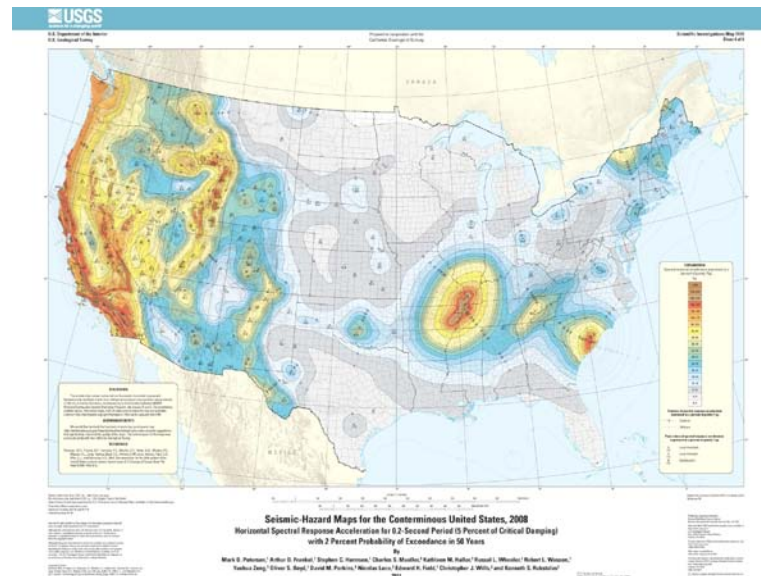


Workshop on the Intermountain West Region – June 13-14, 2012

National Seismic Hazard Mapping Project- Golden, CO



Thanks to University of Utah

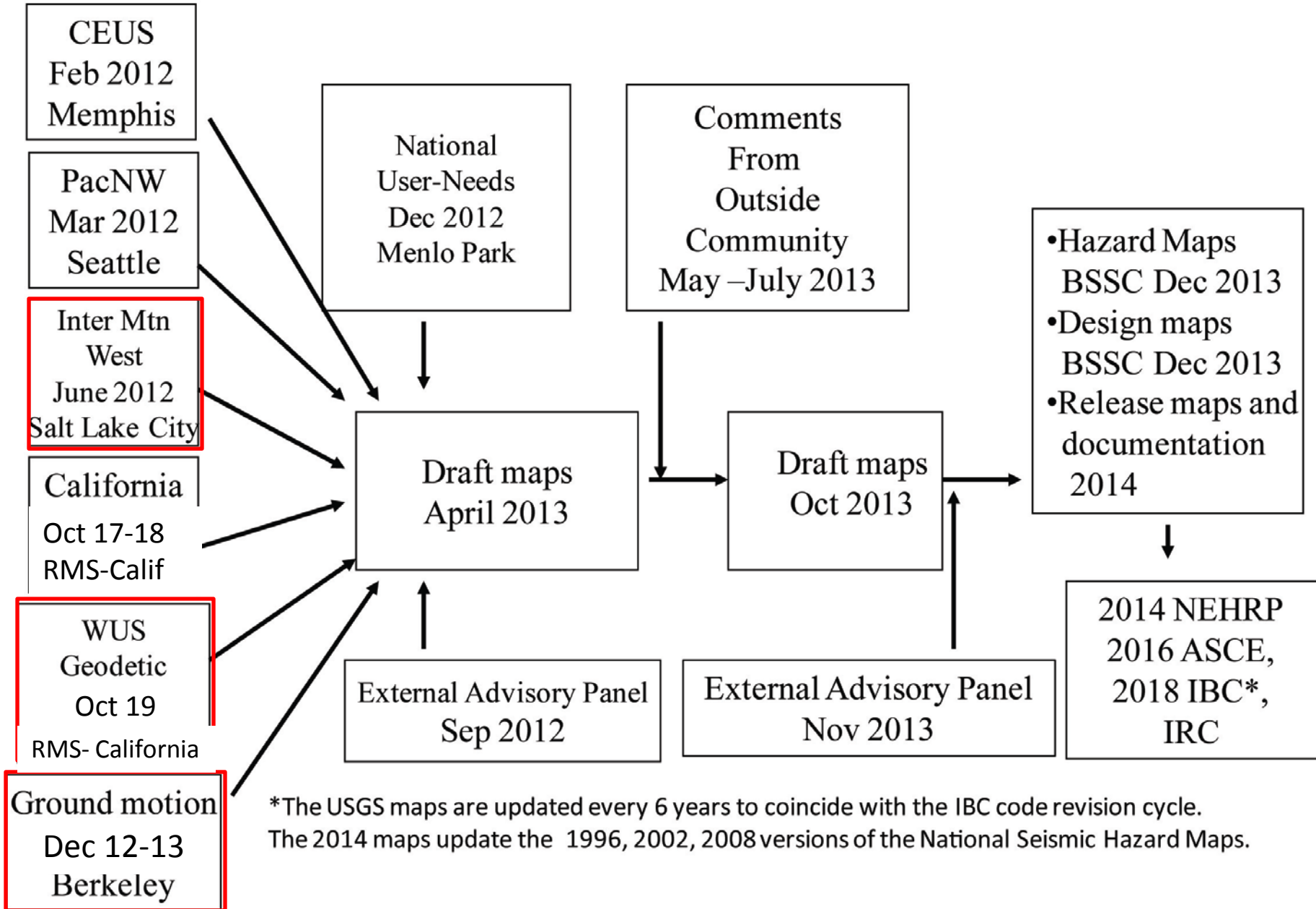
National Seismic Hazard Maps: Uses

- Building codes: BSSC, ASCE-7, IBC, IRC, Railroad, Transportation
- Insurance, risk modelers (EQECAT, RMS, AIR, others)
- Public policy: Liquefaction hazard maps for Utah, CA Seismic Hazard Maps, FEMA (HAZUS), Mitigation fund allocation

•The *International Building Code* (IBC) is in use or adopted in 50 states, the District of Columbia, the U.S. Virgin Islands, NYC, Guam, and the Northern Marianas Islands.

