

NOAA
National Centers for
Environmental
Information (NCEI)

May 2025

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

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Background

Two global historical tsunami databases maintained separately by:

- NOAA National Centers for Environmental Information (NCEI, formerly National Geophysical Data Center (NGDC)) and co-located World Data Service for Geophysics (WDS)
- Novosibirsk Tsunami Laboratory, Institute of Computational Mathematics and Mathematical Geophysics (NTL/ICMMG)



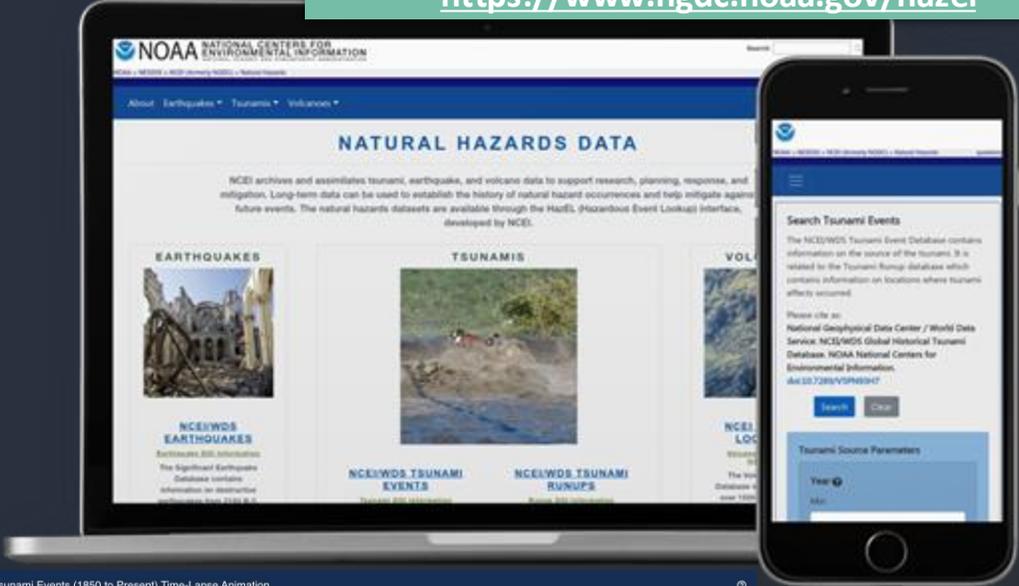
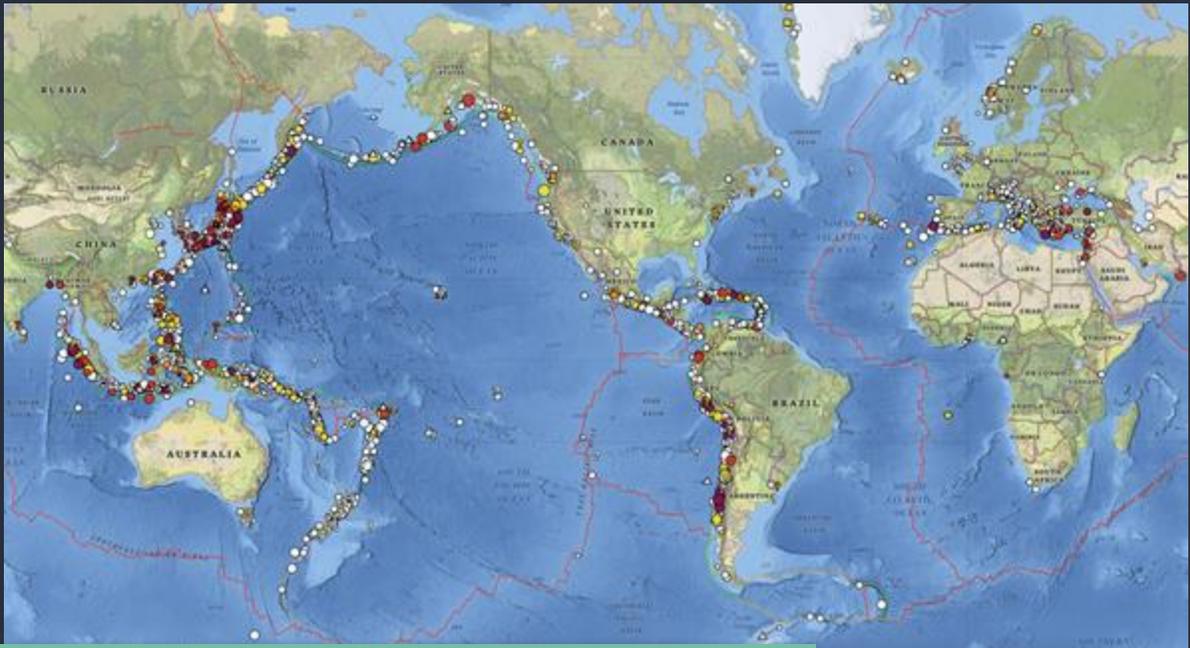
Historical Tsunami Data

