

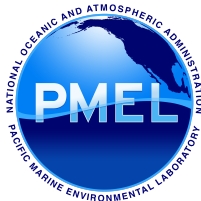


PMEL

Pacific Marine Environmental Laboratory

Research Innovation Science Information Technology

Eugene F. Burger

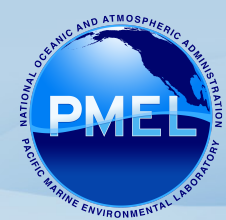




Who are we?

Software developers

- Most with science background
- Embedded with science projects
- Develop IT solutions that help scientists



How we align in the lab?

Work closely with
PMEL science projects

Answer to
The science project PIs

Depend highly on
The PMEL Computer & Network Services Division

We do not
Provide or maintain core IT & network services



Involvement

Observations

- Instrument management
- Data retrieval
- Data processing



Understanding

- Analysis
- Data visualizations
- Modeling tools



Results

- Data access
- Publications
- Technology transfer
- Outreach



Examples

PMEL Science-Focused
Software Development

Instrumentation development

Daniel Dougherty, Mick Spillane

Requirement

- Developmental instrumentation
 - Acquire telemetered data
 - On demand visualization

Solution

- Modular data acquisition
- Data visualization component
- Data viewer

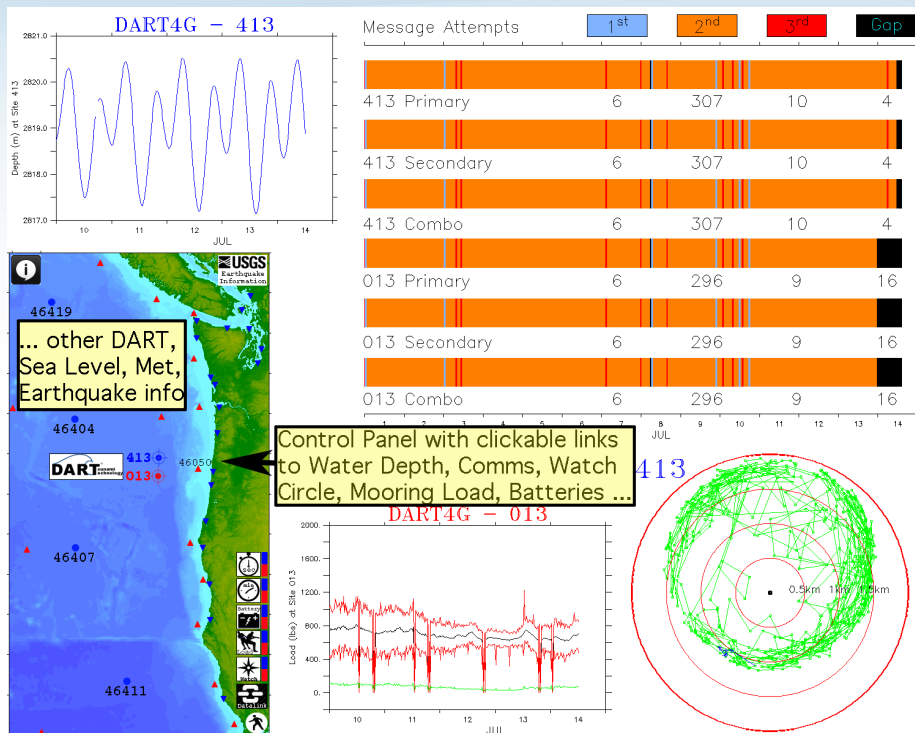
Results

- Platform for future instrumentation development
- Modular design allows for adaption to new telemetry methods

