GoMX PIT from R/V Oceanus cruise OC468-02 in the Gulf of Mexico in 2010 (GoMX - DHOS Marine Snow and Sedimentation project)

Website: https://www.bco-dmo.org/dataset/3459
Data Type: Cruise Results
Version: 11 April 2011
Version Date: 2011-04-11

Project
» Deepwater Horizon Oil Spill, Marine Snow and Sedimentation (GoMX - DHOS Marine Snow and Sedimentation)

Program
» Gulf of Mexico - Deepwater Horizon Oil Spill (GoMX - DHOS)

Contributors	Affiliation	Role
Passow, Uta	University of California-Santa Barbara (UCSB-MSI)	Principal Investigator, Contact
Asper, Vernon L.	University of Southern Mississippi (USM)	Co-Principal Investigator
Diercks, Arne R.	University of Southern Mississippi (USM)	Co-Principal Investigator
Gegg, Stephen R.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Table of Contents

Coverage

Spatial Extent: **N**:28.86731 **E**:-87.2167 **S**:27.3752 **W**:-90.5595
Temporal Extent: 2010-08-24 - 2010-09-14

Dataset Description

Results from floating particle interceptor traps (PIT) deployed August/ September for about 36 hours each at 8 stations in the Gulf of Mexico at 150 or 180 m

Note: These data are restricted. Contact PI for access information.

Methods & Sampling

GoMX Aug/ Sep 2010: PIT traps
Methods
Eight (PIT 1 & 2, 7, & 8) to twelve (PIT 3, 4, 5, 6) columns were attached to a cross (2-3 in each of 4 directions) attached 30 m above the weight. Above the column a bungee cord connection that buffered the wave action connected to two large benthos floats and a bead of a series of small floats with a buoy at the surface. The

traps, which were suspended at 150 m depth (PIT 1 to 6) or 185 m (PIT > 6) and drifted freely, were deployed at the beginning of each main station and recovered at the end. Deployment time varied around 36 hours, except PIT 7 where it was 24 h. Each trap column was 62.5 cm high, with baffles in the 9 top cm and a diameter of 6.96 cm (area 37.94 cm^2).

Gels in jars fitting tightly into the columns were added at the bottom of two columns to investigate size distribution and type of sinking particles. Prior to deployment the cup with the softened gel (softened by adding a layer of 50 ‰ FSW ≥ 2 days before deployment) was fitted into the bottom of the column and overlaid first with a layer of salt-enriched water and then with FSW. The other 6 to 10 columns were filled with FSW which was under laid with 300 mL of salt-enriched water using a tube connected to a sawed off pipette.

Upon retrieval, water was drained above the gel cups, the cups removed and stored in the fridge. The upper 2/3 of the water in the other columns was also drained after particles wee allowed to settle and the lower third of all columns mixed and used for subsequent analysis of POC, PON, Isotopes. DNA content and oil signature is analyzed for selected samples only.

Data Processing Description

Counts: particles were counted in a dissecting scope, abundance calculated.
DW: Subsample was filtered onto pre-weight filter (PC) and filters reweight after drying for 2 h at 60ºC.

BCO-DMO Processing Notes
Generated from original spreadsheet file "GOM_PIT_gelcounts-_BCODMO.xls" contributed by Uta Passow

BCO-DMO Edits
- Parameter names modified to conform to BCO-DMO convention
- Lat/Lons added from spreadsheet: "GPS_PIT_Positions.xls" contributed by Uta Passow
- Data re-organized from columns into rows by PIT station

[table of contents | back to top]

Data Files

File
PITs.csv (Comma Separated Values (.csv), 1.34 KB) MD5:57e44b2420fd11f6ea10160853229547 Primary data file for dataset ID 3459

[table of contents | back to top]

