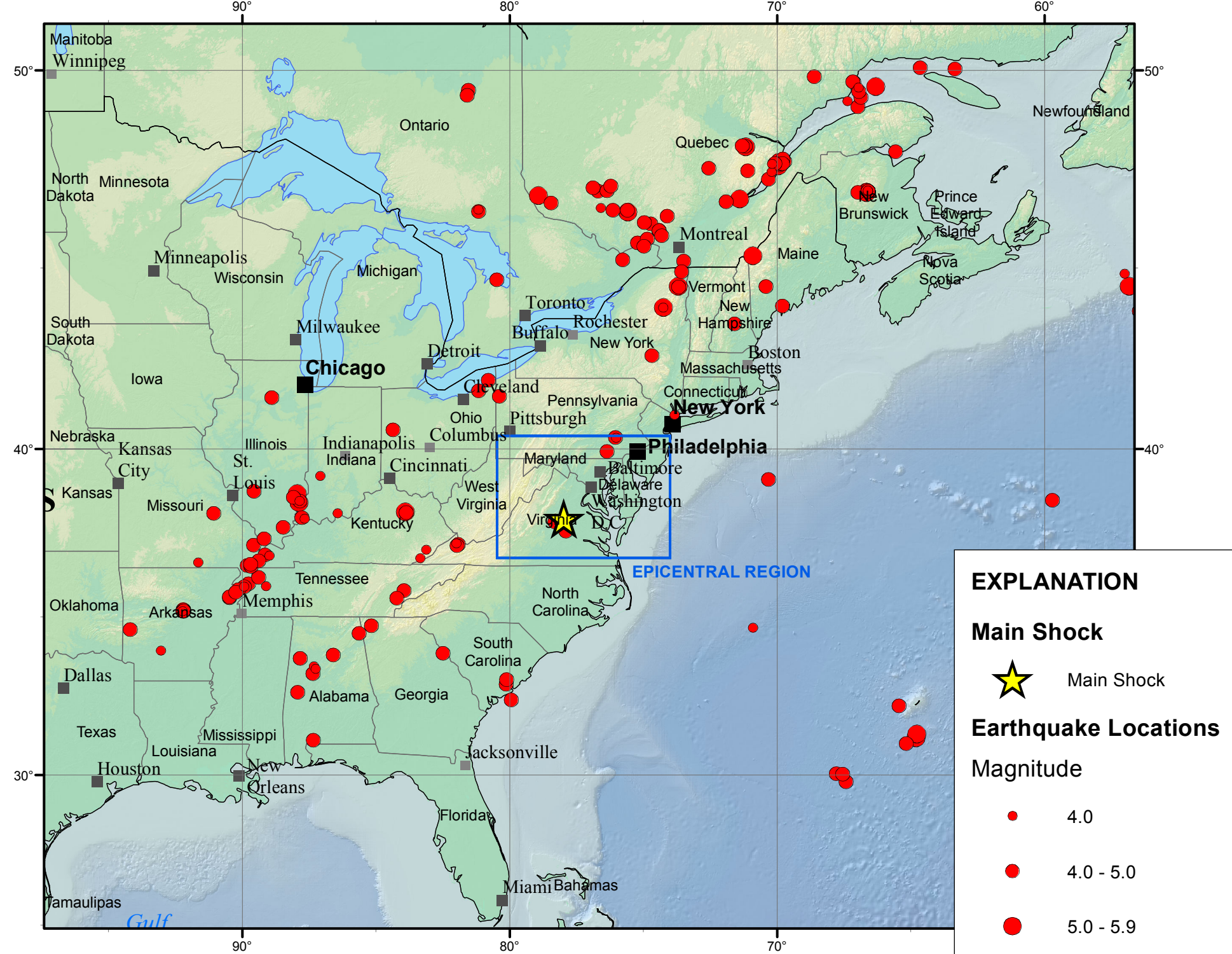


# M5.8 Virginia Region Earthquake of 23 August 2011



## Tectonic Setting



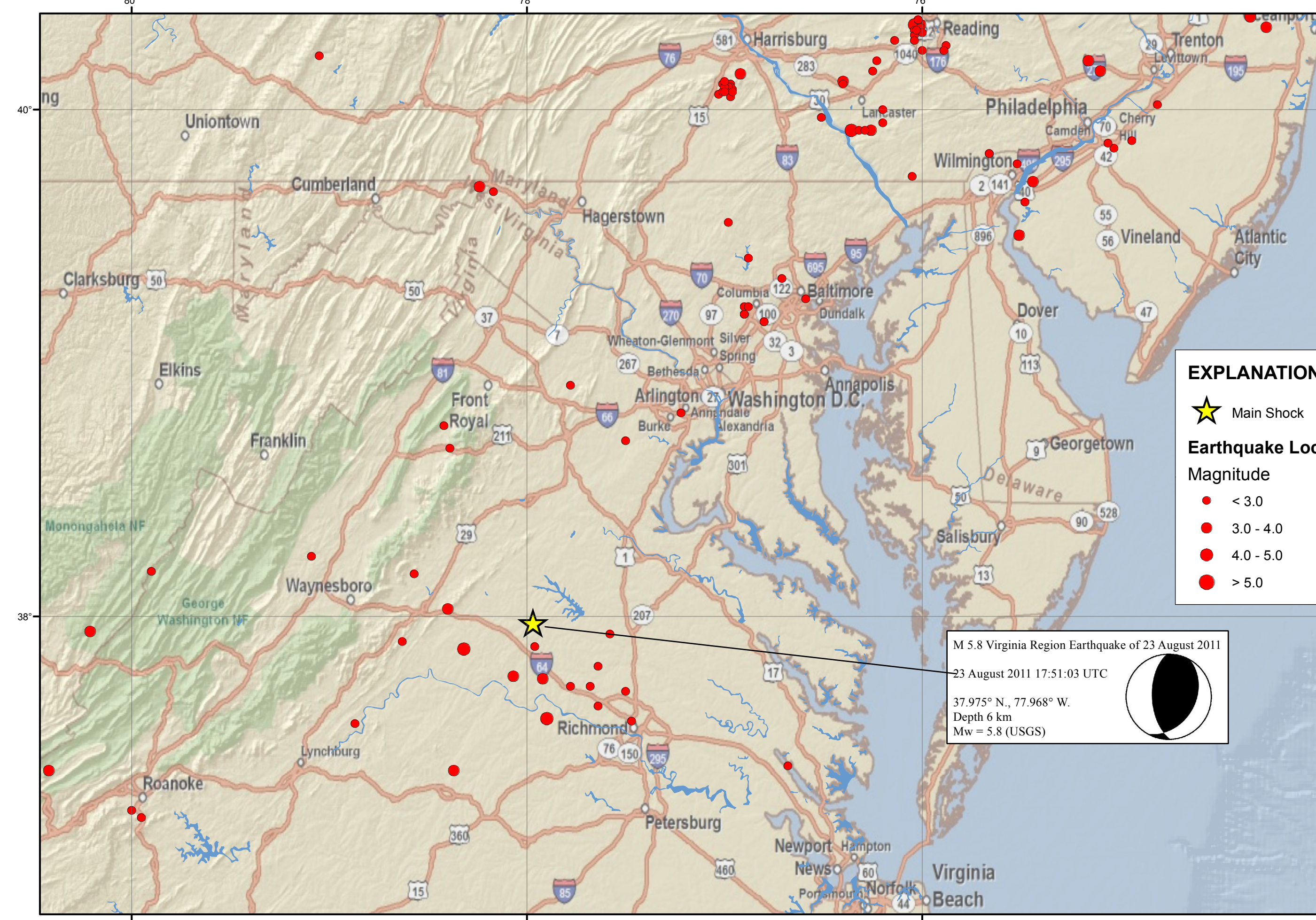
**EXPLANATION**

- Main Shock
- Earthquake Locations
- Magnitude

- 4.0
- 4.0 - 5.0
- 5.0 - 5.9

Scale 1:20,000,000

## Epicentral Region



**EXPLANATION**

- Main Shock
- Earthquake Locations
- Magnitude

- < 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- > 5.0

M 5.8 Virginia Region Earthquake of 23 August 2011  
23 August 2011 17:51:03 UTC  
37.975° N, 77.968° W  
Depth 6 km  
Mw = 5.8 (USGS)

