

NOAA
National Centers for
Environmental
Information (NCEI)

April 2026

NOAA National Centers for Environmental
Information (NCEI)
World Data Service for Geophysics (WDS)

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Boulder, Colorado, United States

Background: ICSU World Data System



International Council of Science (ICSU)/World Data System (WDS)

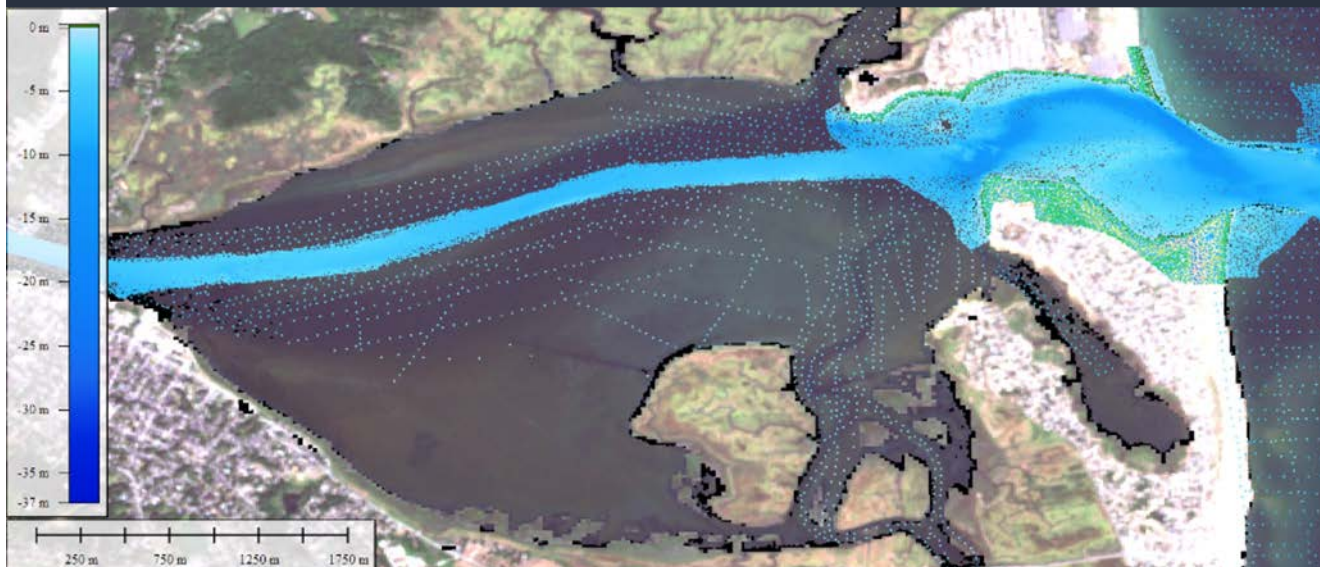
- Created in 2008--Builds on 50-year legacy of the ICSU World Data Centers
- 87 Regular Members

NOAA/NCEI Boulder, Colorado, USA and co-located World Data Service (WDS) for Geophysics provide long-term archive, data management, and access to global tsunami data

- global tsunami event data, damage photos, raw and processed water Level data from NOAA observational networks, and development of digital elevation models (DEMs)



