



Poseidon By Genzoman

Geodesy & Ocean Disasters Sensors (GODS)

Paroscientific, Inc. & Quartz Seismic Sensors, Inc.

Geodesy & Ocean Disasters Sensors (GODS)

- Absolute Pressure Gauges
- Triaxial Accelerometer
- Nano-Resolution Electronics
- A-0-A In-situ Calibration Method

Earthquake & Tsunami Warnings

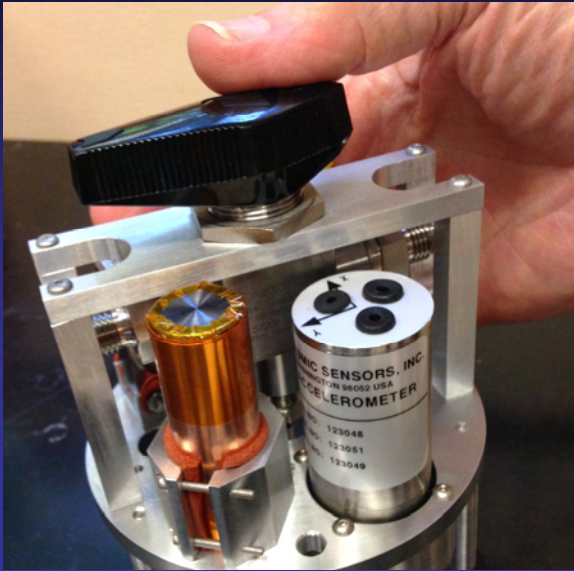
Geodetic Measurements of Earth Movements (Depth & Tilt)

Measurement Platforms

- Boreholes
- Underwater Vehicles
- Inverted Echo Sounders
- Ocean Bottom Recorders
- Cabled Systems (Internally & Externally Mounted)

