Cruise track (1-min fixes; from R2R) from R/V F.G. Walton Smith cruise WS1005 from Miami to the Bahamas in 2010

Website: https://www.bco-dmo.org/dataset/3993
Data Type: Cruise Results
Version: 1
Version Date: 2013-07-09

Project
» Were Protists the Beginning of the End for Stromatolites? (Protists_Stromatolites)

Contributors	Affiliation	Role
Bernhard, Joan M.	Woods Hole Oceanographic Institution (WHOI)	Chief Scientist
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
1-minute resolution navigation from the WS1005 cruise aboard the R/V F.G. Walton Smith from 18 March to 24 March 2010.

Table of Contents

Coverage

Spatial Extent: **N**:25.83778167 **E**:-76.8221655 **S**:24.6997025 **W**:-80.19414733
Temporal Extent: 2010-03-18 - 2010-03-24

Dataset Description

1-minute resolution navigation from the WS1005 cruise aboard the R/V F.G. Walton Smith from 18 March to 24 March 2010.

Methods & Sampling

Original navigation and other data are available from the NSF R2R data catalog:
http://www.rvdata.us/catalog/WS1005

[table of contents | back to top]

Data Files

File
WS1005_cruise_track.csv (Comma Separated Values (.csv), 791.70 KB) MD5:e3a4e2f01bef74d31295080b113e7ebb Primary data file for dataset ID 3993

[table of contents | back to top]

Parameters

Parameter	Description	Units
date_utc	Year, month, and day (UTC) in YYYYmmdd format.	unitless
time_utc	Time (UTC) in hours, minutes, and decimal minutes; 24-hour clock.	HHMM.mmmmm
lat	Latitude (-90 to 90 decimal degrees).	decimal degrees
lon	Longitude (-180 to 180 decimal degrees).	decimal degrees
sog	Instantaneous speed-over-ground (in meters per second); computed from single-differences of successive positions (from the current position to the next position).	m/s
cog	Instantaneous course-over-ground measured in degrees clockwise from north.	degrees clockwise from North
ISO_DateTime_UTC	Date/Time (UTC) formatted to ISO8601 standard. T indicates start of time string; Z indicates UTC.	YYYY-mm-ddTHH:MM:SS.ssZ

[table of contents | back to top]

Deployments

WS1005

Website	https://www.bco-dmo.org/deployment/59051
Platform	R/V F.G. Walton Smith
Start Date	2010-03-18
End Date	2010-03-24
Description	Sampling of stromatolites and thrombolites for the project, "Were protists the beginning of the end for stromatolites?" Cruise information and original data are available from the NSF R2R data catalog.

[table of contents | back to top]

Project Information

Were Protists the Beginning of the End for Stromatolites? (Protists_Stromatolites)

Coverage: Highborne Cay, Bahamas and Carbla Station (Shark Bay), Western Australia

Collaborative Research: Were Protists the Beginning of the End for Stromatolites?

This award is funded under the American Recovery and Reinvestment Act of 2009 (Public Law 111-5).

Microbial mats are conspicuous components of many benthic marine and aquatic settings. A subset of these microbial mats binds sediments to form potentially fossilizable structures, often called stromatolites or

microbialites. While much is known about microbialite autotrophs, little is known about their heterotrophic eukaryotes. The lack of understanding is surprising given that stromatolites have an extensive geologic record spanning most of Earth's history. Stromatolites are layered sedimentary structures formed by a combination of microbial activities, abiotic carbonate precipitation, and sedimentary processes. Details of stromatolite formation and preservation are poorly understood, and a drastic decline in stromatolite occurrence and diversity in the late Precambrian has long been a conundrum. A popular hypothesis to explain this decline at ~1 billion years ago is that eukaryotic organisms evolved to become predators on stromatolites. To date, the most commonly proposed predatory culprit is an unidentified metazoan, although evidence of such an organism is lacking from the fossil record. Protists, most of which are not expected to leave an obvious fossil record, are additional possible stromatolitic predators, but they have been largely ignored in this context. The hypotheses of this project are: (1) Heterotrophic protist activity caused the textural change from stromatolites (layered sediment fabric) to thrombolites (clotted sediment fabric) and (2) Heterotrophic protists caused the decimation of Neoproterozoic stromatolites. Since it is impossible to recreate the Neoproterozoic, studies of modern analogs serve to indirectly test these hypotheses. The overall goal of this project is to describe the eukaryotic communities associated with modern stromatolites and thrombolites from the Bahamas and Australia, compare the communities from the two sites, and to relate the communities to stromatolitic / thrombolitic sediment fabric and biomarker signatures.

The overall goal will be achieved by addressing the following specific aims: (1) Identify, via morphologic and molecular approaches, the eukaryotic community of modern stromatolites and thrombolites; (2) Analyze modern and fossil stromatolites and thrombolites for their eukaryotic lipid biomarkers using solvent extraction, chromatographic and mass spectrometric methods; (3) Using the Fluorescently Labeled Embedded Core (FLEC) method, document the sub-millimeter distributions of the heterotrophic eukaryotic community inhabiting modern stromatolites and thrombolites in conjunction with fine-scale sediment fabric; (4) Using solvent extraction, chromatographic and mass spectrometric methods, analyze cultures of allogromiid foraminifers to survey for lipid biomarkers unique to them; (5) After incubation of modern stromatolites with heterotrophic protists, use FLEC methodology to determine how their activity affects sediment fabric and conduct preliminary comparisons of these modern fabrics to those of stromatolite fossils.

Intellectual Merit: The oldest fossil stromatolites are >3.4 billion years old and are the most visible manifestations of pervasive microbial life on the early Earth. The changes in stromatolite abundance and morphology document complex interplays between biological and geological processes. This project addresses multiple aspects of stromatolite genesis and pre-fossilization alteration but at its core, focuses on one of the greatest geological enigmas: the possible connection between stromatolite decline and the rise of complex life.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0926421

[table of contents | back to top]