

MC252/ DEEPWATER HORIZON JOINT ANALYSIS GROUP

Subsurface Monitoring Data and Analysis

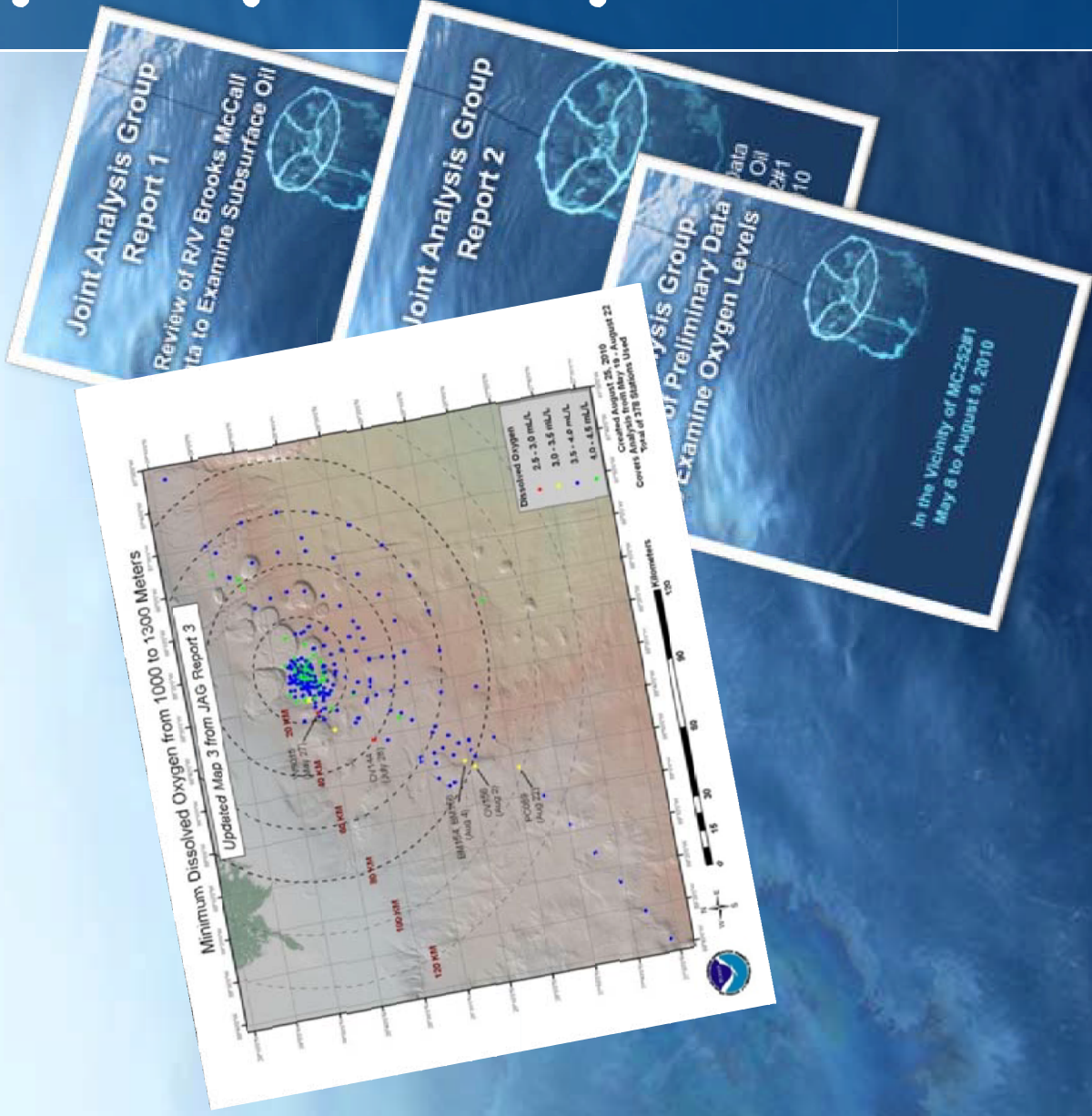
**The Joint Analysis Group
December 14, 2010**

