



# PMEL

Pacific Marine Environmental Laboratory

# Research Innovation Theme

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Theme Leads:

Engineering: Chris Meinig

Research IT: Eugene Burger

Science Data Integration: Kevin O'Brien





# Background: *Who we are*



- Engineering Development Division
- Research IT project
- Integrated Science Data Management project
- Centralized functions within PMEL
- Science Enablers



# Background: *Who we are* Engineering Development Division (EDD)

*Engineering innovations at PMEL is multidisciplinary and driven by the formation of teams that integrate research and engineering to solve difficult ocean and atmospheric observing challenges.*

## The people:

- Engineers
- Instrumentation Technicians
- Mooring Technicians
- Machinists

Unified group that works with scientists and projects across all research themes.





# Background: *Who we are*

## Research Information Technology

*Supports requirements for observing system data collection and the further development of innovative techniques for data analysis, visualization, presentation, and dissemination.*

### The people:

- Software and web developers
  - Mix of individuals who are dedicated to project and individuals who report to Lab Management but are distributed to projects as needed.
- Work as a collective, sharing resources and ideas to benefit all projects.

The screenshot shows the PMEL website homepage. At the top left is the PMEL logo and the text "National Oceanic and Atmospheric Administration Pacific Marine Environmental Laboratory". To the right is a search bar and the text "Search PMEL Home". Below this is a navigation menu with links for Home, About Us, Research, Data, Publications, Education, and Media. The main content area features a large image of a marine ecosystem with the text "Marine Ecosystems" and "Understanding and predicting impacts of natural, physical, chemical, geological and anthropogenic processes". To the right of this image are links for "Climate Research", "Marine Ecosystem Research", "Oceans and Coastal Processes Research", and "Research Innovation". Below the main image are three columns of content: "What's New" with a link to "PMEL Scientists and Engineers Head Back to Axial Seamount", "PMEL in the News" with a link to "Breaking icebergs blast out noise", and "Feature Publication" with a link to "The Cascadia Initiative: A sea change in seismological studies of subduction zones". At the bottom of the page are links for "What's New Archive", "PMEL in the News Archive", and "Publications Archive". The footer contains the PMEL logo, the full name of the organization, contact information, and a list of links including "DOC", "NOAA", "OAR", "PMEL", "Privacy Policy", "Disclaimer", "Accessibility", "Contact Us", "Sitemap", and "Internal".



# Background: *Who we are*

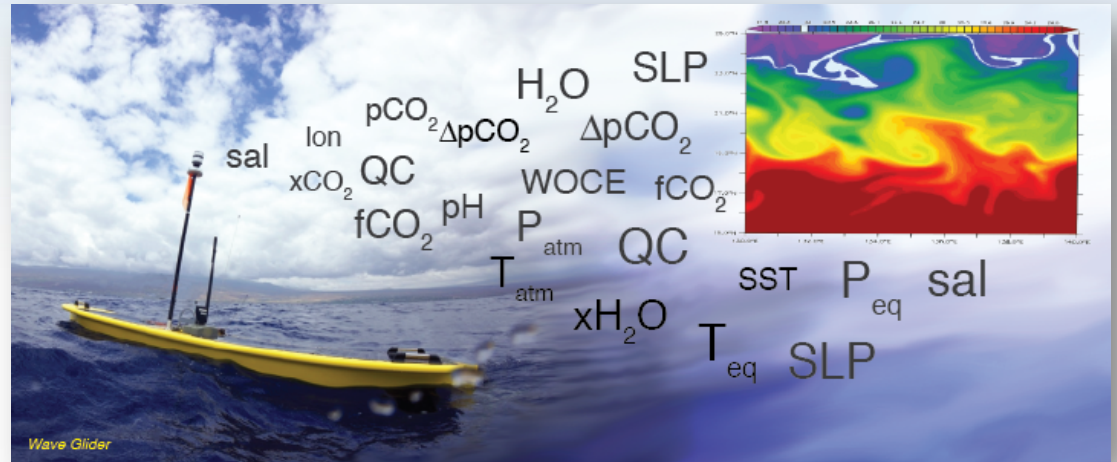
## Science Data Integration

*The PMEL Science Data Integration Group (SDIG) is devoted to data management, data integration management and it's related software development*

### The people:

- Data Integration specialists

Operate as a unit in the Lab, but individuals are tasked to support different projects



