NEIC Mission

MONITORING/RESPONSE

RESEARCH

DATA
NEIC - The People

**24x7 Operations**
1 Director
1 Supervisory Geophysicist
14 Geophysicists
1 Bulletin Editor

**Research**
6 Ph.D. Geophysicist
4-6 University Researchers
2-3 Summer Interns
3 Contractors

**Systems Engineering**
4 Software Developers
1 Software Engineer

**Web Development**
4 Software Developers

**Field Operations**
(GSN and Backbone)
1 Science-in-Charge
1 Director of Operations
~30 Engineers/Admin
Post-Earthquake Information Products

Mostly made by academic community

All In-House
Response Goal: To release accurate & actionable information regarding an earthquake’s location, size, and potential impact, as rapidly as possible.
1920+ events published since July 2009. Approximately complete above M6. Authoritative NEIC magnitude for M6+ EQs in response, and for PDE.
1920+ events published since July 2009. Approximately complete above M6. Authoritative NEIC magnitude for M6+ EQs in response, and for PDE.
USGS’s tool to rapidly assess the intensity of shaking - and thus potential damage - caused by an earthquake.
DYFI? is a way for community users - YOU! - to contribute to our earthquake response.
Answers to these specific questions are very diagnostic of earthquake intensity.
Answers to these specific questions are very diagnostic of earthquake intensity.
The next step is to assess how many people experienced such shaking intensities...
**Prompt Assessment**

**M 9.0, NEAR THE EAST COAST OF HONSHU, JAPAN**

Location: 38.32°N 142.37°E Depth: 32 km

**FOR TSUNAMI INFORMATION, SEE: tsunami.noaa.gov**

Estimated Fatalities

Red alert for shaking-related fatalities and economic losses. High casualties and extensive damage are probable and the disaster is likely widespread. Past red alerts have required a national or international response.

Estimated Economic Losses

Estimated economic losses are 0-1% GDP of Japan.

**Estimated Population Exposed to Earthquake Shaking**

<table>
<thead>
<tr>
<th>Potential Damage</th>
<th>Resistant Structures</th>
<th>Vulnerable Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>V. Light</td>
<td>Light</td>
</tr>
<tr>
<td></td>
<td>Light</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Moderate/Heavy</td>
<td>Heavy</td>
</tr>
<tr>
<td></td>
<td>Heavy</td>
<td>V. Heavy</td>
</tr>
</tbody>
</table>

Red alert for shaking-related fatalities and economic losses. High casualties and extensive damage are probable and the disaster is likely widespread. Past red alerts have required a national or international response.

*Estimated population only includes population within the map area.*

**Structures:**

Overall, the population in this region resides in structures that are resistant to earthquake shaking, though some vulnerable structures exist. The predominant vulnerable building types are non-ductile reinforced concrete frame and heavy wood frame construction.

**Historical Earthquakes (with MMI levels):**

<table>
<thead>
<tr>
<th>Date</th>
<th>Dist. (km)</th>
<th>Mag.</th>
<th>Max MMI</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-06-14</td>
<td>363</td>
<td>5.7</td>
<td>VII(428k)</td>
<td>0</td>
</tr>
<tr>
<td>1994-12-28</td>
<td>263</td>
<td>7.7</td>
<td>VII(132k)</td>
<td>3</td>
</tr>
<tr>
<td>1993-05-26</td>
<td>369</td>
<td>7.7</td>
<td>VII(174k)</td>
<td>104</td>
</tr>
</tbody>
</table>

Recent earthquakes in this area have caused secondary hazards such as tsunamis, landslides, and fires that might have contributed to losses.