•The *International Residential Code* (IRC) is in use or adopted in 49 states, the District of Columbia, and the U.S. Virgin Islands.

2014 National Seismic Hazard Map Update Process

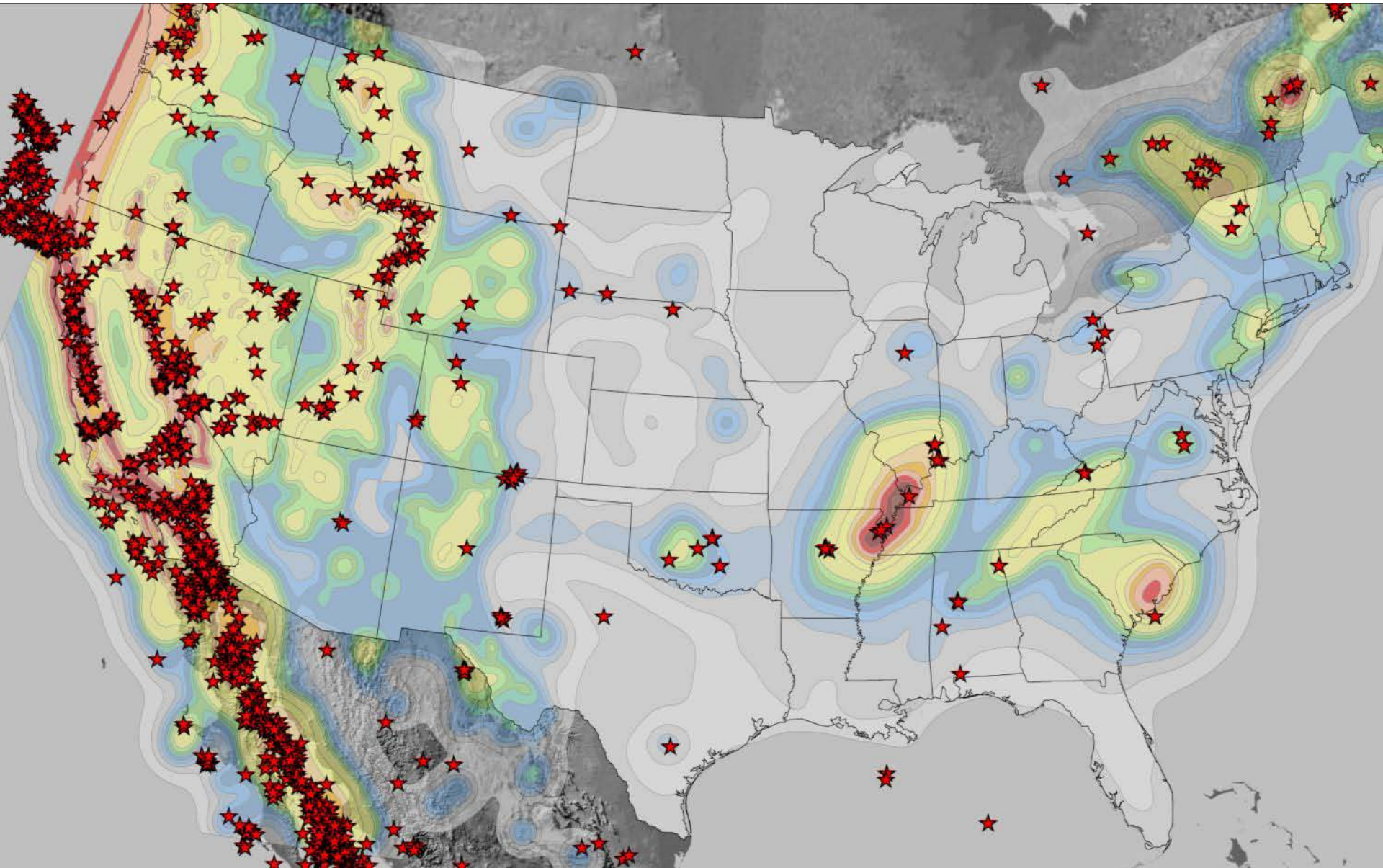


*The USGS maps are updated every 6 years to coincide with the IBC code revision cycle. The 2014 maps update the 1996, 2002, 2008 versions of the National Seismic Hazard Maps.

Purpose of IMW Workshop

- Review of 2008 model which is the basis of 2014 update
- Discuss 8 recommendations from Basin and Range Province Earthquake Working Group (BRPEWG)
- Discuss potential changes for each state
- Develop alternative models for logic tree uncertainty assessment - examine parameter distributions, not just central values
- We will not review ground motion or geodetic models, these will be discussed at later workshops
- Continued discussions after this workshop via web access

