

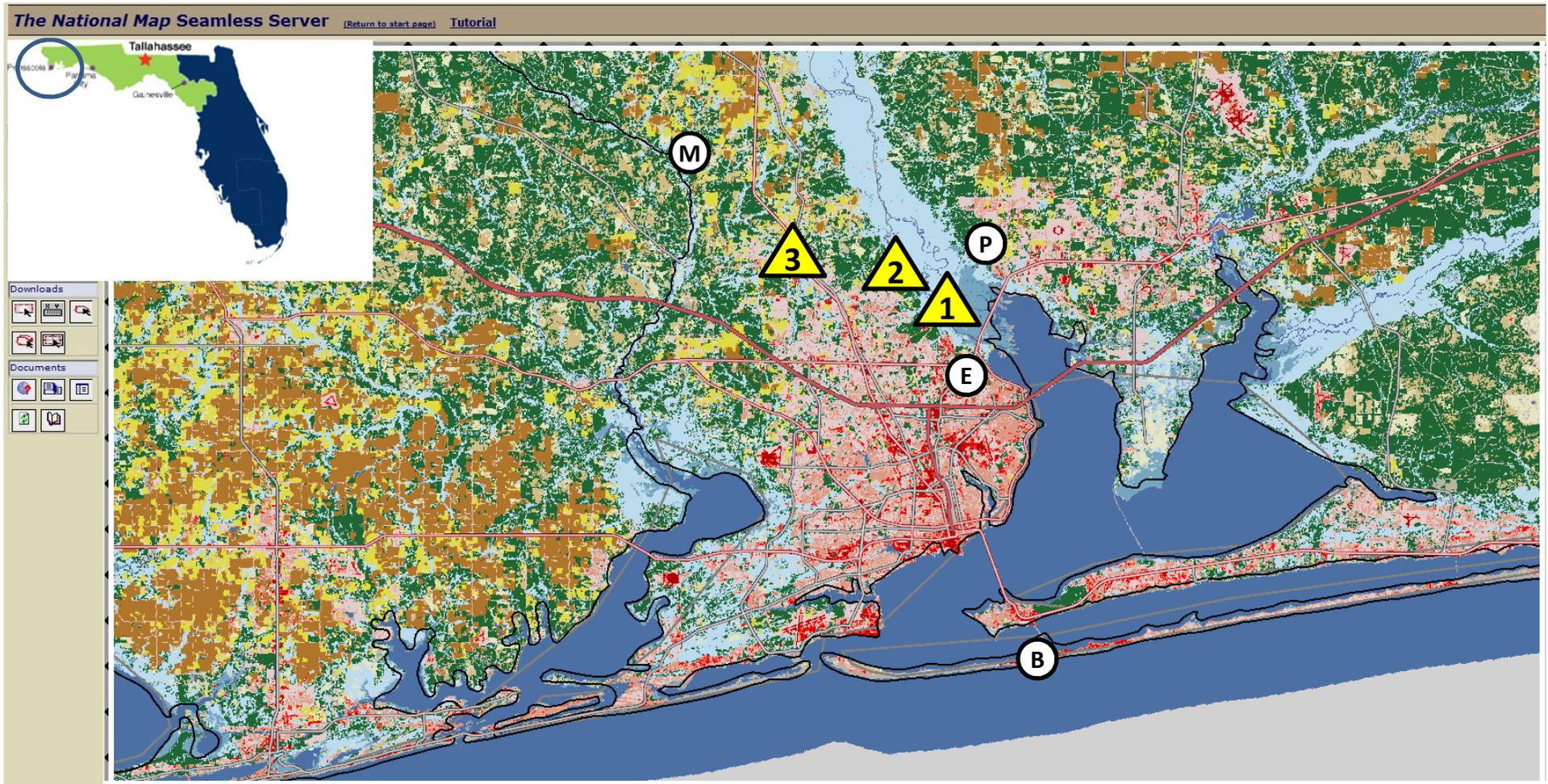
Temporal and Spatial Variability of Mercury, pH, and Non-Sea Salt Sulfate Fluxes associated with anthropogenic emissions in the Pensacola Bay Region

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History

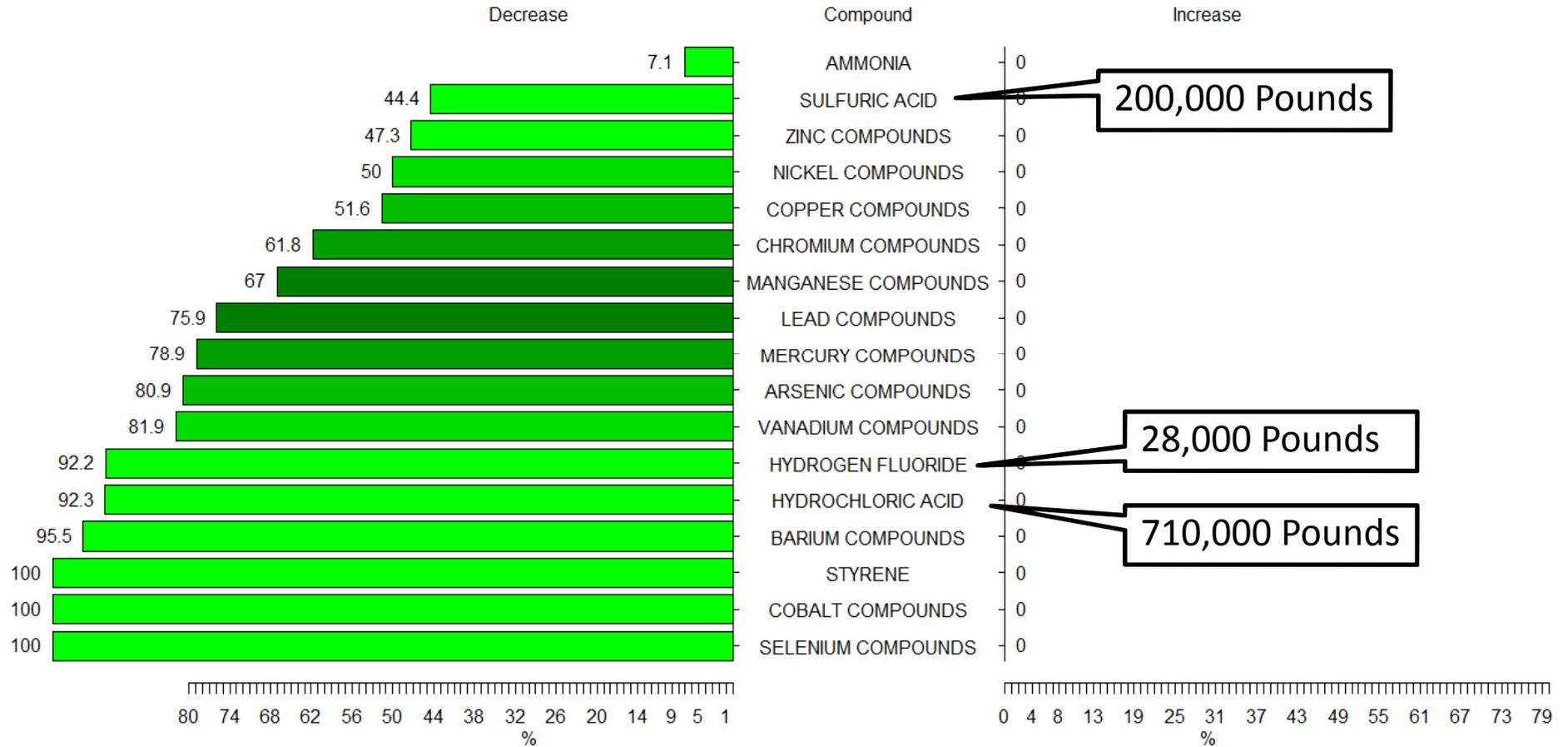
- Project started in November 2004 with collectors at Ellyson, Pace, and Molino.
- Monitoring of atmospheric wet deposition of Hg. Initially funded by EPA. Since January 2008 by the Electric Power Research Institute
- National Atmospheric Deposition Program: NADP - MDN
- Power plant installed scrubber and other controls.
- Beach station became active in September 2009



Source: USGS Map Seamless Server, <http://www.usmarshals.gov>, and Microsoft Bing



Gulf Power Crist Plant - Point Source Air Emissions Percent Change 2009 - 2010



Total Pounds Released 2010 = 946,181 (-90%)

Equipment



Rain Gauge

Temperature and pressure sensor

Data logger

Backup Battery

Sampling and Analysis

- Samples collected after each storm event greater than 0.1 inches
- University of West Florida analyzed samples for pH, Sulfate, Nitrate+nitrite, Chloride, Phosphate, Sodium, Ammonia, Potassium, Magnesium, and Calcium
- Florida State University analyzed Mercury and Trace Metals.