GODS Construction

Oceanic & Seismic Sensors

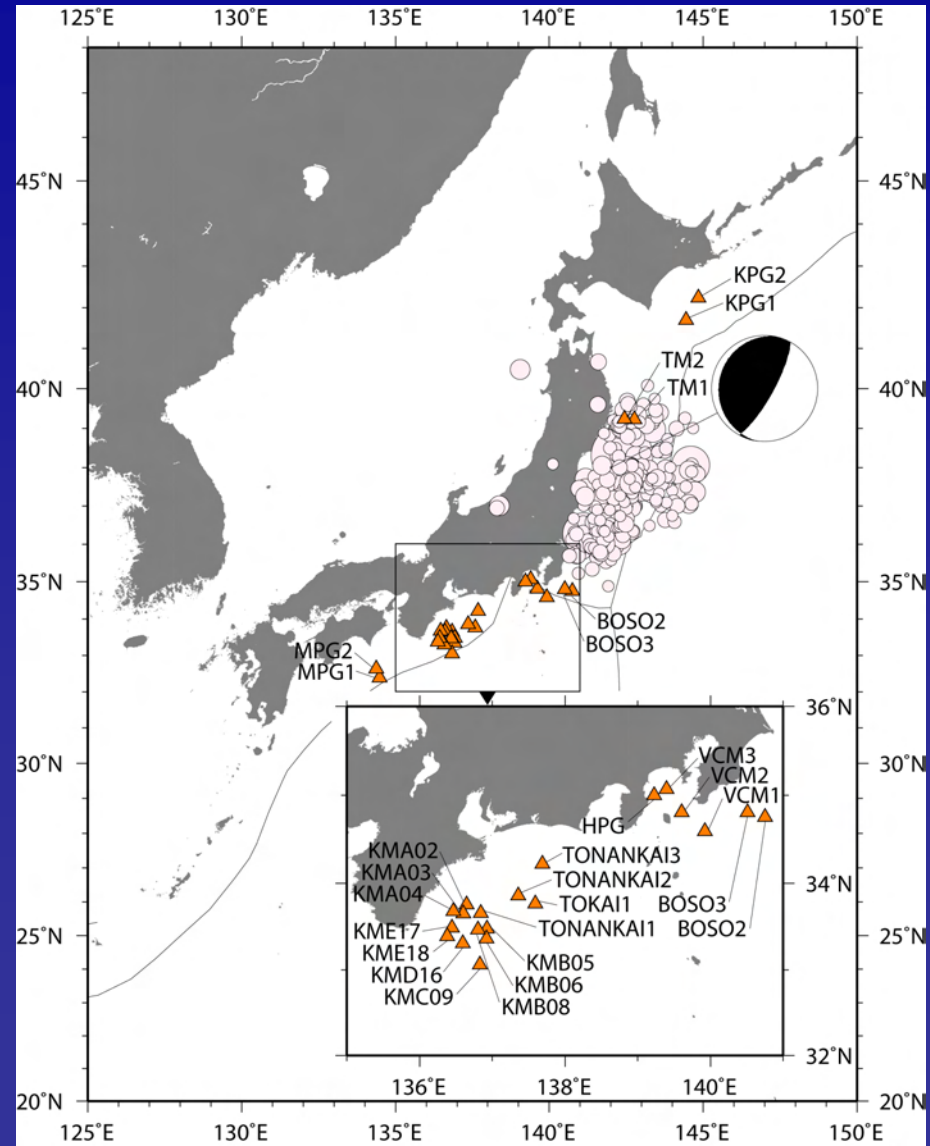
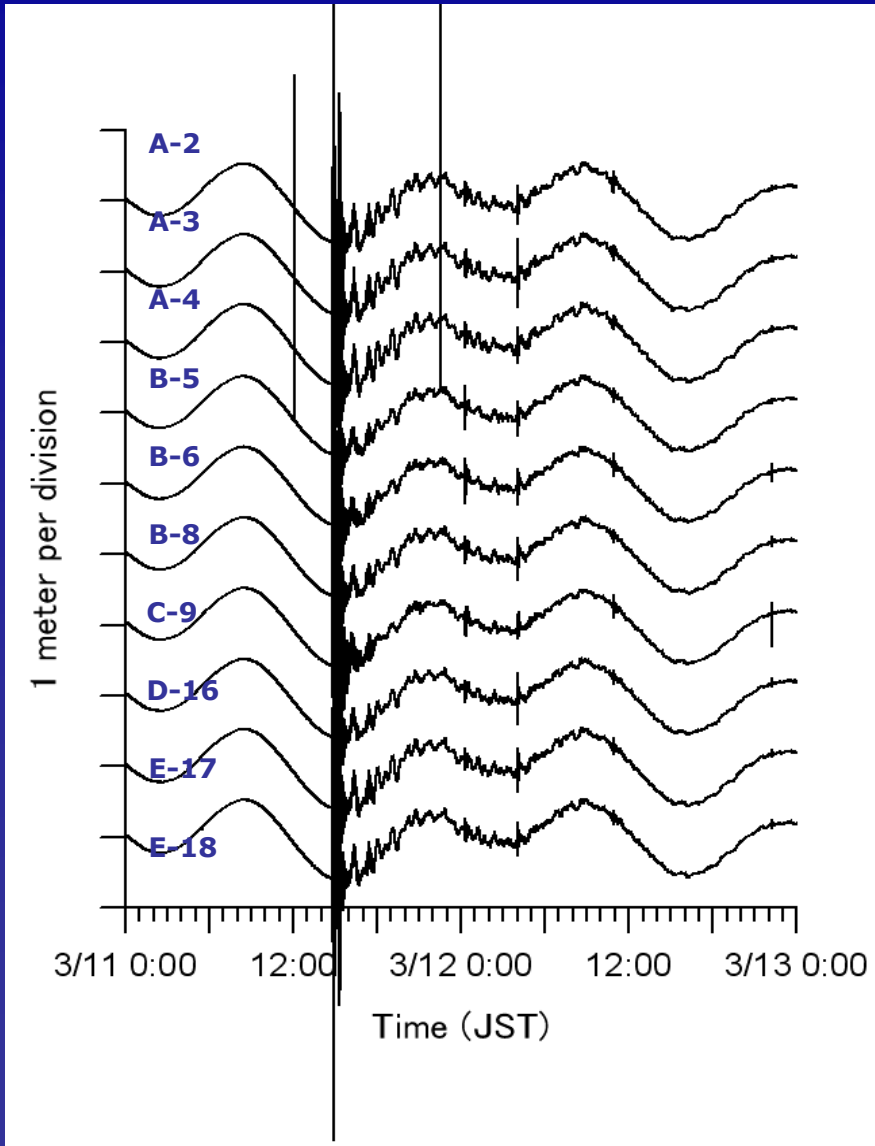


