

# Recent Tsunami Observations and Forecasts

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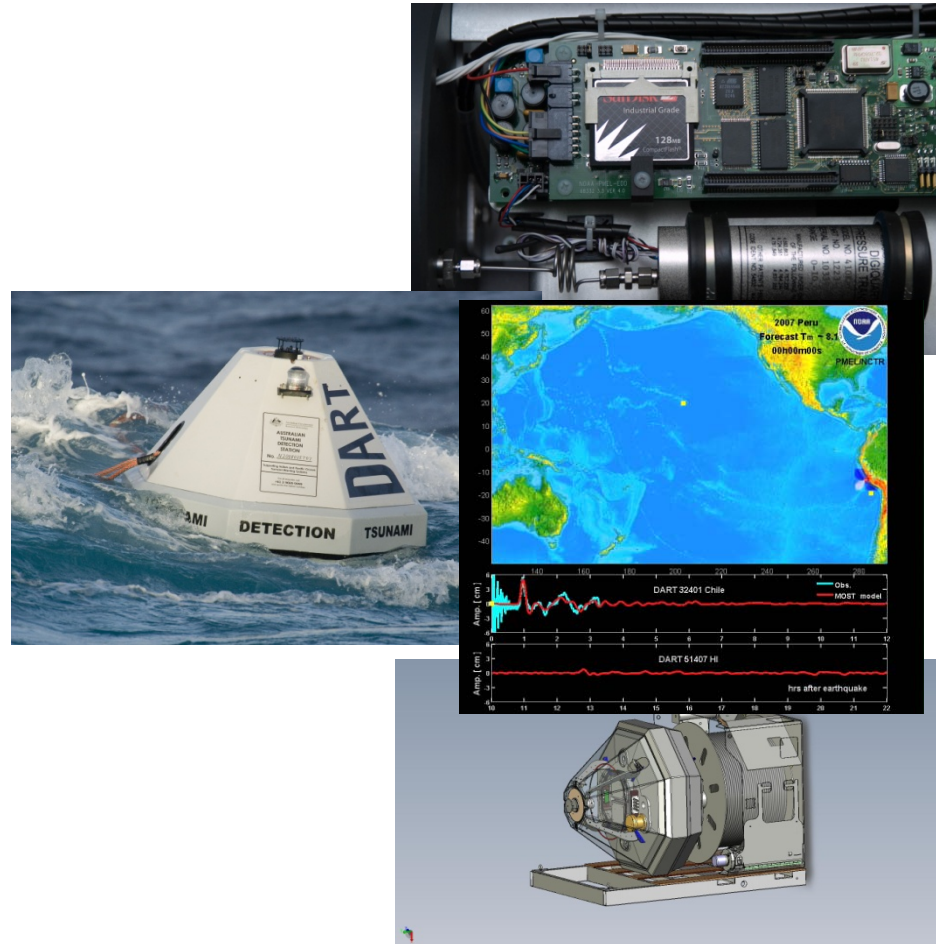
*Eddie Bernard*

