Agency Vision and Decision-Maker Needs: A USGS Perspective

Connecting Grassroots to Government for Disaster Management

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USGS hazard roles and responsibilities

• Delegated federal responsibility to provide notifications and warnings for earthquakes, volcanic eruptions, and landslides.

• Seismic networks support NOAA’s tsunami warnings.

• Streamgages and storm surge monitors support NOAA’s flood and severe weather (including hurricane) warnings.

• Geomagnetic observatories support NOAA and AFWA geomagnetic storm forecasts.

• USGS has key role in tracking zoonotic diseases.

• Geospatial information supports response operations for wildfire and many other disasters.
Crowdsourced Data and Social Media: An Infrastructure for Hazard Assessment, Monitoring, and Response

- Did You Feel It?
- Did You See It?
- USGS TED: Tweet Earthquake Dispatch
- Quake Catcher Network
- Netquake Sensor Volunteers
- National Map Corps
Did You Feel It?

Rapid & automatic intensity maps based on felt reports submitted online.

- Users answer simple online questionnaire.
- Color-code ZIP-code to community’s average intensity.
- Replaces traditional postal questionnaire.
10 Years of DYFI Data (~2 million responses)

USGS National Seismic Hazard Map (2% in 50 Year Probability of Exceedence)
Did You See It?
Landslide Reporting

Landslide Summary

Location Required
Address, zip code, or other information to describe the landslide location.

Input Coordinates Instead

When did you first see the landslide? Required
This may be different than when the landslide occurred.
Date Format: 2011-08-31
12:00 AM

Landslide Type
Hover your mouse over each option for additional information, or see:

- Fall
  A fall occurs when a mass of any size detaches from a steep slope or cliff and descends mostly through the air by freefall, bouncing, or rolling.

- Flow

- Topple

- Rotational

- Translational

• Enables crowd-sourced, online landslide reports

• Qualitative information may be used in USGS reports
TED: Tweet Earthquake Dispatch

- Alerts for earthquakes worldwide with M 5.5+.
- Magnitude descriptor, location, origin time, link to USGS webpage.
- Alerts include frequency of tweets in event region that contain the word “earthquake” or its equivalent in several languages.

USGSted
@USGSted
Official U.S. Geological Survey earthquake alerts. For other official accounts, and to engage with us on other channels see http://usgs.gov/socialmedia

Follow USGSted

Email
Password

Sign up

Tweets

USGSted @USGSted
Powerful earthquake, KURIL ISLANDS, Sep-9 05:39 UTC, 0 #quake
tweets/min, on.doi.gov/OiPXTO
from Северо-Курильский район, Province of Sakhalin

USGSted @USGSted
Strong earthquake, COSTA RICA, Sep-8 20:29 UTC, 13 #temblor
tweets/min, on.doi.gov/Ni3nyd
USGS TED Example: Philippines Quake

M7.6 - 88km E of Sulangan, Philippines
2012-08-31 12:47:33 UTC

ShakeMap

Contributed by USGS NWIS

Twitter Alerts U.S. Geological Survey to Philippines Quake


Twitter Inc., the microblogging service that lets more than 140 million users send short messages on everything from the mundane to the life-altering, tipped off the U.S. Geological Survey to the 7.6-magnitude earthquake that hit near the coast of the Philippines today.

The Reston, Virginia-based agency detected tweets about the earthquake one minute and seven seconds after the seismic event, which occurred at about 8:47 p.m. local time, Paul Earle, a USGS seismologist, said in a telephone interview.

Social media sites such as San Francisco-based Twitter are playing a more prominent role in raising awareness of and coordinating responses to natural disasters, including the 2010 earthquake in Haiti and one last year in Japan that led to the failure of the Fukushima nuclear plant. USGS scientists monitor tweets for mentions of the word “earthquake” and its equivalents in other languages.

“In some cases, it gives us a heads up that it happened before it can be detected by a seismic wave,” Earle said.
Survey to the 7.6-magnitude earthquake that hit near the coast of the Philippines today.

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Other Citizen-aided science: Cheap seismic sensors

QuakeCatcher Network (Stanford Univ.)
iShake (U.C. Berkeley)
NetQuakes (USGS)

The Quake-Catcher Network

The Quake-Catcher Network is a collaborative initiative for developing the world's largest, low-cost strong-motion seismic network by utilizing sensors in and attached to Internet-connected computers. With your help, the Quake-Catcher Network can provide better understanding of earthquakes, give early warning to schools, emergency response systems, and others. The Quake-Catcher Network is a community-led project and is open to anyone who wants to contribute.

The USGS is trying to achieve a denser and more uniform spacing of seismographs in select urban areas to provide better measurements of ground motion during earthquakes. These measurements improve our ability to make rapid post-earthquake assessments of expected damage and contribute to the continuing development of engineering standards for construction.
Distribution of QCN Participants

- Over 2000 seismic stations globally in 67 countries
- Recorded earthquakes between M 2.6 (New Zealand) – M 8.8 (Chile)
National Map Corps
Crowdsourcing used to update USGS geographic data

- Volunteers mapping structures
- Pilot program in CO
- Improved map quality
Any questions?

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Did You Feel It?

Statistics

• Operating in CA since 1999; US since 2001, & globally 2005
• To date >2 million individual responses from all 50 U.S. States & Territories.
• Outside the U.S., over 190,000 responses in 9,500 cities for 140 countries.
• 40 U.S. earthquakes with >10,000 reports submitted; 300 events with > 1,000 entries.
• Max=142,000 reports submitted Aug 23 2011, M5.8 Virginia event (45,000/hr; ~750 per min; ~13/sec).

D. Wald, USGS
Did You Feel It?
Capabilities

- Immediate feedback, “heads up” on events within 1 min, around the globe.
- Intensity maps are immediately available; update constantly.
- USGS can now automatically collect intensity data for all felt earthquakes in U.S.
- Magnitude <2.0 events reported in Central & Eastern US (well below routine reporting level for most seismic networks).
- Can capture felt reports for non-earthquake related shaking: Sonic booms (shuttle; military aircraft) & bolides; explosions & quarry blasts.
- Allows immediate, quality & cost effective way of collecting a large quantity of macroseismic intensity data, replacing postal questionnaires. [USGS can still assign values from field/engineering surveys]
- We can automatically geocode entries to latitude/longitude for higher spatial resolution, as needed.

D. Wald, USGS
Did You Feel It?

Reasons for Success

From our experience with DYFI, essential components of an internet-based citizen-science portal include:

- Easy-to-use forms, & instantaneous feedback so that users may see their contribution (validating their experience),
- Ability to see one’s contribution (but not full responses),
- Open space for first-person accounts (catharsis; risk perception),
- User-friendly tools: common searches, statistics, sorting of responses, time-entry histories, comparing data with empirical intensity estimates,
- Easily-downloadable data exchange format for researchers.

MOTHER NATURE GETS PEOPLES’ ATTENTION!

D. Wald, USGS
Quake-Catcher Network

Website: http://qcn.stanford.edu

*Dense strong-motion (M>3) network:*
- Involves the public in seismic data collection by installing sensor in homes, businesses and schools
- Small, low-cost sensors are connected to desktop computers and plug computer

*Objectives:*
- Community understanding of earthquake risk and seismology
- Rapid earthquake detection and characterization
- Earthquake source imaging
- Wave propagation and seismic hazard

Graves and Somerville (2006), visualization by Chourasia (SDSC)