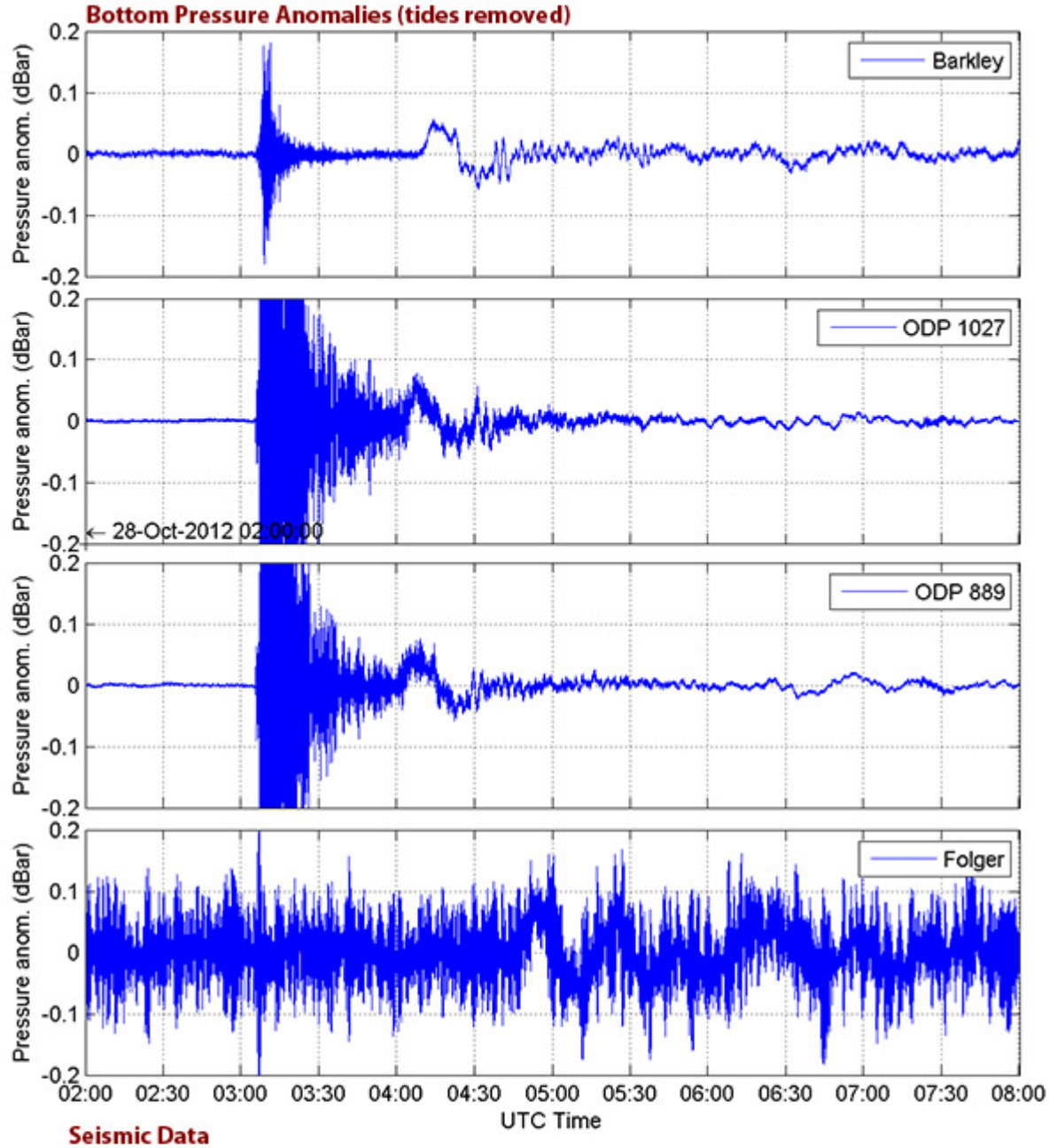