*Scott Stalin*

*NOAA/PMEL*

*Ken Jarrott-AUS BOM*

*September 28, 2008*



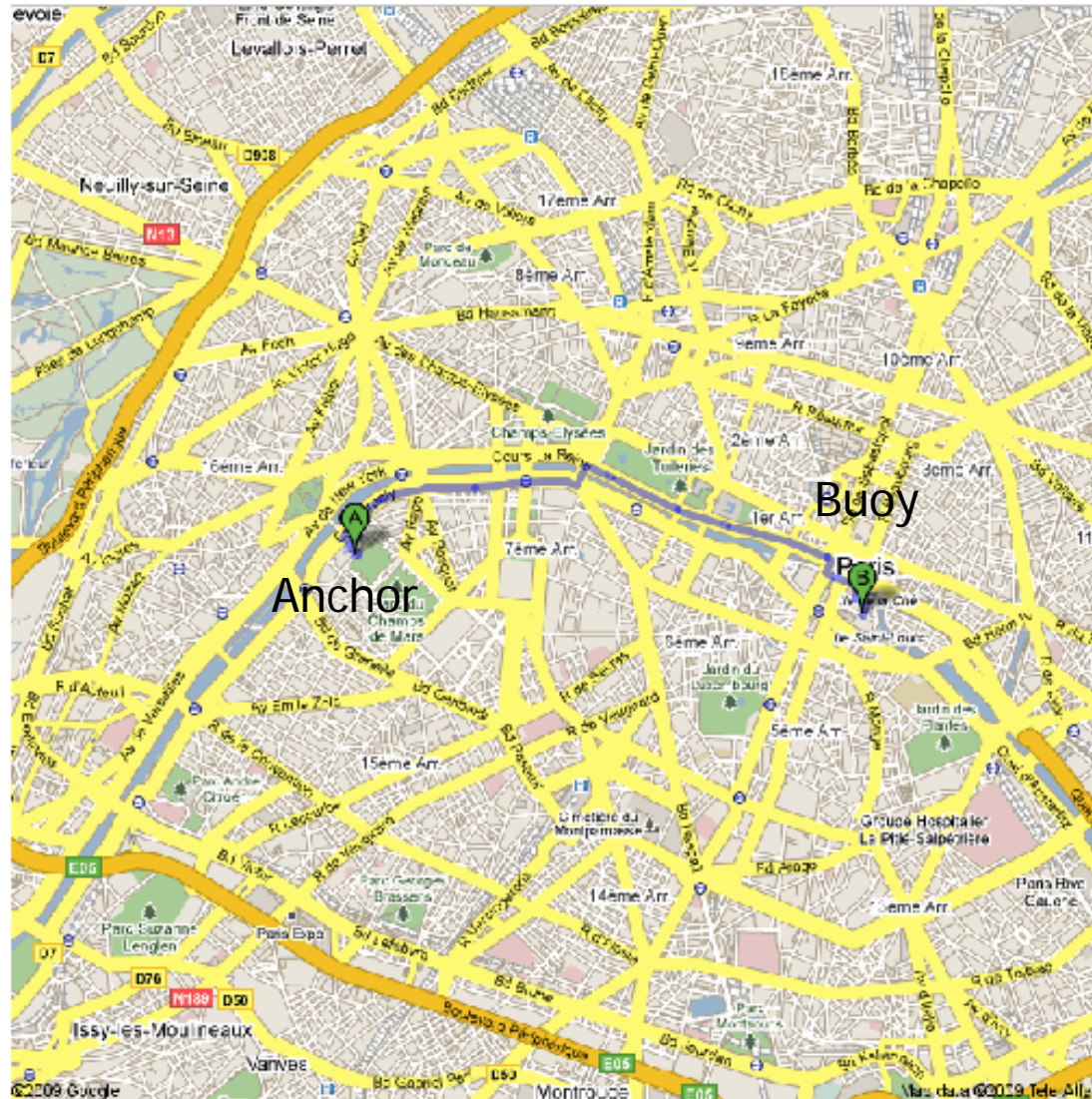
# Topics

- Background
- Technology transfer
- Present state of technology and forecast system
- Future focus

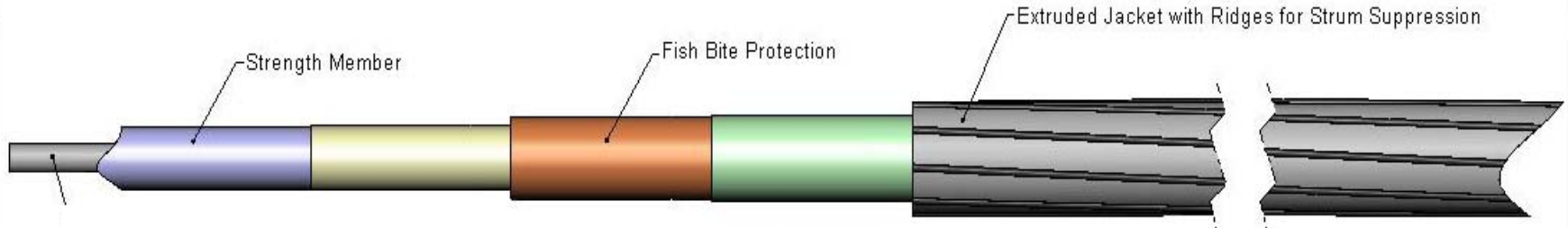
# Recent Technology Developments

- Novel 'self-deploy' mooring; designed for manufacture and safe, efficient operations
- Vandal Resistant, flexible design, low cost of ownership
- Robust acoustic modem integration and coms protocols
- Continuous Composite Mooring Line
  - (patented w/commercial partners)