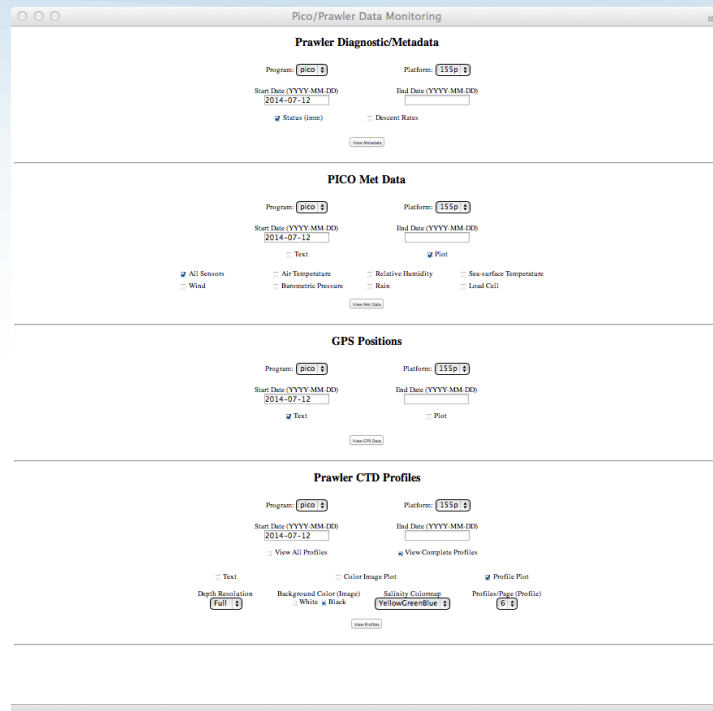


Engineering Group

DART 4G Deployment



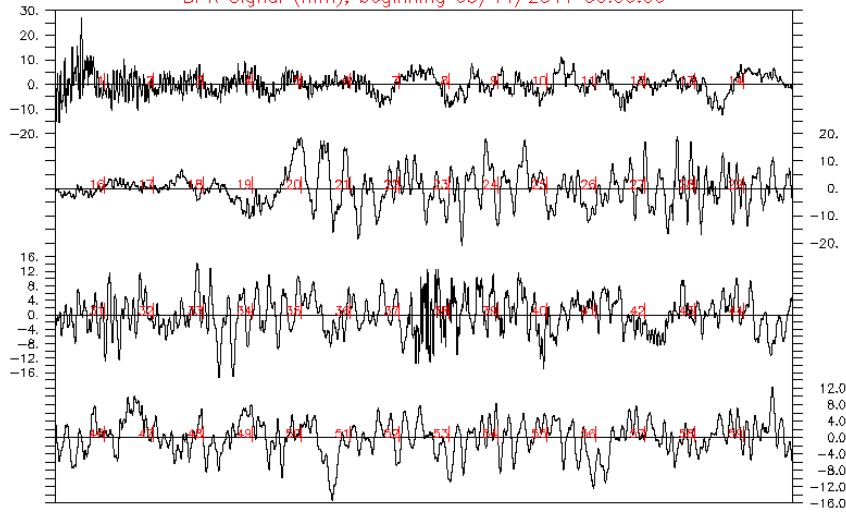
Engineering instrument test-data access



Engineering Group

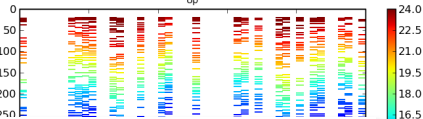
4th Generation DART data viewer

BPR Signal (mm), beginning 03/11/2011 06:00:00

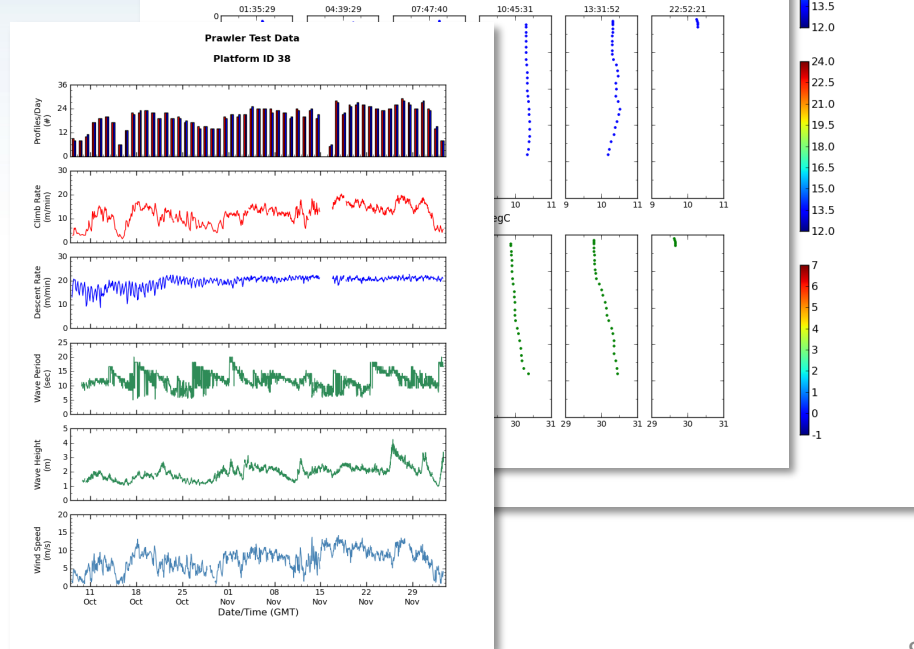


Autonomous profiler data viewer

PRAW 0002: Subsurface Temperature Profiles
 19-Apr-2008 02:00 - 21-Apr-2008 03:00
 Up



Prawler CTD Profile : Platform pico9000
 2013-12-01



FOCI

Peggy Sullivan and Shaun Bell

Requirement

- Extensive inventory of instruments
- Difficult to manage

Solution

- Develop Instrument Database

Results

- Updated FOCI's instrument pool usage
- Scientist guidance in mooring design



***Ecosystems & Fisheries-Oceanography
Coordinated Investigations***

Movie

**Existing Cruise
and Instrument
Records**

ARGO

Donald Denbo

Requirement

- More than 600 floats deployed
- Float calibration history management

Solution

- Automate float testing
- Automatically archive information

Results

- Significant time savings
- On-line access to instrument history
- Correlations between test/calibration and failures



Basic

Hull: Board:

AOML:

PI: n/a

Dock: No dock test group

Ship: GB April 2014

DepthTbl: Format:

Box: Awake:

Status

Model: 1200

Mode: Mission

Transmission

Type: Iridium

Id:

Hex Id:

Program:

Deployment

Platform: unknown

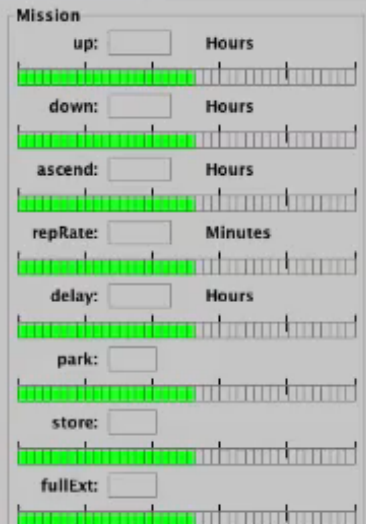
Method: surface box, PA

Cruise:

Deployer: n/a

Profile:

Method:



Equipment

Movie

Conversions (x=a*count+b)

Date	Status
reset: <input type="text"/> <input type="button" value="..."/>	n/a <input type="button" value="v"/>
<input type="text"/> <input type="button" value="..."/>	n/a <input type="button" value="v"/>
<input type="text"/> <input type="button" value="..."/>	n/a <input type="button" value="v"/>
<input type="text"/> <input type="button" value="..."/>	<input type="button" value="..."/>