- 2 Digiquartz® Absolute Pressure Gauges (APG)
- 1 Triaxial Accelerometer
- 1 Digiquartz® Barometer
- 3 Nano-resolution Processing Electronics
- 1 Three-way Ball Valve for A-0-A Calibration

Temperature-compensated & Linearized RS-232 Outputs

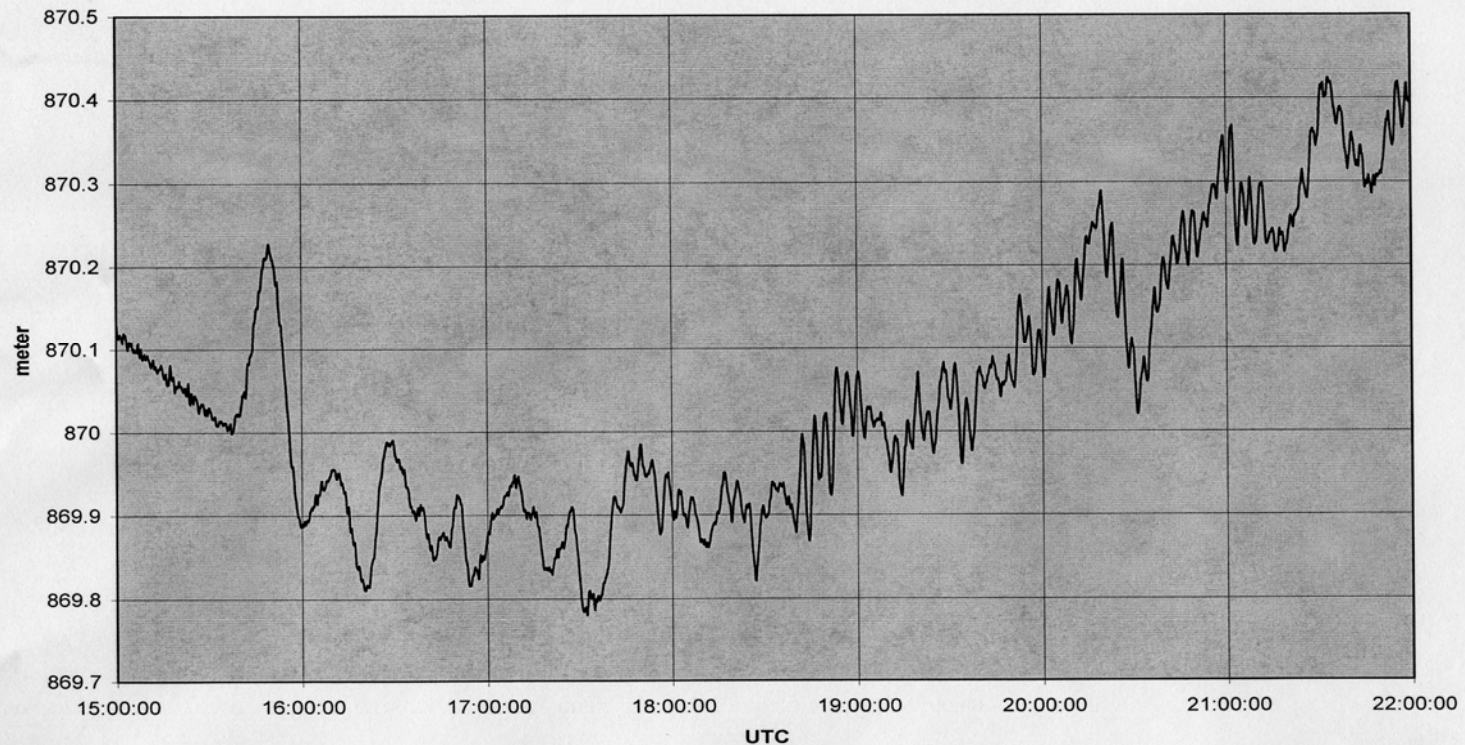
- Seawater Pressures (A) and Temperatures from each APG
 - X-Y-Z plus total Vector Accelerations and Accelerometer Temperature
 - Interior Housing Barometric Pressures (0) and Barometer Temperature
 - All sensors can be synchronized and time-stamped using PPS inputs
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DONET Bottom Pressure during the 2011 Tohoku Earthquake