Transitioning to Industry w/commercial partner SAIC



# Composite Mooring: Near Surface Component



Most Complicated Mooring Component

- Subjected to intense cyclic loading and bending
- Armored against fish bite

UNITS: DIMENSIONS SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:	DWG. CONTROLLED DRAWING DO NOT MAKE ANY CHANGES		7500 Sand Point Way, NE Seattle, WA 98115 206-526-4995
FRACTIONS: ANGLES $\pm 1/16$ $\pm 1^\circ$	APPROVALS	DART-3 Mooring	
DECIMALS	DRAWN: NLS DATE: 09/08/09	CHECKED: XX DATE: 09/08/09	PROJECT: [DART-3] Mooring Live Drawings\BOB Top Section Mockup\0
.X $\pm 0.05$ .XX $\pm 0.02$ .XXX $\pm 0.002$	SCALE: NTS	DWG. NO.: 09/08/09	SHEET: 1 of 1
DO NOT SCALE DRAWING			



# PMEL Mooring Line Testing



- Testing conducted in Bimini ~5-7ft lemon sharks
- Unique bite resistant armor
- Future: Conductor to seafloor



**Shark bite...**

**but mooring survives**

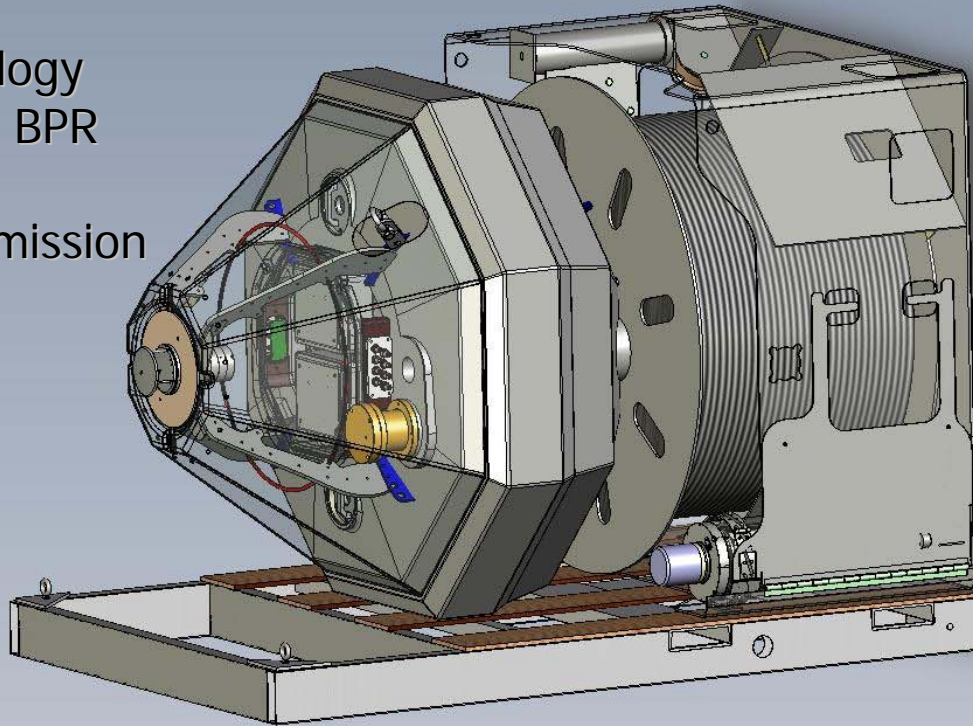


Found on recovery at 330m depth  
near Hawaii. 8" jaw width

# DART<sup>®</sup>-ETD

## Features:

- "Factory-built"
- Transferable technology
- ~4 year expendable BPR
- Designed for Conex
- MET sensors, multi mission





