

Atmospheric Deposition of Mercury, Trace Metals and Major Ions in the Pensacola Bay Watershed

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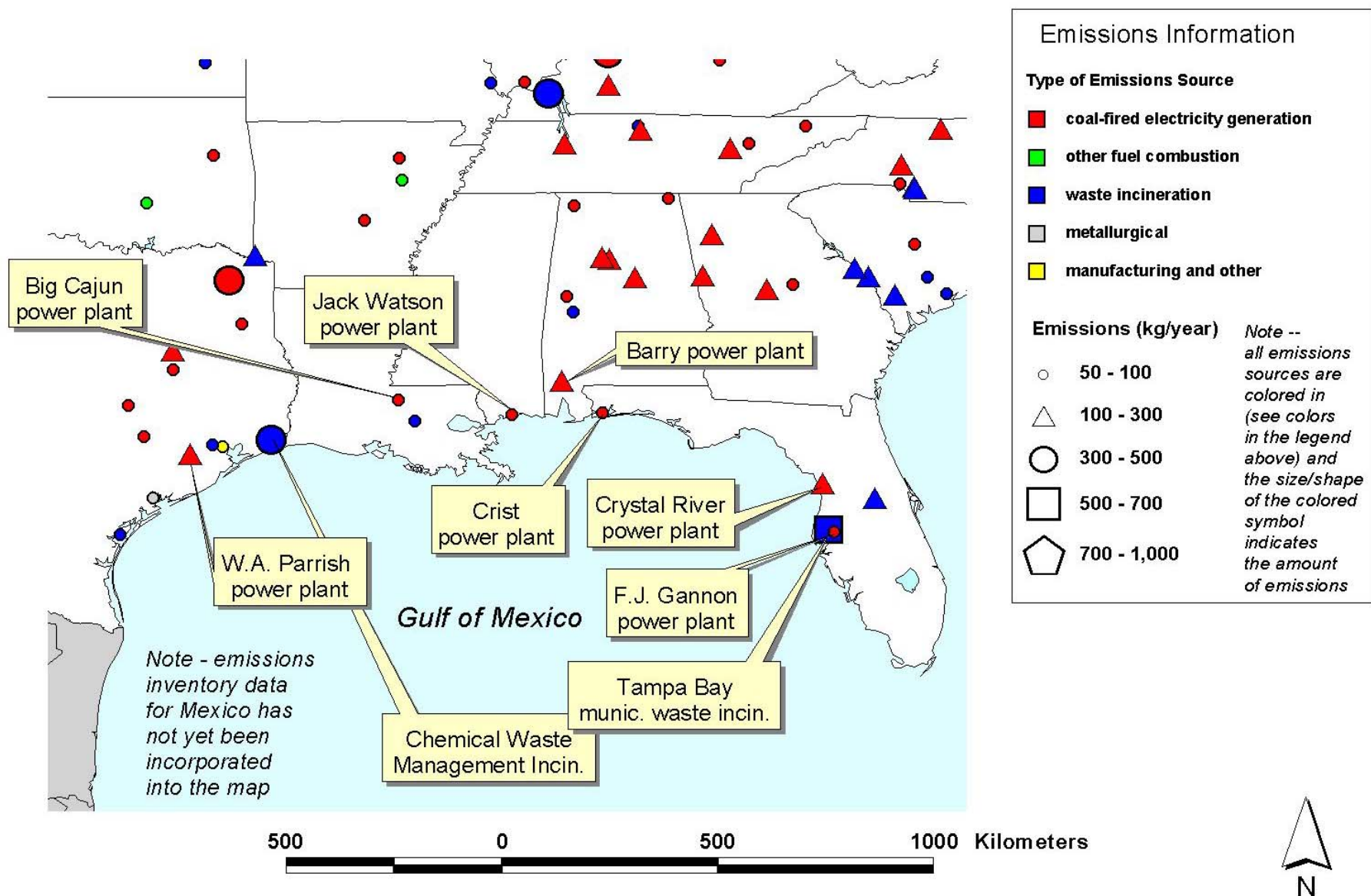


Escambia County 9th in total toxic emissions nationwide, 16th in air emissions



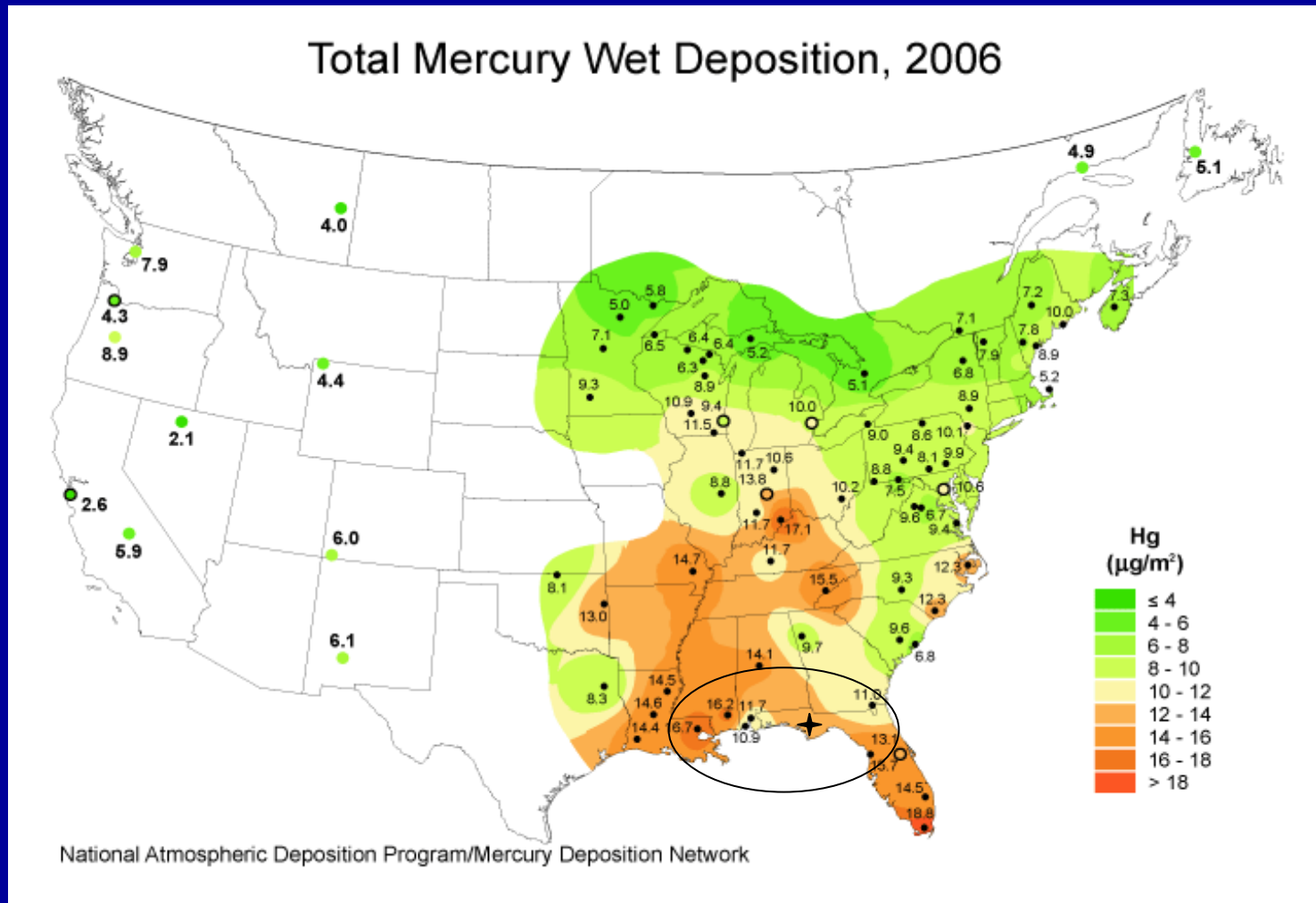
- Coal fired power plant
- Papermill (coal for some power generation)
- Other industrial activities (Solutia, Air Products, etc.)
- 8 Superfund sites
- Partnership for Environmental Research and Community Health (PERCH) – EPA funded
 - Human health effects
 - Environmental effects

