

ShakeCast 2.0 *A Guided Tour*

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

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&
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Information Center,
Golden, Colorado

Acknowledgments

ShakeMap

- Support & development by **Bruce Worden**, Vince Quitoriano
- Ongoing support & development by **Kuo-Wan Lin**, Vince Q.
- Ongoing operations of ShakeMap by NEIC, CISN, and other ANSS regional Networks

ShakeCast

- Funding from **Caltrans**, USGS, and the American Lifeline Alliance
- Development by **Kuo-Wan Lin**, w/ HungryMind Inc., Boulder.
- Initial (V1.0) Development by Gatekeeper Systems, Pasadena
- **Loren Turner**, P.E., Senior Transportation Engineer, Caltrans:
Management of Caltrans support, development & testing V2.0

Talk Outline

- Background
 - ✓ What is ShakeCast?
 - ✓ Alternative Earthquake Notifications
 - ✓ ShakeMap Update
- ShakeCast Developments
 - ✓ Version 2.0
 - ✓ Caltrans & ShakeCast
 - ✓ ShakeCast “Lite”
- ShakeCast Demonstration

ShakeCast

Facilitating the Use of ShakeMap for Post-Earthquake Decision-Making & Response

SHAKEMAP WEB SERVERS



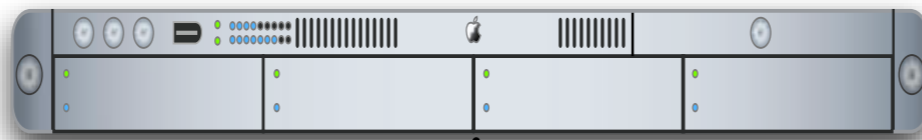
USER'S DATABASES

FACILITIES		NOTIFICATIONS	
Bridge A	Location	Jane Doe	303 273 8123
Overpass 1	Location	jone@email	jone@email
Overpass 2	Location	Bill Jones	smith@mail
Overp			smith@cell
...			jim@pager
Overp			...

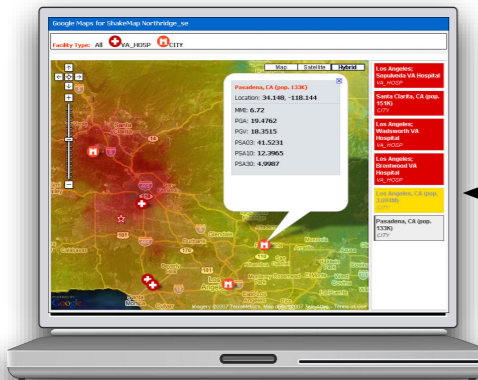
FRAGILITIES	
Bridge A	0.3/0.6g
Overpass 1	0.2/0.5g
Overpass 2	0.2/0.5g
Overpass 3	0.2/0.5g
...	...
Overpass 4	25/50 cm/s

RSS Feed

USER'S SHAKECAST SYSTEM



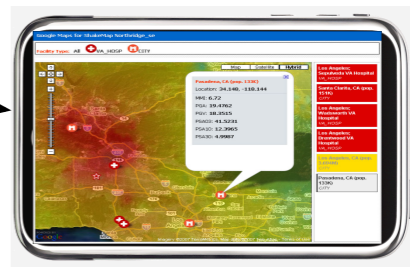
Internal Web Page & User Interface

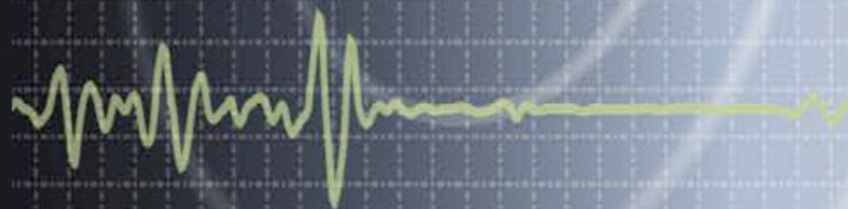


ESTIMATED DAMAGE	
Bridge A	<i>Damage Likely</i>
Overpass 1	<i>Damage Likely</i>
Overpass 2	<i>Damage Likely</i>
Overpass 3	<i>Damage Poss.</i>
...	...
Overpass 4	<i>Damage Poss.</i>



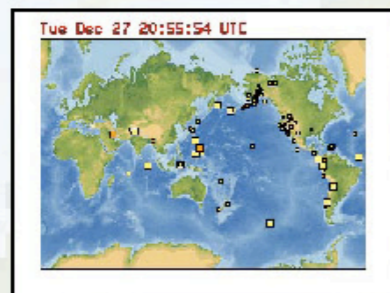
Notifications
Email, PDA, Cell





ANSS Earthquake Information Products & Tools

(Advanced National Seismic System)



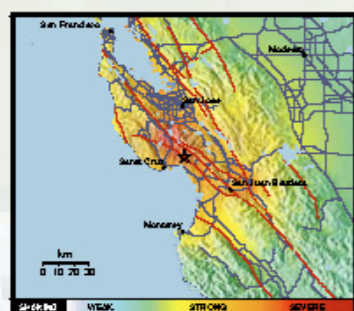
Latest Earthquakes

Maps and information for U.S. and worldwide earthquakes within minutes after they occur.
<http://earthquake.usgs.gov/eqcenter/>



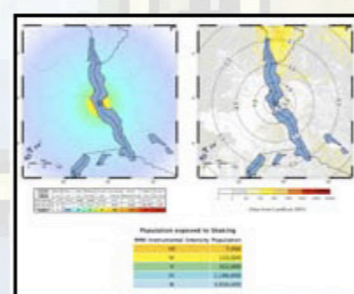
Earthquake Notification

Customizable earthquake information automatically sent to your wireless device or email account.
<http://earthquake.usgs.gov/ens/>



ShakeMaps

Distribution of shaking from an earthquake anywhere in the world within minutes.
<http://earthquake.usgs.gov/shakemap/>



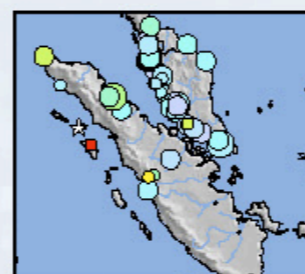
PAGER

Estimates of population exposure to significant earthquake shaking anywhere in the world within minutes.
<http://earthquake.usgs.gov/pager/>



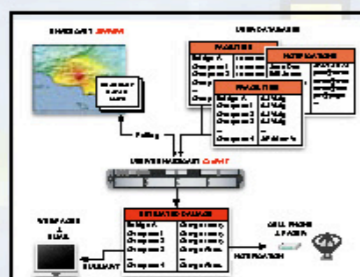
Realtime Feeds & Data

Real-time earthquake data in a variety of formats including RSS, CAP, CSV, and KML.
http://earthquake.usgs.gov/eqcenter/feeds_data.php



Did You Feel It?

Citizen science webpage where shaking intensity maps are created by the people who felt the earthquake.
<http://earthquake.usgs.gov/dyfi/>



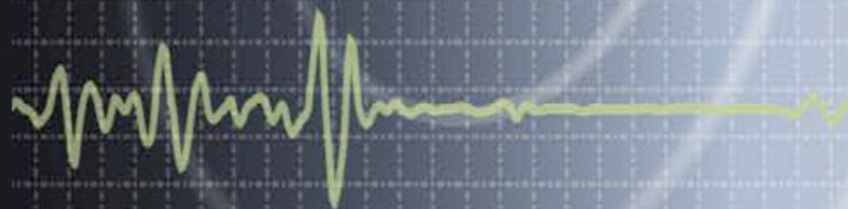
ShakeCast

Automated ShakeMap delivery, damage assessment, and notification for critical lifeline operators.
<http://earthquake.usgs.gov/resources/software/shakecast/>



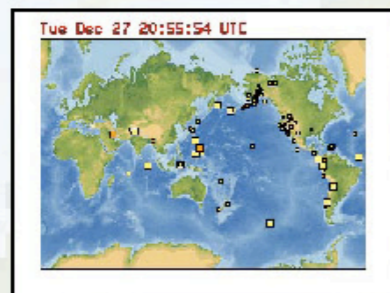
CISN Display

Downloadable software to visualize and receive notifications for seismicity anywhere in the world on your computer.
<http://www.cisn.org/software/cisndisplay.html>



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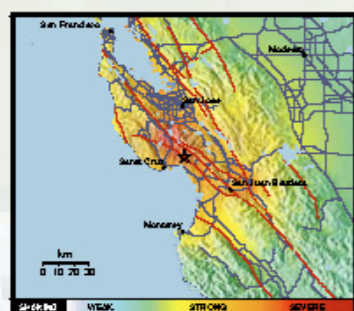
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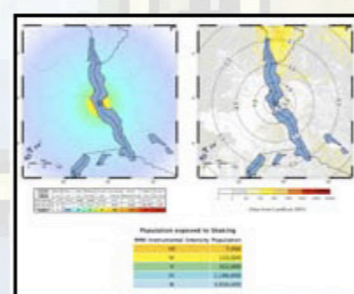
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Customizable earthquake information automatically sent to your wireless device or email account.
<http://earthquake.usgs.gov/ens/>



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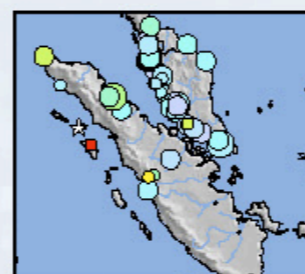
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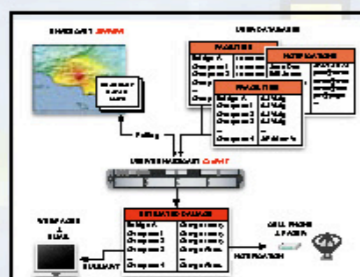
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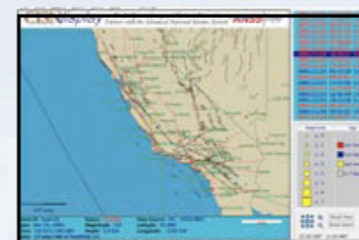
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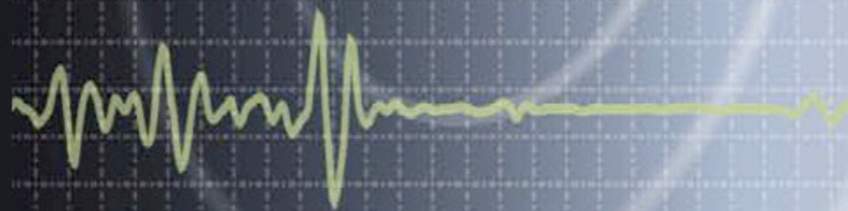
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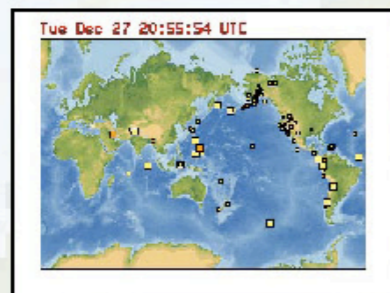
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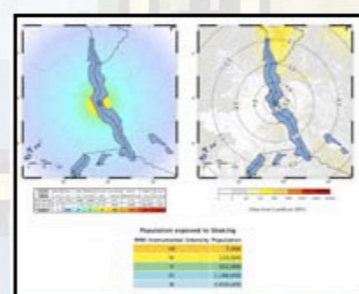
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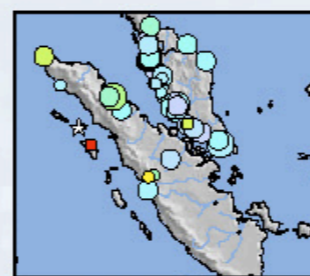
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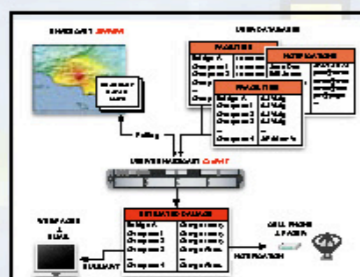
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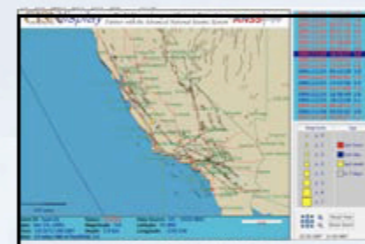
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Earthquake Notification Service (ENS)

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

Customized earthquake alerts!

- Receive notifications by email or on your wireless device for *any earthquake nationally* (located by the regional or regional networks of the ANSS) or *globally* (located by the NEIC).
- Customize *your* notifications based on geographic boundaries, magnitude threshold, time of day.
- Supports multiple user profiles - get email for smaller earthquakes but get paged for the big ones!

ENS

Earthquake Notification Service

<http://earthquake.usgs.gov/ens/>

The screenshot shows the USGS Earthquake Notification Service interface. The main heading is "Earthquake Notification Service: Customizable Earthquake Alerts". Below this, there are tabs for "My Notification Profiles" and "My Account". The central content area displays "Earthquake Notification Profiles Associated with waldjd's Account".

Two profiles are listed:

- Continental US (Custom region)**:
 - Depth: 0.00 to 800.00km
 - Networks: CI,NC,NN,UU,UW,AK,NM,HV,AT,PR,SE,US,LD,MB,WY,AR
 - Geographic Bounds: polygon
 - Day Mag: 4
 - Night Mag: 4.5
 - Day Begins: 08:00
 - Day Ends: 22:00
 - Address 1: 3036386000@vtext.com (short)
 - Address 2: wald@usgs.gov (long)
- World (Custom region)**:
 - Depth: 0.00 to 800.00km
 - Networks: CI,NC,NN,UU,UW,AK,NM,HV,AT,PR,SE,US,LD,MB,WY,AR
 - Geographic Bounds: rectangle
 - South Latitude: -90.000
 - North Latitude: 90.000
 - East Longitude: 180.000
 - West Longitude: -180.000
 - Day Mag: 5.7
 - Night Mag: 6.1

Each profile includes a map and a "View with Google maps" link. On the right side, there is a sidebar with "Welcome waldjd!", "Log Out", "Recent Events Sent to Me", "Map of Recent Events", "My Email Addresses" (listing 3036386000@mmode.com, 3036386000@vtext.com, and wald@usgs.gov), "Add New Email Address", "Add New Profile" (with options for Predefined, Rectangle, Circle, and Polygon profiles), and "Admin Functions" (with buttons for Recent Events List, Recent Events Map, and Admin Page).

SHAKEMAP UPDATE

- ShapeMap Version 3.2 Released (March, 2007):
 - Runs on LINUX, as well as BSD, Solaris
 - Enhancements to XML, KML, Metadata, other products
 - Added new Ground Motion Prediction Equations (AB'03, BA'06, AB'06, Kanno'06)
 - Global ShakeMap (GSM). Predictive ShakeMaps now available for all $M > 5.5$ earthquakes in the world (for ShakeCast as well). Primary use is for PAGER (Prompt Assessment of Global Earthquakes for Response), but good for anyone with global assets.

SOFTWARE: IN DEVELOPMENT

- Uncertainty Quality Indicator (Letter Grade) based on average uncertainty
- Experimenting with duration (Arias Intensity & CAV) parameters

Earthquake Hazards Program

Home **Earthquake Center** Regional Information Learning & Education Research & Monitoring Other Resources

You are here: [Home](#) » [Earthquake Center](#) » [ShakeMap](#) » [S California](#) » Event Northridge

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About EQ Maps

Did You Feel It?

Energy & Broadband Solutions

Fast Moment Tensors

Media Info

PAGER

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17 January 1994 12:30:55 UTC - Event Northridge

[Instrumental Intensity](#) [Peak Ground Acceleration](#) [Peak Ground Velocity](#) **Downloads**

Spectral Response [0.3 sec](#) | [1.0 sec](#) | [3.0 sec](#) || [Media Map](#) [Decorated](#) | [Bare](#)

Downloads

For more information on the formats of these downloads visit the [Shakemap Product Formats](#) page.

Maps

Instrumental Intensity

[JPG - intensity.jpg \(190KB\)](#)

[PS - intensity.ps.zip](#)

[\(429KB\)](#)

Peak Ground Acceleration

[JPG - pga.jpg \(146KB\)](#)

[PS - pga.ps.zip \(1MB\)](#)

Peak Ground Velocity

[JPG - pgv.jpg \(143KB\)](#)

[PS - pgv.ps.zip \(1MB\)](#)

Spectral Response 0.3 sec

Period

[JPG - psa03.jpg \(151KB\)](#)

[PS - psa03.ps.zip \(1MB\)](#)

Spectral Response 1.0 sec

Period

Media Maps

Decorated

[JPG - tvmap.jpg \(275KB\)](#)

[PS - tvmap.ps.zip \(945KB\)](#)

Bare

[JPG - tvmap_bare.jpg](#)

[\(252KB\)](#)

[PS - tvmap_bare.ps.zip](#)

[\(937KB\)](#)

Info Sheet

[Text - tvguide.txt \(9KB\)](#)

Data

Raw Grids

[Text X, Y, Z Values -](#)

[grid.xyz.zip \(328KB\)](#)

GIS Files

[HAZUS Zip File - hazus.zip](#)

[\(1MB\)](#)

[Shape Files - shape.zip](#)

[\(2MB\)](#)

[KML - Northridge.kml](#)

[\(120KB\)](#)

Station Lists

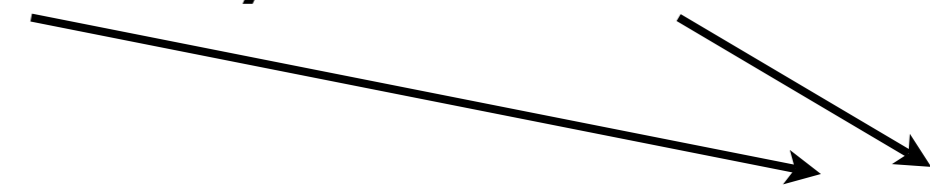
[Text - stationlist.txt \(15KB\)](#)

[XML - stationlist.xml \(65KB\)](#)

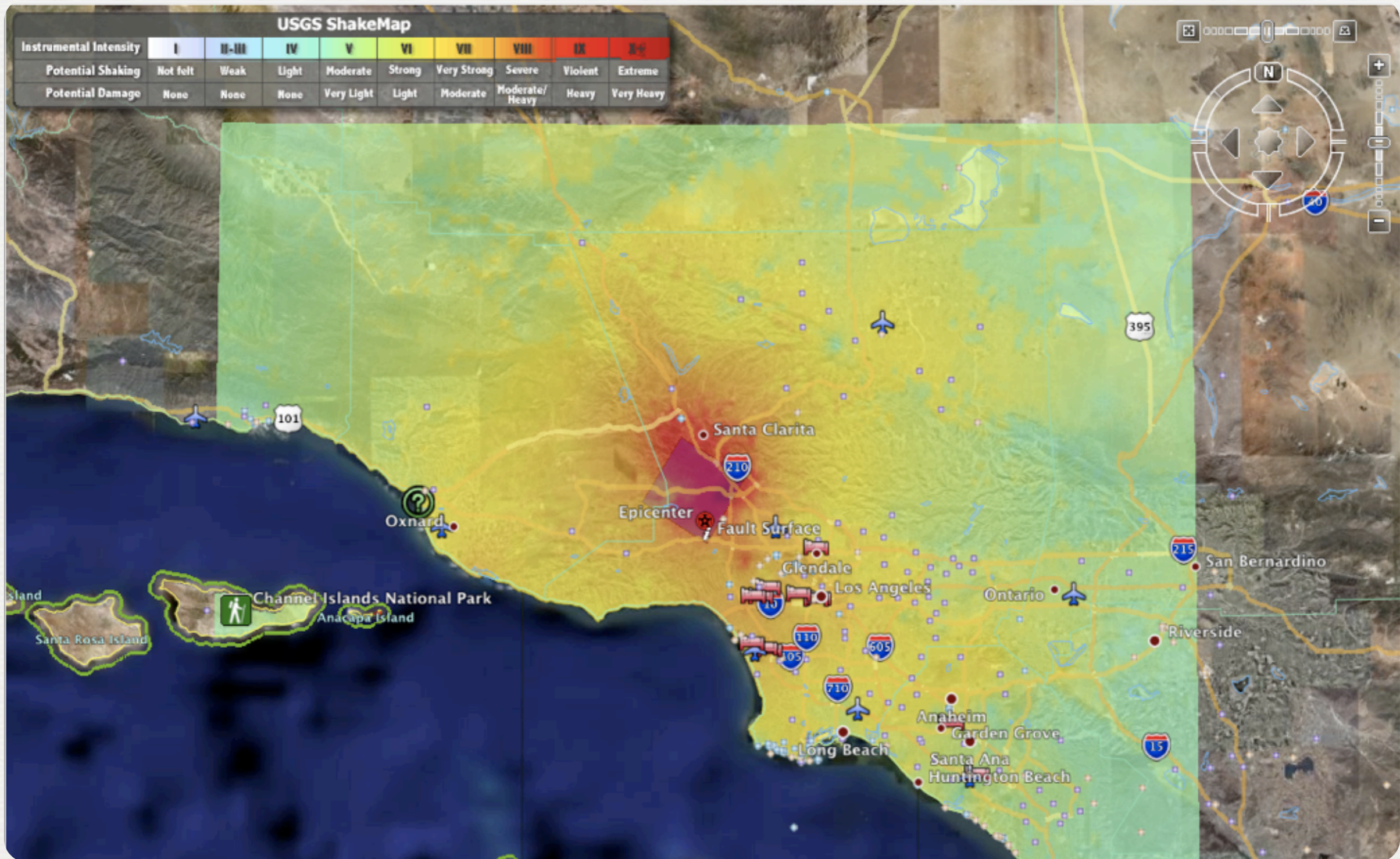
Example of grid.xml file with all lat/lon pairs, parametric data, uncertainty, Vs30, etc.

```
- <shakemap_grid xsi:schemaLocation="http://earthquake.usgs.gov http://earthquake.usgs.gov/eqcenter/shakemap/xml/schemas/shakemap.xsd" event_id="Northridge"
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shakemap_event_type="ACTUAL">
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  <grid_specification lon_min="-119.785700" lat_min="33.379666" lon_max="-117.285700" lat_max="35.046333" nominal_lon_spacing="0.016667" nominal_lat_spacing="0.016667"
nlon="151" nlat="101" nominal_pga_std="0.520000"/>
  <grid_field index="1" name="LON" units="dd"/>
  <grid_field index="2" name="LAT" units="dd"/>
  <grid_field index="3" name="PGA" units="pctg"/>
  <grid_field index="4" name="PGV" units="cms"/>
  <grid_field index="5" name="MMI" units="mmi"/>
  <grid_field index="6" name="PSA03" units="pctg"/>
  <grid_field index="7" name="PSA10" units="pctg"/>
  <grid_field index="8" name="PSA30" units="pctg"/>
  <grid_field index="9" name="SDPGA" units="pctg"/>
  <grid_field index="10" name="SVEL" units="ms"/>
  <grid_data>
    -119.785700 35.046333 6.3305 4.3289 4.9400 10.8521 5.1807 1.0252 1.0000 372.0000 -119.769033 35.046333 6.3811 4.3655 4.9500 10.9535 5.2248 1.0340 1.0000 372.0000
    -119.752367 35.046333 6.4348 4.4044 4.9500 11.0602 5.2719 1.0435 1.0000 372.0000 -119.735700 35.046333 6.4854 4.4404 4.9600 11.1607 5.3151 1.0521 1.0000 372.0000
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    -119.685700 35.046333 6.1375 3.9222 4.9100 10.5959 4.6938 0.9293 1.0000 464.0000 -119.669033 35.046333 6.1914 3.9585 4.9200 10.7029 4.7376 0.9381 1.0000 464.0000
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    -119.619033 35.046333 7.3392 5.3832 5.1200 12.7334 6.4431 1.2763 1.0000 301.0000 -119.602367 35.046333 7.3890 5.4191 5.1300 12.8329 6.4855 1.2848 1.0000 301.0000
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    -119.419033 35.046333 8.0902 5.9490 5.2500 14.2407 7.1197 1.4125 1.0000 301.0000 -119.402367 35.046333 7.5947 5.2190 5.1600 13.3824 6.2455 1.2392 1.0000 372.0000
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    -119.185700 35.046333 9.0423 6.6664 5.4000 16.1823 7.9764 1.5852 1.0000 301.0000 -119.169033 35.046333 9.1271 6.7321 5.4200 16.3566 8.0552 1.6011 1.0000 301.0000
    -119.152367 35.046333 9.2139 6.7994 5.4300 16.5351 8.1363 1.6175 1.0000 301.0000 -119.135700 35.046333 9.2909 6.8586 5.4400 16.6939 8.2072 1.6318 1.0000 301.0000
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    -118.985700 35.046333 9.8701 7.2979 5.5200 17.8972 8.7327 1.7376 1.0000 301.0000 -118.969033 35.046333 9.9507 7.3618 5.5400 18.0659 8.8099 1.7532 1.0000 301.0000
    -118.952367 35.046333 10.0225 7.4221 5.5500 18.1823 8.8165 1.7647 1.0000 301.0000
```