Data Collected

	Since Beginning of the Project	Using Four Collectors
	(November 2004)	(September 2009)
Total PE Bottles	1,155	397
Total Teflon Bottles	2,062	730
Total Bottles	3,217	1,127
Storms Collected	386	101
Records with Climatological Information (Airport and Dataloggers)	61,344	18,263

Climate Findings

- Major storms
- Summer Storms vs Winter Storms
- Wind Direction
- Wind Speed

High Intensity Storms



JULY 2010
LOCAL CLIMATOLOGICAL DATA
 NOAA, National Climatic Data Center

PENSACOLA, FL
 PENSACOLA REGIONAL AIRPORT (KPNS)
 Lat:30° 28'N Long: 87° 11'W Elev (Ground) 112 Feet
 Time Zone : CENTRAL WBAN: 13899 ISSN#: 0198-1404



Date	Temperature °F							Deg Days BASE 65°		WEATHER	SNOWICE ON GND(IN)		PRECIPITATION ON GND(IN)		PRESSURE (INCHES OF HG)		WIND SPEED = MPH DIR = TENS OF DEGREES						Date
	MAXIMUM	MINIMUM	AVERAGE	DEP FROM NORMAL	AVERAGE DEW FT	AVERAGE WET BULB	HEATING	COOLING	DEPTH		WATER- EQUIV	SNOW- FALL	WATER- EQUIV	AVERAGE STATION	AVERAGE SEA LEVEL	RESULTANT SPEED	RES DIR	AVERAGE SPEED	MAXIMUM		DIR	DIR	
																			3-SEC	2-MIN			
01	83	76	80	-2	75	76	0	15	RA				0.05	29.93	30.07	0.7	33	2.5	15	23	12	21	01
02	91	75	83	0	74	76	0	18	TS RA				0.01	29.91	30.03	4.3	09	6.0	29	12	22	13	02
03	90	74	82	0	67	72	0	17					0.00	29.90	30.04	7.0	08	8.1	23	10	14	09	03
04	88	74	81	-1	71	74	0	16					0.00	29.86	30.00	7.5	10	8.4	23	11	18	11	04
05	81	74	78	-4	74	75	0	13	TS TSRA RA BR			1.22	29.83	29.97	5.4	12	6.4	18	14	15	13	05	
06	82	73*	78*	-4	74	75	0	13	TS RA BR VCTS			0.81	29.87	30.00	7.7	11	8.7	23	15	20	13	06	
07	88	75	82	0	74	76	0	17				0.00	29.90	30.03	4.3	14	6.7	18	16	14	16	07	
08	92	75	84	0	73	76	0	19	BR			0.00	29.88	30.00	3.0	22	4.9	24	03	13	21	08	
09	93	78	86	4	74	77	0	21	TS TSRA RA			0.00	29.85	29.98	5.5	25	6.5	26	02	20	01	09	
10	94	78	86	4	73	77	0	21	TS TSRA RA			0.01	29.83	29.97	3.7	27	5.7	18	26	14	31	10	
11	93	78	86	4	75	78	0	21	TS			0.00	29.80	29.93	5.6	25	7.7	21	26	17	23	11	
12	92	80	86	4	74	77	0	21				0.00	29.78	29.91	8.6	25	9.0	22	26	17	27	12	
13	94	81	88	6	75	78	0	23	RA			T	29.84	29.96	9.1	25	9.5	23	23	17	23	13	
14	94	78	86	4	75	78	0	21	TS RA			T	29.88	30.02	4.8	26	7.5	22	22	18	22	14	
15	92	76	84	1	76	78	0	19	TS TSRA RA BR HZ			0.55	29.88	30.01	1.9	18	3.5	31*	27	24*	27	15	
16	89	78	84	1	75	78	0	19	RA			T	29.91	30.04	8.0	17	8.5	23	14	18	18	16	
17	89	80	85	2	75	78	0	20				0.00	29.93	30.06	8.4	17	9.4	21	18	16	17	17	
18	89	75	82	-1	75	77	0	17				0.00	29.94	30.07	4.5	18	6.1	20	19	15	19	18	
19	91	75	83	0	72	76	0	18				0.00	29.93	30.06	3.3	12	5.7	17	15	14	15	19	

JULY 2010
PENSACOLA, FL

WEATHER NOTATIONS

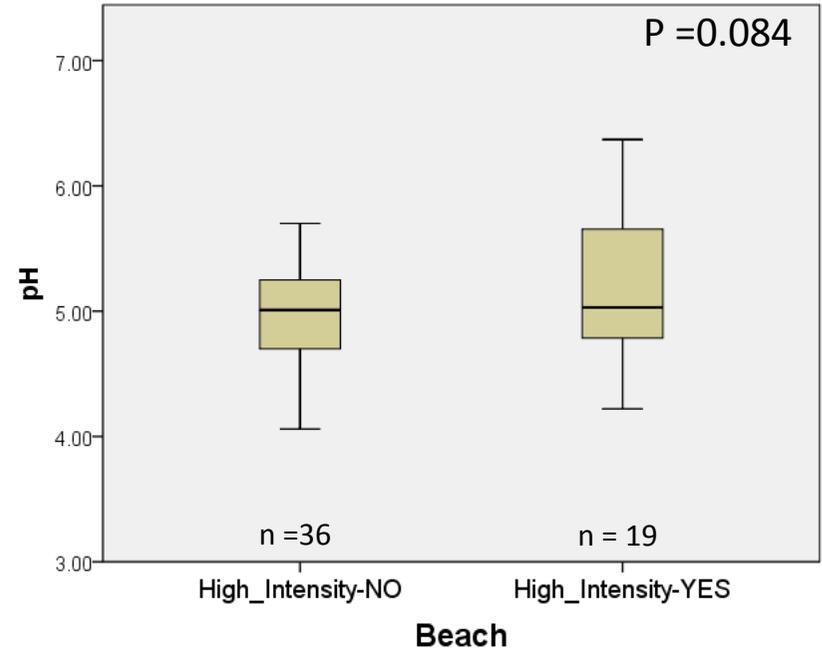
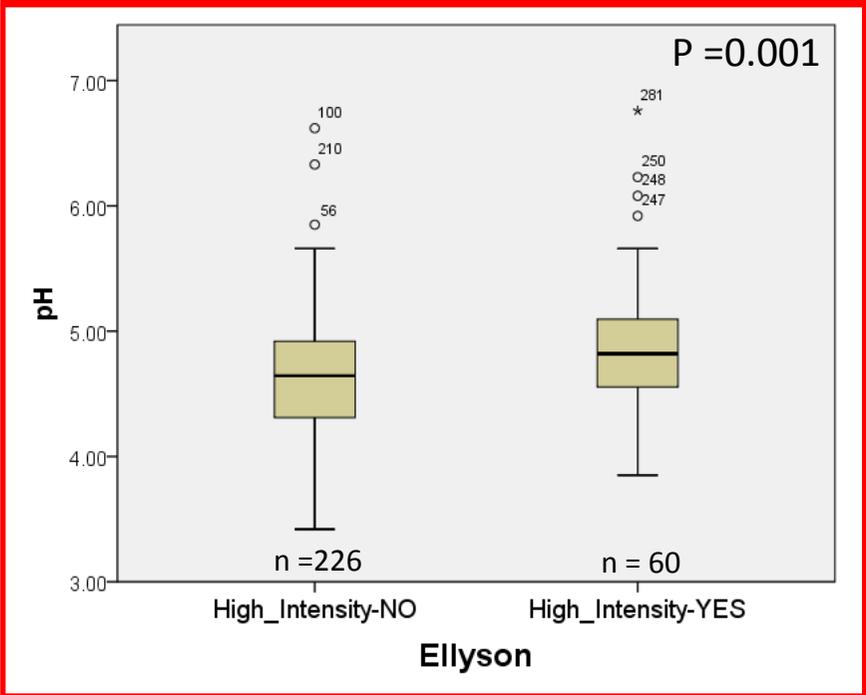
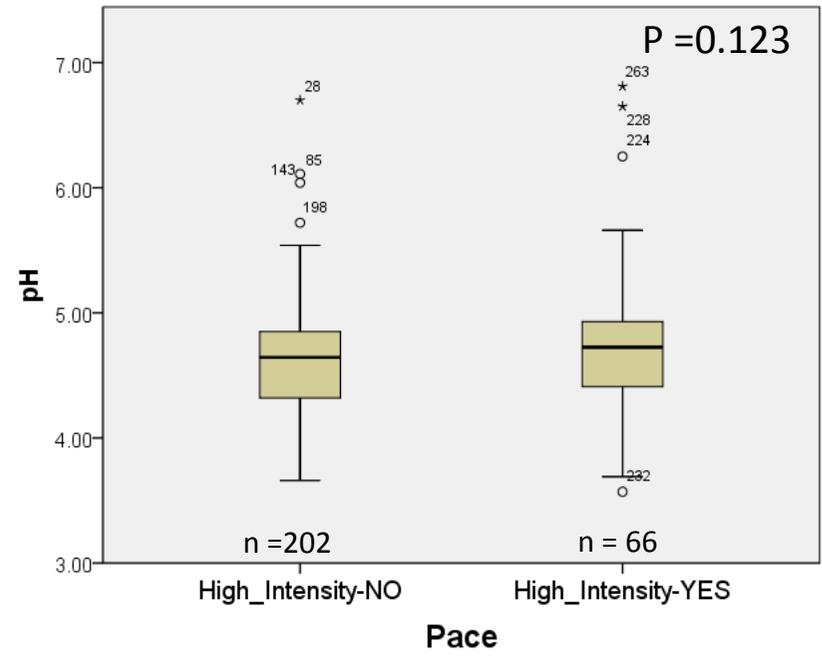
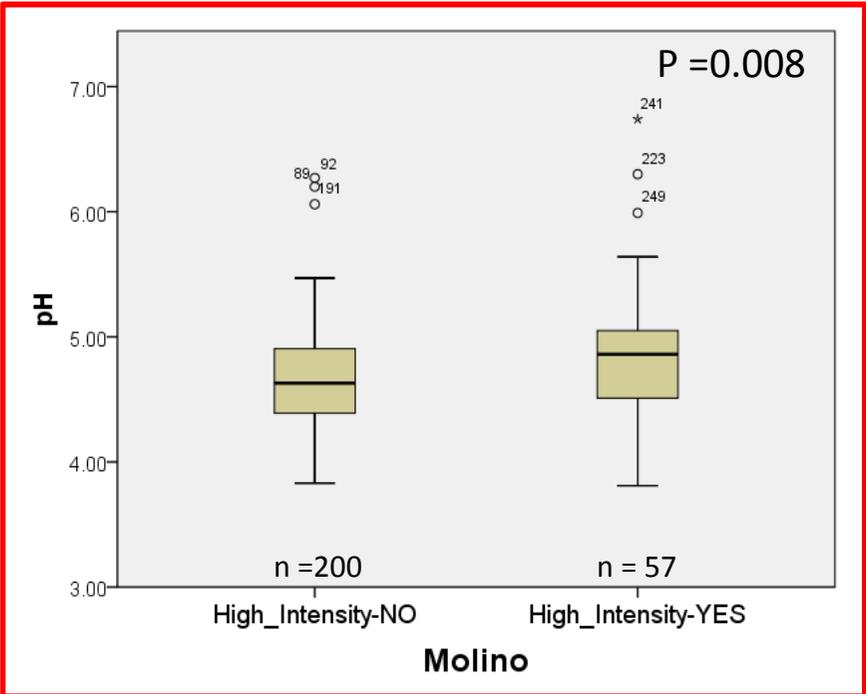
QUALIFIER	WEATHER PHENOMENA		
DESCRIPTOR	PRECIPITATION	OBSCURATION	OTHER
BC Patches	DZ Drizzle	BR Mist	DS Duststorm
BL Blowing	GR Hail	DU Widespread Dust	FC Funnel Cloud
DR Low Drifting	GS Small Hail and/or Snow Pellets	FG Fog	+FC Tornado Waterspout
FZ Freezing	IC Ice Crystals	FU Smoke	PO Well- Developed Dust/Sand Whirls
MI Shallow	PL Ice Pellets	HZ Haze	
PR Partial	RA Rain		
SH Shower(s)	SG Snow Grains	PY Spray	SQ Squalls
TS Thunderstorm	SN Snow	SA Sand	SS Sandstorm
VC In the Vicinity	UP Unknow Precipitation	VA Volcanic Ash	GL Glaze