Misc Mission

InitNudge: ToD:

ascentCorr: autoStart: days

WMO

WMO:

Inst: 858, Profiling, NINJA, TSK cond

Rcldr: 64, Iridium communication, sampling on up transit

Descriptor

3 Lithium

#	Desc...	Profiles

Comment

parkDesc: profDesc:

profile: hyper:

OKVac: airBladder:

HPVemf: HPVRes:

Park:

Profile:

Received From Manufacturer

Date:



Atmospheric Chemistry

Derek Coffman

Requirement

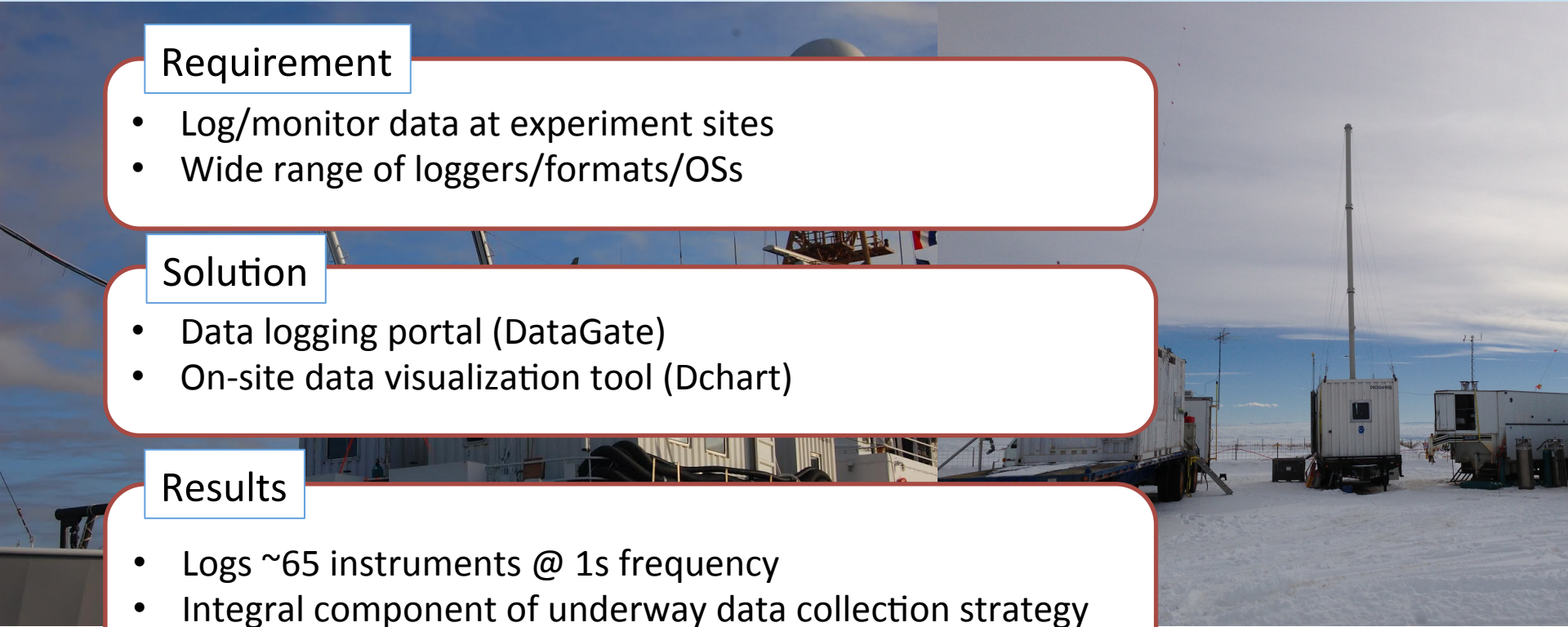
- Log/monitor data at experiment sites
- Wide range of loggers/formats/OSs

Solution

- Data logging portal (DataGate)
- On-site data visualization tool (Dchart)

Results

- Logs ~65 instruments @ 1s frequency
- Integral component of underway data collection strategy



Atmospheric chemistry server

NOAA/PMEL/ACG

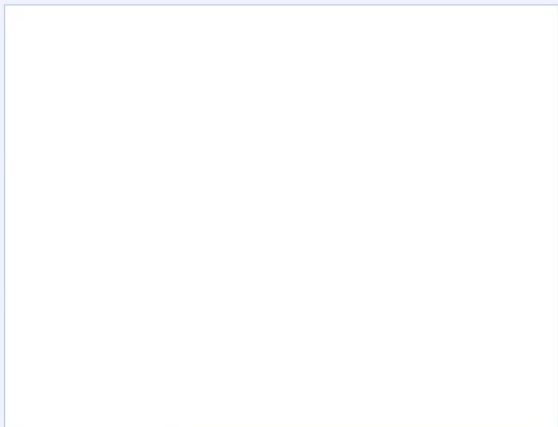
Center map at location:

Drag map with mouse or double click to center [Help](#) [Hide map](#)



CalNex
Leg1 (1D)

Range: 0.00E:0.00E|90S:90.0N|0|0|13 May 2010:08 Jun 2010



every Plot last

Plot Selected

Datasets

Category	Dataset
CalNex	Leg1 (1D)
CalNex	Leg1 (2D)
CalNex	PreCruise (1D)
CalNex	PreCruise (2D)
DYNAMO	Leg1 (1D)
DYNAMO	Leg1 (2D)
DYNAMO	Leg2 (1D)
DYNAMO	Leg2 (2D)

Movie

Link to this page

Variables

absorb_467_frh_lo
absorb_467_sub1
absorb_467_sub10
absorb_467_tthdma
absorb_530_frh_lo
absorb_530_sub1
absorb_530_sub10
absorb_530_tthdma
absorb_660_frh_lo
absorb_660_sub1
absorb_660_sub10
absorb_660_tthdma