In-Development: Open-Source Satellite-Derived Bathymetry Tool

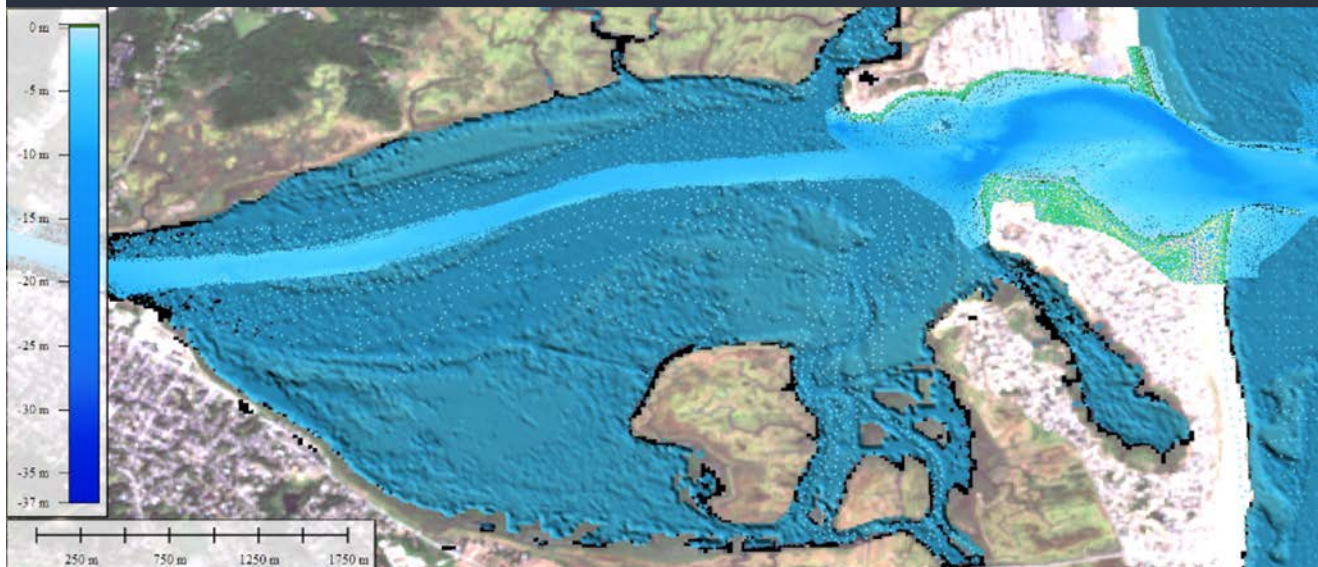


Merrimack River Estuary, Massachusetts, USA

- **Global Satellite Imagery**
 - Sentinel-2
- **Global Satellite Lidar**
 - IceSat-2
- **Local Authoritative Measurements**
 - ship sonar
 - aerial lidar
 - nautical charts, etc.



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 - nautical charts, etc.



Background: Historical Tsunami Data

A global tsunami database's focus is to enable data acquisition, management, and exchange that supports Tsunami Warning Centers and Risk Assessments.

- Helps establish warning criteria
- Validate inundation and evacuation mapping
- Situational awareness of duty scientists
- Used to place the event in historical context to explain to partners or media
- The additional information & references component is valuable because it includes event descriptions that are extracted from the referenced item.



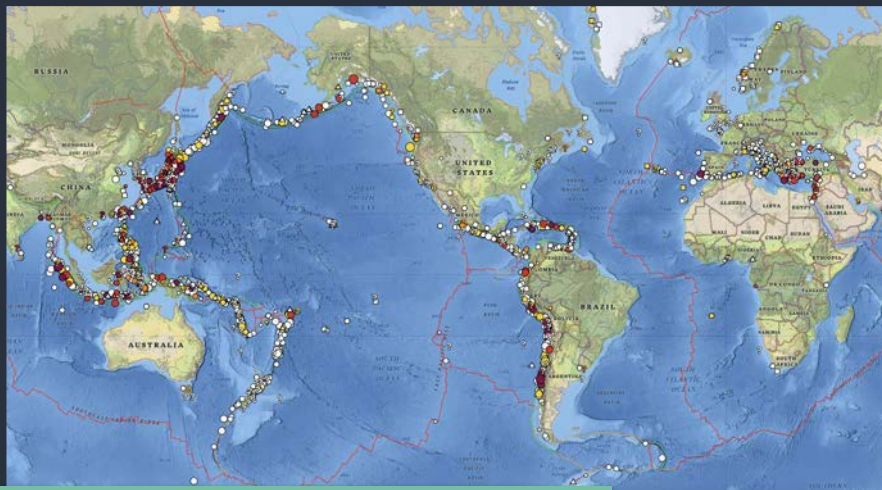
Historical Tsunami Data

Know the past to better understand the future

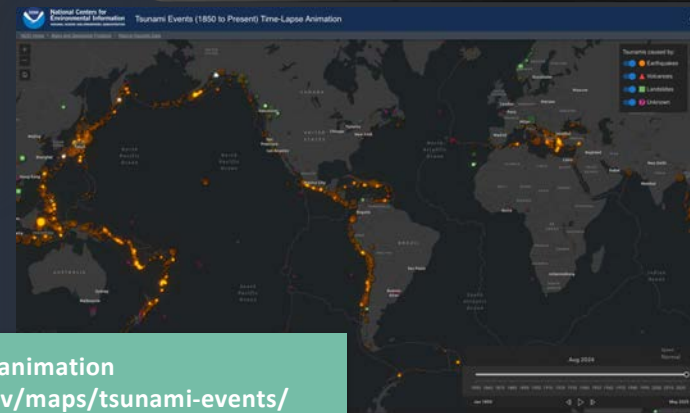
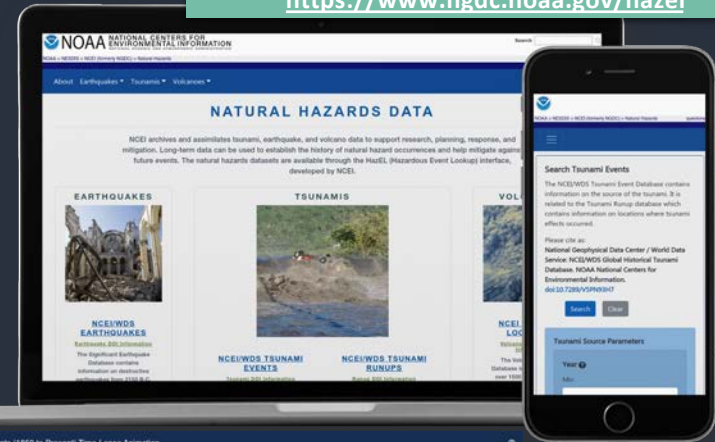
3,100+ **global** tsunami events
(over 1,600 confirmed)

34,000+ **global** runup observations
(i.e., wave observations)

Search forms *and* API
<https://www.ngdc.noaa.gov/hazel>



Geospatial search *and* map services
<https://www.ncei.noaa.gov/maps/hazards/>



Interactive animation
<https://www.ncei.noaa.gov/maps/tsunami-events/>

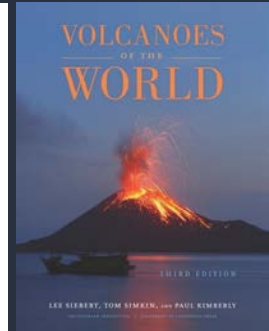
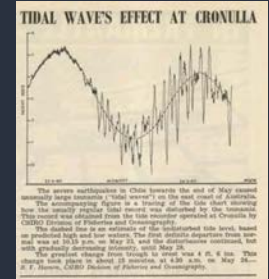


National Oceanic and Atmospheric Administration

Source Documents

Over 8,500 documents that describe damage and effects from tsunami, earthquake, and volcano events. Types of documents:

- Diaries, ships logs, newspaper reports, journal articles, email
- Tsunami, Earthquake, Volcano catalogs
- Tsunami Warning Centers
- **National Reports** from ICGs (e.g., PTWS, Caribe-EWS)
- Regional or National Earthquake Information Centers
- International Tsunami Information Center (ITIC)
- International Tsunami Survey Teams



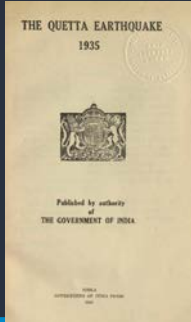
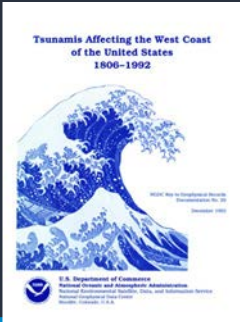
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TSUNAMI NEWSLETTER

International Tsunami Information Centre

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Natural Hazards Map Viewer

The NCEI Natural Hazards Viewer was re-designed using modern web technologies and ESRI frameworks.

- Users will see increased performance/responsiveness, better usability on mobile devices, and improved accessibility.

Event Name	Country	Event Year	Deaths	Damage (millions of \$)	Max Event Response	Number of Observations	Earthquake Magnitude	Latitude, Longitude
1842/05/07: CAP-HAITIAN	Haiti	1842	300	100 to 1000	100 to 124	4	8.1	19.75, 72.2

1842, May 7. At Port-de-Paix, the sea receded 40m, and the returning wave covered the city with 5m of water killing 200 to 300 of the city's 2 000 residents. The tsunami affected a large geographic area. Please refer to the various rungs "Comment" for more information.

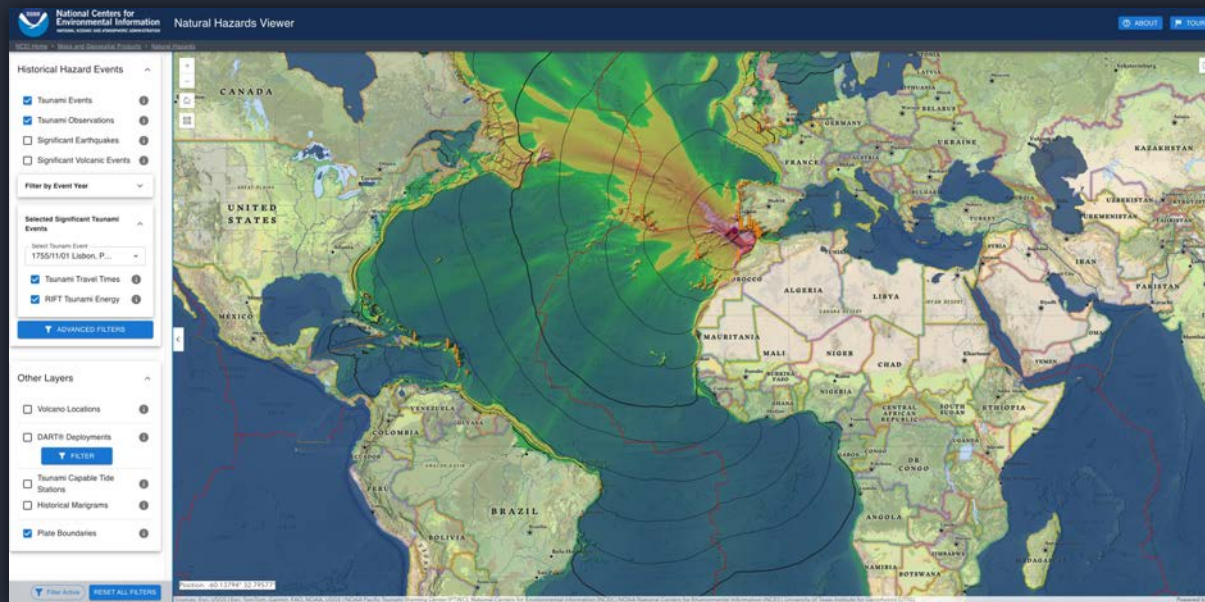
May 7, 1842: Hispaniola. Disturbance earthquakes reported from Môle Saint-Nicolas, Cap-Haitien (19 deg 46 min N, 72 deg 13 min W), Port-de-Paix (19 deg 53 min N, 72 deg 50 min W), Port-Spain (19 deg 40 min N, 70 deg 51 min W), and Santiago de los Caballeros (19 deg 30 min N, 70 deg 42 min W). A destructive tsunami struck the north coast of the island (reference #42).

1842, May 7. West Indies, Santo Domingo, especially at Cap-Haitien, also at Môle St. Nicolas, Port-de-Paix, Fort-Liberte, and Santiago de los Caballeros. On north coast of Haiti there was a



Natural Hazards Map Viewer

In collaboration with the Pacific Tsunami Warning Center (PTWC), NCEI updated the Viewer with 10 new “Selected Significant Tsunami Events”

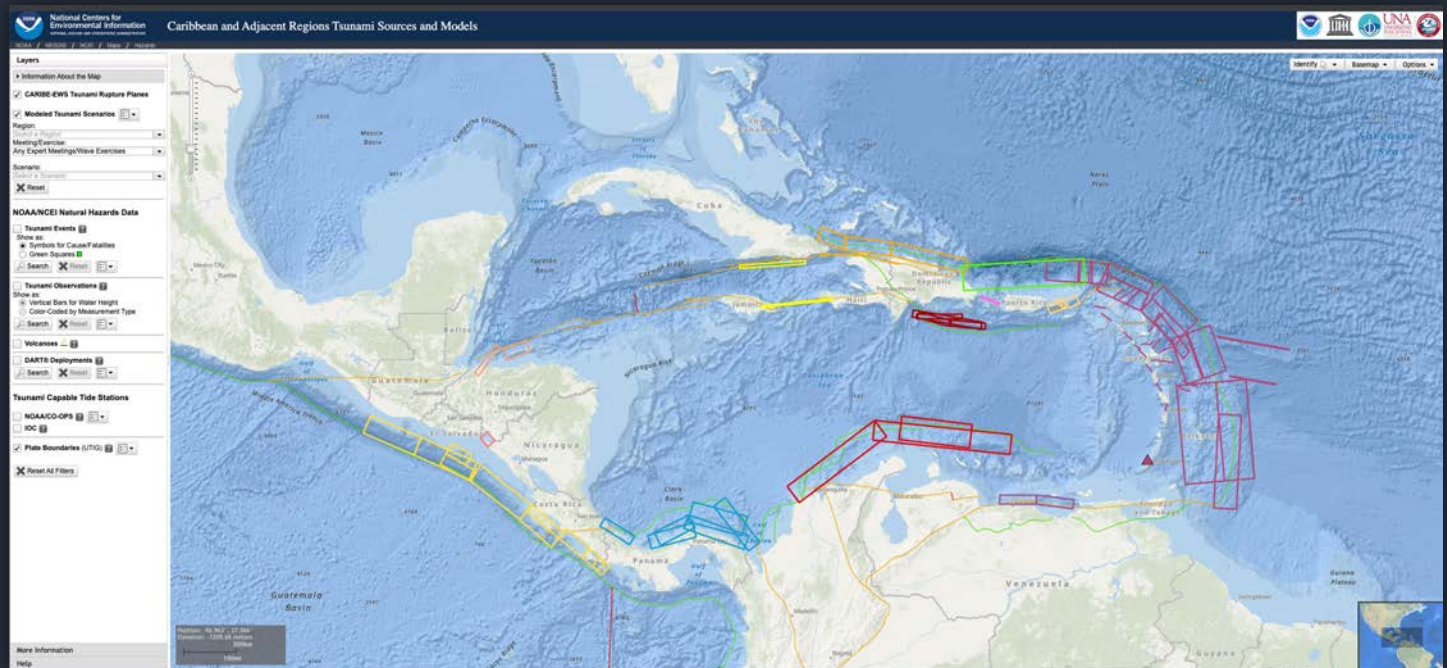


CATSAM Map Viewer

Will be re-designed using modern web technologies and ESRI frameworks.

In Collaboration with WG1

- 35+ scenarios and their associated fault planes and sources from IOC Experts Meetings and Caribe Wave Exercises have been added.
- Historical tsunami data
- IOC Sea Level Stations
- *Still pending files from last two Caribe Waves*



NCEI cloud migration

NCEI is migrating to the cloud in order to increase flexibility in compute and data storage resources.

BENEFITS

The infographic is divided into three colored panels. The first panel, 'HIGHER DATA RELIABILITY', features a green background with icons for a waveform, a globe, a magnifying glass over a water drop, and a volcano. A large blue arrow points from these icons to a shield with a checkmark. The second panel, 'INCREASED APPLICATION UPTIME', has a purple background with a computer monitor showing a green checkmark and the text 'NO ERROR', a clock icon with '24/7/365' and 'ALWAYS ON' below it, and circuit-like patterns. The third panel, 'IMPROVED PRODUCT QUALITY', has an orange and pink background with a world map, a volcano, and a speech bubble that says 'BETTER, MORE ACCURATE DATA PRODUCTS'. There are also star award icons.

HIGHER DATA RELIABILITY

INCREASED APPLICATION UPTIME

IMPROVED PRODUCT QUALITY

BETTER, MORE ACCURATE DATA PRODUCTS

Google. (2026). Gemini 3 Flash [AI Image Generator]



Challenges in collecting data

Global database are now very reliant on searching peer-reviewed publications for new information.

- Data scientists may not be aware of new publications
- Data in peer-reviewed publications not easily transferable to database format (Though significant improvements in consistency in recent years)
- Smaller localized events may only be reported in local media, and/or peer-reviewed journals not typically focused on tsunami science
- Language translation software exists, but still not aware of publication



Opportunities

The Joint ICG/PTWS – IUGG/JTC Tsunami Data Workshop **PROPOSAL**
to be submitted jointly by NCEI/WDS and NTL/ICMMG

Objectives:

- 1) Discussion and refinement of the existing tsunami database format, including data on tsunamis of non-seismic origin, data on small non-damaging tsunamis and data collected from emerging technologies (e.g., remote sensing, etc.).
- 2) Development of a new standard for national reports from ICG member countries.
At ICG/CARIBE-EWS meetings, Member States report on “Information on Tsunami Occurrences”.
- 3) Consider regional coordinators to assist in the completeness and accuracy of tsunami data submission.



Partnership w/ ITIC

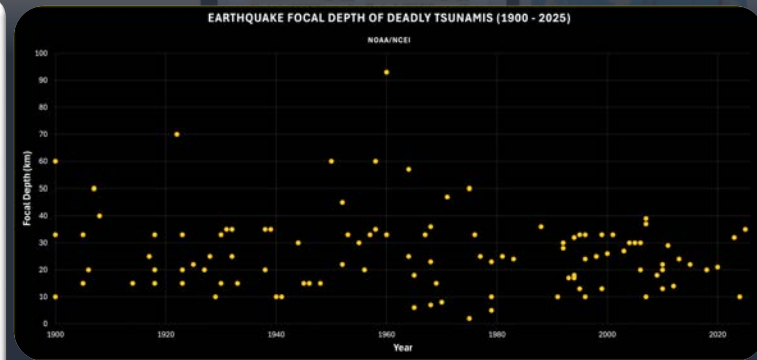
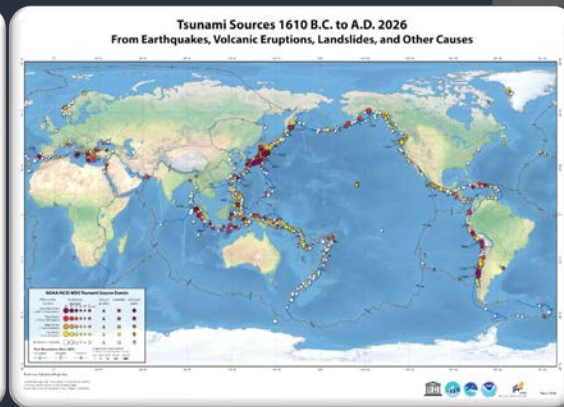
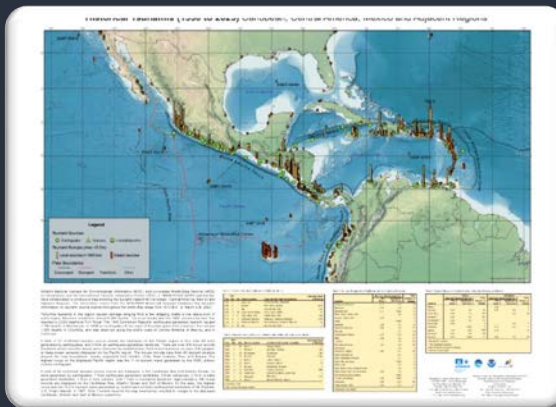
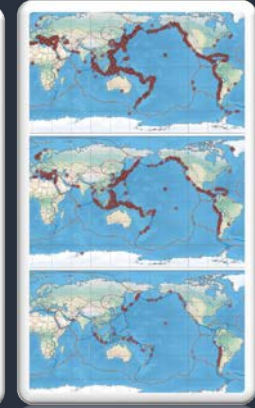
Data to support:

- Global posters - **update**
 - Tsunami Sources
 - Significant Earthquakes
 - Significant Volcanic Eruptions
- Tsunami Glossary – **update**
- Tsunami Training - Tsunami Warning Center Staff



Small informational poster with text and a table of data.

Year	Location	Depth (km)	Magnitude	Deaths	Injured	Displaced	Property Damage (\$)
1900	Alaska	10	8.7	0	0	0	0
1906	California	10	7.8	0	0	0	0
1917	Alaska	10	8.3	0	0	0	0
1920	Alaska	10	8.6	0	0	0	0
1922	Alaska	10	8.6	0	0	0	0
1923	Alaska	10	8.7	0	0	0	0
1925	Alaska	10	8.7	0	0	0	0
1928	Alaska	10	8.7	0	0	0	0
1930	Alaska	10	8.7	0	0	0	0
1933	California	10	8.3	0	0	0	0
1934	Alaska	10	8.7	0	0	0	0
1938	Alaska	10	8.7	0	0	0	0
1940	Alaska	10	8.7	0	0	0	0
1942	Alaska	10	8.7	0	0	0	0
1946	Alaska	10	8.7	0	0	0	0
1947	Alaska	10	8.7	0	0	0	0
1948	Alaska	10	8.7	0	0	0	0
1952	Alaska	10	8.7	0	0	0	0
1954	Alaska	10	8.7	0	0	0	0
1957	Alaska	10	8.7	0	0	0	0
1958	Alaska	10	8.7	0	0	0	0
1960	Alaska	10	8.7	0	0	0	0
1964	Alaska	10	9.2	114	114	114	114
1968	Alaska	10	8.7	0	0	0	0
1970	Alaska	10	8.7	0	0	0	0
1972	Alaska	10	8.7	0	0	0	0
1975	Alaska	10	8.7	0	0	0	0
1976	Alaska	10	8.7	0	0	0	0
1977	Alaska	10	8.7	0	0	0	0
1978	Alaska	10	8.7	0	0	0	0
1980	Alaska	10	8.7	0	0	0	0
1982	Alaska	10	8.7	0	0	0	0
1984	Alaska	10	8.7	0	0	0	0
1985	Alaska	10	8.7	0	0	0	0
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2014	Alaska	10	8.7	0	0	0	0
2015	Alaska	10	8.7	0	0	0	0
2016	Alaska	10	8.7	0	0	0	0
2017	Alaska	10	8.7	0	0	0	0
2018	Alaska	10	8.7	0	0	0	0
2019	Alaska	10	8.7	0	0	0	0



How to access NCEI/WDS tsunami data

Data download through search forms: <https://www.ngdc.noaa.gov/hazel/>

API: <https://www.ngdc.noaa.gov/hazel/view/swagger>

Natural Hazard Map Viewer: <https://www.ncei.noaa.gov/maps/hazards/>

Tsunami Interactive Time-lapse (since 1850): <https://www.ncei.noaa.gov/maps/tsunami-events/>

Map Services: https://gis.ngdc.noaa.gov/arcgis/rest/services/web_mercator/hazards/MapServer

Natural Hazards Images: <https://www.ngdc.noaa.gov/hazardimages>

DART® Bottom Pressure Recorder Data Inventory: <https://www.ngdc.noaa.gov/hazard/dart/>

<https://www.ngdc.noaa.gov/hazard/bpr/> (pre-DART)

U.S. Tsunami Program Coastal Water Level Data Inventory:

<https://www.ngdc.noaa.gov/hazard/tide/>



Thank you

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