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Semi-Volatile Organic Compounds in Lake Water from High-elevation or High-latitude Perched Lakes in National Parks in Western North America

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Abstract
Airborne contaminants, including semi-volatile organic compounds (SOCs), have demonstrated long range atmospheric transport and deposition to high elevations and/or high latitude ecosystems. The Western Airborne Contaminant Assessment Program (WACAP) is aimed at evaluating the potential ecological impact from atmospheric transport and deposition of SOCs to high elevation ecosystems in national parks located in western North America. Within these parks, snow is the dominant form of precipitation and provides 50 to 90 percent of the deposition into high elevation and/or latitude ecosystems. SOCs are deposited by cold condensation and/or by snow either in the ice nuclei or scavenged from the air by the snowflakes. During the summer, the annual snow pack melts and releases the SOCs into lakes. Lake water samples were collected from eight sites located in five national parks, three parks in Alaska (Denali, Noatak, and Gates of the Arctic) and two parks in the contiguous United States (Sequoia and Rocky Mountain). Multiple 50-L lake water samples were collected from eight oligotrophic perched lakes during the ice free summer (four lakes sampled in 2003 and four lakes in 2004). Lake water samples were filtered and extracted *in situ* to determine the particulate verses dissolved phase distribution. SOCs in the dissolved phase were extracted with a hydrophobic/hydrophilic Baker SpeediskTM solid phase extraction device. Samples were analyzed for 84 SOCs, including historic and current-use pesticides, polycyclic aromatic hydrocarbon (PAH), and polychlorinated biphenyls (PCB). Extracts were then analyzed by gas chromatographic mass spectrometry with electron impact and electron capture negative ionization using isotope dilution and selective ion monitoring. Analyte ratios, including isomer ratios, current verses historic-use compound ratios, and parent verses metabolite ratios provide insight into SOC sources