The California Earthquake Clearinghouse

Ridgecrest Earthquakes, July 2019

Improving Earthquake Resiliency
Through the Use of Post-Earthquake Clearinghouses

American Geosciences Institute
Geoscience Online Learning Initiative (GOLI) Webinar
November 14, 2019

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After a major and/or damaging earthquake in California, the California Geological Survey (CGS) is authorized to establish an earthquake clearinghouse.

Works in partnership with its managing partners:
- Earthquake Engineering Research Institute (EERI)
- United States Geological Survey (USGS)
- California Governor’s Office of Emergency Services (Cal OES)
- California Seismic Safety Commission (CSSC)

The clearinghouse provides for the timely sharing of information and data by researchers, engineers, and scientists conducting reconnaissance immediately after an earthquake.
The California Earthquake Clearinghouse can be activated when the following parameters are met:

- An urban area is struck by a major and/or damaging earthquake
  or
- Upon recommendation of CGS, USGS, EERI, CSSC, and Cal OES when damage is significant
  or
- A less densely populated area, with an earthquake large enough to damage structures and lifelines.
Physical EQ Clearinghouse

Location where scientists, engineers, and other professionals become part of a larger, temporary organization whose primary purpose is to collect and disseminate perishable field data.

Provides a daily forum where geologists, engineers, researchers, and other practitioners can assemble to share and discuss observations and coordinate field investigations.
Ridgecrest Earthquakes Overview

On July 4, 2019, Southern California experienced a M6.4 earthquake followed by aftershocks.

Within minutes there were initial reports of some damage and fires.

~34 hours later, a M7.1 earthquake occurred, followed by an even more robust aftershock series.

Los Angeles is 114 miles to SW, felt both earthquakes.
CA EQ Clearinghouse Operations Support

EERI – operations, communication/briefings, virtual clearinghouse
CGS – operations, data collection/database management
USGS – data collection/database management
CSSC - operations
Cal OES – securing a physical location, communications with CA State Emergency Operations Center
Clearinghouse Investigations included Defining and Documenting:

**Hazards:**
- Surface rupture
- Liquefaction
- Lateral spread
- Ground shaking

Photo by Janis Hernandez, CGS

Brandenberg and others, 2019

Photo by Scott Brandenberg

Photo by Brian Olson, CGS

Photo by John Foster, US Navy
Effects on Built Environment and Community:

**Lifeline**: gas, power, communication, bridges, water, transportation

**Structural**: general building stock, hospital, commercial structures, single family homes, manufactured homes, fires, schools, ground motion/damage, building tagging
Ridgecrest Physical Clearinghouse Benefits

- Provided rapid assessment of the geologic hazard and documentation of perishable scientific information – of use to the scientific and engineering community for improvement of building codes and engineering/scientific advances.

- Improved coordination of teams and individuals in the field

- Communication and coordination expanded access to restricted areas

- Linked the scientific and engineering communities with agencies and organizations responsible for emergency response (via evening briefings, virtual clearinghouse, and direct communication with the State Emergency Operations Center)

- Provided expertise important for potentially directing response resources (personnel, equipment, supplies) to impacted areas that may have been missed by standard response measures.
Evening briefings provided a forum for mapping groups to report out their findings. These briefings included call-ins from other field personnel, other invited agencies, and representatives at the CA Emergency State Operations Center in Sacramento.
Data collection apps were used to facilitate systematic gathering, documentation, and dissemination of data, observations, and findings.

Clearinghouse provided onsite support for accessing collection apps.
Virtual Clearinghouse Benefits

• Sharing of field data – *data from NAWS restricted until detailed internal review completed*

• Access to upload and share photos and preliminary reports

• Hosted links to other data and imagery

• Posted preliminary reports and virtual reconnaissance reports

• Continued updates after physical clearinghouse closed
Online information on how to share information and coordinate with others:

**Fulcrum app** – EERI members conducting reconnaissance

**Collector app** – CGS/USGS documenting ground failure

Upload photos

How to coordinate with Clearinghouse

Virtual EQ Reconnaissance Team

Clearinghouse Communications and Coordination with Emergency Management Officials

Direct communications with CGS and Cal OES management at the State Operations Center in Sacramento, CA
- Assisted with location for Physical Clearinghouse
- Arranged for helicopter flyover support for fault rupture mapping
- Communication with Regional, County, and City EOCs

The Clearinghouse evening briefings were broadcast to:
- Emergency management officials at the California State Operations Center in Sacramento, CA
- Included offsite representatives of EERI, USGS, CSSC, Cal OES, CGS, FEMA Region 9, Southern California Earthquake Center, JPL, and others
Clearinghouse members coordinated direct contacts with local officials:

• USGS and CGS lead scientists
  - met with Navy to establish coordination between CGS, USGS and the NAWSCL Commanding Officer
  - met with City of Ridgecrest EOC and Mayor

• CSSC Structural Engineers
  - met with Ridgecrest Building Department

Ken Hudnut, USGS lead scientist, along with CalOES director and FEMA regional administrator, had the opportunity to brief Vice President Pence who was visiting CA

The Clearinghouse evening briefings provided the opportunity to update and inform Clearinghouse partners directly
Emergency managers and public had access to virtual clearinghouse website which was updated daily.

http://learningfromearthquakes.org/
Examples of available data resources posted on the clearinghouse website

**Emergency Response:**
- FEMA – Declaration
- FEMA – IA, PA
- HAZUS runs

**Remote Sensing:**
- NASA-JPL
- UNAVCO

**Virtual Reconnaissance:**
- Structural Recon – StEER
- Virtual EQ Recon – VERT
- Rapid Assessment – CSSC

[http://learningfromearthquakes.org/](http://learningfromearthquakes.org/)
What lessons were learned during the implementation of the Ridgecrest EQ Clearinghouse?

**Lessons learned from the Napa M6, 2014 earthquake, led a team of CGS geologists and GIS staff to develop a digital field data collection system for fault failure, landslide, and liquefaction**

1. Need to strengthen communication with state level regional coordinators and local EOCs
2. Maintain updated contact list for Clearinghouse activation notifications
3. For long activations, additional staff/overlapping shifts
4. Need for a release of a daily summary sheet & online dashboard summaries
5. Continue to reach out to science/engineering/social science professionals to be involved
6. Need to review & update CA EQ CH Operational Plan to build in scalability for large magnitude event within a multi city/county urban area.
THANK YOU

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