Know the past to better understand the future

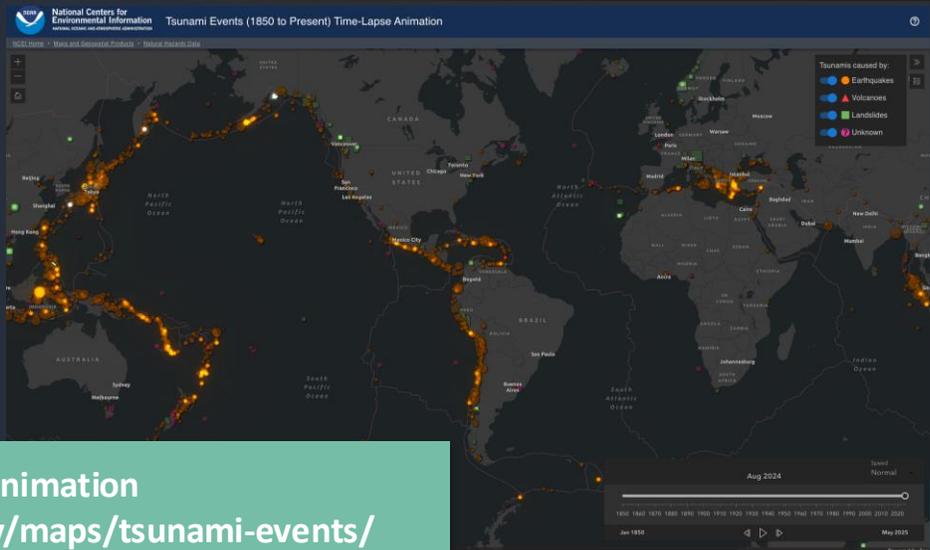
2,900+ **global** tsunami events
(over 1,500 confirmed)

32,000+ **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/>



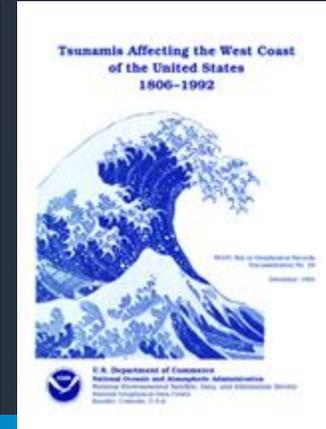
Interactive animation
<https://www.ncei.noaa.gov/maps/tsunami-events/>



Source Documents

Over 8,000 documents that describe damage and effects from tsunami, earthquake, and volcano events. Types of documents:

- Diaries, ships logs, newspaper reports
- Tsunami, Earthquake, Volcano catalogs
- Tsunami Warning Centers
- Regional or National Earthquake Information Centers
- International Tsunami Information Center
- Web articles, e-mail, journal articles
- International Tsunami Survey Teams