**Selected City Exposure**

<table>
<thead>
<tr>
<th>MMI City</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>IX Furukawa</td>
<td>76k</td>
</tr>
<tr>
<td>IX Iwanuma</td>
<td>42k</td>
</tr>
<tr>
<td>IX Hitachi</td>
<td>186k</td>
</tr>
<tr>
<td>IX Kogota</td>
<td>20k</td>
</tr>
<tr>
<td>VIII Shiogama</td>
<td>60k</td>
</tr>
<tr>
<td>VIII Sukagawa</td>
<td>69k</td>
</tr>
<tr>
<td>VII Tokyo</td>
<td>8,337k</td>
</tr>
<tr>
<td>VII Yokohama</td>
<td>3,574k</td>
</tr>
<tr>
<td>IV Nagoya</td>
<td>2,191k</td>
</tr>
<tr>
<td>III Osaka</td>
<td>2,592k</td>
</tr>
<tr>
<td>III Kobe</td>
<td>1,528k</td>
</tr>
</tbody>
</table>

Bold cities appear on map.

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.

http://earthquake.usgs.gov/pager

FOR TSUNAMI INFORMATION, SEE: tsunami.noaa.gov

Event ID: usc0001xgp
PAGER uses a color-coded “earthquake impact scale”, communicating predicted impact and response needed after an event: **green** (little or no impact), **yellow** (regional impact and response), **orange** (national-scale impact and response), and **red** (international response).

**Estimated Fatalities**

Red alert for shaking-related fatalities and economic losses. High casualties and extensive damage are probable and the disaster is likely widespread. Past red alerts have required a national or international response.

**Estimated Economic Losses**

Estimated economic losses are 0-1% GDP of Japan.

PAGER—Rapid Assessment of an Earthquake’s Impact

**Prompt Assessment of Global Earthquakes for Response**
Earthquakes Are Not Points!

M9.0, Japan, 03-2011
Earthquakes Are Not Points!

M9.0, Japan, 03-2011

M8.8, Chile, 02-2010
Earthquakes Are Not Points!

M7.6, Costa Rica, 09-2012

M8.8, Chile, 02-2010
Earthquakes Are Not Points!

M7.6, Costa Rica, 09-2012

M7.8, Haida Gwaii, Canada, 10-2012

Earthquakes are not points! The magnitudes of recent earthquakes are given: M9.0 in Japan, 03-2011; M8.8 in Chile, 02-2010; M7.6 in Costa Rica, 09-2012; M7.8 in Haida Gwaii, Canada, 10-2012.
Two scenarios shown for 2011 Tohoku earthquake; one with northward rupture, and one to the south. Shaking intensities much higher in Tokyo in southward rupture scenario.
Thus, population exposures significantly increase for the southward scenario as well.
Thus, population exposures significantly increase for the southward scenario as well.
A response network is only as good as its ability to communicate.
The USGS Earthquake Hazards Program is part of the National Earthquake Hazards Reduction Program (NEHRP), established by Congress in 1977. We monitor and report earthquakes, assess earthquake impacts and hazards, and research the causes and effects of earthquakes.

Latest Earthquakes

Significant Earthquakes Past 30 Days

6.3 Southern Mid-Atlantic Ridge
2015-05-24 04:53:22 UTC
10.0 km deep

6.8 159km ESE of Kirakira, Solomon Islands
2015-05-22 23:59:33 UTC
10.0 km deep

6.9 204km ESE of Kirakira, Solomon Islands
2015-05-22 21:45:19 UTC
9.9 km deep

4.8 35km SSW of Caliente, Nevada
2015-05-22 18:47:42 UTC
4.0 km deep

4.1 10km ENE of Yountville, California
2015-05-22 02:53:00 UTC
13.0 km deep

6.8 184km W of Lata, Solomon Islands
2015-05-20 22:48:53 UTC
12.0 km deep

6.7 Pacific-Antarctic Ridge
2015-05-19 15:25:21 UTC
10.2 km deep

3.3 6km N of Irving, Texas
2015-05-18 18:14:29 UTC
5.0 km deep

5.7 24km N of Ramechhap, Nepal
2015-05-16 11:34:10 UTC
10.0 km deep

Featured Items

Nepal Earthquake Sequence
Educational Slides

Download 17MB PDF presentation created by USGS scientists.
ComCat (Combined Catalog) - A New Web Interface
Search Earthquake Archives

Search results are limited to 20,000 events. To get URL for a search, click the search button, then copy the URL from the browser address bar.

