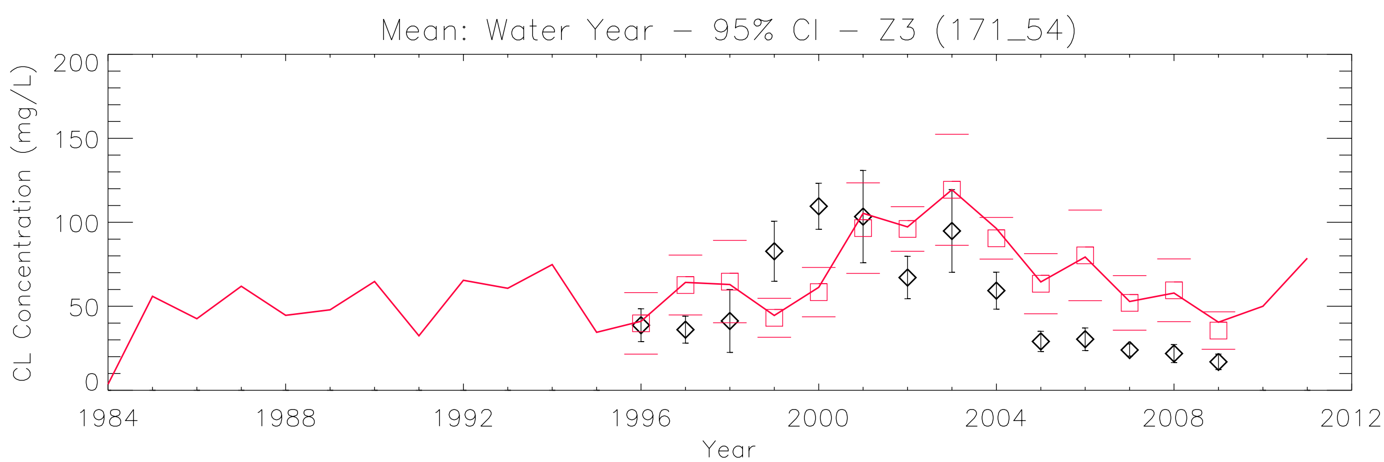

Mean: Season – 95% CI – LOX11 (195_53)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

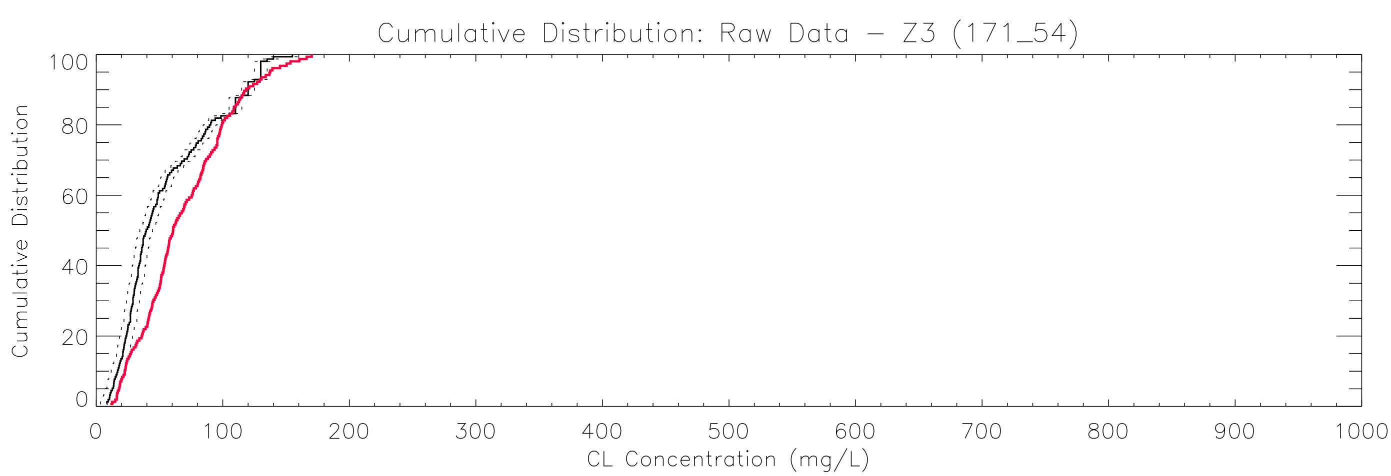

Mean: Water Year – 95% CI – LOX11 (195_53)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

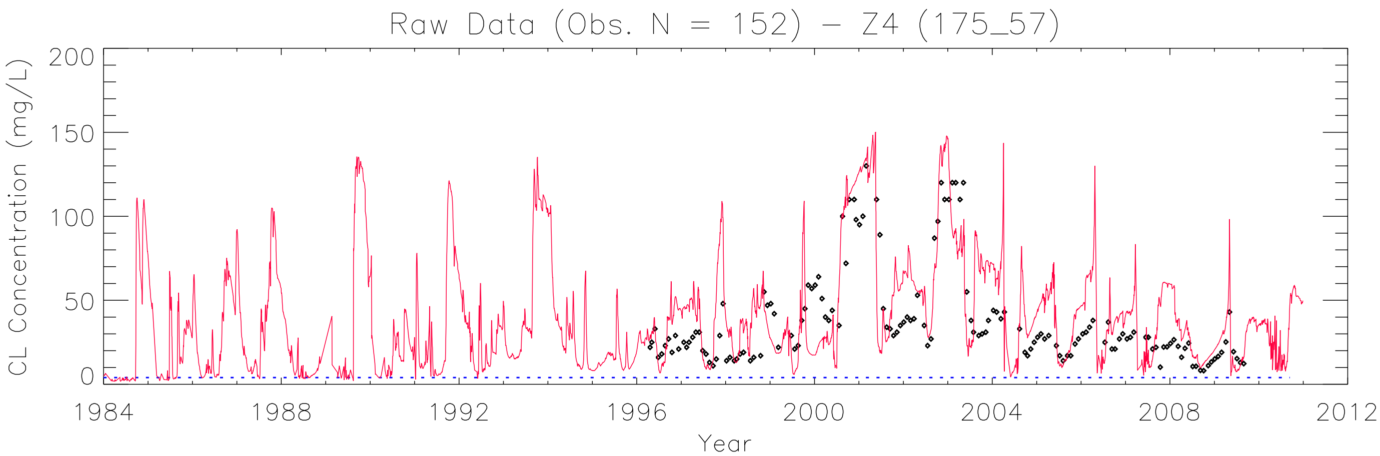

Cumulative Distribution: Raw Data – LOX11 (195_53)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000


Raw Data (Obs. N = 155) – Z3 (171_54)
CL Concentration (mg/L)
Year

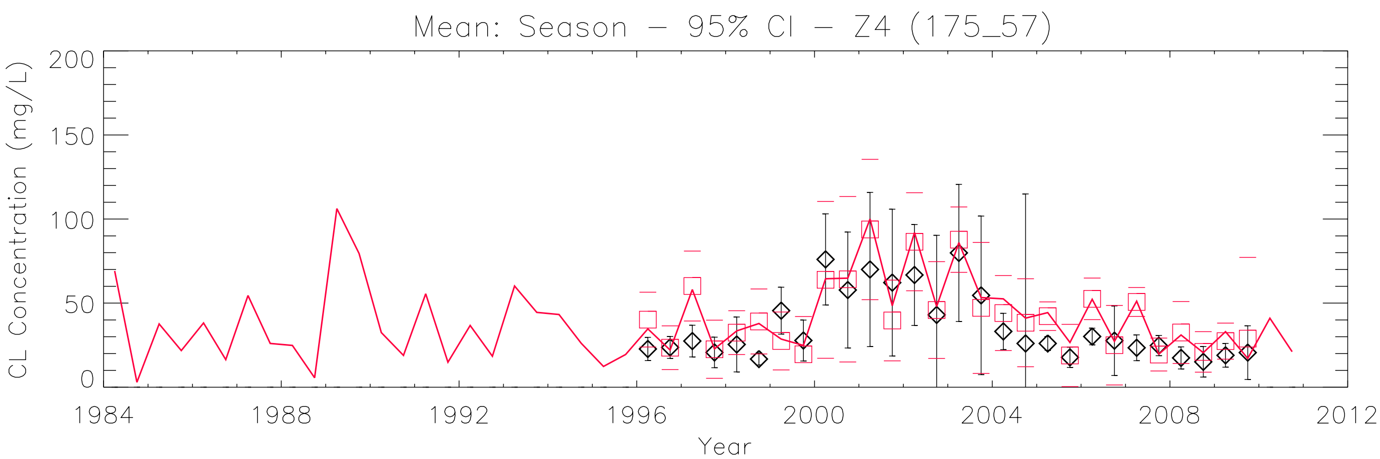

Mean: Season – 95% CI – Z3 (171_54)
CL Concentration (mg/L)
Year


Mean: Water Year – 95% CI – Z3 (171_54)
CL Concentration (mg/L)
Year

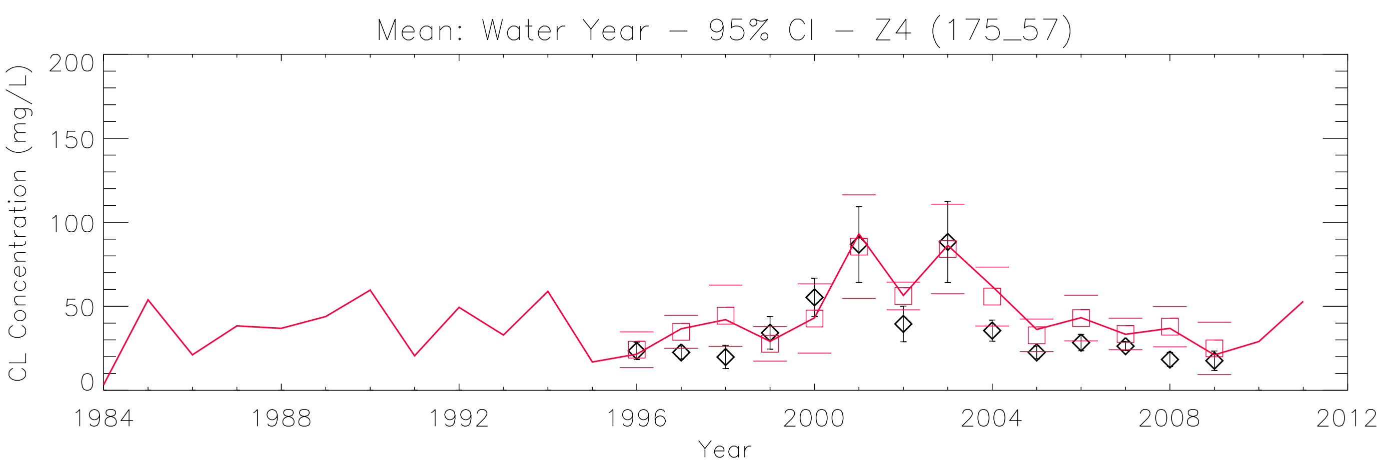

Cumulative Distribution: Raw Data – Z3 (171_54)
Cumulative Distribution
CL Concentration (mg/L)



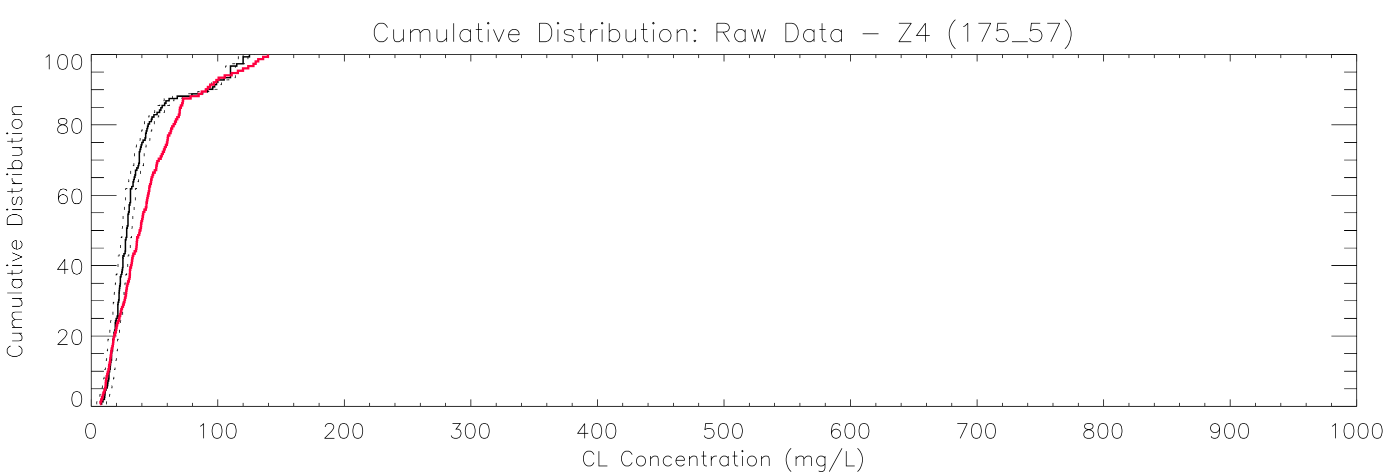
Raw Data (Obs. N = 152) - Z4 (175_57)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year



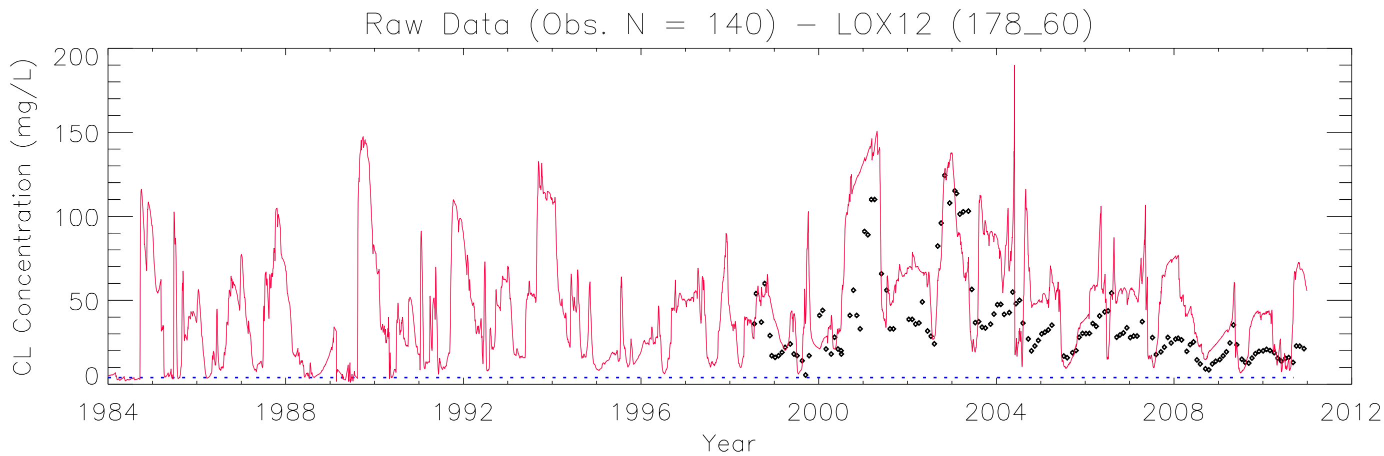
Mean: Season - 95% CI - Z4 (175_57)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year



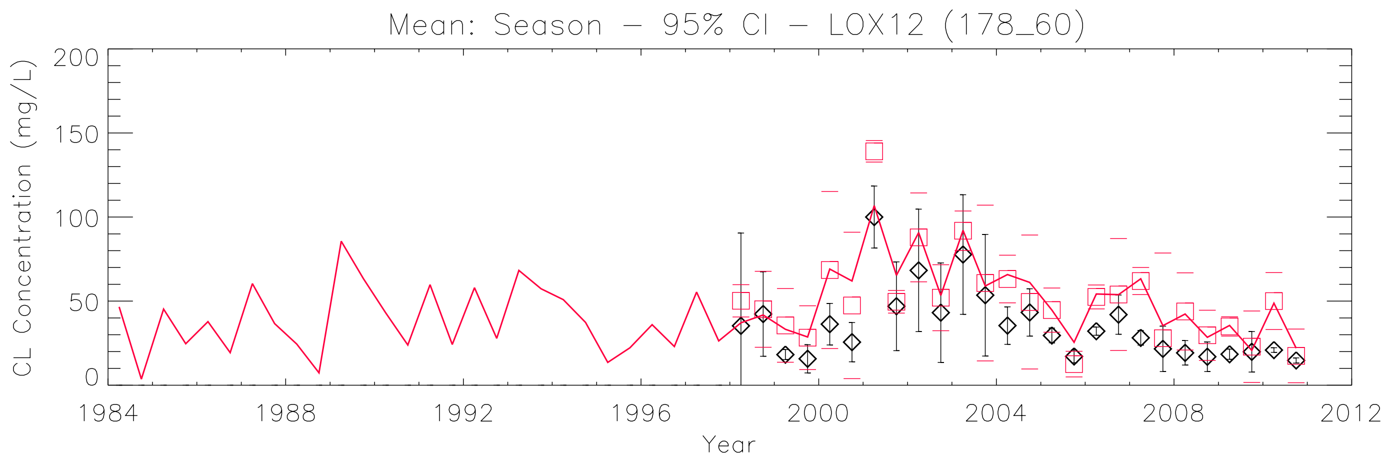
Mean: Water Year - 95% CI - Z4 (175_57)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year



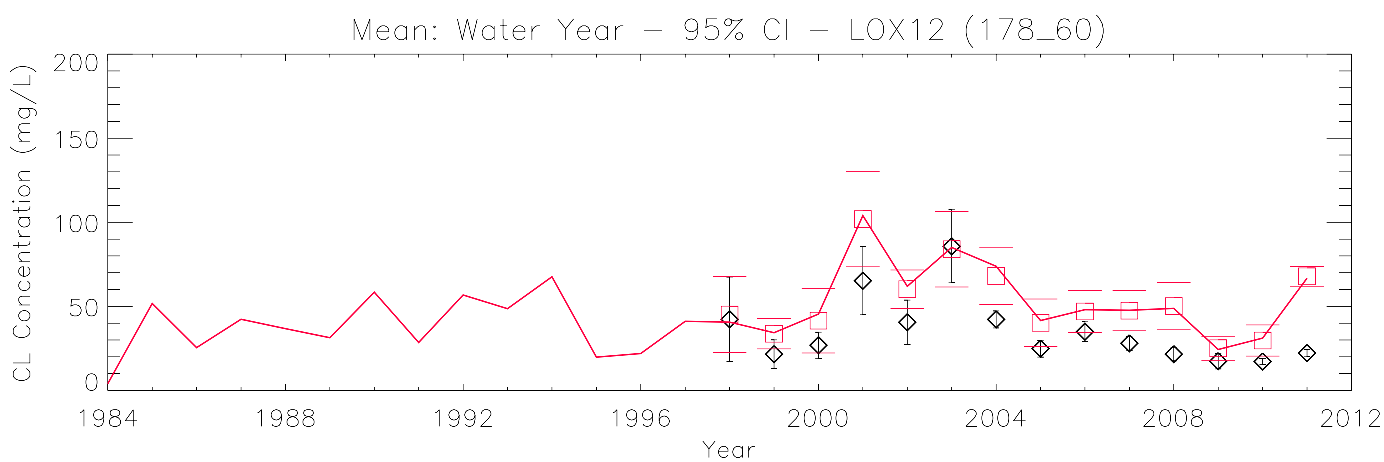
Cumulative Distribution: Raw Data - Z4 (175_57)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



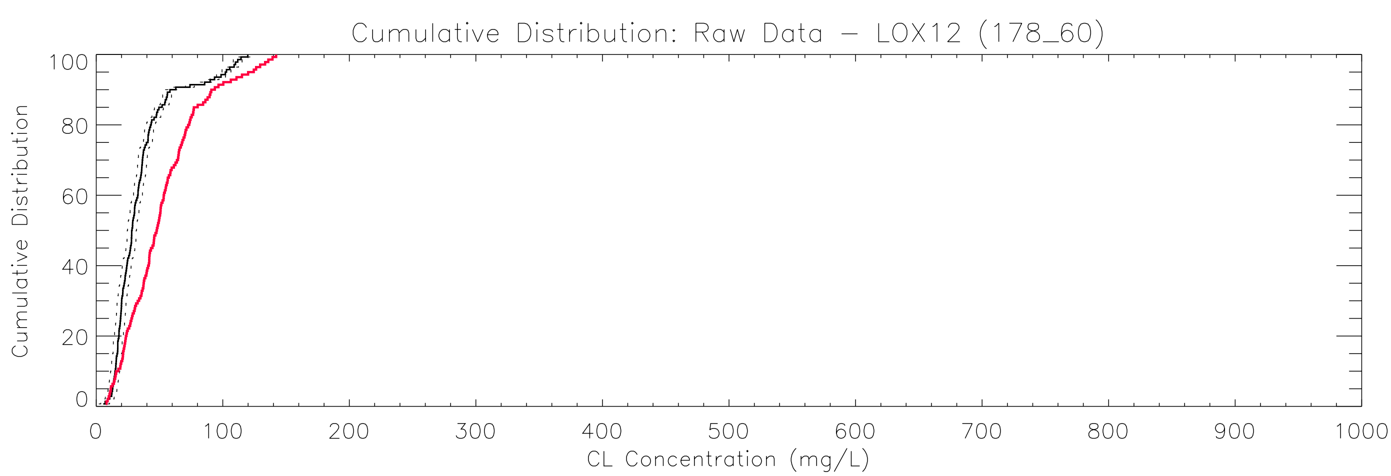
Raw Data (Obs. N = 140) – LOX12 (178_60)
CL Concentration (mg/L)
Year



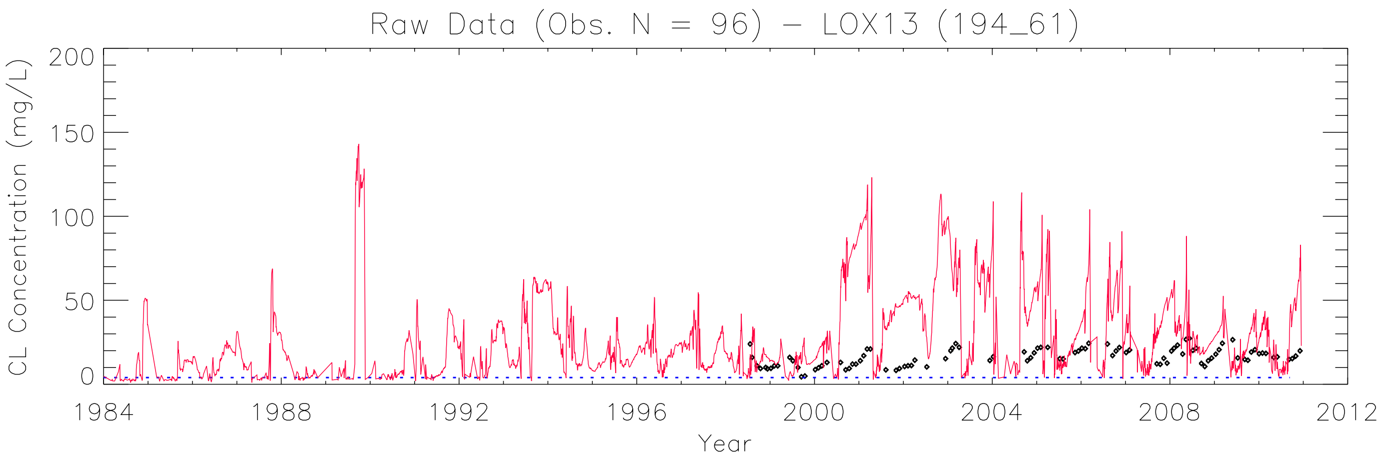
Mean: Season – 95% CI – LOX12 (178_60)
CL Concentration (mg/L)
Year

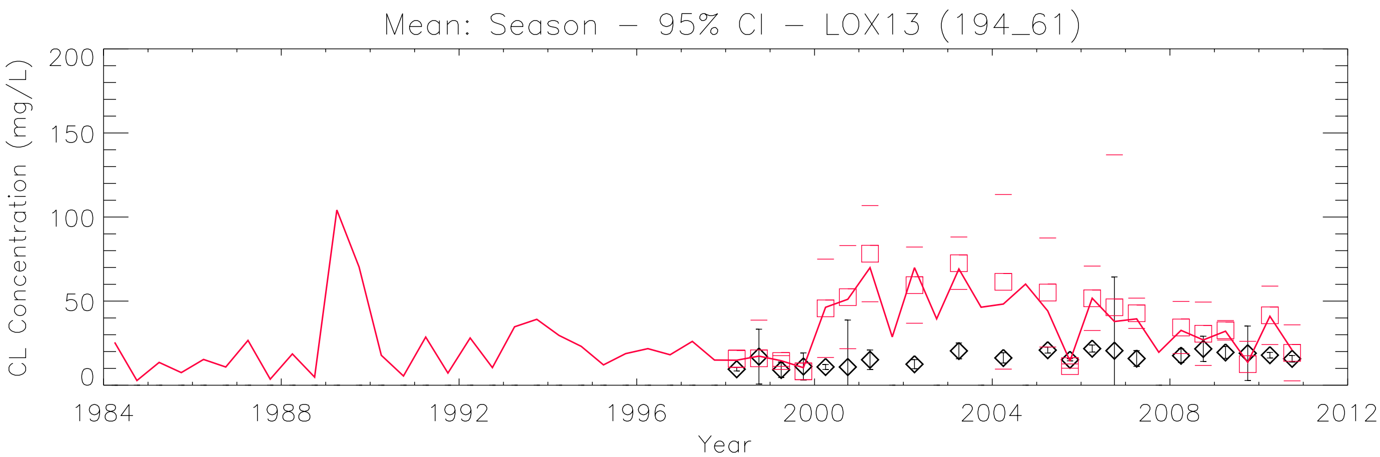


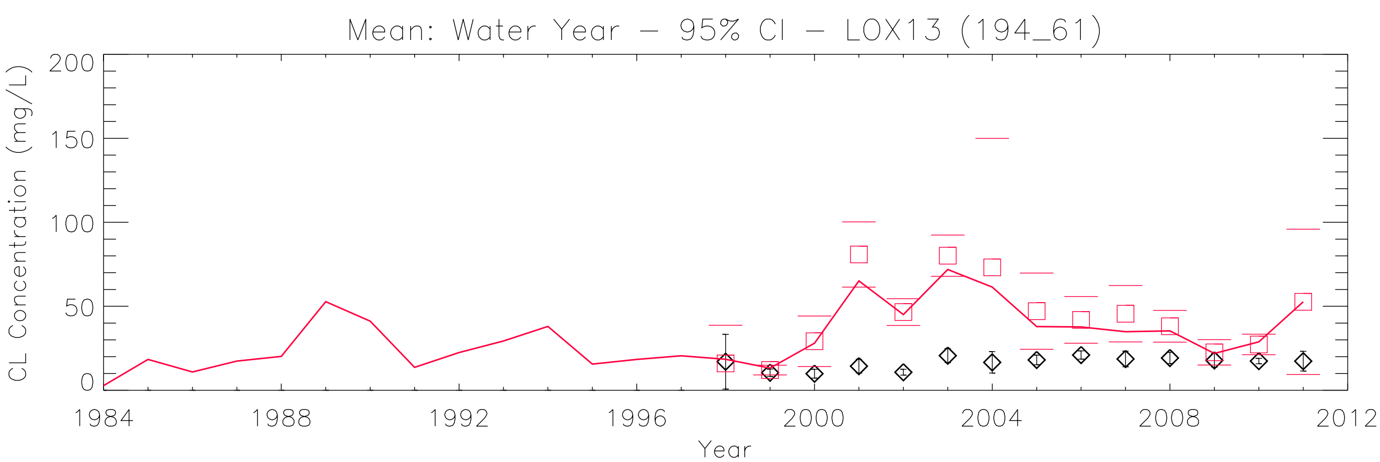
Mean: Water Year – 95% CI – LOX12 (178_60)
CL Concentration (mg/L)
Year

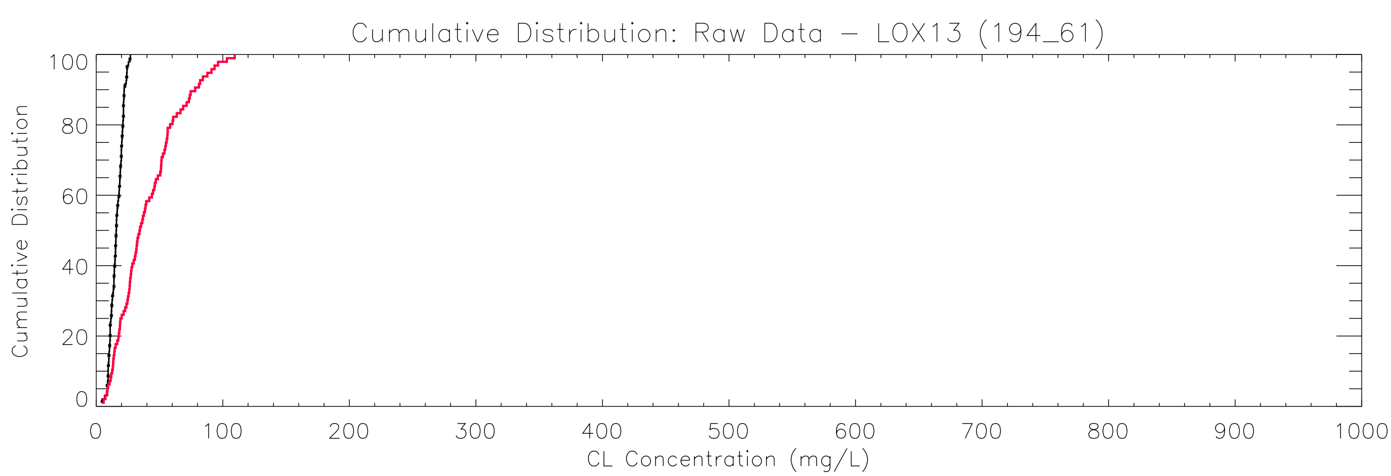


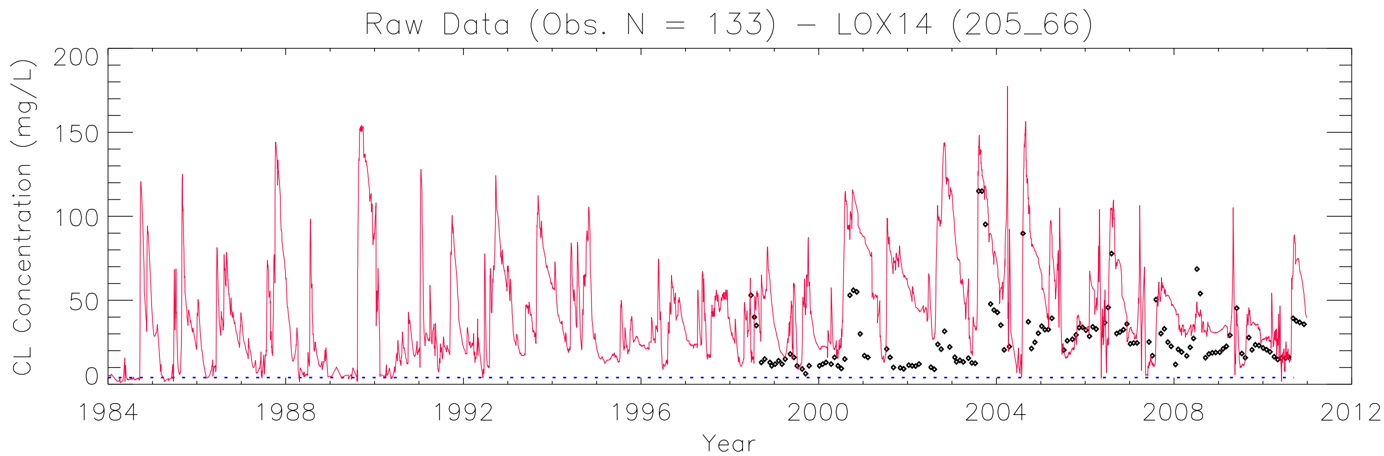
Cumulative Distribution: Raw Data – LOX12 (178_60)
Cumulative Distribution
CL Concentration (mg/L)

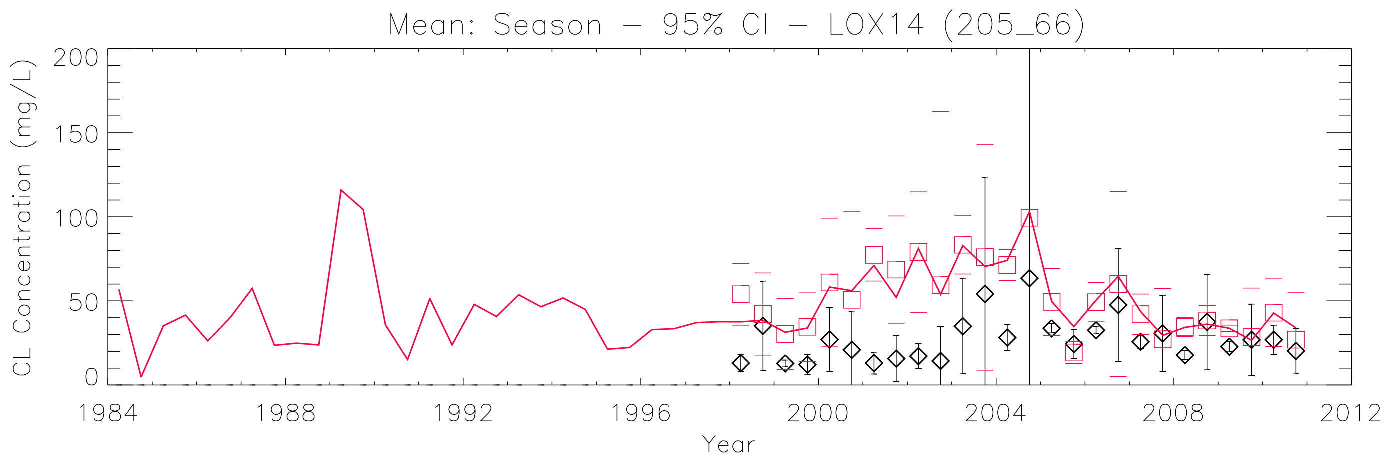

Raw Data (Obs. N = 96) – LOX13 (194_61)
CL Concentration (mg/L)
Year

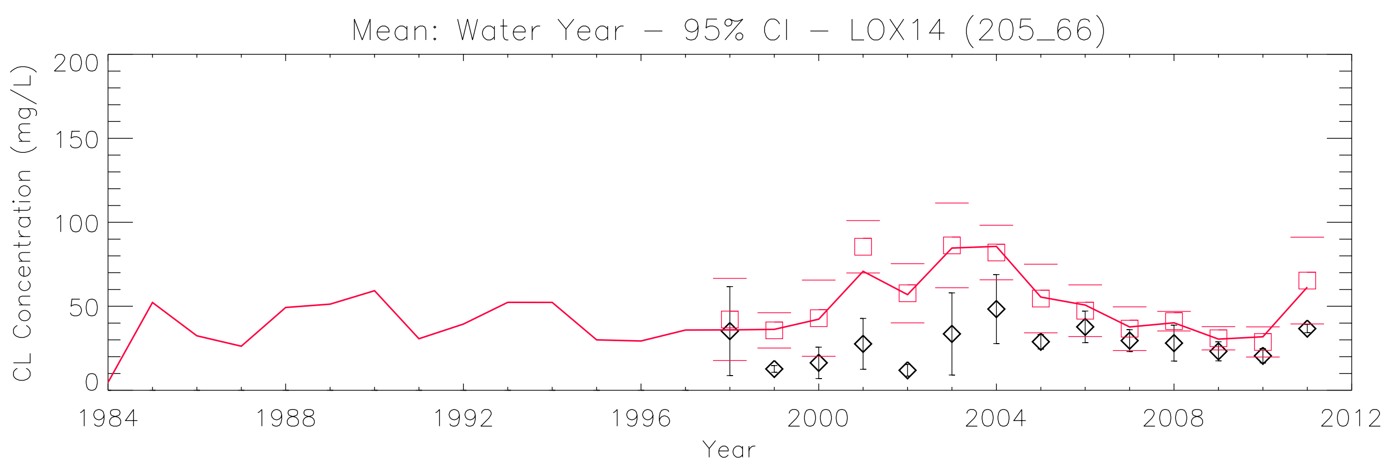

Mean: Season – 95% CI – LOX13 (194_61)
CL Concentration (mg/L)
Year

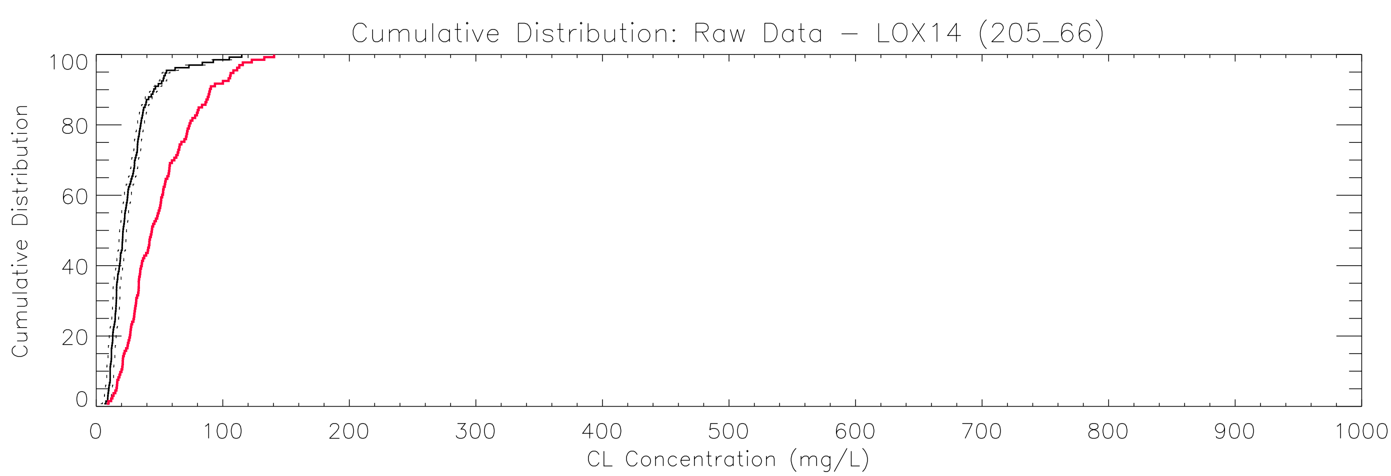

Mean: Water Year – 95% CI – LOX13 (194_61)
CL Concentration (mg/L)
Year

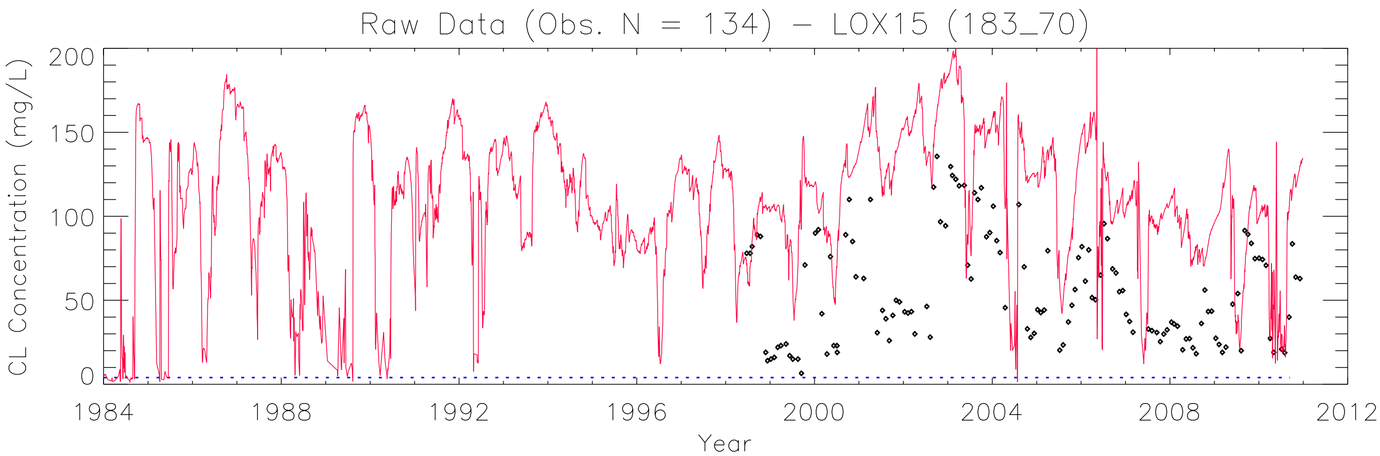

Cumulative Distribution: Raw Data – LOX13 (194_61)
Cumulative Distribution
CL Concentration (mg/L)

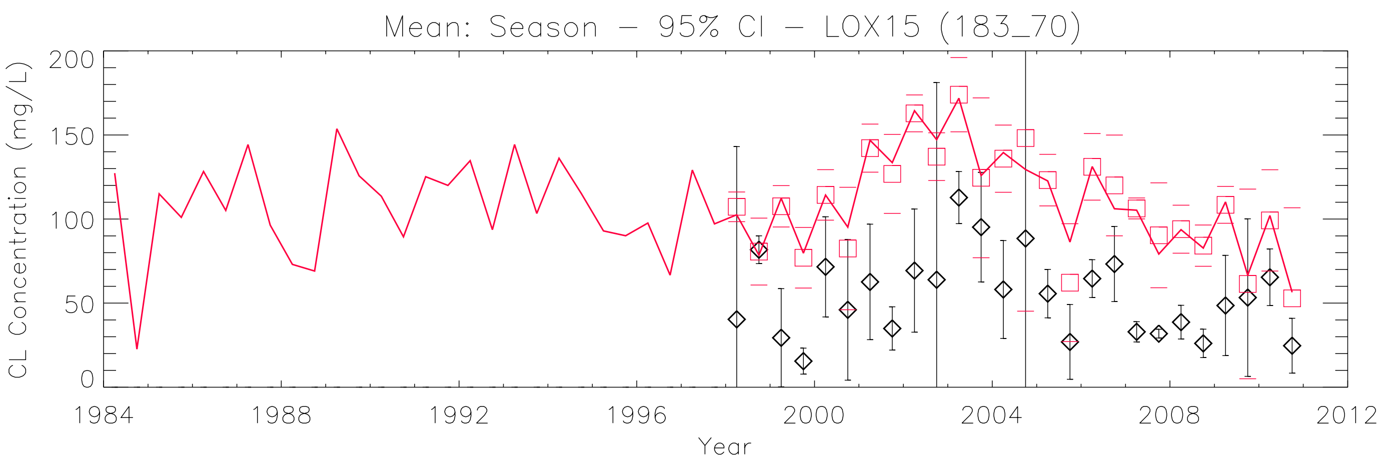

Raw Data (Obs. N = 133) - LOX14 (205_66)
CL Concentration (mg/L)
Year

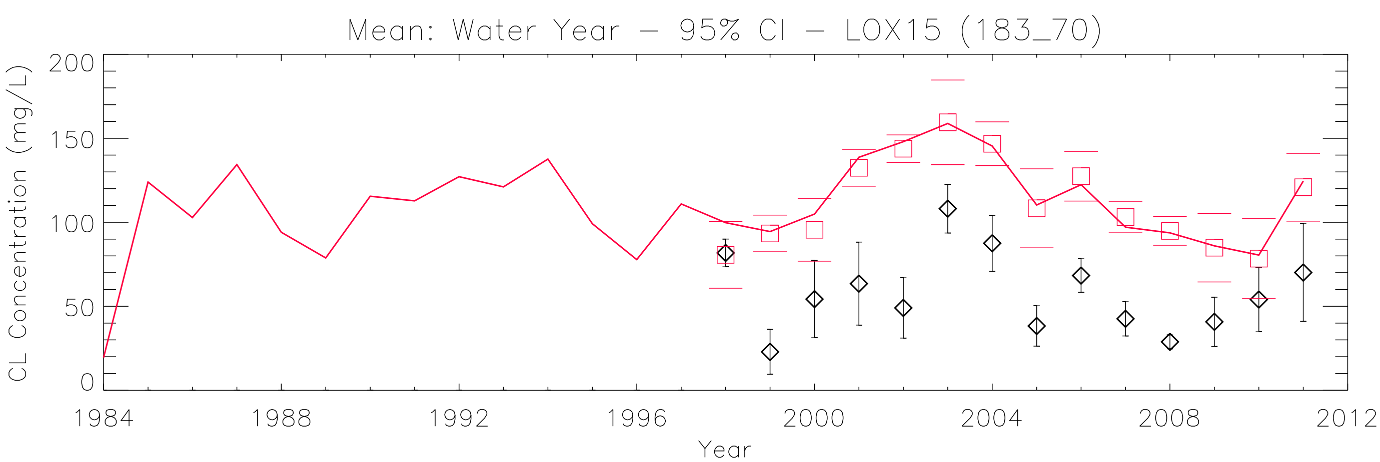

Mean: Season - 95% CI - LOX14 (205_66)
CL Concentration (mg/L)
Year

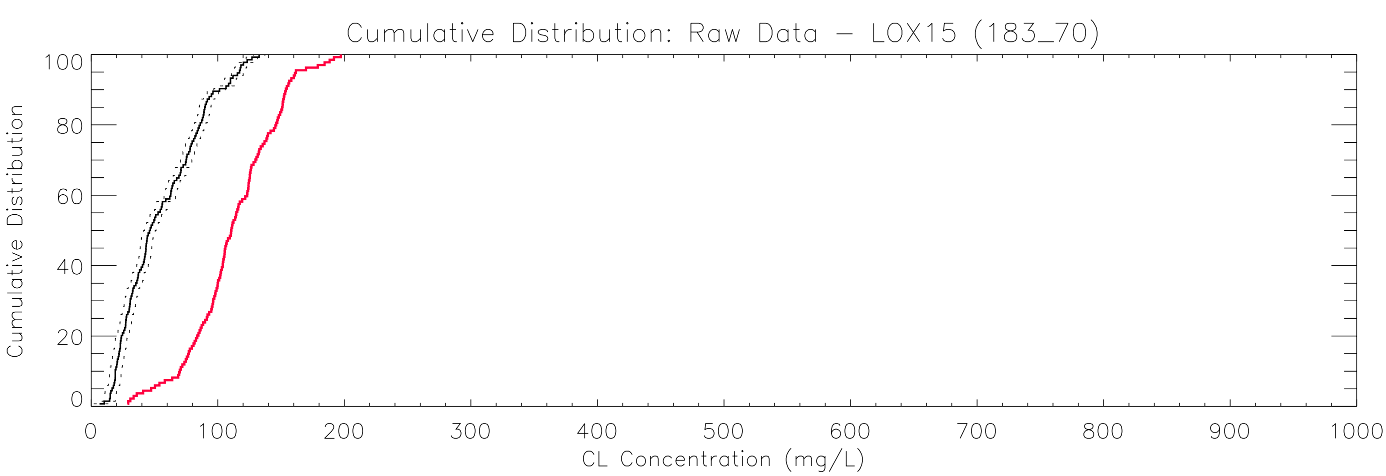

Mean: Water Year - 95% CI - LOX14 (205_66)
CL Concentration (mg/L)
Year

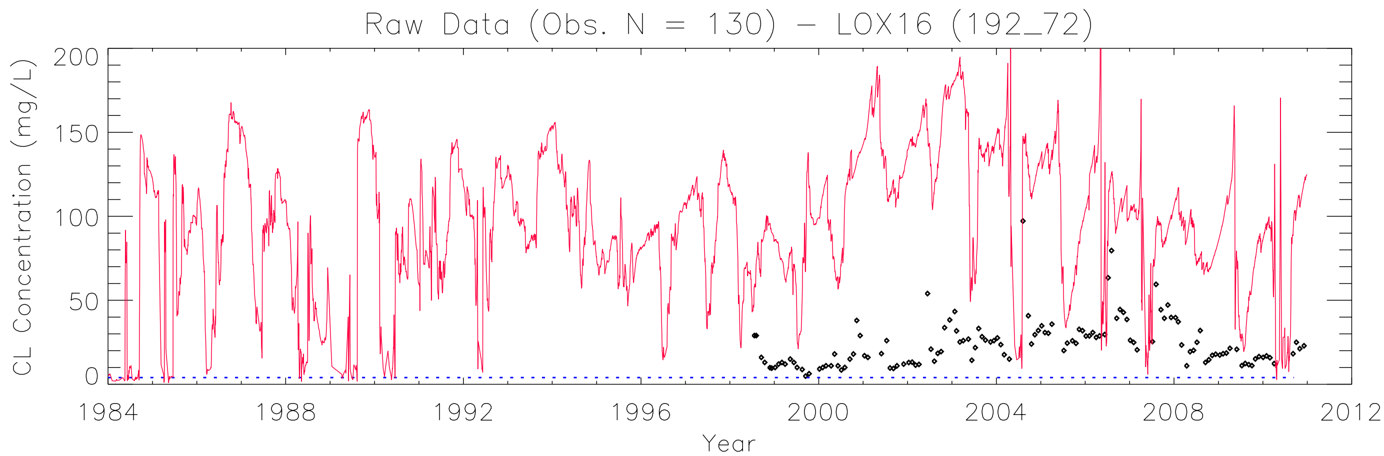

Cumulative Distribution: Raw Data - LOX14 (205_66)
Cumulative Distribution
CL Concentration (mg/L)

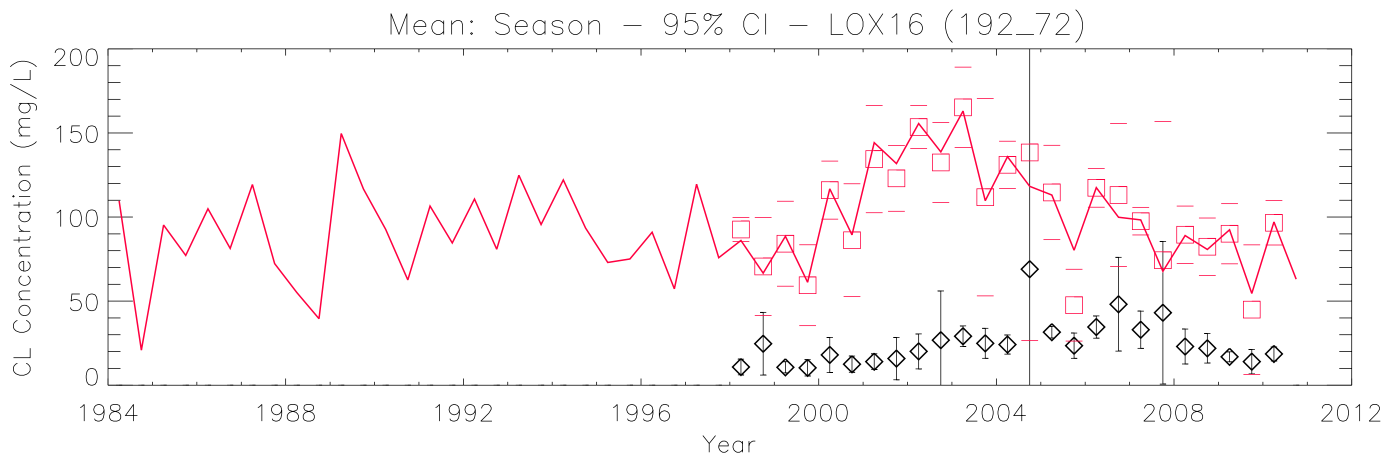

Raw Data (Obs. N = 134) – LOX15 (183_70)
CL Concentration (mg/L)
Year
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012

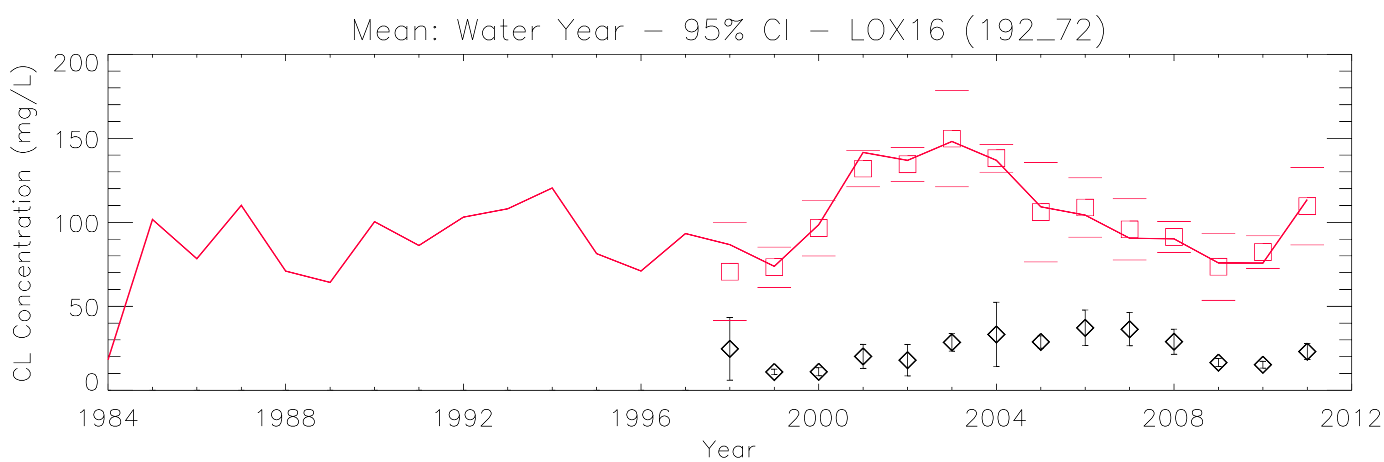

Mean: Season – 95% CI – LOX15 (183_70)
CL Concentration (mg/L)
Year
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012

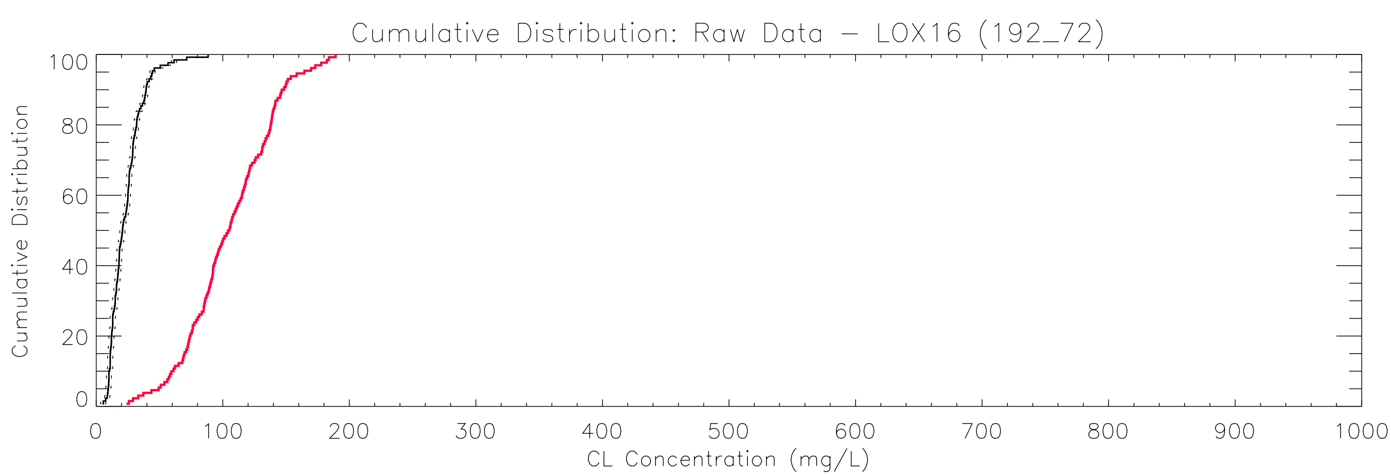

Mean: Water Year – 95% CI – LOX15 (183_70)
CL Concentration (mg/L)
Year
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012

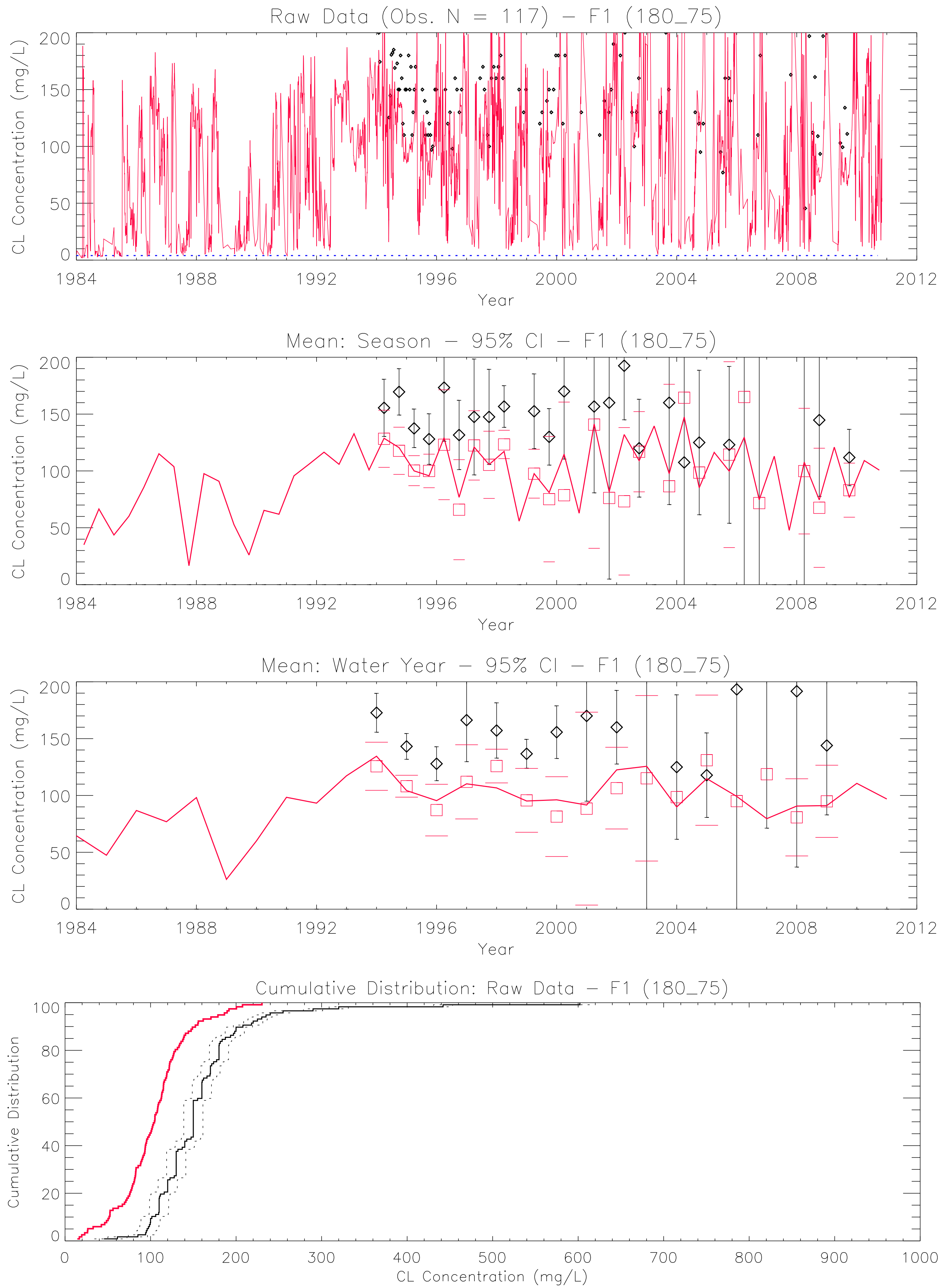

Cumulative Distribution: Raw Data – LOX15 (183_70)
Cumulative Distribution
CL Concentration (mg/L)
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000


Raw Data (Obs. N = 130) – LOX16 (192_72)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

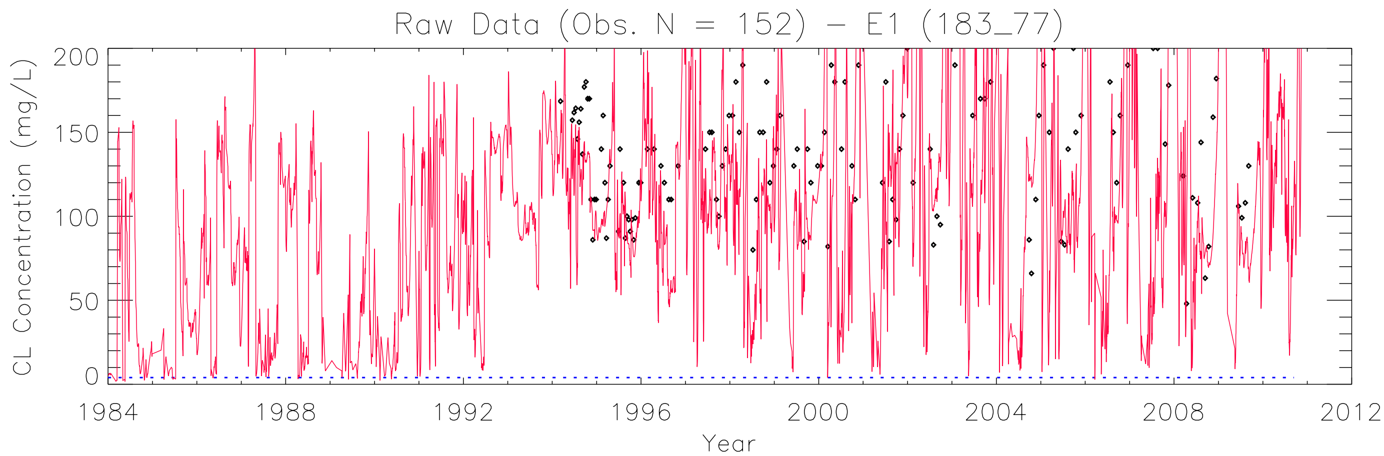

Mean: Season – 95% CI – LOX16 (192_72)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year – 95% CI – LOX16 (192_72)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

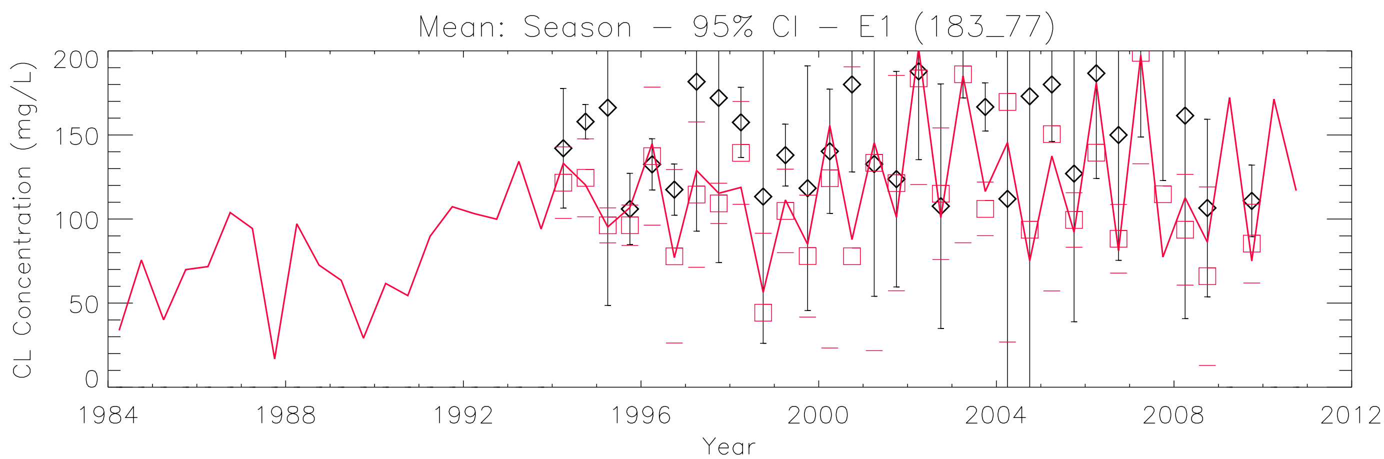

Cumulative Distribution: Raw Data – LOX16 (192_72)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



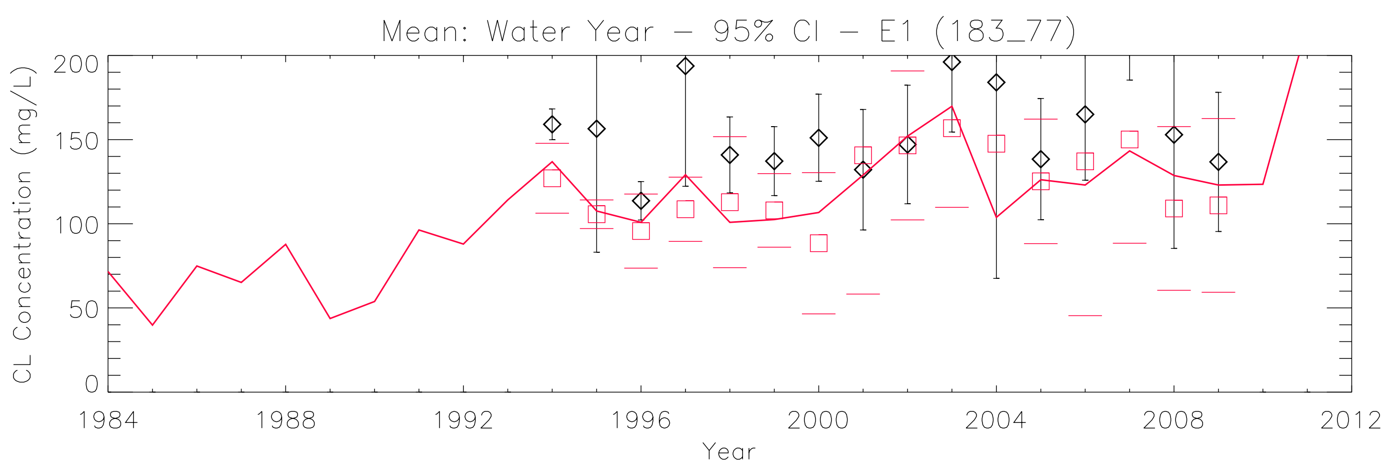
Raw Data (Obs. N = 117) – F1 (180_75)
CL Concentration (mg/L)
Year
Mean: Season – 95% CI – F1 (180_75)
CL Concentration (mg/L)
Year
Mean: Water Year – 95% CI – F1 (180_75)
CL Concentration (mg/L)
Year
Cumulative Distribution: Raw Data – F1 (180_75)
Cumulative Distribution
CL Concentration (mg/L)



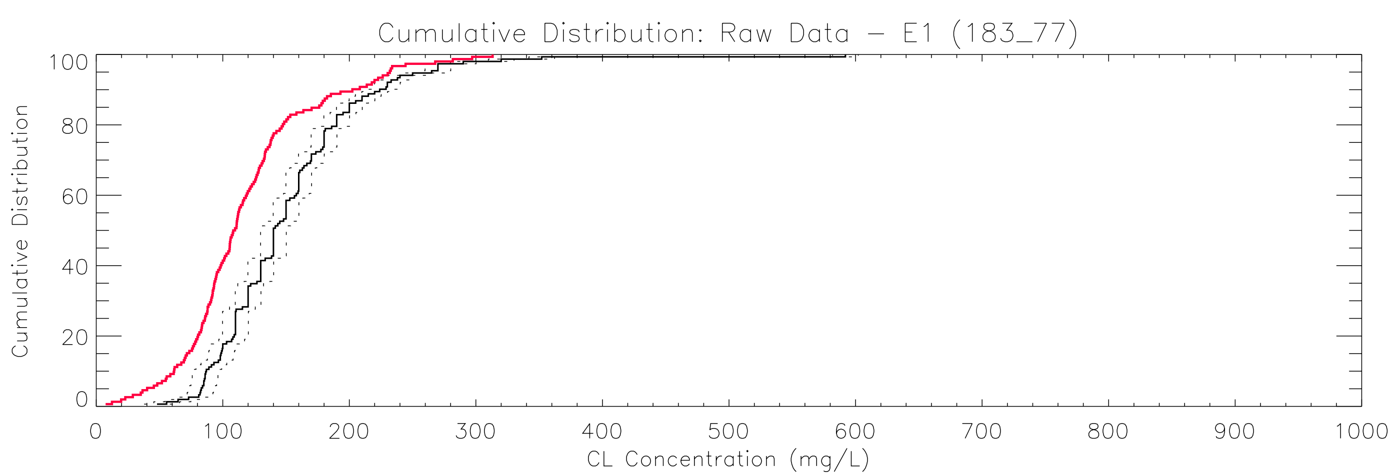
Raw Data (Obs. N = 152) – E1 (183_77)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year



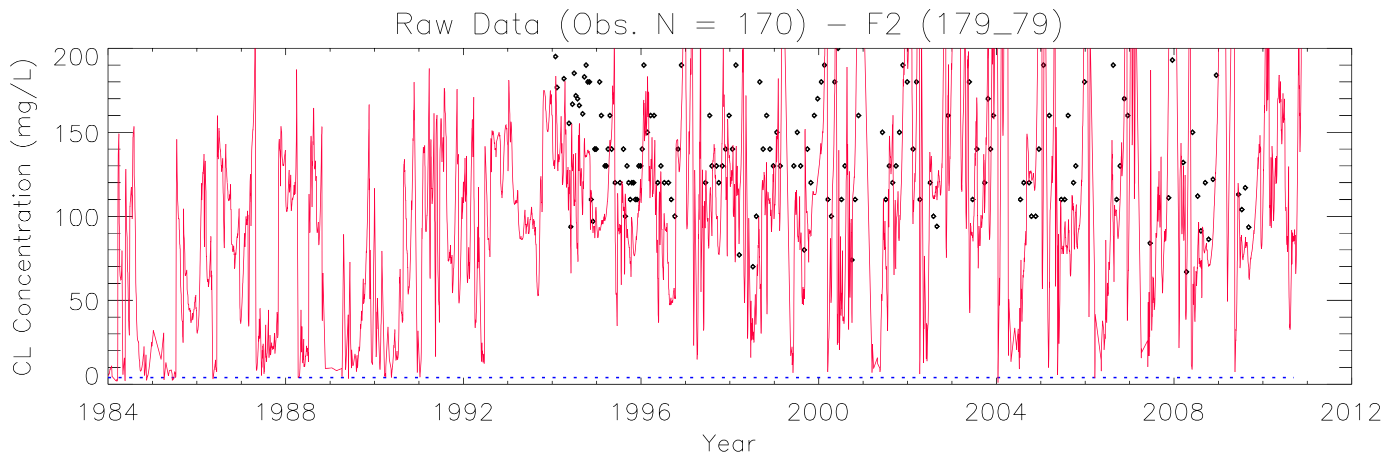
Mean: Season – 95% CI – E1 (183_77)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

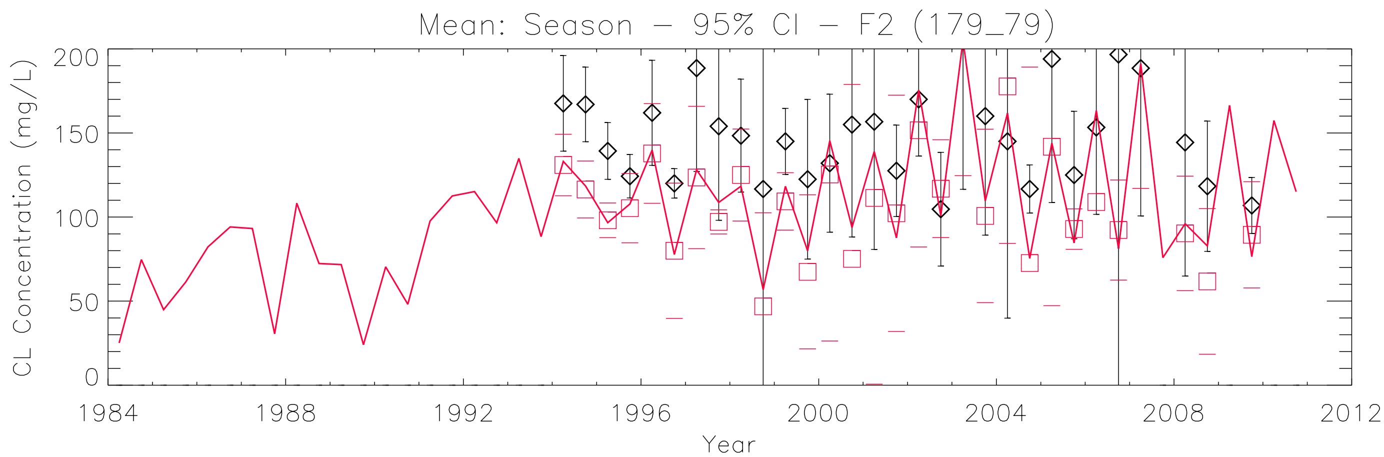


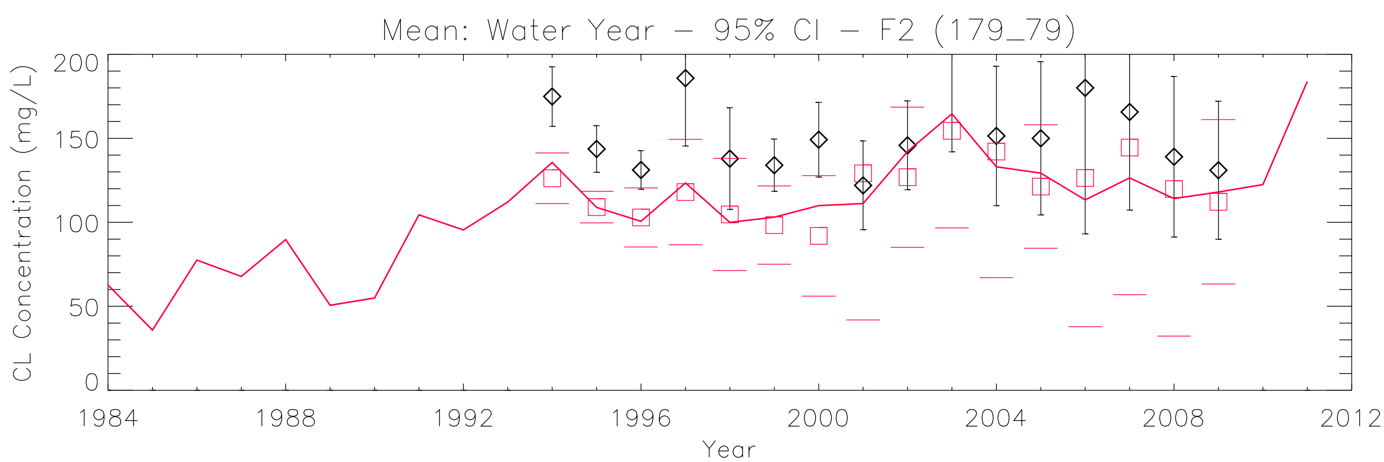
Mean: Water Year – 95% CI – E1 (183_77)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

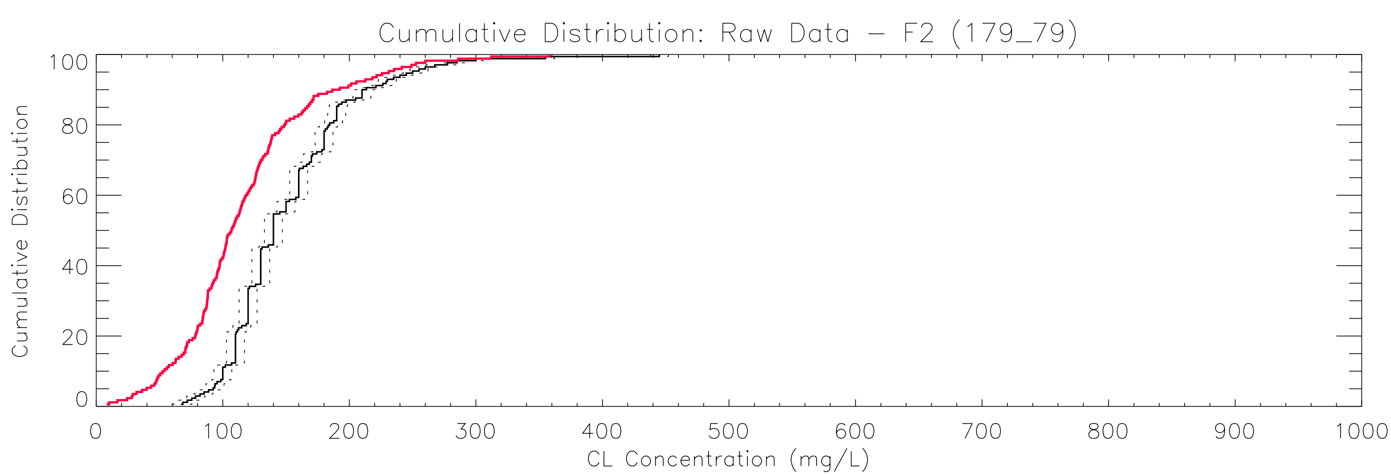


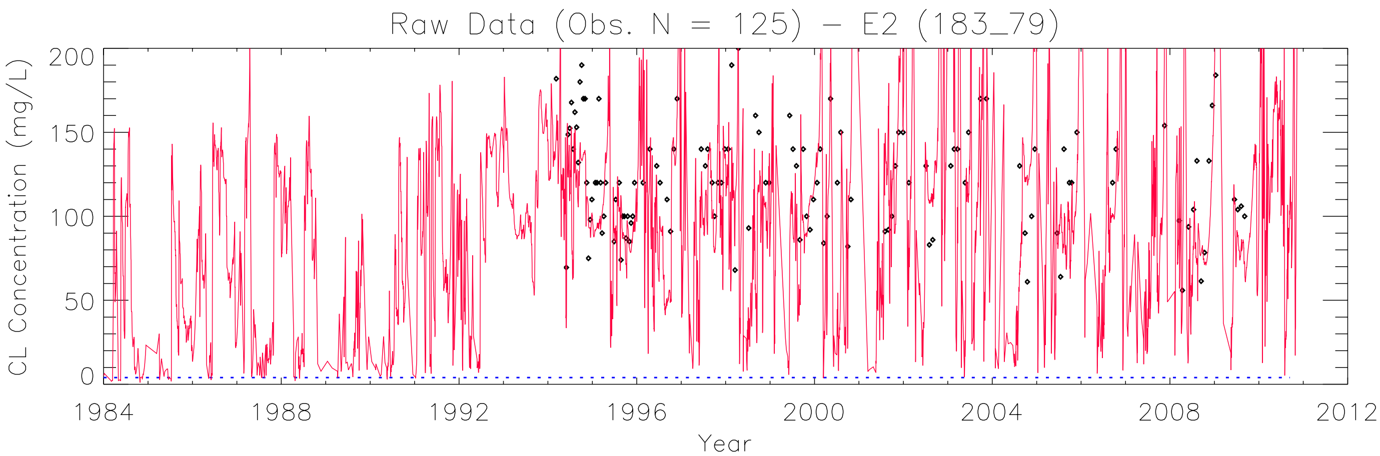
Cumulative Distribution: Raw Data – E1 (183_77)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

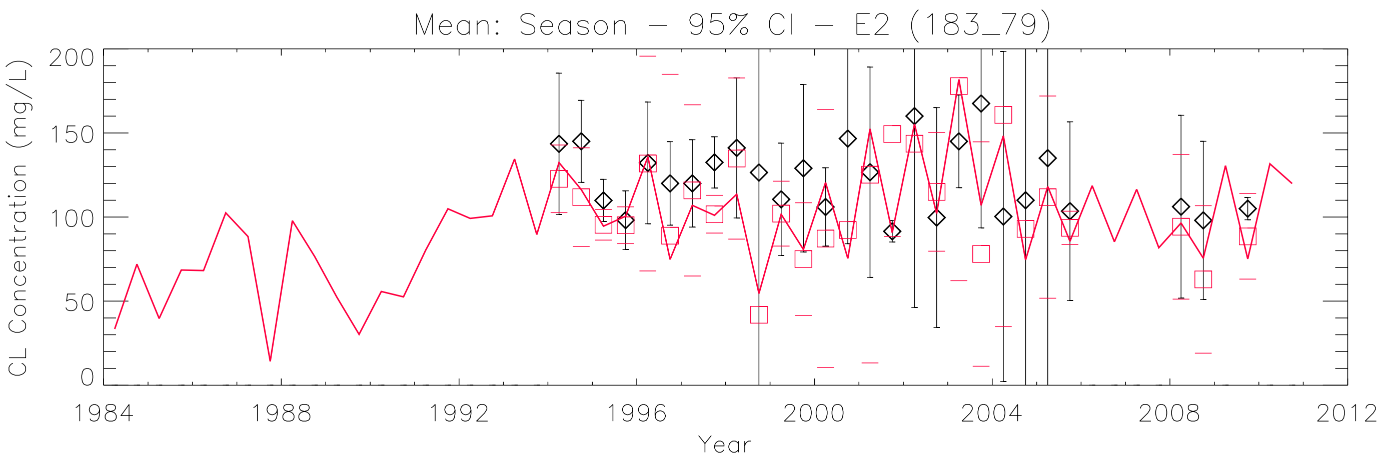

Raw Data (Obs. N = 170) – F2 (179_79)
CL Concentration (mg/L)
Year

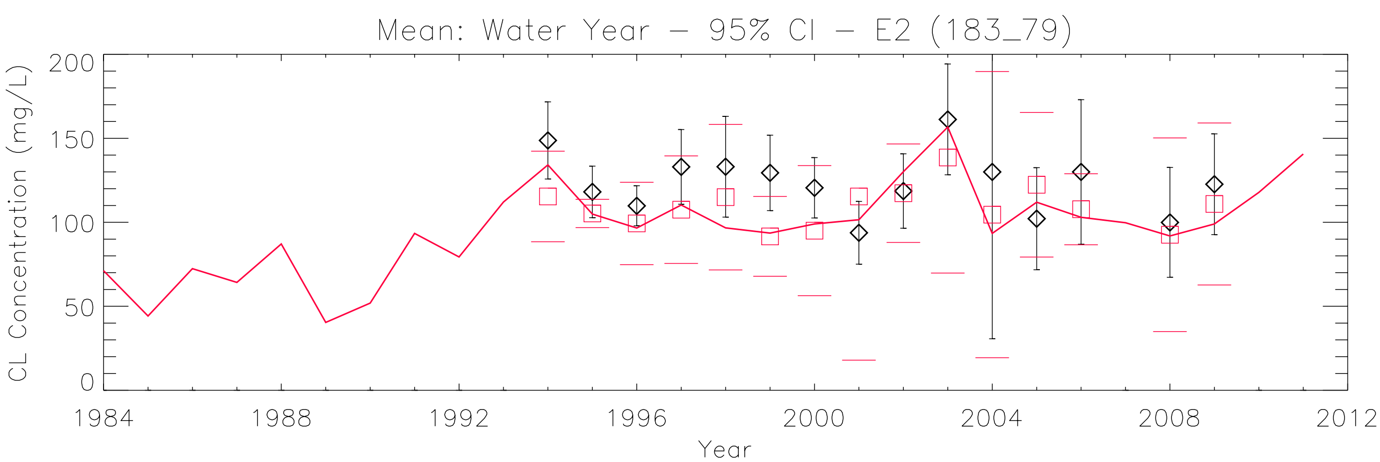

Mean: Season – 95% CI – F2 (179_79)
CL Concentration (mg/L)
Year

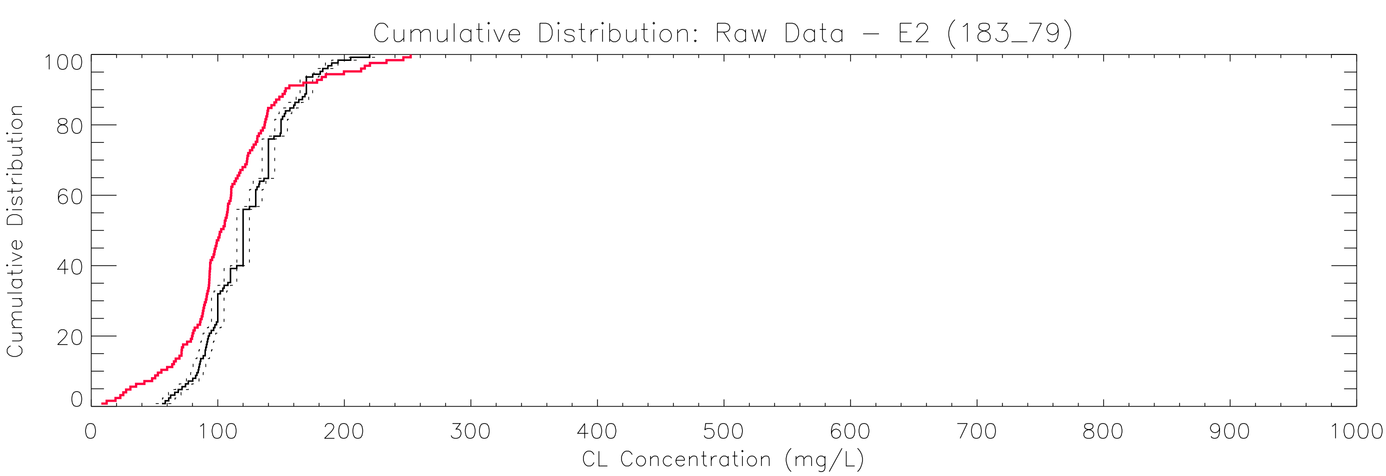

Mean: Water Year – 95% CI – F2 (179_79)
CL Concentration (mg/L)
Year

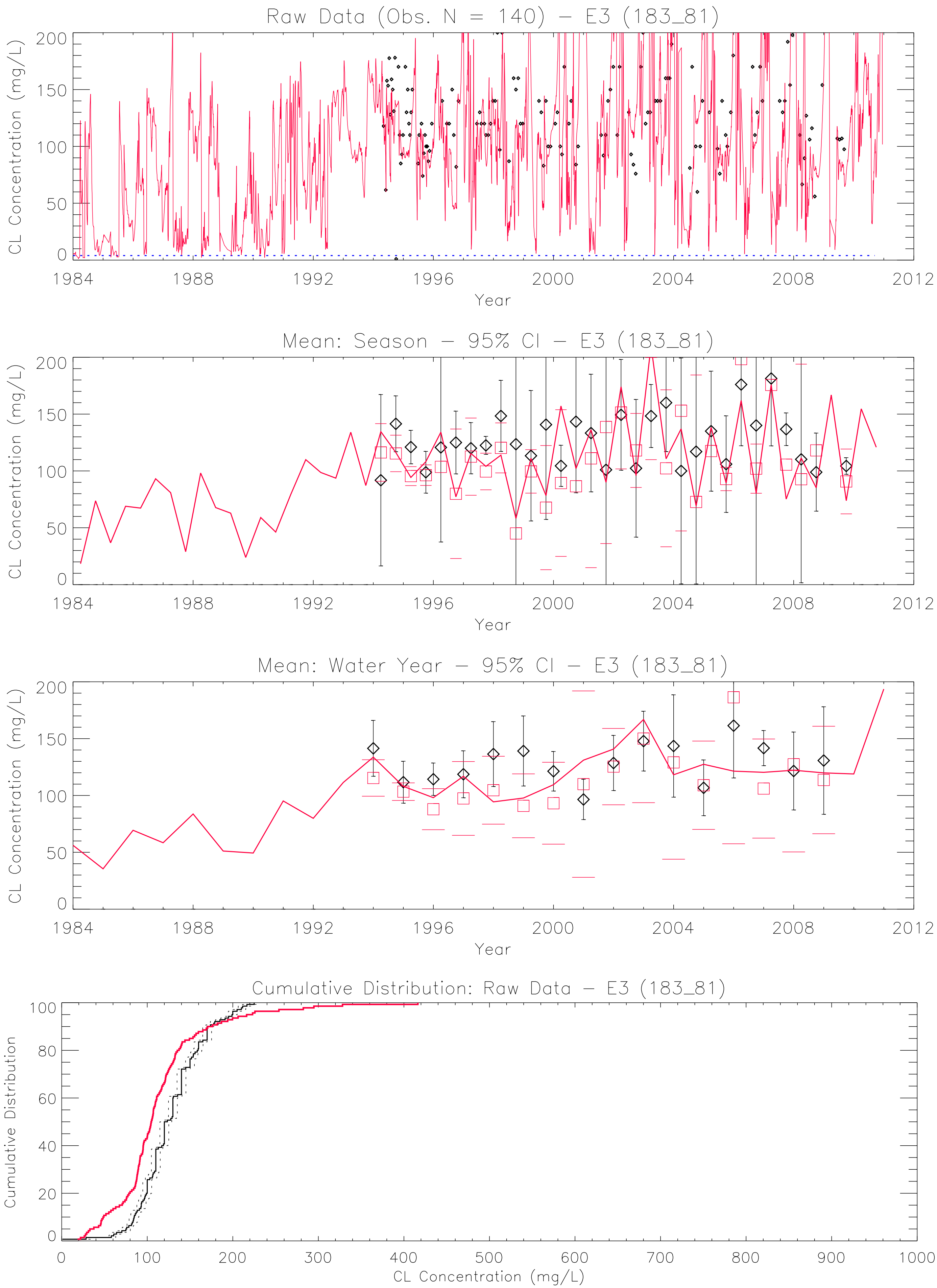

Cumulative Distribution: Raw Data – F2 (179_79)
Cumulative Distribution
CL Concentration (mg/L)

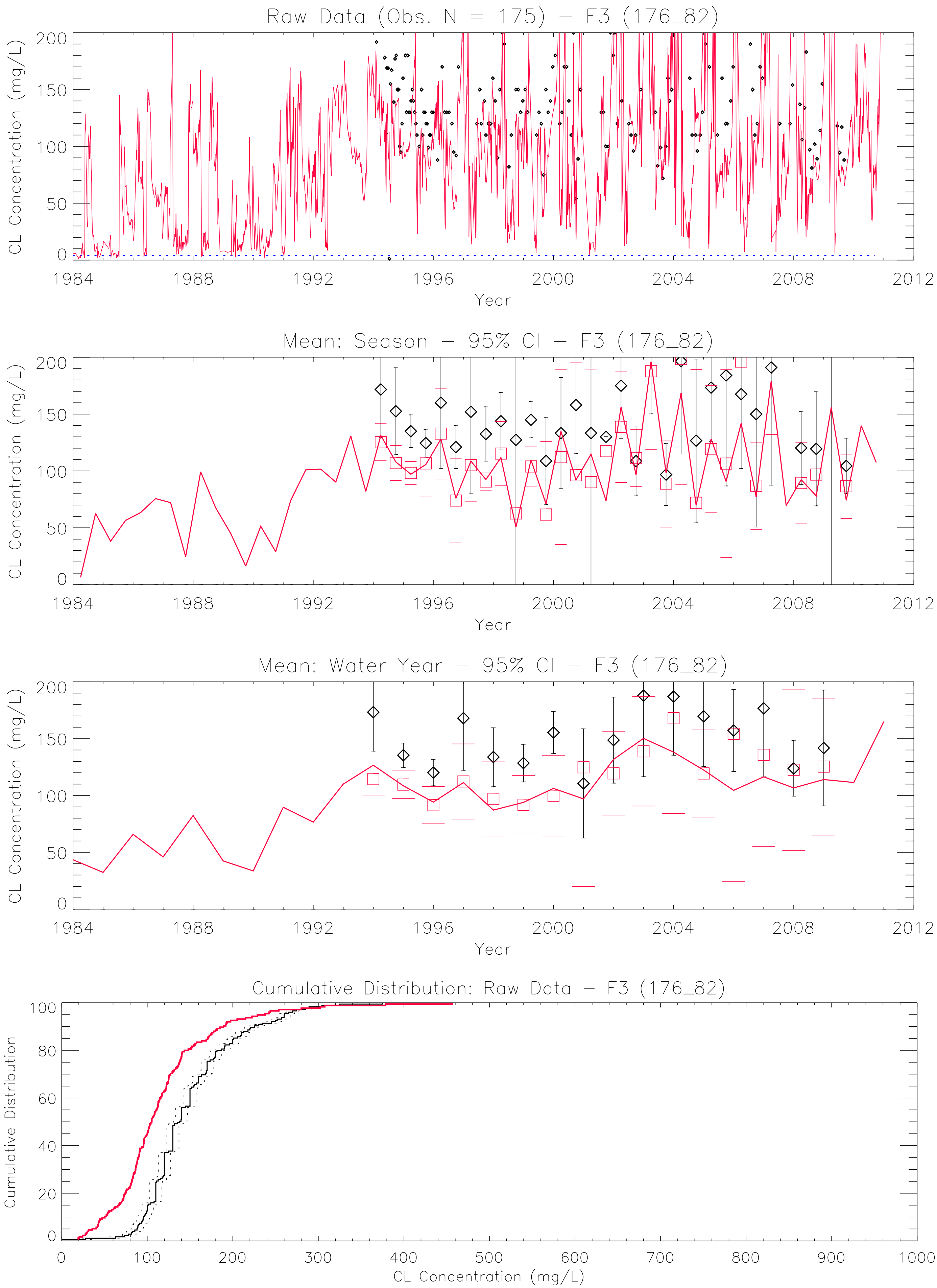

Raw Data (Obs. N = 125) – E2 (183_79)
CL Concentration (mg/L)
Year


Mean: Season – 95% CI – E2 (183_79)
CL Concentration (mg/L)
Year

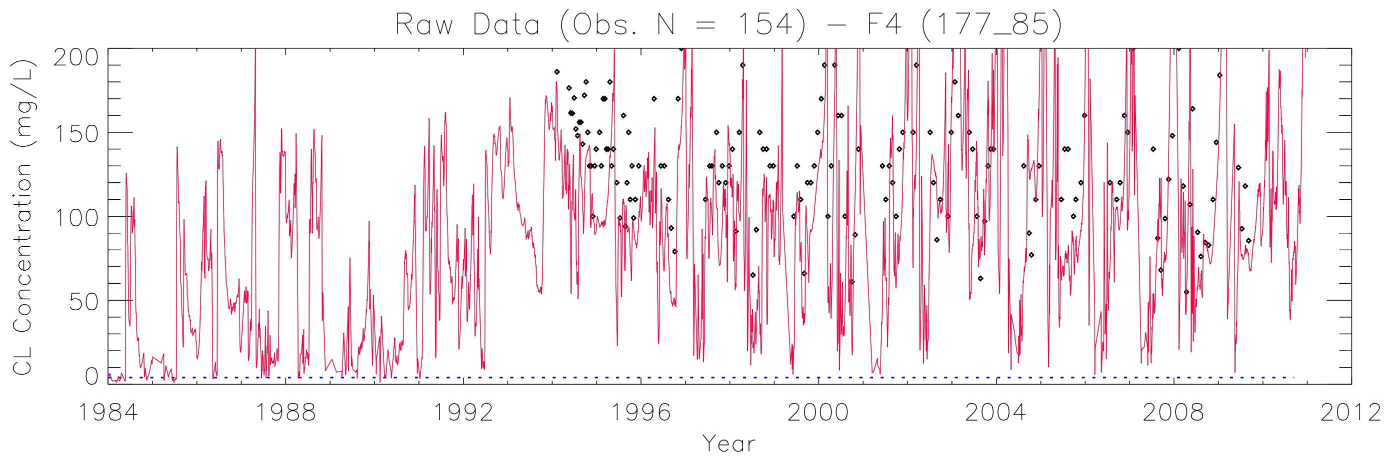

Mean: Water Year – 95% CI – E2 (183_79)
CL Concentration (mg/L)
Year

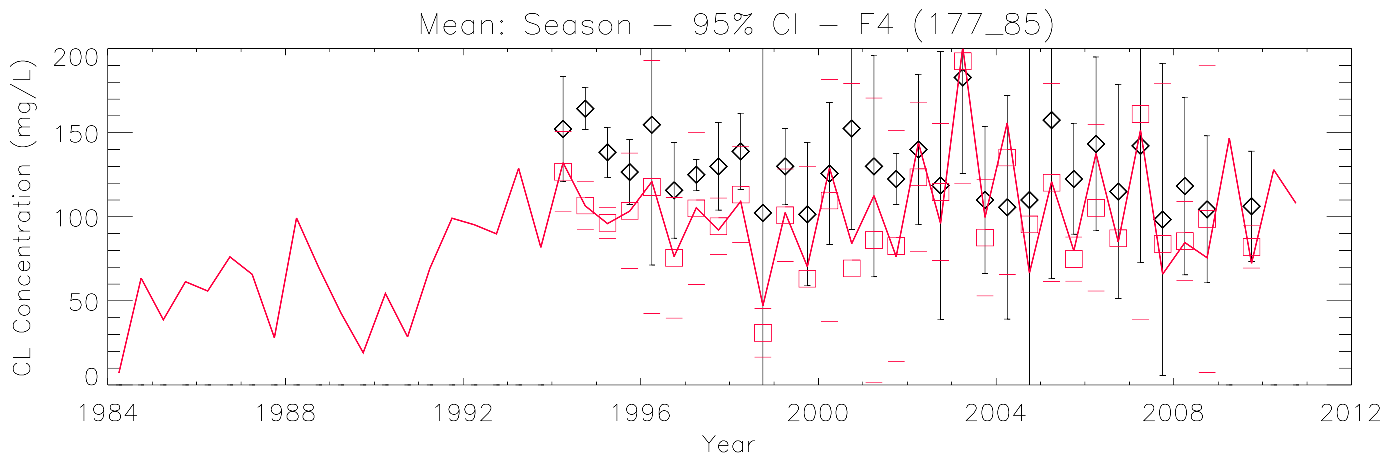

Cumulative Distribution: Raw Data – E2 (183_79)
Cumulative Distribution
CL Concentration (mg/L)