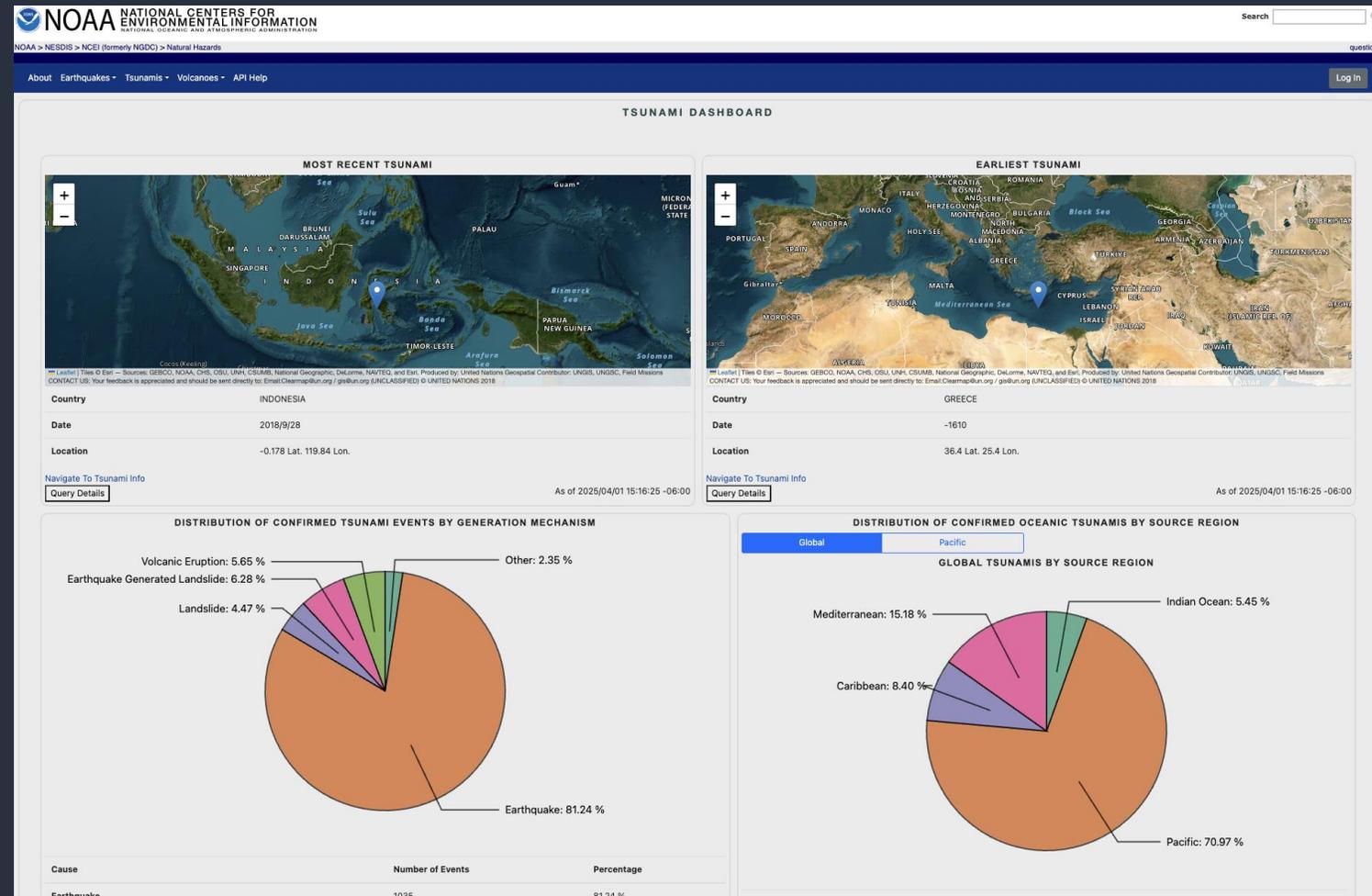


Historical Tsunami Data Dashboard – *in development*

Instant access to tsunami data visualization without having to navigate a more scientifically detailed search form.

Aids in..

- improving consistency;
- answering simple and/or common questions.

