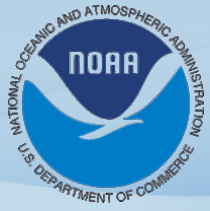


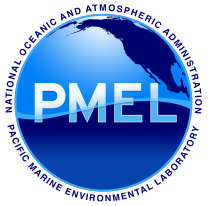
PMEL

Pacific Marine Environmental Laboratory

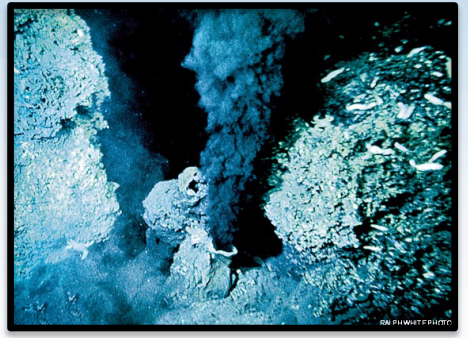
Ocean and Coastal Processes

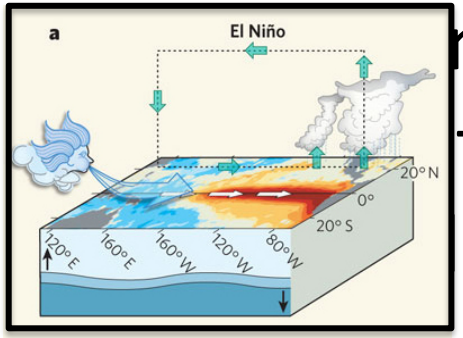
Ocean Environment Research Division

Dr. Jeremy T. Mathis



Connecting the Research Themes





Oceans and Coastal Processes

Climate

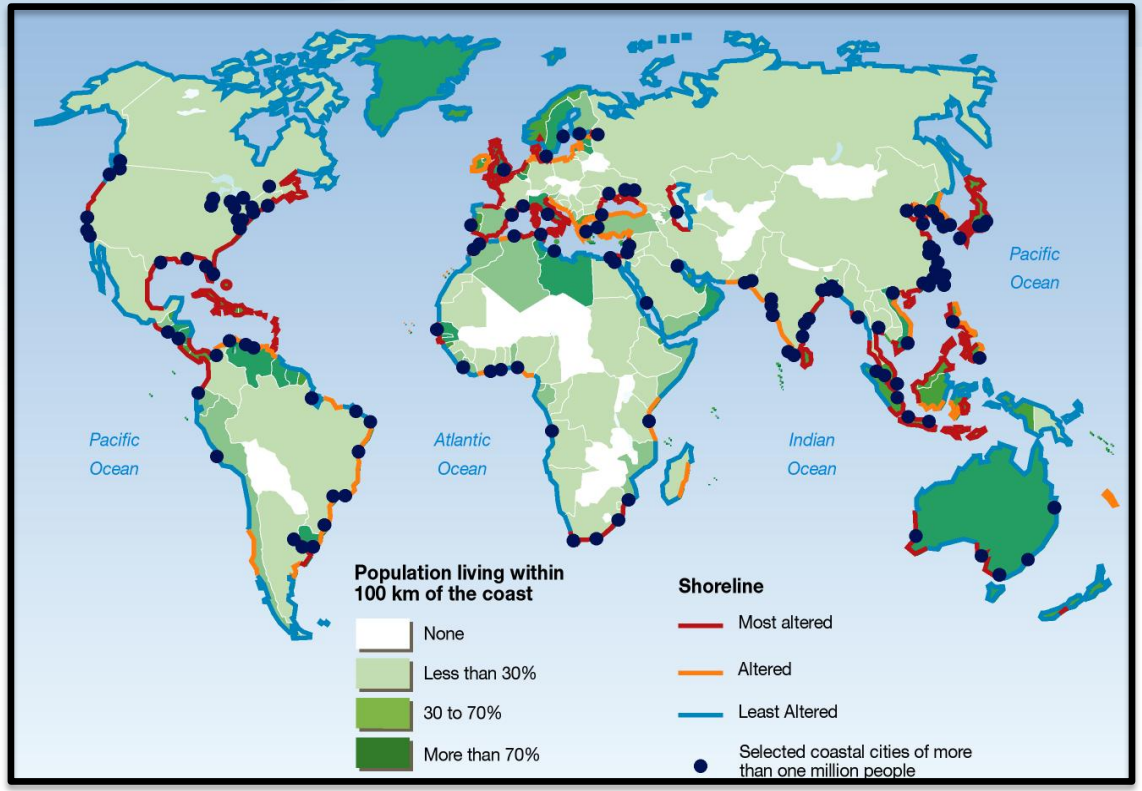
Marine Ecosystems

model and forecast ocean p

teractions between the oce

oor, coastline, and atmosph

Context for Coastal Processes



- Approximately 3 billion people live within 200 kilometers of a coastline. By 2025, that figure is likely to double. (U.N. Assessment)