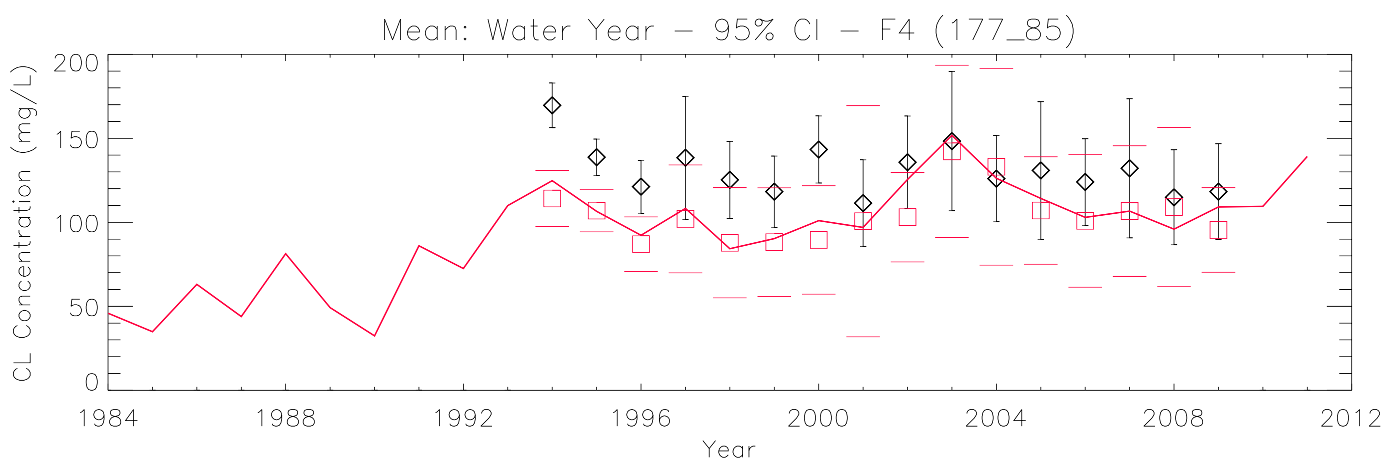

Raw Data (Obs. N = 140) – E3 (183_81)
CL Concentration (mg/L)
Year
Mean: Season – 95% CI – E3 (183_81)
CL Concentration (mg/L)
Year
Mean: Water Year – 95% CI – E3 (183_81)
CL Concentration (mg/L)
Year
Cumulative Distribution: Raw Data – E3 (183_81)
Cumulative Distribution
CL Concentration (mg/L)

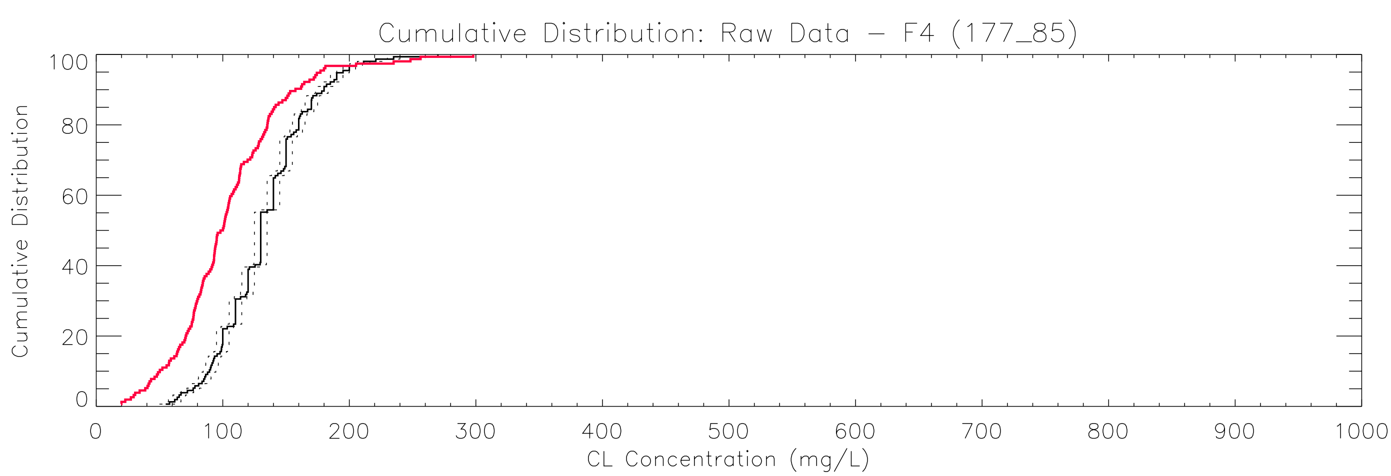


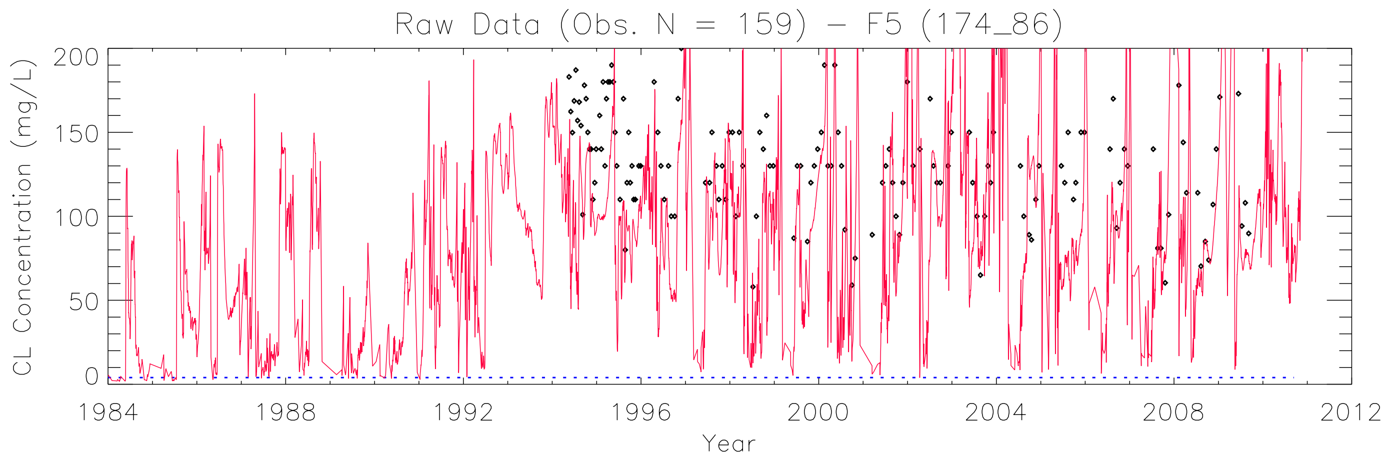
Raw Data (Obs. N = 175) - F3 (176_82)
CL Concentration (mg/L)
Year
Mean: Season - 95% CI - F3 (176_82)
CL Concentration (mg/L)
Year
Mean: Water Year - 95% CI - F3 (176_82)
CL Concentration (mg/L)
Year
Cumulative Distribution: Raw Data - F3 (176_82)
Cumulative Distribution
CL Concentration (mg/L)

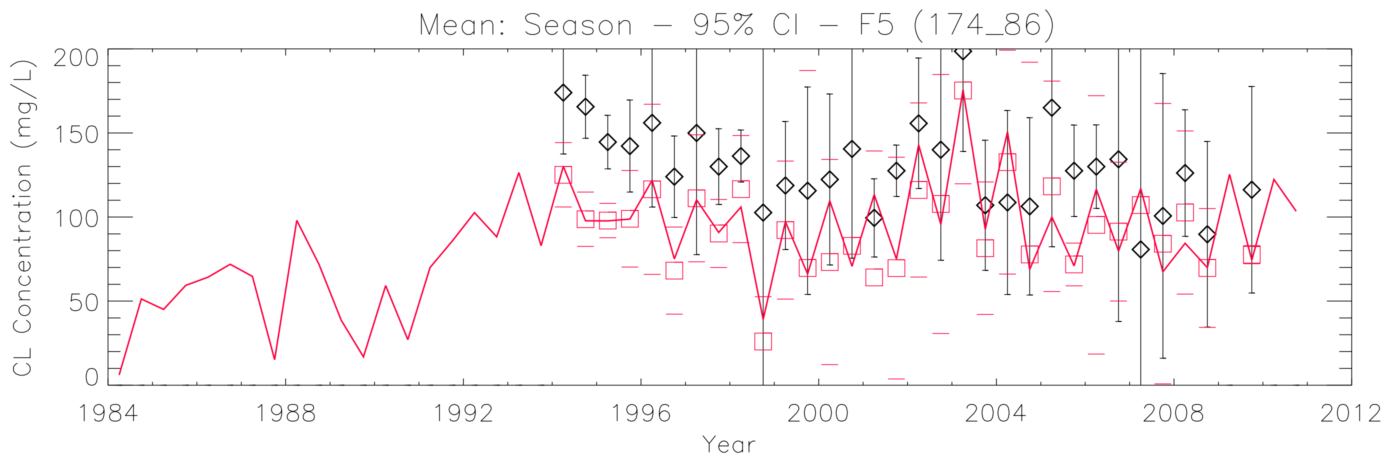

Raw Data (Obs. N = 154) – F4 (177_85)
CL Concentration (mg/L)
Year

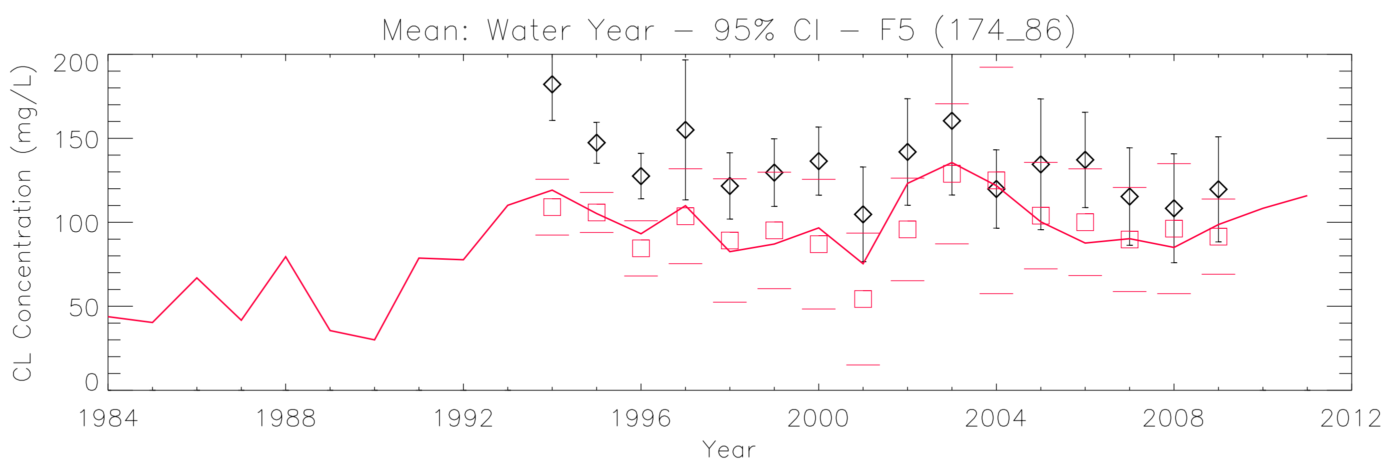

Mean: Season – 95% CI – F4 (177_85)
CL Concentration (mg/L)
Year

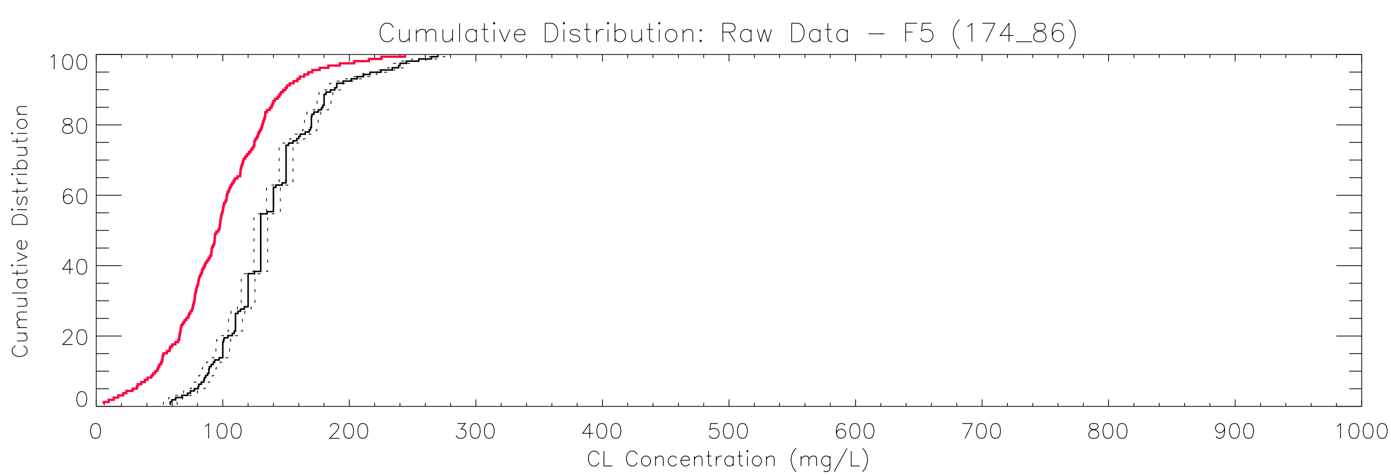

Mean: Water Year – 95% CI – F4 (177_85)
CL Concentration (mg/L)
Year

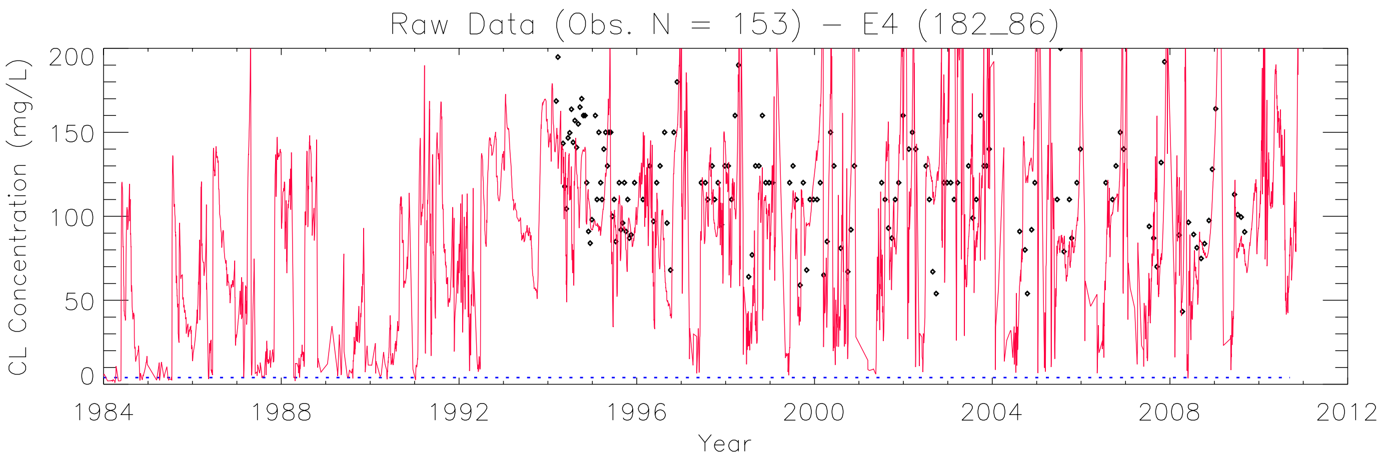

Cumulative Distribution: Raw Data – F4 (177_85)
Cumulative Distribution
CL Concentration (mg/L)

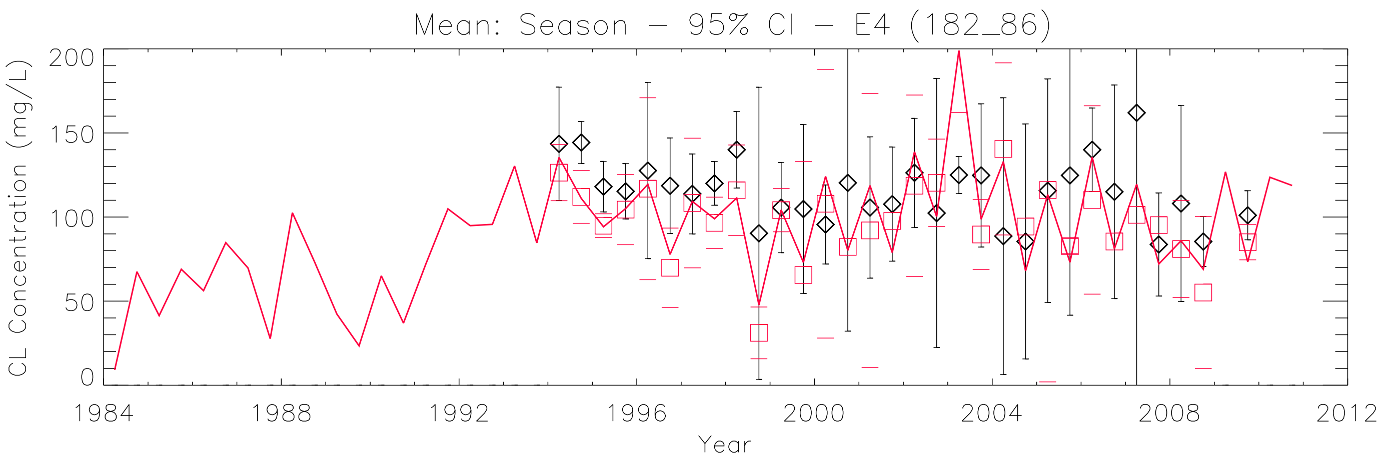

Raw Data (Obs. N = 159) – F5 (174_86)
CL Concentration (mg/L)
Year

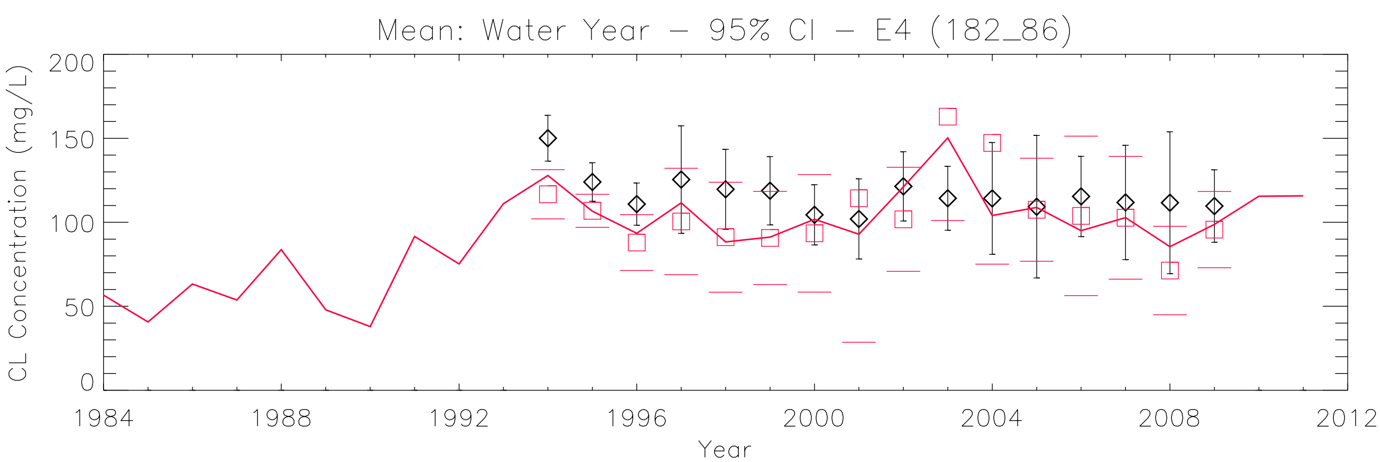

Mean: Season – 95% CI – F5 (174_86)
CL Concentration (mg/L)
Year

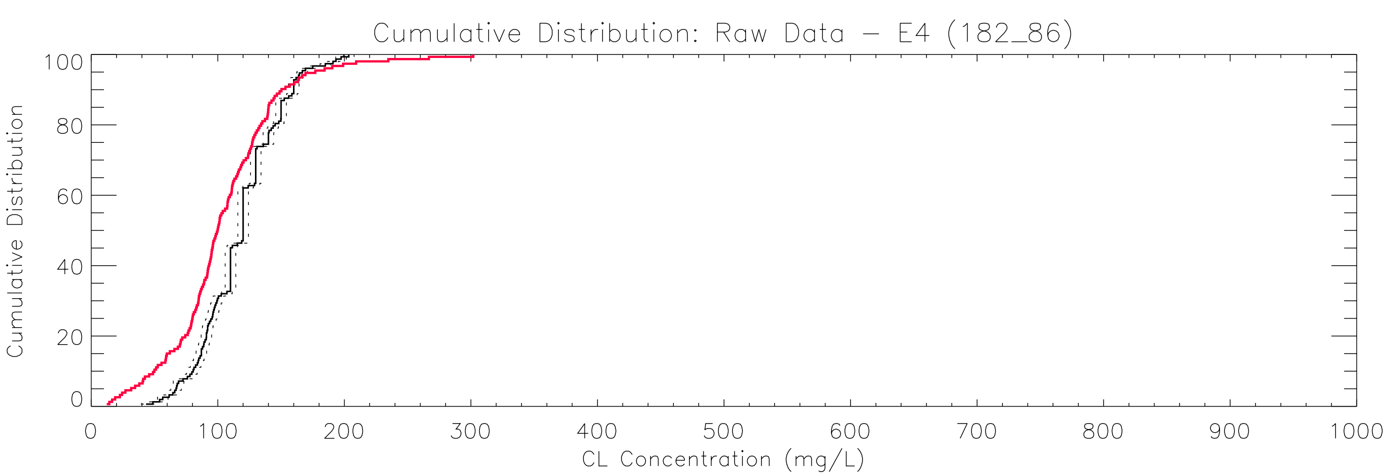

Mean: Water Year – 95% CI – F5 (174_86)
CL Concentration (mg/L)
Year

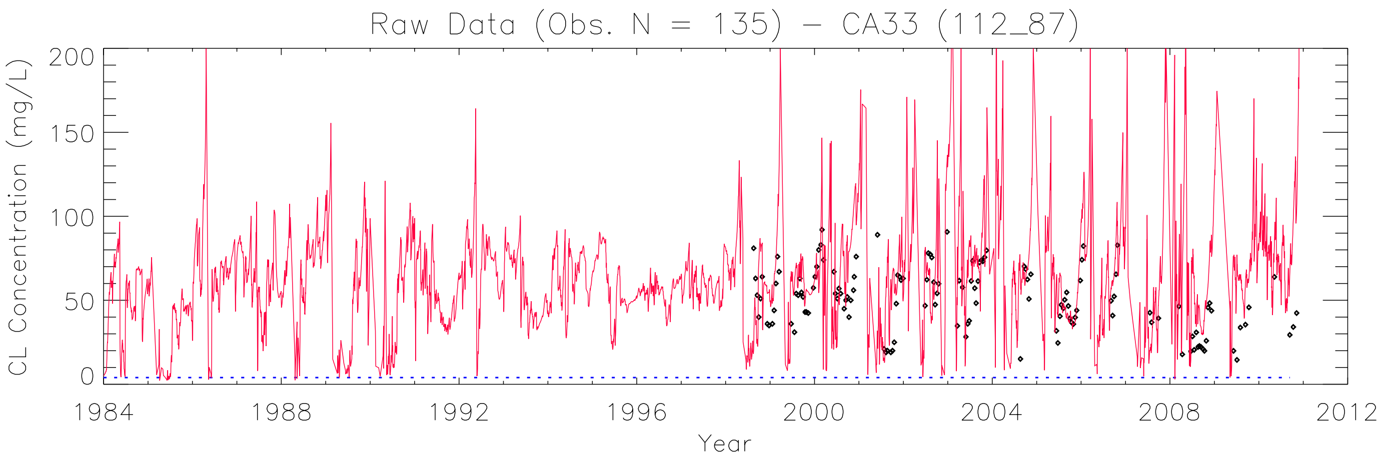

Cumulative Distribution: Raw Data – F5 (174_86)
Cumulative Distribution
CL Concentration (mg/L)

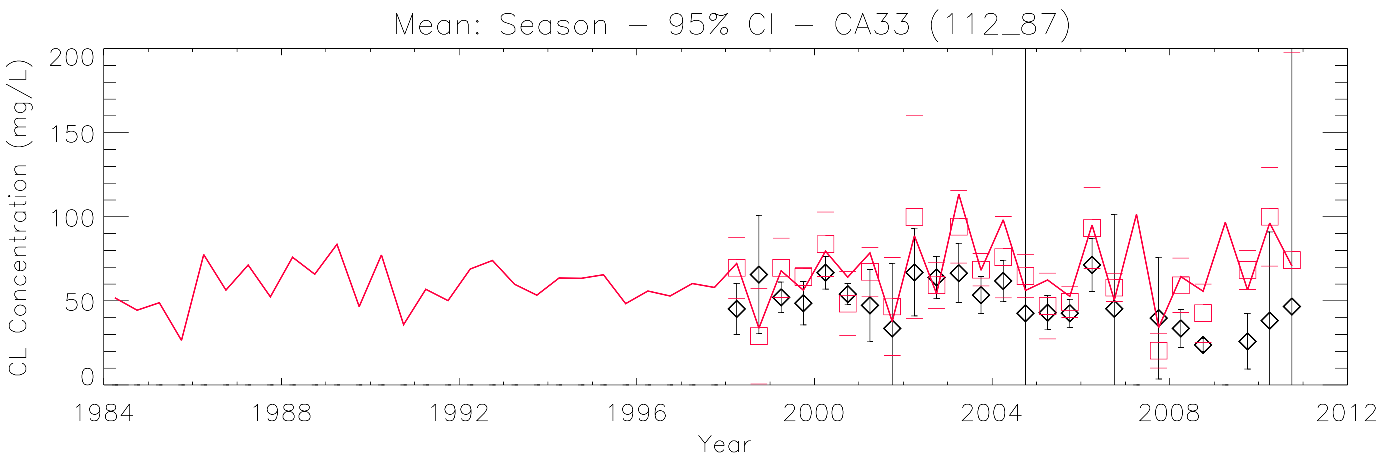

Raw Data (Obs. N = 153) – E4 (182_86)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

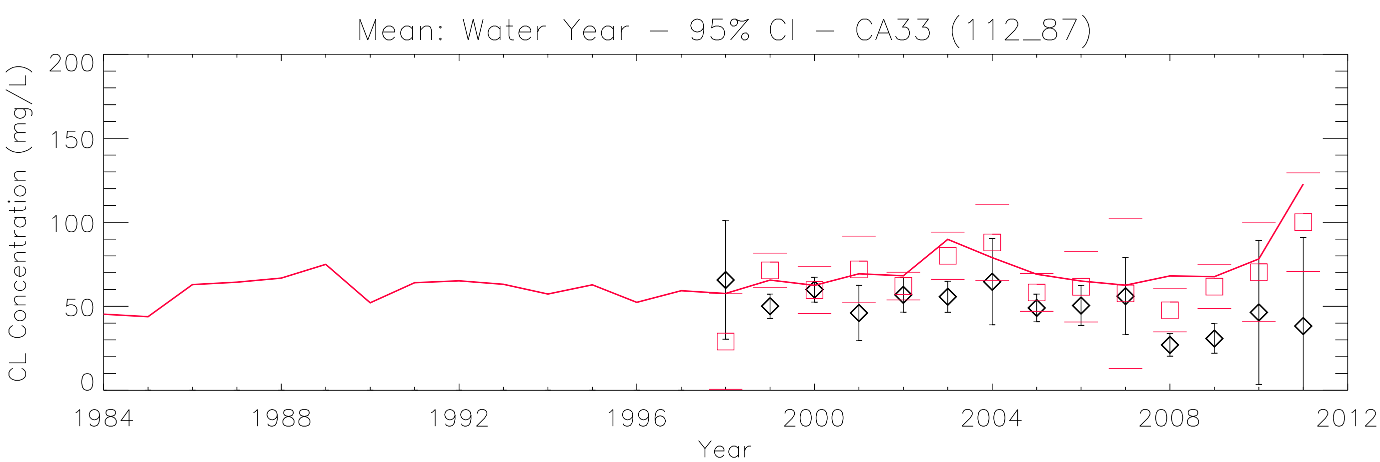

Mean: Season – 95% CI – E4 (182_86)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

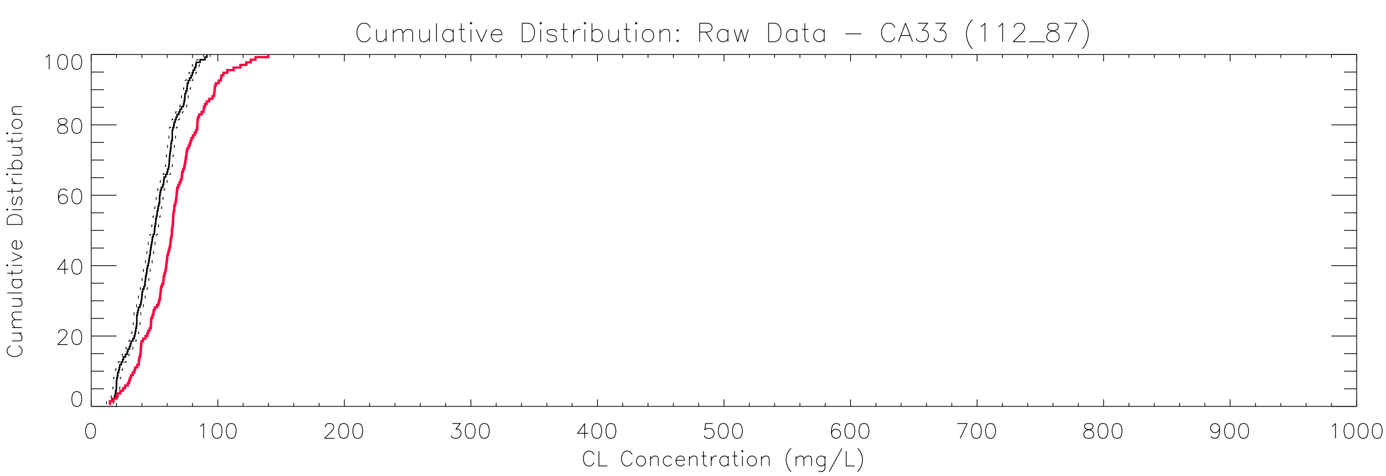

Mean: Water Year – 95% CI – E4 (182_86)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

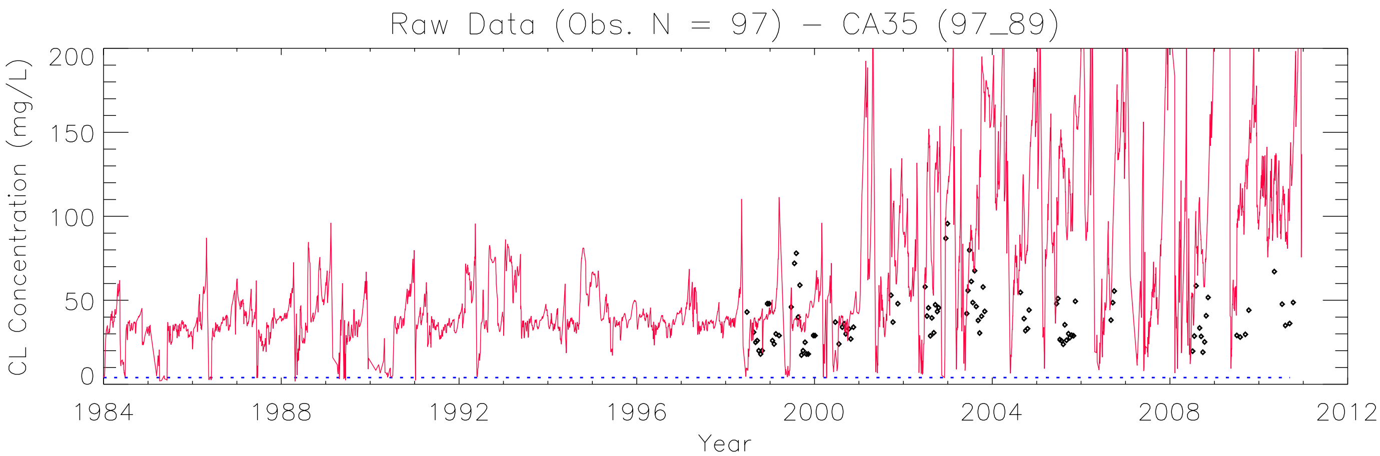

Cumulative Distribution: Raw Data – E4 (182_86)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000


Raw Data (Obs. N = 135) – CA33 (112_87)
CL Concentration (mg/L)
Year

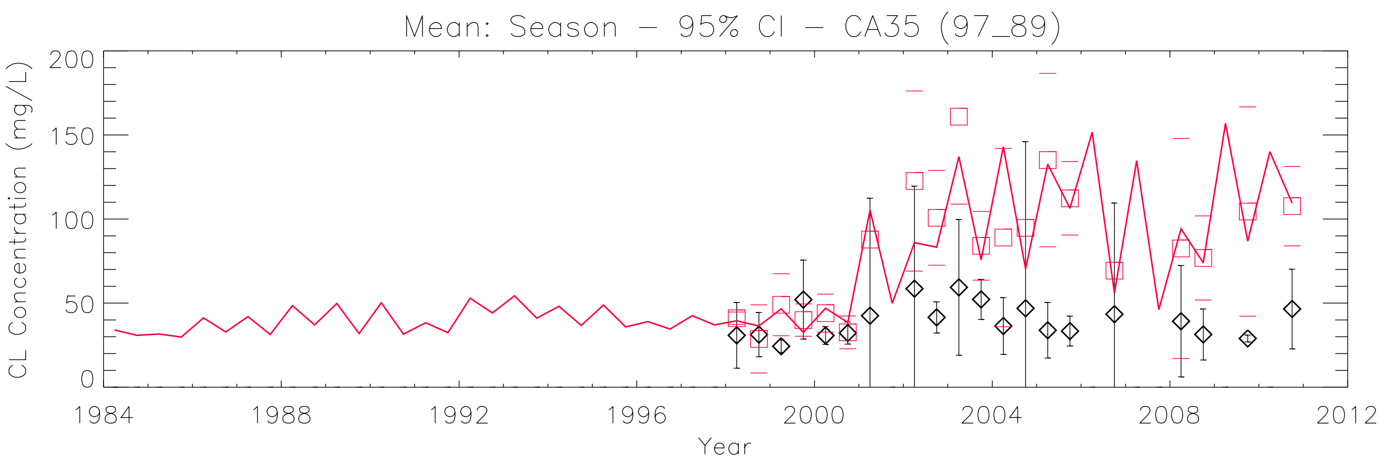

Mean: Season – 95% CI – CA33 (112_87)
CL Concentration (mg/L)
Year


Mean: Water Year – 95% CI – CA33 (112_87)
CL Concentration (mg/L)
Year

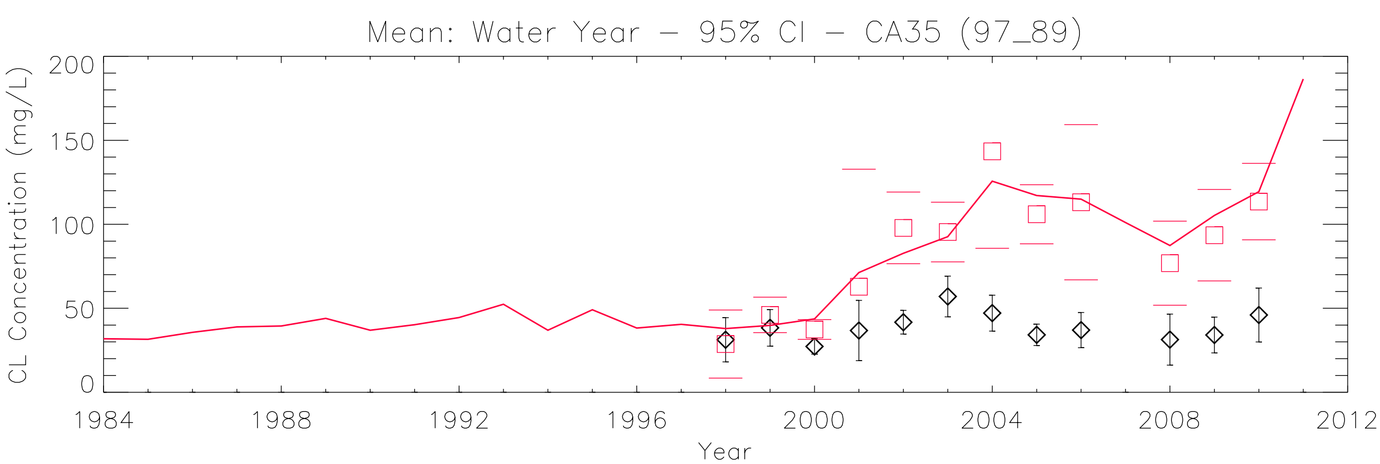

Cumulative Distribution: Raw Data – CA33 (112_87)
Cumulative Distribution
CL Concentration (mg/L)



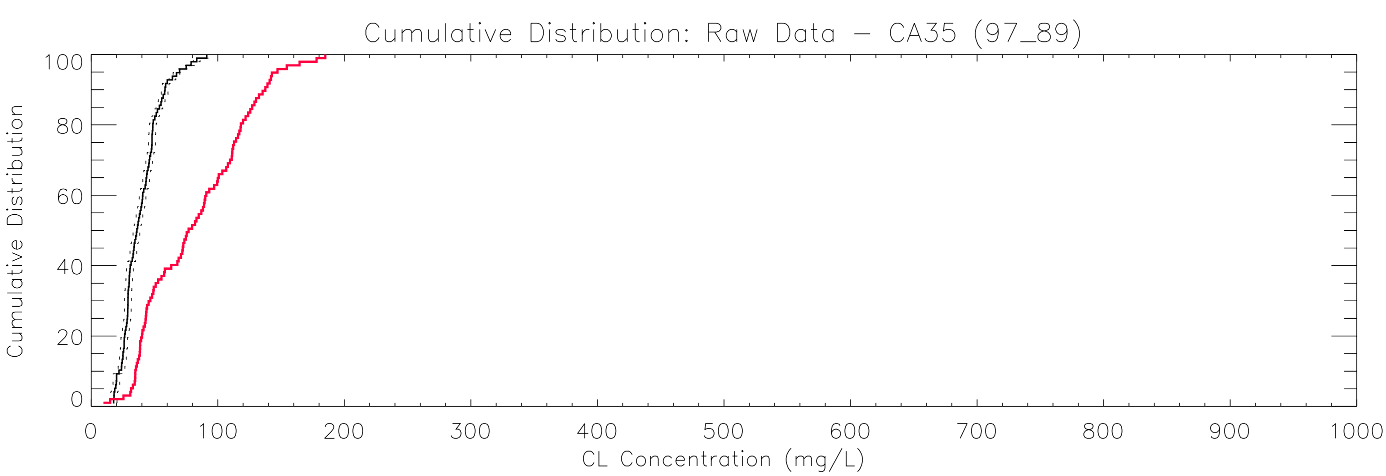
Raw Data (Obs. N = 97) – CA35 (97_89)
CL Concentration (mg/L)
Year



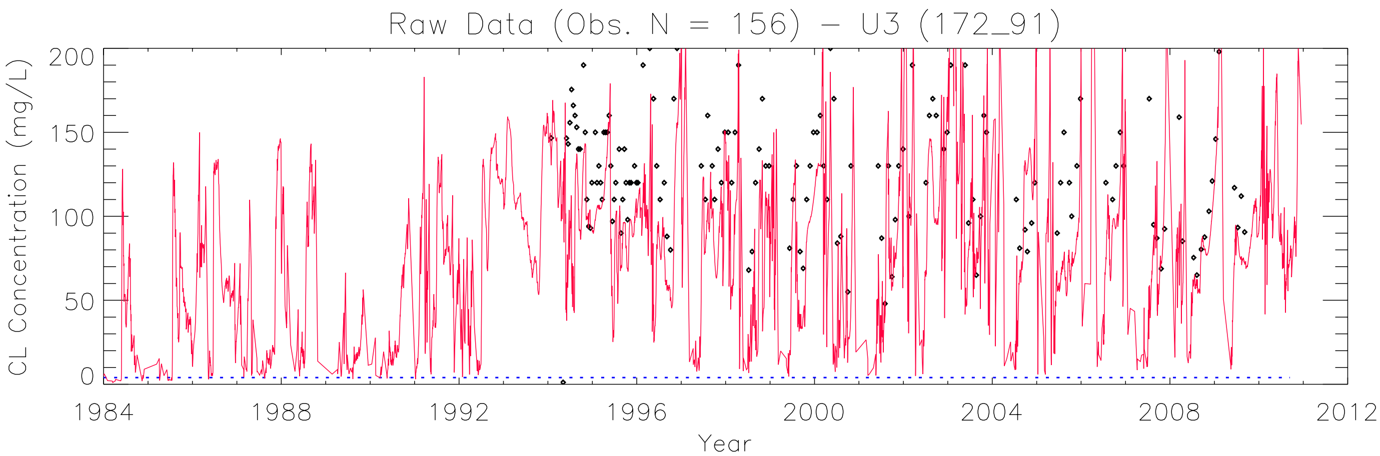
Mean: Season – 95% CI – CA35 (97_89)
CL Concentration (mg/L)
Year



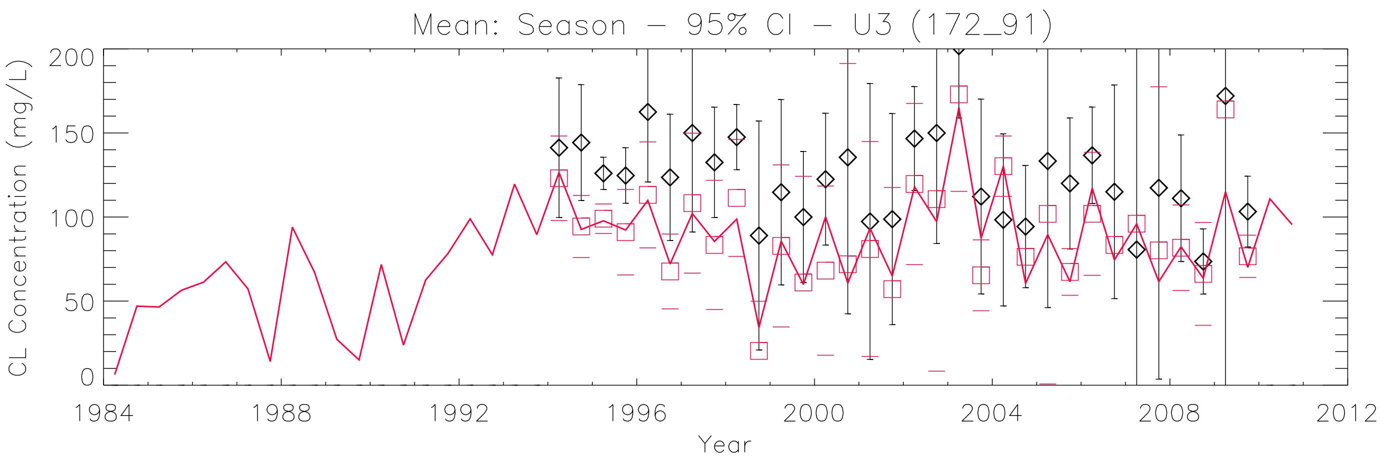
Mean: Water Year – 95% CI – CA35 (97_89)
CL Concentration (mg/L)
Year



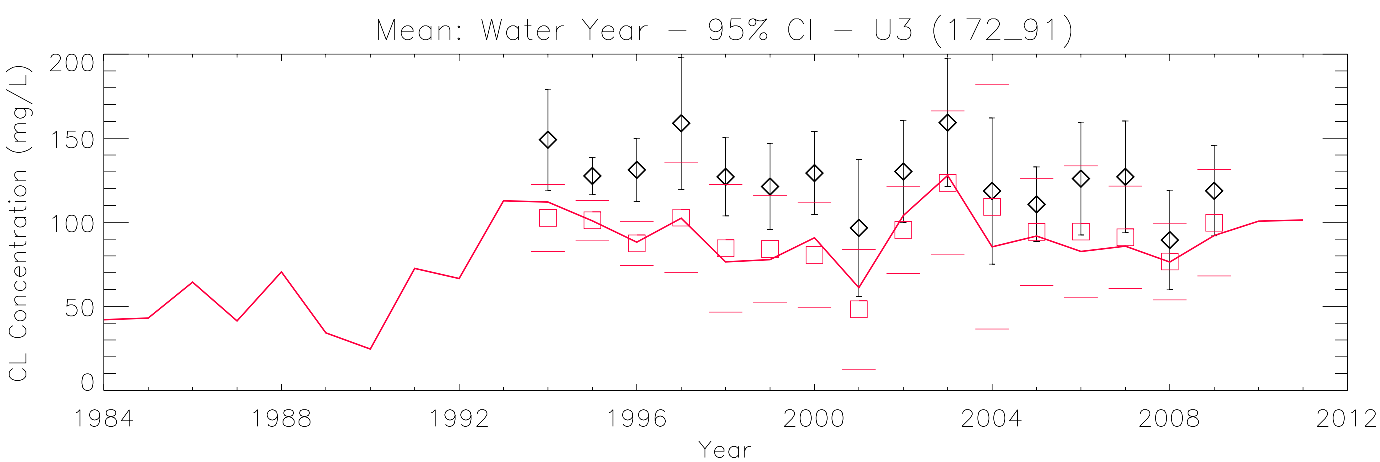
Cumulative Distribution: Raw Data – CA35 (97_89)
Cumulative Distribution
CL Concentration (mg/L)



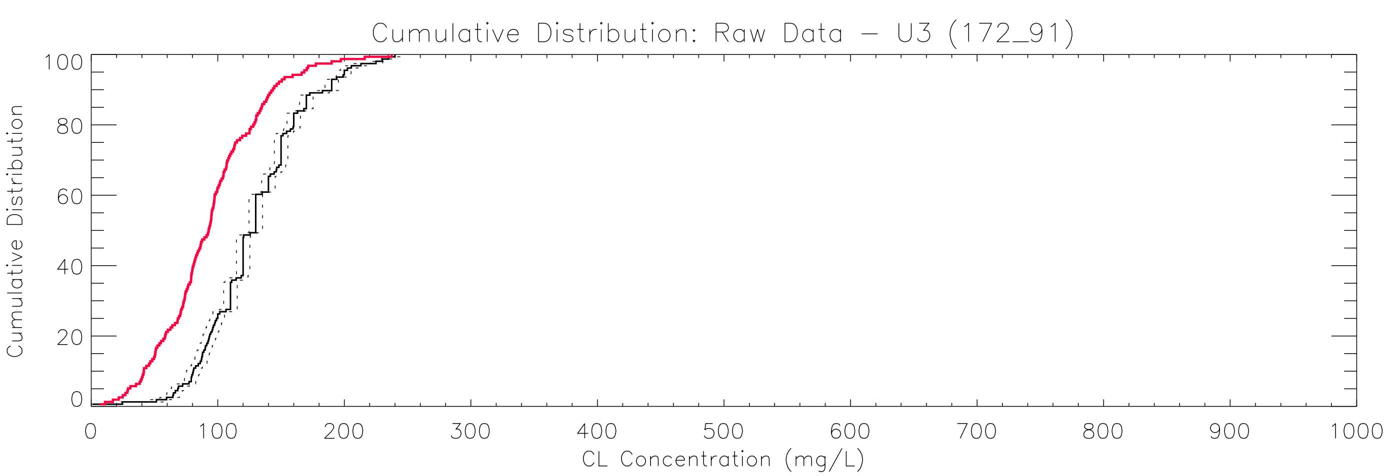
Raw Data (Obs. N = 156) – U3 (172_91)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year



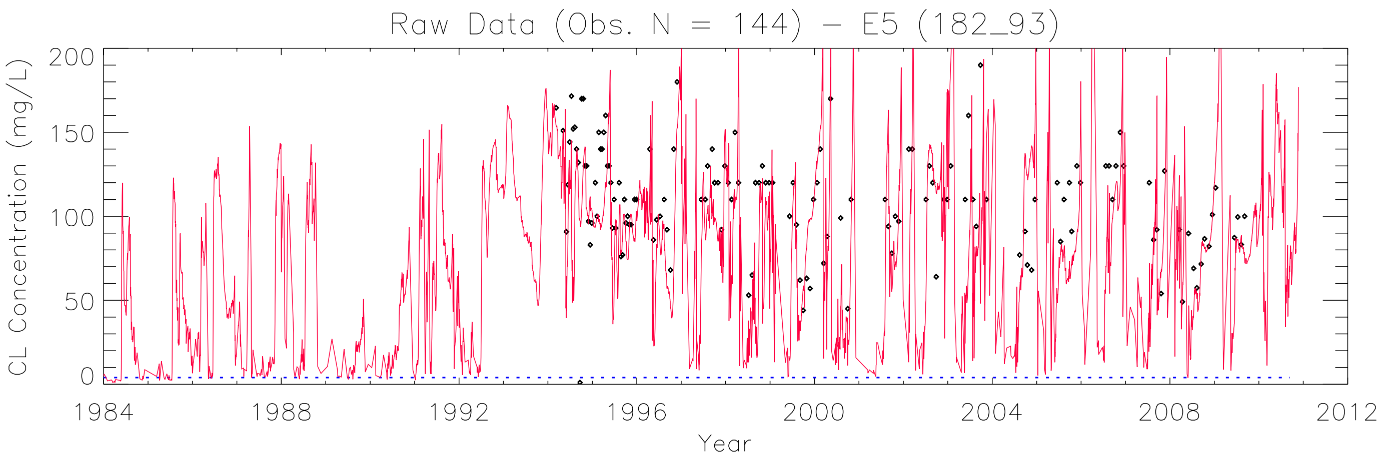
Mean: Season – 95% CI – U3 (172_91)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

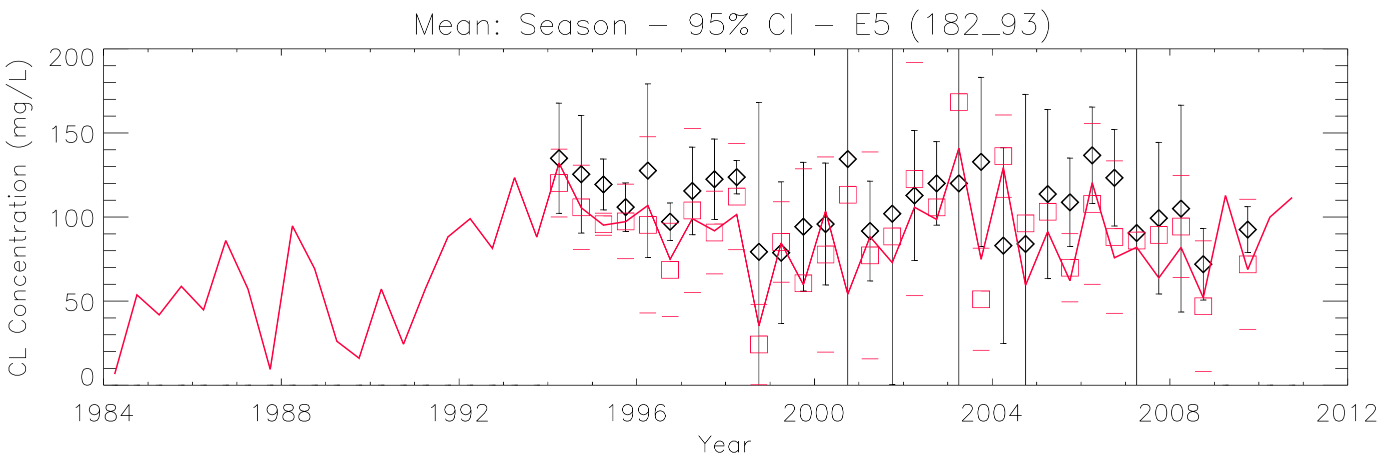


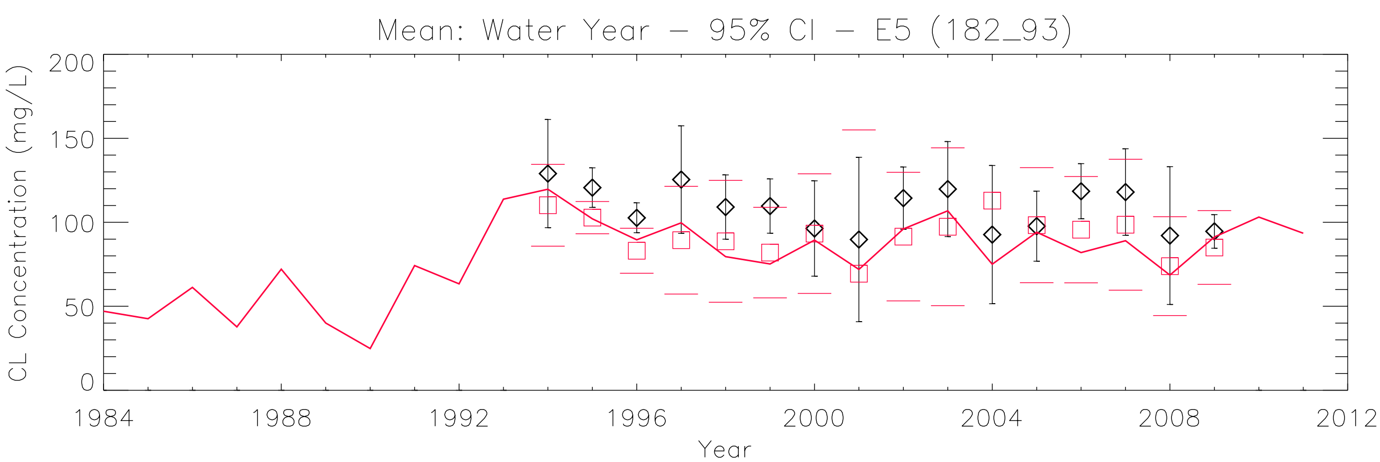
Mean: Water Year – 95% CI – U3 (172_91)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

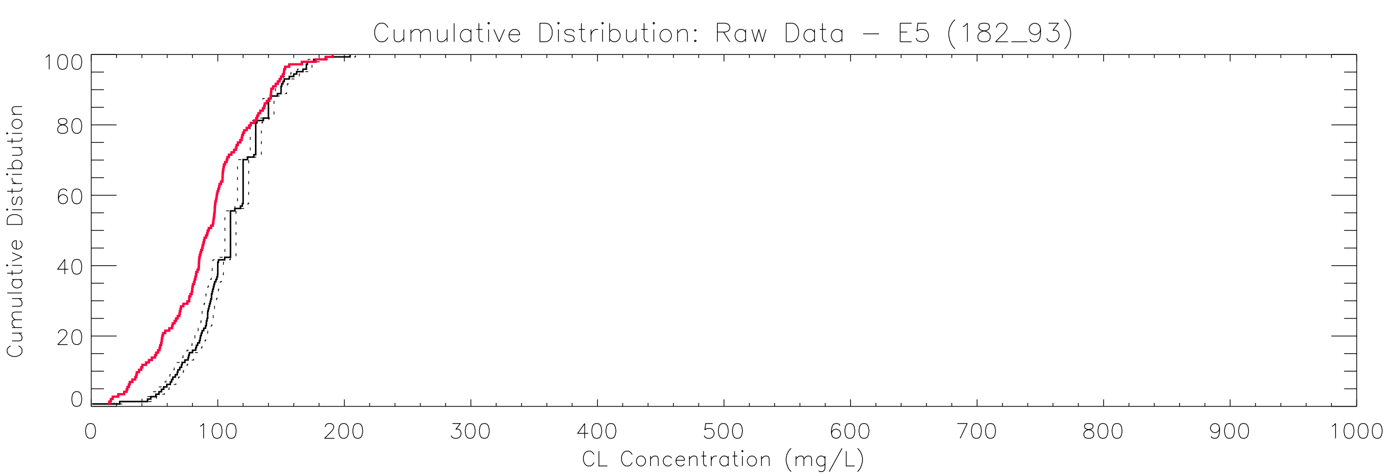


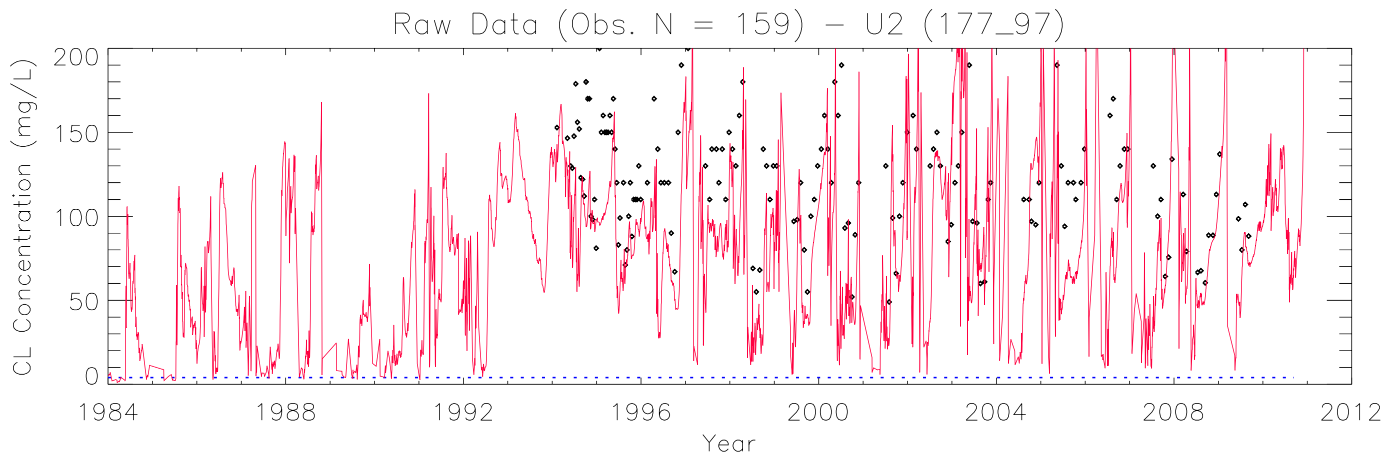
Cumulative Distribution: Raw Data – U3 (172_91)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

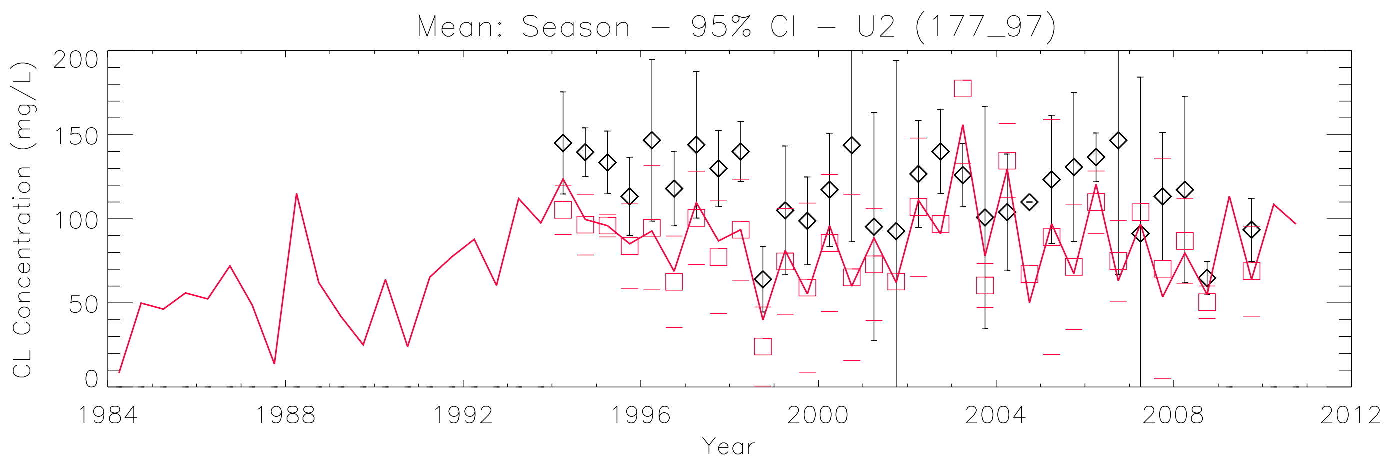

Raw Data (Obs. N = 144) – E5 (182_93)
CL Concentration (mg/L)
Year

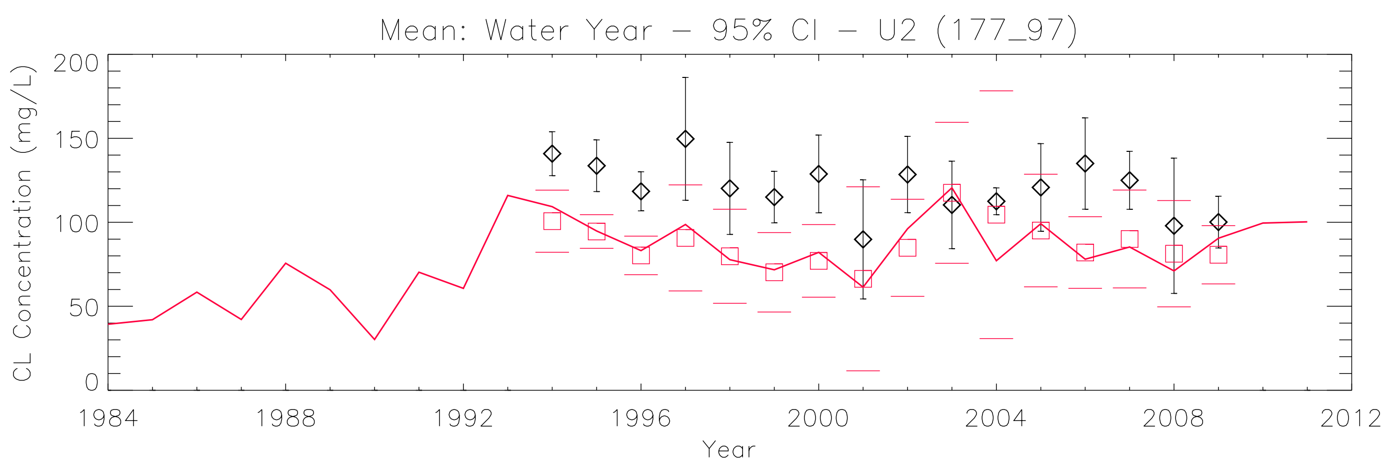

Mean: Season – 95% CI – E5 (182_93)
CL Concentration (mg/L)
Year

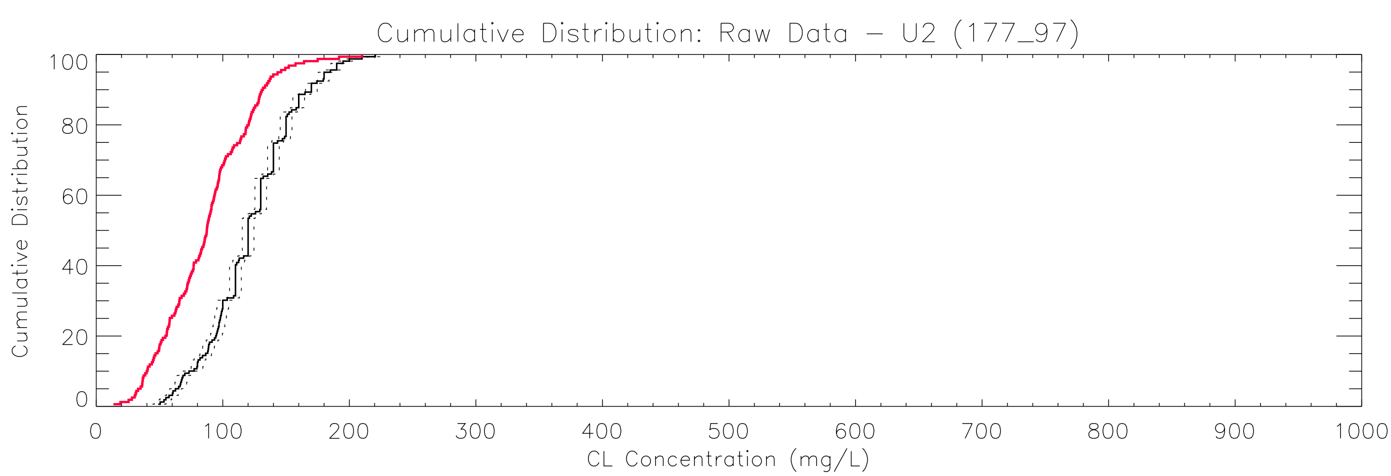

Mean: Water Year – 95% CI – E5 (182_93)
CL Concentration (mg/L)
Year

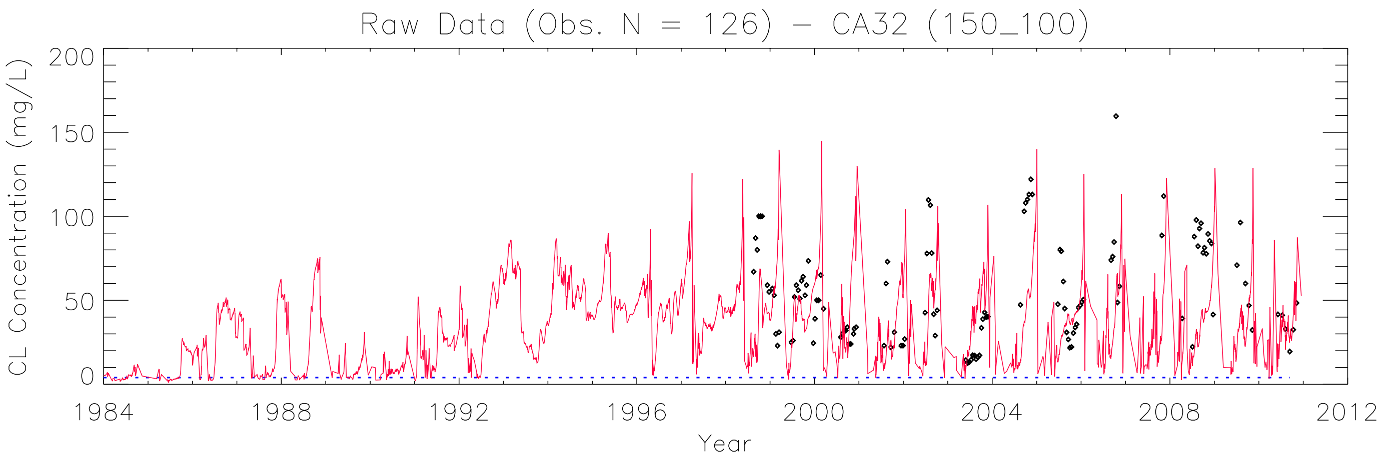

Cumulative Distribution: Raw Data – E5 (182_93)
Cumulative Distribution
CL Concentration (mg/L)

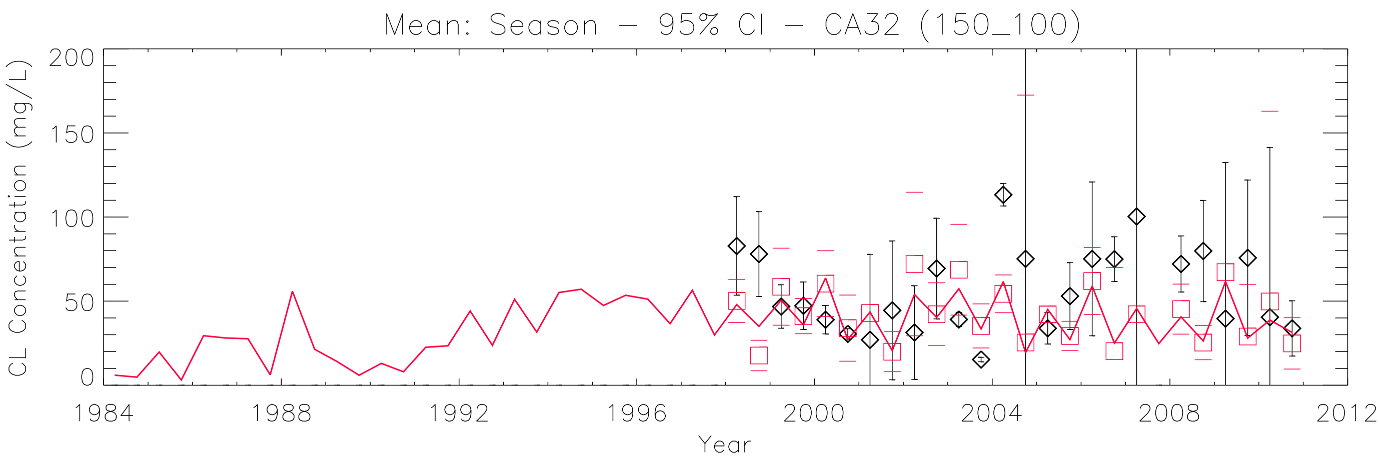

Raw Data (Obs. N = 159) – U2 (177_97)
CL Concentration (mg/L)
Year

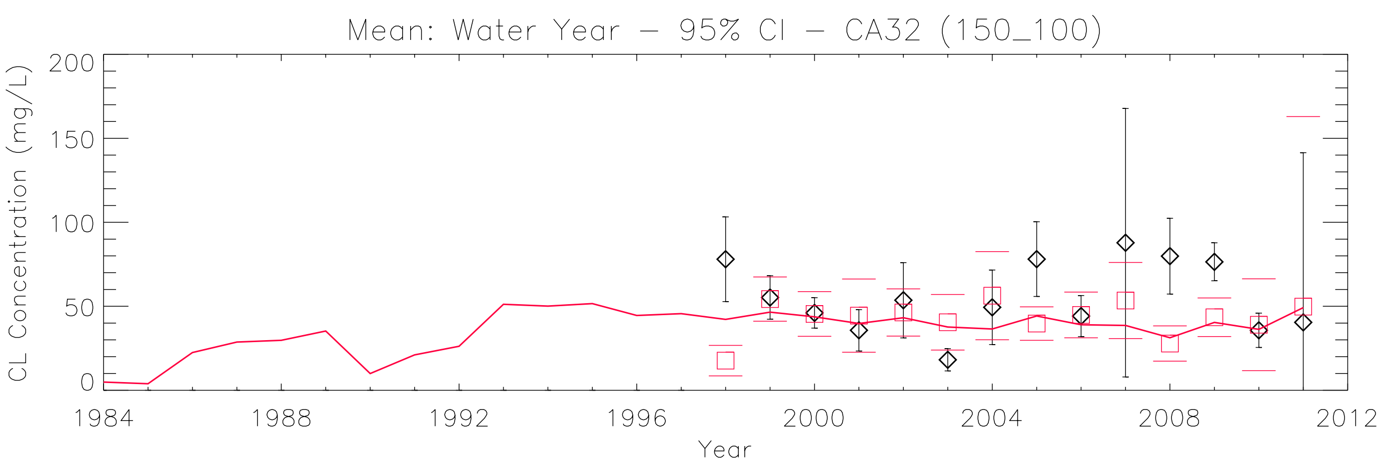

Mean: Season – 95% CI – U2 (177_97)
CL Concentration (mg/L)
Year

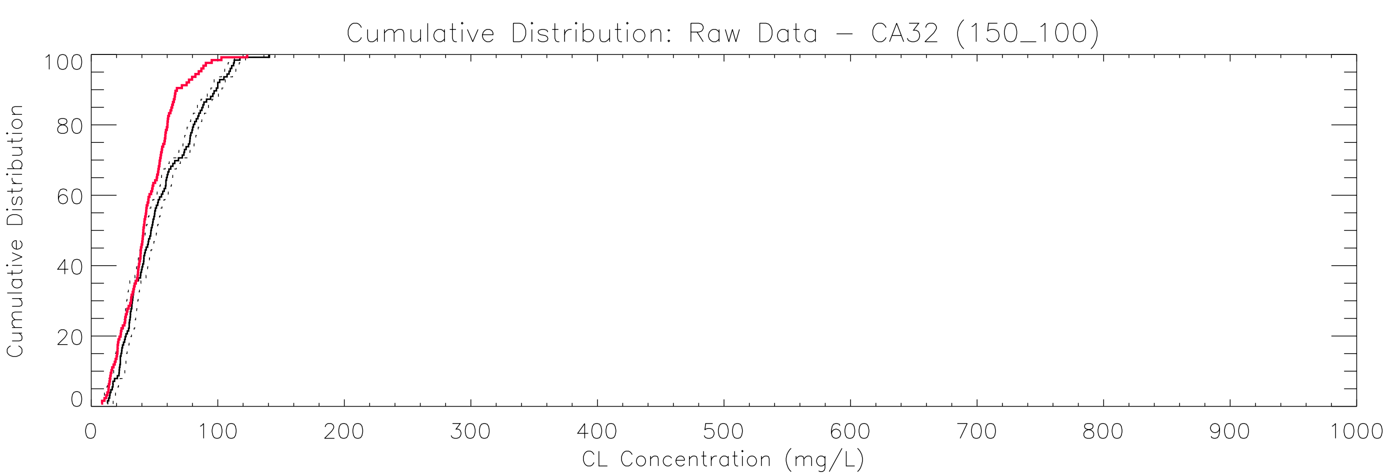

Mean: Water Year – 95% CI – U2 (177_97)
CL Concentration (mg/L)
Year

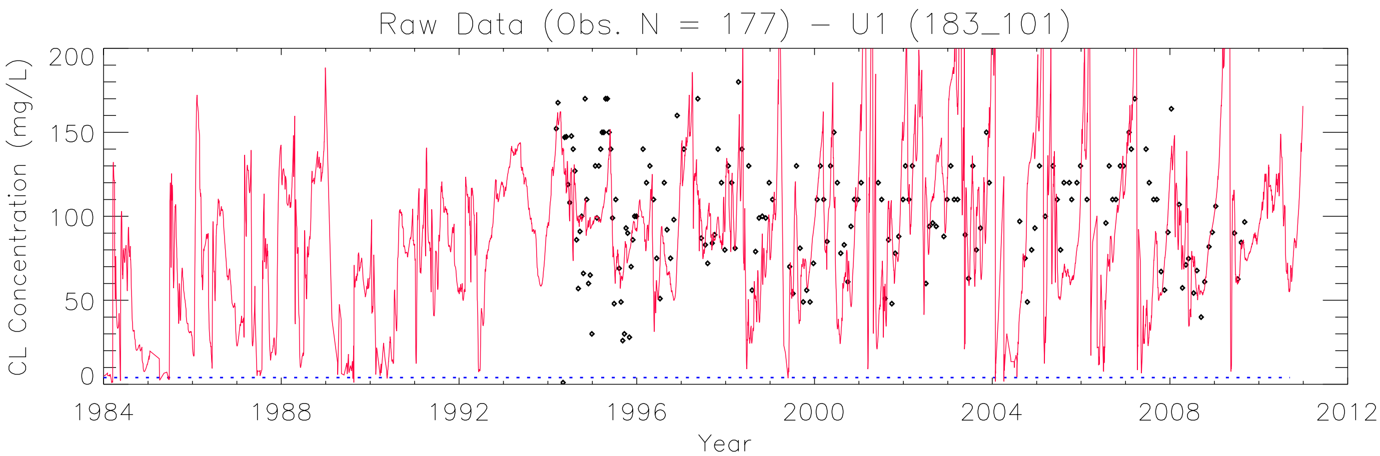

Cumulative Distribution: Raw Data – U2 (177_97)
Cumulative Distribution
CL Concentration (mg/L)

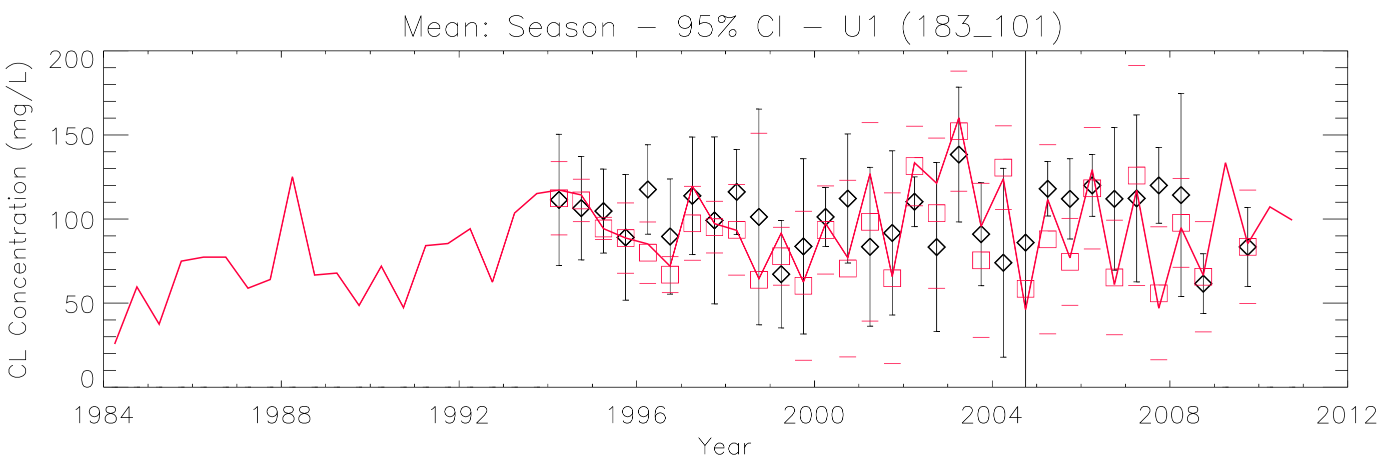

Raw Data (Obs. N = 126) – CA32 (150_100)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

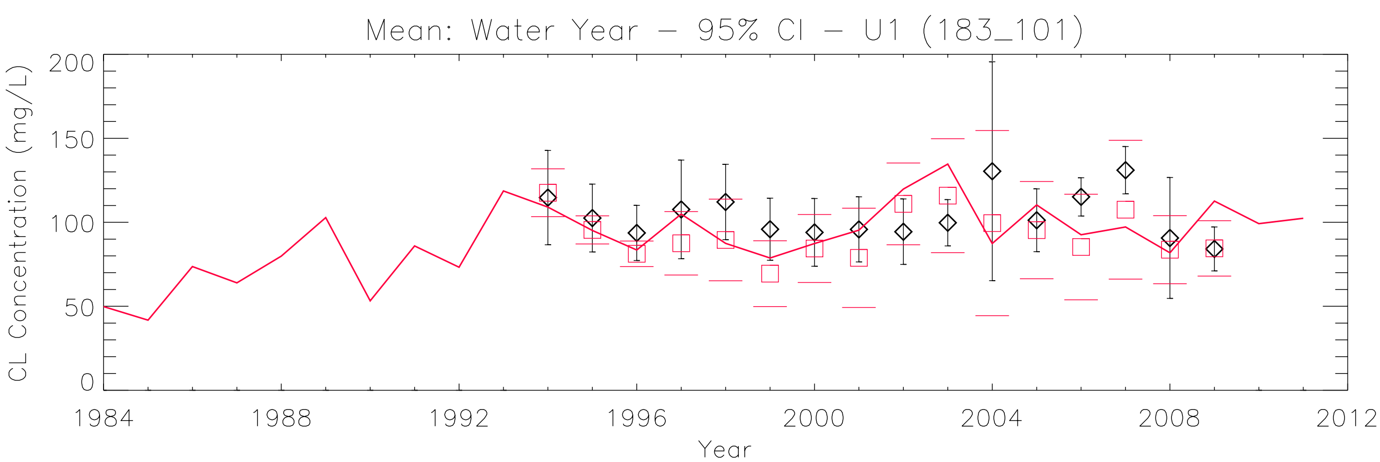

Mean: Season – 95% CI – CA32 (150_100)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

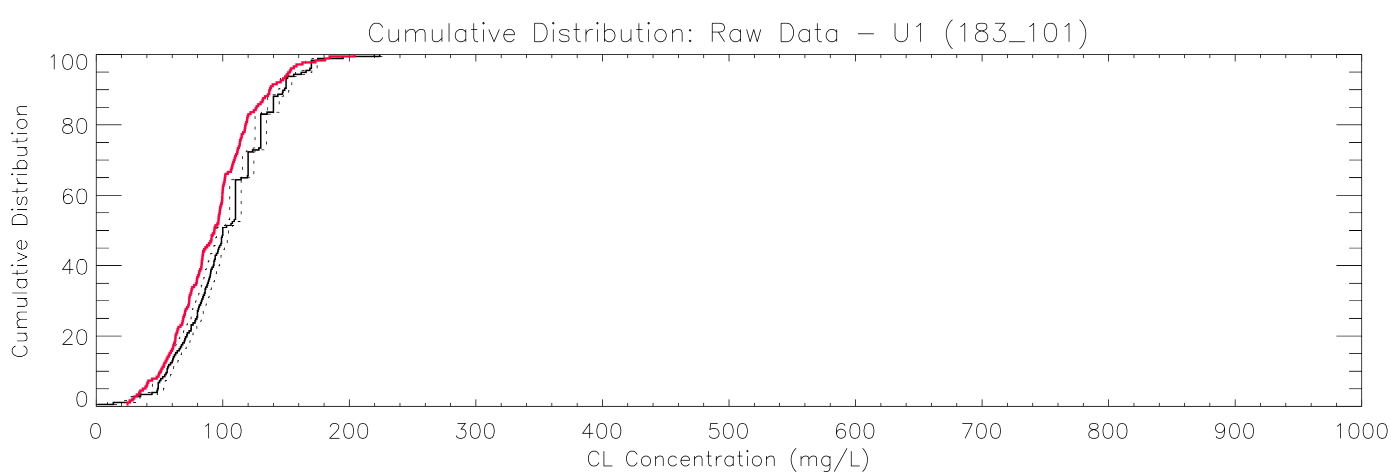

Mean: Water Year – 95% CI – CA32 (150_100)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

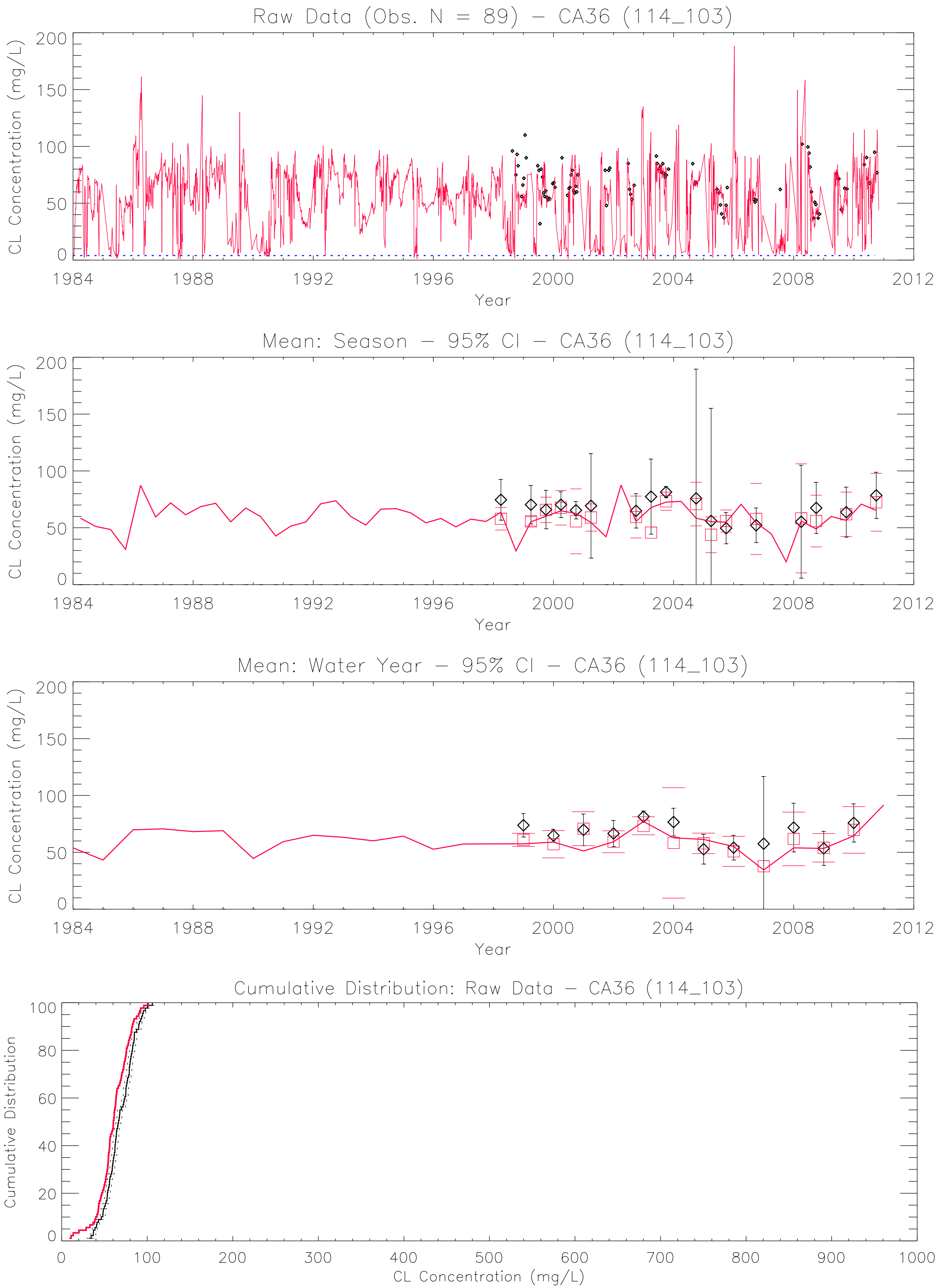

Cumulative Distribution: Raw Data – CA32 (150_100)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

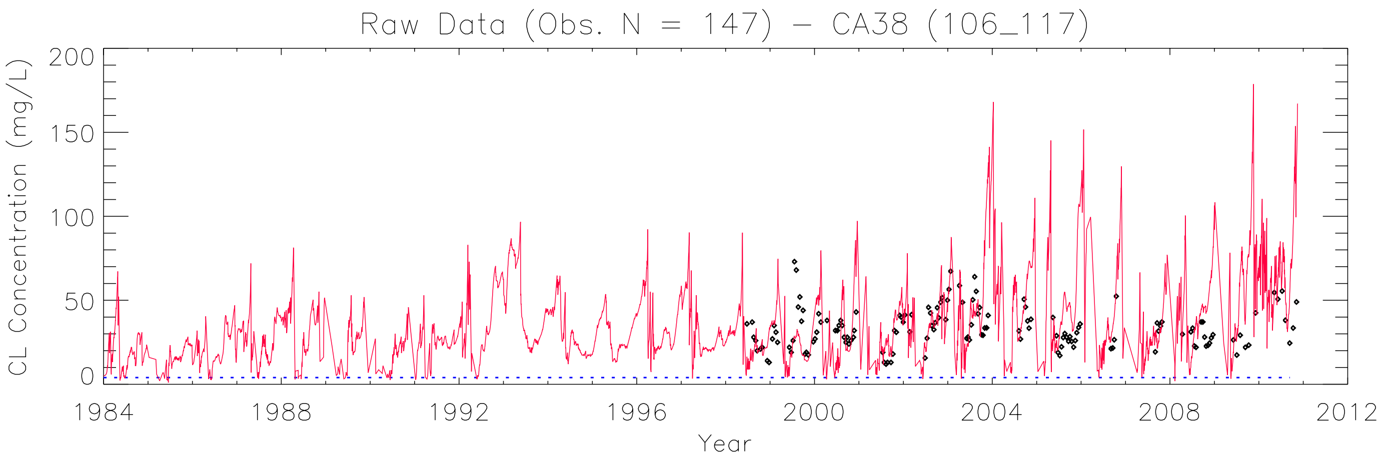

Raw Data (Obs. N = 177) – U1 (183_101)
CL Concentration (mg/L)
Year

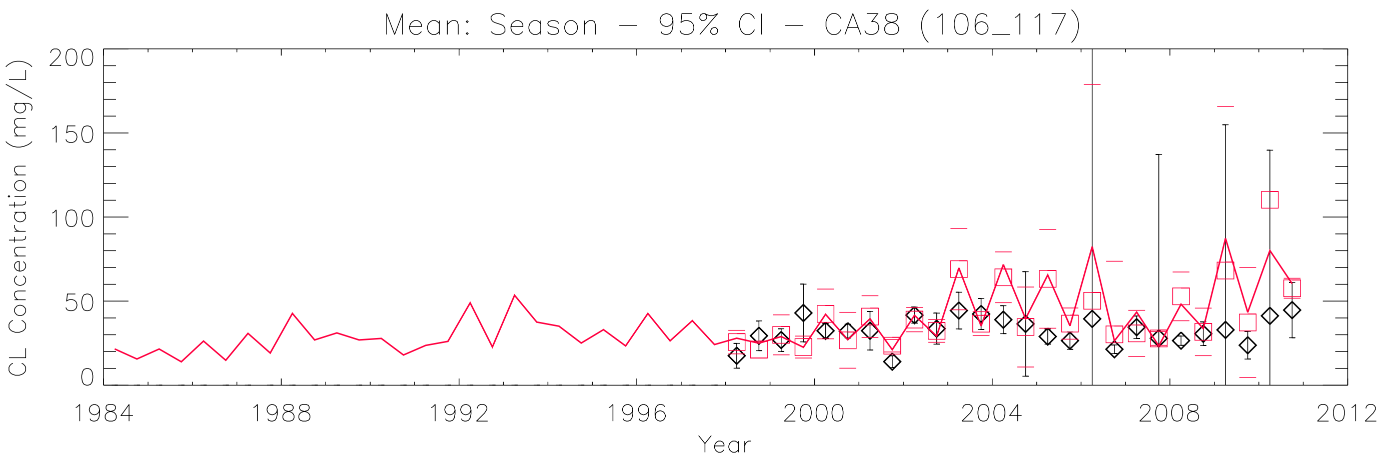

Mean: Season – 95% CI – U1 (183_101)
CL Concentration (mg/L)
Year

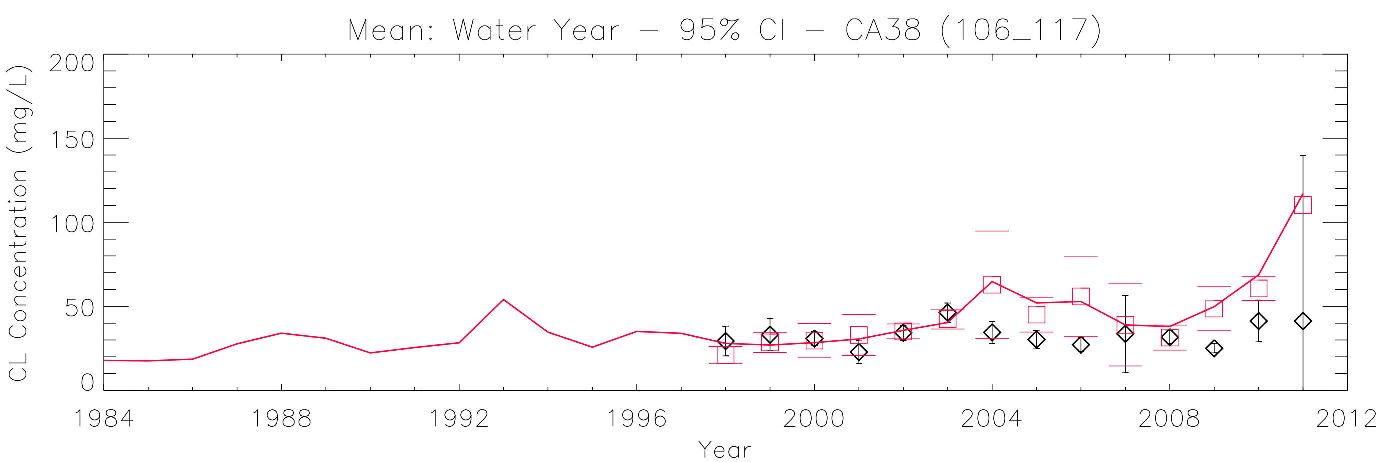

Mean: Water Year – 95% CI – U1 (183_101)
CL Concentration (mg/L)
Year

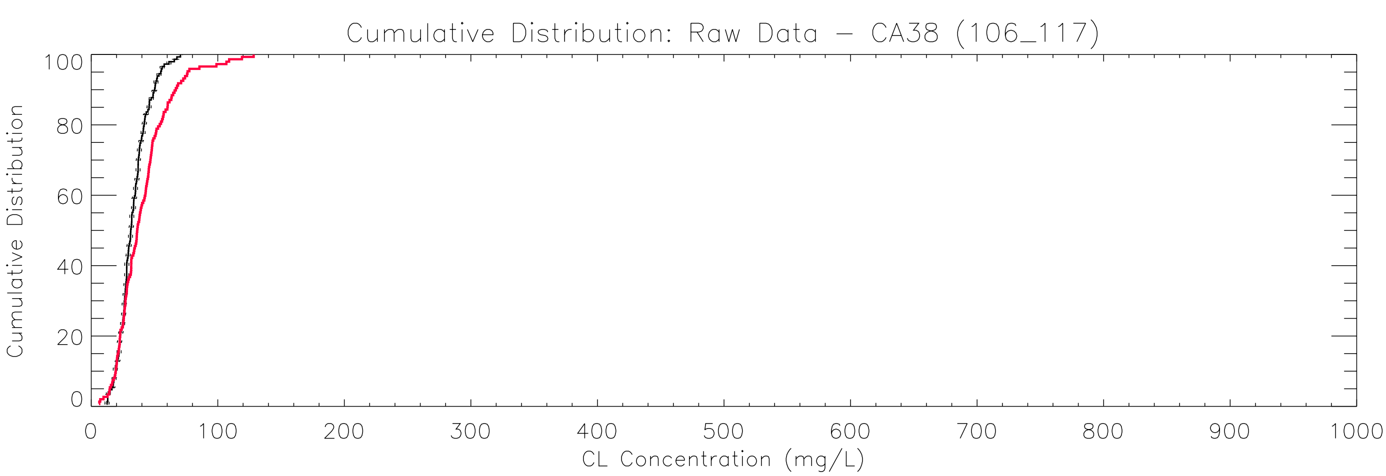

Cumulative Distribution: Raw Data – U1 (183_101)
Cumulative Distribution
CL Concentration (mg/L)

