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Simplified approach to predicting Mercury deposition

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Mercury (Hg) is a persistent and naturally occurring toxin that has drawn global attention due to outbreaks of illness and mortality by consumption of fish from contaminated waters. Atmospheric deposition is a significant source of mercury to aquatic and terrestrial ecosystems. Identifying the fate and transport of this mercury is critical to improving water quality and ecosystem health. This study developed a simple prediction tool for atmospheric mercury deposition from rainfall depth.

The Mercury Deposition Network (MDN) in USA consistently reports its highest annual wet deposition in and around Florida. An estimated 1/2 to 2/3 of lakes and streams in the Florida, contain fish mercury concentrations that exceed health-based standard. To develop a predictive tool, data from 7 MDN sites in and around Florida were used in regression analysis. The average length of operation for all sites was 5.6 years. Average weekly wet season Hg deposition was approximately 500 to 700 ng m^{-2} for each site, while dry season Hg deposition averaged between 150 to 250 ng m^{-2}. Rainfall amounts used in the regression analysis ranged from 1 mm to 363 mm (wet season) and 245 mm (dry season). Regional wet and dry season regression models were developed to predict Hg deposition from rainfall depth. Data from a new site at Orlando, Florida (1-1/2 years) were used to validate the models. Pearson correlations of 0.81 (wet season) and 0.88 (dry season) suggest measured data were strongly correlated (p-value < 0.001) with model values.