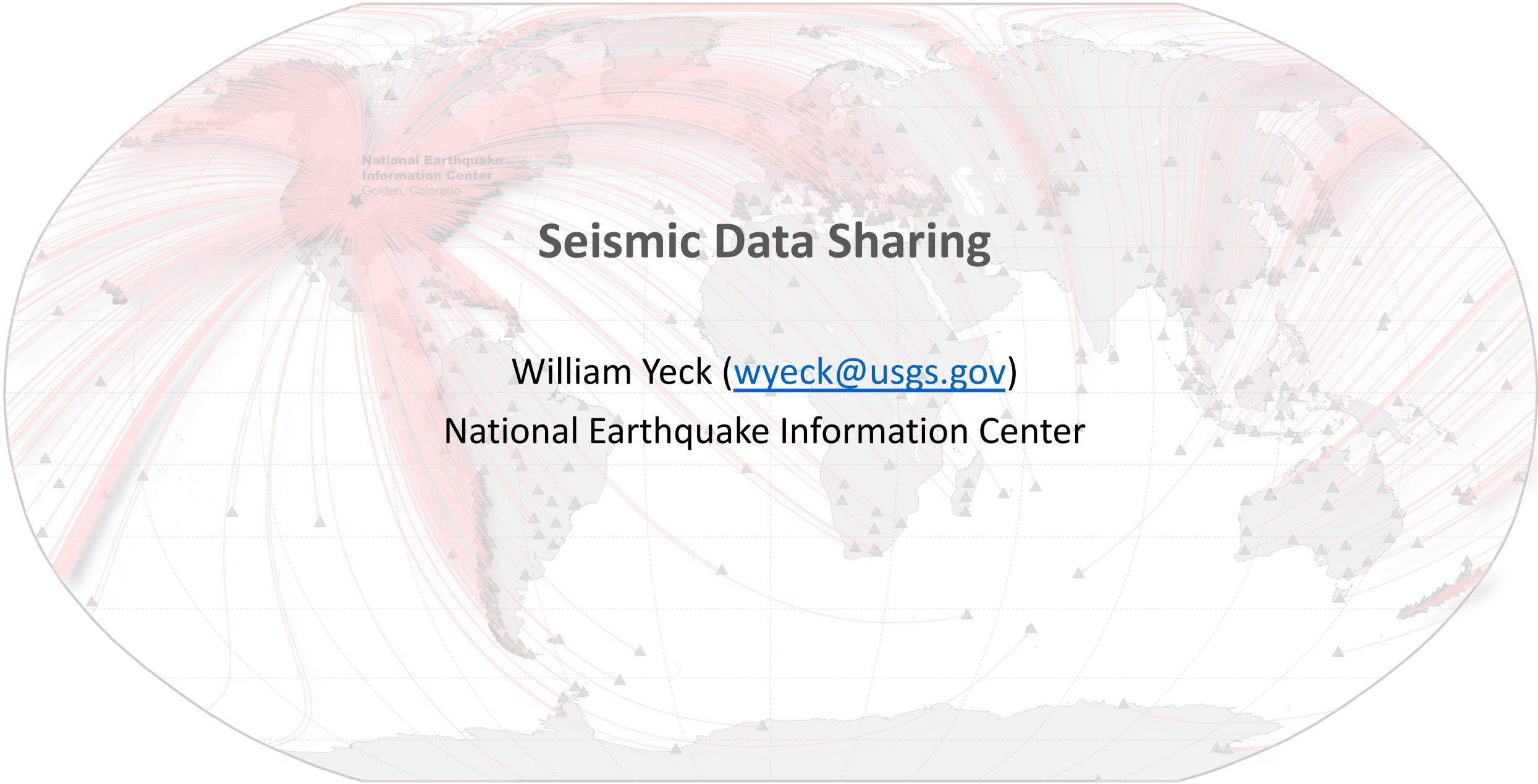

Seismic Data Sharing

William Yeck (wyeck@usgs.gov)

National Earthquake Information Center

National Earthquake Information Center

- Continuously (24/7) monitor global earthquake activity and provide near real-time information about potential loss of life and damage to:
  - Government Officials (Federal, State, Local, & International)
  - Disaster Response Organizations (FEMA,USAID, Red Cross, …)
  - The Public, Media, and Academic Researchers

- Provide a backup for ANSS regional seismic monitoring facilities (in case they are unable to respond).

- Integrate, use, and distribute real-time seismic data acquired from US and collaborative international seismographic networks (Global Seismic Network).

