Water Level Data, Products, and Services

Geophysical Sciences Division

Center for Coasts, Oceans, and Geophysics (CCOG)

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NOAA Satellite and Information Service | National Centers for Environmental Information (NCEI) | Center for Coasts, Oceans, and Geophysics (CCOG)

February 3, 2016

NCEI Water Level Data Support

NCEI is the long-term archive of water level data in support of the NOAA Tsunami Program.

Analog Tide Gauge Records (Marigrams)

- Event-related data from 1854-1994

Digital Tsunami-capable Tide Gauge Data:

- CO-OPS (~200), 2008+
- NTWC (9)
- PTWC (14)

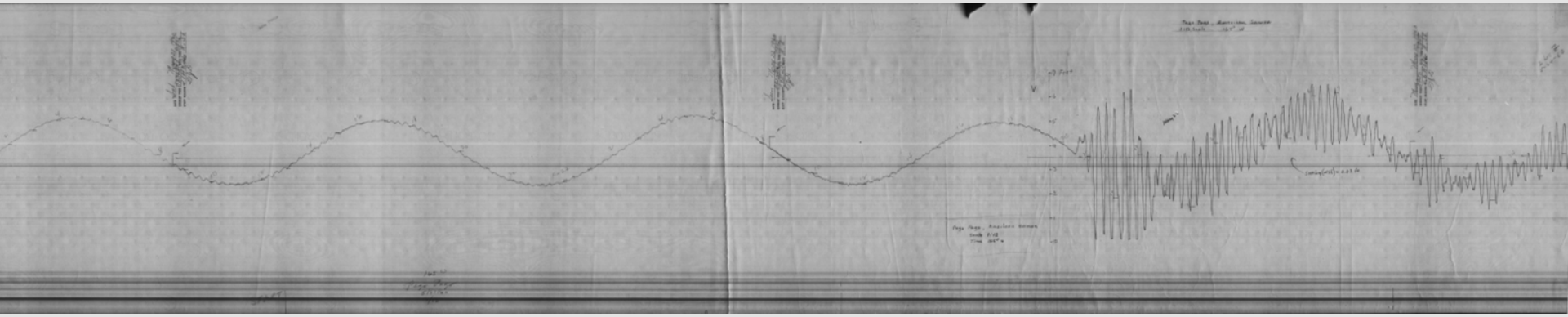
DART Ocean Bottom Pressure Data:

- PMEL (R&D), 1983-2004
- NDBC (39), 2002+
- Some international

NCEI Water Level Data Support

- Provide support services enabling display and delivery of TWC data through CO-OPS website.
- Quality-control water level for instrumental issues and model tides to reveal tsunami-event signals.
- Translate water level data to a standard format for ease of delivery and use
- Develop deployment (DART©) and station (tide gauge) pages for data display and connection to recorded tsunami events.

Paper Tide Gauge Records

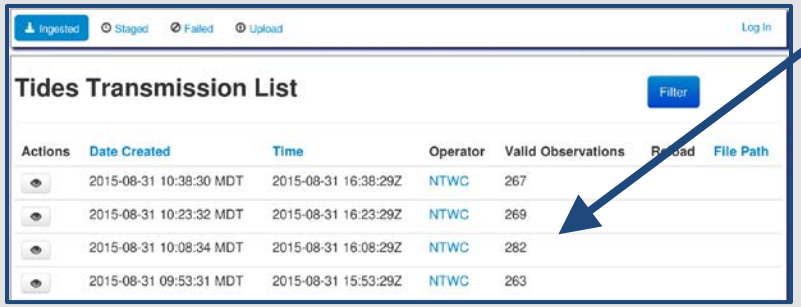


Scanned image of paper tide gauge record (marigram) from 22 May 1960 at Pago Pago, American Samoa