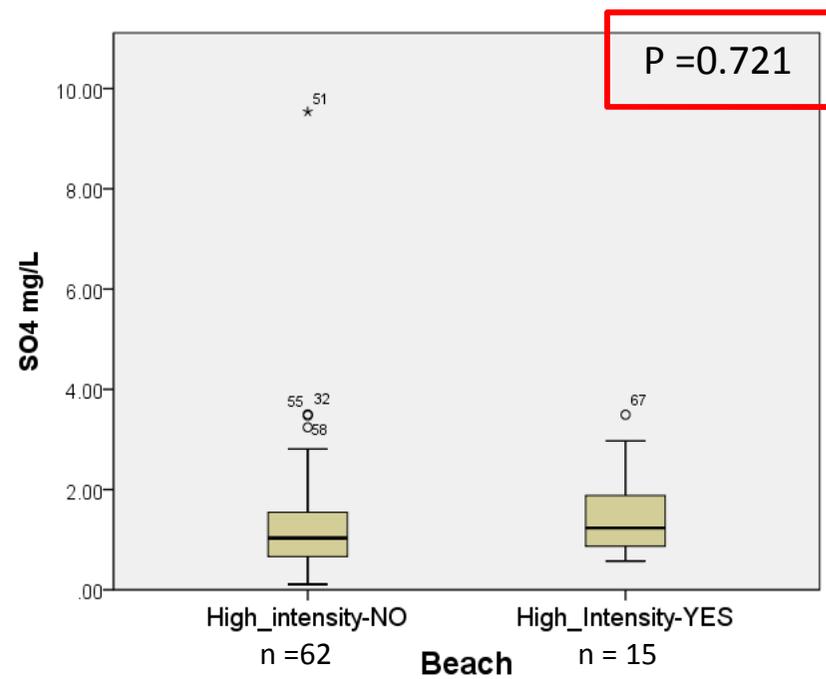
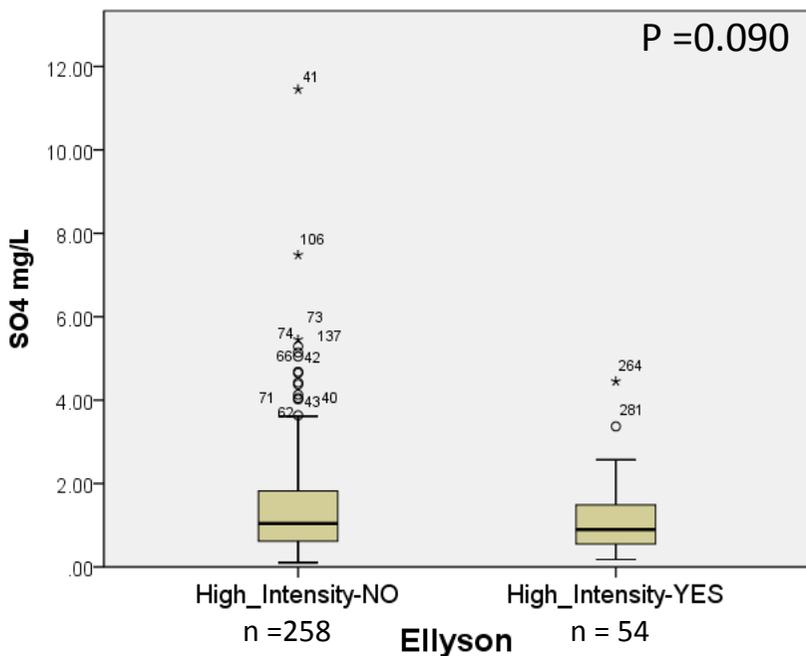
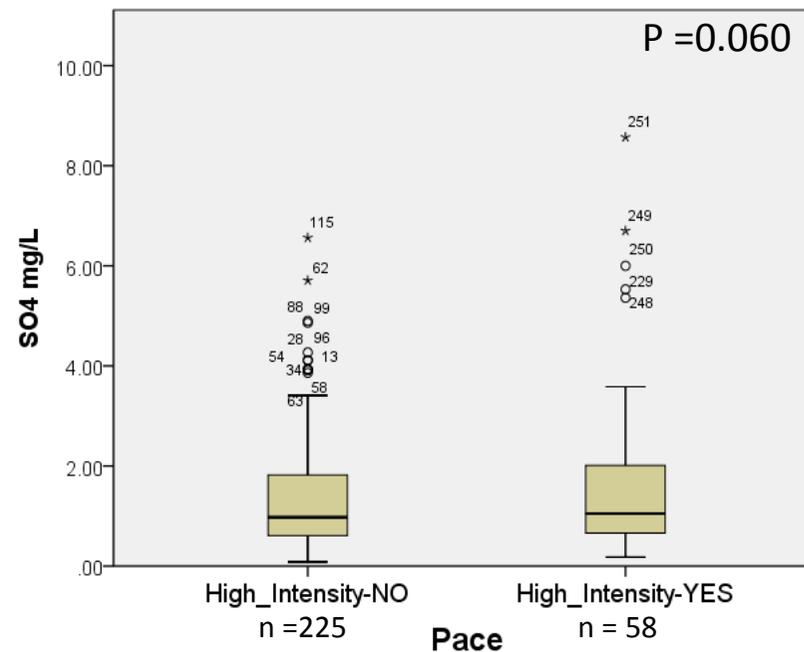
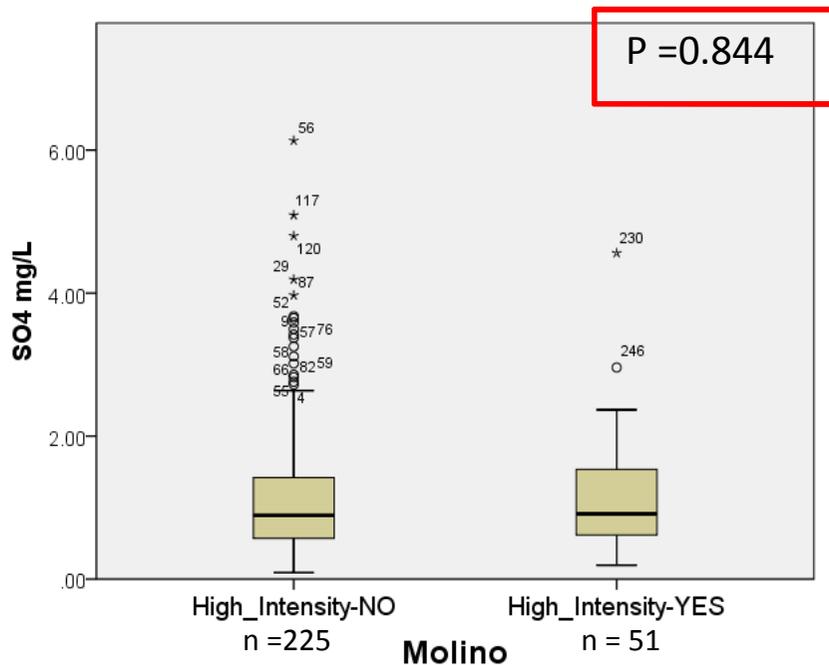
Intensity (as indicated on pages 4 to 6):
 '+' = Heavy '' = Moderate '-' = Light

