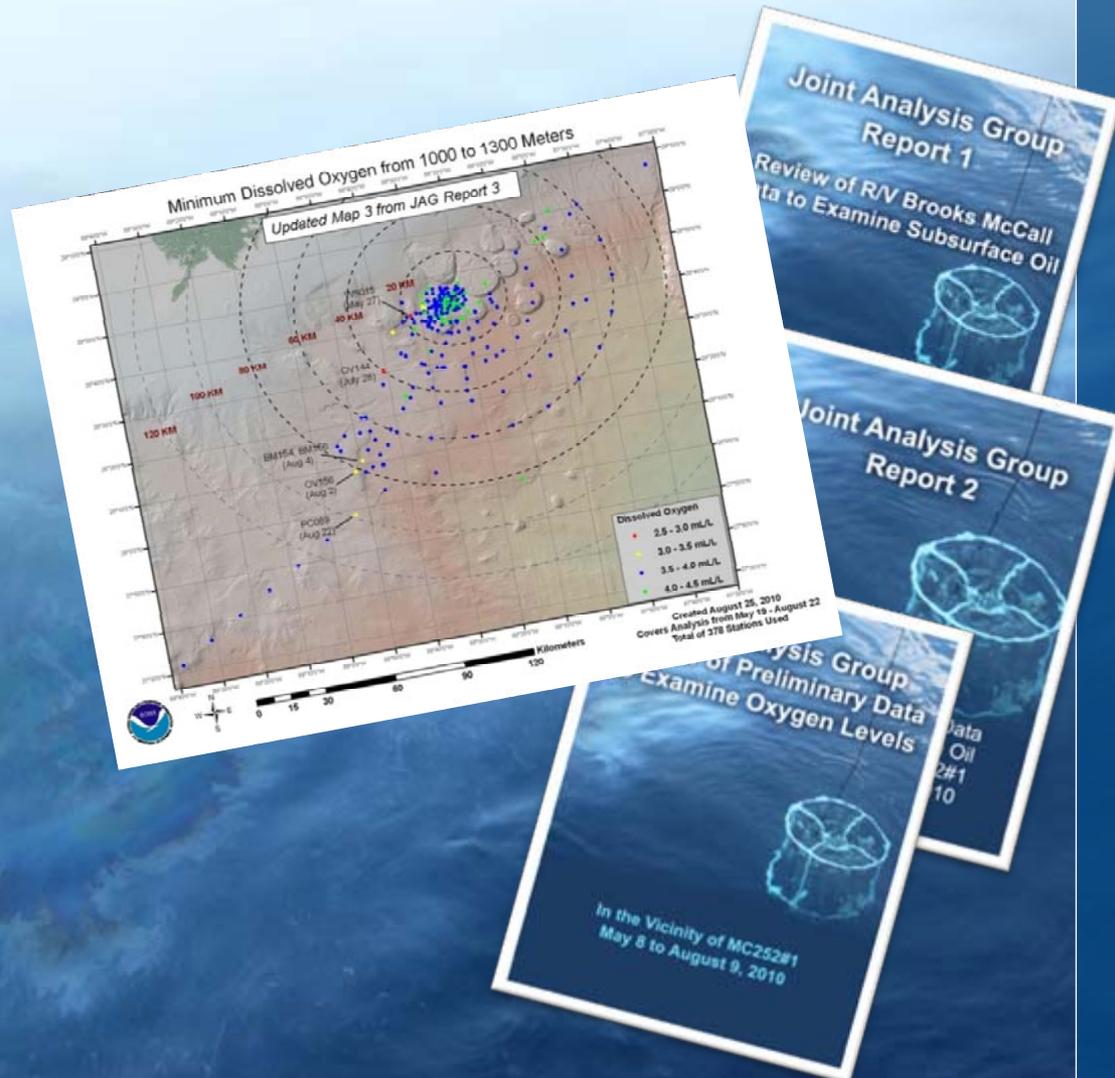
An underwater photograph of a coral reef. The water is clear and blue, with sunlight filtering through the surface, creating a shimmering effect. In the foreground, there is a large, textured coral formation. Several small, dark fish are visible swimming in the water.

**MC252/
DEEPWATER HORIZON
JOINT ANALYSIS GROUP
Subsurface Monitoring Data and Analysis**

**The Joint Analysis Group
December 14, 2010**

Interagency Charge to JAG

- Working group of scientists from EPA, NOAA, OSTP, Academia, BP
- Analyze an evolving database of subsurface oceanographic data developed for the response effort
- Actions:
 - Assemble and analyze data
 - Describe the distribution of oil and dissolved gas, and the oceanographic processes affecting their transport
 - Recommend and oversee additional response actions needed