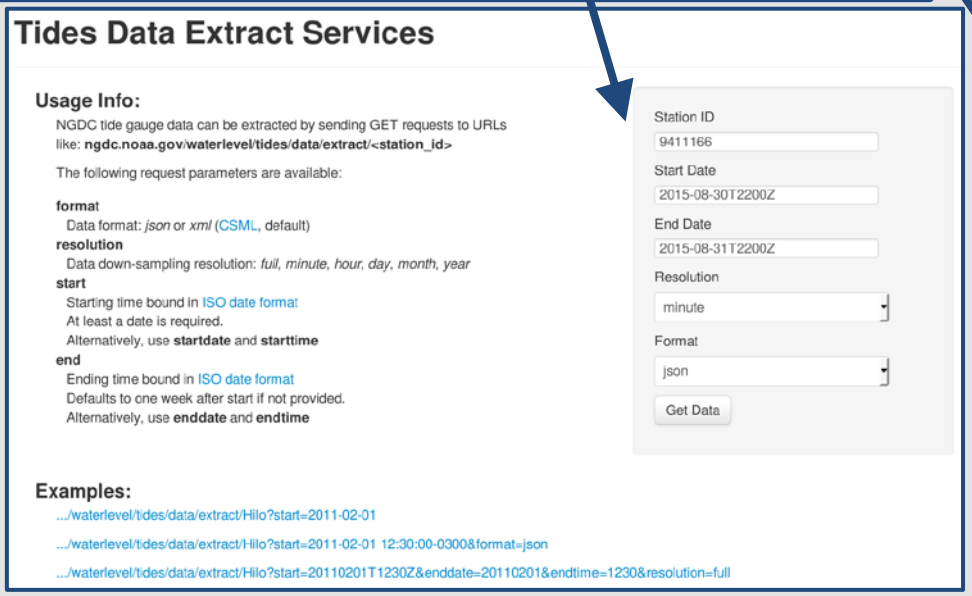
- Marigram archive covers events between 1854 and 1994
- All paper records have been scanned, are archived on tape as TIFF images, and are catalogued for discovery.
- Some available for direct download, others by request (haz.info@noaa.gov).

