

NCEI WATER LEVEL REPORT – Tsunami

UPDATE

August 29, 2022

Services

Additional Analysis of January 15, 2022, Tonga Event

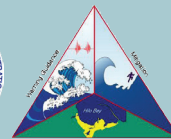
After publishing the February 2022 edition of the “NCEI Water Level Update - Tsunami,” we received additional water level observations for the month of January from stations operated by the National Weather Service’s Pacific Tsunami Warning Center (PTWC). These data also captured tsunami waves generated by the eruption of the Hunga Tonga – Hunga Ha’apai volcano on January 15, 2022. The largest coastal observations (at PTWC stations) of the maximum tsunami wave (MTW), defined in Dunbar et al. 2017, were made at the following stations:

NOS Station ID	Station Name	MTW Peak-to-Trough [m]
1611691	Hanalei, Kaua’i, Hawai’i	1.66
1612352	Makapu’u, O’ahu, Hawai’i	1.71
1612647	Hale’iwa, O’ahu, Hawai’i	1.38

The quality-controlled and de-tided products for these stations are shown in Figures 1-3 below, and have been added to NCEI’s [January 15th tsunami water level webpage](#) for public access.

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Services (cont'd)

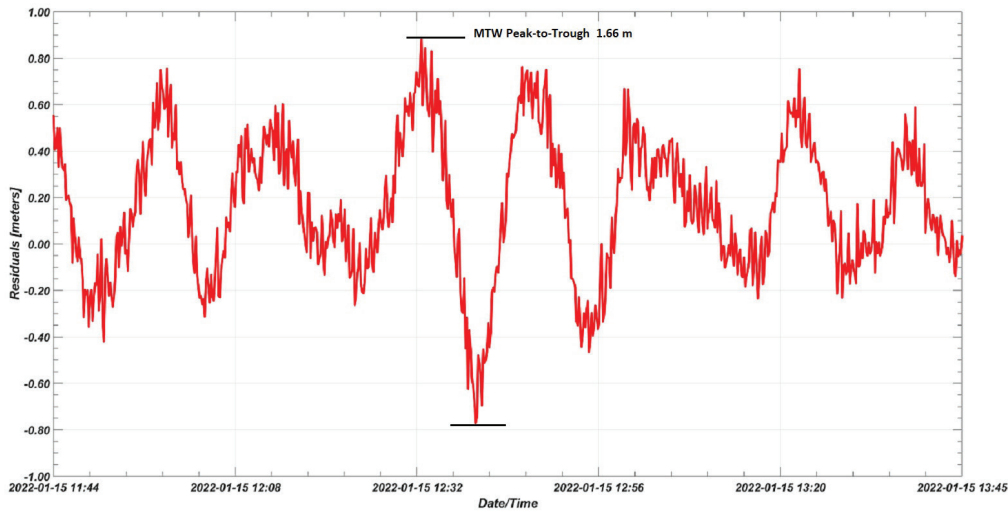


Figure 1: Water levels at Hanalei, Kaua'i, Hawai'i (NOS ID 1611691), with tide removed (i.e. "residuals"). Markings indicate the peak and trough of the maximum tsunami wave (MTW). The small amplitude, high frequency signal that appears to ride on top of the de-tided residuals is likely a local seiche that was present before and during the tsunami arrival. This gives rise to a slightly larger peak-to-trough observation than simply the tsunami alone.

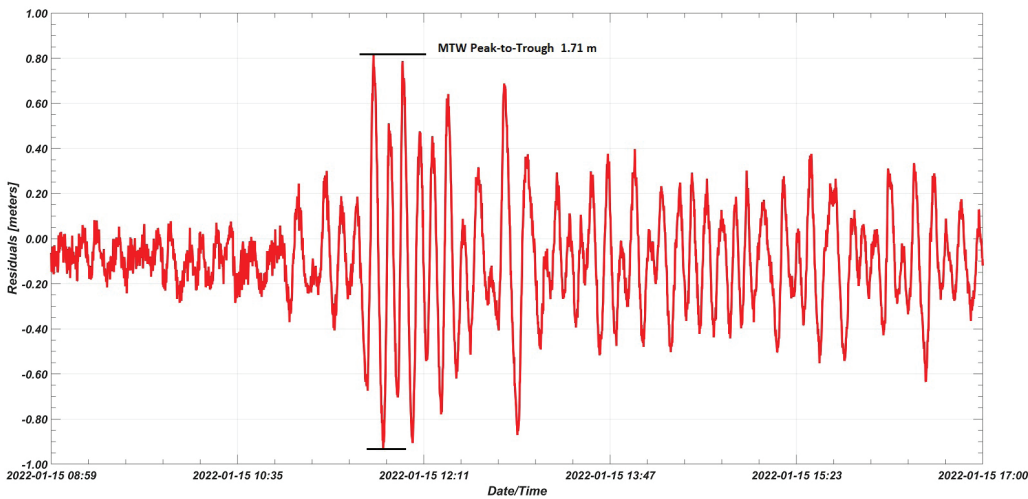


Figure 2: Water levels at Makapu'u, O'ahu, Hawai'i (NOS ID 1612352), with tide removed (i.e. "residuals"). Markings indicate the peak and trough of the maximum tsunami wave (MTW).

