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science for a changing world

Earthquakes ★ Floods ★ Hurricanes ★ Landslides ★ Tsunamis ★ Volcanoes ★ Wildfires

Grand Challenge #1

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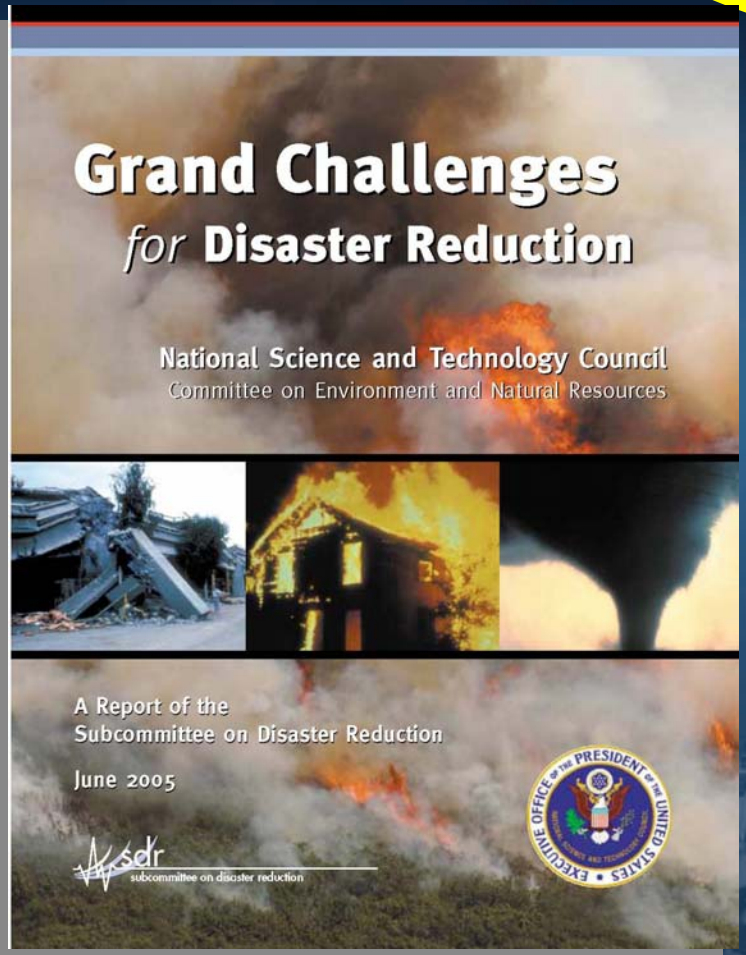
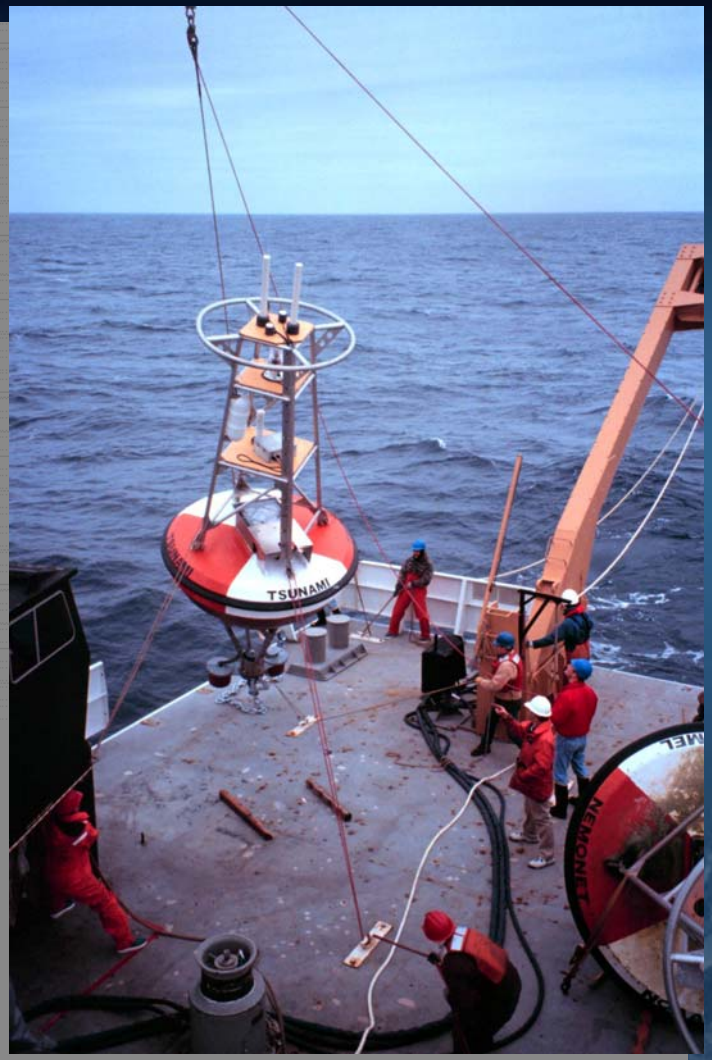
The Grand Challenges for Disaster Reduction
(Published June 2005)



1. **Provide hazard and disaster information where and when it is needed.**
2. **Understand the natural processes that produce hazards.**
3. **Develop hazard mitigation strategies and technologies.**
4. **Recognize and reduce vulnerability of interdependent critical infrastructure.**
5. **Assess disaster resilience using standard methods.**
6. **Promote risk-wise behavior.**

http://www.sdr.gov

Grand Challenge 1. Provide hazard and disaster information where and when it is needed.