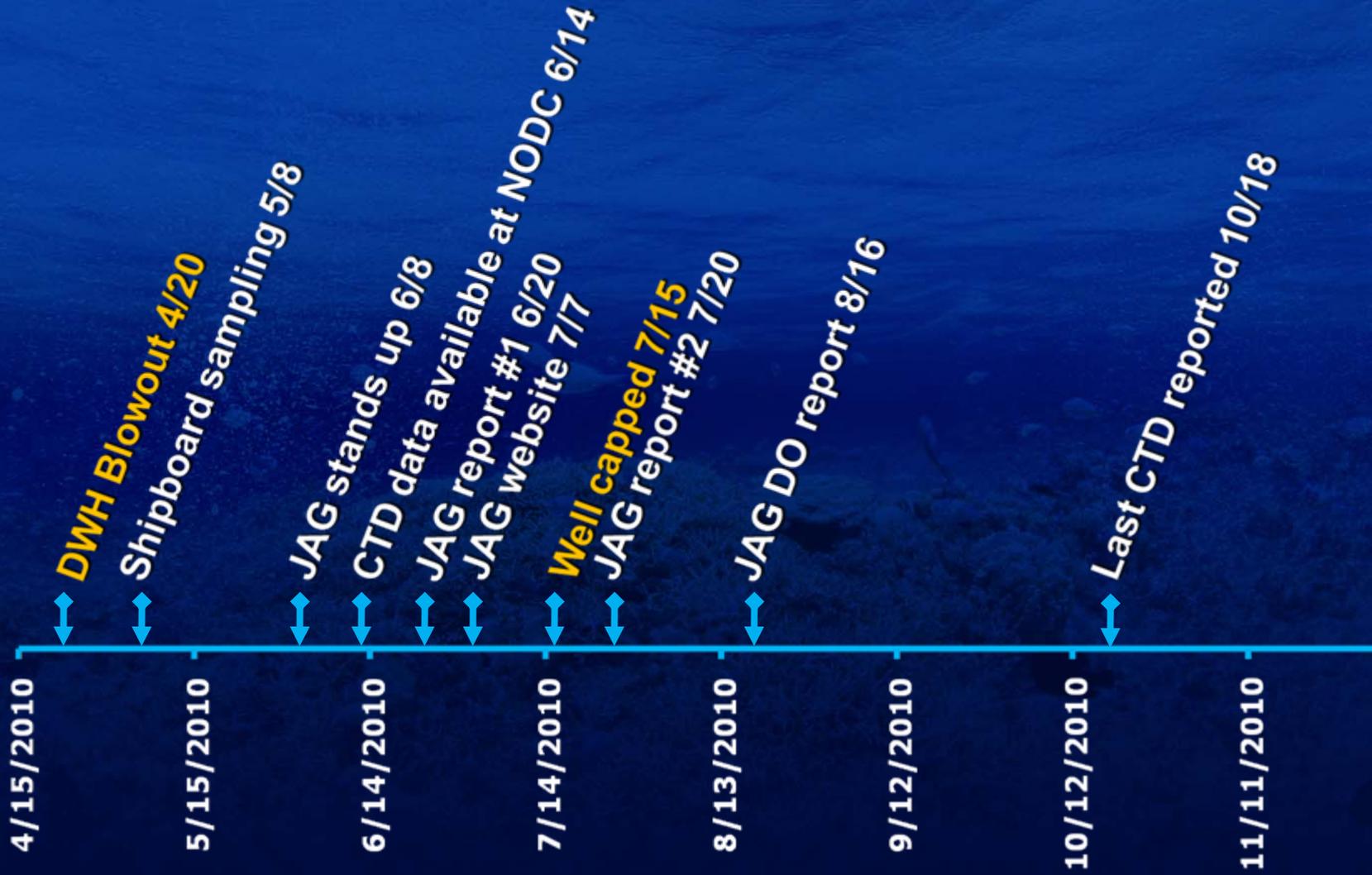


DWH Response Water Profiling

- SeaBird SBE-9/11 + CTD
- WET Labs CDOM Fluorometer
- Chelsea Aquatrack-a Fluorometer
- SeaBird SBE-43 Dissolved Oxygen Sensor
- Sequoia LISST
- Rosette with Niskin bottles
for water sampling, analyzed
for: PAHs
Methane
TPH, BTEX
Rotifer toxicity (rototox)
DO – Winkler titrations
- 23 vessels, 85 cruises, ~1600 CTD casts,
several thousand water samples



Timeline



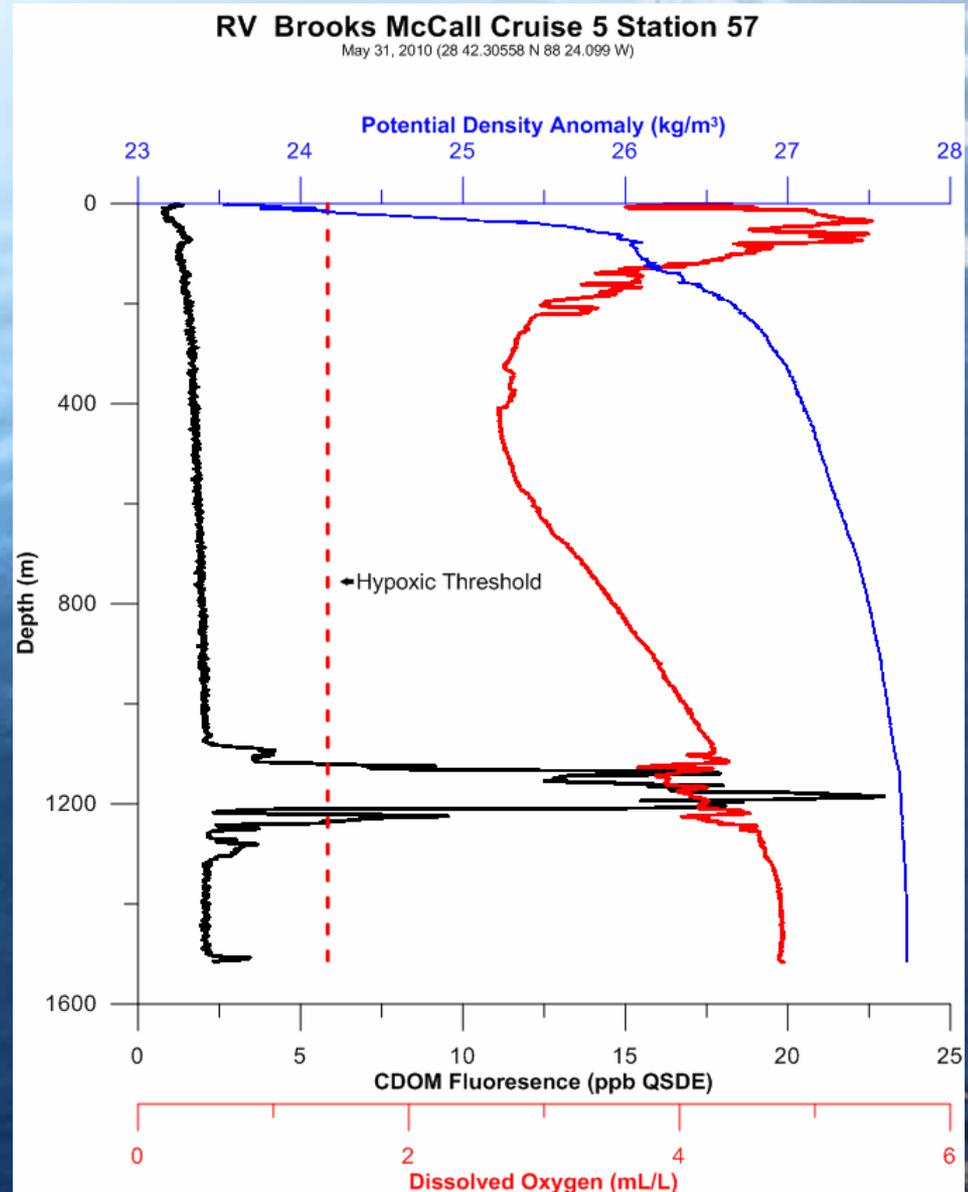
CDOM Fluorometer

Vertical profile showing fluorescence peaks between 1100 and 1300 m, coincident with DO depression.