1996 USGS PGA 2% in 50; ★M4.0 and greater since 1997

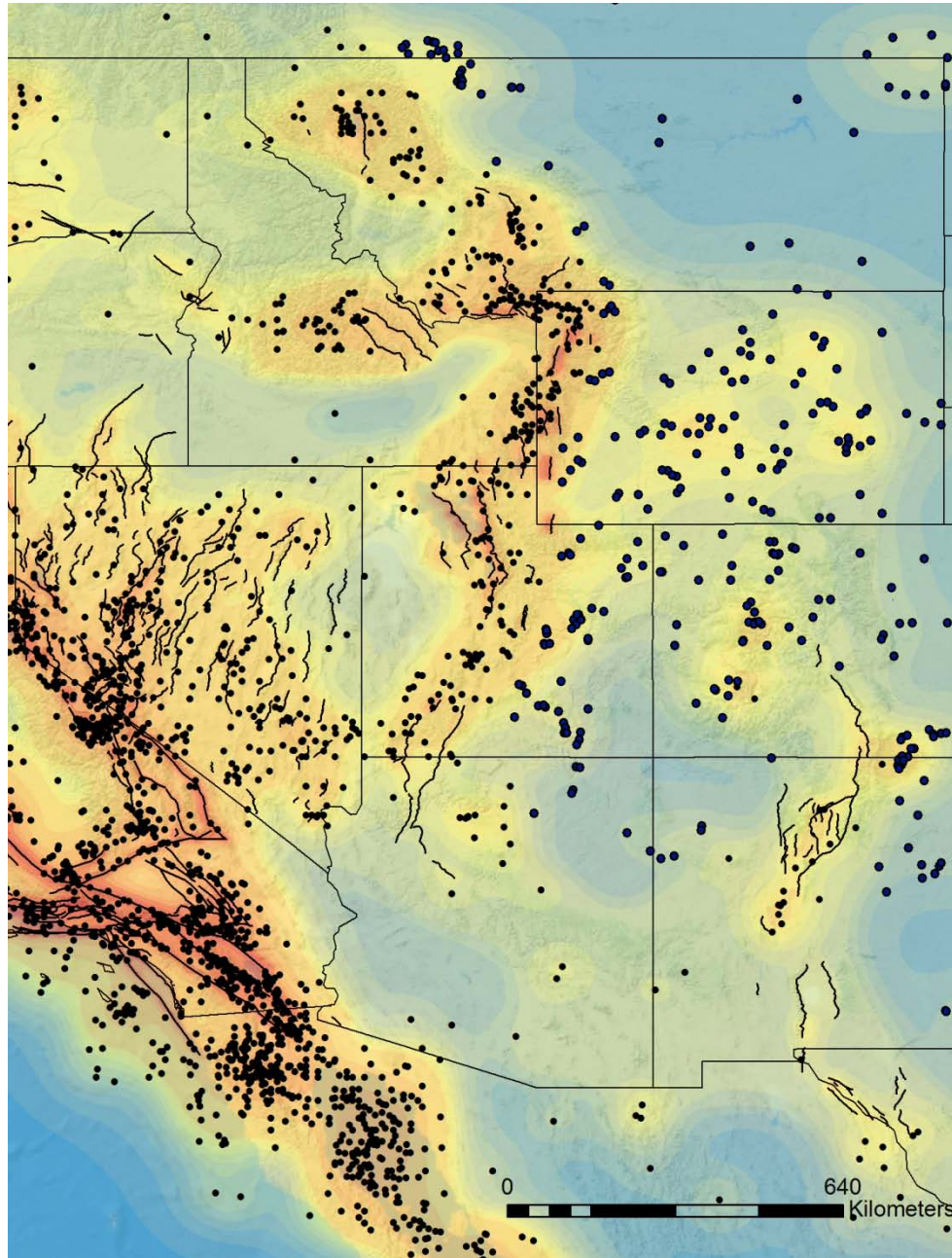


2008 Hazard Model

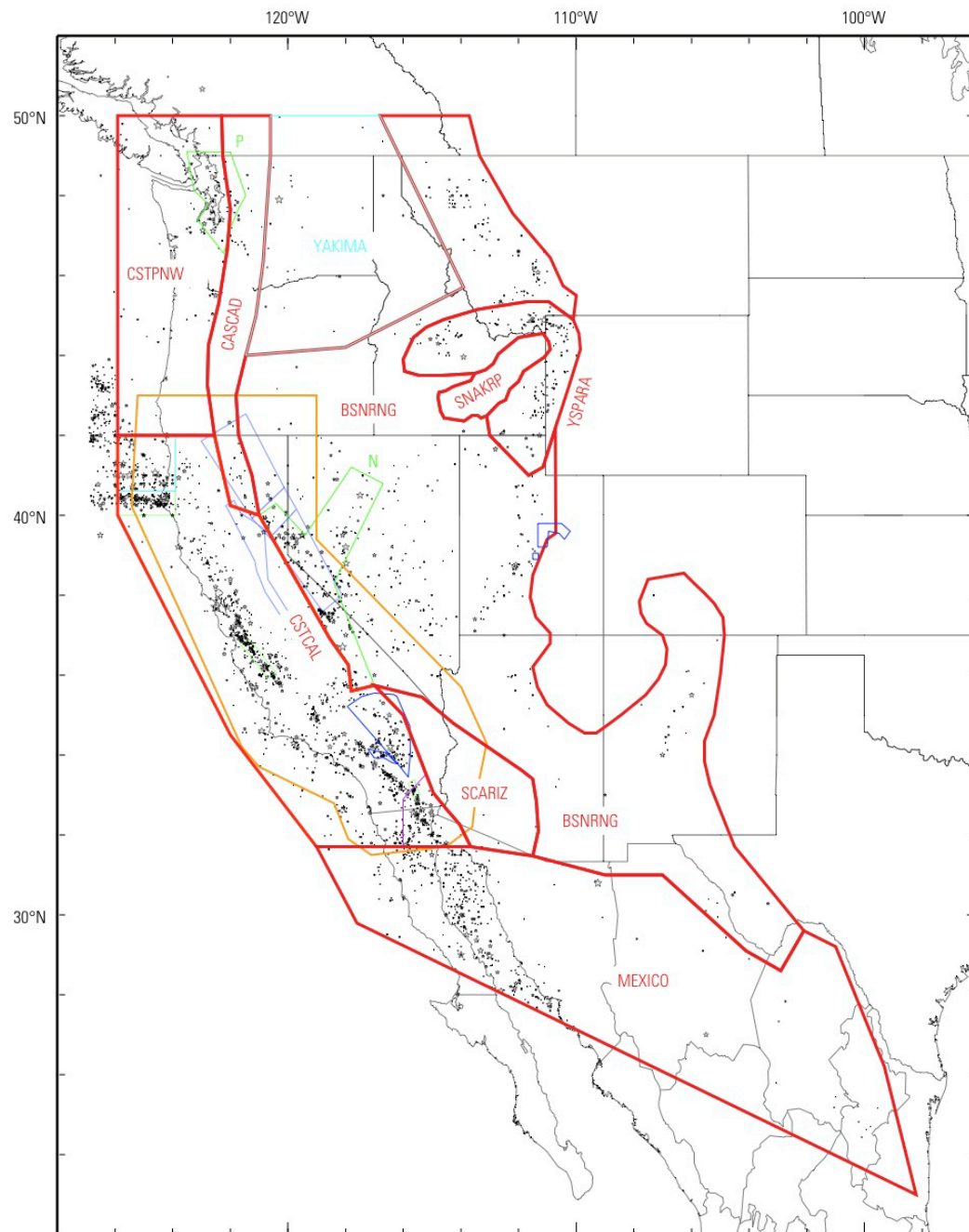
- Background seismicity model
 - **Smoothed**: Based on locations of $M \geq 4$ earthquakes, 50 km fixed smoothing kernel –assumes locations of smaller earthquakes indicate locations of future large earthquakes (M 5 – 7(6.5))
 - **Floor**: provides some level of hazard in places that have no earthquakes in catalog (catalog is short)
- Fault models – based on characteristic and distributed sizes of floating earthquakes (GR, M 6.5- M_{char})
- Ground motion models (NGA-W I)