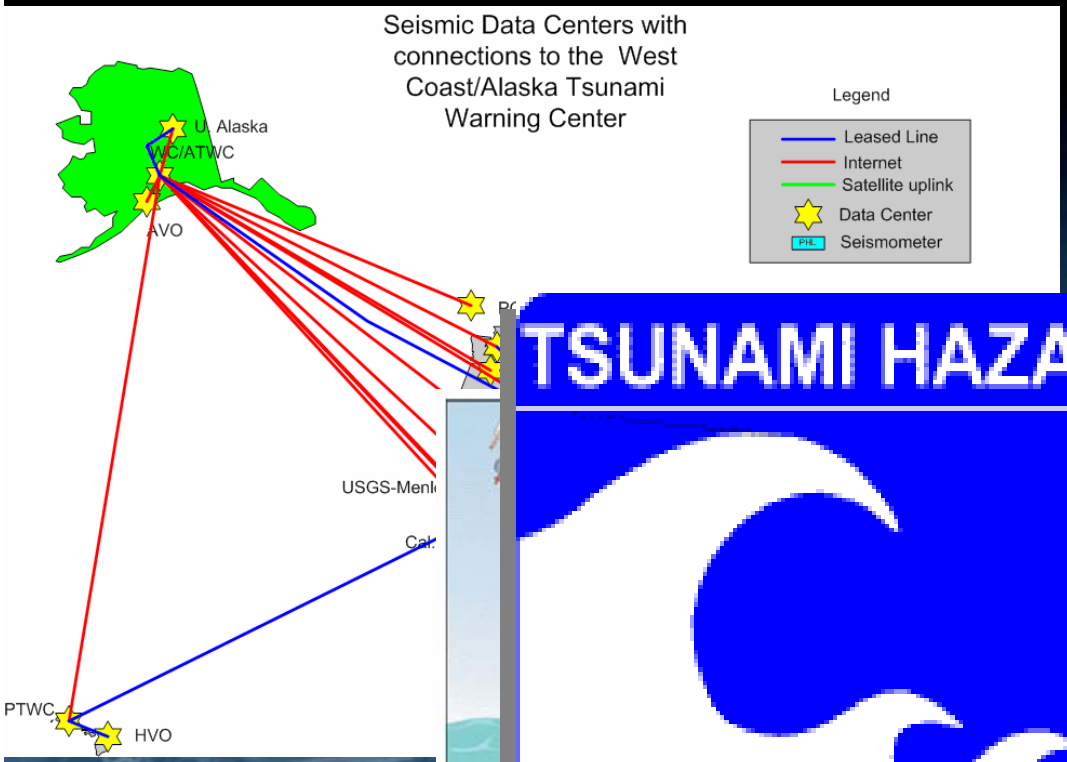
"To identify and anticipate the hazards that threaten communities, a mechanism for real-time data collection and interpretation must be readily available to and usable by scientists, emergency managers, first responders, citizens, and policy makers.

Developing and improving observation tools is essential to provide pertinent, comprehensive, and timely information for planning and response."

"Warn the right people in the right place at the right time."

Seismic is the start…

The beach is the finish



All Hazard Alert Broadcast system installed at Ocean Shores, Washington.

Credit: Washington Emergency Management

NOAA

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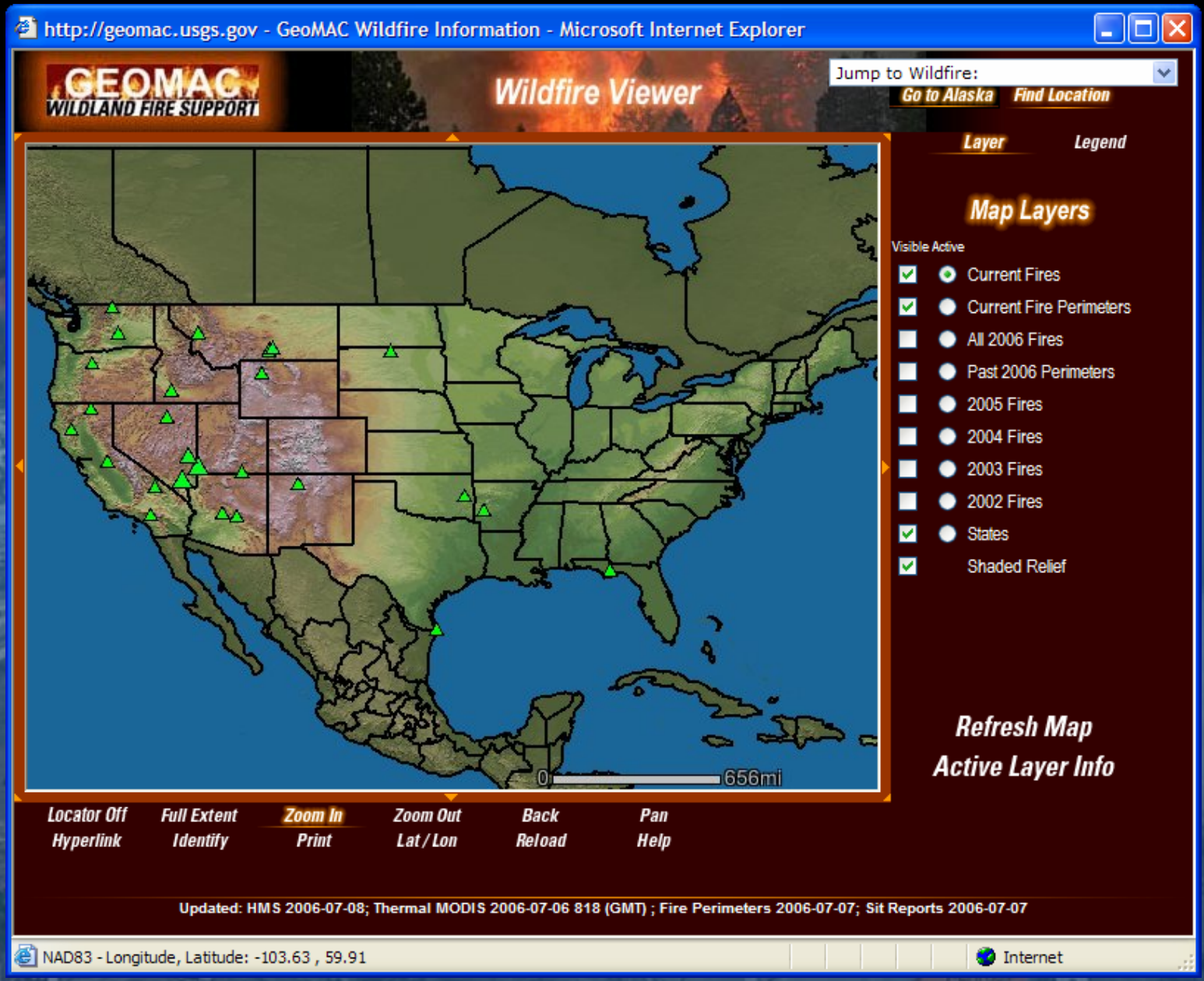
Improving situational awareness



