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Semi-Volatile Organic Compounds in Snow and Lake Water from National Parks of the Western United States

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Abstract:

Semi-volatile organic compounds (SOCs) are known to undergo atmospheric long-range transport and deposition to cold regions at high elevations and latitudes. This phenomenon is of interest to the United States National Park Service, which is sponsoring a 5-year study called the Western Airborne Contaminants Assessment Project (WACAP), because high-elevation and latitude ecosystems are prevalent in the national park system. To meet the WACAP objective of assessing potential SOC accumulation in national parks, snow and lake water samples were collected in high-elevation and latitude catchments at seven western national parks and analyzed for 84 different SOCs. Target analytes included current- and historic-use pesticides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs). Full-depth samples (~50 kg) of the annual snowpack were collected at maximum accumulation in the spring of 2003. SOCs were extracted from melted snow with hydrophilic/hydrophobic solid-phase extraction (SPE) disks. Lake water (~50 L) was sampled during late summer of 2003. SOCs were extracted from lake water *in situ* by pumping lake water through hydrophilic/hydrophobic SPE disks with a submersible pump. Extracts were analyzed using gas chromatography with mass spectrometry. SOCs that are currently produced or used in the United States, such as chlorothalonil, dacthal, endosulfan, and PAHs, were detected in both snow and lake water. SOCs that were banned in the United States several decades ago, such as chlordane, dieldrin, and PCBs, were also detected in snow and lake water. Sources of SOCs in national parks may be within the park (e.g. PAHs), regional (e.g. current-use pesticides), or distant (e.g. historic-use pesticides and PCBs).

Characters = 1815

Max. Characters = 1800

Words = 255

SOCs that are currently used as pesticides in North America, such as chlorothalonil, dacthal, and endosulfan, were detected in both snow and lake water. Since these SOCs are often used on land near or adjacent to national parks, their presence may be, in part, due to regional atmospheric transport. A variety of sources, including those located within parks, may be responsible for PAHs found in snow and lake water. SOCs that were banned in the United States several decades ago, including chlordane, dieldrin, and PCBs, were also detected in snow and lake water. Regional sources from historic use or long-range transport from other countries may be responsible for their presence.