Plot type

- Time series plot
- Cruise plot
- Property/Property plot
- Export data

Ranges

Time

Plot options

Use time average:
Average period (sec):

Carbon Program

Willa Zhu, John Osborne

Requirement

- Manage increasing data volume from MapCO₂ moorings

Solution

- Data ingest software
- Database archive
- Compute xCO₂ parameters

Results

- Millions of data records
- Easy access and diagnostic tools (Graphite)

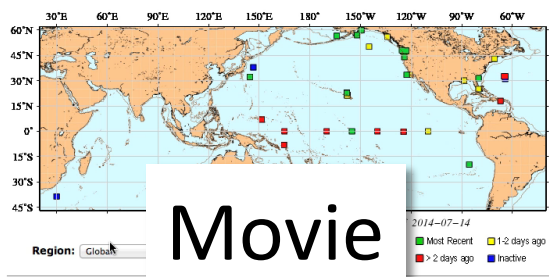
Change Since 2008

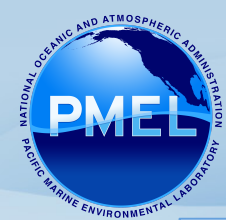
	2008	2010
Moorings	14	38
Sensor pool	21	285

Diagnostic & Status
pCO₂ Moorings / Coastal MapCO₂ Buoys



[Home](#) | [Diagnostics](#) | [Data Management](#) | [Related Links](#) | [About](#)





Tropical Moored Buoy Array

Dai McClurg, Dan Dougherty, Curran Fey

Requirement

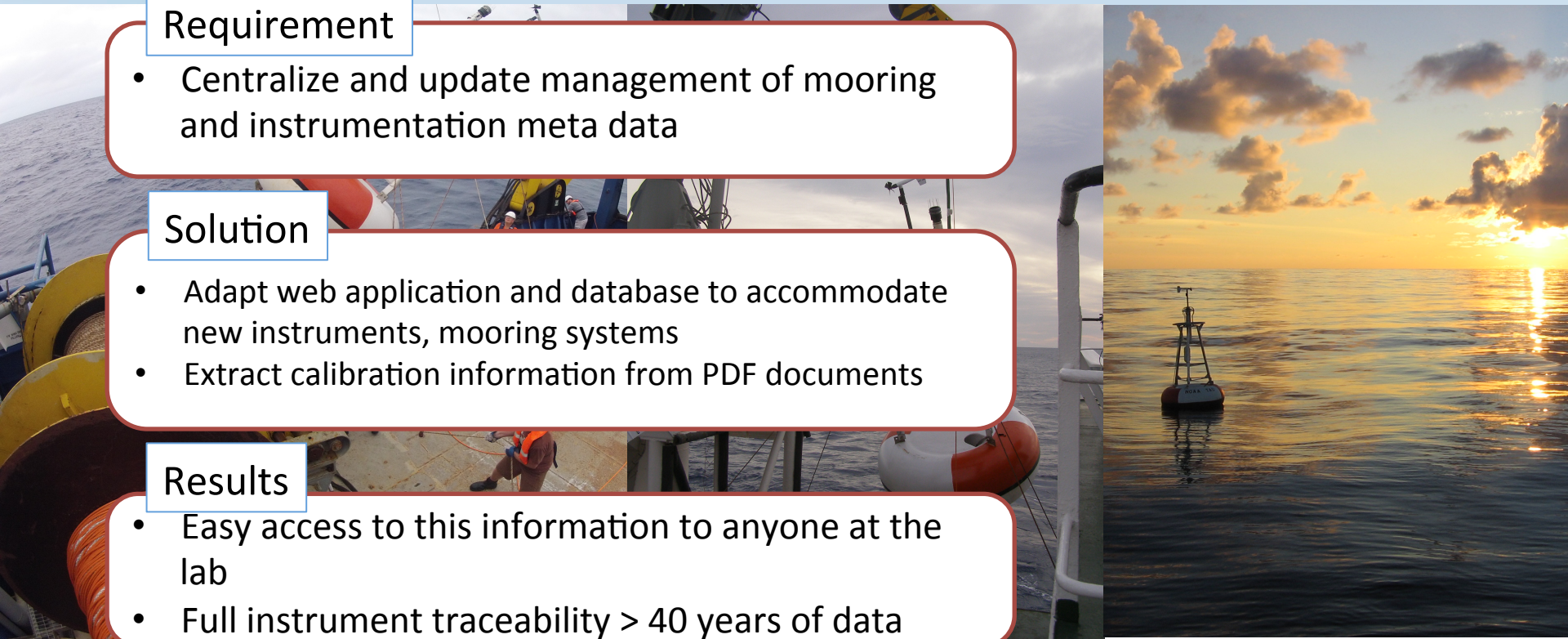
- Centralize and update management of mooring and instrumentation meta data

Solution

- Adapt web application and database to accommodate new instruments, mooring systems
- Extract calibration information from PDF documents

Results

- Easy access to this information to anyone at the lab
- Full instrument traceability > 40 years of data





Science Data Integration Group

Kevin O'Brien, Steven Hankin, Roland Schweitzer, Karl Smith, Ansley Manke, Eugene Burger

