



USGS perspective on lessons  
learned from Fukushima and  
implementation of improvements  
related to seismic reevaluations

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David Applegate

Associate Director for Natural Hazards

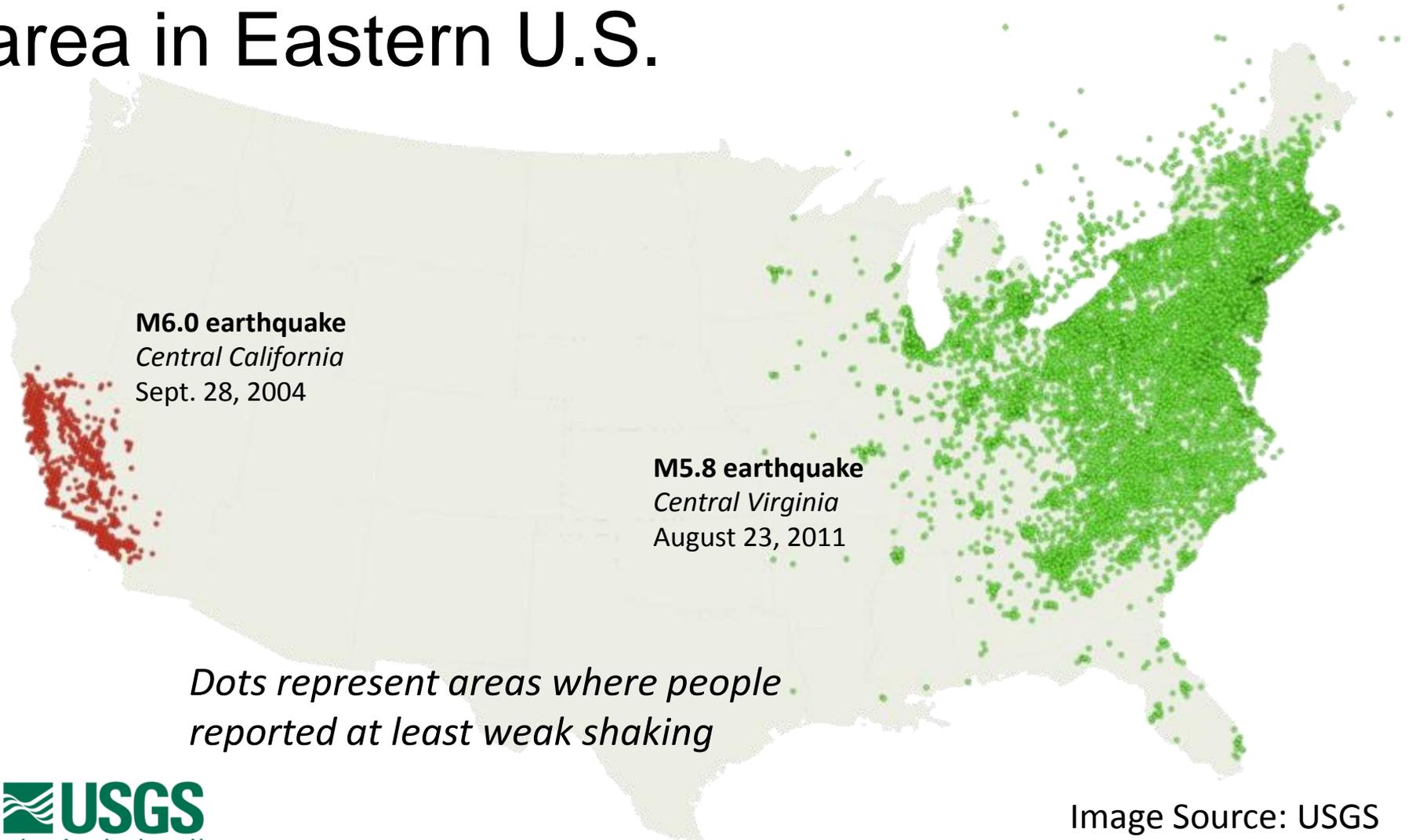
U.S. Geological Survey

# USGS-USNRC cooperation

- Seismic hazard analyses for new license applications
- *ShakeCast* alerting for ground motion at U.S. nuclear power plants
- Evaluation of seismic monitoring needs in Central and Eastern U.S.
- Research on ground motion
- Tsunami hazard assessment