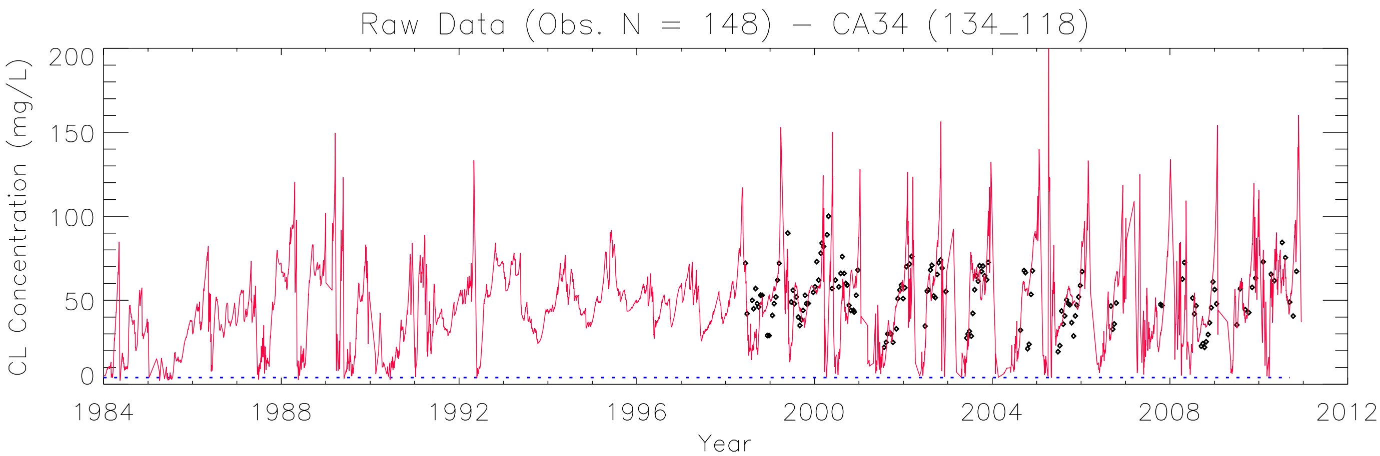

Raw Data (Obs. N = 89) – CA36 (114_103)
CL Concentration (mg/L)
Year
Mean: Season – 95% CI – CA36 (114_103)
CL Concentration (mg/L)
Year
Mean: Water Year – 95% CI – CA36 (114_103)
CL Concentration (mg/L)
Year
Cumulative Distribution: Raw Data – CA36 (114_103)
Cumulative Distribution
CL Concentration (mg/L)

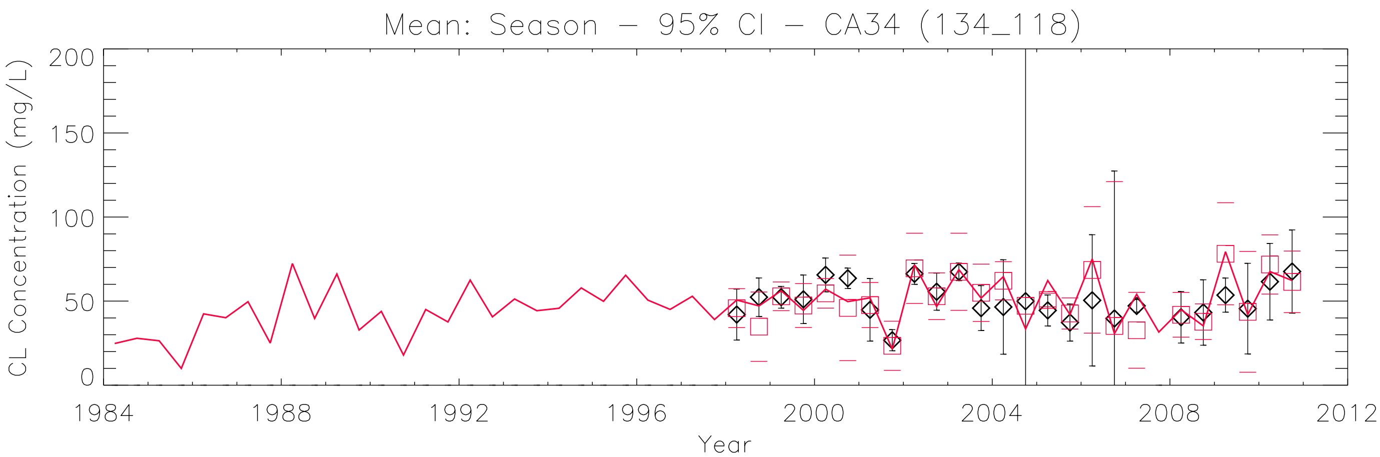

Raw Data (Obs. N = 147) – CA38 (106_117)
CL Concentration (mg/L)
Year

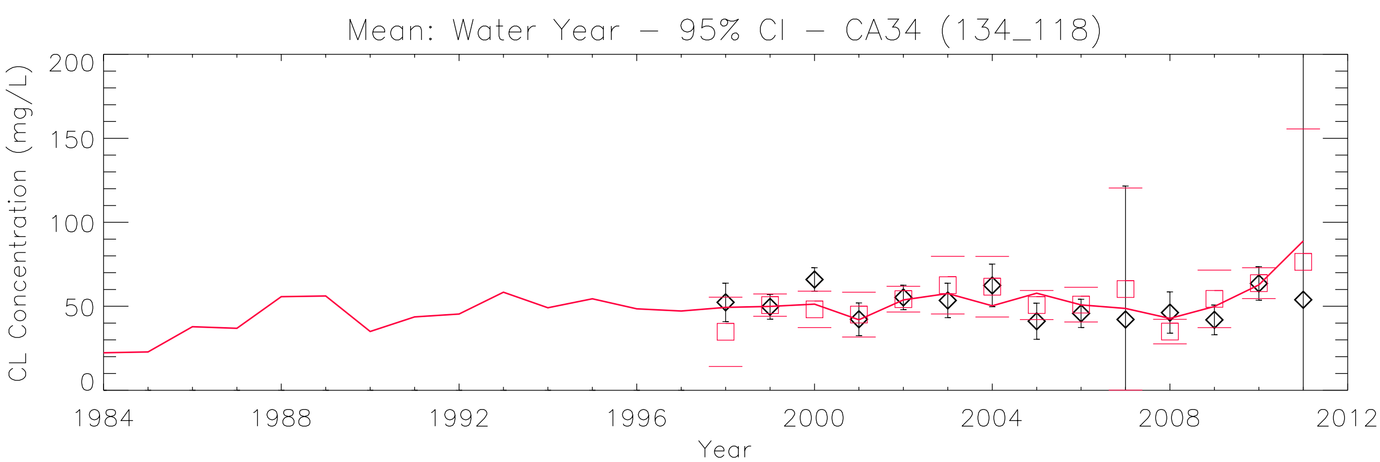

Mean: Season – 95% CI – CA38 (106_117)
CL Concentration (mg/L)
Year

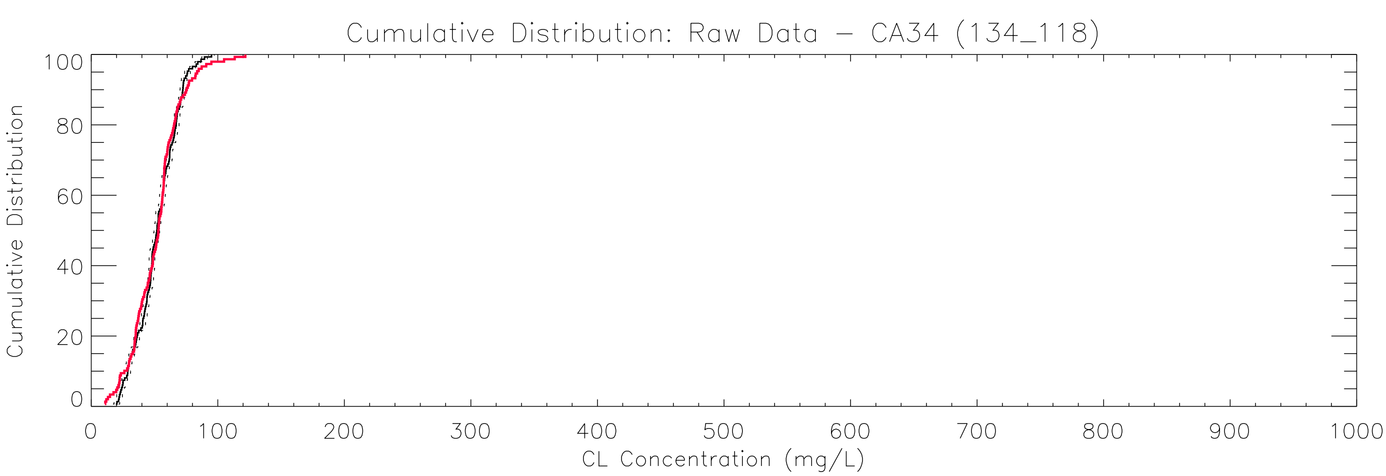

Mean: Water Year – 95% CI – CA38 (106_117)
CL Concentration (mg/L)
Year

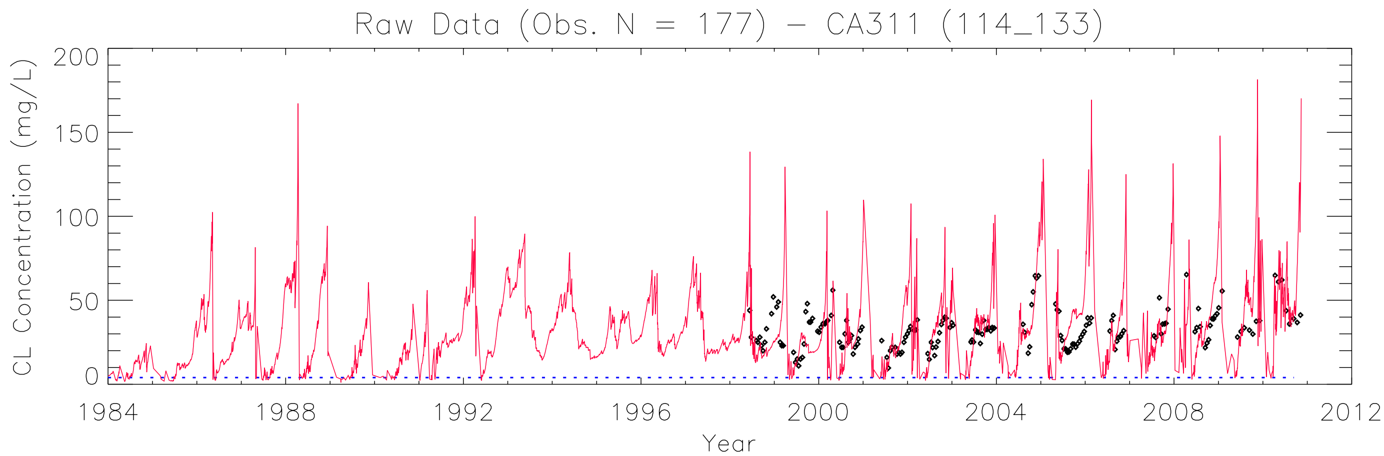

Cumulative Distribution: Raw Data – CA38 (106_117)
Cumulative Distribution
CL Concentration (mg/L)

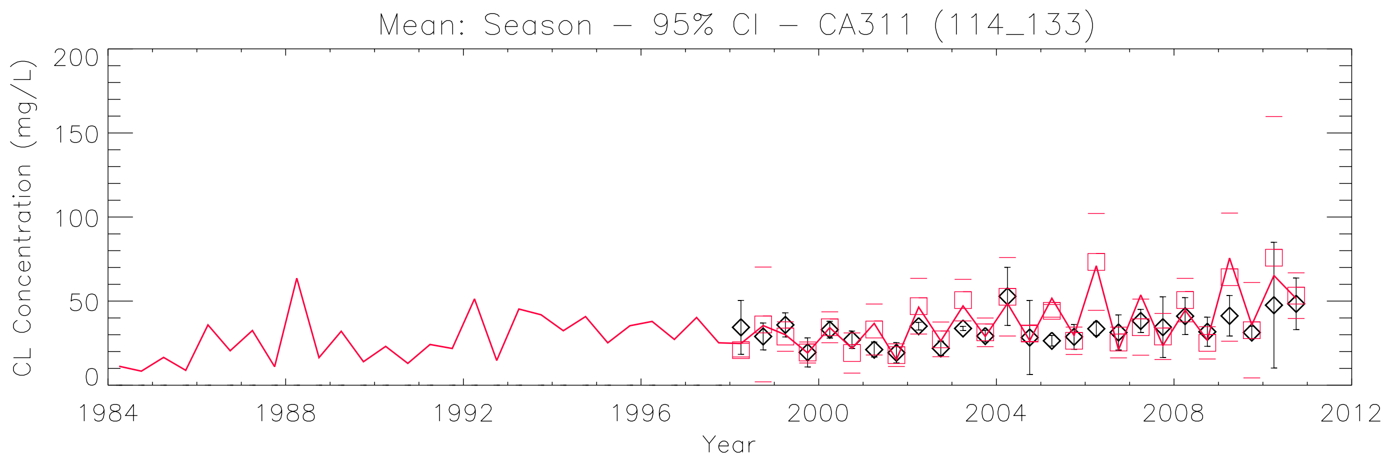

Raw Data (Obs. N = 148) – CA34 (134_118)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

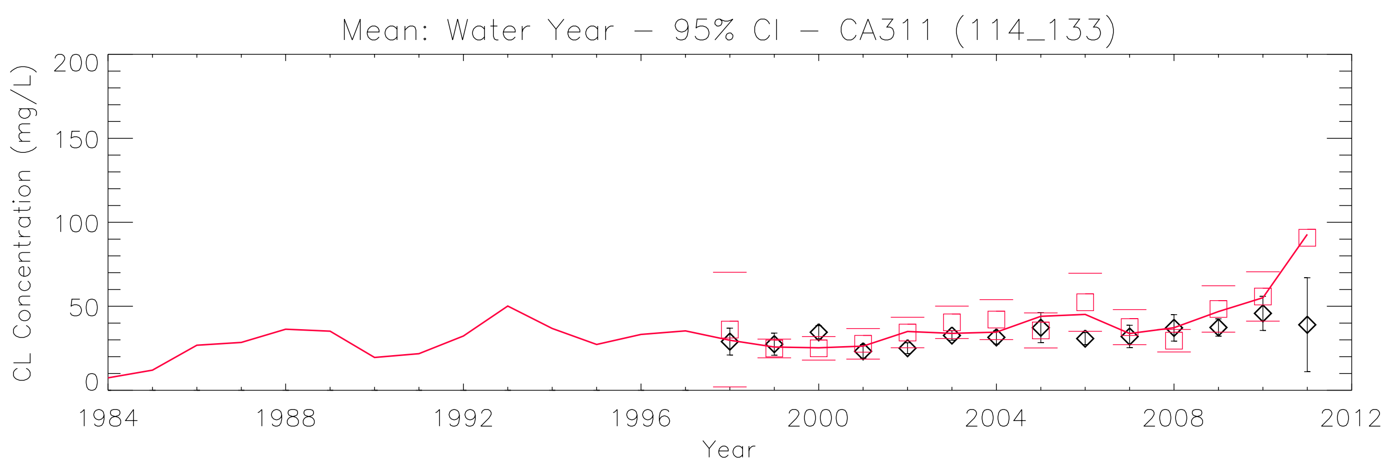

Mean: Season – 95% CI – CA34 (134_118)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

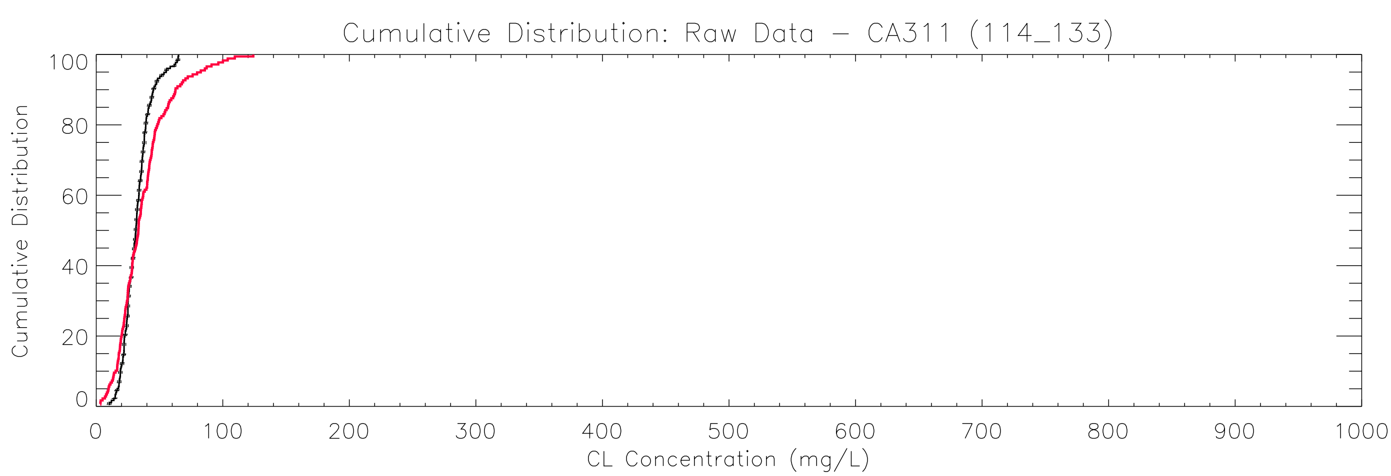

Mean: Water Year – 95% CI – CA34 (134_118)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

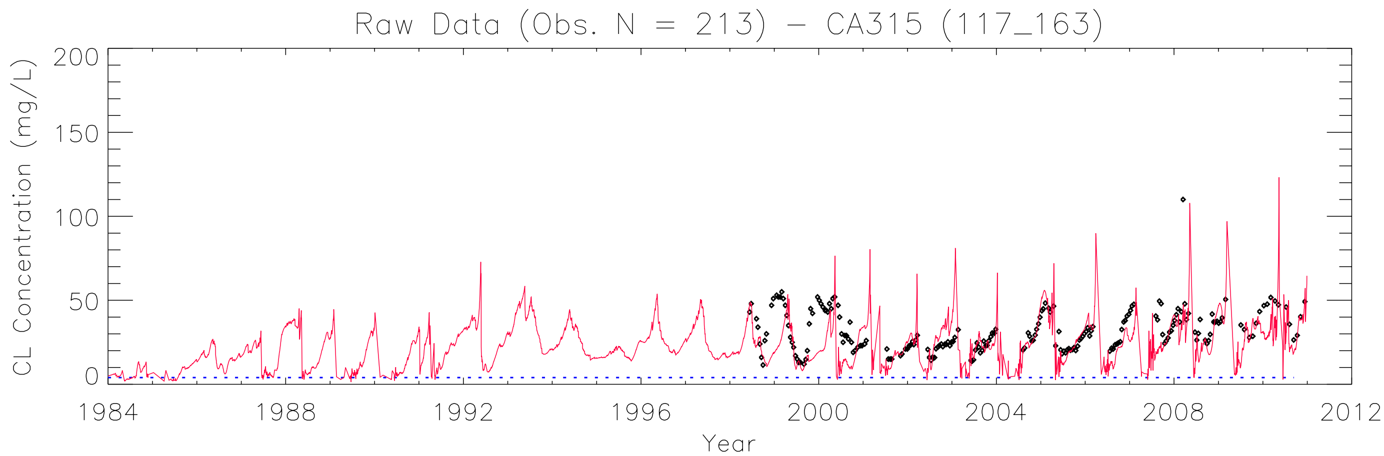

Cumulative Distribution: Raw Data – CA34 (134_118)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

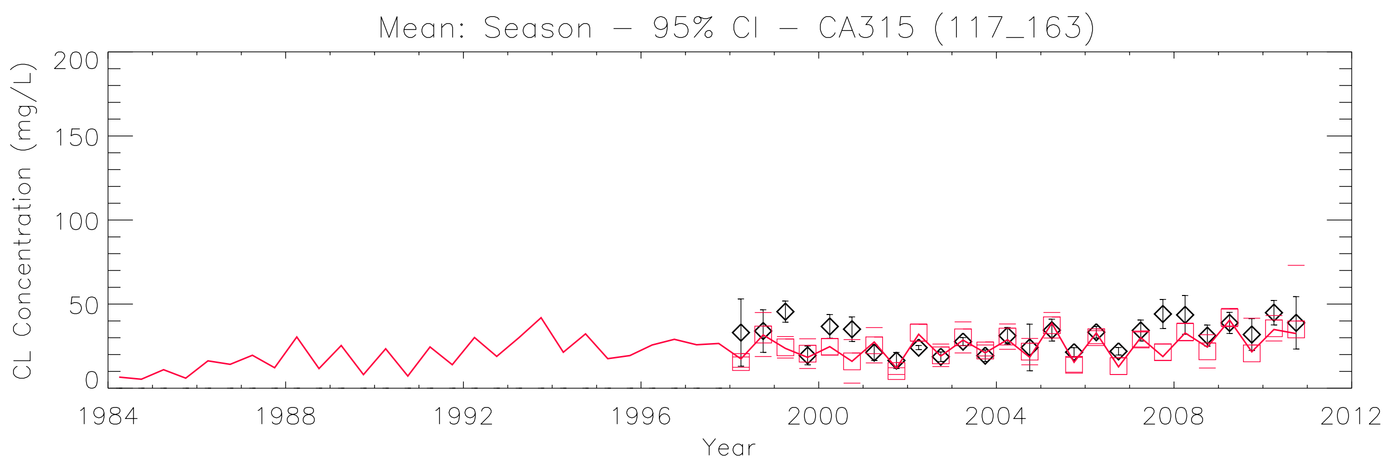

Raw Data (Obs. N = 177) – CA311 (114_133)
CL Concentration (mg/L)
Year

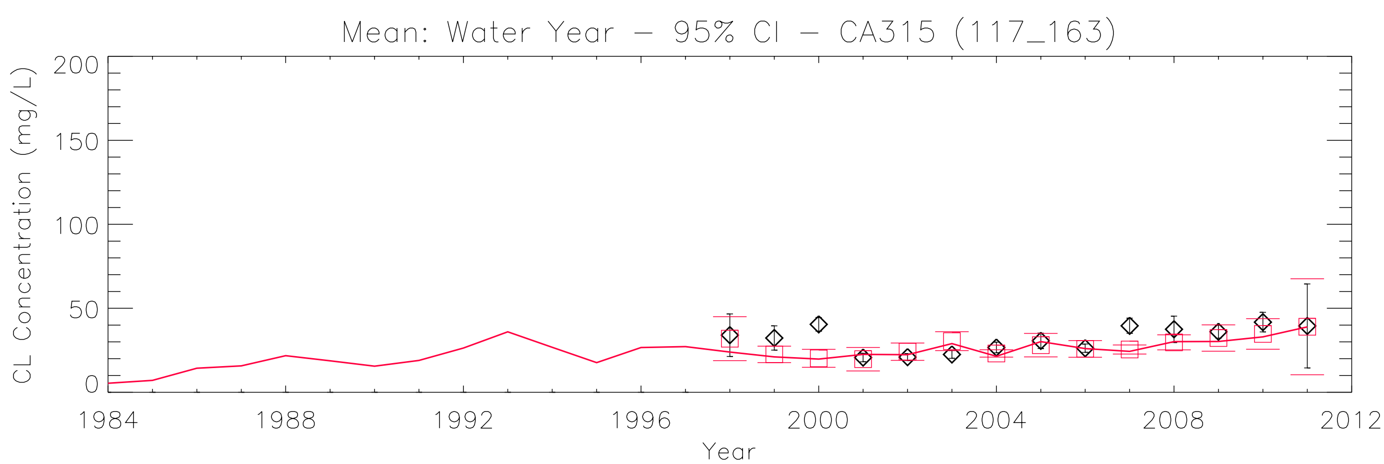

Mean: Season – 95% CI – CA311 (114_133)
CL Concentration (mg/L)
Year

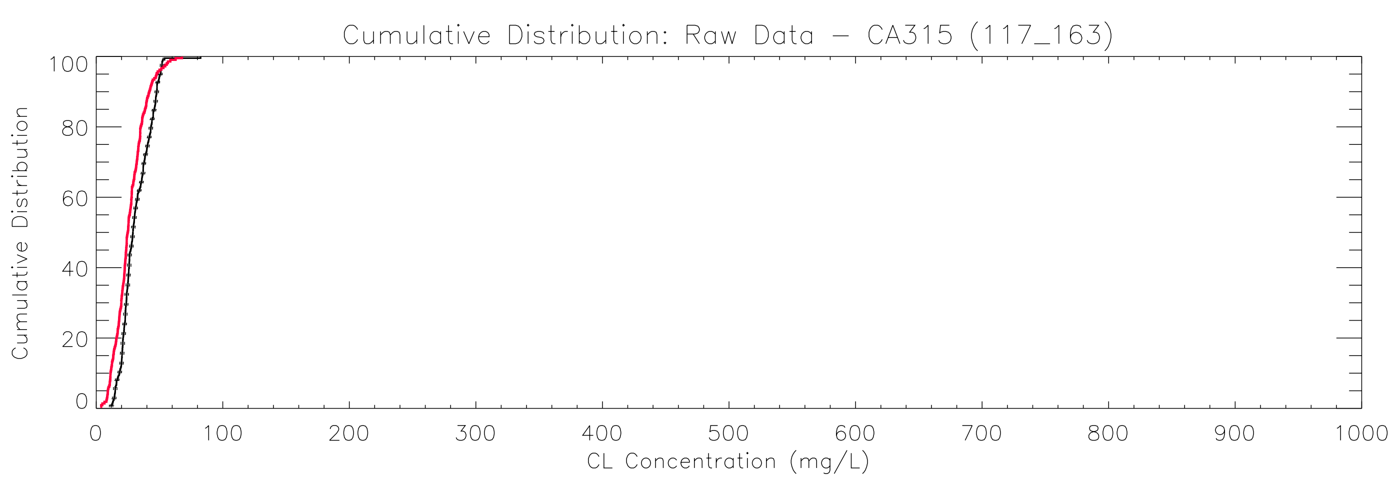

Mean: Water Year – 95% CI – CA311 (114_133)
CL Concentration (mg/L)
Year

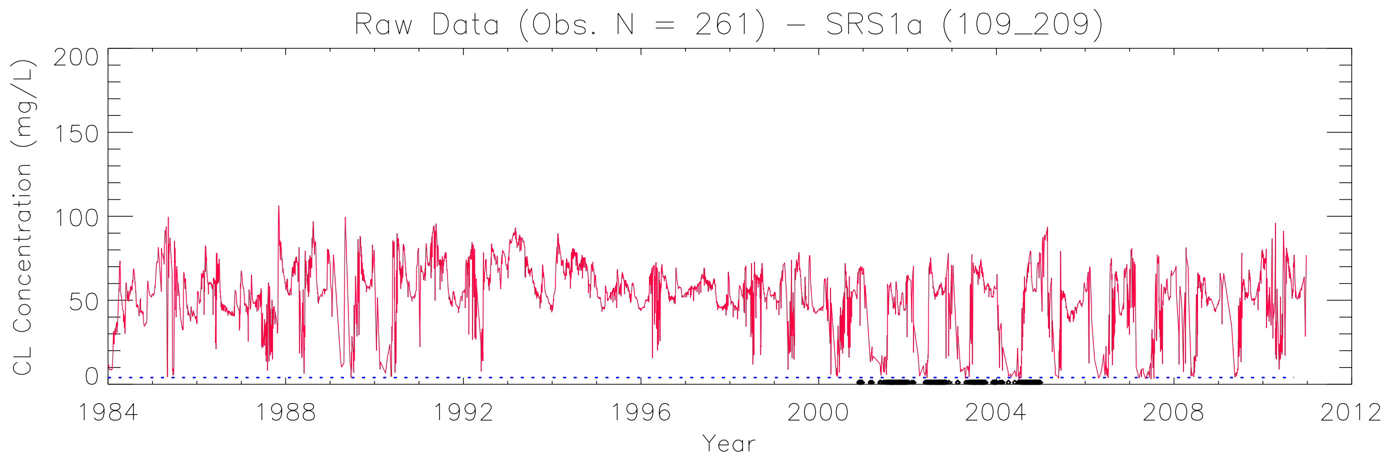

Cumulative Distribution: Raw Data – CA311 (114_133)
Cumulative Distribution
CL Concentration (mg/L)

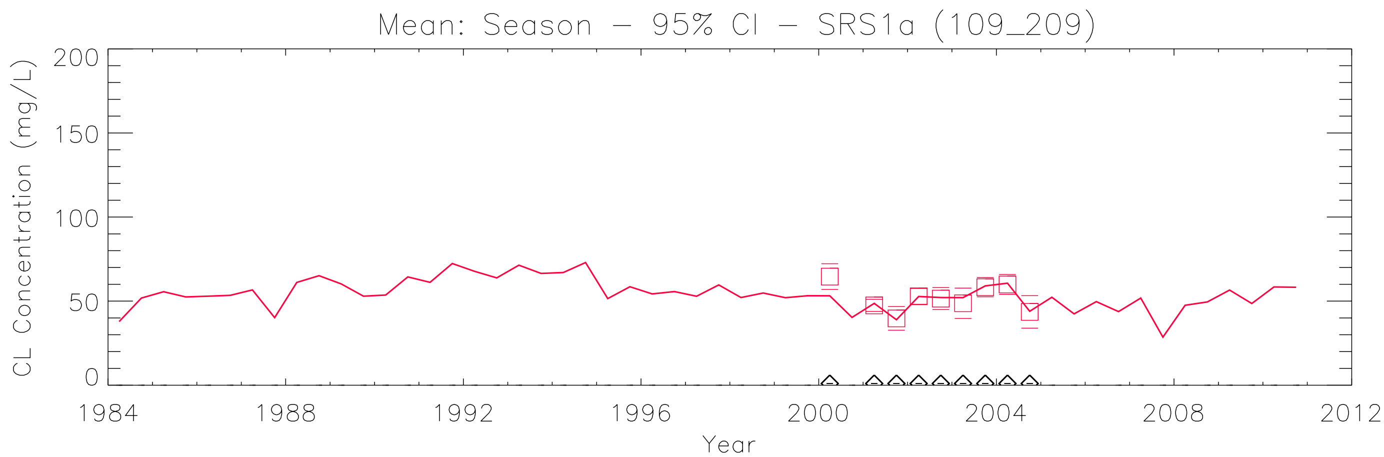

Raw Data (Obs. N = 213) – CA315 (117_163)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

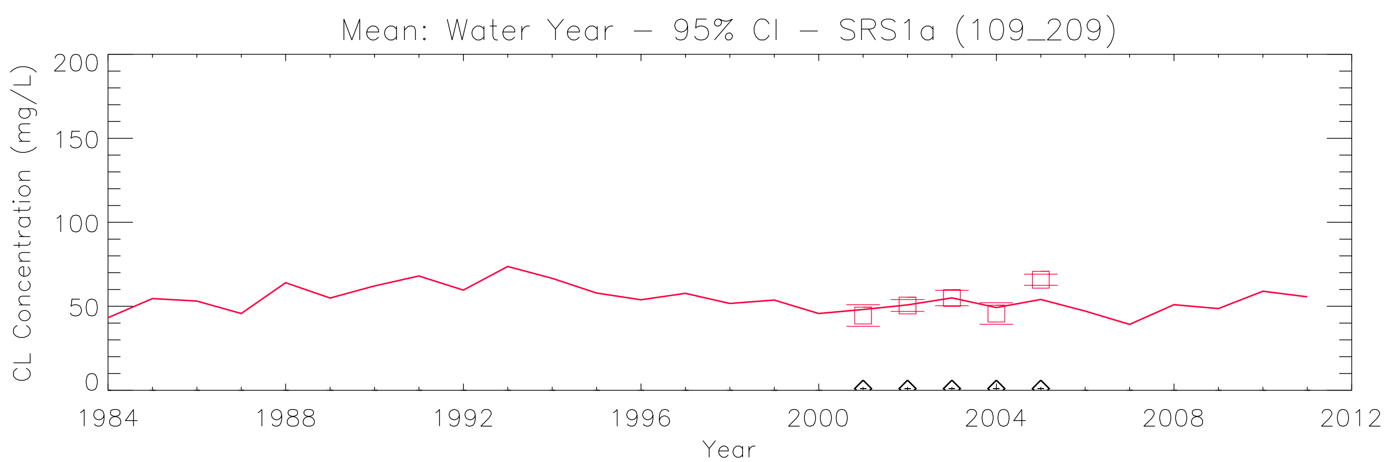

Mean: Season – 95% CI – CA315 (117_163)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

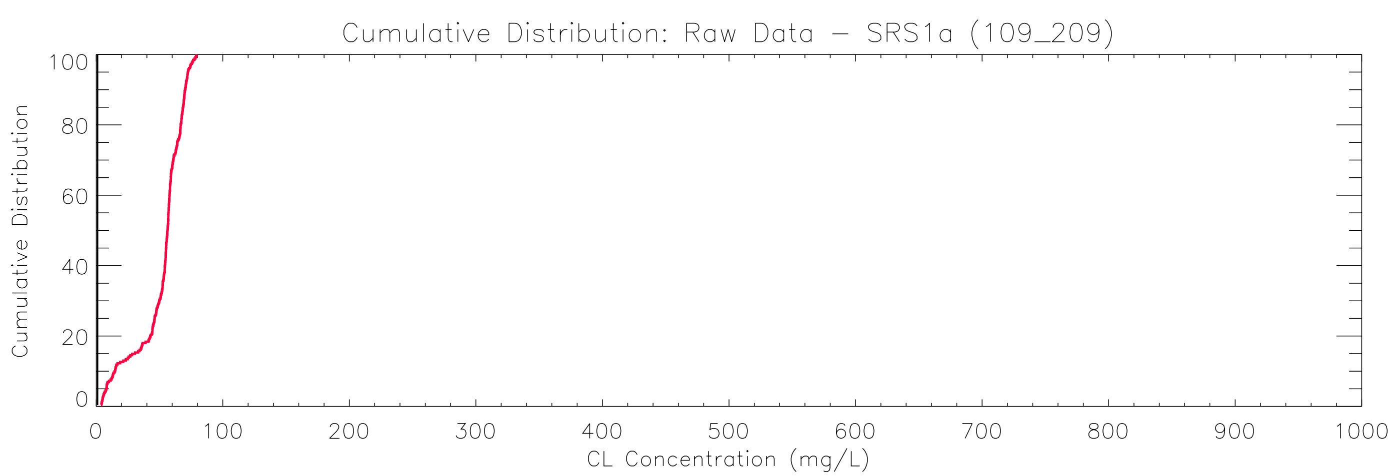

Mean: Water Year – 95% CI – CA315 (117_163)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

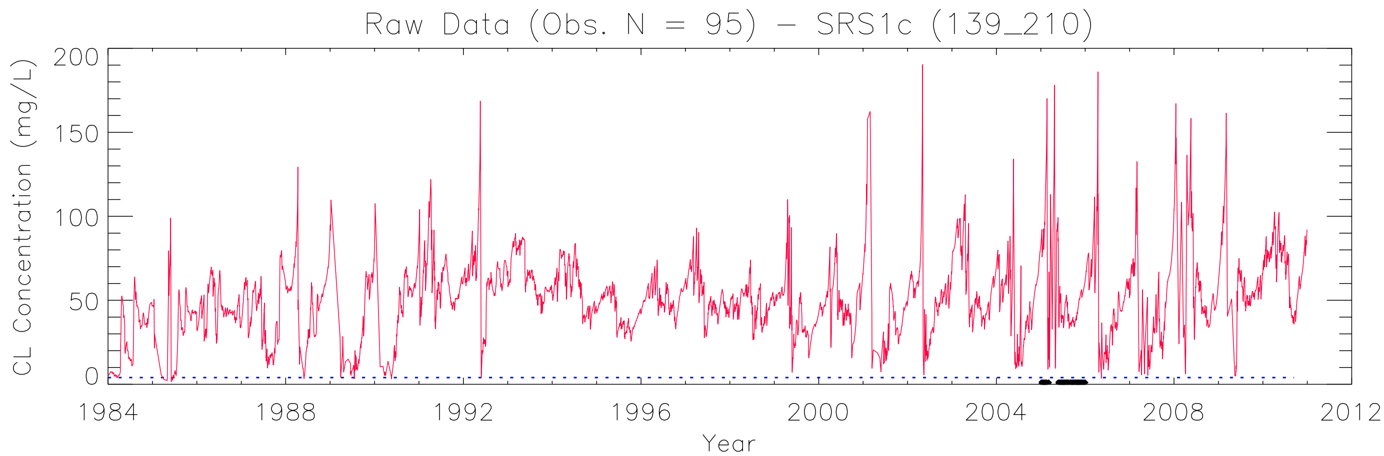

Cumulative Distribution: Raw Data – CA315 (117_163)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

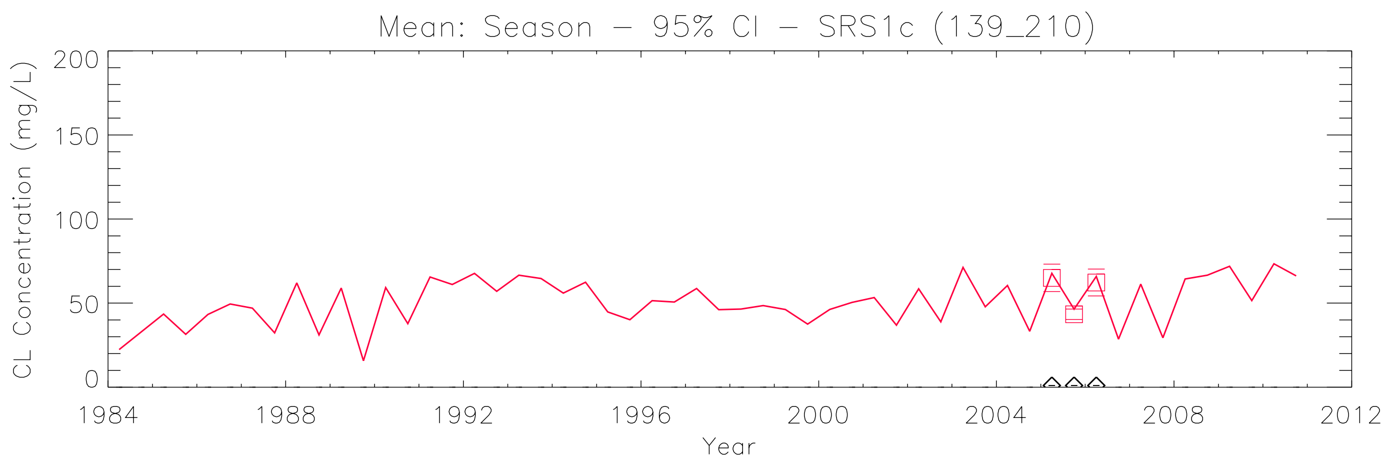

Raw Data (Obs. N = 261) – SRS1a (109_209)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

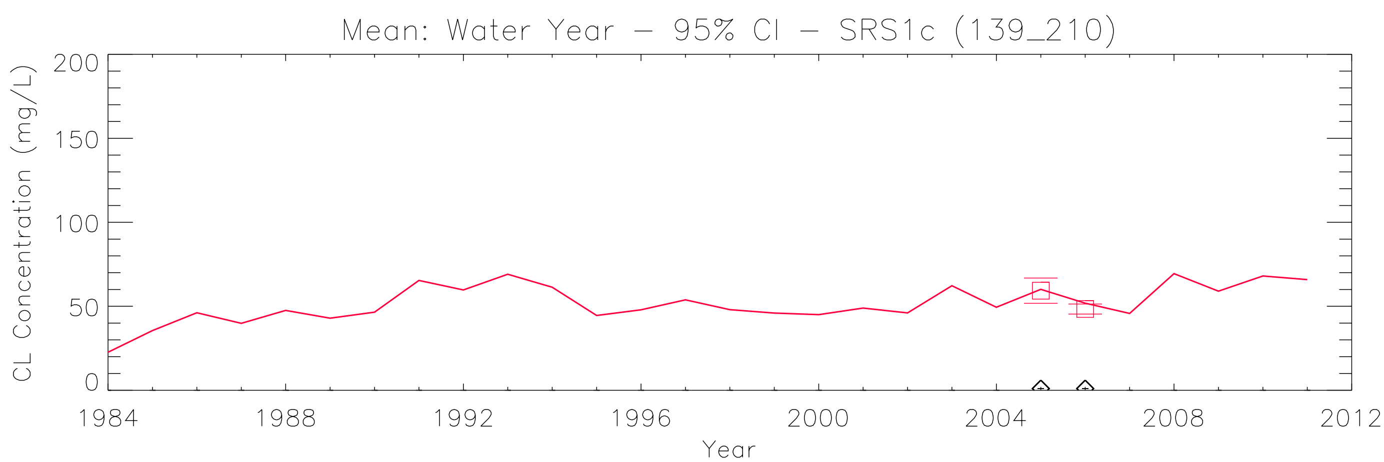

Mean: Season – 95% CI – SRS1a (109_209)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

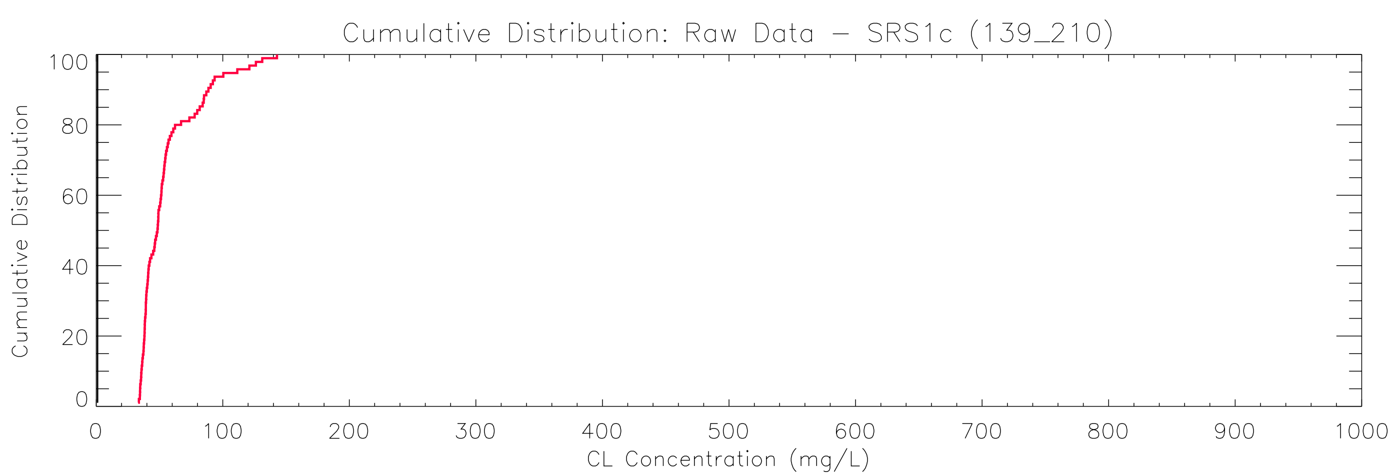

Mean: Water Year – 95% CI – SRS1a (109_209)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

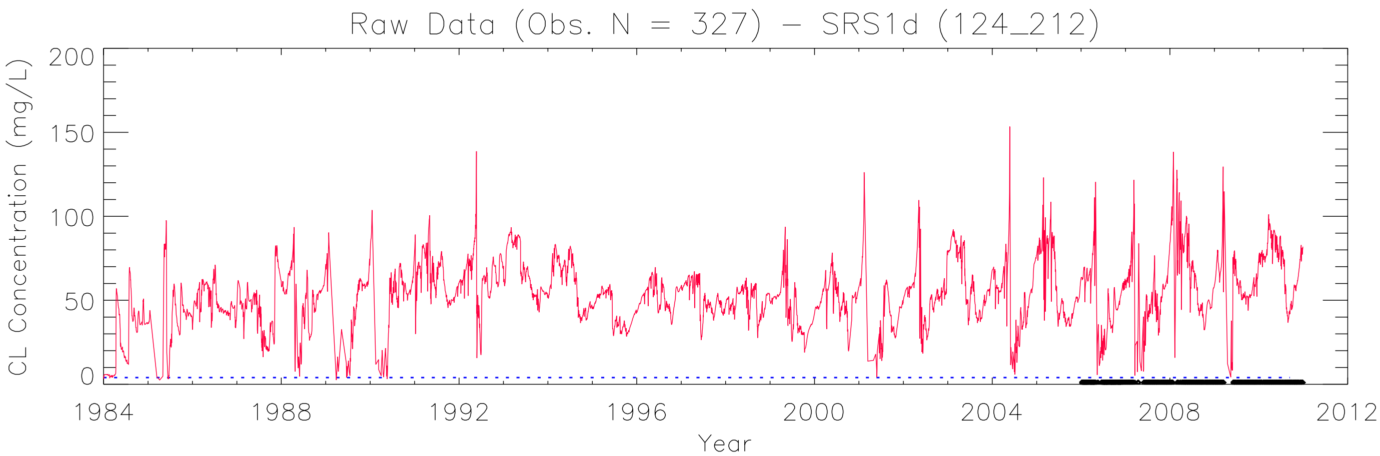

Cumulative Distribution: Raw Data – SRS1a (109_209)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)


Raw Data (Obs. N = 95) - SRS1c (139_210)
CL Concentration (mg/L)
Year

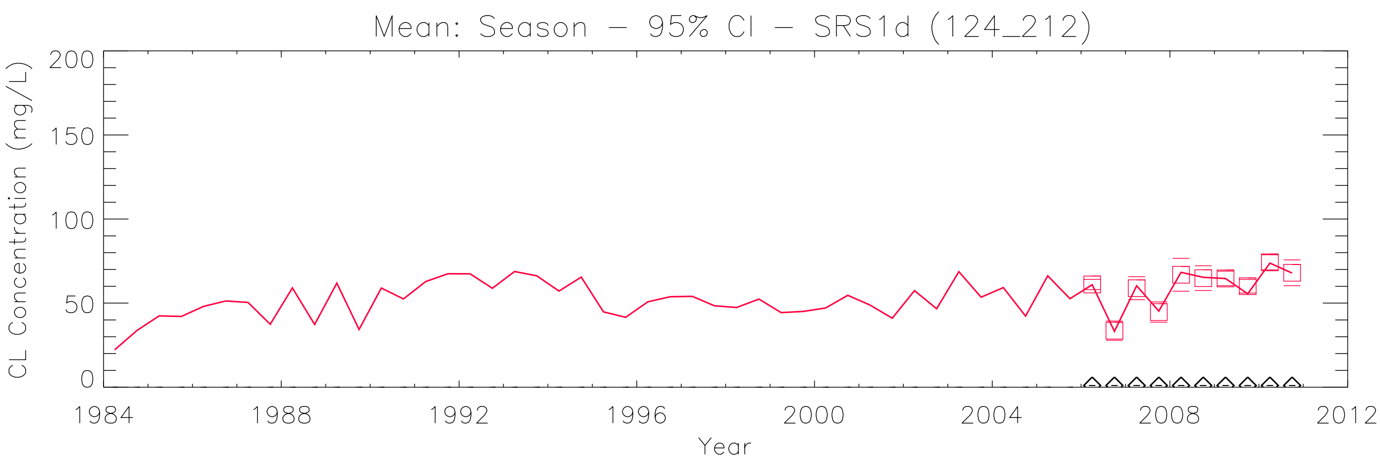

Mean: Season - 95% CI - SRS1c (139_210)
CL Concentration (mg/L)
Year


Mean: Water Year - 95% CI - SRS1c (139_210)
CL Concentration (mg/L)
Year

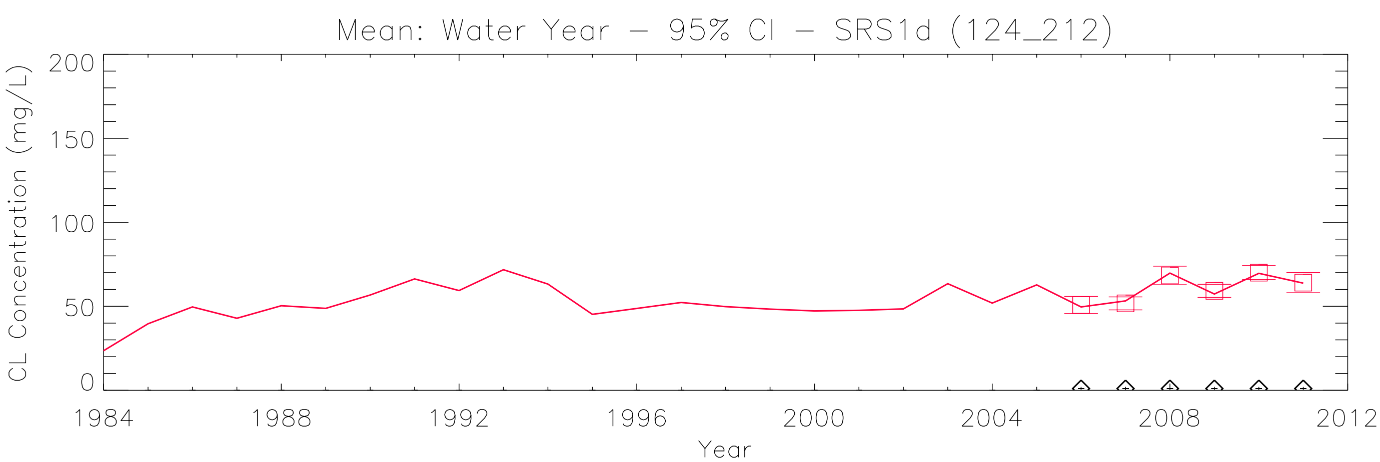

Cumulative Distribution: Raw Data - SRS1c (139_210)
Cumulative Distribution
CL Concentration (mg/L)



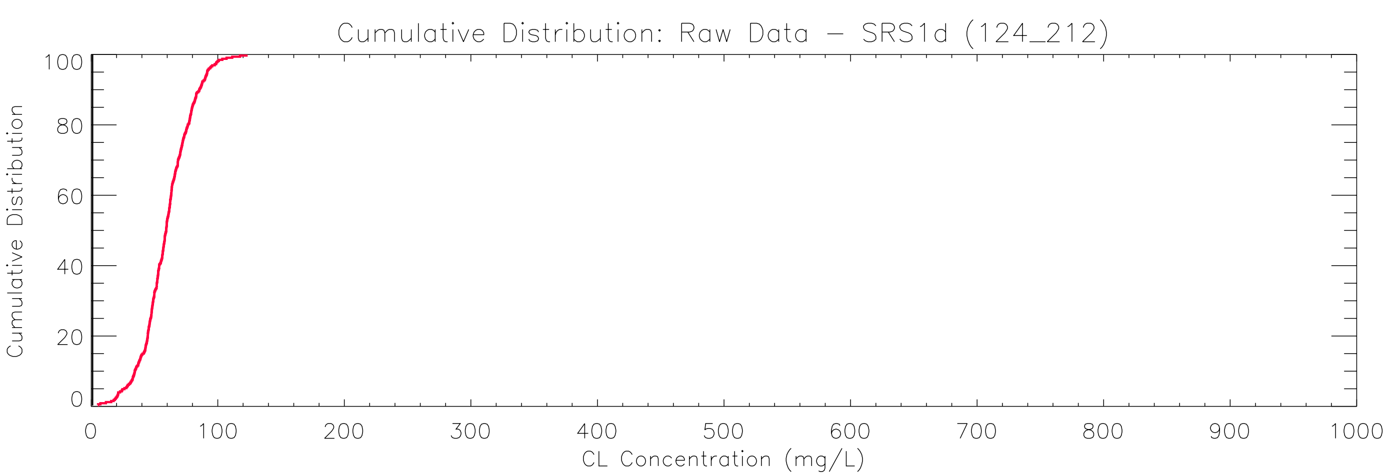
Raw Data (Obs. N = 327) – SRS1d (124_212)
CL Concentration (mg/L)
Year



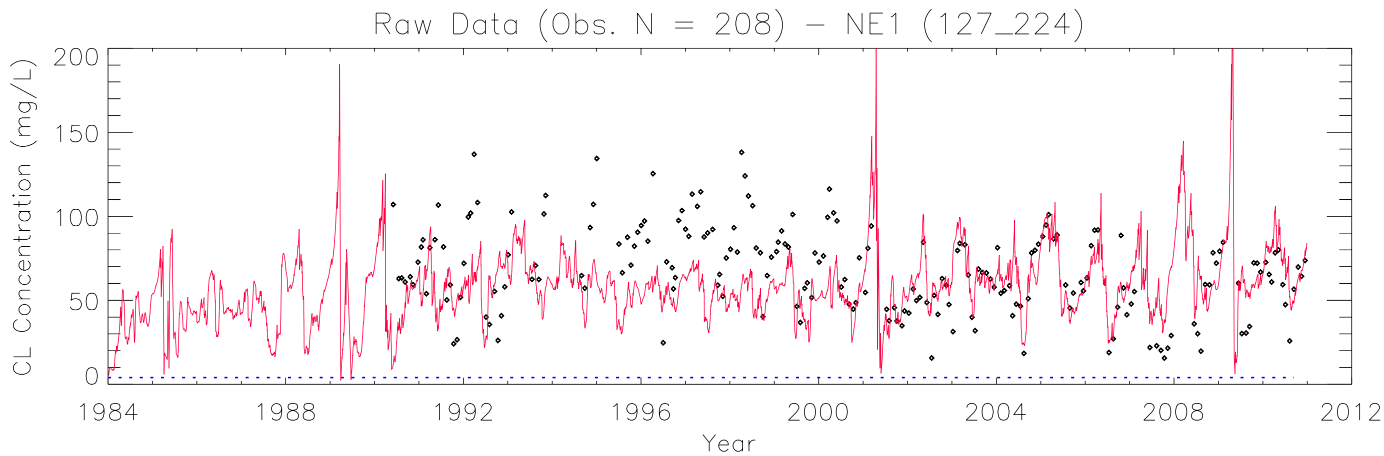
Mean: Season – 95% CI – SRS1d (124_212)
CL Concentration (mg/L)
Year

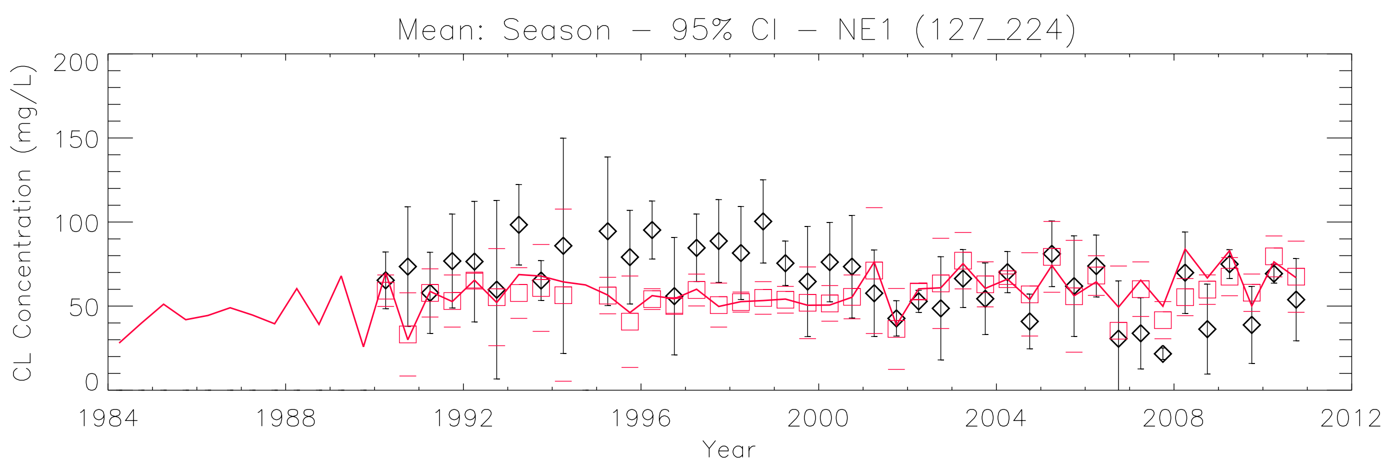


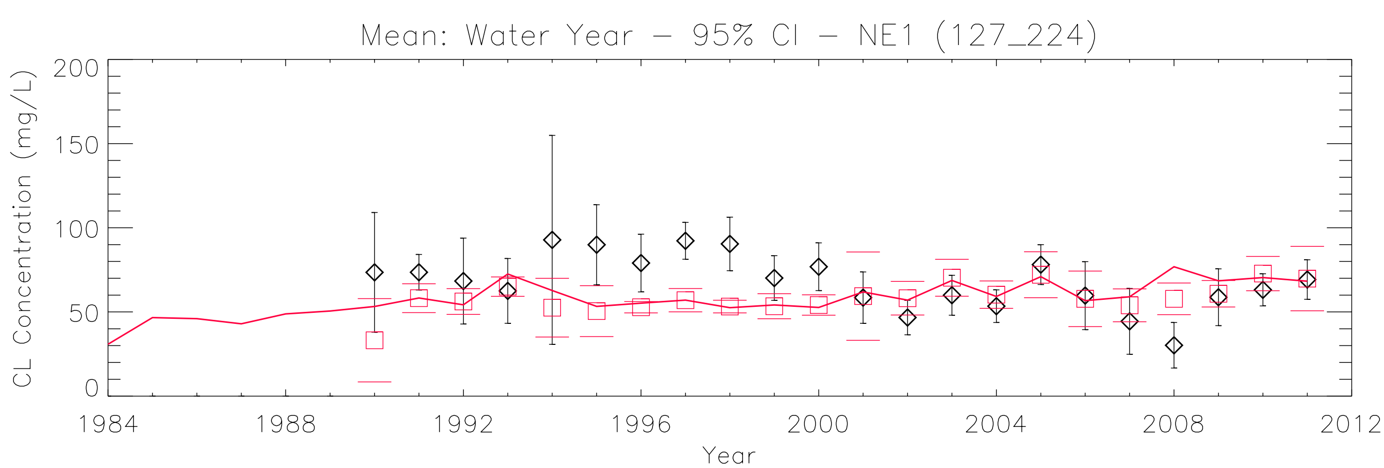
Mean: Water Year – 95% CI – SRS1d (124_212)
CL Concentration (mg/L)
Year

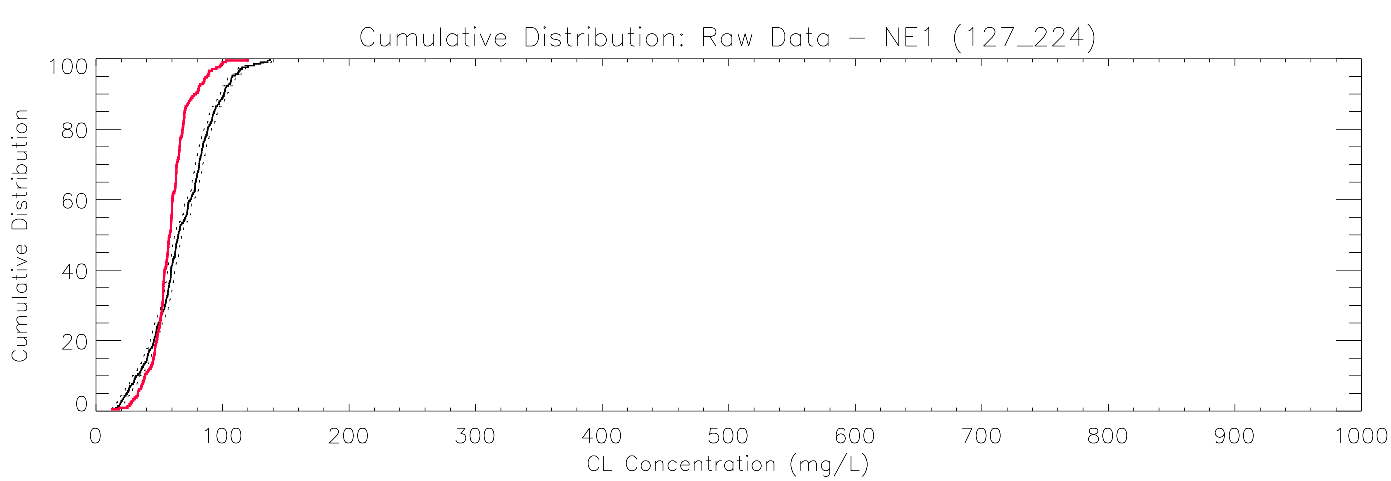


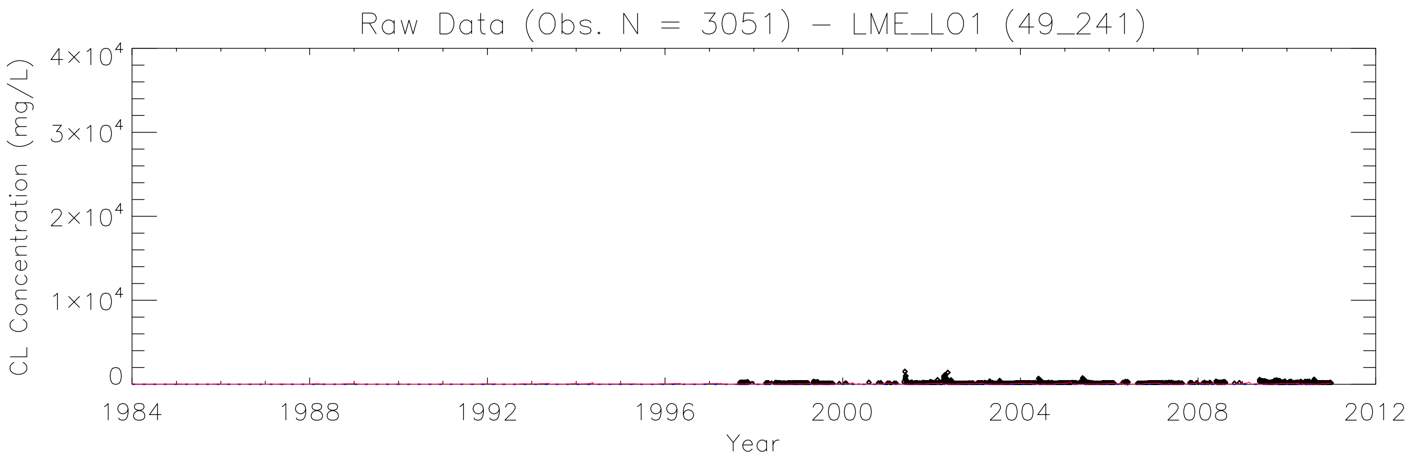
Cumulative Distribution: Raw Data – SRS1d (124_212)
Cumulative Distribution
CL Concentration (mg/L)

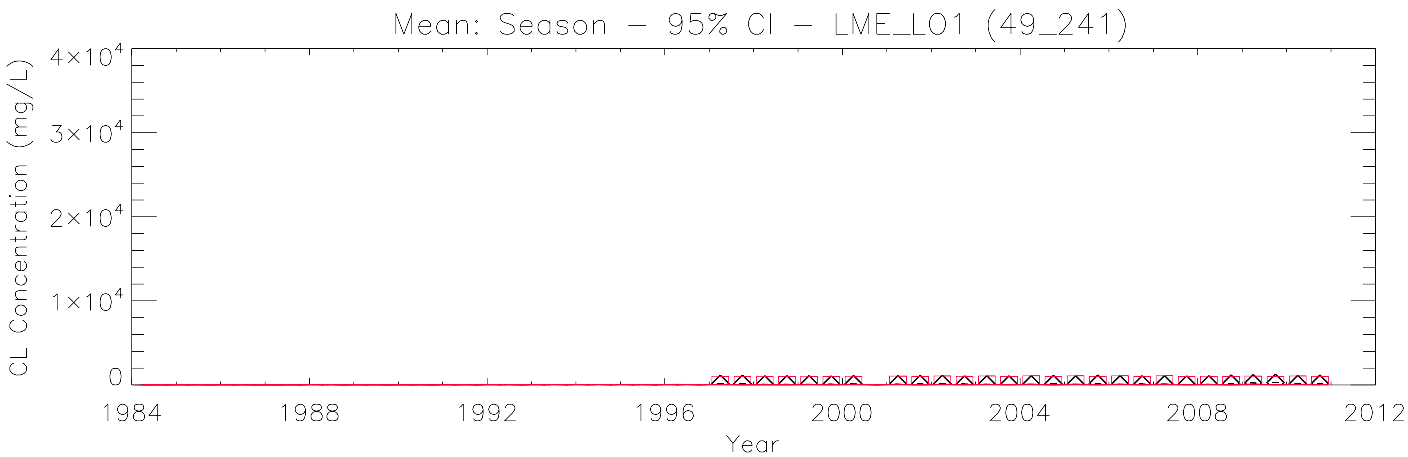

Raw Data (Obs. N = 208) – NE1 (127_224)
CL Concentration (mg/L)
Year

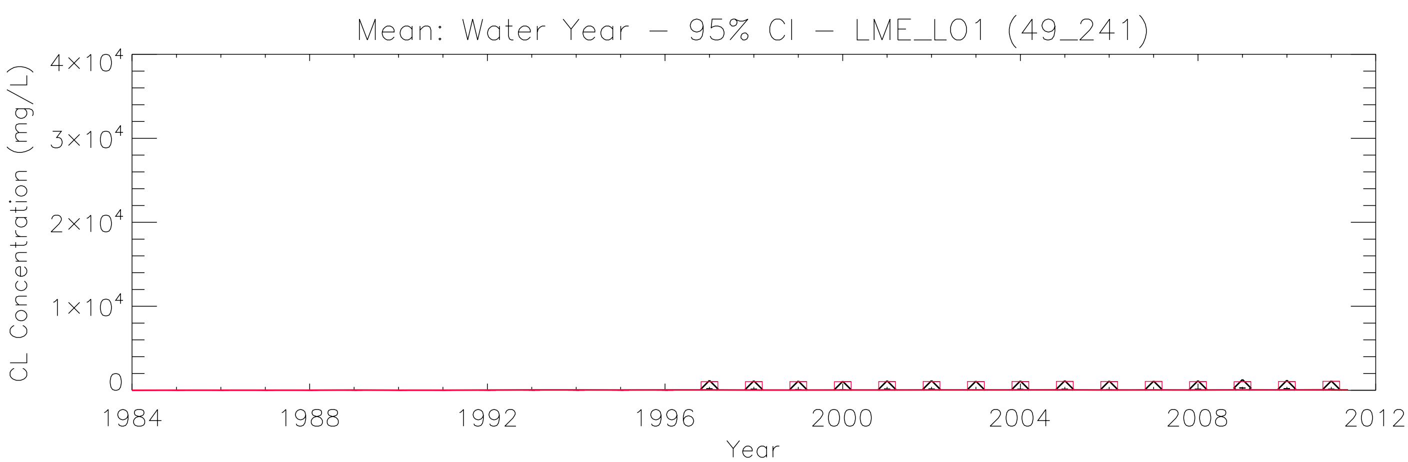

Mean: Season – 95% CI – NE1 (127_224)
CL Concentration (mg/L)
Year

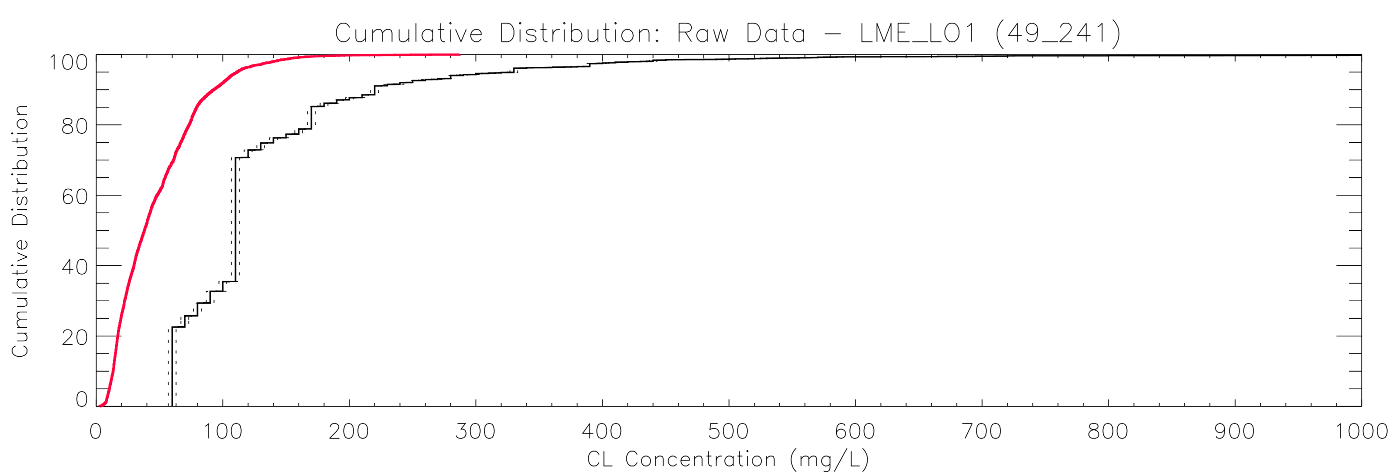

Mean: Water Year – 95% CI – NE1 (127_224)
CL Concentration (mg/L)
Year

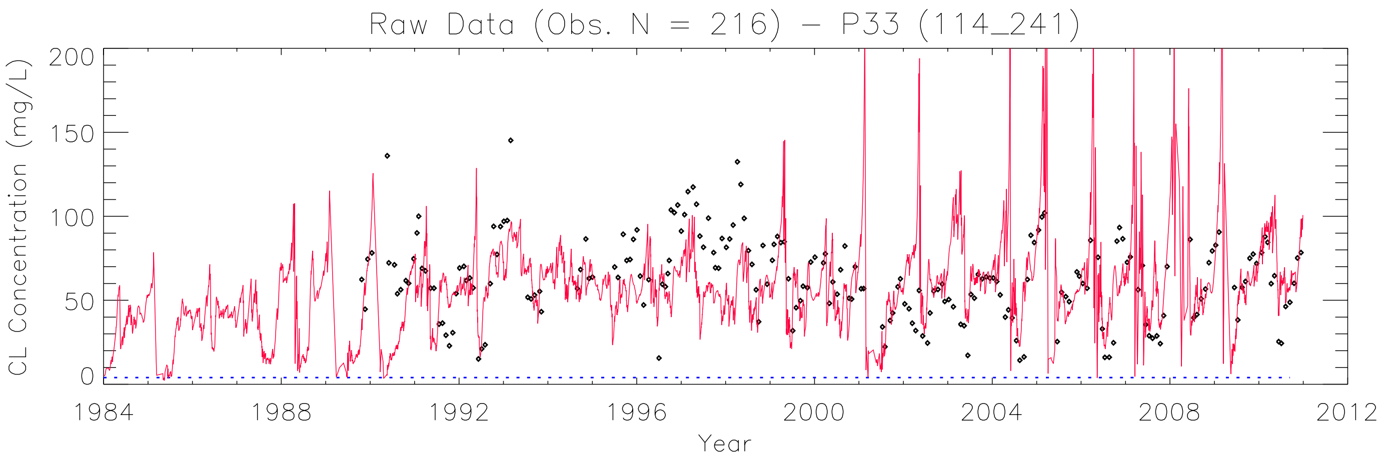

Cumulative Distribution: Raw Data – NE1 (127_224)
Cumulative Distribution
CL Concentration (mg/L)


Raw Data (Obs. N = 3051) - LME_LO1 (49_241)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

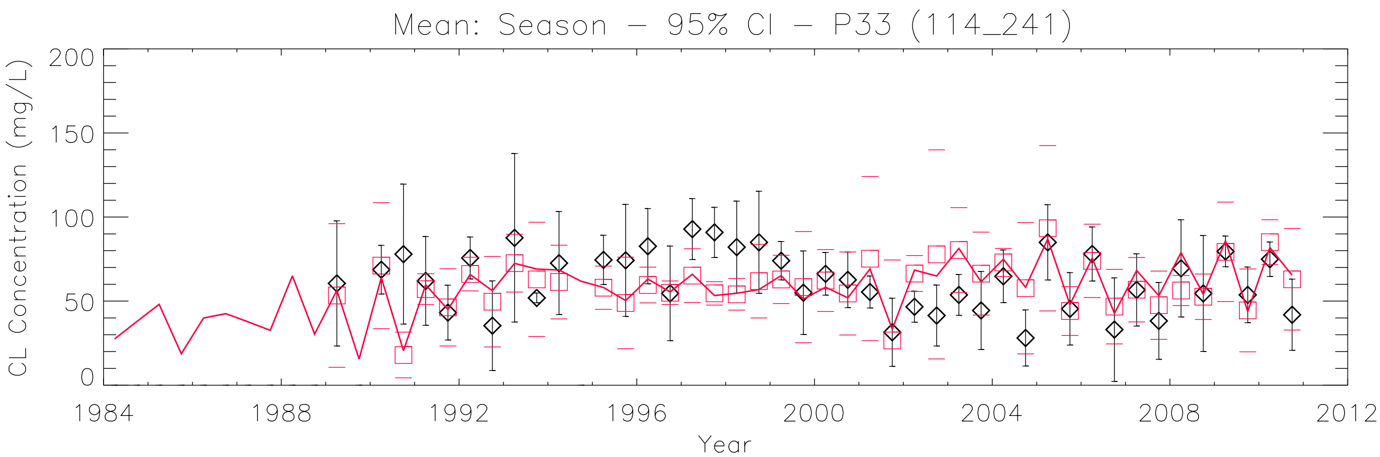

Mean: Season - 95% CI - LME_LO1 (49_241)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year - 95% CI - LME_LO1 (49_241)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

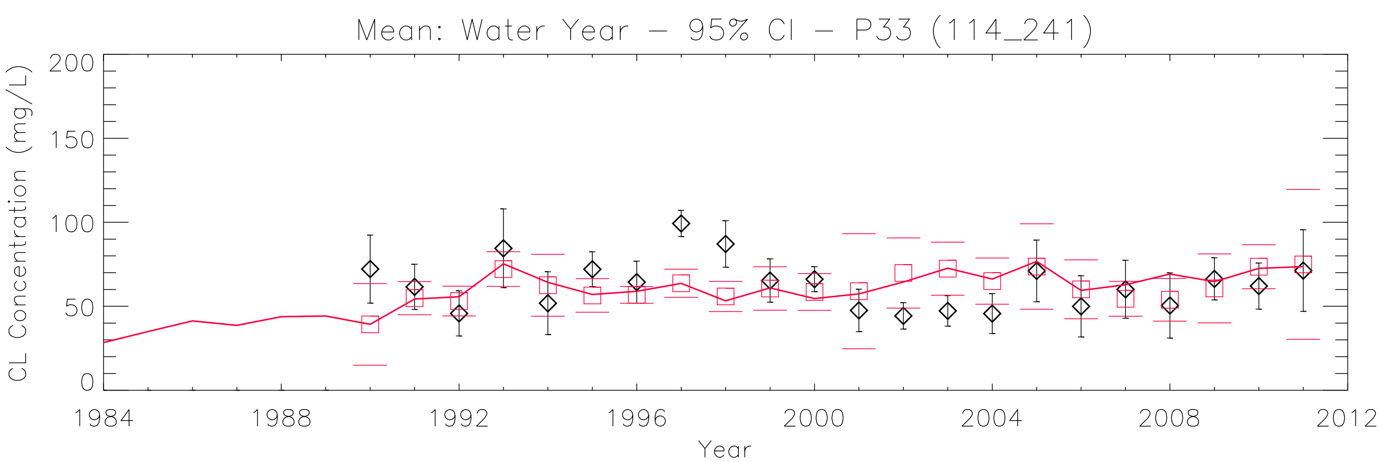

Cumulative Distribution: Raw Data - LME_LO1 (49_241)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



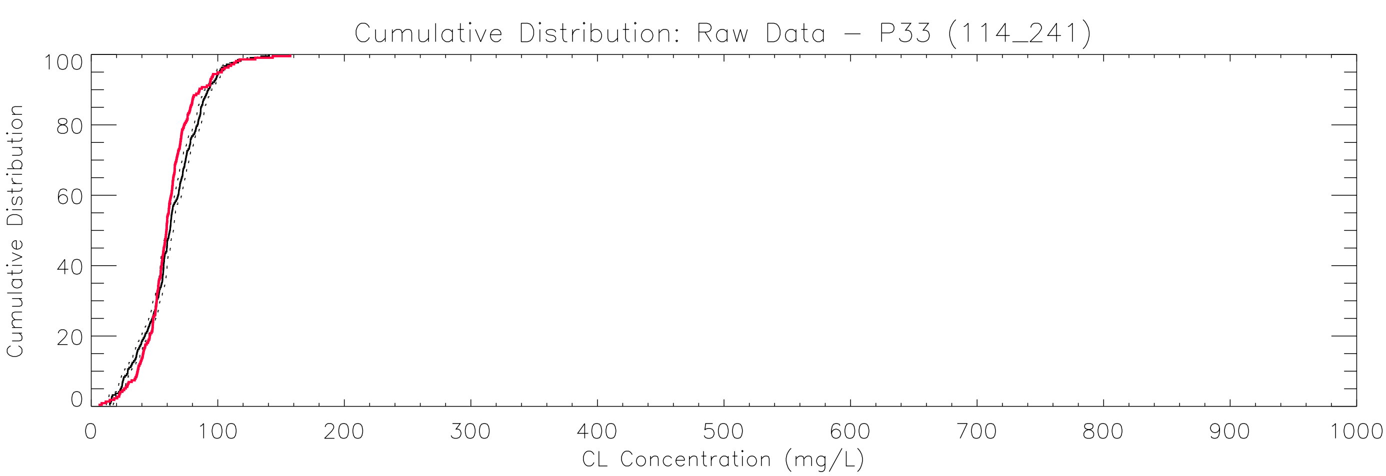
Raw Data (Obs. N = 216) – P33 (114_241)
CL Concentration (mg/L)
Year



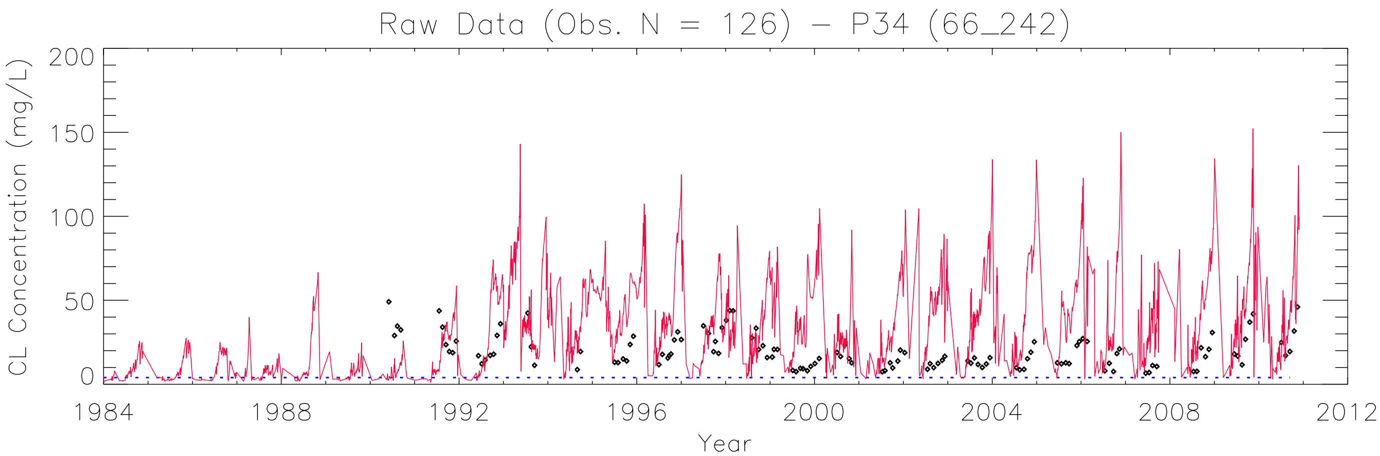
Mean: Season – 95% CI – P33 (114_241)
CL Concentration (mg/L)
Year

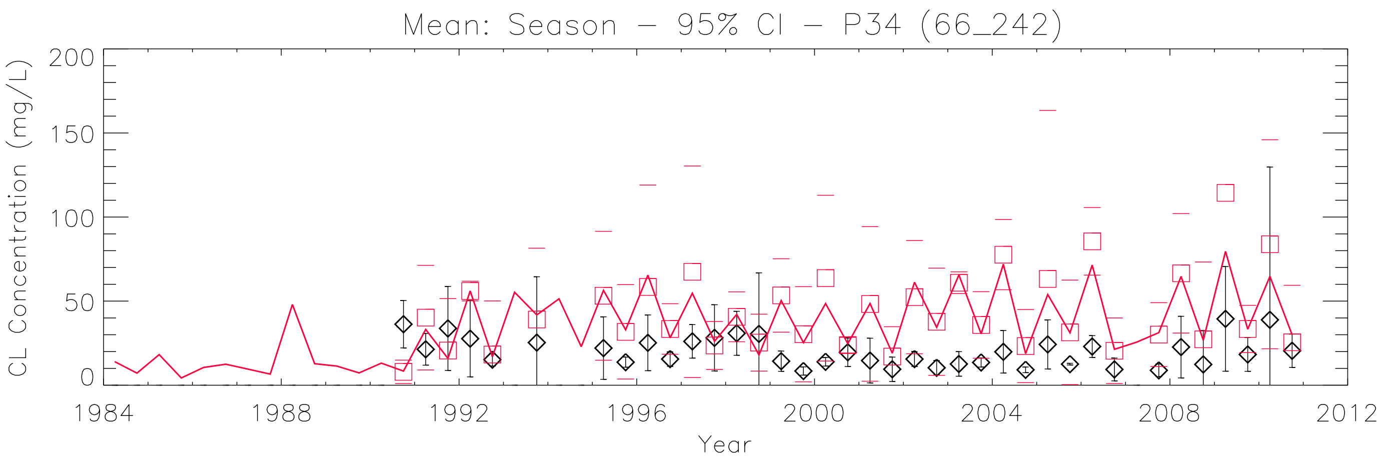


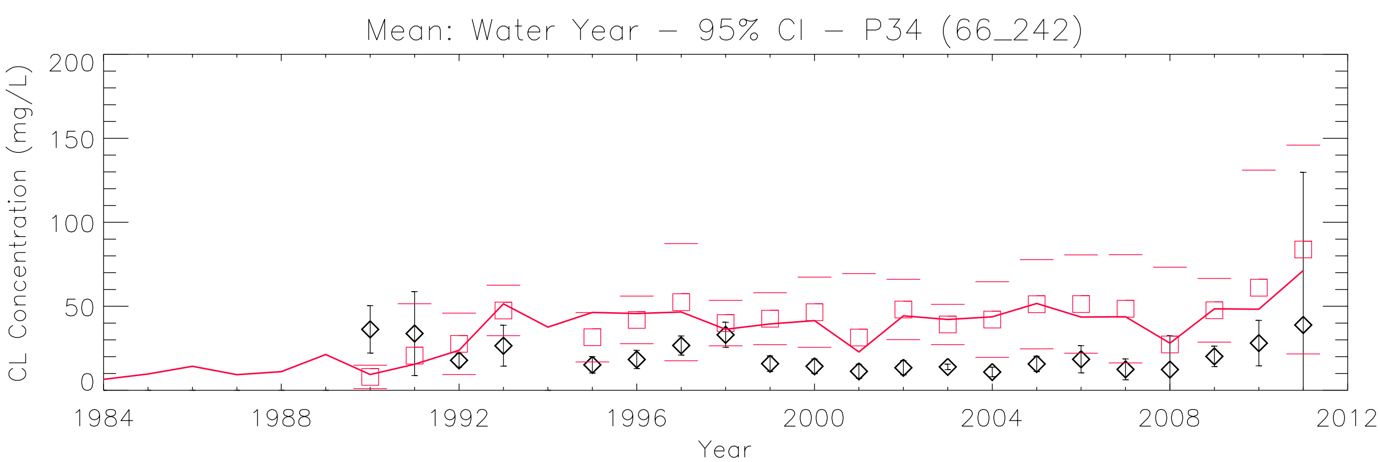
Mean: Water Year – 95% CI – P33 (114_241)
CL Concentration (mg/L)
Year

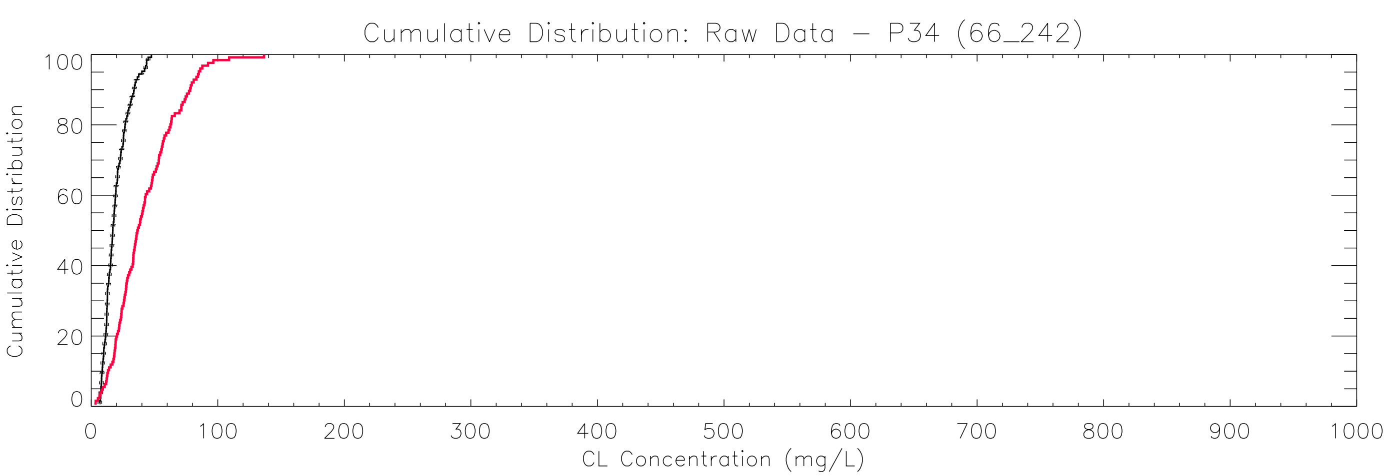


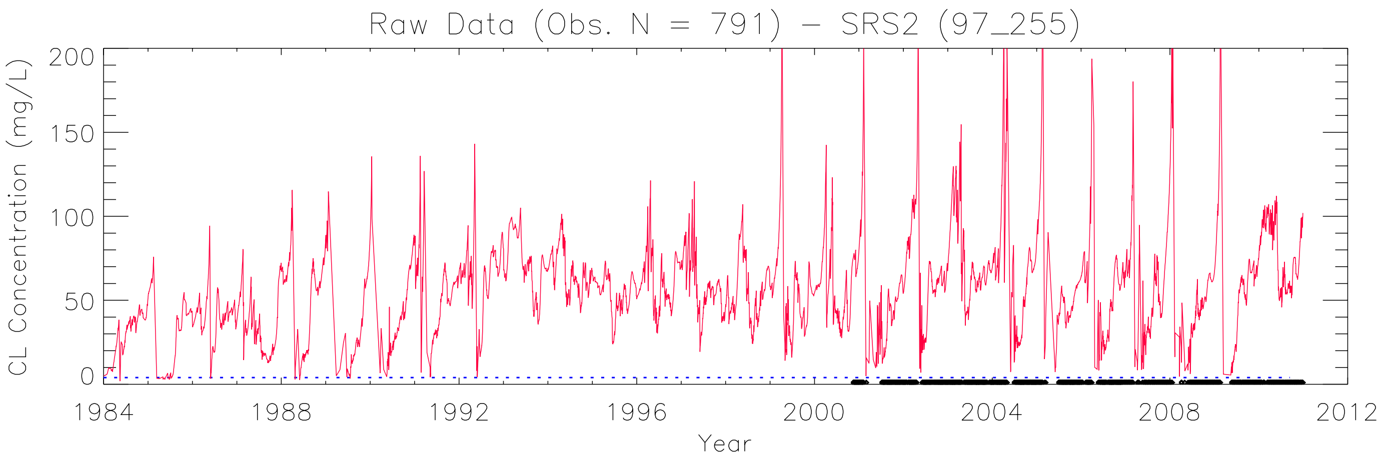
Cumulative Distribution: Raw Data – P33 (114_241)
Cumulative Distribution
CL Concentration (mg/L)


Raw Data (Obs. N = 126) - P34 (66_242)
CL Concentration (mg/L)
Year

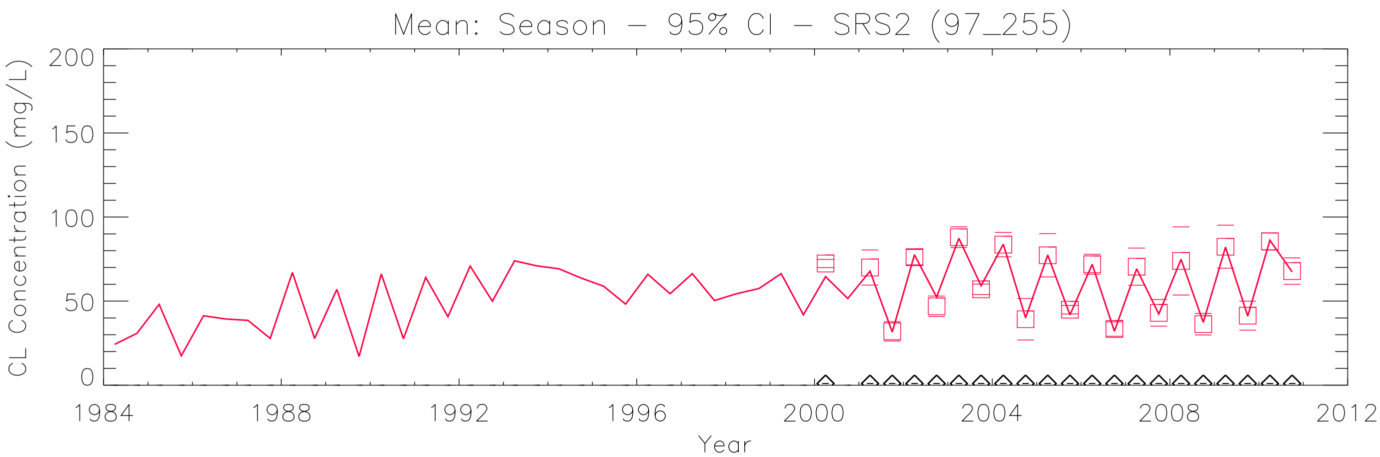

Mean: Season - 95% CI - P34 (66_242)
CL Concentration (mg/L)
Year


Mean: Water Year - 95% CI - P34 (66_242)
CL Concentration (mg/L)
Year

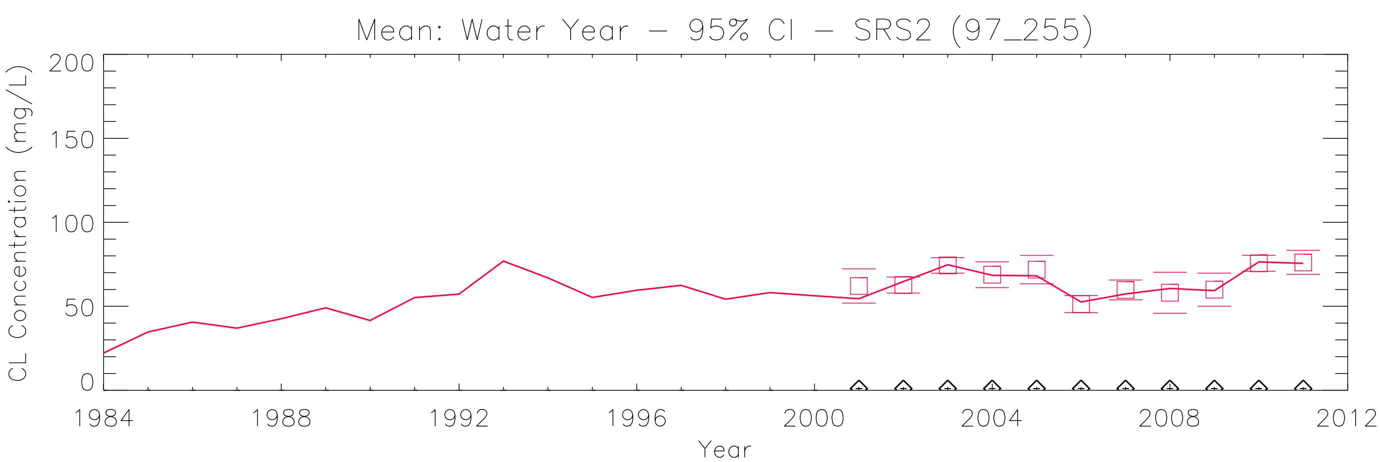

Cumulative Distribution: Raw Data - P34 (66_242)
Cumulative Distribution
CL Concentration (mg/L)