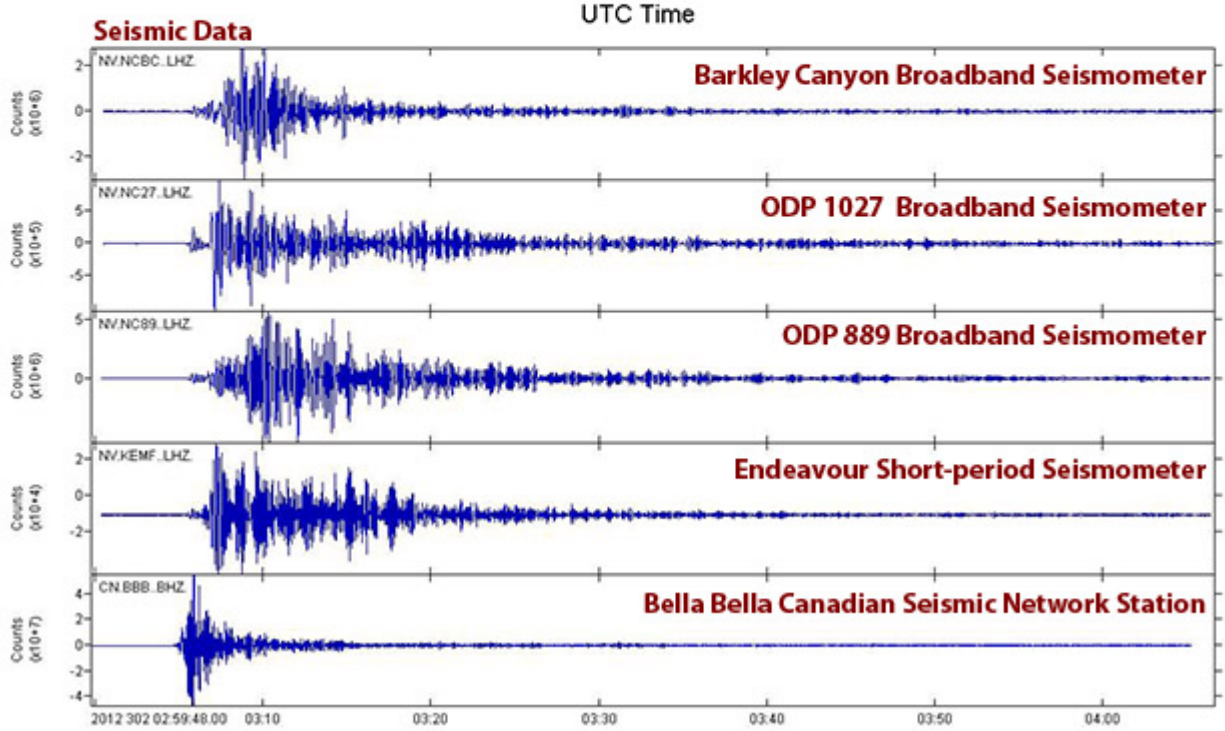
Haida Gwaii Earthquake and Tsunami [1]