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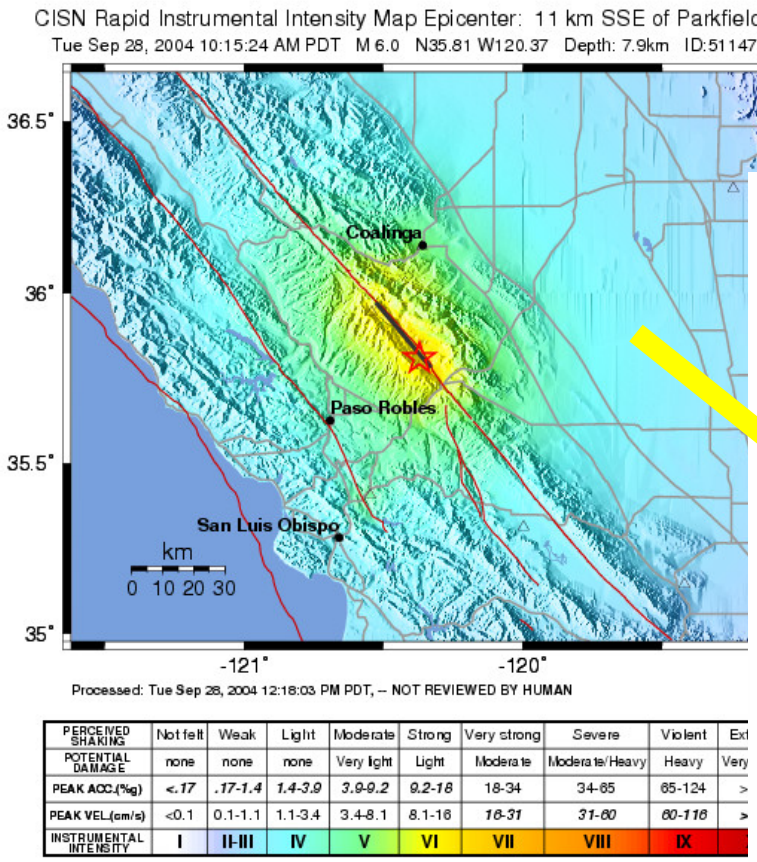
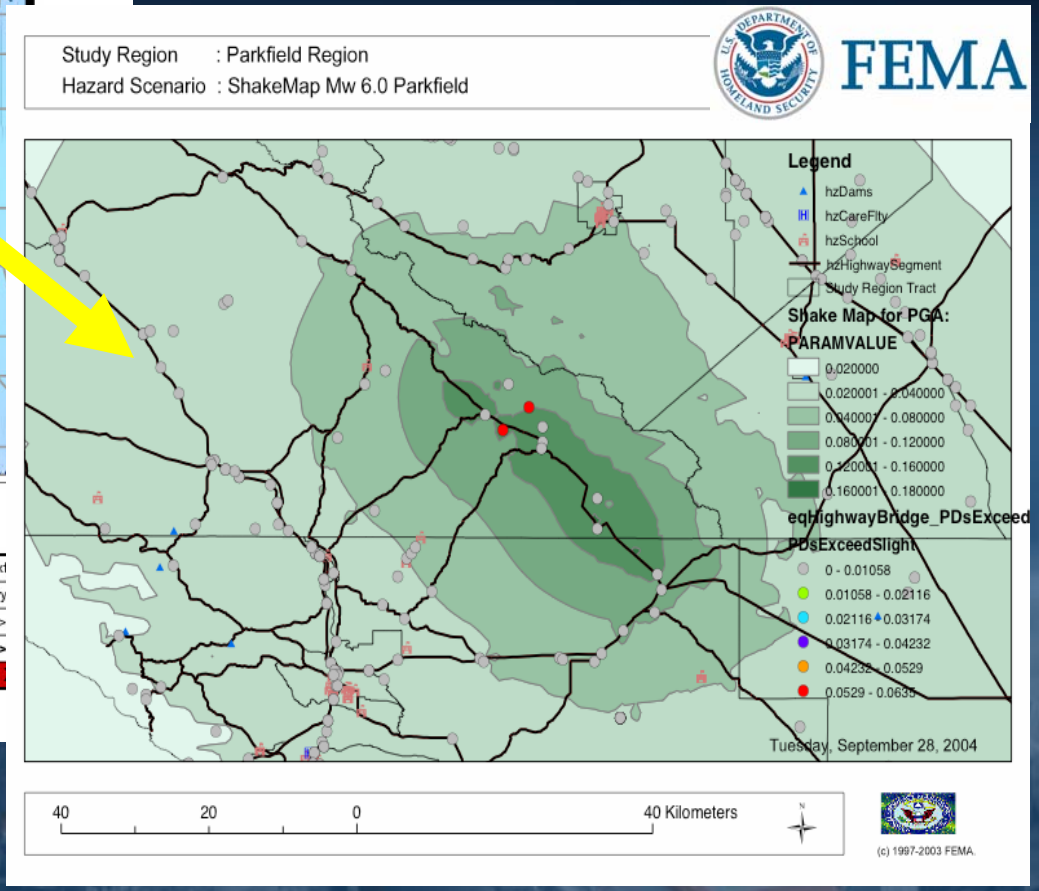
ShakeMap supports targeted response and rapid loss estimation