Context for Coastal Processes

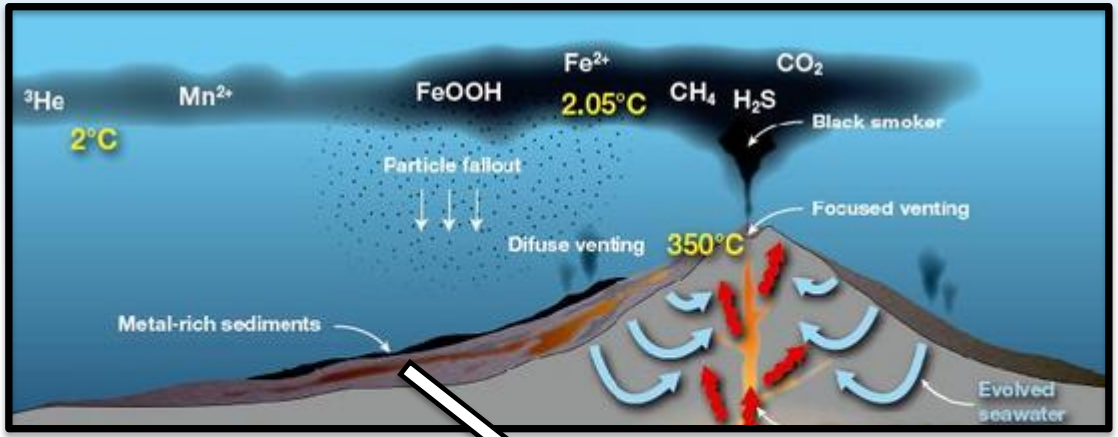
Tsunamis during 2004-2014:

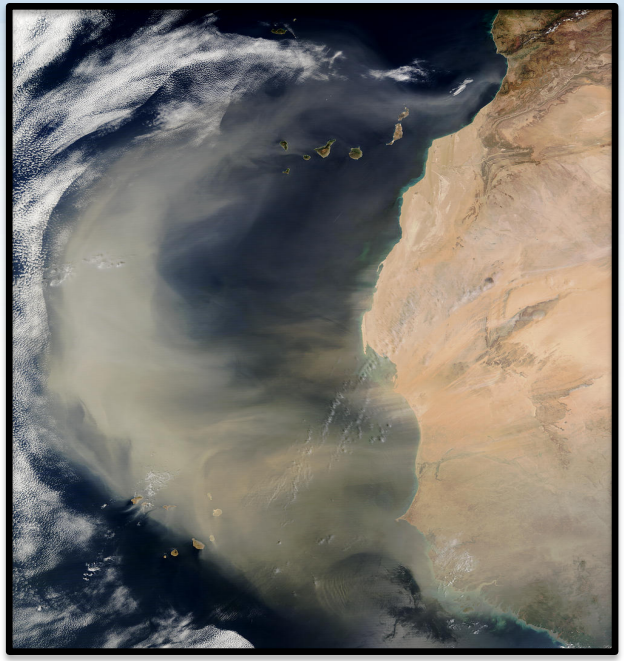
- Over **30** tsunamis world-wide
- Over **250,000** people killed
- Over **$250 billion** in damage

- **33** people killed, over **$100 million** in damage
- Over **$1 billion** in aid from U.S. government

Context for Global Ocean Processes

The delivery of trace metals from vents and continental sources is critical for primary production in the oceans.