Grid uncertainty value, Vs30



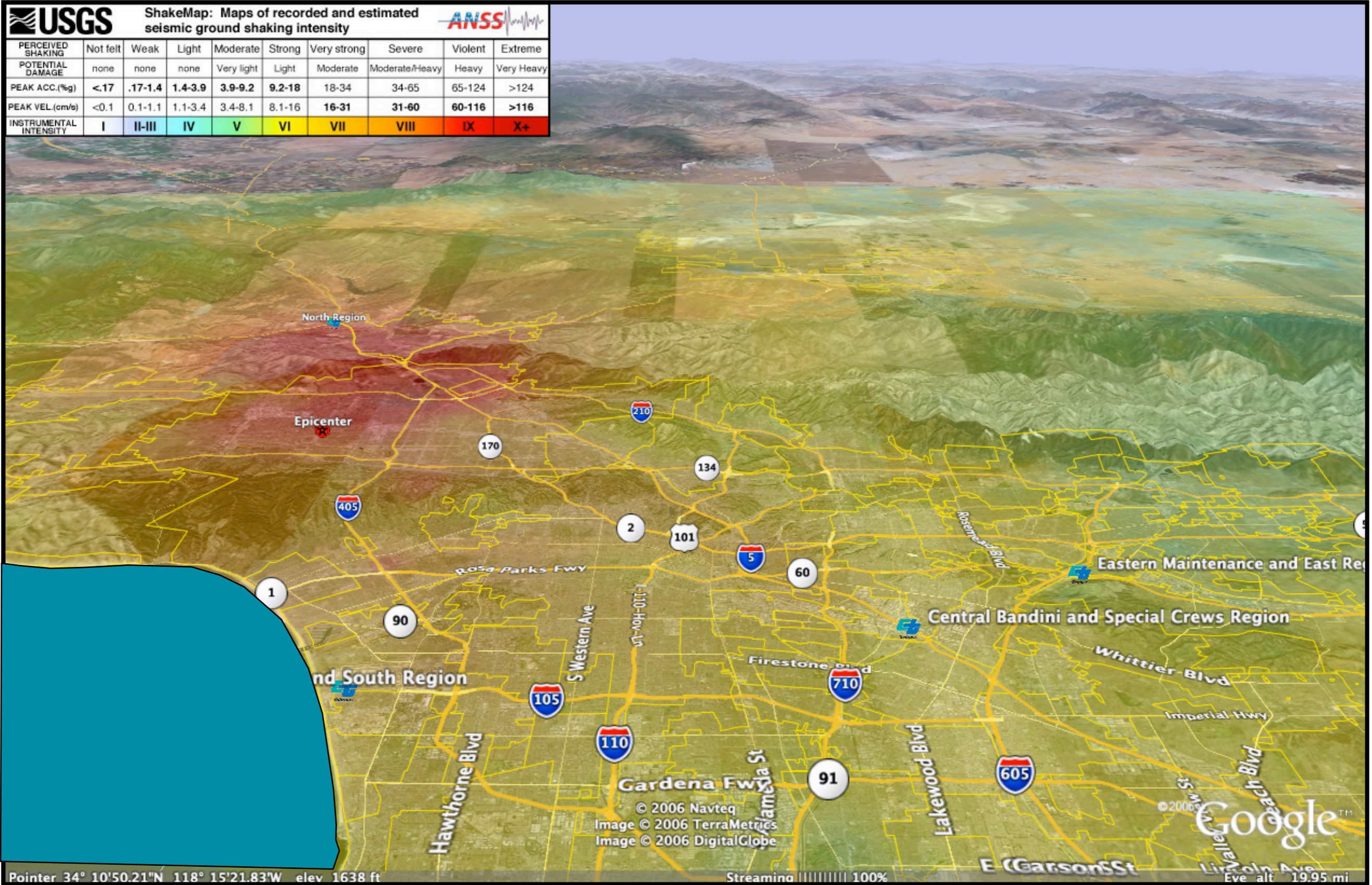
GOOGLE EARTH KMLS



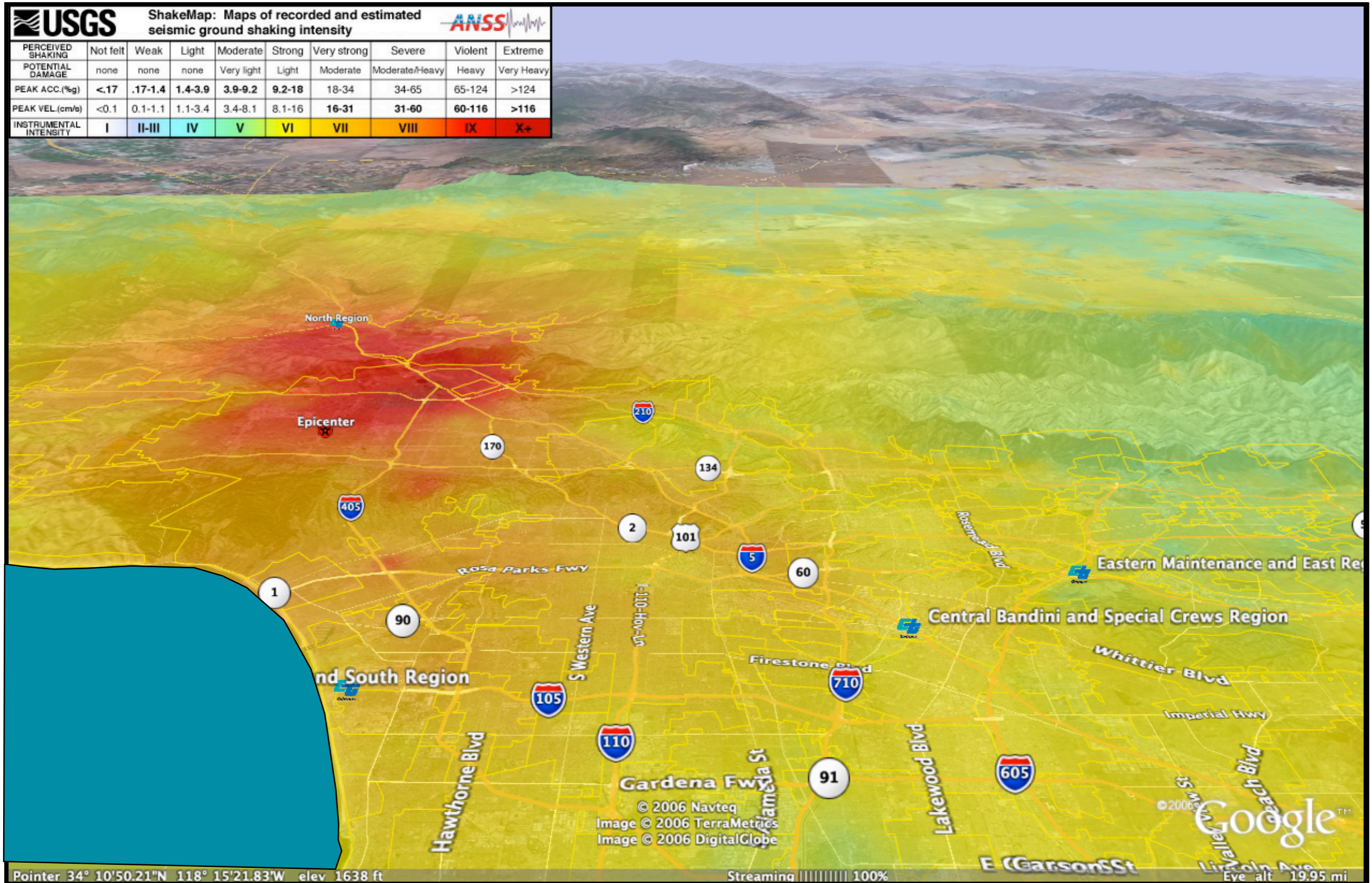
Northridge ShakeMap in Google Earth (KML Format)



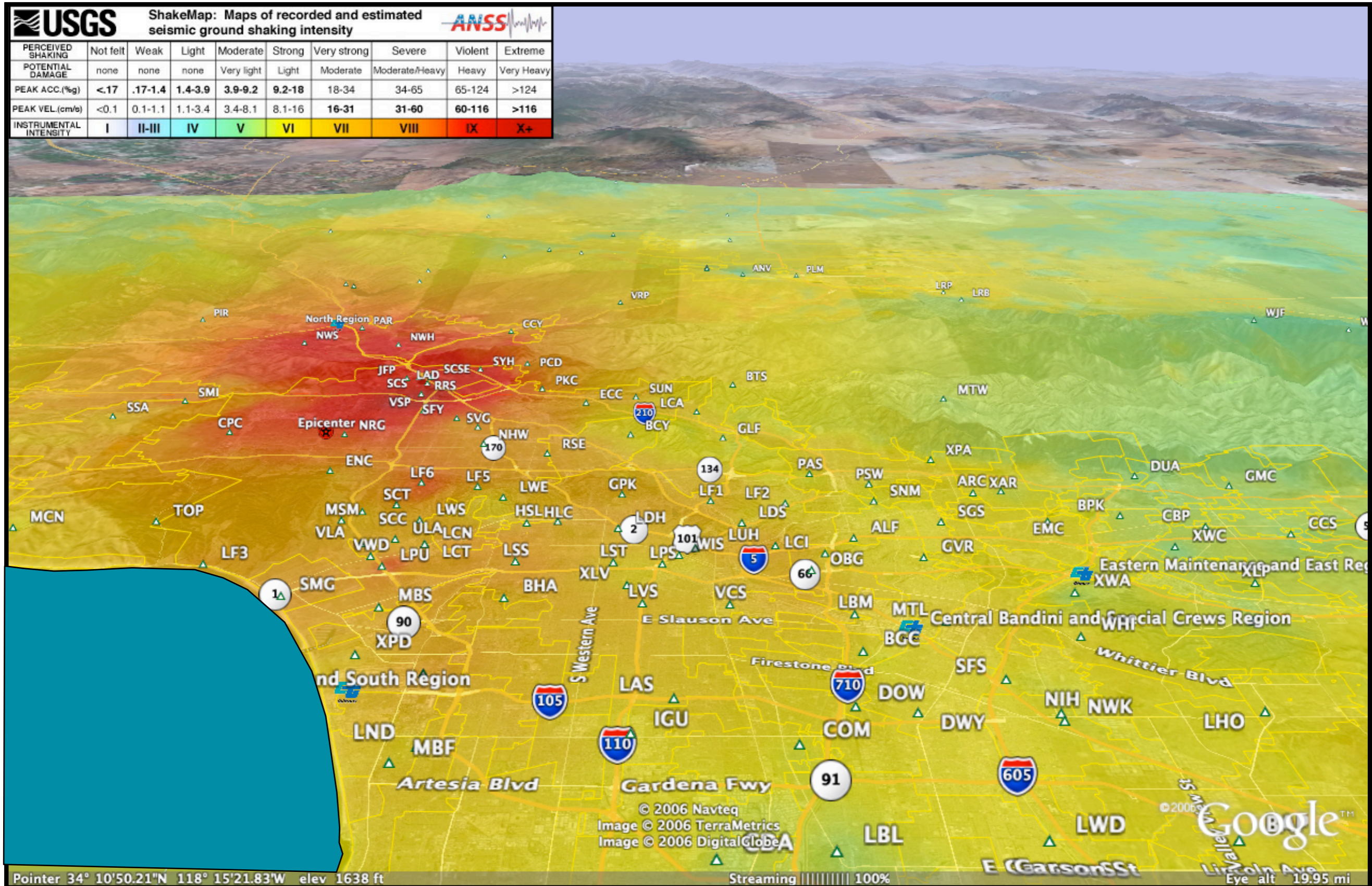
Northridge ShakeMap in Google Earth (KML Format)



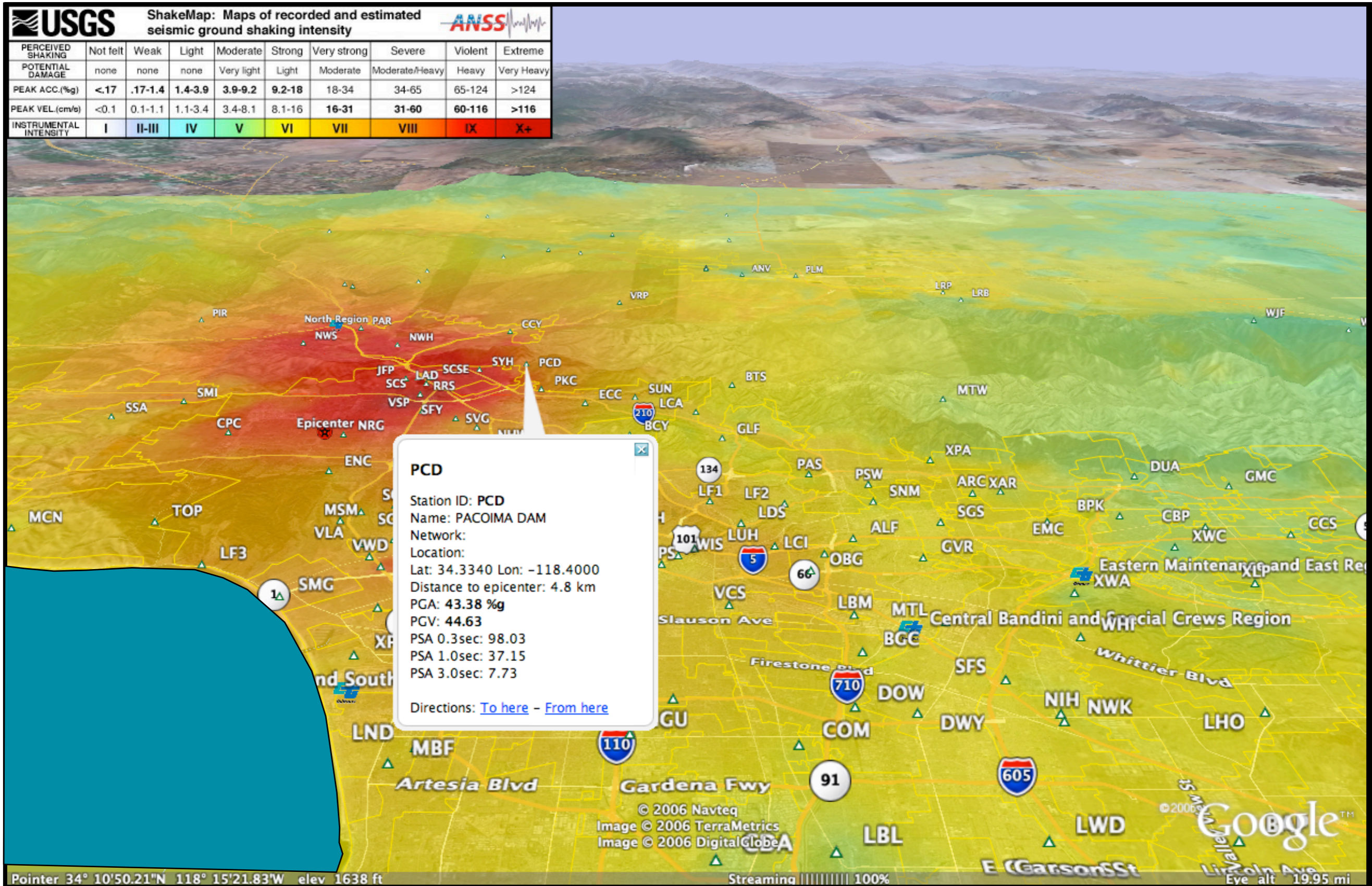
Northridge ShakeMap in Google Earth (KML Format)



Northridge ShakeMap in Google Earth (KML Format)



Northridge ShakeMap in Google Earth (KML Format)



EVENT ON Aug 15 2007 |
 [Instrumental Intensity](#) |
 [Peak Ground Acceleration](#) |
 [Peak Ground Velocity](#) |
 [Download](#)

ShakeMap Products Available for Download |
 [Product Listing](#) |
 [Format Information](#)

Maps:

	Instrumental Intensity	Peak Ground Motion	
		Acceleration	Velocity
JPEG	intensity.jpg	pga.jpg	pgv.jpg
Postscript	intensity.ps.zip	pga.ps.zip	pgv.ps.zip

Media Maps:

Decorated	tvmap.jpg	tvmap.ps.zip
Bare	tvmap_bare.jpg	tvmap_bare.ps.zip
Info Sheet	tvguide.txt	

Data:

Raw Grids

Text X, Y, Z Values	grid.xyz.zip
XML (important note)	grid.xml

GIS Files

KML (what's this?)	200708152340.kml
--------------------------------------	----------------------------------

Station Lists:

Text	stationlist.txt
XML	stationlist.xml

Metadata

Format	HTML	Text	XML

Supplemental Data

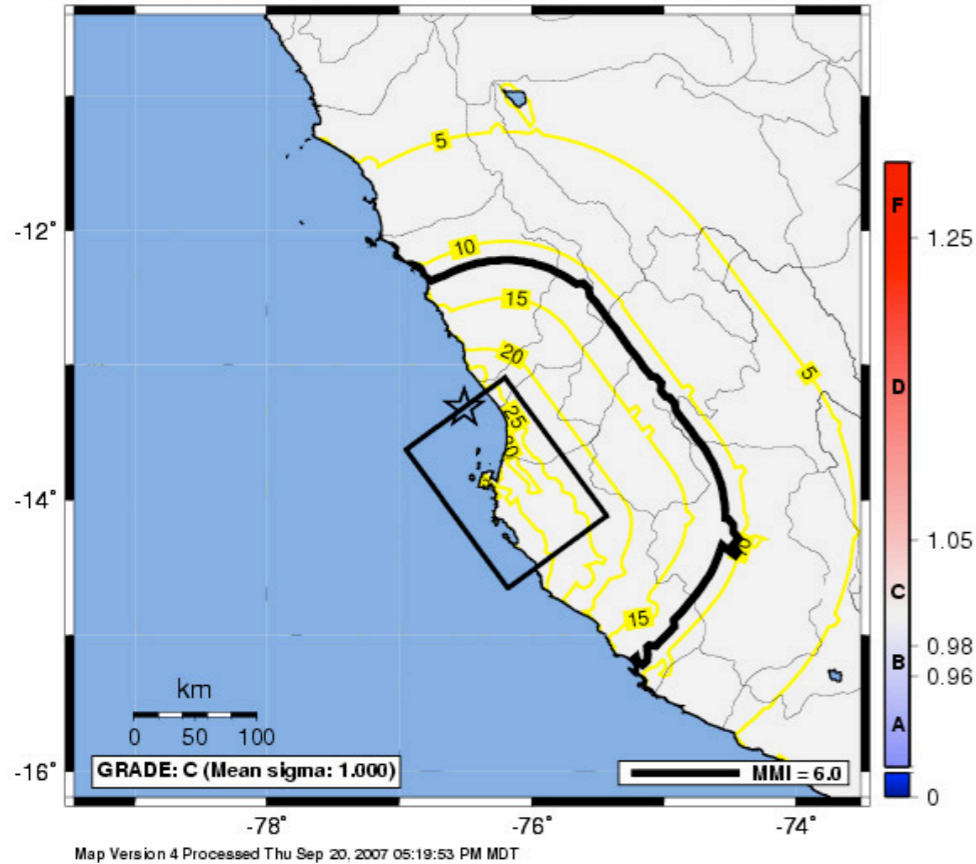
Quality/Processing Parameters	sd.jpg	info.xml
-------------------------------	------------------------	--------------------------

EVENT ON Aug 15 2007 | Instrumental Intensity | Peak Ground Acceleration | Peak Ground Velocity | [Download](#)

ShakeMap Products Available for Download | [Product Listing](#) | [Format Information](#)

Maps:

USGS PGA/Sigma Map (in %) : Off Coast of Central Peru
 Wed Aug 15, 2007 23:40:58 GMT M 8.0 S13.32 W76.51 Depth: 30.2km ID:200708152340



Media M

Data:

[Raw](#)

[GIS](#)

[Sta](#)

Peak Ground Motion

Acceleration

Velocity

[pga.jpg](#)

[pgv.jpg](#)

[pga.ps.zip](#)

[pgv.ps.zip](#)

[tvmap.ps.zip](#)

[tvmap_bare.ps.zip](#)

[tvguide.txt](#)

[grid.xyz.zip](#)

[grid.xml](#)

[200708152340.kml](#)

[stationlist.txt](#)

[stationlist.xml](#)

Metadata

Format

[HTML](#)

[Text](#)

[XML](#)

Supplemental Data

Quality/Processing Parameters

[sd.jpg](#)

[info.xml](#)

EVENT ON
Aug 15 2007

Instrumental
Intensity

Peak Ground
Acceleration

Peak Ground
Velocity

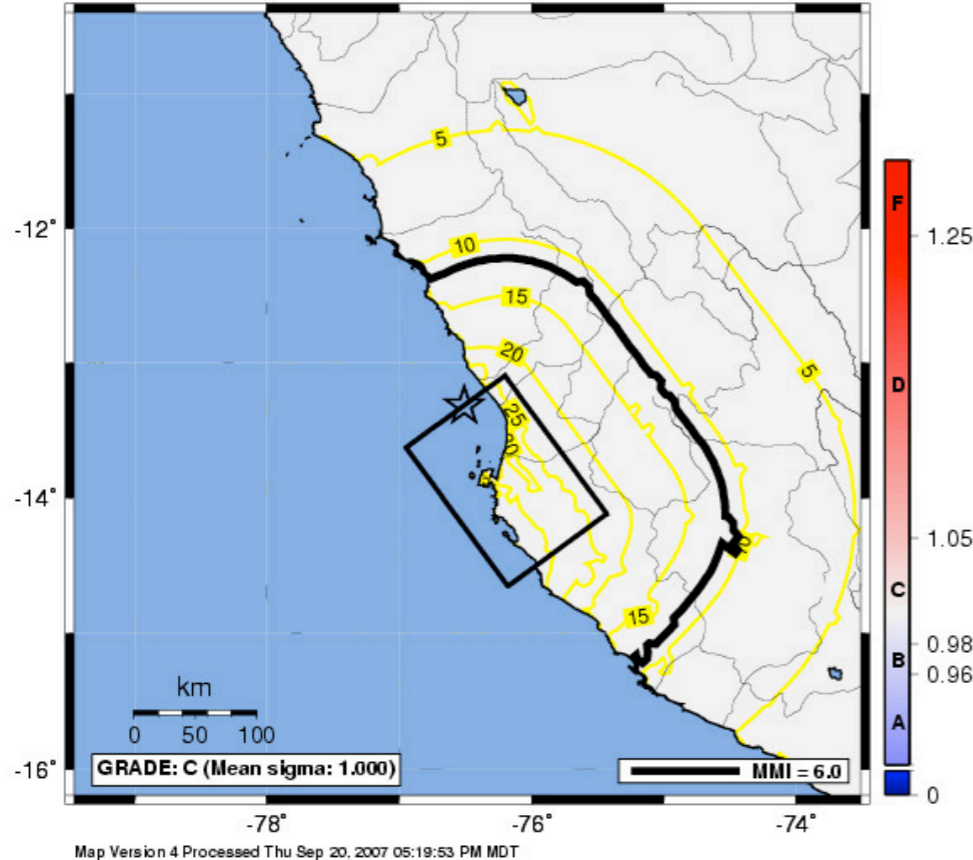
Download

ShakeMap Products Available for Download

Product Listing | Format Information

Maps:

USGS PGA/Sigma Map (in %g) : Off Coast of Central Peru
Wed Aug 15, 2007 23:40:58 GMT M 8.0 S13.32 W76.51 Depth: 30.2km ID:200708152340



Media M

Data:

Rav

GIS

Sta

Metadata

Format

[HTML](#)

[Text](#)

[XML](#)

Supplemental Data

Quality/Processing Parameters

[sd.jpg](#)

[info.xml](#)

This XML file does not appear to have any style information associated with it. The document tree is shown below.