- Conduct research to advance our understanding of earthquake processes and hazards.
- We work in conjunction with the Albuquerque Seismological Laboratory

U.S. Department of the Interior
U.S. Geological Survey

National Elevation Data Set Shaded Relief of the United States

USGS
science for a changing world

Geography - *The National Map*

Advantages of Open Data

- Robust archiving at independent data centers
    - A long-term backup of seismic data
    - Facilitates both internal and external data sharing through various tools (e.g., web-services). These are integrated into common seismological toolboxes (e.g., ObsPy)
- Access to open and easily accessibly tools to assess station quality
    - Helps ensure data meets community standards
    - Helps improve seismic stations and quickly identify potential problems
- Further potential for novel research products and external collaboration
- Improved products for large global earthquakes from agencies which can incorporate data (e.g., event locations, moment-tensors, finite faults).

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Mailing Lists
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About the FDSN

The International Federation of Digital Seismograph Networks (FDSN) is a global organization. Its membership is comprised of groups responsible for the installation and maintenance of seismographs either within their geographic borders or globally. Membership in the FDSN is open to all organizations that operate more than one broadband station. Members agree to coordinate station siting and provide free and open access to their data. This cooperation helps scientists all over the world to further the advancement of earth science and particularly the study of global seismic activity. The FDSN also holds commission status within IASPEI.

The FDSN goals related to station siting and instrumentation are to provide stations with good geographic distribution, recording data with 24 bits of resolution in continuous time series with at least a 20 sample per second sampling rate. The FDSN was also instrumental in development of a universal standard for distribution of broadband waveform data and related parametric information. The Standard for Exchange of Earthquake Data (SEED) format is the result of that effort.

Network Codes

Network codes are also assigned by the FDSN in order to provide uniqueness to seismological data streams. Network operators request these unique codes for both permanent and temporary networks. Network Code request forms are here.

FDSN historical information

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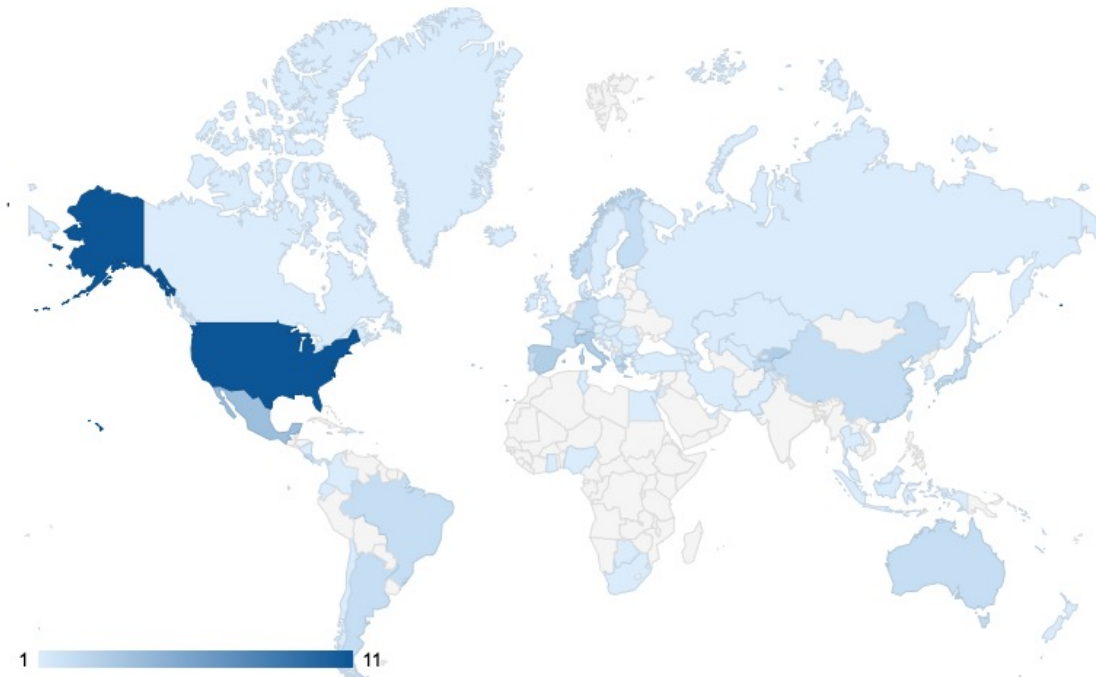
FDSN Membership

The membership of the FDSN is truly global and not dominated by any one country or group. Members come from all continents. Most members of the FDSN operate stations that are confined to their national boundaries but several FDSN members operate stations well outside their borders.



FDSN Membership includes 110 institutions in 78 countries.

Membership in the FDSN is open to all groups that operate more than one broad-band station. Members agree to coordinate station siting and provide free and open access to their data (normally in SEED format). There is

VU: Vanuatu Seismic Network

FDSN Network Information

Are you the operator of this network? Update this information.