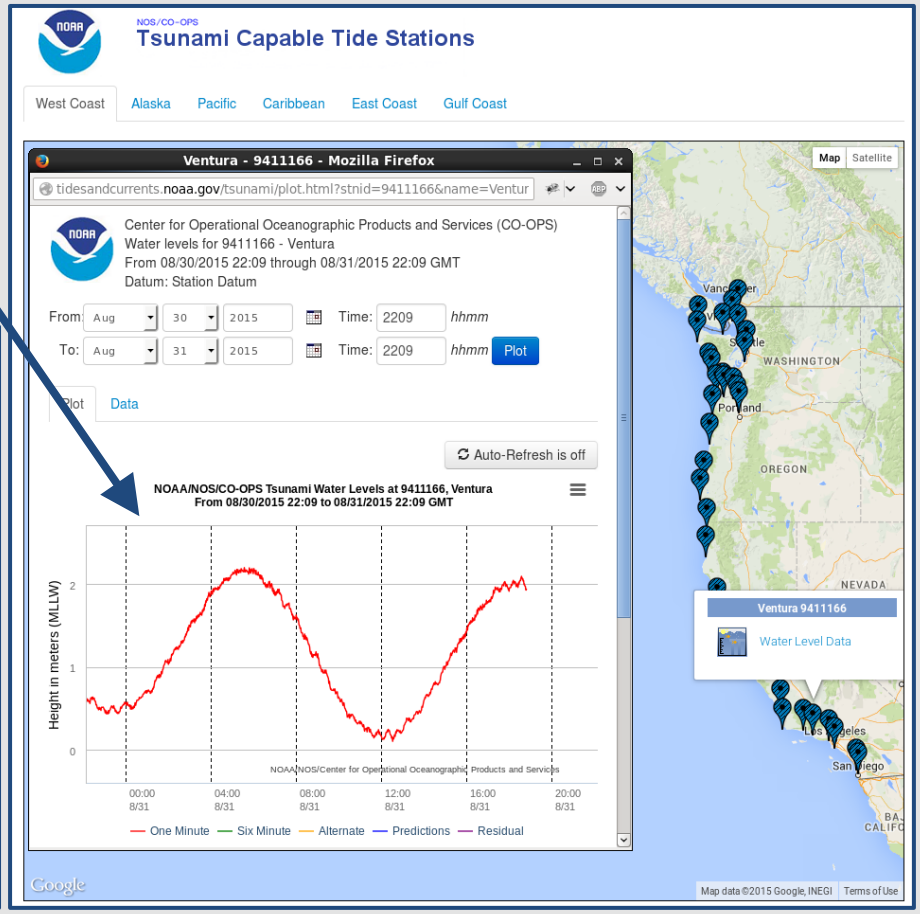
TWC Support Services

Monitor incoming TWC tide gauge data to NCEI



CO-OPS pulls data from NCEI for display

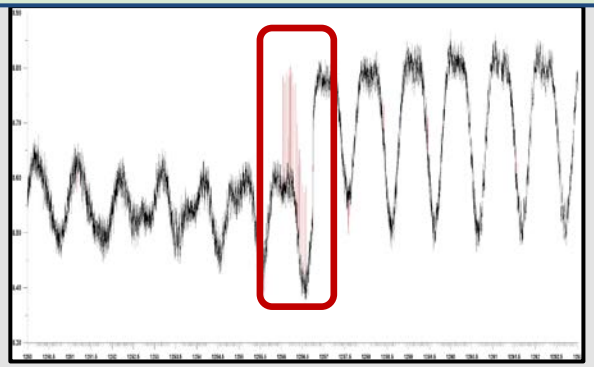




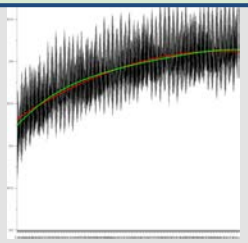
Quality Control and Tide Modeling

- Quality-control for instrumental effects

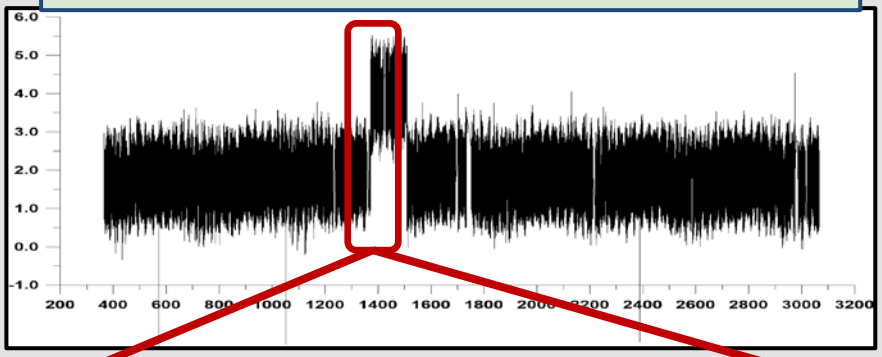
Spikes Identified and Removed

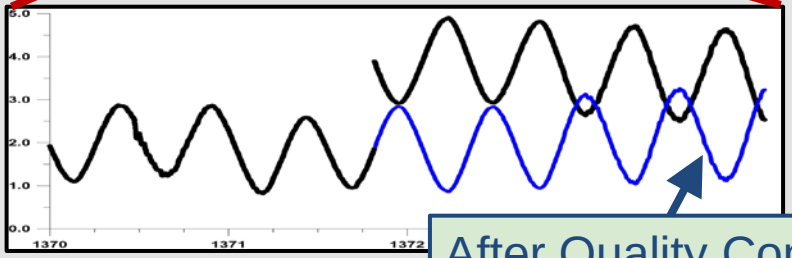


Trends Removed (polynomials)



Shifted and Inverted Data Corrected





After Quality Control

- Model tides (multi-year time-series, 69 harmonic constituents)
  - used in automated detection of tsunamis

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Search...