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<info evid="200708152340"
tags="grind_time,datafiles,faultfiles,regression,src_mech,distance_used,median_dist,big_bound,map_bound,site_c
<tag name="grind_time" value="Thu Sep 20 17:18:11 MDT 2007 " desc="Start time for event processing"/>
<tag name="datafiles" value="" desc="List of input files"/>
<tag name="faultfiles" value="/home/shake/ShakeMap_3.2/bin/./data/200708152340/input/20pc_fault.txt" de
<tag name="regression" value="Regression::Youngs97_interface" desc="Regression type"/>
<tag name="src_mech" value="undef" desc="Source mechanism (based on regression)"/>
<tag name="distance_used" value="custom" desc="Distance: standard or custom"/>
<tag name="median_dist" value="no" desc="Median distance used"/>
<tag name="big_bound" value="-79.860000/-73.110000/-16.589000/-9.989000" desc="Boundary of grind co
<tag name="map_bound" value="-79.460000/-73.510000/-16.189000/-10.389000" desc="Boundary of even
<tag name="site_correction" value="/home/shake/ShakeMap_3.2/bin/./lib/sitecorr/site_corr_slope.dat" desc=
<tag name="sitecorr_regime" value="active" desc="Computed site correction regime (stable/active)"/>
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<tag name="pgv_surface_stations" value="0" desc="Input gridpoints used to create output grid"/>
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<tag name="mmi_max" value="8.7" desc="Max value of grid"/>
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<tag name="grade" value="C" desc="Empirical ShakeMap Grade"/>
</info>
```


U.S. OPERATIONS

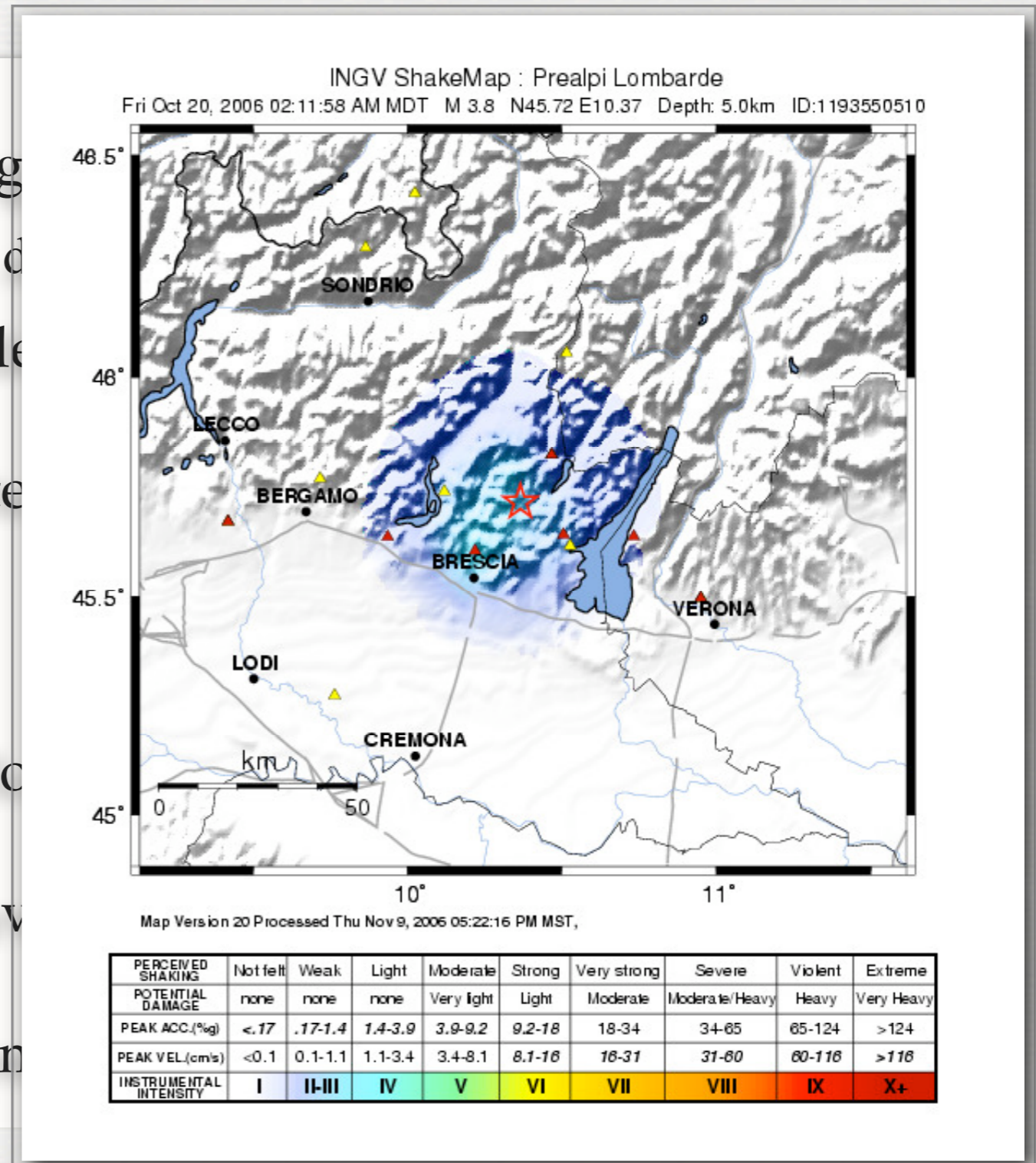
- Robust regional systems in No. & So. California, Utah, Nevada, Washington/Oregon, Anchorage.
- Developmental systems in Central US, Alaska, Puerto Rico, Northeast.
- NEIC in Golden running ShakeMap for Hawaii & Anchorage.
- NEIC began backup plans for all Regional ShakeMap Implementations (fail safe conditions).
- NEIC Global ShakeMap (GSM) automatically produced for all $M > 3.5 / 4.0$ events in US and $M > 5.5$ globally (uses “Did You Feel It?” intensity constraints).

INTERNATIONAL OPERATIONS

- V3.2 has Download Tracking:
 - us, .mx, .ch, .pt, .tr, .kr, .es, .de, .ro, .gr, .it, .no, .ca, .cn
- Italy: operational nationwide by INGV since 2006 (M>3)
- Norway: Implemented for testing & Development
- Switzerland [Operational]
- Turkey [Operational / Development]
- Romania [Operational / Development]
- Greece, Egypt [In Development]

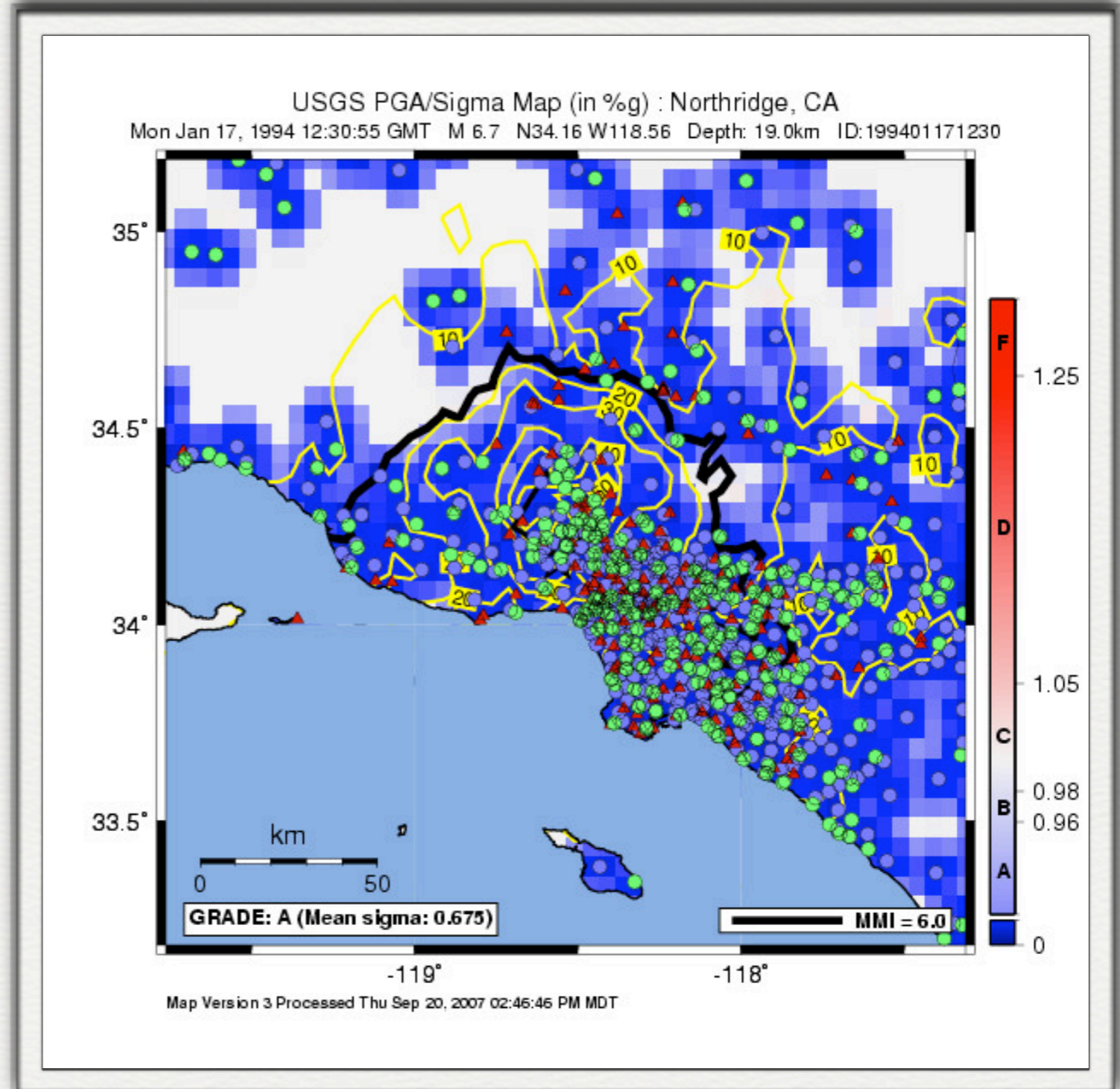
INTERNATIONAL OPERATIONS

- V3.2 has Download Tracking
 - us, .mx, .ch, .pt, .tr, .kr, .es, .d
- Italy: operational nationwide
- Norway: Implemented for te
- Switzerland [Operational]
- Turkey [Operational / Develop
- Romania [Operational / Dev
- Greece, Egypt [In Developm



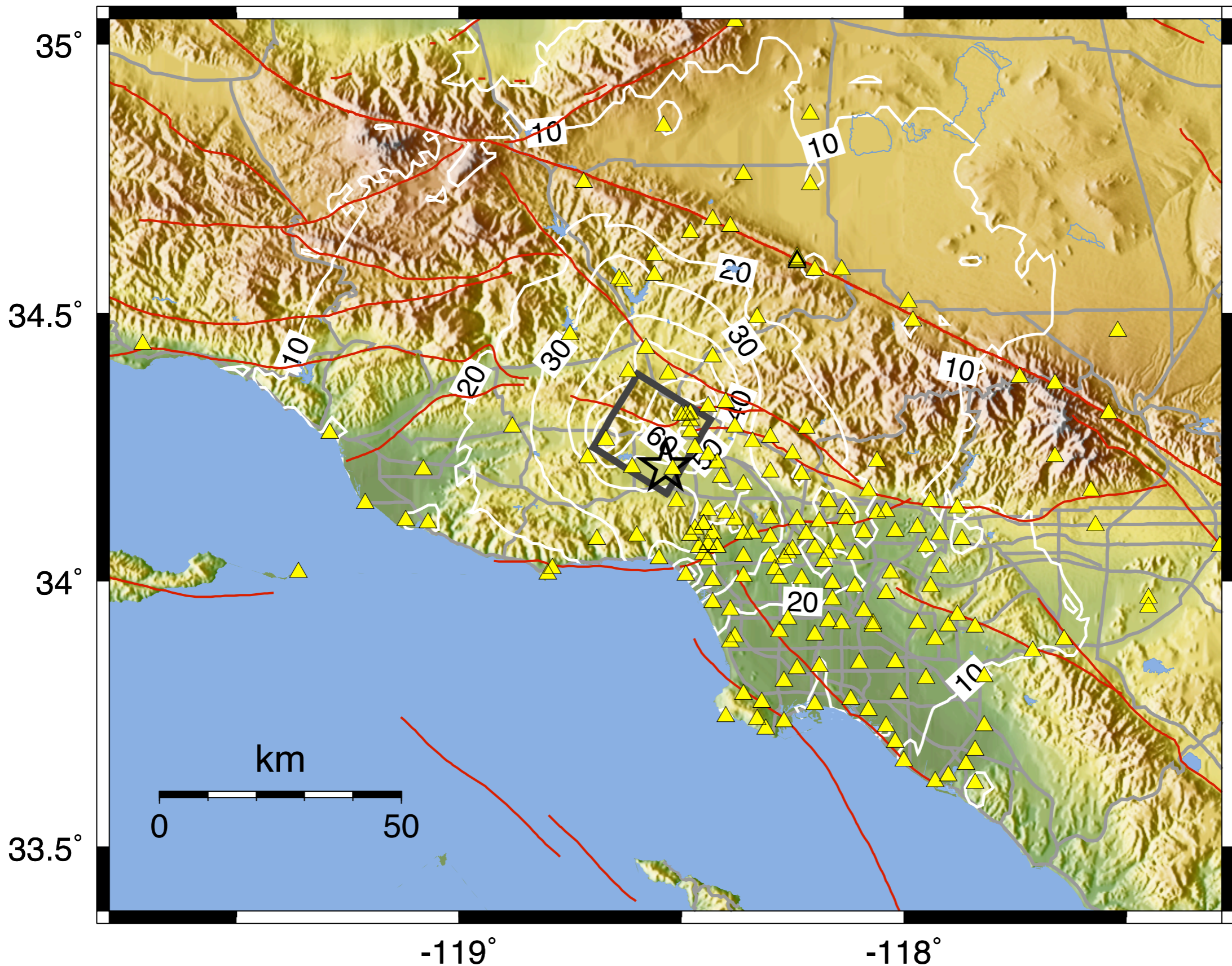
ShakeMap Uncertainty

- Uncertainty computed at each lat/lon grid cell based on distance from stations, magnitude, fault dimension & uncertainty in computing distance to each point on the map.
- Letter “Grade” based on average uncertainty over each map (Imm>VI, land)



CISN Peak Accel. Map (in %g) for Northridge Earthquake

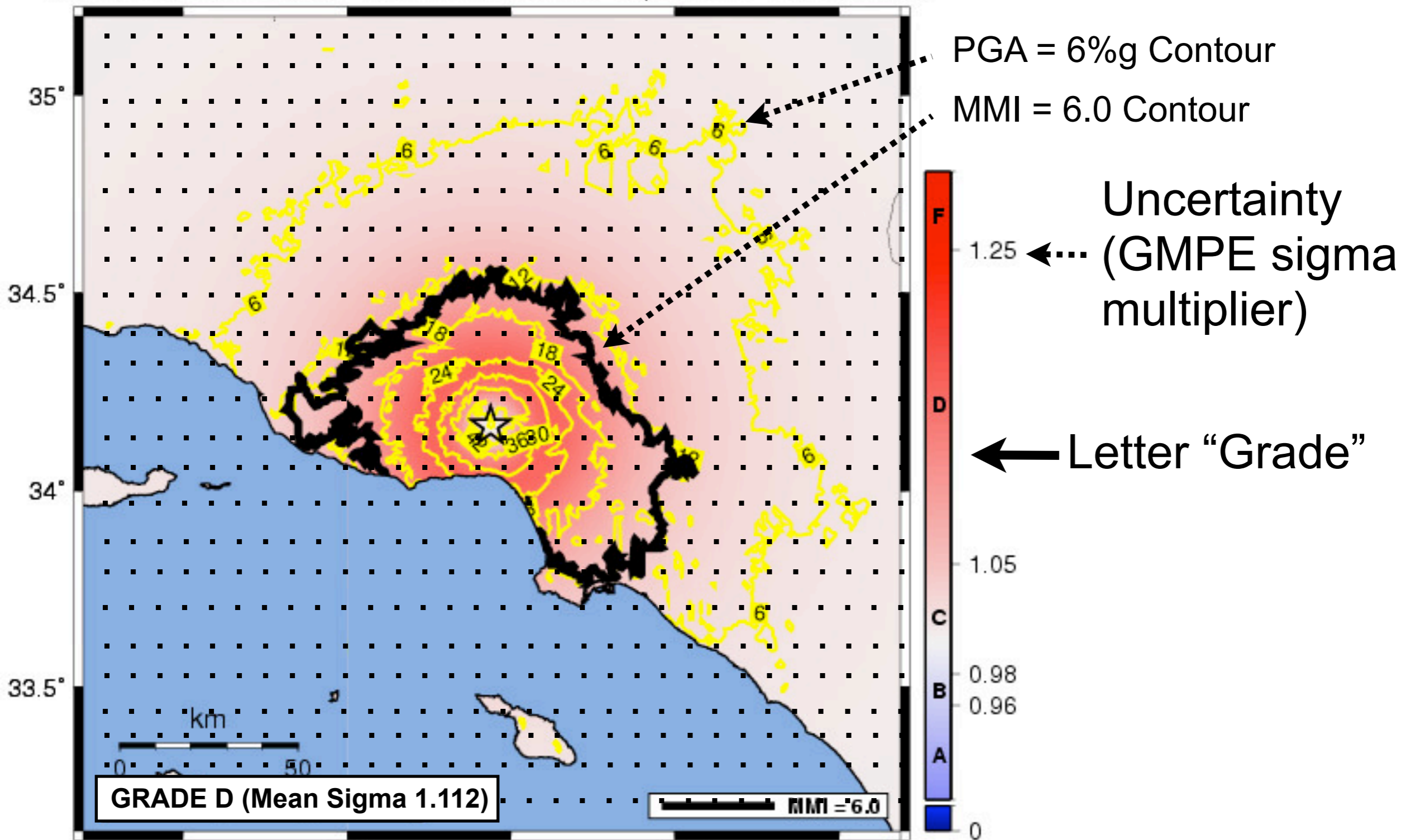
Mon Jan 17, 1994 04:30:55 AM PST M 6.7 N34.21 W118.54 Depth: 18.0km ID:Northridge



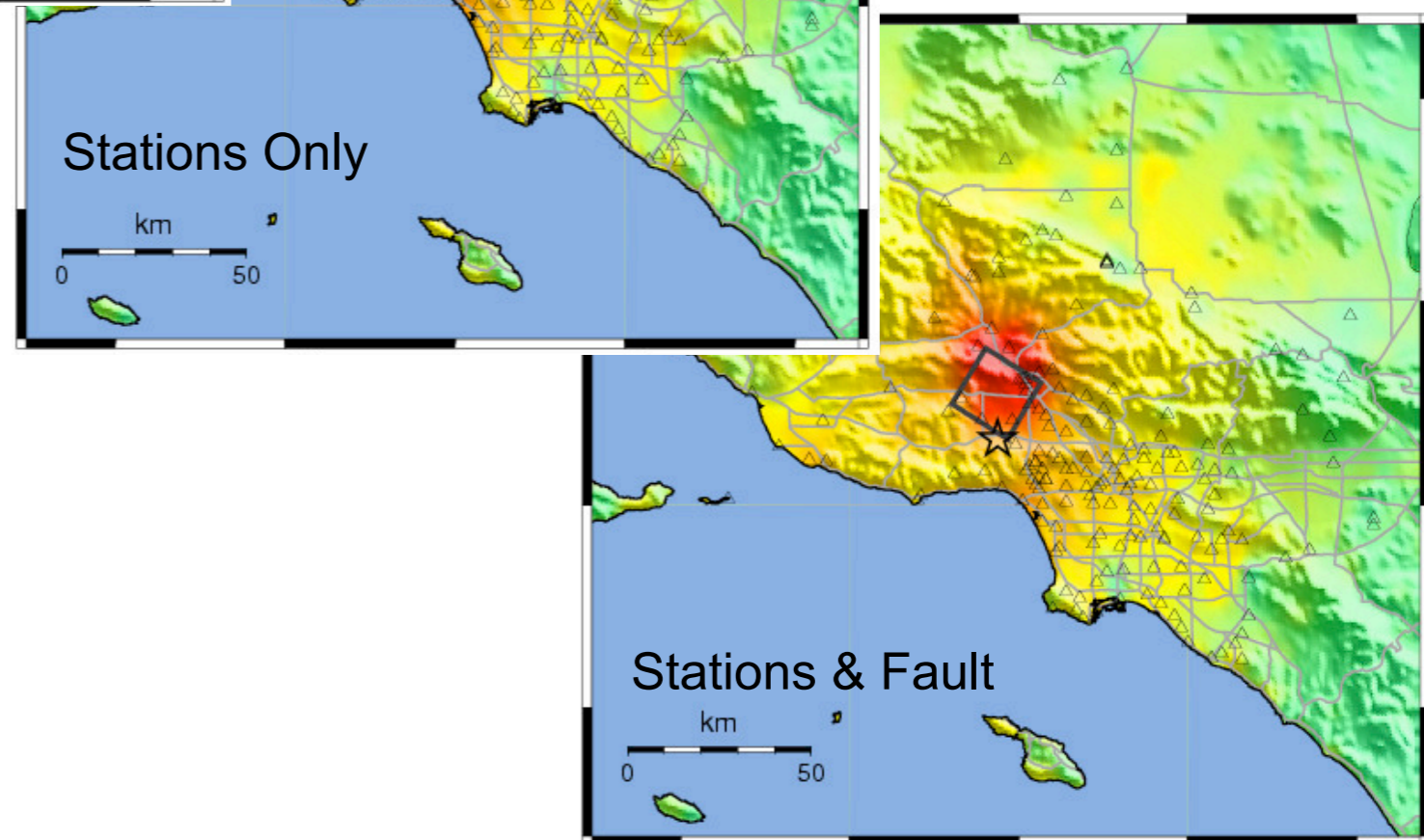
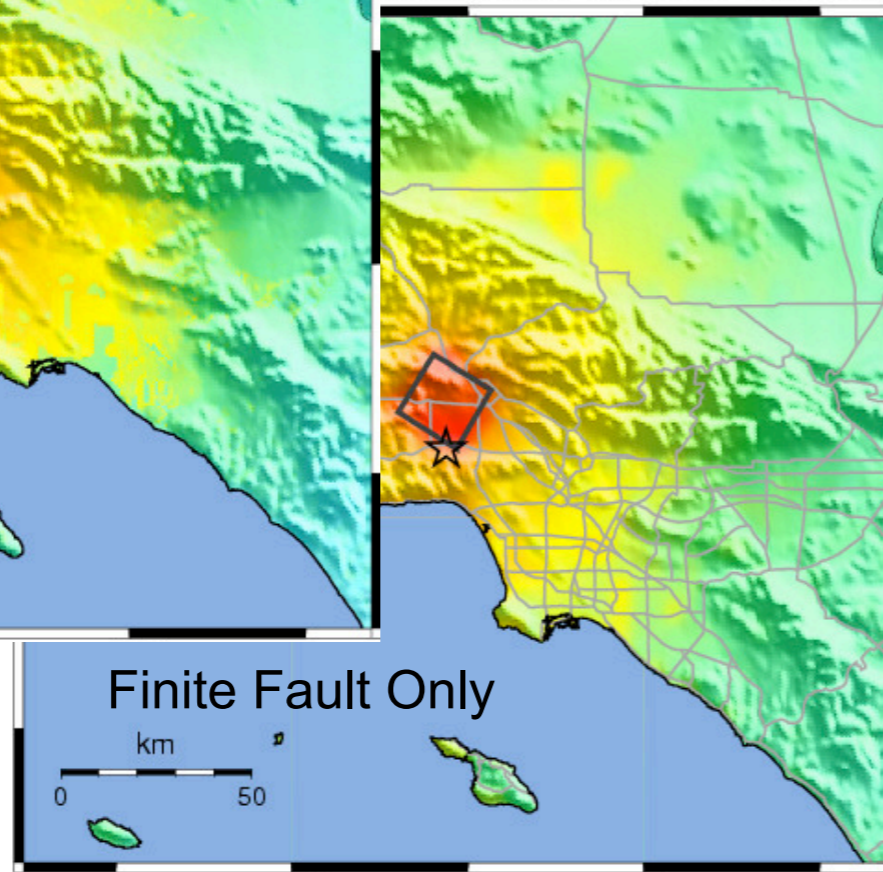
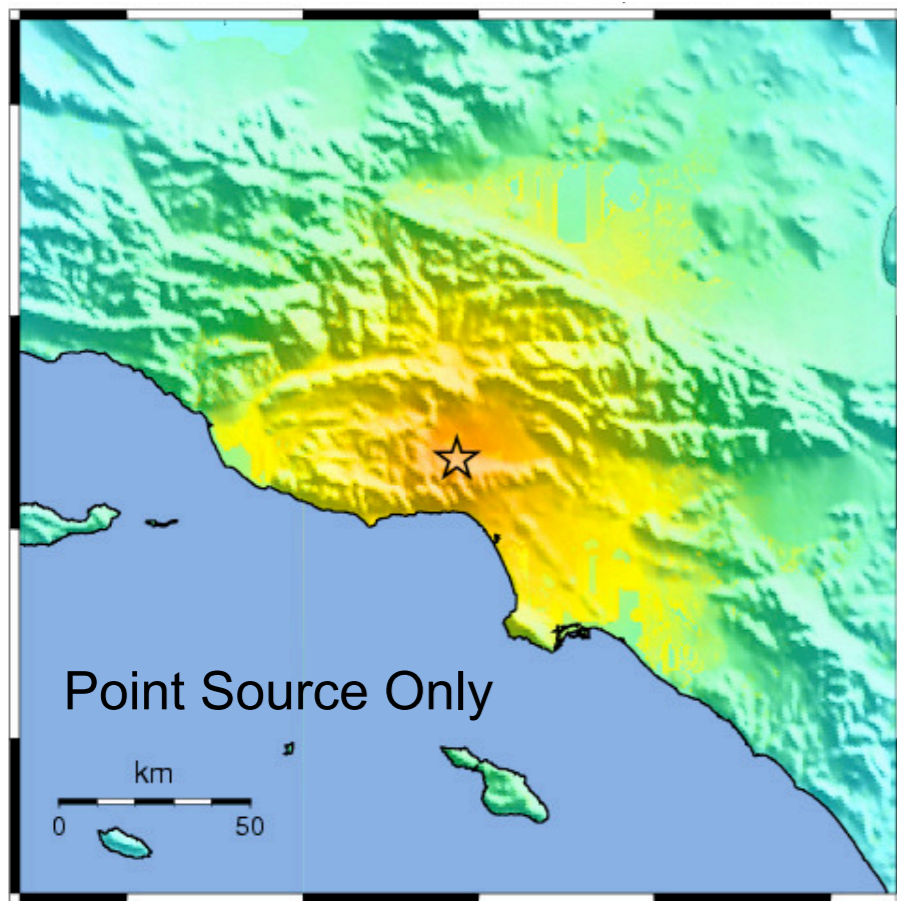
Map Version 15 Processed Thu Feb 1, 2007 03:11:01 PM PST,

USGS PGA/Sigma Map (in %g) : Northridge, CA

Mon Jan 17, 1994 12:30:55 GMT M 6.7 N34.16 W118.56 Depth: 19.0km ID:199401171230

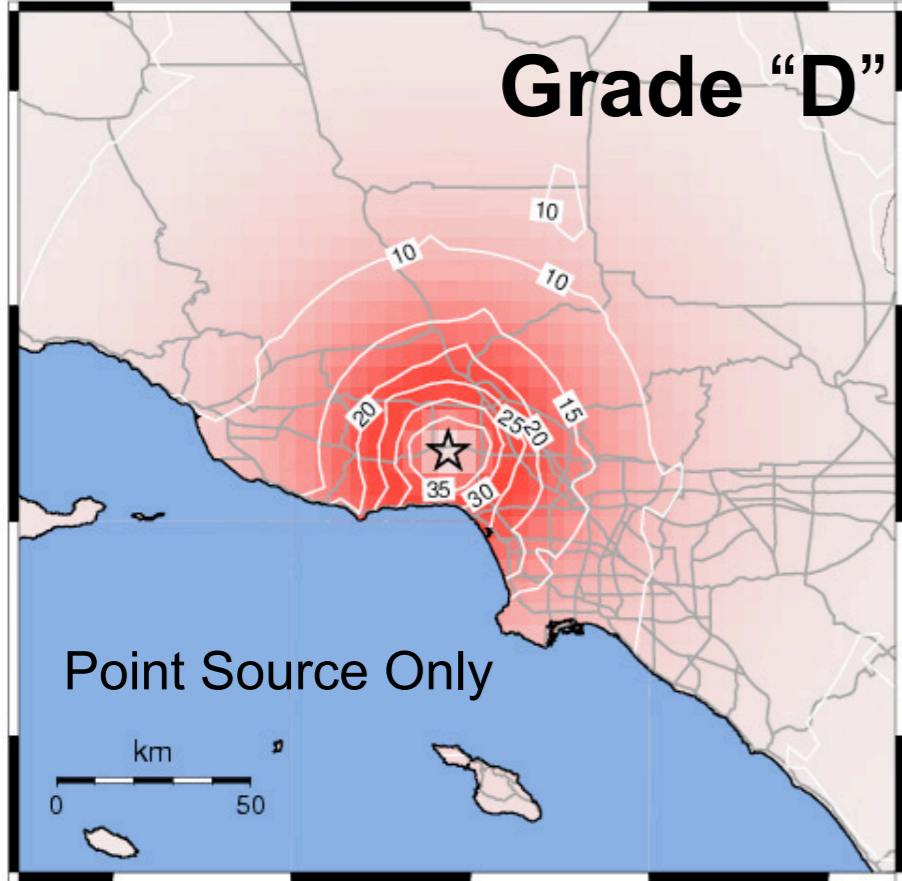


M6.7 Northridge Earthquake



M6.7 Northridge Earthquake

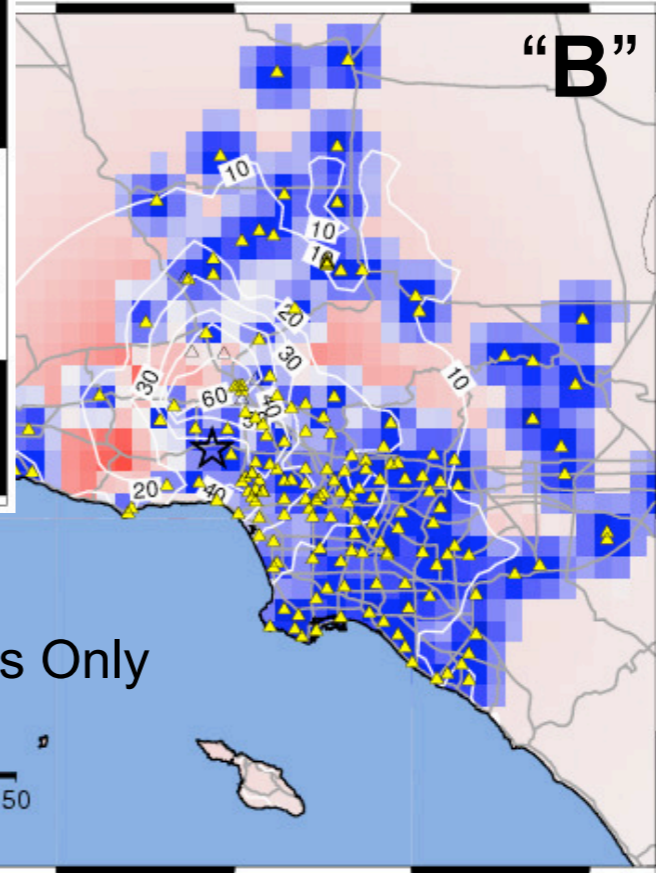
Grade "D"



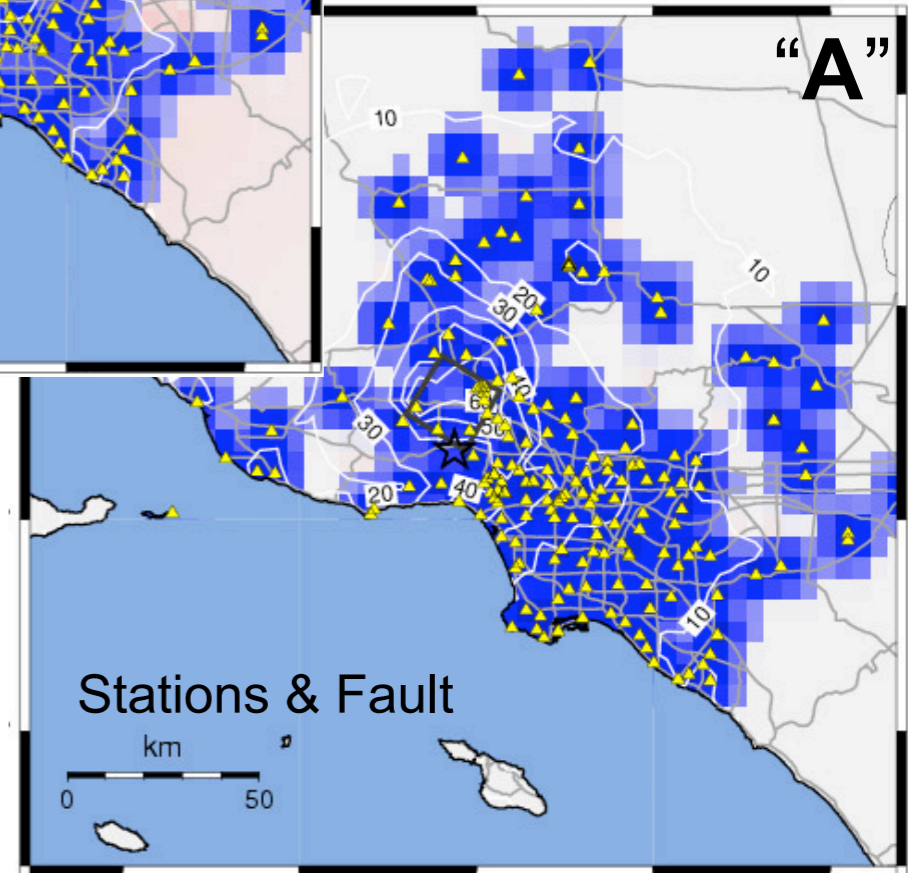
"C"







"B"

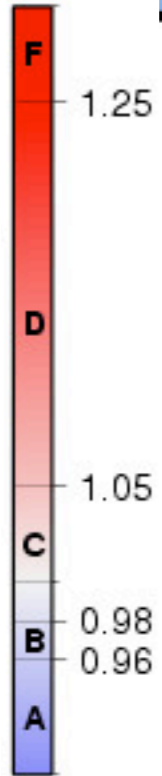


"A"



Letter Grade

- D 
- C 
- B 
- A 



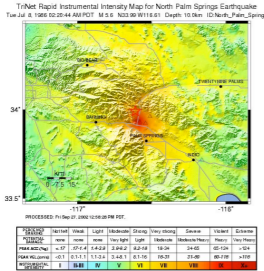
Magnitudes ~ 6, 7, 8

M~8

USGS Rapid Instrumental Intensity Map for event: 22614036

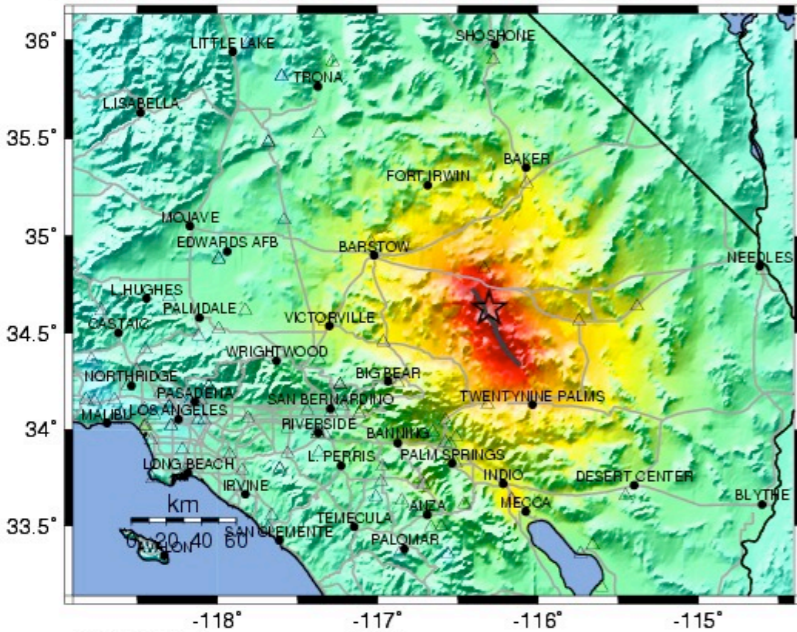
Sun Nov 3, 2002 10:12:41 PM GST M 7.9 N63.52 W147.53 Depth: 5.0km ID:22614036

M~6



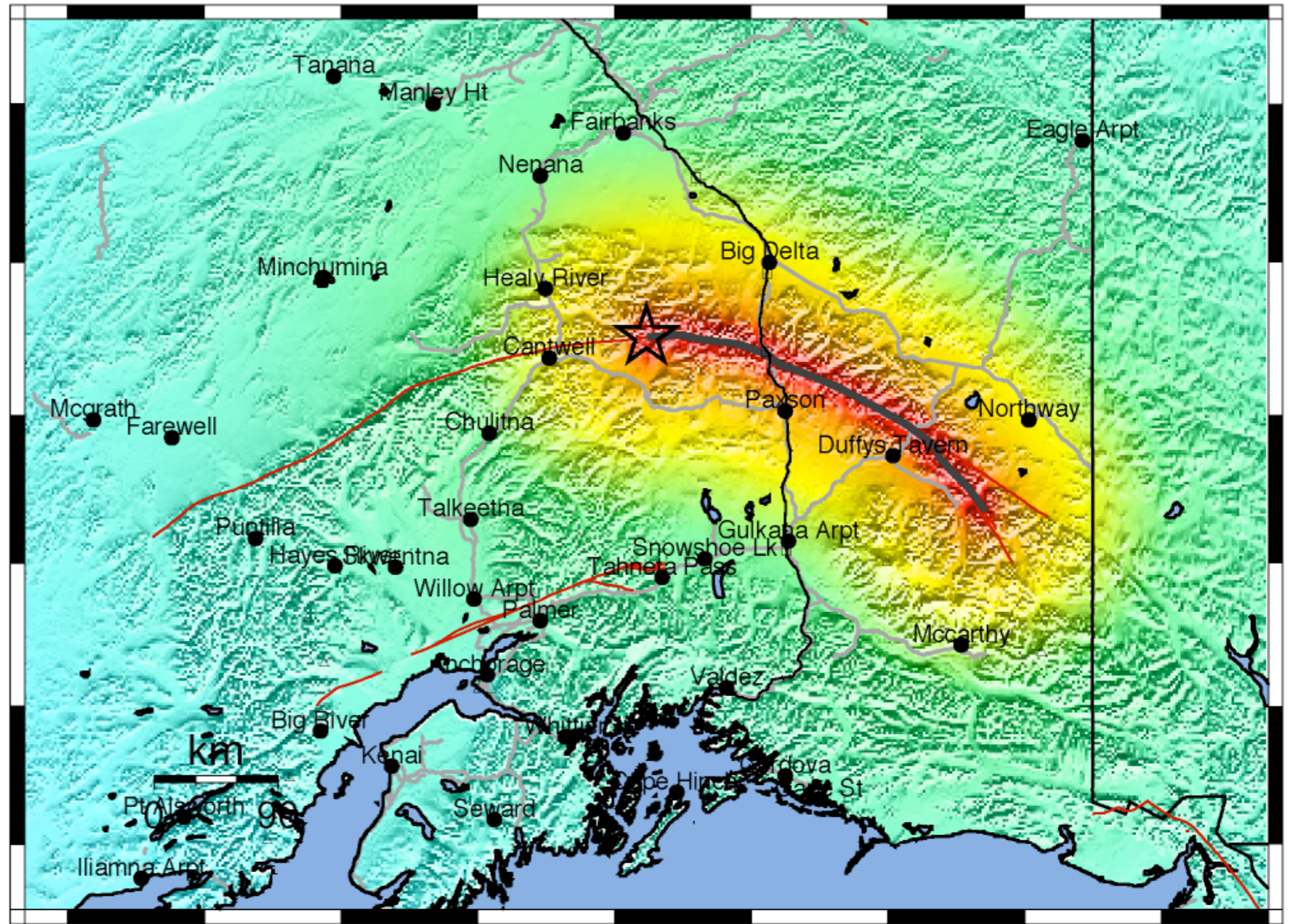
M~7

CISN Rapid Instrumental Intensity Map for Hector Mine Earthquake
Sat Oct 16, 1999 03:04:53 AM PDT M 7.1 N34.63 W116.30 Depth: 23.6km ID:9108645



PROCESSED: Mon Jun 9, 2003 09:37:56 PM PDT.

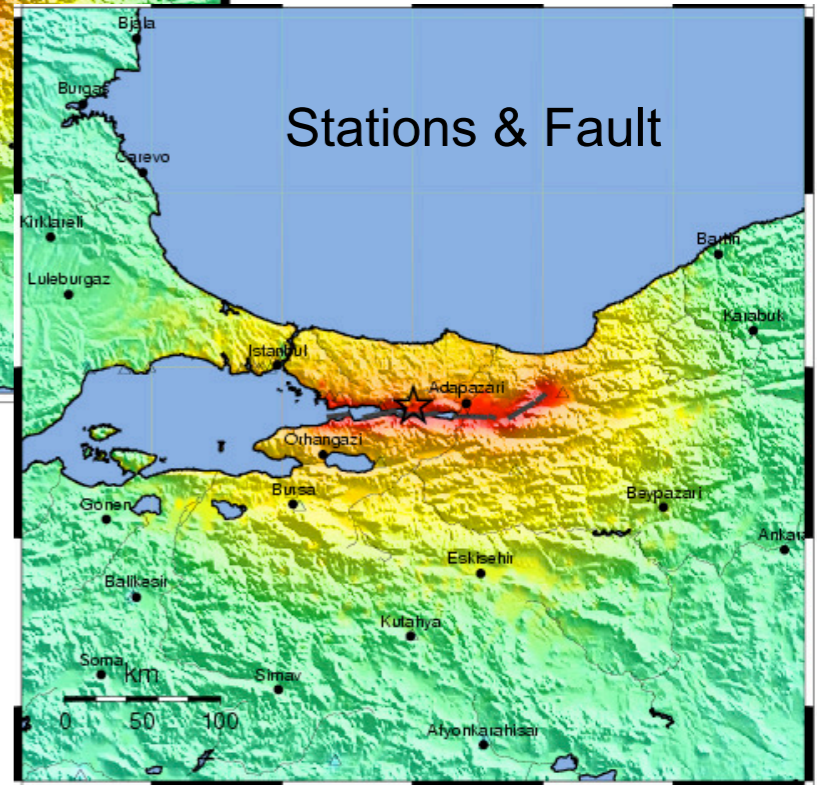
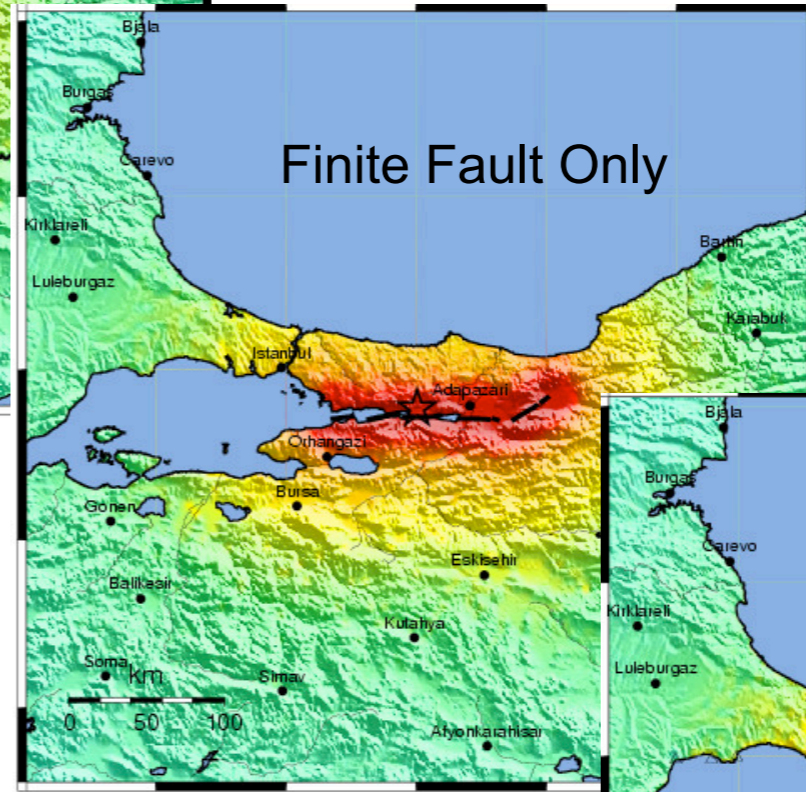
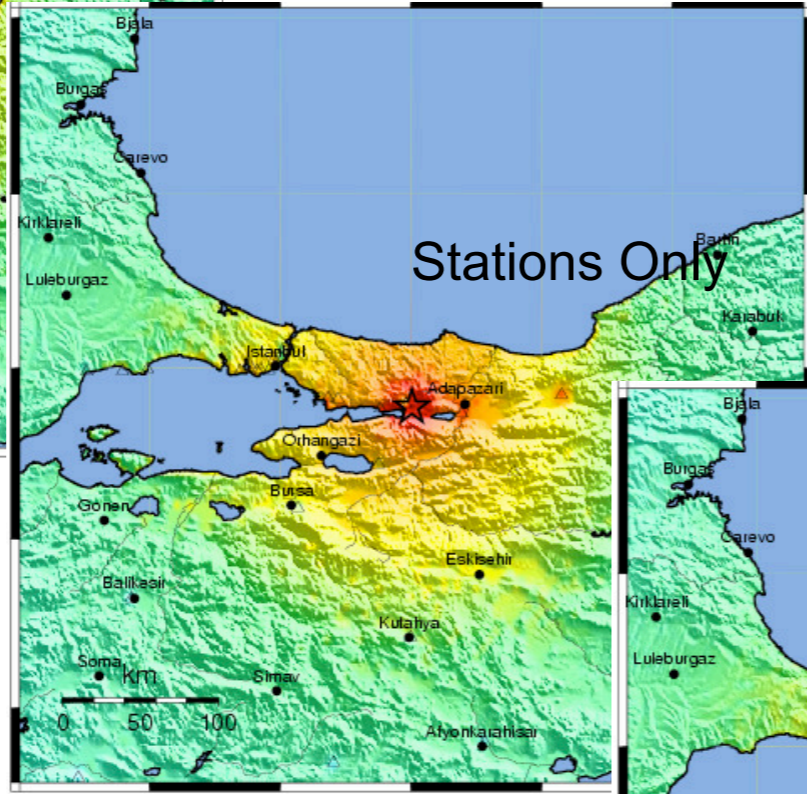
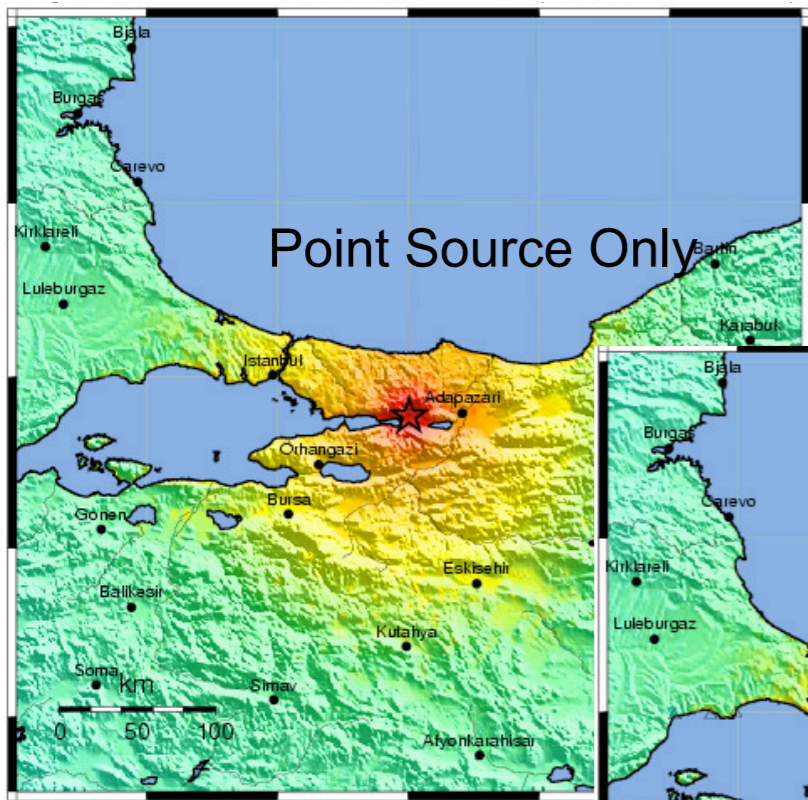
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16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



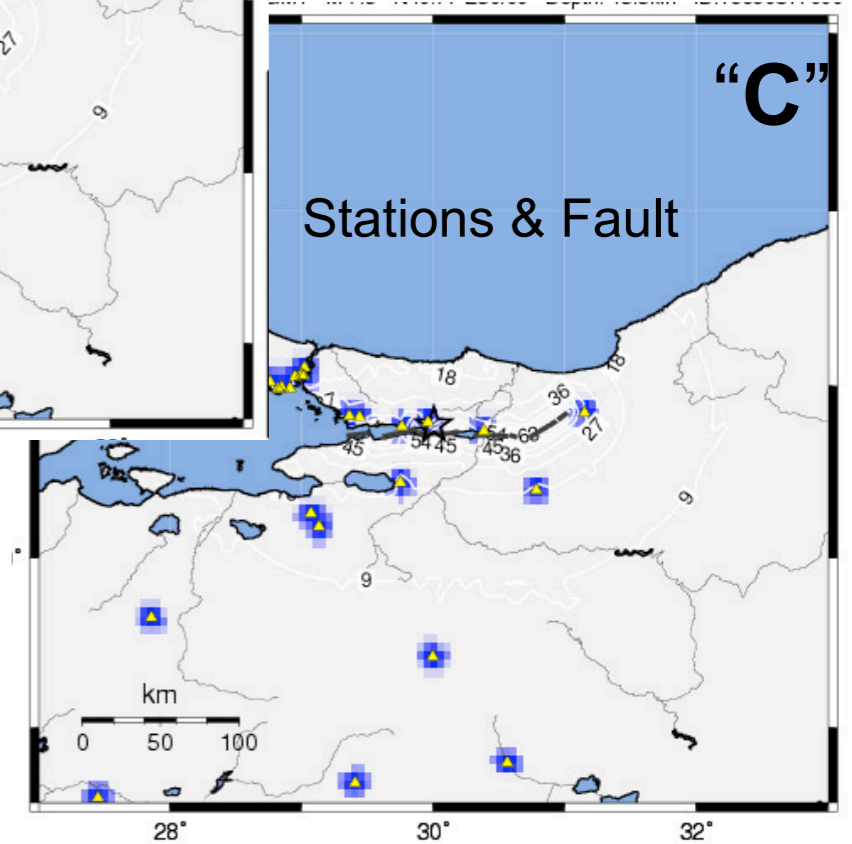
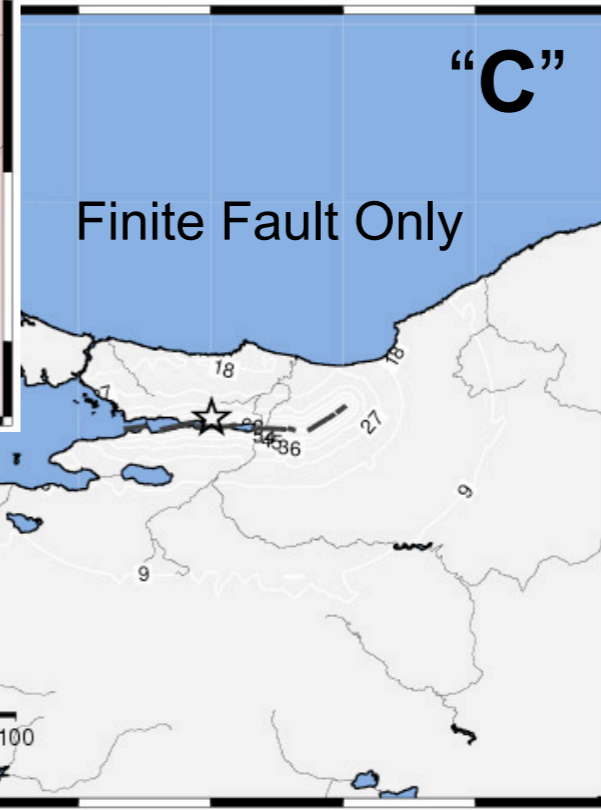
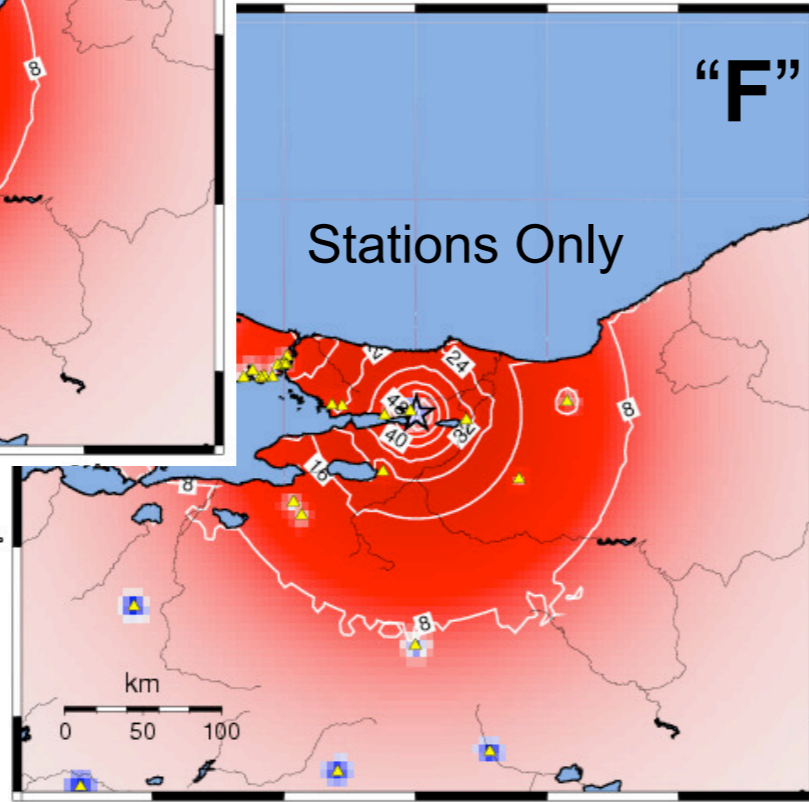
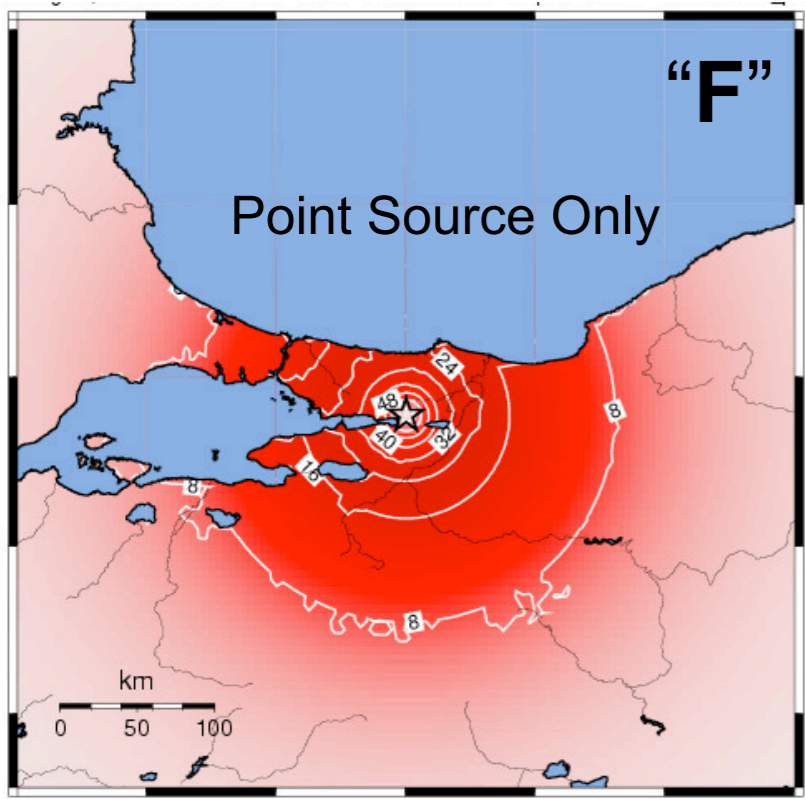
PROCESSED: Wed May 21, 2003 05:08:47 PM GST,

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	.17-1.4	1.4-3.9	3.9-9.2	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+

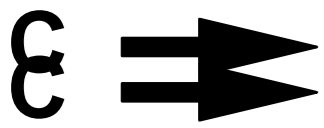
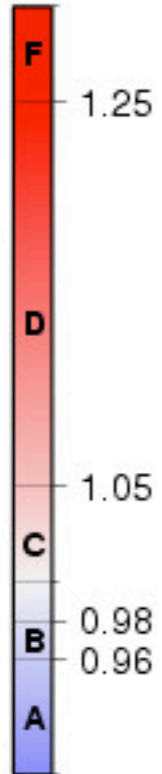
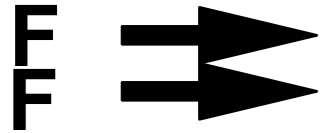
M7.6 Koceli, Turkey, Earthquake



M7.6 Koceli, Turkey, Earthquake



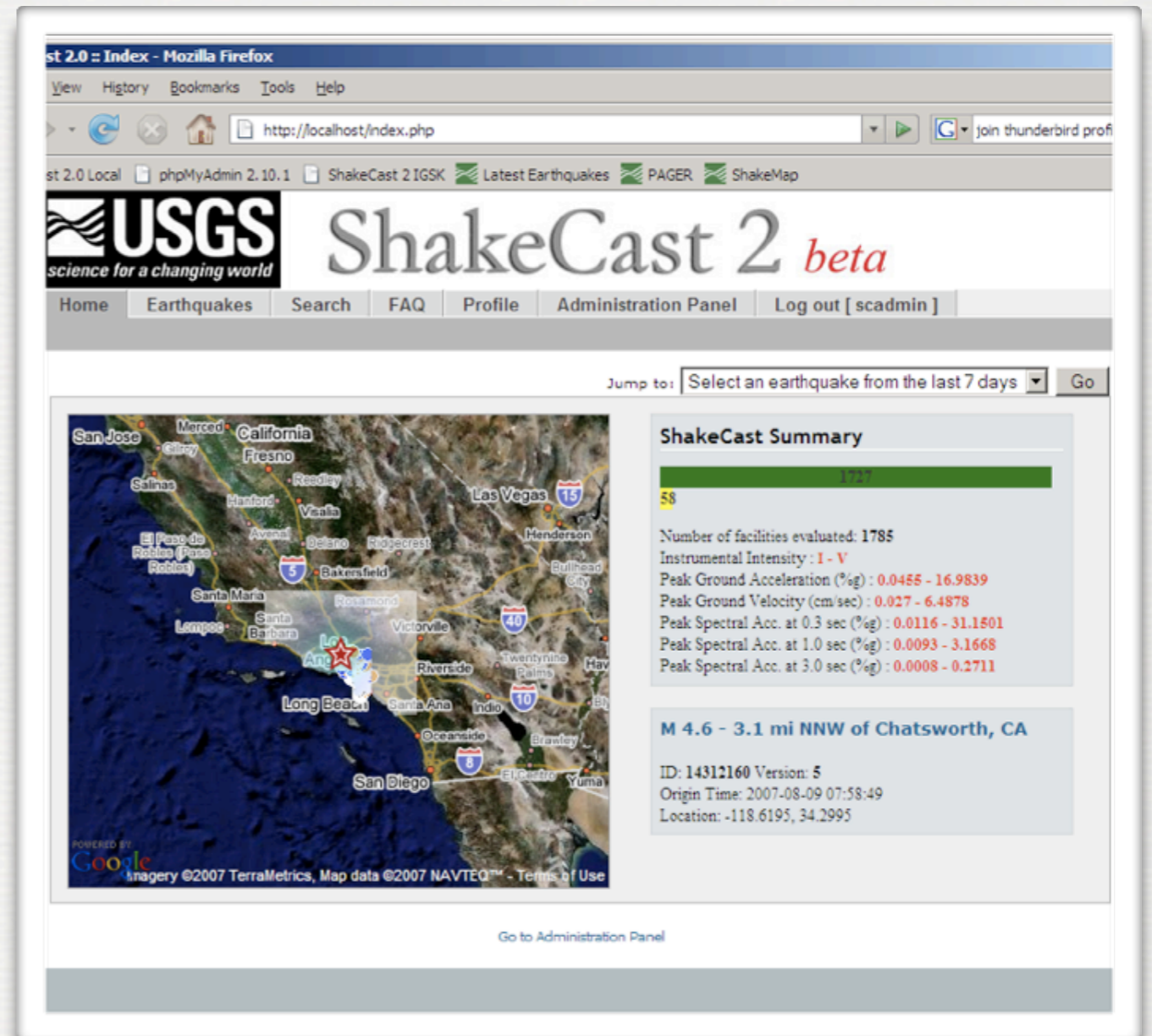
Letter Grade



SHAKEOUT UNCERTAINTY MAPs?

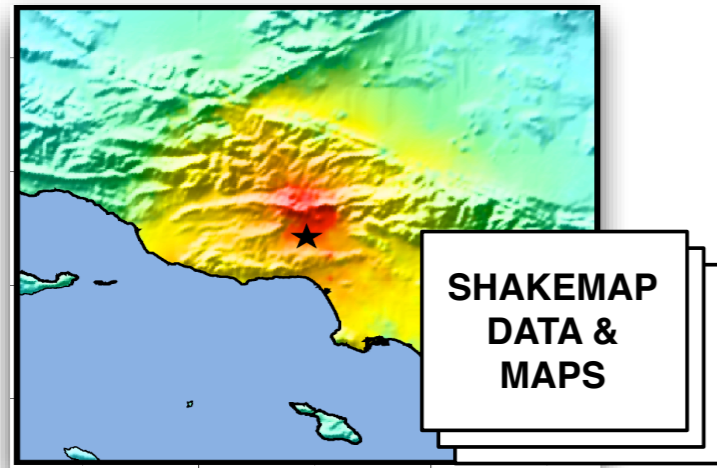
ShakeCast 2.0

- Public Release Nov, 2007 (at Earthquake Research Affiliates Conference, Caltech, Pasadena)
- ShakeCast Fact Sheet hot off the press...
- Automatic delivery and use of ShakeMap for Critical Users
- ShakeCast “*Lite*” for scientists and casual users (it’s also less filling).

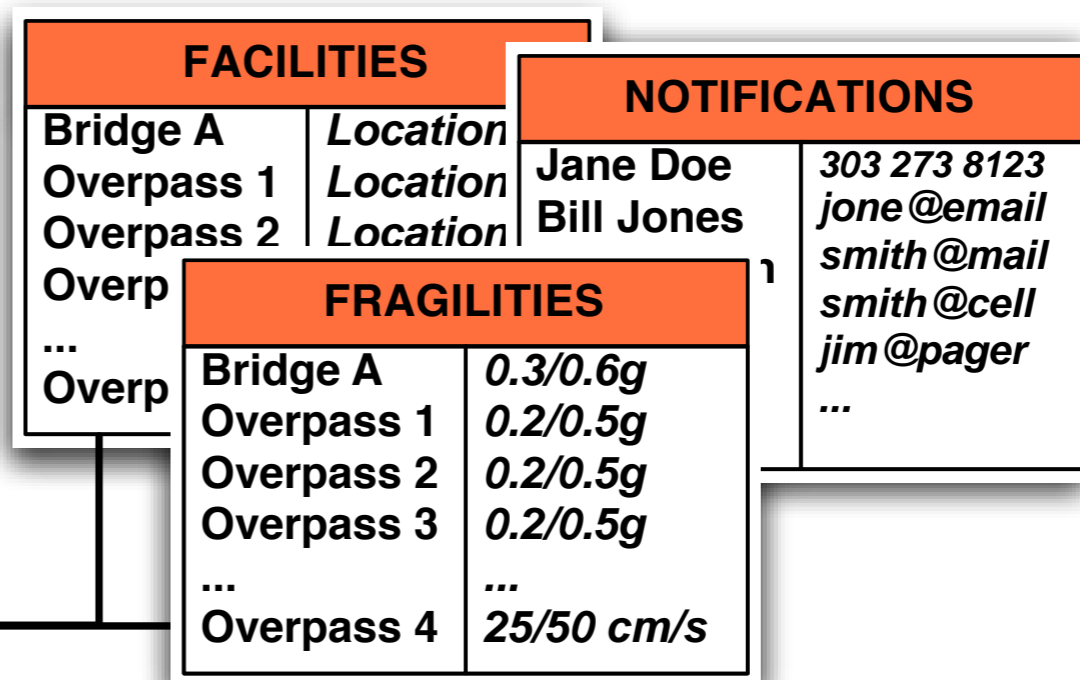


ShakeMap/ShakeCast Flowchart

SHAKEMAP WEB SERVERS



USER'S DATABASES

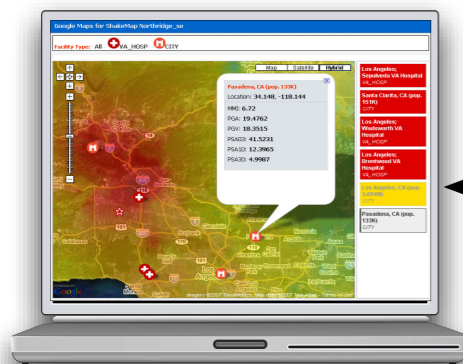


RSS Feed

USER'S SHAKECAST SYSTEM

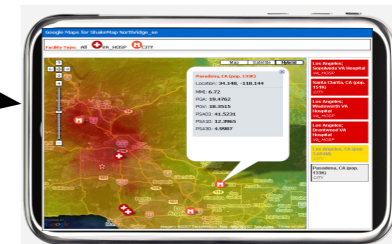
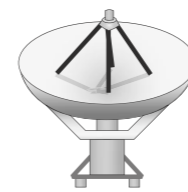


Internal Web Page & User Interface



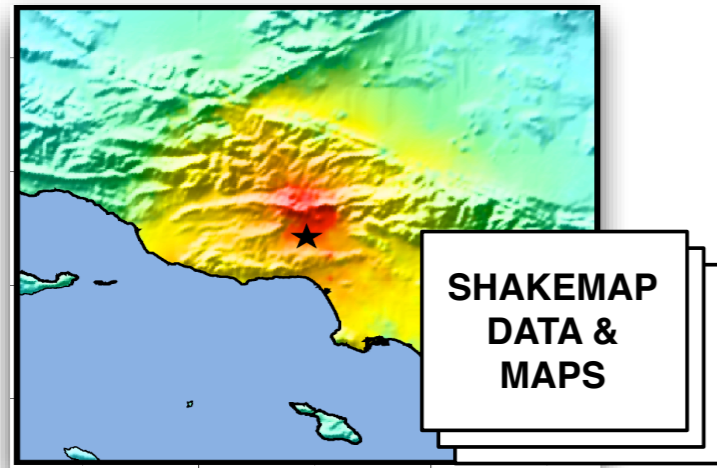
ESTIMATED DAMAGE	
Bridge A	<i>Damage Likely</i>
Overpass 1	<i>Damage Likely</i>
Overpass 2	<i>Damage Likely</i>
Overpass 3	<i>Damage Poss.</i>
...	...
Overpass 4	<i>Damage Poss.</i>

Notifications
Email, PDA, Cell

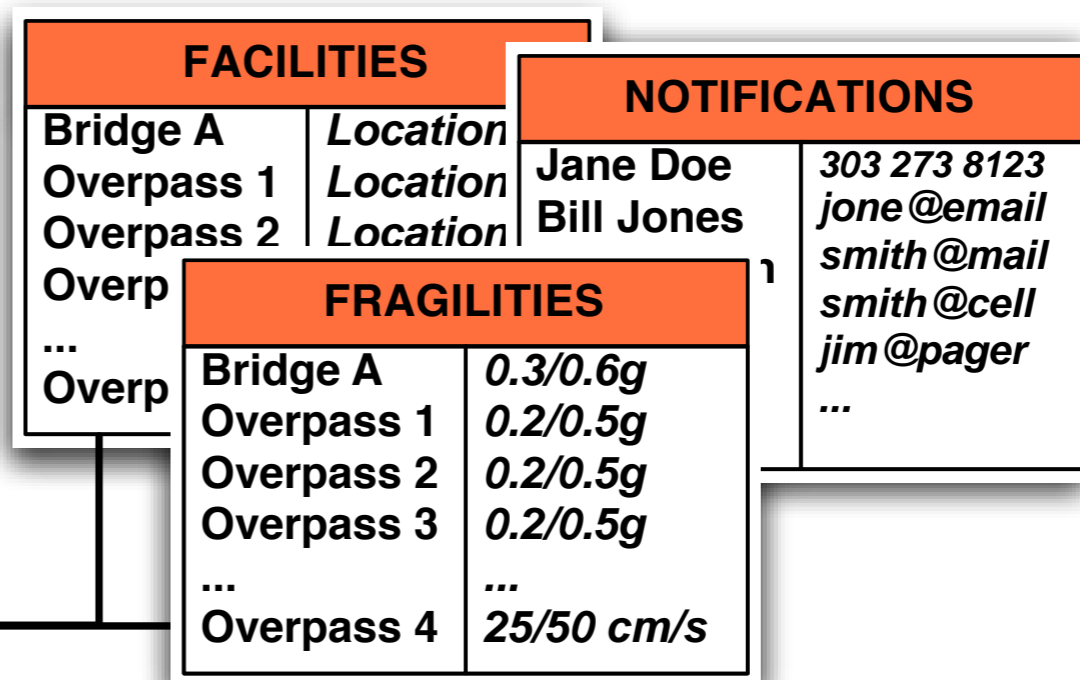


ShakeMap/ShakeCast Flowchart

SHAKEMAP WEB SERVERS

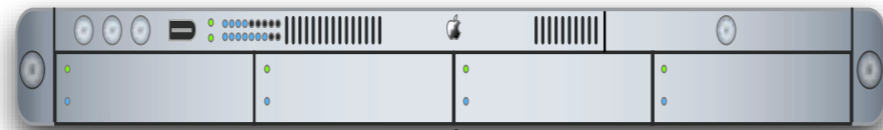


USER'S DATABASES

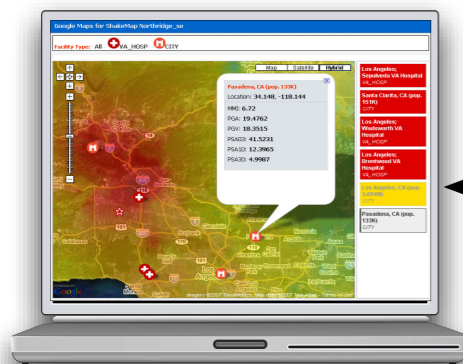


RSS Feed

USER'S SHAKECAST SYSTEM

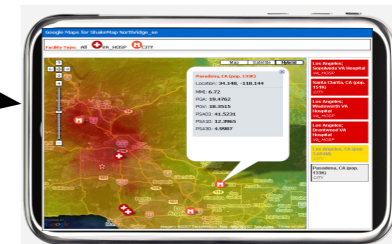
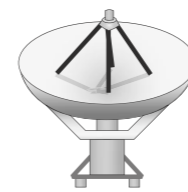


Internal Web Page & User Interface



ESTIMATED DAMAGE	
Bridge A	<i>Damage Likely</i>
Overpass 1	<i>Damage Likely</i>
Overpass 2	<i>Damage Likely</i>
Overpass 3	<i>Damage Poss.</i>
...	...
Overpass 4	<i>Damage Poss.</i>

Notifications Email, PDA, Cell



ShakeCast Version 2.0

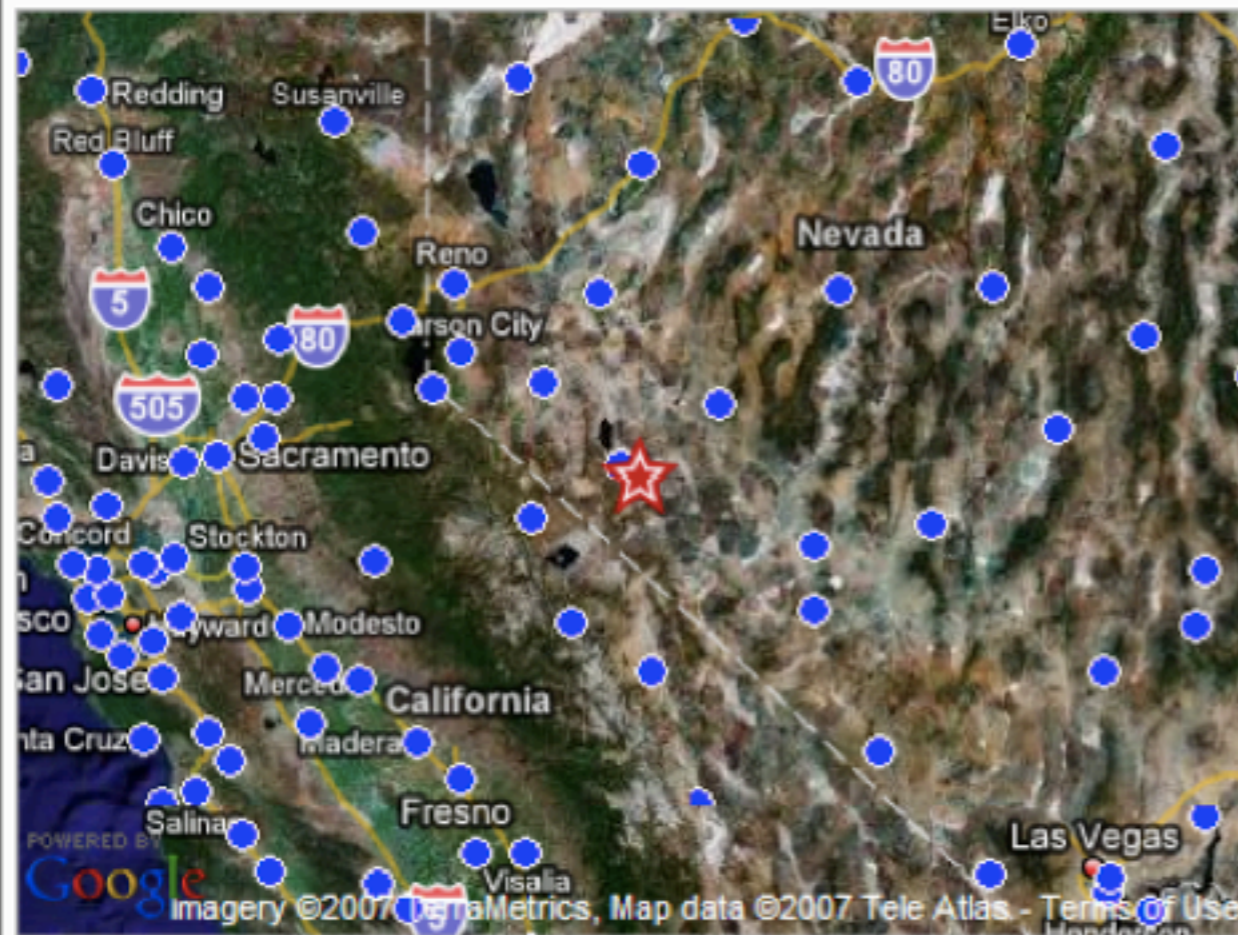
Basics

- Software: PERL, Apache, MySQL, PHP (all Open Source)