FDSN code	VU	**Network name**	Vanuatu Seismic Network
Start year	2010	**Operated by**	Vanuatu Geoscience Observatory
End year	-	**Deployment region**	

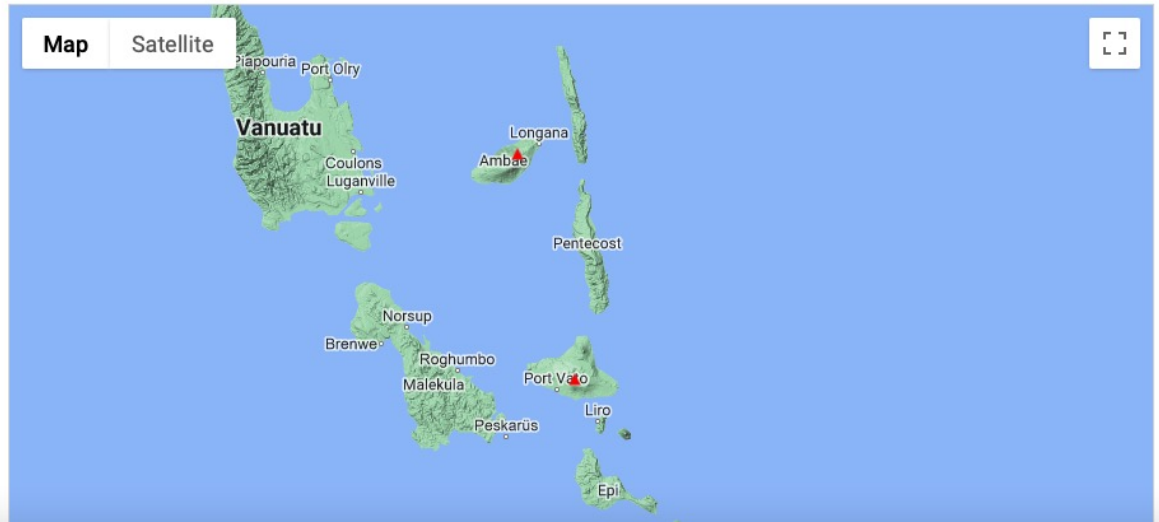
Citation Information

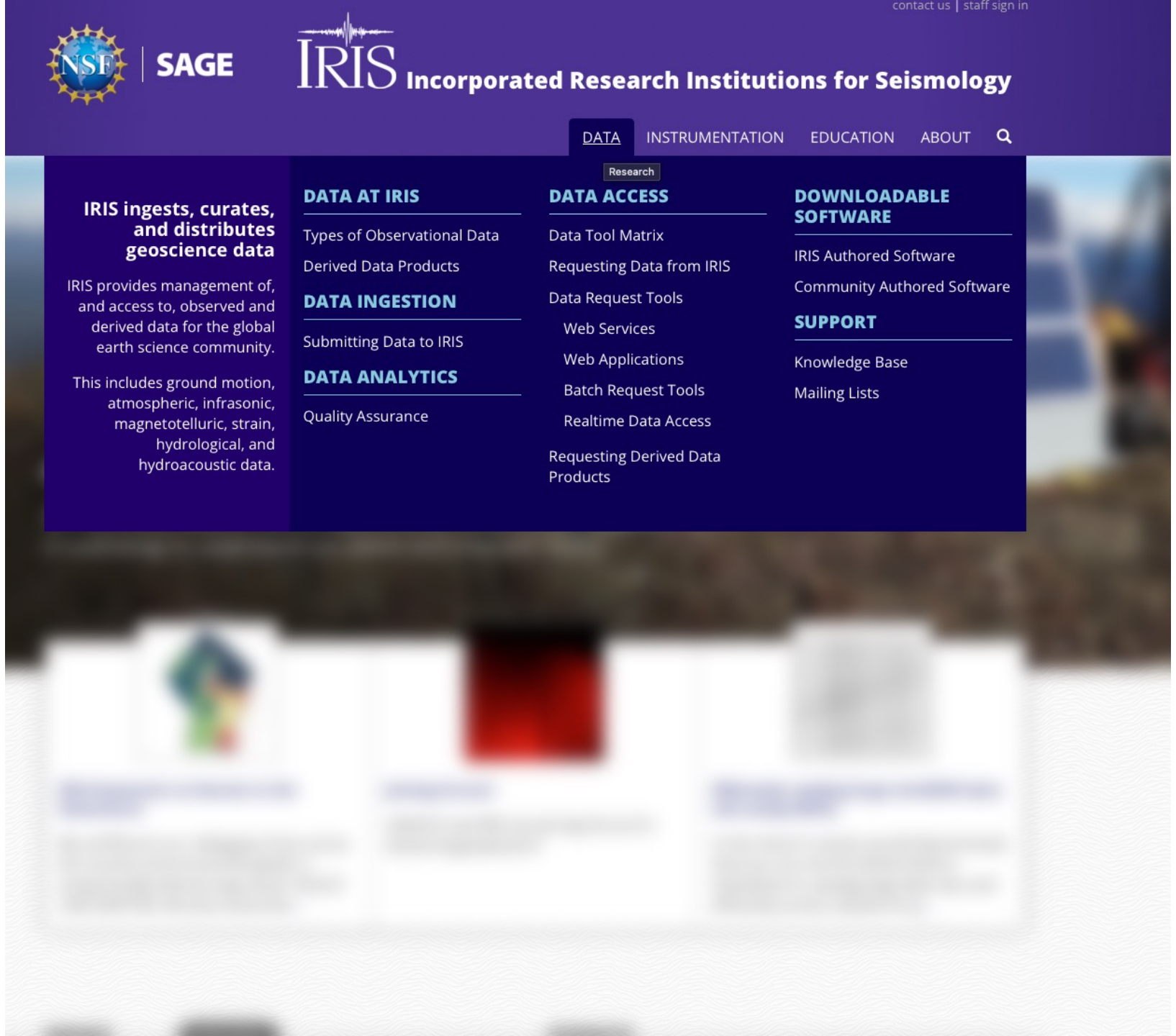
Digital Object Identifier (DOI)	No DOI is registered for this network. A Digital Object Identifier (DOI) is a standardized way of identifying electronic records, and can be used to automatically generate citation text. **DOIs are recommended for all seismic networks.** You can request or register a DOI for this network using the network update form.