Has more externally-driven projects than Engineering or the Research IT groups



# Relevance



Project	Science Products	Science Planning	Exp. Design	Prototype Dev.	Implement	Transition to ops/app
DART Array	✓	✓	✓	✓	✓	✓
TAO Array	✓	✓	✓	✓	✓	✓
Tsunami Modeling	✓	✓	✓	✓	✓	✓
Repeat Hydrography	✓	✓	✓	✓	✓	✓
Ocean Carbon	✓	✓	✓	✓	Underway	
PIRATA & RAMA	✓	✓	✓	✓	Underway	
Alaska/Arctic Ecosys.	✓	✓	✓	UW (Arctic)	UW (Alaska)	
Ocean Acidification	✓	✓	✓	Underway		
Ocn. Noise Network	✓	✓	✓	Underway		



# Relevance

## Dept. of Commerce Strategic Plan:

- Objective 3.1: Advance the understanding and prediction of changes in the environment through world-class science and observations.
- Objective 4.1: Transform the Department's data capacity to enhance the value, accessibility, and usability of Commerce data for government, business, and the public.
- Strategic Goal 5: Operational Excellence: Deliver better services, solutions, and outcomes that benefit the American people.





# Relevance

## NOAA Next Generation Strategic Plan:

- Objective: A holistic understanding of the earth system through research
  - More effective development and transition of technologies to operational services and stewardship applications.
- Objective: Accurate and reliable data from sustained and integrated earth observing systems
  - Improved data interoperability and usability through application and use of common data standards.
  - Enhanced access and use of environmental data through data storage and access solutions, integration of systems, and long-term stewardship.
  - Reduced life-cycle costs of observations through increased partnerships, integration of systems leveraging available data, and reducing duplicative capabilities.
- Objective: An integrated environmental modeling system
  - Effective and efficient collaboration and coordination with NOAA and partners to enhance the scope and predictive accuracy of integrated Earth system models for global, national, and regional applications, and for specific phenomena.







# Relevance

## **NOAA 5 Year R&D Plan, 2013-2017:**

Objective: Improved accuracy, coverage, resolution, effectiveness, and cost of observation systems.

Objective: Enhance data stewardship.





# Relevance

## OAR Strategic Plan:

- OAR creates new or significantly improved technology for observation and modeling systems, as well as tools for information delivery and stakeholder engagement.

## PMEL Strategic Plan:

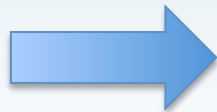
*“Accomplishments across NOAA’s mission goals are dependent upon the continued innovative development and use of observing platforms, systems, and information technology to improve data quality and delivery, and lower operating costs.”*



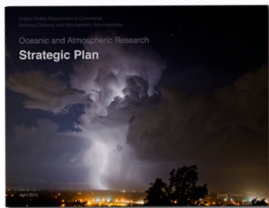
# Relevance



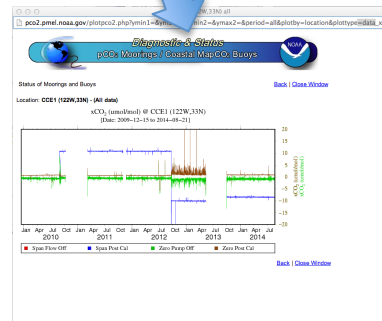
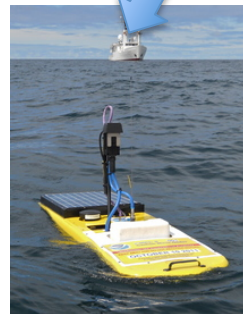
requirements



results



Science requirements are established by PMEL, OAR and NOAA strategic goals...

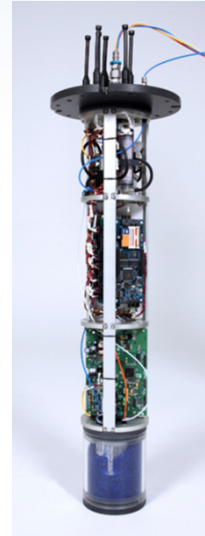
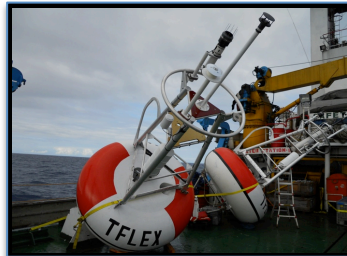
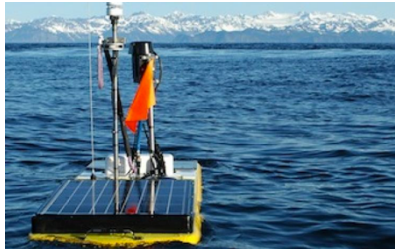