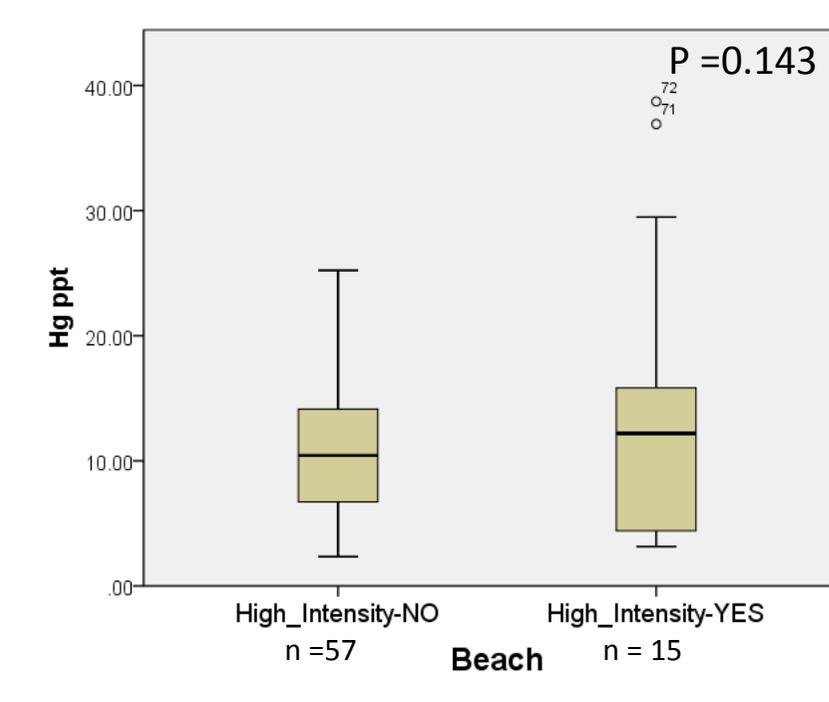
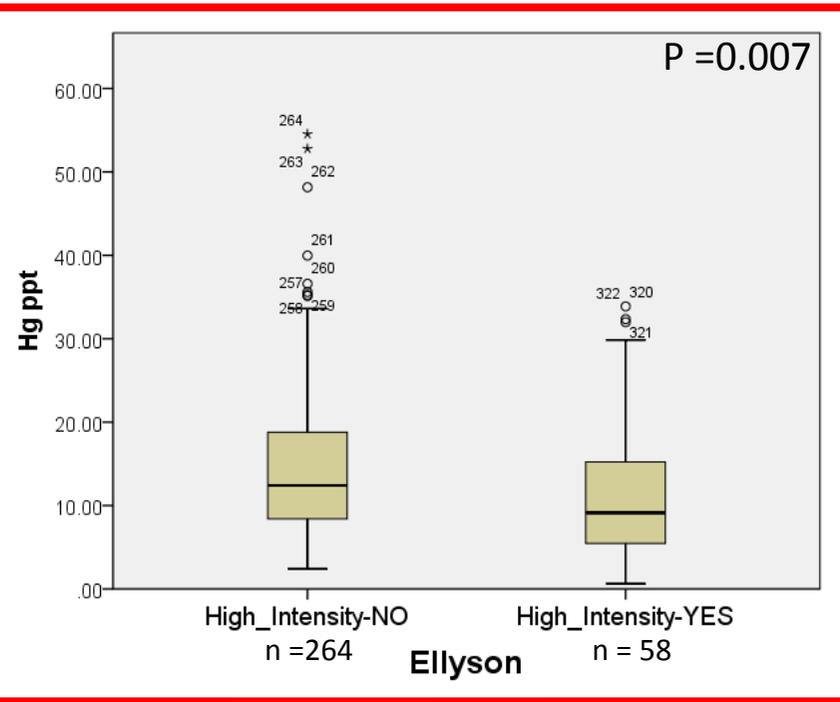
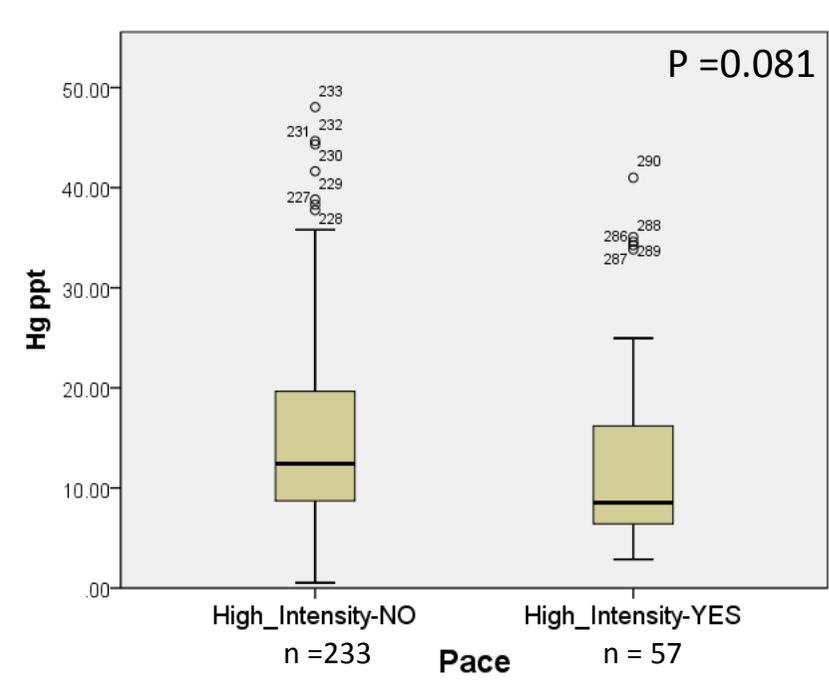
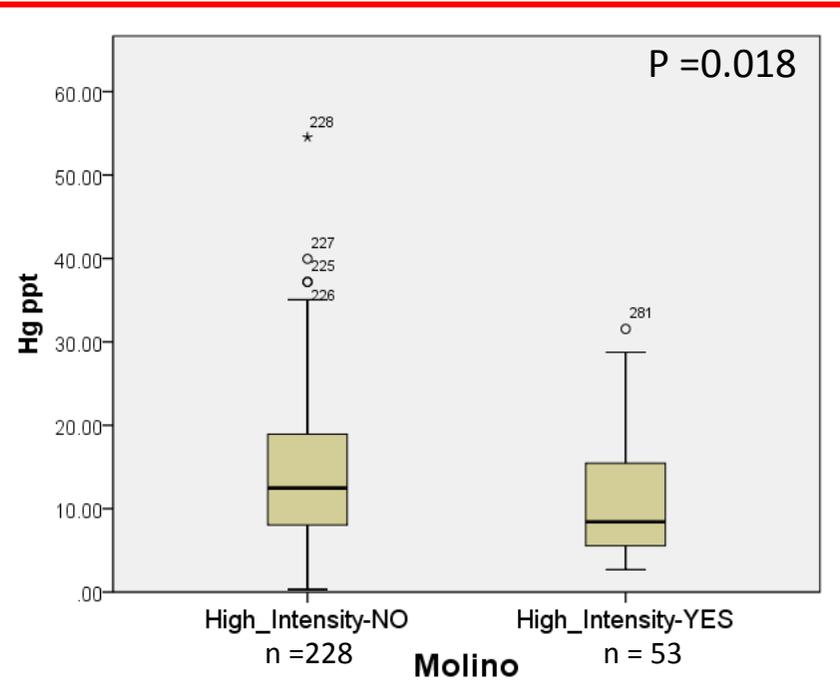
MAXIMUM SHORT DURATION PRECIPITATION (See Note)

Time Period (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (Inches)	0.31	0.51	0.53	0.53	0.53	0.54	0.55	0.55	0.59	0.62	0.68	0.69
Ending Date	23	23	23	23	23	15	15	15	06	06	06	06
Ending Time (Hr/Min)	1432	1436	1441	1441	1441	1827	1827	1827	0337	0352	0428	0428

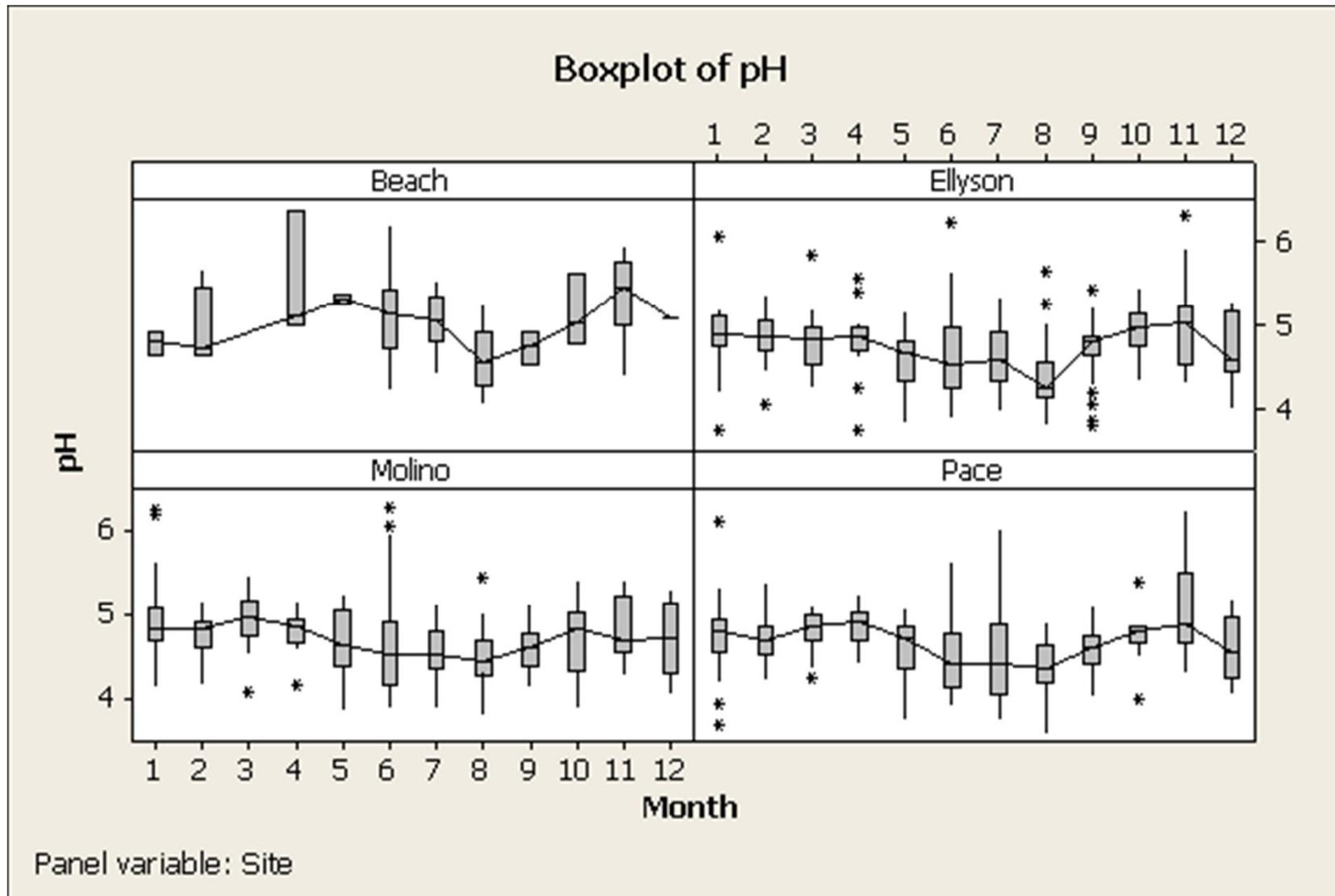
Date and time are not entered for TRACE amounts.



