Concentrations of acetate, formate, chloride, sulfate, and oxalate from total suspended particle (TSP) samples collected near Lake Tahoe from 2006 to 2009

Website: https://www.bco-dmo.org/dataset/856108
Data Type: Other Field Results
Version: 1
Version Date: 2021-07-19

Project
» Atmospheric Deposition Impacts on Marine Ecosystems (ADIMA)

Contributors	Affiliation	Role
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Abstract
This dataset reports concentrations of acetate, formate, chloride, sulfate, and oxalate from total suspended particle (TSP) samples collected near Lake Tahoe from 2006 to 2009.

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Coverage

Spatial Extent: **Lat**:39.09231 **Lon**:-120.00275
Temporal Extent: 2006-01-17 - 2009-11-30

Methods & Sampling

Total suspended particle (TSP) samples were collected between 2005 and 2010. Weekly integrated samples were collected on acid washed quartz fiber filters (10"x8", Whatman®) using a Graseby Andersen TSP High Volume Sampler. Between November 2005 and May 2007, the sampler was located near the lake at the UC Davis Field Station (Hatchery) away from any local source of disturbance. After May 2007, the sampler was relocated about 300 meters south to reduce local impacts due to remodeling at the Hatchery. The TSP sampler was placed 3.2 meters above the ground and protected by trees from direct road dust inputs. TSP samples were collected at an airflow rate of 85 cubic meters per hour. All filters were kept frozen until further analyses. To extract the soluble fraction of nutrients and trace metals in TSP samples, a 47 mm circular subsample of each filter was placed on an acid-washed filter tower, and 100 mL of MilliQ water was passed through the sample under gentle vacuum pressure exposing the sample for about 10 seconds to the water (Buck et al., 2006). A 100 µL of concentrated nitric acid was added to 5 mL of the MilliQ water for trace metal analysis and the rest of the sample was kept frozen for nutrient and ion chromatography analyses. Formate (CHOO), acetate (C2H3O2), chloride (Cl), sulfate (SO2), and oxalate (C2O4) were separated and eluted using a 4x250mm AS18 column (DIONEX) with a KOH eluent and analyzed by Ion Chromatography (IC) using a DIONEX ICS-2000 system.

Data Processing Description

BCO-DMO Processing:
- changed date format to YYYY-MM-DD.

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Data Files

File
lake_tahoe_tsp_ions.csv (Comma Separated Values (.csv), 1.45 KB) MD5:ddbd71731b2f34d07c8fb647da2483b9 Primary data file for dataset ID 856108

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Related Publications

Buck, C. S., Landing, W. M., Resing, J. A., & Lebon, G. T. (2006). Aerosol iron and aluminum solubility in the northwest Pacific Ocean: Results from the 2002 IOC cruise. Geochemistry, Geophysics, Geosystems, 7(4), n/a–n/a. doi:10.1029/2005gc000977 https://doi.org/10.1029/2005GC000977
Methods

Chien, C.-T., Allen, B., Dimova, N. T., Yang, J., Reuter, J., Schladow, G., & Paytan, A. (2019). Evaluation of atmospheric dry deposition as a source of nutrients and trace metals to Lake Tahoe. Chemical Geology, 511, 178–189. doi:10.1016/j.chemgeo.2019.02.005
Results

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Parameters

Parameter	Description	Units
Date	Beginning date of TSP (Total suspended particle) collection; format: YYYY-MM-DD	unitless
Acetate	Concentration of acetate in TSP samples	micromoles per cubic meter (umol m-3)
Formate	Concentration of formate in TSP samples	micromoles per cubic meter (umol m-3)
Chloride	Concentration of chloride in TSP samples	micromoles per cubic meter (umol m-3)
Sulfate	Concentration of sulfate in TSP samples	micromoles per cubic meter (umol m-3)
Oxalate	Concentration of oxalate in TSP samples	micromoles per cubic meter (umol m-3)

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Instruments

Dataset-specific Instrument Name	Graseby Andersen TSP High Volume Sampler
Generic Instrument Name	Aerosol Sampler
Generic Instrument Description	A device that collects a sample of aerosol (dry particles or liquid droplets) from the atmosphere.

Dataset-specific Instrument Name	DIONEX ICS-2000 system
Generic Instrument Name	Ion Chromatograph
Generic Instrument Description	Ion chromatography is a form of liquid chromatography that measures concentrations of ionic species by separating them based on their interaction with a resin. Ionic species separate differently depending on species type and size. Ion chromatographs are able to measure concentrations of major anions, such as fluoride, chloride, nitrate, nitrite, and sulfate, as well as major cations such as lithium, sodium, ammonium, potassium, calcium, and magnesium in the parts-per-billion (ppb) range. (from http://serc.carleton.edu/microbelife/research_methods/biogeochemical/ic....)

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Project Information

Atmospheric Deposition Impacts on Marine Ecosystems (ADIMA)

Website: http://pmc.ucsc.edu/~apaytan/page_projects.html

Coverage: Gulf of Aqaba, Atlantic Ocean (Bermuda Time Series Station), Monterey Bay

Chemical components delivered to the surface ocean through atmospheric deposition influence ocean productivity and ecosystem structure thus are tightly related to the global carbon cycle and climate. Accordingly, the major aim of this project is to quantitatively estimate the variable impact of aerosols on marine phytoplankton and to determine the specific effects on various taxa. Such data could in the future be used to better understand the global impact of aerosols on the oceanic ecosystem. To accomplish this goal the PI will monitor aerosol dry deposition fluxes, determine aerosol sources, obtain the chemical composition and solubility of aerosols, and evaluate the contribution of aerosols to nutrient and trace metal budgets of seawater at two oceanographically different sites (Bermuda and Monterey Bay) representing open ocean and coastal setting. The effects of the different aerosol "types" (defined by source and chemical characteristics) on specific phytoplankton taxa will also be evaluated using pure culture and natural samples bioassays. This project is particularly important in light of the role atmospheric deposition can resume in oligotrophic and coastal settings and the predicted future global conditions of increased aridity and urbanization and associated changes in dust fluxes and composition.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0850467

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