

Cruise track position data from cruises OC468-02, CH1010, EN496, EN509, CH0711, EN510 in the Gulf of Mexico; 2007-2010 (GoMX projects)

Website: <https://www.bco-dmo.org/dataset/3465>

Version: 30 October 2013

Version Date: 2018-07-23

Project

- » [Deepwater Horizon Oil Spill, Marine Snow and Sedimentation](#) (GoMX - DHOS Marine Snow and Sedimentation)
- » [Nitrogen fixation, nutrient supply and biological production in the Gulf of Mexico](#) (GoMX - N2 Fixation)
- » [Spatially-explicit, High-resolution Mapping and Modeling to Quantify Hypoxia and Oil Effects on the Living Resources of the Northern Gulf of Mexico](#) (GoMX - Hypoxia and Oil Effects)

Programs

- » [Gulf of Mexico - Deepwater Horizon Oil Spill](#) (GoMX - DHOS)
- » [Gulf of Mexico - Deepwater Horizon Oil Spill](#) (GoMX - DHOS)
- » [Ocean Carbon and Biogeochemistry](#) (OCB)
- » [Gulf of Mexico - Deepwater Horizon Oil Spill](#) (GoMX - DHOS)

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Dataset Description

Cruise tracks generated from WHOI Athena daily files (.csv's) and R2R Archive files
Cruise Id, Date, Time, Lat, Lon
1 minute fixes

Cruise Track for CH0711 regenerated 30October2013, srg. Was missing data in original file.

Methods & Sampling

Generated by BCO-DMO staff from WHOI Athena daily files (.csv's) and R2R Archive files

Data Processing Description

Generated by BCO-DMO staff from WHOI Athena daily files (.csv's) and R2R Archive files

version: 2013-10-30 (broken data url) replaced with version 2018-07-23

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Data Files

File
CruiseTracks.csv (Comma Separated Values (.csv), 1.79 MB) MD5:89170de29d555d811b2ec2cb064478a9 Primary data file for dataset ID 3465

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Parameters

Parameter	Description	Units
Longitude	Longitude (West is negative)	decimal degrees
Latitude	Latitude (South is negative)	decimal degrees
ISO_DateTime_UTC	ISO formatted UTC Date and Time	YYYY-MM-DDTHH:MM:SSZ
CruiseId	Official UNOLS cruise id	text

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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 its 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 moorings 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, mooring 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.

Methods & Sampling

Collected by WHOI Athena shipboard logging system as daily files

Processing Description

WHOI Athena daily .csv files converted to date, time, latitude and longitude using awk script "OC468-02_Make_CruiseTrack_from_Athena_csv.awk" Only date, time, latitude and longitude preserved. All other data ignored. No filtering applied to the data.

Website	https://www.bco-dmo.org/deployment/58876
Platform	R/V Cape Hatteras
Start Date	2010-08-21
End Date	2010-09-16
Description	<p>This cruise was funded by NSF OCE-0928495. Cruise information and original data are available from the NSF R2R data catalog. The science plan called for sampling in the Gulf of Mexico during the summer, when large populations of N2-fixing organisms are known to be present and the Mississippi plume tends to extend the furthest offshore. The cruise plans included stable isotope (15N, 13C) tracer experiments; one meter MOCNESS tows for zooplankton sampling; and plans to sample Trichodesmium and large diatoms using SCUBA gear.</p> <p>Methods & Sampling Generated from files downloaded from the NSF R2R data catalog.</p> <p>Processing Description Generated from files downloaded from the http://www.rvdata.us/catalog/CH1010">NSF R2R data catalog.</p>

EN496

Website	https://www.bco-dmo.org/deployment/58932
Platform	R/V Endeavor
Start Date	2011-07-02
End Date	2011-07-27
Description	<p>Original data are available from the NSF R2R data catalog</p> <p>Methods & Sampling Generated from files downloaded from the NSF R2R data catalog.</p> <p>Processing Description Generated from files downloaded from the http://www.rvdata.us/catalog/EN496">NSF R2R data catalog.</p>

EN509

Website	https://www.bco-dmo.org/deployment/58933
Platform	R/V Endeavor
Start Date	2012-05-25
End Date	2012-06-20
Description	Original data are available from the NSF R2R data catalog

CH0711

Website	https://www.bco-dmo.org/deployment/58875
Platform	R/V Cape Hatteras
Start Date	2011-07-04
End Date	2011-07-29
Description	<p>This cruise was funded by NSF OCE-0928495. Cruise information and original data are available from the NSF R2R data catalog. The science plan called for sampling in the Gulf of Mexico during the summer, when large populations of N₂-fixing organisms are known to be present and the Mississippi plume tends to extend the furthest offshore. The cruise plans included stable isotope (15N, 13C) tracer experiments; one meter MOCNESS tows for zooplankton sampling; and plans to sample Trichodesmium and large diatoms using SCUBA gear.</p> <p>Methods & Sampling Generated from files downloaded from the NSF R2R data catalog.</p> <p>Processing Description Generated from files downloaded from the http://www.rvdata.us/catalog/CH0711">NSF R2R data catalog.</p>

EN510

Website	https://www.bco-dmo.org/deployment/59018
Platform	R/V Endeavor
Start Date	2012-06-25
End Date	2012-07-05
Description	Original data are available from the NSF R2R data catalog

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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 polyacryl 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

Nitrogen fixation, nutrient supply and biological production in the Gulf of Mexico (GoMX - N2 Fixation)