- Hardware (Windows OS). 7x24 & hardened environment.
- Internet & Exchange files are XML
- Installation via Install Wizard, scripts & tutorials
- Configuration with tools & GUI.
- Setup with import tools & GUI: Import databases of Facilities Fragilities, Users, Notification profiles from CSV files / spreadsheets.

ShakeCast Web "Portal"

Jump to: Select an earthquake from the last 7 days

SUBMIT



ShakeCast Summary



Number of facilities evaluated: 3
 Instrumental Intensity : 1 - 1
 Peak Ground Acceleration (%g): 0.002 - 0.2764
 Peak Ground Velocity (cm/sec): 0.0008 - 0.0484

M 2.9 - 7.5 miles ESE of HAWTHORNE-NV

ID: 2007282_221841 Version: 1
 Origin Time: 2007-10-09 12:32:12
 Location: -118.5044, 38.4736

Log in

Username:

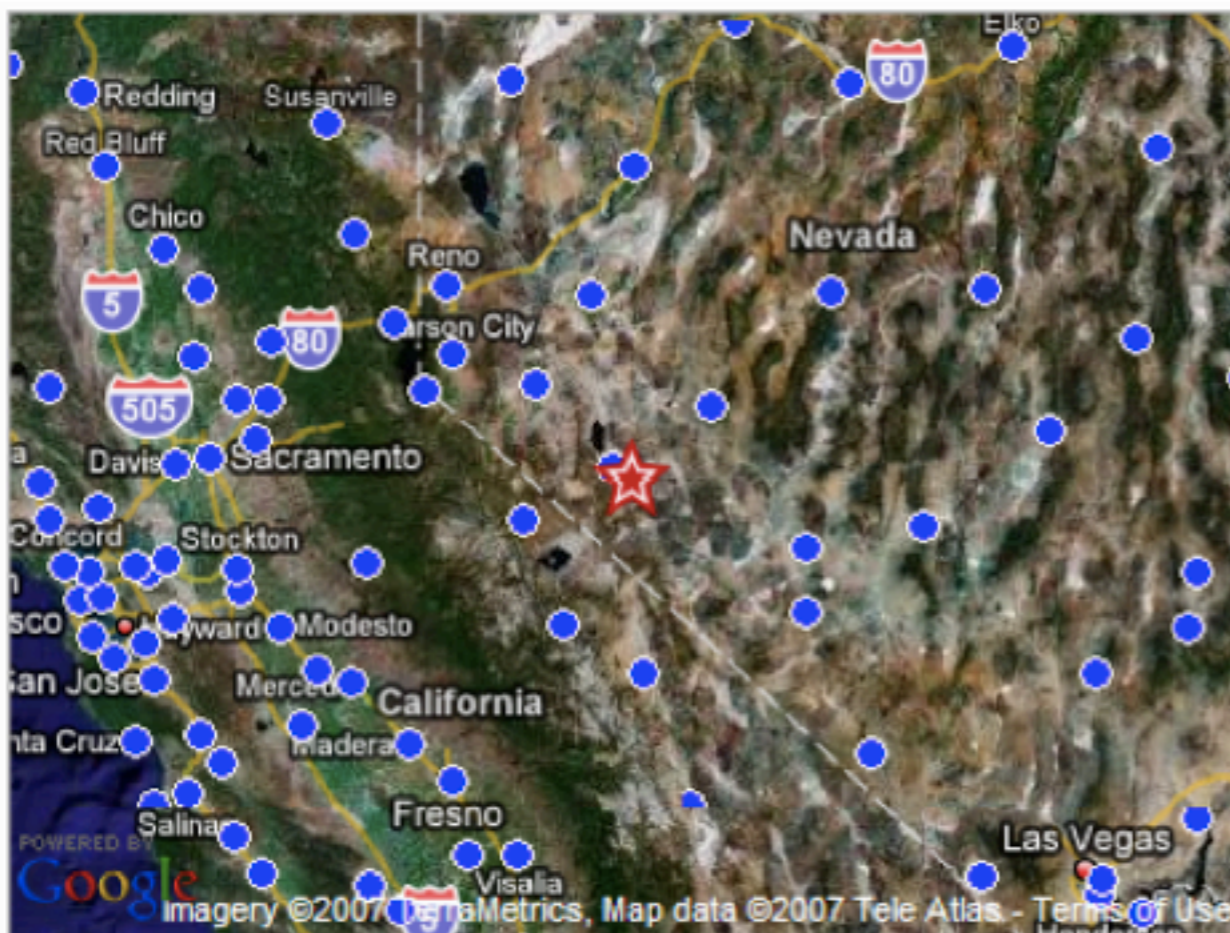
Password:

Log me on automatically each visit

LOGIN

ShakeCast Web "Portal"

Jump to: Select an earthquake from the last 7 days



ShakeCast Summary

3

Number of facilities evaluated: 3
 Instrumental Intensity : 1 - 1
 Peak Ground Acceleration (%g): 0.002 - 0.276
 Peak Ground Velocity (cm/sec): 0.0008 - 0.048

M 2.9 - 7.5 miles ESE of HAWTHORNE-NV

ID: 2007282_221841 Version: 1
 Origin Time: 2007-10-09 12:32:12
 Location: -118.5044, 38.4736

Sig. Dam. Likely
Sign. Dam. Poss.
Dam. Possible
No Damage

Log in Username:

Password:

Log me on automatically each visit

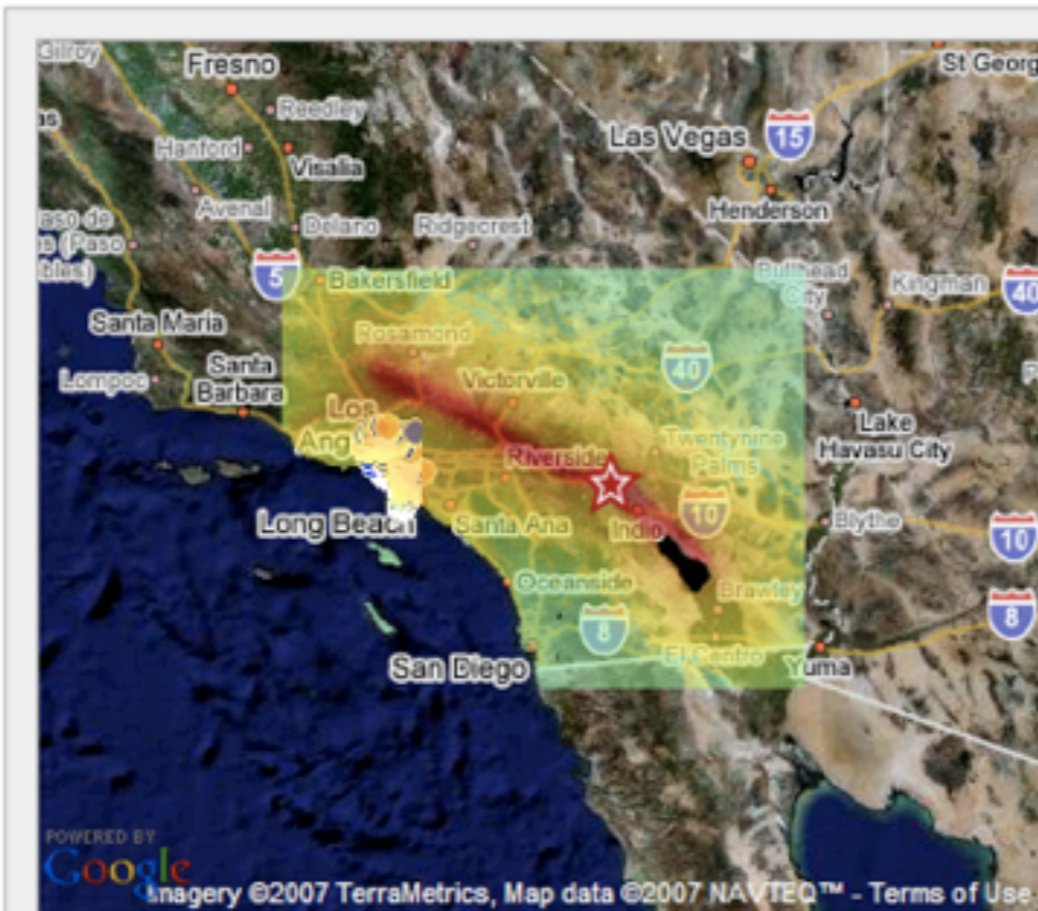


ShakeCast 2 *beta*

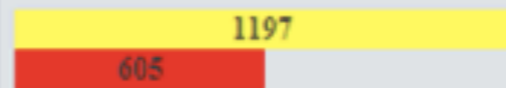
[Home](#) [Earthquakes](#) [Search](#) [FAQ](#) [Profile](#) [Administration Panel](#) [Log out \[scadmin \]](#)

Scenario Earthquake

Jump to:



ShakeCast Summary



Number of facilities evaluated: 1802
 Instrumental Intensity : **IV - X**
 Peak Ground Acceleration (%g) : 3.0857 - 65.4836
 Peak Ground Velocity (cm/sec) : 2.8676 - 155.9166
 Peak Spectral Acc. at 0.3 sec (%g) : 4.5754 - 141.5577
 Peak Spectral Acc. at 1.0 sec (%g) : 3.0292 - 164.703
 Peak Spectral Acc. at 3.0 sec (%g) : 1.788 - 59.9913

M 7.8 - SAF-southern M7.8 Scenario

ID: SAF_south7.8_se Version: 1
 Origin Time: 2006-08-03 12:00:00
 Location: -116.46967, 33.92227

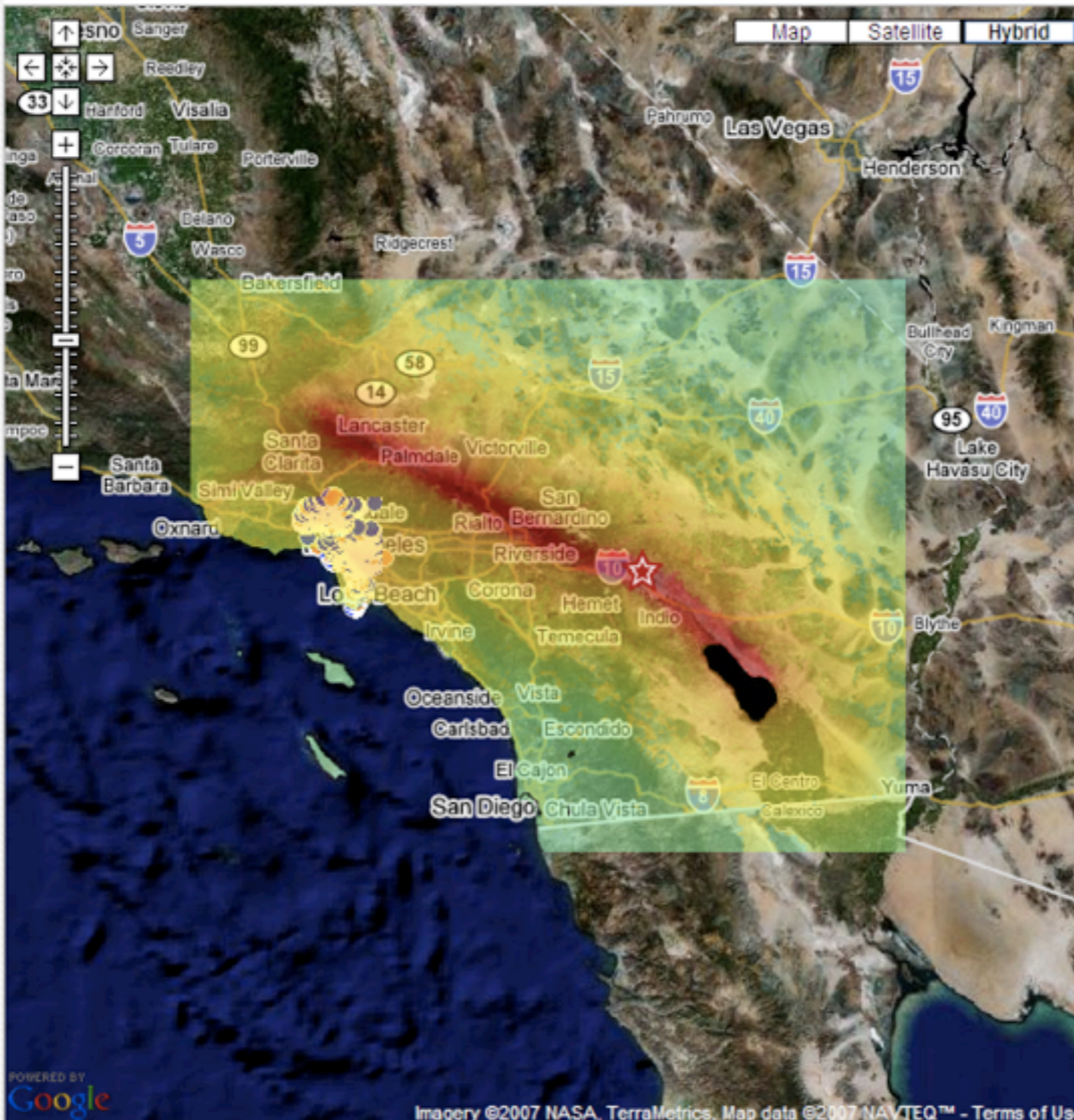
[Go to Administration Panel](#)



Table View

Google Maps for ShakeMap SAF_south7.8_se


Facility Type: All  CAMPUS

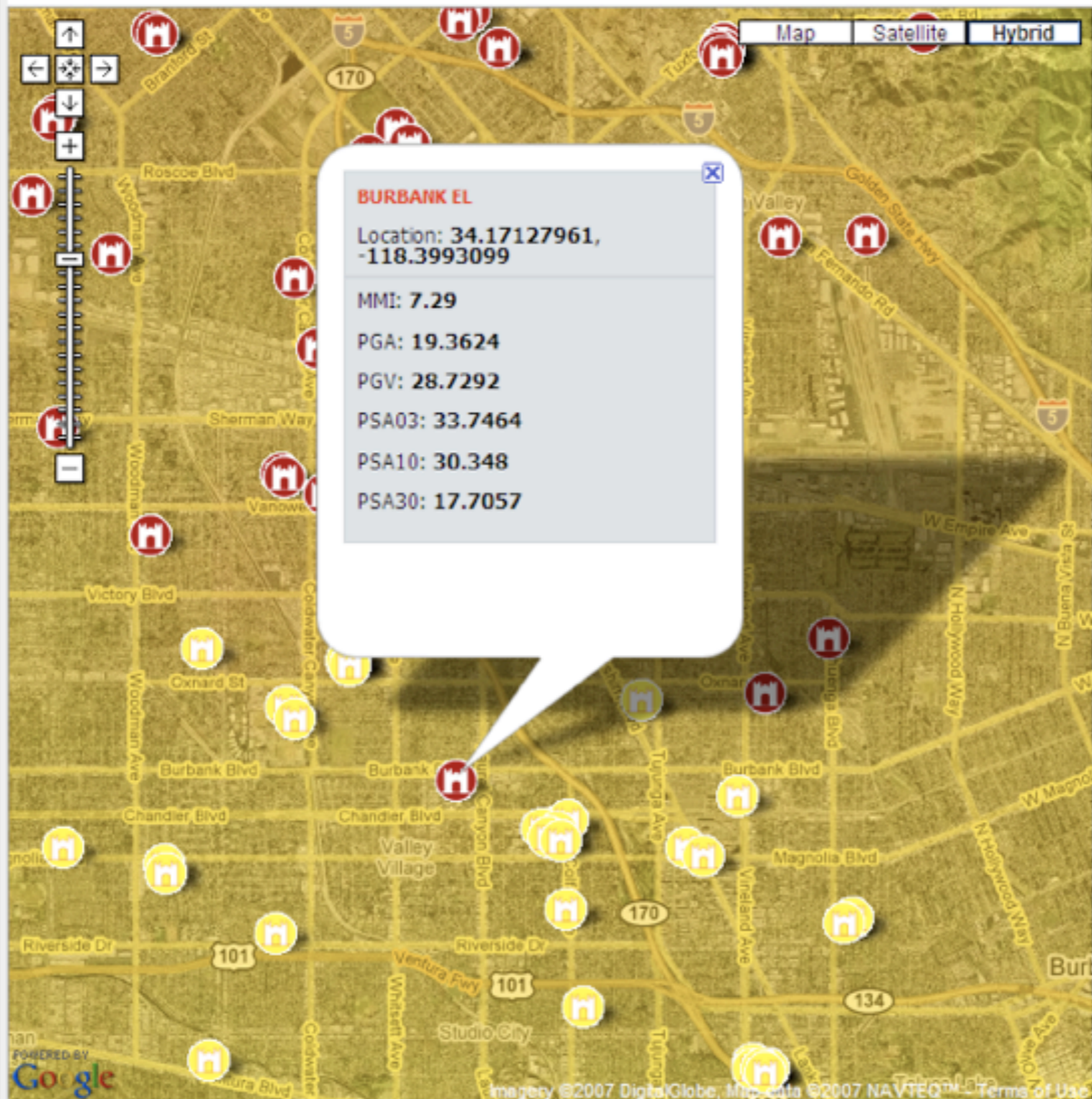


- EL DORADO EL CAMPUS
- SAN FERNANDO M S CAMPUS
- SAN FERNANDO DENTAL CAMPUS
- ST FERDINAND SCHOOL CAMPUS
- MORNING SIDE EL CAMPUS
- NUEVO SOL CHARTER SCHOOL CAMPUS
- LAKEVIEW CHARTER SCHOOL CAMPUS
- N VALLEY OCCUPATIONAL CTR CAMPUS
- SANTA ROSA DE LIMA SCHOOL CAMPUS
- SAN FERNANDO EL CAMPUS
- OSCEOLA EL CAMPUS
- SAN FERNANDO FEC

Table View

Google Maps for ShakeMap SAF_south7.8_se

Facility Type: All  CAMPUS



- BURBANK EL
CAMPUS
- OXNARD EL
CAMPUS**
- MAURICE SENDAK
ES
CAMPUS
- TOLUCA LAKE EEC
CAMPUS
- TOLUCA LAKE EL
CAMPUS
- EAST VALLEY NEW
HS
CAMPUS
- LANKERSHIM EL
CAMPUS
- LOCAL DISTRICT 2
OFFICE
CAMPUS
- N HLLYWD HG MAG
CAMPUS
- EARHART HS
CAMPUS
- N
HOLLYWD-POLYTECH
CAS
CAMPUS
- COLFAX EL
CAMPUS


[Go to Administration Panel](#)

ShakeCast 2.0 :: Google Maps for ShakeMap SAF_south7.8_se - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost/eq_map.php?event=SAF_south7.8_se&version=1

ShakeCast 2.0 Local



ShakeCast 2 *beta*

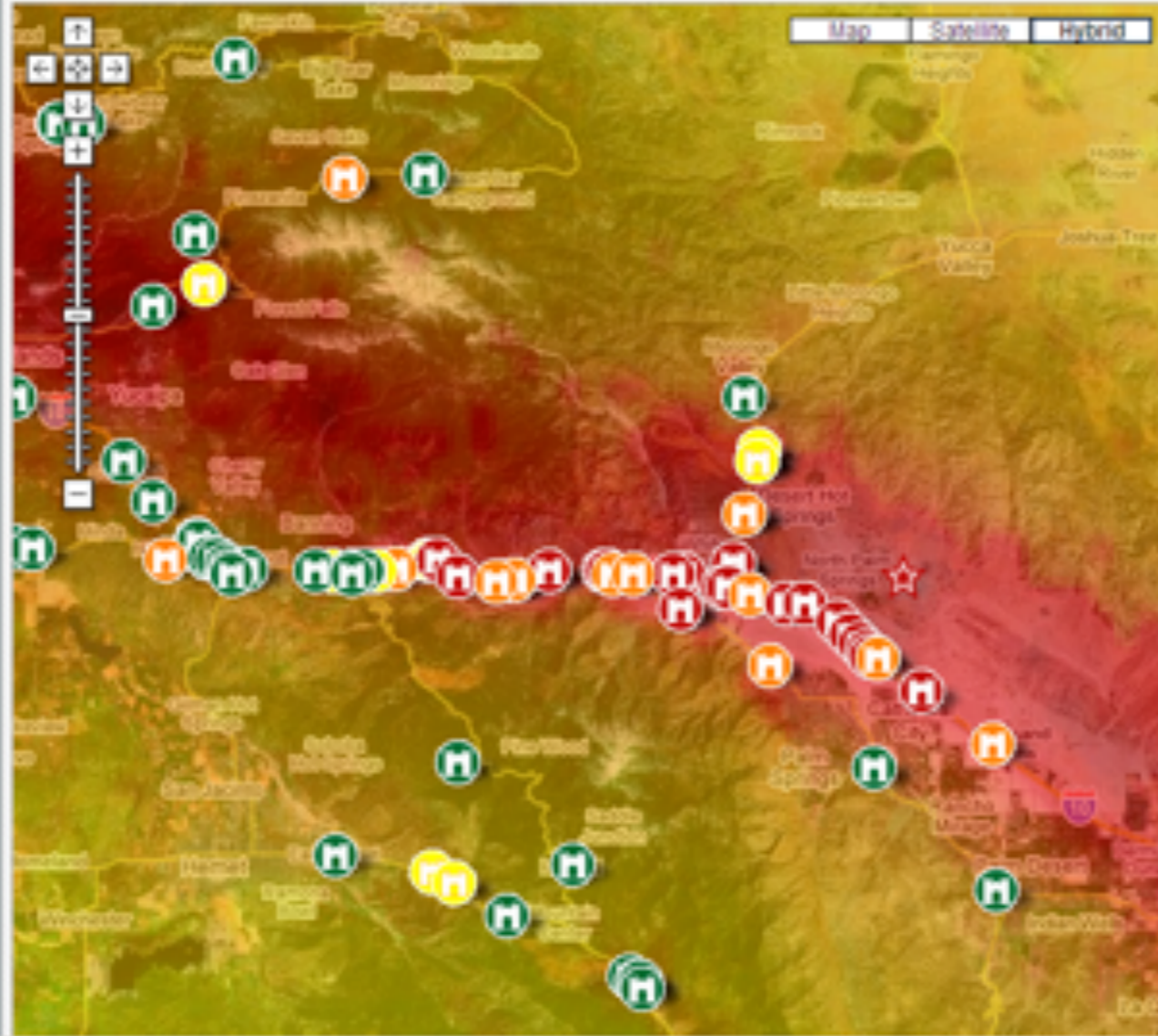
Home Earthquakes Search FAQ Profile Administration Panel Log out [scadmin]

Latest Earthquake Earthquake Archive Scenarios

Table View

Google Maps for ShakeMap SAF_south7.8_se

Facility Type: All BRIDGE













- Mission Creek BRIDGE
- Garnet Creek BRIDGE
- Garnet Creek BRIDGE
- Ramon Wash BRIDGE
- Sahia Wash BRIDGE
- Indian Ave Oc BRIDGE
- Palm Drive Oc BRIDGE
- Edom Wash BRIDGE
- Whitewater River BRIDGE
- Whitewater River BRIDGE
- Whitewater Oc BRIDGE
- 562 E 10 Connector Oc BRIDGE

Done

Search

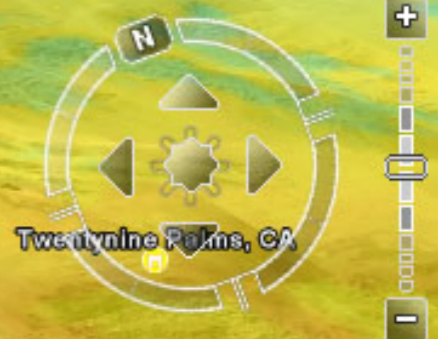
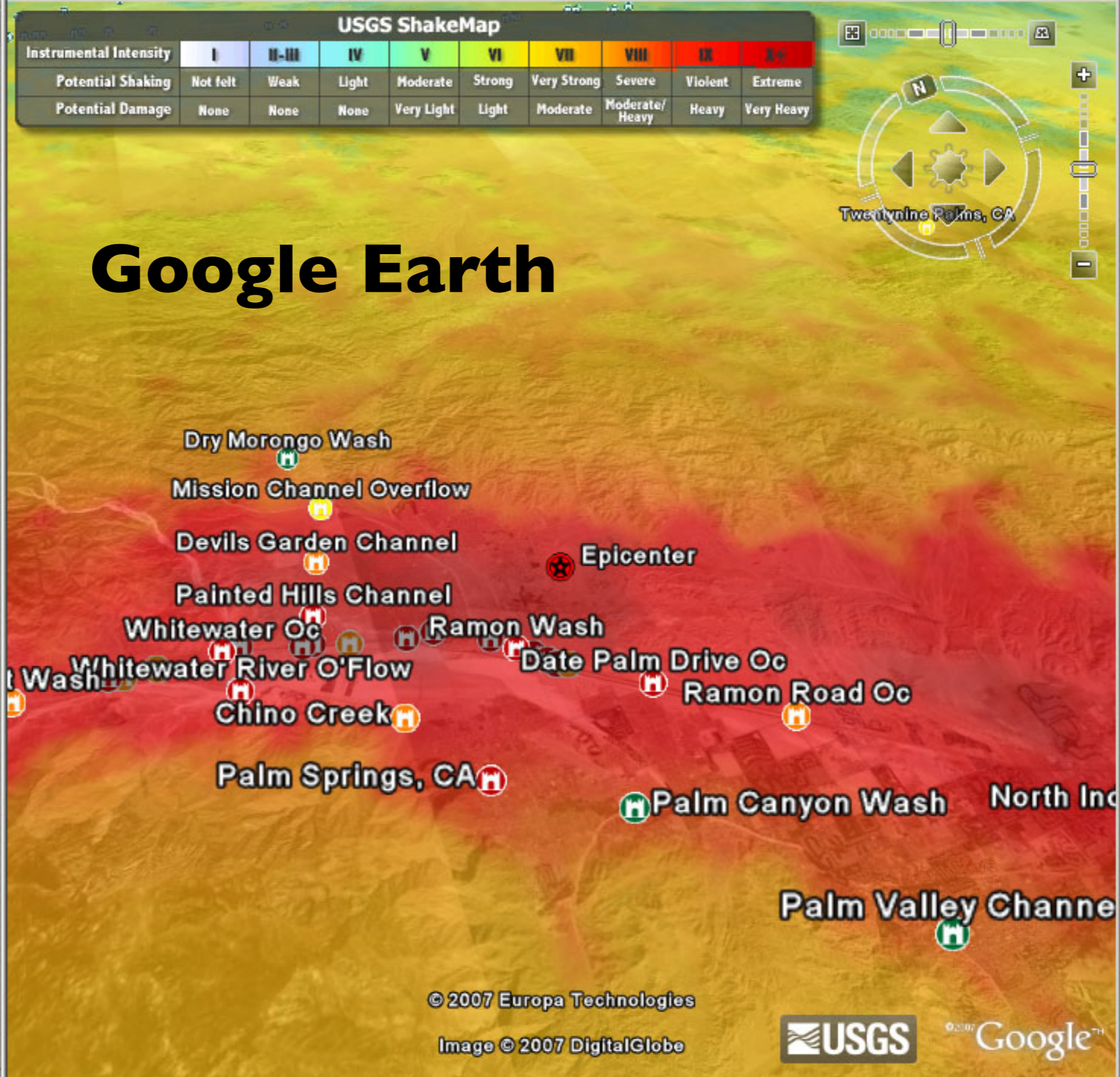
Places Add Content

-  [Ramon Road Oc](#)
Lat: 33.4820
Lon: -116.9110
-  [S62-E10 Connector Oc](#)
Lat: 33.4820
Lon: -116.9110
-  [E10-N62 Connector Oc](#)
Lat: 33.4820
Lon: -116.9110
-  [Echo Ditch](#)
Lat: 33.4820
Lon: -116.9110
-  [Echo Ditch](#)
Lat: 33.4820
Lon: -116.9110
-  [Polaris Wash](#)
Lat: 33.4820
Lon: -116.9110
-  [Day Street Uc](#)
Lat: 33.4820
Lon: -116.9110
-  [Pigeon Pass Rd Uc](#)
Lat: 33.4820
Lon: -116.9110
-  [Pigeon Pass Rd Uc](#)
Lat: 33.4820
Lon: -116.9110
-  [La Rue Street Oc](#)
Lat: 33.4820
Lon: -116.9110
-  [Cherry Valley Blvd Oc](#)
Lat: 33.4820
Lon: -116.9110
-  [Calimesa Blvd Oc](#)
Lat: 33.4820
Lon: -116.9110
-  [Nason Street Oc](#)
Lat: 33.4820
Lon: -116.9110
-  [Moreno Beach Dr Oc](#)



USGS ShakeMap									
Instrumental Intensity	I	II-III	IV	V	VI	VII	VIII	IX	X+
Potential 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

Google Earth



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Image © 2007 DigitalGlobe



Layers

ShakeCast

- Special capabilities for First Responders.
- Locate donut shops with a low likelihood of damage!

The screenshot displays the ShakeCast 2.0 web application interface. The browser window title is "ShakeCast 2.0 :: Google Maps for ShakeMap 14313828 - Mozilla Firefox". The address bar shows "http://localhost/eq_map.php?event=14313828&version=4". The page content includes a "Table View" header, a "Google Maps for ShakeMap 14313828" title, and a "Facility Type" filter set to "DONUT". The map shows Pasadena, CA, with several donut shop icons (orange donuts) and a data popup for "Mr Goods Donuts Shop" at location 34.146012, -118.112355. The popup displays MMI: 1, PGA: 0.0789, and PGV: 0.0268. A sidebar on the right lists various donut shops, including Gladstone Donut House, Poster's Donuts, Royal Donuts, Yum Yum Donuts, Sierra Doughnut, Mr Goods Donuts Shop, and Washington Donuts. The status bar at the bottom shows "Done" and "Go to Administration Panel".

ShakeCast Summary VA Hospitals: 40194055 (4)

Previous Reply Reply All Forward Link Flag Edit Print Junk

From: ShakeCast <shake@gldrd2.cr.usgs.gov>
 Date: Thursday, March 1, 2007 11:09 PM
 To: wald@usgs.gov
 Subject: ShakeCast Summary VA Hospitals: 40194055 (4)

ShakeCast Event: Magnitude 4.2

ShakeMap (Unnamed Event) Version 3
 Event Location: 2 km NE of Lafayette, CA
 Event Time: 2007-03-02 04:40:00
 Generated at 2007-03-01 16:07:03
 Reported by: Server ID = 1301, DNS = localhost

Damage Summary

Number of VA Hospital Facility Reported: 4
 Max Value: MMI: 2.59; Acceleration: (not measured)
 Number of Reports of Likely Damage: 0
 Number of Reports of Possible Damage: 0
 Number of Reports of Unlikely Damage: 4

FACILITY Shaking Estimates from ShakeMap

VA Hospital Name	Damage Level	Metric	Value	Exceedance Ratio
Menlo Park; VA Hospital	Unlikely	MMI	2.59	0.397
San Francisco; VA Hospital	Unlikely	MMI	2.48	0.370
Palo Alto; VA Hospital	Unlikely	MMI	2.02	0.255
Livermore; VA Hospital	Unlikely	MMI	1.83	0.208

ShakeCast Summary VA Hospitals: 40194055 (4)

Previous Reply Reply All Forward Link Flag Edit Print Junk Move

From: ShakeCast <shake@gldrd2.cr.usgs.gov>
 Date: Thursday, March 1, 2007 11:09 PM
 To: wald@usgs.gov
 Subject: ShakeCast Summary VA Hospitals: 40194055 (4)

ShakeCast Event: Magnitude 4.2

ShakeMap (Unnamed Event) Version 3
 Event Location: 2 km NE of Lafayette, CA
 Event Time: 2007-03-02 04:40:00
 Generated at 2007-03-01 16:07:03
 Reported by: Server ID = 1301, DNS = localhost

Damage Summary
 Number of VA Hospital Facilities Reported: 2
 Max Value: MMI: 2.59; Acceleration: (not measured)
 Number of Reports of Likely Damage: 0
 Number of Reports of Possible Damage: 0
 Number of Reports of Unlikely Damage: 2

FACILITY ShakeMap

VA Hospital Name
Menlo Park; VA Hospital
San Francisco; VA Hospital
Palo Alto; VA Hospital
Livermore; VA Hospital

ShakeCast Summary Nuclear Power Plants: 40194055 (2)

Previous Reply Reply All Forward Link Flag Edit Print Junk Move

From: ShakeCast <shake@gldrd2.cr.usgs.gov>
 Date: Thursday, March 1, 2007 11:09 PM
 To: wald@usgs.gov
 Subject: ShakeCast Summary Nuclear Power Plants: 40194055 (2)

ShakeCast Event: Magnitude 4.2

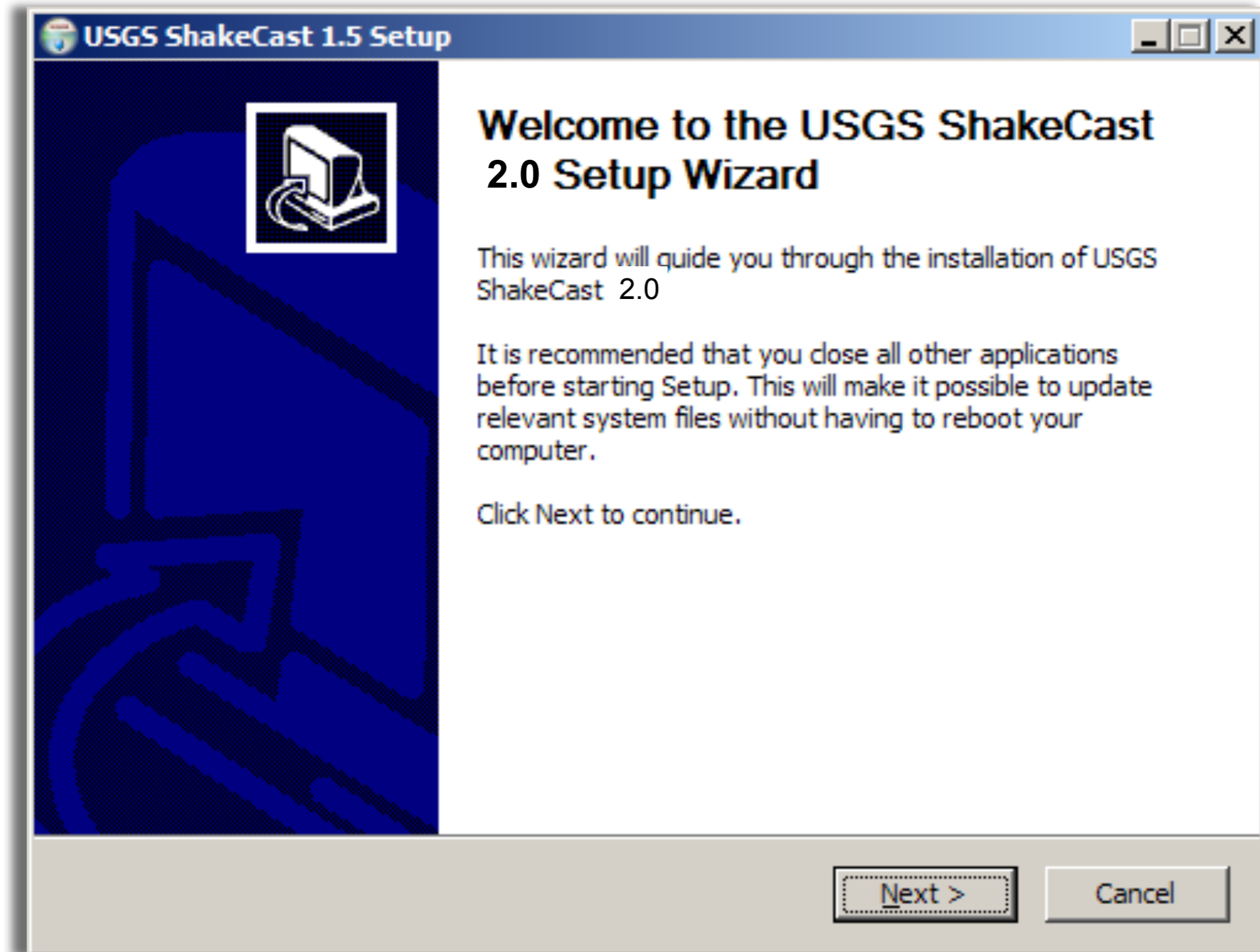
ShakeMap (Unnamed Event) Version 3
 Event Location: 2 km NE of Lafayette, CA
 Event Time: 2007-03-02 04:40:00
 Generated at 2007-03-01 16:07:03
 Reported by: Server ID = 1301, DNS = localhost

Damage Summary
 Number of NUCLEAR Facility Reported: 2
 Max Value: MMI: 2.31; Acceleration: (not measured)
 Number of Reports of Likely Damage: 0
 Number of Reports of Possible Damage: 0
 Number of Reports of Unlikely Damage: 2

FACILITY Damage Estimates from ShakeMap

Nuclear Power Plant	Damage Level	Metric	Value	Exceedance Ratio
GE Vallecitos, Sunol, CA	Unlikely	MMI	2.31	0.328
Rancho Seco, Herald, CA	Unlikely	MMI	1.31	0.078

ShakeCast V2.0 Installation Wizard



ShakeCast Installation Tutorials

(there are also separate Facility & Notification tutorials)

ShakeCast Installation Tutorials



(there are also separate Facility & Notification tutorials)

ShakeCast Manuals (Online)

- User's Guide
- Installation Guide
- Technical Manual
- XML, Databases
- FAQ

*(sign up to receive a
hardcopy)*

ShakeCast User Web Interface

This document describes the User Web Interface of ShakeCast. The User Web Interface is called the "ShakeCast Portal" and is used for all interaction with the ShakeCast system, such as reviewing ShakeCast damage assessment summary for facilities affected by earthquakes, applying for a ShakeCast user account, or signing-up for automatic ShakeCast notifications on facilities likely affected after earthquakes. The key features of the ShakeCast Portal are:

- Runs on any of the popular Web browsers connected to the Internet.
- Accesses to all processed ShakeMaps for both actual and scenario earthquakes.
- Displays all pertinent information associated with facilities including facility parameters, intensity measures and damage estimates
- Management automatic ShakeCast notifications for both message formats and facilities of interest.
- Accesses to ShakeCast web GIS interface.

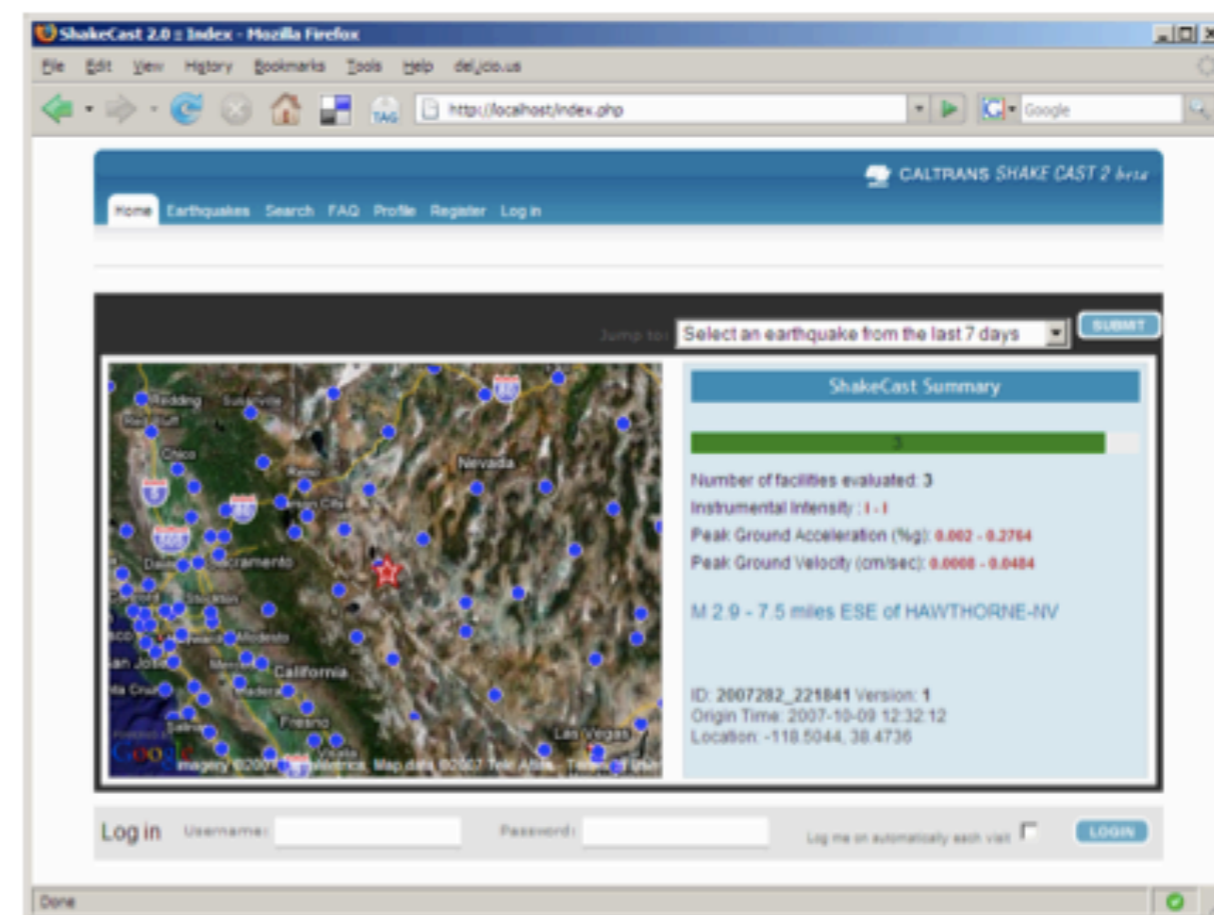
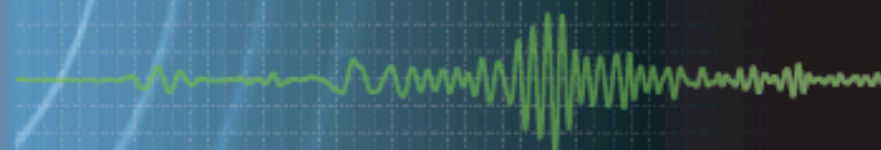


Figure 1 Default web page of the ShakeCast Portal.

General Background:

ShakeCast *Fact Sheet*: 6-Page Overview for potential users



USGS ShakeCast

Automating, Simplifying, and Improving the Use of ShakeMap for Post-Earthquake Decisionmaking and Response

ShakeCast is a freely available, post-earthquake situational awareness application that automatically retrieves earthquake shaking data from ShakeMap, compares intensity measures against users' facilities, and generates potential damage assessment notifications, facility damage maps, and other Web-based products for emergency managers and responders.

What is ShakeCast?

ShakeCast, short for *ShakeMap Broadcast*, is a fully automated system for delivering specific ShakeMap products to critical users and for triggering established post-earthquake response protocols. ShakeMap is a well-established tool used to portray the extent of potentially damaging shaking following an earthquake. ShakeMap is automatically generated for small and large earthquakes in areas where it is available and can be found on the Internet at <http://earthquake.usgs.gov/shakemap/>. It was developed and is used primarily for emergency response, loss estimation, and public information. However, for an informed response to a serious earthquake, critical users must go beyond just looking at ShakeMap, and understand the likely extent and severity of impact on the facilities for which they are responsible. To this end the U.S. Geological Survey (USGS) has developed ShakeCast.

ShakeCast allows utilities, transportation agencies, businesses, and other large organizations to control and optimize the earthquake information they receive. With ShakeCast, they can automatically determine the shaking value at *their* facilities, set thresholds for notification of damage states for each facility, and then automatically notify (by pager, cell phone, or email) specified operators and inspectors within their organizations who are responsible for those particular facilities so they can set priorities for response.



Collapse of the Interstate-5/State Highway-14 interchange showing damage north of Los Angeles caused by the 1994 magnitude 6.7 Northridge, California, earthquake. Thousands of State and County bridges were shaken at varying intensity levels during this earthquake; many required inspections.

Example Uses and Users: The California Department of Transportation (Caltrans)

Caltrans has deployed the prototype ShakeCast system (Version 1.0). Following a major earthquake, Caltrans faces an array of decisionmaking challenges. Perhaps no other agency has a comparable earthquake exposure in the State of California. Caltrans has more than 11,000 bridges and overpasses under its responsibility in California; having an instantaneous snapshot of the likely damage to each will allow Caltrans to set priorities for traffic rerouting, closures, and inspections following a damaging earthquake. One of several critical tasks facing Caltrans after an earthquake is to rapidly assess the condition of all bridges and roadway corridors in the State highway system. Timely response is important to ensure public safety, aid routing of emergency vehicle traffic, and (re-) establish critical lifeline routes.

Technical Information:

Earthquake Spectra Article (in review)

— DRAFT —

ShakeCast: Automating and Improving the Use of ShakeMap for Post-Earthquake Decision-Making and Response

David Wald,^{a)} M.EERI, Kuo-Wan Lin,^{a)} Keith Porter^{b)} M.EERI, and Loren Turner^{c)}

When a potentially damaging earthquake occurs, utility and other lifeline managers, emergency responders, and other critical users have an urgent need for information about the impact on their particular facilities so they can make appropriate decisions and take quick actions to ensure safety and restore system functionality. ShakeMap, a tool used to portray the extent of potentially damaging shaking following an earthquake, on its own can be useful for emergency

... public information. However,

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You are here: [Home](#) » [Other Resources](#) » [ShakeCast](#)

[Other Resources Home](#)

[Tsunami Websites](#)

[Other USGS Hazards Websites](#)

[Non-USGS Websites](#)

[Preparedness & Response](#)

[Products & Publications](#)

[Earth Science Publications](#)

[Photo Collections](#)

ShakeCast

An application for automating ShakeMap delivery to critical users and for facilitating notification of shaking levels at user-selected facilities.

What's New

The current release of ShakeCast is Version 2.0 (Nov. 2007). This is a complete rewrite from Version 1.0, and although it preserves the basic features and principles, it is advised that all users upgrade to Version 2 to add significant improvements in robustness, capabilities and features, and ease of installation and use. ShakeCast comes in two distinctly different applications, ShakeCast (Version 2.0) and ShakeCast "Lite".

ShakeCast (Version 2.0)



Critical users (lifeline utilities, for example) can receive automatic notifications within minutes of an earthquake indicated the level of shaking and the likelihood of impact to their own facilities.

Authors: Kuo-Wan Lin and David Wald

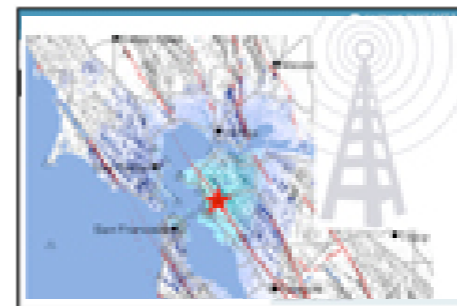
Usage: An application for automating ShakeMap delivery to critical users and for facilitating notification of shaking levels at user-selected facilities. Full Web-based Graphical User Interface & Documentation

Platform: Windows

Interface: PERL, Apache, MySQL, PHP

Output: Email & Cell messaging, Web-based GUI using Google Maps

ShakeCast "Lite" - ShakeMap RSS Reader



Delivers maps of areas affected by an earthquake. Areas of interest can be defined, and shaking thresholds can be set to trigger automatic notifications. Easy to integrate with in-house systems.

Authors: Kuo-Wan Lin and David Wald

Usage: Automated ShakeMap delivery to users, facilitating use of ShakeMap products and post-download post-commands (script startup)

Platform: Mac, Unix, Windows

Interface: Scripts / text configuration files

Output: ShakeMap products and post-commands (Google Earth, Browser, etc.)

References & Acknowledgements



ShakeCast Facility Administration

From this control panel you can add, edit, and remove facilities.

- Administration**
- Admin Index
- ShakeCast Web
- Preview ShakeCast
- Event Admin**
- Processed Event
- Test Event
- USGS ShakeMap
- Facility Admin**
- Damage Level
- Facility Type
- Management
- Supplemental Attributes
- General Admin**
- Backup Database
- Configuration
- Mass Email
- Restore Database
- Profile Admin**
- Facility Management
- Notification Management
- Polygon Management
- Template Management
- Server**
- Management
- Template
- User Admin**
- Ban Control
- Management

Edit Facility Information

Facility Name	<input type="text"/>	*
Short Name	<input type="text"/>	
Facility Type	<input type="text" value="W1 Moderate Code"/>	*
Facility Description	<input type="text"/>	
Latitude	<input type="text" value="33.97621366"/>	* <-> <input type="text" value="33.97621366"/>
Longitude	<input type="text" value="-118.3177312"/>	* <-> <input type="text" value="-118.3177312"/>

Damage Level	Low Limit	High Limit	Metric
Damage Unlikely	<input type="text" value="0"/>	<input type="text" value="43"/>	<input type="text" value="Peak Ground Acceleration (%g)"/>
Damage Possible	<input type="text" value="43"/>	<input type="text" value="91"/>	<input type="text" value="Peak Ground Acceleration (%g)"/>
E Damage Possible	<input type="text" value="91"/>	<input type="text" value="134"/>	<input type="text" value="Peak Ground Acceleration (%g)"/>
Damage Likely	<input type="text" value="134"/>	<input type="text" value="99999"/>	<input type="text" value="Peak Ground Acceleration (%g)"/>

Facility Attribute

ADMIN_REGION	<input type="text"/>
--------------	----------------------



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- Management

Edit Facility Information

Facility Name *

Short Name

Facility Type *

Facility Description

Latitude * <->

Longitude * <->

Damage Level	Low Limit	High Limit	Metric
Damage Unlikely	<input type="text" value="0"/> *	<input type="text" value="43"/> *	Peak Ground Acceleration
Damage Possible	<input type="text" value="43"/> *	<input type="text" value="91"/> *	Peak Ground Acceleration
E Damage Possible	<input type="text" value="91"/> *	<input type="text" value="134"/> *	Peak Ground Acceleration
Damage Likely	<input type="text" value="134"/> *	<input type="text" value="99999"/> *	Peak Ground Acceleration

Facility Attribute

ADMIN_REGION

- S4M Pre Code
- S4L High Code
- S4L Moderate Code
- S4L Low Code
- S4L Pre Code
- S5H Low Code
- S5H Pre Code
- S5L Low Code
- S5L Pre Code
- S5M Low Code
- S5M Pre Code
- URML Low Code
- URML Pre Code
- URMM Low Code
- URMM Pre Code
- W1 High Code
- W1 Moderate Code**
- W1 Low Code
- W1 Pre Code
- W2 High Code
- W2 Moderate Code
- W2 Low Code
- W2 Pre Code
- Bridge
- Multi-building campus
- Capitol
- City
- Dam - Constant radius arch
- County
- Dam - Crib
- Dam
- District
- Engineered Building
- Dam - Earth & rock
- Dam - Earth
- Dam - Flashboard & buttress
- Dam - Gravity
- Dam - Hydraulic fill
- Industrial
- Dam - Multiple arch
- Multi-family housing unit
- Nuclear - Facility
- Dam - Reinforced concrete
- Basic Roadway
- Dam - Rockfill
- Single Family Home
- Dam - Slab & buttress
- Structure
- Tank or Concrete Reservoir



ShakeCast Facility Administration

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Restore Database

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Notification Management
Polygon Management
Template Management

Server

Management
Template

User Admin

Ban Control
Management

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Facility Name *

Short Name

Facility Type *

Facility Description

Latitude * <->

Longitude * <->

Damage Level	Low Limit	High Limit	Metric
Damage Unlikely	<input type="text" value="0"/> *	<input type="text" value="43"/> *	Peak Ground Acceleration (%g) <input type="text" value=""/> *
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E Damage Possible	<input type="text" value="91"/> *	<input type="text" value="134"/> *	Peak Ground Acceleration (%g) <input type="text" value=""/> *
Damage Likely	<input type="text" value="134"/> *	<input type="text" value="99999"/> *	Peak Ground Acceleration (%g) <input type="text" value=""/> *

Facility Attribute

ADMIN_REGION