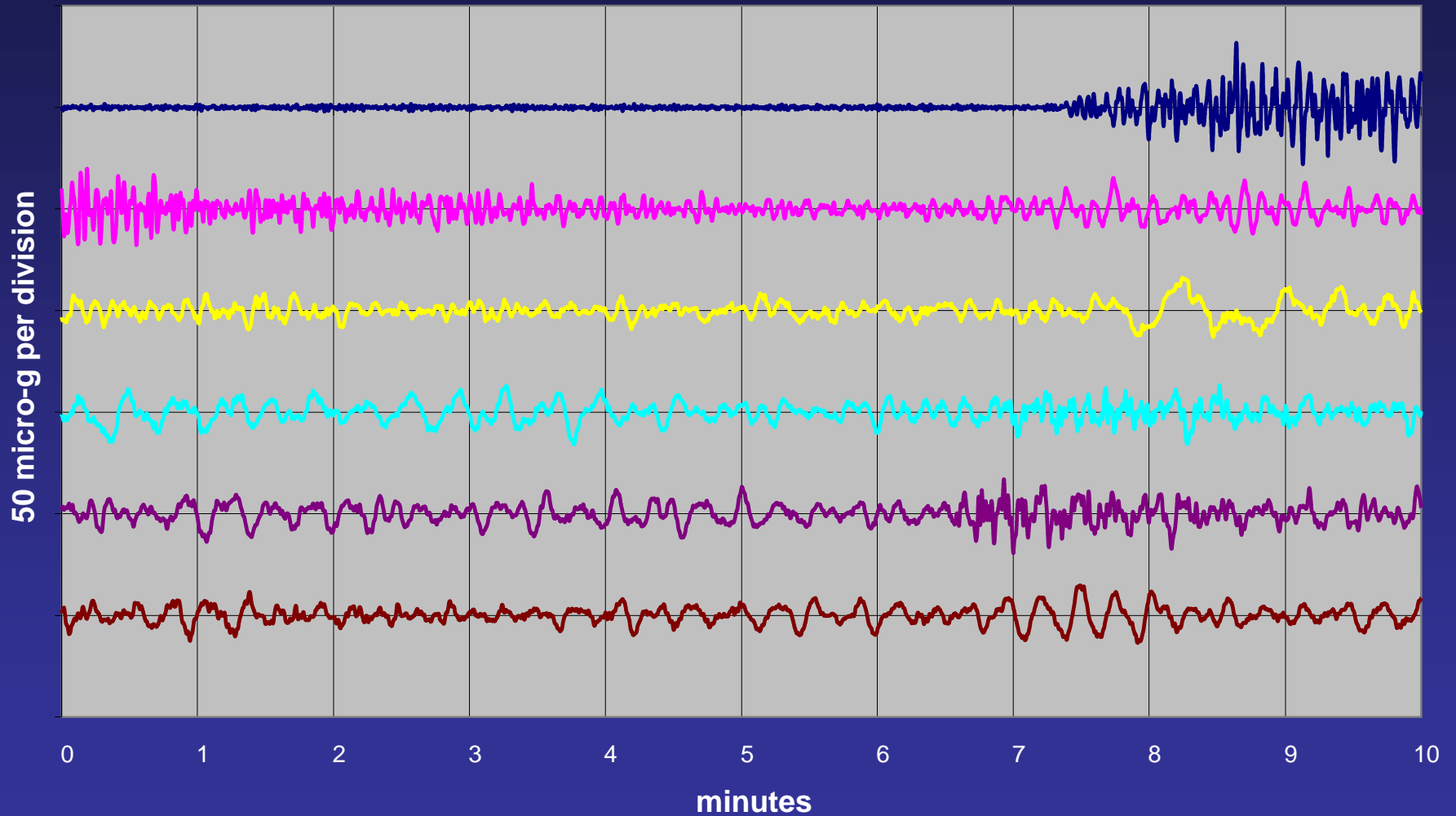


Tohoku Tsunami Measured in Monterey California with Nano-Resolution Depth Sensor

Tsunami in Monterey Bay with CPARO (div 40) 3/11/11 M9 Japan



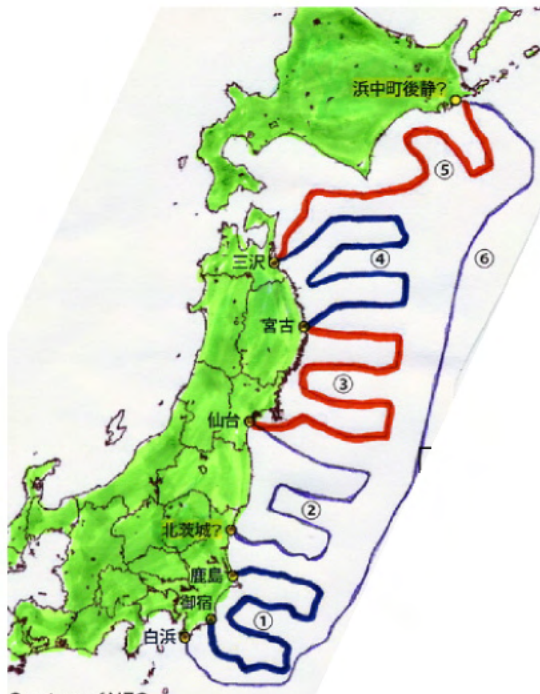