Coverage: Northern Gulf of Mexico

From the NSF proposal abstract

This project will study the interplay of physical, chemical, and biological factors in supplying nitrogen, an essential nutrient, to temperate coastal and offshore waters of the Gulf of Mexico. The Gulf is an economically important but understudied marginal sea with major commercial and recreational fisheries as well as extensive fossil fuel deposits. Diazotrophic (N₂-fixing) cyanobacteria bloom regularly in offshore and coastal waters of the Gulf and the limited data suggest that they contribute significant quantities of both nitrogen and carbon to the pelagic food web. These diazotrophs may play also a critical role in supplying N to other organisms, including the ichthyotoxic red tide dinoflagellate *Karenia brevis*. Despite its importance, little is currently known of the factors that promote N₂-fixation in the Gulf or the relative significance of different physical and biological processes in creating conditions that favor N limitation in the water column. The Gulf of Mexico is strongly influenced by both riverine inputs and advective processes, providing an excellent model system for studying nutrient dynamics, physical forcing of productivity, terrestrial-oceanic linkages, and the potential impact of land use and climate change on marine ecosystems.

The relatively small basin of the Gulf of Mexico provides an opportunity to quantify and study interactions among physical, chemical, and biological processes relevant to a broad range of other coastal and oceanic systems. Land-use and climate change are likely to affect the circulation and hydrography of the Gulf, as well as the magnitude and nature of riverine inputs, all with uncertain impacts on the biogeochemistry of the Gulf of Mexico. This research will provide timely insights into these processes and will generate a baseline of understanding for evaluating and predicting the impact of future land use and climate changes in the system. This project will make an important contribution to our understanding of the factors that regulate N₂-fixation and its role in supporting the biota in temperate waters. The following specific goals are included in the work:

1. Identify the major diazotroph groups in the Gulf of Mexico and characterize their distribution and activity in different regions and water masses.
2. Quantify the impact of advective processes, mesoscale features, and riverine inputs on nutrient limitation and N₂-fixation in the Gulf, and evaluate the controls on N₂-fixation and the degree of spatial and temporal niche differentiation among diazotroph assemblages in different regions affected by these processes.
3. Use satellite data and physical models to scale up our measurements spatially and to evaluate the regional significance of N₂-fixation in the Gulf of Mexico. The researchers will also use a coupled physical/biological model to explore variability in the physical forcing and the potential impact of likely land use and climate change

scenarios in altering nutrient dynamics and N₂-fixation in the Gulf of Mexico.

The investigators and their institutions have a strong commitment to undergraduate and graduate education. This project includes support for graduate students, a technician, and undergraduates. In addition to peer-reviewed papers and websites, workshops aimed at K-12 teachers, and a program involving high school teachers in research will be used to disseminate the results of this project broadly in the local community. The investigators are committed to increasing the diversity of the ocean science community and are active in recruiting and training efforts at their institutions.

Spatially-explicit, High-resolution Mapping and Modeling to Quantify Hypoxia and Oil Effects on the Living Resources of the Northern Gulf of Mexico (GoMX - Hypoxia and Oil Effects)

Coverage: Northern Gulf of Mexico

RAPID Collaborative Proposal: Spatially-explicit, High-resolution Mapping and Modeling to Quantify Hypoxia and Oil Effects on the Living Resources of the Northern Gulf of Mexico

From the NSF proposal abstract

On April 22, 2010, the drill platform Deepwater Horizon sank in nearly 1,200 m of water in the northern Gulf of Mexico. Since this date various estimates of oil and added chemical dispersants have been released from the site with dispersion both at the surface and at depth. The transport of this oil and dispersants has been influenced by wind-driven currents over the shelf and by the Loop Current and its derivatives offshore. To date the exact amount and paths of movement of the Horizon spill remain speculative. Since 2003, with NOAA-CSCOR funding, this group of investigators has conducted 5 summer cruises in the northern Gulf of Mexico that used high-resolution sampling to define the spatially explicit relationships between physical structure to pelagic zooplankton and fish distributions. Thus this group has one of the most comprehensive, synoptic data sets on temperature, salinity, oxygen, phytoplankton, zooplankton and fish in the northern Gulf of Mexico for conditions prior to the oil leak.

The current RAPID award will allow this group to repeat their high-resolution mapping of hydrography, oxygen, plankton and fish in the northern Gulf of Mexico. The domain of interest will include the previous survey region in the hypoxic zone west of the Mississippi Delta but also the area east of the Mississippi where more oil transport from the spill has been suggested. The cruise will take place in the late summer period because the investigators have 5 years of ?baseline? data during this season to compare the results. The measures of species diversity and abundance, biomass size spectrum, fish diets, fish growth rate potential and ecosystem models will all be extremely useful to assess the possible effects of the oil spill on the living resources of the northern Gulf of Mexico. In addition to the rapid mapping cruise on the inner to mid-shelf, this group also will send scientists on the ORV Oceanus to conduct high resolution vertical zooplankton measurements (LOPC and TAPS) and MOCNESS zooplankton tows at deeper stations and broader mapping surveys to extend our spatial coverage of the affected area. They will coordinate our zooplankton and fish measurements with other investigators assessing the biogeochemical and biological impacts of the BP oil spill. Data from previous NOAA will be deposited in the BCODMO data management facility as well as current measurements and model products.

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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.

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

Coverage: Northern Gulf of Mexico

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Ocean Carbon and Biogeochemistry (OCB)

Website: <http://us-ocb.org/>

Coverage: Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO₂ and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon

fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.

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

Coverage: Northern Gulf of Mexico

Grants for Rapid Response Research (RAPID)

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0928495
NSF Division of Ocean Sciences (NSF OCE)	OCE-1045330

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