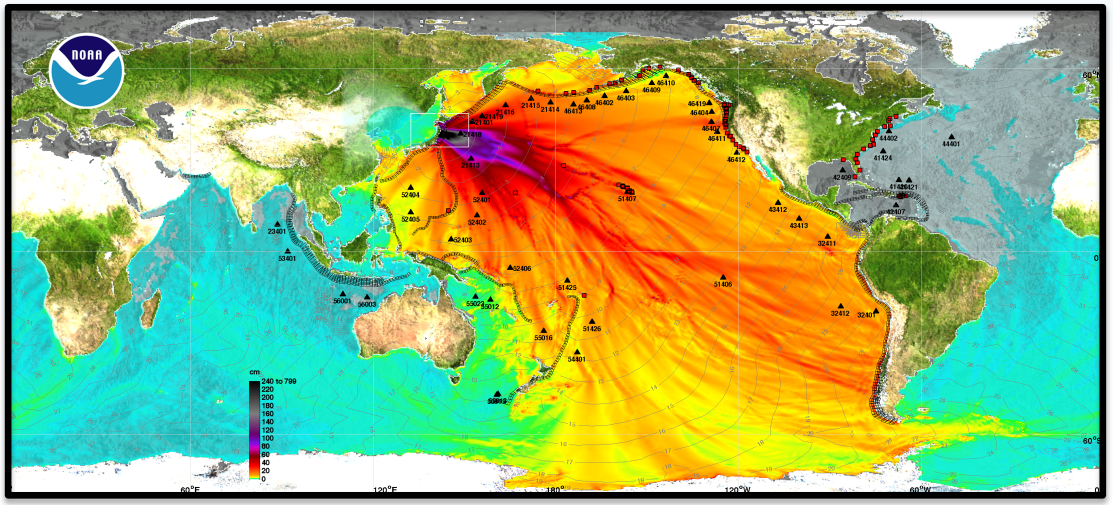
Mining metal-rich sediments could be an emerging resource.

NOAA Center for Tsunami Research

- Dr. Vasily Titov has been the senior tsunami modeler since 1997.

Mission: Developing methods and tools to reduce tsunami hazard and protect life.

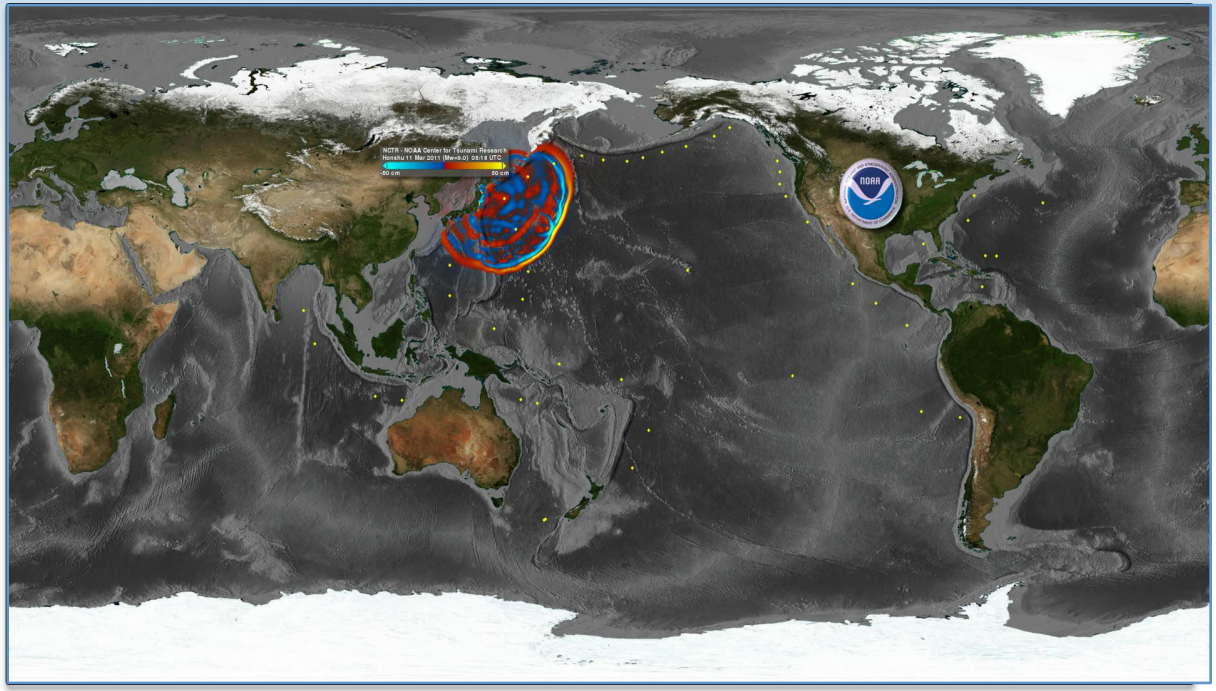
1. Optimal monitoring networks
2. Increase the speed and accuracy of forecasts and warnings
3. Predict impacts on the population and infrastructure



NOAA Center for Tsunami Research

NOAA Center for Tsunami Research

Focused on measurements, models and forecasts.