Parameters

Parameter	Description	Units
Station_Id	Trap Station Id	text
date	Trap deployment date	yyyymmdd
time	Trap deployment time	hhmm
lat_deploy	Trap deployment latitude (South is negative)	decimal degrees

lon_deploy	Trap deployment longitude (West is negative)	decimal degrees
lat_recover	Trap recovery latitude (South is negative)	decimal degrees
lon_recover	Trap recovery longitude (West is negative)	decimal degrees
Aggregates_0point06mm	Sedimentation rate – Aggregates 0.06mm	# per m^2 per day
Aggregates_0point12mm	Sedimentation rate - Aggregates 0.12mm	# per m^2 per day
Aggregates_0point24mm	Sedimentation rate - Aggregates 0.24mm	# per m^2 per day
Aggregates_gt_0point32mm	Sedimentation rate - Aggregates .gt. 0.32mm	# per m^2 per day
zooplankton	Sedimentation rate – Zooplankton	# per m^2 per day
fecal_pellets_total	Sedimentation rate - Fecal pellets total	# per m^2 per day
fecal_pellets_lt_0point1mm	Sedimentation rate - Fecal pellets .lt. 0.1mm	# per m^2 per day
fecal_pellets_0point15mm	Sedimentation rate - Fecal pellets 0.15mm	# per m^2 per day
phytoplankton	Sedimentation rate - Phytoplankton	# per m^2 per day
detritus	Sedimentation rate - Detritus	# per m^2 per day
u_p_o_s	Sedimentation rate - u.p.o.'s	# per m^2 per day
sand_minerals	Sedimentation rate - Sand Minerals	# per m^2 per day
DW	Dry Weights	g/m^2 /d

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Sediment Trap - Particle Interceptor
Generic Instrument Name	Sediment Trap - Particle Interceptor
Generic Instrument Description	A Particle Interceptor Trap is a prototype sediment trap designed in the mid 1990s to segregate 'swimmers' from sinking particulate material sampled from the water column. The prototype trap used 'segregation plates' to deflect and segregate 'swimmers' while a series of funnels collected sinking particles in a chamber (see Dennis A. Hansell and Jan A. Newton. September 1994. Design and Evaluation of a "Swimmer"-Segregating Particle Interceptor Trap, Limnology and Oceanography, Vol. 39, No. 6, pp. 1487-1495).

[table of contents | back to top]

Deployments

OC468-02

Website	https://www.bco-dmo.org/deployment/58119
Platform	R/V Oceanus
Start Date	2010-08-21
End Date	2010-09-16
Description	To support additional work related to the Deepwater Horizon well leak oil spill, the Oceanus operations will be coordinated with those aboard R/V Cape Hatteras. Chief Scientist pre-cruise update May 17 ,2010 ********** Over the last few days, we've rethought our fall cruise as it's become evident that much of the oil from the Deepwater Horizon leak isn't reaching the surface and that the 5000 bbl/day official release rate estimate could be low by an order of magnitude or more. The bottom line is that an awful lot of oil is getting into the water column and we really don't know much about where it's going or what it's impact is/will be on ecosystems in the Gulf. We discussed this situation with Dave Garrison on Friday and he was very supportive of us changing the focus of our cruise and using it to survey and assess the spread and impact of the oil. Dave asked us to try to assemble a team that could attack the problem of the physical spread of the oil and its impact through the food web. We're working on this but wanted to let you know of this change in plan and to start a discussion of what the revised cruise plan would look like. Our current thinking is that we would make use of the two ships in complementary ways: * The Oceanus will focus on the vertical distribution of oil and its impact on phytoplankton and zooplankton. We envision running a series of stations along a roughly E-W transect along the slope and one or more transects running out into deep water. We would be using a CTD-rosette system to sample the water column and both meter nets and the mocness to sample zooplankton. We'll also want to use a LADCP system to measure flows in deep plumes of oil. We're talking to Andreas Thurnherr at LDEO, who has experience in these measurements and expect that he'll have someone on board to carry them out. We would carry out deck incubations to assess productivity, nutrient dynamics, and toxicity of hydrocarbons in the water column. Finally, we would like to take box and gravity cores at selected stations. * The Cape Hatteras will focus on mapping the spatial extent of oil in the upper water column through a broad survey of the northern Gulf. This would involve mostly towed instrumentation and in-line analyses complemented by CTD profiles and net tows at selected stations. A limited amount of experimental work would be done on this Planned science activities include CTD casts, mocness tows, meter net tows, surface pumping for collecting large volumes of water, deck incubations, floating sediment traps, moored sediment trap (1), multicoring (if no multicore then box and gravity core), camera deployment, radioisotopes, possible small boat ops for personnel transfer between R/V Cape Hatteras and sample collecting. Additional information: WHOI cruise planning synopsis Figure of Station Locations Cruise information and original data are available from the NSF R2R data catalog.