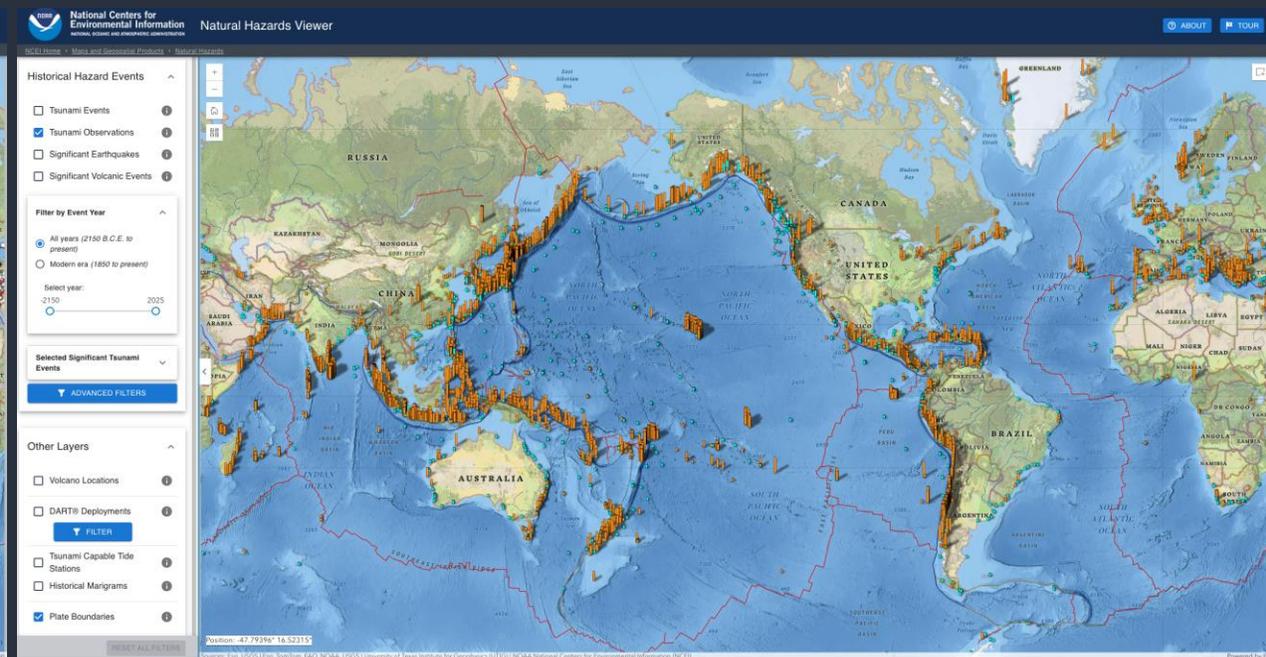
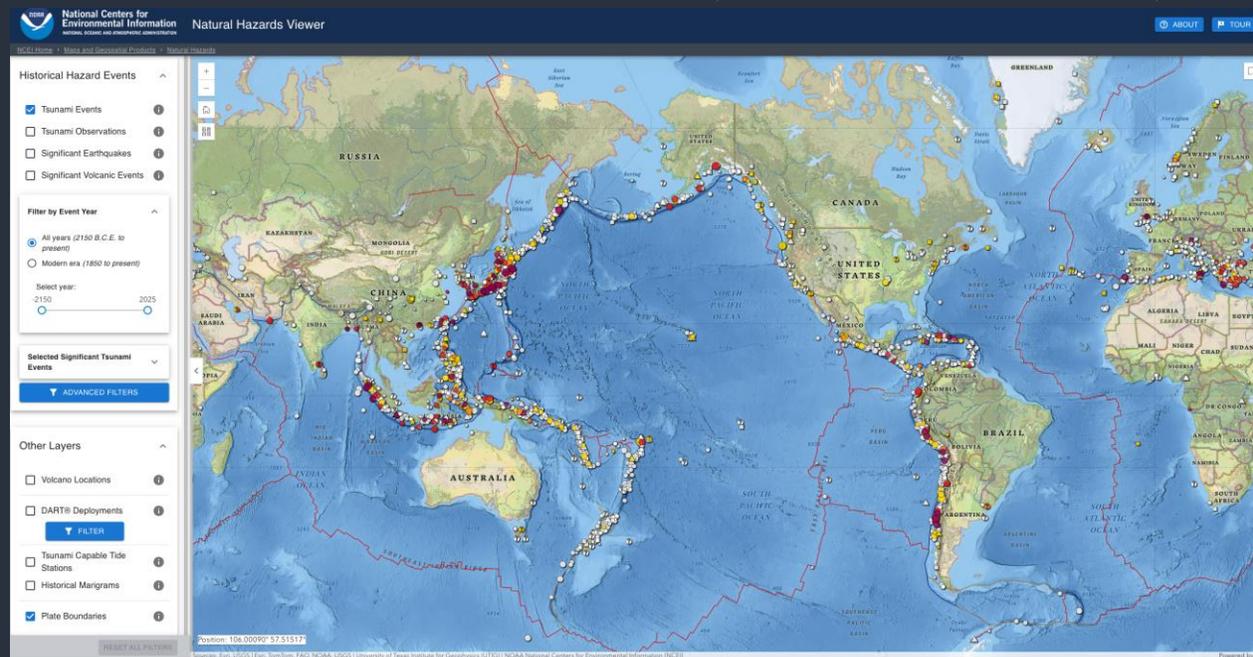


Historical Tsunami Data Dashboard

– *in development*

The NCEI Natural Hazards Viewer is currently being re-designed using modern web technologies/frameworks.

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



Support Tsunami Warning Systems and Risk Assessments

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.

The cataloging of smaller tsunami events is critical to help characterize tsunami sources and impacts.

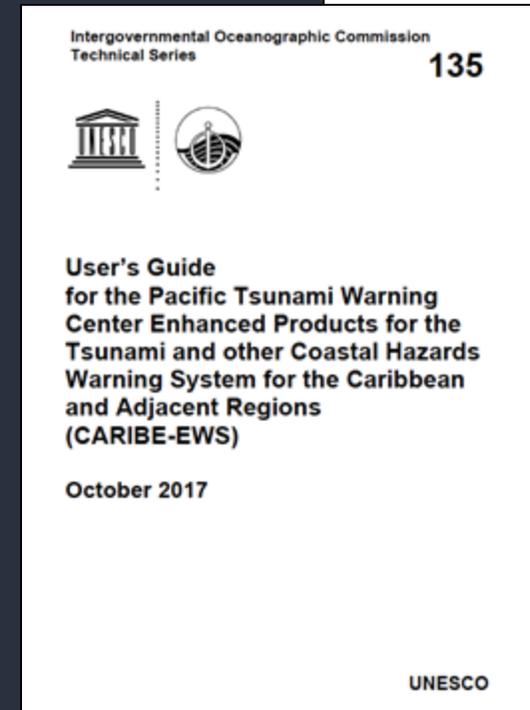
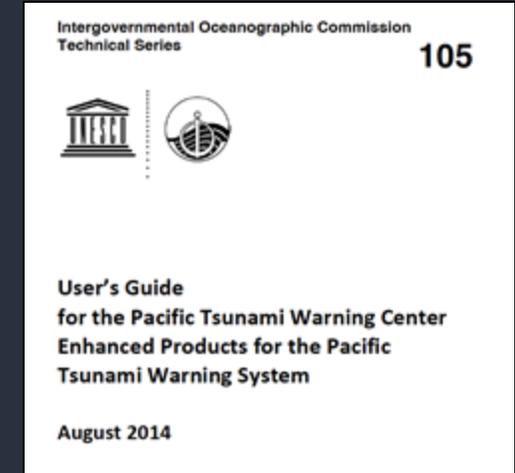