# “Did You Feel It?” comparison: Earthquakes are felt over much larger area in Eastern U.S.

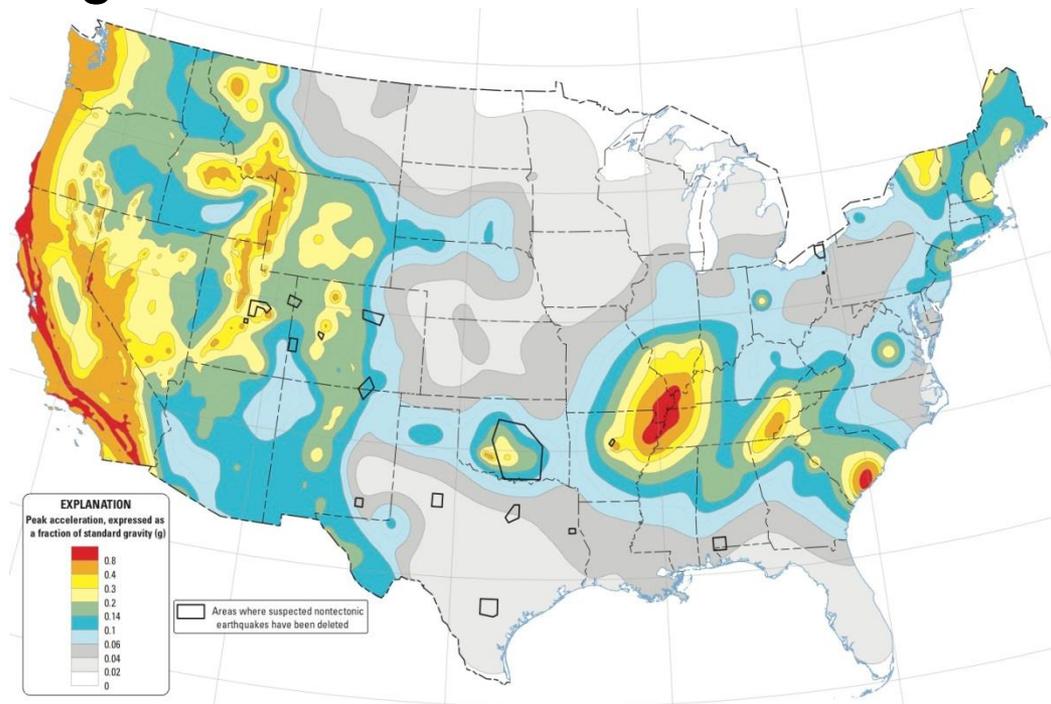


# National Seismic Hazard Maps 2014 revision

Updated every 6 years, these maps forecast the levels of earthquake shaking expected throughout the conterminous U.S. over long time periods. Form basis for seismic provisions in building codes used in most states and communities.

Those codes inform nearly one trillion dollars in new construction every year.

The data are heavily used by engineers, architects and designers, and by federal building owners.



# Central & Eastern U.S. seismic network

Data are critical for reducing uncertainty in ground motion models for the Central and Eastern U.S. Codes and regulations are under-informed by current data. Structures may be under- or over-designed, at significant cost.

Key target users are owners or regulators of critical infrastructure.