Scale 1:2,000,000

## TECTONIC SUMMARY

The Virginia earthquake of 2011 August 23 occurred as reverse faulting on a north or northeast-striking plane within a previously recognized seismic zone, the "Central Virginia Seismic Zone." The Central Virginia Seismic Zone has produced small and moderate earthquakes since at least the 18th century. The previous largest historical shock from the Central Virginia Seismic Zone occurred in 1875. The 1875 shock occurred before the invention of effective seismographs, but the felt area of the shock suggests that it had a magnitude of about 4.8. The 1875 earthquake shook bricks from chimneys, broke plaster and windows, and overturned furniture at several locations. A magnitude 4.5 earthquake on 2003, December 9, also produced minor damage. Previous seismicity in the Central Virginia Seismic Zone has not been causally associated with mapped geologic faults. Previous, smaller, instrumentally recorded earthquakes from the Central Virginia Seismic Zone have had shallow focal depths (average depth about 8 km). They have had diverse focal mechanisms and have occurred over an area with length and width of about 120 km, rather than being aligned in a pattern that might suggest that they occurred on a single causative fault. Individual earthquakes within the Central Virginia Seismic Zone occur as the result of slip on faults that are much smaller than the overall dimensions of the zone. The dimensions of the individual fault that produced the 2011 August 23 earthquake will not be known until longer-term studies are done, but other earthquakes of similar magnitude typically involve slippage along fault segments that are 5 – 15 km long.

Earthquakes in the central and eastern U.S., although less frequent than in the western U.S., are typically felt over a much broader region. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake on the west coast. A magnitude 4.0 eastern U.S. earthquake typically can be felt at many places as far as 100 km (60 mi) from where it occurred, and it infrequently causes damage near its source. A magnitude 5.5 eastern U.S. earthquake usually can be felt as far as 500 km (300 mi) from where it occurred, and sometimes causes damage as far away as 40 km (25 mi).

## DISCLAIMER

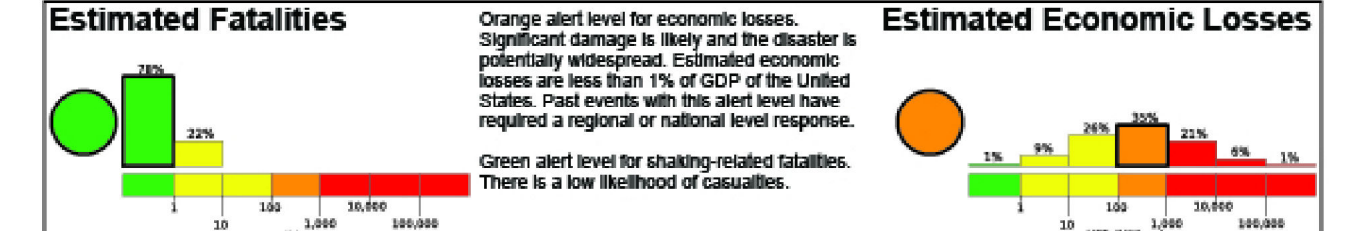
Base map data, such as place names and political boundaries, are the best available but may not be current or may contain inaccuracies and therefore should not be regarded as having official significance.