Requirement

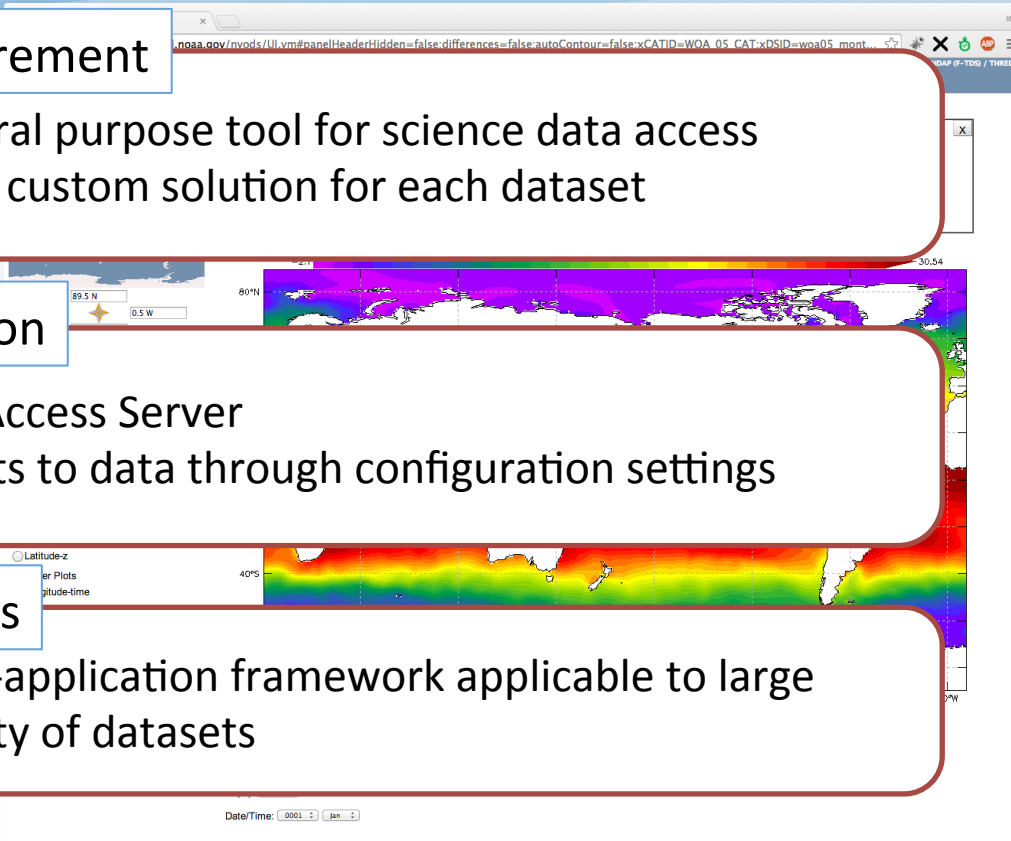
- General purpose tool for science data access
- Not a custom solution for each dataset

Solution

- Live Access Server
- Adapts to data through configuration settings

Results

- Web-application framework applicable to large variety of datasets



Acoustics

Andy Lau (PMEL/Newport, OR)

Requirement

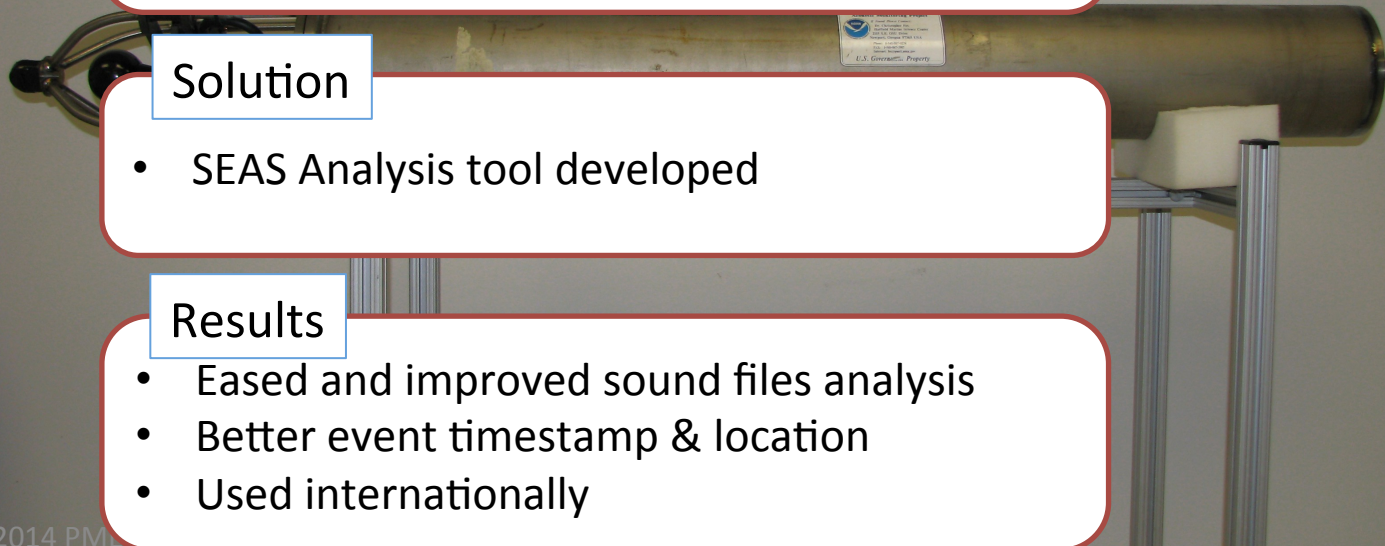
- Analyze data from hydrophones
- No off-the-shelf solution available

Solution

- SEAS Analysis tool developed

Results

- Eased and improved sound files analysis
- Better event timestamp & location
- Used internationally