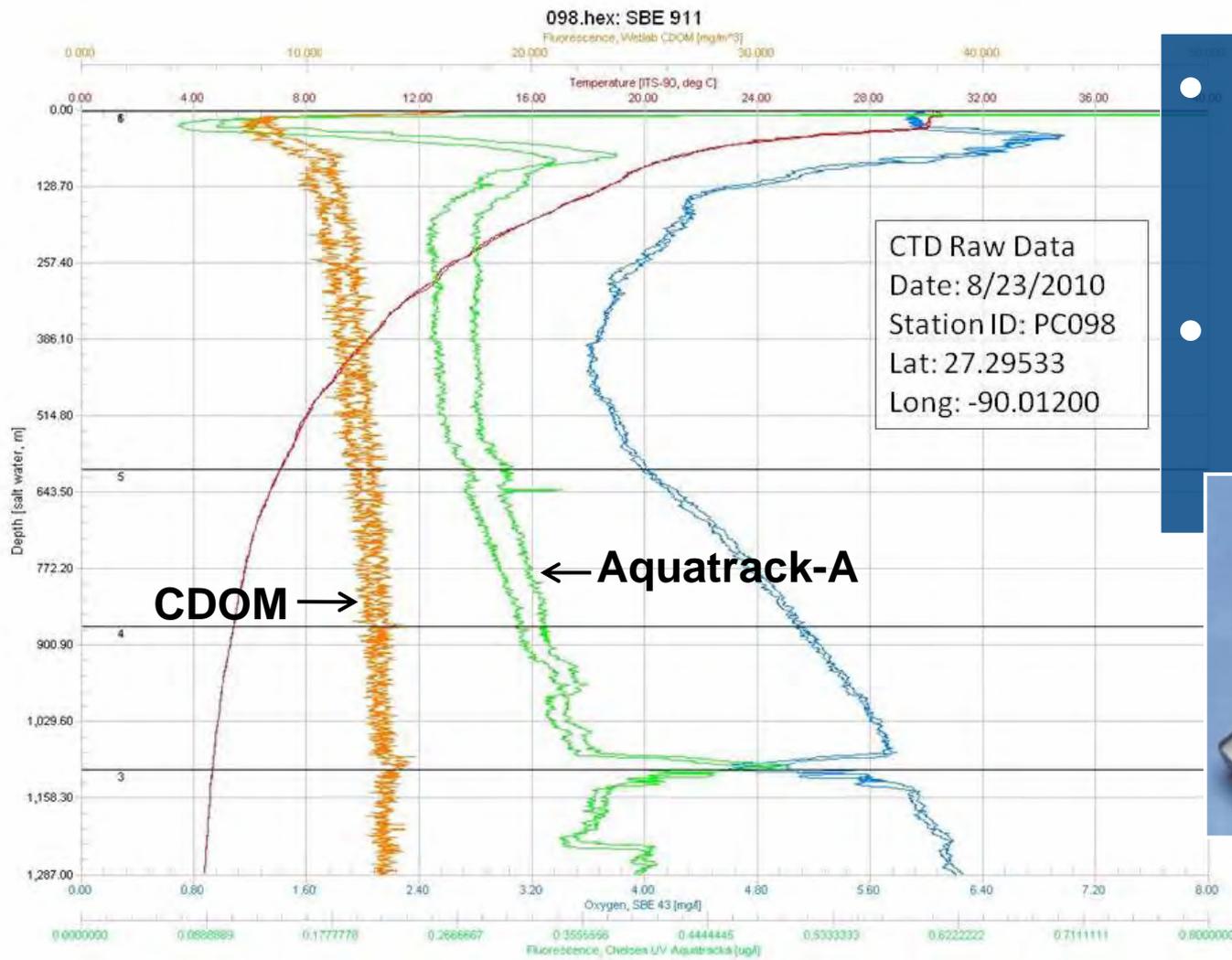
Fluorescence peaks did not extend to the seafloor, indicating a plume of oil.

Maximum concentration observed was 34 ppb above background.

Minimum detection limit is 1 ppm



Chelsea Aquatrack- a



- By the end of Aug. more sensitive instruments were needed
- detecting a peak at 0.35 - 0.5 ug/L



Preliminary Conclusions from Spill Response CDOM Fluorometry

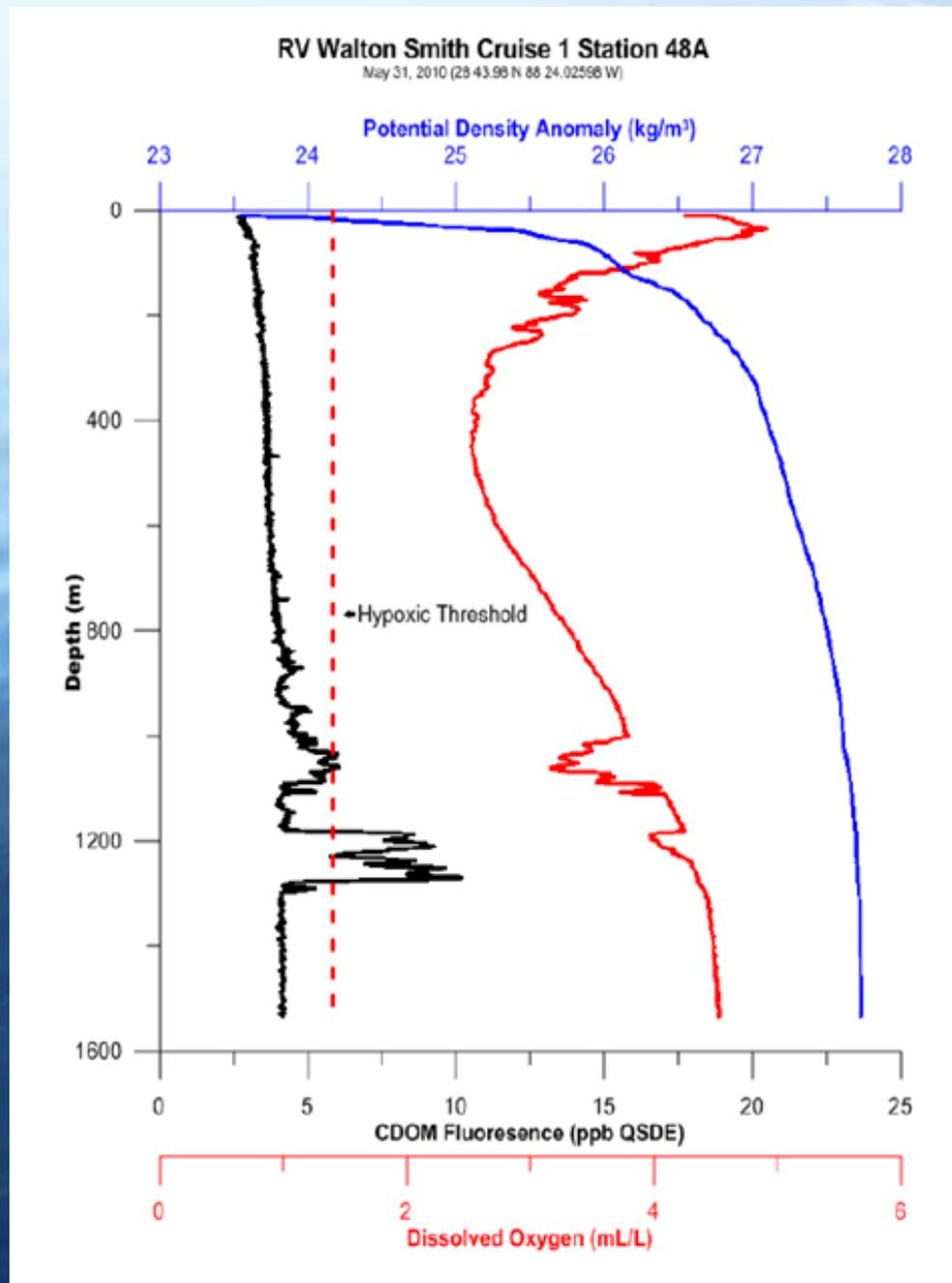
- **Fluorometry shows recurring anomaly at 1000 to 1300 m**
 - **Strongest near wellhead, decreases with distance**
 - **Trending WSW to NE direction consistent with water movement along isobath**
 - **Active natural seeps mapped ~12 km SW and 17 km NE of wellhead, which could contribute to the signal**
 - **Natural Organic Matter contributes to fluorescence signal, so the fluorescence observed is not solely due to oil**