Alternative models considered in logic tree

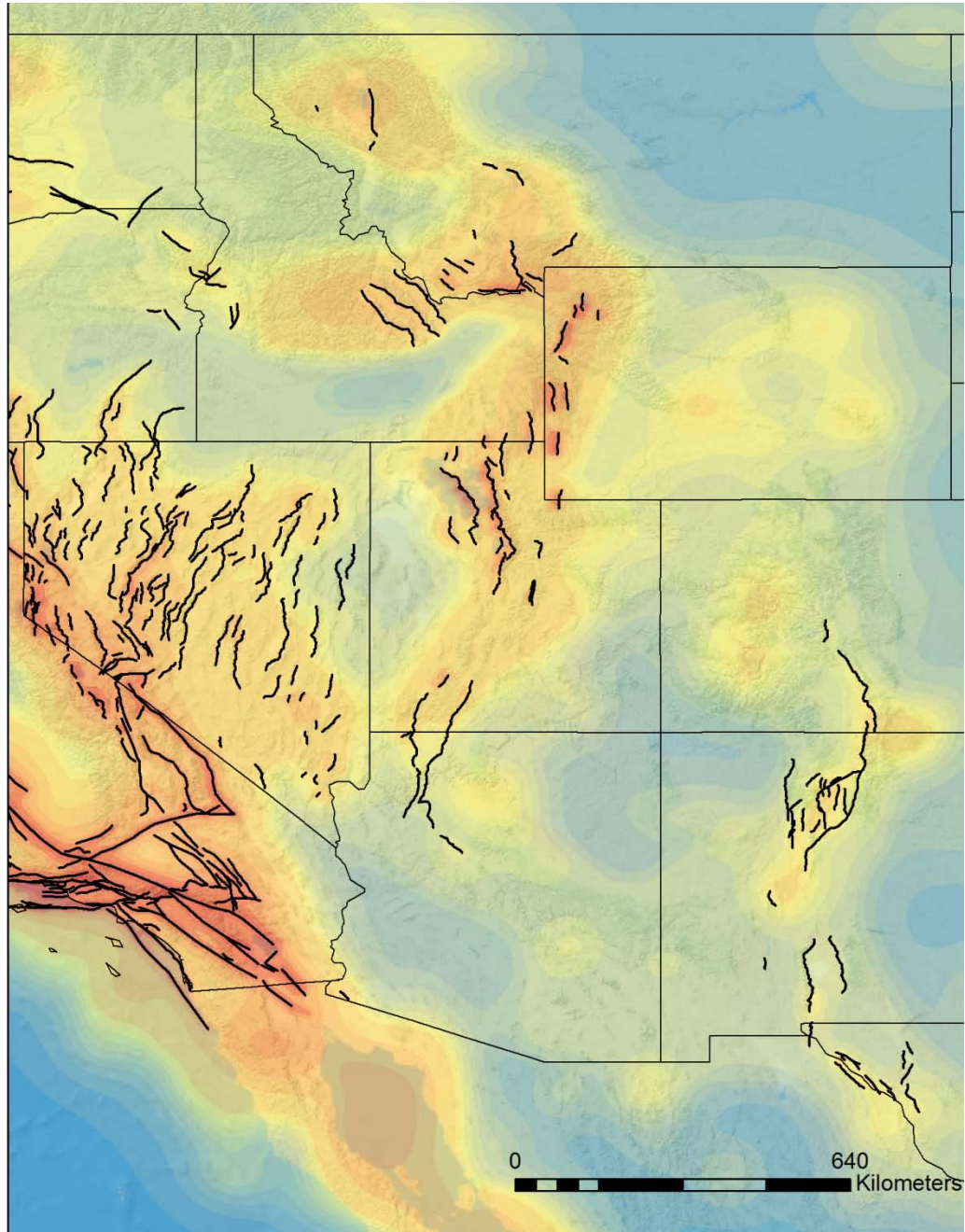
Seismicity in the IMW



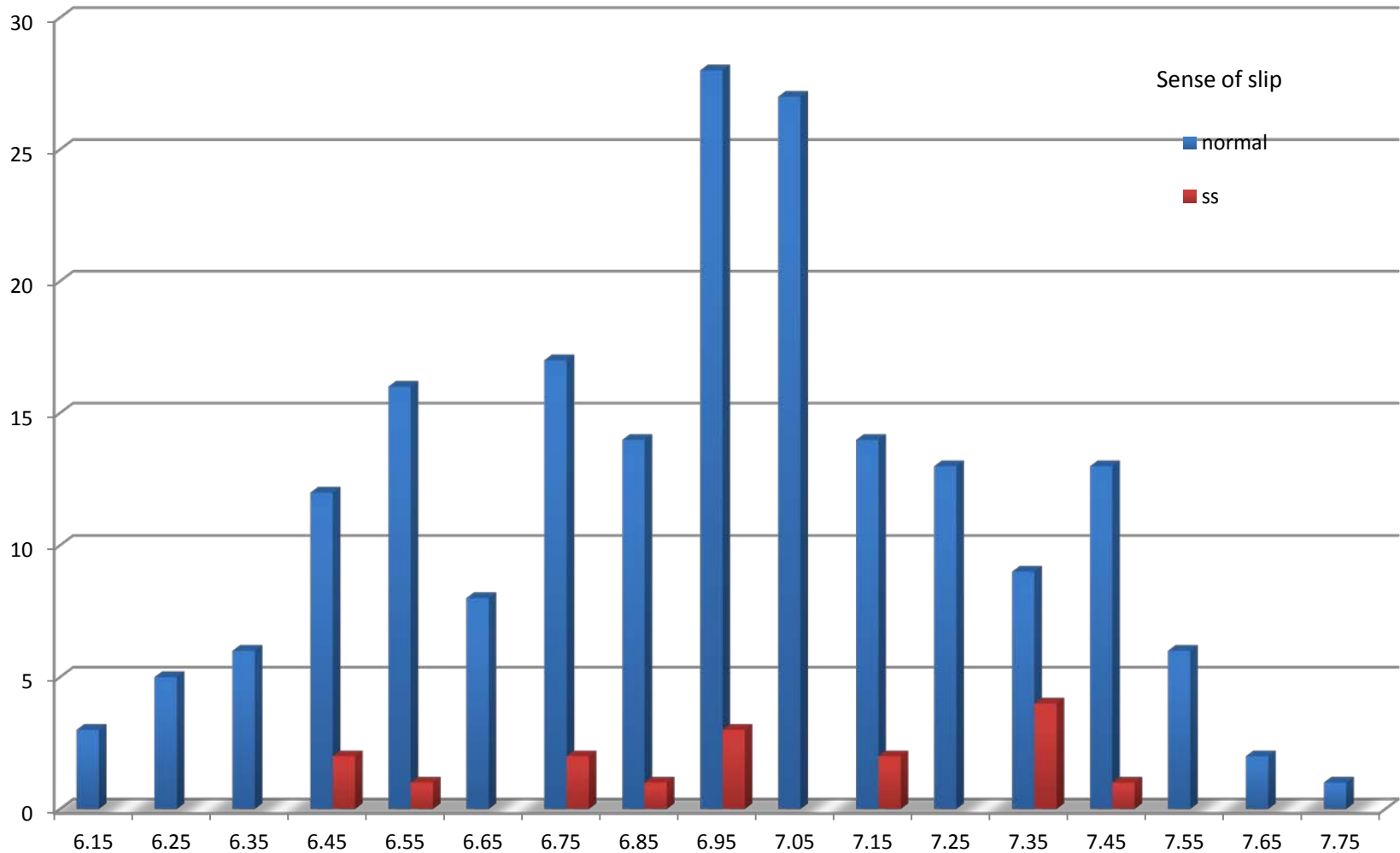
Seismicity zones



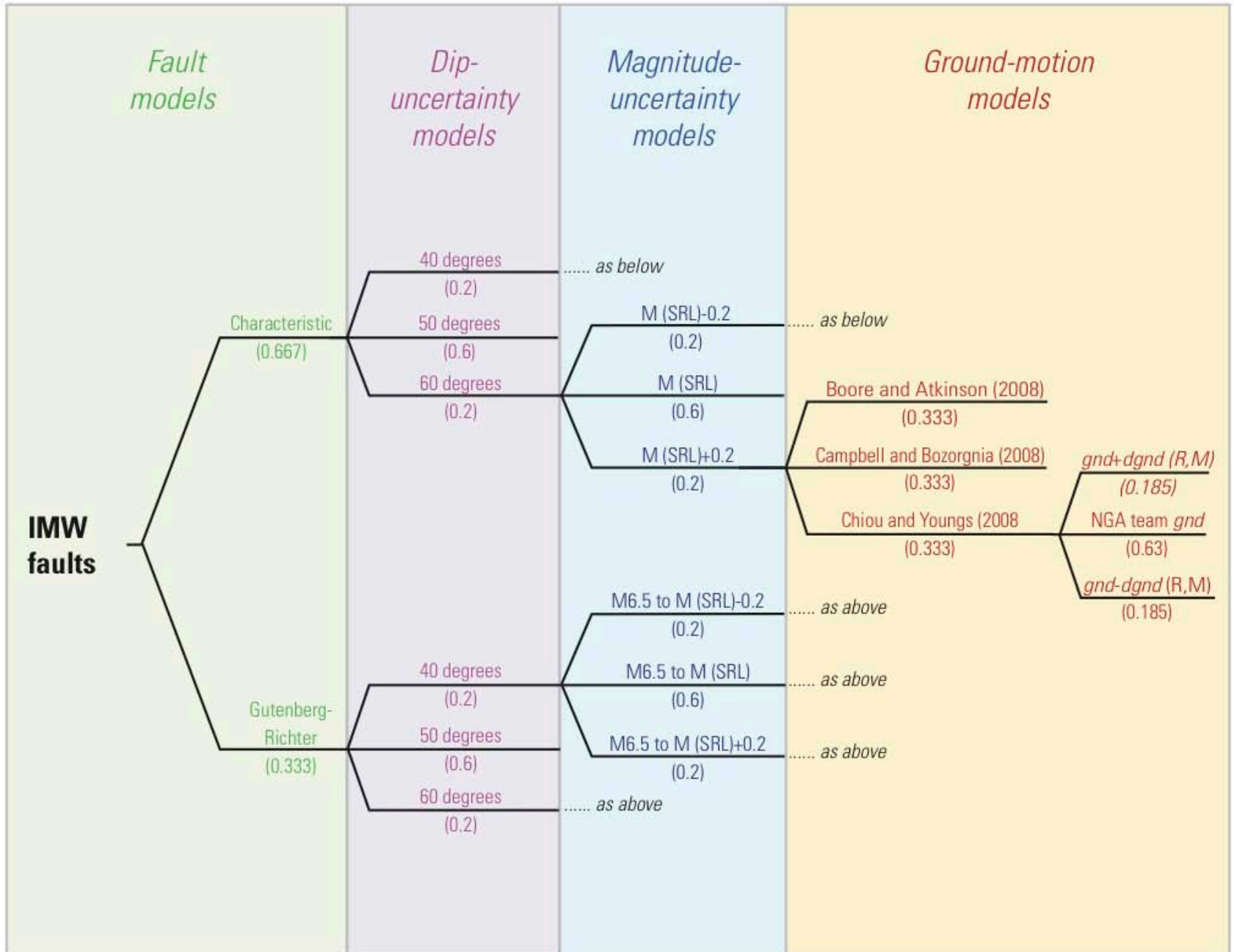
Faults in IMW



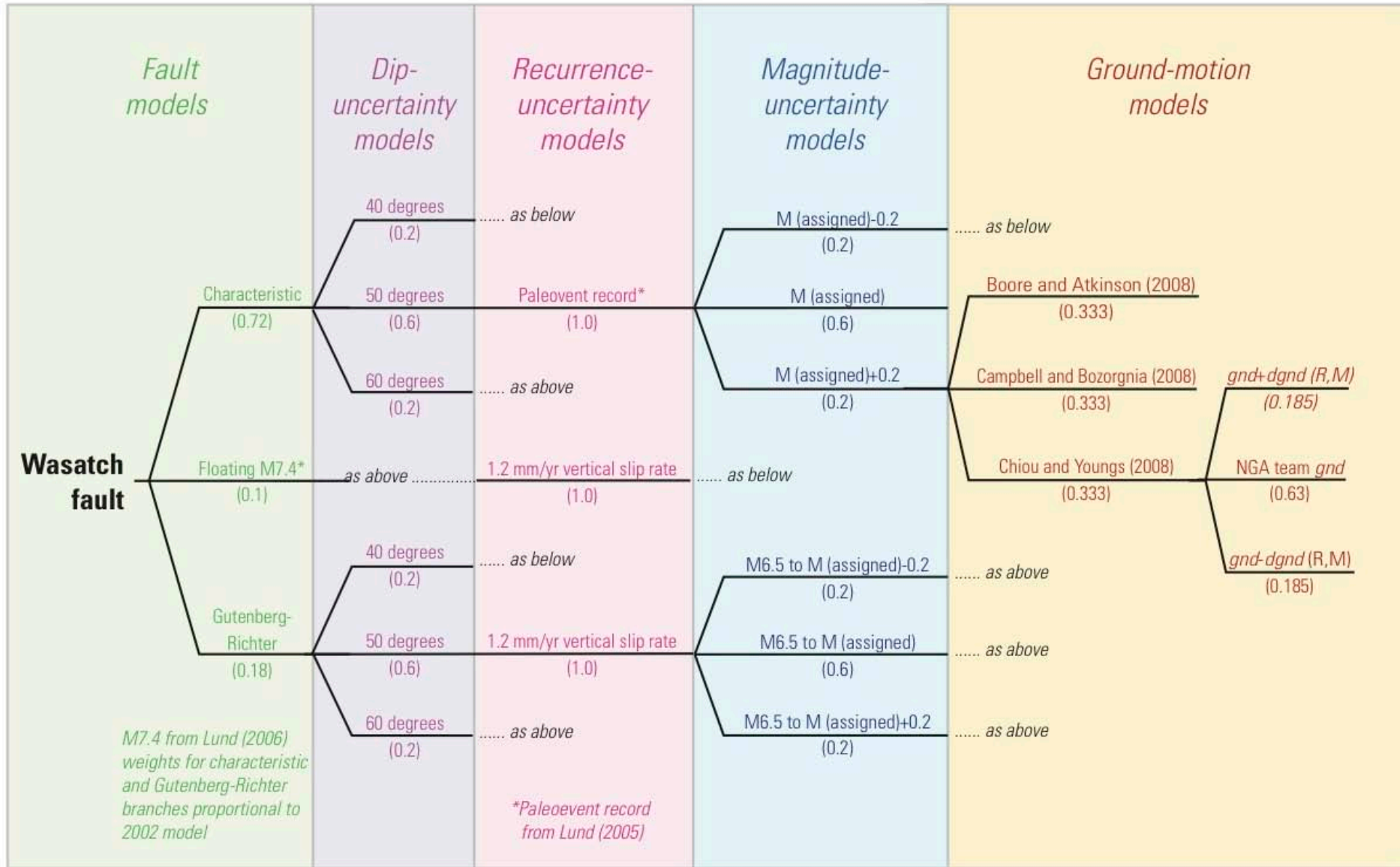
IMW Mchar distribution



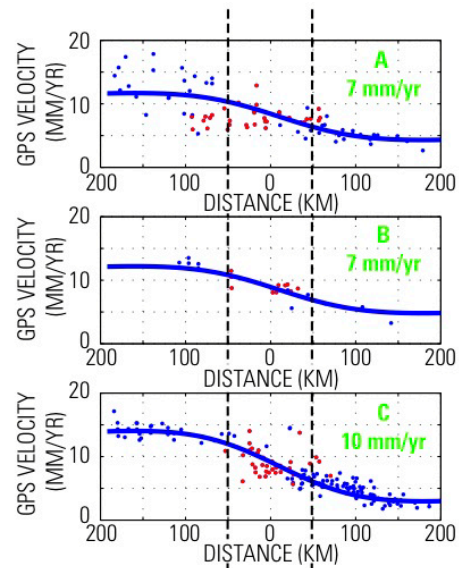