Largest U.S. RGM emissions sources in the Gulf of Mexico region, based on the 1999 National Emissions Inventory (U.S. EPA)

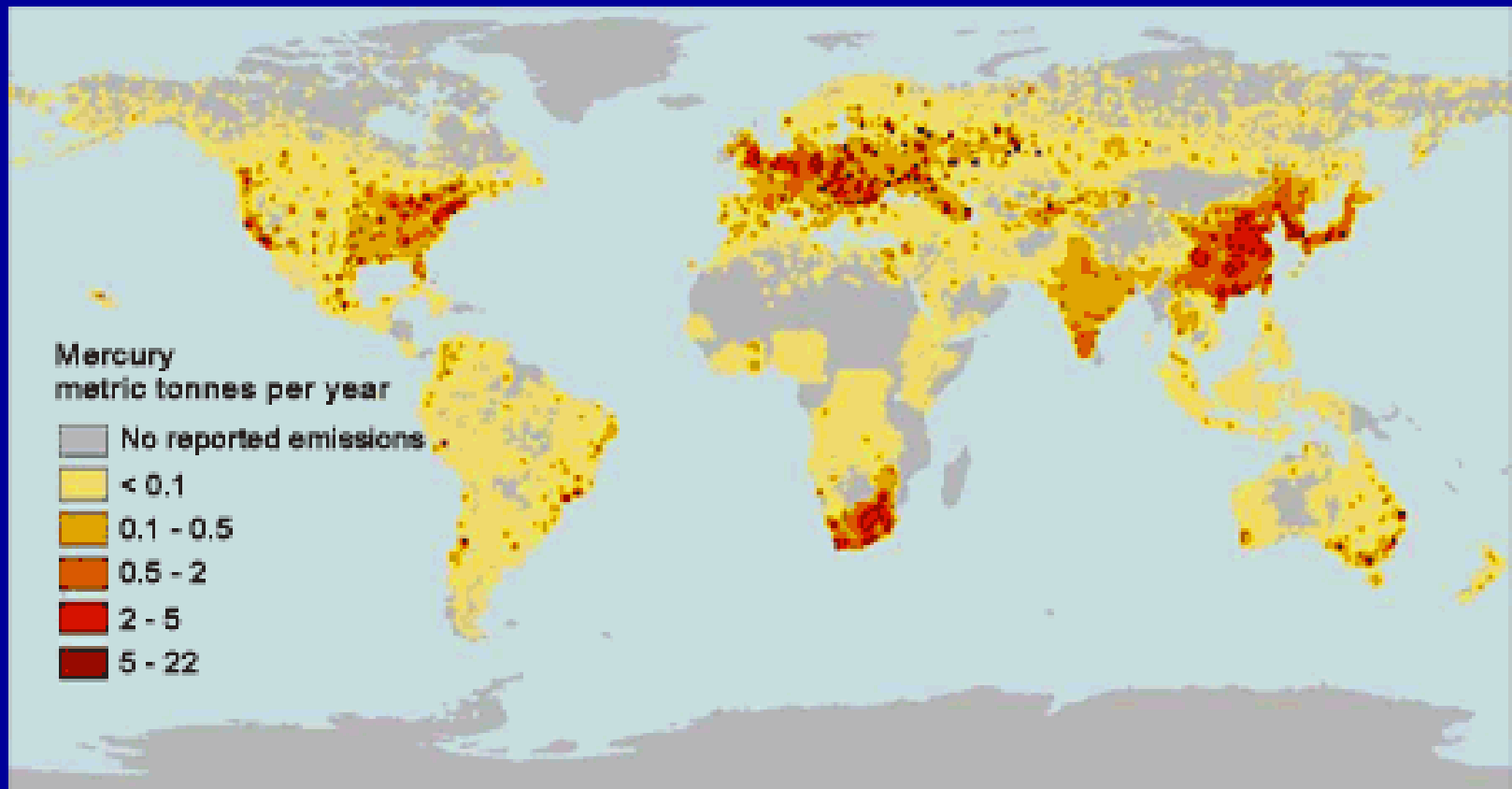


From Mark Cohen, NOAA ARL

Generally higher mercury deposition in the SE, most driven by higher rainfall along the Gulf Coast



Mercury deposition is an international problem

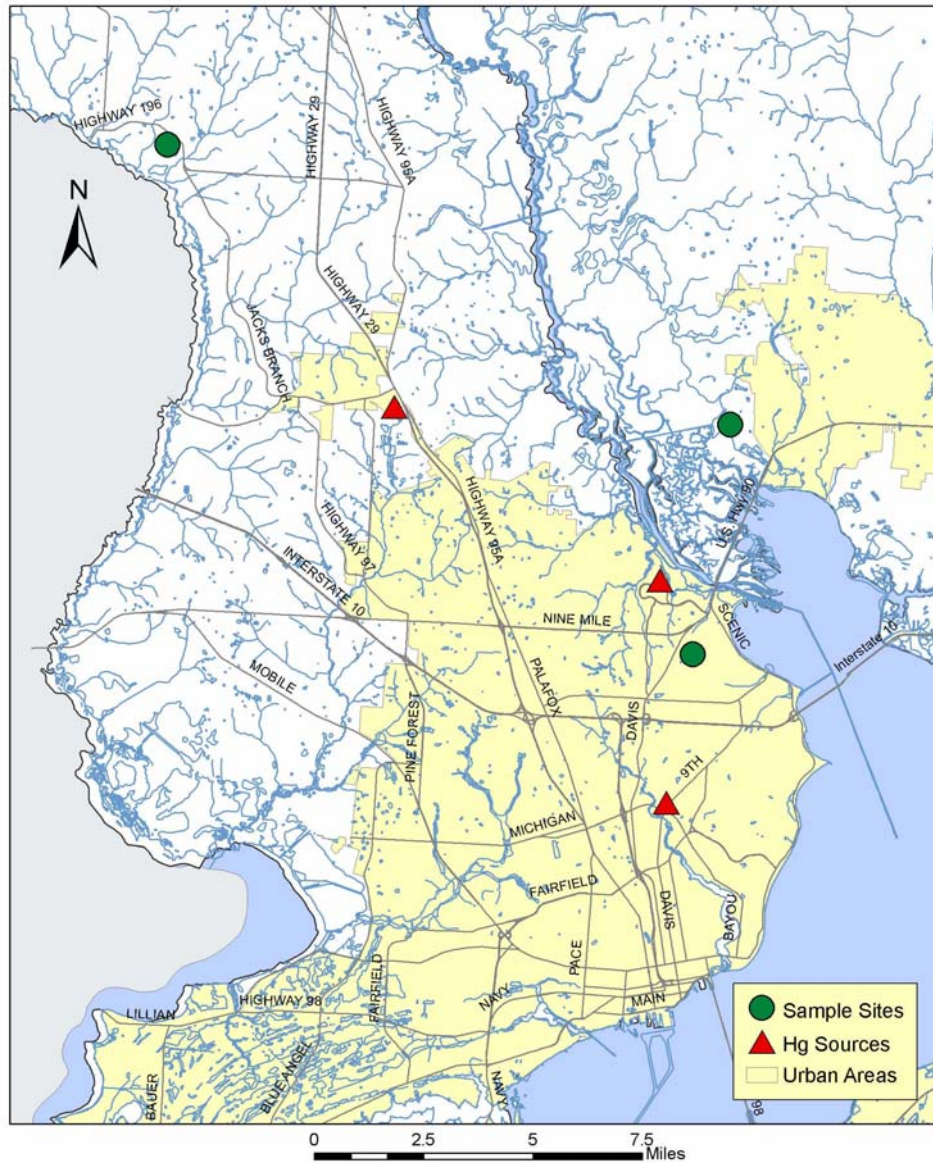


US coal fired power plants represent about 1% of Hg emissions globally
53% of emissions come from Asia, 18% from Africa, 11% from Europe, 9% from North America

What is the atmospheric wet deposition of mercury, trace metals and major ions to the lower Pensacola Bay Watershed?