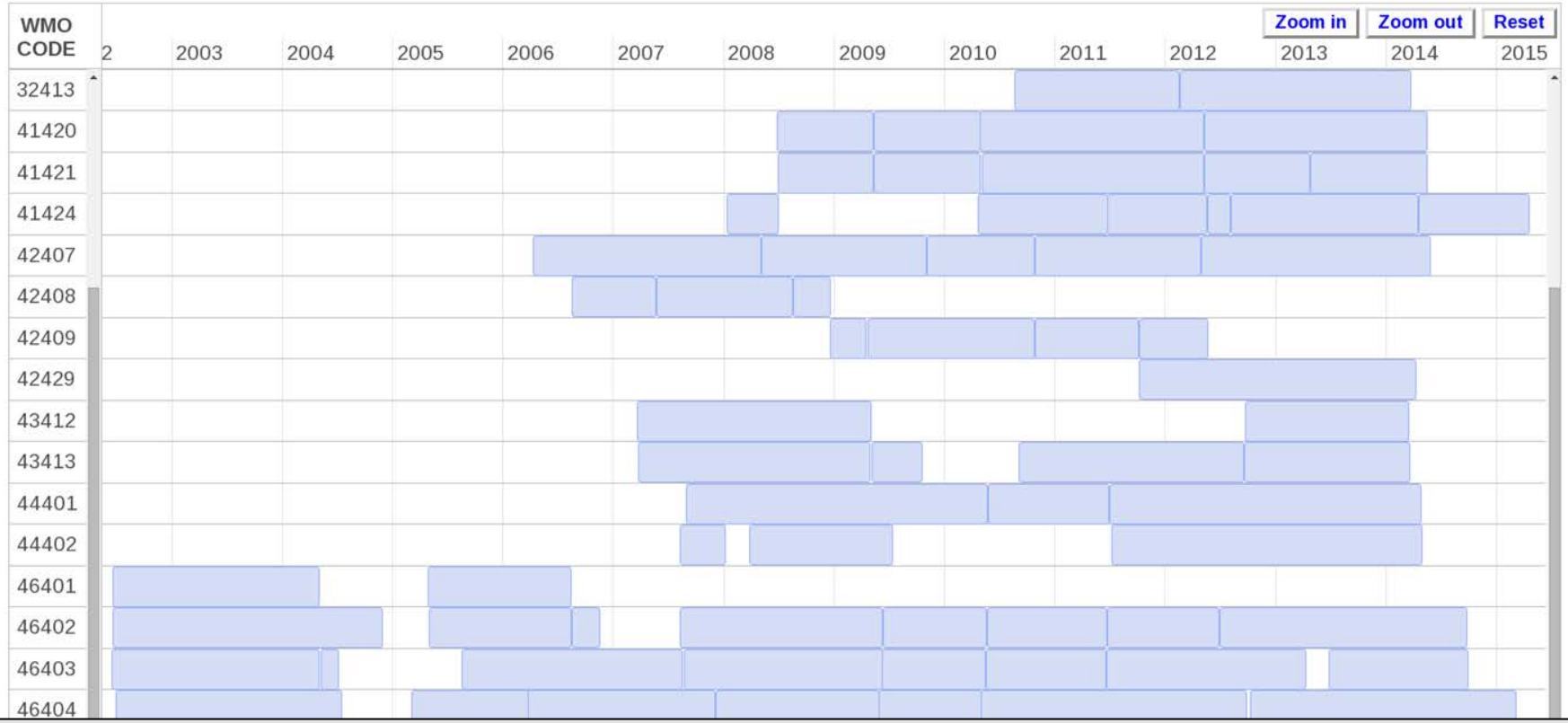
NOAA > NESDIS > NCEI (formerly NGDC) > Natural Hazards > DART

privacy policy

Tsunamis | Earthquakes | Volcanoes

DART® Bottom Pressure Recorder Data Inventory

- The first column is the 5-digit code assigned to the DART deployment region, following the convention promoted by the World Meteorological Organization.
- Deployments may last several years. Clicking a deployment will open a new page with access to data and metadata.
- If the bottom pressure recorder was not recovered, only low-resolution data are available and indicated by **"LO-RES"**.
- Pan and zoom along the timeline with your mouse or touchscreen.



NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
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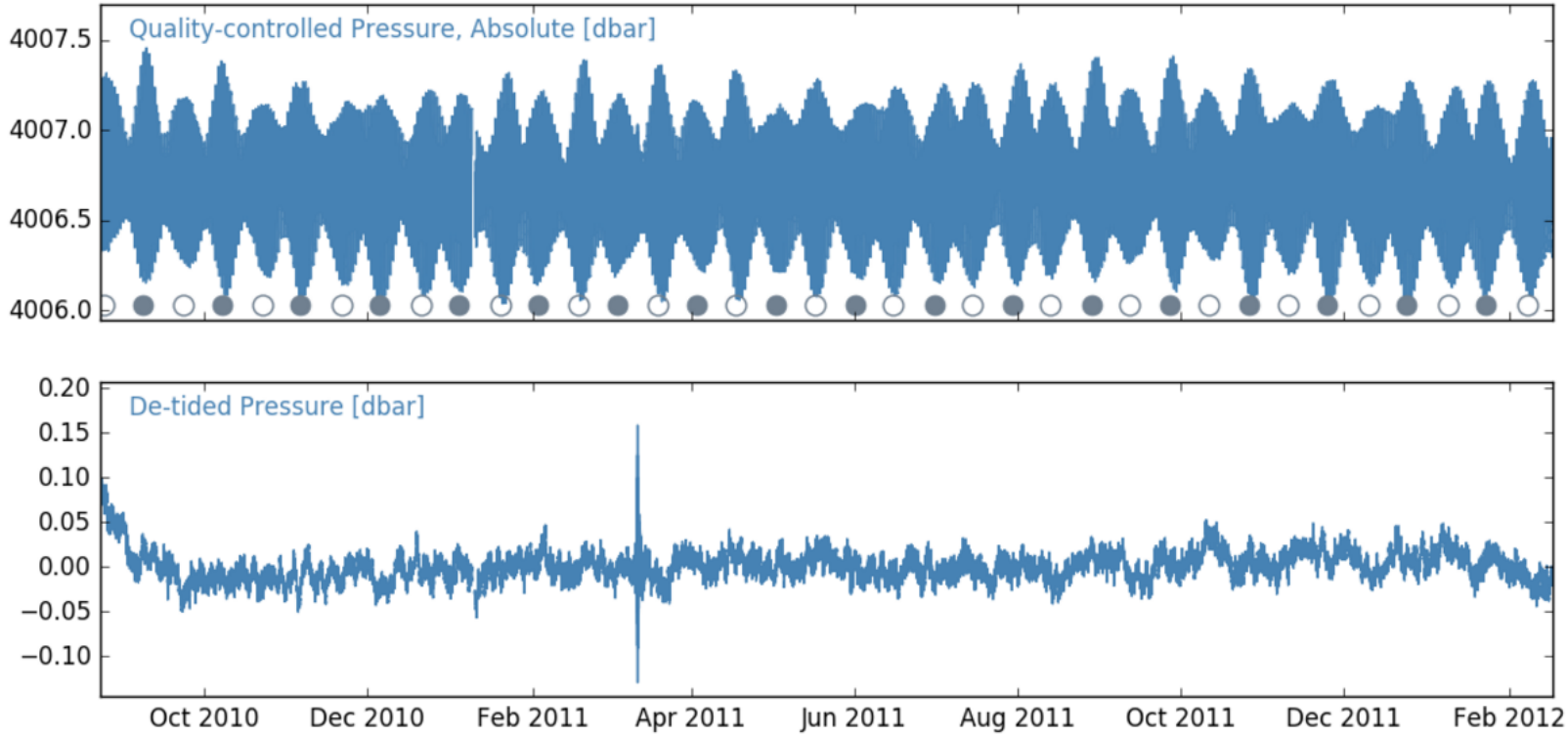
Tsunamis Earthquakes Volcanoes

DART® Deployment 32413_20100822to20120217



Quality-controlled and de-tided ocean bottom pressure data
netCDF WaterML2 CSV
Modeled Tidal Coefficients
Unassessed ocean bottom pressure data
netCDF WaterML2 CSV
Metadata (XML)
Reported Tsunami Events
Comments

Data

Tidal Harmonics

Associated Event(s)

Set up to replace DART #51406.