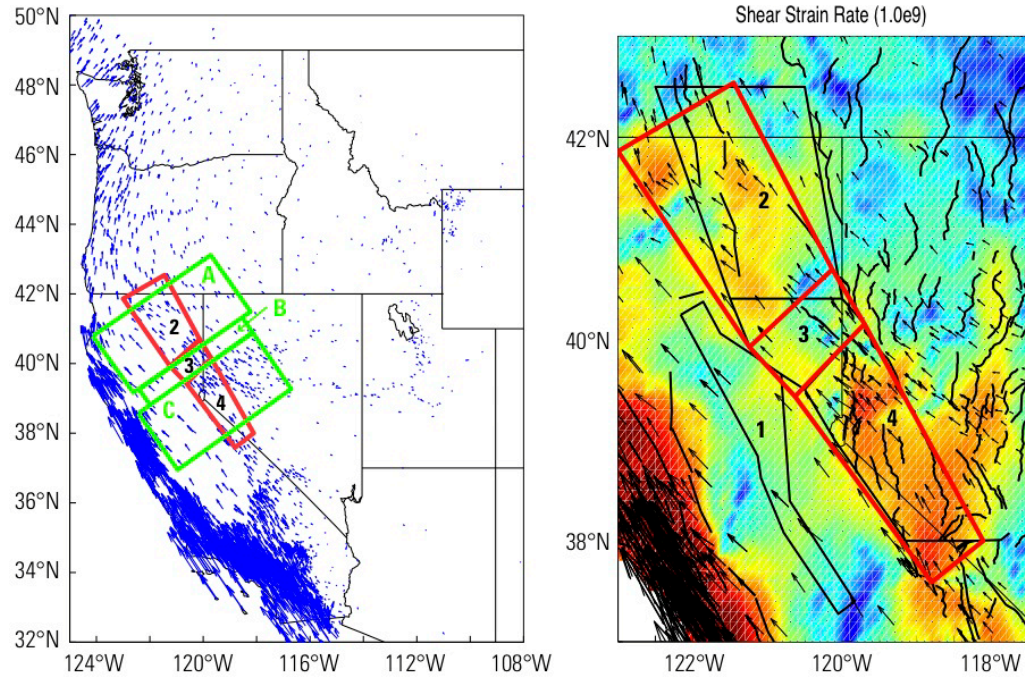
IMW Fault Logic Tree



Wasatch fault logic tree



Shear Zones



Geodetic data

- Geodetic community would like to include models in National Seismic Hazard Maps
- Moment rate of geodetic models are higher than observed seismicity or paleoseismic rates
- We are developing model for WUS working with geodetic community (Bob Smith)
- We will have a workshop on October 19, 2012 to discuss details

NGA Project Database

- NGA strong-motion database:
 - **172** worldwide earthquakes
 - **1,400** recording stations
 - **3,500** multi-component strong-motion recordings
 - **Over 100** parameters describing source, path, and site conditions