# Field Deployments

Present Locations:

North Pacific, Hawaii, New Zealand

Endurance testing: on-going

2.5 years+ Hawaii &

2.0 years+ North Pacific

Data Availability:

>92% in N. Pacific (>96%  
w/xducer mods)

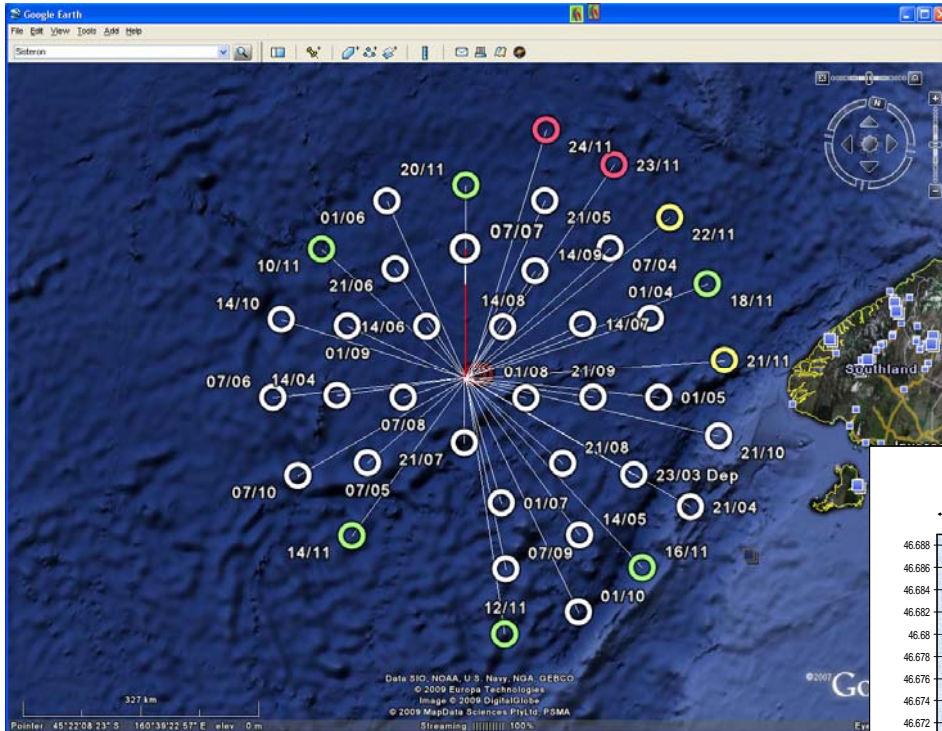
>94% in Hawaii

>74% in Southern Ocean\*\*\*