- *Seasonal patterns?*
- *Prior weather conditions?*
- *Are there hot spots?*
- *Local sources?*

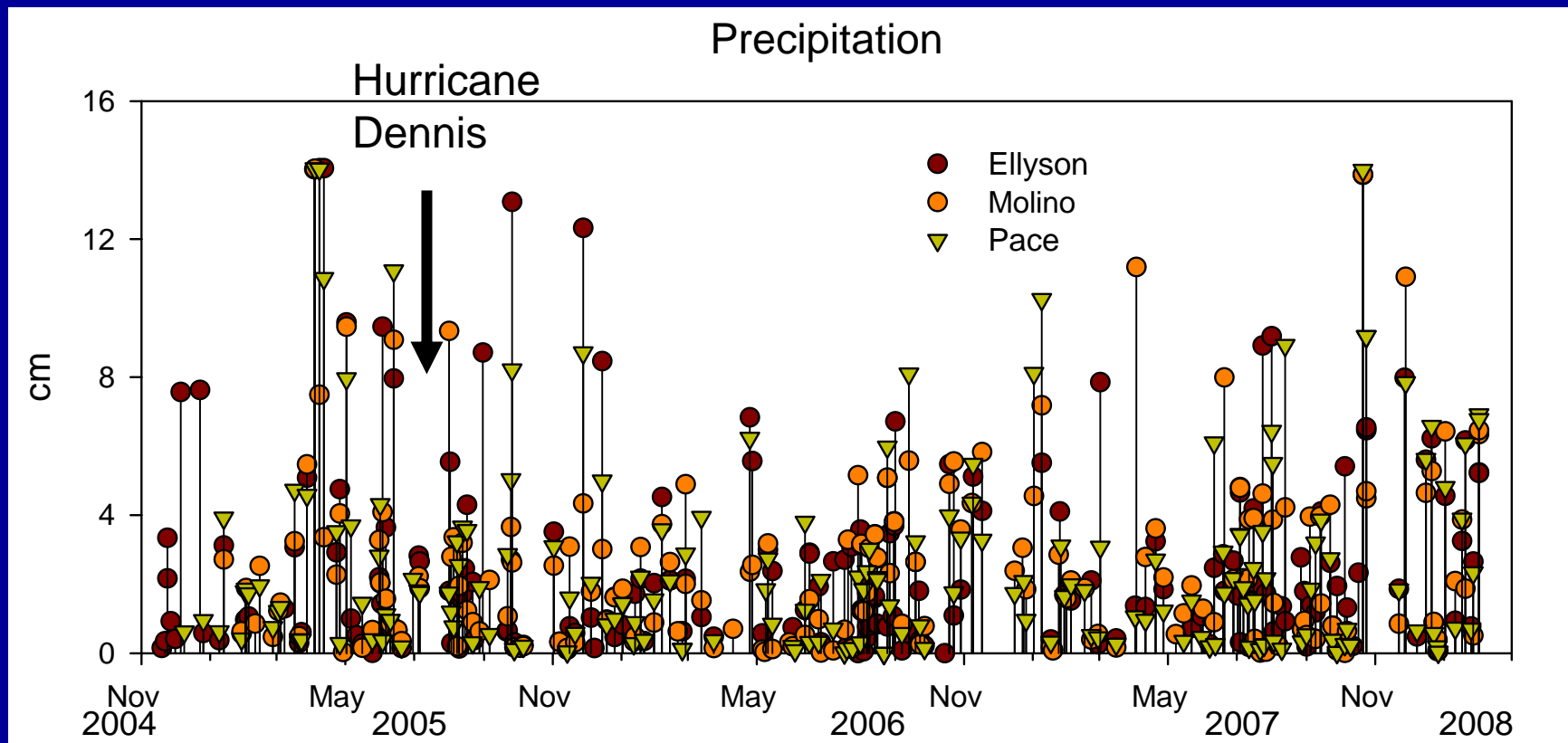
Sample Sites for Mercury Study



Sampling Locations



Sample collection began in November 2004 and will continue through March 2009



~ 565 samples from 225 rain events to Feb 2008

Analyses

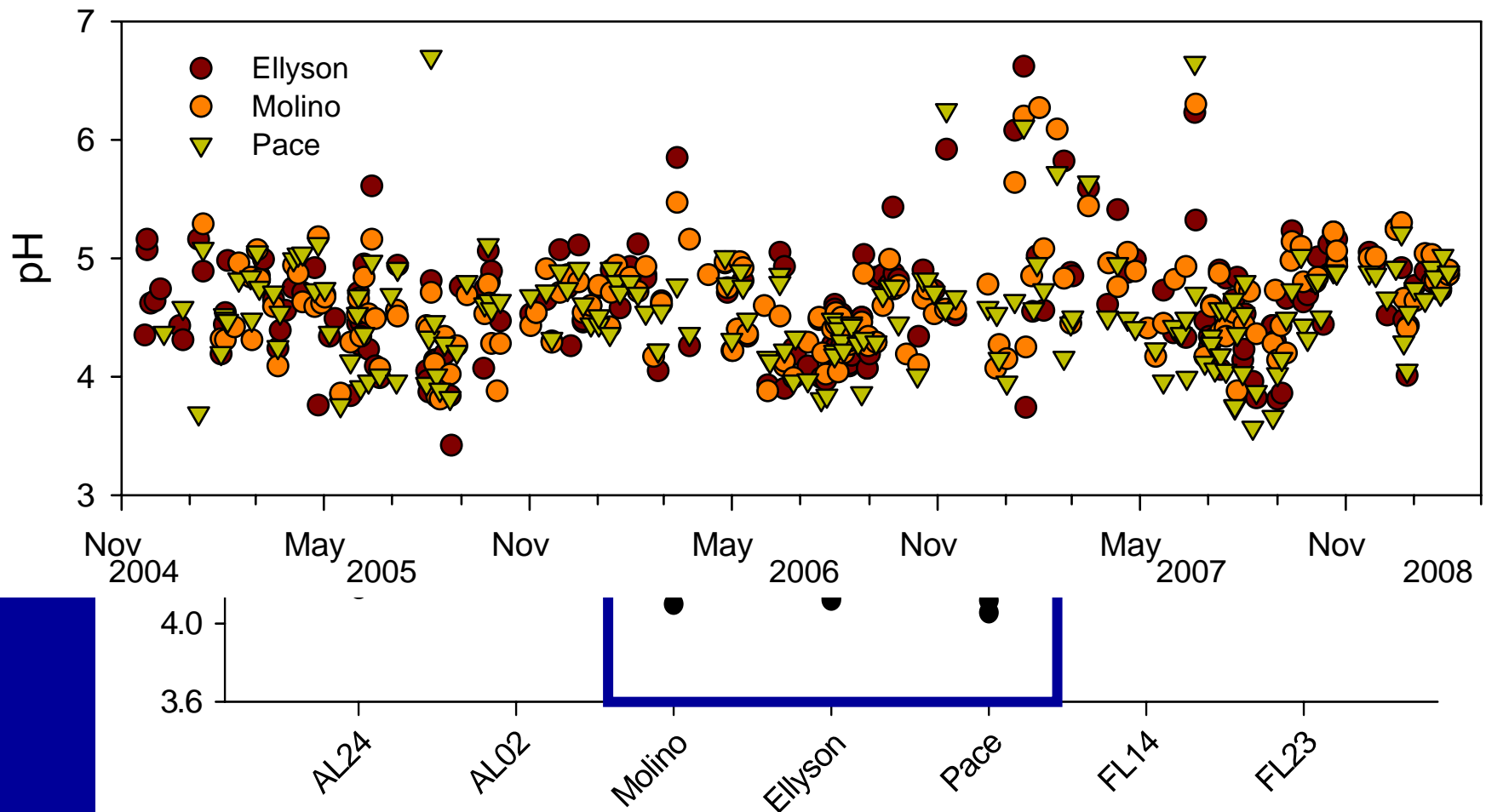
UWF -WRL

- pH