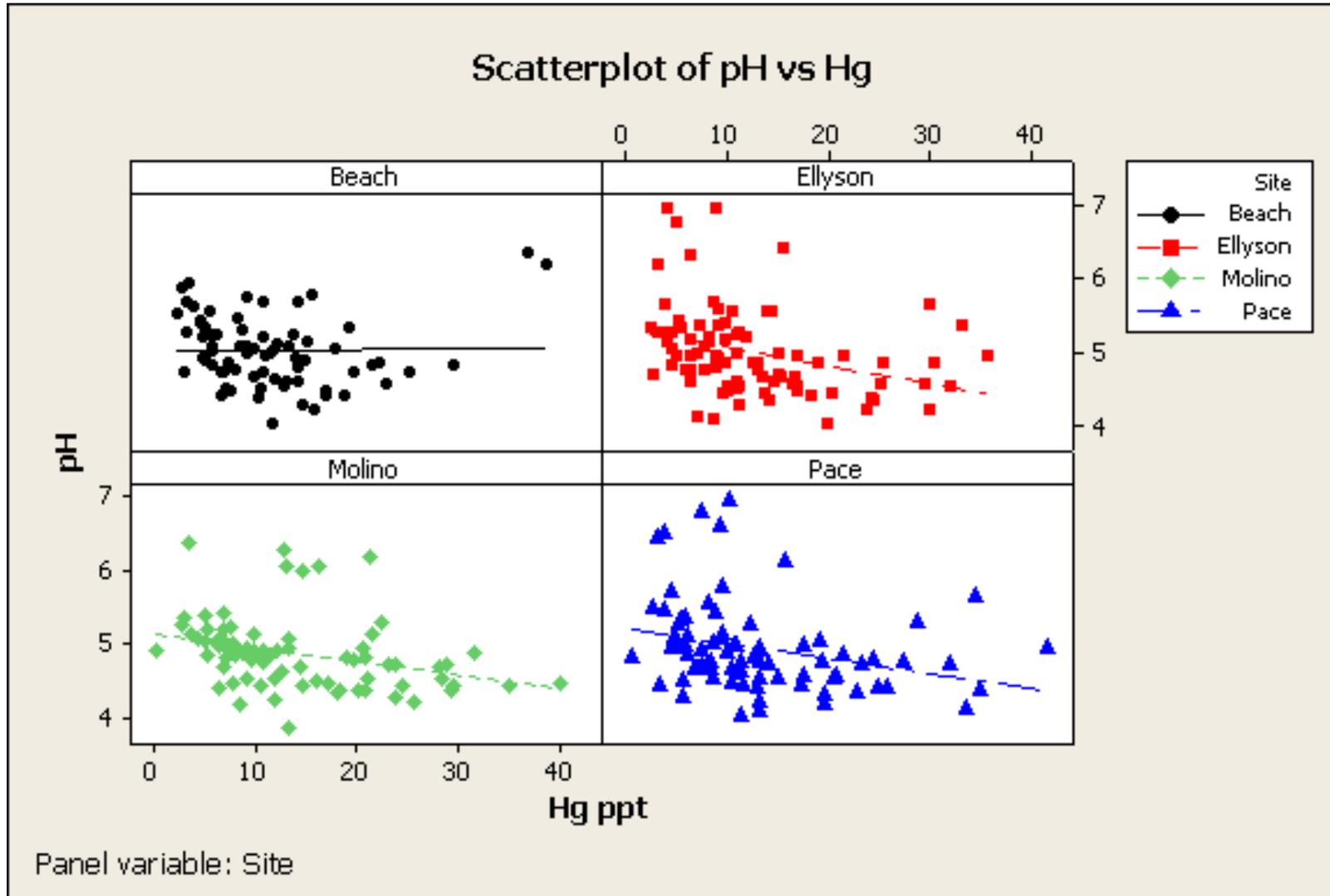




Monthly Analysis

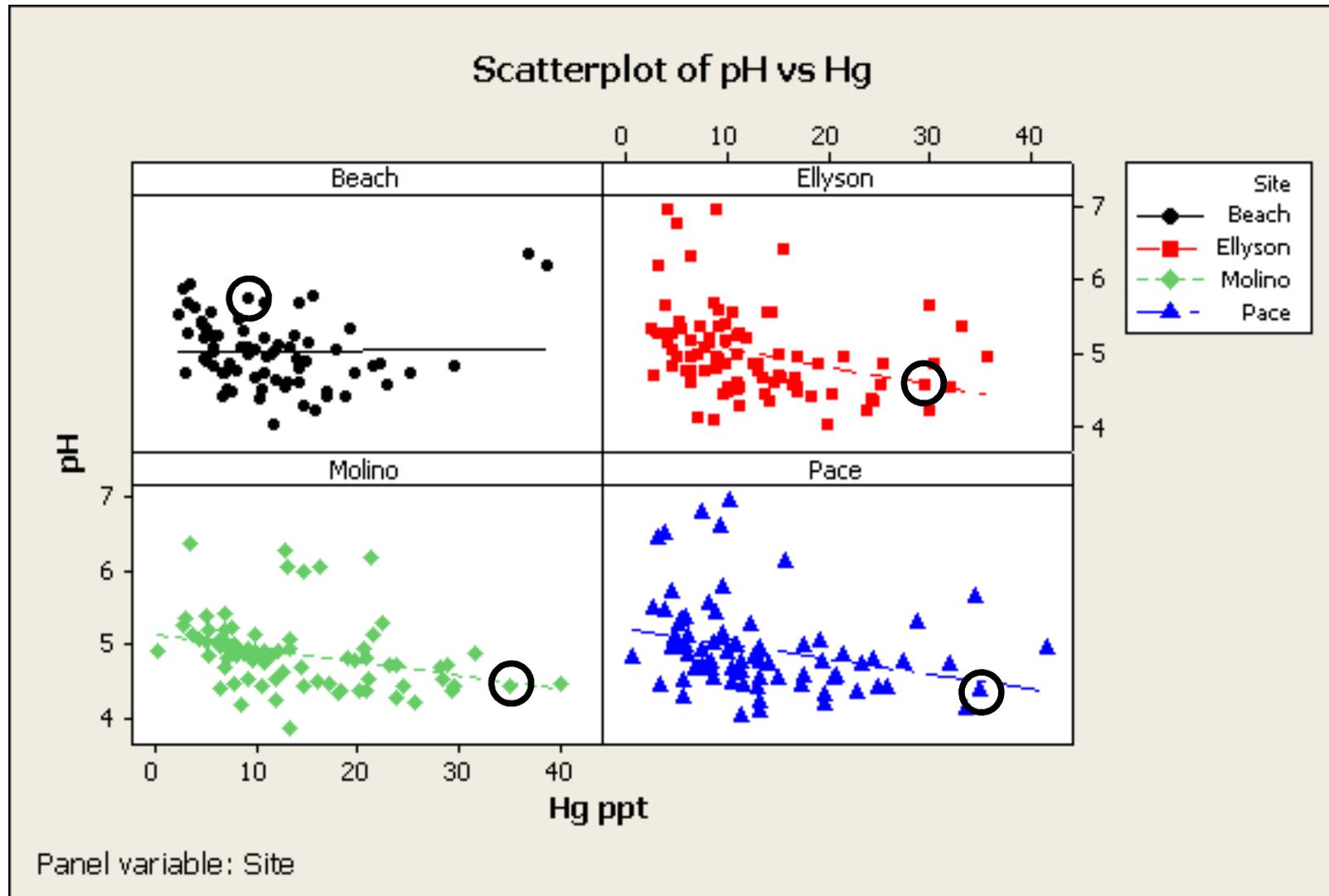


Since September 2009



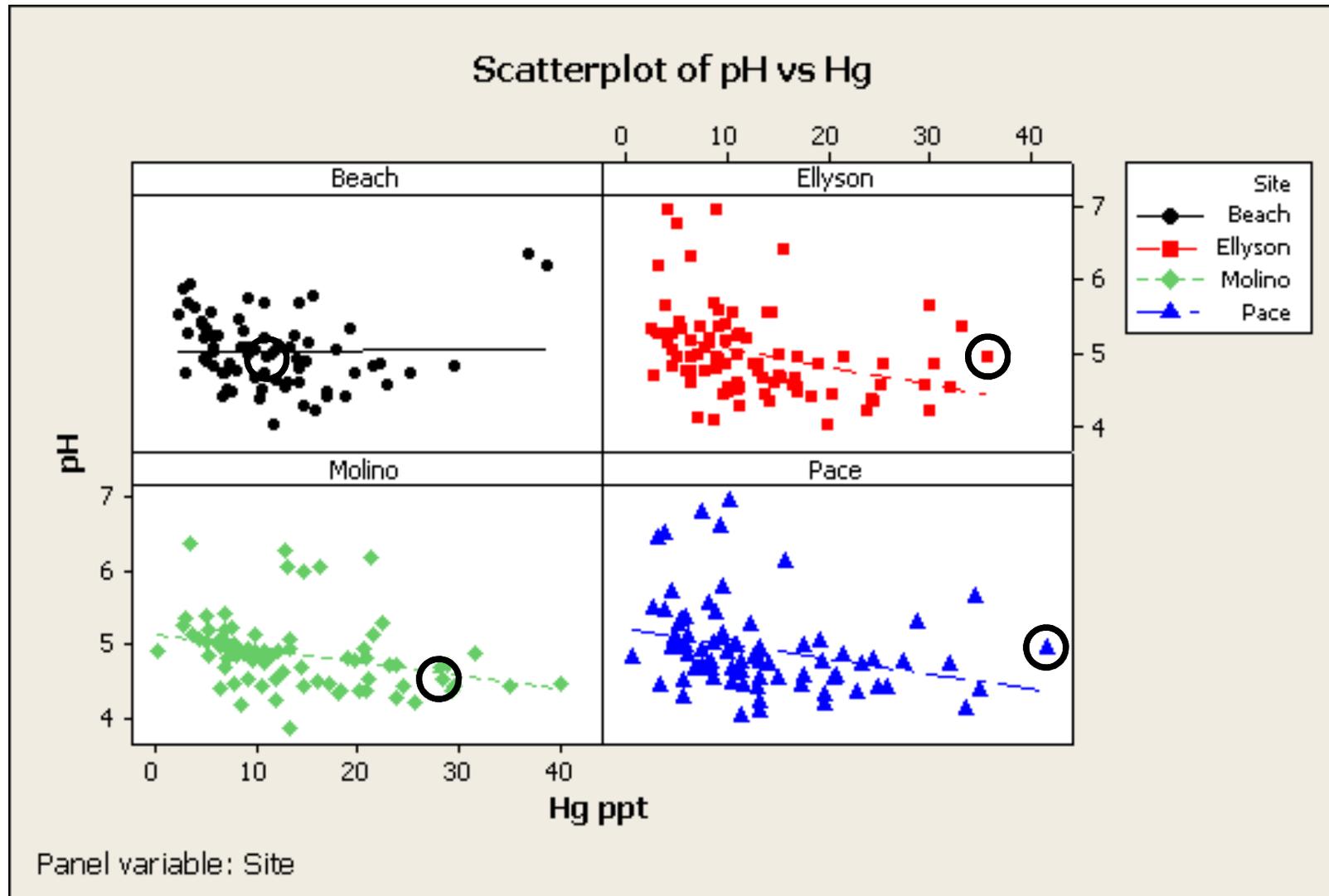
Since September 2009