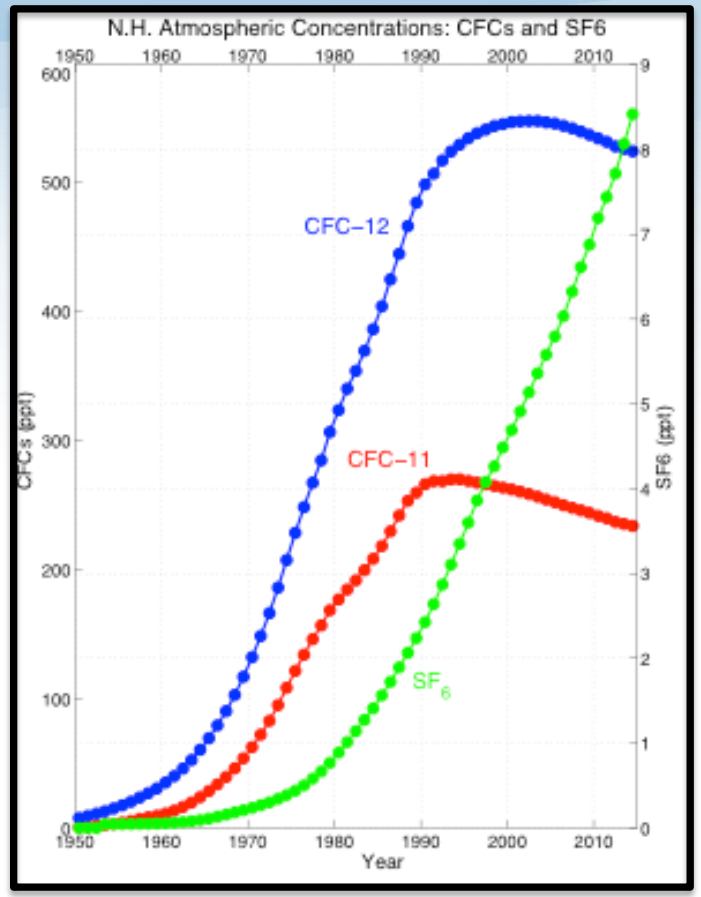


Ocean Tracer Program

Dr. John Bullister

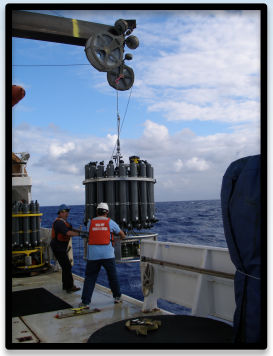
Dr. Rolf Sonnerup

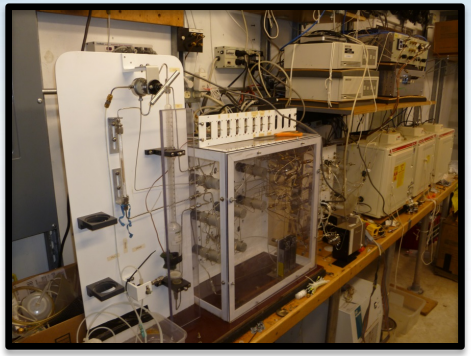
Mission: To document the invasion of atmospheric tracers into the thermocline of the world ocean and estimate the rates and pathways of ocean circulation.