NOAA > NESDIS > NCEI (formerly NGDC) > Natural Hazards

Tsunami Events Search - sorted by Date, Country

Tsunami Events where (Start < 18-Feb-2012 00:00:00 and Start >= 23-Aug-2010 00:00:00)

View parameter descriptions and access statistical information by clicking on column headings.

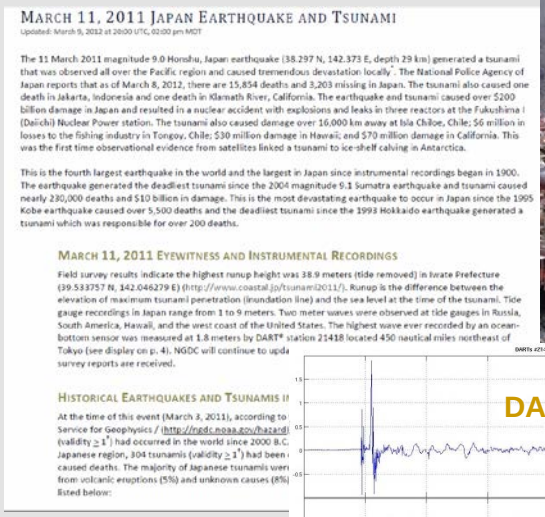
For additional information about the tsunami, runups, associated earthquake or volcanic eruption, click on the links in the **Earthquake Mag**, **Volcano**, **Addl Tsu Info**, or **Num. of Runups** columns.

Date						Tsunami Cause						Tsunami Source Location				Tsunami Parameters							
																Max Water Height	Num. of Runups	Magnitude		Tsu Int	Deaths		
Year	Mo	Dy	Hr	Mn	Sec	Val	Code	Earth-quake Mag	Vol-cano	Addl Tsu Info	Deposits	Country	Name	Latitude	Longitude			Abe	Iida		Num	De	N
2010	10	25	14	42	22.0	4	1	7.8		*		INDONESIA	SUMATRA	-3.487	100.082	16.90	351				431	3	
2010	12	21	17	19	40.6	4	1	7.4		*		JAPAN	BONIN ISLANDS	26.901	143.698	.13	4						
2010	12	25	13	16	37.0	4	1	7.3		*		VANUATU	VANUATU ISLANDS	-19.702	167.947	.15	4						
2011	1	9	10	3	44.2	4	1	6.5		*		VANUATU	VANUATU ISLANDS	-19.157	168.311	.03	1						
2011	2	11	20	5	30.7	4	1	6.8		*		CHILE	CENTRAL CHILE	-36.474	-73.125	.15	1						
2011	2	21	23	51	42.3	2	1	6.1		*		NEW ZEALAND	SOUTH ISLAND	-43.583	172.680		0						
2011	3	9	2	45	20.3	4	1	7.5		*		JAPAN	HONSHU ISLAND	38.435	142.842	.60	11						
2011	3	11	5	46	24.1	4	1	9.0		*	2	JAPAN	HONSHU ISLAND	38.297	142.372	38.90	6200				18457	4	6
2011	4	7	14	32	43.2	4	1	7.1		*		JAPAN	E. COAST HONSHU ISLAND	38.276	141.588	.08	1						
2011	6	24	3	9	39.4	4	1	7.3		*		USA	ATKA, ALEUTIAN ISLANDS, AK	52.050	-171.836	.10	7						
2011	6	27				2	9			*		UK	PLYMOUTH, ENGLAND	50.500	-3.000	.40	4						
2011	7	6	19	3	18.2	4	1	7.6		*		NEW ZEALAND	KERMADEC ISLANDS	-29.539	-176.340	1.20	23						
2011	7	10	0	57	10.8	4	1	7.0		*		JAPAN	OFF EAST COAST OF HONSHU ISLAND	38.034	143.264	.09	1						
2011	7	30	5	30		3	8			*		NORWAY	LYSEFJOREN, WESTERN NORWAY	59.050	6.640		1						
2011	8	6	12	55		3	8			*		NORWAY	LYSEFJOREN, WESTERN NORWAY	59.050	6.640		0						
2011	8	20	16	55	2.5	4	1	7.1		*		VANUATU	VANUATU ISLANDS	-18.365	168.143	.18	4						
2011	8	20	18	19	23.5	4	1	7.0		*		VANUATU	VANUATU ISLANDS	-18.311	168.218	.18	1						
2011	9	2	10	55	53.5	4	1	6.8		*		USA	FOX ISLANDS, ALEUTIAN ISLANDS, AK	52.171	-171.708	.06	1						
2011	10	21	17	57	16.1	4	1	7.4		*		NEW ZEALAND	KERMADEC ISLANDS	-28.993	-176.238	.14	2						
2012	2	2	13	34	40.6	4	1	7.0		*		VANUATU	VANUATU ISLANDS	-17.827	167.133	.08	1						