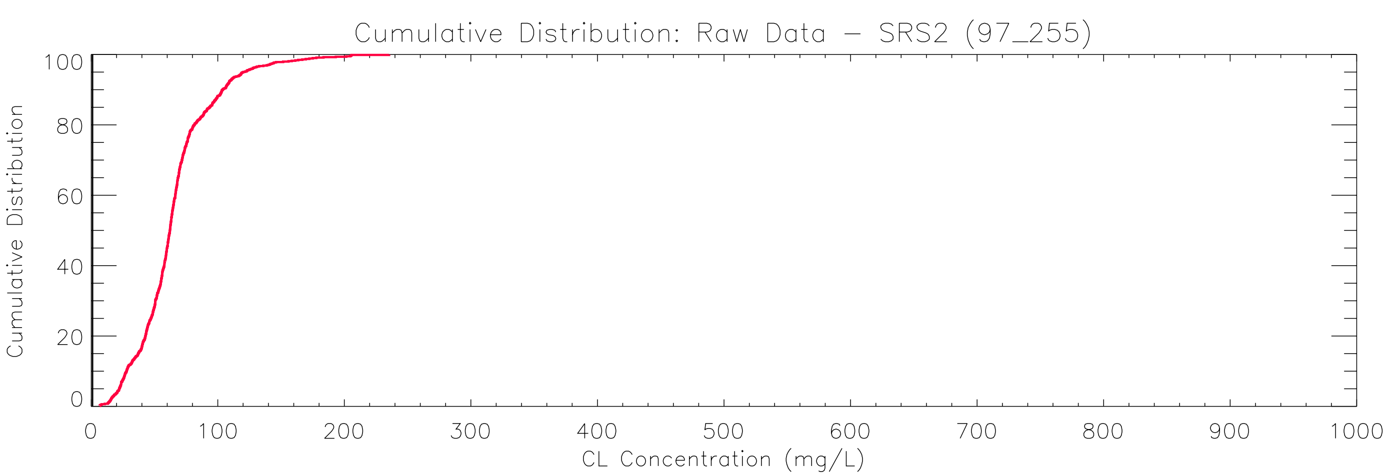
Raw Data (Obs. N = 791) – SRS2 (97_255)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year



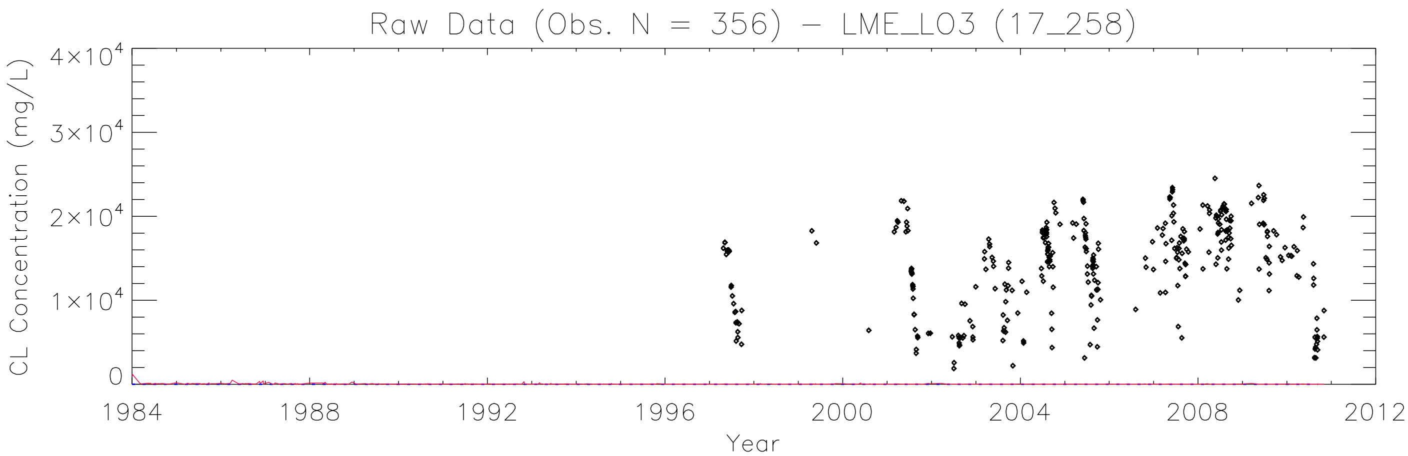
Mean: Season – 95% CI – SRS2 (97_255)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

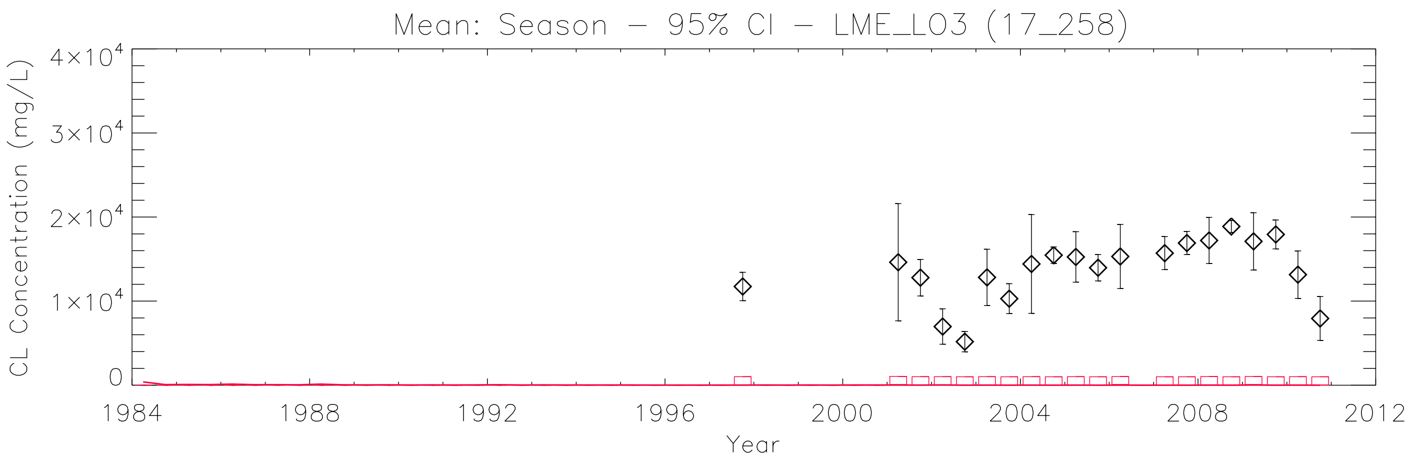


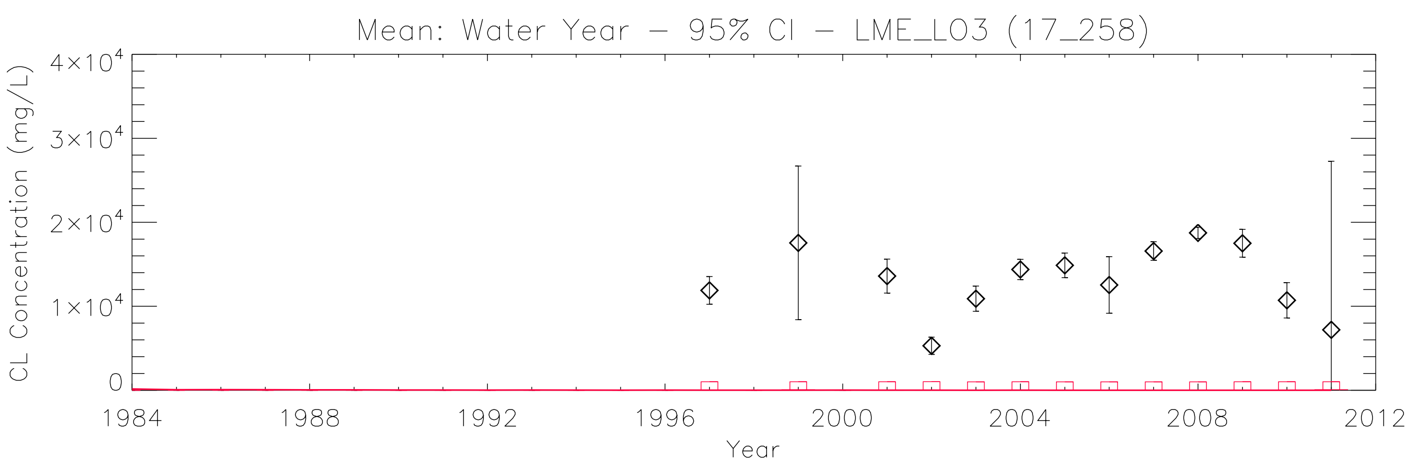
Mean: Water Year – 95% CI – SRS2 (97_255)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

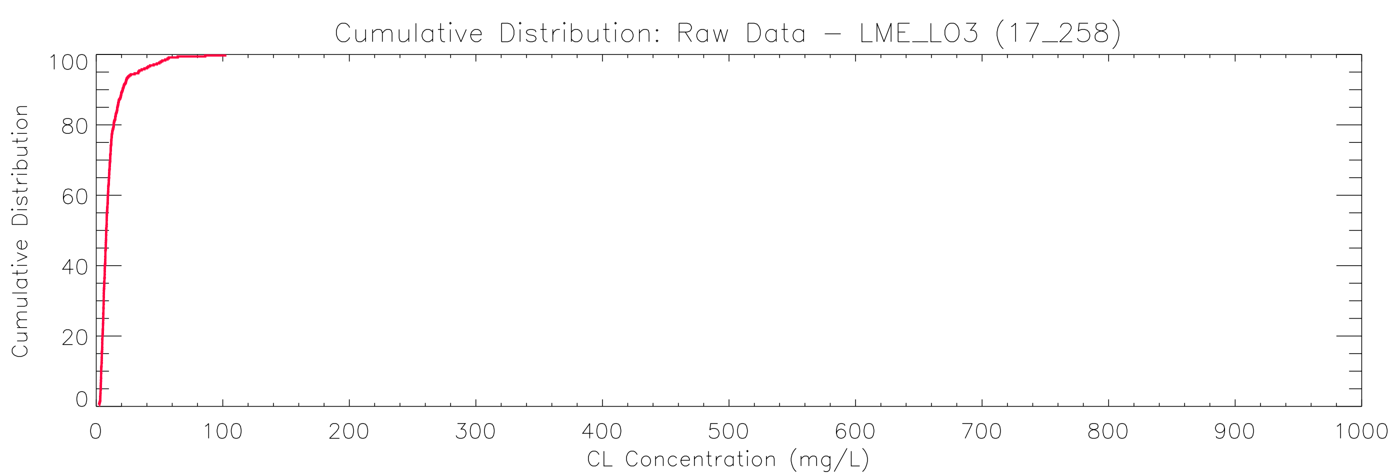


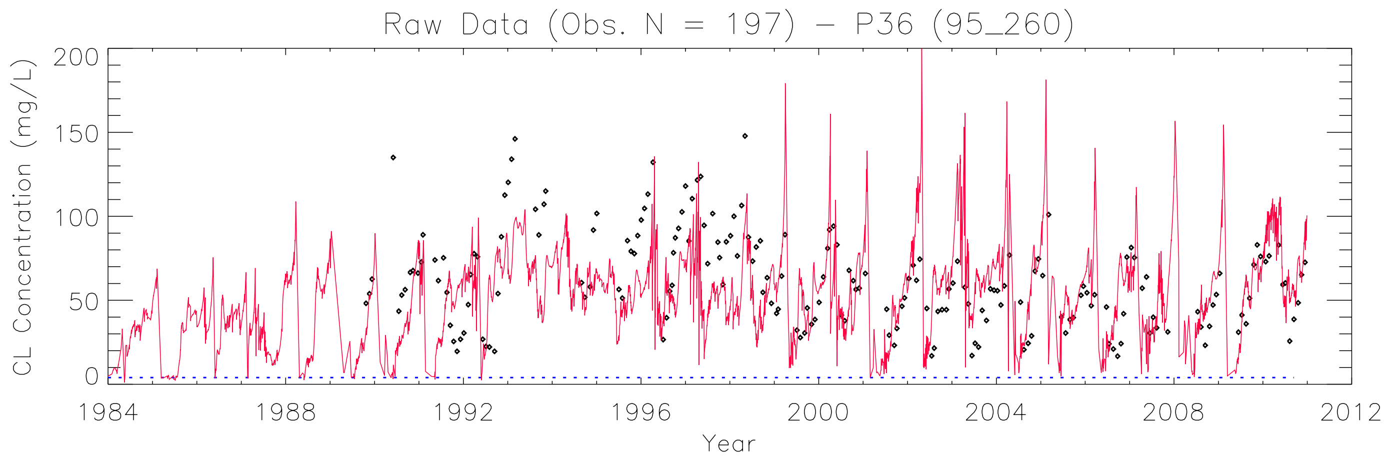
Cumulative Distribution: Raw Data – SRS2 (97_255)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

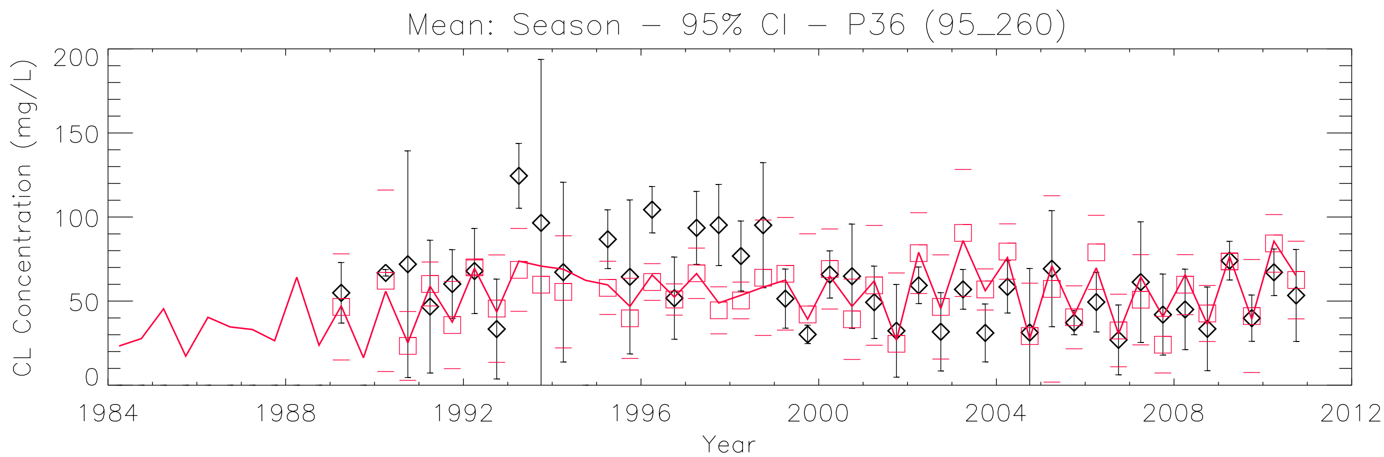

Raw Data (Obs. N = 356) – LME_LO3 (17_258)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

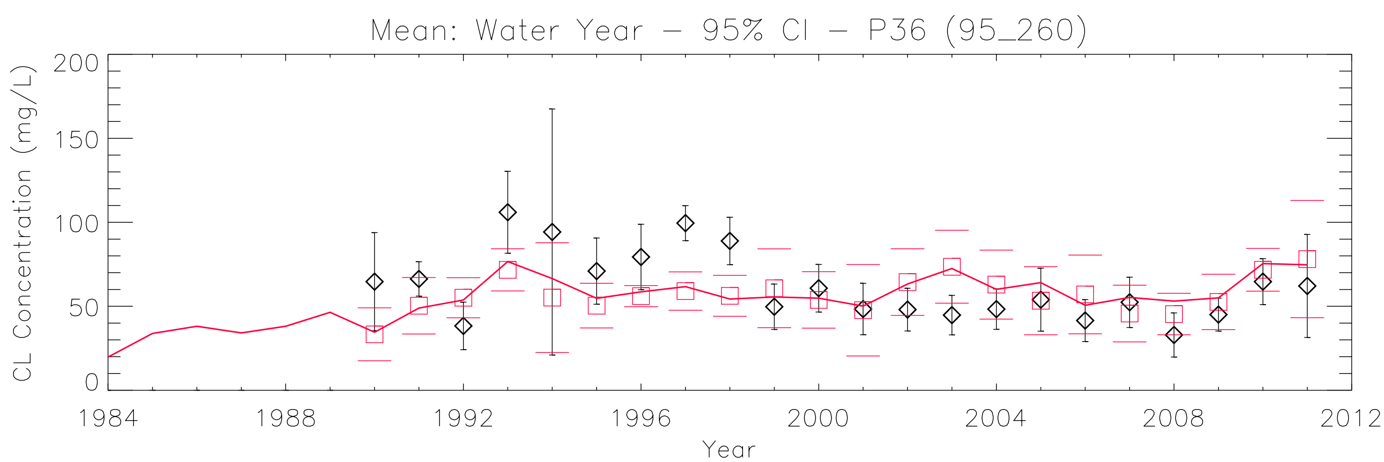

Mean: Season – 95% CI – LME_LO3 (17_258)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

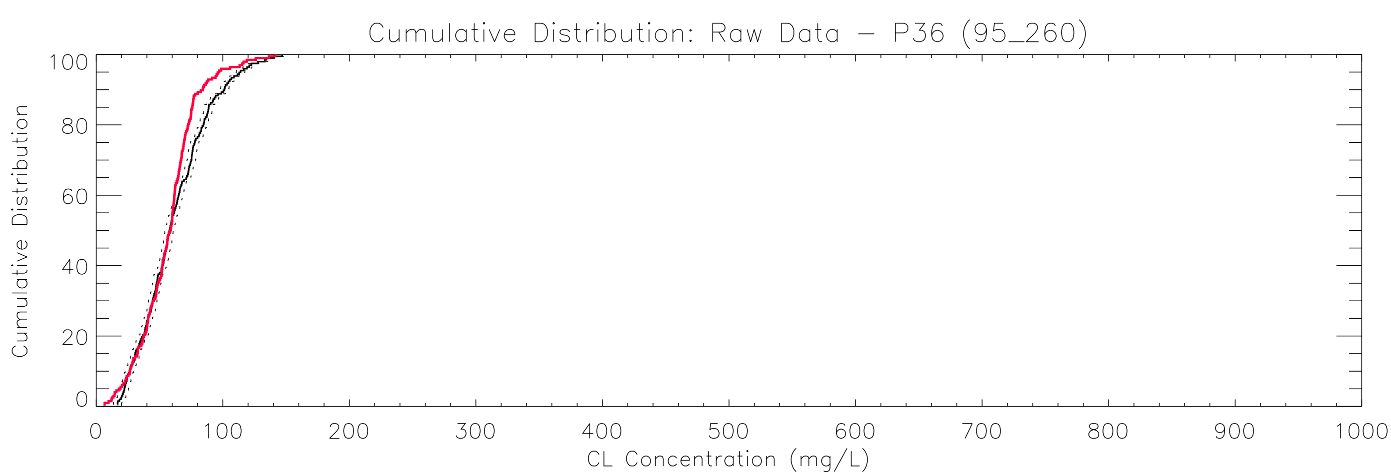

Mean: Water Year – 95% CI – LME_LO3 (17_258)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

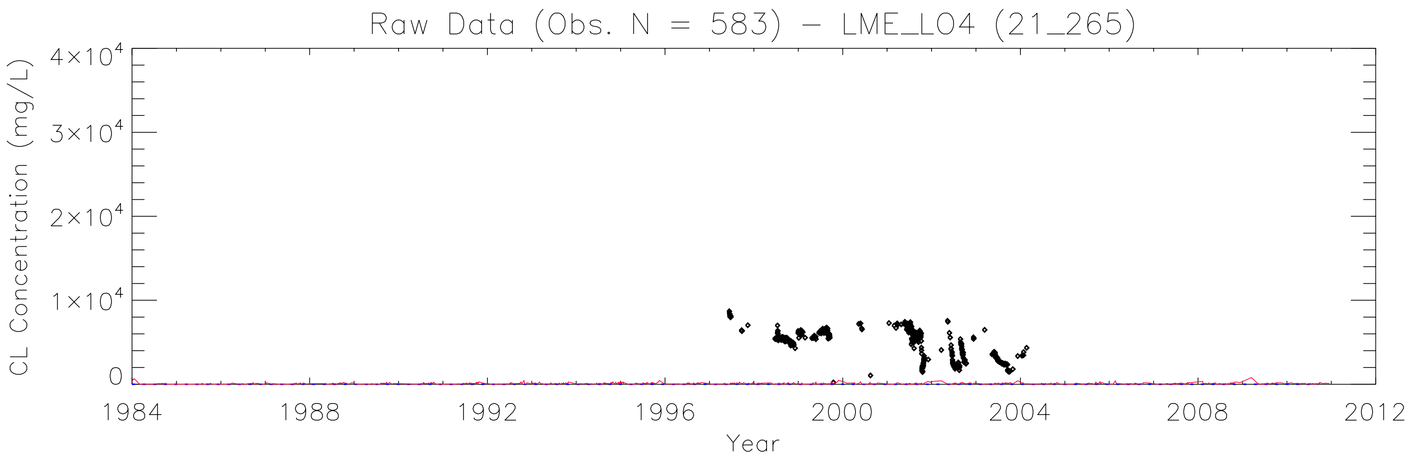

Cumulative Distribution: Raw Data – LME_LO3 (17_258)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

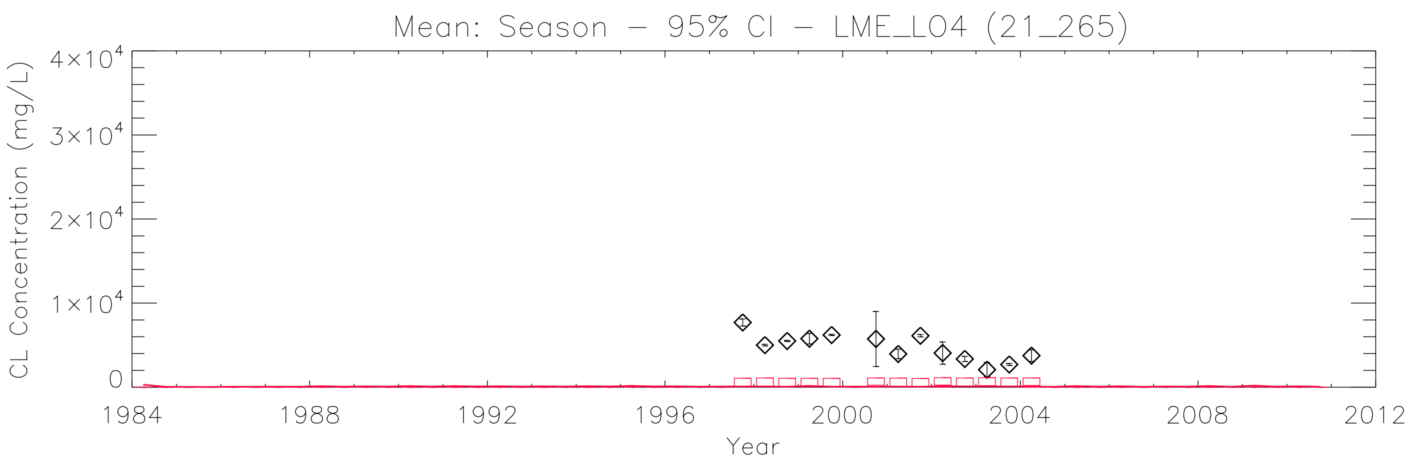

Raw Data (Obs. N = 197) - P36 (95_260)
CL Concentration (mg/L)
Year

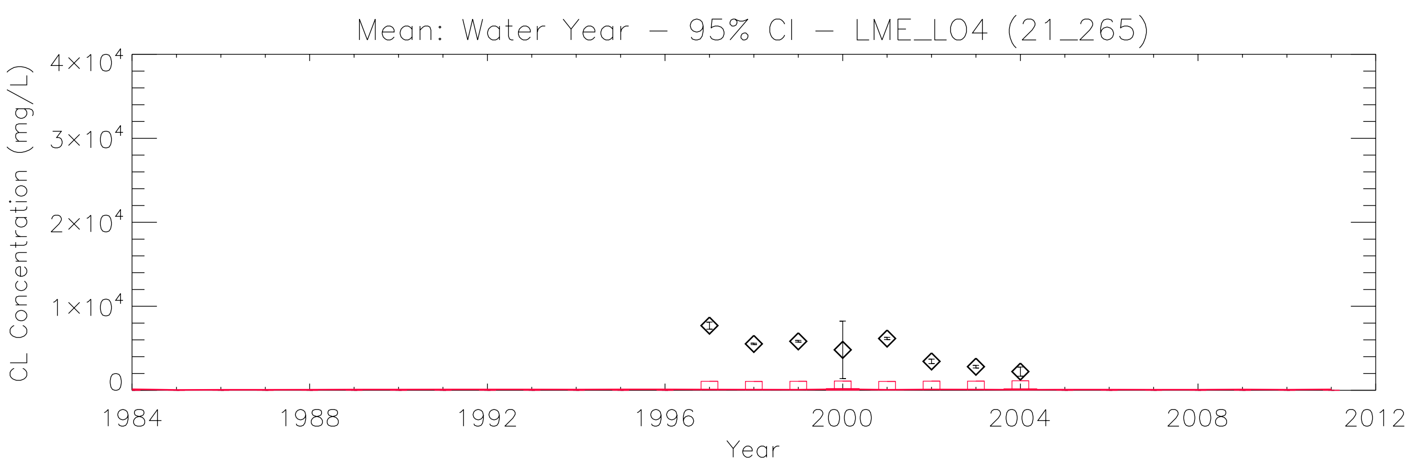

Mean: Season - 95% CI - P36 (95_260)
CL Concentration (mg/L)
Year

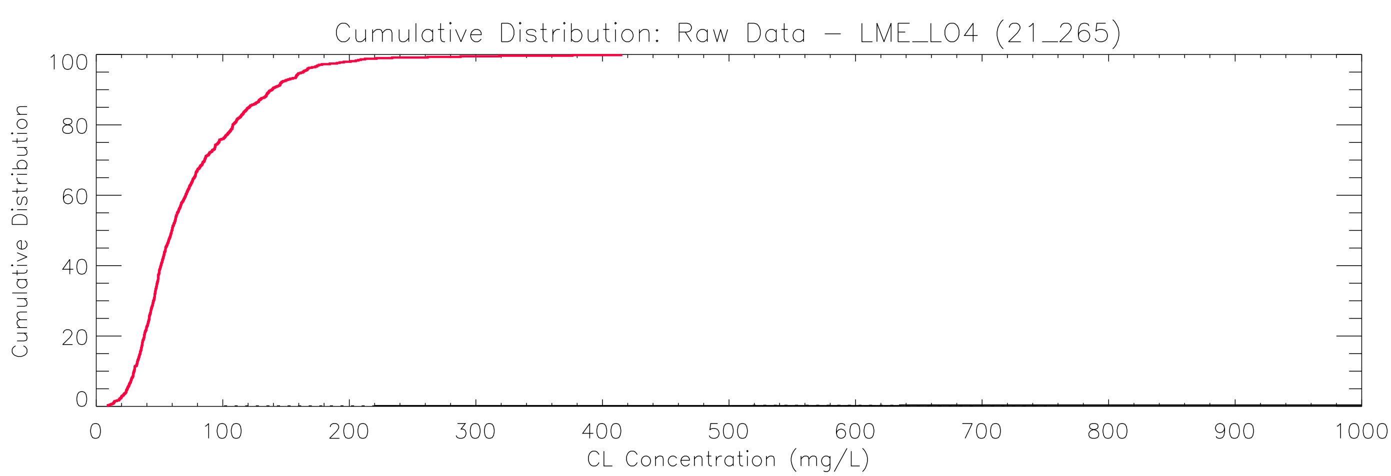

Mean: Water Year - 95% CI - P36 (95_260)
CL Concentration (mg/L)
Year

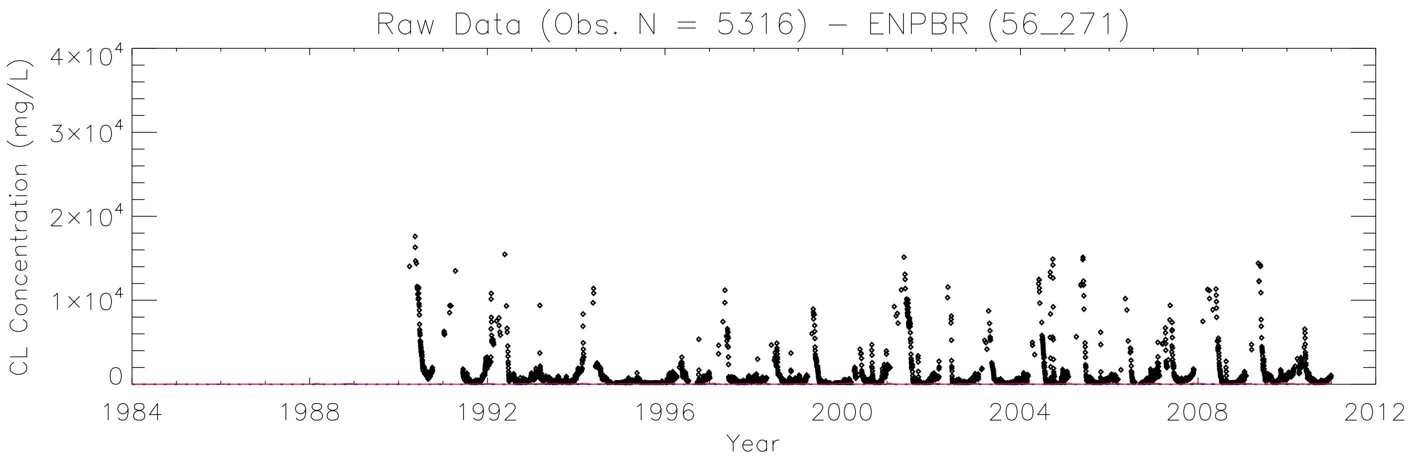

Cumulative Distribution: Raw Data - P36 (95_260)
Cumulative Distribution
CL Concentration (mg/L)

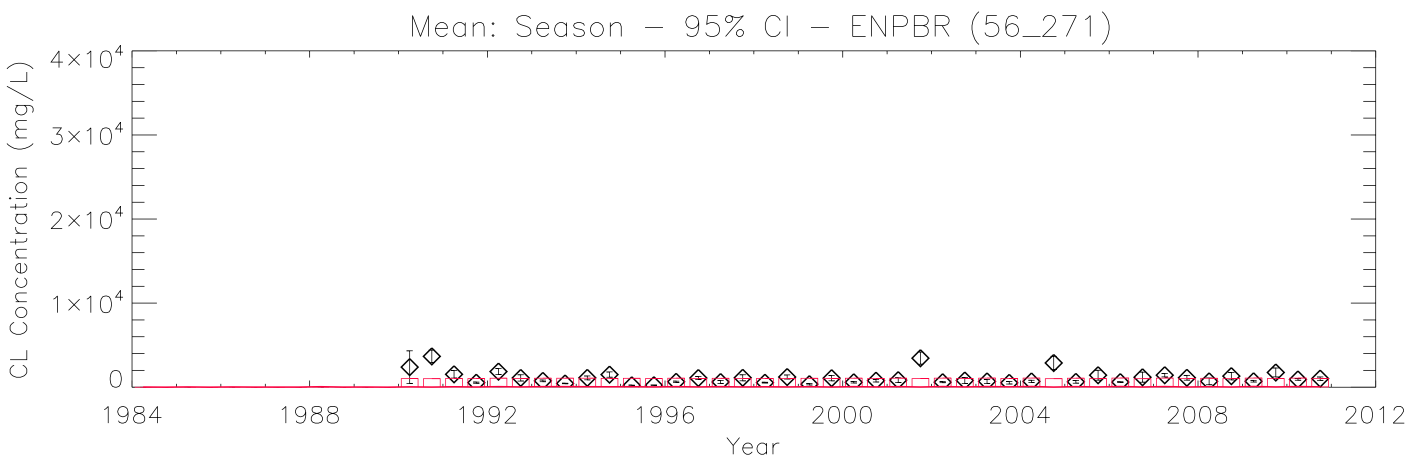

Raw Data (Obs. N = 583) - LME_L04 (21_265)
CL Concentration (mg/L)
Year

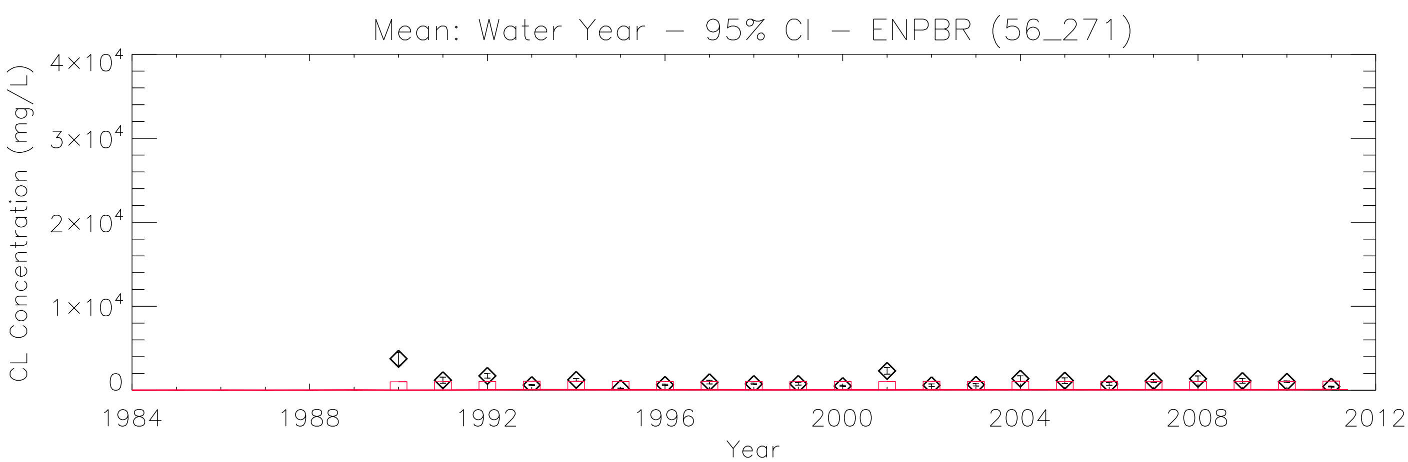

Mean: Season - 95% CI - LME_L04 (21_265)
CL Concentration (mg/L)
Year

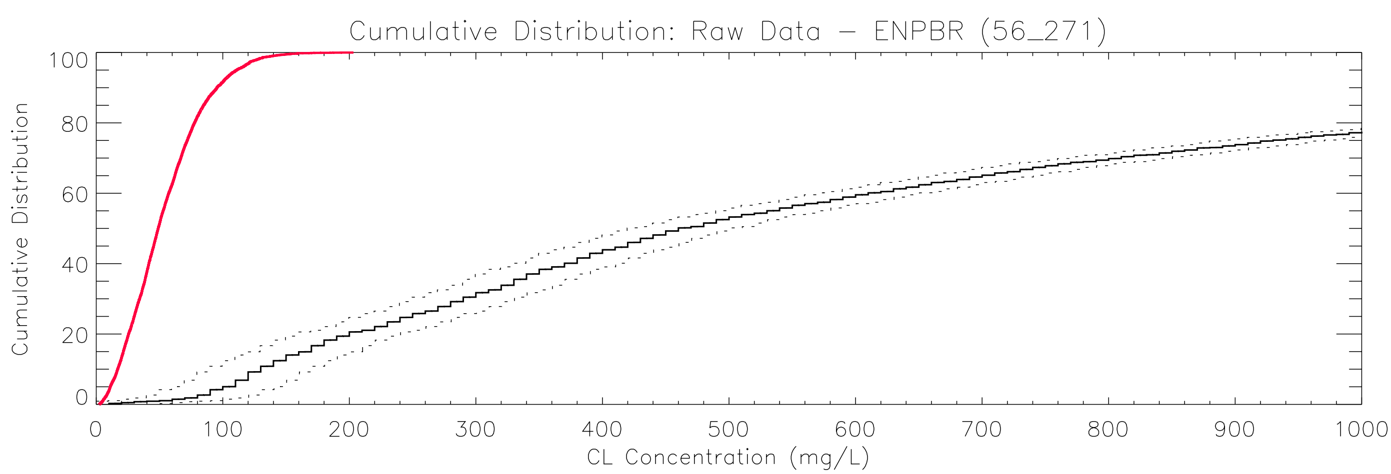

Mean: Water Year - 95% CI - LME_L04 (21_265)
CL Concentration (mg/L)
Year

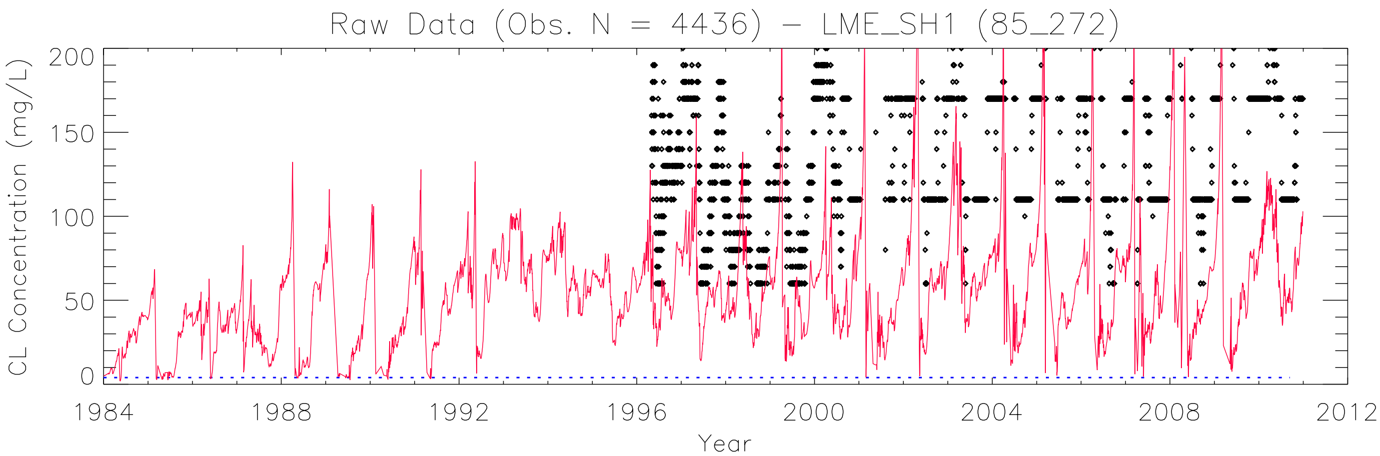

Cumulative Distribution: Raw Data - LME_L04 (21_265)
Cumulative Distribution
CL Concentration (mg/L)


Raw Data (Obs. N = 5316) – ENPBR (56_271)
CL Concentration (mg/L)
Year

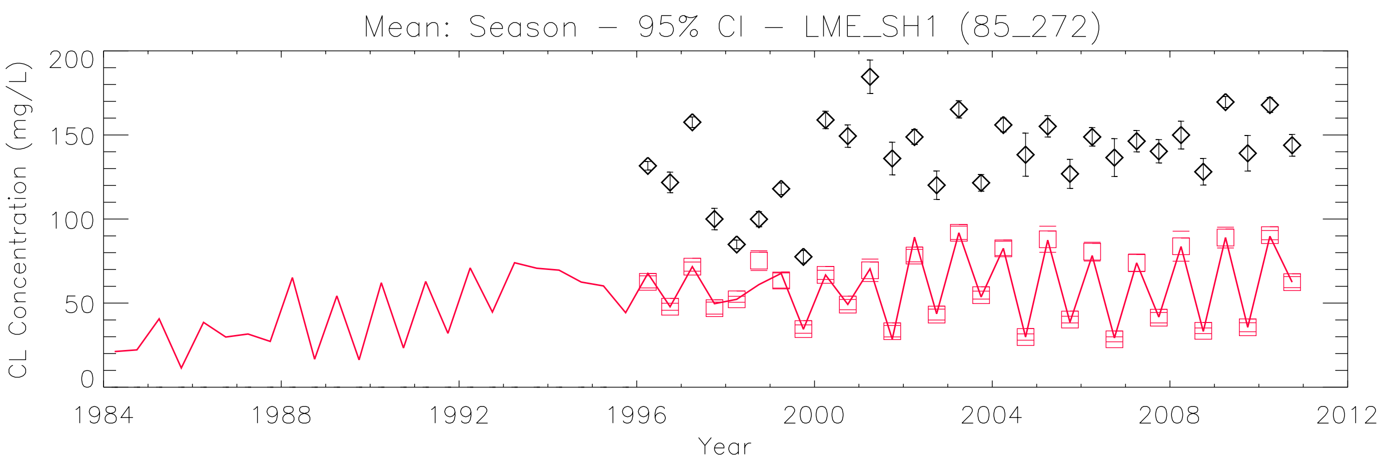

Mean: Season – 95% CI – ENPBR (56_271)
CL Concentration (mg/L)
Year


Mean: Water Year – 95% CI – ENPBR (56_271)
CL Concentration (mg/L)
Year

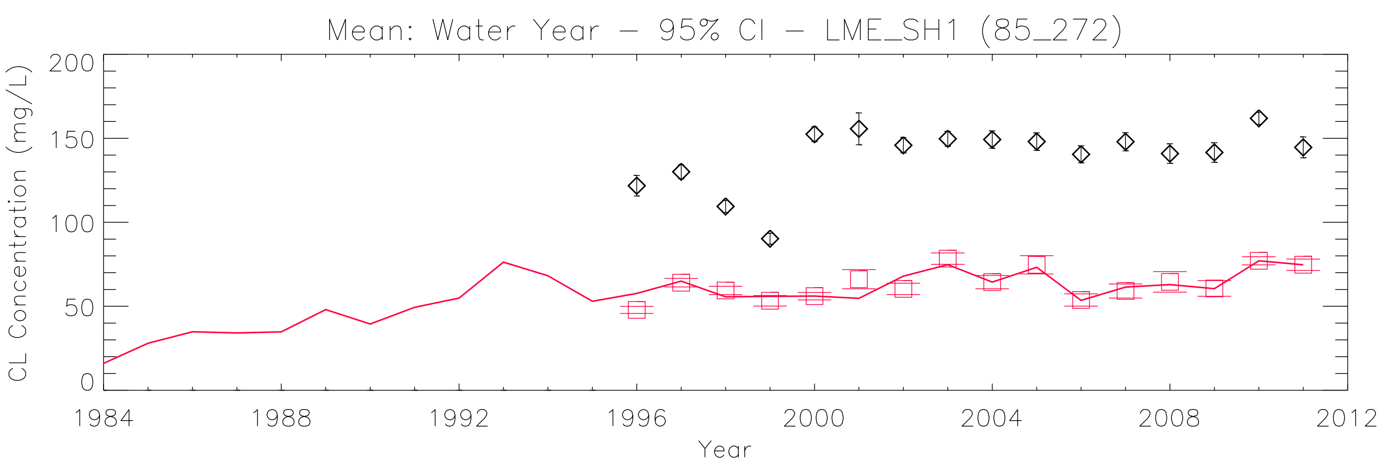

Cumulative Distribution: Raw Data – ENPBR (56_271)
Cumulative Distribution
CL Concentration (mg/L)



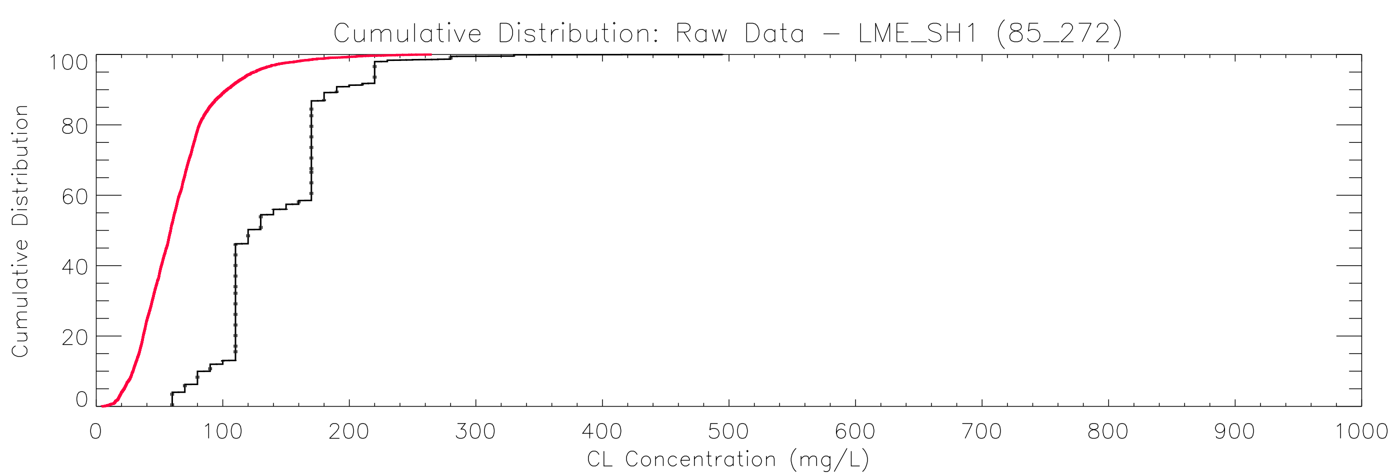
Raw Data (Obs. N = 4436) – LME_SH1 (85_272)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012



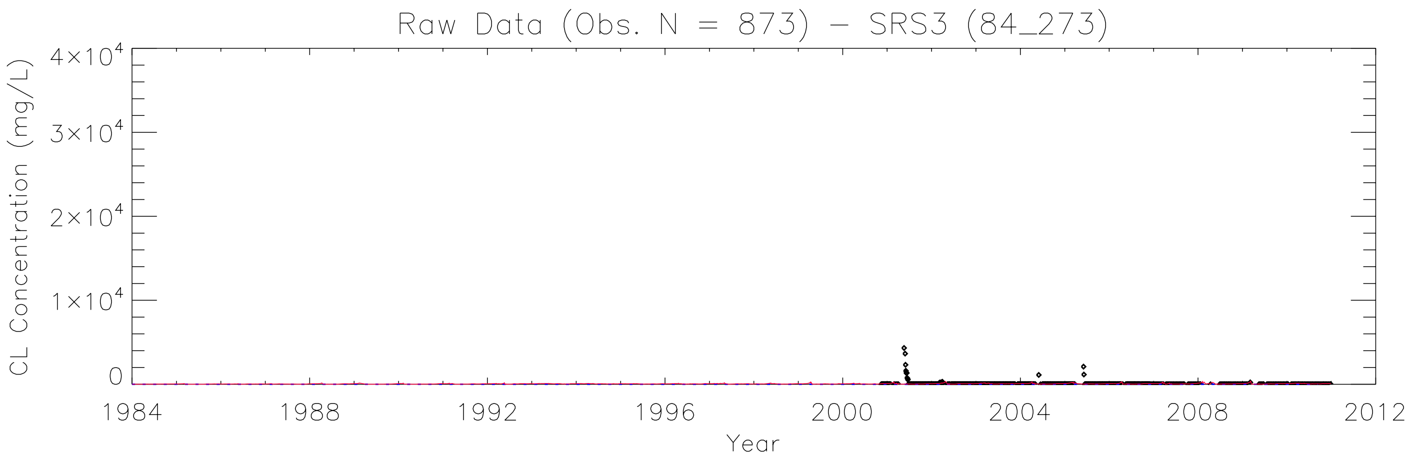
Mean: Season – 95% CI – LME_SH1 (85_272)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

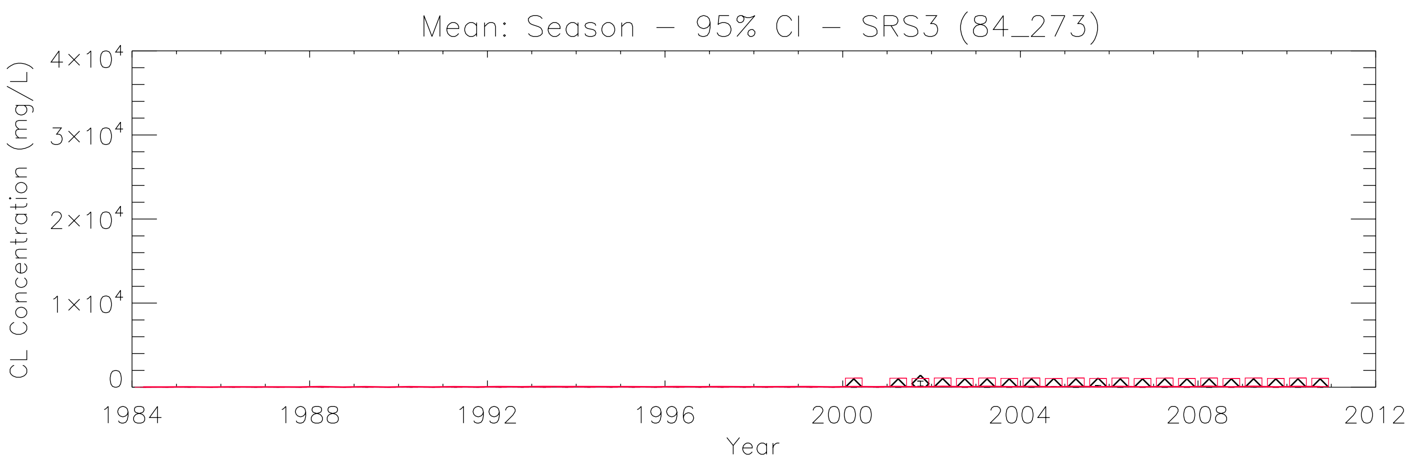


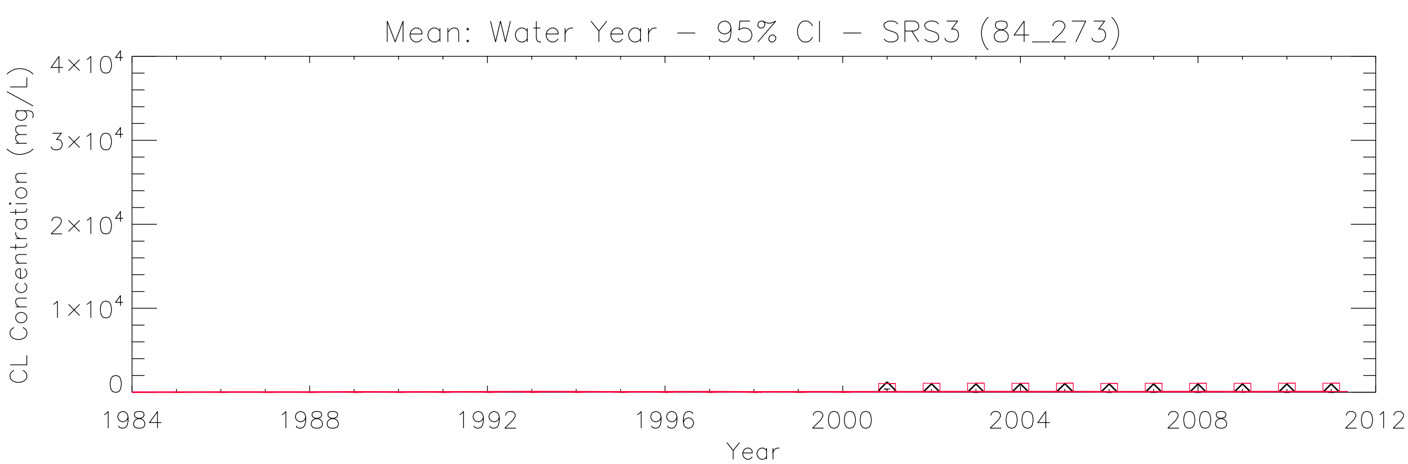
Mean: Water Year – 95% CI – LME_SH1 (85_272)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

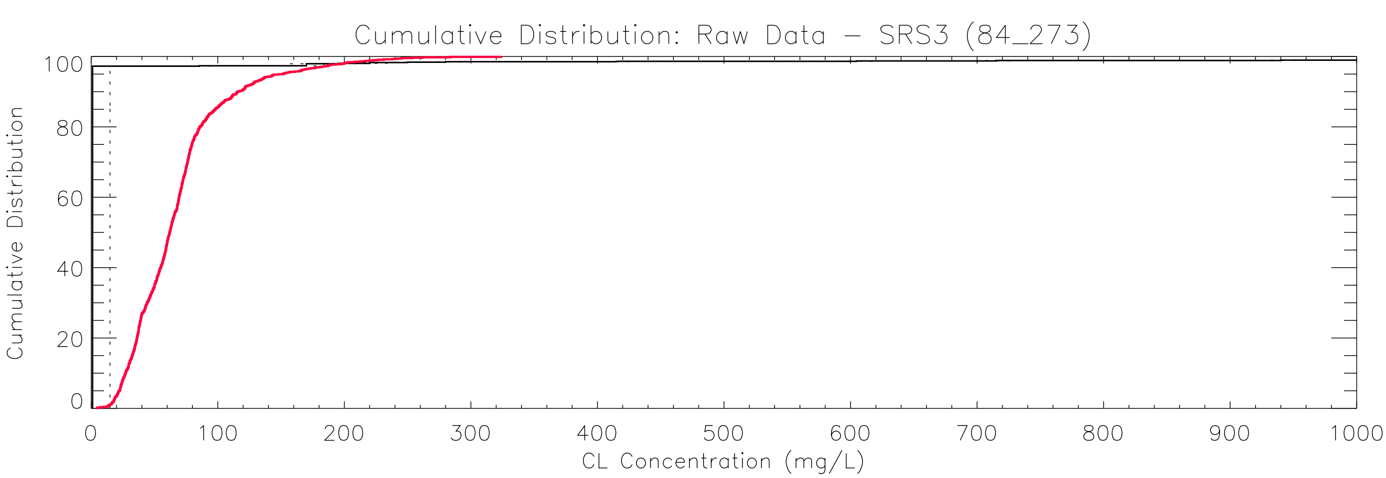


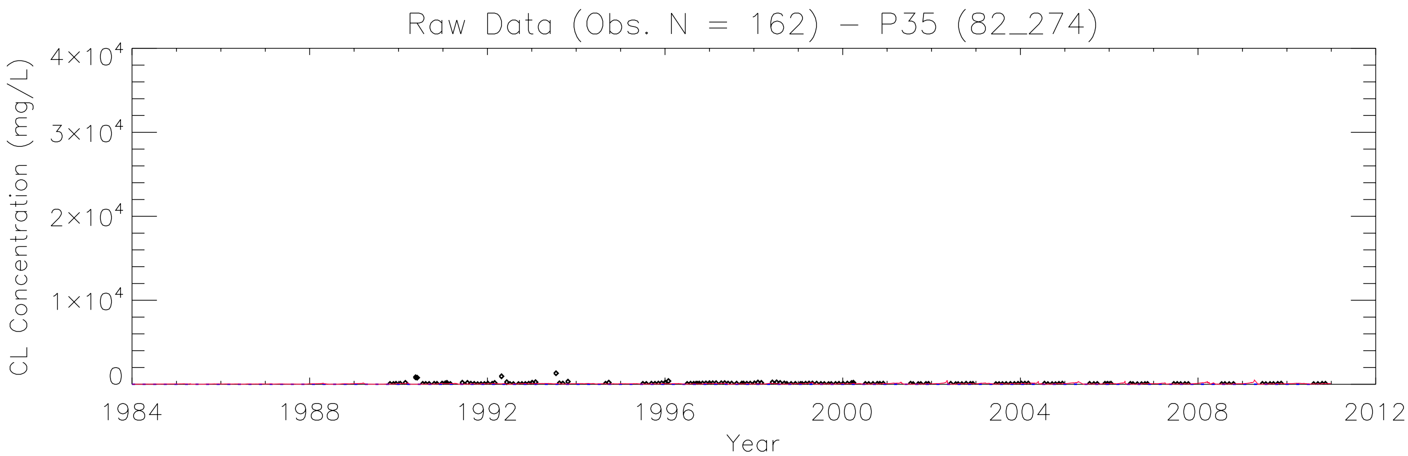
Cumulative Distribution: Raw Data – LME_SH1 (85_272)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

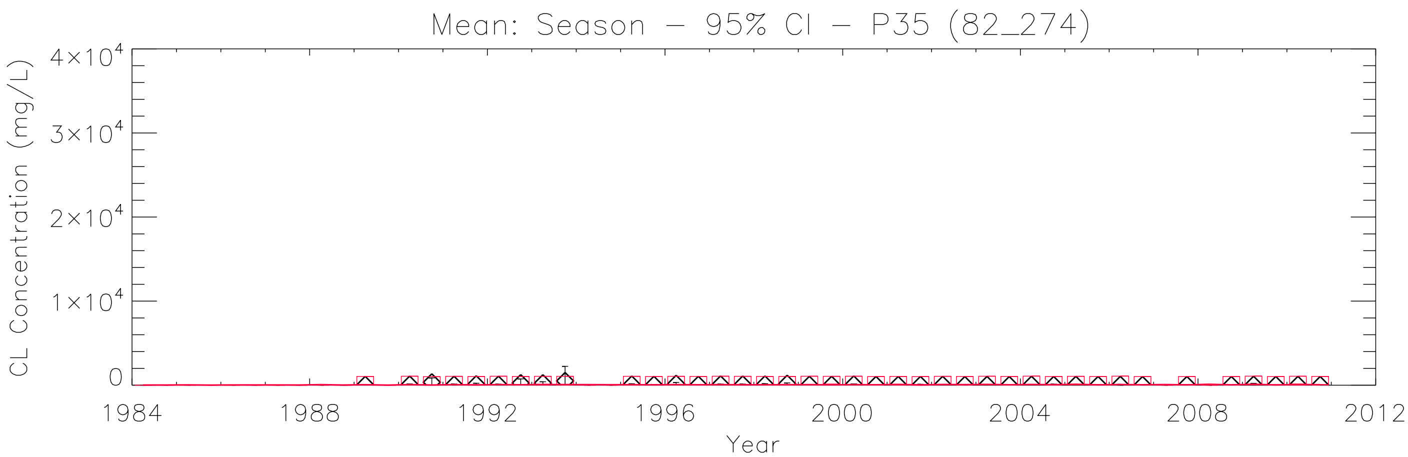

Raw Data (Obs. N = 873) – SRS3 (84_273)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

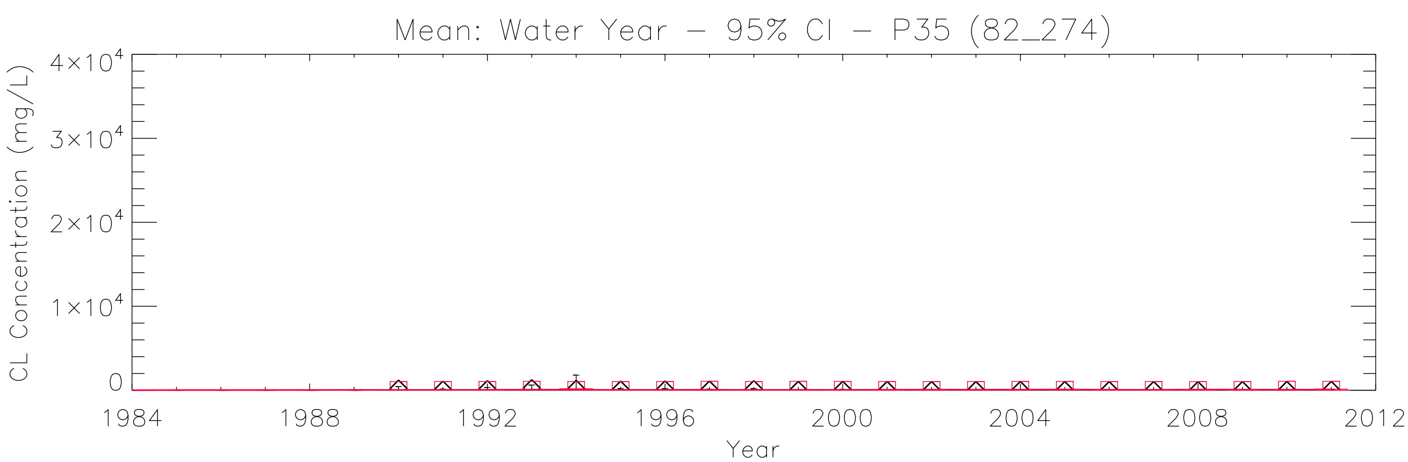

Mean: Season – 95% CI – SRS3 (84_273)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

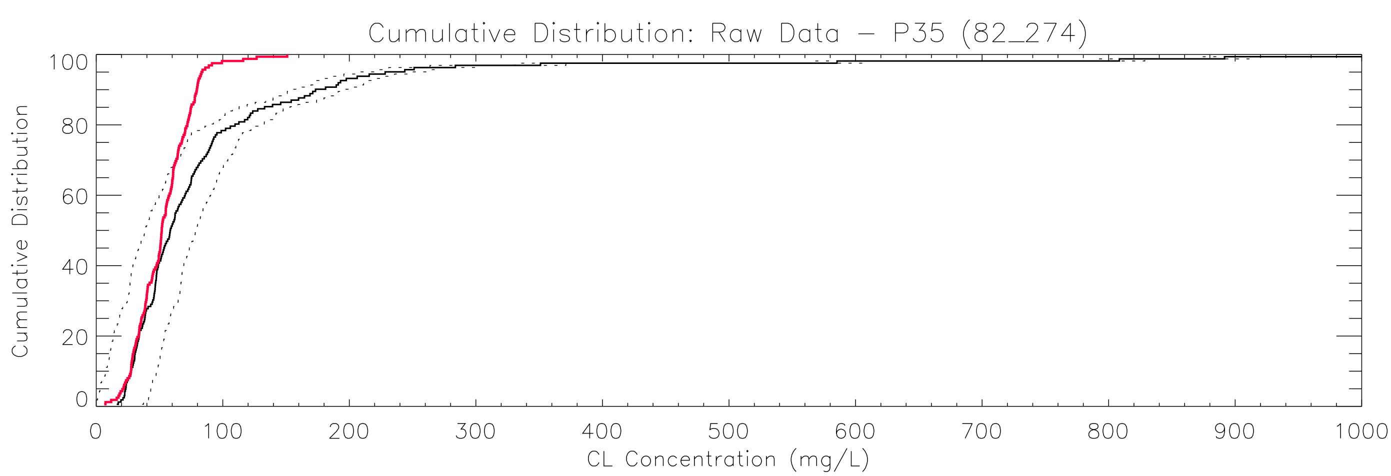

Mean: Water Year – 95% CI – SRS3 (84_273)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

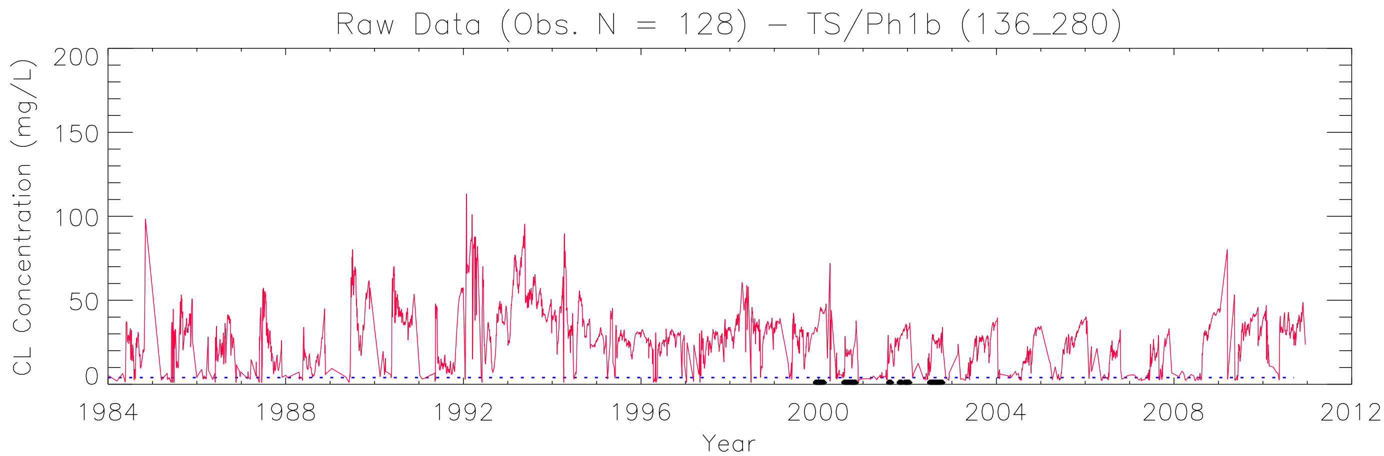

Cumulative Distribution: Raw Data – SRS3 (84_273)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

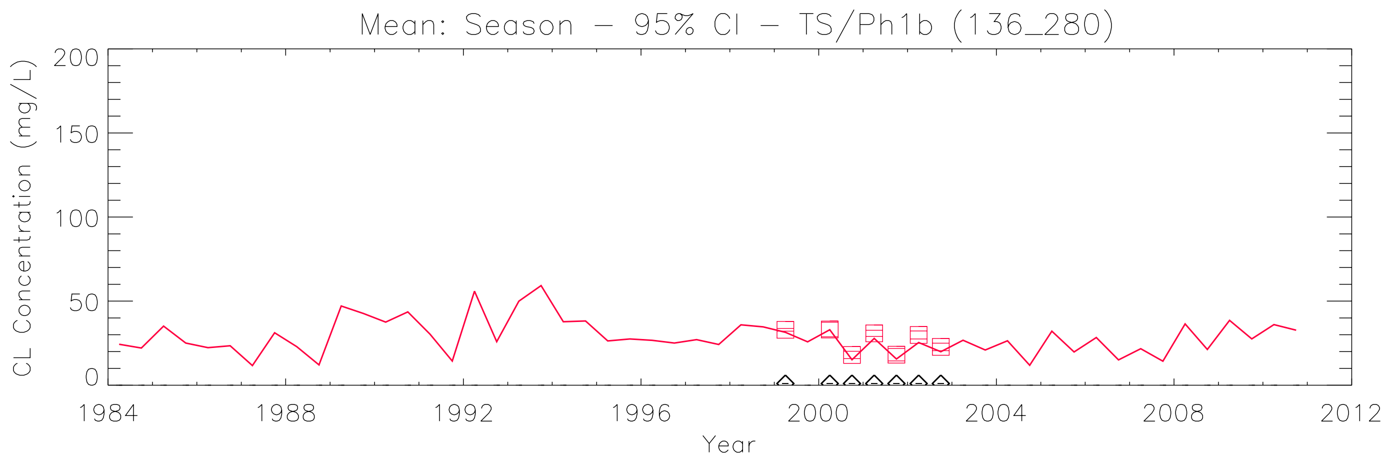

Raw Data (Obs. N = 162) - P35 (82_274)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

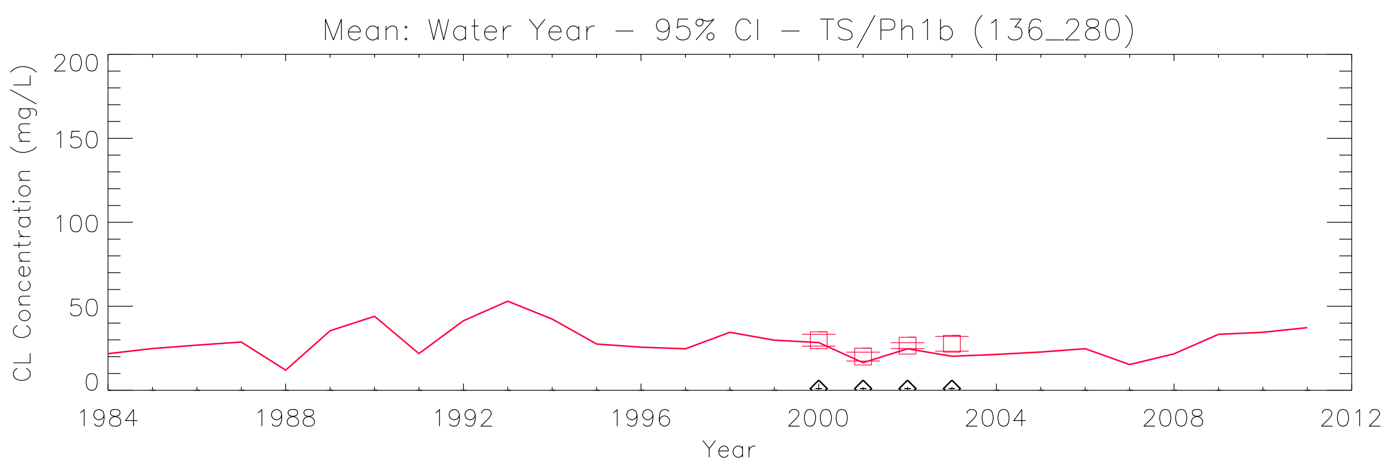

Mean: Season - 95% CI - P35 (82_274)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

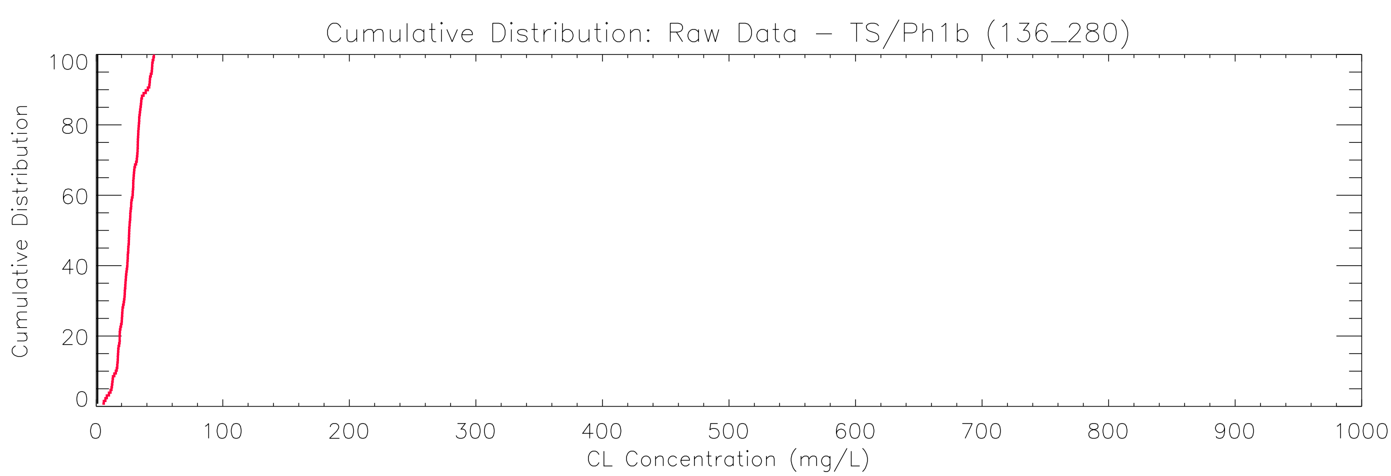

Mean: Water Year - 95% CI - P35 (82_274)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

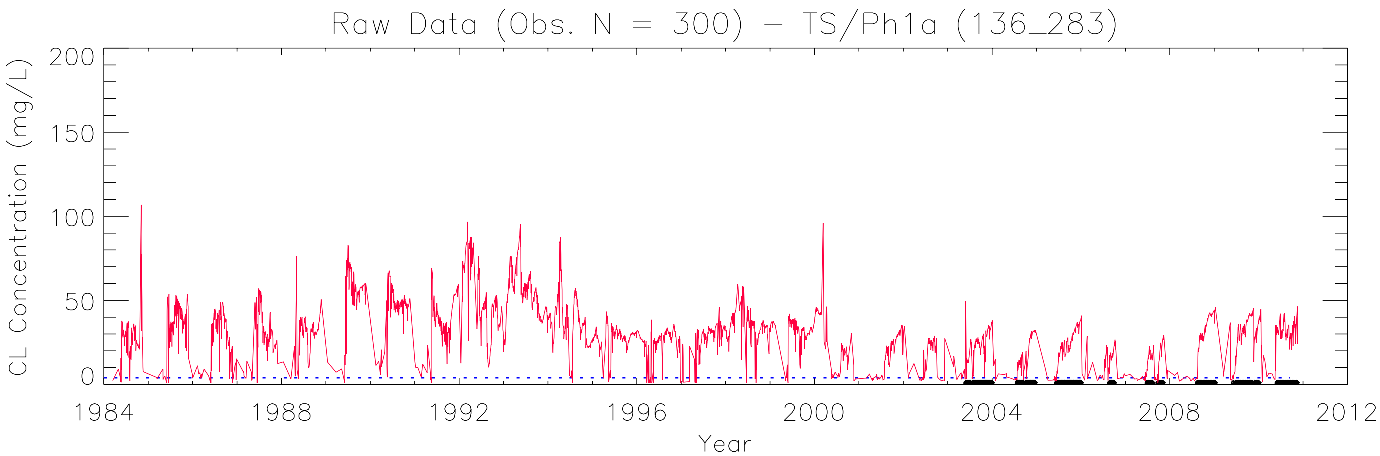

Cumulative Distribution: Raw Data - P35 (82_274)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

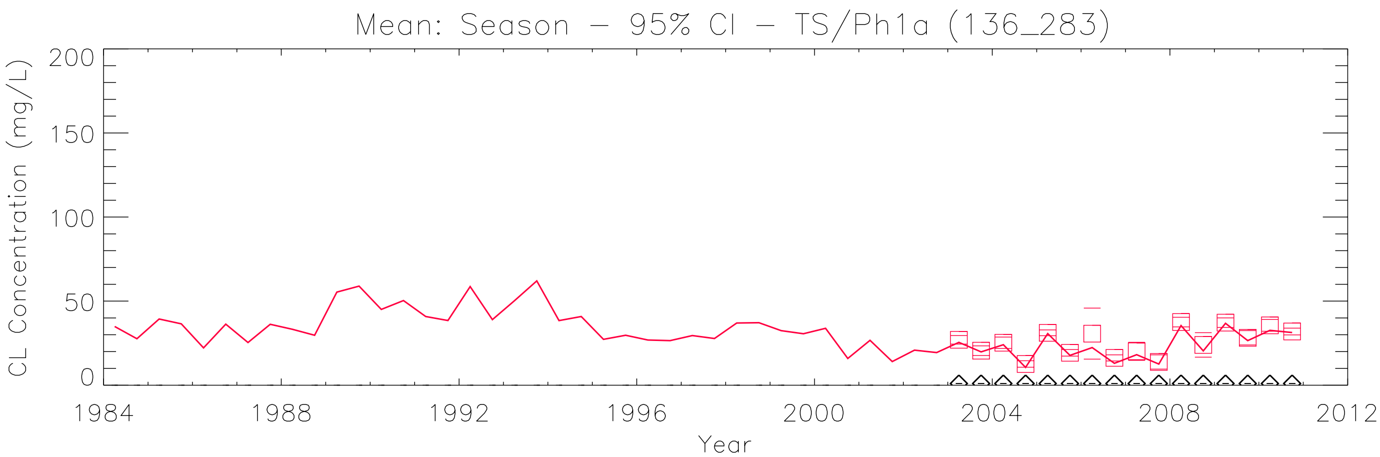

Raw Data (Obs. N = 128) – TS/Ph1b (136_280)
CL Concentration (mg/L)
Year

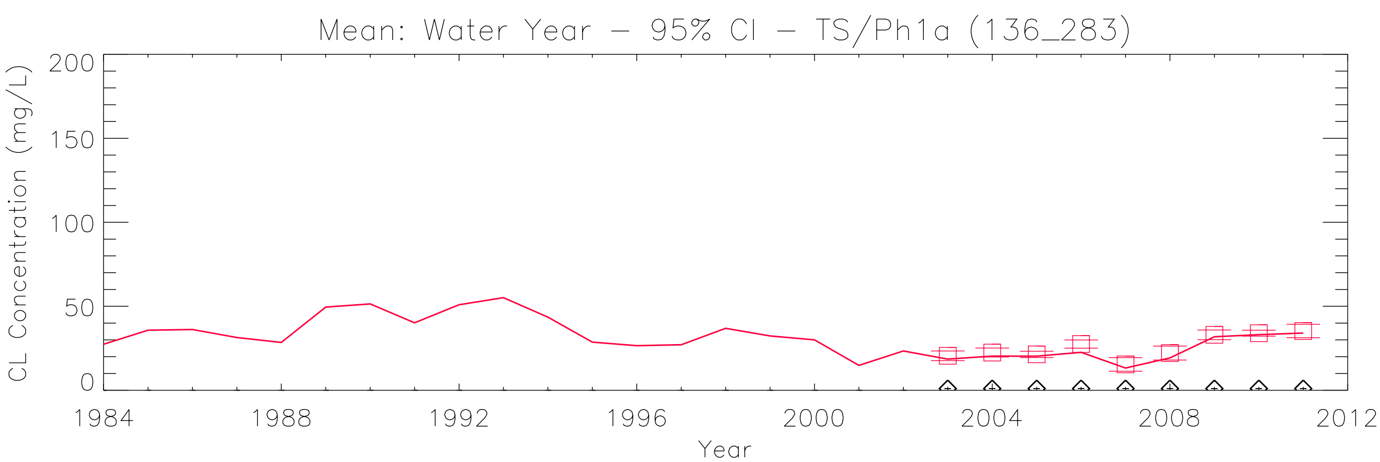

Mean: Season – 95% CI – TS/Ph1b (136_280)
CL Concentration (mg/L)
Year

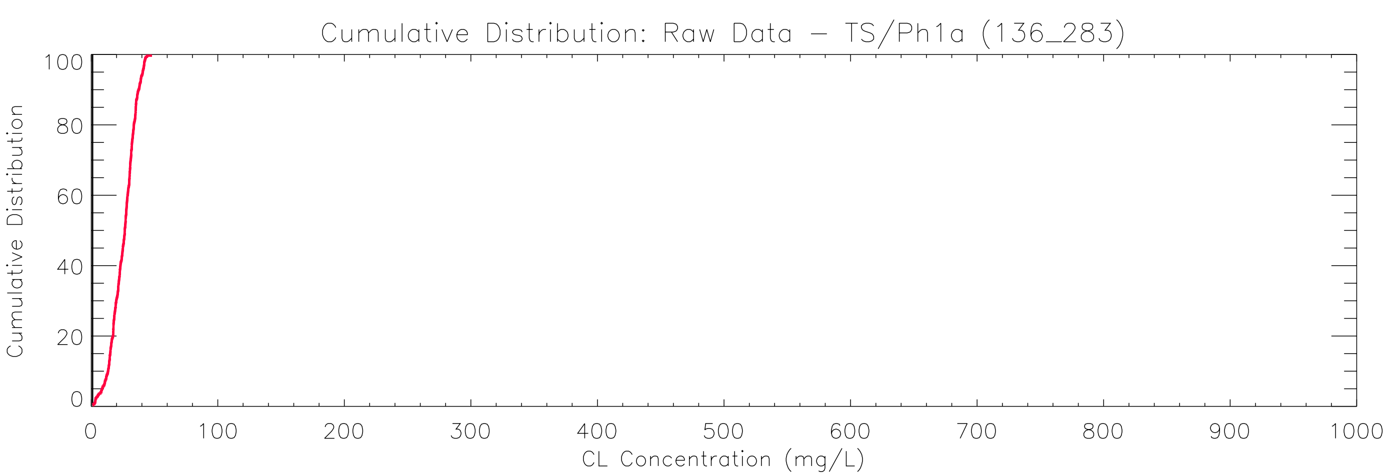

Mean: Water Year – 95% CI – TS/Ph1b (136_280)
CL Concentration (mg/L)
Year

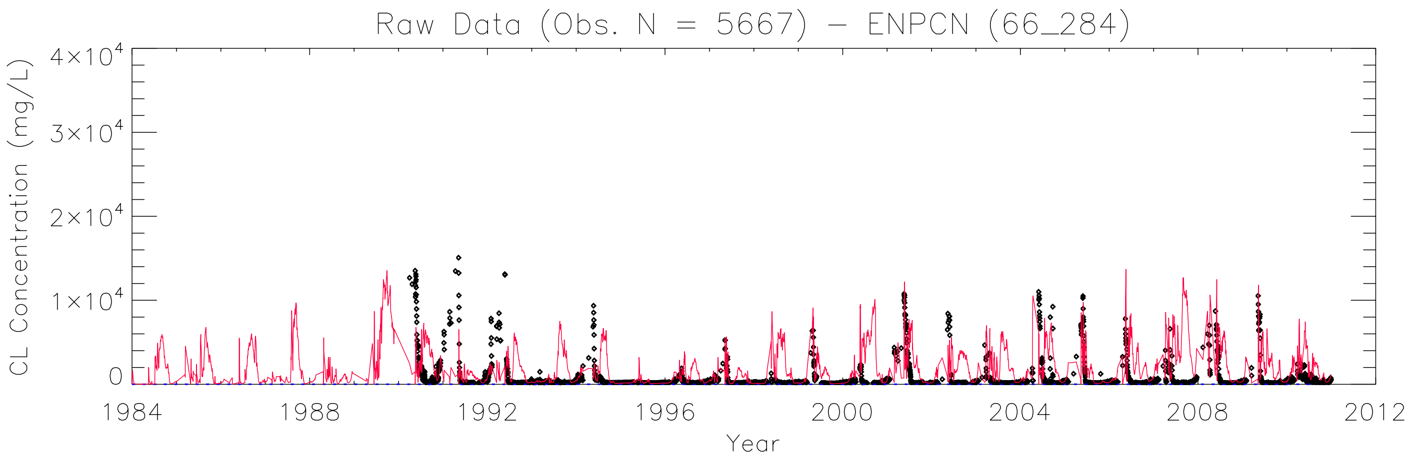

Cumulative Distribution: Raw Data – TS/Ph1b (136_280)
Cumulative Distribution
CL Concentration (mg/L)

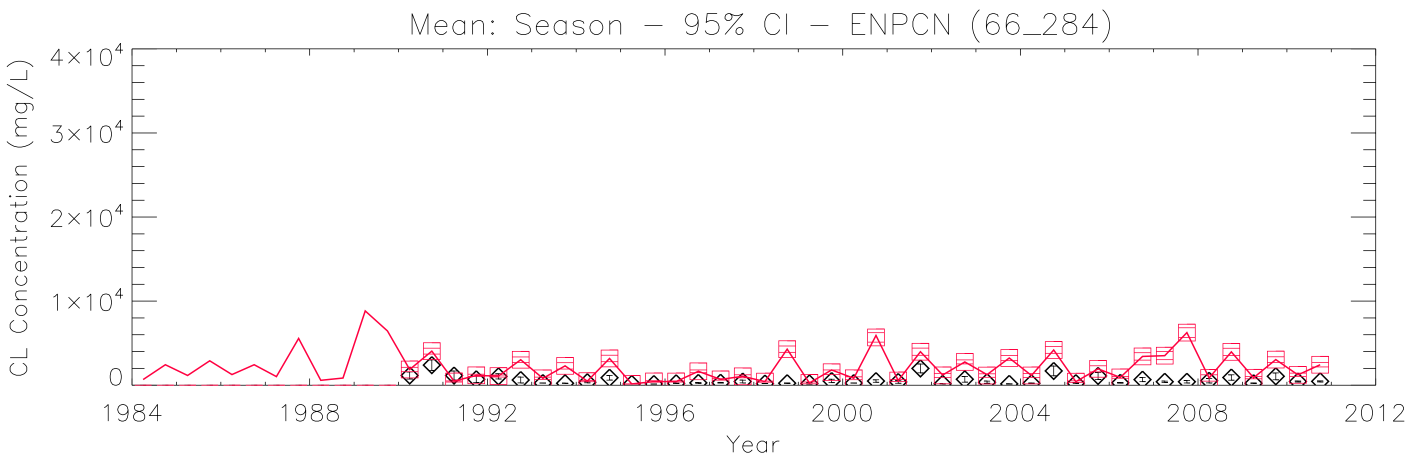

Raw Data (Obs. N = 300) – TS/Ph1a (136_283)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

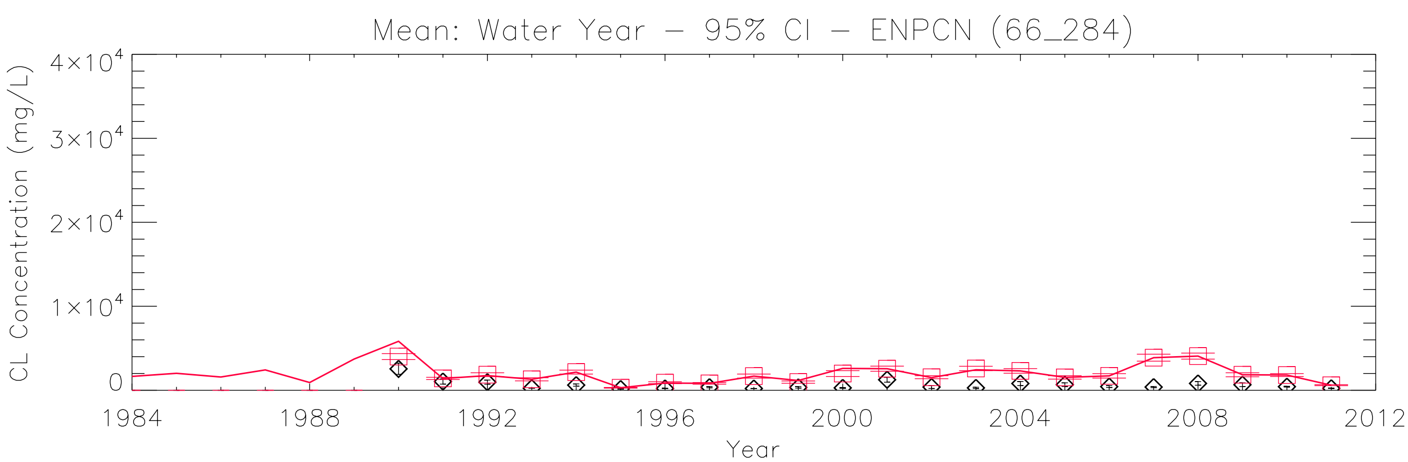

Mean: Season – 95% CI – TS/Ph1a (136_283)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

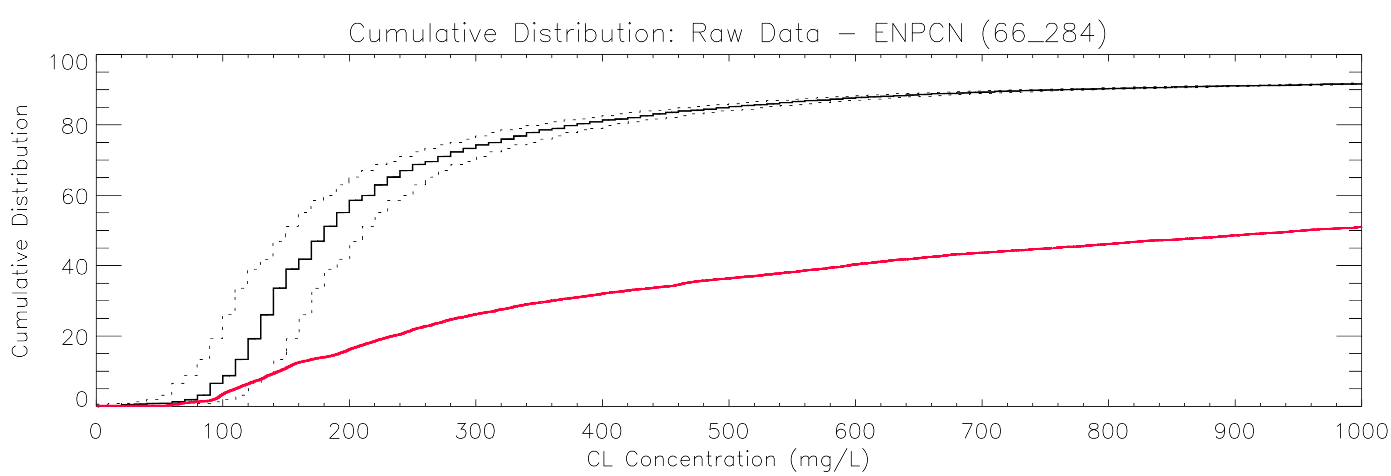

Mean: Water Year – 95% CI – TS/Ph1a (136_283)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

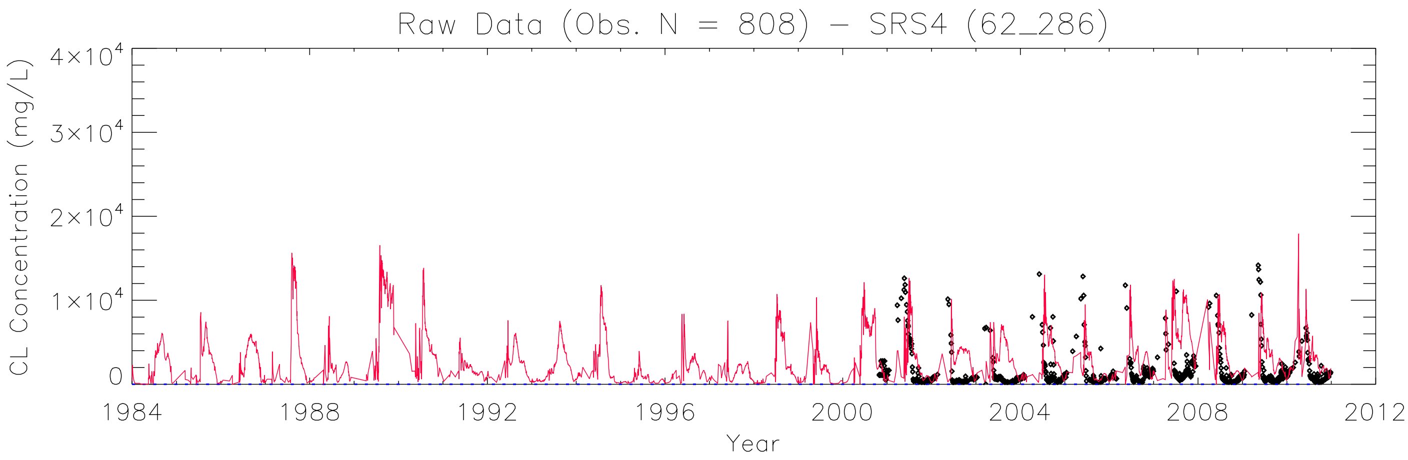

Cumulative Distribution: Raw Data – TS/Ph1a (136_283)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