Submitted by Rory Lattimer Sat, 2012-10-27 00:00

A powerful magnitude 7.7 earthquake [2] struck central Moresby Island in the Haida Gwaii [3] archipelago at 8:04PM PDT, 27 October 2012. Residents along the west coast?from Alaska to Vancouver?also felt several aftershocks up to magnitude 5.8. However, no major damage or injuries were reported. This was the largest temblor to hit Canada since 1949, when an 8.1-magnitude quake hit west of the Queen Charlotte Islands, in the same area.

The following plots show both seismic and bottom pressure data collected by Ocean Networks Canada instrumentation, located approximately 600 km south of the earthquake epicenter. The light-blue plots at upper-left illustrate changes in pressure, as measured by bottom pressure recorders at four node locations. In the top three plots, initial strong blue signatures, beginning at 3:04 UTC, indicate shaking of the seafloor as seismic energy passed through the region. As this energy dispersed, the recordings indicate changes in sea level above each bottom pressure recorder as waves emanating from the disturbance traveled across the ocean's surface. The fourth plot shows bottom pressure anomalies at Folger Passage, a shallow (100 m) near-shore station where surface swell typically conceals tsunami waves from easy detection by the casual viewer.

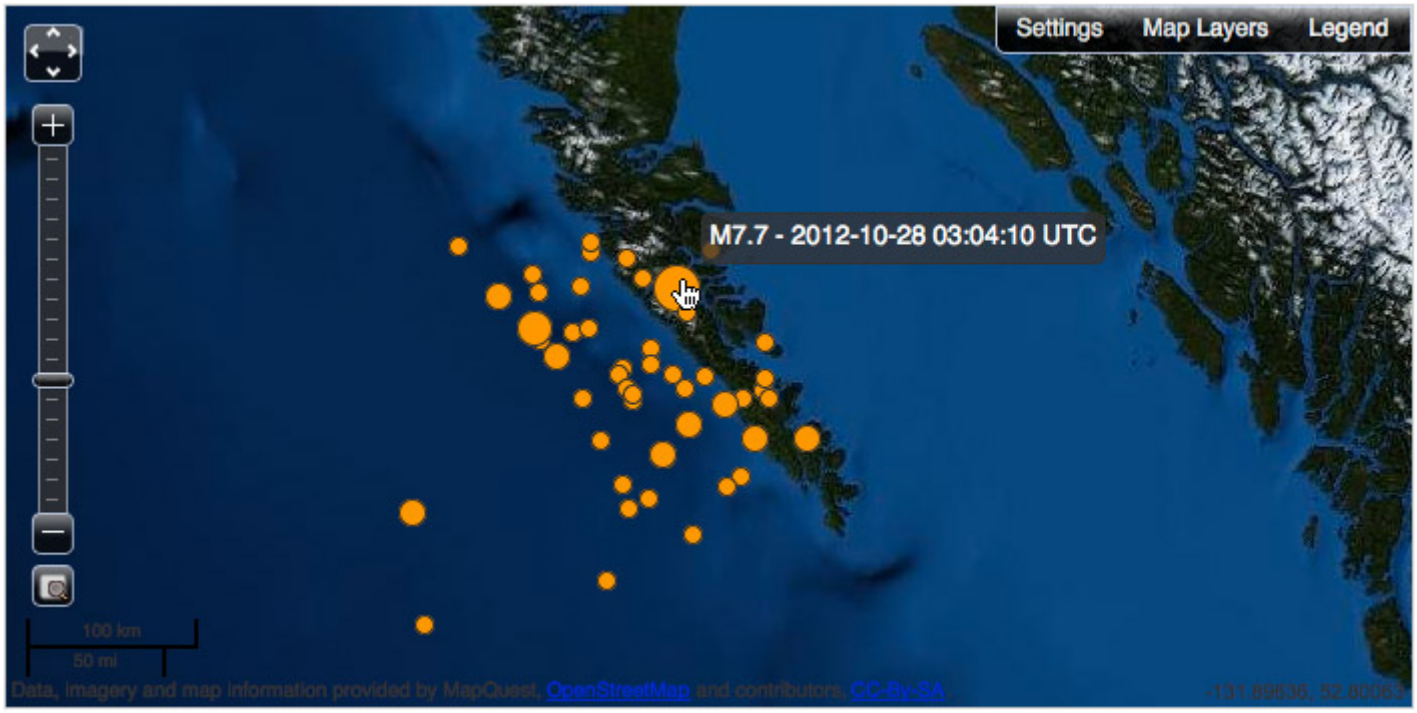

Bottom Pressure Anomalies (tides removed)
Barkley
ODP 1027
ODP 889
Folger
Pressure anom. (dBar)
0.2
0.1
0
-0.1
-0.2
← 28-Oct-2012 02:00:00
02:00
02:30
03:00
03:30
04:00
04:30
05:00
05:30
06:00
06:30
07:00
07:30
08:00
UTC Time


Seismic Data
NV.NCBC..LHZ
Barkley Canyon Broadband Seismometer
NV.NC27..LHZ
ODP 1027 Broadband Seismometer
NV.NC89..LHZ
ODP 889 Broadband Seismometer
NV.KEMF..LHZ
Endeavour Short-period Seismometer
CN.BBB..BHZ
Bella Bella Canadian Seismic Network Station
Counts (x10^6)
Counts (x10^5)
Counts (x10^6)
Counts (x10^4)
Counts (x10^7)
2012 302 02:59:48.00
03:10
03:20
03:30
03:40
03:50
04:00

[4]

The lower five plots, in dark blue above, illustrate seismic energy as measured by four Ocean Networks Canada seafloor seismometers and one land-based seismometer located in Bella Bella on British Columbia's central coast. Earthquake onset is clearly indicated in all five plots, with Bella Bella recording the earliest onset, because it is located much closer to the earthquake epicenter, 265 km to the southeast. The Bella Bella seismometer is part of the Canadian National Seismograph Network [5], maintained by National Resources Canada's Pacific Geoscience Centre.

Numerous aftershocks were also detected following the initial earthquake, with over 50 magnitude 4+ aftershocks recorded in the initial 16 hours. Most of these aftershocks occurred beneath the seafloor, as indicated in the following USGS map.