- Sulfate
- Nitrate+nitrite
- Chloride
- Ammonium
- Sodium
- Calcium
- Phosphate

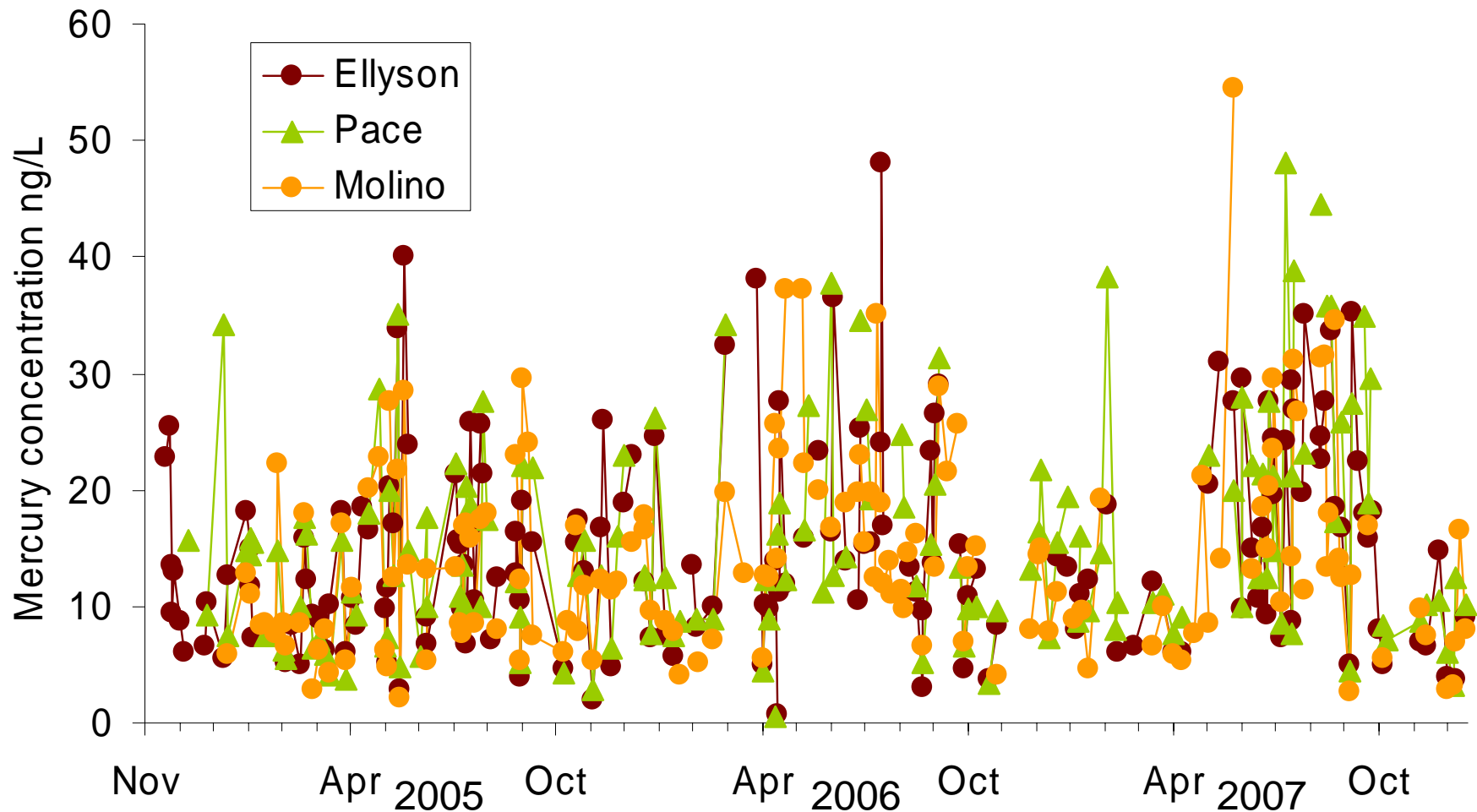
FSU - Oceanography

- Mercury
- Trace metals
 - mineral/crustal elements: Al, Si, Sc, Ti, Mn, Fe, Rb, Y, Nb, Cs, La and all rare earth elements, Th, U
 - Sea Salt aerosols: Li, Na, Mg, Sr
 - urban pollution, fossil fuel combustion: V, Ga, Sb, Pb, Bi, P, Cu, Zn
 - As, Se