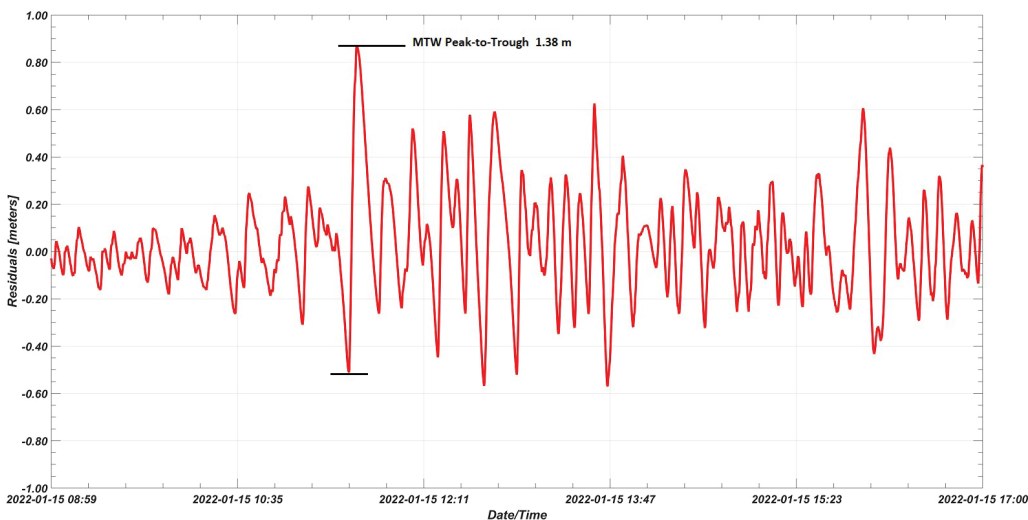


Figure 3: Water levels at Hale'iwa, O'ahu, Hawai'i (NOS ID 1612647), with tide removed (i.e. "residuals"). Markings indicate the peak and trough of the maximum tsunami wave (MTW).

References:

Dunbar, P., G. Mungov, A. Sweeney, K. Stroker, and N. Arcos. Challenges in Defining Tsunami Wave Heights. *Pure Appl. Geophys.* 174, 3043–3063 (2017). <https://doi.org/10.1007/s00024-017-1614-y>

PTWC 2021/Jan. 2022 Water Levels Archived and Processed

PTWC has submitted for archive at NCEI thirteen months (all of 2021 + January 2022) of 10-second-resolution water level data from 10 tide gauge stations PTWC operates in Hawai'i, including a new station at Kaunalapau, Lāna'i, installed in October 2021. Two tsunami events were observed at these stations in 2021. On March 4, 2021, a M8.1 earthquake near Kermadec Islands, New Zealand, resulted in a small tsunami observed at PTWC stations at Nāwiliwili, Kaua'i (6 cm), and Hale'iwa, O'ahu (5 cm). On August 12, 2021, a M8.1 earthquake in the South Sandwich Islands resulted in a small tsunami observed at PTWC stations at Nāwiliwili, Kaua'i (6 cm), Hale'iwa, O'ahu (4 cm), Honokōhau, Hawai'i (6 cm), and Honu'apo, Hawai'i (2 cm). These data have been converted to netCDF and CSV formats at NCEI and are available for discovery and access via the [tide gauge layer of the Natural Hazards Map Viewer](#) and via the [tide gauge data inventory timeline](#) (select Data Source -> PTWC). NCEI's Tsunami Water Level Team has quality-controlled and de-tided these data.

NDBC DART Data Archived and Processed

NCEI has received and archived six new Deep-ocean Assessment and Reporting of Tsunamis (DART) ocean bottom pressure data packages from six sites maintained by the National Weather Service's National Data Buoy Center (NDBC) in the Pacific and Atlantic Oceans. The data have been quality-controlled and tides analyzed by NCEI's Tsunami Water Level Team. No tsunamis were observed in these data. The period of coverage varies among the sites. These data, recorded at 15-second resolution, are not available until the data are physically retrieved from the seafloor instrument. The data and products may be viewed and downloaded from NCEI at these web pages: Atlantic: [41420](#), [44403](#); Pacific: [46409](#), [51407](#), [51425](#), and [52403](#).

