PROJECT UPDATE

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New York State Energy Research and Development Authority

Environmental Monitoring, Evaluation, and Protection Program

Mercury Deposition Monitoring Network: Adirondacks and Catskills

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Project Location

Adirondack and Catskill regions outlined

Contact Information

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Keywords

- Dry deposition
- Mercury (Hg)
- Mercury Deposition Network (MDN)
- Speciated mercury data
- Wet deposition

PROJECT FOCUS

This project supports the only two mercury deposition monitoring stations in New York State (NYS). The project currently funds speciated mercury (Hg) wet deposition collection at Huntington Wildlife Forest (owned and operated by the State University of New York College of Environmental Science and Forestry, in cooperation with Syracuse University) in the Adirondack Mountains, and at Biscuit Brook in the Catskill Mountains (operated by the U.S. Geological Survey and the Frost Valley YMCA). Both of the sites are part of the National Atmospheric Deposition Program (NADP) Mercury Deposition Network (MDN). Participation in this network allows comparisons to be made between atmospheric mercury deposition in the Adirondacks and the Catskills, as well between NYS deposition and national rates, thereby broadening the understanding of mercury deposition across the state. This project also provides background mercury deposition data necessary for detailed mercury cycling studies that are being conducted in the Adirondacks and Catskills.

CONTEXT

In the past century, anthropogenic emissions of mercury have caused a concomitant increase in the atmospheric deposition of this toxic chemical. In areas remote from point sources, such as the Adirondack region, atmospheric deposition is the main contributor to elevated mercury concentrations. Analyses of lake sediment show that the current rate of mercury deposition in the Northeast is 2 to 5 times greater than historical levels (before ~60 years ago). The major anthropogenic sources of emissions are the combustion of mercury-containing fuels or materials, such as coal, in the production of electricity and in industrial processes. Mercury emissions from coal-fired power plants, which are currently unregulated under federal law, constitute ~30% of U. S. anthropogenic emissions.

In the northeastern United States, mercury deposition has resulted in higher levels of mercury in freshwater ecosystems. As it accumulates in organisms exposed to it (bioaccumulation), mercury also poses a danger to organisms higher up in the food chain (biomagnification). An issue of particular concern for human health is the accumulation of mercury in fish muscle tissue, which is eaten by human beings. When mercury concentrations reach high enough levels, it can impair neurological development in fetuses and young children, and damage the central nervous system of adults. In New York, fish consumption advisories currently cover over 70 lakes, rivers, and reservoirs because of high mercury levels.

Huntington monitor

Mike McHale setting up the mercury monitor at the Biscuit Brook project site.
Photograph by: Mark Watson

Project Status

- Initiated 2002
- Project ongoing

New York Energy Smart℠
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Since 1975, the New York State Energy Research and Development Authority (NYSERDA) has developed and implemented innovative products and processes to enhance the State's energy efficiency, economic growth, and environmental protection. One of NYSERDA's key efforts, the Environmental Monitoring, Evaluation, and Protection (EMEP) Program, supports energy-related environmental research. The EMEP Program is funded by a System Benefits Charge (SBC) collected by the State's investor-owned utilities. NYSERDA administers the SBC program under an agreement with the Public Service Commission.

METHODOLOGY

To assess wet deposition inputs of mercury in New York State, the two NADP/MDN stations will continue monitoring activities through 2006. Syracuse University operates Huntington Forest (HF) station in the Adirondacks, and the U.S. Geological Survey, in cooperation with Frost Valley YMCA personnel, operates Biscuit Brook station (BB) in the Catskills.

In addition to monitoring deposition, the project team will:

- Provide annual summaries of the mercury concentration and deposition data for the HF and BB sites.
- Compare the wet deposition of mercury at HF, BB, and other regional sites in the network.
- Develop preliminary total mercury deposition maps for the Adirondack region, using information on wet deposition at HF, and throughfall and litter deposition (i.e., dry deposition) of mercury obtained from Sunday Lake, HF, and other areas of the Adirondacks.

RECENT FINDINGS

HUNTINGTON FOREST

The annual volume-weighted concentration of total mercury for the site is 7.3 ± 5.0 ng/L, with values ranging from 1.3 to 29.2 ng/L. The annual wet deposition of mercury is 9.4 $\mu g/m^2$ per year. These values are similar to values reported in the network for other sites in eastern Northern America.

BISCUIT BROOK

The Biscuit Brook monitoring station began operation March, 2004. Samples are being collected weekly in accordance with MDN protocols by Frost Valley YMCA personnel. Volume-weighted concentrations of total mercury for the site have ranged from 3.0 to 28.7 ng/L.

PROJECT IMPLICATIONS

The choice of a regulatory regime for mercury and the evaluation of future controls requires a reliable data record of atmospheric deposition rates, on the basis of which the effects of emission reductions may be predicted and ultimately evaluated. The data gathered at the two stations supported through this project are essential for the interpretation of spatial and seasonal trends in mercury deposition in New York State and provide the reference information for detecting future changes in wet deposition rates. The work performed at the stations also benefits other studies of mercury in the region, such as the NYS Department of Environmental Conservation's extensive survey of mercury concentrations in fish in NYS waters. As part of the MDN, these sites will contribute to a national database of weekly concentrations of total mercury in precipitation and seasonal and annual fluxes of total mercury in wet deposition.