...and the Research Innovation group partners with the Science Programs to meet those goals



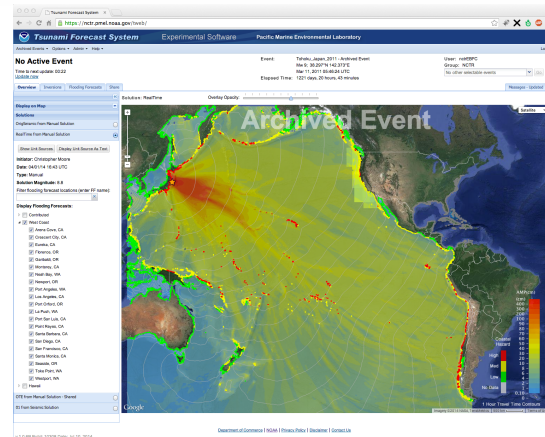
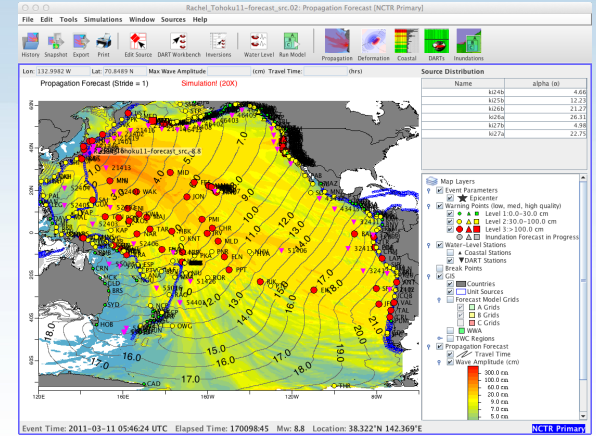
# Performance – Engineering Development Division

- Carbon Wave Gliders
- T-FLEX mooring system
- pCO<sub>2</sub> sensor technology
- DART-ETD



# Performance – Research IT

- Effective tools supporting engineering development
- Systems to ensure data quality and high data-return
- Innovative data logging solutions
- Software transitioned to operations
- Access to scientific applications



Tsunami forecast graphics from the SIFT (above) and Tweb applications.



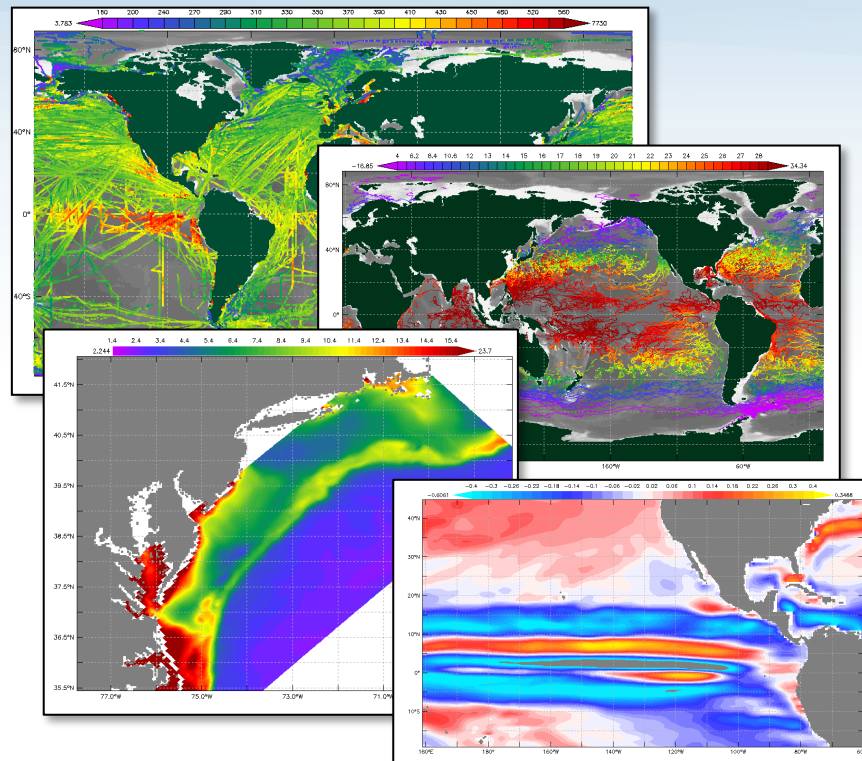
# Performance – Integrated Data Management Group