[table of contents | back to top]

Project Information

Deepwater Horizon Oil Spill, Marine Snow and Sedimentation (GoMX - DHOS Marine Snow and Sedimentation)

Coverage: Northern Gulf of Mexico

The accident at the BP oil well in the Gulf of Mexico in April 2010 resulted in an oil spill of unprecedented magnitude and consequences. Preliminary data collected in the beginning of May at the site of the accident show very high concentrations of marine snow in the water, especially in close proximity to the oil/ dispersants. The goal of this project is to evaluate the role these large marine snow-like particles play in the ecosystem during the following weeks to months. Neither the formation mechanisms nor the aggregate composition are known. These investigators will monitor the distribution of marine snow, characterize these particles and measure sedimentation rates to try to understand the role of snow formation and sedimentation in the ecosystem response.

This project examined the effects of the ***Deepwater Horizon oil spill*** in the Gulf of Mexico. During a field investigation on the *RV Oceanus* we began investigating how the ***oil and dispersants impact the carbon cycle*** and, specifically, aggregation and sedimentation of particles. First results indicate signals which were consistent with the presence of oil at around 1000 m depth at many stations. Oil-like material was also observed in the upper layers of many sediment cores. Marine snow concentrations did not seem exceptional anymore, although they were high at stations near the spill site. We deployed a time series sediment trap in the area of the accident, which will continue to sample over the next year, allowing us to collect continuous data on sedimentation rates in the area.

Intellectual Merit
The characteristics and the potential fate of these marine snow like aggregates, which may potentially sink or float, be grazed, degraded or remain suspended in the water for a long period of time, is unknown. This accident is an opportunity to evaluate and expand our knowledge on reactions of marine ecosystems to such large disturbances in general and more specifically to study the role of aggregation and sedimentation in the process. Marine snow formation and its sedimentation are an essential component of elemental cycling. It has been postulated that sedimentation of material "cleans" the water column from particles. Marine snow is also thought to be hotspots of microbial activity. Potentially this oily marine snow could not only represent hotspots of activity for oil degrading organisms, but may also function to isolate oil into small volumes. However, rapid sedimentation of such oil aggregates may lead to anoxia at depths. Scientifically we do not understand the possible interactions between marine snow, marine particles, oil and dispersant.

Tasks performed during the investigate the formation of marine snow and sedimentation patterns in the aftermath of the oil spill:
1. Deploy floating, VERTEX type sediment traps (8 to 12 columns per trap array) at 8 stations for about 36 hours each at 150 or 180 m depth. Two columns filled with polyacrymyl gels for microcosmical investigation of sinking particle types and sizes
2. Deploy 1 time series trap at 28 42.360N; 88 25.325W (about 2.5 nmiles SW of the spill site) at about 1400 m from August 2010 for about 1 year.
3. Determine marine snow distribution in the water column
4. Experiments on the formation mechanisms of marine snow

[table of contents | back to top]

Program Information

Gulf of Mexico - Deepwater Horizon Oil Spill (GoMX - DHOS)

Coverage: Northern Gulf of Mexico

Grants for Rapid Response Research (RAPID)
The RAPID funding mechanism is used for proposals having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events.

GOM - Broader Impacts
The need to understand the impact of this largest oil spill to date on ecosystems and biochemical cycling is self evident. The consequences of the disaster and accompanying clean up measures (e.g. the distribution of dispersants) need to be evaluated to guide further mediating measures and to develop and improve responses to similar disasters in the future. Would it be advantageous if such oil aggregates sink, or should it rather remain suspended? Possibly measures can be developed to enhance sinking or suspension (e.g. addition of ballast minerals) once we understand their current formation and fate. Understanding the particle dynamics following the input of large amounts of oil and dispersants into the water is a prerequisite to develop response strategies for now and in the future.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1045330

[table of contents | back to top]