Ex 12069

**Worldwide
Court Reporters, Inc.**

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

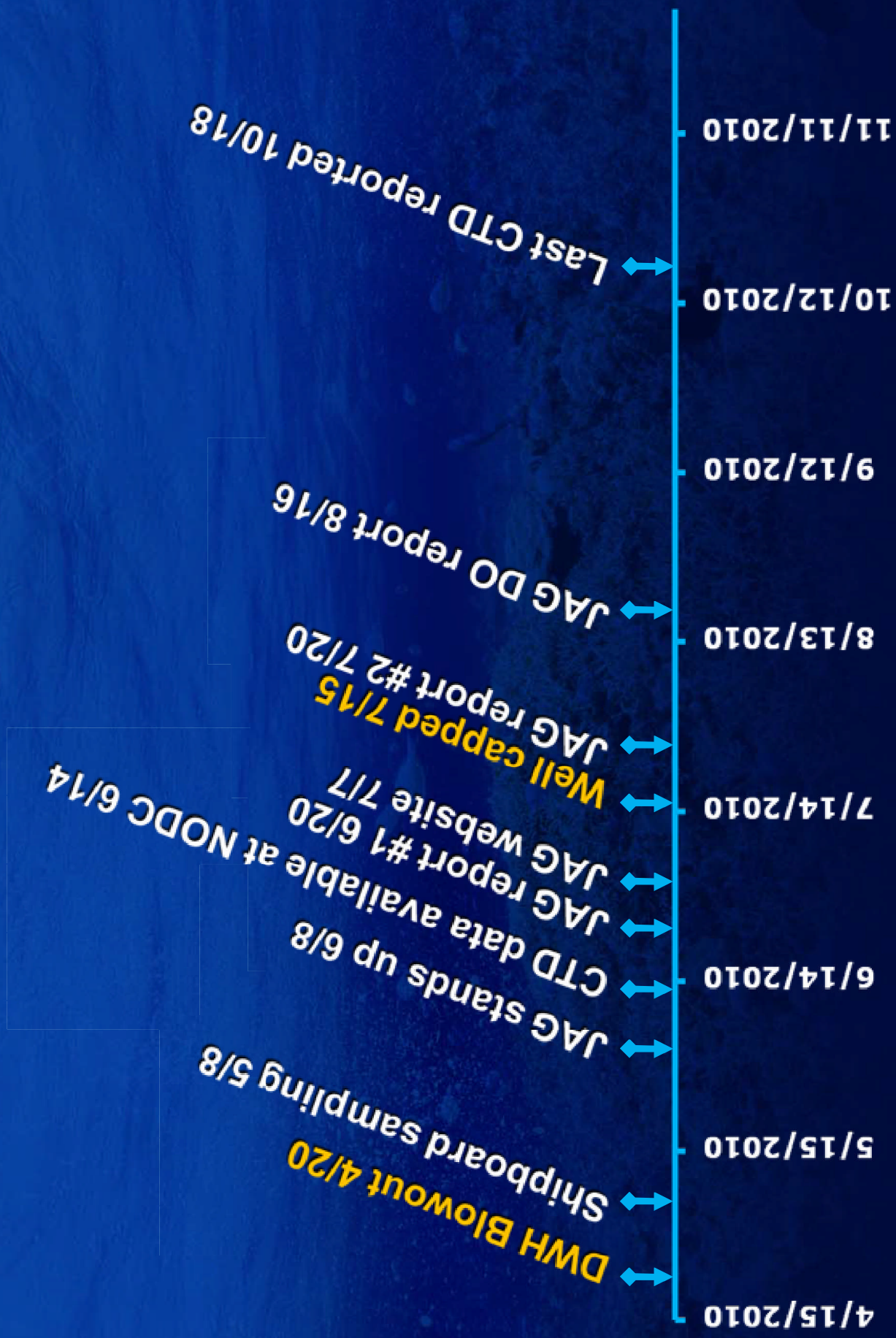


DWH Response Water Profiling