Observing System Monitoring Center



Global Earth Observation  
Integrated Data Environment  
Unified Access Framework





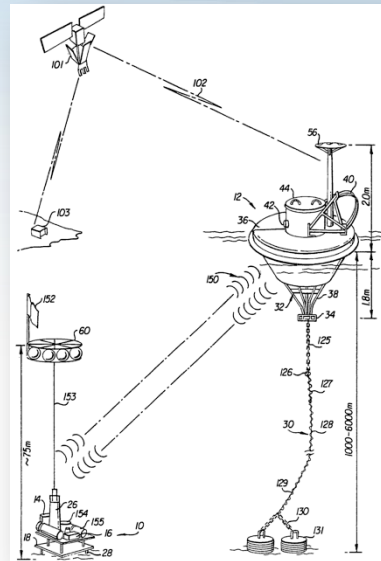
# Quality: *Significant Awards, 2008-13*

- NOAA Technology Transfer Awards:
  - 2011 - pCO<sub>2</sub> sensor development
  - 2008 - DART tsunami observing technology
- NOAA Research Employee of the Year Awards:
  - 2011 - Utilization of YouTube technology to increase understanding of OAR science
  - 2008 - Leadership in the development of NOAA IT Administrative support systems

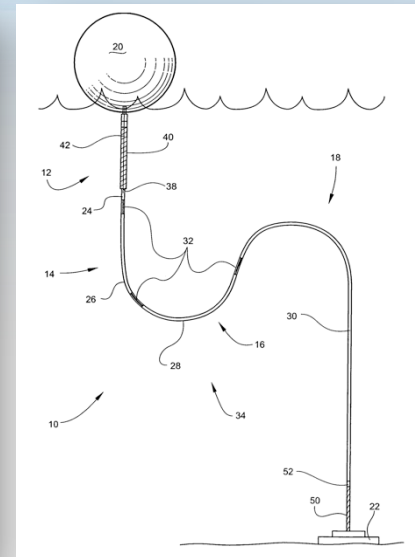


# Quality: *Patents, Licenses, CRADAs*

- Patents (2)
  - Tsunameter (2007)
  - Oceanographic mooring line
- Cooperative Research and Development Agreements -CRADAs (4)
  - Paroscientific
  - Battelle Memorial Institute
  - Liquid Robotics
  - Saildrone
- Licenses (1)
  - SAIC (tsunameter)



Patent US7289907





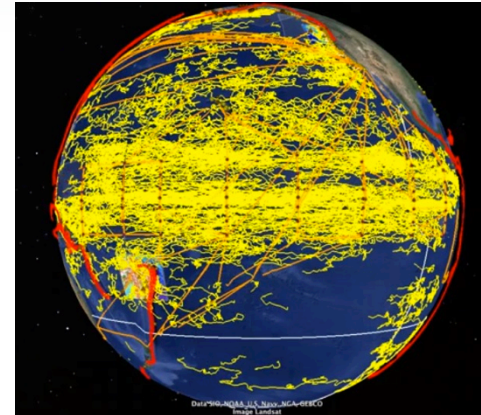
# Future Directions

- Wherever the research takes us...



# Future Directions

- Autonomous vehicles and sensor packages
- Improved accuracy, data transfer, instrument lifetime
- PMEL-wide integrated Data Management System





# What's Next?

For all: A brief introduction/overview of PMEL Engineering,  
led by Chris Meinig

Then, For Reviewers: tour of Engineering Facilities in this building and in  
Buildings 8 and 32 (1 hour and 10 minutes scheduled)

For non-reviewers, unscheduled time (your Engineering tour will  
be held Thursday morning from 10:05 to 11:15)

For remote viewers, we will be back on screen at 3:20 PM PDT

Two remaining presentations on Research IT and Integrated Data  
Management will begin at 3:20 in this room.