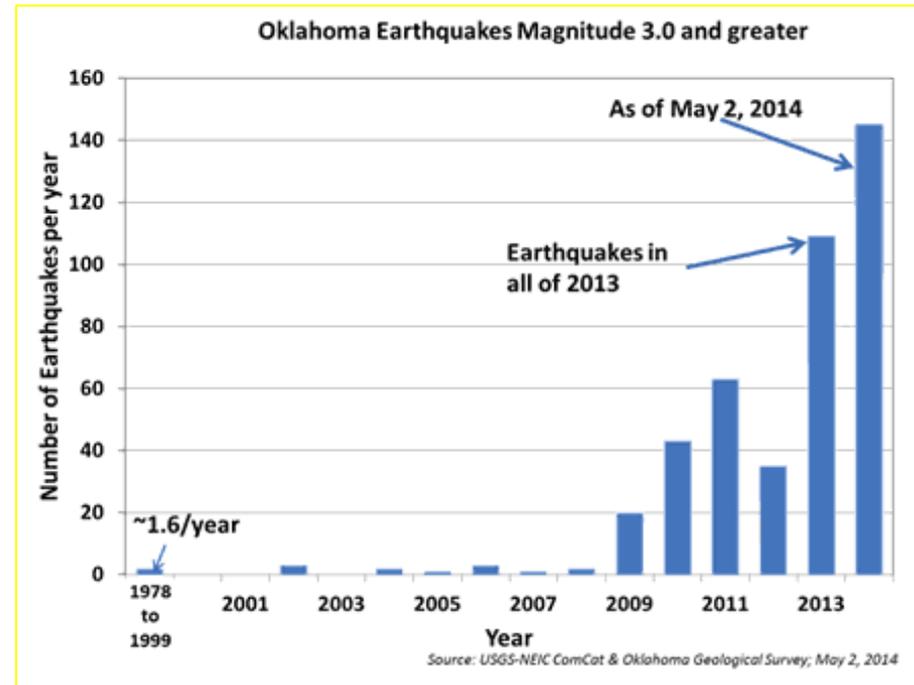


# Induced seismicity

Expanded research on potentially induced earthquakes in several states and hazard implications.

Demonstrated Oklahoma's seismic regions continue to expand and tied this to expansion in the number of wastewater disposal wells in Oklahoma and the injected volumes.

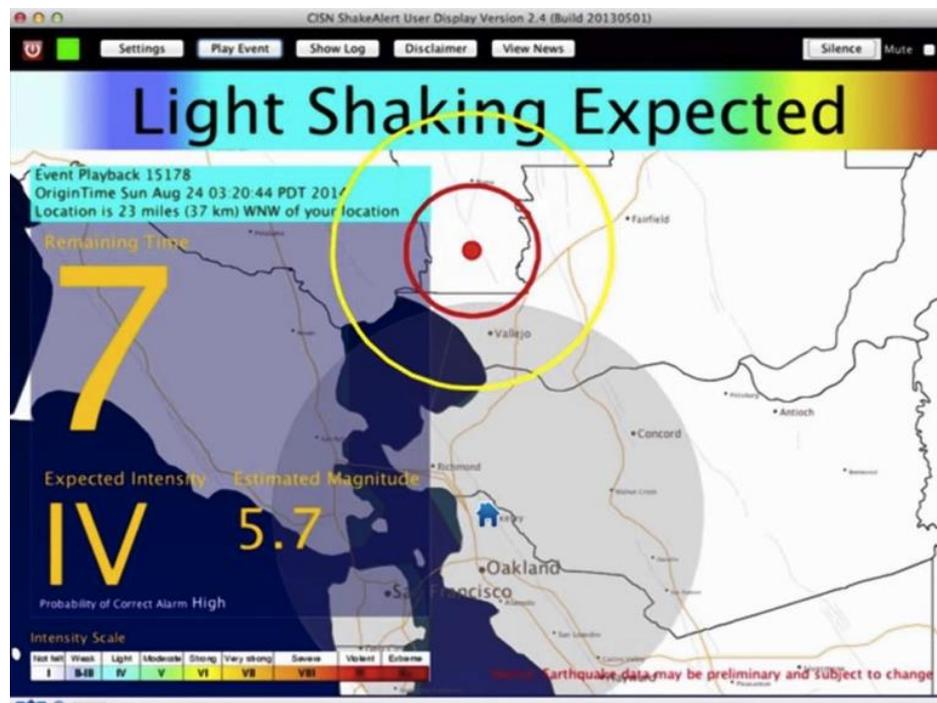
In a public-private partnership with Archer Daniels Midland and the State of Illinois, installed a seismic network at pilot CO2 injection site in the state. States are now taking action to address risk: Draft regulations for injection in Texas, Colorado and Ohio; seismic committee being formed in Oklahoma; a state seismologist hired in Texas; and several wells shut down.



# Earthquake early warning

Earthquake early warning systems are currently in use in Japan and a number of other countries.