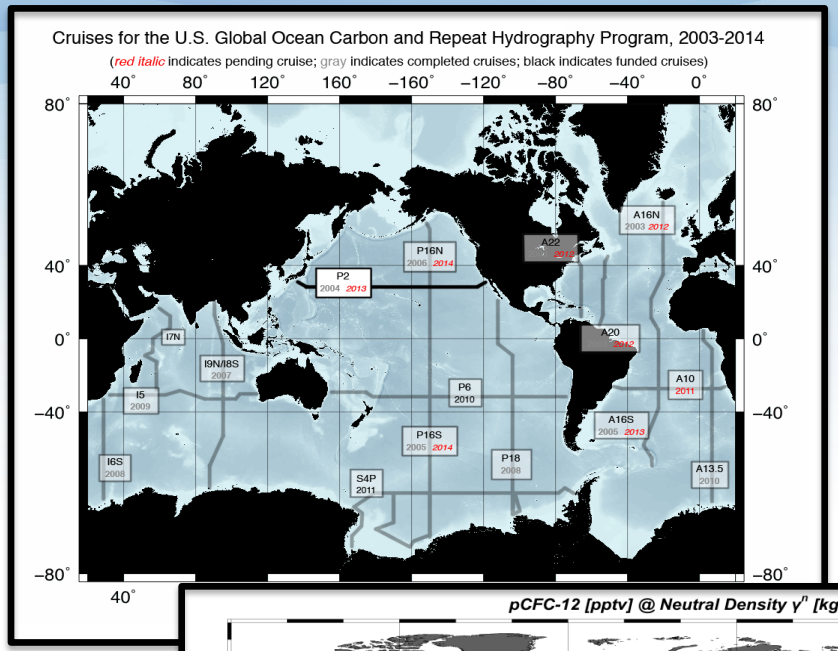


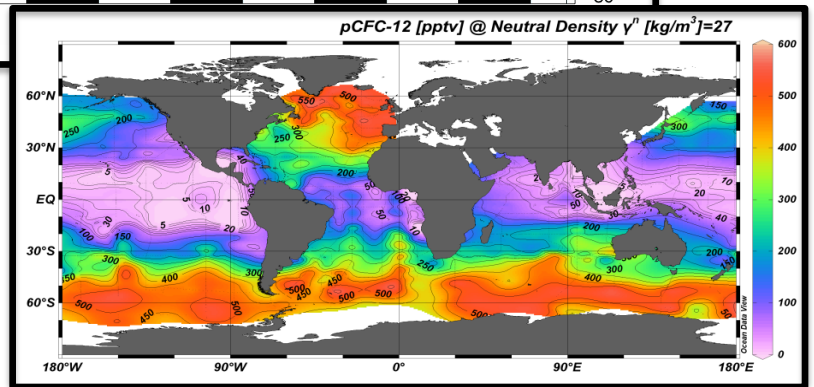
- Anthropogenic, no natural background
- Well characterized atmospheric input history
- Conservative in seawater
- Large temporal changes can be detected in much of the ocean

Ocean Tracer Program









Extraordinarily sensitive analytical techniques

Detection Limit:

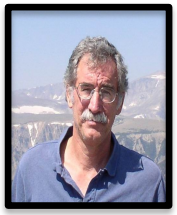
- CFC-12=0.000000000000002 moles kg^{-1}
- SF_6=0.0000000000000002 moles kg^{-1}