ShakeMap for the
M6.0 Parkfield earthquake
Sep. 28, 2004



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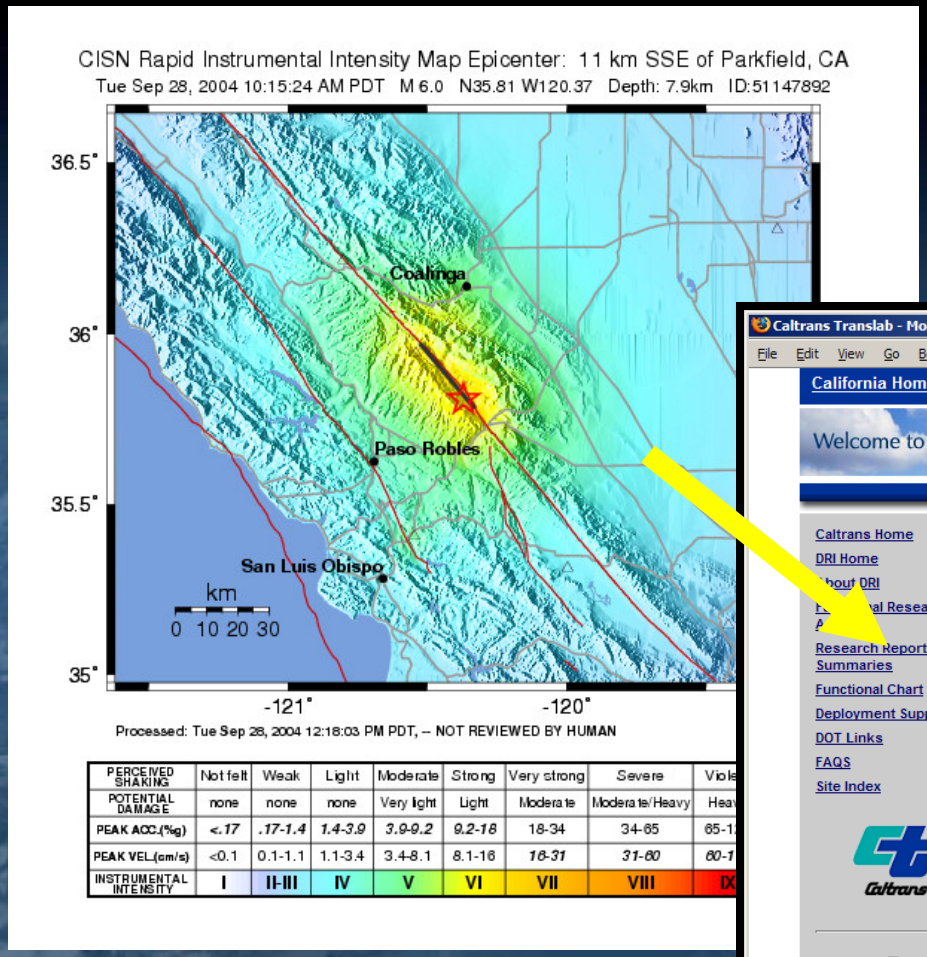
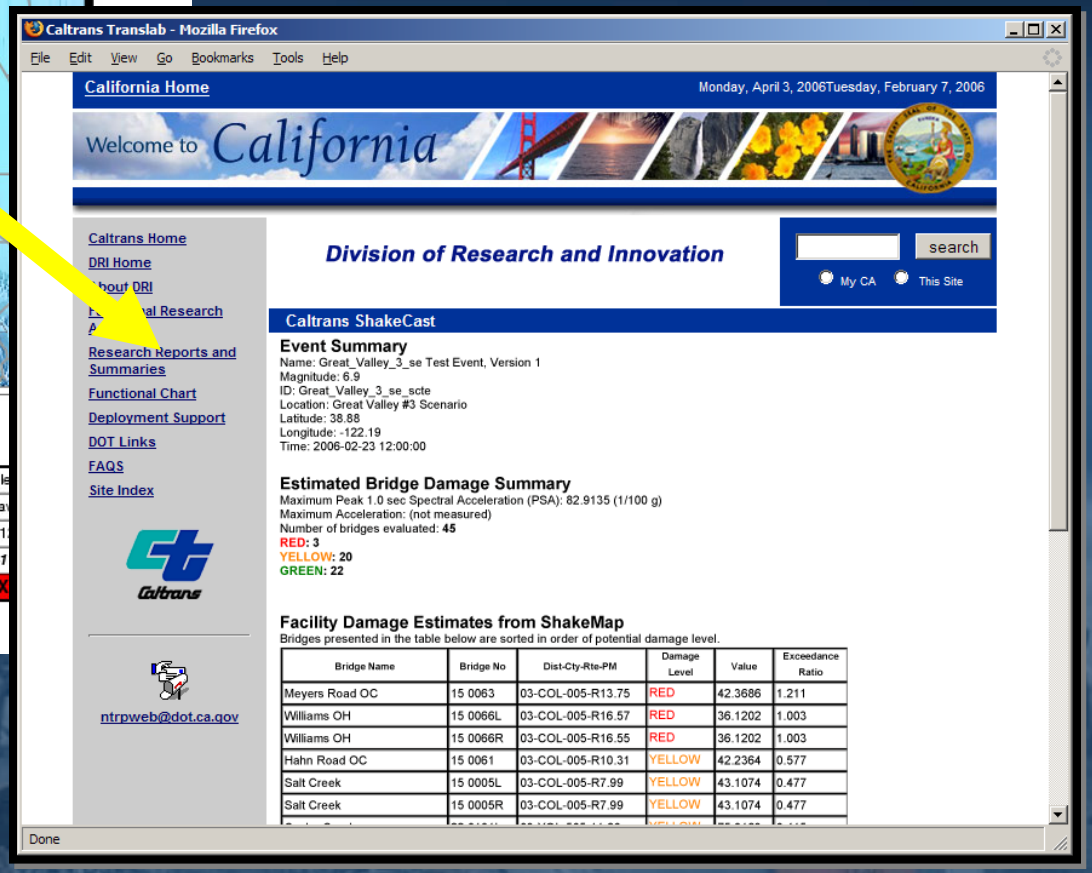
Loss estimation results from FEMA's HAZUS based on ShakeMap data

ShakeCast: Automatic Damage Assessment for Critical Facilities





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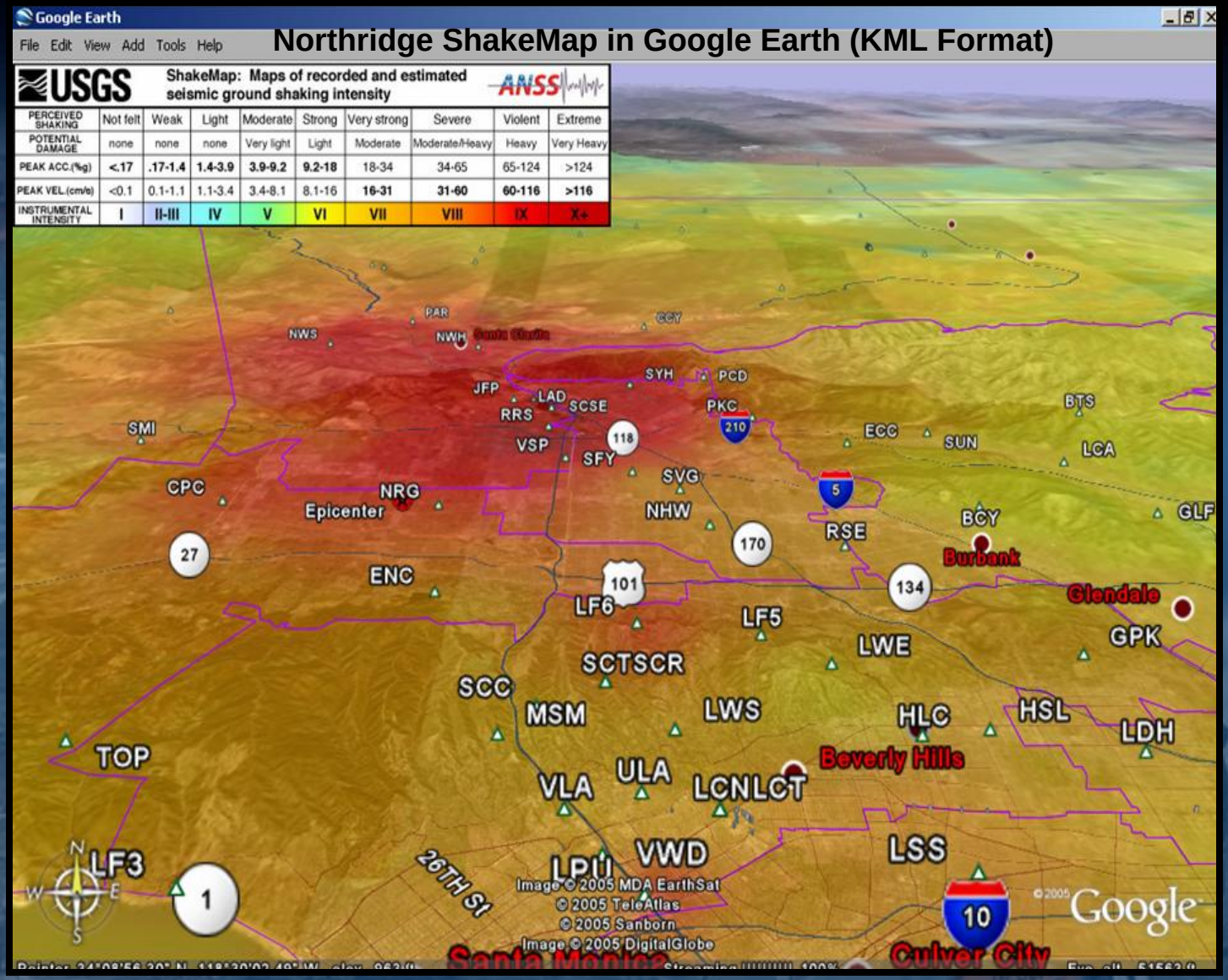
ShakeMap now available to users as Google Earth transparent overlay