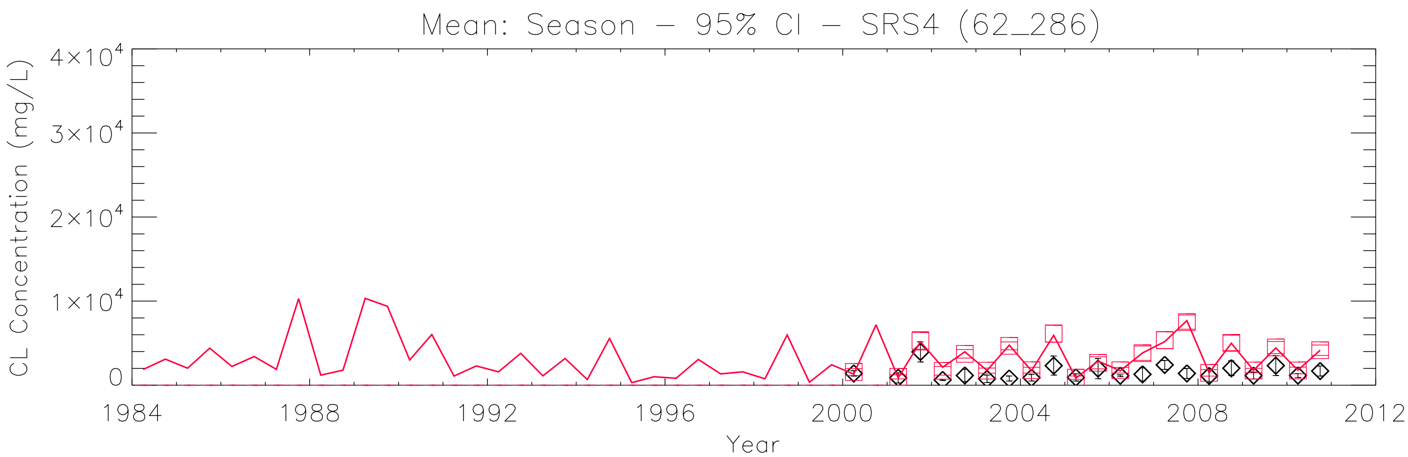

Raw Data (Obs. N = 5667) – ENPCN (66_284)
CL Concentration (mg/L)
Year

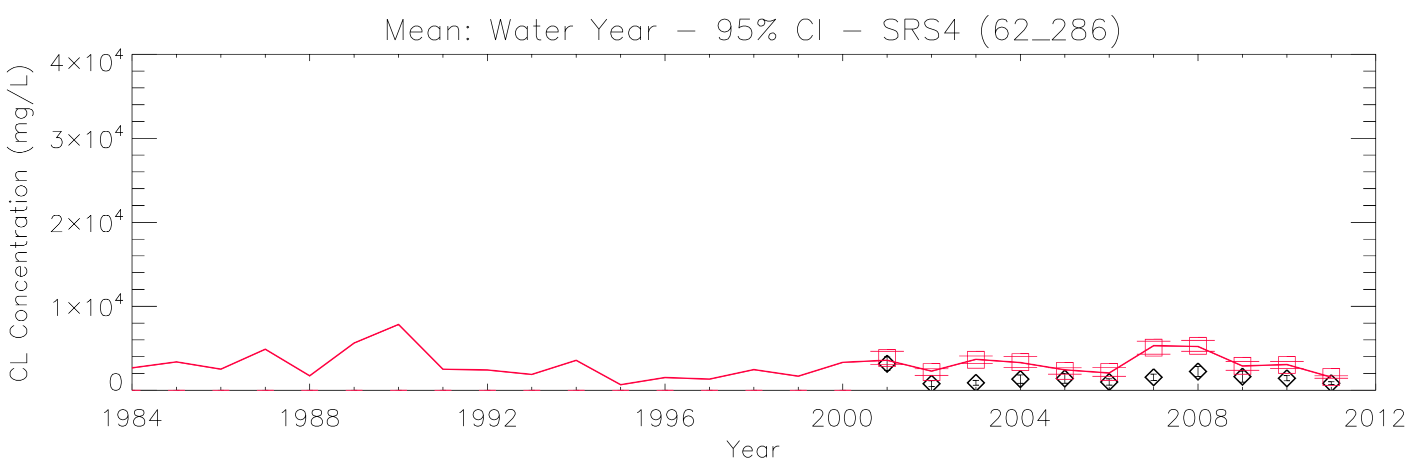

Mean: Season – 95% CI – ENPCN (66_284)
CL Concentration (mg/L)
Year

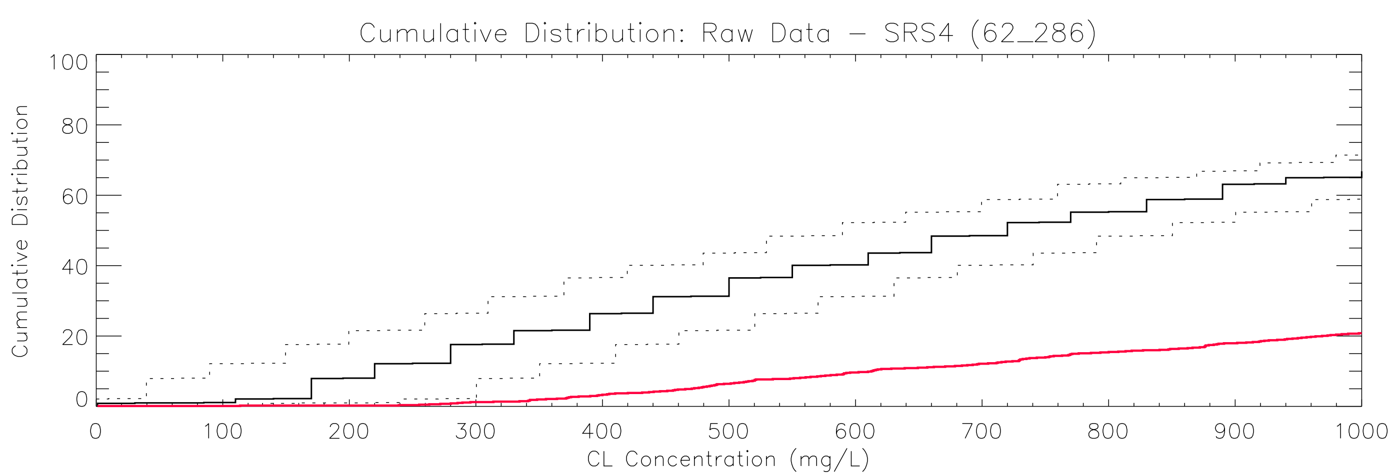

Mean: Water Year – 95% CI – ENPCN (66_284)
CL Concentration (mg/L)
Year

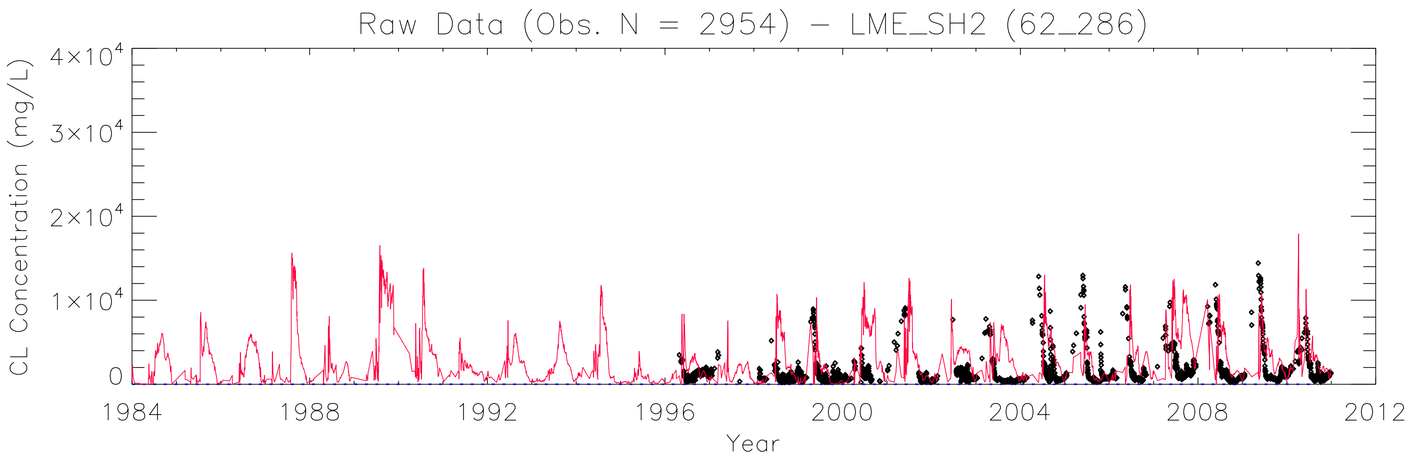

Cumulative Distribution: Raw Data – ENPCN (66_284)
Cumulative Distribution
CL Concentration (mg/L)

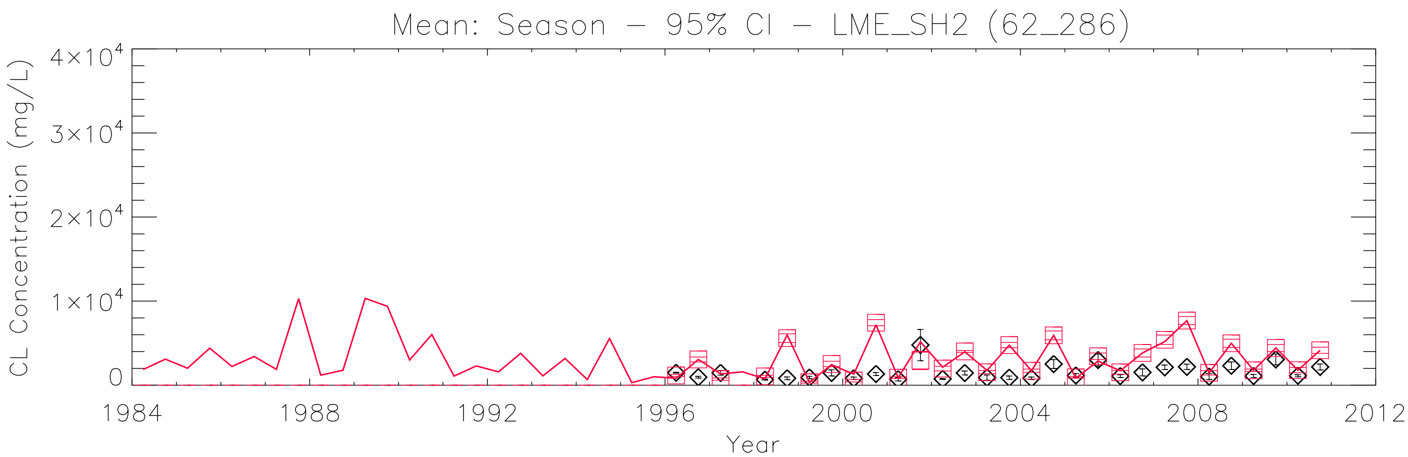

Raw Data (Obs. N = 808) – SRS4 (62_286)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

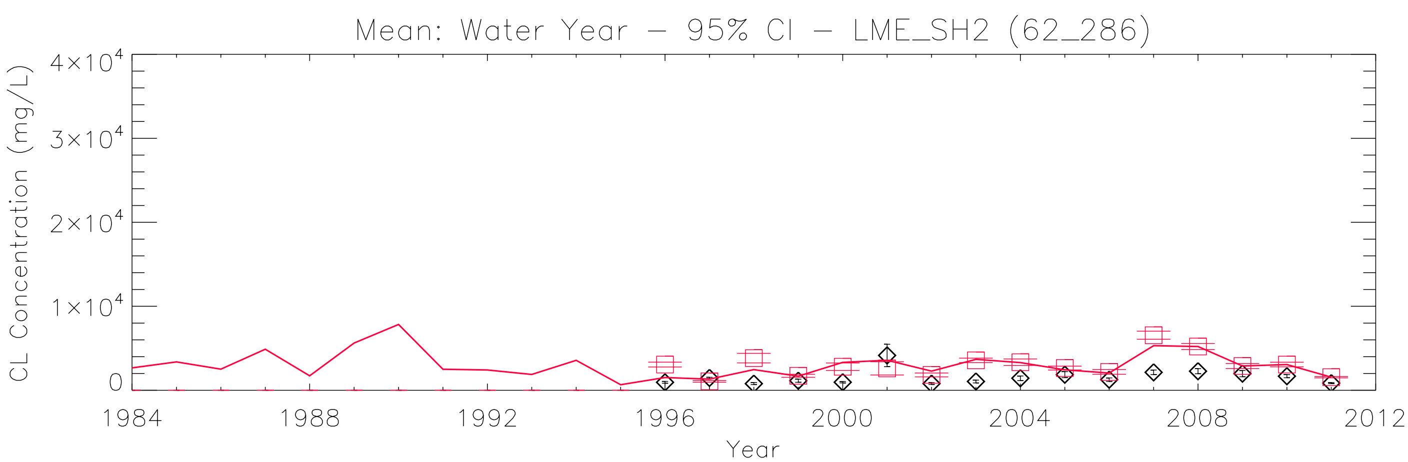

Mean: Season – 95% CI – SRS4 (62_286)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

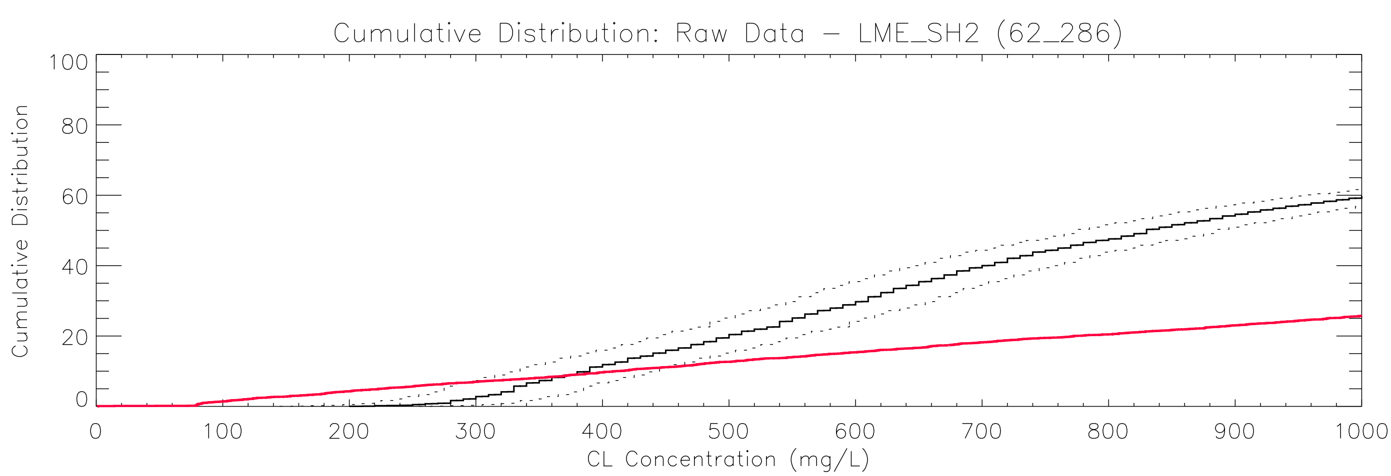

Mean: Water Year – 95% CI – SRS4 (62_286)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

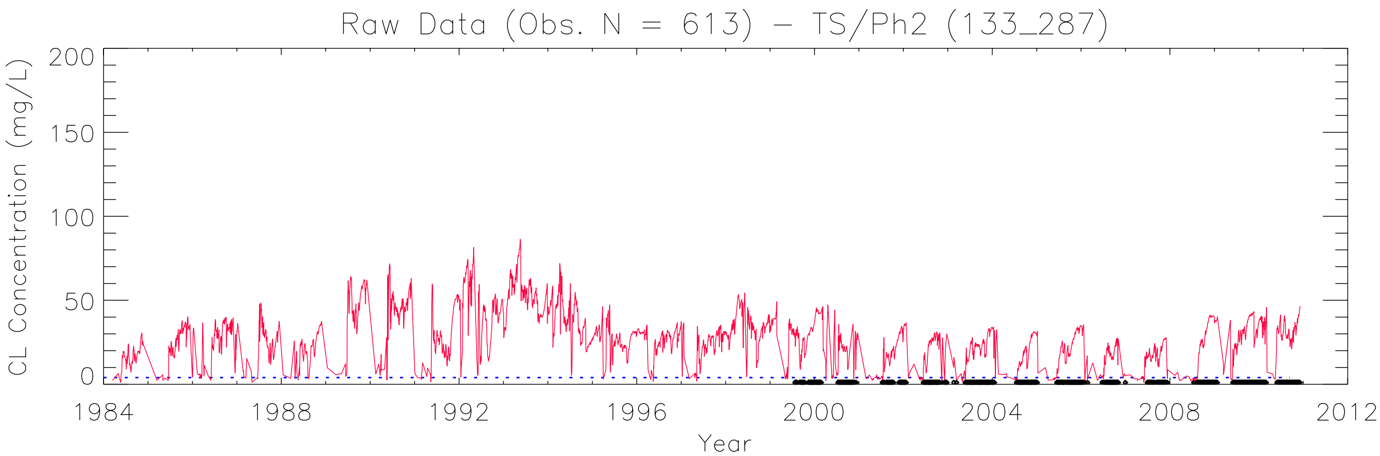

Cumulative Distribution: Raw Data – SRS4 (62_286)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

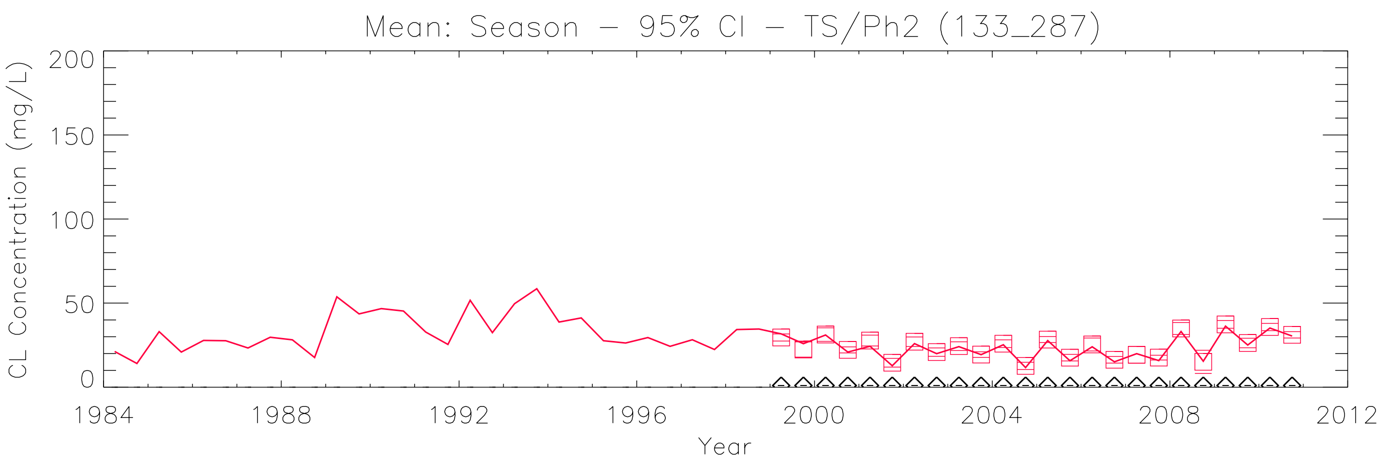

Raw Data (Obs. N = 2954) - LME_SH2 (62_286)
CL Concentration (mg/L)
Year

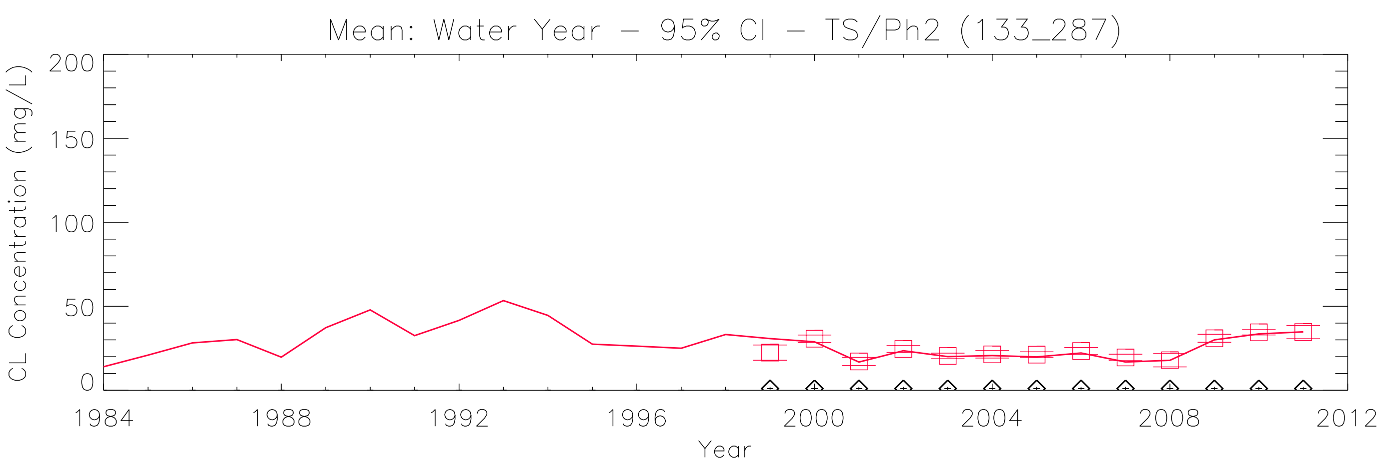

Mean: Season - 95% CI - LME_SH2 (62_286)
CL Concentration (mg/L)
Year

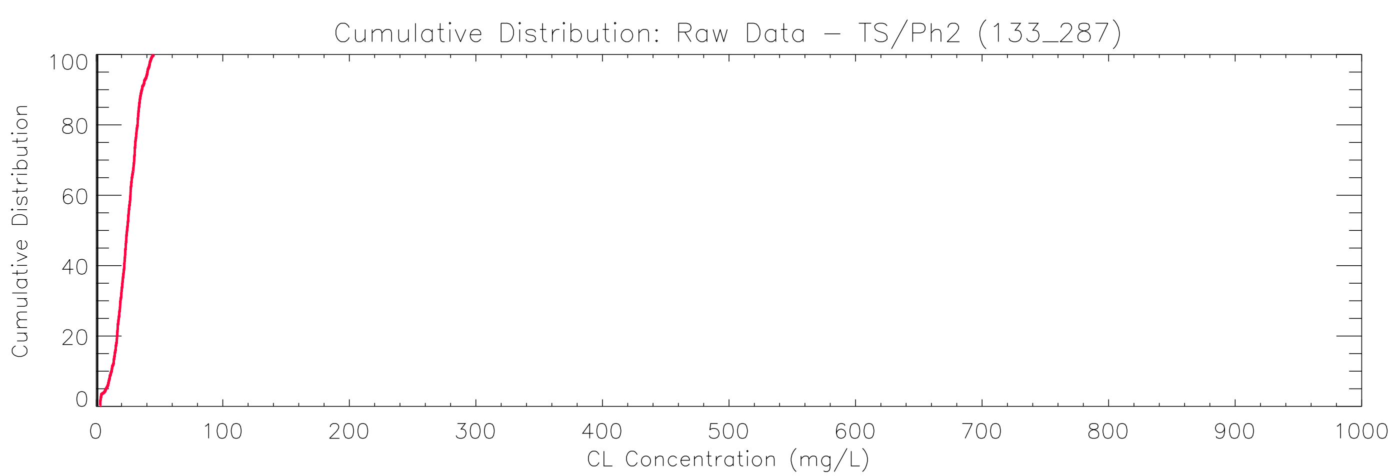

Mean: Water Year - 95% CI - LME_SH2 (62_286)
CL Concentration (mg/L)
Year

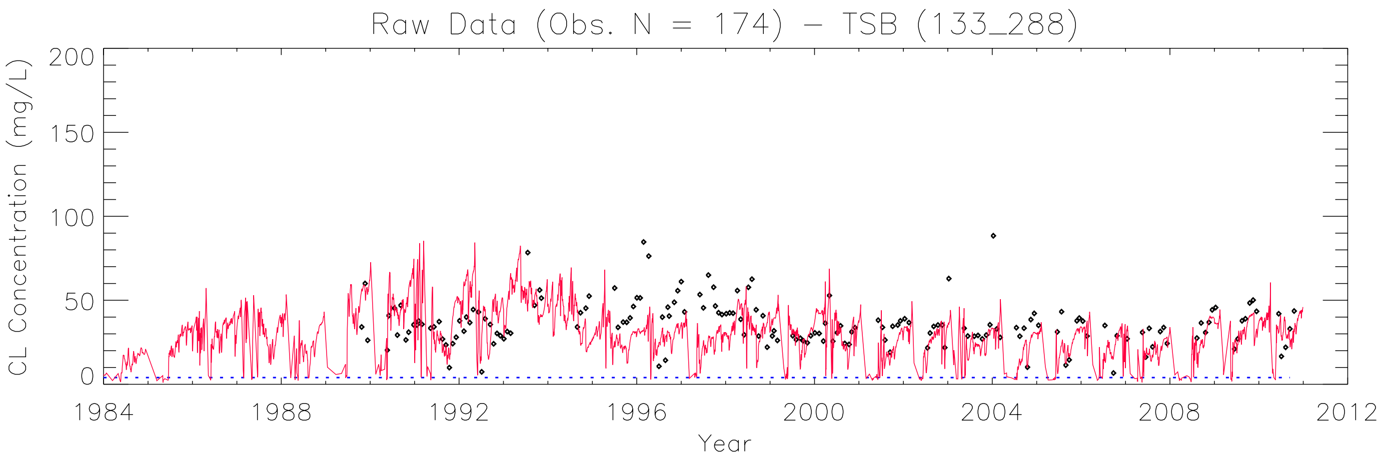

Cumulative Distribution: Raw Data - LME_SH2 (62_286)
Cumulative Distribution
CL Concentration (mg/L)

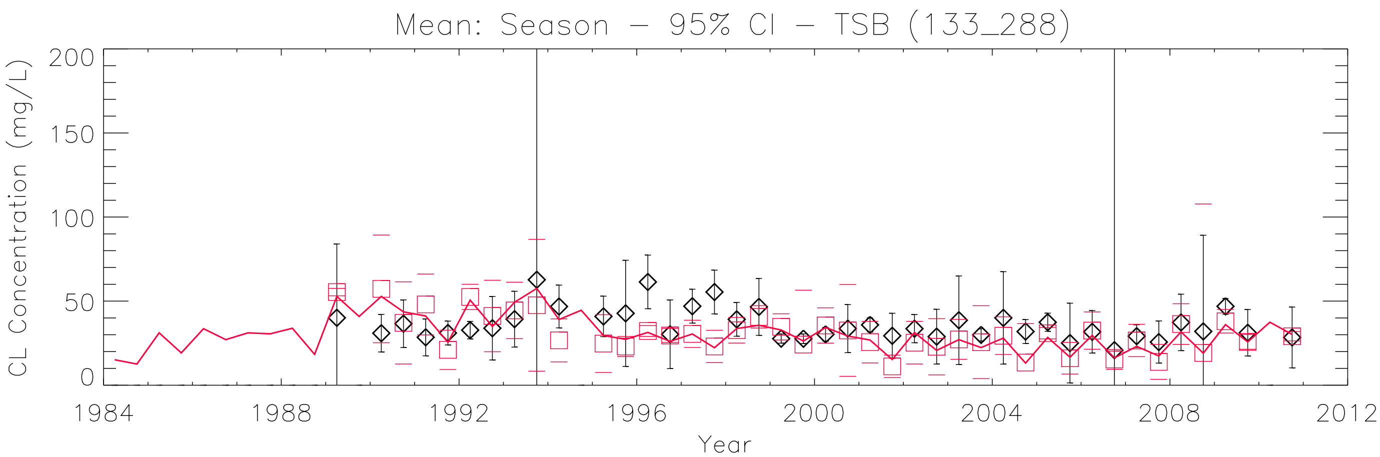

Raw Data (Obs. N = 613) - TS/Ph2 (133_287)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

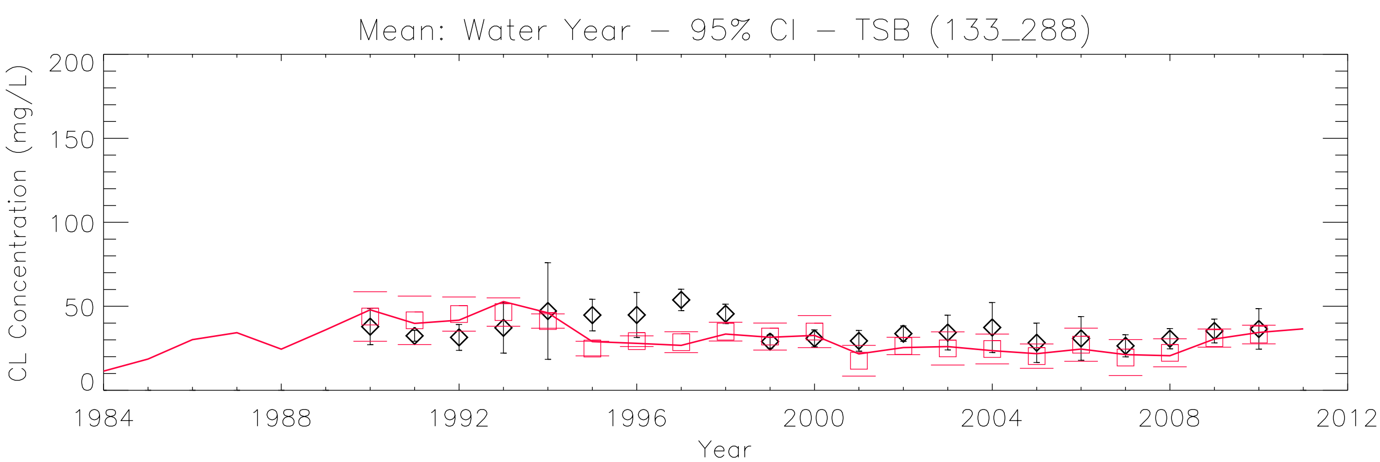

Mean: Season - 95% CI - TS/Ph2 (133_287)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

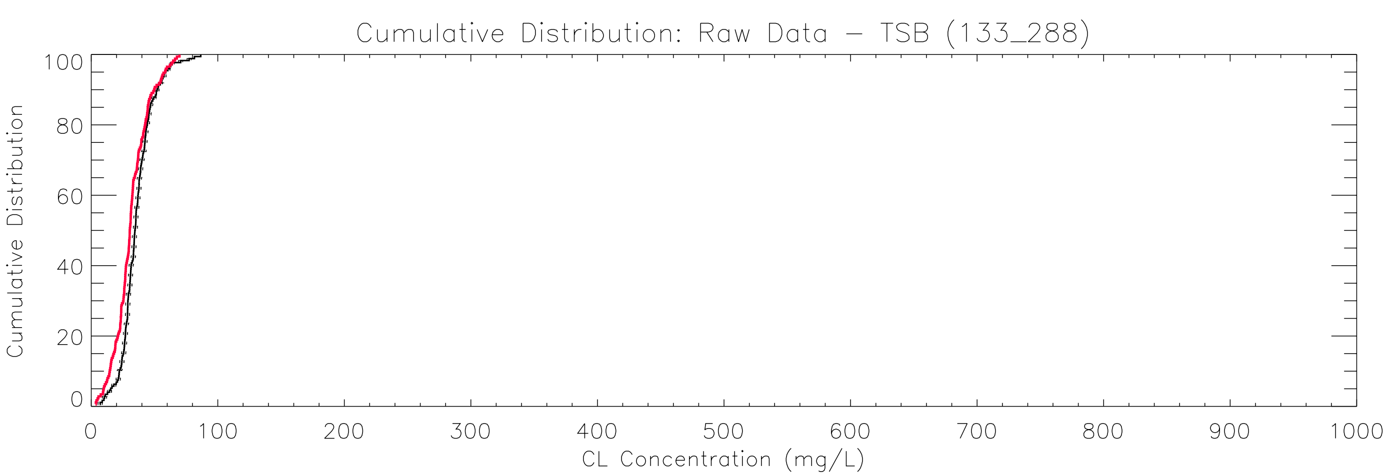

Mean: Water Year - 95% CI - TS/Ph2 (133_287)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

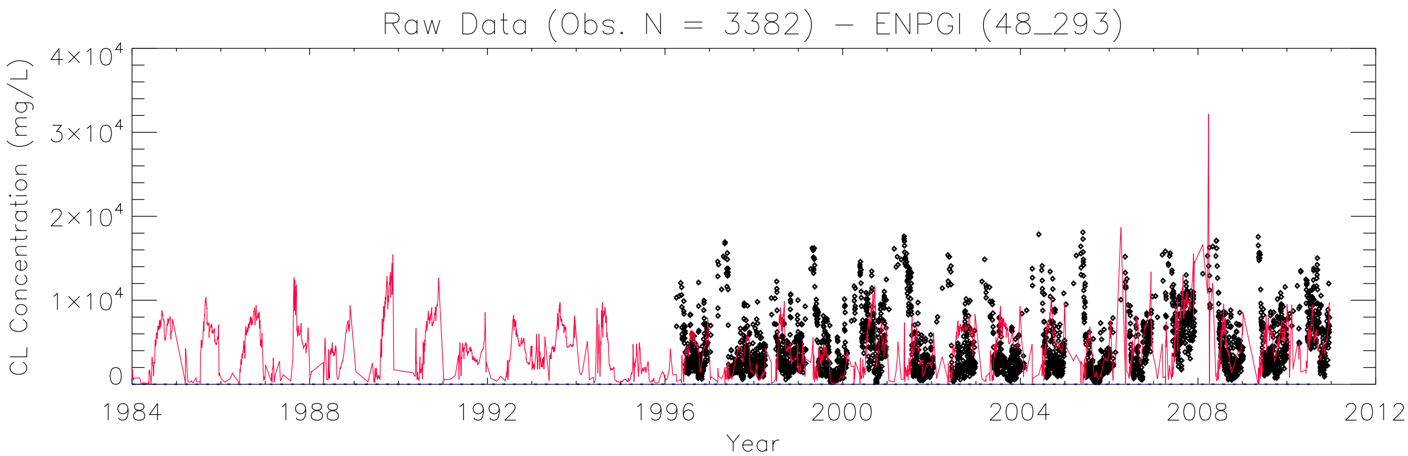

Cumulative Distribution: Raw Data - TS/Ph2 (133_287)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)


Raw Data (Obs. N = 174) – TSB (133_288)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

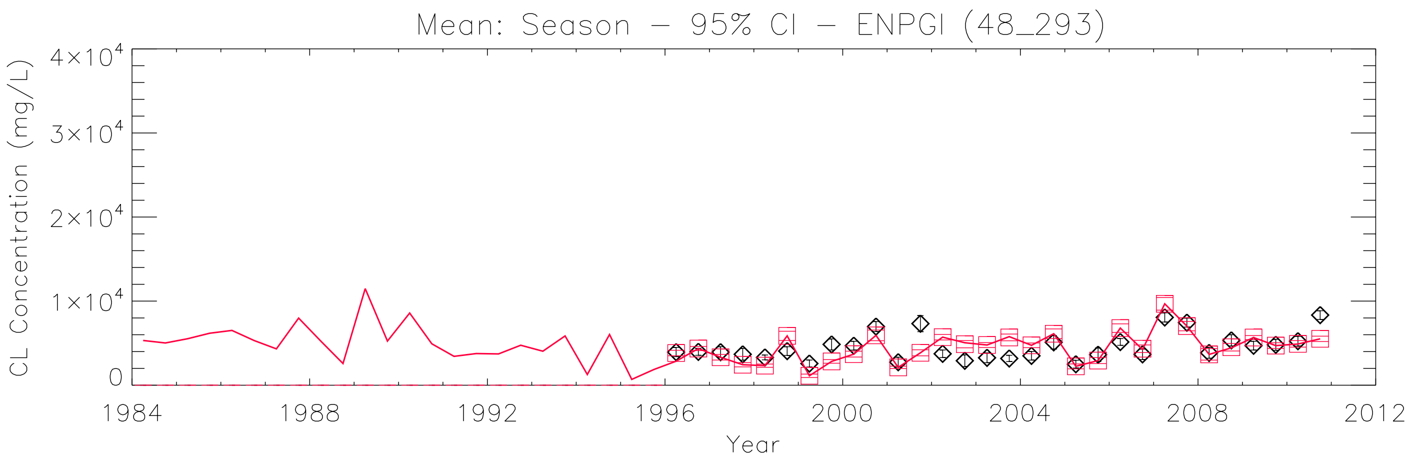

Mean: Season – 95% CI – TSB (133_288)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year – 95% CI – TSB (133_288)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

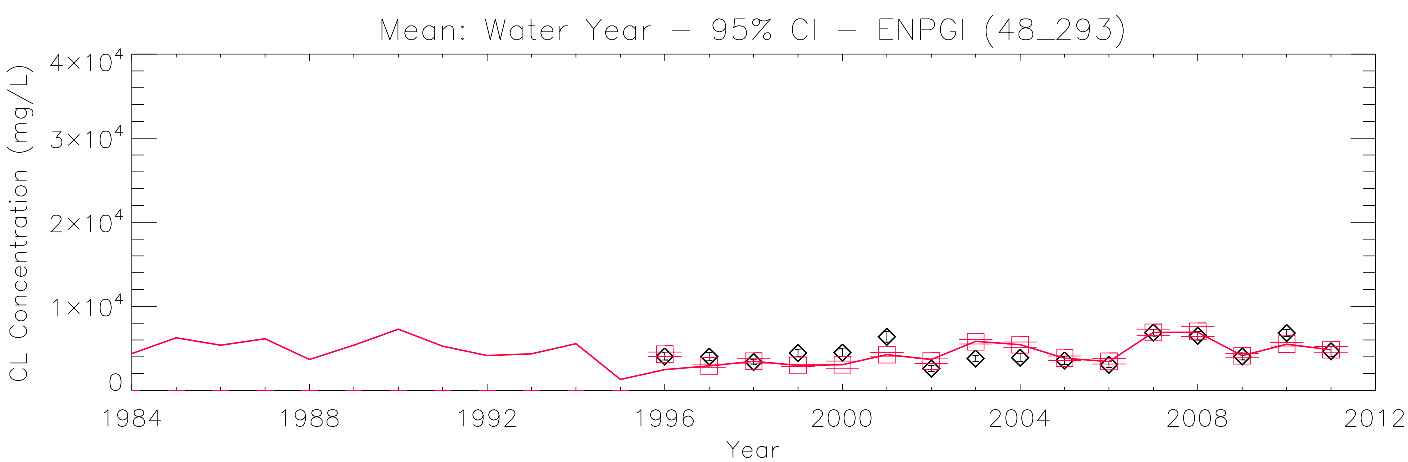

Cumulative Distribution: Raw Data – TSB (133_288)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



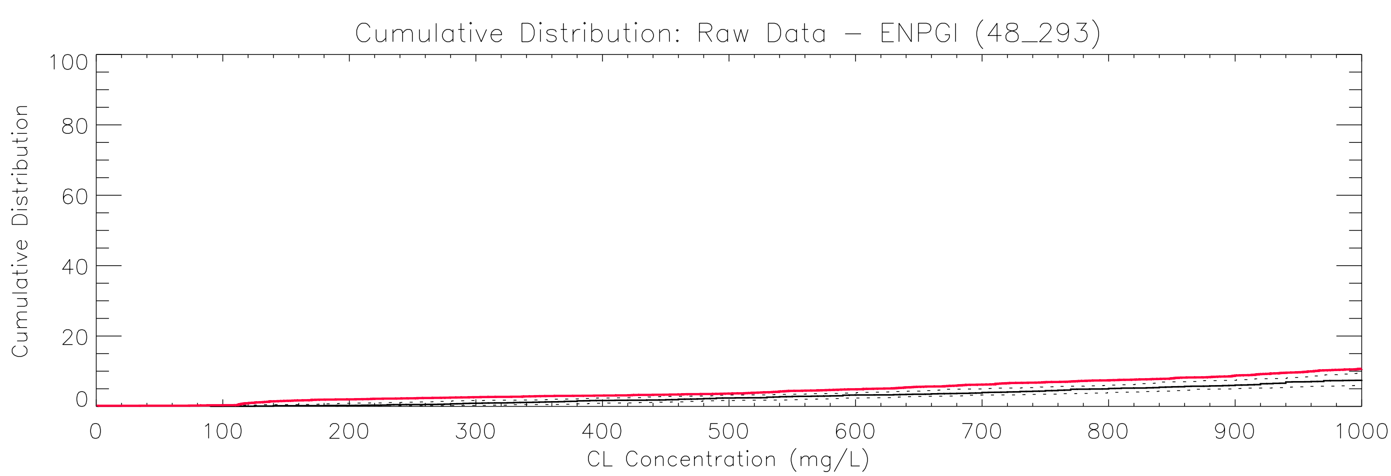
Raw Data (Obs. N = 3382) – ENPGI (48_293)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year



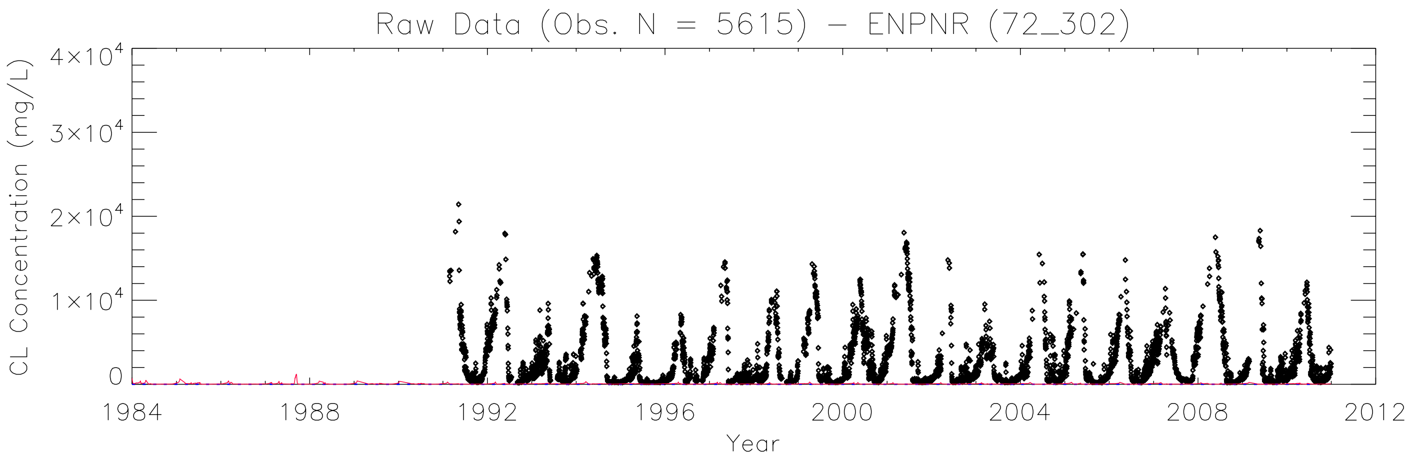
Mean: Season – 95% CI – ENPGI (48_293)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year



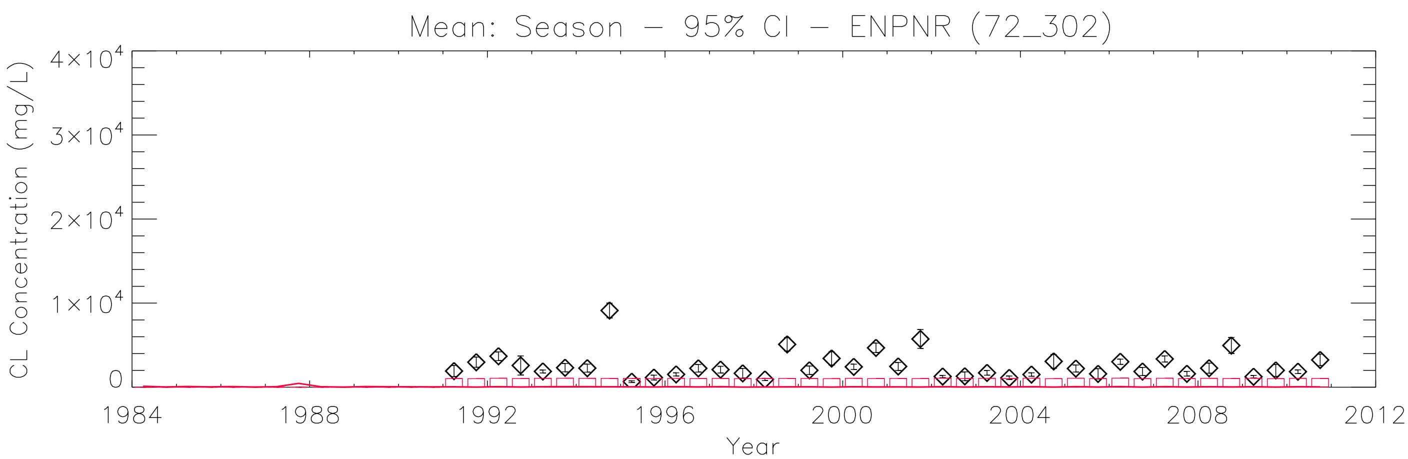
Mean: Water Year – 95% CI – ENPGI (48_293)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year



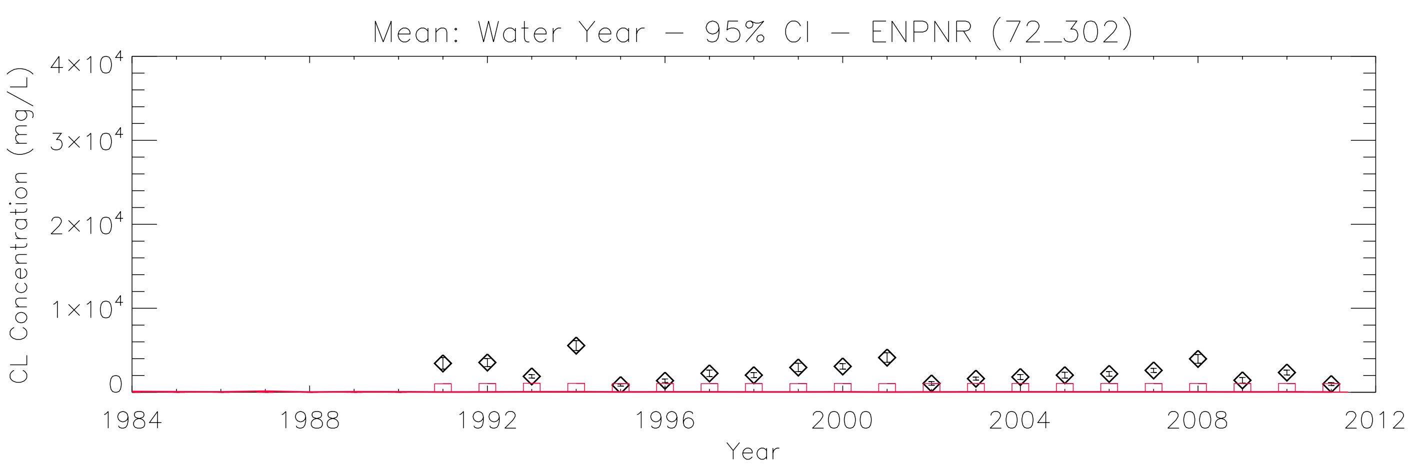
Cumulative Distribution: Raw Data – ENPGI (48_293)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



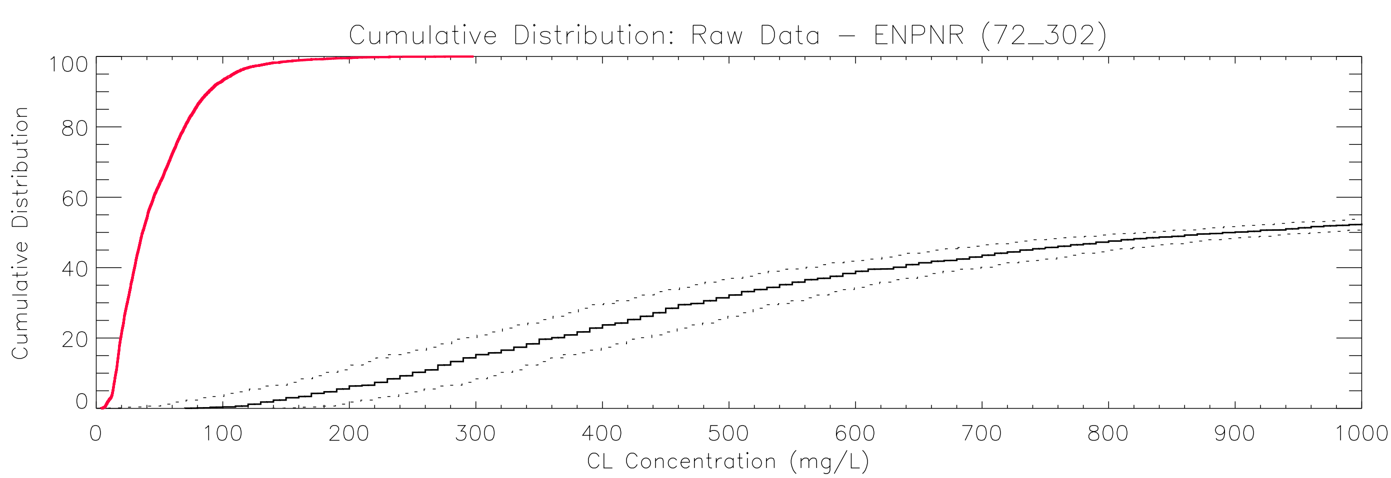
Raw Data (Obs. N = 5615) – ENPNR (72_302)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year



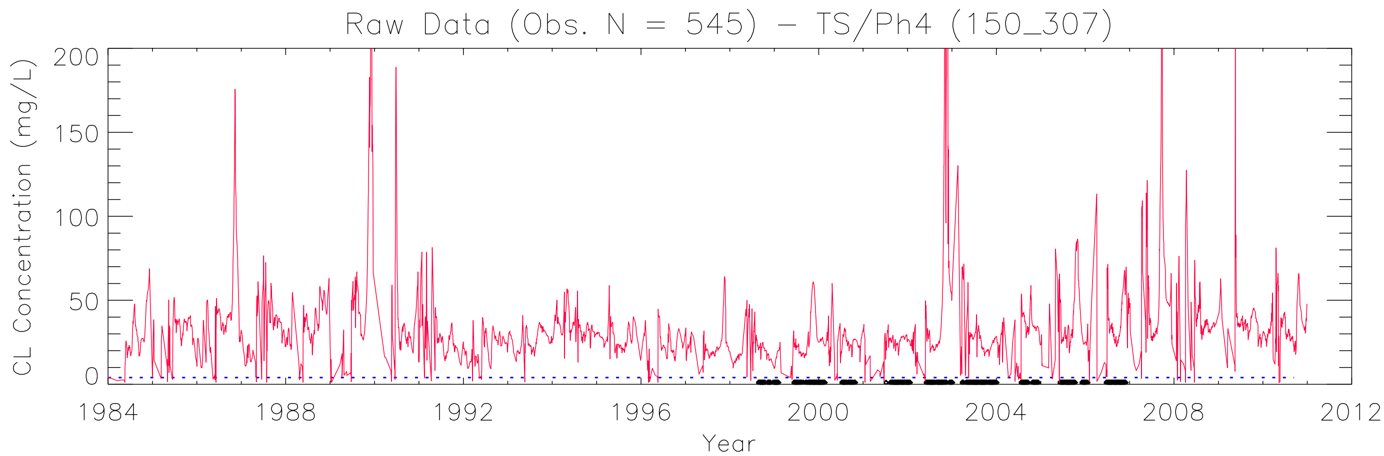
Mean: Season – 95% CI – ENPNR (72_302)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

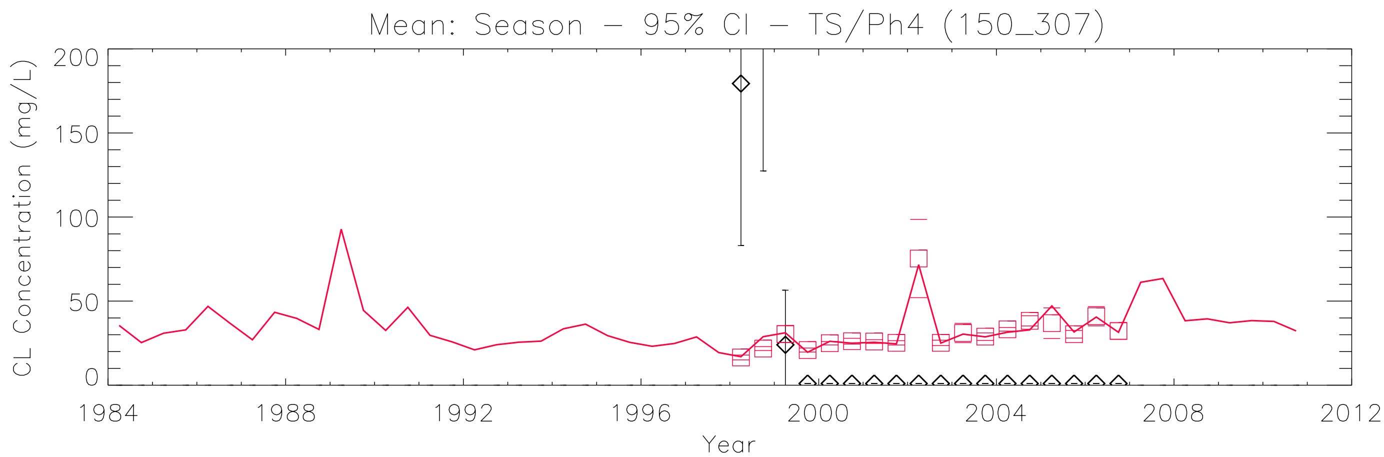


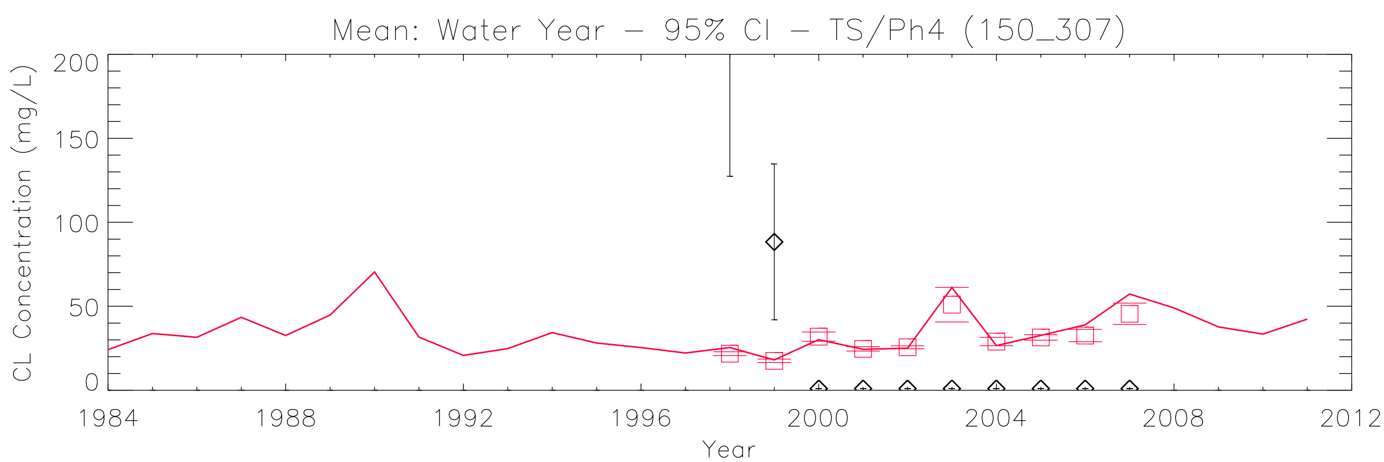
Mean: Water Year – 95% CI – ENPNR (72_302)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

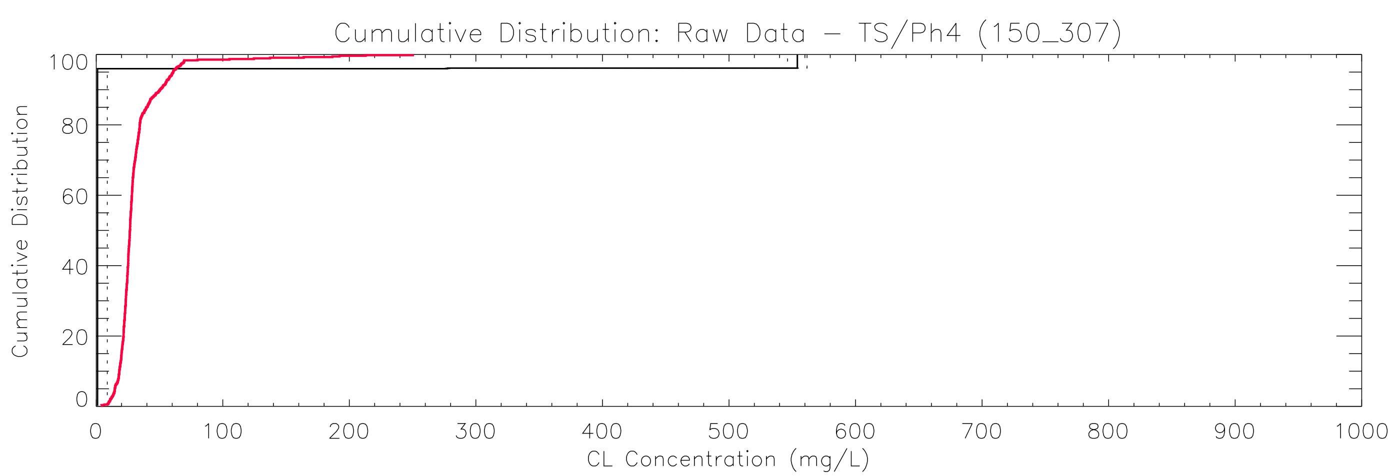


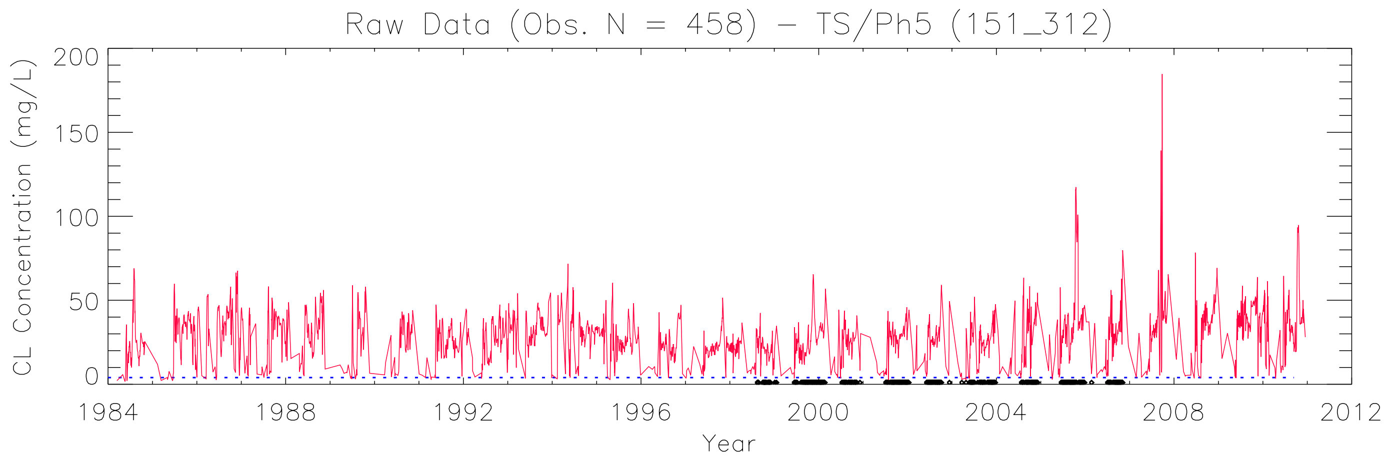
Cumulative Distribution: Raw Data – ENPNR (72_302)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

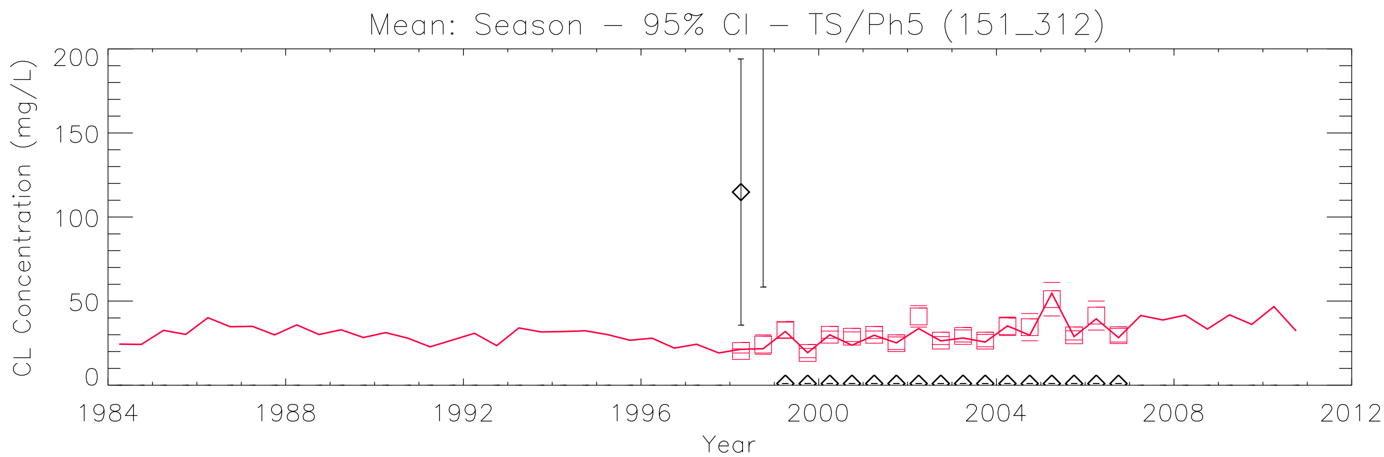

Raw Data (Obs. N = 545) – TS/Ph4 (150_307)
CL Concentration (mg/L)
Year

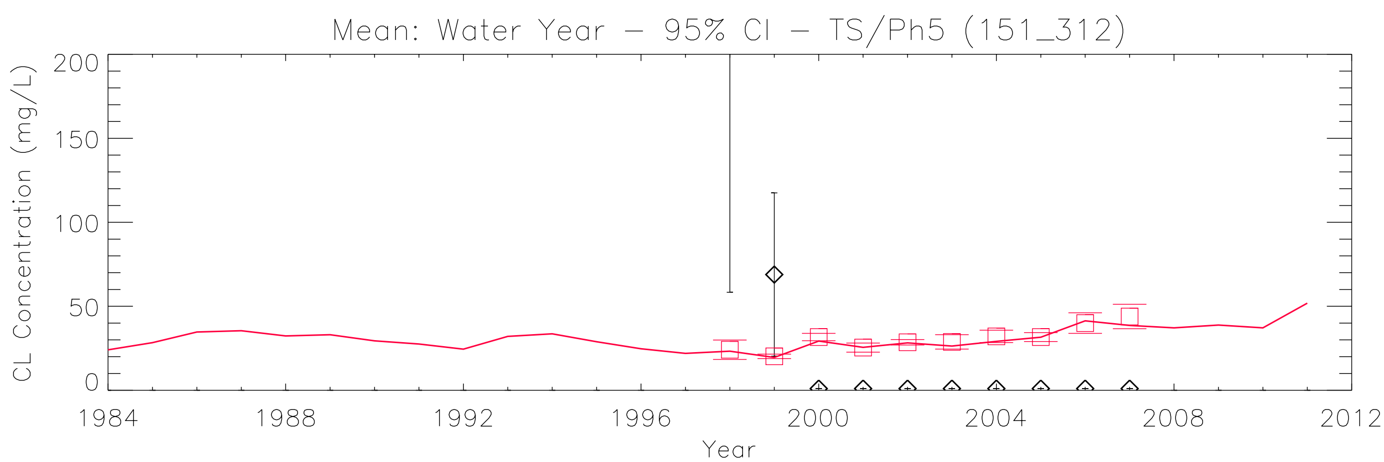

Mean: Season – 95% CI – TS/Ph4 (150_307)
CL Concentration (mg/L)
Year

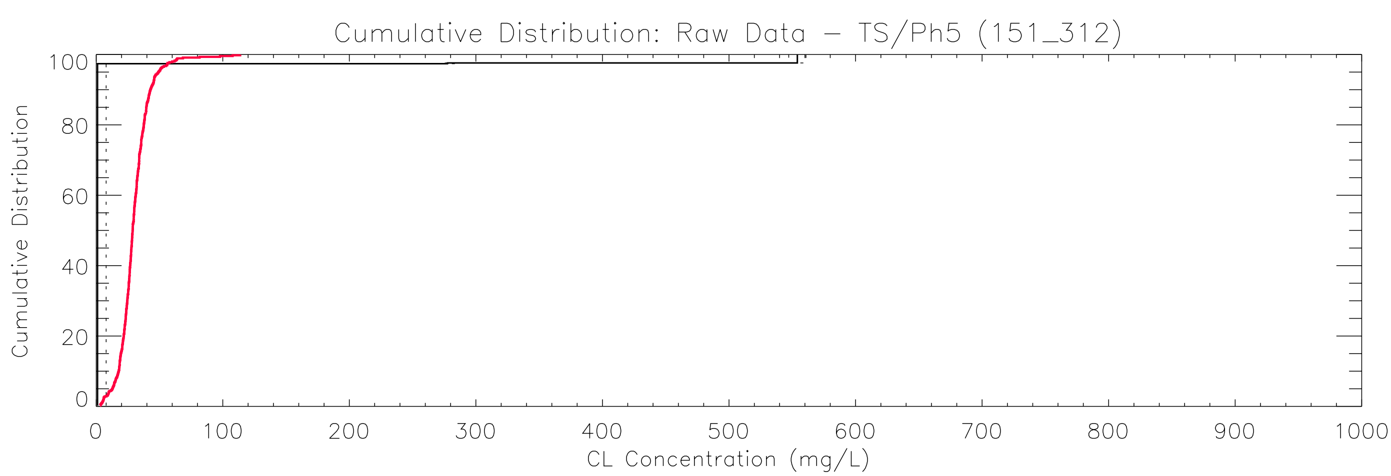

Mean: Water Year – 95% CI – TS/Ph4 (150_307)
CL Concentration (mg/L)
Year

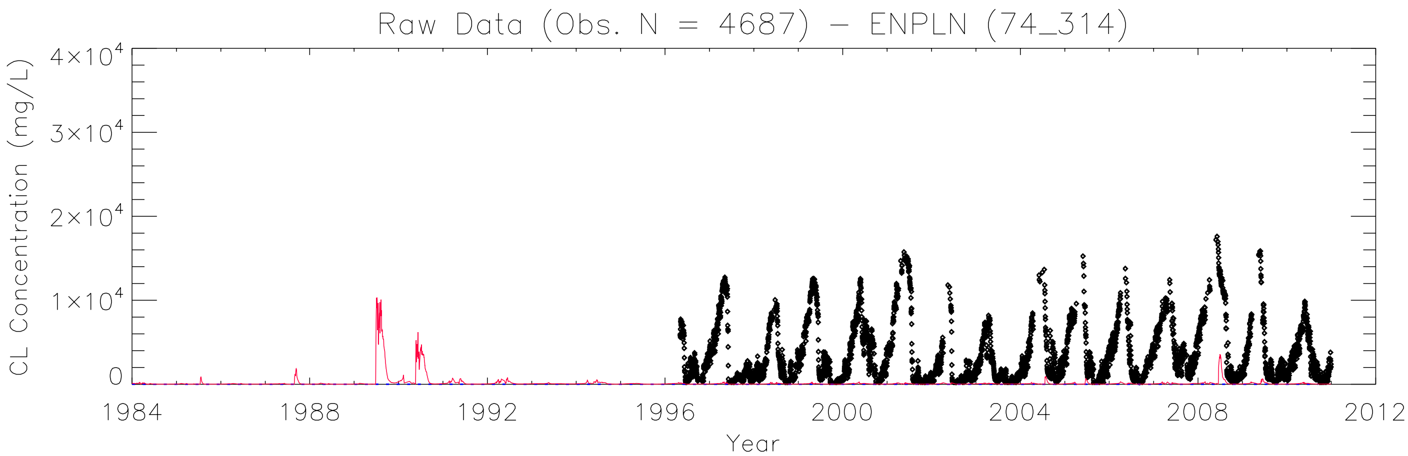

Cumulative Distribution: Raw Data – TS/Ph4 (150_307)
Cumulative Distribution
CL Concentration (mg/L)

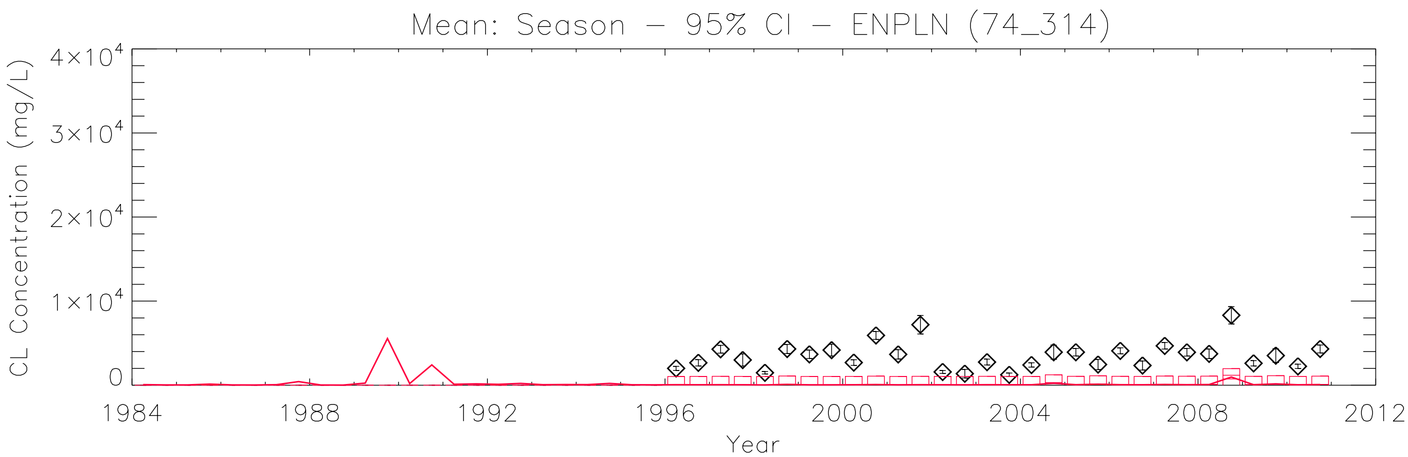

Raw Data (Obs. N = 458) – TS/Ph5 (151_312)
CL Concentration (mg/L)
Year

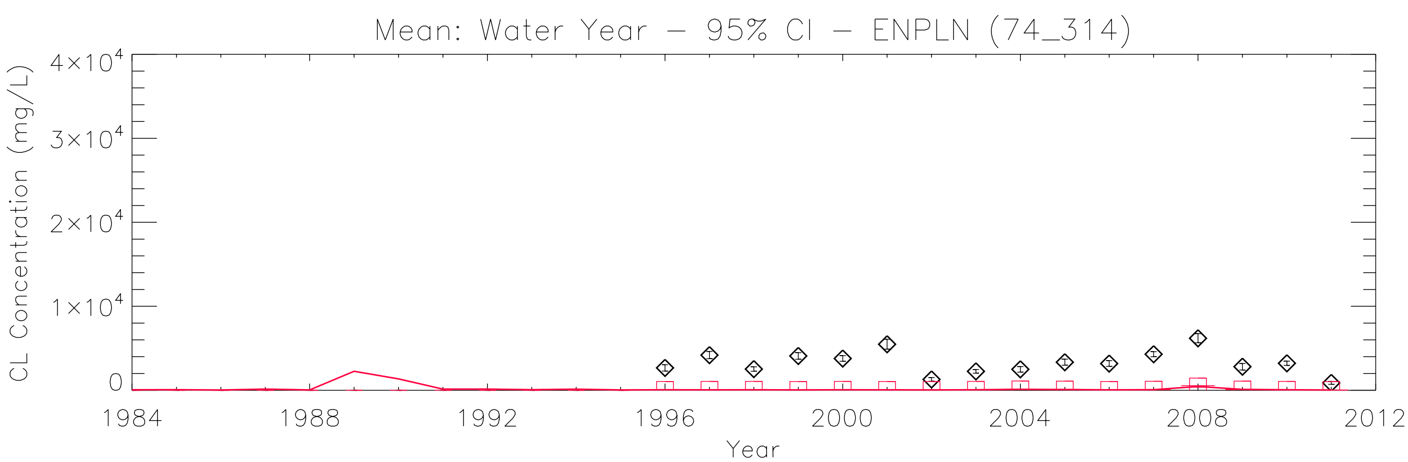

Mean: Season – 95% CI – TS/Ph5 (151_312)
CL Concentration (mg/L)
Year

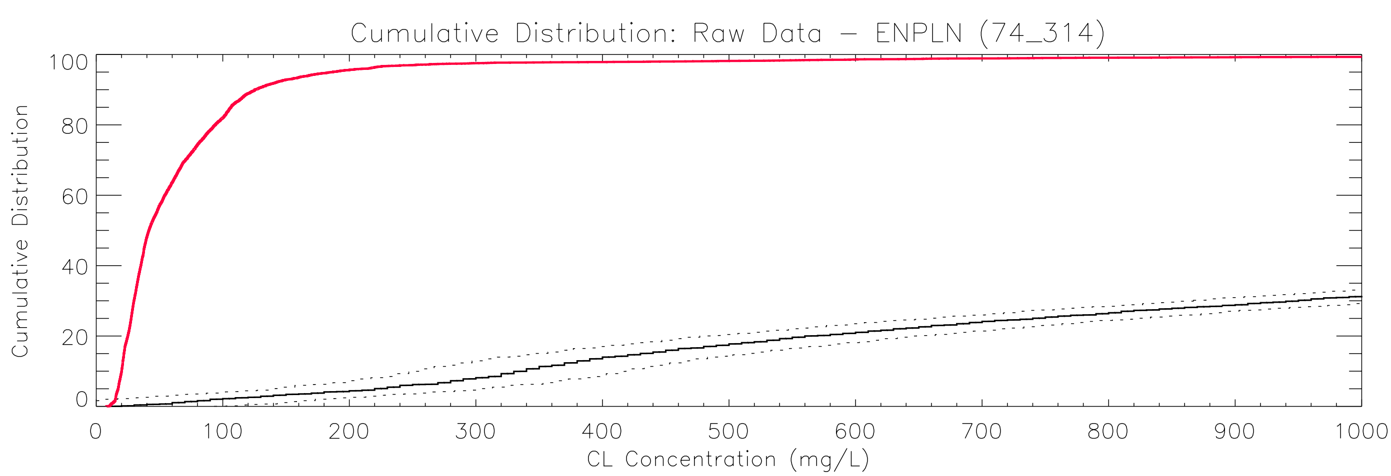

Mean: Water Year – 95% CI – TS/Ph5 (151_312)
CL Concentration (mg/L)
Year

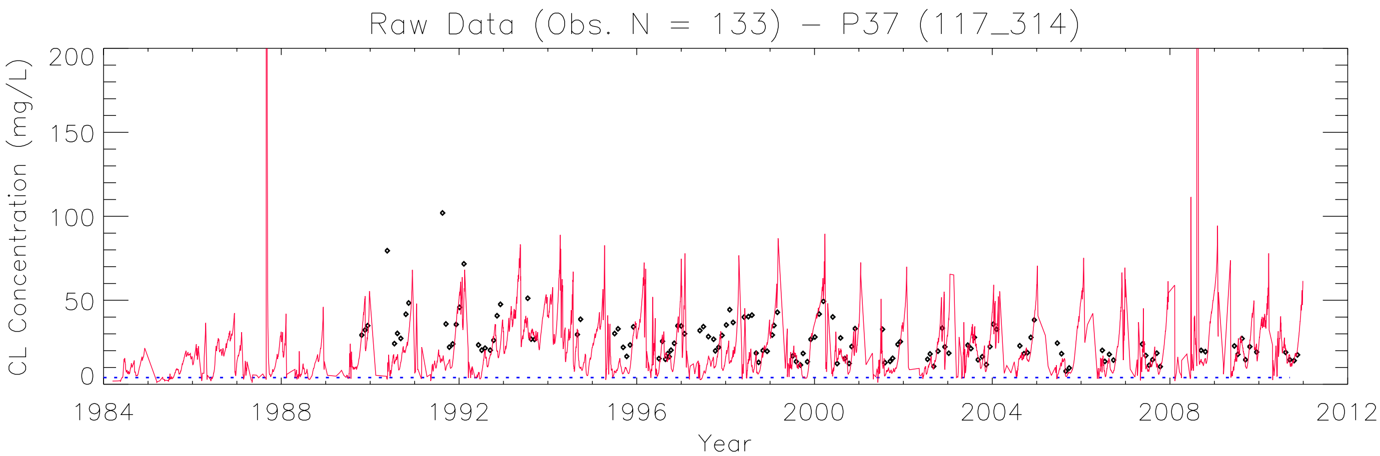

Cumulative Distribution: Raw Data – TS/Ph5 (151_312)
Cumulative Distribution
CL Concentration (mg/L)

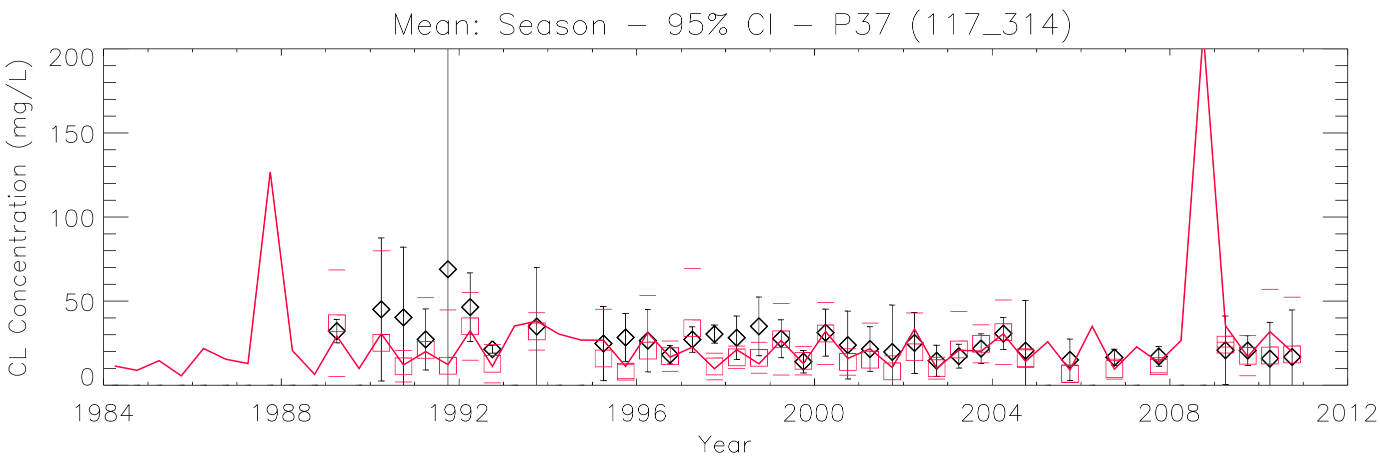

Raw Data (Obs. N = 4687) – ENPLN (74_314)
CL Concentration (mg/L)
Year
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012

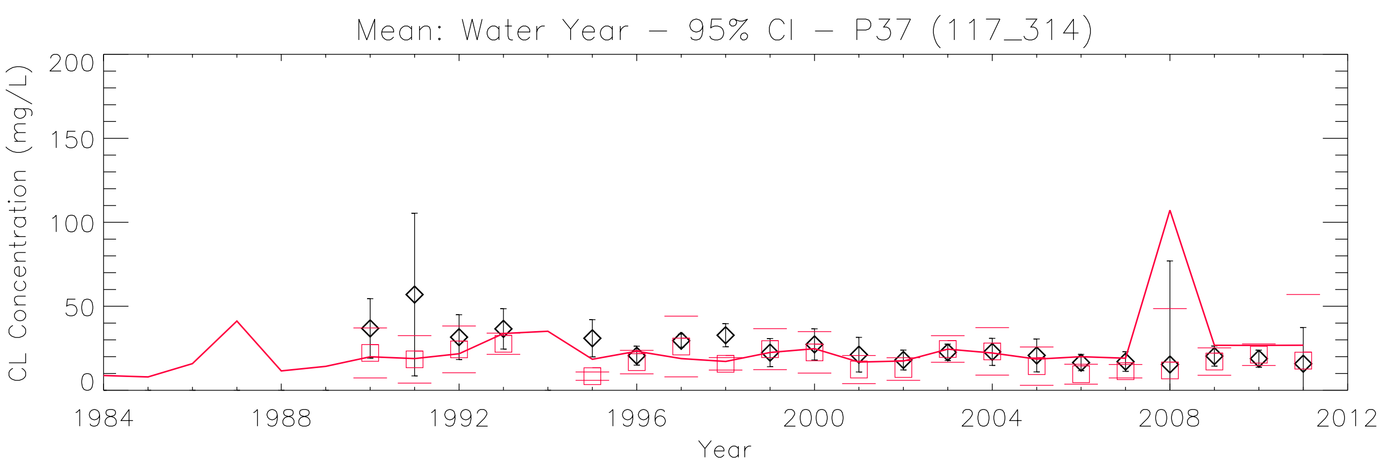

Mean: Season – 95% CI – ENPLN (74_314)
CL Concentration (mg/L)
Year
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012

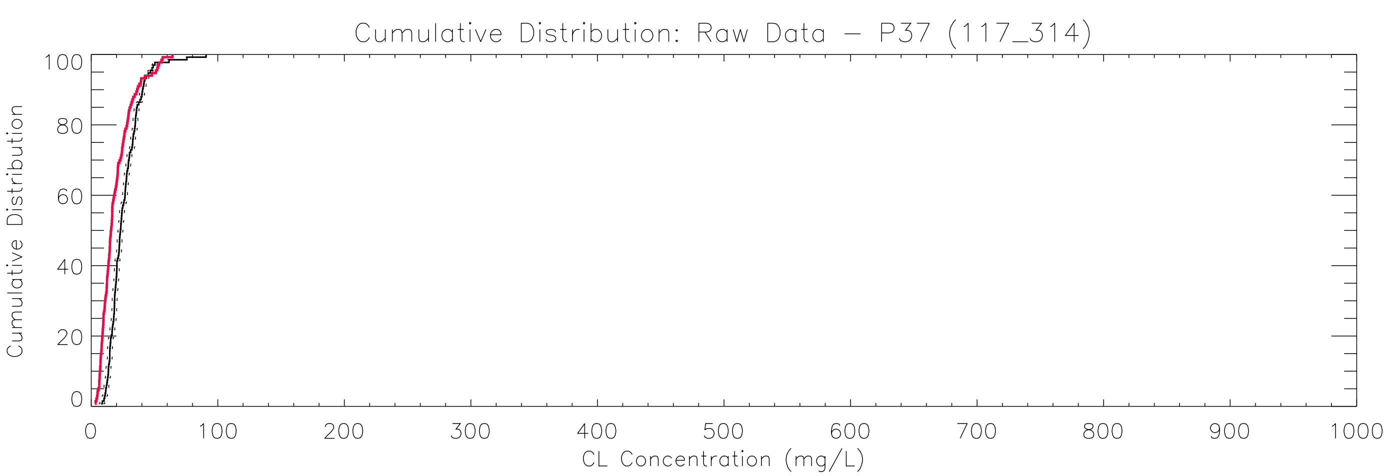

Mean: Water Year – 95% CI – ENPLN (74_314)
CL Concentration (mg/L)
Year
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012

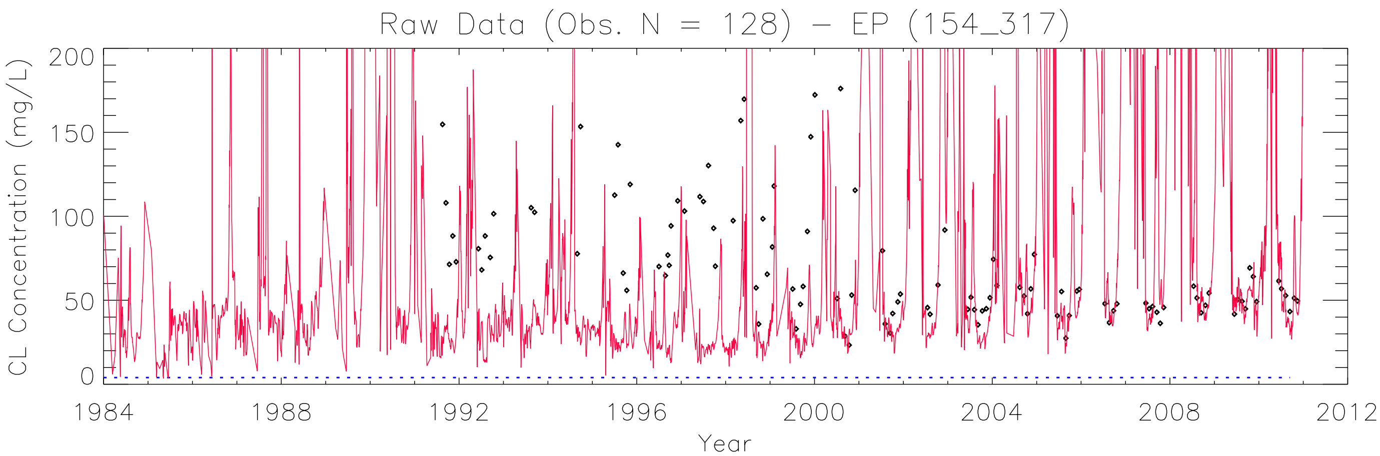

Cumulative Distribution: Raw Data – ENPLN (74_314)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

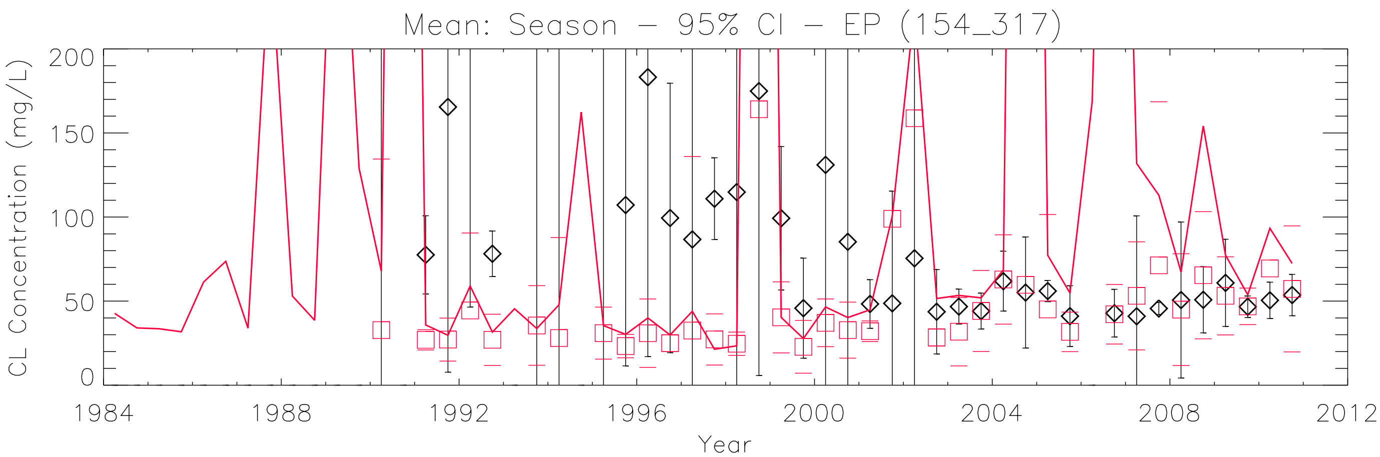

Raw Data (Obs. N = 133) – P37 (117_314)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

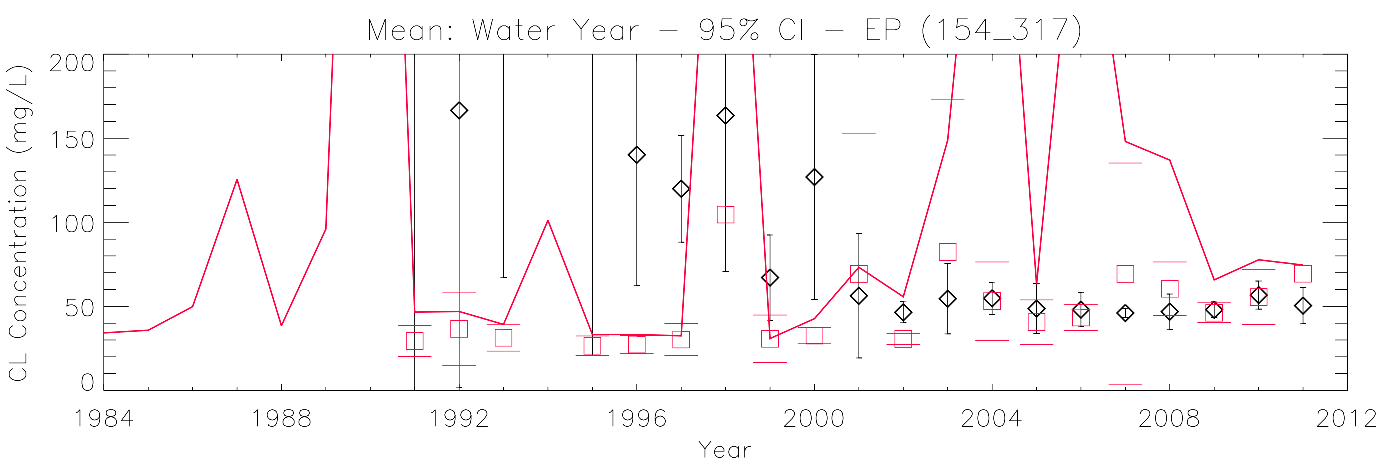

Mean: Season – 95% CI – P37 (117_314)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

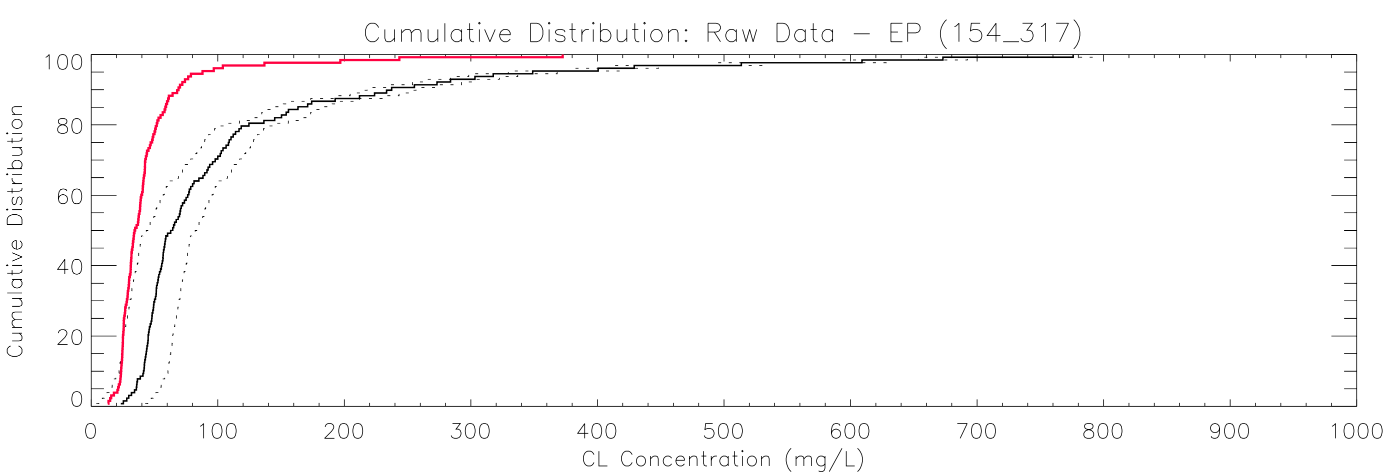

Mean: Water Year – 95% CI – P37 (117_314)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

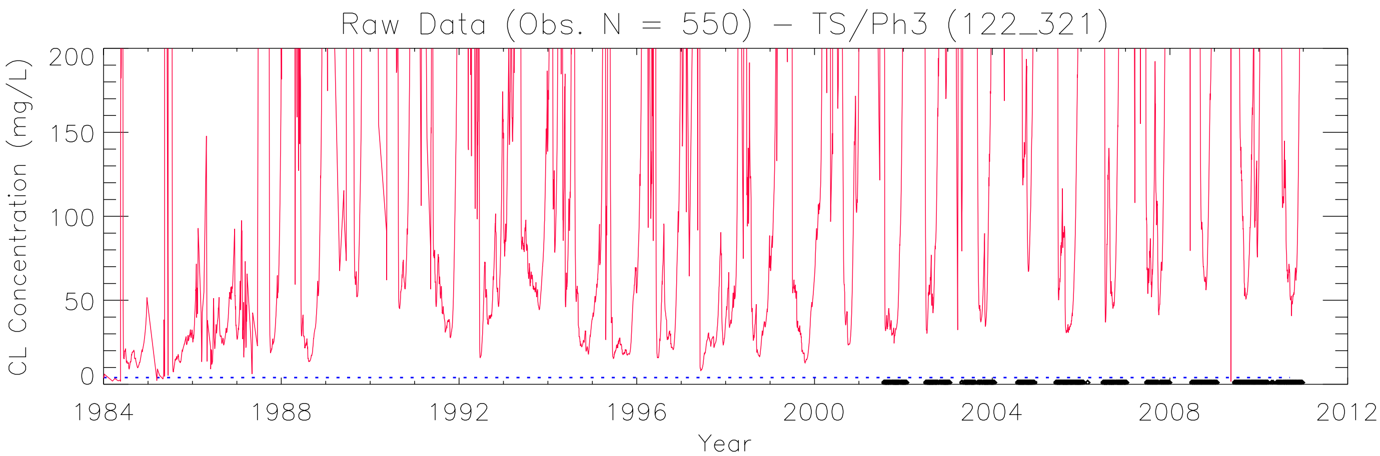

Cumulative Distribution: Raw Data – P37 (117_314)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