SeaBird SBE-43 Dissolved Oxygen Sensor

Vertical profile showing 2 DO depressions coincident with CDOM fluorescence peaks

Various handheld probes were used on ship to validate the SBE-43 sensor, since polarographic membrane technology had not been certified at depths below 1000m

Automated Winkler titrations were added later in the response effort

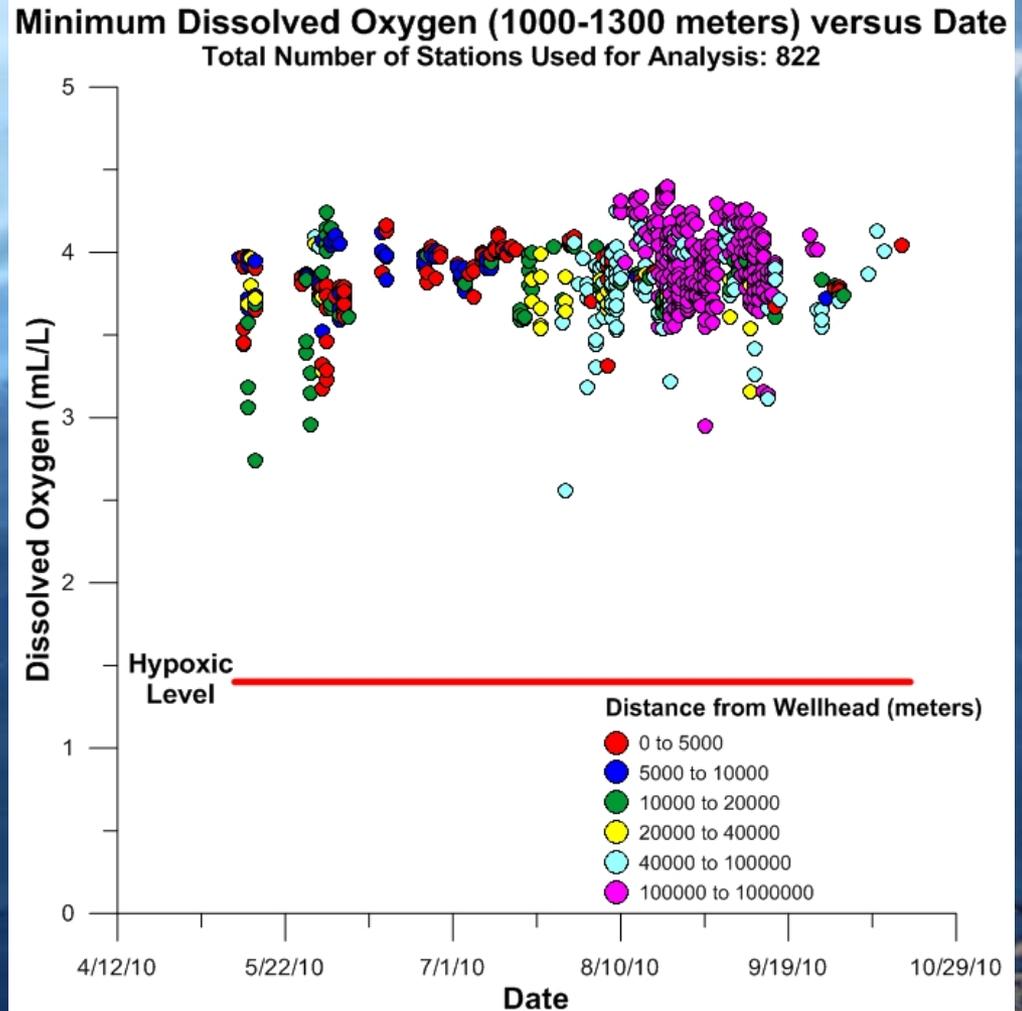


Deep Dissolved Oxygen Minimum: Time Evolution

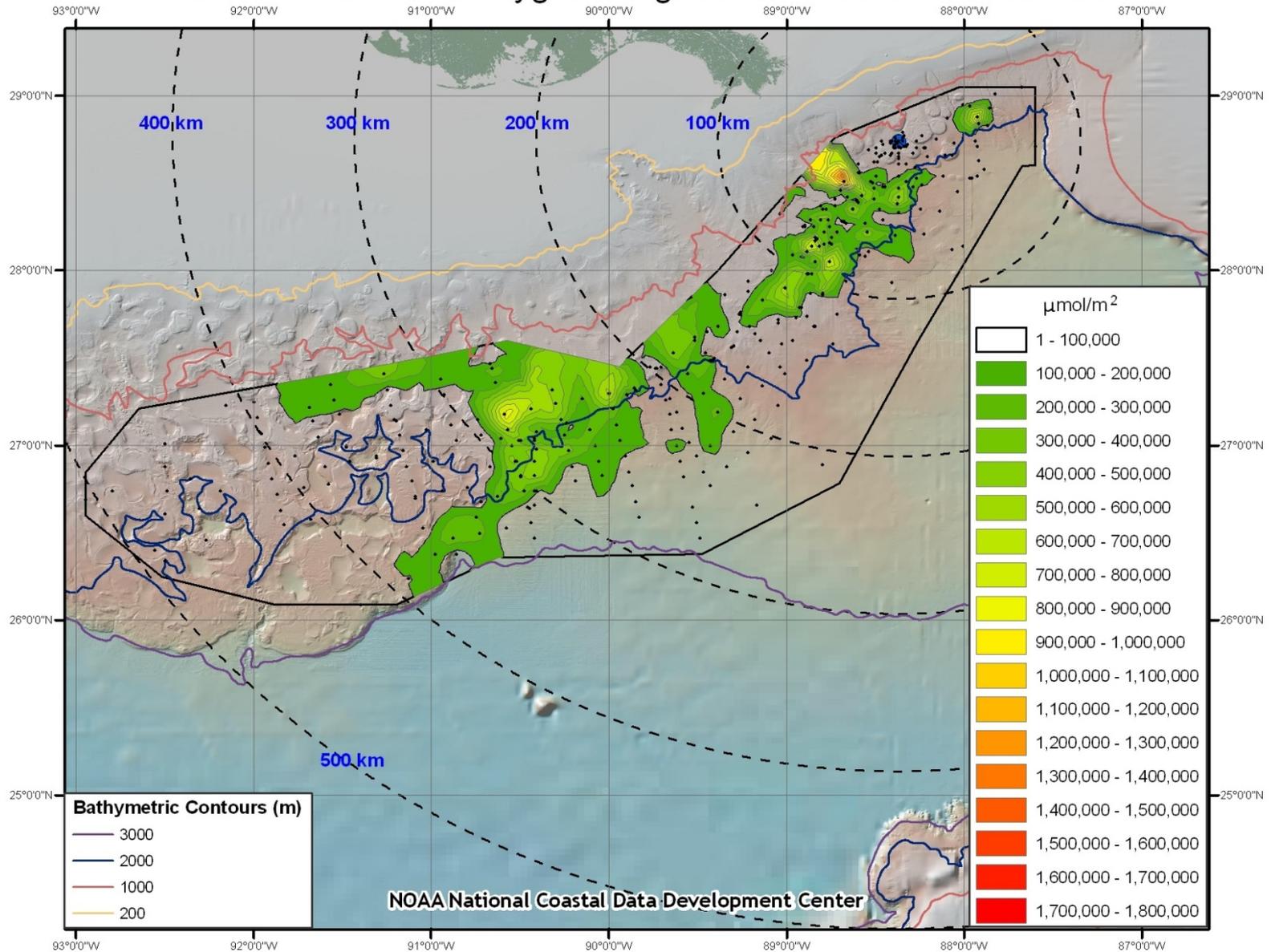
Plot showing minimum SBE43 DO in the depth range 1000-1300 m, versus distance from wellhead (x-axis) and time (colors). Red line indicates nominal hypoxia (1.4 mL/L)