Situational awareness for humanitarian response

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ANSS

GSN

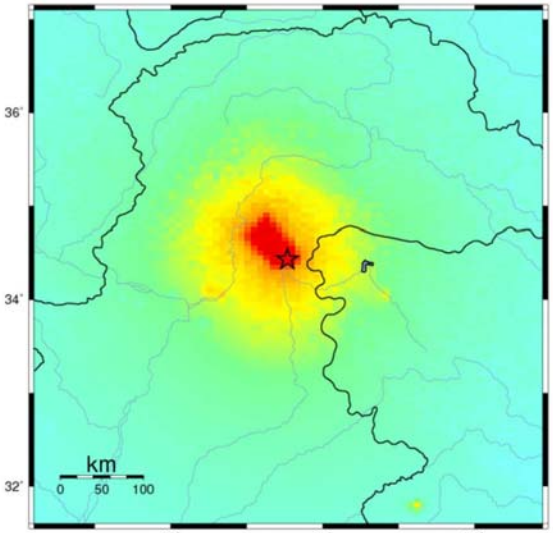
USAID

Prompt Assessment of Global Earthquakes (PAGER)

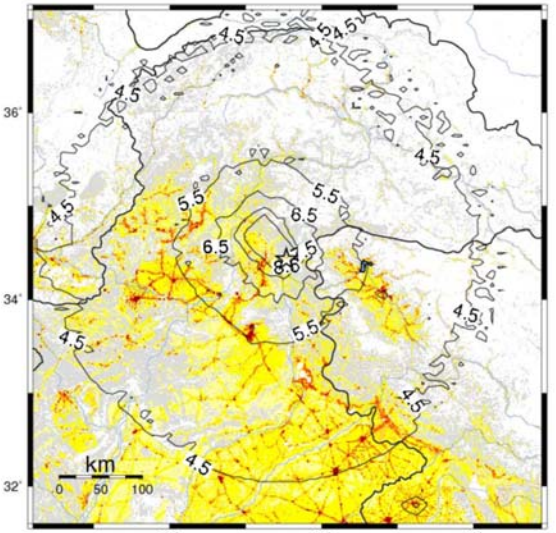
M7.6 PAKISTAN

N34.43 E73.53 10km Sat Oct 08, 2005 03:50:38 AM GMT

Shaking Intensity



Population per km^2



(Data from LandScan 2003)

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	< 17	17-14	1.4-39	3.9-92	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Population exposed to shaking

MMI Intensity	Population
IX	525,000
VIII	827,000
VII	1,550,000

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Greater specificity and lead time for warnings

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CAP Alert

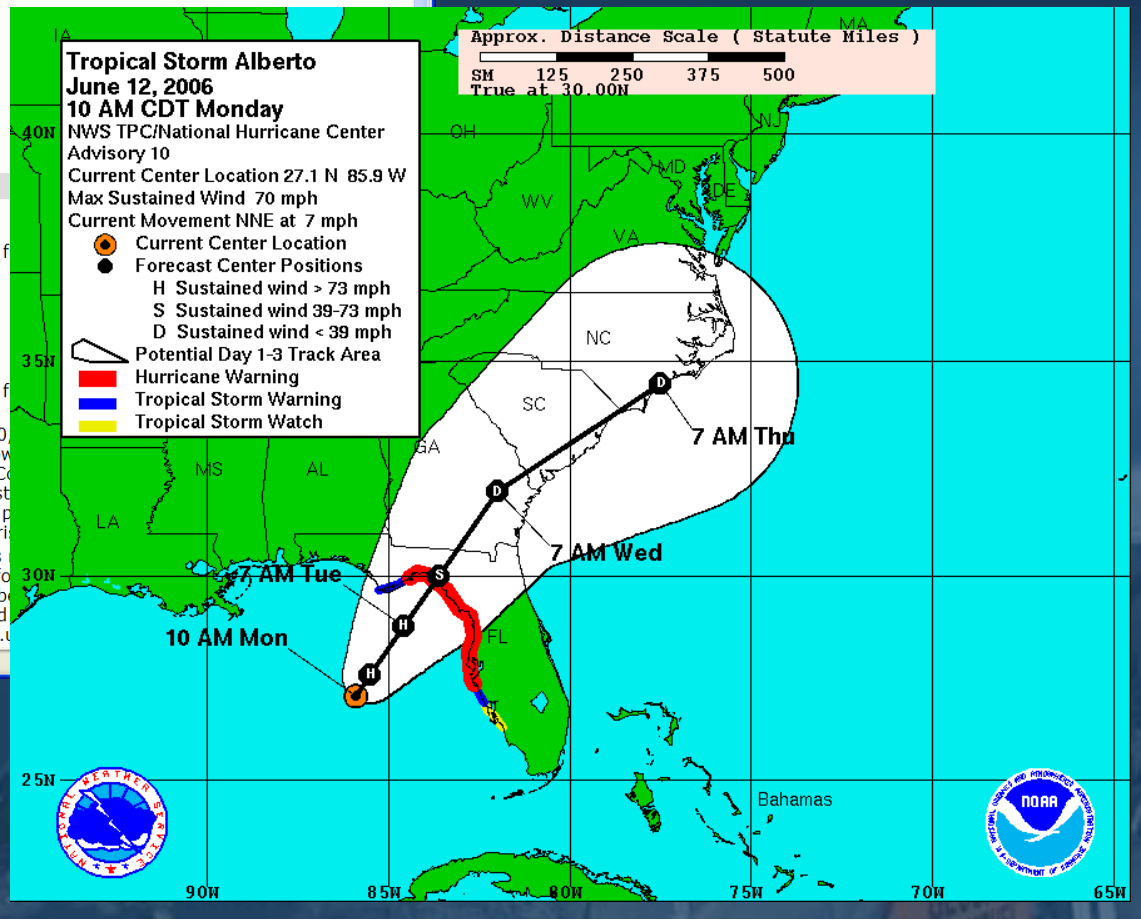
Flash Flood and Debris Flow Watch for Recently Burned Areas in Southern California