20 events returned. Return to Historical Tsunami Database at NGDC

Tsunami Online Event Summaries

- Authoritative Event reports
  - Tsunami source & impact
  - Latest confirmed casualties
  - Past events in same region
  - Field surveys & photographs
  - Source documents
- DART & Tide Gauge data
- Tsunami-Travel-Time maps



MARCH 11, 2011 JAPAN EARTHQUAKE AND TSUNAMI

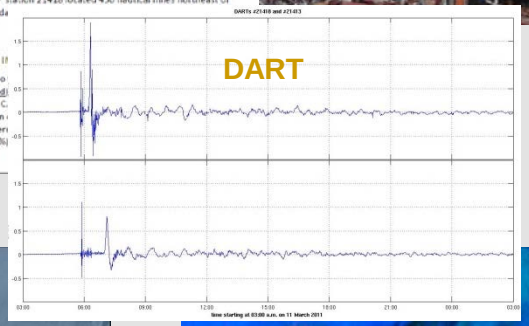
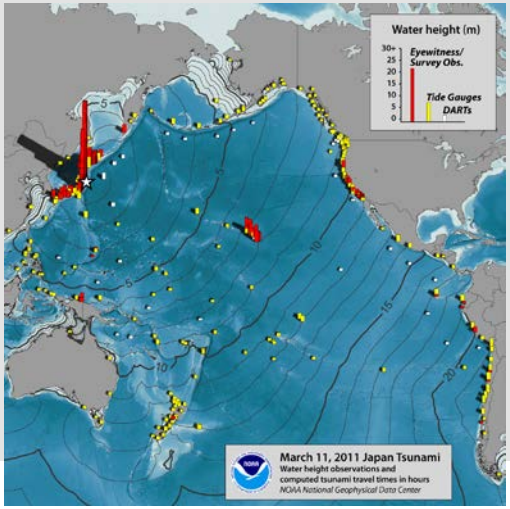
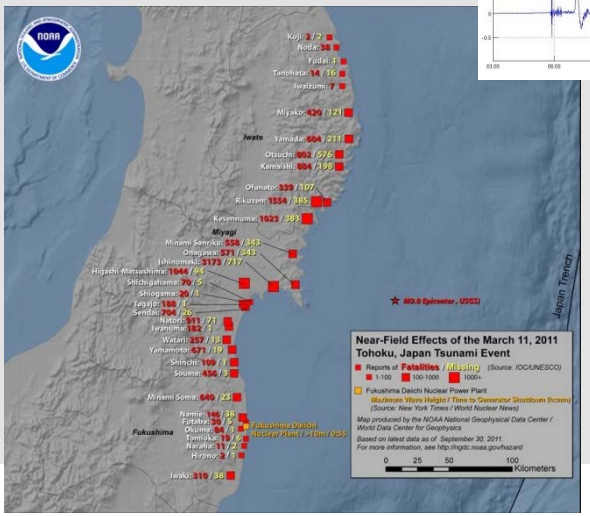
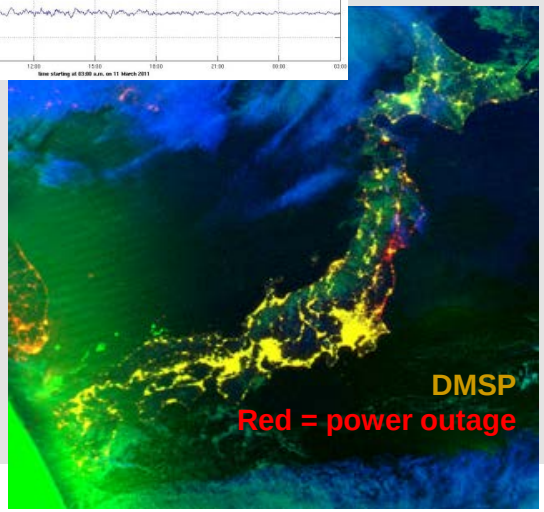
Updated: March 9, 2012 at 20:00 UTC, 02:00 pm MDT