The Earth-Ocean Interactions Group

Basin-Wide Processes

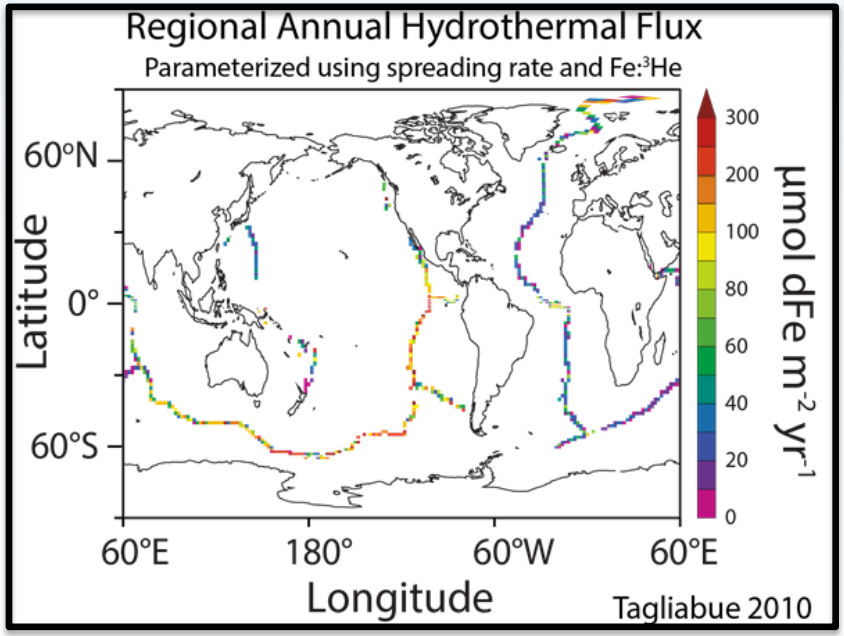
Dr. Joe Resing

Dr. Ed Baker



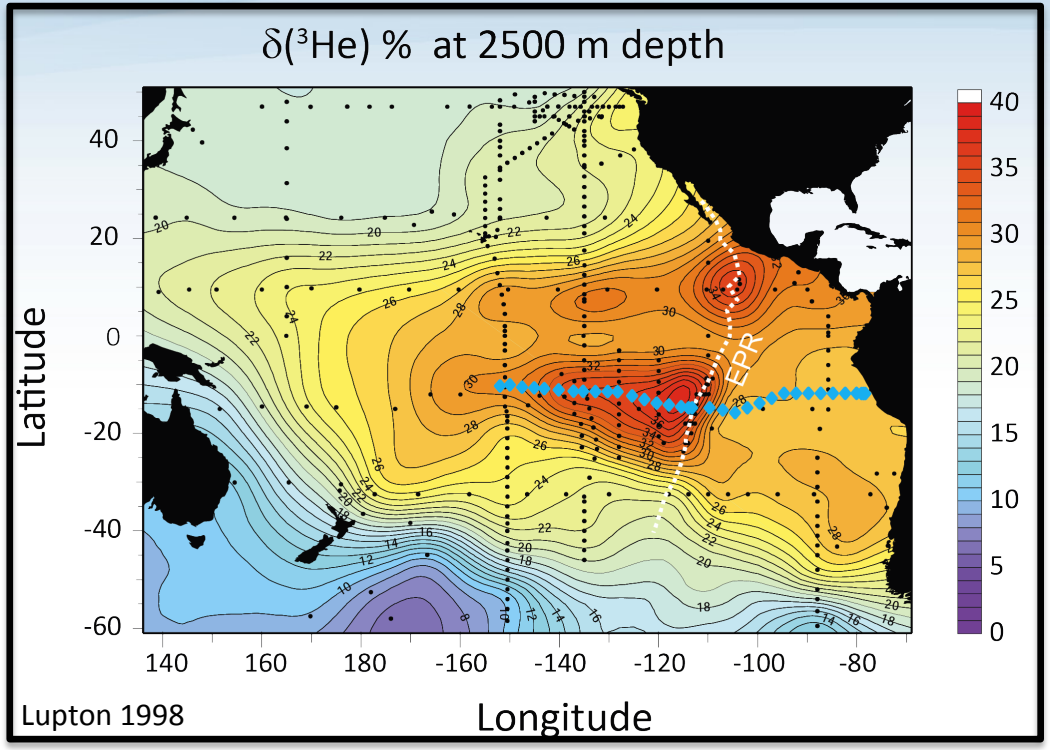
Dr. John Lupton

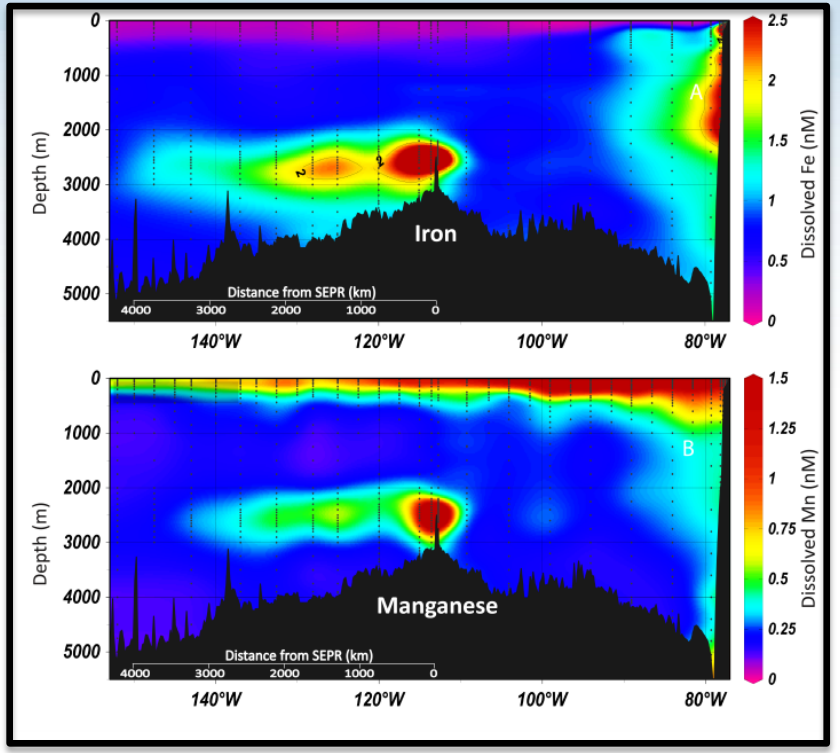
Discovering, measuring, and understanding the input of trace elements into the ocean from vent systems.