Acoustics

Exit

Pick T-Phase Events

Locate T-Phase Origin

Locate Arrival Times

Save Located Result

Plot T-Phase Location

Show ConfidenceRegion

Compute Error Surface

Show Error Contours

Show Error Surface

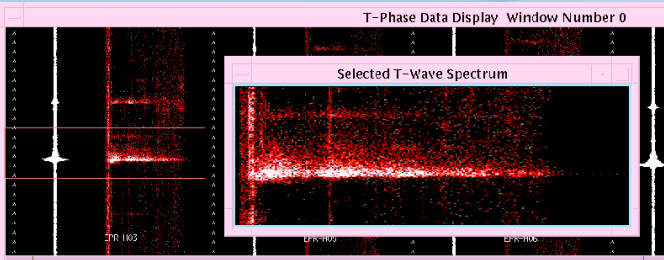
Use Slant-Range: Off

Detail Time Pick Off

Show Time Pick Off

Graphic on Screen

TPD_ILOCATF_TPHASF

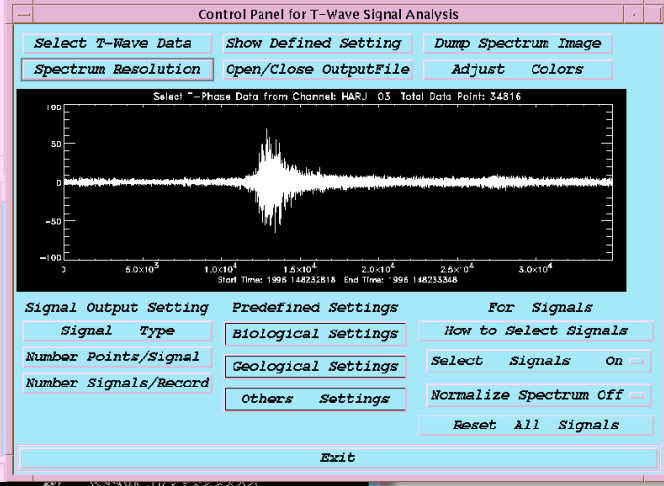
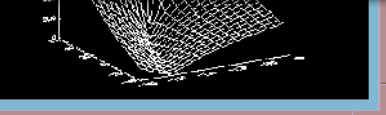


*Pick T-Phase Events
 You can locate the origin
 by a least-square method*

Examine the Error Contours.

and

Examine the Error Surface.



NOAA Center for Tsunami Research

NOAA Center for Tsunami Research – Donald Denbo, Clint Pells

Requirement

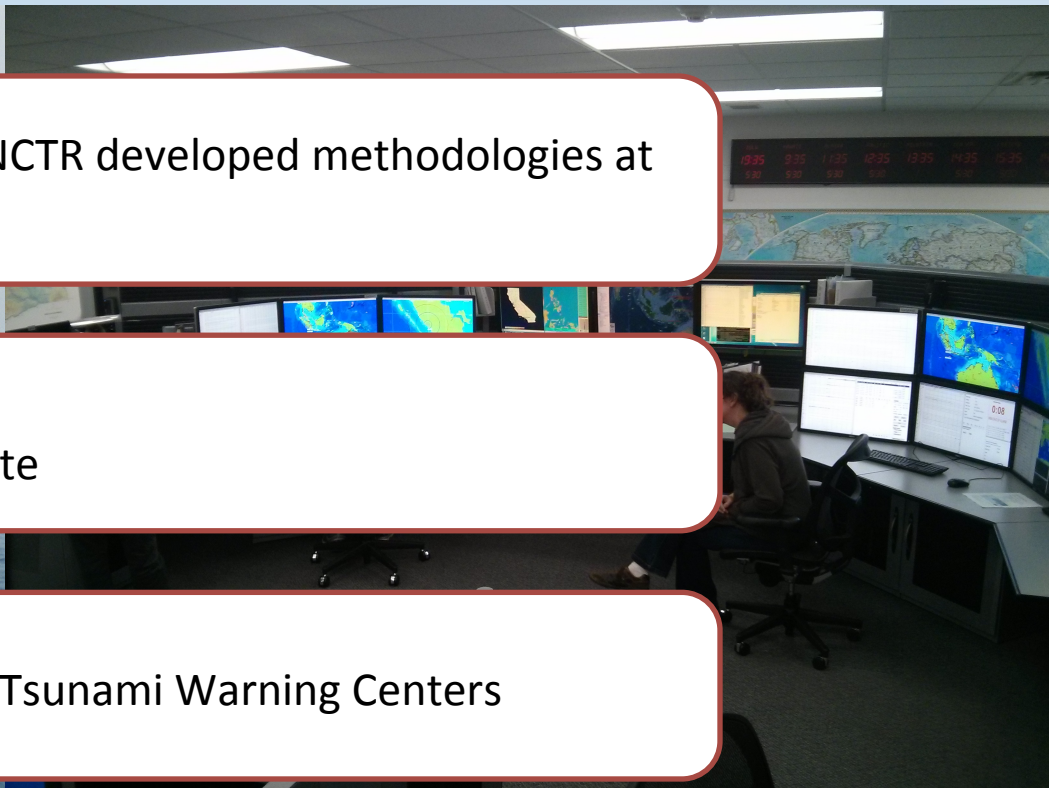
- Operationalize MOST and NCTR developed methodologies at TWCs