Summary

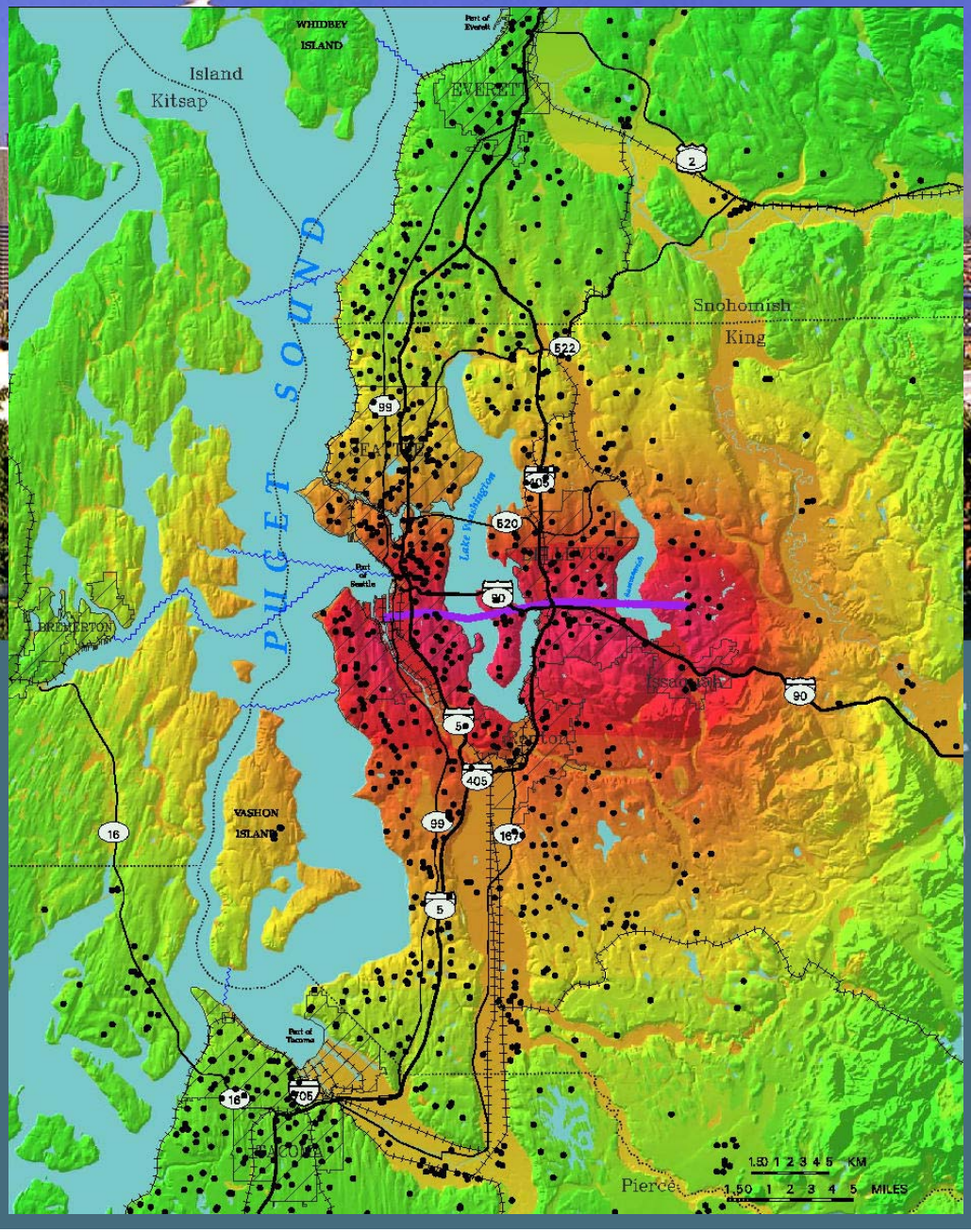
Identifier: USGS-landslides.20060522T144154
Sender: cannon@usgs.gov
Sent: 20060522T144154.000Z
Status: Actual
Message Type: Alert
Scope: Public

Additional Details:

Category: Geo
Event: Flash Flood and Debris Flow Watch f
California
Urgency: Future
Severity: Unknown
Certainty: Possible
Sender Name: Susan Cannon
Headline: Flash Flood and Debris Flow Watch f
California
Description: At 8:41 pm PDT on Saturday May 20,
issued a Flash Flood and Debris Flow
Barbara, Ventura and Los Angeles C
Monday morning, May 22, 2006. A st
rainfall rates of one half of an inch p
thresholds for flash floods and debri
Instruction: Residents or persons with interests
burned areas should monitor later fo
action should flash flood warnings b
do if you live near a recently burned
debris flow flows: http://landslides.