M9 Honshu Earthquake 11 Mar 2011 05:50-06:50 UTC
Recorded with Nano-Resolution Accelerometer in Seattle, WA USA



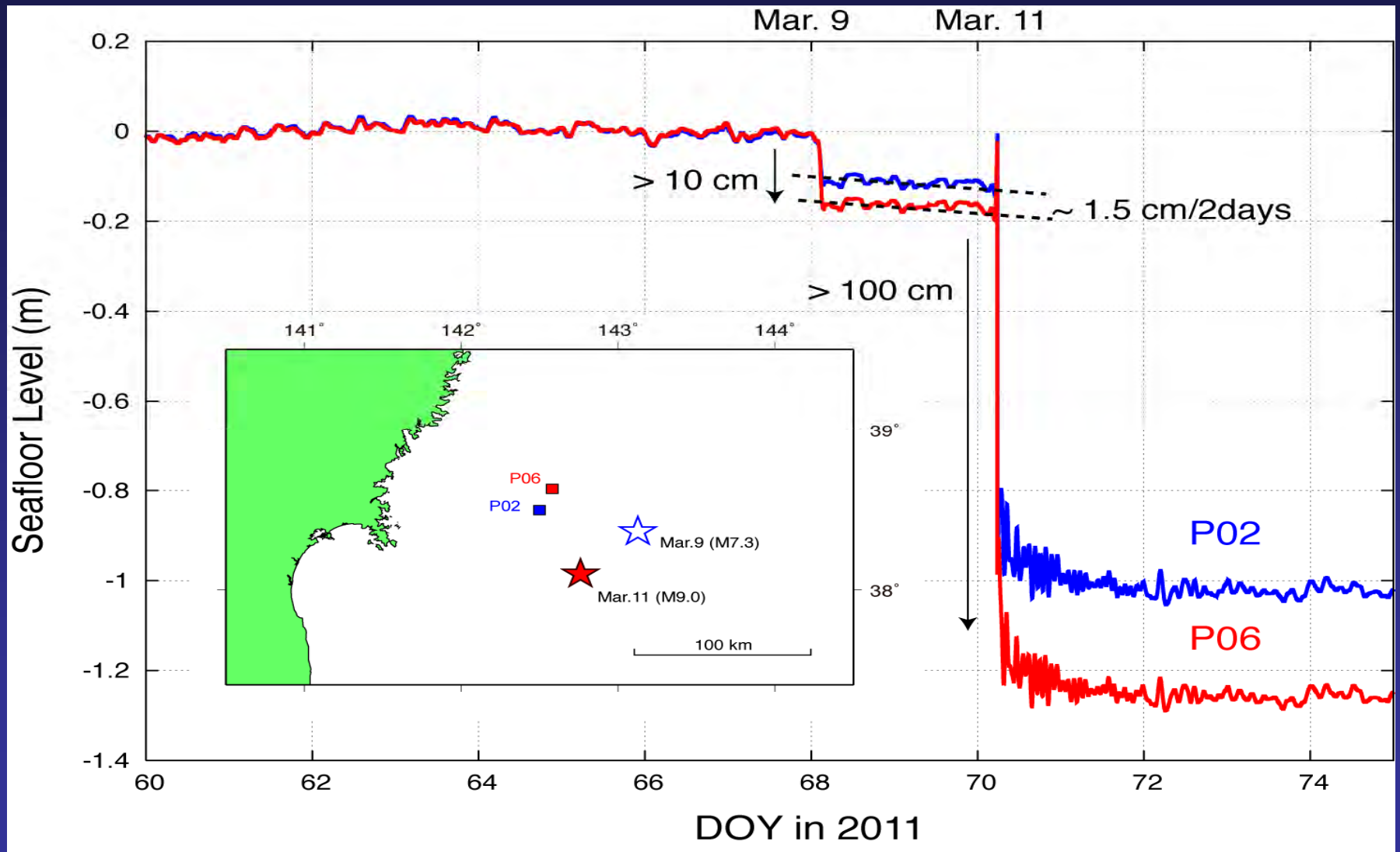
**Japan Trench Observation
& Tsunami Warning System**
Over 5200 km of Cable and
154 Instrument Stations.