Solution

- SIFT development
- Full tsunami forecasting suite

Results

- Operationalized at NOAA's Tsunami Warning Centers

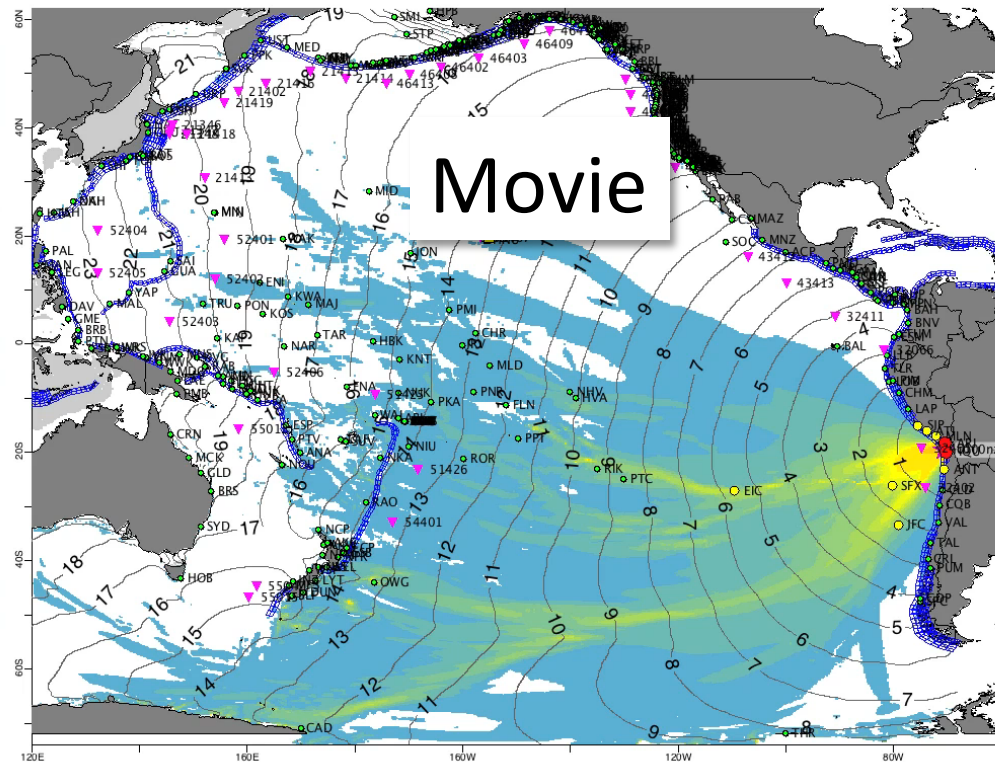




Lon: 93.6327 W Lat: 16.3678 N Max Wave Amplitude

(cm) Travel Time: (hrs)

Propagation Forecast (Stride = 1)

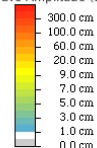


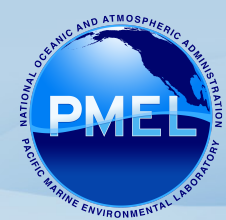
Source Distribution

Name	alpha (α)	Quality
cs70a	2.12	***
cs71b	2.32	***
cs71a	4.22	*****

Map Layers

- Event Parameters
 - Epicenter
- Warning Points (low, med, high quality)
 - Level 1: 0.0-30.0 cm
 - Level 2: 30.0-100.0 cm
 - Level 3: >100.0 cm
- Water-Level Stations
 - Coastal Stations
 - DART Stations
- Break Points
- GIS
 - Countries
 - Unit Sources
- Forecast Model Grids
 - A Grids
 - B Grids
 - C Grids
 - WWA
- TWC Regions
- Propagation Forecast
 - Travel Time
 - Wave Amplitude (cm)





NOAA Center for Tsunami Research

Eugene Burger, Linus Kamb

Requirement

- Easy access to MOST model
- Research platform to investigate new technologies

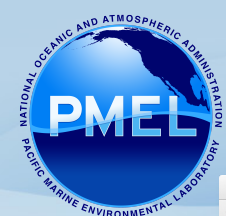
Solution

- Tweb
- Leverage SIFT development as the backend for a new web-based display tier

Results

- Widespread acceptance by users
- Some of Tweb is being operationalized





NOAA Center for Tsunami Research

The screenshot displays the NOAA Tsunami Forecast System web interface. The main window shows the "No Active Event" status for the "Tohoku Japan 2011 - Archived Event". The interface includes a navigation menu on the left with options like "Overview", "Inversions", and "Flooding Forecasts". The central area features a map of Japan with a grid overlay, a "Unit Sources" table, and three data plots for DART stations 21418, 21419, and 21414. The plots show "Water Level Height (cm)" vs "Time (UTC)" with "STATION" and "SOLUTION" lines. The bottom of the page includes version information (v 1.0.6B Build: 10308 Date: Jul 10, 2014) and a footer with "Department of Commerce | NOAA | Privacy Policy | Disclaimer | Contact Us".

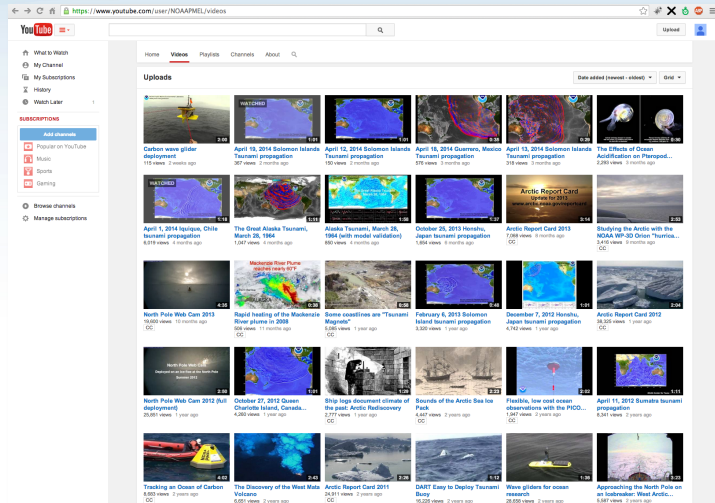
Unit Sources	Name	Alpha	% Mag
<input type="checkbox"/>	K27a	22.75	24.675
<input type="checkbox"/>	K24b	4.68	5.054
<input type="checkbox"/>	K27b	4.98	5.401
<input type="checkbox"/>	K25b	12.23	13.265
<input type="checkbox"/>	K26a	26.31	28.536
<input type="checkbox"/>	K26b	21.27	23.089