Overview of Schools



- Over 1,200 schools and campuses in region
- Wide range of construction materials and age
- Some level of upgrade completed but not well documented as a region

THE SEAL OF THE STATE OF WASHINGTON 1889

Seattle Emergency Management

CITY OF BELLEVUE WASHINGTON

UNIVERSITY OF WASHINGTON

CREW

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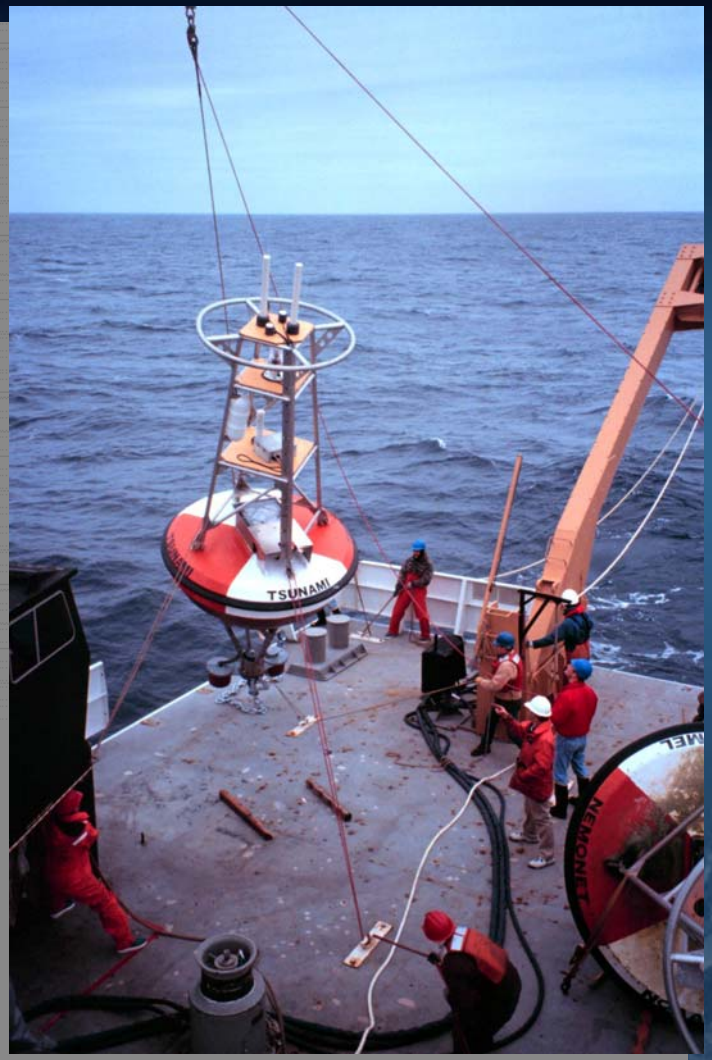
STRUCTURAL ENGINEERS ASSOCIATION WASHINGTON SEA

ASCE Seattle Section Geotechnical Group

EERI Earthquake Engineering Research Institute

Grand Challenge 1. Provide hazard and disaster information where and when it is needed.



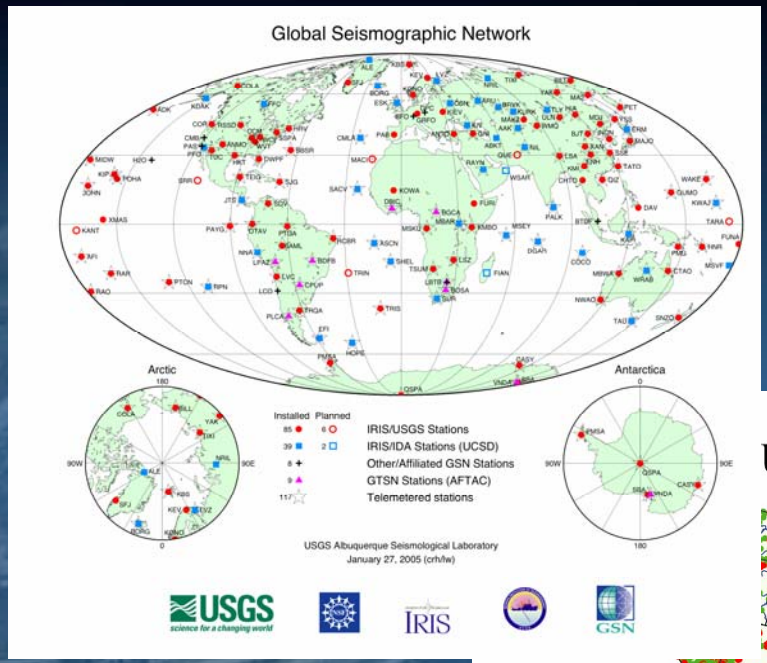
Challenges:

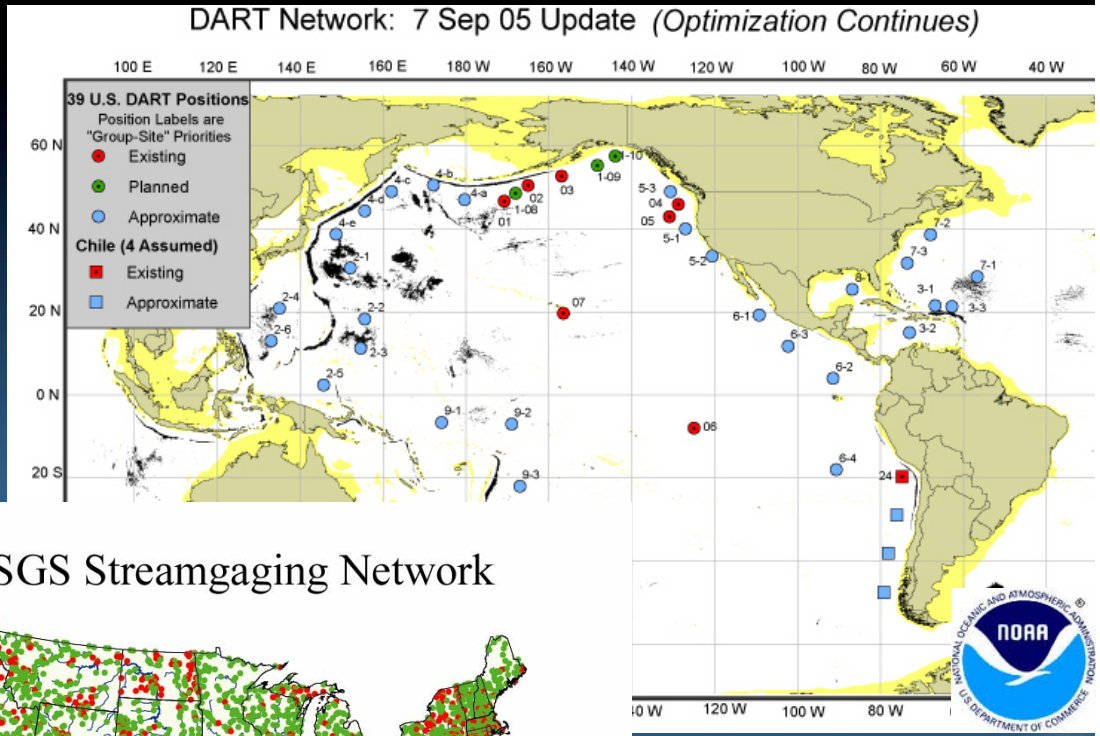
- Improve data collection to increase understanding of the ways in which hazards evolve.
- Create standards for sharing, storing and analyzing data.

