

Determination of Bromide in NADP/NTN Wet Deposition Samples and its Spatial and Temporal Correlation with North American Mercury Wet Deposition

Christopher Lehmann, Lee Green, Tracy Dombek, and David Gay

National Atmospheric Deposition Program
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana-Champaign
Phone: 217-265-8512
Email: clehmann@illinois.edu

Bromide is released into the environment via natural and anthropogenic processes. Brominated flame retardants are used widely in a wide variety of products, while methyl bromide is a fumigant applied before and after harvest for a variety of fruits and vegetables. Methyl bromide is classified as an ozone-depleting substance, and its use is strictly regulated and monitored by the U.S EPA. Research has linked gaseous bromide to oxidation of elemental mercury in the atmosphere; this could lead to enhanced deposition of mercury to the terrestrial environment. Therefore it is of interest to determine if there is any correlation in time and space between oxidized forms of bromine and mercury wet deposition.

The NADP is evaluating bromide as an additional analyte for its 244-site National Trends Network (NTN) and 7-site Atmospheric Integrated Research Monitoring Network (AIRMoN). Bromide concentrations have been measured in all NTN and AIRMoN samples since June of 2009. Additional funding was provided by the U.S. Geological Survey to evaluate bromide concentrations in NTN archive samples. Archive samples from 2001 and 2002 were selected based upon geographical locations and agricultural activities in those areas. Spatial and temporal trends are evaluated and presented from the data obtained for 2001-2002 and 2009-2010. Initial spatial trends indicate that the highest wet concentrations of bromides are in the Rocky Mountains and along the Gulf and East Coast of North America.

Data from the National Atmospheric Deposition Program/Mercury Deposition Network (NADP/MDN) indicate significant trends have occurred in the deposition of mercury in certain regions of the United States (U.S.). Collocated bromide wet deposition samples are studied to determine spatial or temporal relationships between mercury and bromide concentrations.