- 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



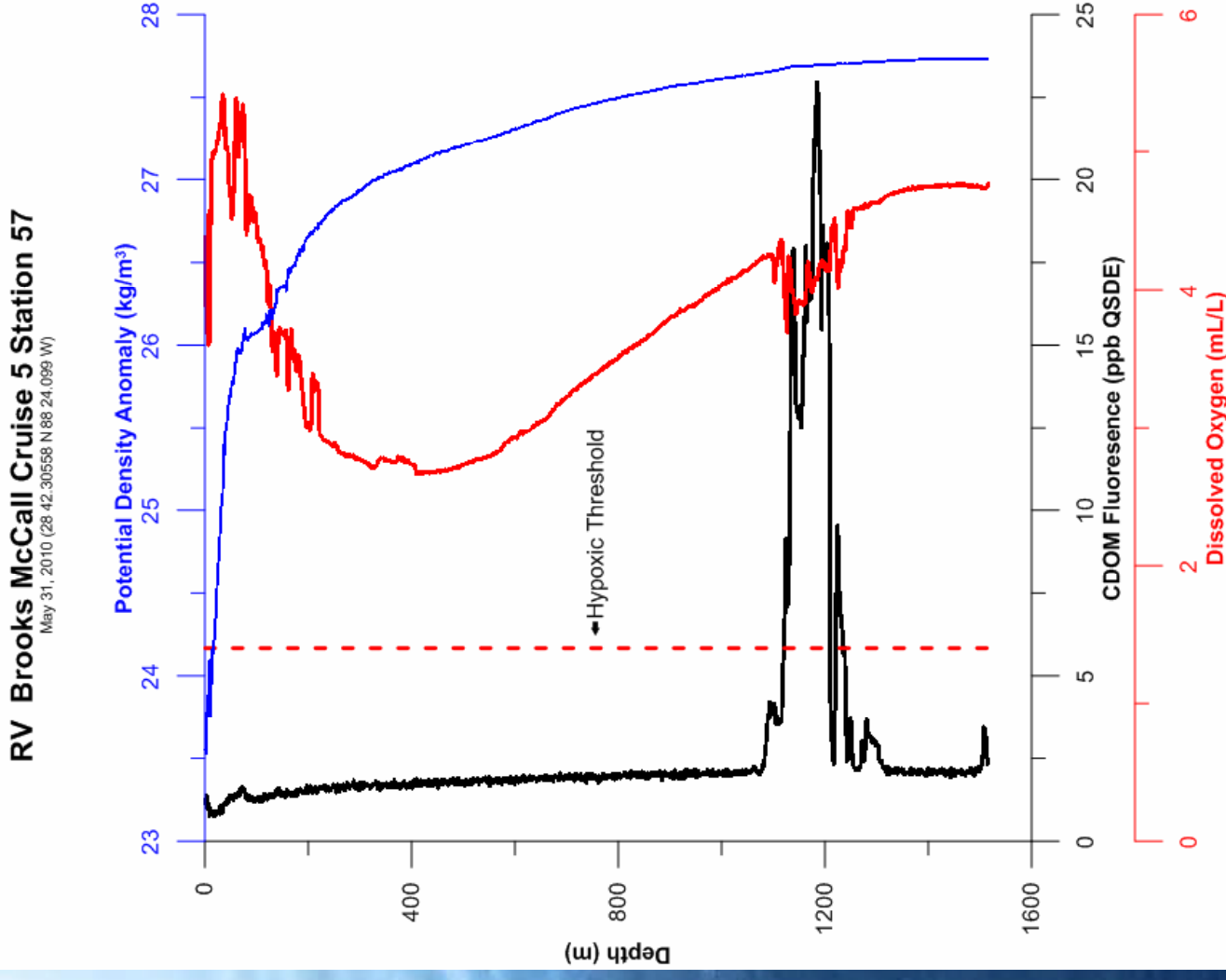
CDOM Fluorometer

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 ppm above background.