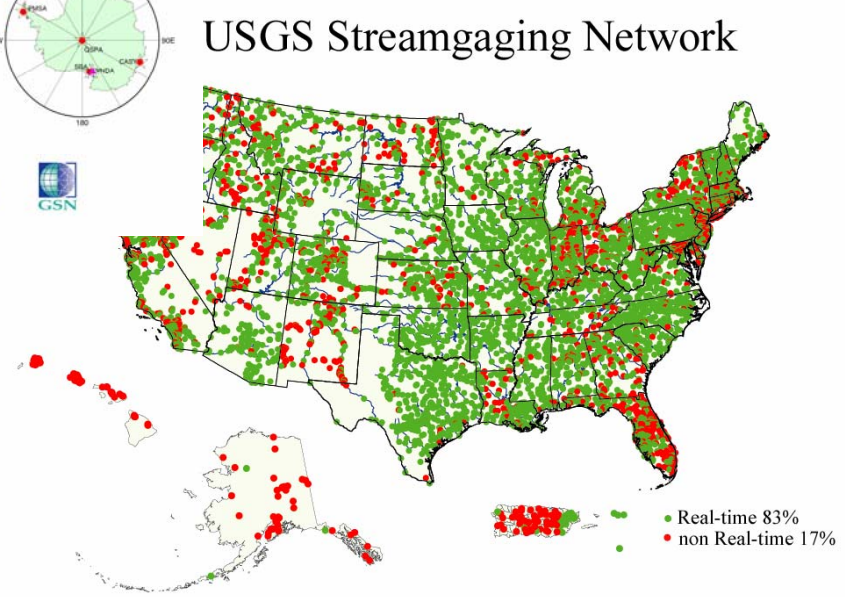
National Volcano Early Warning Sytem: Closing the monitoring gap

NVEWS TARGETS	MONITORING GAP
Kilauea, HI	1 ERUPTION
St. Helens, WA	1 ERUPTION
Rainier, WA	3
Hood, OR	3
Shasta, CA	3
South Sister, OR	3
Lassen, CA	3
Mauna Loa, HI	2
Redoubt, AK	2
Makushin. AK	2
Glacier Peak, WA	4
Akutan, AK	2
Baker, WA	3
Spurr, AK	2
Newberry Volcano,OR	3
Augustine, AK	2
Crater Lake, OR	4
Inyo Craters., CA	3
Adams, WA,	2
Veniaminof, AK	1 ERUPTION
Wrangell, AK	2
Mono Craters, CA	3
Hualalai, HI	2
Medicine Lake, CA	3
Pagan, CNMI	3
Churchill, AK	3
Anatahan, CNMI	2 ERUPTION
Clear Lake, CA	3
Alamagan, CNMI	3
Kaguyak, AK	2
Dutton, AK	2
Hayes, AK	3
Emmons Lake, AK	2
Seguam, AK	3
Chiginagak, AK	3

Expansion of real-time in situ networks







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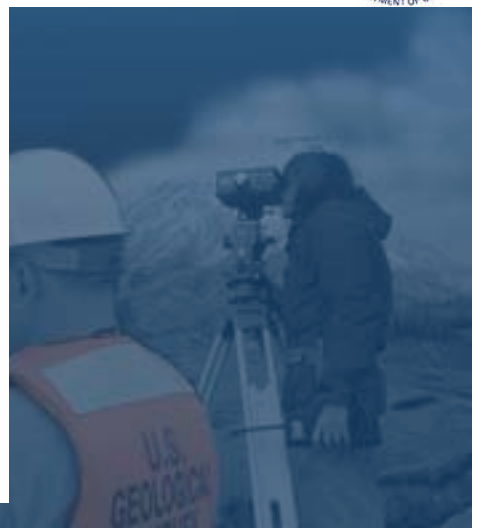
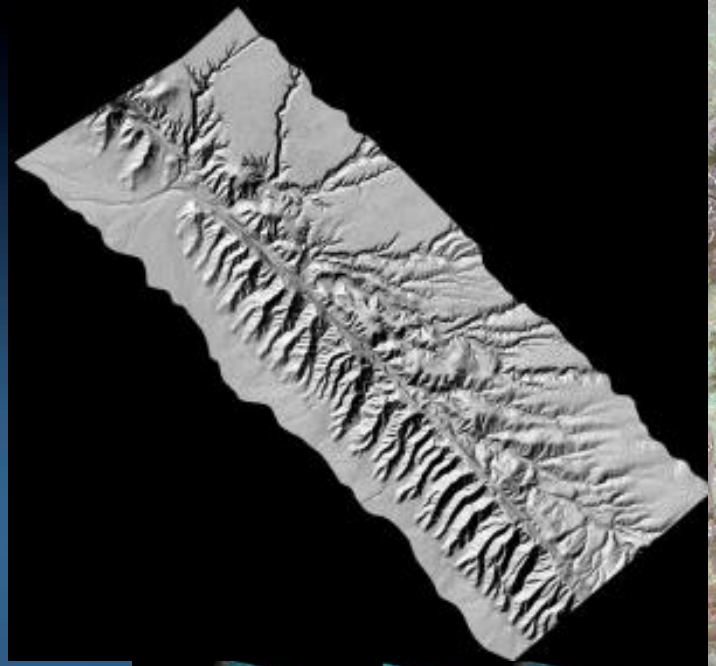
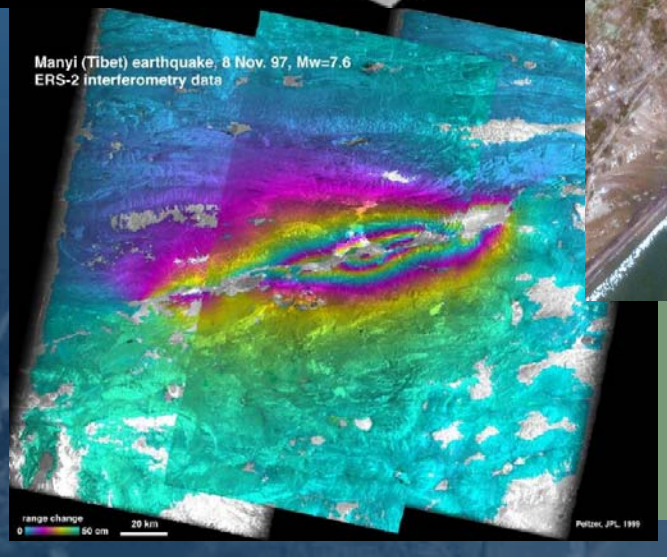


A new generation of satellites and other remote-sensing capabilities





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NASA