Small(er) events

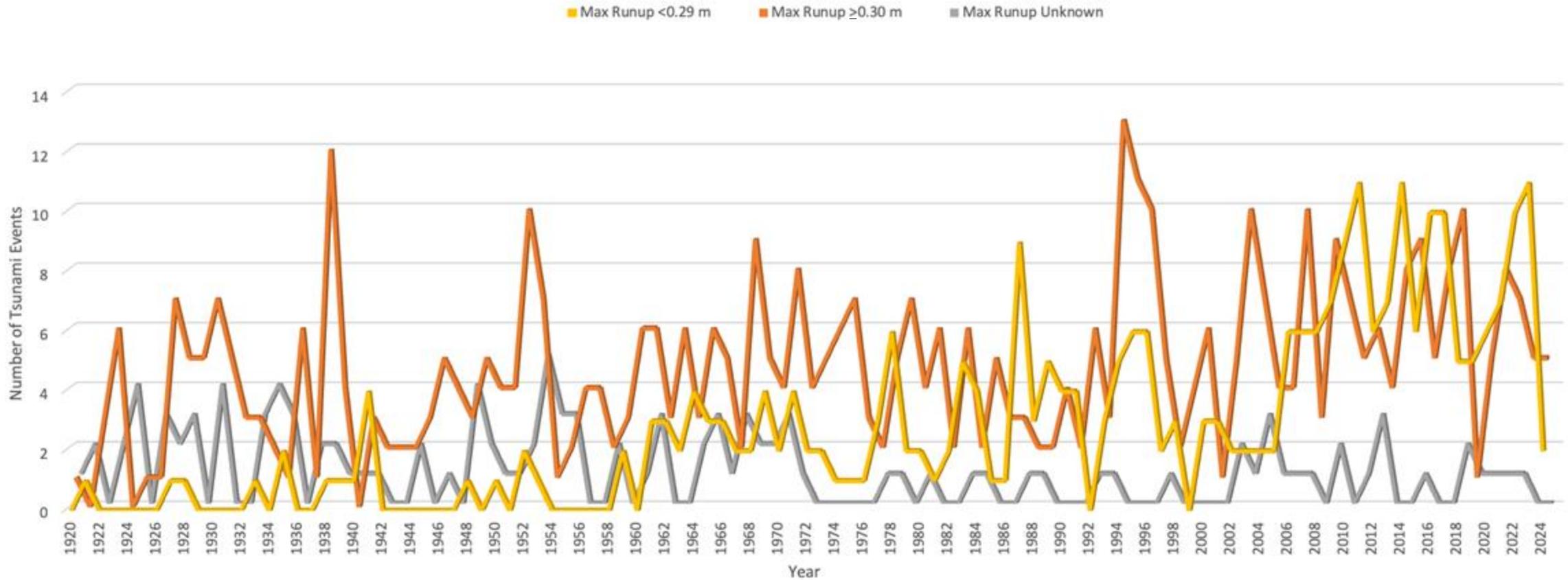
For the purposes of this discussion, events below 0.3 meters considered “small events”.

Criteria based NOAA’s Pacific Tsunami Warning Center User Guide (2014 ,2017), which has four categories of amplitudes relative to the tide: i) less than 0.3 m, ii) 0.3 to less than 1 m, iii) 1 m to 3 m, and iv) greater than 3 m.

“A tsunami that is forecast to have less than 0.3 meter fluctuations from the tide level is generally not a hazard” (IOC, 2014)



All Tsunami Events 1920 - Present



Challenges in collecting data

Global historical tsunami databases continue to expand on Soloviev and Go (1974, 1975), Iida (1984), and Landers and Lockridge (1989), as well as all the initiatives and data sharing of all ITST scientists.

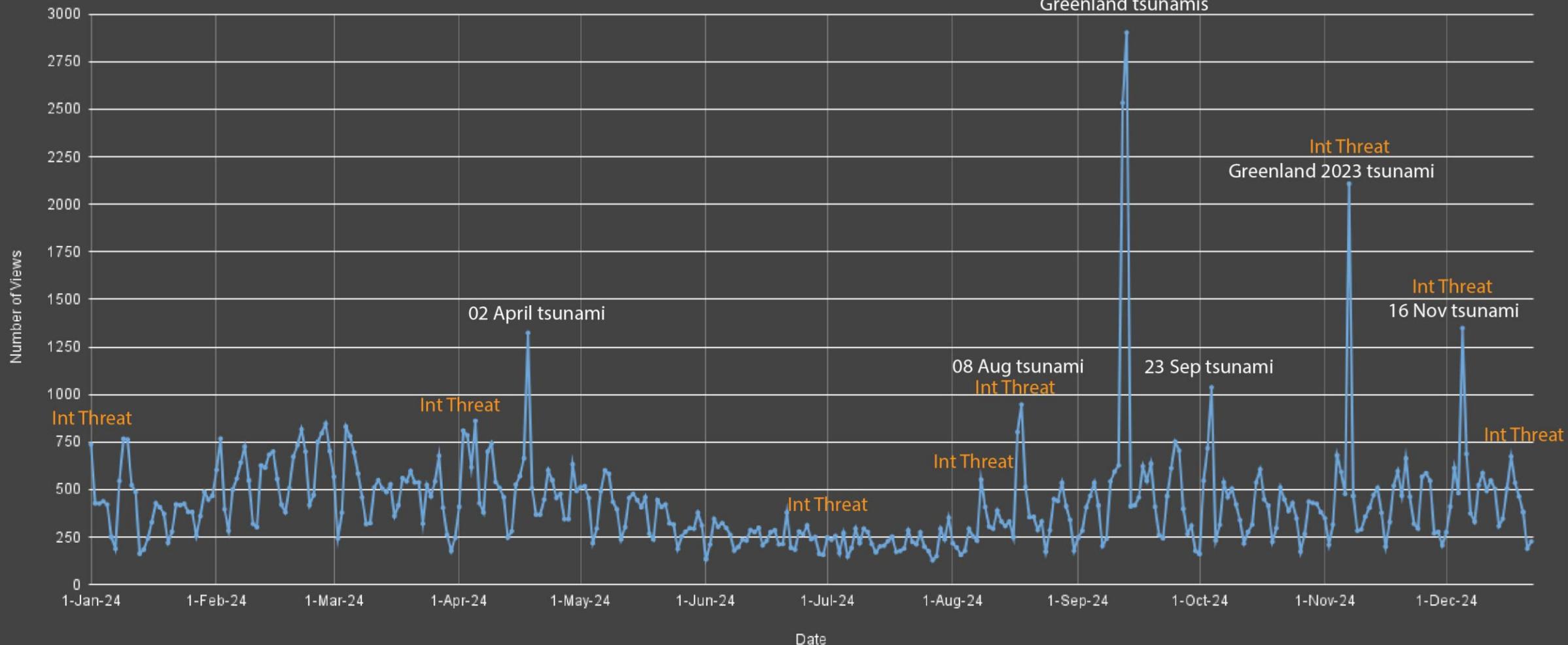
However, global databases are now very reliant on searching peer-reviewed publications for new information.

- 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



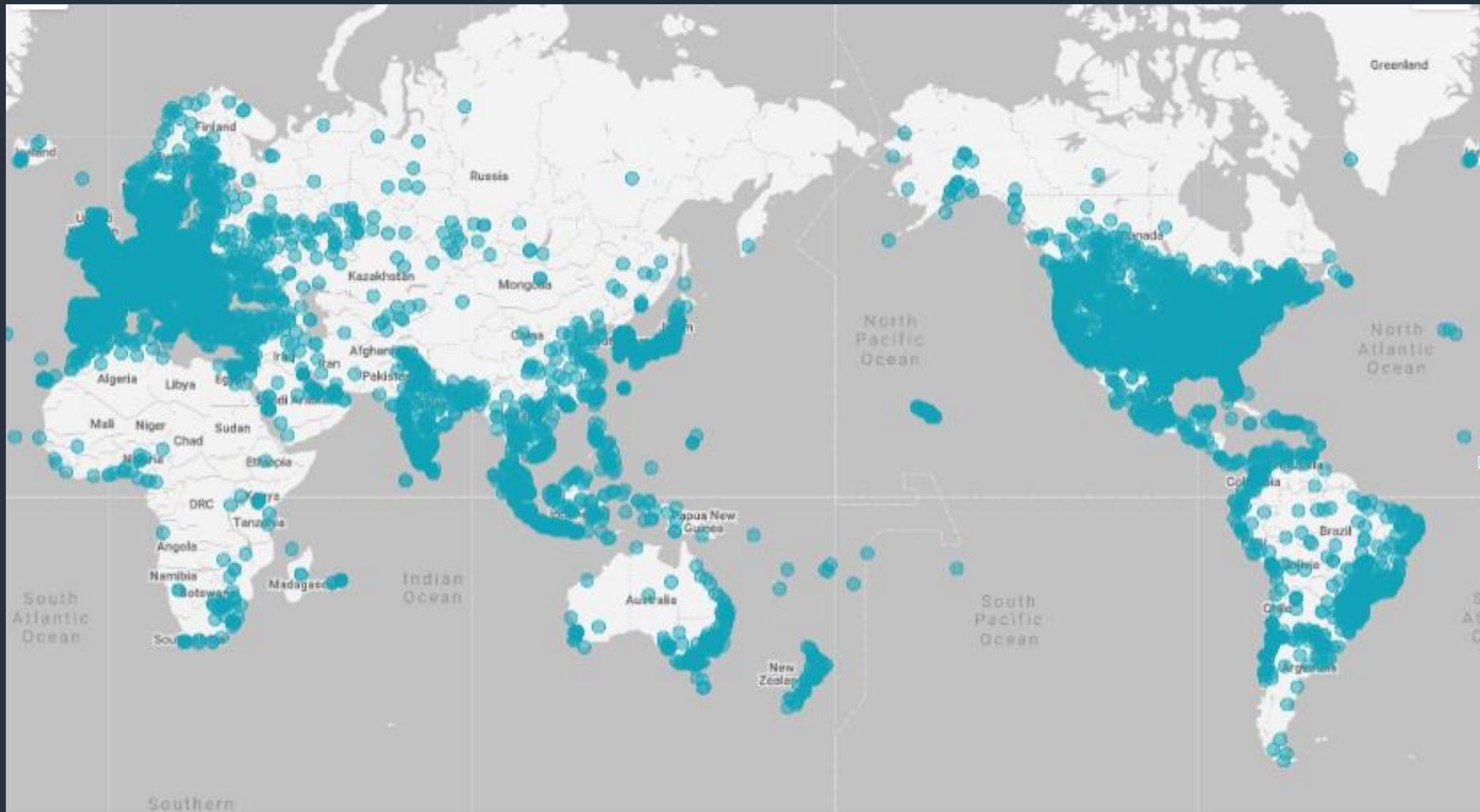
PTWC Threat Message Most Viewed Tsunami

2017 & 2023
Greenland tsunamis



2024 NCEI/WDS Tsunami Database *views via search forms: 156,000+*



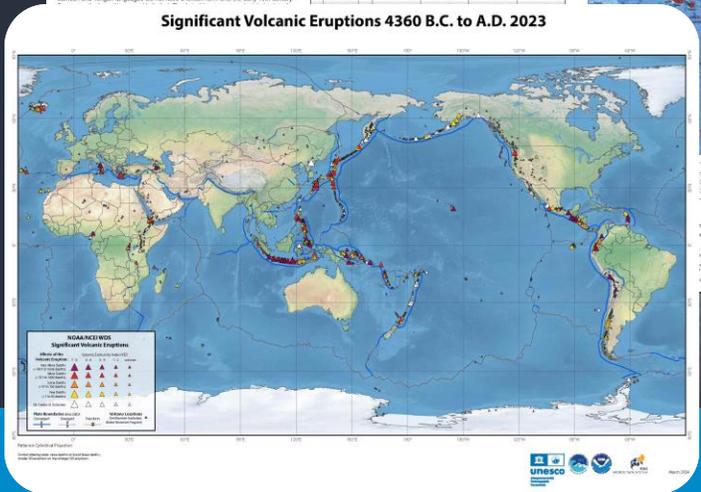
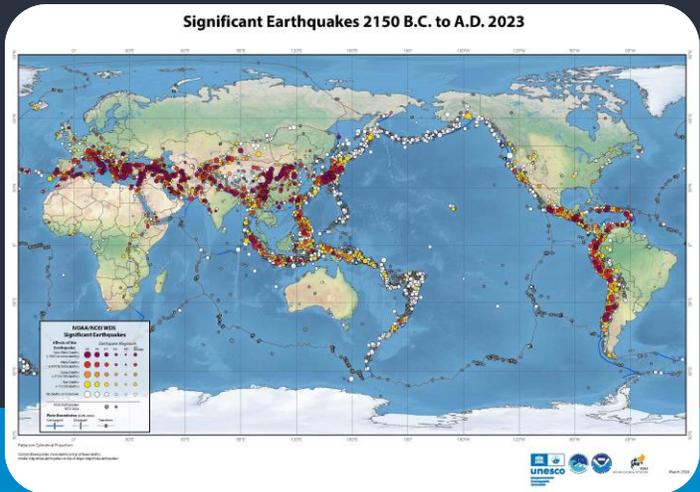
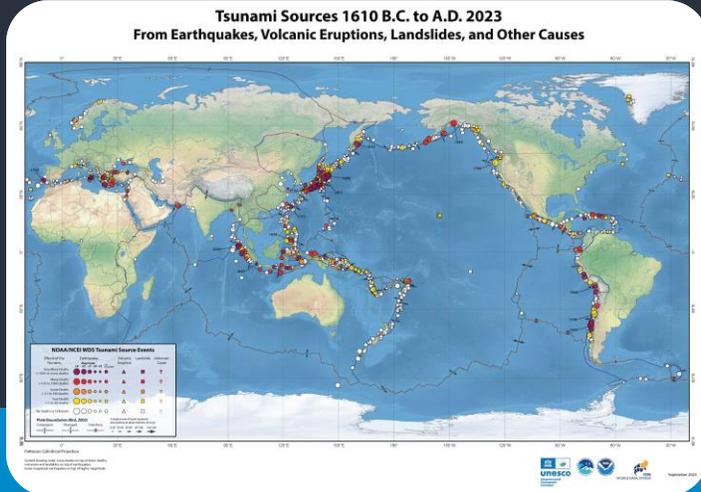
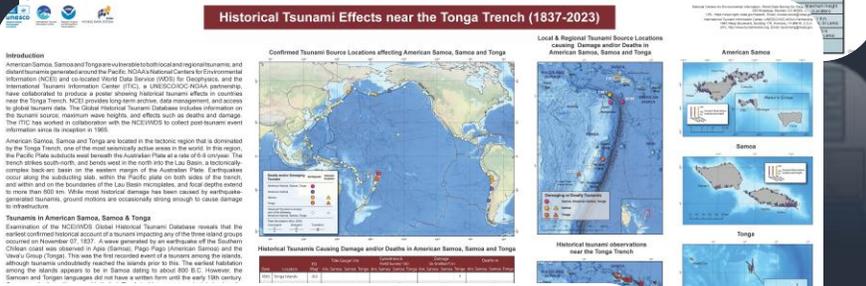
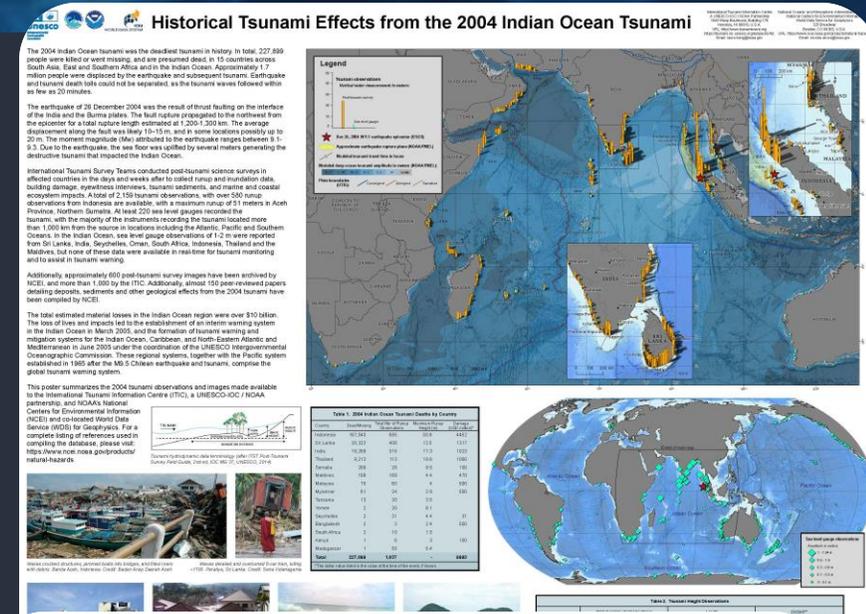
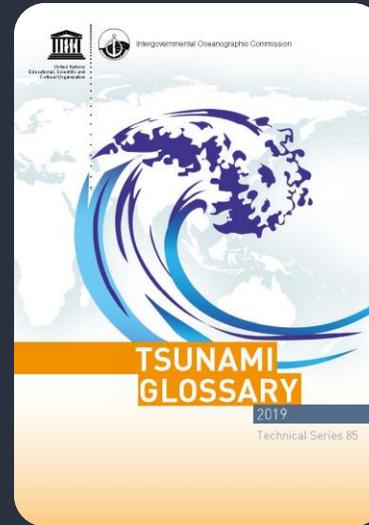


2024 NCEI/WDS Tsunami Database Unique Users: 93,000+ (across 197 countries*)



Partnership w/ ITIC

- Global posters - *update*
 - Tsunami Sources
 - Significant Earthquakes
 - Significant Volcanic Eruptions
- Historical Tsunami Effects: 2004 Indian Ocean Tsunami poster- *new*
- Historical Tsunami Effects: Tonga Trench (1837–2023) Poster – *update*
- Tsunami Glossary - *update*



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/>



Questions?

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