## PAGER

**USGS** Earthquake Shaking **Orange Alert**

**M 5.8, VIRGINIA**  
Origin Time: Tue 2011 08 23 17:51:04 UTC (13:51:04 local)  
Location: 37.94°N 77.93°W Depth: 6 km

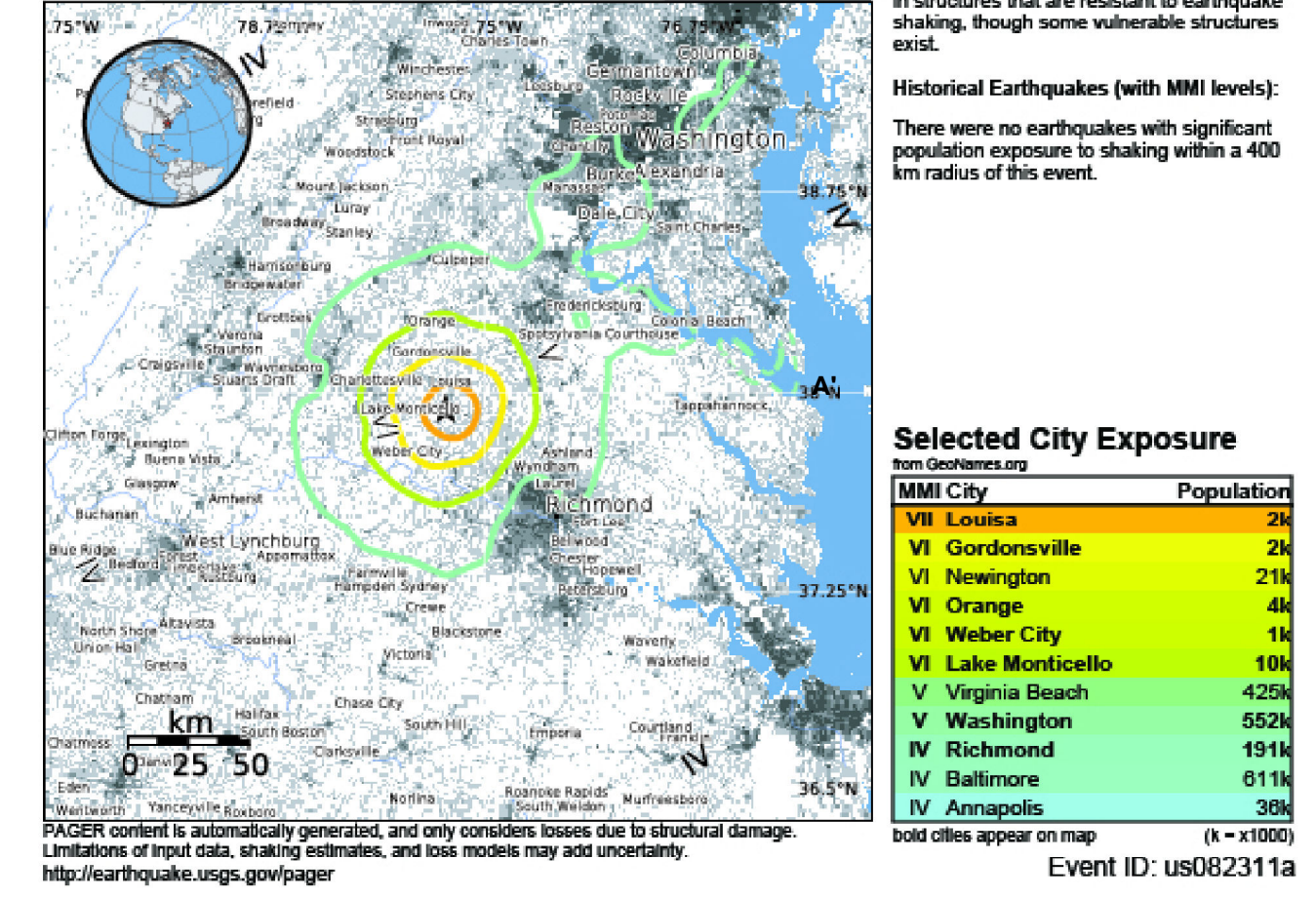
**USAID** **PAGER Version 1**  
Created: 2 hours, 5 minutes after earthquake