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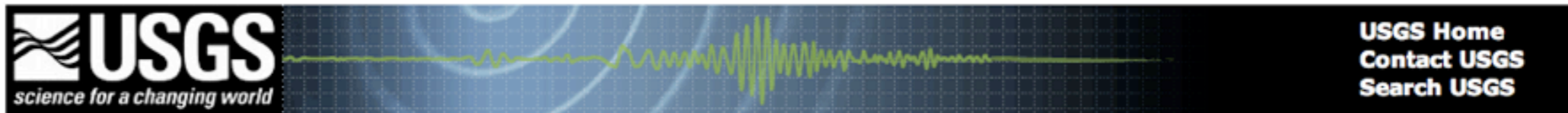
Damage Level	Low Limit	High Limit	Metric
Damage Unlikely	<input type="text" value="0"/>	<input type="text" value="43"/>	<input type="text" value="Peak Ground Acceleration (%g)"/>
Damage Possible	<input type="text" value="43"/>	<input type="text" value="91"/>	<input type="text" value="Peak Ground Acceleration (%g)"/>
E Damage Possible	<input type="text" value="91"/>	<input type="text" value="134"/>	<input type="text" value="Peak Ground Acceleration (%g)"/>
Damage Likely	<input type="text" value="134"/>	<input type="text" value="99999"/>	<input type="text" value="Peak Ground Acceleration (%g)"/>

Facility Attribute

ADMIN_REGION	<input type="text"/>
--------------	----------------------

- Nature Center
- Bookmarks Toolbar Folder
 - DYFI?
 - ShakeMap
 - ShakeCast
 - PAGER
 - EQ PROGRAM
 - USGS
 - Meetings
 - MINES
 - Travel
 - NEWS
 - USGS Earthquake ShakeMaps

- Family
- BIRDING
- Societies
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- Running
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- Firefox and Mozilla Links
- Contact



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Latest Earthquakes

- USA
- World
- EQ Notification Service
- Feeds & Data
- Animations

Recent Earthquakes: Last 8-30 Days

Historic Earthquakes

- "Top 10" Lists & Maps
- Significant EQs
- Earthquake Search
- EQ Summary Posters
- Scientific Data

About EQ Maps

- Did You Feel It?
- Fast Moment Tensors
- Media Info
- PAGER
- Seismogram Displays

ShakeMaps

- ShakeMap Archive
- Scientific Background
- Product Formats
- Disclaimer
- Related Links
- Comments

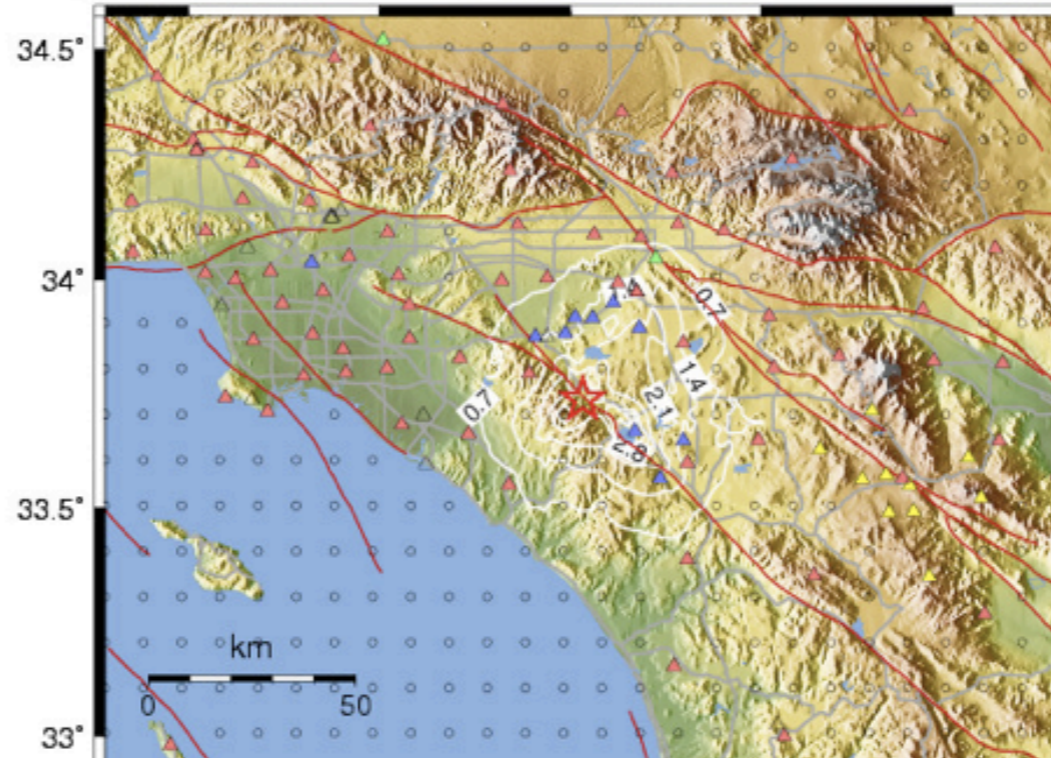
Shakemap sc14325560

[Instrumental Intensity](#)
[Peak Ground Acceleration](#)
[Peak Ground Velocity](#)
[Media Maps Decorated](#)
[Bare](#)
[Downloads](#)

Peak Ground Acceleration

Available Formats: [JPG \(163 kB\)](#) || [PS \(1 Mb\)](#) || [Contours \(12 kB\)](#)

CISN Peak Accel. Map (in %g) : 9.4 mi WNW of Lake Elsinore, CA
 Tue Sep 25, 2007 03:38:24 PM PDT M 3.9 N33.74 W117.47 Depth: 4.8km ID:14325560





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- USA
- World
- EQ Notification Service
- Feeds & Data
- Animations

Recent Earthquakes

Historic Earthquakes

- "Top 10" Lists & Maps
- Significant EQs
- Earthquake Search
- EQ Summary Posters
- Scientific Data

About EQ Maps

- Did You Feel It?
- Energy & Broadband Solutions
- Fast Moment Tensors

Media Info

- PAGER
- Seismogram Displays

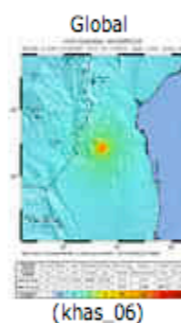
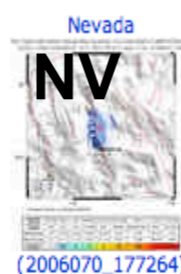
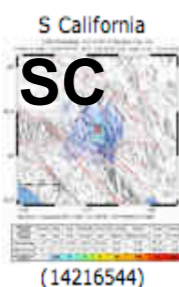
ShakeMaps

- ShakeMap Archive
- Related Links
- Scientific Background
- Disclaimer
- Comments

ShakeMaps

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http://earthquake.usgs.gov/eqcenter/shakemap/

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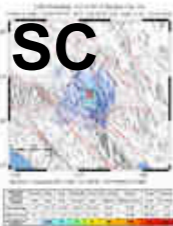



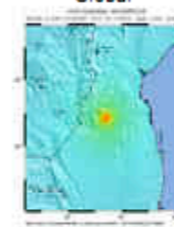
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<p>S California</p>  <p>SC</p> <p>(14216544)</p>	<p>N California</p>  <p>NC</p> <p>(40183357)</p>	<p>Pacific NW</p>  <p>PN</p> <p>(0602091926)</p>	<p>Nevada</p>  <p>NV</p> <p>(2006070_177264)</p>
<p>Utah</p>  <p>UT</p> <p>(13232)</p>	<p>Alaska</p>  <p>AK</p> <p>(26072009)</p>	<p>Global</p>  <p>GLOBAL</p> <p>(khas_06)</p>	

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S California N California Pacific NW Nevada

Utah Alaska Global

UT (13232) AK (26072009) GLOBAL (khas_06)

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ShakeCast "Lite"

ShakeCast "Lite"

Do you really want to run ShakeCast???

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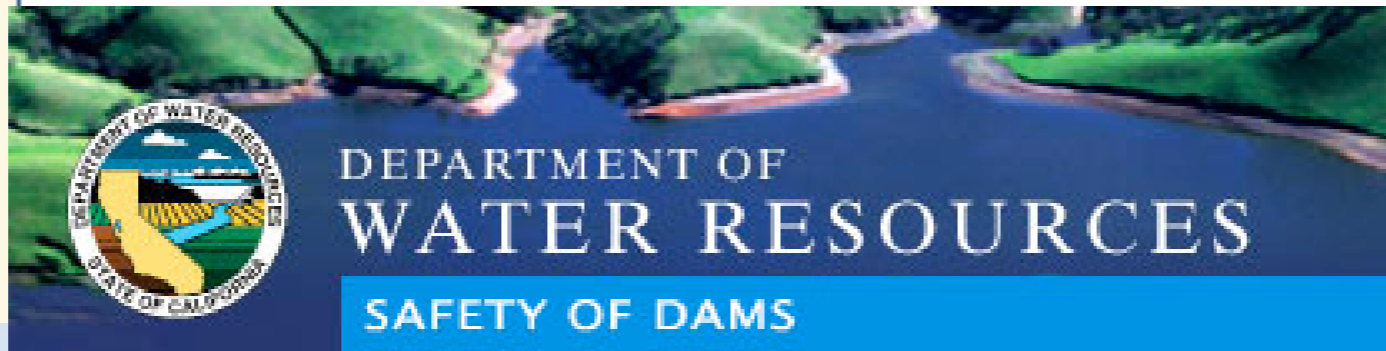
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ShakeCast & ShakeCast "Lite" Users



Los Angeles Unified School District



Division of Homeland Security

Utah Department of Public Safety



FEMA



Pacific Gas and Electric Company



Washington Military Department

Emergency Management Division



ImageCat, Inc.™



AMLIN



UNITED STATES

DEPARTMENT OF VETERANS AFFAIRS

Sample of Current ShakeCast/ShakeMap Users

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

California Department of Transportation (Caltrans)

Responsible for 11,000 overpasses & bridges spread throughout the State.

California Dept of Water Resources, Div. of Safety of Dams

Responsible for over 1,200 dams statewide.

Los Angeles Unified School District,

Responsible for over 700,000 K-12 students, 100,000 employees, 13,500 buildings, and 1,100 schools and offices. Students and schools are spread across 704 square miles. LAUSD buildings are integral to the emergency operations of the city of LA, because school facilities will serve as emergency shelters to be managed by the Red Cross.

**ShakeCast: Facilitating the Use of ShakeMap for
Post-Earthquake Decision-Making and Response
within Caltrans**

David Wald & Kuo-wan Lin
U.S. Geological Survey, Golden, CO

Bruce Worden
U.S. Geological Survey, Pasadena, CA

Loren Turner
Caltrans, Sacramento, CA



ShakeCast: Version 2.0 Development

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

3 Year Funding from Caltrans for ShakeCast Version 2.0:

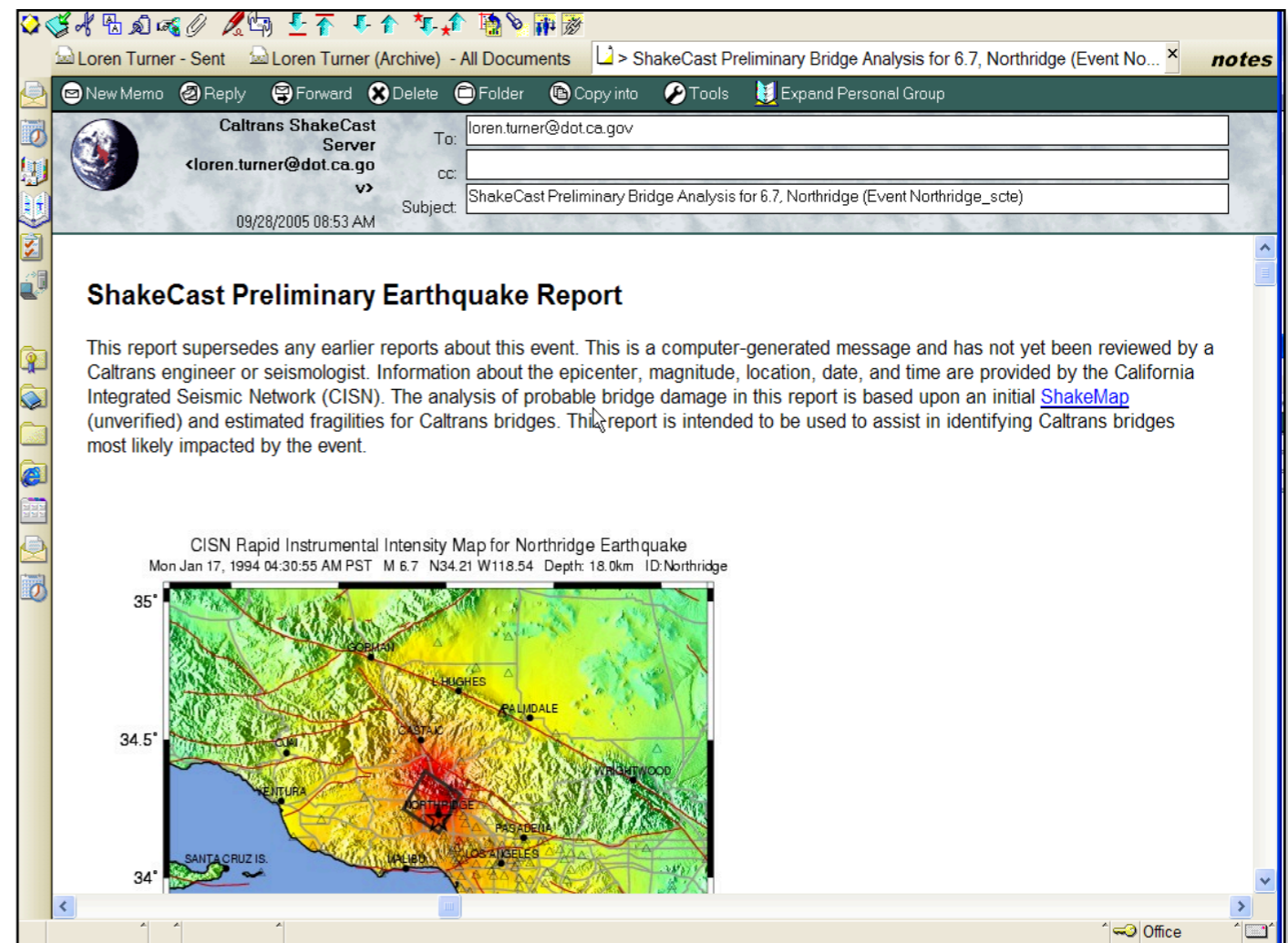
- RSS Feed for redundant delivery
- Improved Database & Damage Vulnerability functions
- Operator/User Web-Interface
- Interface for visualization (e.g., Google Earth, GIS)

ShakeCast “Lite”

- Auto-download & Use of ShakeMap Products
- Simple to implement; no overhead in use (even some scientists can figure it out)

ShakeCast at Caltrans

- Automatic delivery of ShakeMap products to Caltrans.
- Automatic analysis of potential bridge damage state based on Basoz & Mander methodology using ShakeMap peak spectral accelerations.
- Email/Page bridge inspection prioritization lists.



Example ShakeCast Notification (Caltrans)



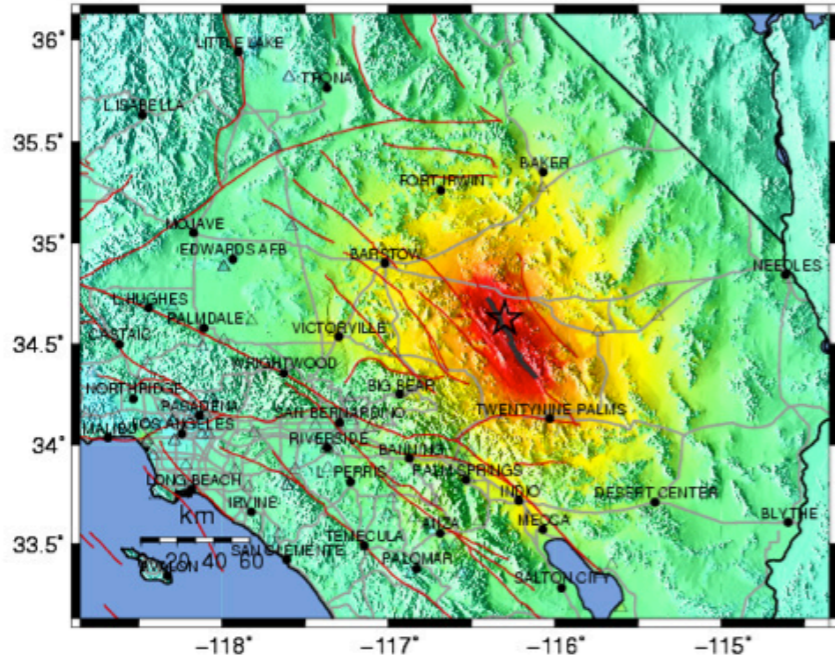
Caltrans ShakeCast Server
 <loren_turner@dot.ca.gov>
 03/24/2006 09:41 AM

To: loren_turner@dot.ca.gov
 cc:
 bcc:
 Subject: DAMAGE ASSESSMENT: Hector Mine, 7.1,
 (9108645_scte-1)

Caltrans ShakeCast Preliminary Earthquake Report

This report supersedes any earlier reports about this event. This is a computer-generated message and has not yet been reviewed by a Caltrans Engineer or Seismologist. Information about the epicenter, magnitude, location, date, and time are provided by the California Integrated Seismic Network (CISN). The analysis of potential bridge damage in this report is based upon an initial [ShakeMap](#) (unverified) and estimated fragilities for Caltrans bridges. Bridge fragility models were adopted from HAZUS and Basoz & Mander (1999). This report is intended to be used as a first response tool to assist in identifying Caltrans bridges most likely impacted by the event.