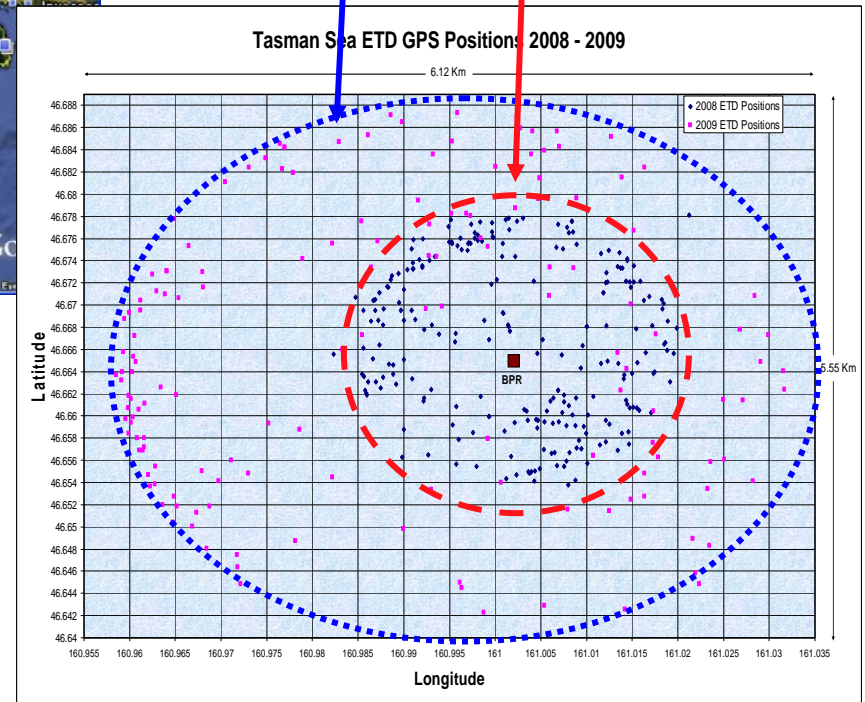
Tasman ETD March '08

# Affect of Watch Circle on Data Delivery Performance – Tasman ETD



2009 watch circle

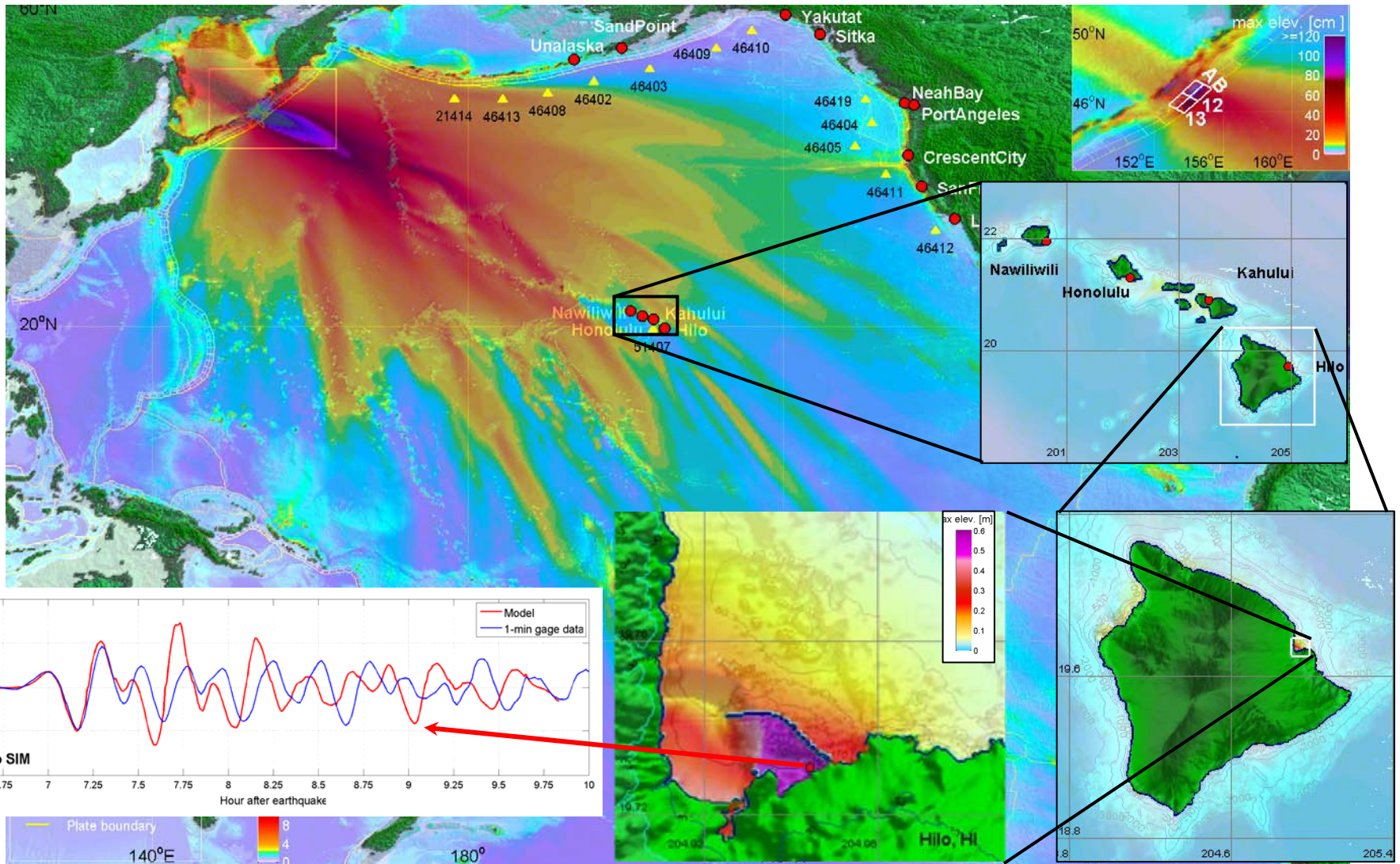
2008 watch circle



# Realtime Tsunami Forecasts



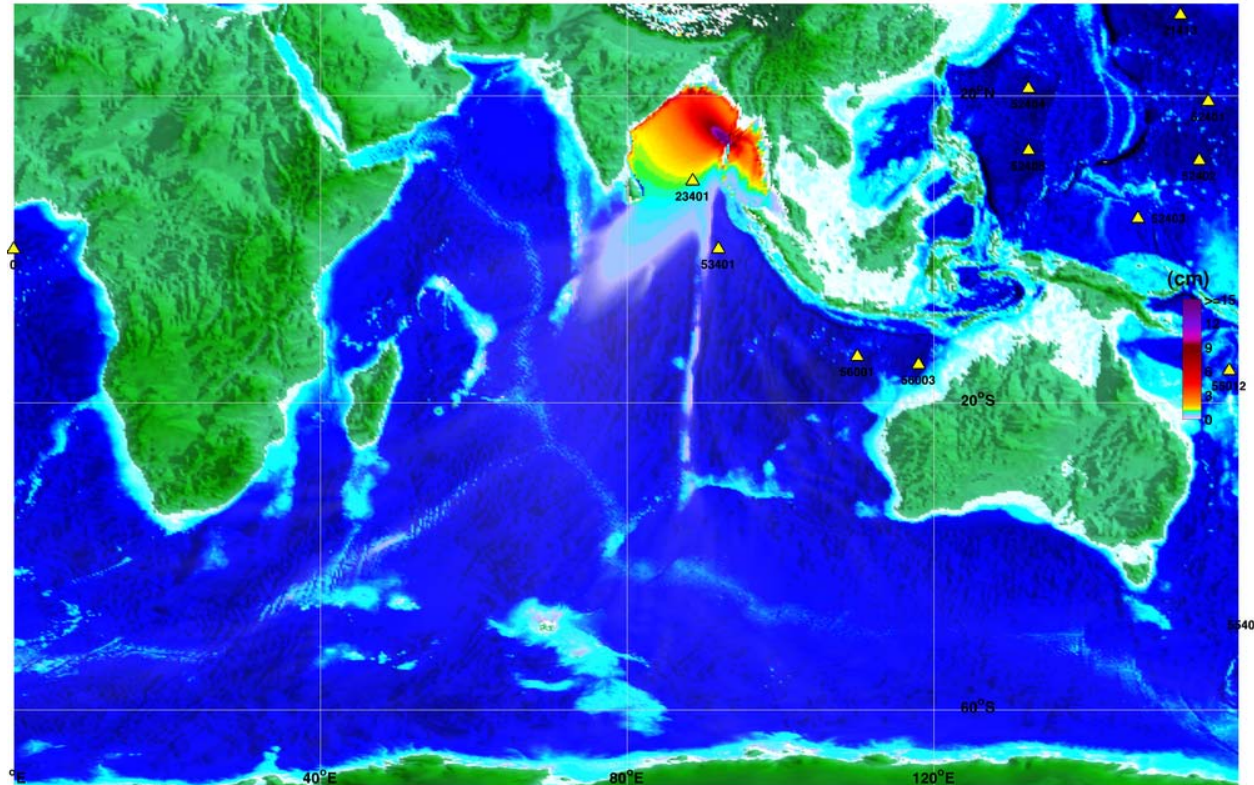