The 11 March 2011 magnitude 9.0 Honshu, Japan earthquake (38.297 N, 142.373 E, depth 29 km) generated a tsunami that was observed all over the Pacific region and caused tremendous devastation locally. The National Police Agency of Japan reports that as of March 8, 2012, there are 15,854 deaths and 3,203 missing in Japan. The tsunami also caused one death in Jakarta, Indonesia and one death in Klamath River, California. The earthquake and tsunami caused over $200 billion damage in Japan and resulted in a nuclear accident with explosions and leaks in three reactors at the Fukushima I (Daiichi) Nuclear Power station. The tsunami also caused damage over 16,000 km away at Isla Chiloe, Chile; $6 million in losses to the fishing industry in Tongoy, Chile; $30 million damage in Hawaii; and $70 million damage in California. This was the first time observational evidence from satellites linked a tsunami to ice-shelf calving in Antarctica.

This is the fourth largest earthquake in the world and the largest in Japan since instrumental recordings began in 1900. The earthquake generated the deadliest tsunami since the 2004 magnitude 9.1 Sumatra earthquake and tsunami caused nearly 230,000 deaths and $10 billion in damage. This is the most devastating earthquake to occur in Japan since the 1995 Kobe earthquake caused over 5,500 deaths and the deadliest tsunami since the 1993 Hokkaido earthquake generated a tsunami which was responsible for over 200 deaths.

MARCH 11, 2011 EYEWITNESS AND INSTRUMENTAL RECORDINGS

Field survey results indicate the highest runup height was 38.9 meters (tide removed) in Iwate Prefecture (39.533757 N, 142.046279 E) (http://www.coastal.jp/tsunami2011/). Runup is the difference between the elevation of maximum tsunami penetration (inundation line) and the sea level at the time of the tsunami. Tide gauge recordings in Japan range from 1 to 9 meters. Two meter waves were observed at tide gauges in Russia, South America, Hawaii, and the west coast of the United States. The highest wave ever recorded by an ocean-bottom sensor was measured at 1.8 meters by DART® station 21418 located 450 nautical miles northeast of Tokyo (see display on p. 4). NGDC will continue to upda
survey reports are received.

HISTORICAL EARTHQUAKES AND TSUNAMIS I

At the time of this event (March 3, 2011), according to
Service for Geophysics / (http://ngdc.noaa.gov/hazard
(validity ≥ 1) had occurred in the world since 2000 B.C.
Japanese region, 304 tsunamis (validity ≥ 1) had been
caused deaths. The majority of Japanese tsunamis wer
from volcanic eruptions (5%) and unknown causes (8%)
listed below: