Oxidation data of whole terrestrial organic matter samples (soils)

Website: https://www.bco-dmo.org/dataset/999251
Version: 1
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Project
» EAGER: The camouflaging of terrigenous organic matter as marine organic matter through hydroxyl radical oxidation via the dark Fenton reaction (Fenton oxidation)

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

EAGER: The camouflaging of terrigenous organic matter as marine organic matter through hydroxyl radical oxidation via the dark Fenton reaction (Fenton oxidation)

NSF Award Abstract:
Organic carbon in the ocean is made-up of materials delivered by riverine runoff from land and marine sources. However, even though a large amount of land-derived organic carbon enters the ocean from rivers, most carbon in the ocean appears to be from marine sources. This has led scientists to conclude that land-derived carbon is not transported far into the ocean. This EAGER project aims to test this assumption. The team of scientists will examine whether chemical reactions alter the composition of land-derived organic carbon in a way that makes it look like marine organic carbon. If this proves true, the results could explain why land-derived organic carbon is difficult to identify in the ocean and could lead to a reconsideration of present carbon budgets and models. The scientists will perform experiments using land-derived carbon collected from major river systems throughout the world. Samples will be introduced to reactive oxygen species (mainly hydroxyl radicals) and iron in the dark under conditions that occur in nature. Reaction rates and changes in the

composition of the organic matter will be monitored during and following the experiments. This EAGER project provides research training and valuable professional development experience for an early career researcher who has not received prior support from NSF. Undergraduate students enrolled in STEM and REU programs at the lead institutions will participate in the research.

This EAGER project examines the hypothesis that hydroxyl radicals generated during dark Fenton reactions react with terrigenous organic matter to produce organic matter that is compositionally and isotopically similar to marine organic matter. The PIs will test this hypothesis using environmentally relevant concentrations of hydroxyl radical and terrestrial organic matter samples collected from several large-scale terrestrial riverine systems. The PIs will use multiple methods to characterize bulk organic matter (infrared/nuclear magnetic resonance (NMR) spectroscopy), its molecular composition (electrospray ionization Fourier Transform ion cyclotron resonance mass spectrometry (ESI FT-ICR MS), and stable isotope values of carbon and nitrogen (δ13C, δ15N) of dissolved and particulate organic matter pools before, during and following the experiments. This study explores an untested, but potentially transformative hypothesis that could alter existing paradigms about the fate of terrestrial organic matter in the ocean. Results from this study could revise understanding of the contributions of terrigenous organic matter to the ocean carbon cycle. The project would provide research and professional development opportunities for an early career investigator who has not received prior NSF support (co-PI Goranov). Undergraduates enrolled in REU and STEM training programs at the PIs' home institutions would participate in the research.

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-2346285

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