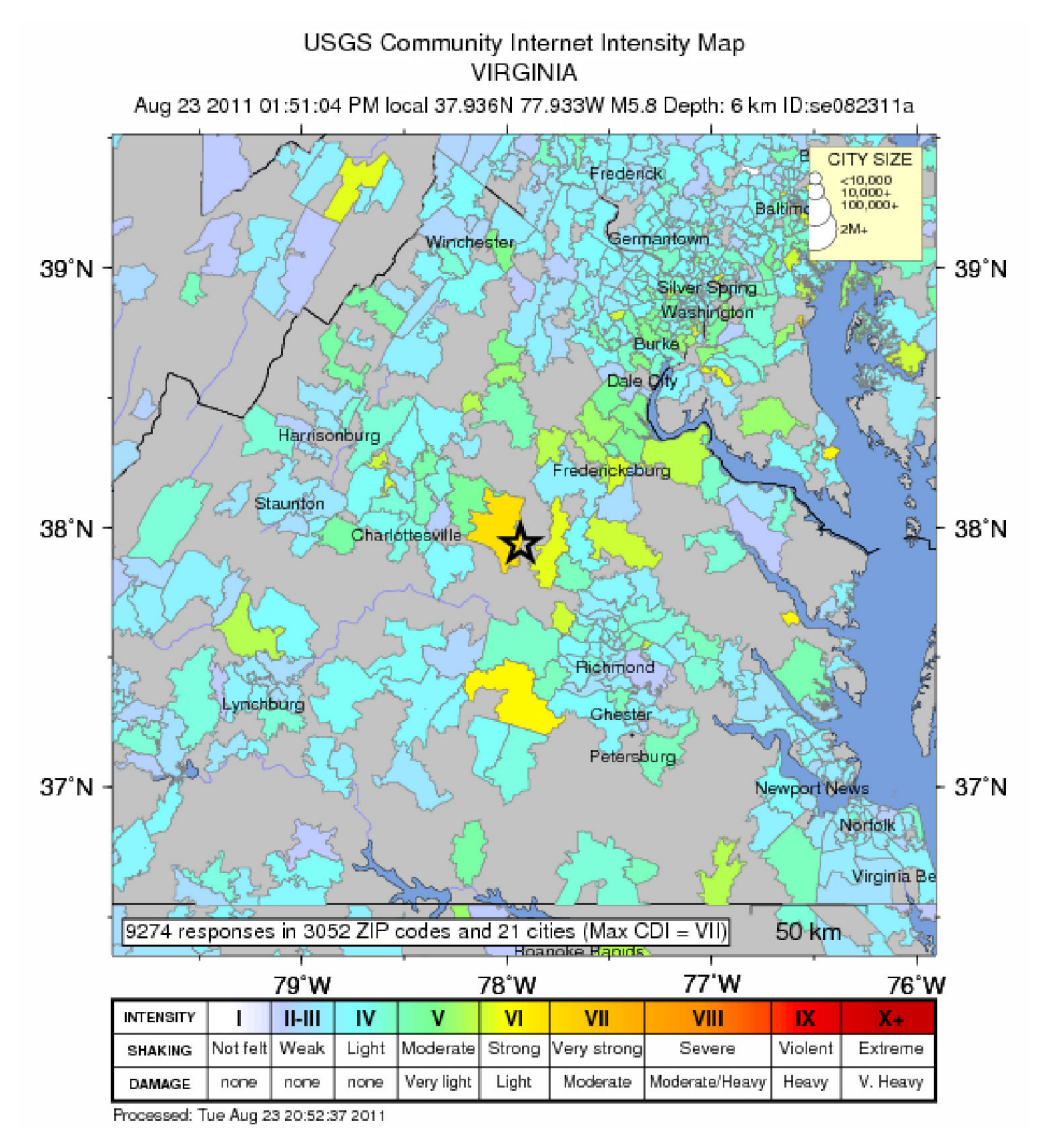
**Estimated Population Exposed to Earthquake Shaking**

ESTIMATED POPULATION EXPOSURE (N = 1185)	I	II-III	IV	V	VI	VII	VIII	IX	X+
ESTIMATED MODIFIED MERCALLI INTENSITY	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
PERCEIVED SHAKING	None	None	None	Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
POTENTIAL DAMAGE	None	None	None	Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