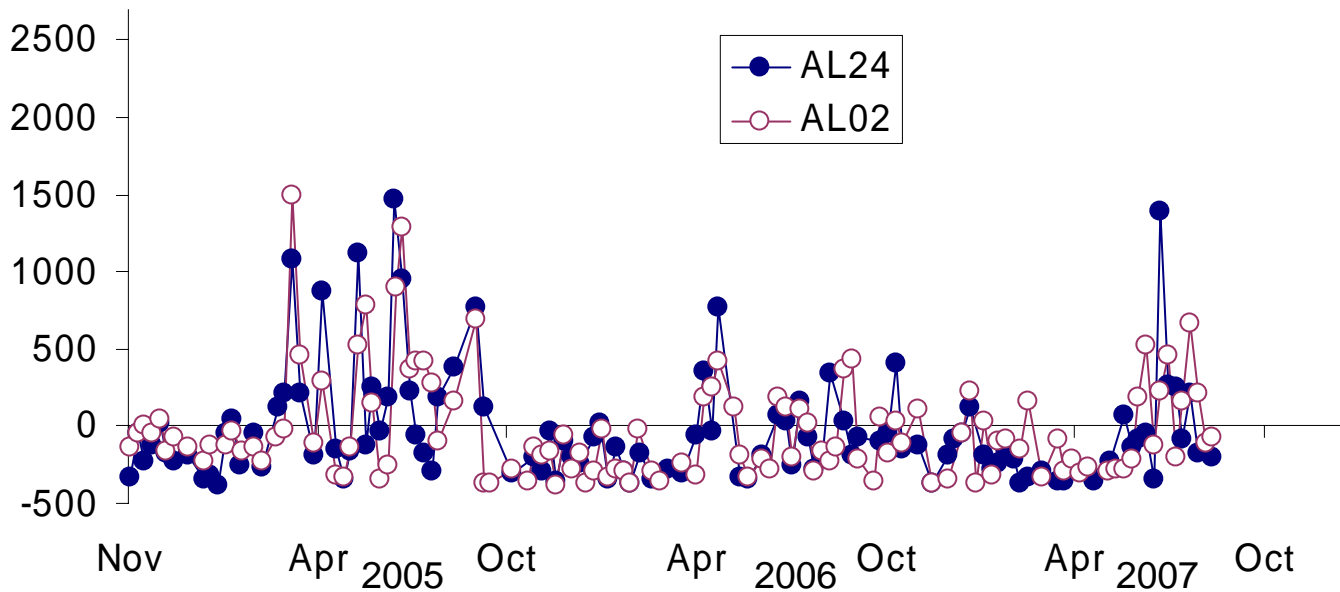
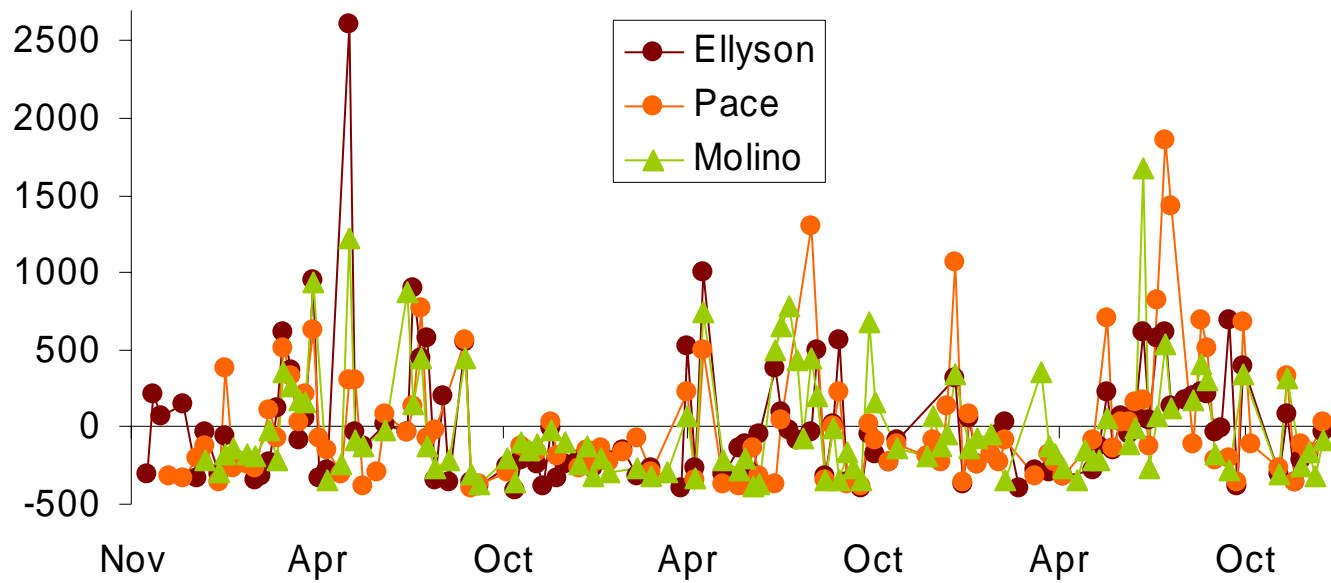
Rain is generally acidic, sometimes highly acidic