# November 15, 2006 Kuril Is. Tsunami



Propagation Animation

# Tsunami Forecast tests:

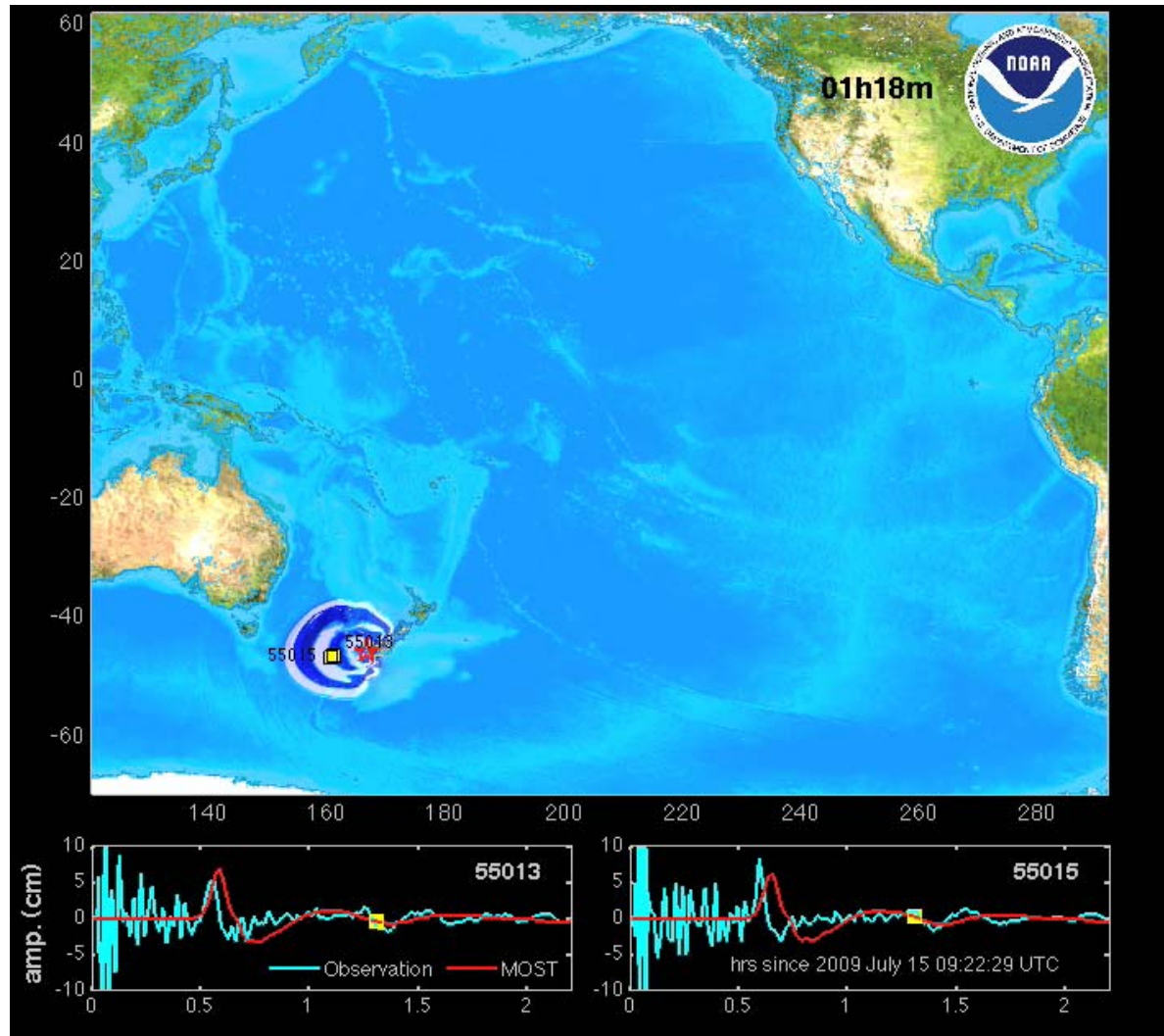
9 real-time tests  
10 data tests  
19 global test events



Andaman Aug 10, 2009 Tsunami



# Observation & model comparison example: July 15 Tsunami





# Future Directions

- Reducing cost of operations
- Continue to reduce size and life-cycle costs
  - System→Sensor
- Continued mooring line and anchor/spool transition to industry
- Web-based realtime forecasts
- Potential use of mobile platforms such as Liquid Robotics Waveglider



Example: F/V SEA FALCON