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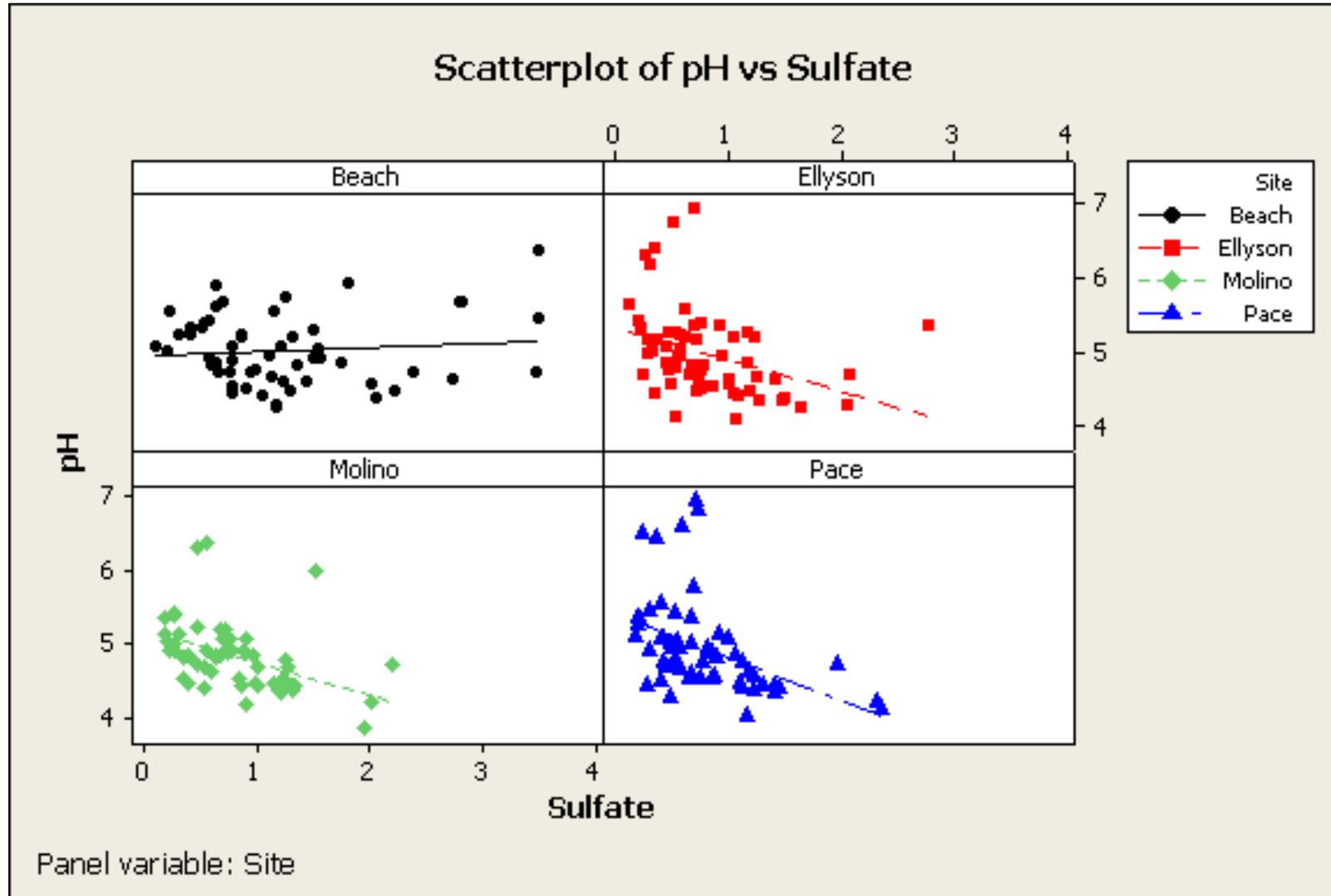


Since September 2009

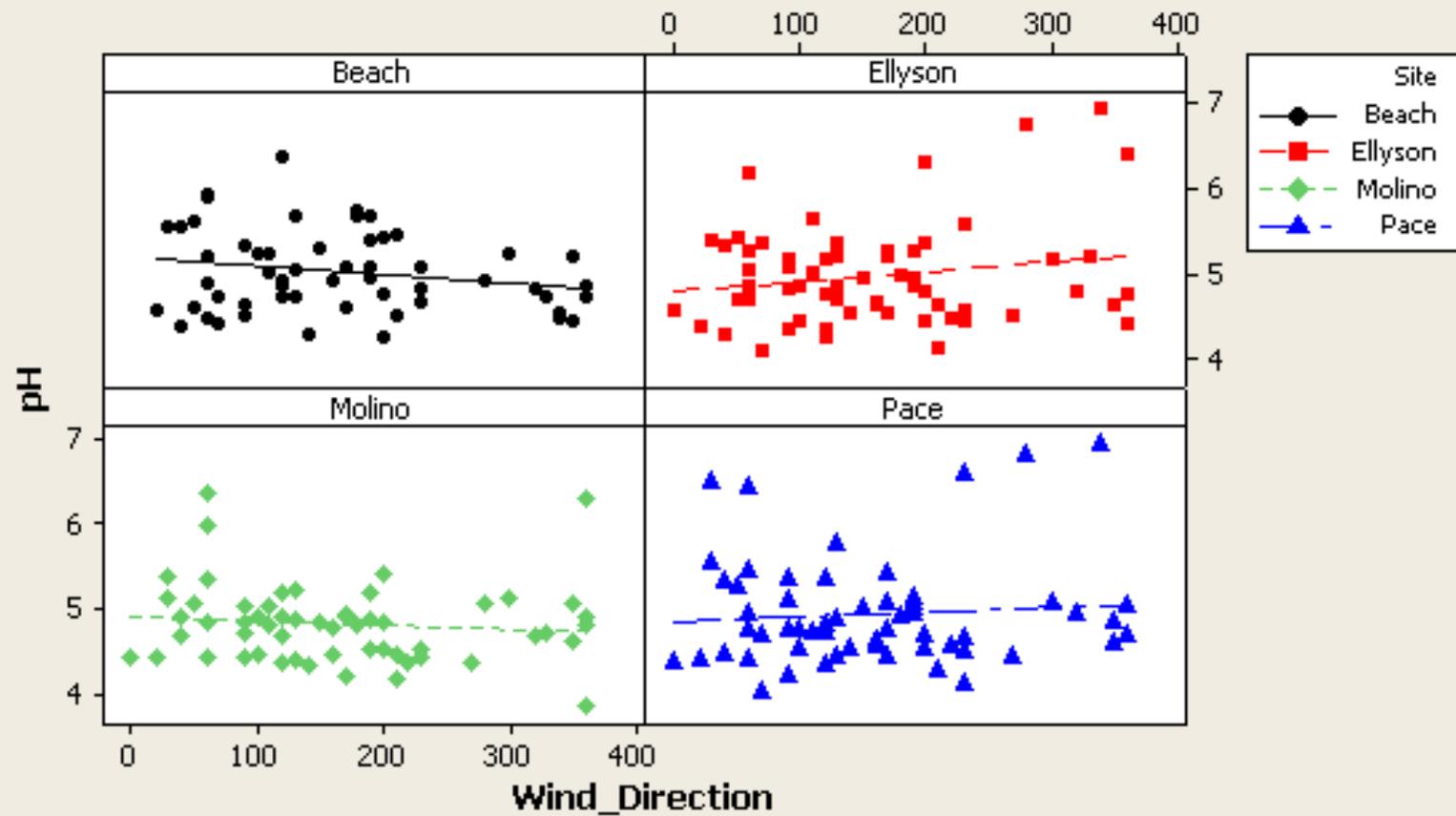
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Since September 2009