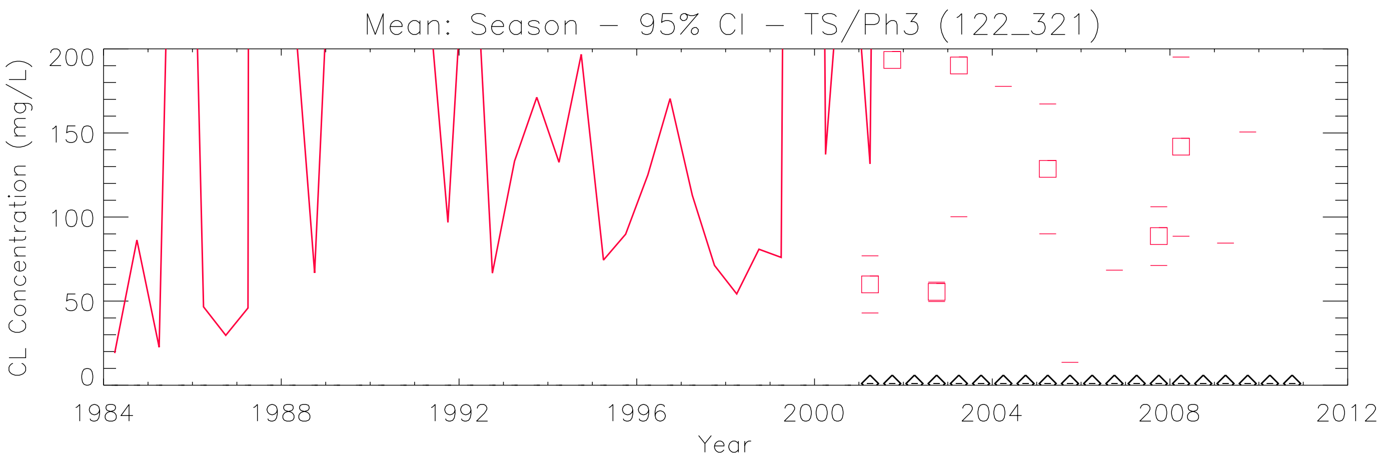

Raw Data (Obs. N = 128) – EP (154_317)
CL Concentration (mg/L)
Year

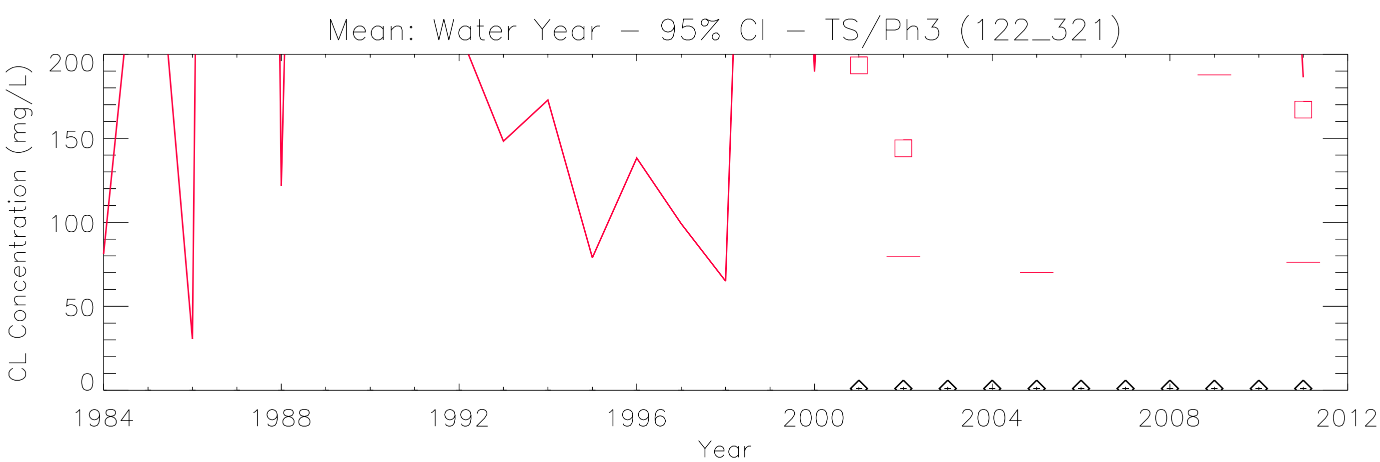

Mean: Season – 95% CI – EP (154_317)
CL Concentration (mg/L)
Year

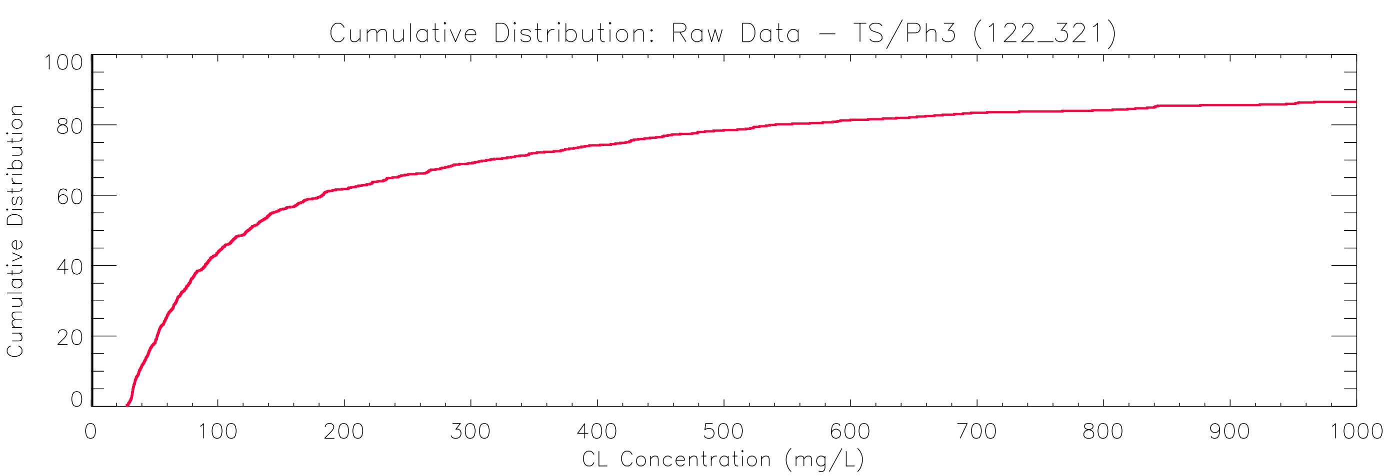

Mean: Water Year – 95% CI – EP (154_317)
CL Concentration (mg/L)
Year

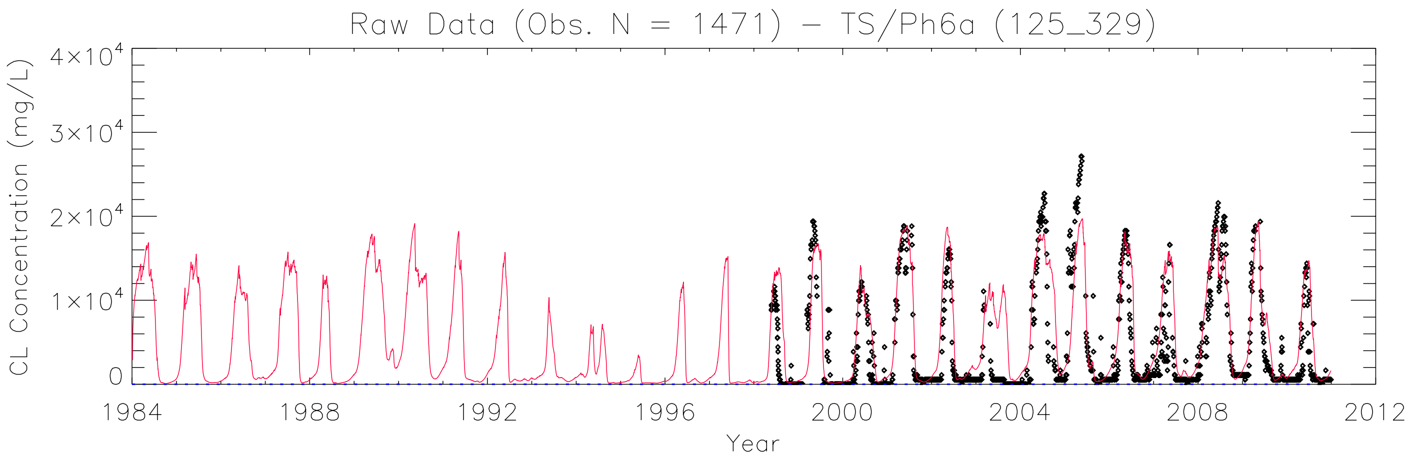

Cumulative Distribution: Raw Data – EP (154_317)
Cumulative Distribution
CL Concentration (mg/L)

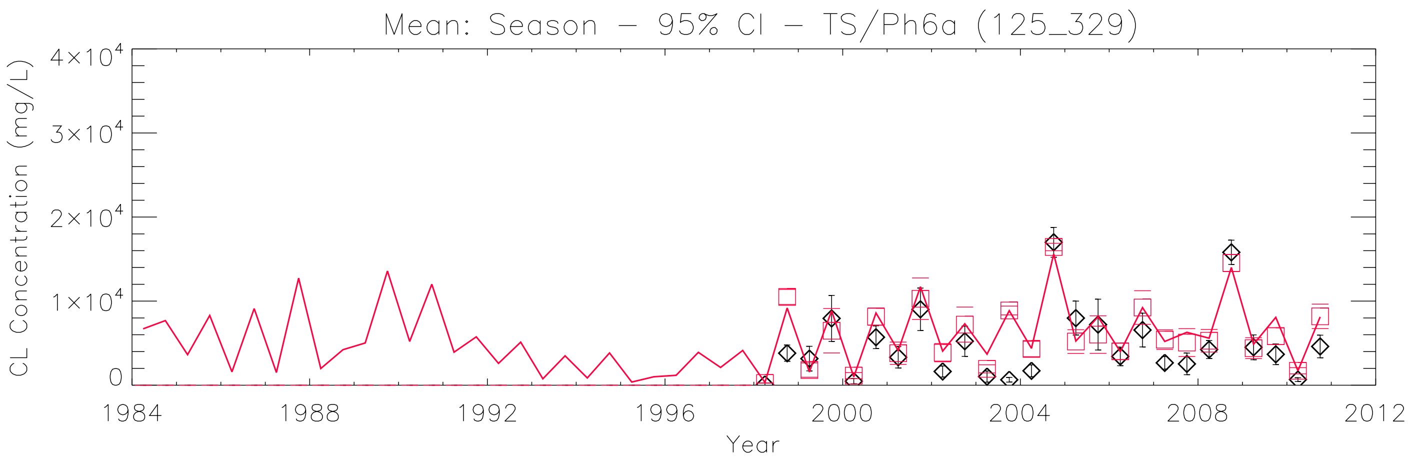

Raw Data (Obs. N = 550) – TS/Ph3 (122_321)
CL Concentration (mg/L)
Year

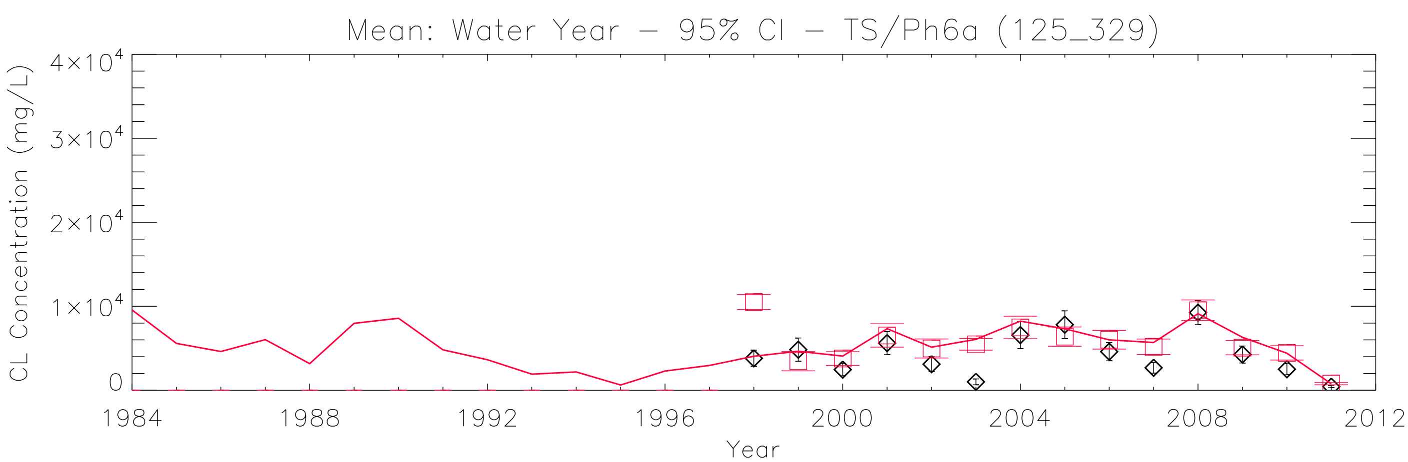

Mean: Season – 95% CI – TS/Ph3 (122_321)
CL Concentration (mg/L)
Year

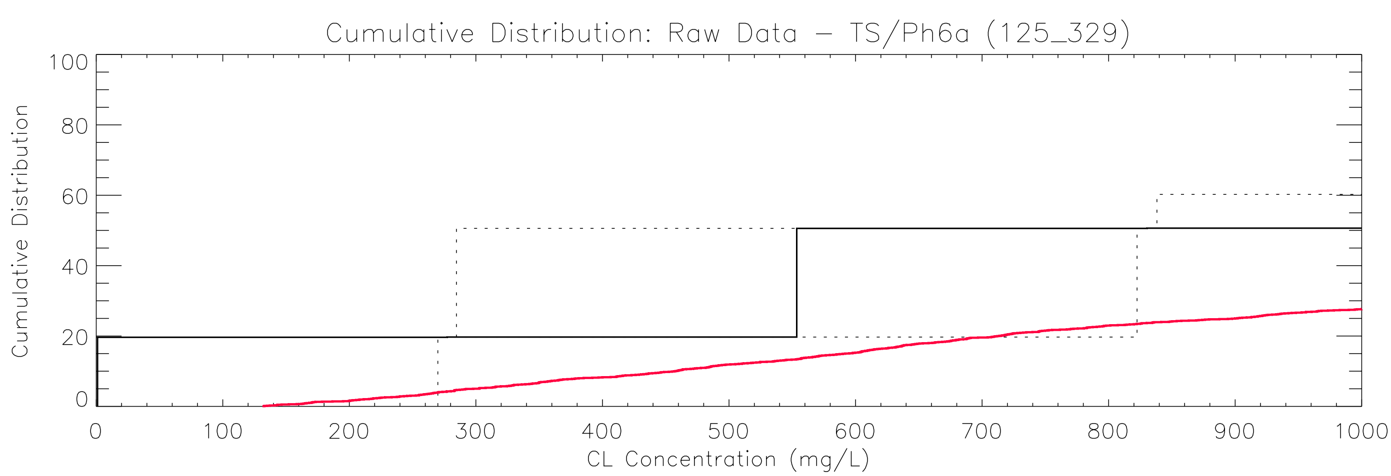

Mean: Water Year – 95% CI – TS/Ph3 (122_321)
CL Concentration (mg/L)
Year

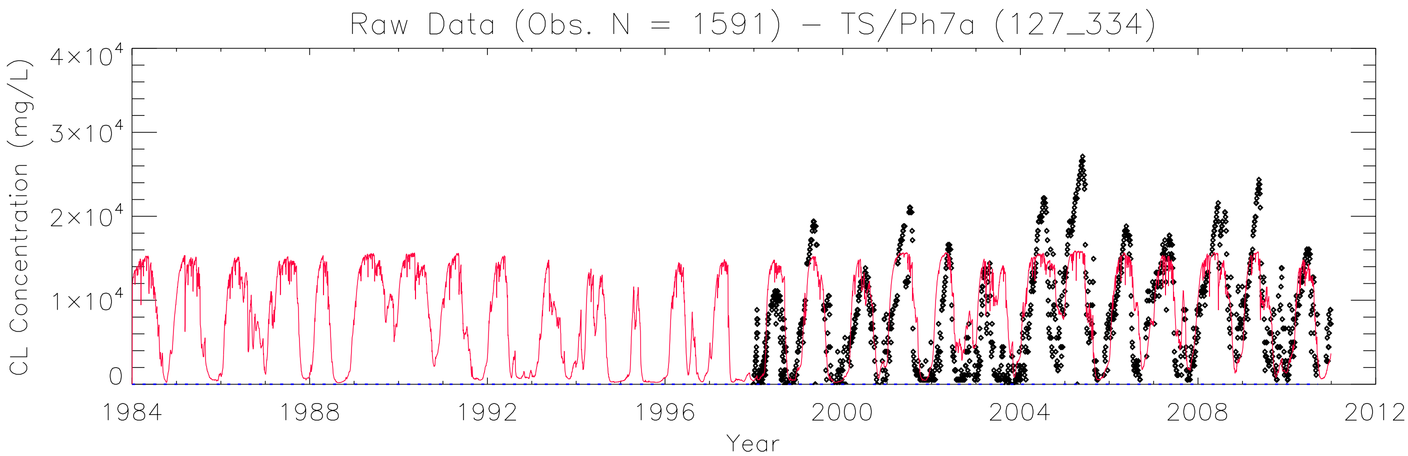

Cumulative Distribution: Raw Data – TS/Ph3 (122_321)
Cumulative Distribution
CL Concentration (mg/L)


Raw Data (Obs. N = 1471) - TS/Ph6a (125_329)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

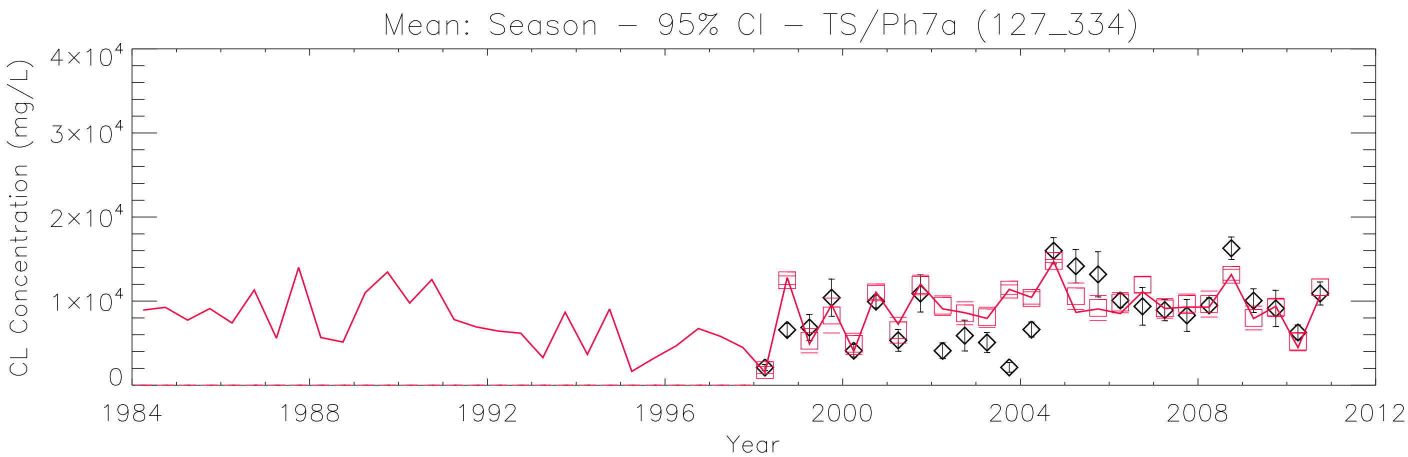

Mean: Season - 95% CI - TS/Ph6a (125_329)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year - 95% CI - TS/Ph6a (125_329)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

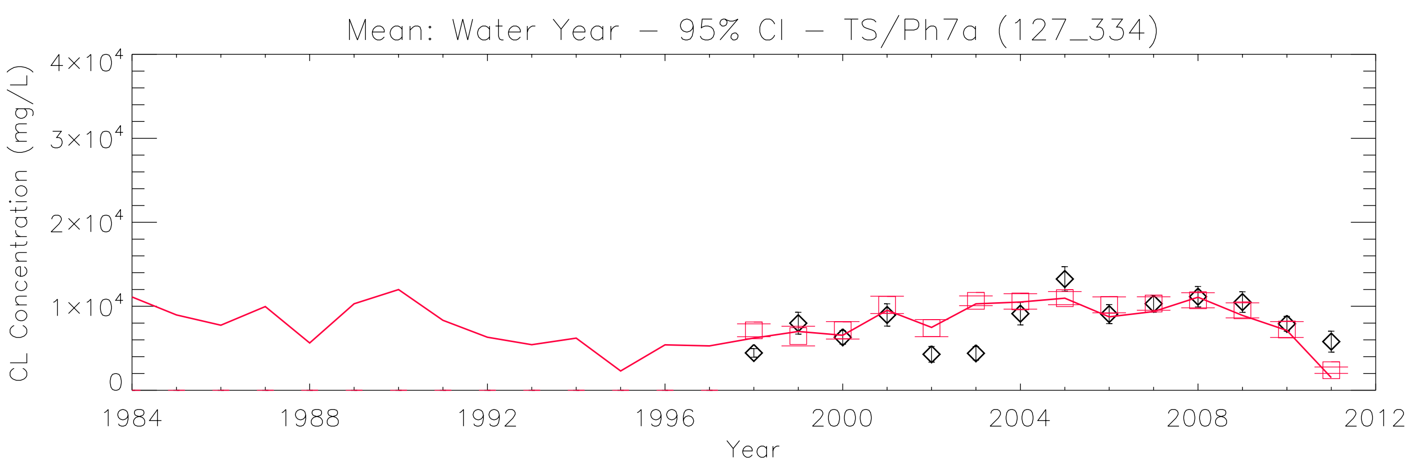

Cumulative Distribution: Raw Data - TS/Ph6a (125_329)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



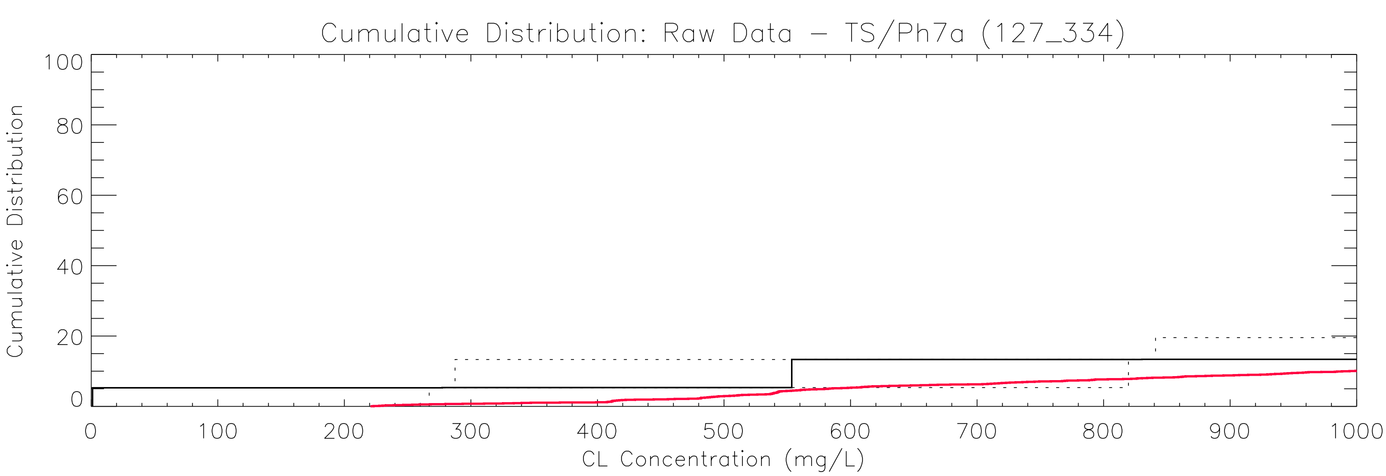
Raw Data (Obs. N = 1591) – TS/Ph7a (127_334)
CL Concentration (mg/L)
Year



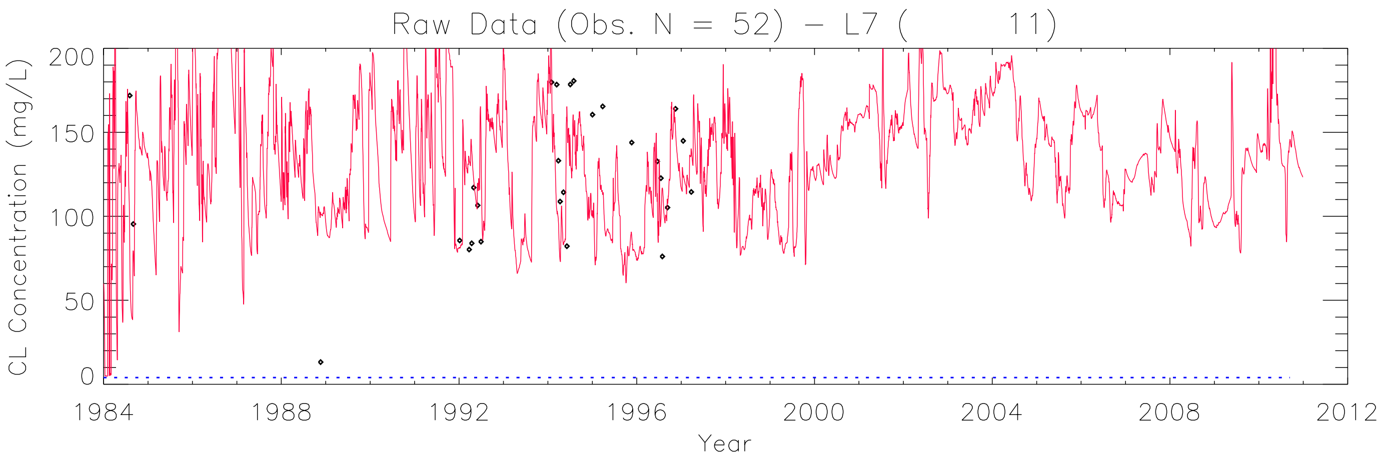
Mean: Season – 95% CI – TS/Ph7a (127_334)
CL Concentration (mg/L)
Year

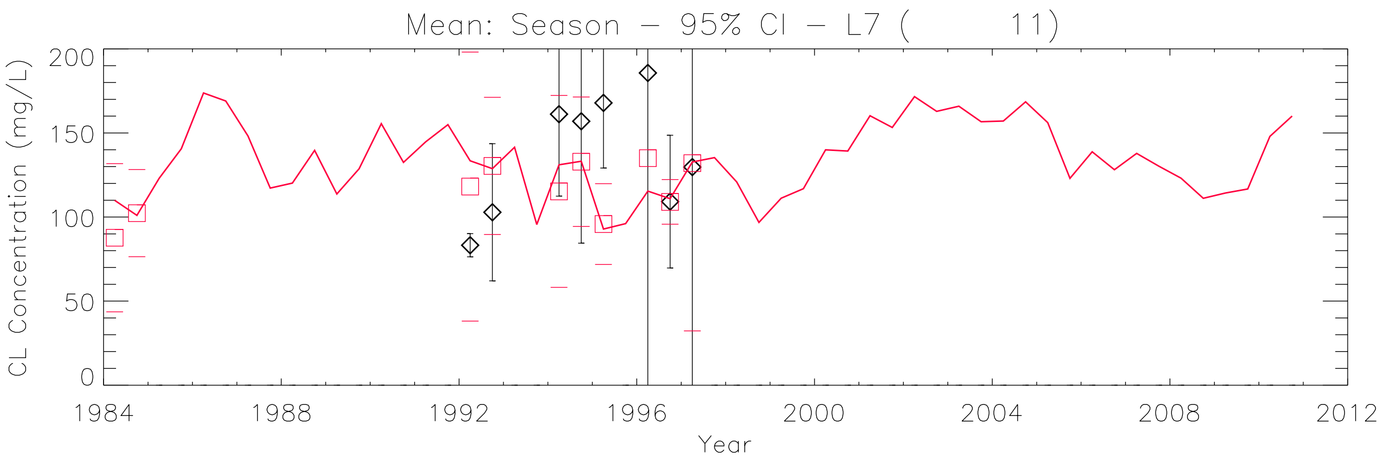


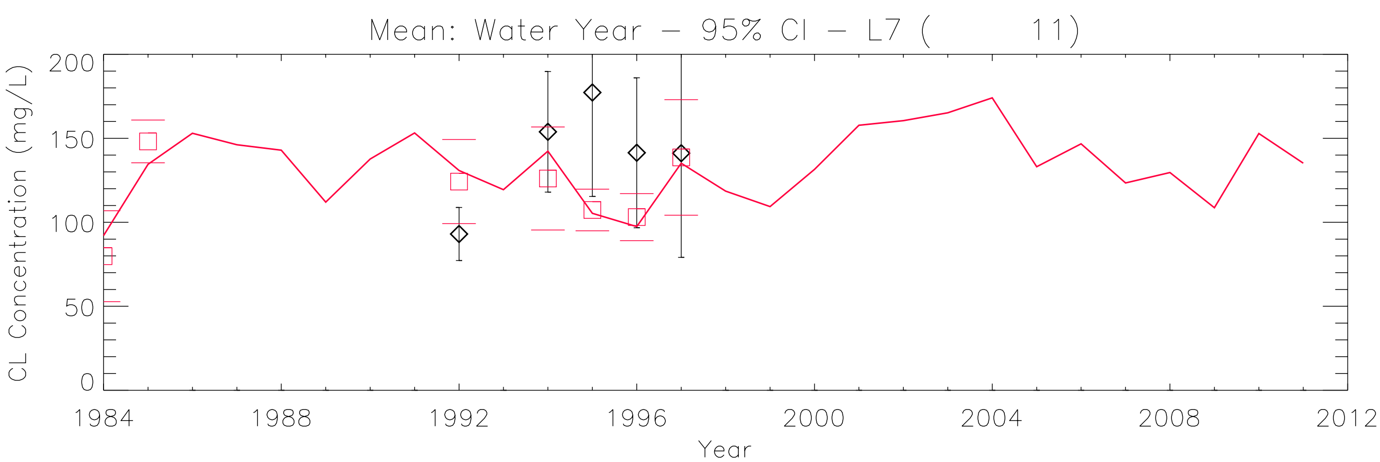
Mean: Water Year – 95% CI – TS/Ph7a (127_334)
CL Concentration (mg/L)
Year

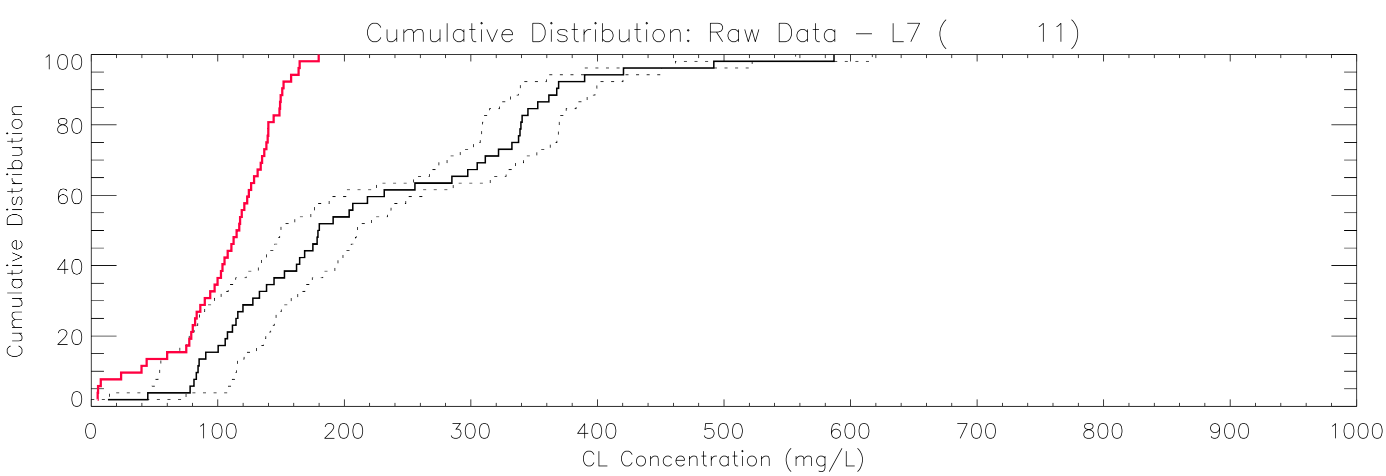


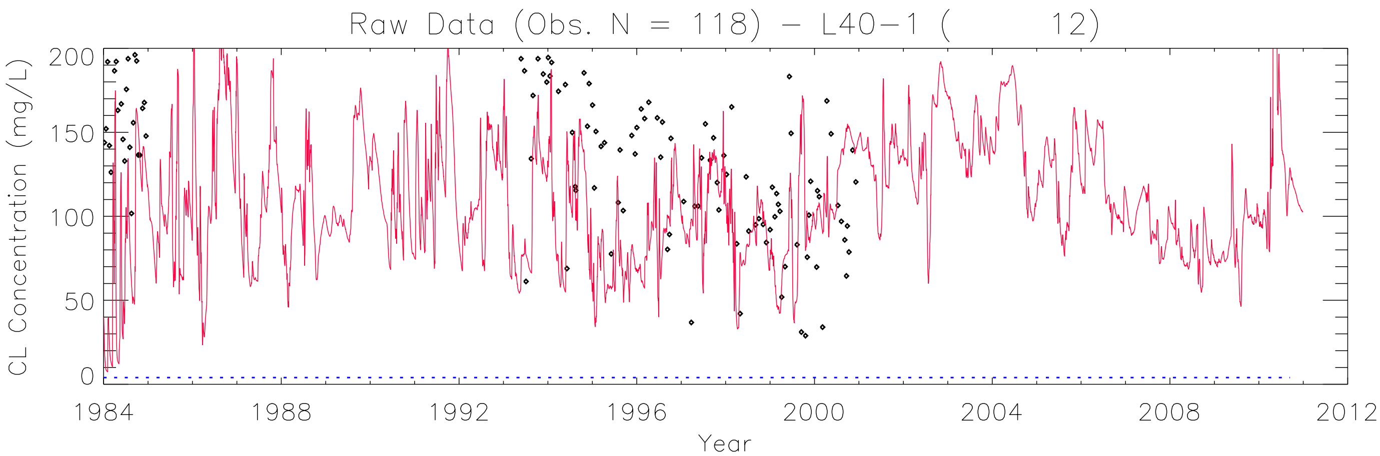
Cumulative Distribution: Raw Data – TS/Ph7a (127_334)
Cumulative Distribution
CL Concentration (mg/L)

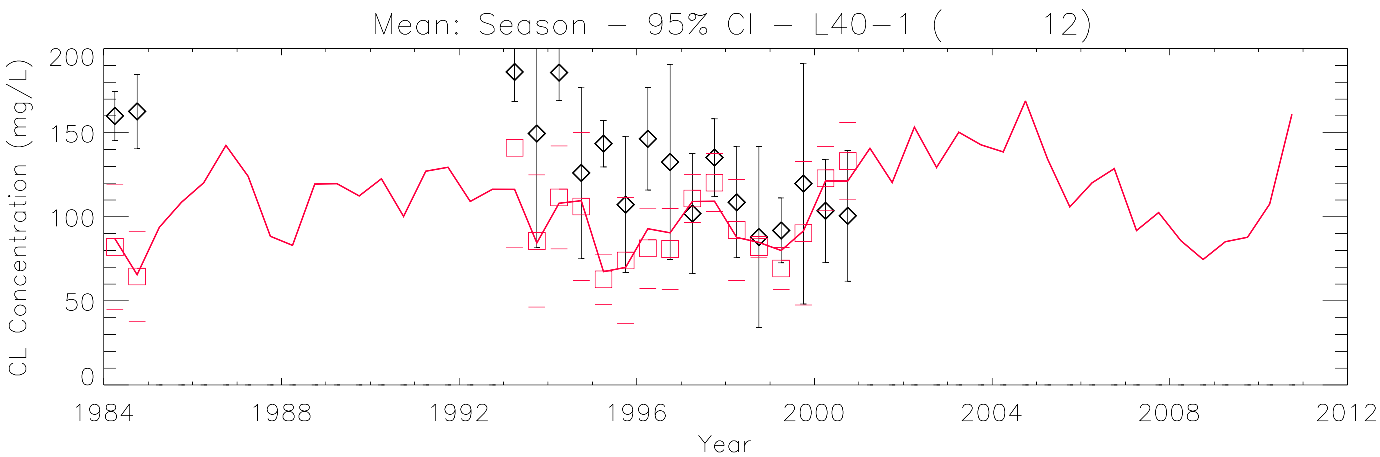

Raw Data (Obs. N = 52) - L7 (11)
CL Concentration (mg/L)
Year

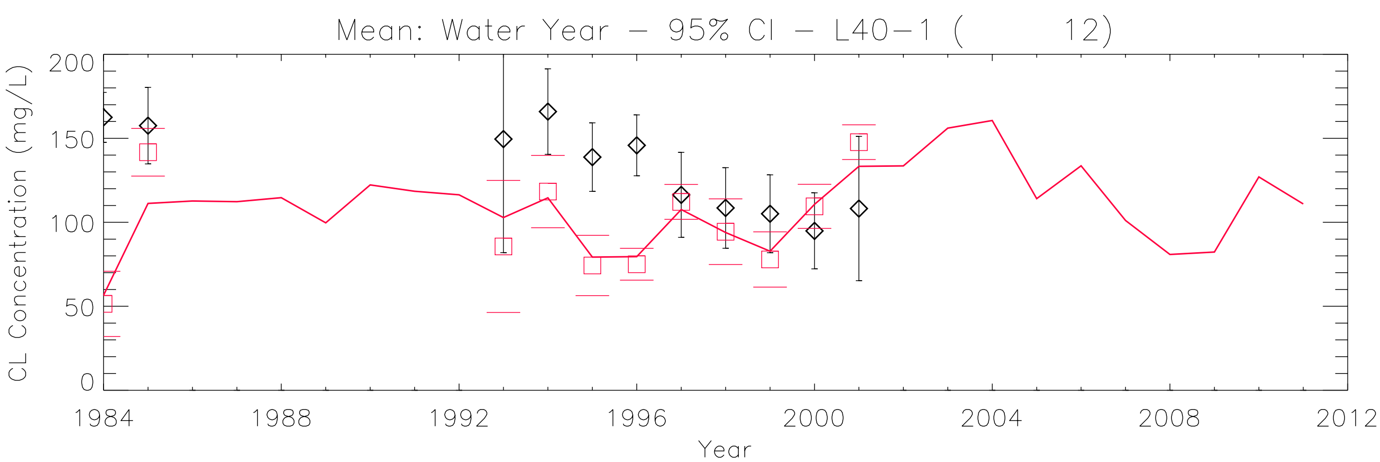

Mean: Season - 95% CI - L7 (11)
CL Concentration (mg/L)
Year

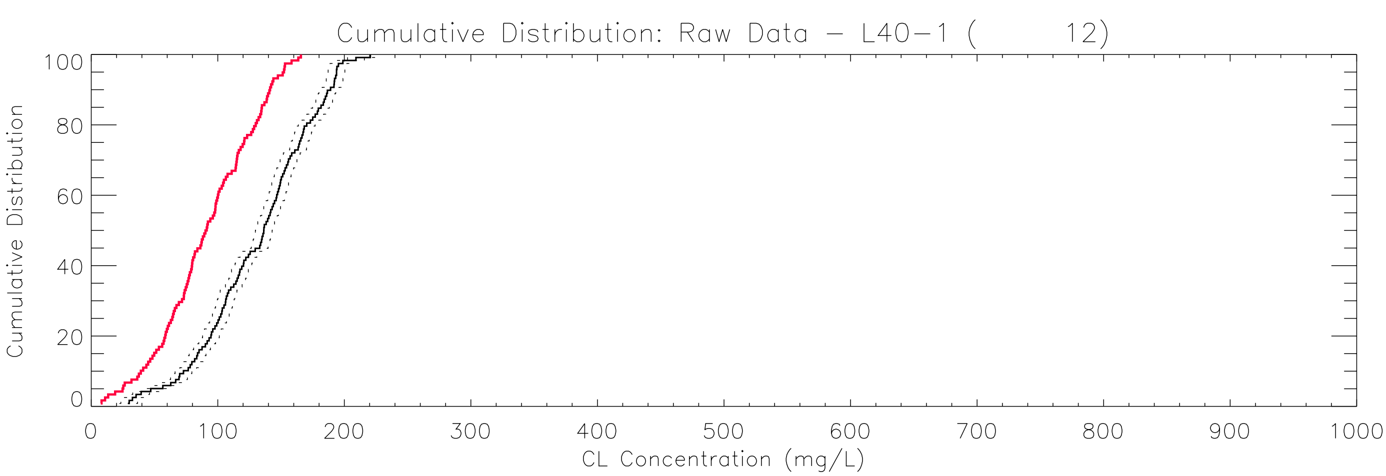

Mean: Water Year - 95% CI - L7 (11)
CL Concentration (mg/L)
Year

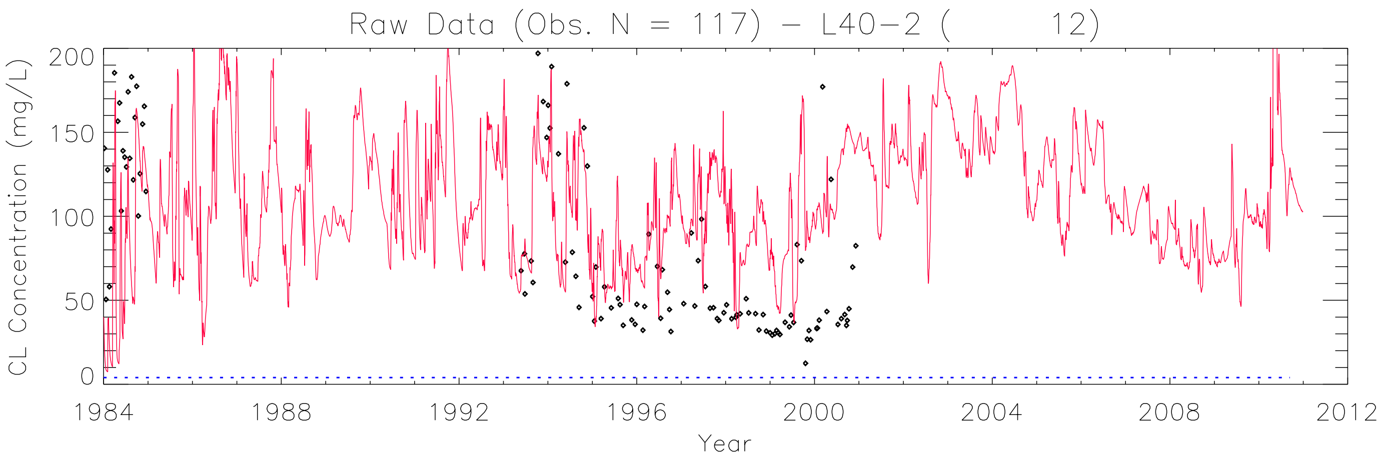

Cumulative Distribution: Raw Data - L7 (11)
Cumulative Distribution
CL Concentration (mg/L)

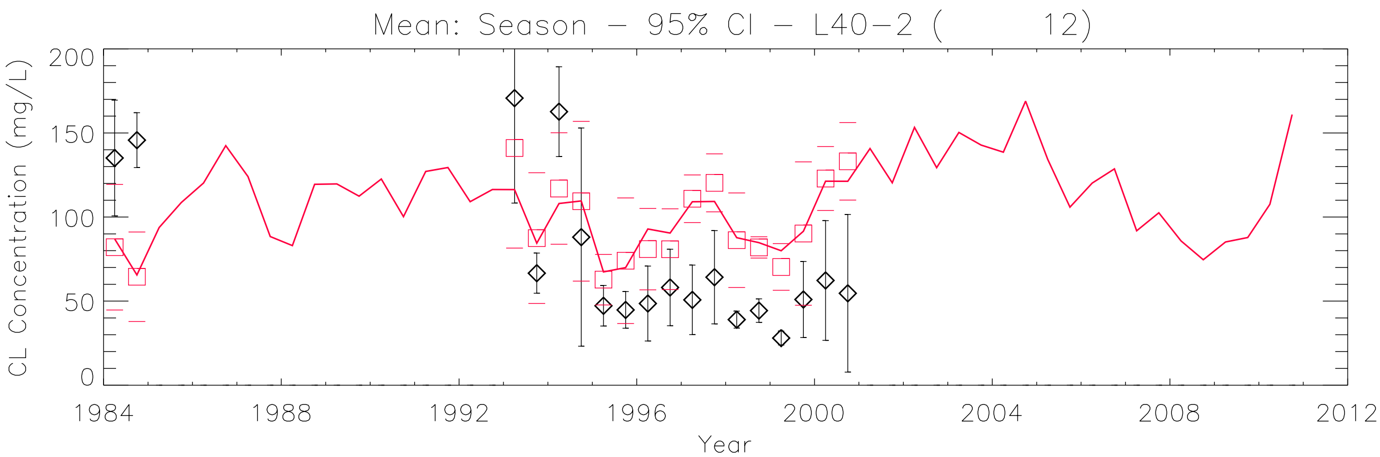

Raw Data (Obs. N = 118) – L40–1 (12)
CL Concentration (mg/L)
Year

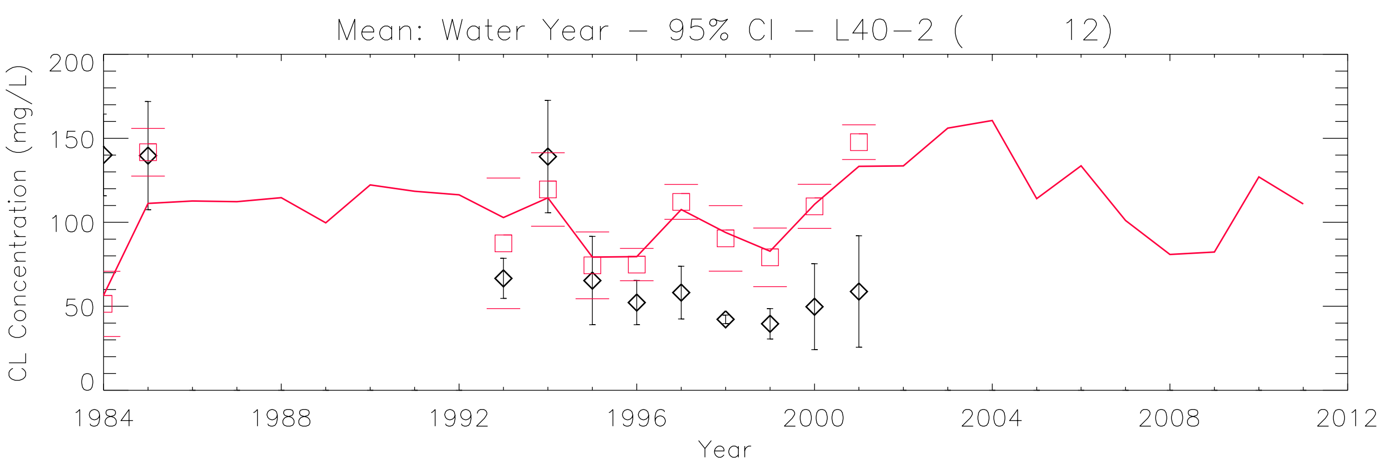

Mean: Season – 95% CI – L40–1 (12)
CL Concentration (mg/L)
Year

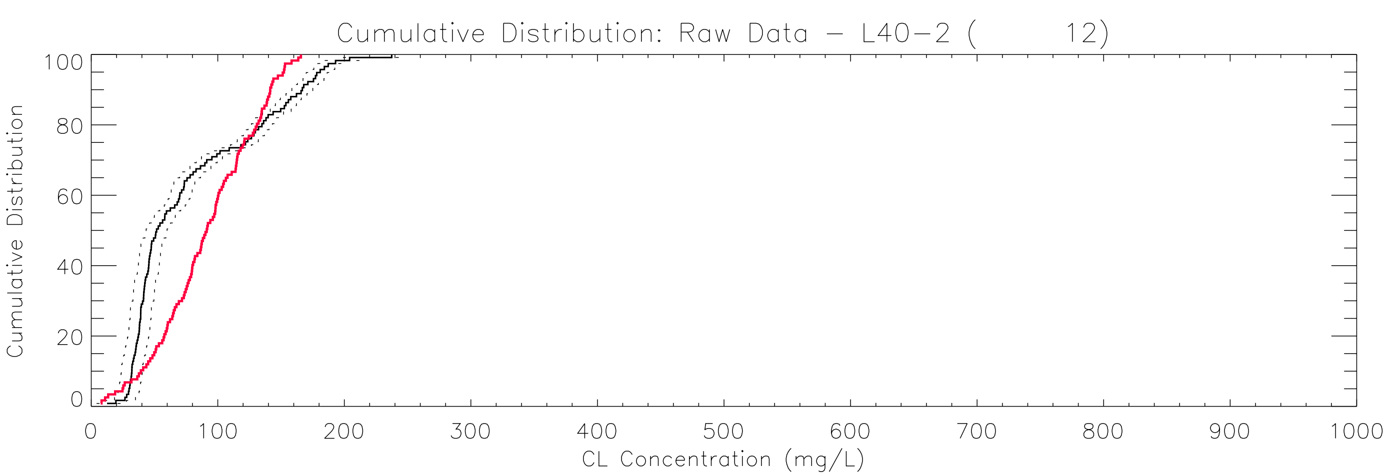

Mean: Water Year – 95% CI – L40–1 (12)
CL Concentration (mg/L)
Year

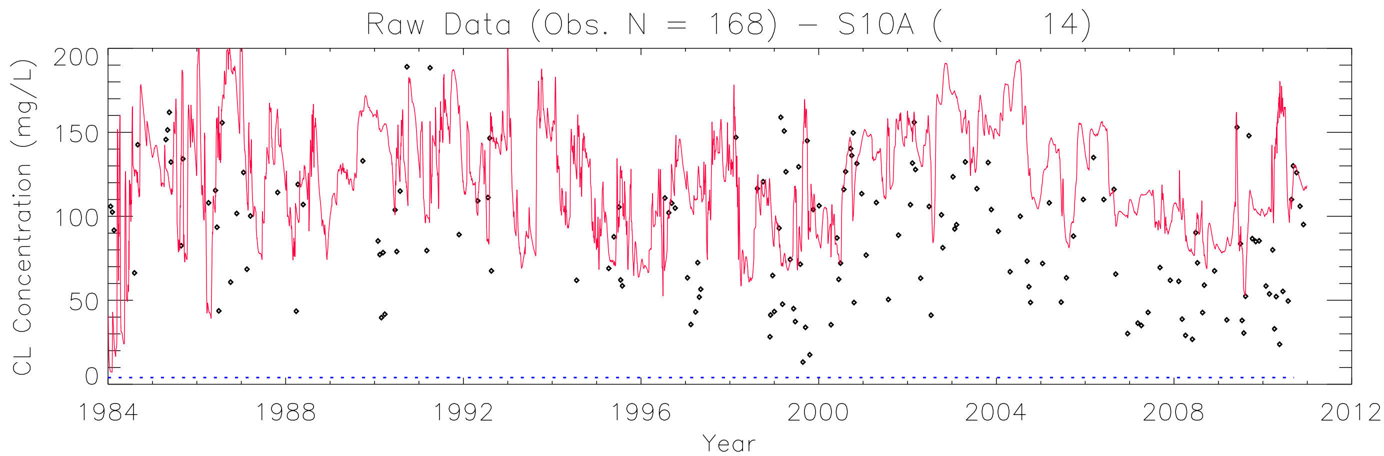

Cumulative Distribution: Raw Data – L40–1 (12)
Cumulative Distribution
CL Concentration (mg/L)

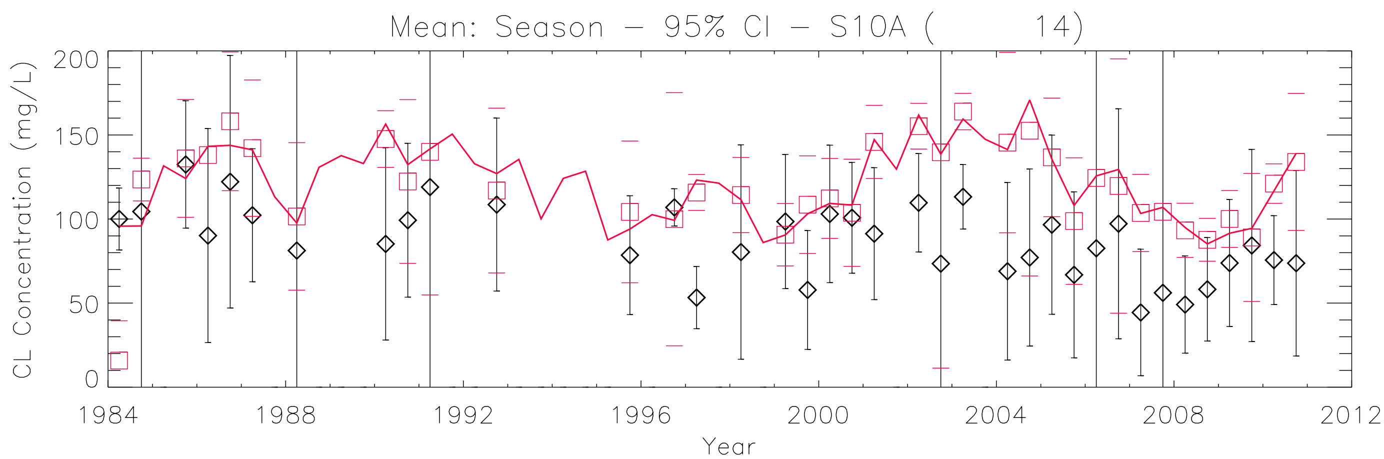

Raw Data (Obs. N = 117) − L40−2 (12)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

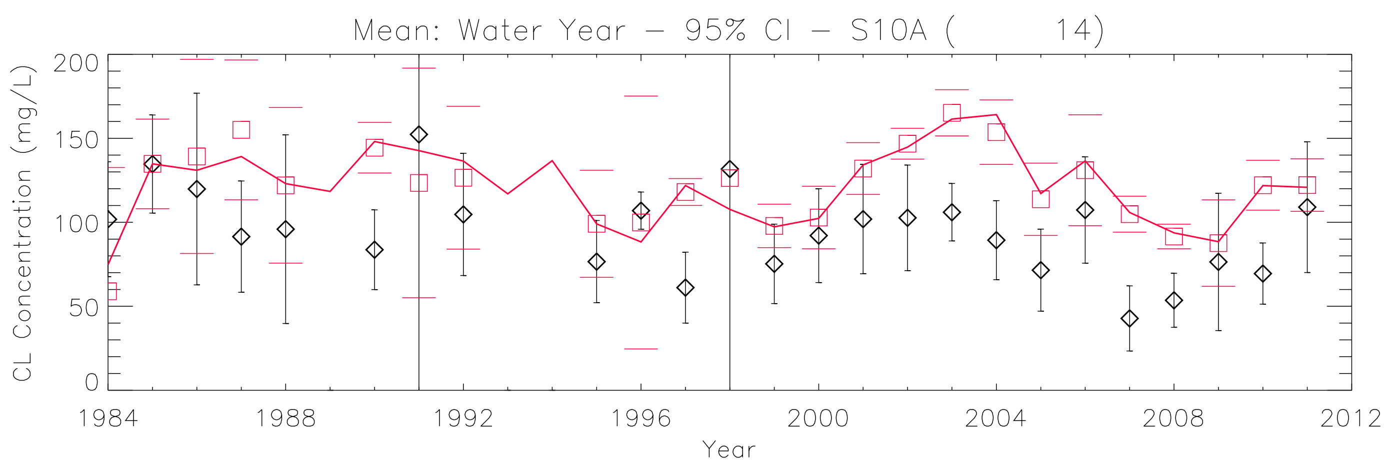

Mean: Season − 95% CI − L40−2 (12)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

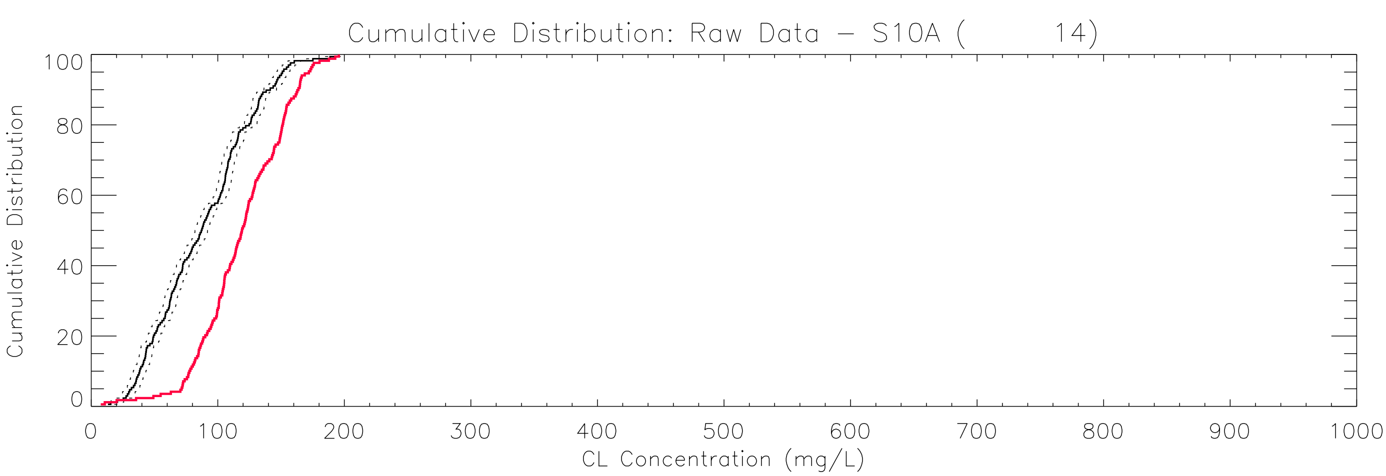

Mean: Water Year − 95% CI − L40−2 (12)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

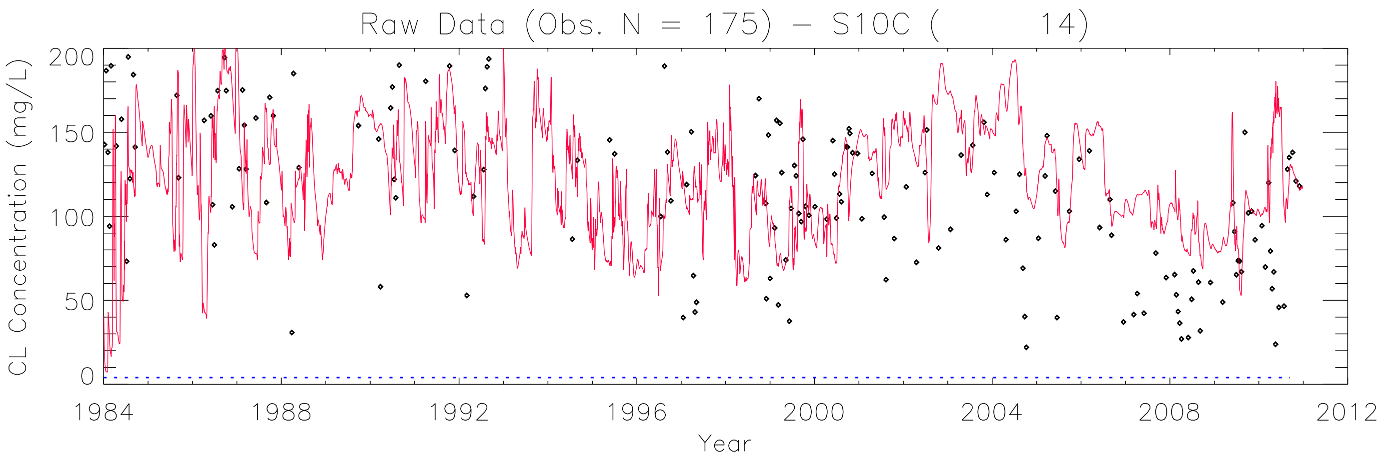

Cumulative Distribution: Raw Data − L40−2 (12)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

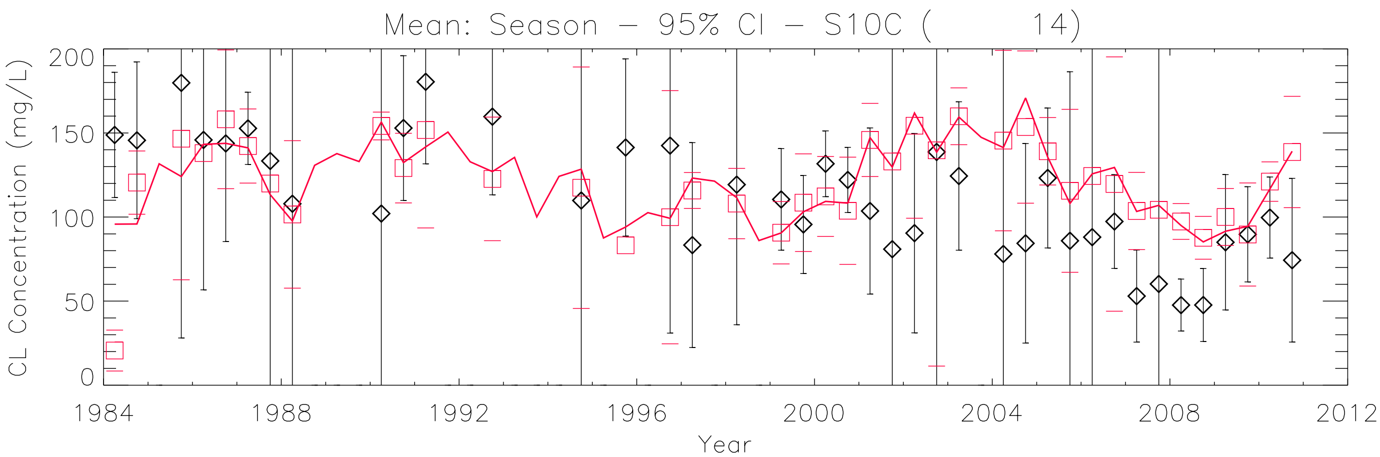

Raw Data (Obs. N = 168) – S10A (14)
CL Concentration (mg/L)
Year

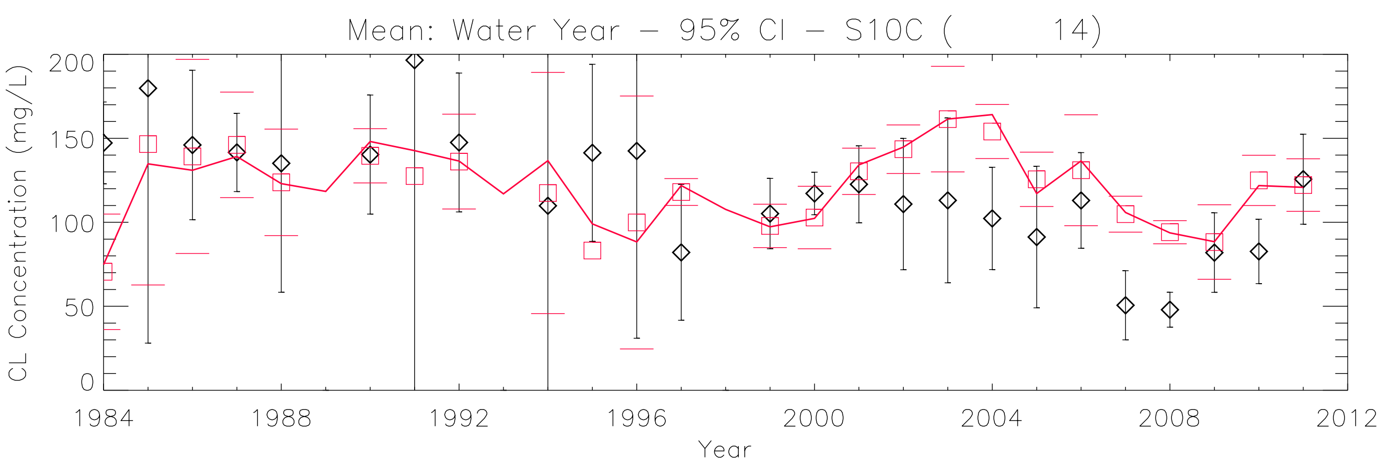

Mean: Season – 95% CI – S10A (14)
CL Concentration (mg/L)
Year

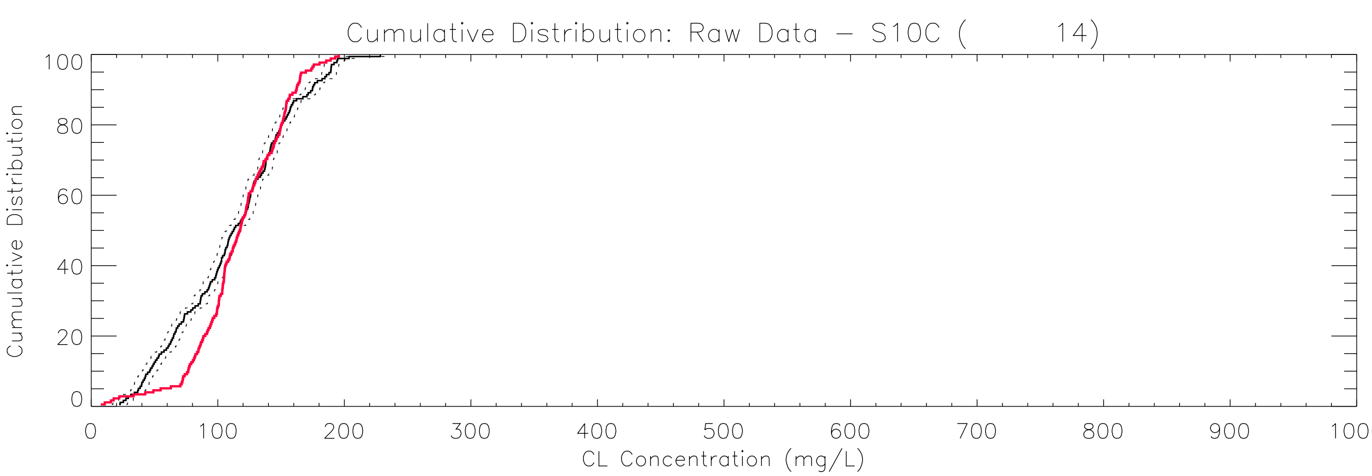

Mean: Water Year – 95% CI – S10A (14)
CL Concentration (mg/L)
Year

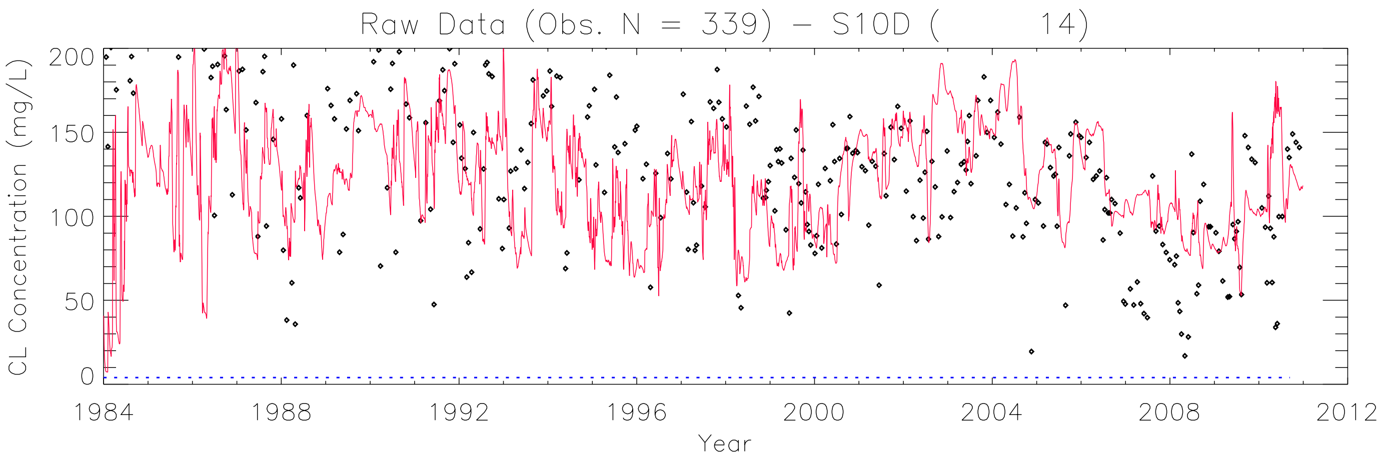

Cumulative Distribution: Raw Data – S10A (14)
Cumulative Distribution
CL Concentration (mg/L)

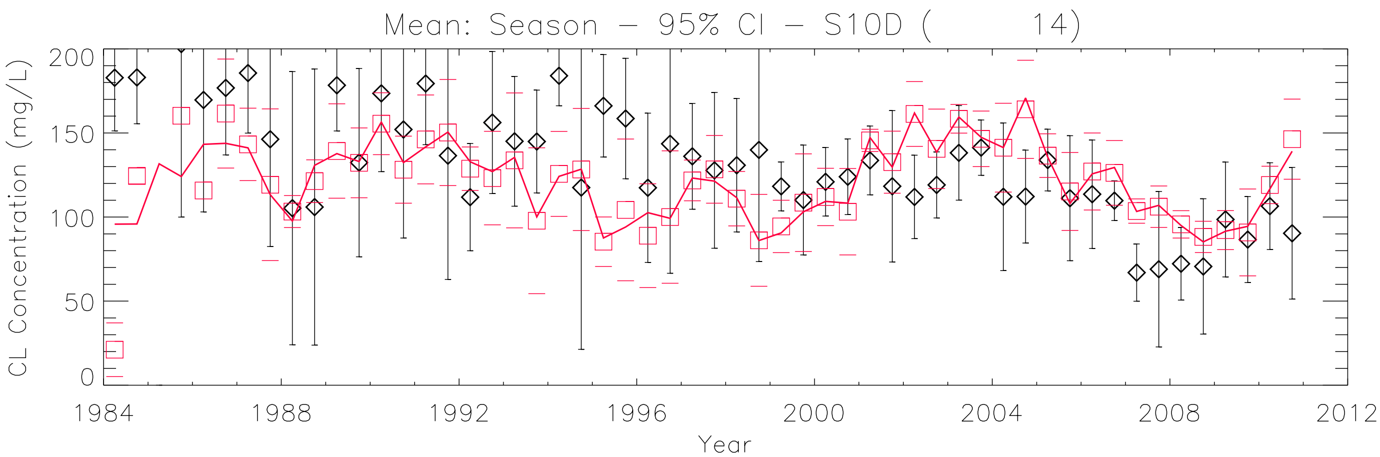

Raw Data (Obs. N = 175) – S10C (14)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

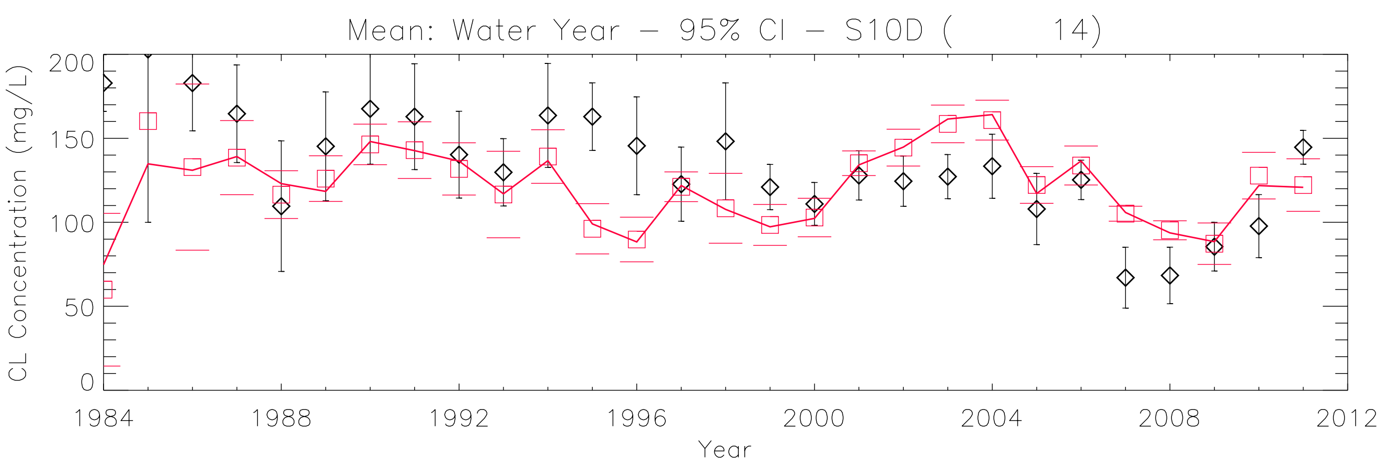

Mean: Season – 95% CI – S10C (14)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

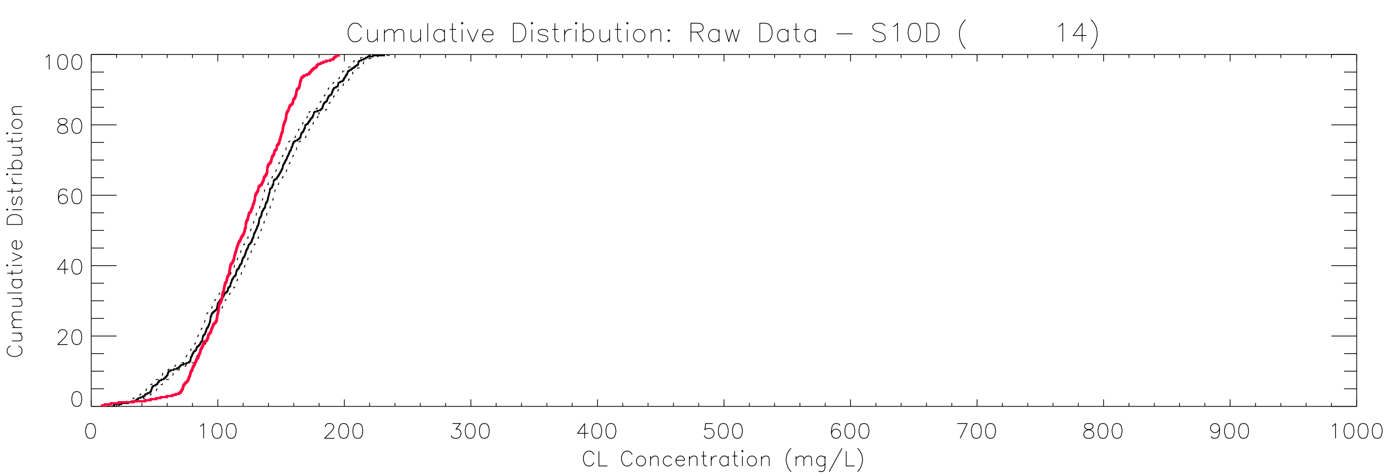

Mean: Water Year – 95% CI – S10C (14)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

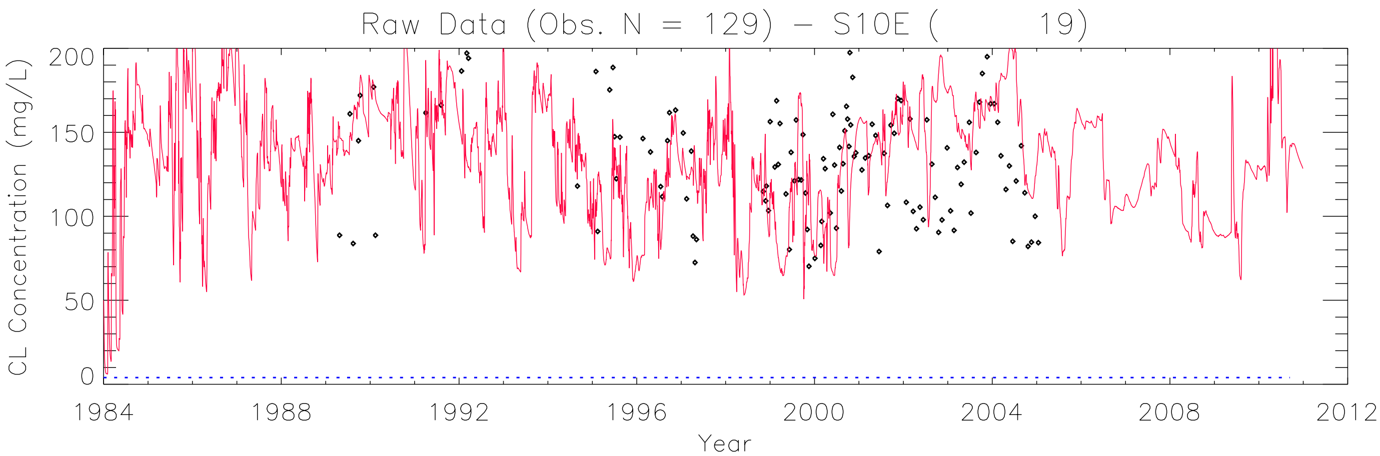

Cumulative Distribution: Raw Data – S10C (14)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

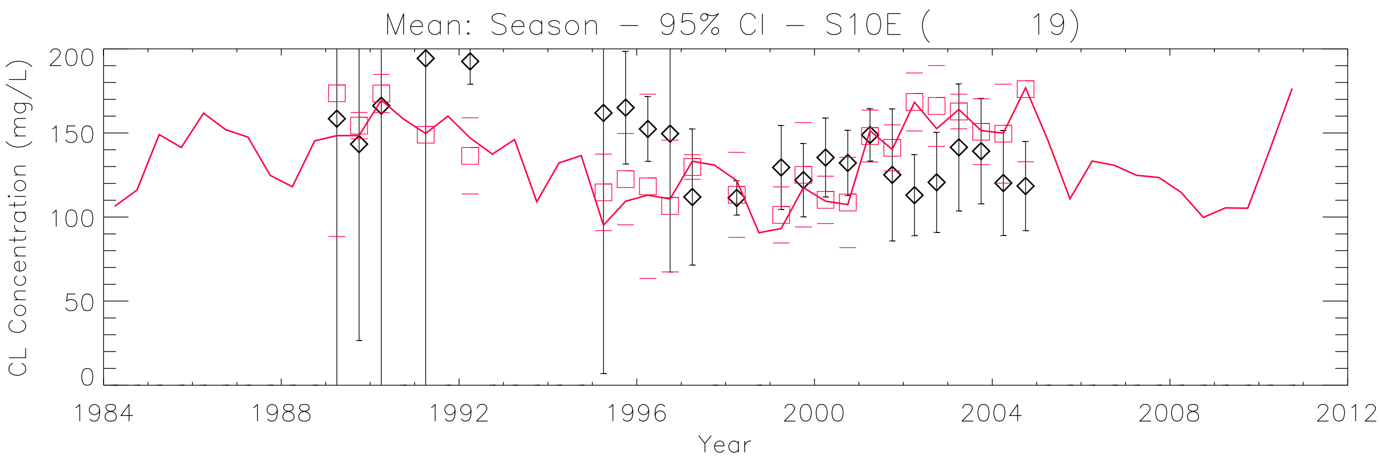

Raw Data (Obs. N = 339) – S10D (14)
CL Concentration (mg/L)
Year

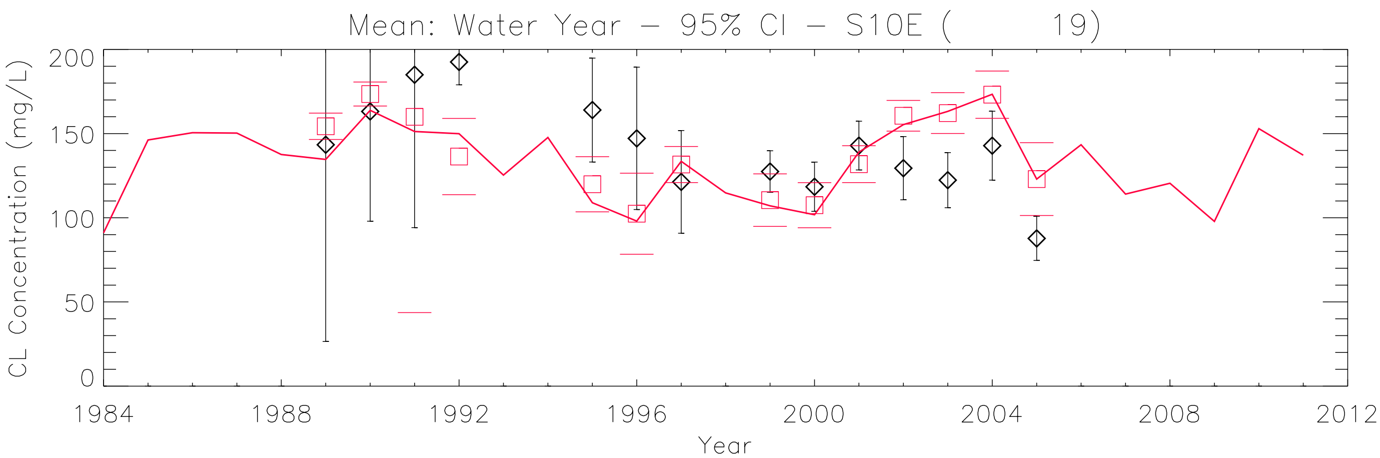

Mean: Season – 95% CI – S10D (14)
CL Concentration (mg/L)
Year

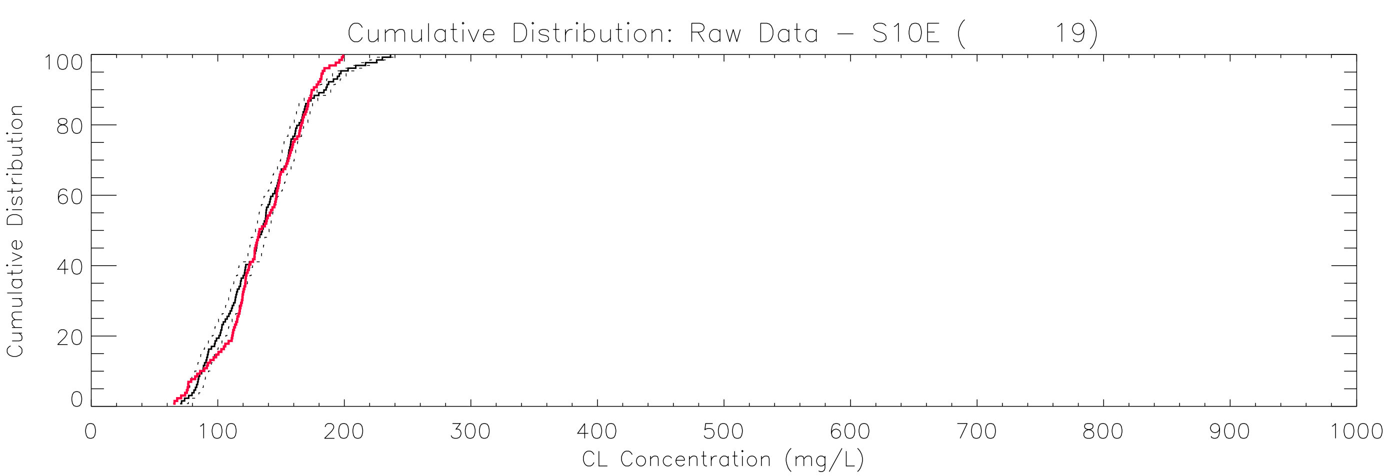

Mean: Water Year – 95% CI – S10D (14)
CL Concentration (mg/L)
Year

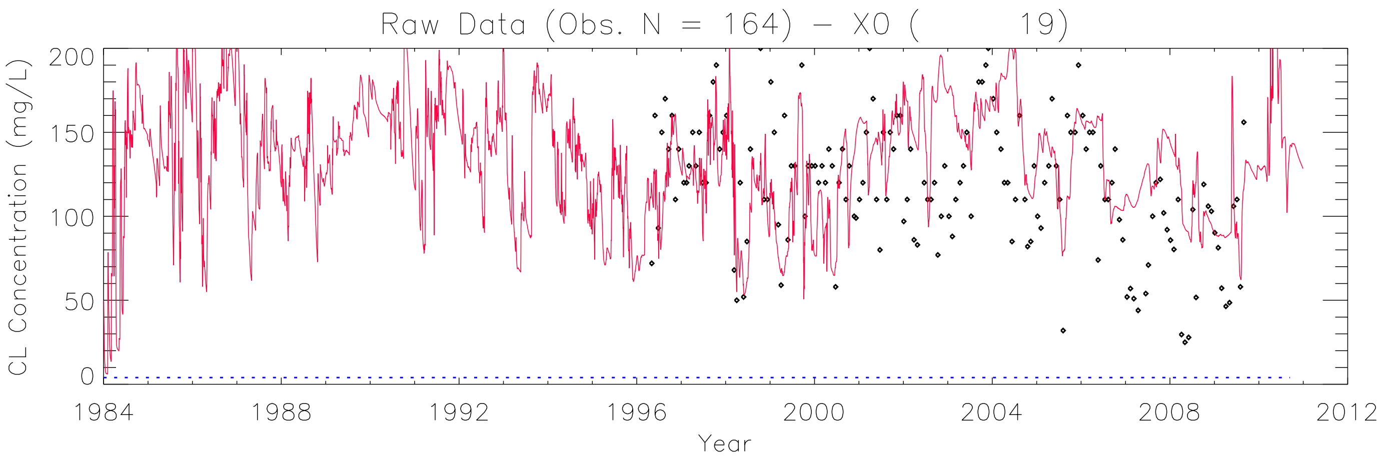

Cumulative Distribution: Raw Data – S10D (14)
Cumulative Distribution
CL Concentration (mg/L)


Raw Data (Obs. N = 129) – S10E (19)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

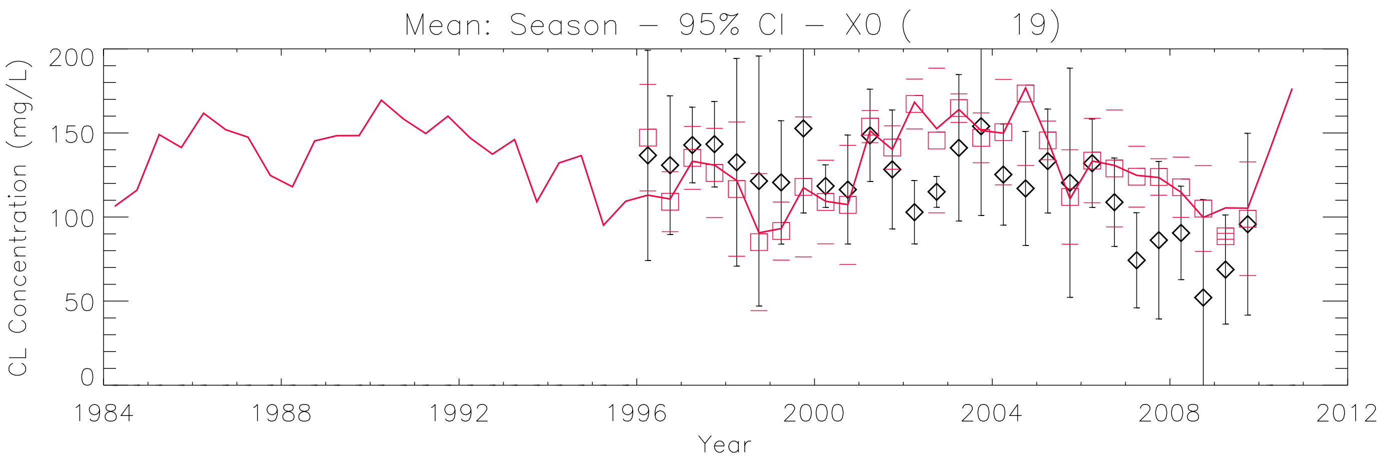

Mean: Season – 95% CI – S10E (19)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year – 95% CI – S10E (19)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

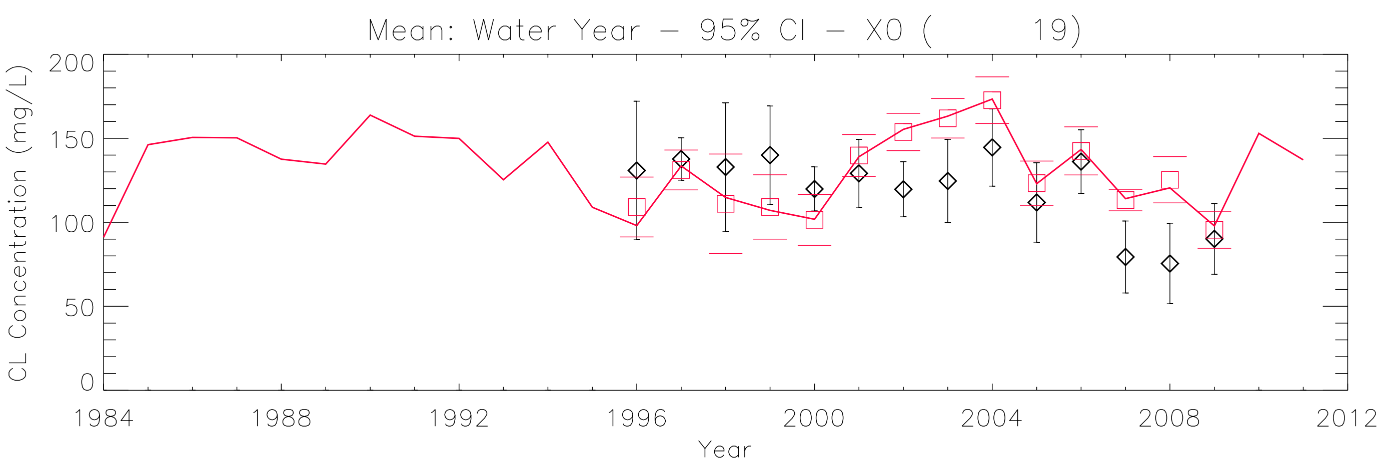

Cumulative Distribution: Raw Data – S10E (19)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



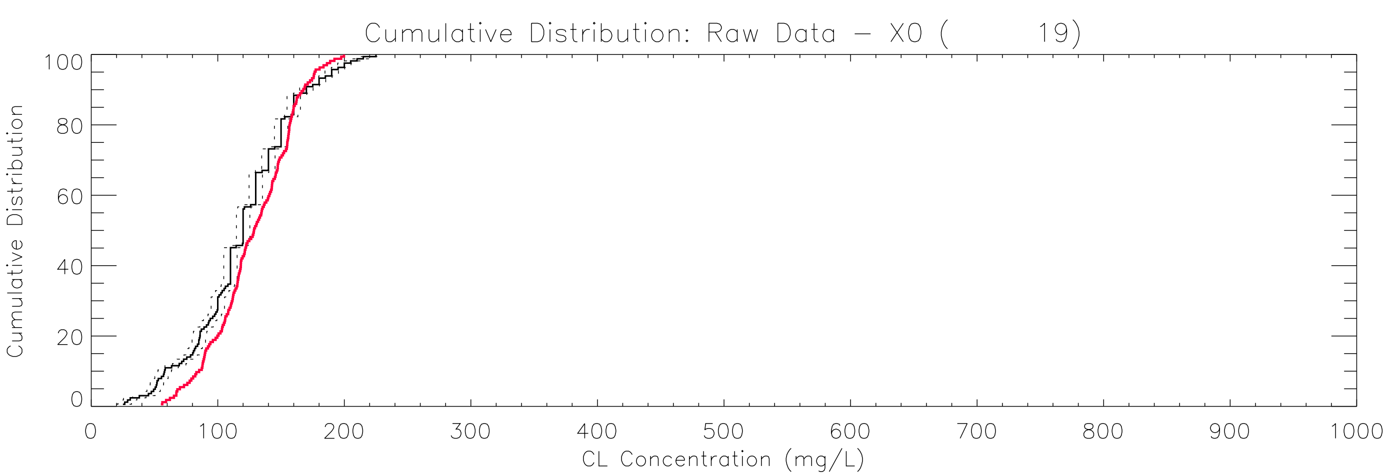
Raw Data (Obs. N = 164) − X0 (19)
CL Concentration (mg/L)
Year



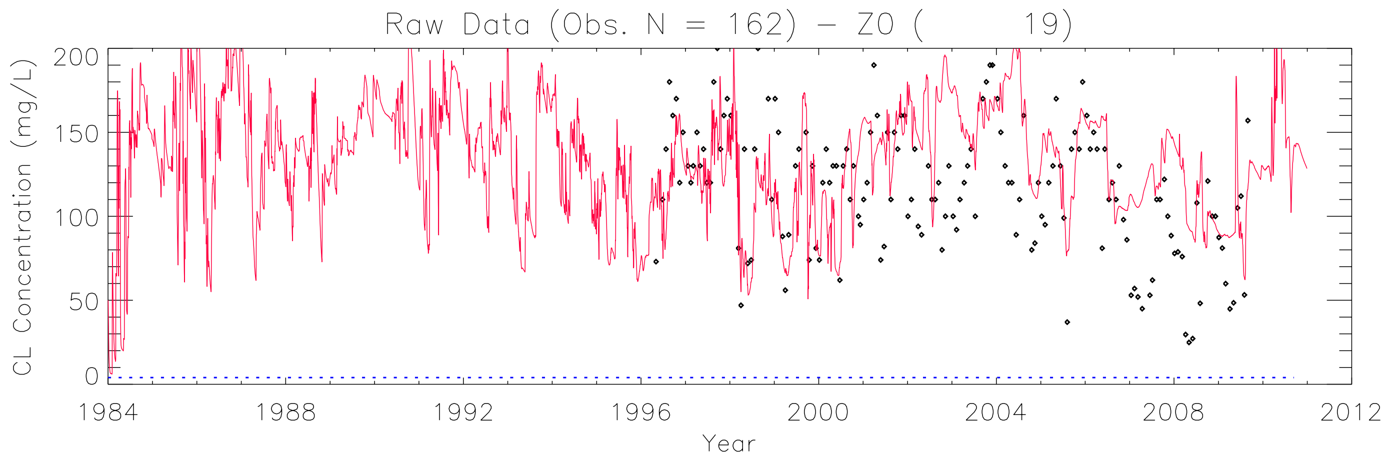
Mean: Season − 95% CI − X0 (19)
CL Concentration (mg/L)
Year



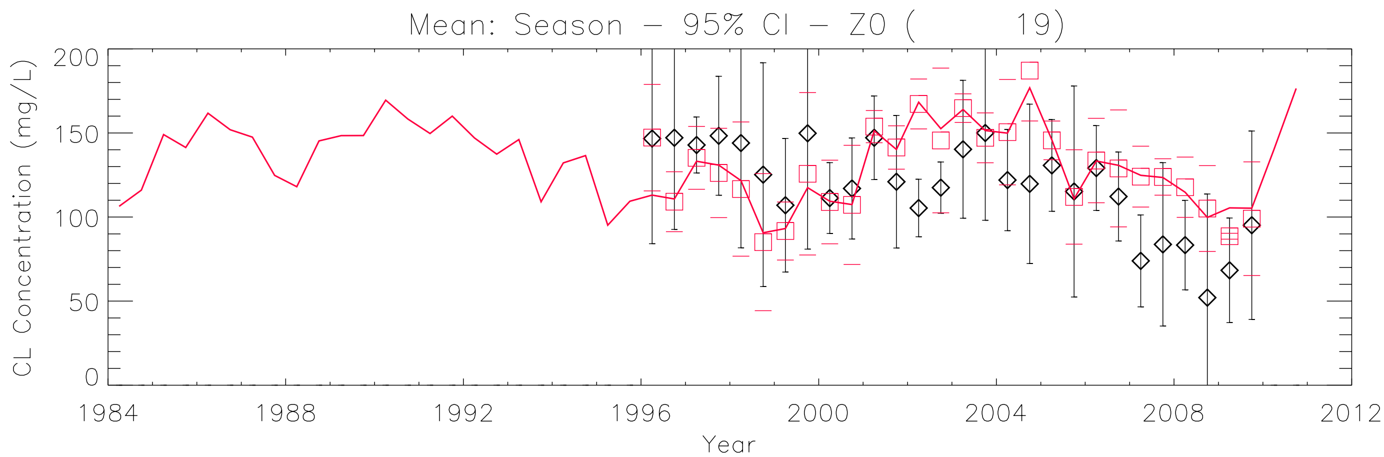
Mean: Water Year − 95% CI − X0 (19)
CL Concentration (mg/L)
Year