The Earth-Ocean Interactions Group

Basin-Wide Processes

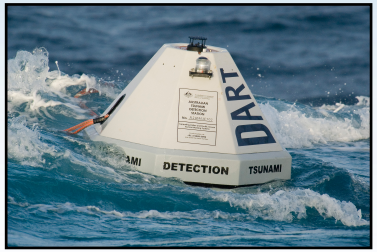




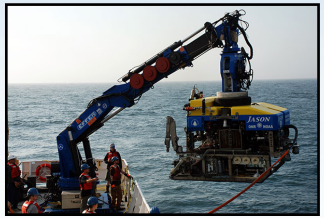
Performance

Technologies

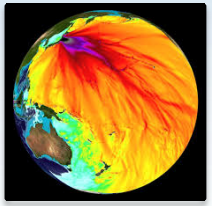
Moorings



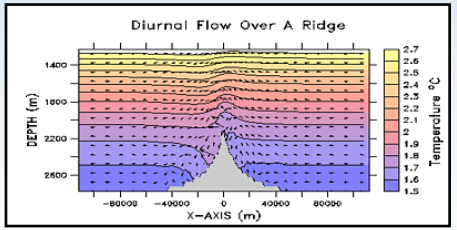
Platforms



Models

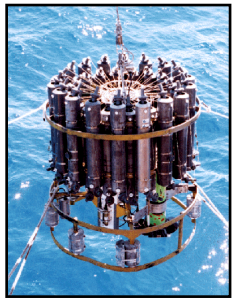


MOST

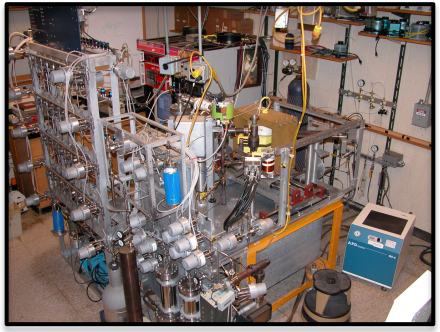


Gaia

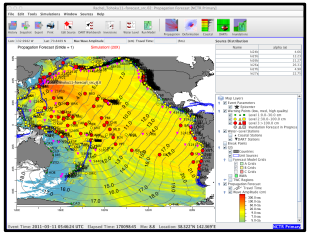
Instruments



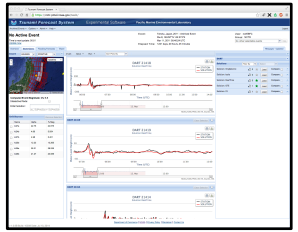
Analytical Processes



Software

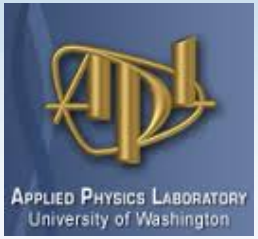


SIFT



TWEB

Leveraging With Our Partners

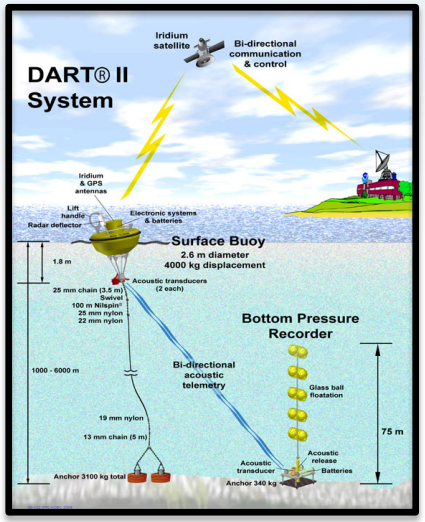


NOAA FISHERIES | ALASKA FISHERIES SCIENCE CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

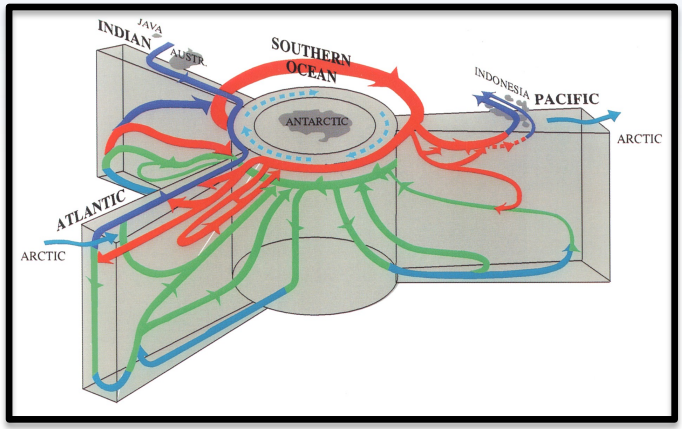
Synergies

What Makes PMEL Unique

Expertise + Partnerships + Engineering + Administration



Dart II Mooring



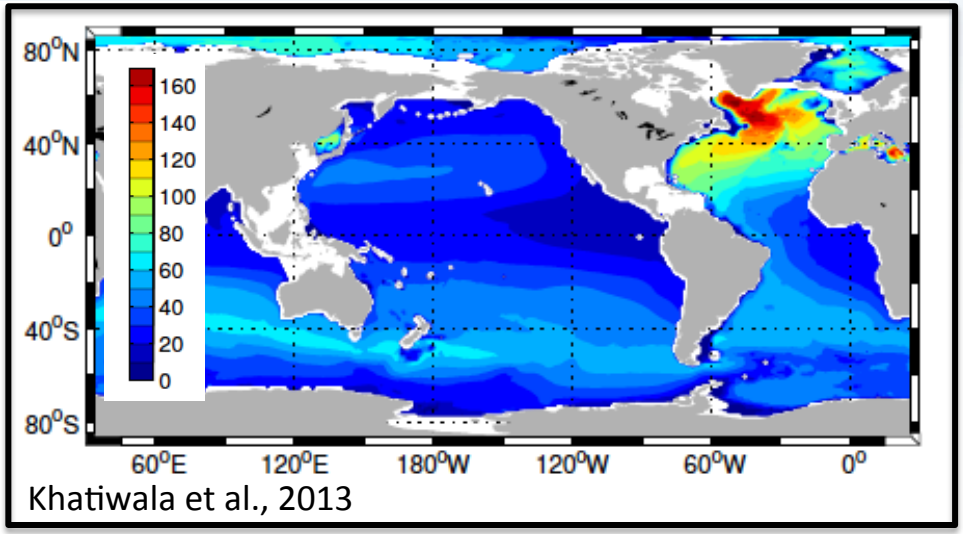
Global Ocean Synthesis

Hydrothermal vent studies

Relevance

Tsunami Warning and Education Act
Passed in 2006. Authorized and strengthened the tsunami detection, forecast, warning, and mitigation program of NOAA.

Large-scale climate process could not be constrained without accurate estimates of ocean circulation.



Khatiwala et al., 2013

Accomplishments Over the Past 5 Years

- Operationalizing SIFT - it is now used in creating warnings at NTWC and PTWC.
- First basin-scale trace-element transect reoccupied (A16N; 2003 and 2013)
  - Documenting nearly constant dust deposition and confirmed that Al has a residence time of less than 1 year.