Deep DO depressions continued to occur in the far field into September, however...

...at no time or location did measured deep DO approach hypoxic levels



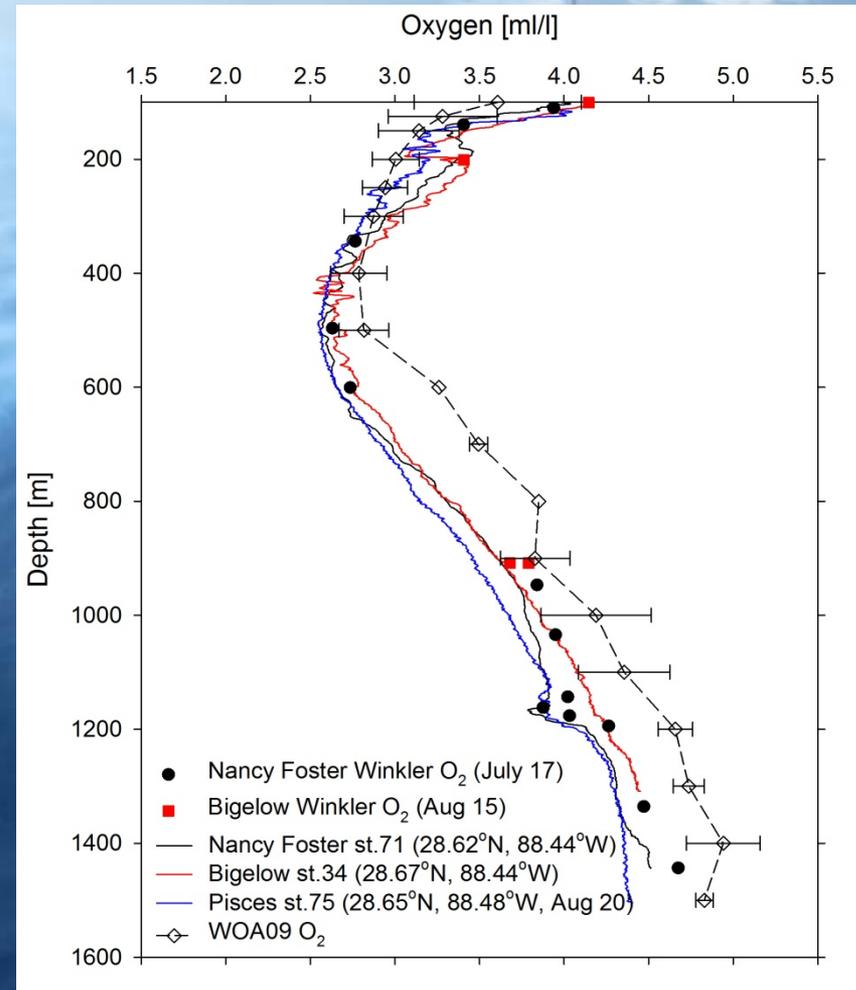
Detrended Dissolved Oxygen Integral from 1000 to 1300 Meters



Created Dec. 10, 2010
 Covers Analysis from July 22 - Oct. 16
 Total of 484 Stations Used

Conclusions from Spill Response Dissolved Oxygen

- DO depressions were found relative to background concentrations
- Lowest concentrations were 2.56 ml/L and 2.96 ml/L, compared to a spring climatological mean of 4.8 ml/L
- DO depressions did not approach hypoxic levels (approximately 1.4 ml/L)
- Depressions were observed at stations and depths where oil was observed (coincident with fluorescence signal indication of oil)



SBE 43 dissolved oxygen compared against Winkler titration values and climatological values from the World Ocean Atlas