Minimum detection limit is 1 ppm



Preliminary Conclusions from Spill Response CDOM Fluorometry

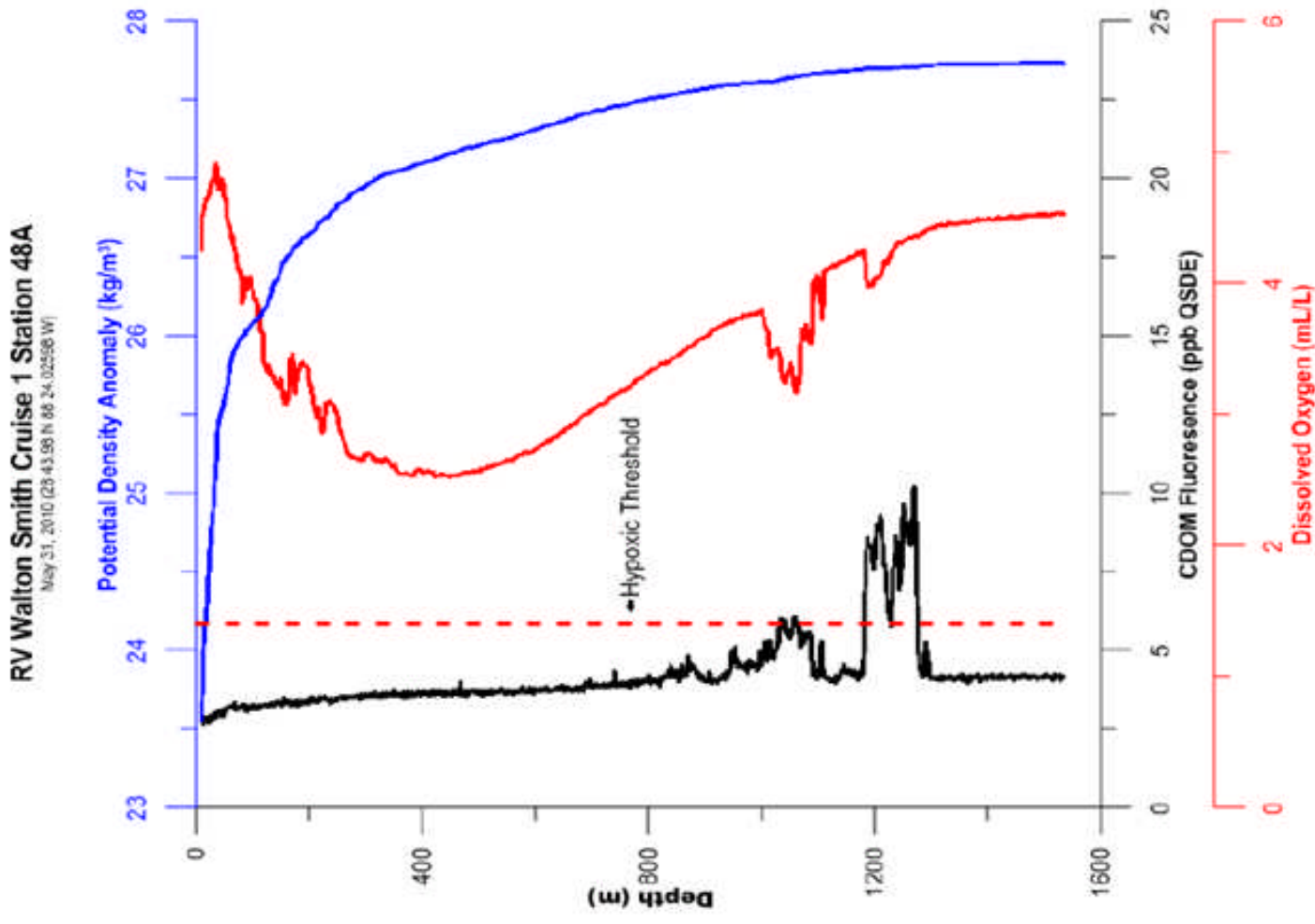
- Fluorometry shows recurring anomaly at 1000 to 1300 m
 - Strongest near wellhead, decreases with distance
 - Trending WSW to NE direction consistent with water movement along isobath
 - Active natural seeps mapped ~12 km SW and 17 km NE of wellhead, which could contribute to the signal
 - Natural Organic 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