Data Access

Data Availability	Data available from: **The IRIS Data Management Center (IRISDMC)** : http://service.iris.edu/fdsnws/dataselect/1/ FDSN Web Services provide a common data access API for seismic data. Availability based on irisws-fedcatalog service. **Full fedcatalog information for this network**

Stations in this Network




contact us | staff sign in
SAGE
IRIS
Incorporated Research Institutions for Seismology
DATA
INSTRUMENTATION
EDUCATION
ABOUT
Research
IRIS ingests, curates, and distributes geoscience data
IRIS provides management of, and access to, observed and derived data for the global earth science community.
This includes ground motion, atmospheric, infrasonic, magnetotelluric, strain, hydrological, and hydroacoustic data.
DATA AT IRIS
Types of Observational Data
Derived Data Products
DATA INGESTION
Submitting Data to IRIS
DATA ANALYTICS
Quality Assurance
DATA ACCESS
Data Tool Matrix
Requesting Data from IRIS
Data Request Tools
Web Services
Web Applications
Batch Request Tools
Realtime Data Access
Requesting Derived Data Products
DOWNLOADABLE SOFTWARE
IRIS Authored Software
Community Authored Software
SUPPORT
Knowledge Base
Mailing Lists

WEB SERVICES

IRIS DMC Web Services

Service Implementations

FDSNWS

Service Interface	Version	Summary	Return options
station	v.1	metadata for time series stored in SEED format	• FDSN StationXML • Text
dataselect	v.1	time series data in miniSEED and other formats	miniSEED SAC zip GeoCSV
event	v.1	contributed earthquake origin and magnitude estimates	• QuakeML • Text • GeoCSV
availability	v.1	Service for returning time series data availability	• Text • JSON • GEOCSV • Request

IRISWS

Service Interface	Version	Summary	Return options
fedcatalog	v.1	A service for federating requests for channel metadata across multiple data centers	text, request
nrl	v.1	A service for integrating with the Nominal Response Library	json, xml, StationXML, StationXML-Response, SEED RESP
syngine	v.1	A service for synthetic seismograms	SACZIP and miniSEED
timeseries	v.1	similar to ws-dataselect with additional options for processing and reformatting	ASCII, WAV, miniSEED, SAC, PNG
timeseriesplot	v.1	A charting webservice offering timeseries graphic display in single-	image: PNG (default) or JPEG

MUSTANG

Service Interface	Version	Summary	Return options
measurements	v.1	The main MUSTANG web service returning measurements for metrics relating to station data quality.	• XML (default) • text • CSV • JSON • JSONP
noise-psd	v.1	Returns Power Spectral Density (PSD) estimates of seismic data and can generate aggregate plots.	• Text – CSV • XML • Plot (PNG)
noise-pdf	v.1	Returns Probability Density Functions (PDFs) in frequency `bins` and can generate aggregate plots.	• Text – CSV • XML • Plot (PNG)
noise-spectrogram	v.1	Returns seismic spectrogram images based on daily PDF mode values	• Plot (PNG)
noise-pdf-browser	v.1	Returns browseable views of MUSTANG PDF plots and spectrogram plots	• Text • JSON • HTML
noise-mode-timeseries	v.1	Returns PDF daily modes and mode timeline plots	• Text – CSV • XML • Plot (PNG)
metrics	v.1	The metrics web service returns a description of available metrics in a variety of formats	• XML • HTML • XSD • JSON • JSONP
targets	v.1	The targets web service returns a list of stations and channels for a given metric.	• Text

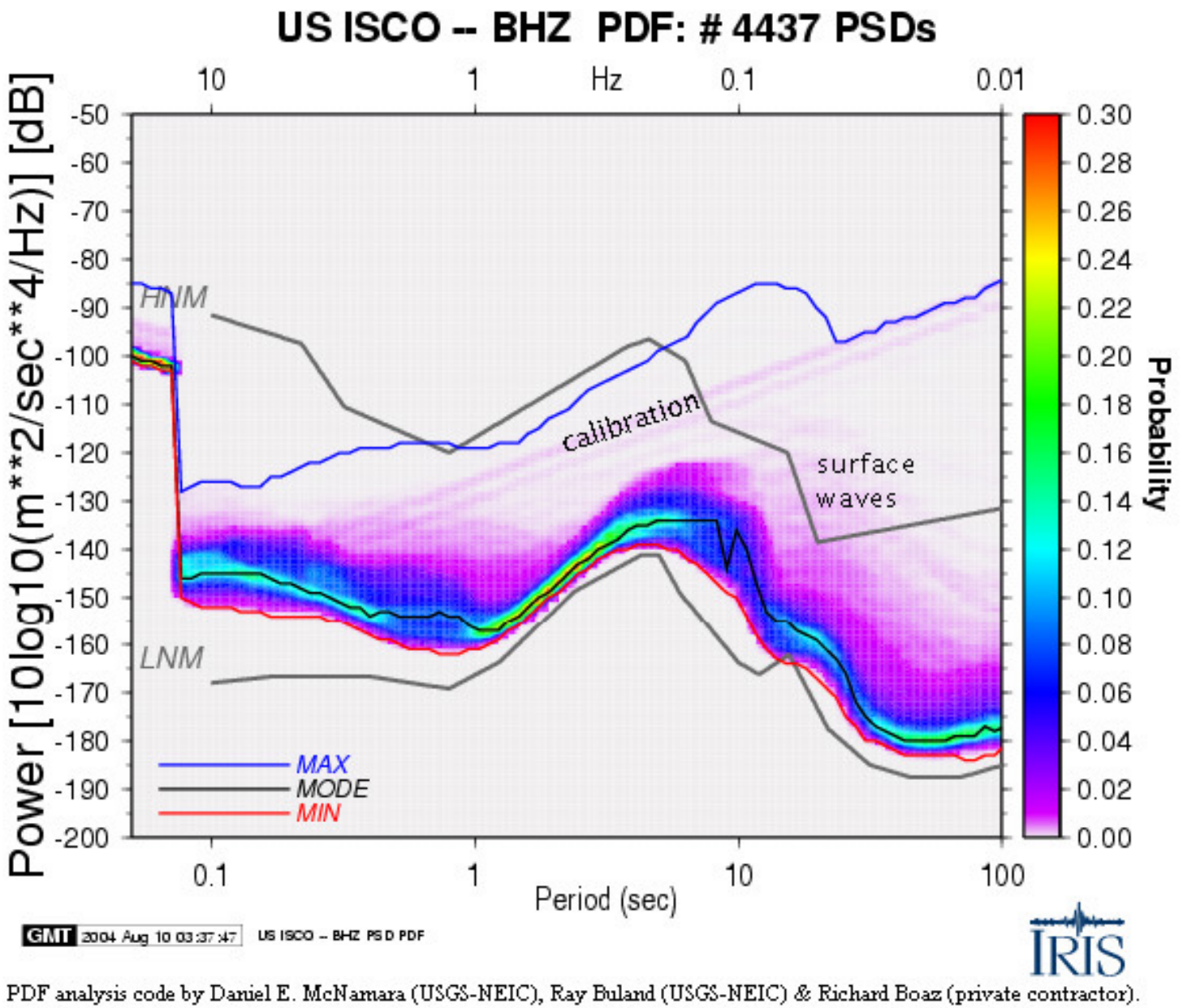
Mustang Examples:

- Noise Spectrograms:
  - https://service.iris.edu/mustang/noise-spectrogram/1/query?target=II.MSVF.00.BHZ.M
  - https://service.iris.edu/mustang/noise-spectrogram/1/query?target=IU.ANMO.00.BHZ.M
- Noise PDF
  - https://service.iris.edu/mustang/noise-pdf/1/query?target=IU.ANMO.00.BHZ.M&starttime=2021-12-01&endtime=2022-12-31&format=plot
  - https://service.iris.edu/mustang/noise-pdf/1/query?target=II.MSVF.00.BHZ.M&starttime=2021-12-01&endtime=2022-12-31&format=plot
- Metrics
  - http://service.iris.edu/mustang/measurements/1/query?metric=clock_locked&sta=MSVF&cha=BHZ&loc=00&format=text&start=2022-01-01&end=2022-10-01&value_lt=4000

Station Quality

Noise Probability Density Functions can alert you to station issues and help prioritize station maintenance and development.

If data is available in IRIS, like for MSVF, simple web tools are available to evaluate noise.

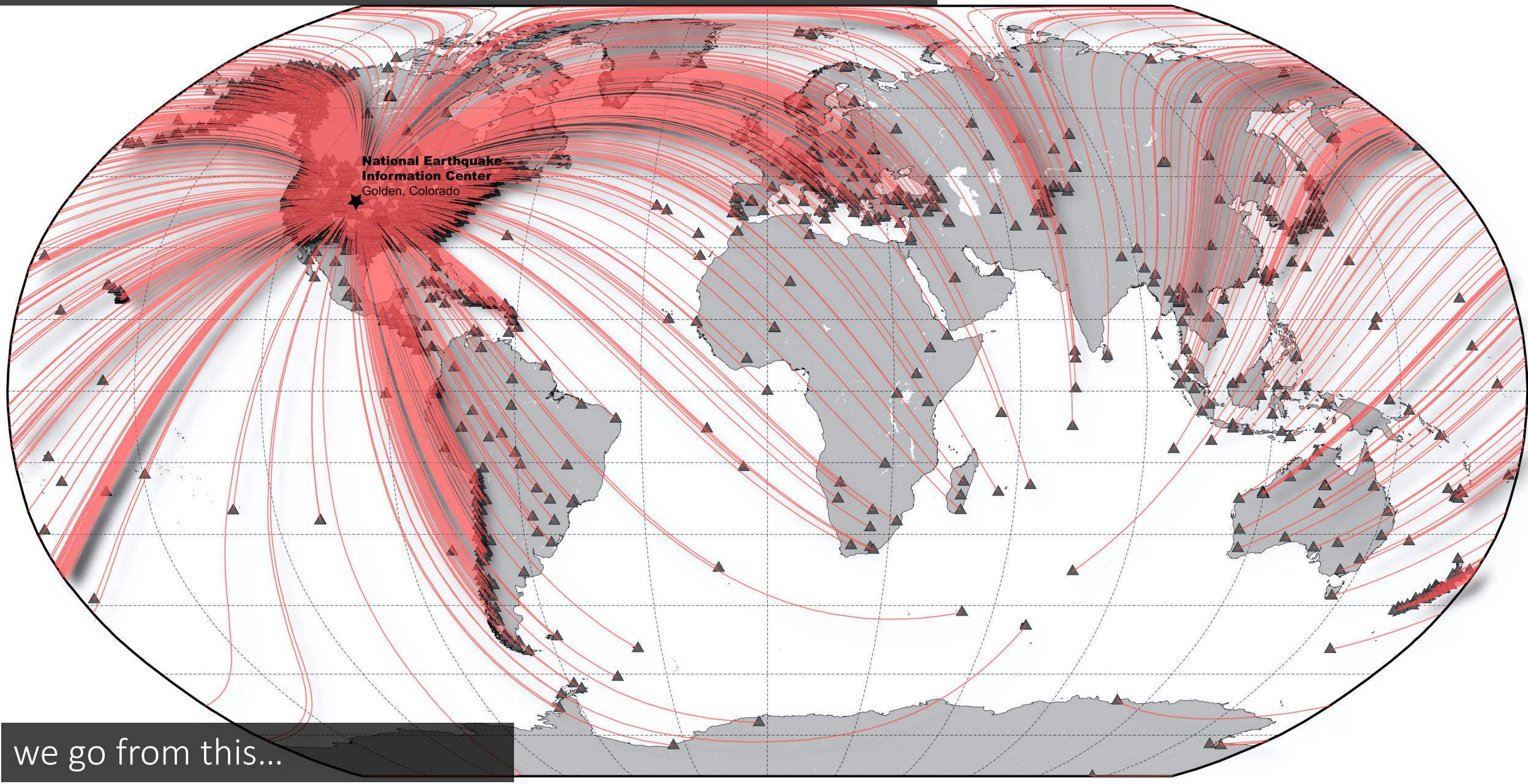


http://services.iris.edu/mustang/noise-pdf-browser/1/gallery?target=II.MSVF.00.BH*.M