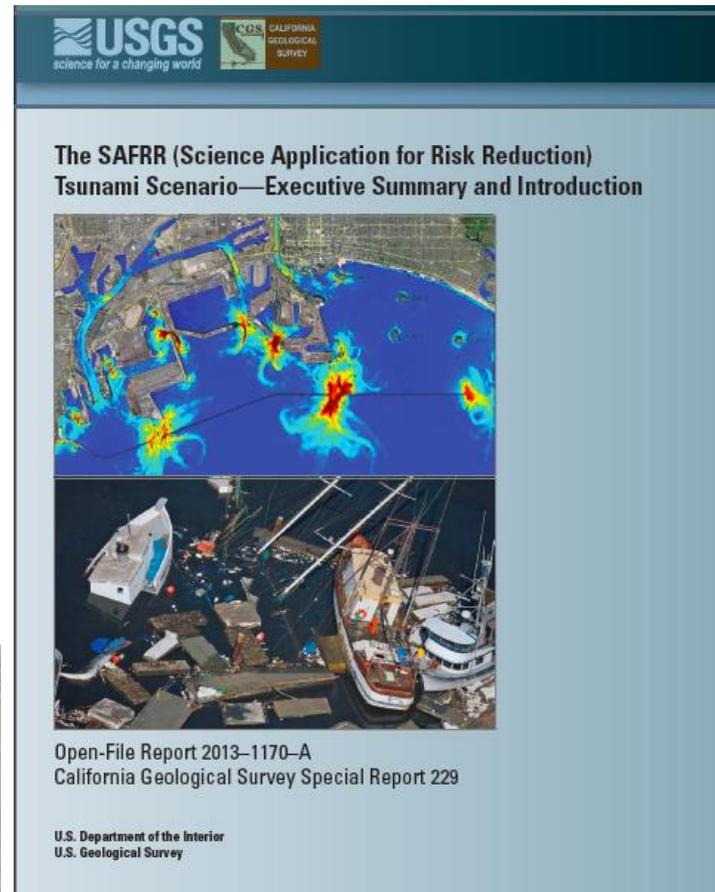
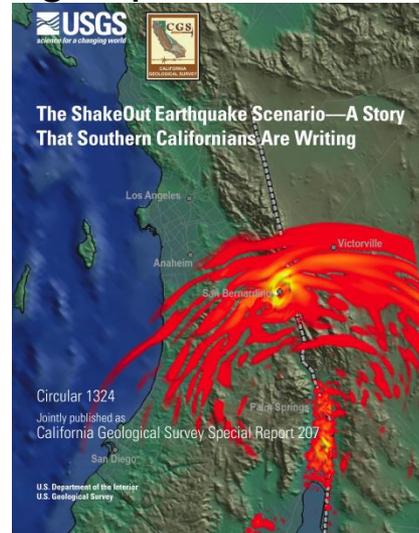
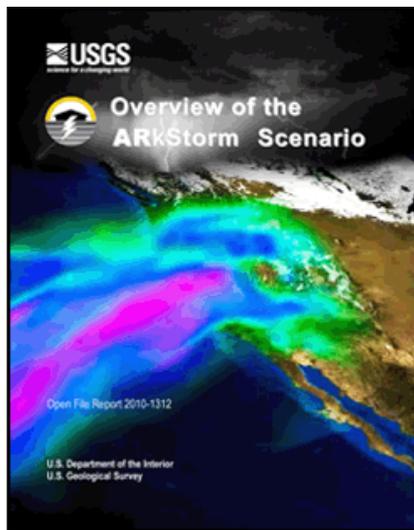
Magnitude-6.0 South Napa earthquake provided the first major and successful test of the prototype *ShakeAlert* system in California.



Potential to provide additional situational awareness for critical infrastructure operators.

# Using scenarios to capture cascading consequences

- USGS Science Application for Risk Reduction (SAFRR) project principles used for ShakeOut, ARkStorm, and SAFRR Tsunami scenarios:
  - A single, large but plausible event
  - An event we need to be ready for
  - Craft study with community partners
  - Consensus among leading experts



# Additional Information

## USGS disaster scenarios

[www.usgs.gov/natural\\_hazards/safrr/](http://www.usgs.gov/natural_hazards/safrr/)

## USGS fact sheet on earthquake early warning

[pubs.usgs.gov/fs/2014/3083/](http://pubs.usgs.gov/fs/2014/3083/)

## USGS National Seismic Hazard Maps

[earthquake.usgs.gov/hazards/](http://earthquake.usgs.gov/hazards/)

## USGS ShakeCast

[earthquake.usgs.gov/research/software/shakecast/](http://earthquake.usgs.gov/research/software/shakecast/)

# Acronyms

CO <sub>2</sub>	carbon dioxide
GMT	Greenwich Mean Time
km	kilometer
M	magnitude