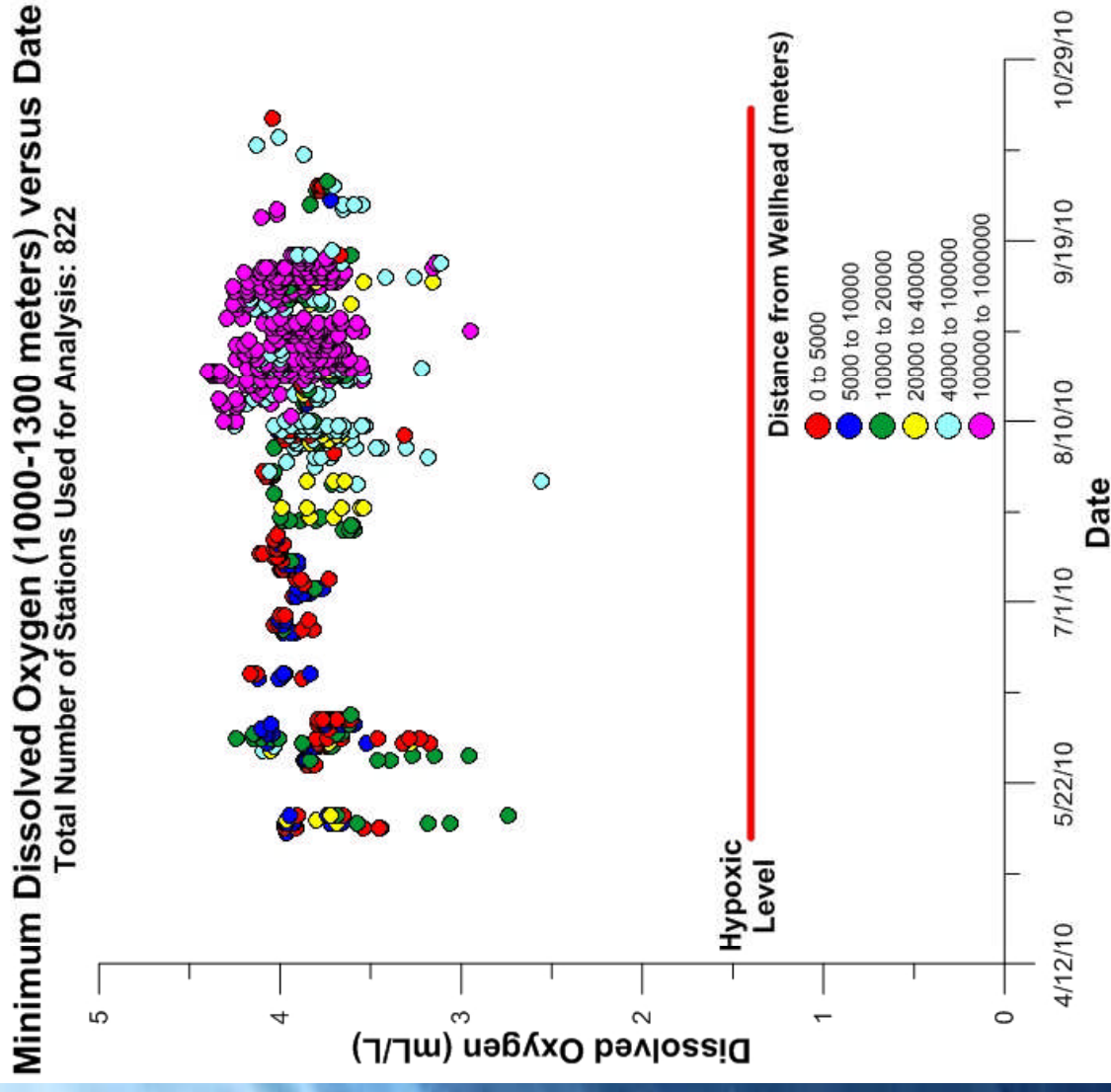


Deep Dissolved Oxygen Minimum: Time Evolution

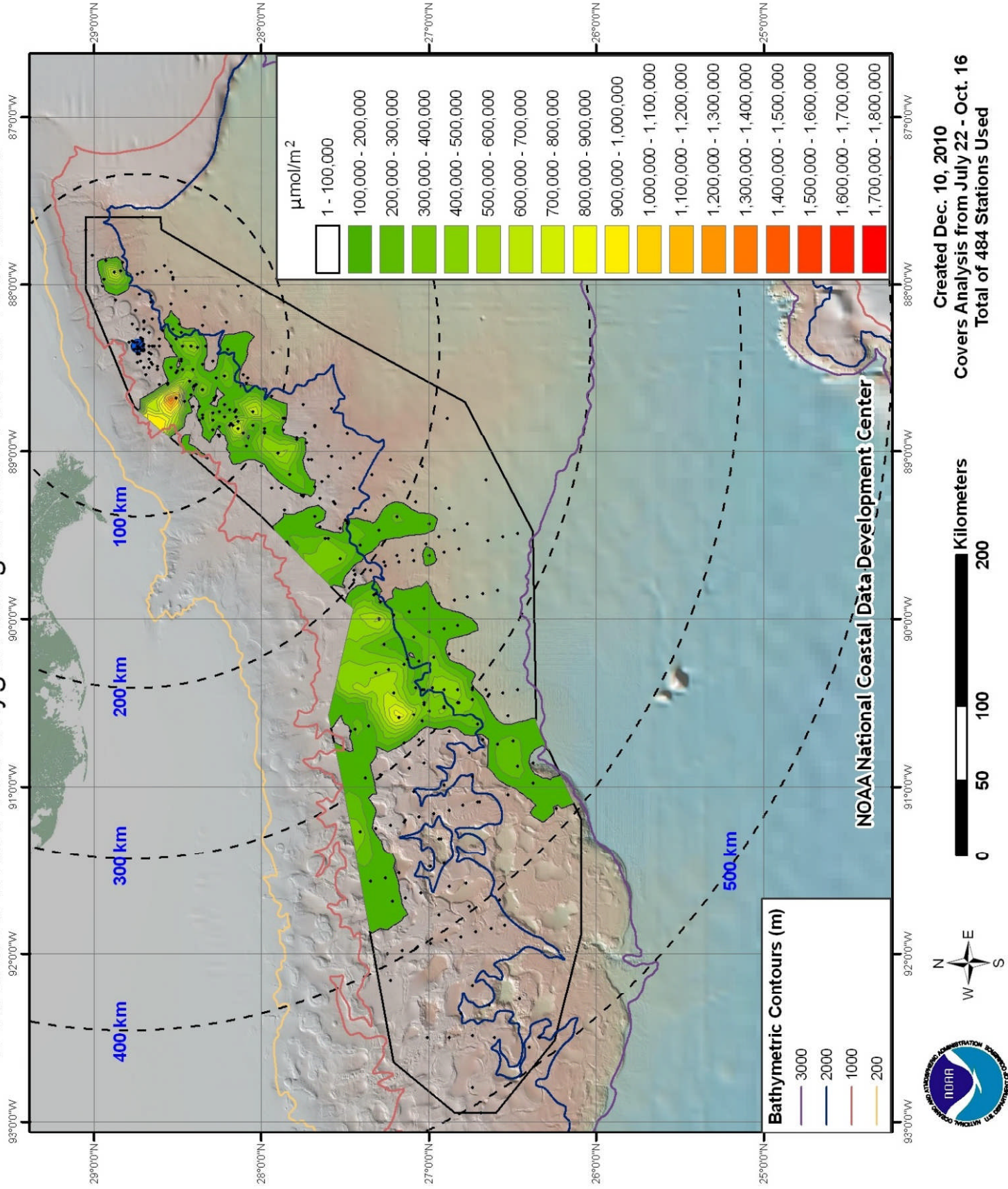
Plot showing minimum SBE43 DO in the depth range 1000-1300 m, versus distance from wellhead (x-axis) and time (colors). Red line indicates nominal hypoxia (1.4 mL/L)