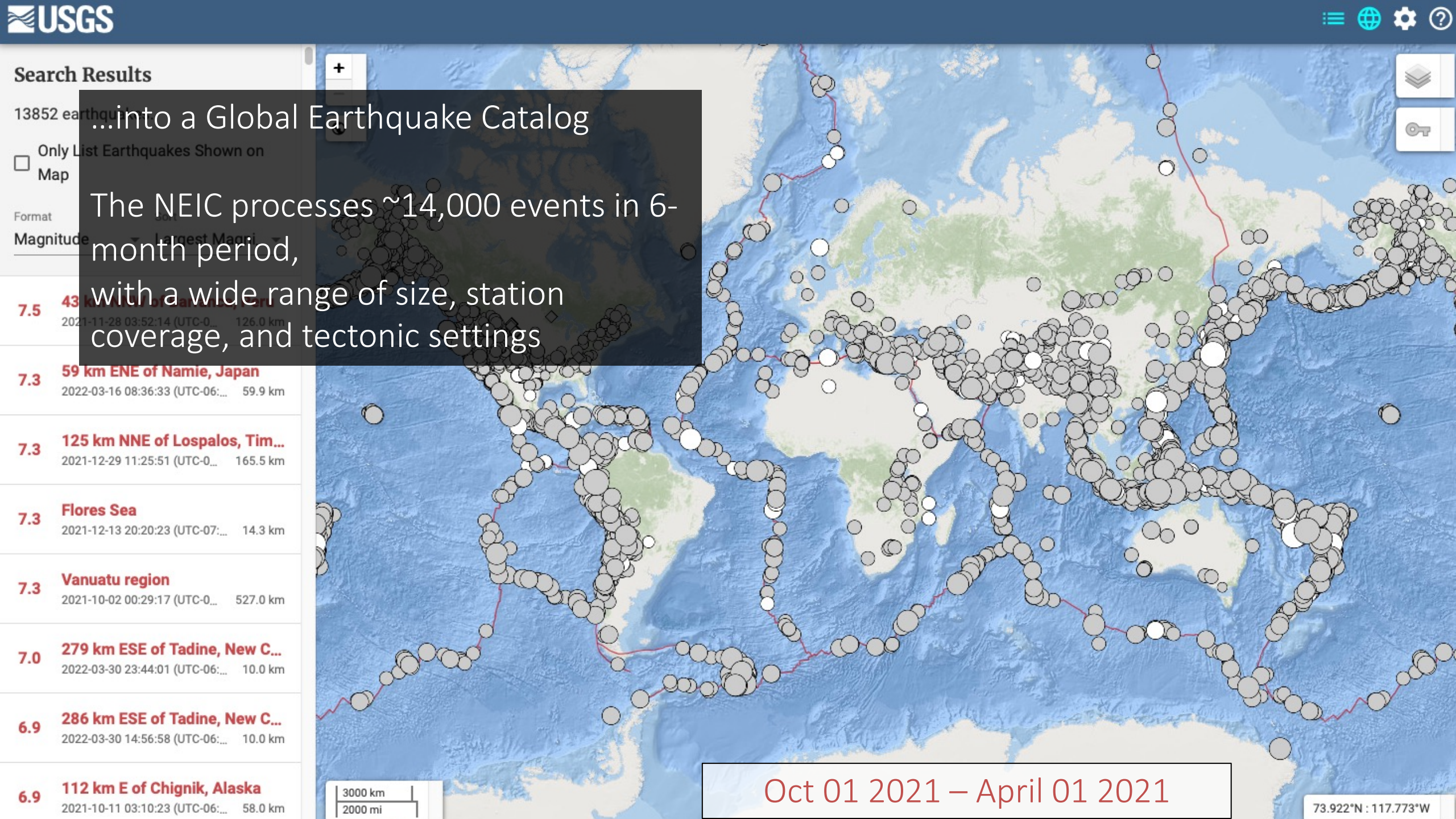
More Details on QC from MUSTANG

- https://ds.iris.edu/ds/workshops/2018/08/north-american-seismic-network-training-workshop-quality-assurance/presentations/

The NEIC leverages 2,100+ real-time seismic stations



we go from this…


USGS
Search Results
13852 earthqu
Only List Earthquakes Shown on Map
Format
Magnitude
7.5
43 km
2021-11-28 03:52:14 (UTC-0...
126.0 km
7.3
59 km ENE of Namie, Japan
2022-03-16 08:36:33 (UTC-06:...
59.9 km
7.3
125 km NNE of Lospalos, Tim...
2021-12-29 11:25:51 (UTC-0...
165.5 km
7.3
Flores Sea
2021-12-13 20:20:23 (UTC-07:...
14.3 km
7.3
Vanuatu region
2021-10-02 00:29:17 (UTC-0...
527.0 km
7.0
279 km ESE of Tadine, New C...
2022-03-30 23:44:01 (UTC-06:...
10.0 km
6.9
286 km ESE of Tadine, New C...
2022-03-30 14:56:58 (UTC-06:...
10.0 km
6.9
112 km E of Chignik, Alaska
2021-10-11 03:10:23 (UTC-06:...
58.0 km
...into a Global Earthquake Catalog
The NEIC processes ~14,000 events in 6-month period,
with a wide range of size, station coverage, and tectonic settings
3000 km
2000 mi
Oct 01 2021 – April 01 2021
73.922°N : 117.773°W