- Help
- About the ANSS Comprehensive Catalog and Important Caveats

Basic Options

Date & Time

Start (UTC)
2015-05-19 00:00:00

End (UTC)
2015-05-26 23:59:59

Geographic Region

Currently searching entire world

Rectangle
Decimal degree coordinates. North must be greater than South. East must be greater than West.

Draw Rectangle on Map

Magnitude

Minimum
6

Maximum

Depth (km)

Minimum

Maximum

Circle/ Donut
Specify an inner radius to perform a donut search.

Center Latitude

Center Longitude

North

West

East

South
Impact (PAGER, ShakeMap, DYFI)

Significance

Minimum

Maximum

PAGER Alert Level

- Any
- Green
- Yellow
- Orange
- Red

ShakeMap MMI

Decimal numbers

Minimum

Maximum

Did You Feel It CDI

Decimal numbers

Minimum

Maximum

Number of DYFI? Responses

Minimum

Order By

- Time - Newest First
- Time - Oldest First
- Magnitude - Largest First
- Magnitude - Smallest First
Catalog
- Any
- AK - Alaska Earthquake Information Center
- AT - National Tsunami Warning Center
- Atlas
- Choy
- CI - California Institute of Technology
- Dr
- Duputel
- Gcmt
- HV - Hawaiian Volcano Observatory
- Is
- ISC-GEM
- LD - Lamont-Doherty Cooperative Seismographic Network
- MB - Montana Bureau of Mines and Geology
- NC - Northern California Seismic System
- Ne
- NM - St. Louis University
- NN - University of Nevada
- Official
- PR - Red Sismica de Puerto Rico
- PT - Pacific Tsunami Warning Center
- SE - Virginia Tech
- US - National Earthquake Information Center, PDE
- UU - University of Utah
- UW - University of Washington

Event Type
- Impact (PAGER, ShakeMap, DYFI)

Catalog

Contributor

Product Type

Order By
- Time - Newest First
- Time - Oldest First
- Magnitude - Largest First
- Magnitude - Smallest First
During the most recent 12-month period the website had just over 150 million pageviews, which is about 12.5 million pageviews per month, 3 million pageviews per week, or 0.5 million pageviews per day. Over half the total pageviews were of real-time data pages of some sort. Pageviews for the real-time feeds are not included in Google Analytics, but comparing the number of pageviews of the Latest EQ interface with the number of pageviews in the top 8 feeds using our Logaholic statistics for a 30-day period, we receive about 4 times more feed pageviews than all the other real-time pageviews on average.
Information On The Move

<table>
<thead>
<tr>
<th>Device Category</th>
<th>Total Sessions</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>desktop</td>
<td>75,004,055</td>
<td>100.00%</td>
</tr>
<tr>
<td>mobile</td>
<td>75,004,055</td>
<td>100.00%</td>
</tr>
<tr>
<td>tablet</td>
<td>7350828</td>
<td>9.80%</td>
</tr>
<tr>
<td>mobile</td>
<td>17,725,873</td>
<td>23.63%</td>
</tr>
<tr>
<td>desktop</td>
<td>49,927,354</td>
<td>66.57%</td>
</tr>
</tbody>
</table>

Two-thirds of our visitors are using their desktops to access the website, about ¼ are using a mobile device, and 10% are using a tablet.
Earthquake Notification Service

Event pages linked directly from text messages; instant access to all event-based info in new, phone-friendly web format.
Changes in Modern EQ Response

Rising Expectation from the Public, Media, State and Federal Agencies

- Increasingly the planet is becoming more wired. Citizens get upset if they don’t get good information quickly.
Changes in Modern EQ Response

Rising Expectation from the Public, Media, State and Federal Agencies

~ 1 min after 04-17 EQ felt in Santiago @ ~ 1AM)
Changes in Modern EQ Response

Rising Expectation from the Public, Media, State and Federal Agencies

- Increasingly the planet is becoming more wired. Citizens get upset if they don’t get good information quickly.
Changes in Modern EQ Response

EQ @ 03:50:16

2012/04/17 03:50:46
UL: Chile. Providencia.
GEO: -33.423, -70.612 (C)
Terremoto!!!!!!!!!!!!!!!!