Disaster Warning System for Japan

Each cabled node contains:
2 Nano-Resolution Depth Sensors for Tsunami Measurements &
3 Nano-Resolution Accelerometers for Seismic & Tilt Measurements



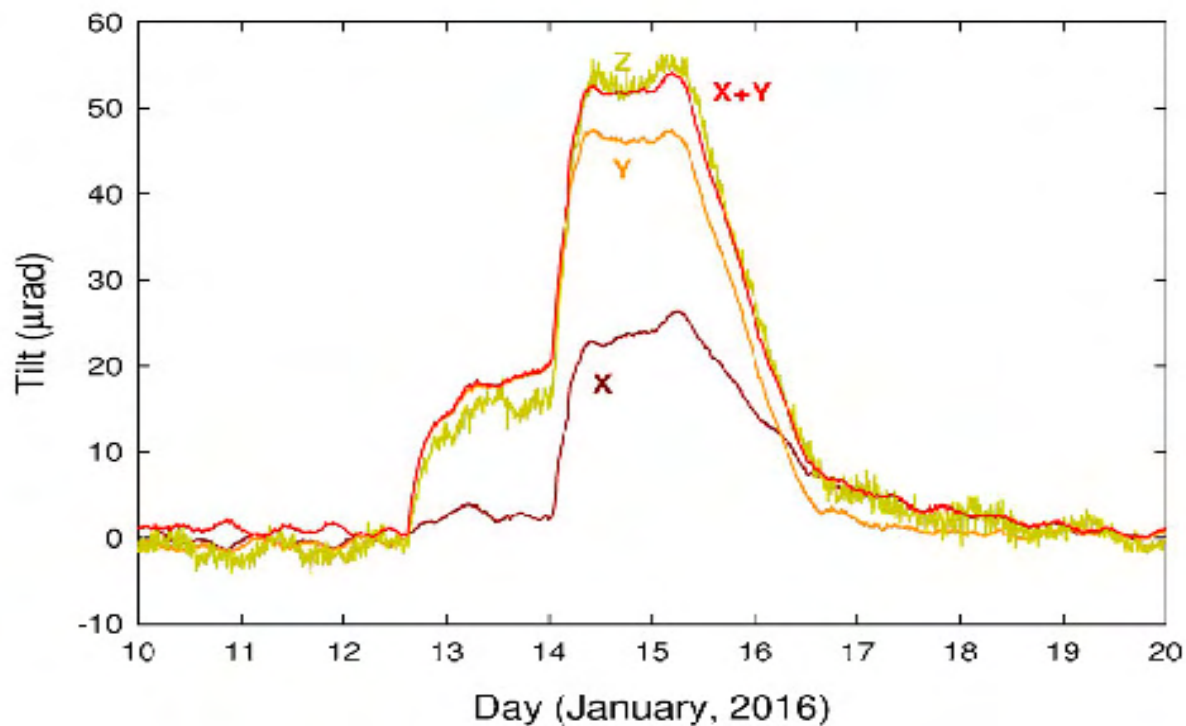
3-9 Precursor to 3-11 Tsunami



Tilt Measurements Using 3G Range Quartz Triaxial Accelerometer with Internal Alignment Matrix

Longer-term geodynamic signal (at time of nearby gas venting activity)