Updated Submission Agreement between NCEI and NDBC for DART data

Submission Agreements (SA) are NCEI's approach to documenting submission details including data transmission method and schedule, data and metadata content, and data format for archival purposes. The Submission Agreement between NCEI and NDBC for DART ocean bottom pressure data has been updated. The services provided by NCEI for these data and products may be found at the following DOI URL: <https://doi.org/10.7289/V5F18WNS>. The updated SA has been submitted to NCEI Archive Branch's Document Library.

SAs between NCEI and PTWC and between NCEI and NTWC Completed

Submission Agreements with PTWC and with the National Tsunami Warning Center (NTWC) for water level data were completed and submitted to NCEI Archive Branch Document Library. The services provided by NCEI for these data and products may be found at the following DOI URLs: <https://doi.org/10.25921/mand-3524> (PTWC) and <https://doi.org/10.25921/23vy-9z62> (NTWC).

HazEL Marigram Search Updates

The [Hazards Event Lookup \(HazEL\) marigram search](#) has been improved to include selection by map bounding box (Figure 4) and the search results have been expanded to include water level station country, area, latitude, and longitude (Figure 5).

Services (cont'd)

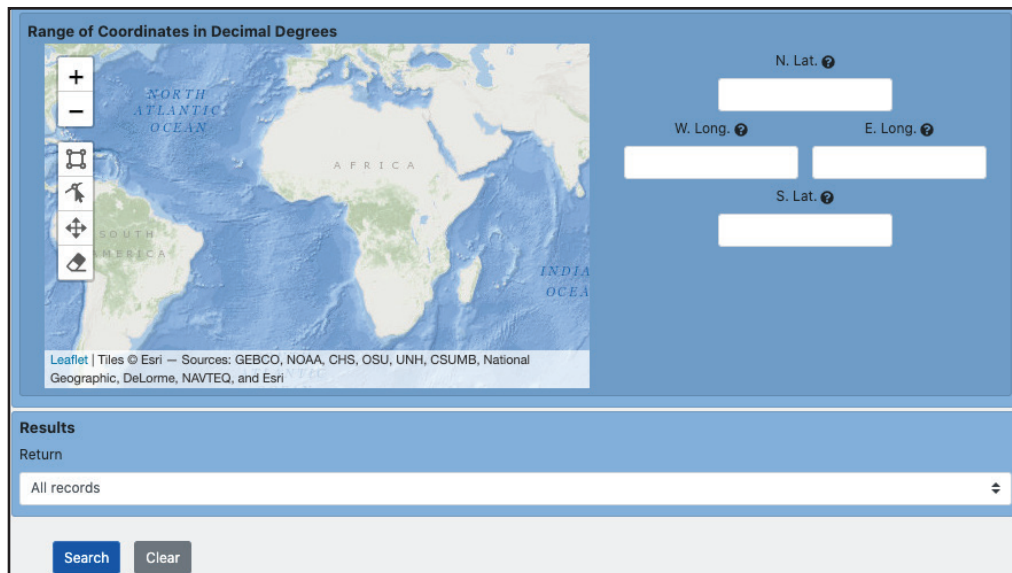


Figure 4: The HazEL marigram search now has a map for defining the area of the search.

Search Parameters
Year = 1960 Only records with digital data

Please cite individual marigrams. For marigrams that do not have a DOI, please cite as:
NOAA National Centers for Environmental Information; NCEI: Archival and Discovery of [event YYYY-MM-DD] Tsunami Event on Marigrams. NOAA National Centers for Environmental Information. [access date]
If the file you are looking for is not yet online, please contact haz.info@noaa.gov to request it.

Marigrams - 5 Results Found

Year	Mo	Dy	Country	Area	Location Name	Latitude	Longitude	Event	Scan Preview	Plot Preview	Scan Full Record	NetCDF	CSV	DOI
1960	5	22	JAPAN	AOMORI	OMINATO	41.25638	141.145	2	b	b	b	b	b	10.7289/V51R6NQJ b
1960	5	22	PANAMA		BALBOA, CANAL ZONE	8.9655	-79.5731	2	b	b	b	b	b	10.7289/V51R6NQJ b
1960	5	22	USA	AK	SEWARD, ALASKA	60.12	-149.4267	2	b	b	b	b	b	10.7289/V51R6NQJ b
1960	5	22	USA	OR	TONGUE POINT, ASTORIA, OREGON	46.2073	-123.7683	2	b	b	b	b	b	10.7289/V51R6NQJ b
1960	5	22	USA TERRITORY	GU	GUAM, MARIANA ISLANDS	13.4434	144.6564	2	b	b	b	b	b	10.7289/V51R6NQJ b

Figure 5: The HazEL marigram search results now include country, area, latitude, and longitude.

Revised 2023-12-06 to correct spelling of geographic names in accordance with the Hawai'i Board on Geographic Names (see <https://planning.hawaii.gov/gis/hbgn/>).