## Population Exposure



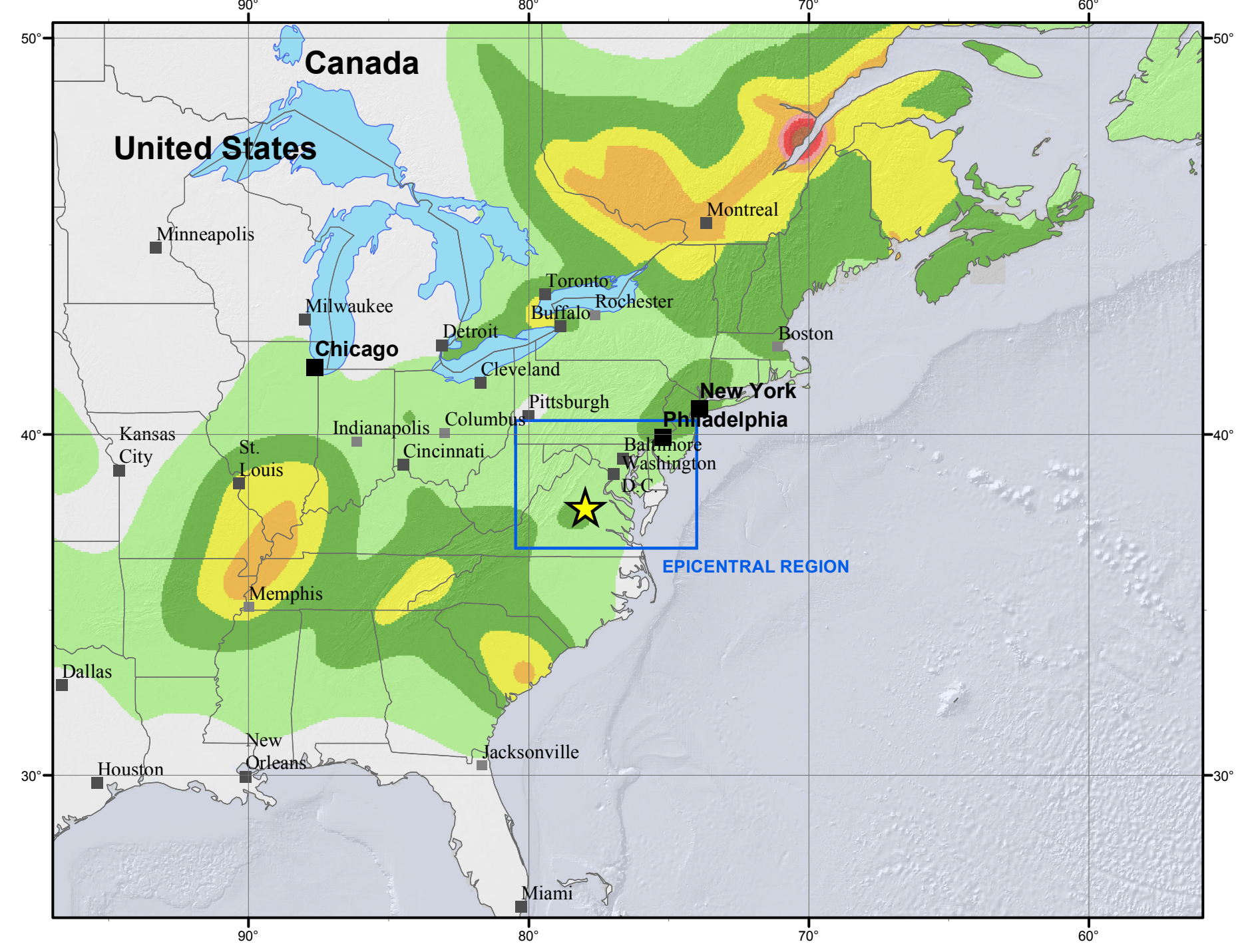
## Did You Feel It?