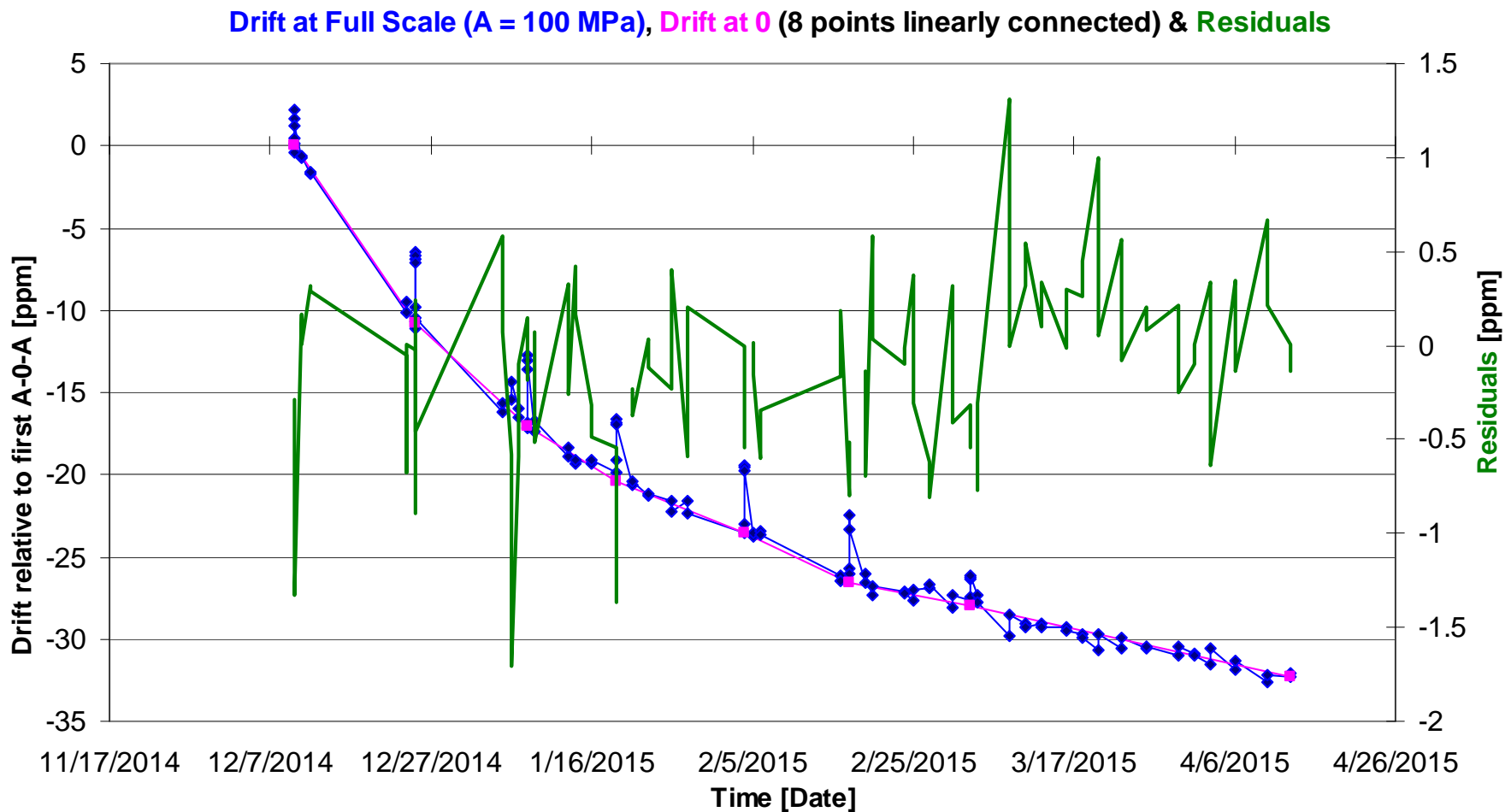
NC89



Plot Courtesy of Dr. Earl Davis

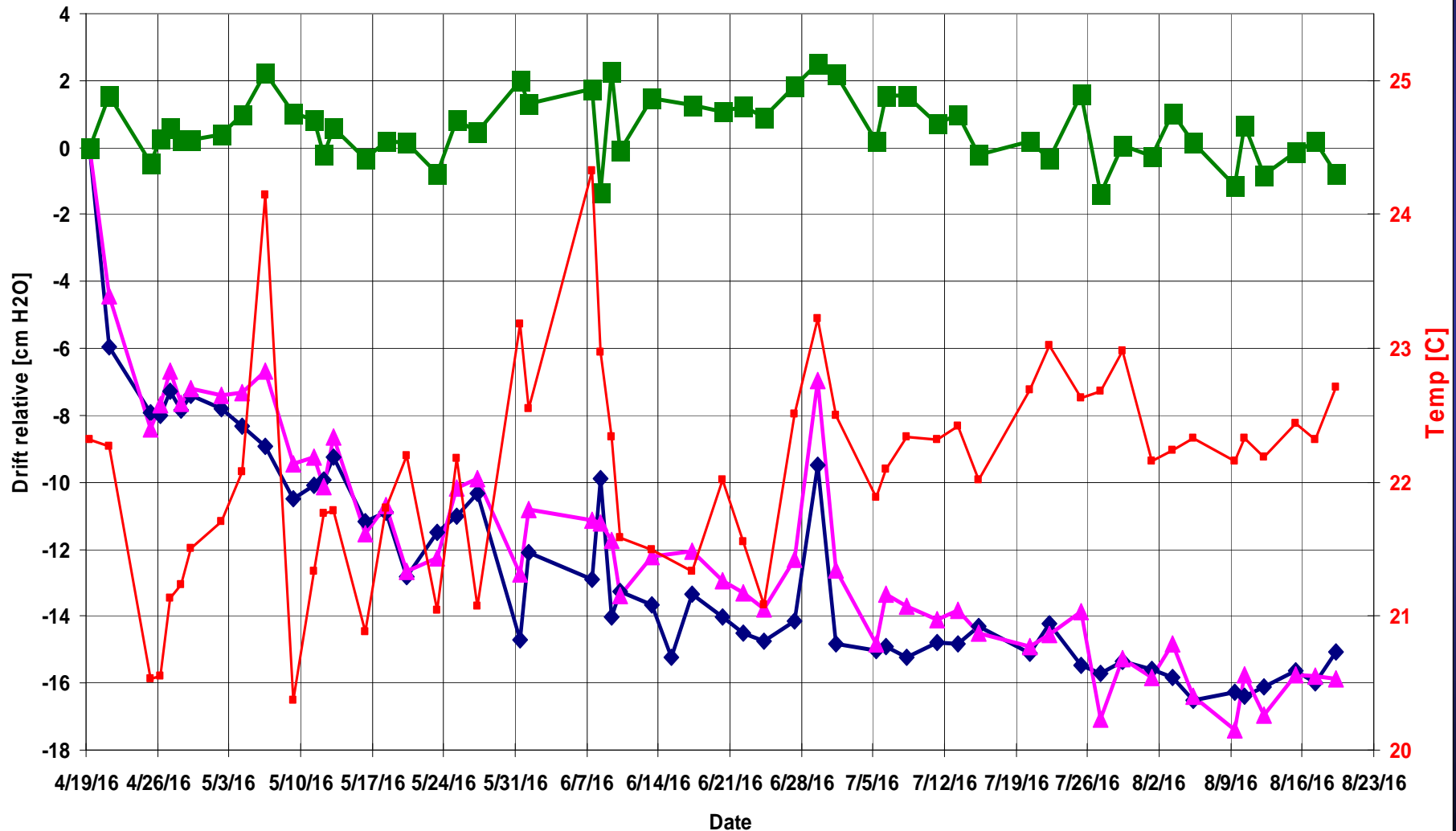
A-0-A In-situ Calibration Method for Improved Geodetic Measurements

Depth Sensor Stability at 10,000 meters Referenced to Internal
OBS Atmospheric Pressure Using A-0-A Calibration Method



Depth Sensor Stability at 3,000 meters Referenced to Internal OBS Atmospheric Pressure Using A-0-A Calibration Method

Drift of **FS**, **0**, **Span (FS - 0)**, & **Temp**, average of 19 sensors



GODS Sensing Modules Provide:

- ▣ Improved disaster warning times for tsunamis and earthquakes**
- ▣ Improved geodetic measurements for scientific research and predictions of natural disasters**
- ▣ Low-cost measurement solutions for new and existing cabled, remote, and mobile platforms**