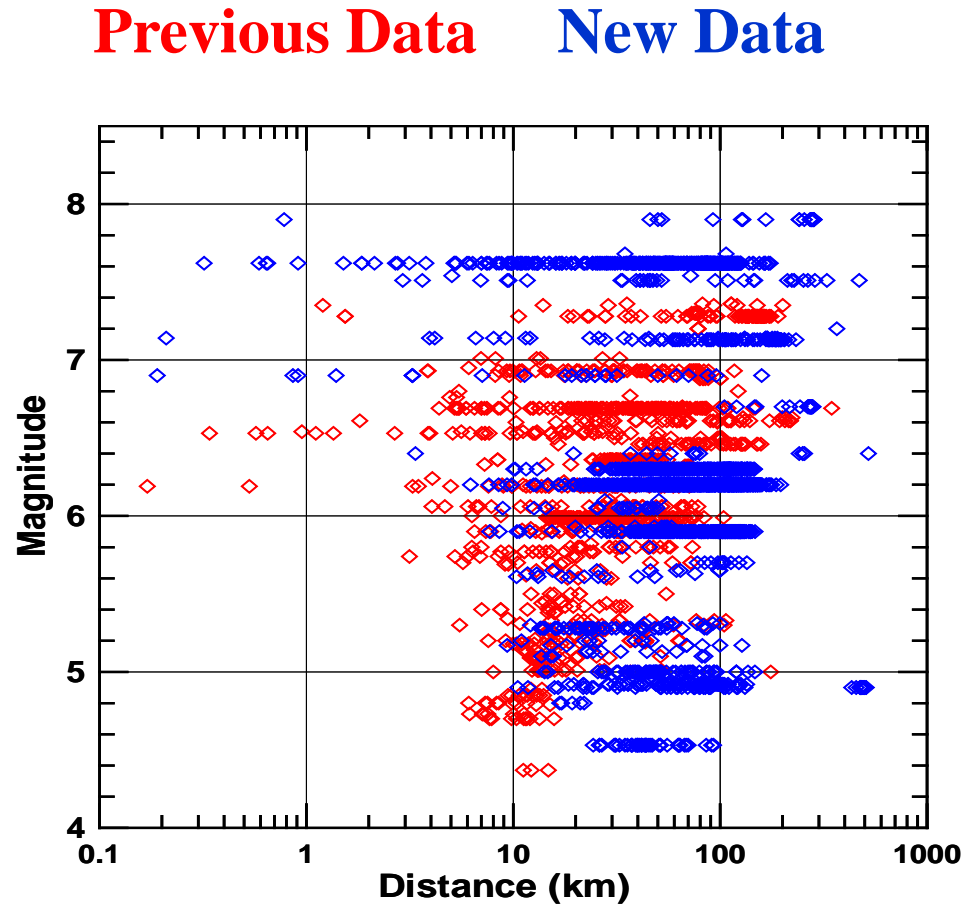
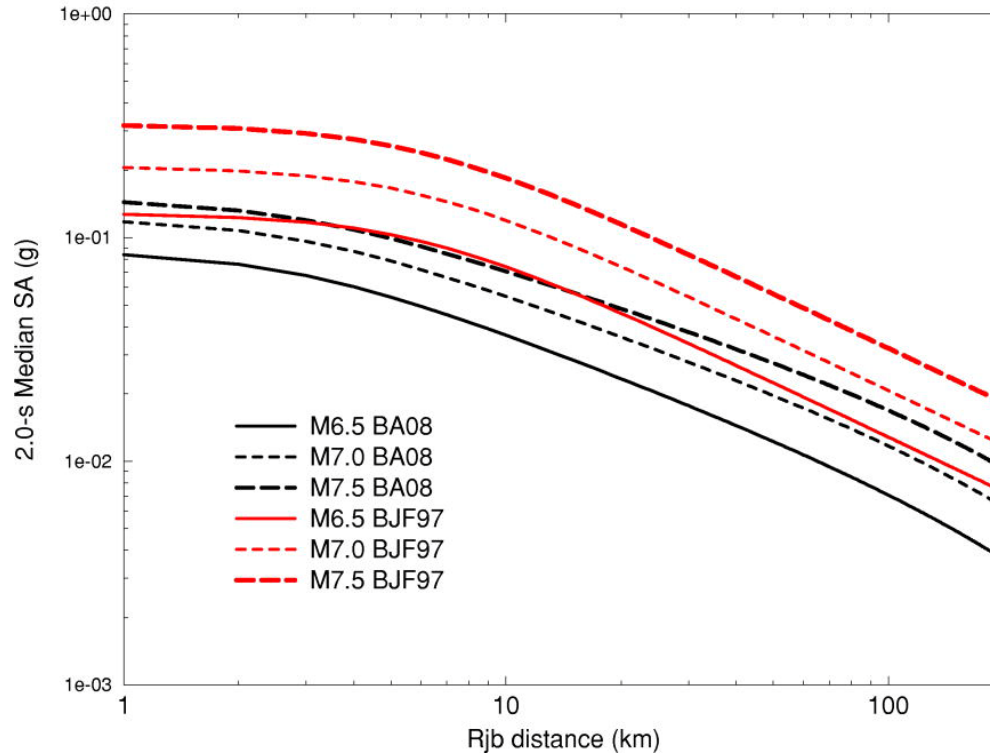


Figure provided by Ken Campbell

Compare 2008 and 2002 Normal-Slip Attenuation

Boore Atkinson NGA versus BJJF97



1. New strong ground shaking database
2. New distance measures (e.g., depth to rupture, hanging wall term)
3. New Vs30 soil amplification factors

Suggested 2014 update questions

- Should we adopt the BRPEWG recommendations (dip: $40^{\circ} \pm 15^{\circ}$, smoothing kernels, M uncertainty, antithetic fault pairs, slip rate uncertainty, etc)?
- Should we consider regional catalogs?
- How should we smooth seismicity to produce random earthquake model (isotropically, anisotropically, faults)?
- Should we apply Mmax distribution?
- Should we use alternative M-area/length equations?
- What additional new sources should be considered? Should we modify other fault sources?
- What should we learn and apply from recent earthquakes?

Agenda and plan

- June 13
 - Review 2008 model
 - Review fault issues (BRPEWG)
 - Review fault models for each state
- June 14
 - Review seismicity issues (BRPEWG)
 - Discuss products and uses

We have many topics to cover and limited time so we appreciate it if you will try to keep your talks to the allocated time. - Thanks