Protist numbers in subtropical North Atlantic at and below 100 m collected on the R/V Pelagia (64PE356) from Galway, Ireland to Reykjavik, Iceland in 2010 (Eukaryote Microbes NAtl project)

Website: https://www.bco-dmo.org/dataset/565129
Data Type: Cruise Results
Version: 2015-08-31

Project
» Ecology of eukaryote microbes in the deep North Atlantic (Eukaryote Microbes NAtl)

Contributors	Affiliation	Role
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Dataset Description

Excerpt from Bochdansky et al. (submitted):

"The Medea-2 expedition on the RV Pelagia (Royal Netherlands Institute for Sea Research) took place from mid June to mid July 2012. Twenty-four stations were sampled from the Porcupine Plains west towards the Charlie-Gibbs Fracture Zone, and then north to the Norwegian Sea. Water from six depths (ranging from 100 - 4483 m), four below 1000 m, one at the oxygen minimum zone (OMZ), and one at 100 m, was collected from 25 L Niskin bottles into 250 mL polycarbonate bottles. Various volumes of water were filtered onto 0.2 µm pore size, 25 mm diameter polycarbonate filters depending on depth: 50 mL from 100 m, 150 mL from the OMZ, and 250 mL from the deep sea and fixed the same way as stated above. The filters were stored in 2 mL cryovials at -80 °C immediately after filtering and shipped to Old Dominion University on dry ice. The filters were cut into 8ths. For prokaryote abundance, two opposite slices were stained and mounted with Vectashield DAPIon glass slides. For eukaryotic microbe abundance, two opposite filter slices were dual-stained with FITC and Vectashield DAPI, and enumerated (Morgan-Smith et al. 2011). All prokaryote and eukaryotic microbe counts were performed on an epifluorescence microscope (Olympus BX51). For prokaryotes a minimum of 50 randomly selected fields of view, 25 on each filter slice, were counted. For eukaryotic microbes, a minimum of 100 randomly selected fields of view was counted per station, 50 from each filter slice."

Cell counts of eukaryotic microbes can be found in the Protist counts for the cruise Archimedes-IV dataset**.** Context data for this cruise are stored on the Centralized Oceanographic Data Information System (CODIS) of the Data Management Group at the Netherlands Institute of Sea Research (www.nioz.nl/portals-en). Cruise number: **64PE356**. (not yet available, 2015-09-01)

References:

Morgan-Smith D., Clouse M. A., Herndl G. J., Bochdansky A. B. (2013) Diversity and distribution of microbial eukaryotes in the deep tropical and subtropical North Atlantic Ocean. Deep-Sea Res. I: 78: 58-69. doi:10.1016/j.dsr.2013.04.010

Morgan-Smith D., Herndl G. J., van Aken H. M., Bochdansky A. B. (2011) Feature article. Abundance of eukaryotic microbes in the deep subtropical North Atlantic. Aquat. Microb. Ecol. 65:103-115. doi: 10.3354/ame01536

Related datasets: See Dataset Collections under the project page for "Basin-scale distribution and activity of deep-sea protists in the North Atlantic Ocean"

Data Processing Description

Raw counts were converted into cell numbers per ml using field of view under the microscope, filtered area on the polycarbonate filter, and volume filtered as input variables.

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- replaced blank cells with nd's (no data)
- id column not served
- converted 360 lons to 180 lons

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Data Files

File
protists_prokaryotes_MEDEAII.csv (Comma Separated Values (.csv), 12.52 KB) MD5:b544cb5a216acc4511b56665f2a20e65 Primary data file for dataset ID 565129

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Parameters

Parameter	Description	Units
cruise_id	cruise identification	unitless
sta	station number	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
depth_w	depth of the water	meters
depth	sample depth	meters
temp	temperature	degrees Celsius
Prokaryotes	prokaryote cell numbers (Bacteria + Archaea)	cells/ml
Eukaryotes	Protist cell numbers (eukaryotic microbes)	cells/ml

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Fluorescence Microscope
Dataset-specific Description	Epifluorescence microscope (Olympus BX51)
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of fluorescence and phosphorescence instead of, or in addition to, reflection and absorption of visible light. Includes conventional and inverted instruments.

Dataset-specific Instrument Name	Niskin bottle
Generic Instrument Name	Niskin bottle
Dataset-specific Description	25 liter
Generic Instrument Description	A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc.

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Deployments

64PE356

Website	https://www.bco-dmo.org/deployment/565135
Platform	R/V Pelagia
Start Date	2012-06-23
End Date	2012-07-23
Description	Cruise for the MEDEA II project

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Project Information

Ecology of eukaryote microbes in the deep North Atlantic (Eukaryote Microbes NAtl)

Coverage: Temparate, subarctic Atlantic and Arctic Ocean

Description from NSF award abstract:
In the microbial realm, one of the three domains of life -- the Eukarya -- has received little attention in deep-sea research. This stands in contrast to the fact that in all known aquatic environments, and measured by the amount of material and energy transferred, the link between prokaryotic and eukaryotic cells is one of the most significant trophic interactions on Earth. In terms of volume, the deep sea is the largest biome, and despite its tremendous role in long-term biogeochemical cycles, it has largely been neglected. Biological activity in the deep sea is neither negligible nor homogeneous in space and time. Recent data suggest that biological activity in the dark ocean (as evidenced by respiration rates, bacterial secondary production and a variety of other metrics) is much higher than anticipated from all known organic carbon fuel sources combined (i.e., POC flux, DOC convection, in situ production and active transport by zooplankton). Water masses in the deep ocean represent highly-diverse biogeographic regions with distinct communities and particle distributions. Moreover, because of feeding thresholds, cold temperatures, extreme pressures and unique adaptations that deep-sea microbes exhibit, biological activity rules cannot simply be extrapolated from laboratory cultures and from experiments with surface-dwelling microbes. This study focuses on the fundamental role of eukaryotic microbial communities in deep-sea ecology with the overarching hypothesis that protists represent sensitive biological indicators of utilizable organic carbon. There is good reason to believe that microbial eukaryotes and their activities are better indicators of "new" sources of organic carbon than particle inventories, sediment

traps, isotope ratios, or models based on surface production and theoretical flux attenuation. For these new biological indicators to work, however, one needs to separate live from the moribund and dead cells, the bacterivores from saprotrophs, the inactive resting stages from those actively feeding on prokaryotes, the gametes and zoospores from vegetative and feeding stages, and those located on particles from the ones freely suspended in the water column. Each of these groups represents different levels of per-cell energy and carbon requirements.

This study determines the ecological role of eukaryotic microbes in the deep North Atlantic over large geographic regions. The research incorporates two fundamentally different experimental designs that capitalize on different time scales: 1) Short-term incubations (~72 hours) of respiratory activity and bacterivory combined with a high resolution sampling of abundances across large geographic regions performed from a research vessel, and 2) Long-term incubations (=/> 4 weeks) measuring colonization of sinking particles and growth of eukaryotic microbes using free-falling (untethered) vehicles representing the first attempt of physiological rate measurements directly in the deep sea. Methods include new tracers for bacterivory, incubations for single-cell respiration, taxonomic identification using fluorescence in situ hybridization, single-cell genomics, and the first of its kind deep-sea holographic microscope capturing images to a maximum depth of 6000 m at 5 micrometer resolution.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1235169

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