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Total gaseous mercury concentrations in Pensacola, FL

GEOC 84

Jane M. Caffrey¹, William M. Landing², and Sara D. Cleveland². (1) Center for Diagnostics and Bioremediation, University of West Florida, 11000 University Parkway, Pensacola, FL 32514, (2) Department of Oceanography, Florida State University, Tallahassee, FL 32306-4320

Total gaseous mercury concentrations have been measured continuously in Pensacola, FL since February 9, 2005. Readings were integrated over 5 minute intervals. February and March were characterized by periodic afternoon spikes of mercury exceeding 10 ng/m³. The highest concentrations observed were 35 ng/m³. These spikes were less common in April and May and concentrations greater than 10 ng/m³ did not appear in June or July. Elevated SO₂ concentrations, up to 30 ppb, often coincided with mercury spikes. Spikes occurred following periods of calm morning winds. We are using the HYSPLIT trajectory analysis model to back forecast the potential source of elevated concentrations.

Spatial and temporal variability in precipitation chemistry in the Pensacola Bay watershed

GEOC 85

Jane M. Caffrey¹, William M. Landing², and Sara D. Cleveland². (1) Center for Diagnostics and Bioremediation, University of West Florida, 11000 University Parkway, Pensacola, FL 32514, (2) Department of Oceanography, Florida State University, Tallahassee, FL 32306-4320

We evaluate the temporal and spatial patterns in atmospheric wet deposition in the Pensacola Bay watershed. Three sites were established in November 2004. Peak rainfall occurred during April 2005 when we collected over 15 cm of rain in individual rain events at the different sites. Site to site variation in rainfall amounts was significant because of the patchy nature of thunderstorm activity. pH values at the three sites ranged from 3.7 to 5.6. There were no consistent differences among the different sites. Sulfate concentrations and pH values were negatively correlated as were nitrate and pH. The marine influence is evident at two sites near Pensacola Bay, which had higher chloride and sodium concentrations than an inland site. Chloride and sodium concentration were significantly positively correlated.

Mercury deposition to the Pensacola Bay watershed

GEOC 86

Sara D. Cleveland¹, William M. Landing¹, and Jane M. Caffrey². (1) Department of Oceanography, Florida State University, Tallahassee, FL 32306-4320, (2) Center for Diagnostics and Bioremediation, University of West Florida, 11000 University Parkway, Pensacola, FL 32514

By sampling individual rain events over a 1-2 year period at three sites situated around a known point source of atmospheric mercury, we are attempting to quantify its influence on local mercury deposition. In the first year, we collected samples for 61 individual rain events. Total mercury concentrations in the rainwater samples range from 2-40 ng/L. The volume weighted mean rainfall Hg concentrations for the first full year of sampling range from 9.2-9.5 ng/L, and there were no significant differences in the rainfall Hg flux between the three sites. Plume dispersion modeling and air-mass back trajectory analysis are being used to interpret the Hg concentrations measured for each rain event.

Trace element correlations in rainfall from the Pensacola Bay watershed

GEOC 87

William M. Landing¹, **Sara D. Cleveland**¹, and Jane M. Caffrey². (1) Department of Oceanography, Florida State University, Tallahassee, FL 32306-4320, (2) Center for Diagnostics and Bioremediation, University of West Florida, 11000 University Parkway, Pensacola, FL 32514

A full year of individual rain event samples from three sites in Pensacola, Florida have been analyzed for mercury and a suite of other trace elements. A multi-element analytical program has been set up using a Thermo-Finnigan "Element" high-resolution ICP-MS. We have identified over 50 elements that are significantly enriched in rain samples relative to the method blank, including the alkali metals and alkaline earth elements, all three rows of the transition metals, and the rare earth elements. Plume dispersion and air-mass back trajectory analysis is also being conducted for each rain event. The goal of this research is to use trace element relationships in an effort to identify, and quantify, the impacts from various emission sources in the region on rainfall chemistry. Preliminary analyses showed that rainfall mercury deposition was significantly correlated with Cd, Pb, V, and Zn ($R^2 > 0.7$).