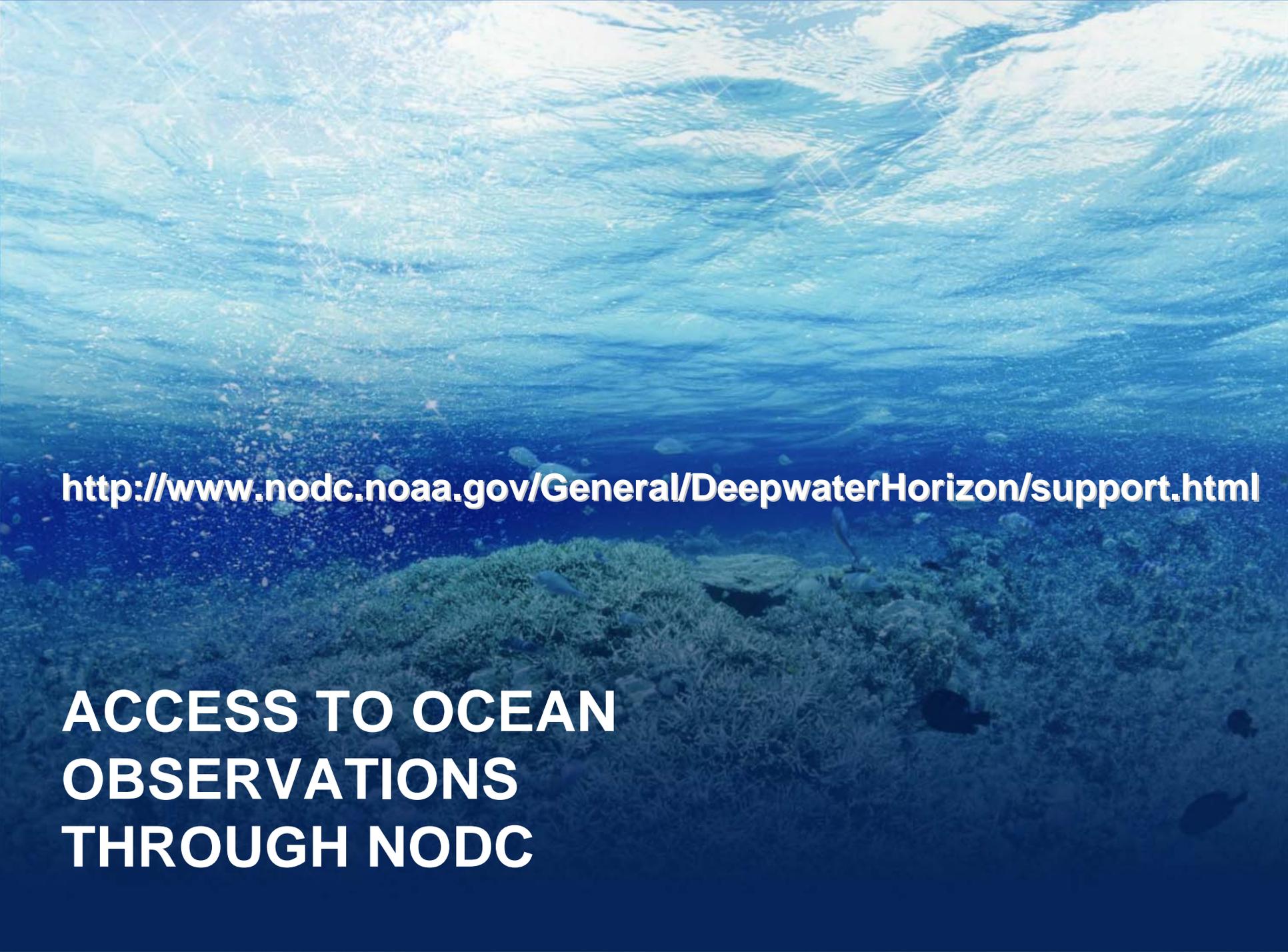
Summary of Preliminary Chemistry Information

Number of results in concentration ranges;
n = 2779 individual samples (from 1000-1300 m)



Concentration	Total VOA	TPH
<10 µg/L	1,484	1,836
10 – 100 µg/L	104	33
100– 1,000 µg/L	129	0
> 1,000 µg/L	16	0

- Highest level of semivolatiles at depth = 78 µg/L
- Highest level of TVOAs = 1800 µg/L
- PAHs being assessed currently
- QA/QC of data and metadata development is ongoing

An underwater photograph showing a vibrant coral reef with various fish swimming in clear blue water. The scene is captured from a slightly elevated perspective, looking down at the reef.

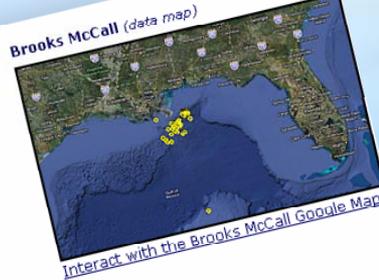
<http://www.nodc.noaa.gov/General/DeepwaterHorizon/support.html>

**ACCESS TO OCEAN
OBSERVATIONS
THROUGH NODC**

Ocean Profile Data

Brooks McCall Observations

Subsurface Oil Monitoring Data
Temperature, Salinity, Dissolved Oxygen, Fluorescence, Sound Velocity, Total Petroleum Hydrocarbons and Total Volatile Organic Analysis Data



- Cruise 03: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 04: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 05: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 06: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 07: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 08: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 09: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 11: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 12: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 13: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 15: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 16: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 17: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 18: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise 19: [Processed](#) | [Unprocessed](#) | [Documentation](#)

Bunny Bordelon Observations

Subsurface Oil Monitoring Data
Temperature, Salinity, Dissolved Oxygen, Fluorescence,

- Cruise 01: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise CR3: [Processed](#) | [Unprocessed](#) | [Documentation](#)
- Cruise CS1: [Processed](#) | [Unprocessed](#) | [Documentation](#)

NOAA NATIONAL OCEANOGRAPHIC DATA CENTER (NODC) UNITED STATES DEPARTMENT OF COMMERCE

NOAA Satellite and Information Service

You are here: [NODC Home](#) > [Access Data](#) > [Gulf of Mexico Data and Information](#) > [Deepwater Horizon Incident Support](#)

NODC Support for the Deepwater Horizon Incident

Directory view and OPeNDAP or THREDDS (TDS) views of data submitted to NODC in support of the Deepwater Horizon Incident

- Archived Deepwater Horizon Data
- Climatology Products
- Ocean Archive System
- Ocean Currents Data
- Satellite Data
- Ocean Profile Data (Aircraft, Floats, Buoys, Ships and more)
- Coastal Ecosystem Maps
- Resources on Oil Spills, Response, and Restoration
- A Selected Bibliography

Other data and projects at NODC
Archive of original data
NOAA Library Resources

Access Data - Submit Data - Site Map - Intended Use of the Data? - Online Store - Customer Service

- Processed, ascii (csv)
- Processed, netCDF-CF
- Unprocessed, hex files
- OPeNDAP web services