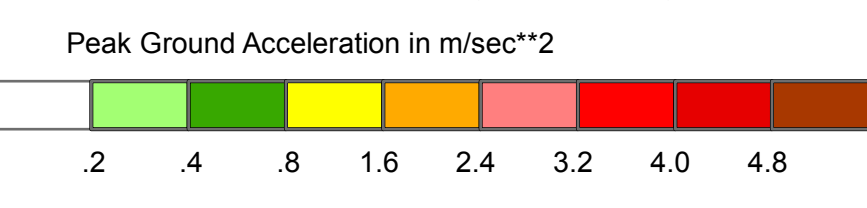
## DATA SOURCES

- EARTHQUAKES AND SEISMIC HAZARD: USGS, National Earthquake Information Center
- NOAA, National Geophysical Data Center
- IASPEI Centennial Catalog (1900 - 1999) and extensions (Engdahl and Villasenor, 2002)
- IDDI (unpublished earthquake catalog) (Engdahl, 2003)
- Global Seismic Hazard Assessment Program
- BASE MAP: NIMA and ESRI, Digital Chart of the World
- USGS, EROS Data Center
- NOAA GEBCO and GLOBE Elevation Models
- ESRI Online

## Seismic Hazard

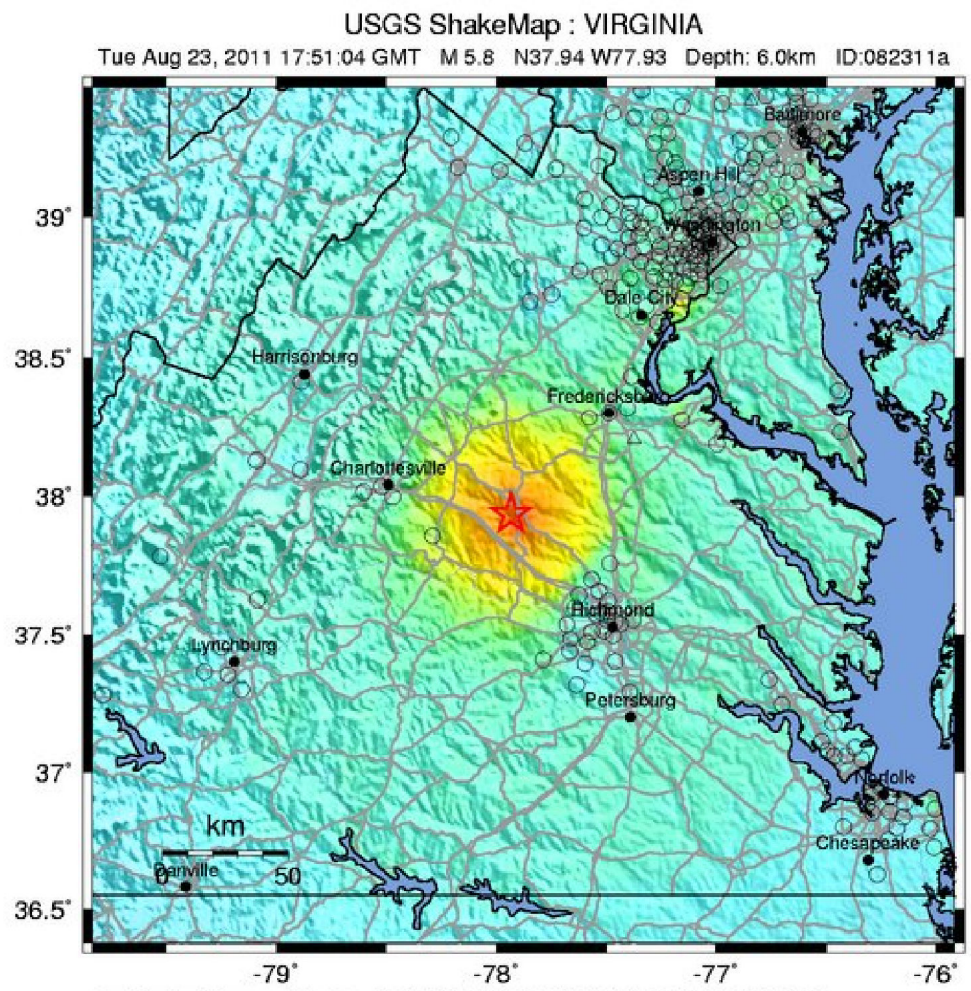


Scale 1:20,000,000



Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec<sup>2</sup>, expected to be exceeded in a 50-yr period with a probability of 10 percent.

## ShakeMap



Map Version 4 Processed Tue Aug 23, 2011 01:50:45 PM EDT - NOT REVIEWED BY HUMAN