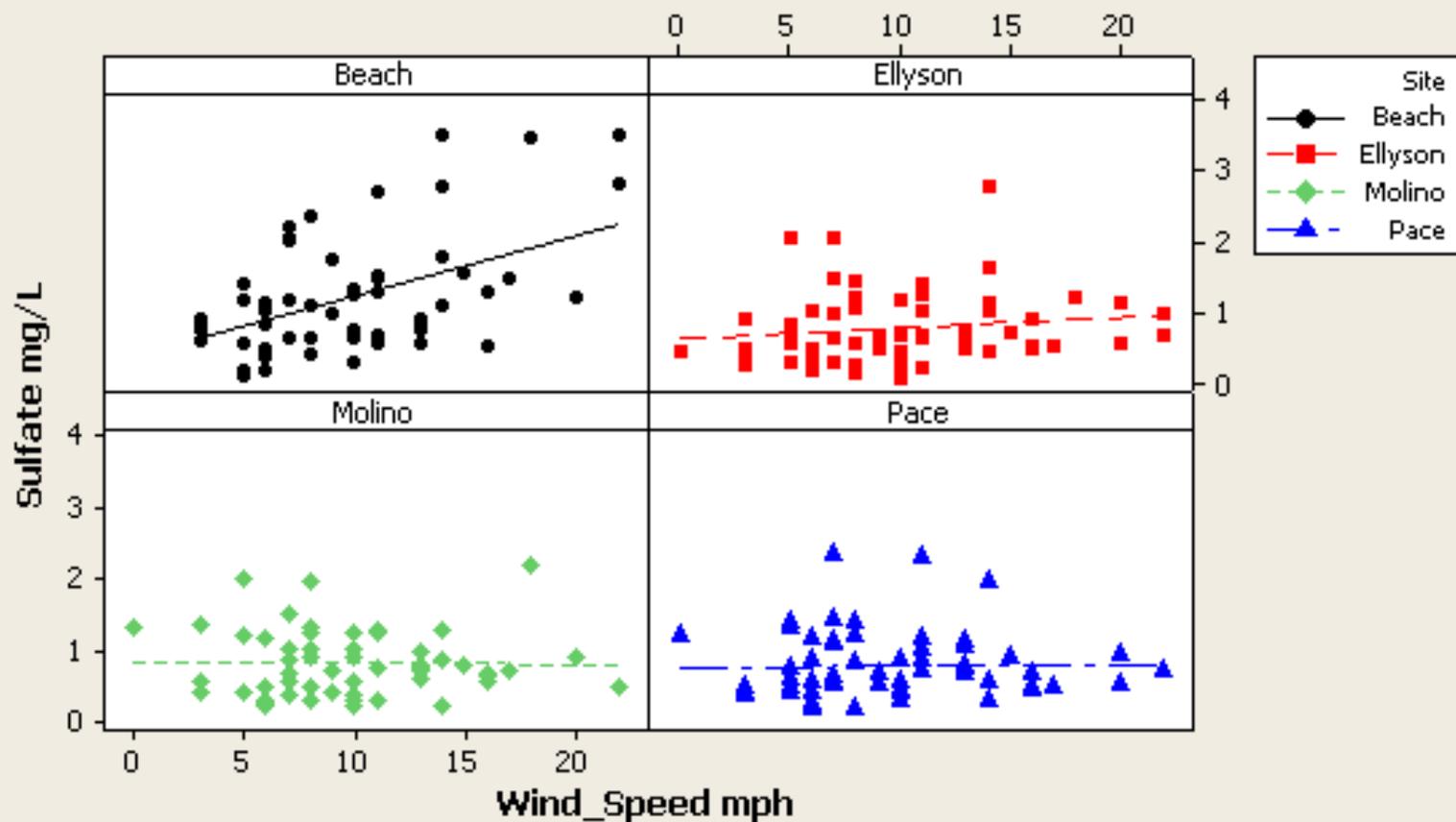


Scatterplot of pH vs Wind_Direction



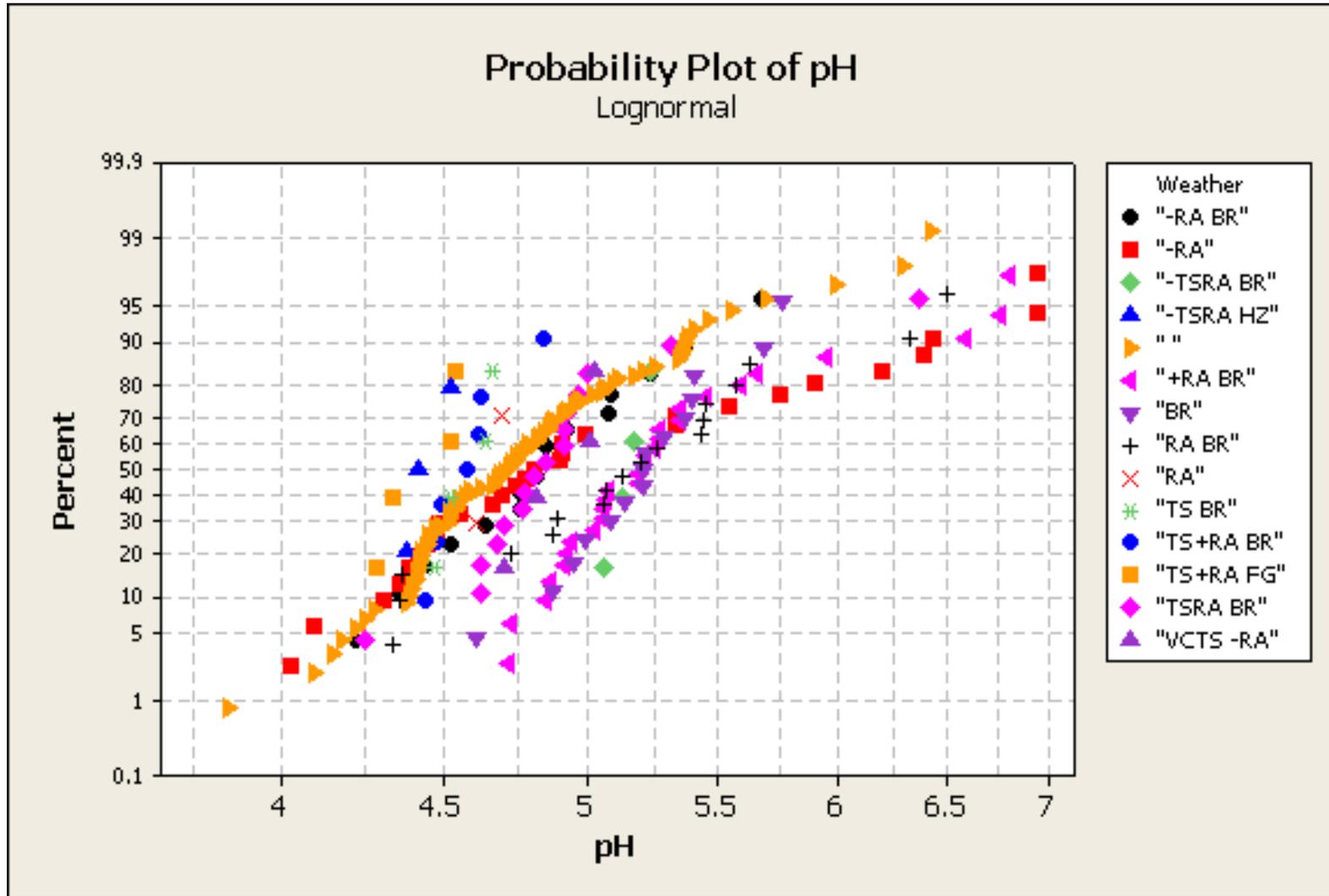
Panel variable: Site

Scatterplot of Sulfate vs Wind_Speed

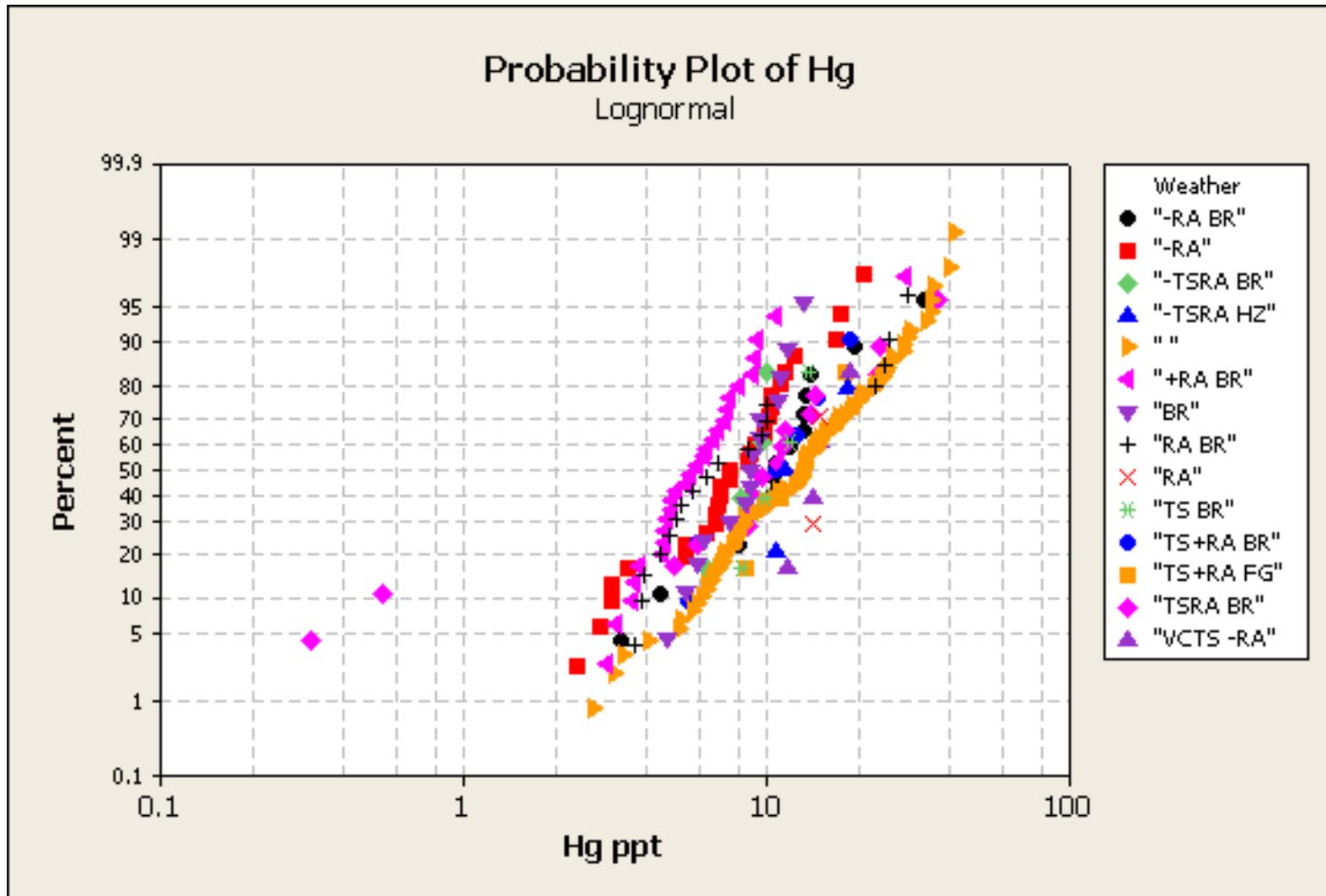


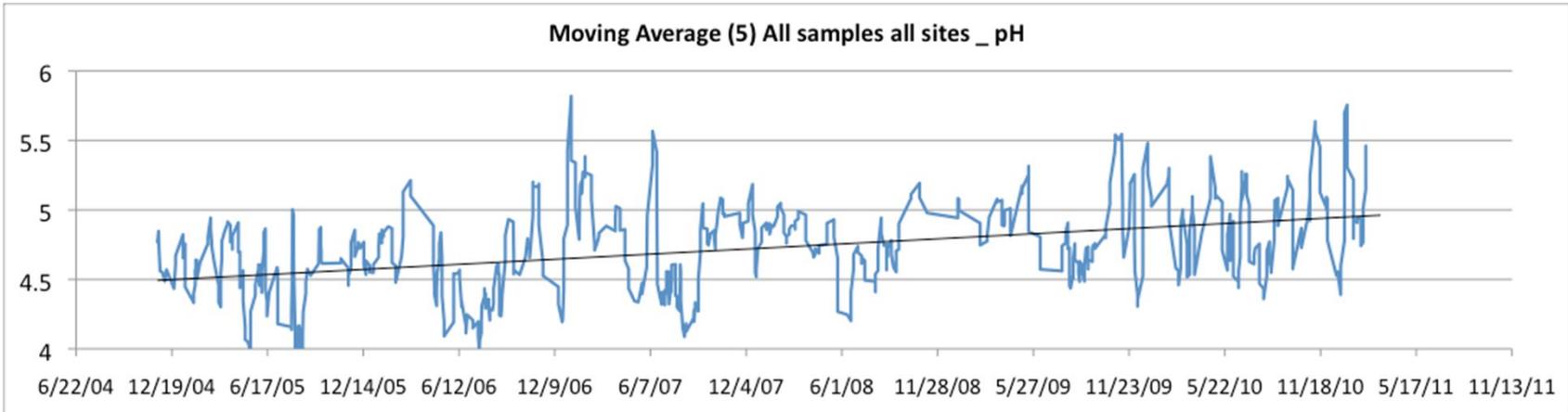
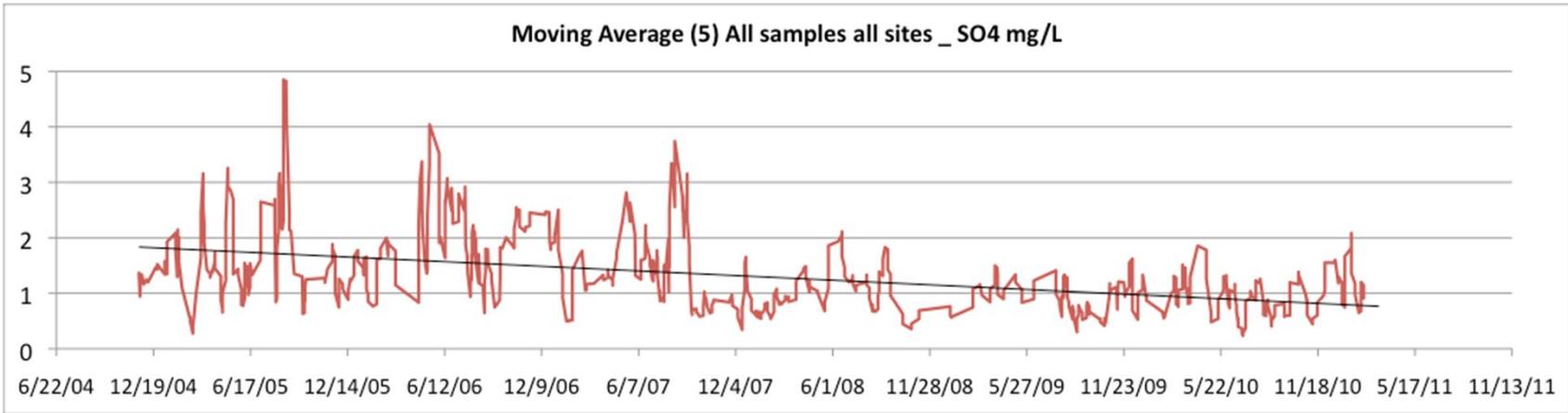
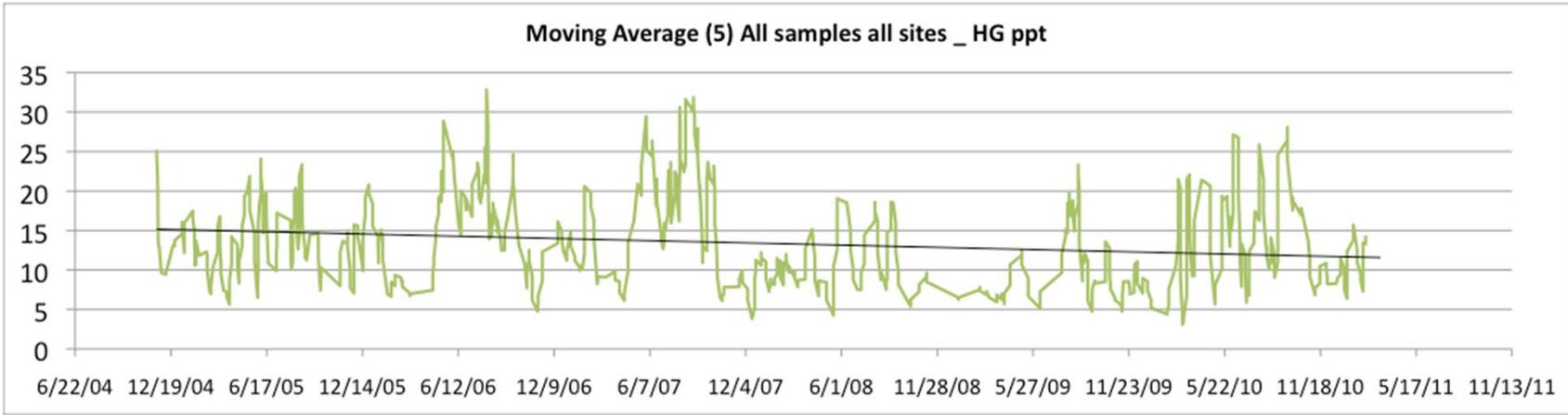
Panel variable: Site

Aviation Routing Weather Report



Aviation Routing Weather Report





Conclusions

- There is an apparent relation between pH and total mercury concentration on the three sites located close to the power plant and other major plants in Pensacola.
- Rain events with high intensity at the beginning of the storm, appeared to have higher pH than storms with low intensity.
- Samples collected during the summer had significant lower pH values and higher total mercury concentrations compared with samples collected during the winter.

Thank you

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