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

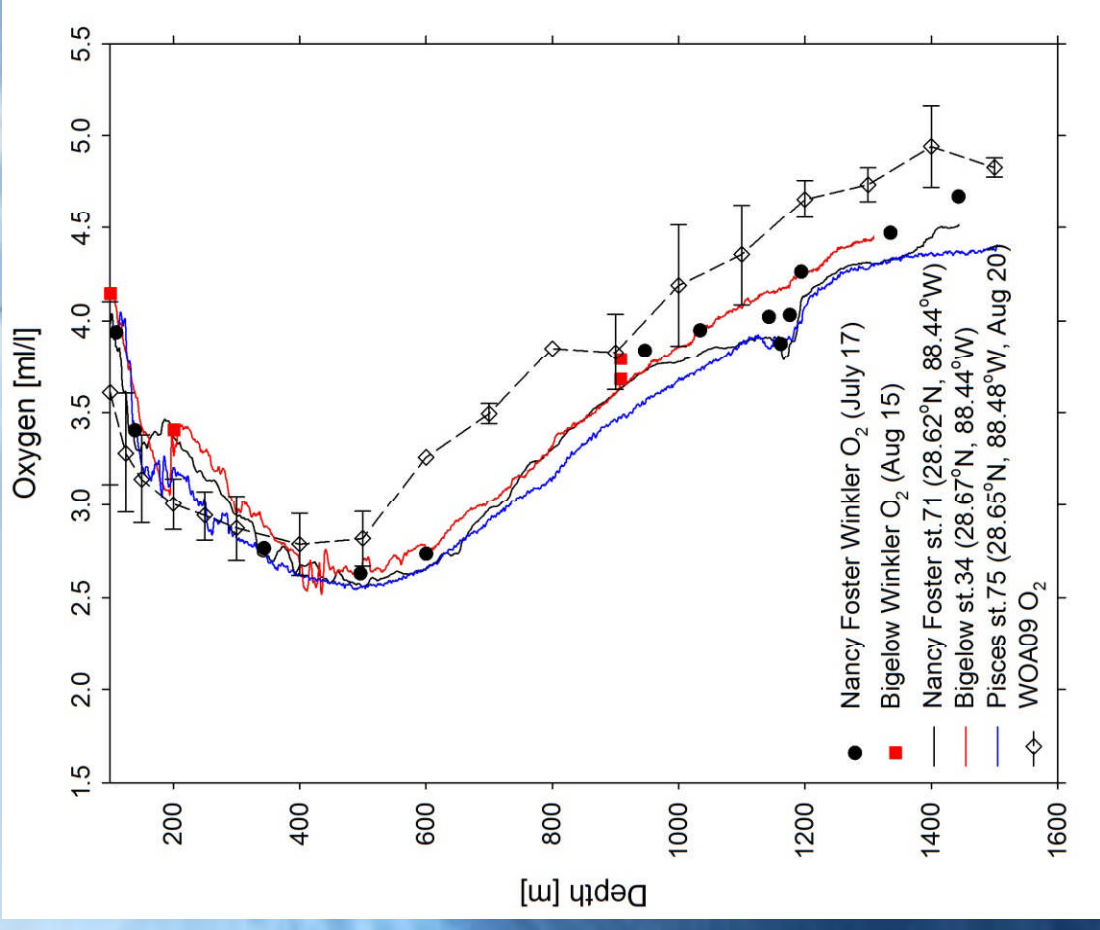


Detrended Dissolved Oxygen Integral from 1000 to 1300 Meters



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



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

ACCESS TO OCEAN OBSERVATIONS THROUGH NODC

Ocean Profile Data

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



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

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Initial Quality Control of Analytical Chemistry Data | Documentation

Bunny Bordelon Observations

Subsurface Oil Monitoring Data

Temperature, Salinity, Dissolved Oxygen, Fluorescence,

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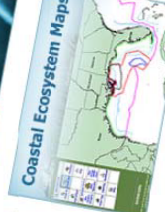
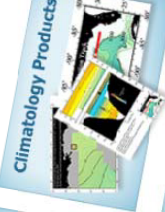
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Cruise 11: Processed | Unprocessed | Documentation



NODC Support for the Deepwater Horizon Incident

Directory view and OPeNDAP or HEBEOS (ID3) views of data submitted to NODC in support of the Deepwater Horizon Incident



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



<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



JAG Membership

Federal:

National Oceanic and Atmospheric Administration

Dr. Steven Murawski, NOAA Fisheries Service, Silver Spring, MD (JAG Lead)

Dr. Robert Pavia, Contractor, NOAA Office of Response and Restoration, Seattle, WA (Deputy Lead)

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

Russ Beard, National Coastal Data Development Center, Stennis Space Center, MS

Dr. Jim Farr, NOAA Office of Response and Restoration, Seattle, WA

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

Dr. Hernan Garcia, National Oceanographic Data Center, Ocean Climate Laboratory, Silver Spring, MD

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

Dr. C.J. Beegle-Krause, Contractor, NOAA Office of Response and Restoration, Seattle, WA

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.)

U.S. Environmental Protection Agency

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:

BP

Peter Carragher, Micah Reasnor, and Mike Staines, BP, Houston, TX
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

JAG Academic Partners

Dr. Vernon Asper, Marine Sciences, University of Southern Mississippi

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

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/>