2012/04/17 03:50:46
UL: Chile, Santiago
GEO: -33.463, -70.648 (C)
temblor pesado

2012/04/17 03:50:46
UL: San Antonio, Chile
GEO: -33.587, -71.613 (C)
weno el temblor mierda

2012/04/17 03:50:46
UL: SCL-Santiago de Chile
GEO: -33.437, -70.651 (C)
temblor!!!!!

2012/04/17 03:50:46
UL: Santiago, Chile
GEO: -33.437, -70.651 (C)
Temblor

2012/04/17 03:50:45
UL: Viña del Mar, Chile.
GEO: -33.024, -71.552 (C)
Temblor

2012/04/17 03:50:34
UL: Kristenland♥, Chile
GEO: -37.021, -87.946 (C)
OOOOOOOOOH TEMBLOR!

2012/04/17 03:50:34
UL: Viña del mar, Chile
GEO: -33.024, -71.552 (C)
Uyyyy temblor fuerte
Twitter Alerts

@USGSted

Twitter Earthquake Dispatch

~50,000 followers

Highly scaleable

Tweets alerts for M5.5+ EQs
Communicating EQ Products - PDL

PDL Hub
Product Distribution Layer

ShakeMap
PAGER
Loss Modeling & Analysis

DYFI?
Did You Feel It?

Edge
Data Acquisition

Hydra
NEIC Earthquake Monitoring & Analysis

Web
earthquake.usgs.gov

ComCat
Comprehensive Catalog

TED
Tweet Earthquake Dispatch Detector

ENS
Earthquake Notification System

Twitter

PDL Client
Custom Code

External Product Consumers

End Users

Collaborators:
ANSS, IDC, ISC
The products we serve - magnitude doesn’t tell us how an earthquake affects people. New products have allowed us to both improve our rapid response, and serve more useful information.
Comparing EQ Response Response

2004 Sumatra EQ (M 9.1) vs 2011 Tohoku EQ (M 9.0)

<table>
<thead>
<tr>
<th>Time</th>
<th>2004</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>OT + 30 min</td>
<td>10-19 min</td>
<td>38 min</td>
</tr>
<tr>
<td>OT + 75 min</td>
<td>65 min</td>
<td>2 hrs</td>
</tr>
<tr>
<td>OT + 6 hr</td>
<td>77-83 min</td>
<td>6 hr 13 min</td>
</tr>
<tr>
<td>OT + 7 hr</td>
<td>6 hr 55 min</td>
<td></td>
</tr>
</tbody>
</table>

- **2004 Sumatra EQ**
  - Public Release M 7.9
  - PAGER Red Alert (Economic Loss)

- **2011 Tohoku EQ**
  - Update # 1 Mw 8.8
  - Update # 2 Mw 8.9
  - Finiteness in ShakeMap
  - Slip Map Published (One of our last response products)
  - Update # 1 Mw 8.9 (gCMT)
  - Public Release Ms 8.5

- **Public Release**
  - Ms 8.5
  - M 7.9

- **Update**
  - # 1 Mw 8.8
  - # 2 Mw 8.9

- **Finiteness in ShakeMap**
  - Update # 1 Mw 8.9 (gCMT)

- **Slip Map Published**
  - (One of our last response products)
Questions?

Gavin P. Hayes (ghayes@usgs.gov)
USGS NEIC (earthquake.usgs.gov)

See the detailed earthquake response and educational material, etc., on our website!