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Measurement of Semi-Volatile Organic Compounds in High Elevation Lake Sediments

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Abstract

The transport of airborne contaminants, including semi-volatile organic compounds (SOCs) and their deposition, is recognized as a potential risk to high elevation ecosystems. The objective of the Western Airborne Contaminants Assessment Project (WACAP) is to assess the deposition of airborne contaminants to western national parks by measuring SOCs in different environmental compartments. The objective of the sediment research is to evaluate decennial to century trends in SOC contaminant flux to the 14 WACAP lake catchments by dating and analyzing sediment cores from each lake. This research focuses on the development of a new analytical method and its validation for the measurement of SOCs in high elevation lake sediments. The target compounds are 84 SOCs, including organochlorines, polycyclic aromatic hydrocarbons (PAHs), polychlorinated benzenes (PCBs), carbonates, organophosphates, and s-triazines. Sediment cores were collected using a gravity coring system, sliced into 0.5-1.0 cm fractions in each lake and stored at -20°C until sample extraction. Sodium sulfate was added to samples to remove water and Accelerated Solvent Extractor (ASE) was used to extract SOCs from sediment. The sample clean-up procedure included Gel Permeation Chromatography (GPC), which was used to remove lipid and natural sulfur from samples, and silica adsorption chromatography, which was used to remove polar interferants. Finally, extracts were analyzed by gas chromatographic mass spectrometry (GC/MS) using electron impact (EI) and electron capture negative ionization (ECNI). The percent recoveries of the analytes was 45-150% for the entire analytical method. Data will be presented on the performance of the analytical method using a NIST sediment SRM and on the concentration of SOCs measured in sediments collected from Sequoia National Parks.