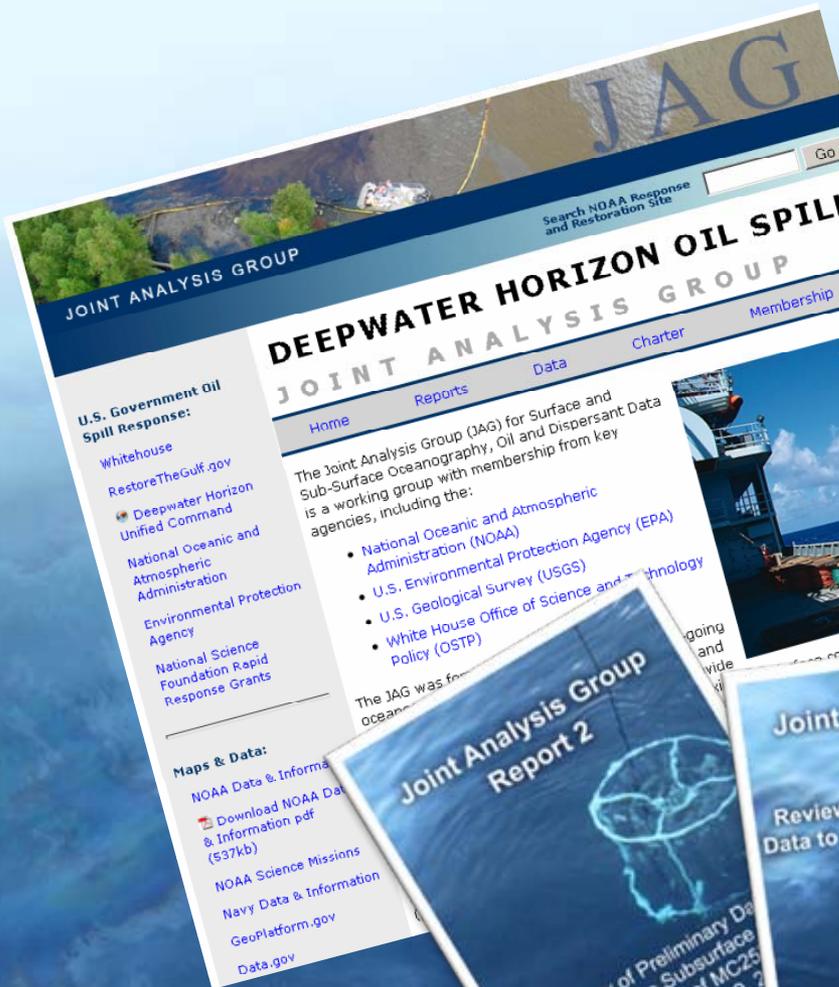
An underwater photograph showing a coral reef with various fish swimming around. The water is clear and blue, with sunlight filtering through the surface.

<http://ecowatch.ncddc.noaa.gov/JAG/>

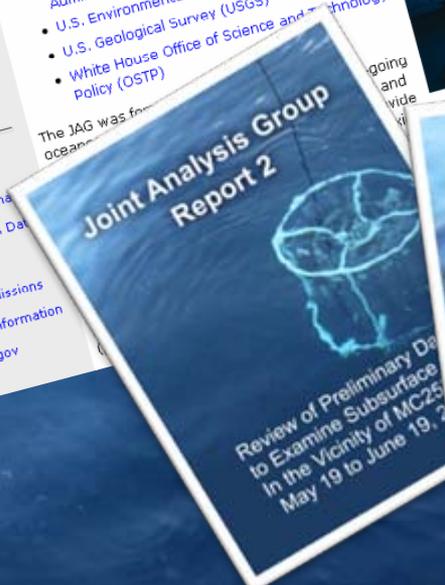
**ACCESS TO OCEAN
OBSERVATIONS
THROUGH JAG WEBSITE**

JAG website

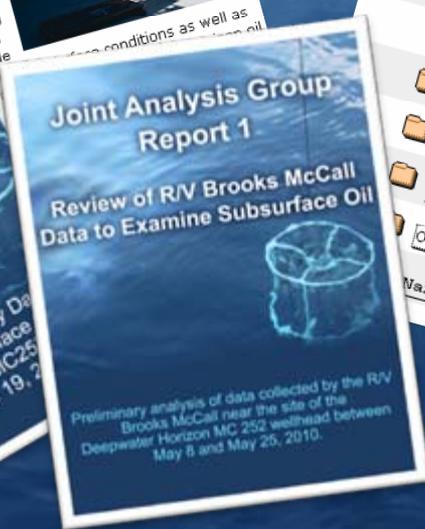
- JAG reports
- CTD data via OPeNDAP/THREDDS
- Links to NOAA, EPA, interagency sites



The screenshot shows the homepage of the Joint Analysis Group (JAG) website. At the top, there is a search bar for the NOAA Response and Restoration Site. Below the search bar, the text reads "JOINT ANALYSIS GROUP" and "DEEPWATER HORIZON OIL SPILL". The navigation menu includes "Home", "Reports", "Data", "Charter", and "Membership". On the left side, there are links for "U.S. Government Oil Spill Response", "Whitehouse", "RestoreTheGulf.gov", "Deepwater Horizon Unified Command", "National Oceanic and Atmospheric Administration", "Environmental Protection Agency", "National Science Foundation Rapid Response Grants", and "Maps & Data". The "Maps & Data" section includes links for "NOAA Data & Information", "Download NOAA Data & Information pdf (537kb)", "NOAA Science Missions", "Navy Data & Information", "GeoPlatform.gov", and "Data.gov". The main content area features a large image of an oil rig and text describing the JAG as a working group for surface and sub-surface oceanography, oil, and dispersant data. A list of member agencies is provided: National Oceanic and Atmospheric Administration (NOAA), U.S. Environmental Protection Agency (EPA), U.S. Geological Survey (USGS), U.S. Geological Office of Science and Technology, and White House Office of Science and Policy (OSTP).



Joint Analysis Group Report 2
Review of Preliminary Data to Examine Subsurface Oil in the Vicinity of MC252#1
May 19 to June 19, 2010



Joint Analysis Group Report 1
Review of R/V Brooks McCall Data to Examine Subsurface Oil
Preliminary analysis of data collected by the R/V Brooks McCall near the site of the Deepwater Horizon MC 252 wellhead between May 8 and May 25, 2010.



Catalog <http://ecowatch.ncddc.noaa.gov/>

Dataset

- DWH CTD
- Wes_Bordelon/
- Walton_Smith/
- Thomas_Jefferson/
- Specialty_Diver/
- Seward_Johnson/
- Ryan_Chouest/
- Rachel_Bordelon/
- Pisces/
- Pelican/
- Ocean_Veritas/
- Nancy_Foster/



Joint Analysis Group Review of Preliminary Data to Examine Oxygen Levels
In the Vicinity of MC252#1
May 8 to August 9, 2010

JAG Membership

Federal:

National Oceanic and Atmospheric Administration

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Dr. Carl Childs, NOAA Office of Response and Restoration, Seattle, WA (Deputy Lead)

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Dr. Jerry Galt, Contractor, NOAA Office of Response and Restoration, Seattle, WA

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Dr. Jeffery Napp, Alaska Fisheries Science Center, Seattle, WA

Dr. Rost Parsons, National Coastal Data Development Center, Stennis Space Center, MS

Benjamin Shorr, NOAA Office of Response and Restoration, Seattle, WA

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Dr. Scott Cross, Regional Science Officer, National Coastal Data Development Center, Charleston, SC

Dr. Sam Walker, NOAA IOOS, Silver Spring, MD

Dr. Richard Crout, NOAA National Data Buoy Center

Dr. Rik Wanninkhof, Atlantic Oceanographic and Meteorological Laboratory, Miami, FL

Julie Bosch, National Coastal Data Development Center, Stennis Space Center, MS

Betsy Gardner, National Coastal Data Development Center, Stennis Space Center, MS

Fred Zeile, National Coastal Data Development Center, Stennis Space Center, MS

Angela Sallis, National Coastal Data Development Center, Stennis Space Center, MS

JAG Membership (cont.)