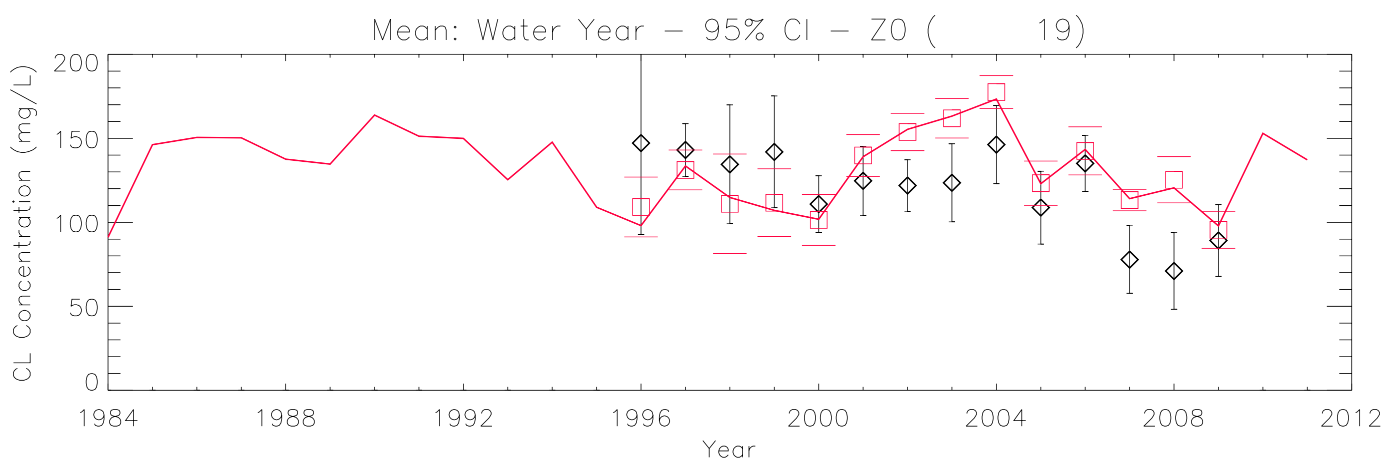
Cumulative Distribution: Raw Data − X0 (19)
Cumulative Distribution
CL Concentration (mg/L)



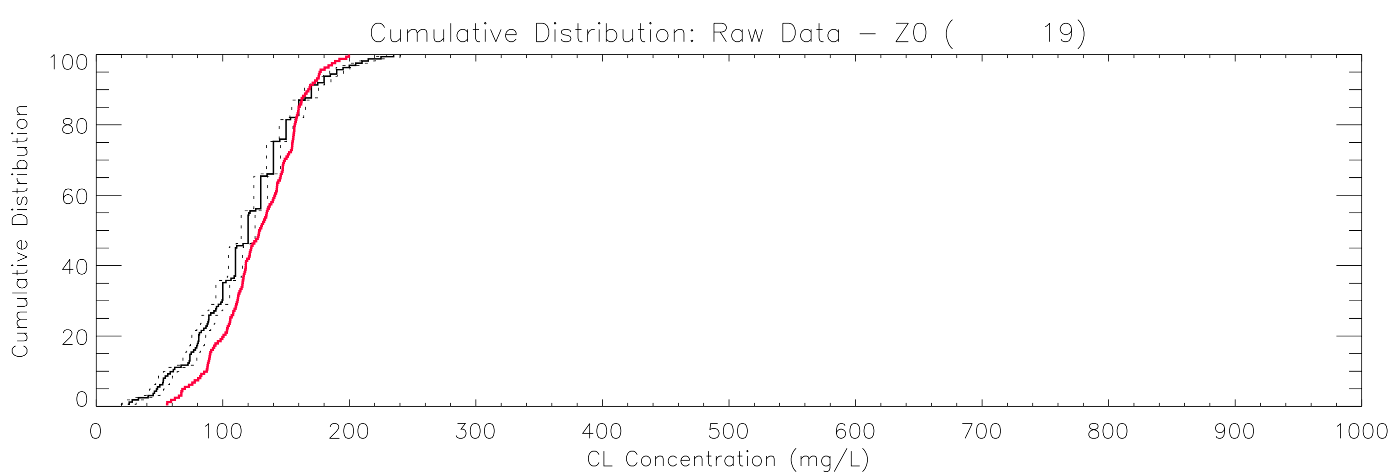
Raw Data (Obs. N = 162) − Z0 (19)
CL Concentration (mg/L)
Year



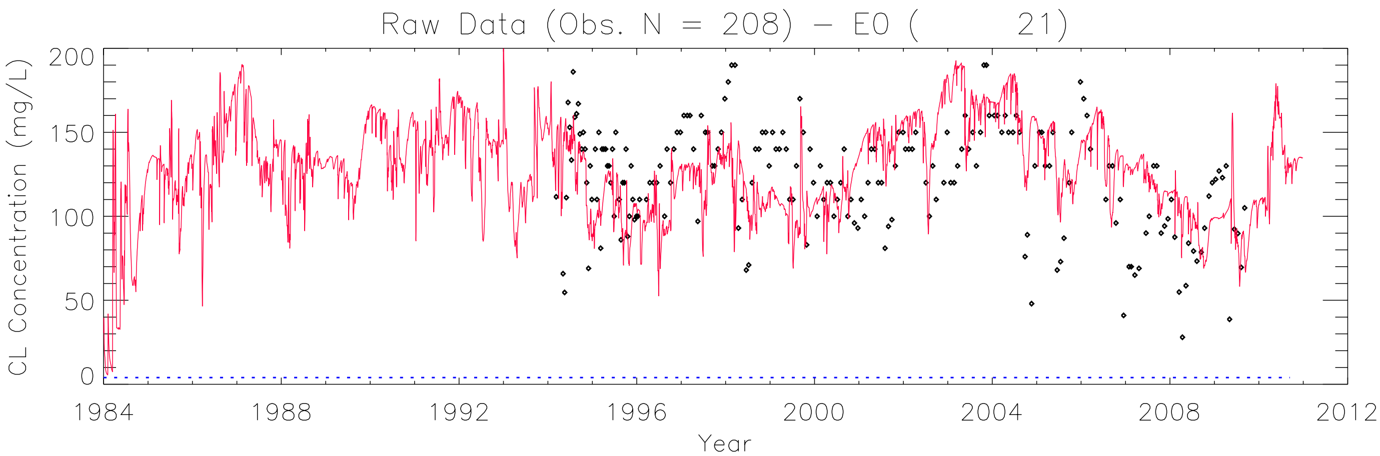
Mean: Season − 95% CI − Z0 (19)
CL Concentration (mg/L)
Year



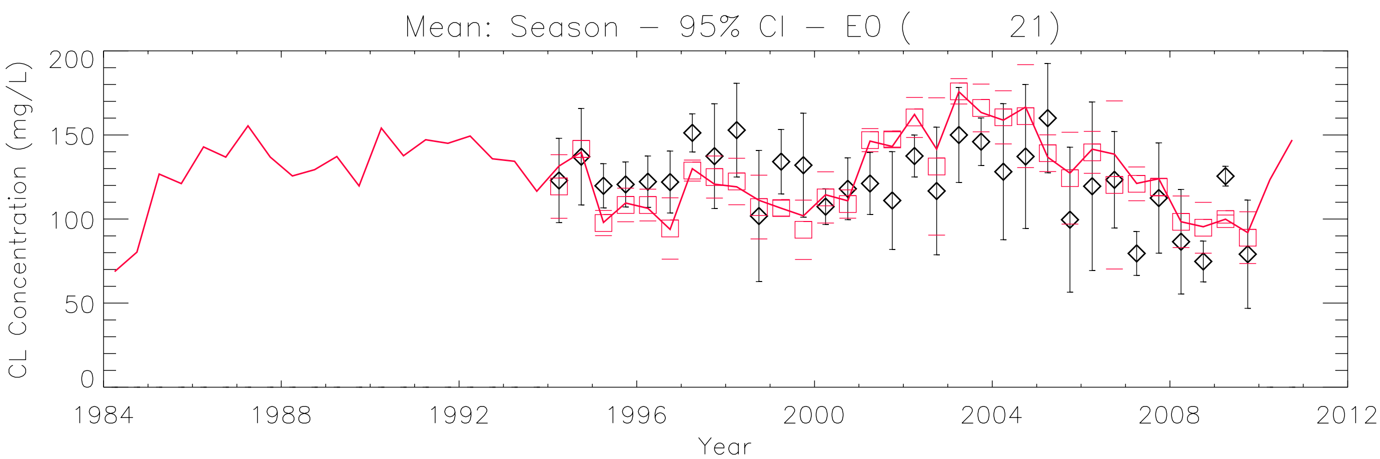
Mean: Water Year − 95% CI − Z0 (19)
CL Concentration (mg/L)
Year



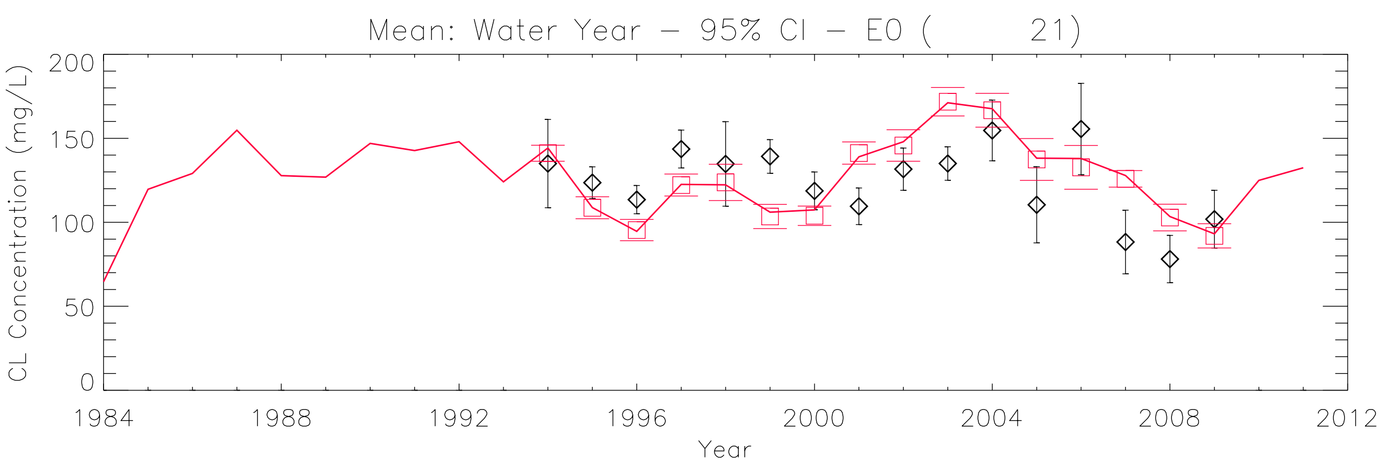
Cumulative Distribution: Raw Data − Z0 (19)
Cumulative Distribution
CL Concentration (mg/L)



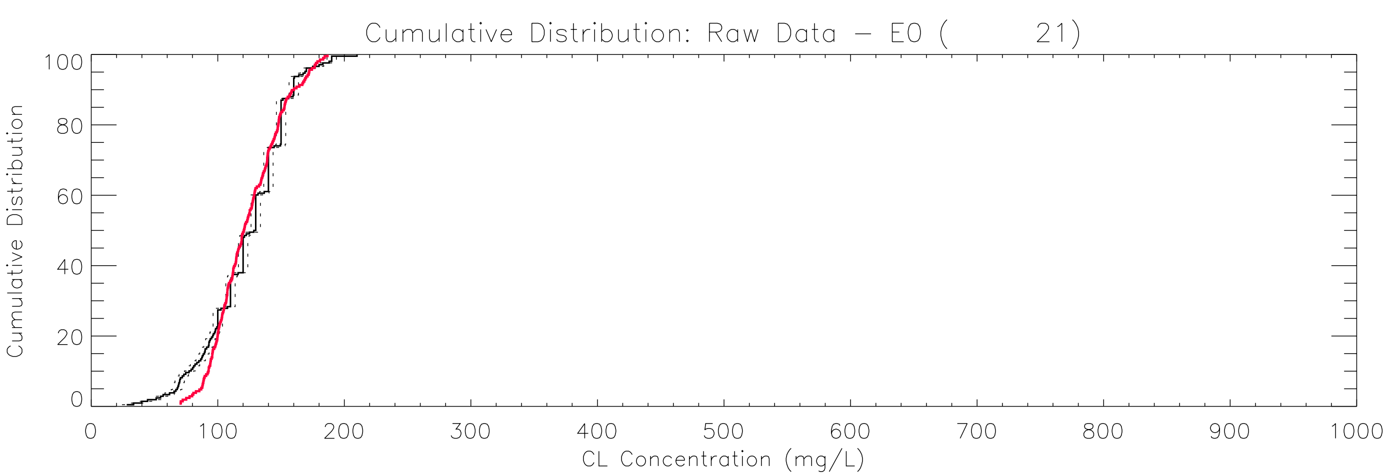
Raw Data (Obs. N = 208) – E0 (21)
CL Concentration (mg/L)
Year



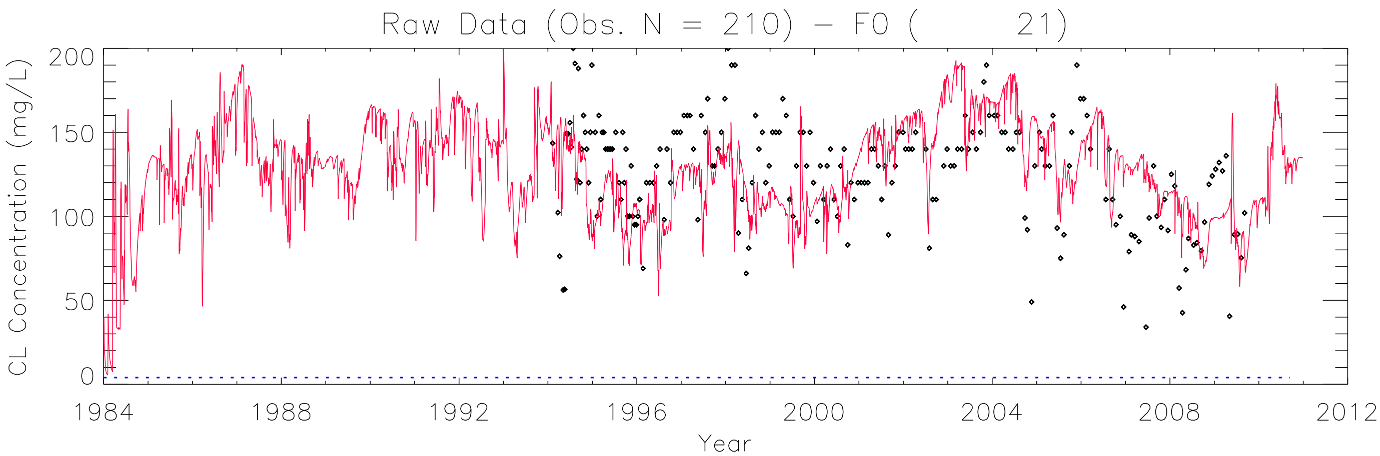
Mean: Season – 95% CI – E0 (21)
CL Concentration (mg/L)
Year

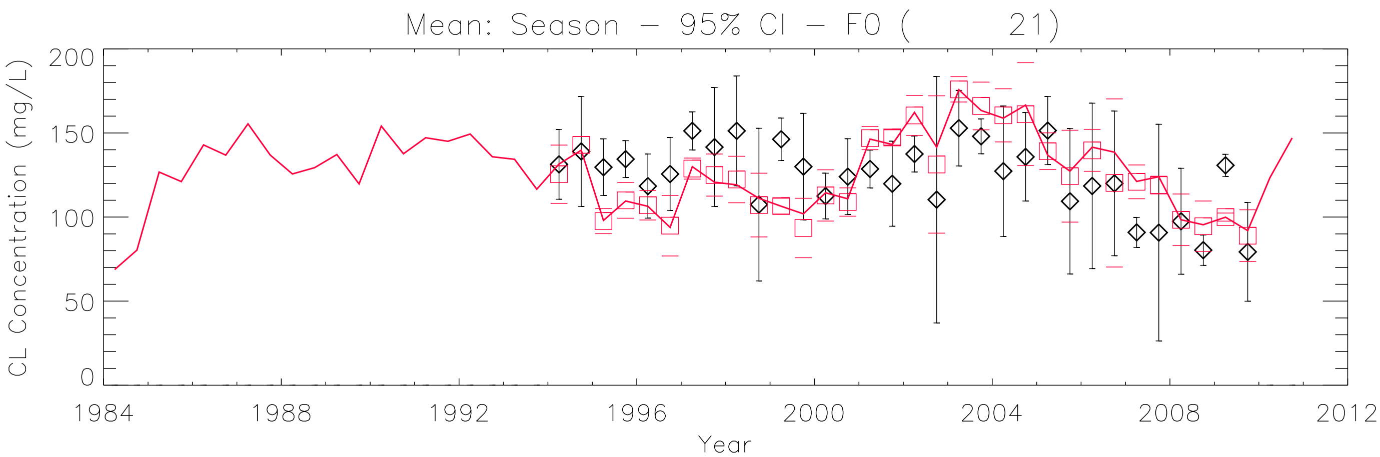


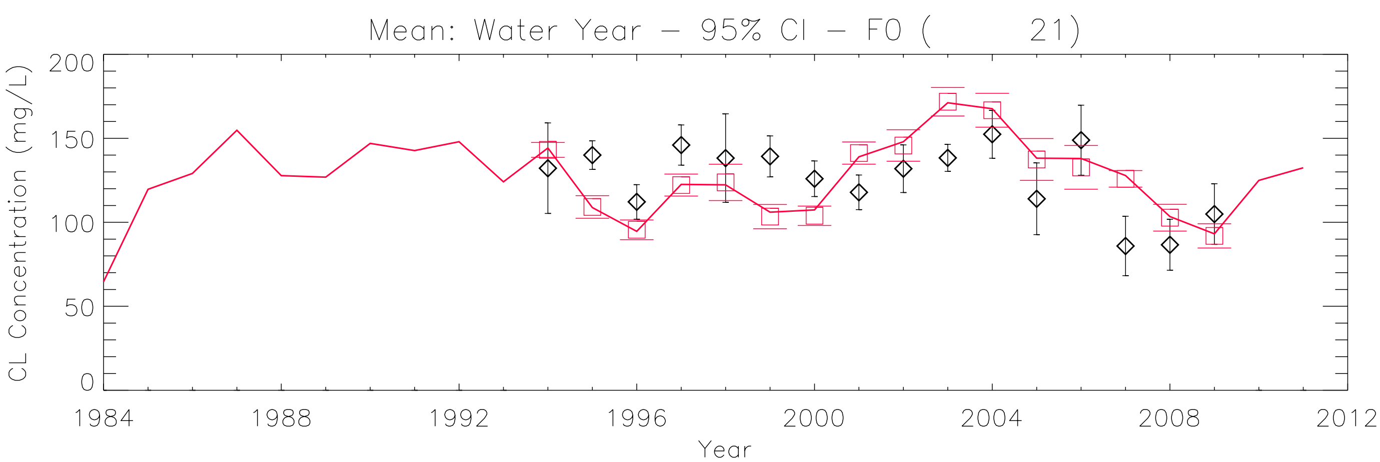
Mean: Water Year – 95% CI – E0 (21)
CL Concentration (mg/L)
Year

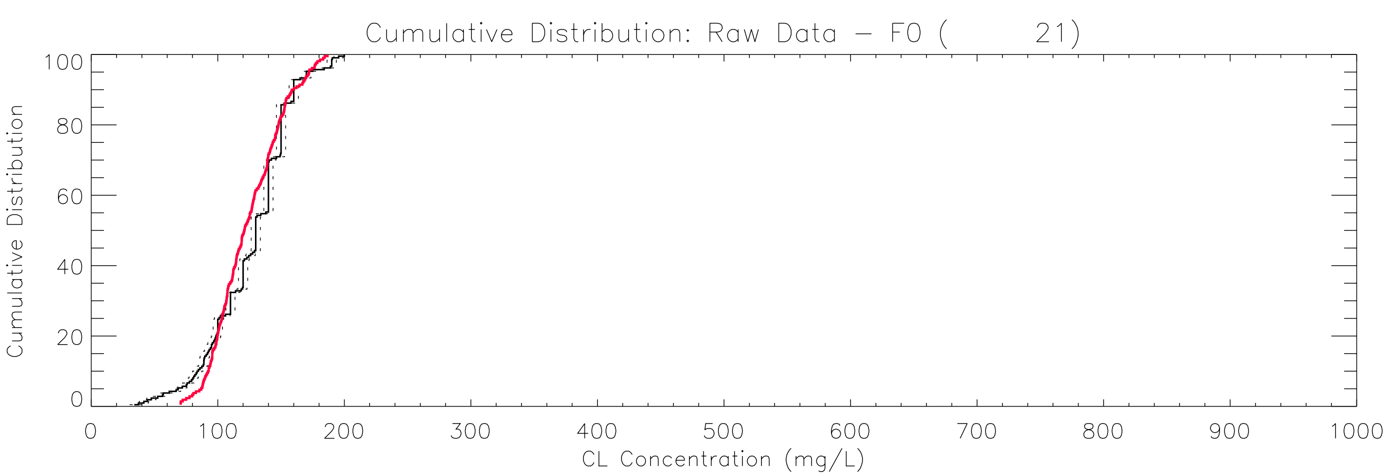


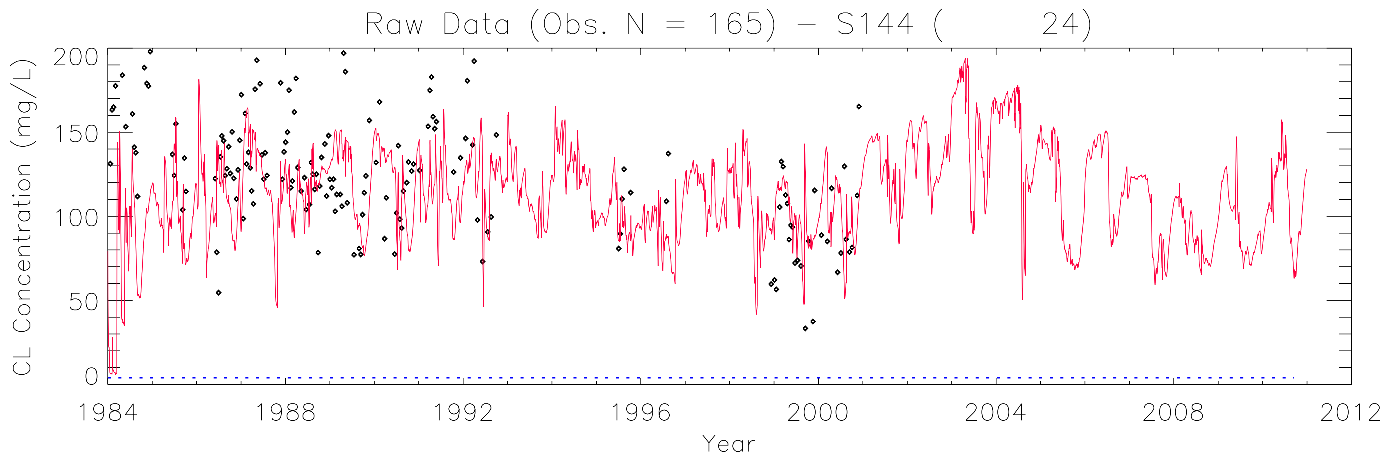
Cumulative Distribution: Raw Data – E0 (21)
Cumulative Distribution
CL Concentration (mg/L)

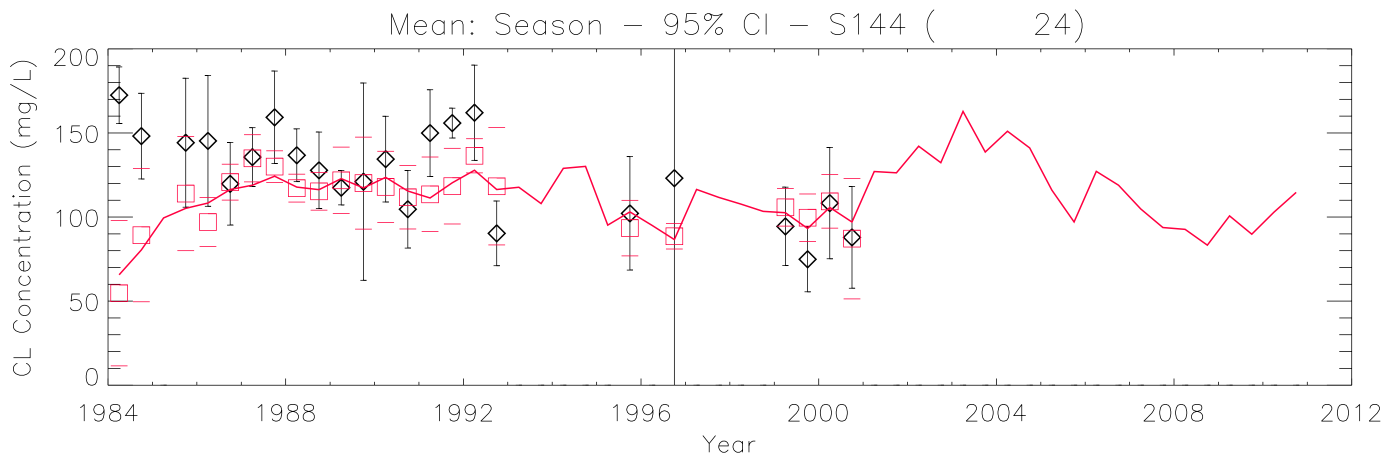

Raw Data (Obs. N = 210) – F0 (21)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

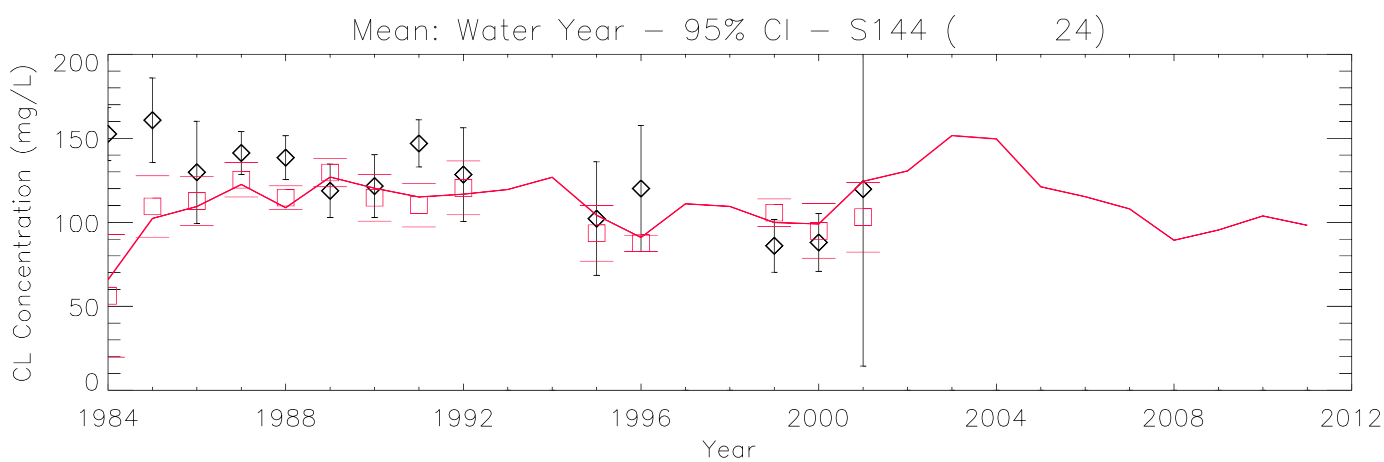

Mean: Season – 95% CI – F0 (21)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

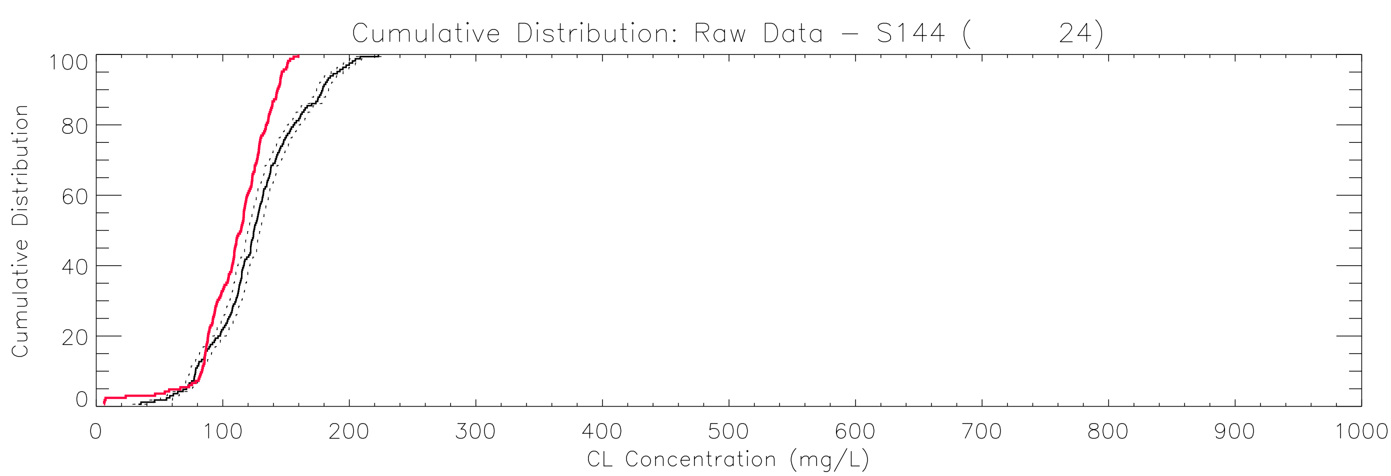

Mean: Water Year – 95% CI – F0 (21)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

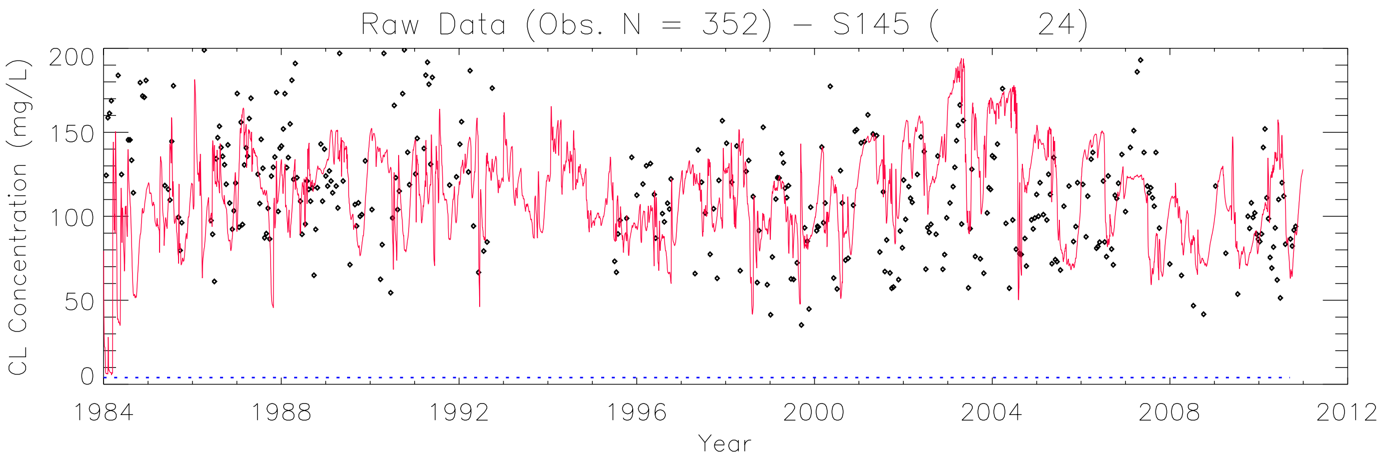

Cumulative Distribution: Raw Data – F0 (21)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

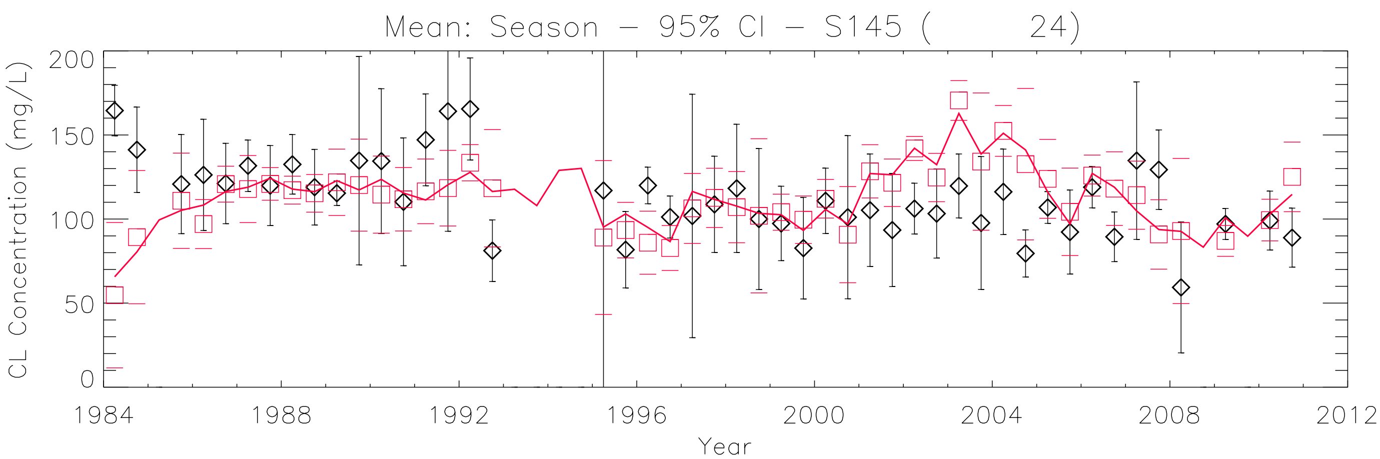

Raw Data (Obs. N = 165) – S144 (24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

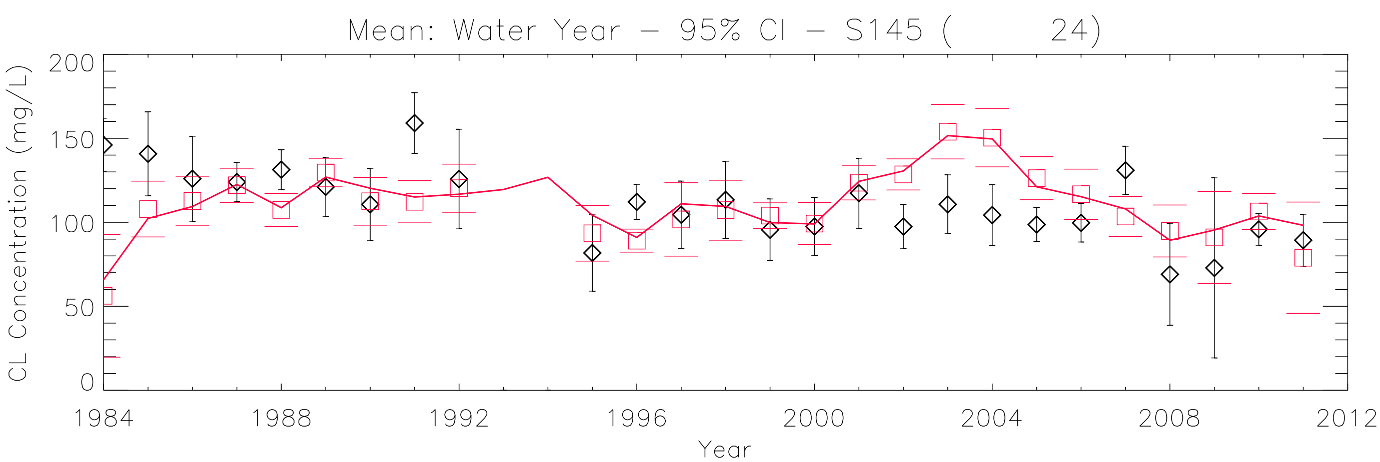

Mean: Season – 95% CI – S144 (24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

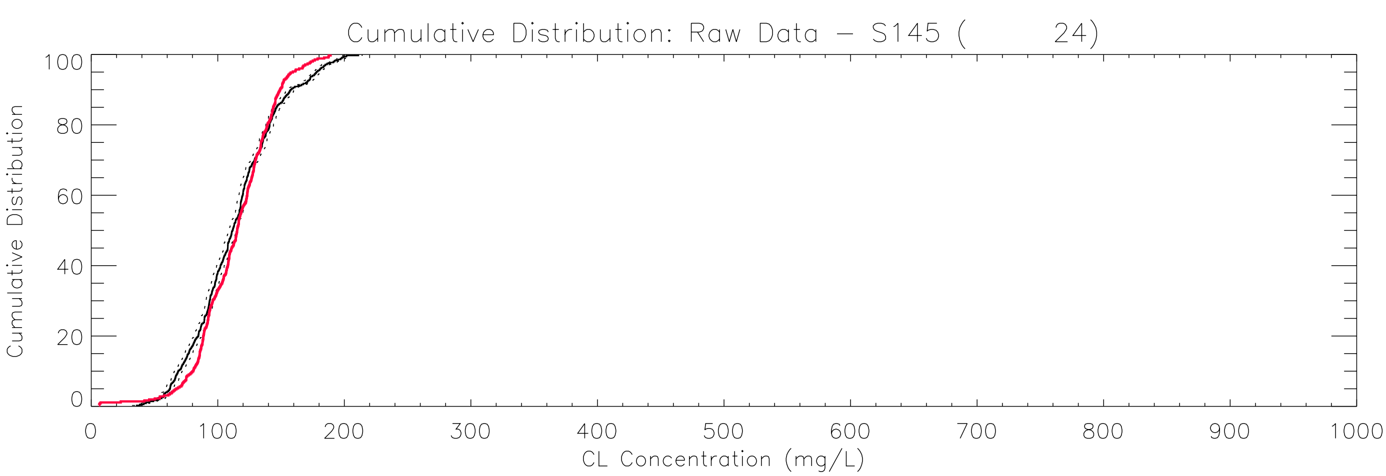

Mean: Water Year – 95% CI – S144 (24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

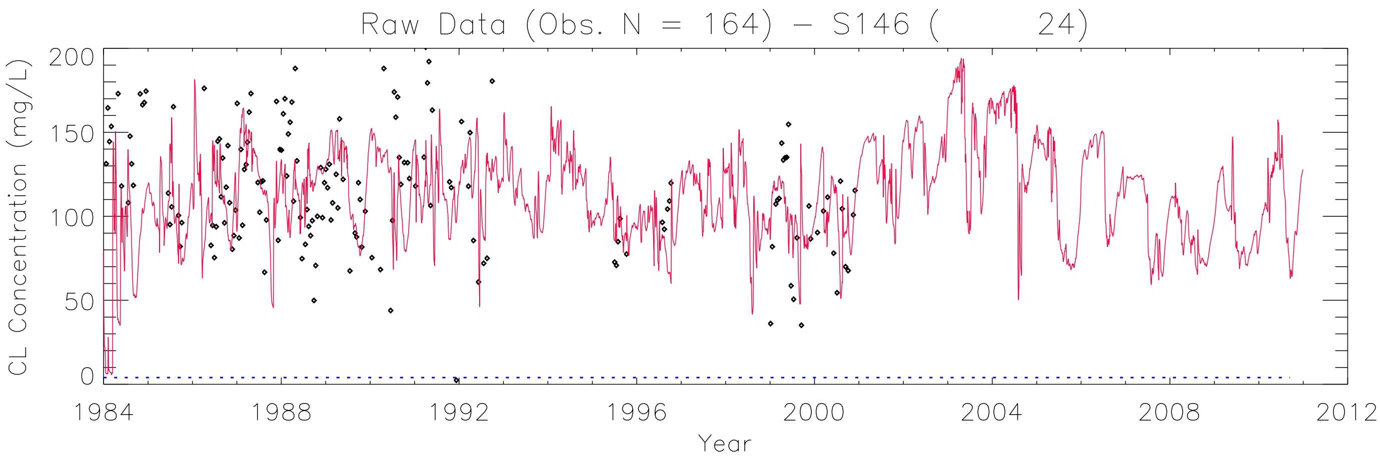

Cumulative Distribution: Raw Data – S144 (24)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

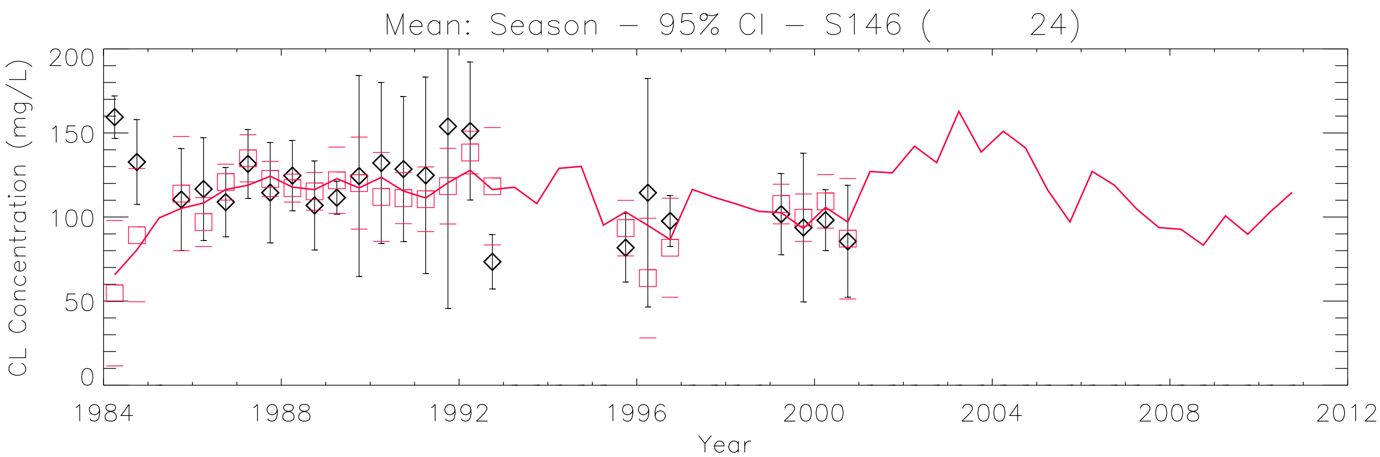

Raw Data (Obs. N = 352) – S145 (24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

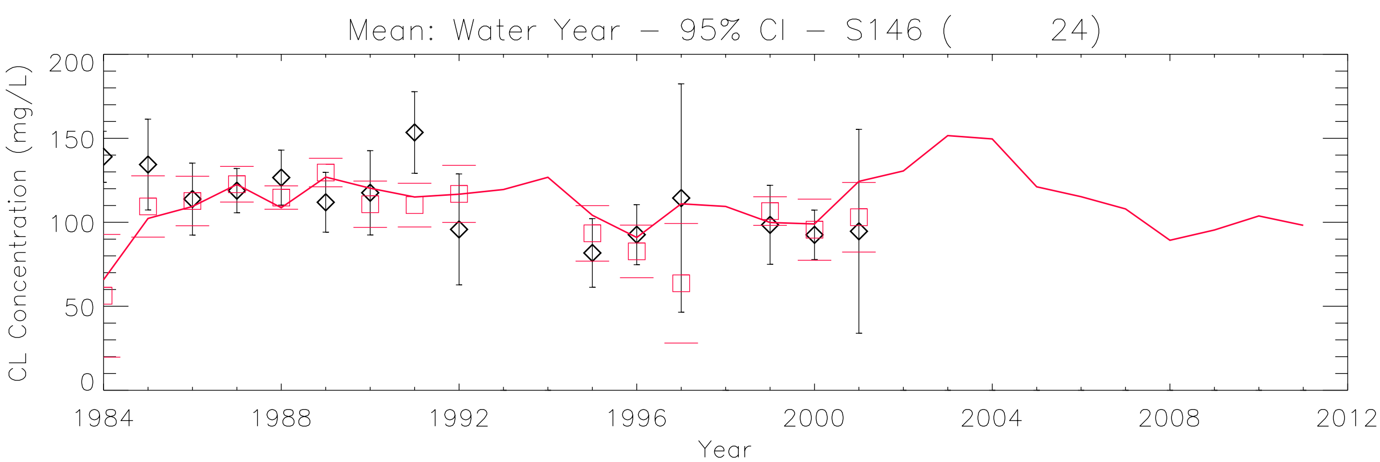

Mean: Season – 95% CI – S145 (24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

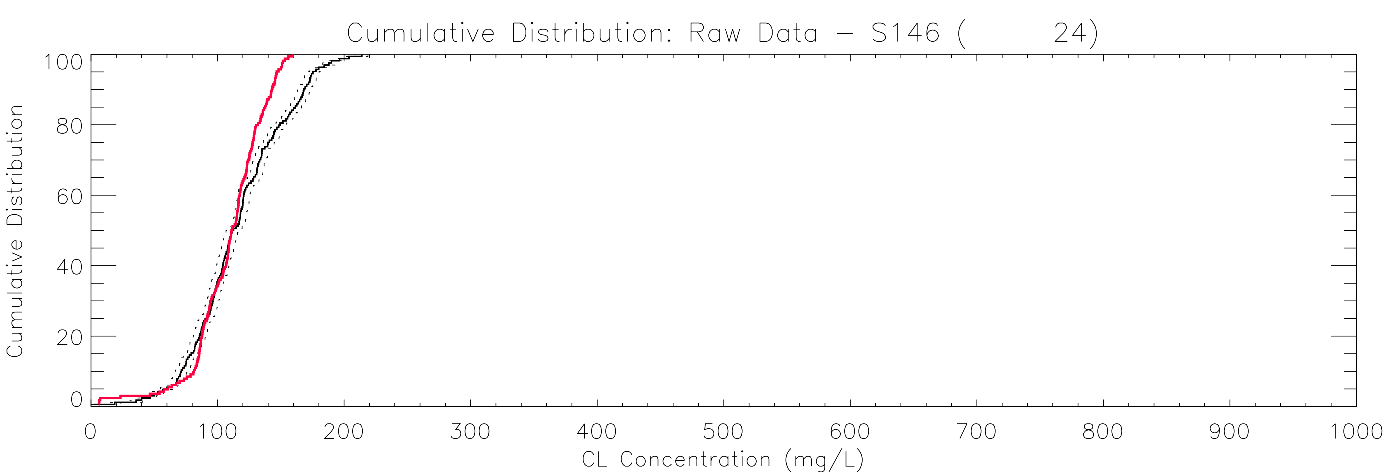

Mean: Water Year – 95% CI – S145 (24)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

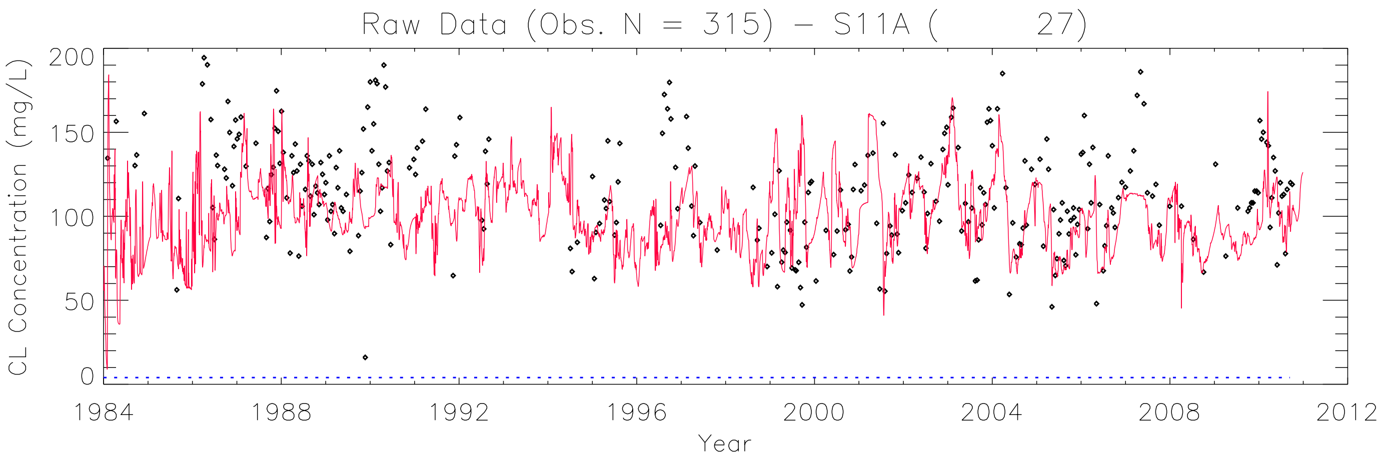

Cumulative Distribution: Raw Data – S145 (24)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

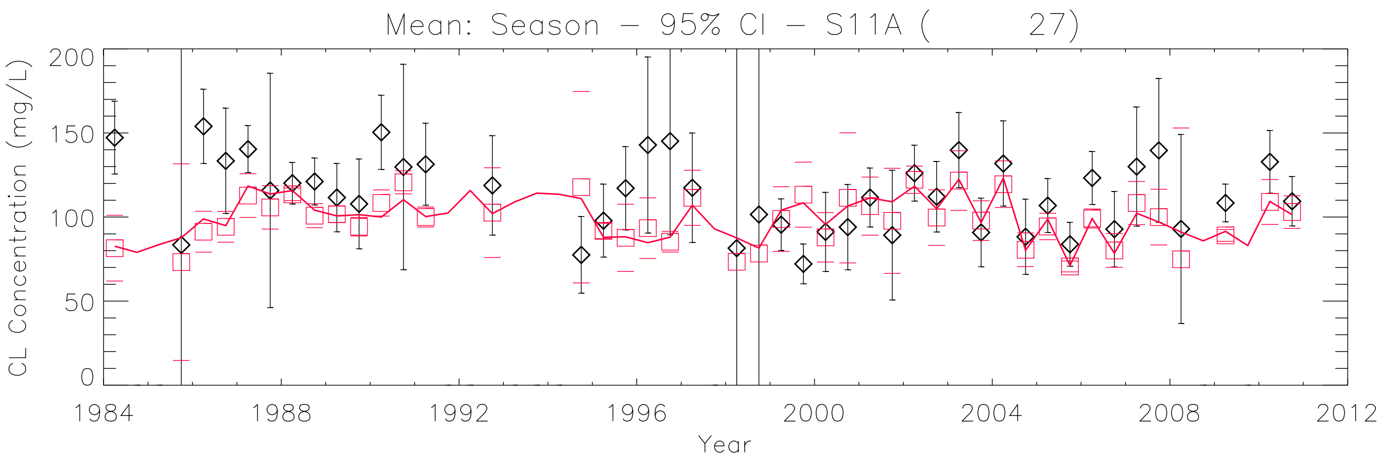

Raw Data (Obs. N = 164) - S146 (24)
CL Concentration (mg/L)
Year

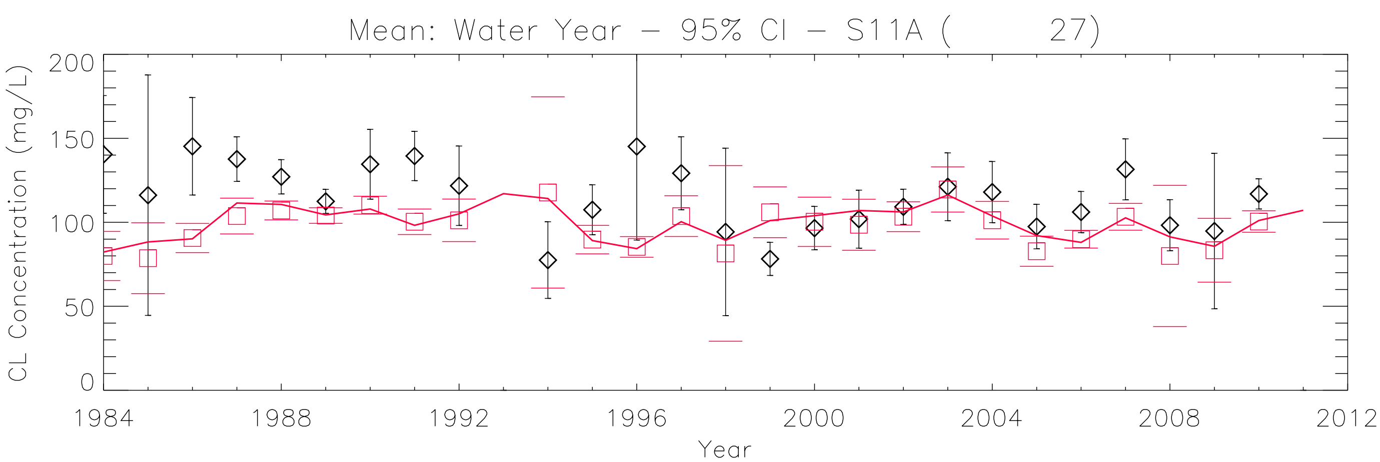

Mean: Season - 95% CI - S146 (24)
CL Concentration (mg/L)
Year

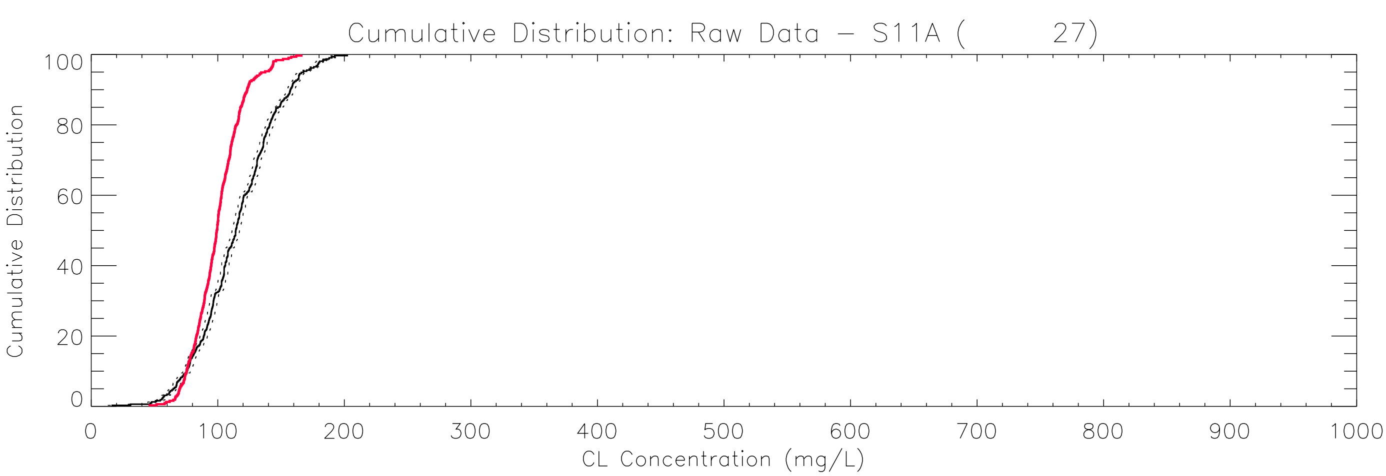

Mean: Water Year - 95% CI - S146 (24)
CL Concentration (mg/L)
Year

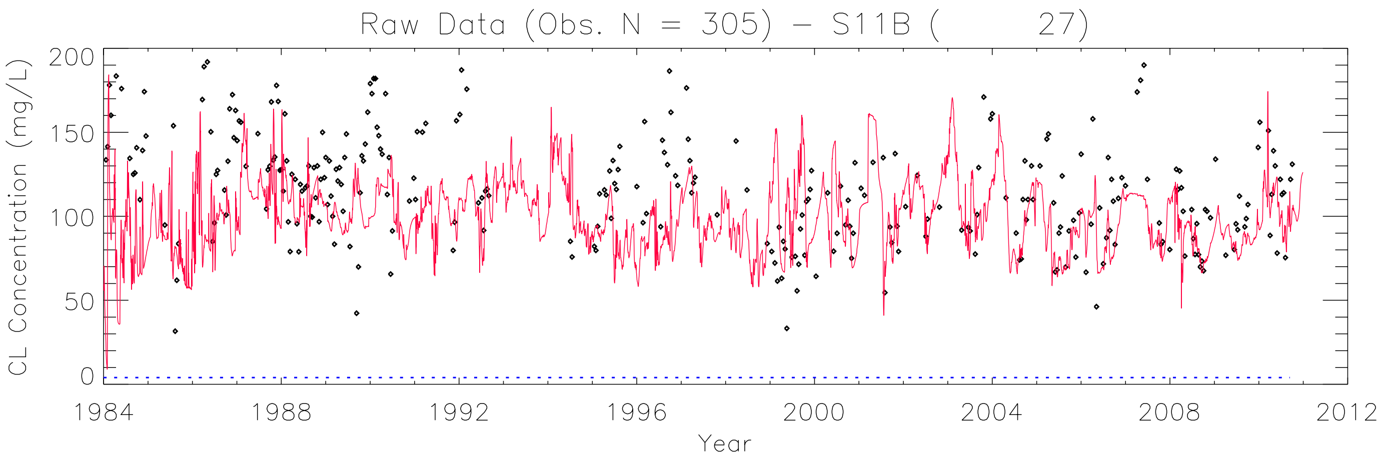

Cumulative Distribution: Raw Data - S146 (24)
Cumulative Distribution
CL Concentration (mg/L)

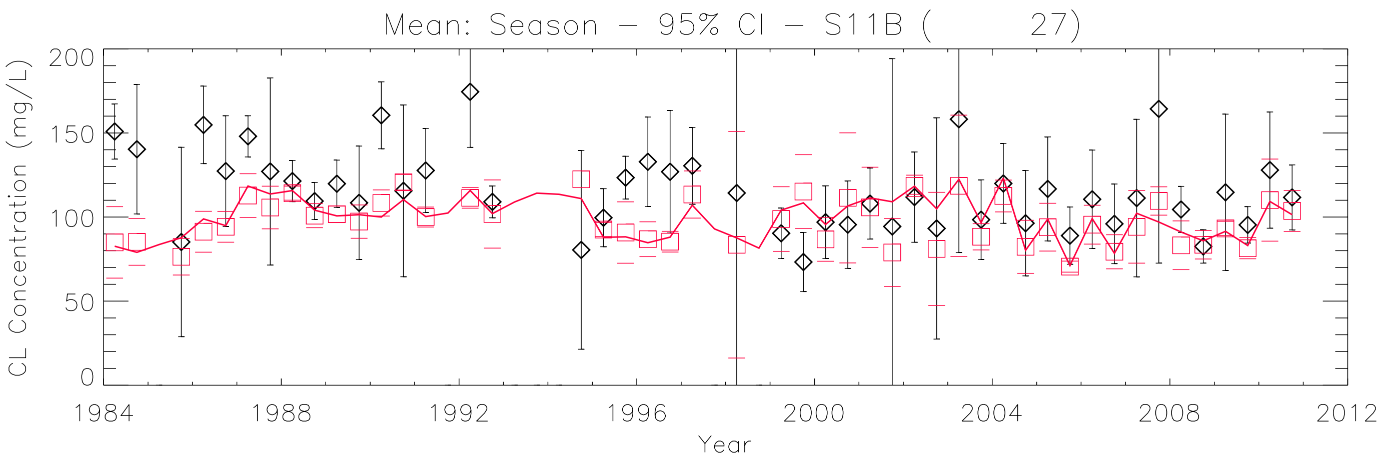

Raw Data (Obs. N = 315) – S11A (27)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

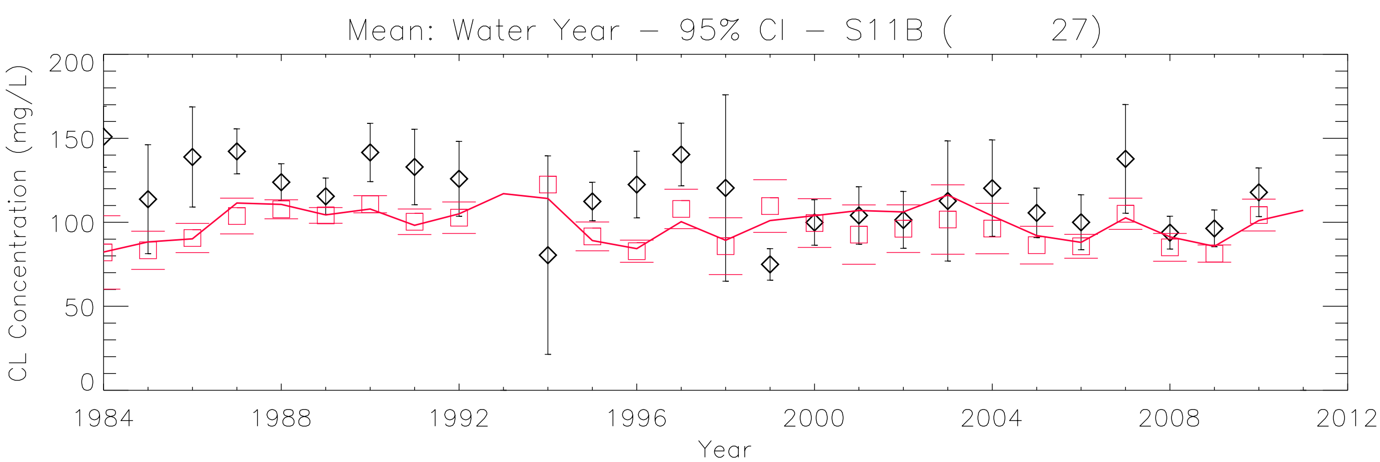

Mean: Season – 95% CI – S11A (27)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

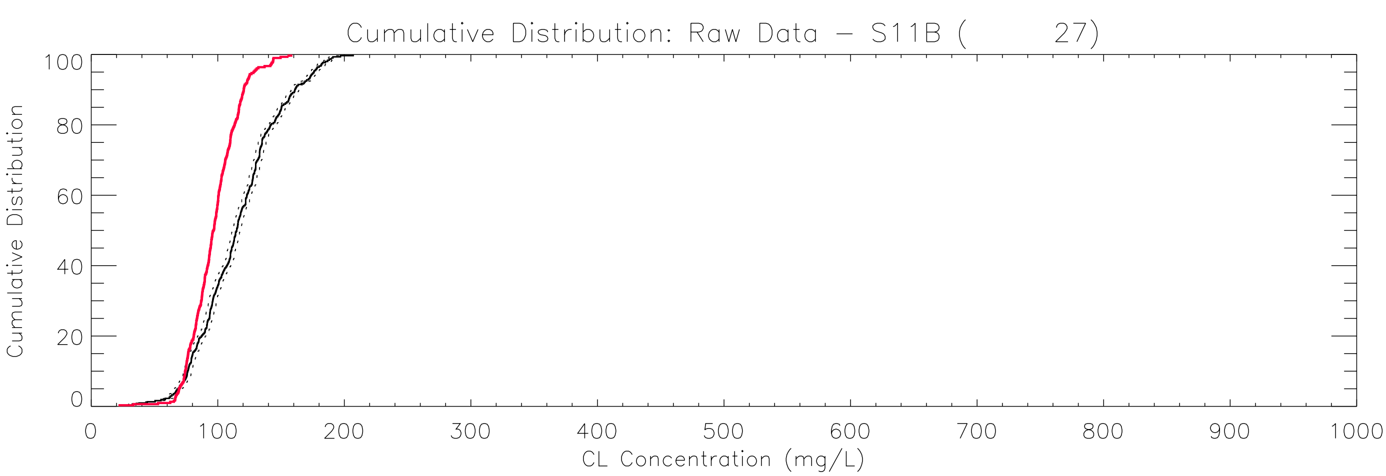

Mean: Water Year – 95% CI – S11A (27)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

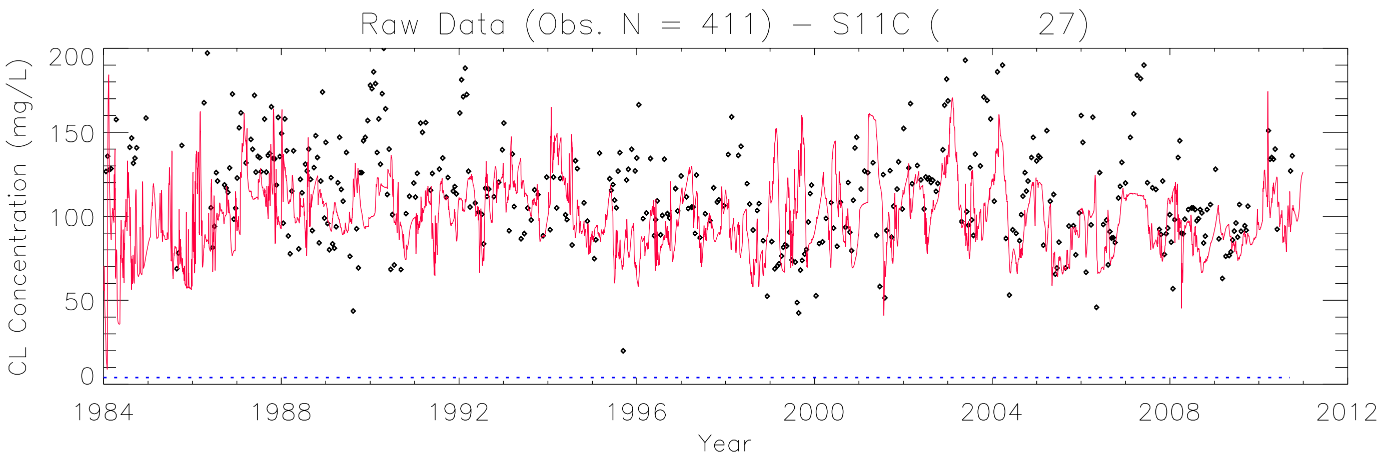

Cumulative Distribution: Raw Data – S11A (27)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

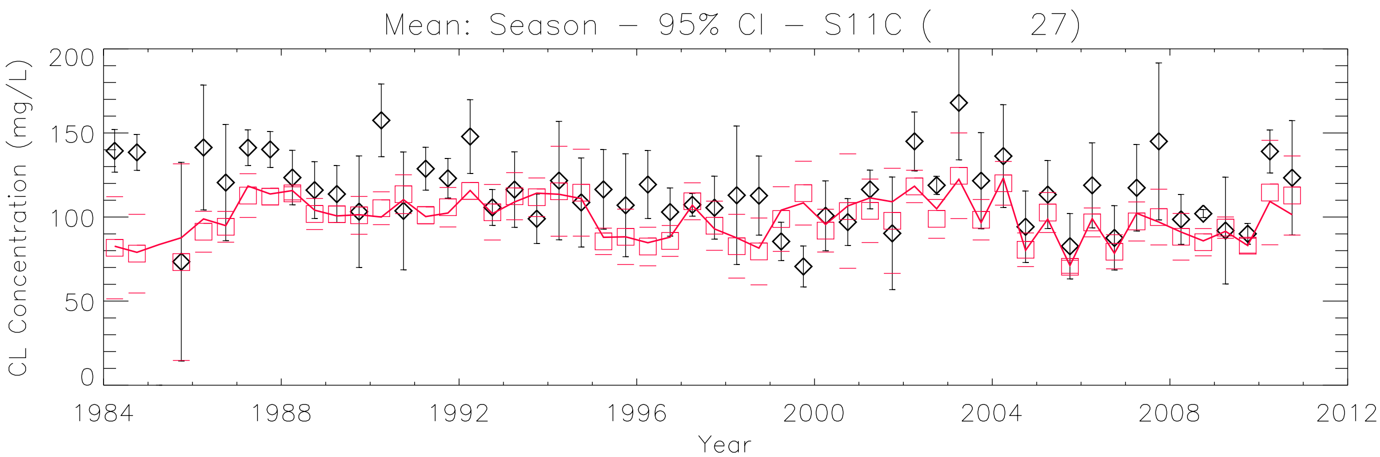

Raw Data (Obs. N = 305) - S11B (27)
CL Concentration (mg/L)
Year

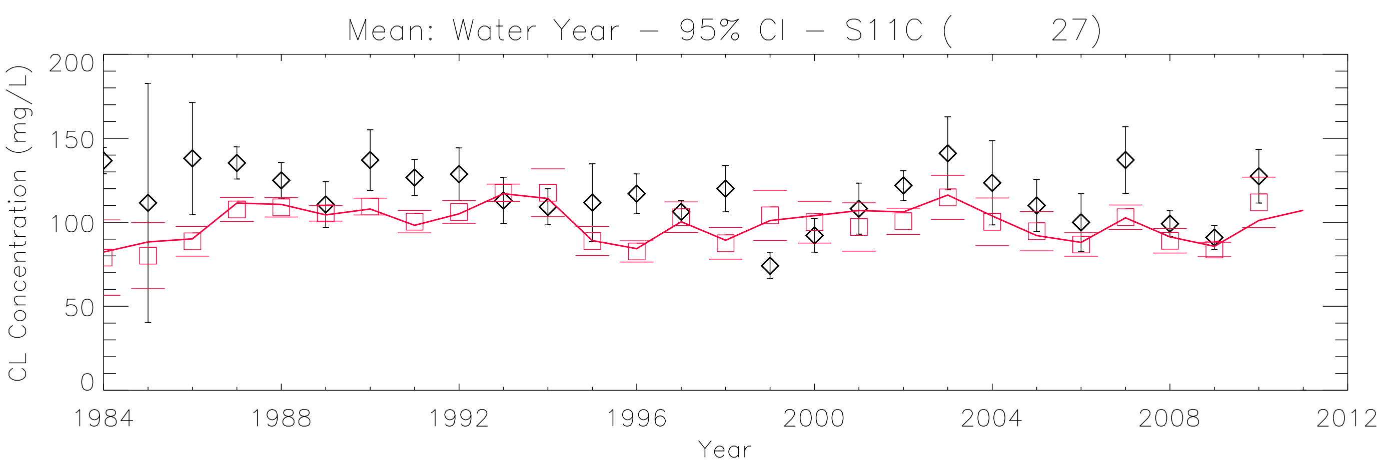

Mean: Season - 95% CI - S11B (27)
CL Concentration (mg/L)
Year

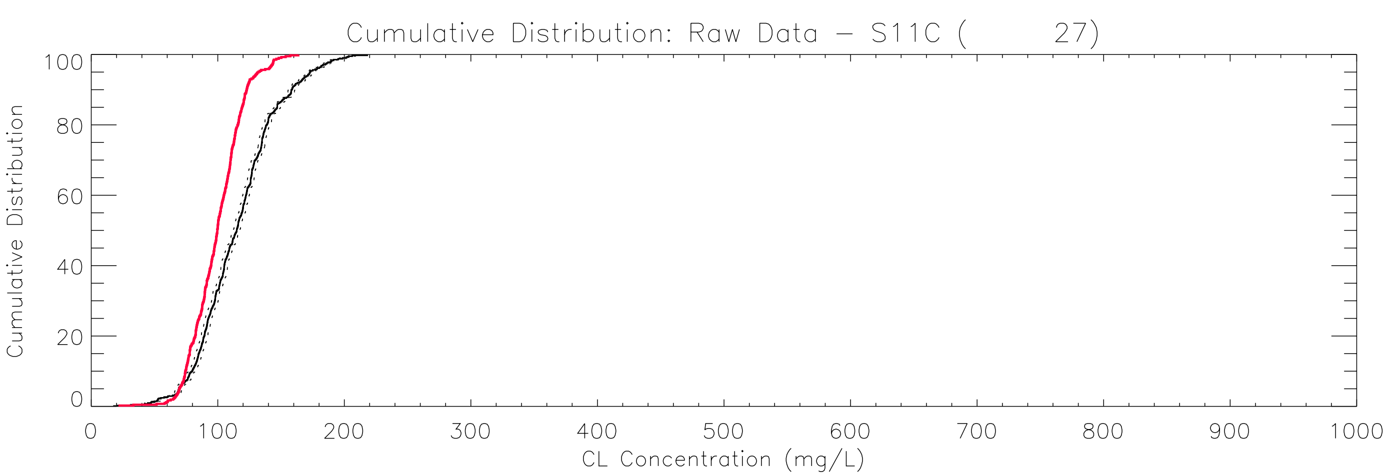

Mean: Water Year - 95% CI - S11B (27)
CL Concentration (mg/L)
Year

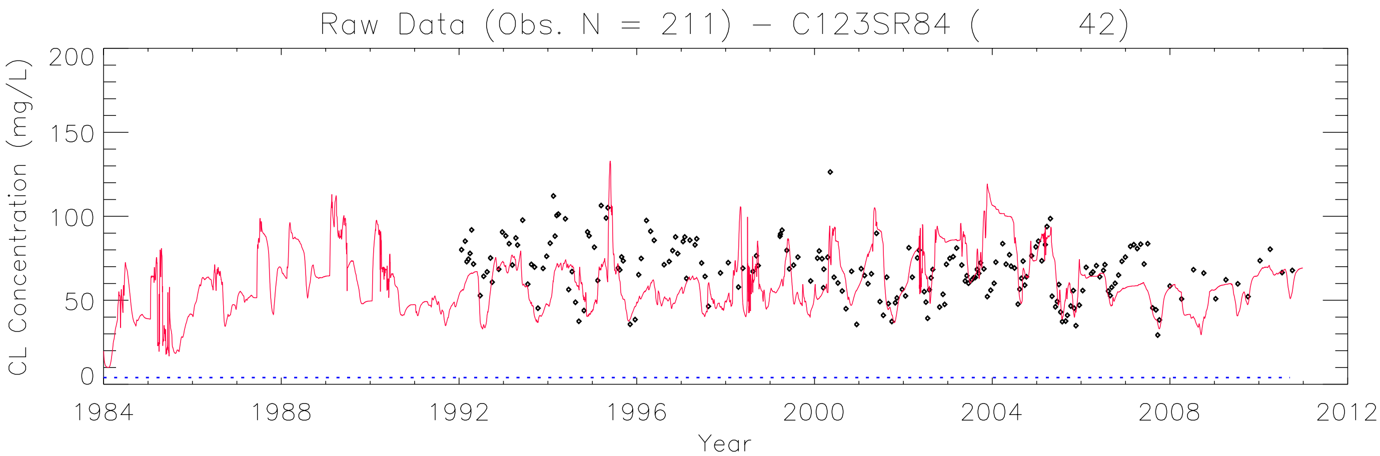

Cumulative Distribution: Raw Data - S11B (27)
Cumulative Distribution
CL Concentration (mg/L)

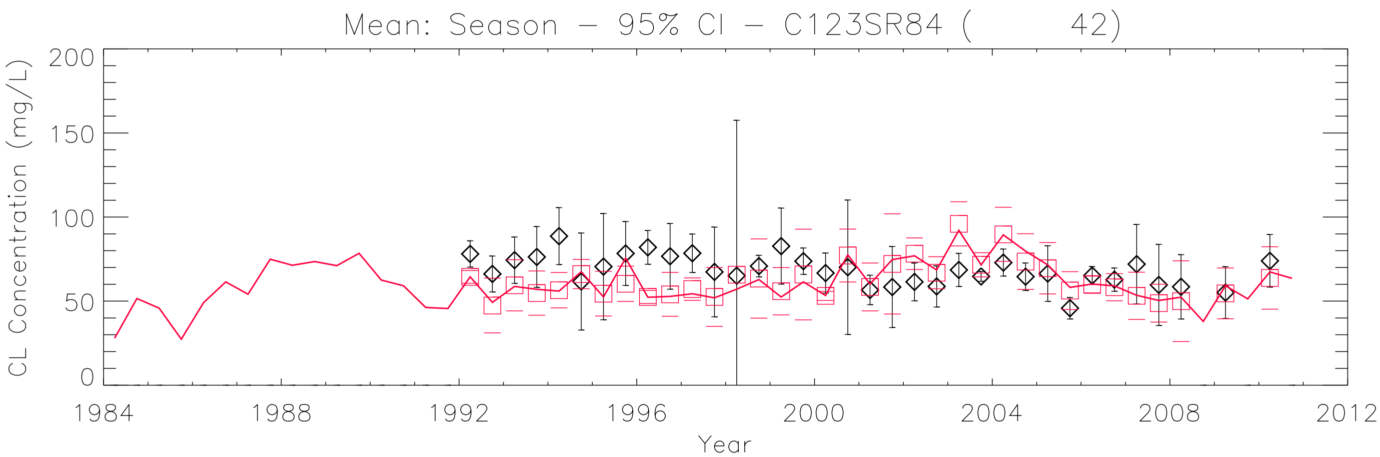

Raw Data (Obs. N = 411) – S11C (27)
CL Concentration (mg/L)
Year

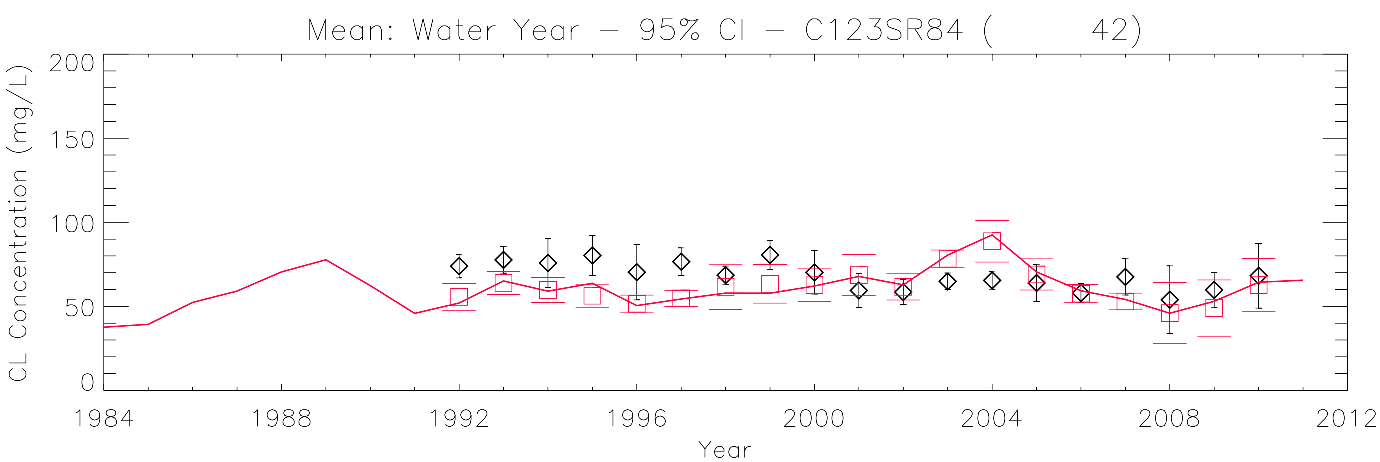

Mean: Season – 95% CI – S11C (27)
CL Concentration (mg/L)
Year

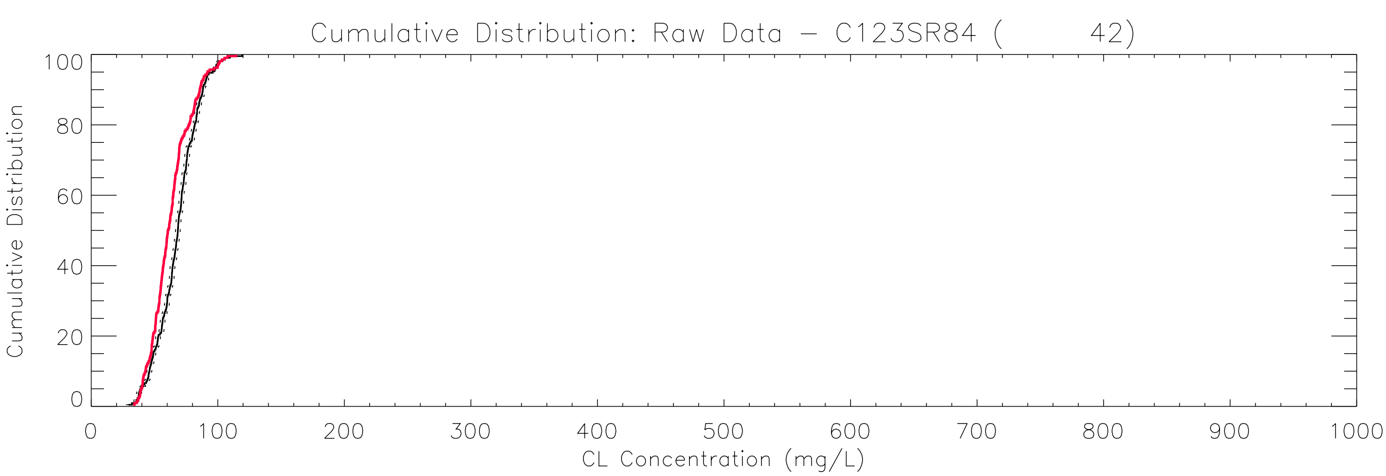

Mean: Water Year – 95% CI – S11C (27)
CL Concentration (mg/L)
Year

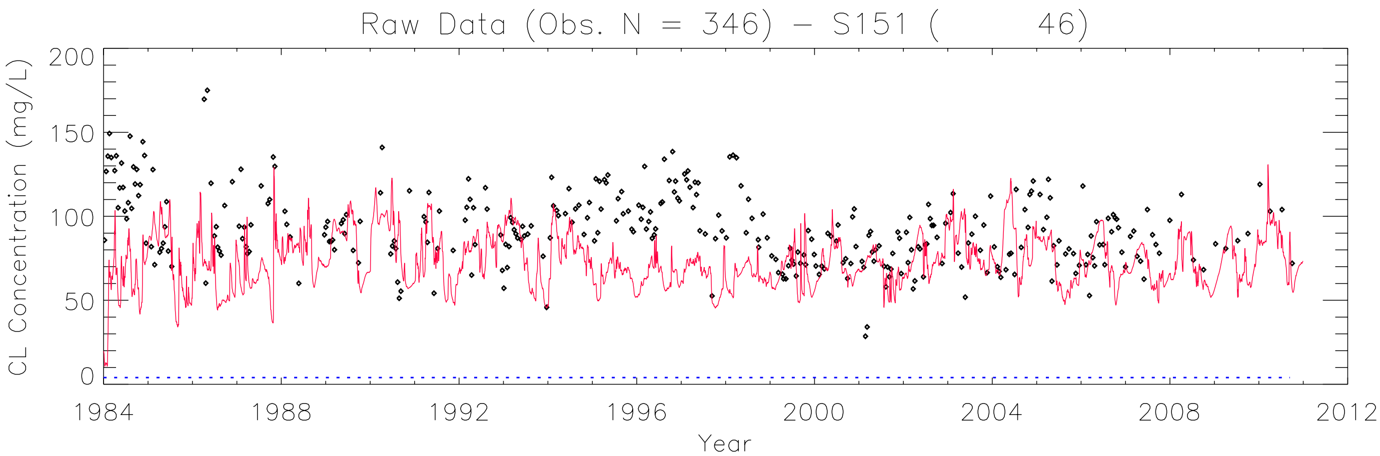

Cumulative Distribution: Raw Data – S11C (27)
Cumulative Distribution
CL Concentration (mg/L)

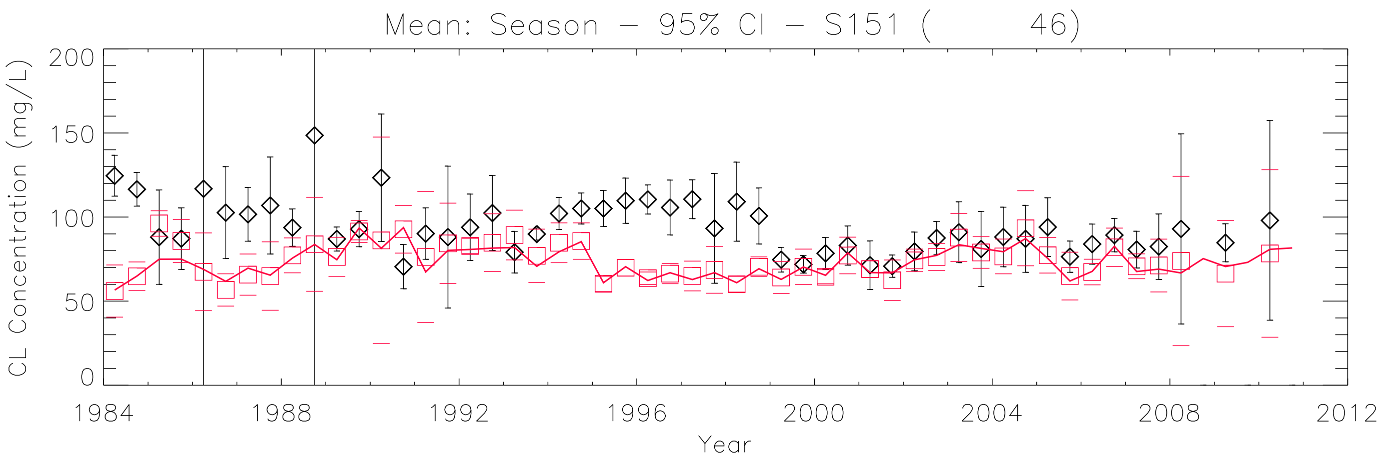

Raw Data (Obs. N = 211) - C123SR84 (42)
CL Concentration (mg/L)
Year

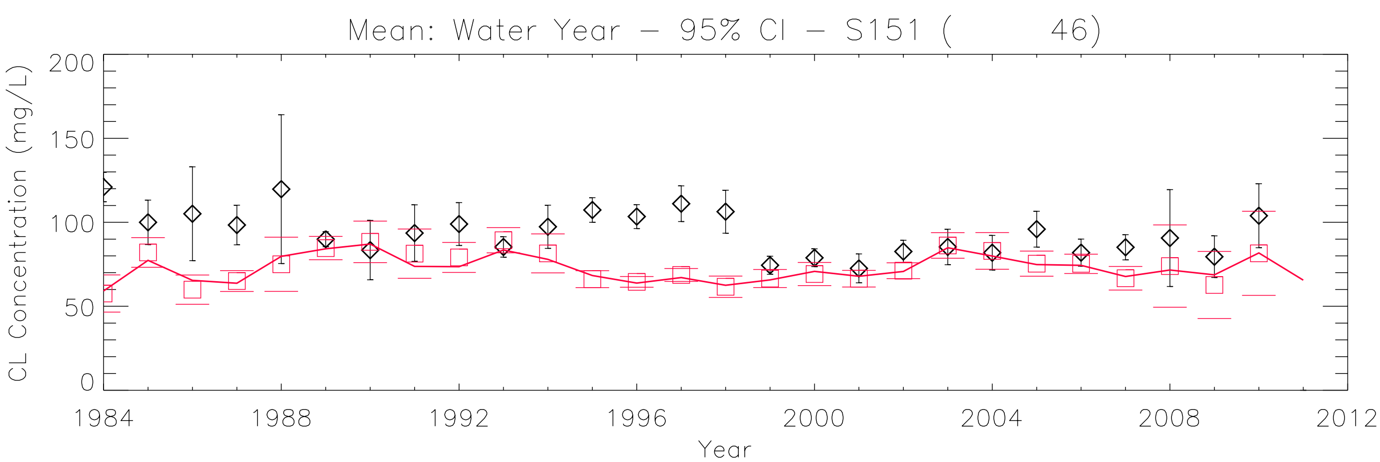

Mean: Season - 95% CI - C123SR84 (42)
CL Concentration (mg/L)
Year

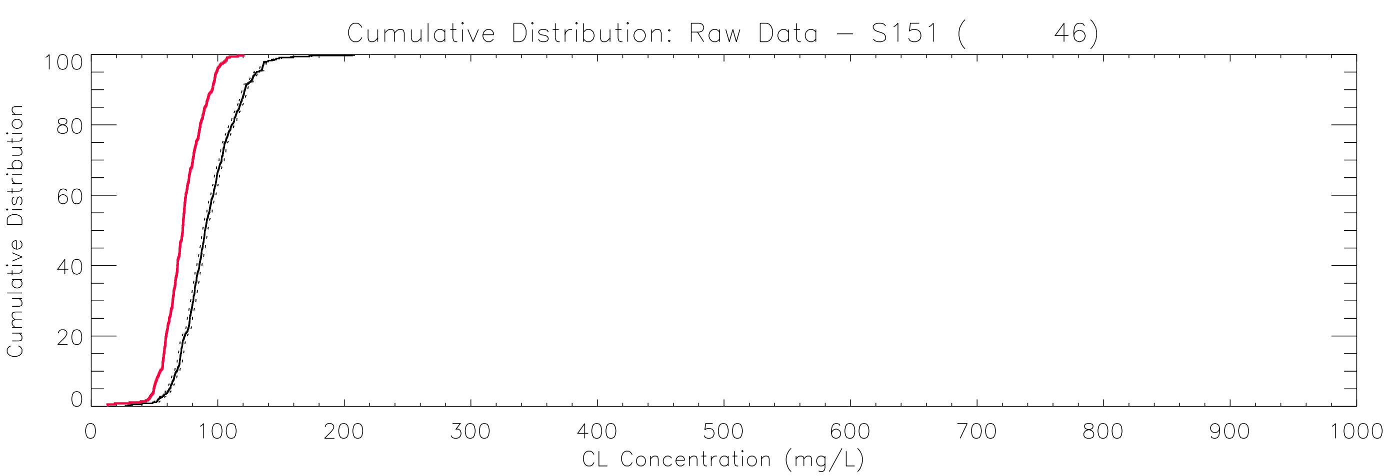

Mean: Water Year - 95% CI - C123SR84 (42)
CL Concentration (mg/L)
Year

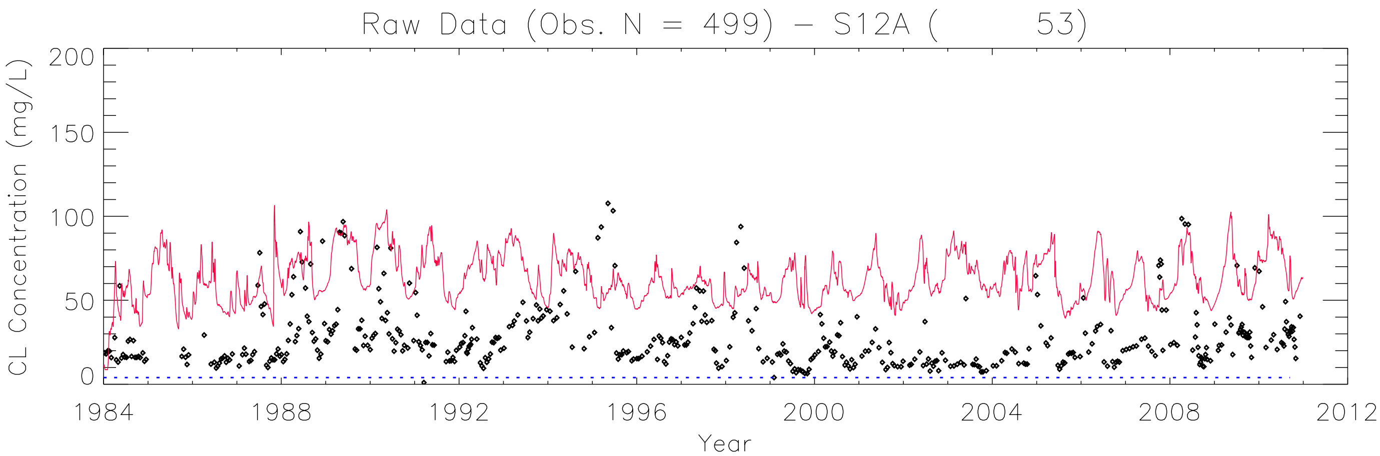

Cumulative Distribution: Raw Data - C123SR84 (42)
Cumulative Distribution
CL Concentration (mg/L)

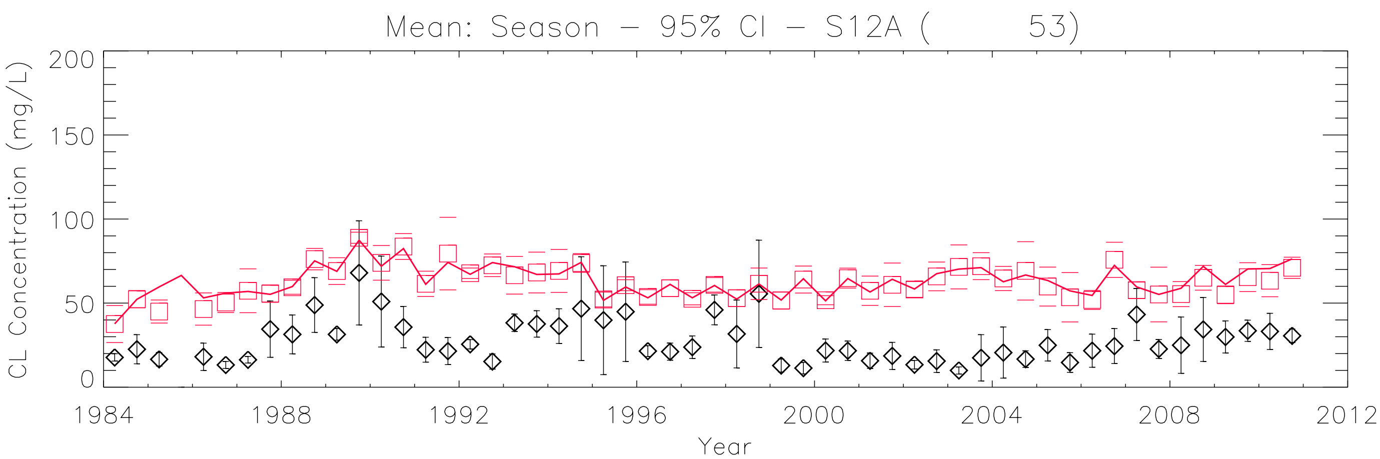

Raw Data (Obs. N = 346) – S151 (46)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

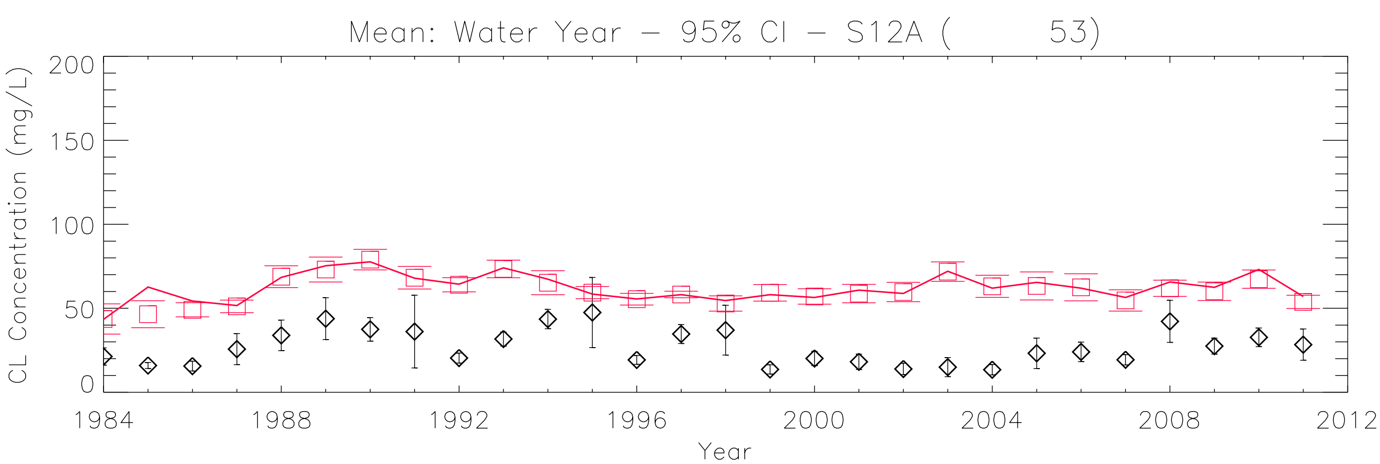

Mean: Season – 95% CI – S151 (46)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