CISN Rapid Instrumental Intensity Map for Hector Mine Earthquake
 Sat Oct 16, 1999 03:04:53 AM PDT M 7.1 N34.63 W116.30 Depth: 23.6km ID:9108645



Processed: Sun Apr 24, 2005 02:38:19 PM PDT.

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	.17-1.4	1.4-3.9	3.9-9.2	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+

Event Summary

Name: Hector Mine, Version 1
 Magnitude: 7.1
 ID: 9108645_scte
 Location: 33.8 mi N of Joshua Tree, CA
 Latitude: 34.626
 Longitude: -116.303
 Time: 1999-10-16 10:04:53

Estimated Bridge Damage Summary

Maximum Peak 1.0 sec Spectral Acceleration (PSA): 56.4714 (1/100 g)
 Maximum Acceleration: (not measured)
 Number of bridges evaluated: 7
RED: 2
YELLOW: 1
GREEN: 4

Facility Damage Estimates from ShakeMap

Bridges presented in the table below are sorted in order of potential damage level.

Bridge Name	Bridge No	Dist-Cty-Rte-PM	Damage Level	Value	Exceedance Ratio
Pisgah Overhead	54 0689L	08-SBD-040-R37.41	RED	47.6856	1.163
Pisgah Overhead	54 0689R	08-SBD-040-R37.44	RED	47.6856	1.163
Lavic Road OC	54 0734	08-SBD-040-R41.91	YELLOW	56.4714	0.867
Ash Hill Wash	54 0758L	08-SBD-040-R54.75	GREEN	25.5495	0.887
Ash Hill Wash	54 0758R	08-SBD-040-R54.77	GREEN	25.5495	0.887
Argos Wash	54 0737L	08-SBD-040-R43.84	GREEN	48.8524	0.053
Argos Wash	54 0737R	08-SBD-040-R43.84	GREEN	48.8524	0.053

ShakeCast Server

Generated: 2004-06-29 16:15:44
 Reported by: Server ID 2110
 DNS: 10.160.173.186
 Template Modified: 03-23-06 by L.Turner

[END]

Example ShakeCast Notification (Caltrans)



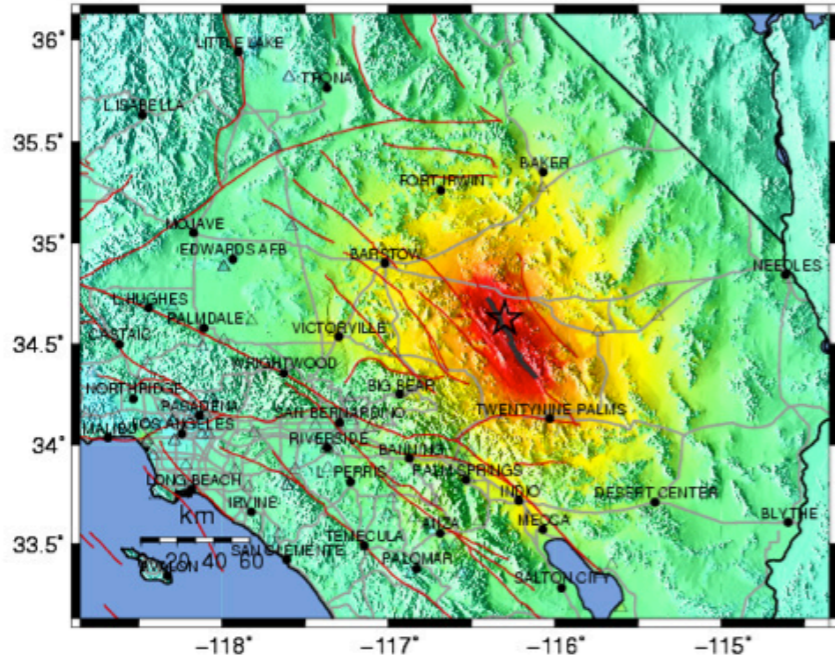
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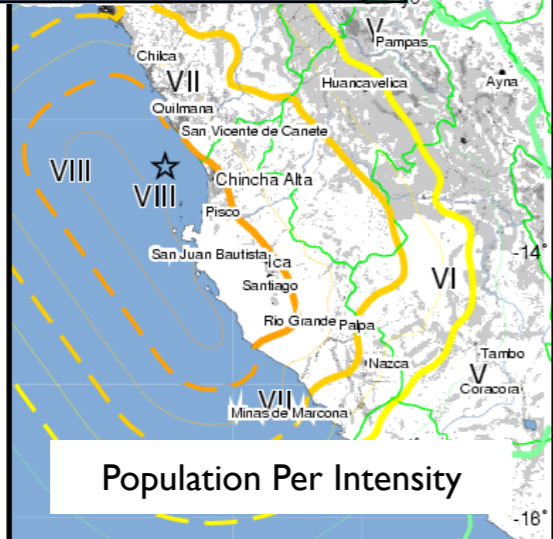
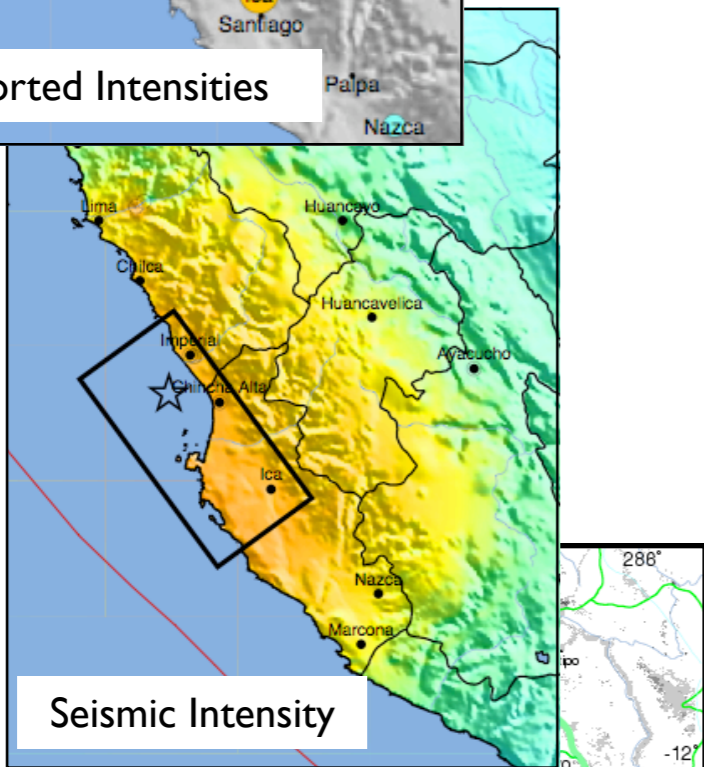
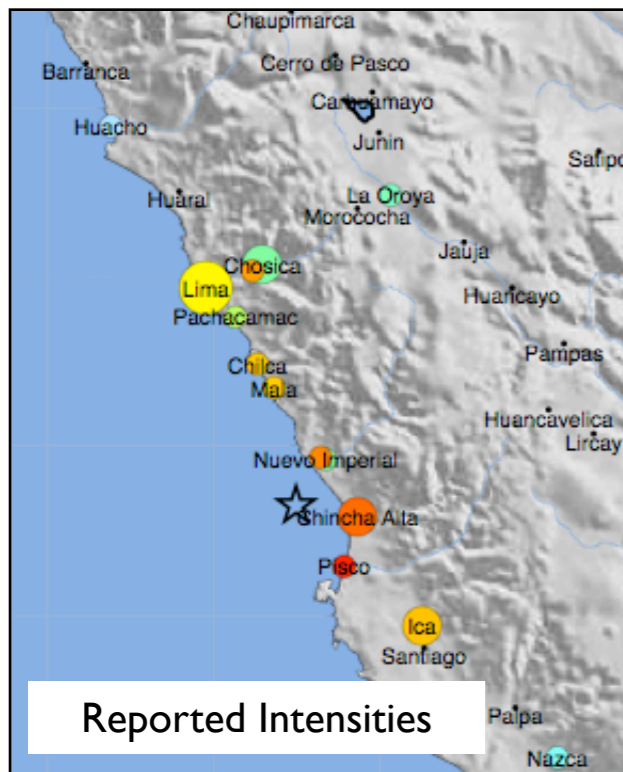
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Argos Wash	54 0737R	08-SBD-040-R43.84	GREEN	48.8524	0.053



ShakeOut Scenario & ShakeMap/ShakeCast?

PAGER:

Prompt Assessment of Global Earthquakes for Response



PAGER



USAID
FROM THE AMERICAN PEOPLE

M 8.0 NEAR THE COAST OF CENTRAL PERU

Origin Time: Wed 2007-08-15 23:40:58 UTC

Location: 13.32°S 76.51°W Depth: 30 km

PAGER

Version 4

Created: 13 hrs, 9 mins after earthquake

Estimated Population Exposed to Earthquake Shaking

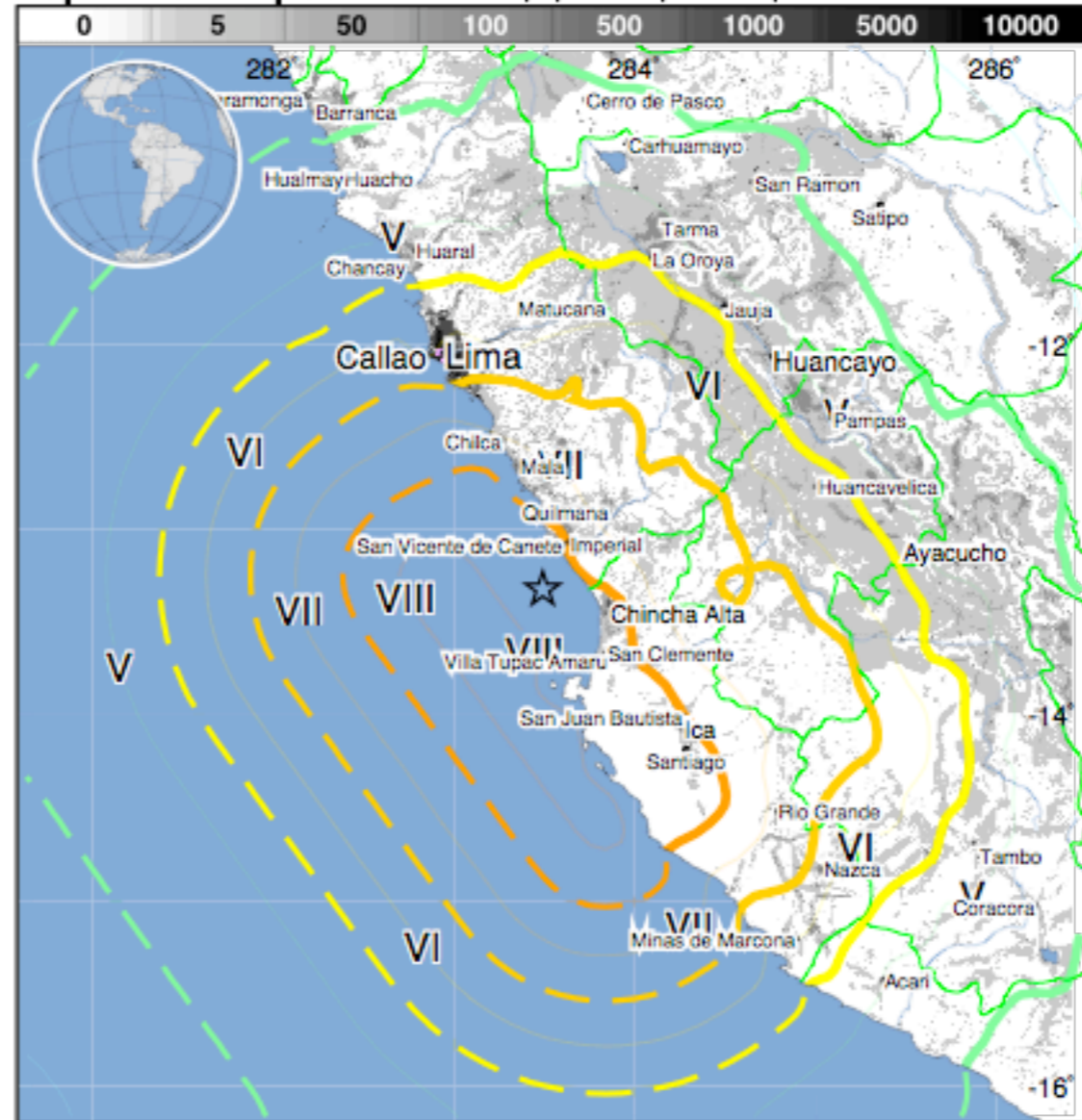
ESTIMATED POPULATION EXPOSURE (k = x1000)	--*	--*	398k*	2,417k*	8,085k	944k	614k	0	0	
ESTIMATED MODIFIED MERCALLI INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+	
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme	
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within the map area.

Population Exposure

population per ~1 sq. km from Landsat 2005

Selected City Exposure

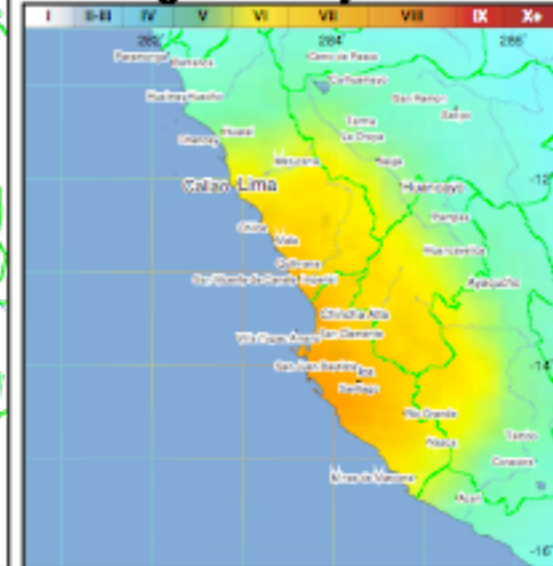


MMI City	Population
VIII Chincha Alta	153k
VIII Villa Tupac Amaru	11k
VIII San Clemente	15k
VIII Los Aquijes	7k
VIII Subtanjalla	9k
VIII Ica	246k
VI Lima	7,737k
VI Callao	813k
V Huancayo	376k
V Chosica	88k
V Ayacucho	140k

bold cities appear on map (k = x1000)

Shaking Intensity

MMI





ShakeCast 2

Home Earthquakes Search

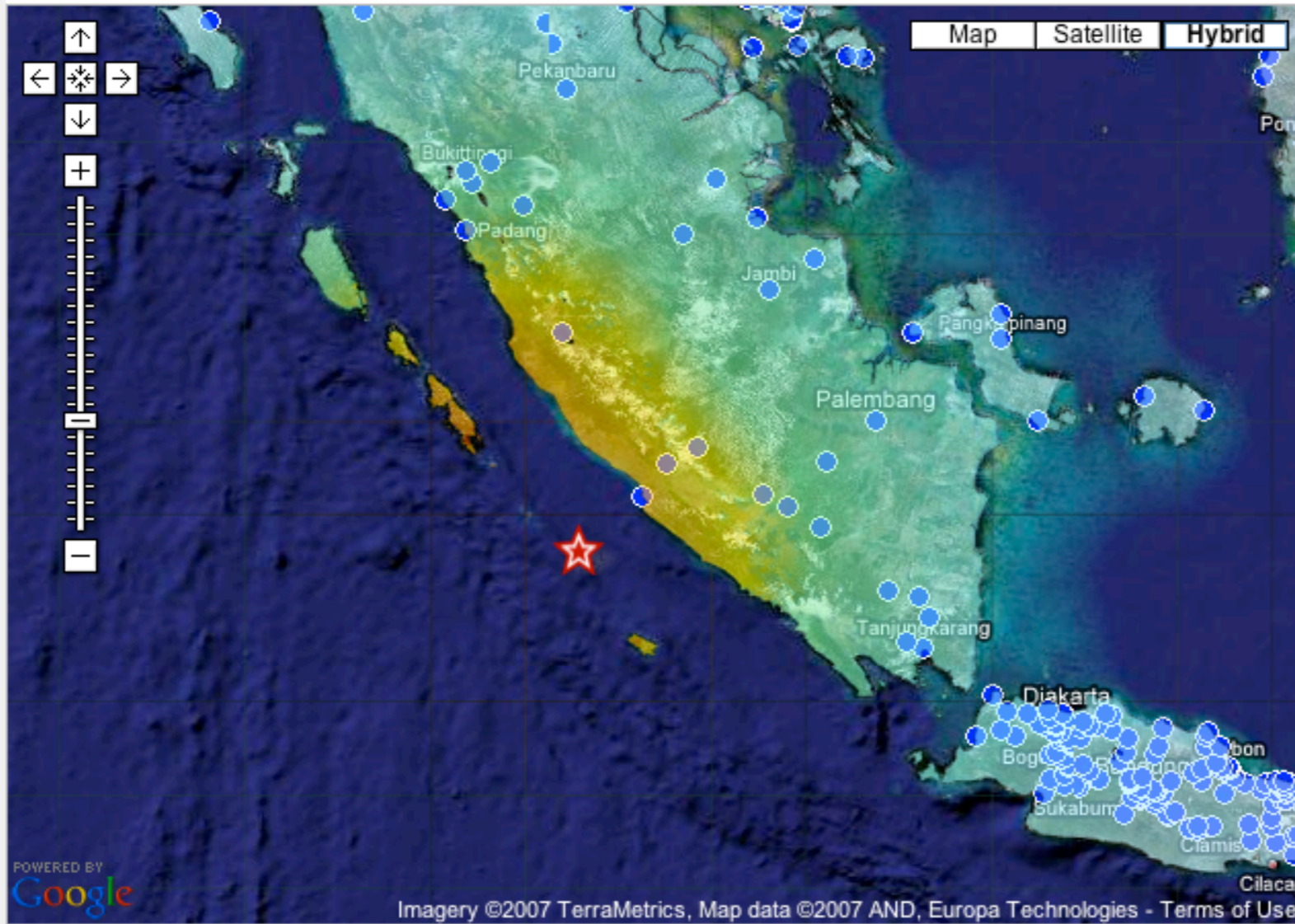
Latest Earthquake Earthquake A

How USGS NEIC uses ShakeCast

Table View

Google Maps for ShakeMap 2007hear

Facility Type: All CITY CAPITAL



Bengkulu, Indonesia (pop. 265K) CITY
Curup, Indonesia (pop. 38K) CITY
Lubuk Linggau, Indonesia (pop. 69K) CITY
Lahat, Indonesia (pop. 67K) CITY
Tanjung Agung, Indonesia (pop. 54K) CITY
Sungai penuh, Indonesia (pop. 39K) CITY
Baturaja, Indonesia (pop. 67K) CITY
Prabumulih, Indonesia (pop. 81K) CITY

[Go to Administration Panel](#)

Other
ShakeCast
Uses:

Global
Cities

ShakeCast Shaking Summary: vzaj_06 (9)

ShakeCast <shake@gldshake.cr.usgs.gov>

To: wald@usgs.gov

ShakeCast Event: Magnitude 5.7

ShakeMap (Unnamed Event) Version 1

Event Location: EAST TIMOR REGION

Event Time: 2006-12-07 06:35:00

Generated at 2006-12-07 00:05:26

Reported by: Server ID = 1301, DNS = localhost

Shaking Summary

Number of Facilities Reported: 9

Max Value: MMI: 5.97; Acceleration: (not measured)

Number of Reports of Shaking over Threshold: 9

Facility Shaking Estimates from ShakeMap

Facility	Metric	Value
Viqueque, East Timor (pop. 6K)	MMI	5.97
Baucau, East Timor (pop. 15K)	MMI	5.68
Lautem, East Timor (pop. 3K)	MMI	5.01
Los Palos, East Timor (pop. 4K)	MMI	4.88
Manatuto, East Timor (pop. 2K)	MMI	4.66
Metinaro, East Timor (pop. 4K)	MMI	4.26
Same, East Timor (pop. 2K)	MMI	4.06
Dare, East Timor (pop. 18K)	MMI	4.04
Dili, East Timor (pop. 52K)	MMI	4.04

Other
ShakeCast
Uses:

Nuclear
Power
Plants

ShakeCast Summary Nuclear Power Plants: 51169283 (2)

ShakeCast <klin@usgs.gov>

To: wald@usgs.gov

ShakeCast Event: Magnitude 3.7

ShakeMap (Unnamed Event) Version 1

Event Location: 6 km SW of Alamo, CA

Event Time: 2006-03-21 21:41:42

Generated at 2006-11-28 16:07:03

Reported by: Server ID = 1301, DNS = localhost

Damage Summary

Number of NUCLEAR Reported: 2

Max Value: MMI: 1.18; Acceleration: (not measured)

Number of Reports of Likely Damage: [NULL]

Number of Reports of Possible Damage: [NULL]

Number of Reports of Unlikely Damage: 2

FACILITY Damage Estimates from ShakeMap

Nuclear Power Plant	Damage Level	Metric	Value	Exceedance Ratio
GE Vallecitos, Sunol, CA	Unlikely	MMI	1.18	0.045
Rancho Seco, Herald, CA	Unlikely	MMI	1	0.000

ShakeCast: Ongoing & Future Improvements:

- Additional predefined facility structure types & vulnerability functions, including pipeline, liquefaction, & landslide potential.
- Modified HAZUS damage state estimates to accommodate ShakeMap peak motion and grid-based uncertainty values explicitly for loss uncertainty.
- In addition to maps, 2-D profiles for pipeline corridor views.
- Enhanced GIS import options (currently via import XML).

ShakeCast: Ongoing & Future Improvements:

- Associate specific structures with co-located seismic instruments such that recorded data is used preferentially over ShakeMap interpolated shaking values there (*mostly implemented*)
- Support for LINUX / UNIX OS (*implemented, but not yet supported*)
- Improved re-notification logic, allowing flexibility in conditions for re-alerting (for example, if damage state changes at particular facilities).
- Optional updates of the software via RSS feed from USGS web servers (*implemented*)
- Redundancy above & beyond USGS Earthquake Program Web servers.

Conclusions

- ShakeCast for:
 - ✓ Automatic retrieval of ShakeMap products.
 - ✓ Rapid assessment of damage likelihood to widely distributed facilities.
 - ✓ Notifications with specific, customized content to relevant responders.
 - ✓ Generalized loss approach suitable to all types of infrastructure and facilities.
 - ✓ Version 2.0 now available, with simplified use and installation, implementation.
 - ✓ Try ShakeCast “Lite” now - ShakeMap product delivery via an RSS Reader
 - ✓ All available at:

<http://earthquake.usgs.gov/shakecast>