- Eastern Pacific zonal section revealed near conservative transport of Fe and Mn over 4000 km from the Southern East Pacific Rise.
- Conducting 8 cruises to carry out tracer measurements and refining analytical techniques to include SF_6 and N_2O, while providing gas standards to the international community.

Quality
Awards 2008-2014

- **Fellows of the American Geophysical Union**
  - Edward T. Baker – 2012
- **Fellow of the Geological Society of America**
  - Robert W. Embley – 2010
- **Bronze Medals**
  - Stephen R. Hammond, et al., - 2012
  - Robert W. Embley, et al., - 2009
- **Presidential Meritorious Rank Award**
  - Eddie N. Bernard. – 2010
- **Best Paper Awards**
  - Edward T. Baker – 2013
- **Miscellaneous Awards**
  - Mick Spillane, et al.,—2009 Education and Outreach
  - Stephen R. Hammond – 2011 Distinguished Career Award
  - Donald Denbo — 2009 NOAA Team Member of the Month
  - Eddie Bernard — 2008 Service to America Medal
  - Eugene Burger — 2008 OAR's NOAA Research Employee of the Year
- **NOAA Technology Transfer Award**
  - Christain Meinig and Scott Stalin – 2013

Future Directions

- Develop and improve forecast for near-field tsunami warning system.
- Continue to development a robust sensor strategy that leverages new technologies and capabilities for tsunami monitoring and prediction.
- Continue to quantify the sources of trace metals from solid earth processes.
- Continue to improve analytical techniques for ocean tracers and identify new ocean tracers to better measure anthropogenic CO_2 uptake and biogeochemical processes.