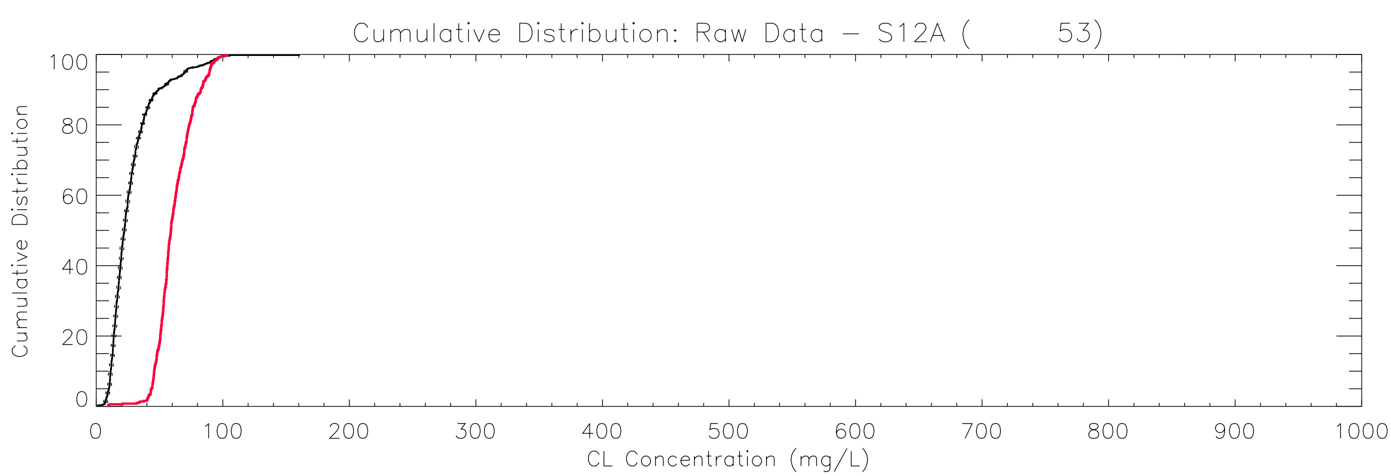

Mean: Water Year – 95% CI – S151 (46)
CL Concentration (mg/L)
Year
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012

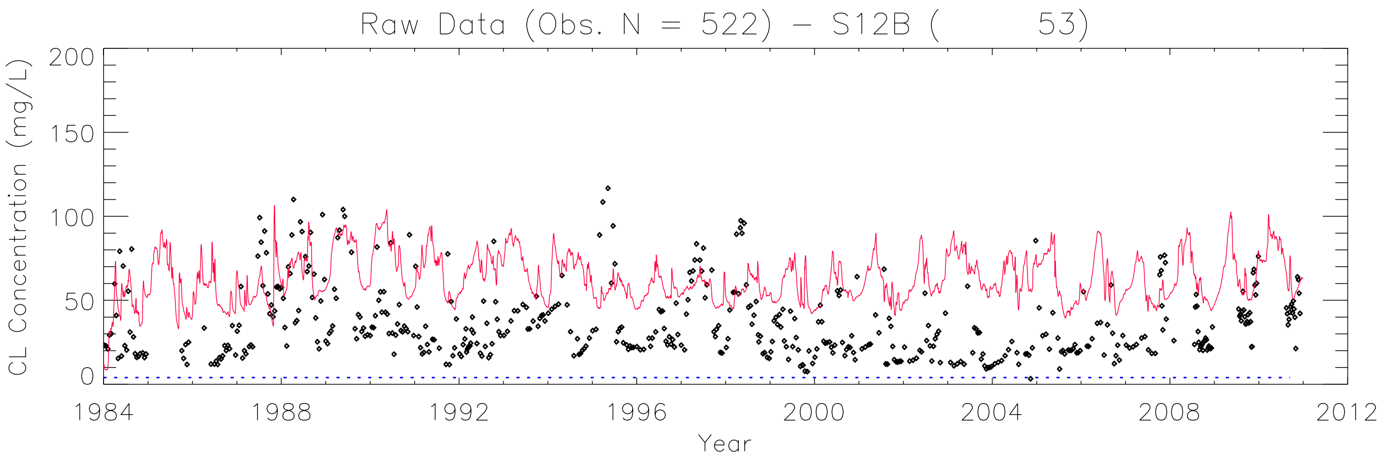

Cumulative Distribution: Raw Data – S151 (46)
Cumulative Distribution
CL Concentration (mg/L)
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000

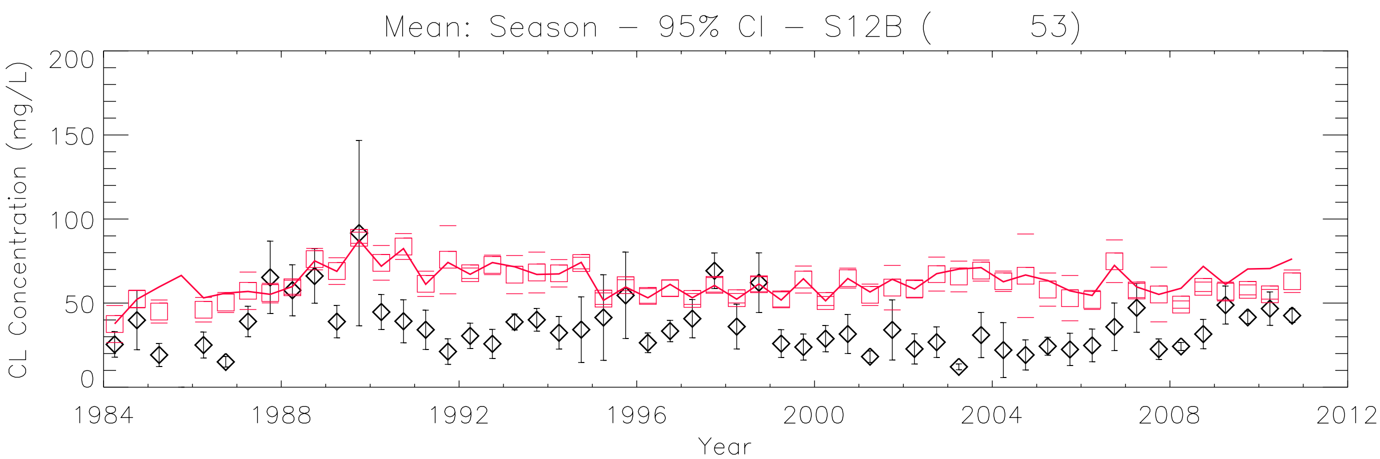

Raw Data (Obs. N = 499) – S12A (53)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

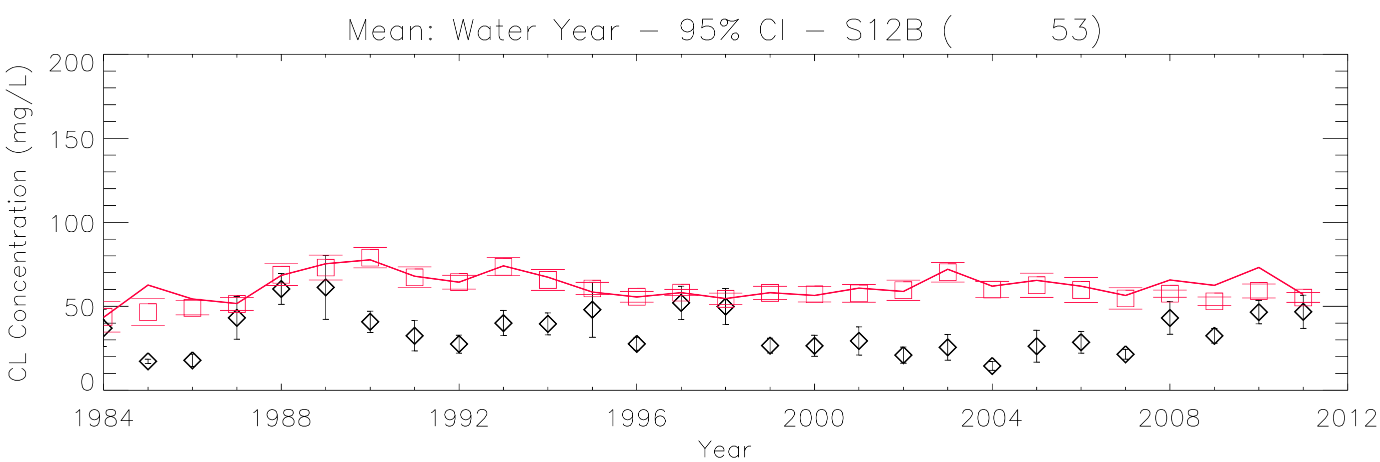

Mean: Season – 95% CI – S12A (53)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

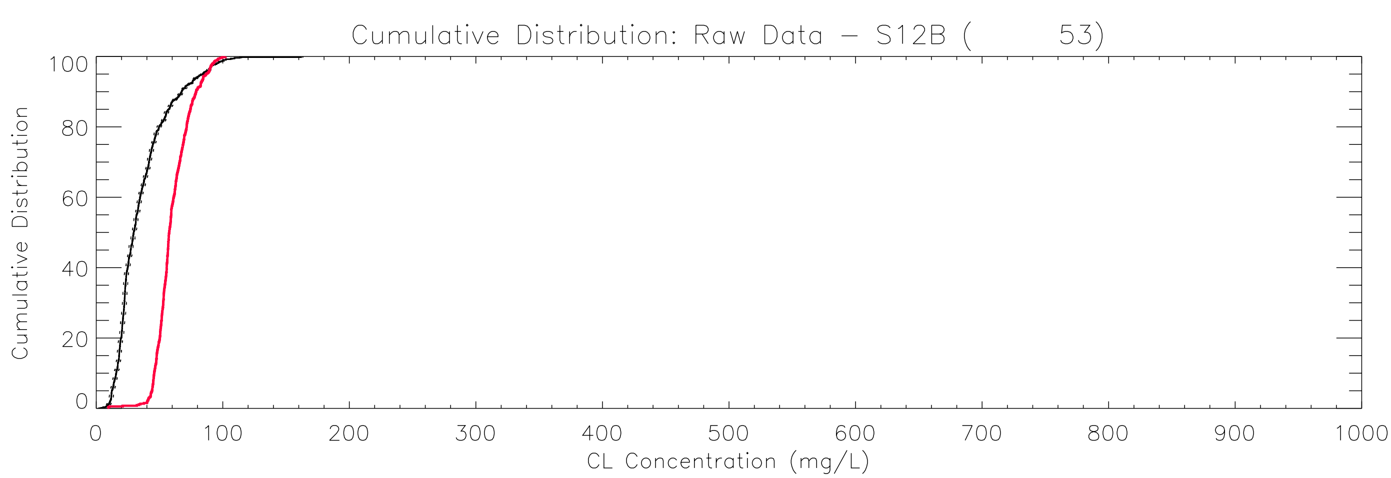

Mean: Water Year – 95% CI – S12A (53)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

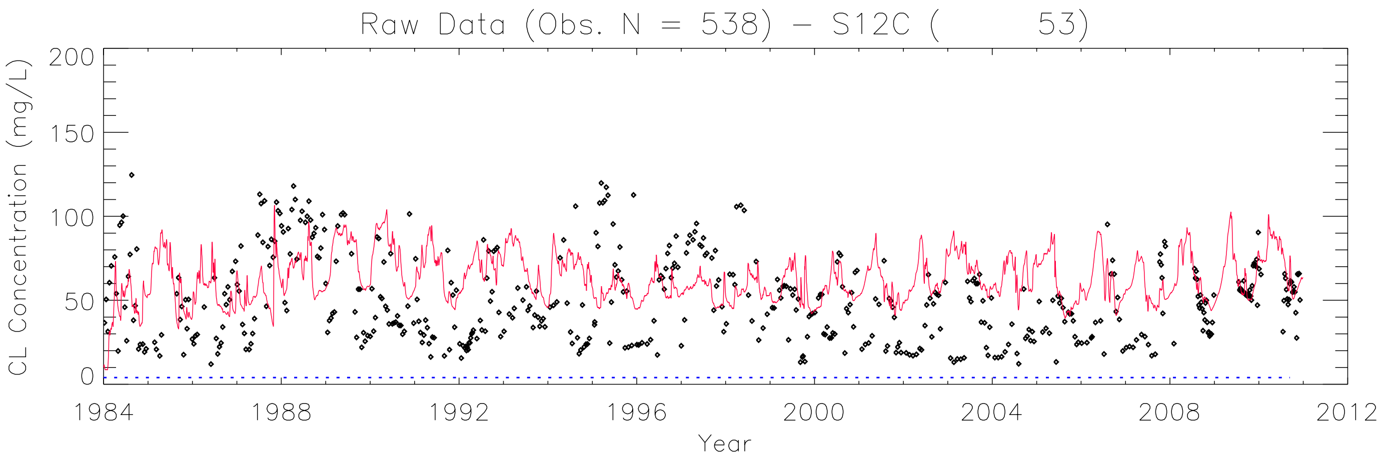

Cumulative Distribution: Raw Data – S12A (53)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)

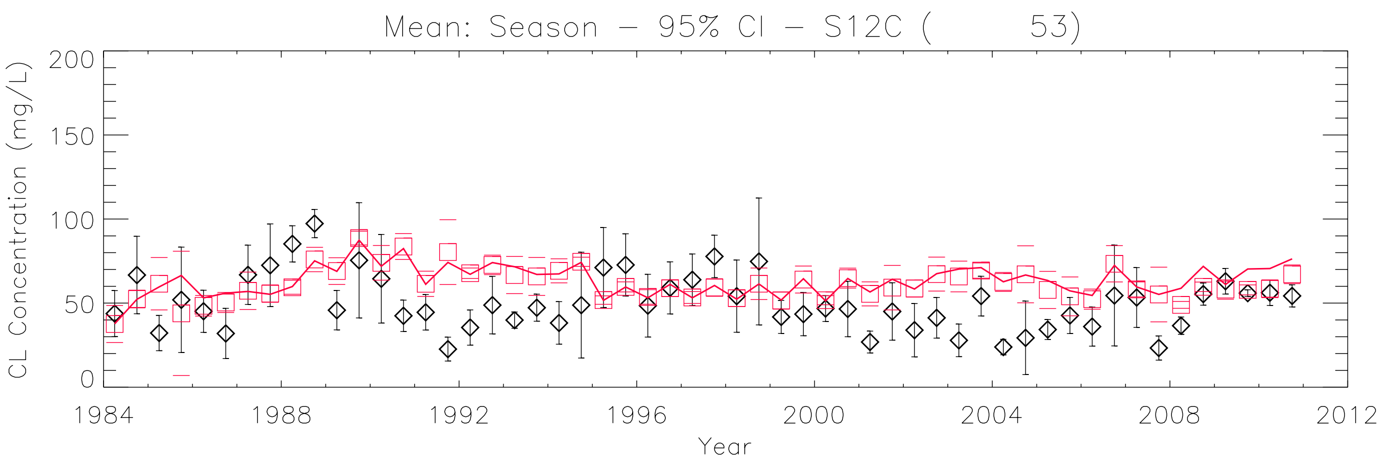

Raw Data (Obs. N = 522) – S12B (53)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

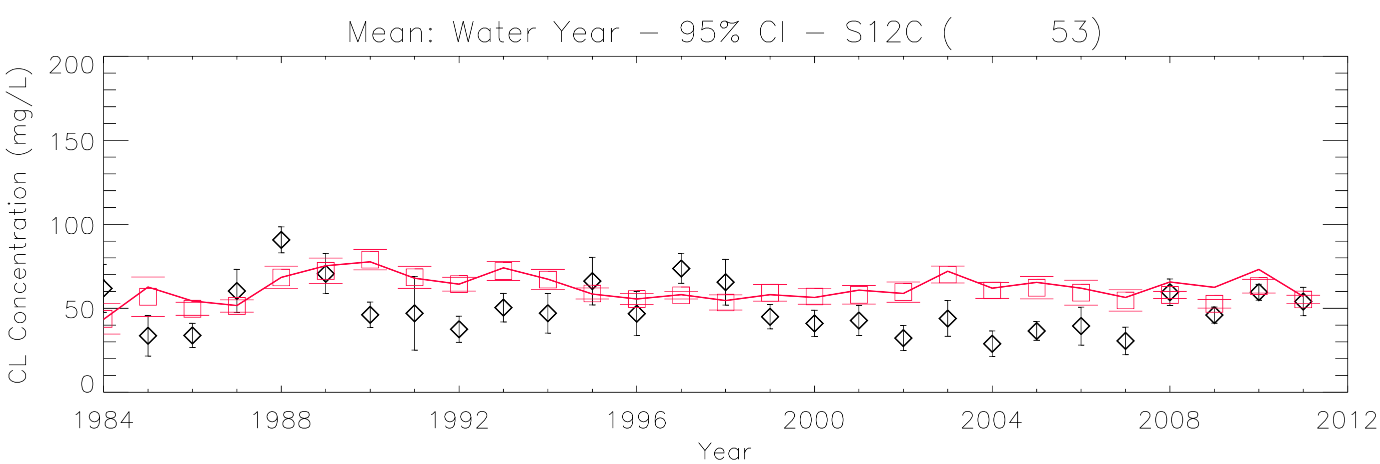

Mean: Season – 95% CI – S12B (53)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

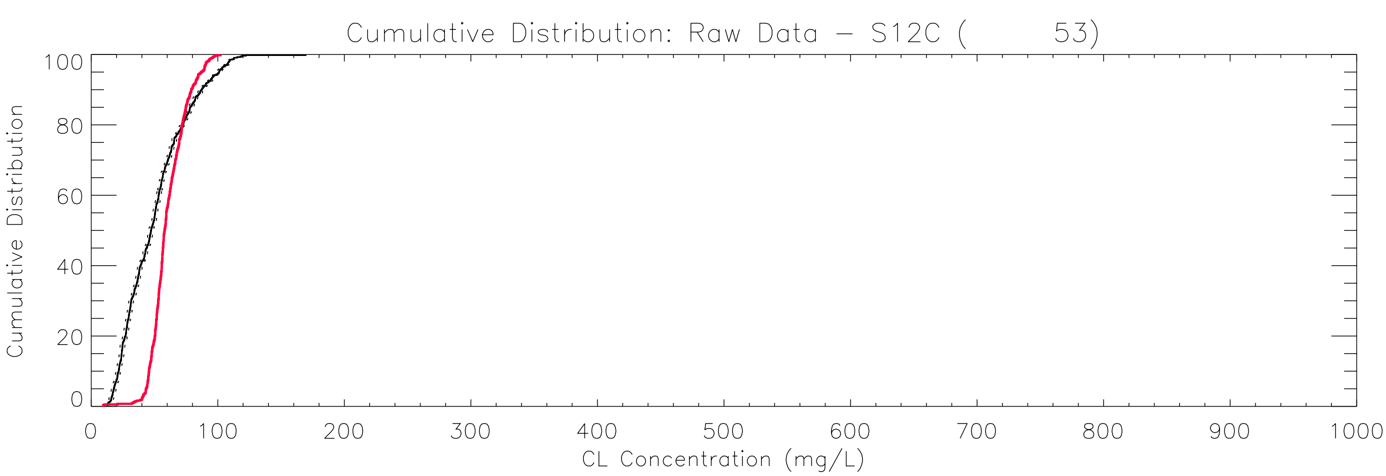

Mean: Water Year – 95% CI – S12B (53)
CL Concentration (mg/L)
0
50
100
150
200
1984
1988
1992
1996
2000
2004
2008
2012
Year

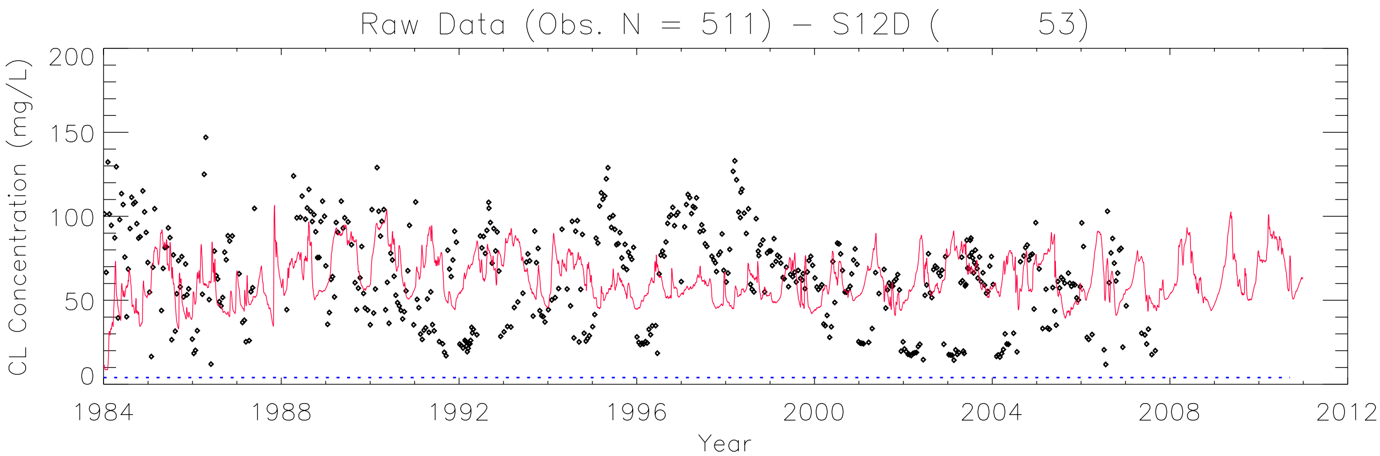

Cumulative Distribution: Raw Data – S12B (53)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)


Raw Data (Obs. N = 538) – S12C (53)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

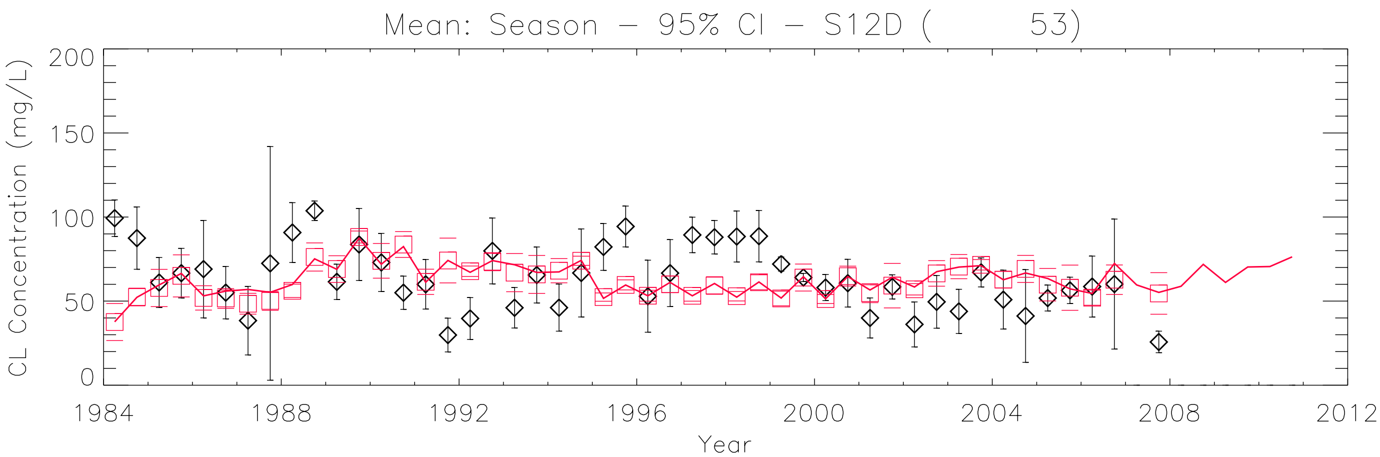

Mean: Season – 95% CI – S12C (53)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year – 95% CI – S12C (53)
CL Concentration (mg/L)
200
150
100
50
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

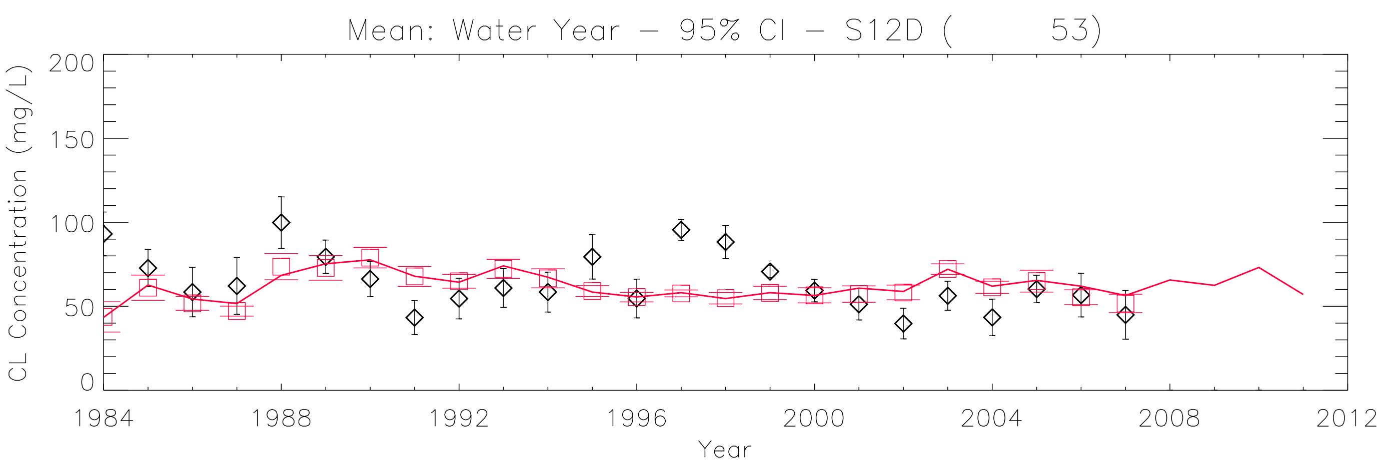

Cumulative Distribution: Raw Data – S12C (53)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



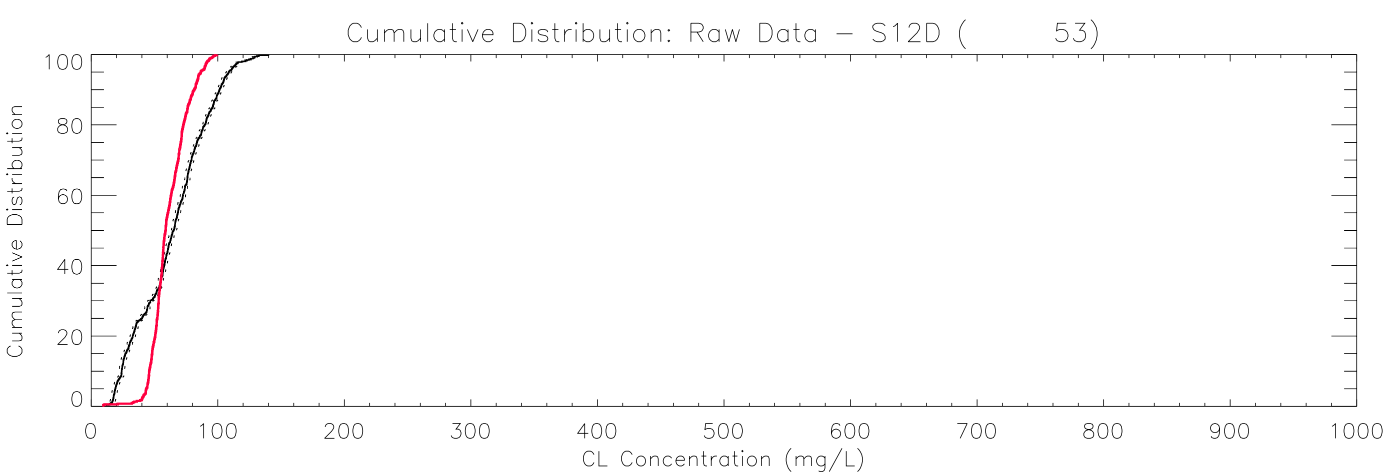
Raw Data (Obs. N = 511) – S12D (53)
CL Concentration (mg/L)
Year



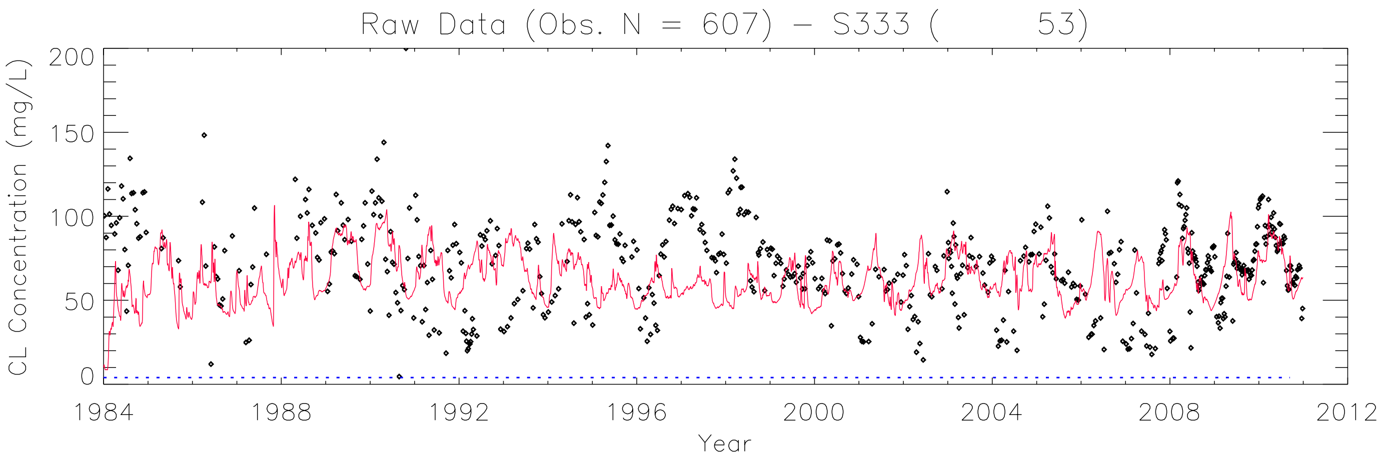
Mean: Season – 95% CI – S12D (53)
CL Concentration (mg/L)
Year

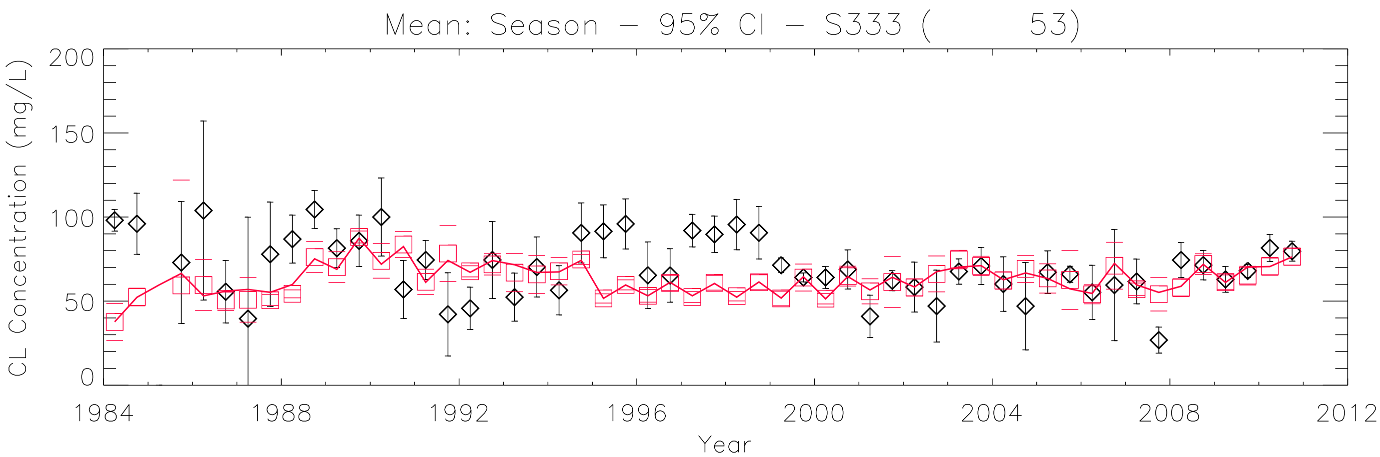


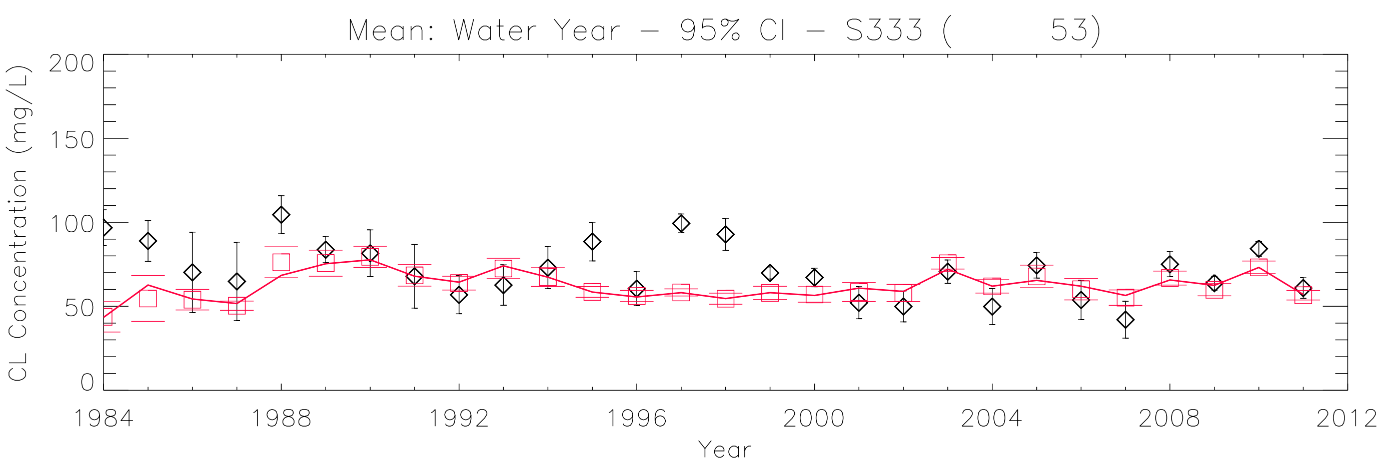
Mean: Water Year – 95% CI – S12D (53)
CL Concentration (mg/L)
Year

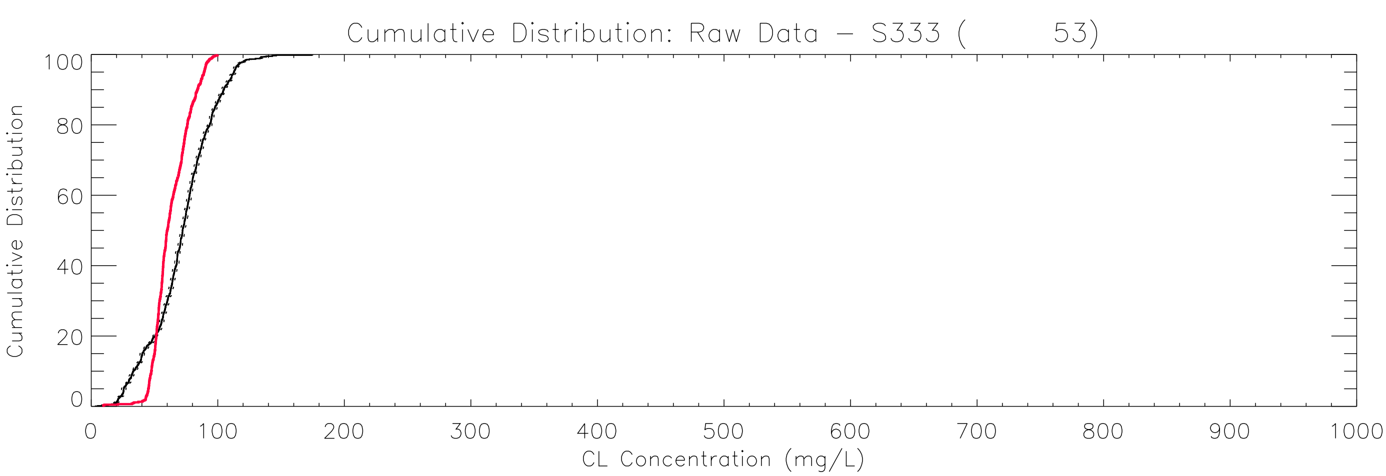


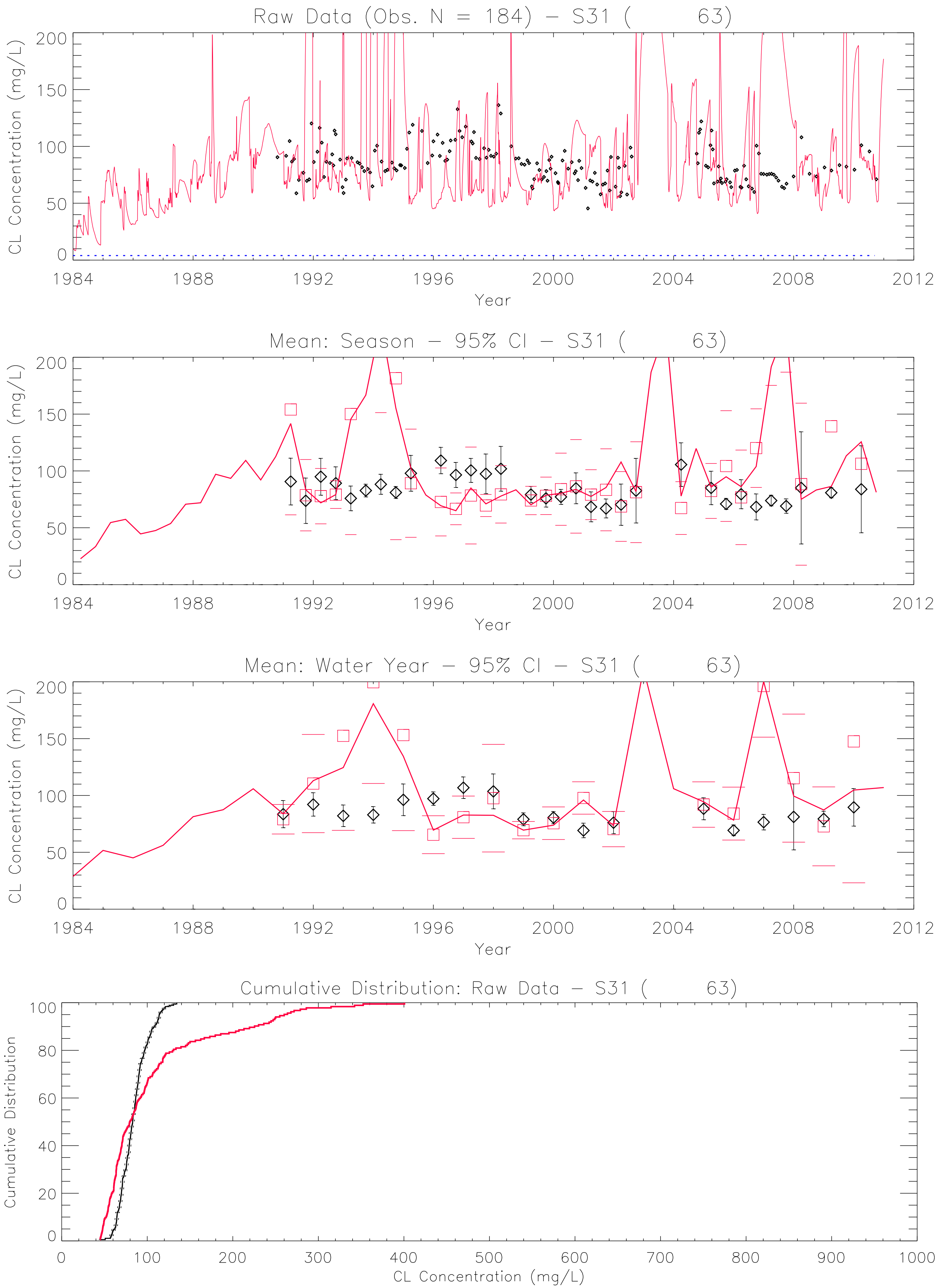
Cumulative Distribution: Raw Data – S12D (53)
Cumulative Distribution
CL Concentration (mg/L)


Raw Data (Obs. N = 607) – S333 (53)
CL Concentration (mg/L)
Year

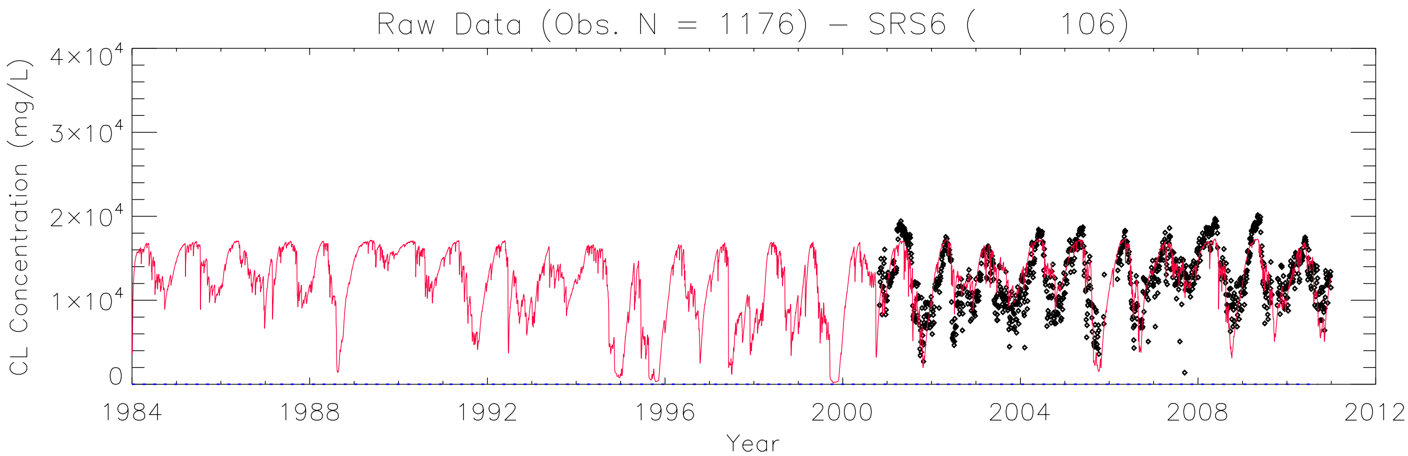

Mean: Season – 95% CI – S333 (53)
CL Concentration (mg/L)
Year


Mean: Water Year – 95% CI – S333 (53)
CL Concentration (mg/L)
Year

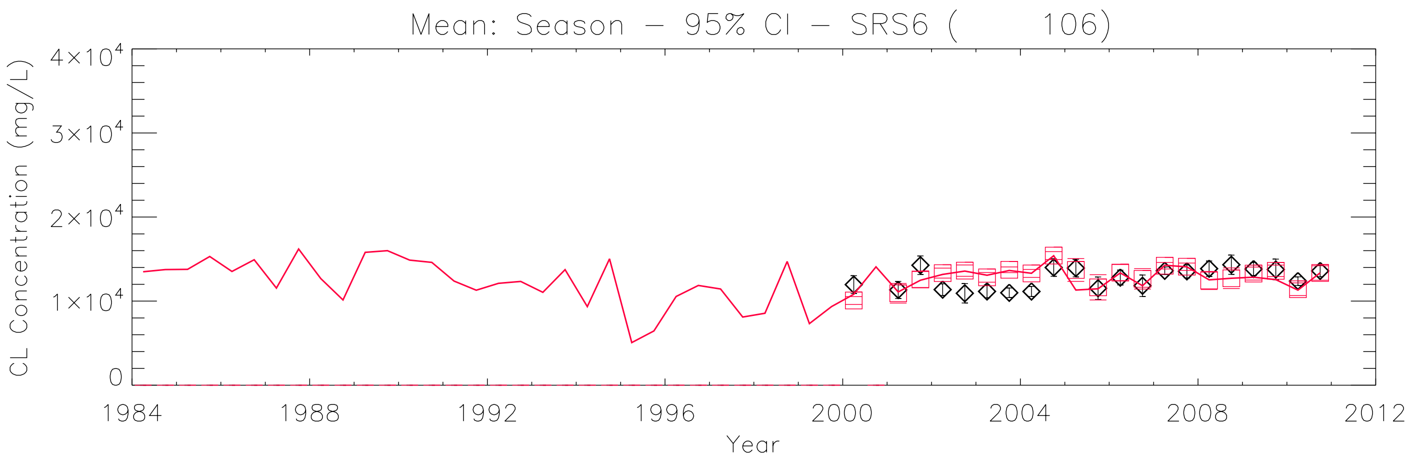

Cumulative Distribution: Raw Data – S333 (53)
Cumulative Distribution
CL Concentration (mg/L)



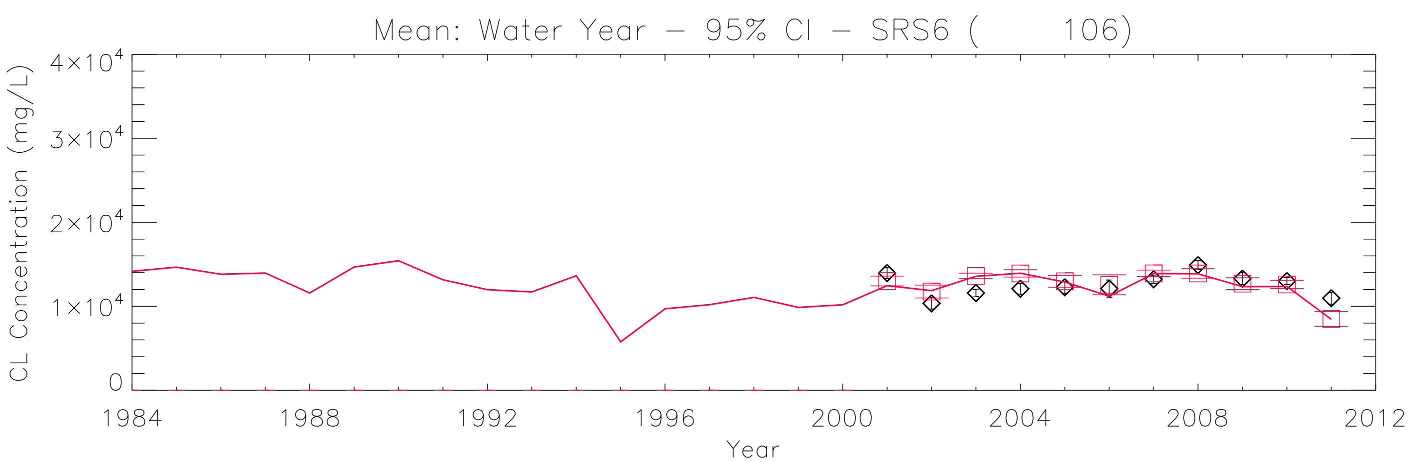
Raw Data (Obs. N = 184) – S31 (63)
CL Concentration (mg/L)
Year
Mean: Season – 95% CI – S31 (63)
CL Concentration (mg/L)
Year
Mean: Water Year – 95% CI – S31 (63)
CL Concentration (mg/L)
Year
Cumulative Distribution: Raw Data – S31 (63)
Cumulative Distribution
CL Concentration (mg/L)



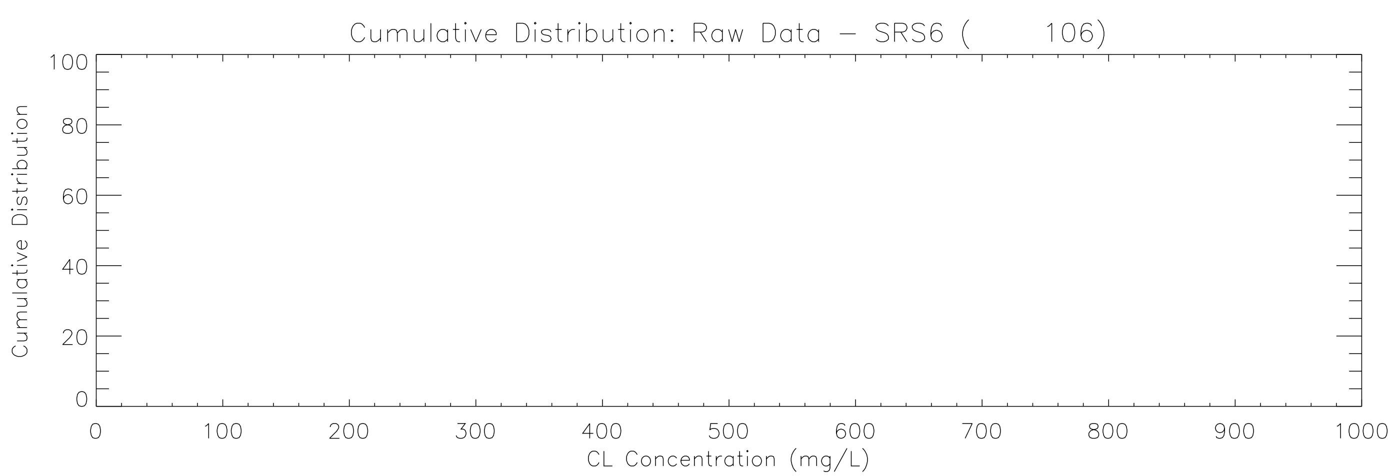
Raw Data (Obs. N = 1176) - SRS6 (106)
CL Concentration (mg/L)
Year



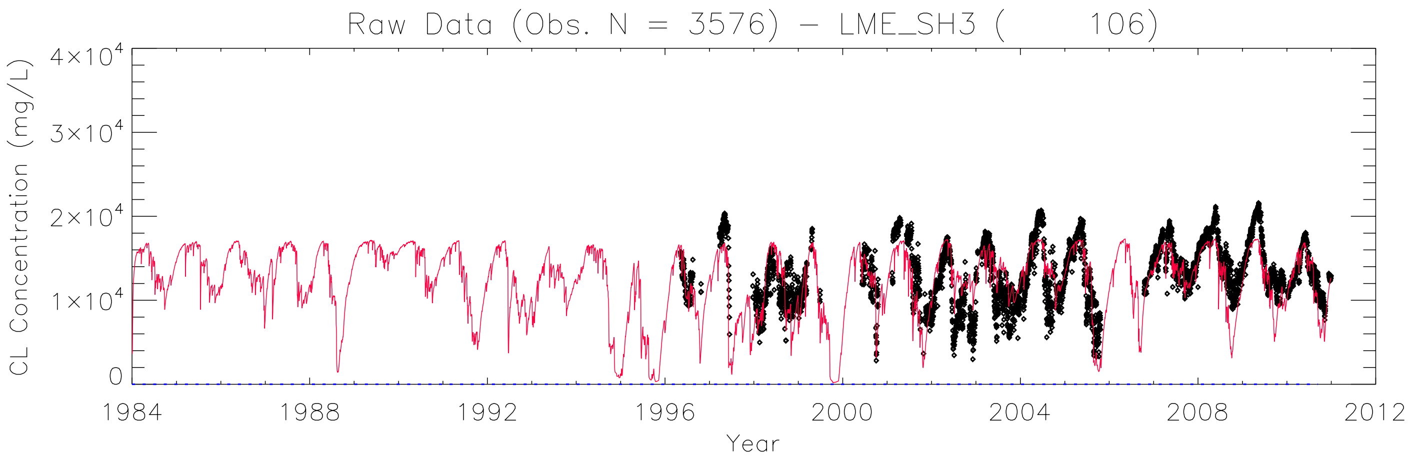
Mean: Season - 95% CI - SRS6 (106)
CL Concentration (mg/L)
Year



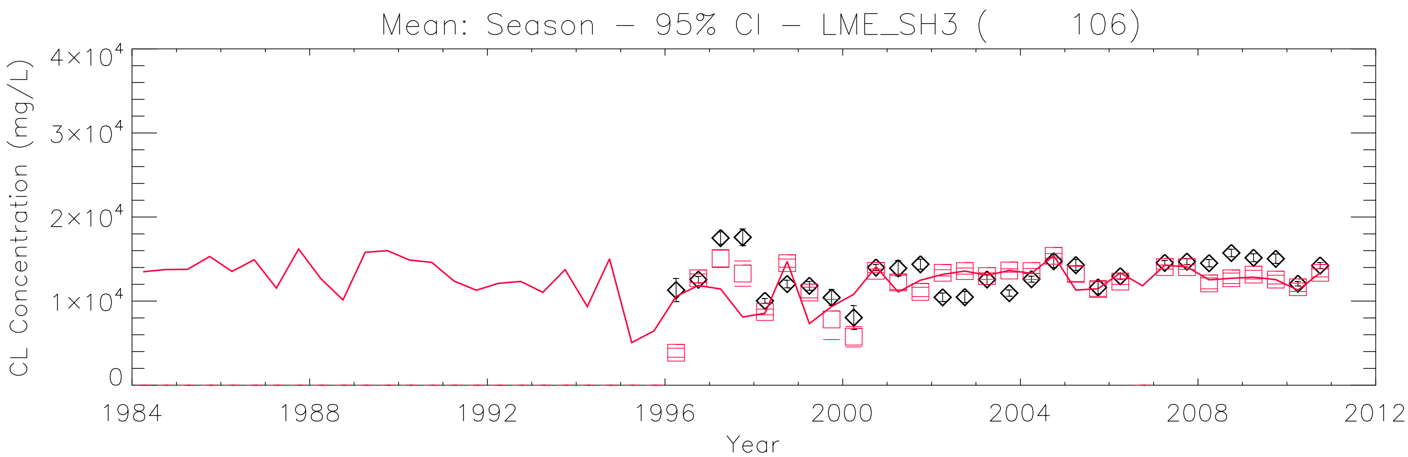
Mean: Water Year - 95% CI - SRS6 (106)
CL Concentration (mg/L)
Year



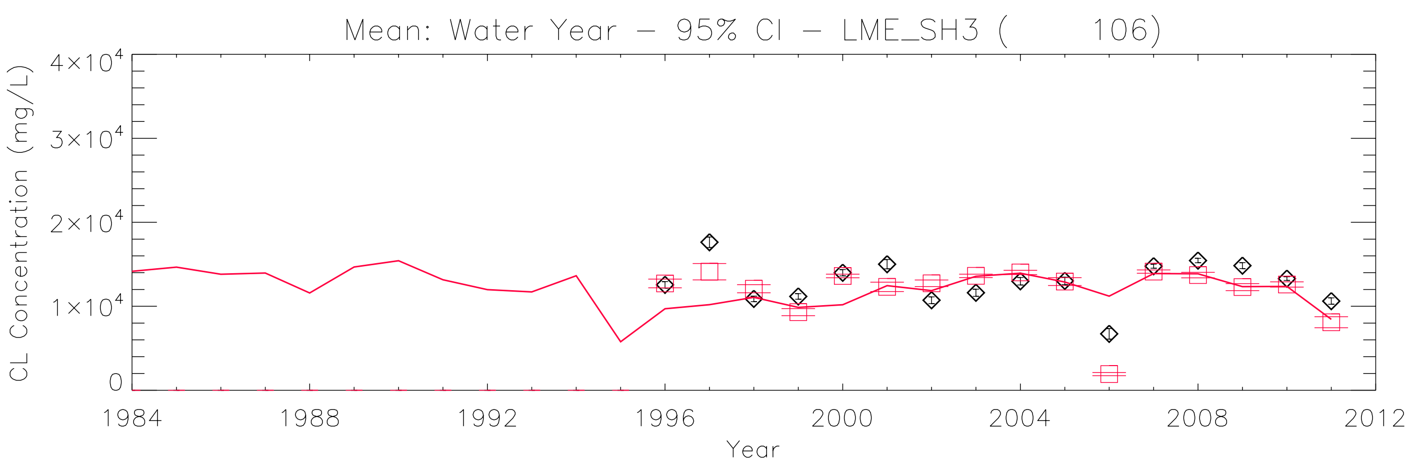
Cumulative Distribution: Raw Data - SRS6 (106)
Cumulative Distribution
CL Concentration (mg/L)



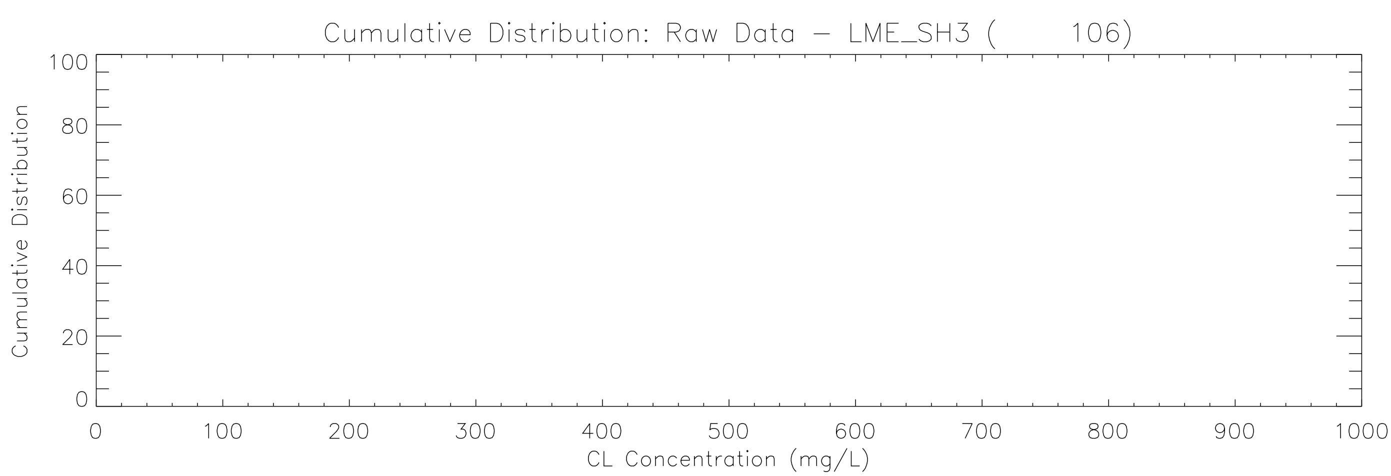
Raw Data (Obs. N = 3576) – LME_SH3 (106)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year



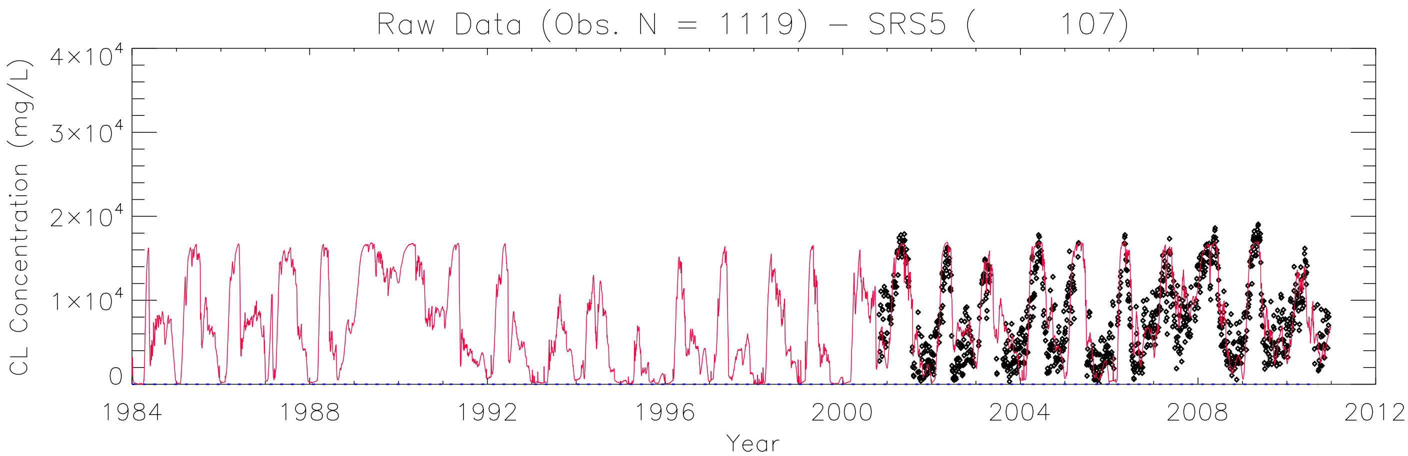
Mean: Season – 95% CI – LME_SH3 (106)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

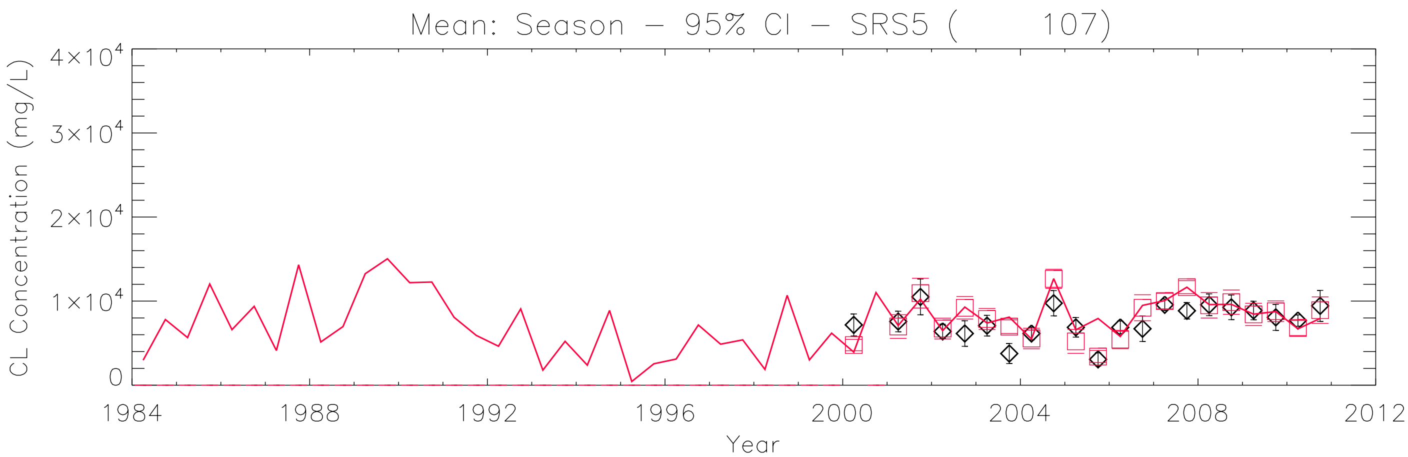


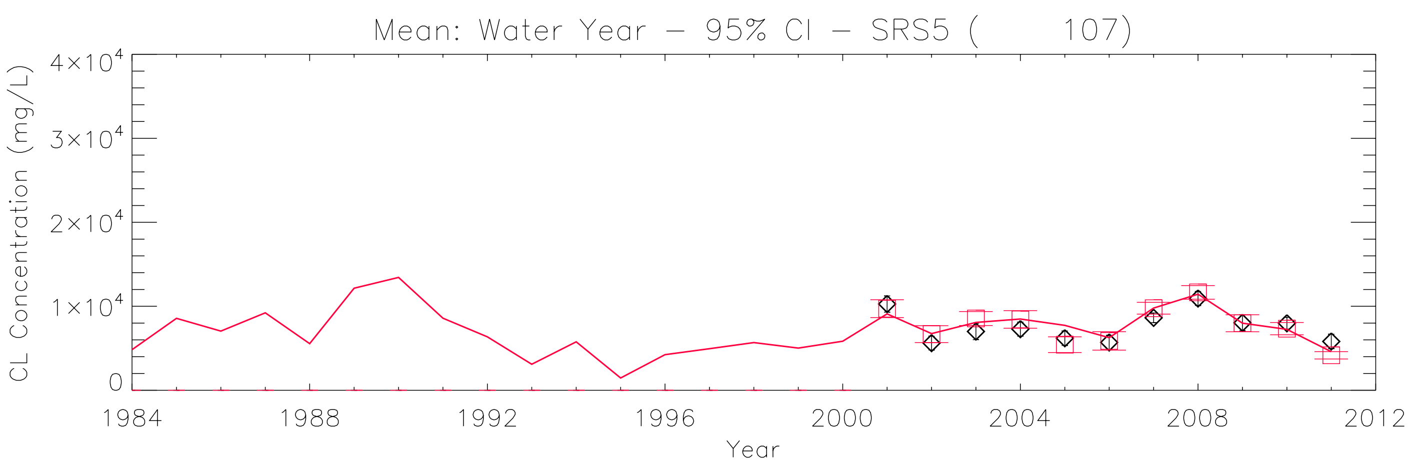
Mean: Water Year – 95% CI – LME_SH3 (106)
CL Concentration (mg/L)
4×10^4
3×10^4
2×10^4
1×10^4
0
1984
1988
1992
1996
2000
2004
2008
2012
Year

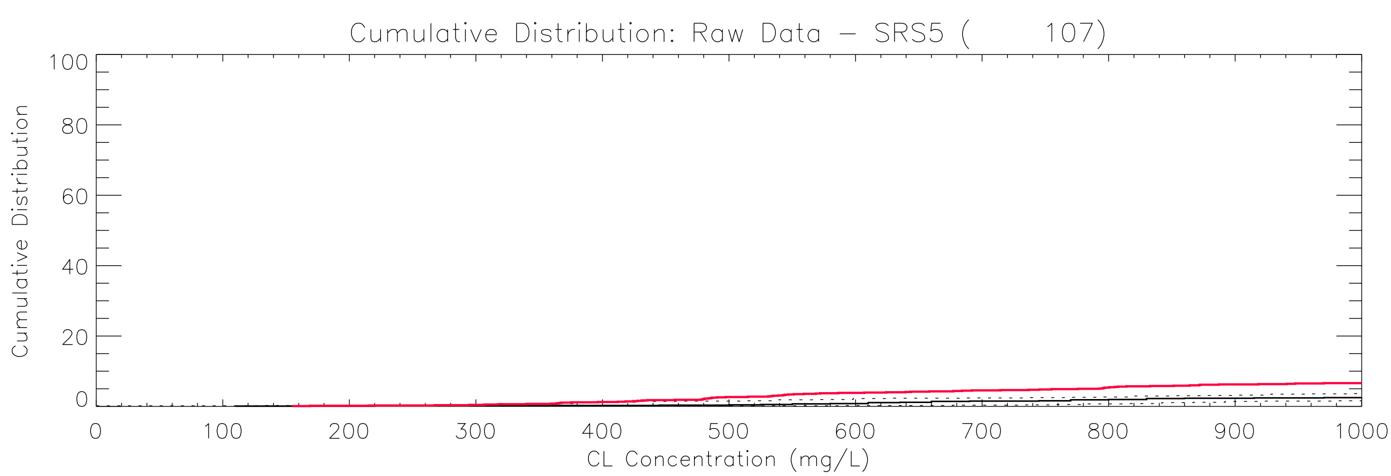


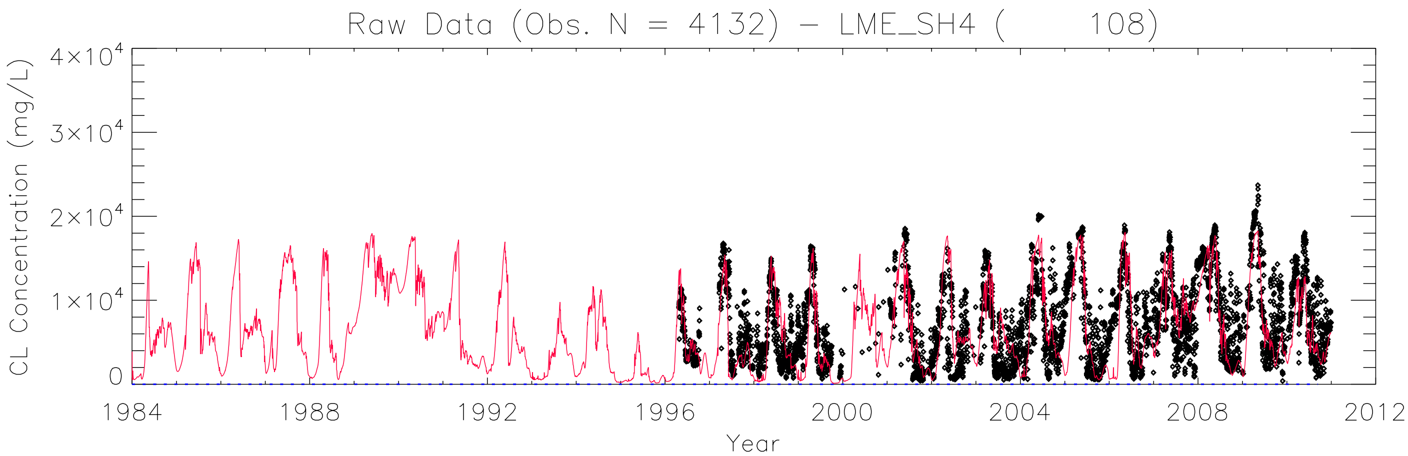
Cumulative Distribution: Raw Data – LME_SH3 (106)
Cumulative Distribution
100
80
60
40
20
0
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)


Raw Data (Obs. N = 1119) - SRS5 (107)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

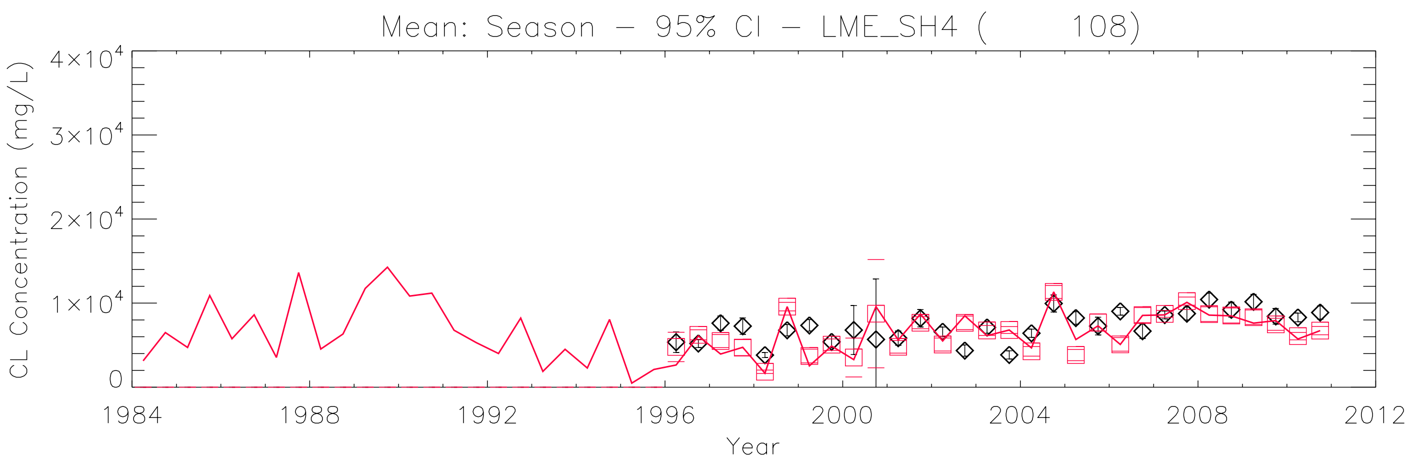

Mean: Season - 95% CI - SRS5 (107)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year - 95% CI - SRS5 (107)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year

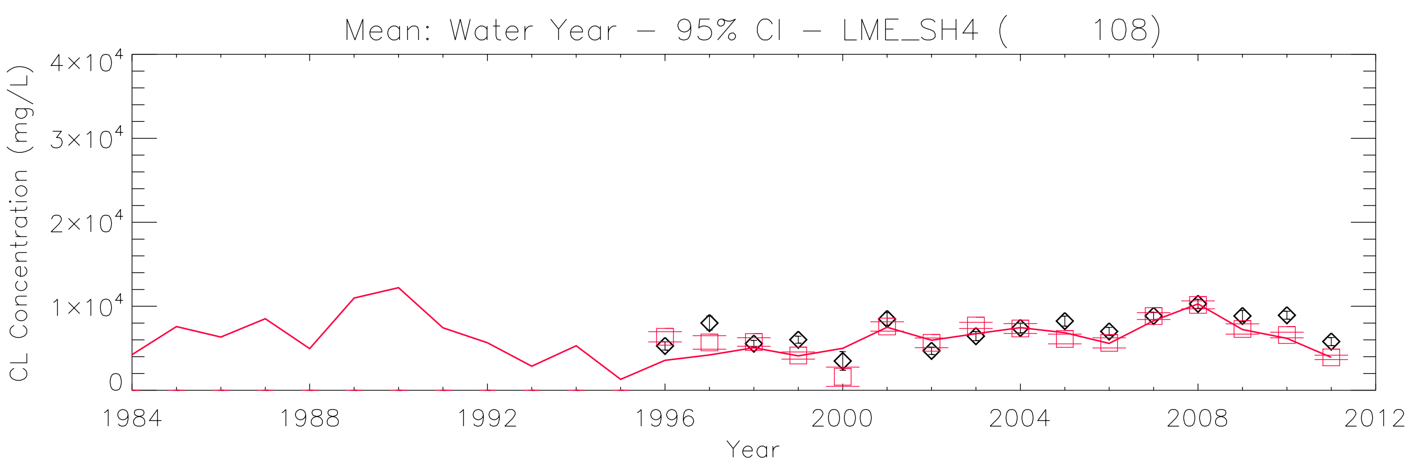

Cumulative Distribution: Raw Data - SRS5 (107)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)



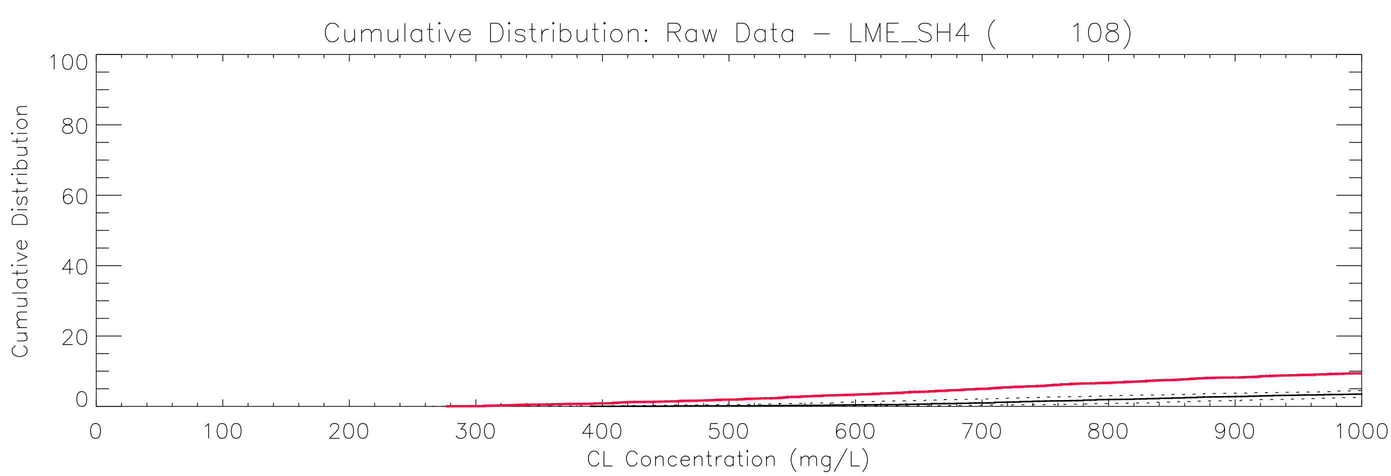
Raw Data (Obs. N = 4132) - LME_SH4 (108)
CL Concentration (mg/L)
Year



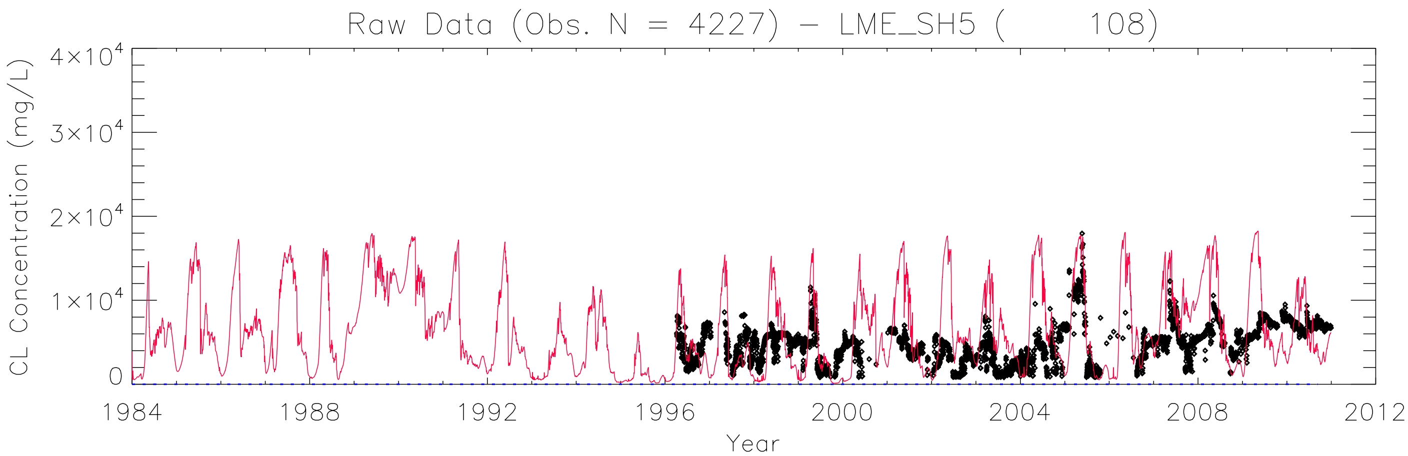
Mean: Season - 95% CI - LME_SH4 (108)
CL Concentration (mg/L)
Year



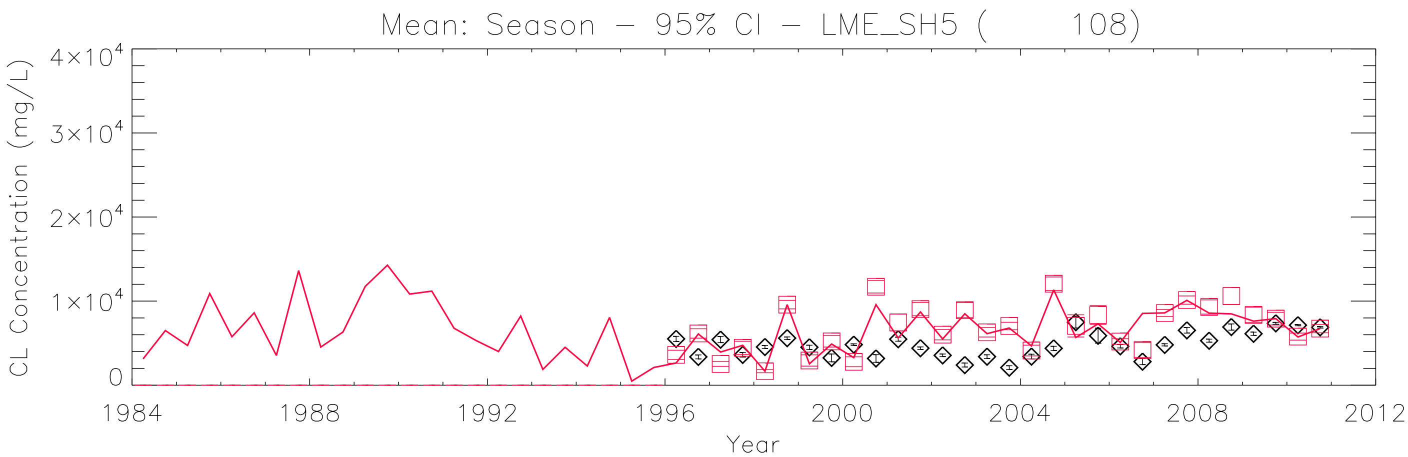
Mean: Water Year - 95% CI - LME_SH4 (108)
CL Concentration (mg/L)
Year



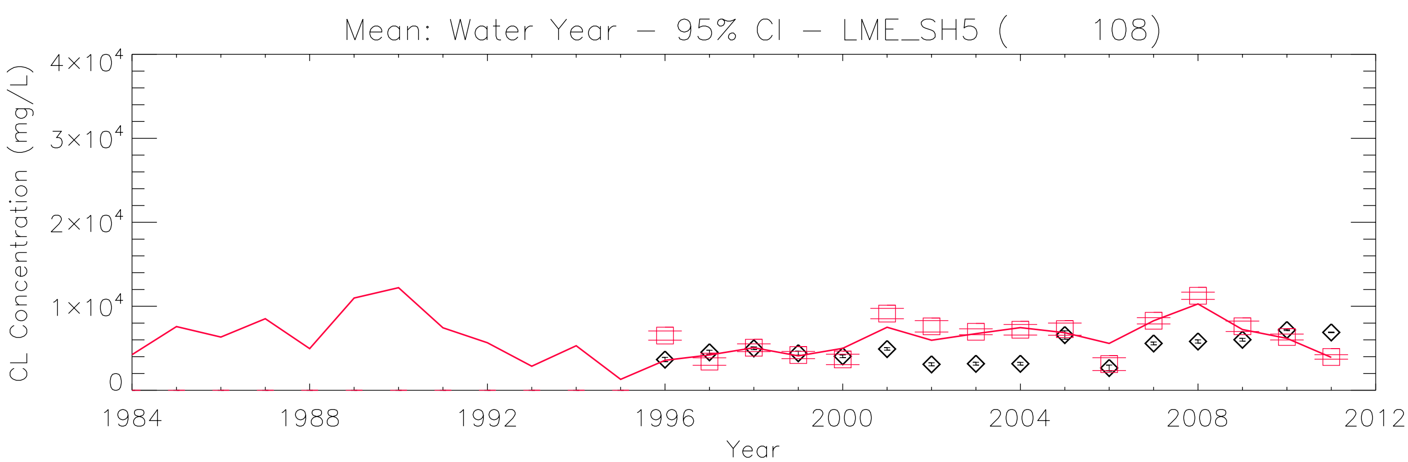
Cumulative Distribution: Raw Data - LME_SH4 (108)
Cumulative Distribution
CL Concentration (mg/L)



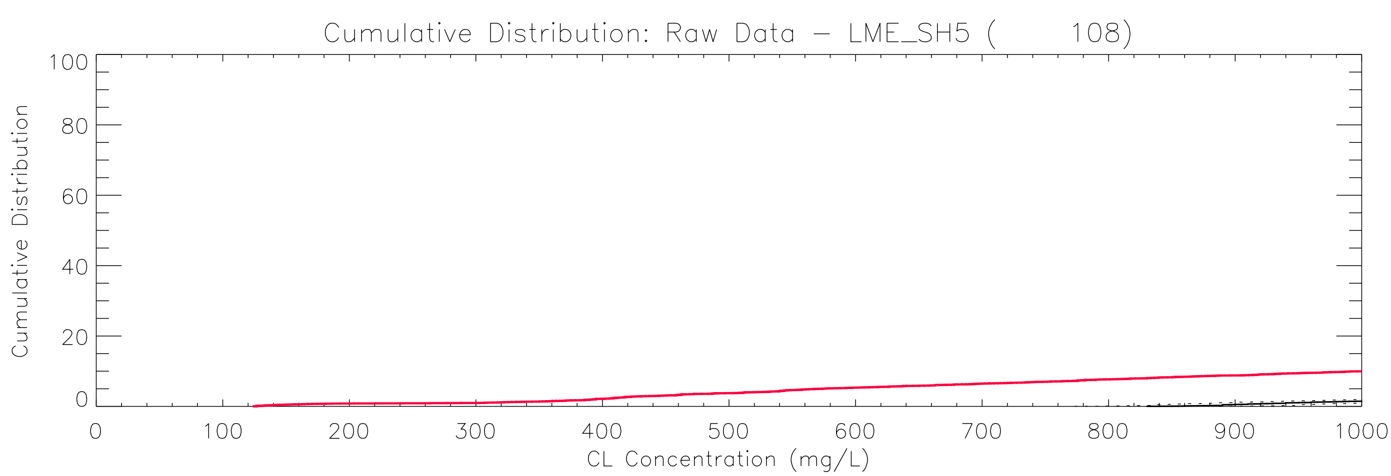
Raw Data (Obs. N = 4227) – LME_SH5 (108)
CL Concentration (mg/L)
Year



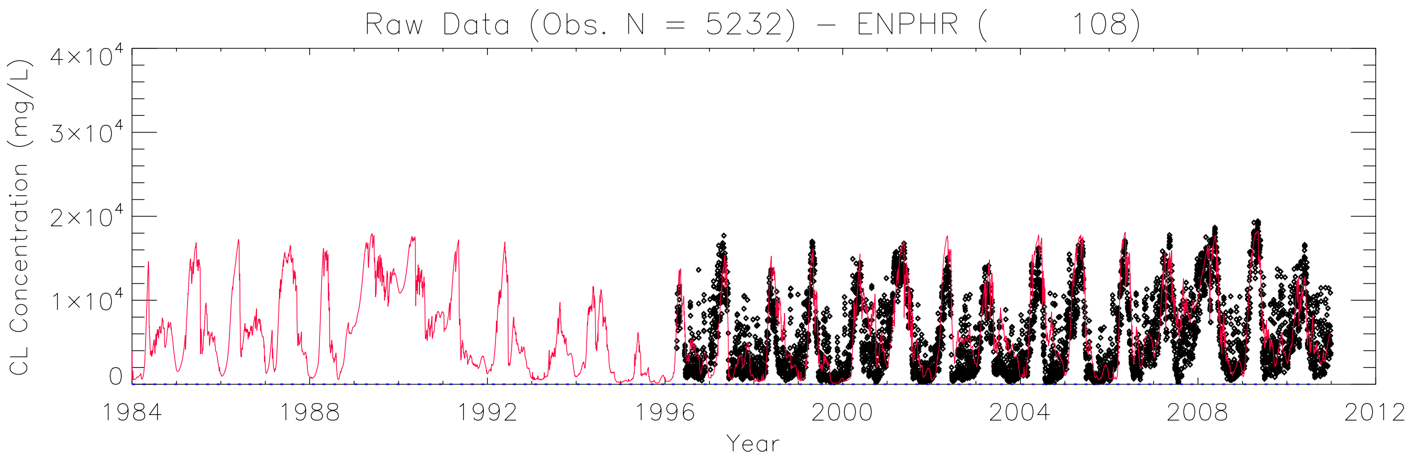
Mean: Season – 95% CI – LME_SH5 (108)
CL Concentration (mg/L)
Year

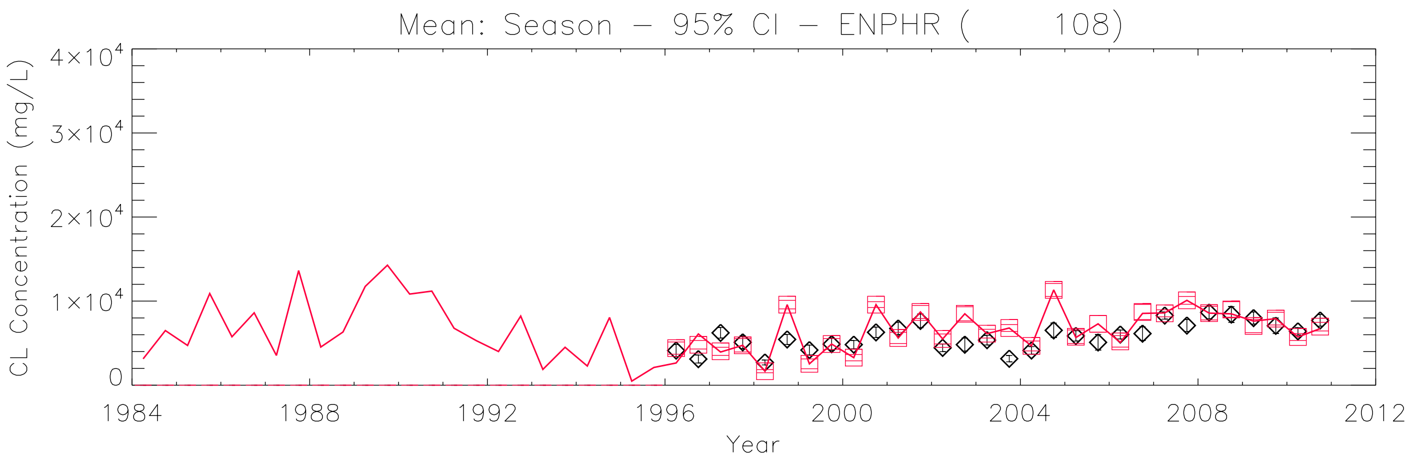


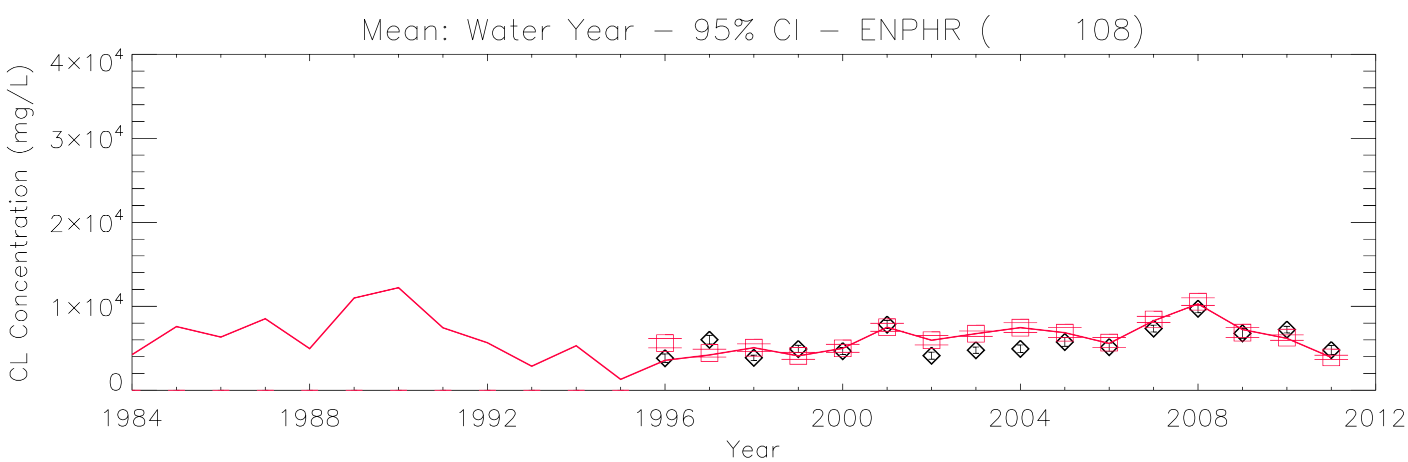
Mean: Water Year – 95% CI – LME_SH5 (108)
CL Concentration (mg/L)
Year

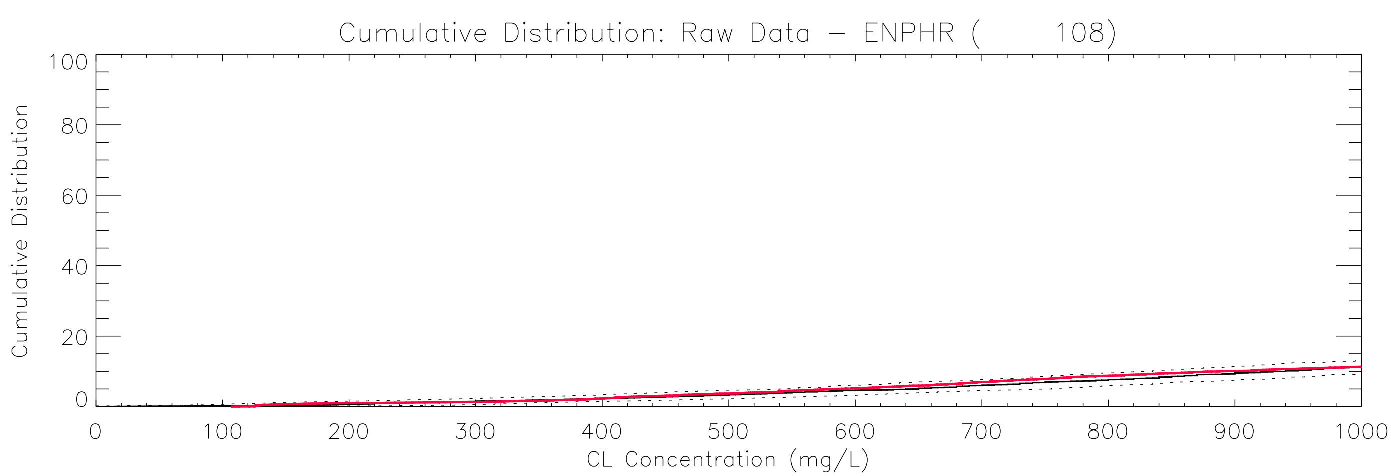


Cumulative Distribution: Raw Data – LME_SH5 (108)
Cumulative Distribution
CL Concentration (mg/L)


Raw Data (Obs. N = 5232) − ENPHR (108)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Season − 95% CI − ENPHR (108)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year


Mean: Water Year − 95% CI − ENPHR (108)
CL Concentration (mg/L)
0
1×10^4
2×10^4
3×10^4
4×10^4
1984
1988
1992
1996
2000
2004
2008
2012
Year


Cumulative Distribution: Raw Data − ENPHR (108)
Cumulative Distribution
0
20
40
60
80
100
0
100
200
300
400
500
600
700
800
900
1000
CL Concentration (mg/L)