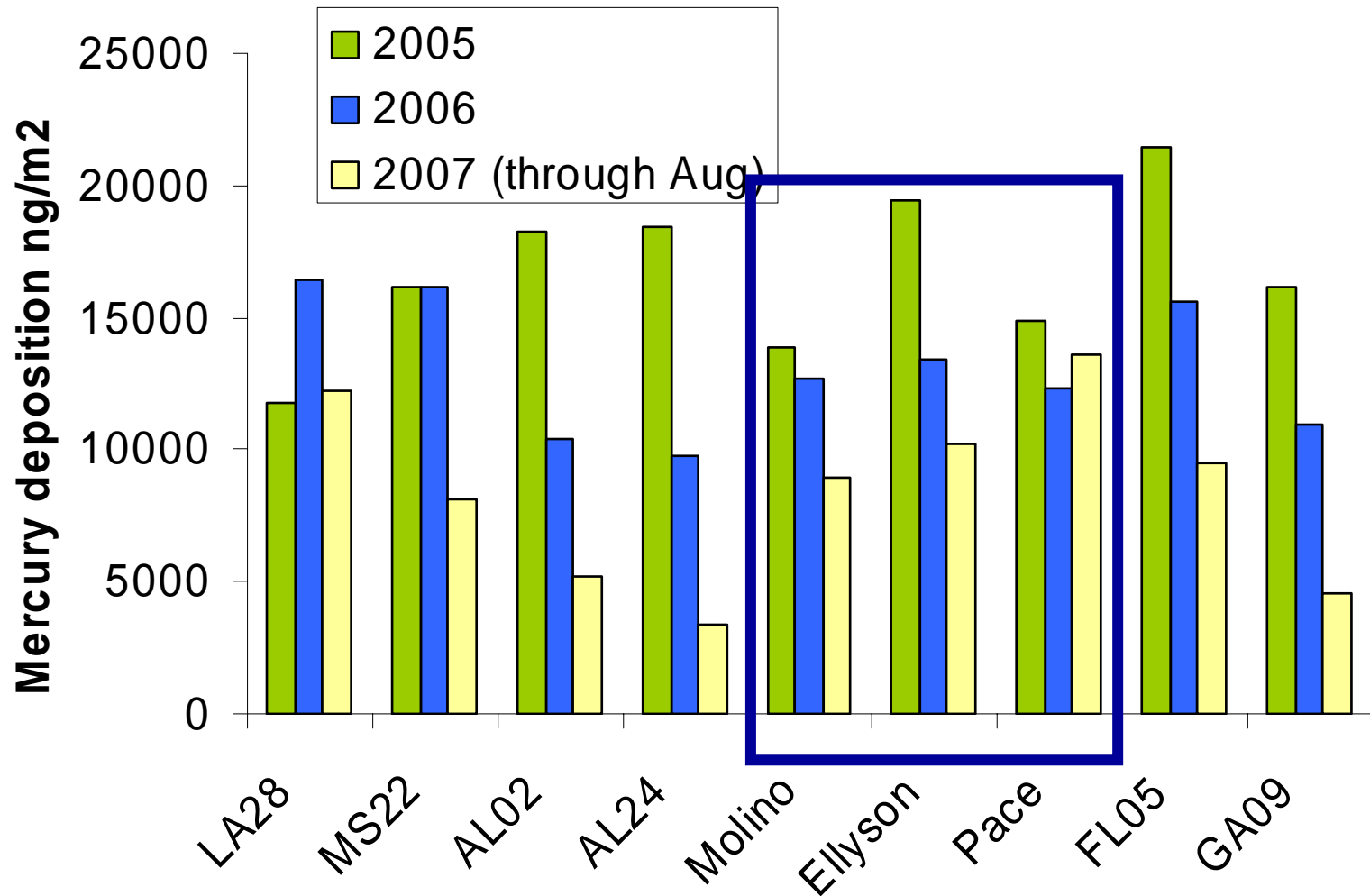
Mercury Concentrations



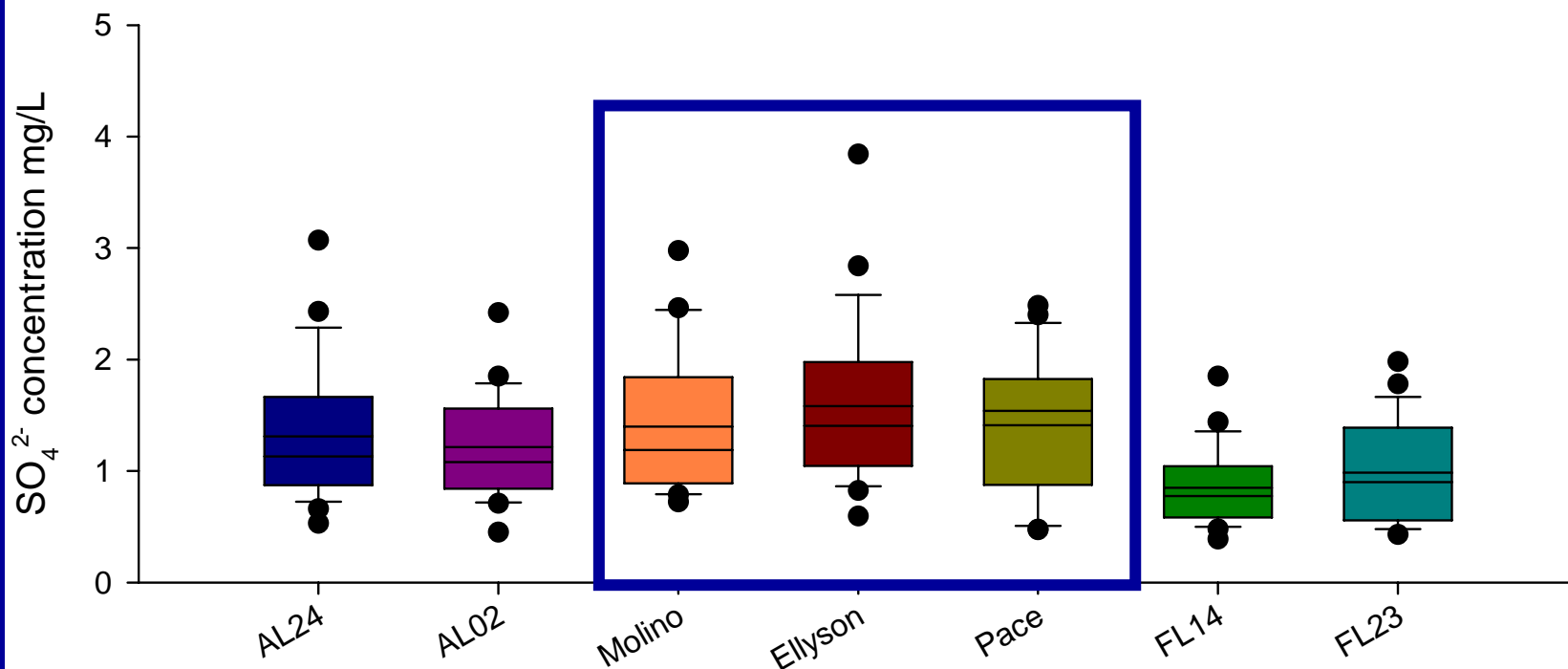
Hg Deposition – deviation from mean ng/m^2



