AT50-22 sediment rates

Website: https://www.bco-dmo.org/dataset/1000873
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Project
» Collaborative research: Regulation and dynamics of microbial communities and biogeochemical cycling in hydrothermally-influenced habitats in the Gulf of California (GoC Microbial Biogeochem)

Contributors	Affiliation	Role
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Coverage

Spatial Extent: **Lat**:0 **Lon**:0

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Parameters

Parameters for this dataset have not yet been identified

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Project Information

Collaborative research: Regulation and dynamics of microbial communities and biogeochemical cycling in hydrothermally-influenced habitats in the Gulf of California (GoC Microbial Biogeochem)

Coverage: Gulf of California

NSF Award Abstract:
Oceanic hydrothermal ecosystems have captivated the imagination of scientists and the general public since their discovery ~40 years ago. These habitats are characterized by extremes in temperature and pH, low oxygen concentrations, and high concentrations of toxic metals. Despite this, these ecosystems support rich and abundant microbial communities that achieve high rates of biogeochemical cycling. This project supports unprecedented studies to identify the impact of chemical regimes on microbial and viral community composition, diversity, and activity in areas in the Gulf of California along a range of hydrothermalism and dissolve oxygen levels. The project provides training opportunities for undergraduate and graduate students. Results are communicated through talks and lectures, publications, and data sharing through public repositories. The work will be shared through Ocean Discovery Camp and Clubs for diverse middle school students, displays at the Georgia Museum of Art, and a collaboration with the BBC Planet Earth III – Oceans team. Through these cumulative efforts, the project will forge a strong legacy in education and in fostering ocean literacy and promoting ocean advocacy in the general public.

The Gulf of California is a system where hydrothermal fluids flow through and alter sediment prior to discharge into deep waters. In sediments, fluid flow modulates biological dynamics through changes in carbon loading and electron accepter availability. In the water column, inorganic and organic energy sources are injected into hypoxic deep waters, creating dynamic chemical niches. This project studies how gradients in geochemistry shape and modulate the microbial and viral communities that carry out key biogeochemical reactions in sediments and in the water column of Guaymas and Pescadero Basins. The research integrates data streams from biogeochemistry, genomics, and microbiology, including single-cell activity approaches, to achieve unprecedented insight into regulatory mechanisms and dynamics. The project includes experiments and observations in the laboratory and at sea during an expedition on the R/V Atlantis with the deep submergence vehicle ALVIN in 2022. Key topics for investigation include: (1) Do variations in geochemical regimes select for metabolically plastic microbial populations? (2) Do different microbes become active under specific geochemical conditions or do the same microbes adapt to changing geochemical conditions? (3) What is the role of viruses in shaping the microbial populations present in highly dynamic hydrothermal habitats?

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2049439

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