M	Location Click event below for details	Time UTC	Lat	Lon	D km
5.1	166km S of Masset, Canada	2012-10-28 19:16:55	52.544°N	132.580°W	47.2
5.5	190km S of Masset, Canada	2012-10-28 19:09:56	52.315°N	131.860°W	14.8
5.4	151km SSW of Masset, Canada	2012-10-28 19:03:24	52.742°N	132.901°W	32.8
6.3	159km SSW of Masset, Canada	2012-10-28 18:54:21	52.633°N	132.701°W	8.2
5.1	184km S of Masset, Canada	2012-10-28 16:17:04	52.380°N	131.664°W	15.0
4.0	185km SSE of Masset, Canada	2012-10-28 15:42:21	52.404°N	131.422°W	10.0
4.3	135km S of Masset, Canada	2012-10-28 15:24:22	52.803°N	132.113°W	10.0
4.0	166km S of Masset, Canada	2012-10-28 15:10:34	52.516°N	132.066°W	10.0
4.4	177km S of Masset, Canada	2012-10-28 15:06:55	52.417°N	132.169°W	10.0
4.0	164km SSE of Masset, Canada	2012-10-28 14:14:28	52.588°N	131.440°W	7.7
4.2	154km S of Masset, Canada	2012-10-28 14:04:27	52.635°N	132.403°W	10.0
4.8	176km S of Masset, Canada	2012-10-28 13:09:14	52.432°N	131.882°W	10.2
4.1	127km S of Masset, Canada	2012-10-28 12:38:46	52.870°N	132.204°W	10.1

[6]

Tsunami warnings originally issued for a large stretch of the North and Central coast, as well as the Haida Gwaii region and eastward to Hawaii, were later cancelled or downgraded. One wave that hit Langara Island, northern-most island in the Haida Gwaii archipelago, measured 69 cm. Tsunami wave heights as high as 76 cm were recorded in Kahului, Maui, HI [7], and harbour oscillations up to 1.2 m were measured in Hilo, HI [8].

The tsunami generated by this earthquake was not nearly as large and devastating as those struck Sri Lanka, Indonesia and Japan in recent years, because it occurred on a strike-slip [9] (lateral) fault. Vertical displacement for strike-slip earthquakes is typically much less than may be expected from a major subduction [10] earthquake. The following short video illustrates the distinction between strike-slip and subduction earthquakes.

For scientists like those at the Pacific Geoscience Centre and other institutions studying tsunami propagation in the northeast Pacific, this event will provide valuable insights. The tsunami generated by this earthquake was similar in size to other tsunamis, such as last year's Japan tsunami [11] and the Chilean tsunami of February 2010 [12], when they reached the northeast Pacific. Although tremendously large in their source regions, these tsunamis diminished significantly after crossing large ocean basins to reach coastal British Columbia. The Haida Gwaii tsunami is the first regional tsunami tracked by Ocean Networks Canada's sensor network; its local source region is expected to result in different wave responses in BC's coastal embayments. By comparing these two types of tsunamis (distant vs. local), scientists can begin to piece together a picture of how BC coastal zones may react to large tsunamis originating in this region.

Tags:

- earthquake [13]
- Haida Gwaii [14]
- tsunami [15]
- seismometer [16]
- Bottom Pressure Recorder [17]
- seismograph [18]
- subduction [19]

Categories:

- Data Highlights [20]
- News Stories [21]

// FIXES AMPERSAND IN BREADCRUMB var ONC_breadcrumb = document.getElementById("breadcrumb"); if (ONC_breadcrumb) { var ONC_innerHTML = ONC_breadcrumb.innerHTML; ONC_innerHTML = ONC_innerHTML.replace("&", "&"); ONC_breadcrumb.innerHTML = ONC_innerHTML; }

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Source URL: https://www.oceannetworks.ca/Haida-Gwaii-earthquake-and-tsunami

Links:
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[6] https://www.oceannetworks.ca/sites/default/files/images/pages/data/haida_guaii_aftershocks.jpg
[7] http://ptwc.weather.gov/ptwc/text.php?id=hawaii.TSUHWX.2012.10.28.0910
[8] http://ptwc.weather.gov/ptwc/text.php?id=hawaii.TSUHWX.2012.10.28.1022
[9] http://earthquake.usgs.gov/learn/glossary/?termID=194
[10] http://earthquake.usgs.gov/learn/glossary/?term=subduction
[11] http://www.neptunecanada.ca/news/news-details.dot?id=26077
[12] http://www.neptunecanada.ca/news/news-details.dot?id=36286
[13] https://www.oceannetworks.ca/article-tags/earthquake
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