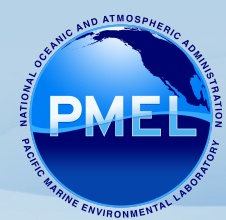
Web Interface examples

Communicate

Communicate PMEL science

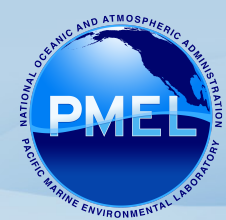
- PMEL and science topic webpages
- YouTube Channel
 - 54 Videos
 - 2.2 million views





Performance & Quality

- Prominent role in NOAA
 - Tools used widely: LAS
 - Tsunami modeling tools: SIFT, Tweb and ComMIT
 - Visualization tools: Ferret, SGT framework
- Science IT group underpins the PMEL scientific achievement
 - Instrument development and deployment
 - High quality data delivery
 - Data analysis
 - Communication of science results



Future Directions

- Continue to serve scientists
- Apply innovative & appropriate technologies
- New frontiers
 - Cloud computing
 - Crowd sourcing science
- Federal IT environment challenges

Opportunity Lab-wide Strategy

- Data management
 - Data volume increase
- Data interoperability
 - Easier access to PMEL data
- Instrument management
 - Platform proliferation

The screenshot displays the PMEL data management web interface. At the top, there is a navigation bar with links for Home, Project overview, Data display and delivery, El Niño & La Niña, and Site Map. Below this, a 'Mooring Location Summary' section shows a map of the Pacific Ocean with a location marker. The main content area is titled 'Data display and delivery' and includes a 'Find' search bar. A prominent warning message states: 'TAO data dropouts since June 2012 have compromised the quality of gridded data. Use with caution!'. Below the warning, there are several sections for data management, including 'Database User Name', 'Site Information', 'Deployment Information', 'System Information', and 'Sequence Information'. A 'Depth Section' plot is visible on the right side, showing depth (m) on the y-axis and time on the x-axis. The plot shows data points for various parameters, with some points highlighted in red and others in blue. The interface also includes various buttons for actions like 'Create New', 'Update Current', 'Delete Current', and 'Re-Calculate xCo2'.



To Summarize

Support engineering development

Ensure data quality and high data-return

Innovative data logging solutions

Operation transition

Scientific application access

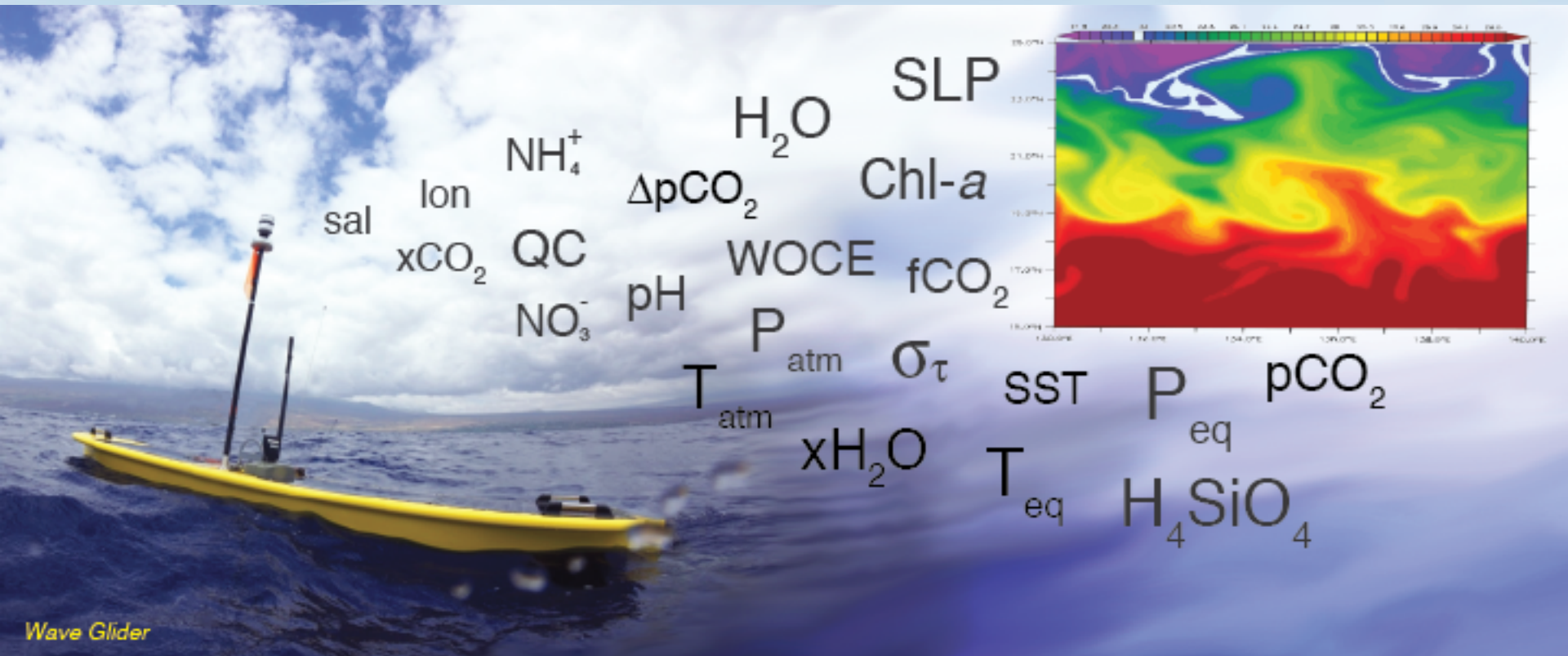
Outreach

Guided by science requirements

Defined by DOC, NOAA, OAR & PMEL Strategic

Goals

Thank you



Wave Glider