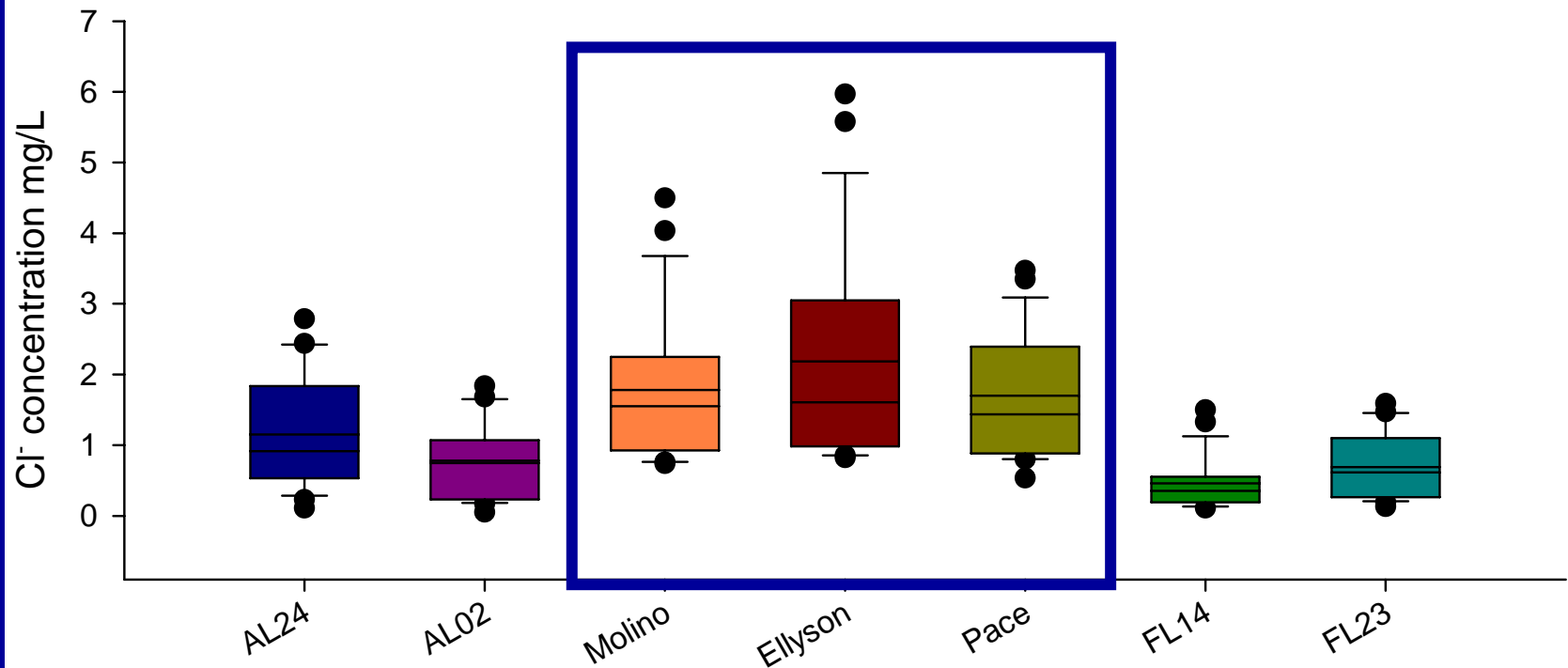
Regional Mercury deposition

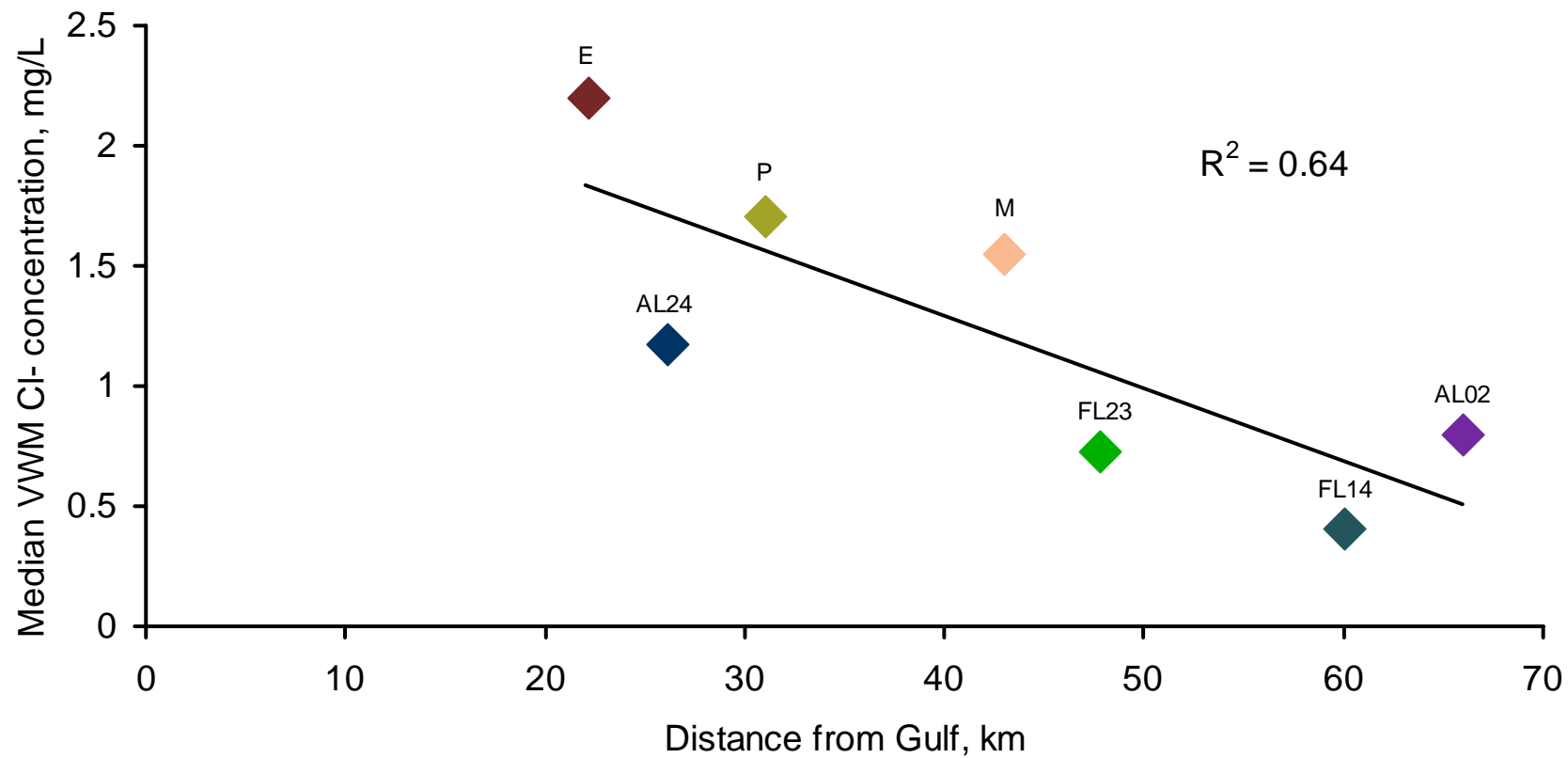


Sulfate concentrations are similar across the region

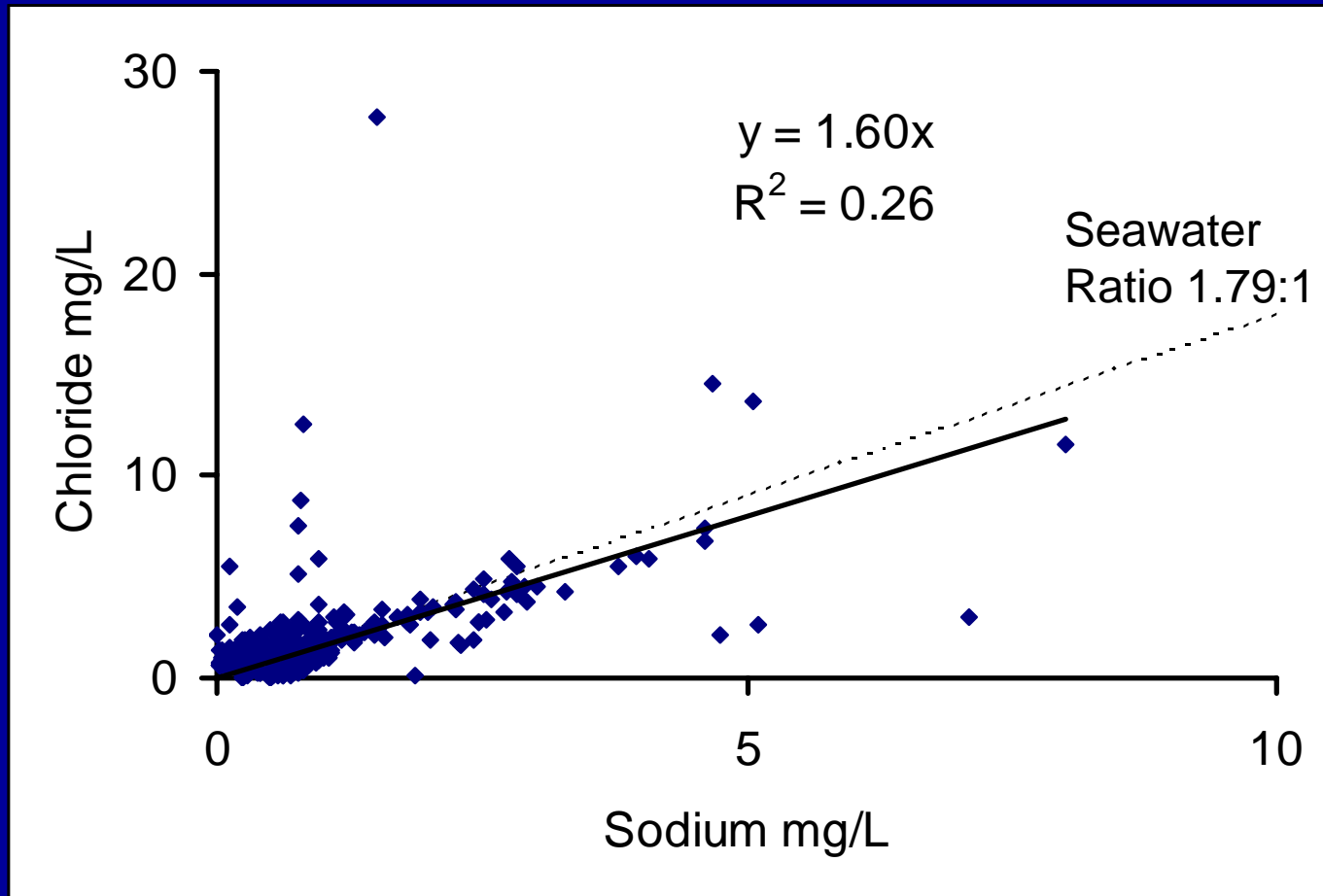


Chloride concentrations are high relative to other sites

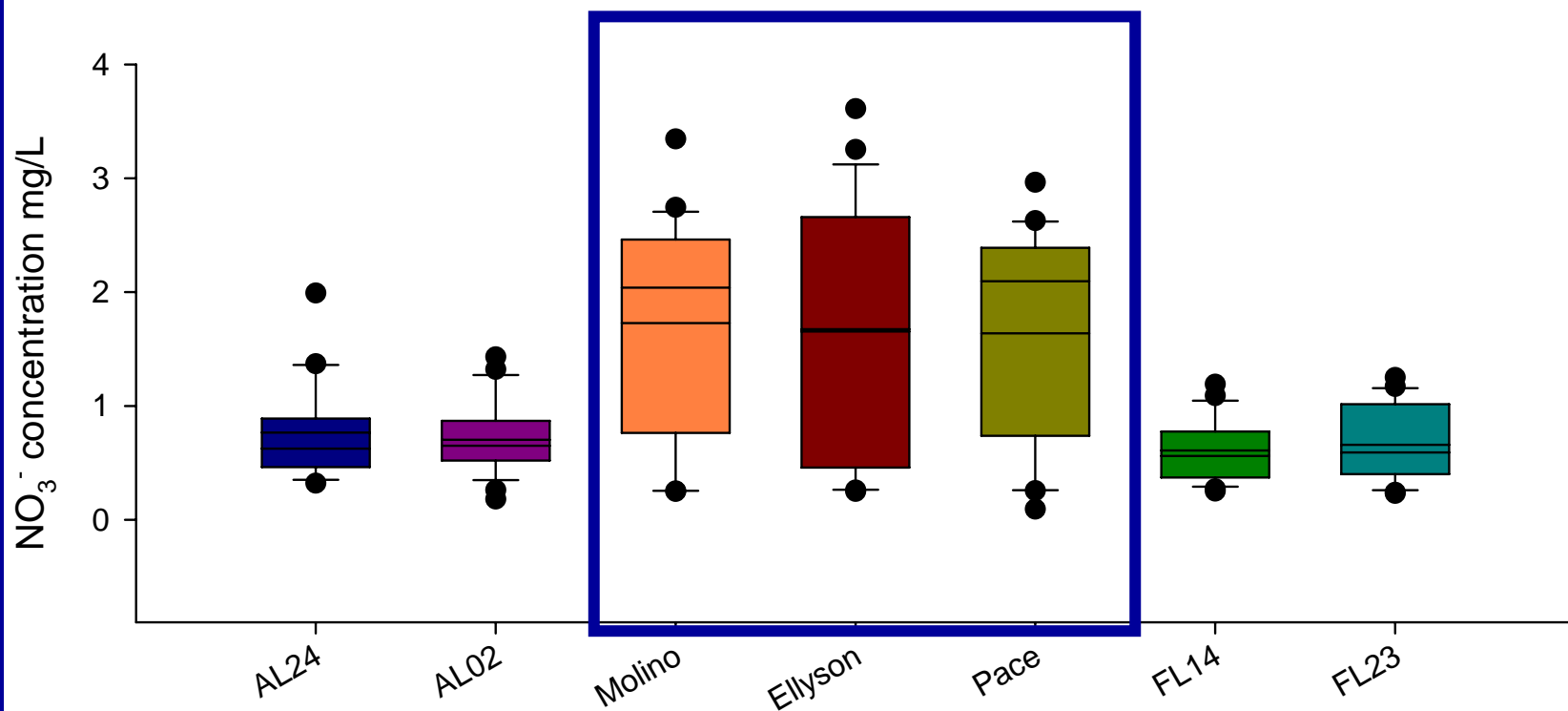




Sea salt aerosols influence on chloride and sodium concentrations

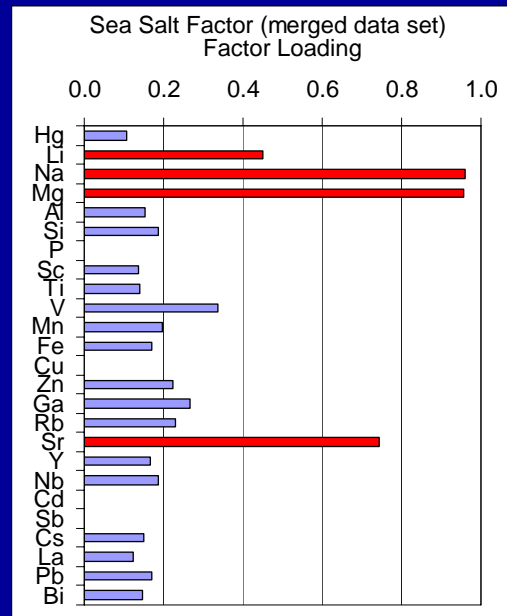
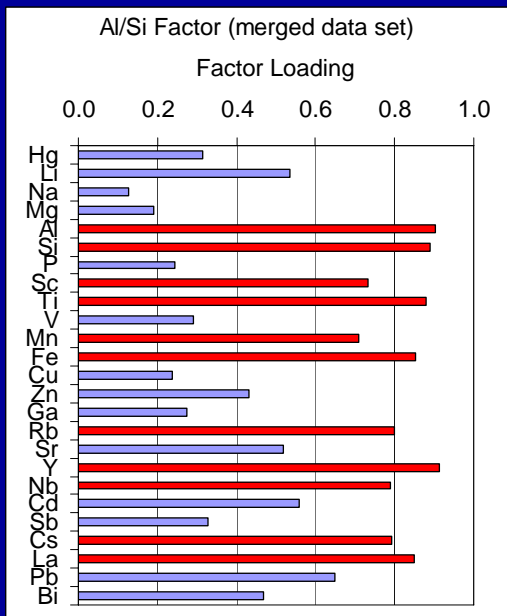
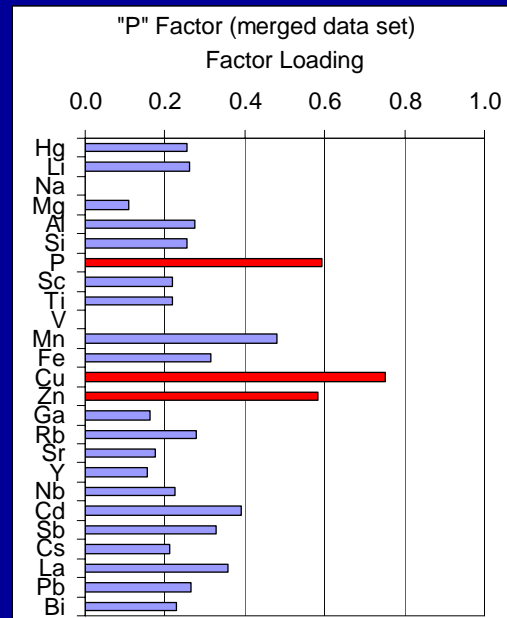
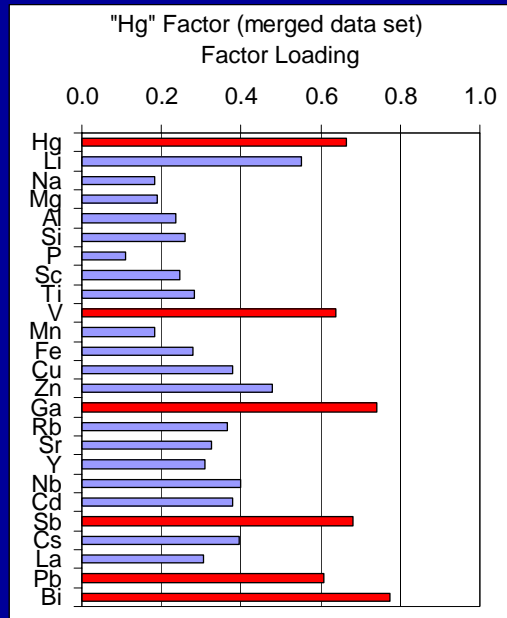


Higher nitrate concentrations than other parts of the Gulf Coast



Can we use multi-element analysis to “fingerprint” various sources of mercury and other trace element in Pensacola Bay rainfall?

Principal components Analysis used to examine relationships among mercury and trace metal data



Conclusions and Future research

- Mercury deposition in the Pensacola Bay watershed is similar to deposition in the region
- Sulfate and pH is also similar, nitrate and chloride are higher.
- Sea salt aerosols are important component of rain in the region
- Will use Principal components analysis and other statistical tests to identify sources affecting rainwater composition and look at weather effects

Acknowledgements

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