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Dr. Robyn Conmy, ORD, National Health and Environmental Effects Research Laboratory Gulf Breeze, FL
Dr. Jan Kurtz, ORD, National Health and Environmental Effects Research Laboratory, Gulf Breeze, FL
Dr. Blake Schaeffer, ORD, National Health and Environmental Effects Research Laboratory, Gulf Breeze, FL
Dr. Albert Venosa, ORD, NRMRL, Land Remediation & Pollution Control, Cincinnati, OH
Dr. Daniel Wainberg, Region New England, Boston, MA
Dr. Gregory Wilson, Office of Emergency Management, Washington, DC

The White House

Dr. Jerry Miller, Office of Science and Technology / Executive Office of the President

Information Coordination and Synthesis Provided by:

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Anne Walls, BP, United Kingdom

Applied Science Associates (ASA)

Lauren Decker, Physical Oceanographer

Fisheries and Oceans Canada

Dr. Ken Lee, Fisheries and Oceans Canada, Bedford Institute of Oceanography

University of New Hampshire

Dr. Larry Mayer, Center for Coastal and Ocean Mapping, Joint Hydrographic Center
Dr. Tom Weber, Center for Coastal & Ocean Mapping, Joint Hydrographic Center

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Dr. Mike Carron, Director, Northern Gulf Institute

Dr. George Crozier, Executive Director, Dauphin Island Sea Lab

Dr. John Harding, Chief Scientist, Northern Gulf Institute

Dr. Ray Highsmith, Director, National Institute for Undersea Science and Technology, University of Mississippi

Dr. Bill Hogarth, Dean, Marine Sciences, University of South Florida

Dr. Chuck Hopkinson, Director, Georgia Sea Grant

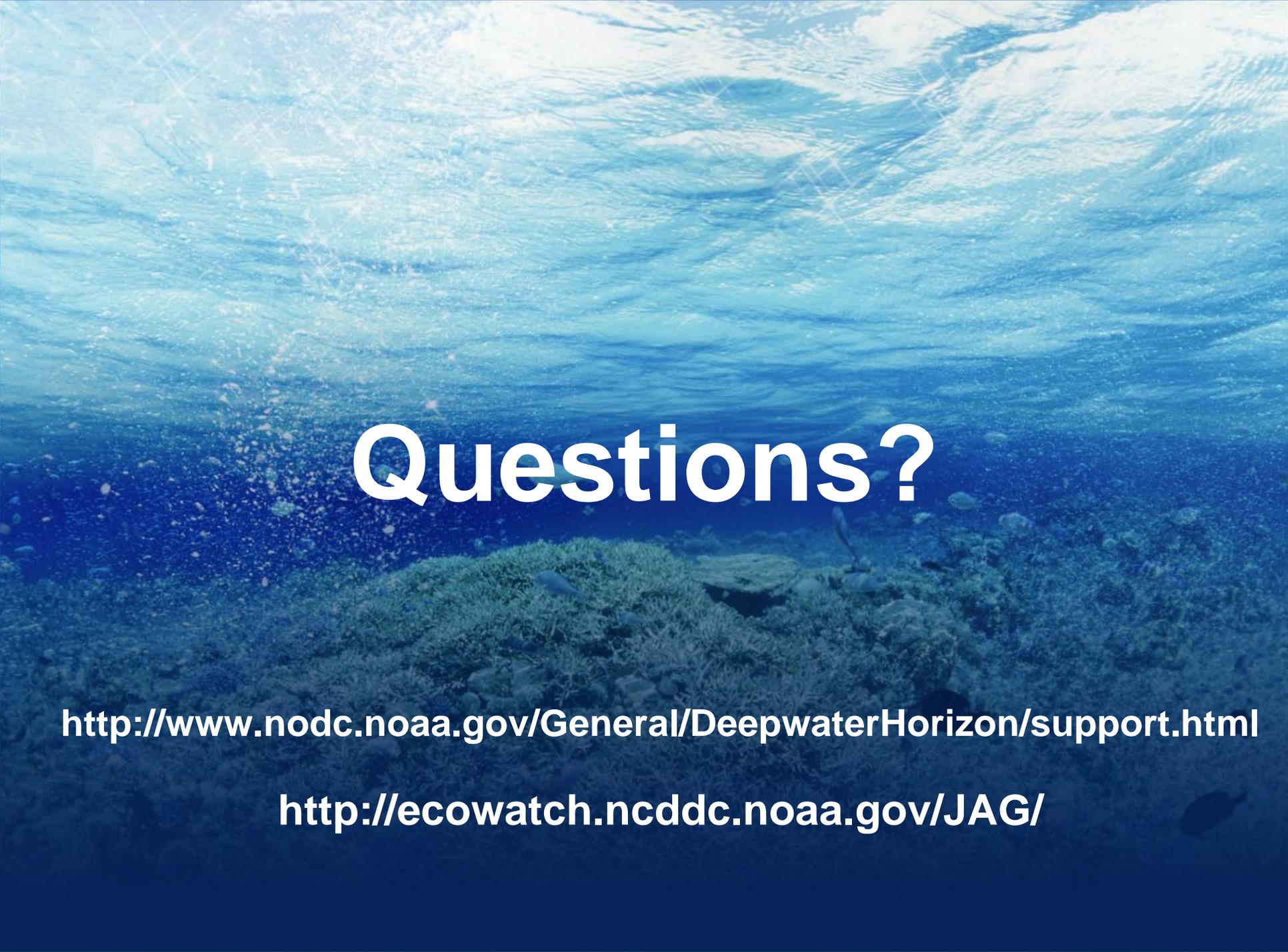
Dr. Samantha Joye, Marine Sciences, University of Georgia

Dr. Steve Lohrenz, Chair, Marine Sciences, University of Southern Mississippi

Dr. David Shaw, Vice President for Research and Economic Development, Mississippi State University

**Dr. LaDon Swann, Director, Mississippi-Alabama Sea Grant Consortium and the Auburn Marine Extension and
Research Center**

Dr. Charles “Chuck” Wilson, Executive Director, Louisiana Sea Grant, Louisiana State University

An underwater photograph showing a coral reef with various fish swimming around. The water is clear and blue, with sunlight filtering through from the surface.

Questions?

<http://www.nodc.noaa.gov/General/DeepwaterHorizon/support.html>

<http://ecowatch.ncddc.noaa.gov/JAG/>

Additional websites of interest

<http://www.noaa.gov/deepwaterhorizon/>

<http://www.geoplatform.gov/response>

<http://www.data.gov>

<http://www.epa.gov/BPSpill/>