each event has an event page

USGS science for a changing world

MENU

Earthquake Hazards Program

← Latest Earthquakes

- Overview
- Interactive Map
- Regional Information

Impact

- Felt Report - Tell Us!
- Did You Feel It?
- ShakeMap
- PAGER

Technical

- Origin
- Moment Tensor
- Finite Fault
- Waveforms

Download Event KML

View Nearby Seismicity

- Earthquakes
- Hazards

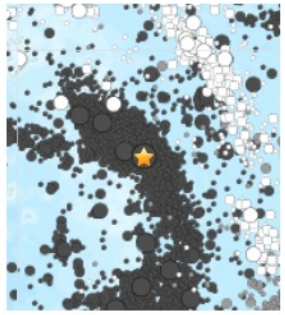
M 8.2 – 267 km E of Levuka, Fiji

2018-08-19 00:19:40 (UTC) | 18.113°S 178.153°W | 600.0 km depth

Interactive Map

Contributed by US [5]

Regional Information



Contributed by US [5]

Felt Report - Tell Us!

0 0 0 0 3 1

Responses

Contribute to citizen science. Please tell us about your experience.

Citizen Scientist Contributions

Did You Feel It? V

Community Internet Intensity Map

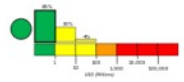
Contributed by US [5]

ShakeMap IV

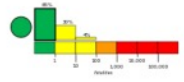
Estimated Intensity Map

Contributed by ATLAS [3]

PAGER GREEN



Estimated Economic Losses



Estimated Fatalities

Contributed by US [5]

Origin

Review Status
REVIEWED

Magnitude
8.2 mww

Depth
600.0 km

Time
2018-08-19 00:19:40 UTC

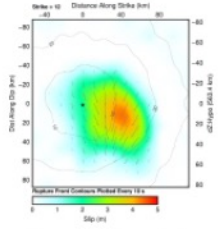
Contributed by US [5]

Moment Tensor

Fault Plane Solution

Contributed by US [5]

Finite Fault



Cross-section of slip distribution.

Contributed by US [5]

Tsunami

U.S. Tsunami Warning System

To view any current tsunami advisories for this and other events please visit https://www.tsunami.gov.

NOAA

View Nearby Seismicity

Time Range
± Three Weeks

Search Radius
250.0 km

Magnitude Range
≥ 5.0

ANSS Comcat

The August 18, 2018, M 8.2 earthquake near Fiji occurred as the result of deep, normal faulting approximately 560 km beneath the South Pacific Ocean several hundred kilometers to the west of the Tonga Trench. Focal mechanism solutions indicate that rupture occurred on a moderately dipping normal fault striking to the west-northwest or the east-southeast. At the location of this earthquake, the Pacific plate moves approximately due west relative to the Australia plate at a velocity of about 81 mm/yr. The location, depth, and focal mechanism solutions of the August 18th event indicate that the earthquake is related to faulting within the subducted Pacific slab.

↩ Latest Earthquakes

Overview

Interactive Map

Regional Information

Impact

Felt Report - Tell Us!

ShakeMap

PAGER

Technical

Origin

Moment Tensor

Waveforms

Download Event KML

View Nearby Seismicity

Earthquakes

Hazards

M 5.5 – Fiji region

2022-10-14 10:05:17 (UTC) | 20.923°S 178.684°W | 565.9 km depth

Origin

View all origin products (1 total)

Contributed by US [1] last updated 2022-10-14 10:23:34 (UTC)

✓ The data below are the most preferred data available
✓ The data below have been reviewed by a scientist

Details | **Phases** | Magnitudes

Phase Arrival Times

DOWNLOAD

Channel	Distance ↑	Azimuth	Phase	Arrival Time	Status	Residual	Weight
YC TNG1 BHZ 00	3.26 °	94.94 °	P	76.8 s	manual	-1.11	0.54
II MSVF BHZ 10	4.41 °	315.19 °	P	87.7 s	manual	1.49	0.54
G FUTU BHZ 00	6.60 °	4.75 °	P	105.7 s	manual	0.88	0.54
NZ GLKZ HHZ 10	8.33 °	175.39 °	P	120.2 s	manual	-1.36	0.58
IU AFI BHZ 10	9.59 °	44.45 °	P	131.8 s	manual	-2.34	0.62
HV ANDI HHZ --	10.20 °	50.69 °	P	139.9 s	manual	-0.20	0.65
HV OFU HHZ --	10.90 °	53.50 °	P	147.4 s	manual	0.12	0.68

Recommendations

- Recommend member national networks join the International Federation of Digital Seismograph Networks
- Contribute some data from each network to a public datacenter (e.g., IRIS DMC)
- Leverage webservices to monitor station quality

Questions?

- William Yeck (wyeck@usgs.gov)
- Feel free to reach out to me any time.

Neat link:

https://earthquake.usgs.gov/storymap/index-seismo-EasternMargin-AustraliaPlate.html