Potential Design Mapping Updates

Workshop on Update of Pacific Northwest Portion of U.S. National Seismic Hazard Maps

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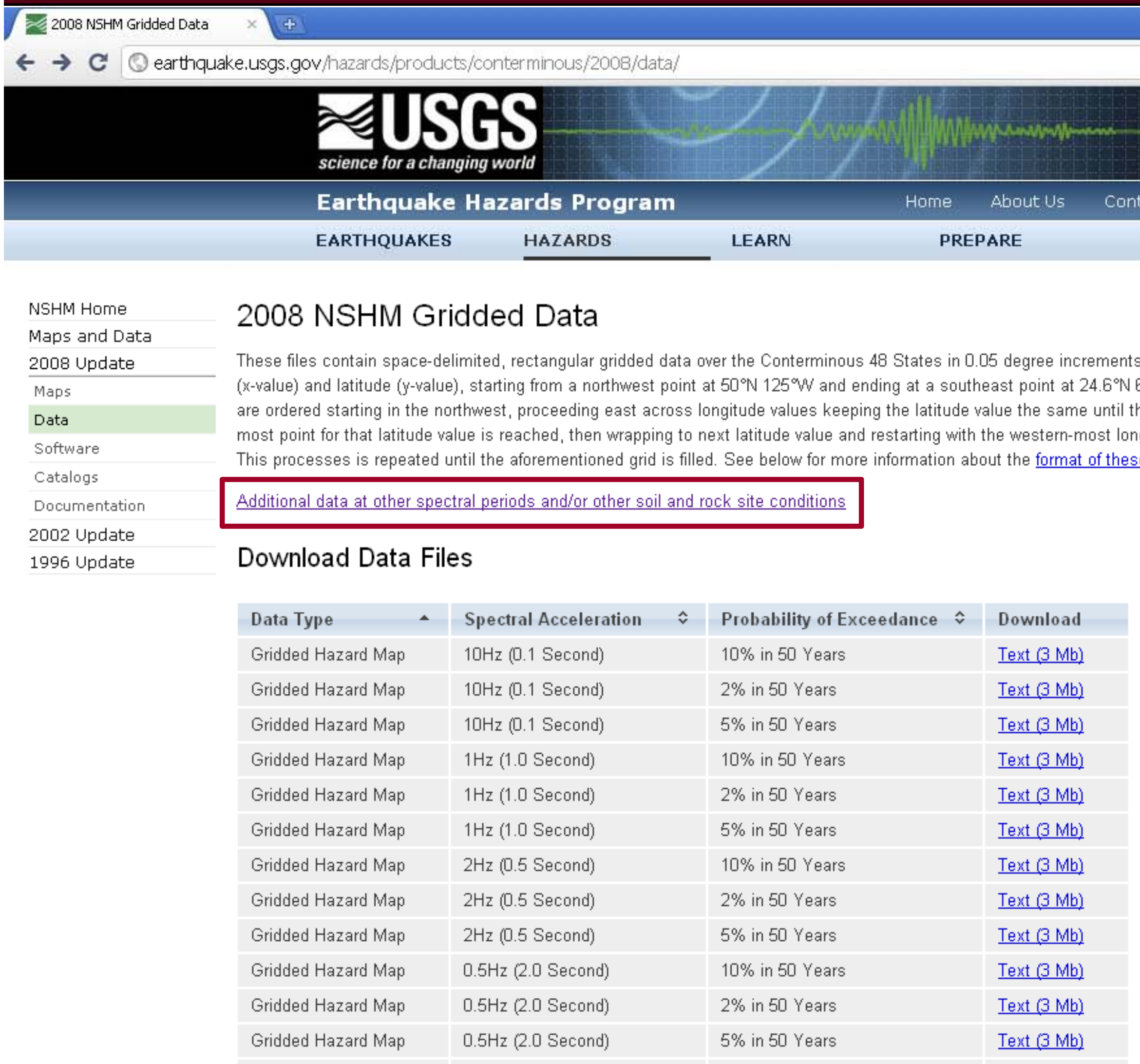
Discussion Topics

- Building Seismic Safety Council (BSSC) 2014 NEHRP Provisions Update Committee (PUC) *Design Mapping Issue Team (Luco, Bachman, Crouse, Dolan, Harris, Hooper, Kircher)*
- Risk-Targeted Maximum Considered Earthquake (MCE_R) ground motions in 2012 International Building Code (IBC)
- Potential duration-related increases in risk-targeted ground motions for subduction-zone vs. crustal earthquakes

BSSC PUC Design Mapping Tasks

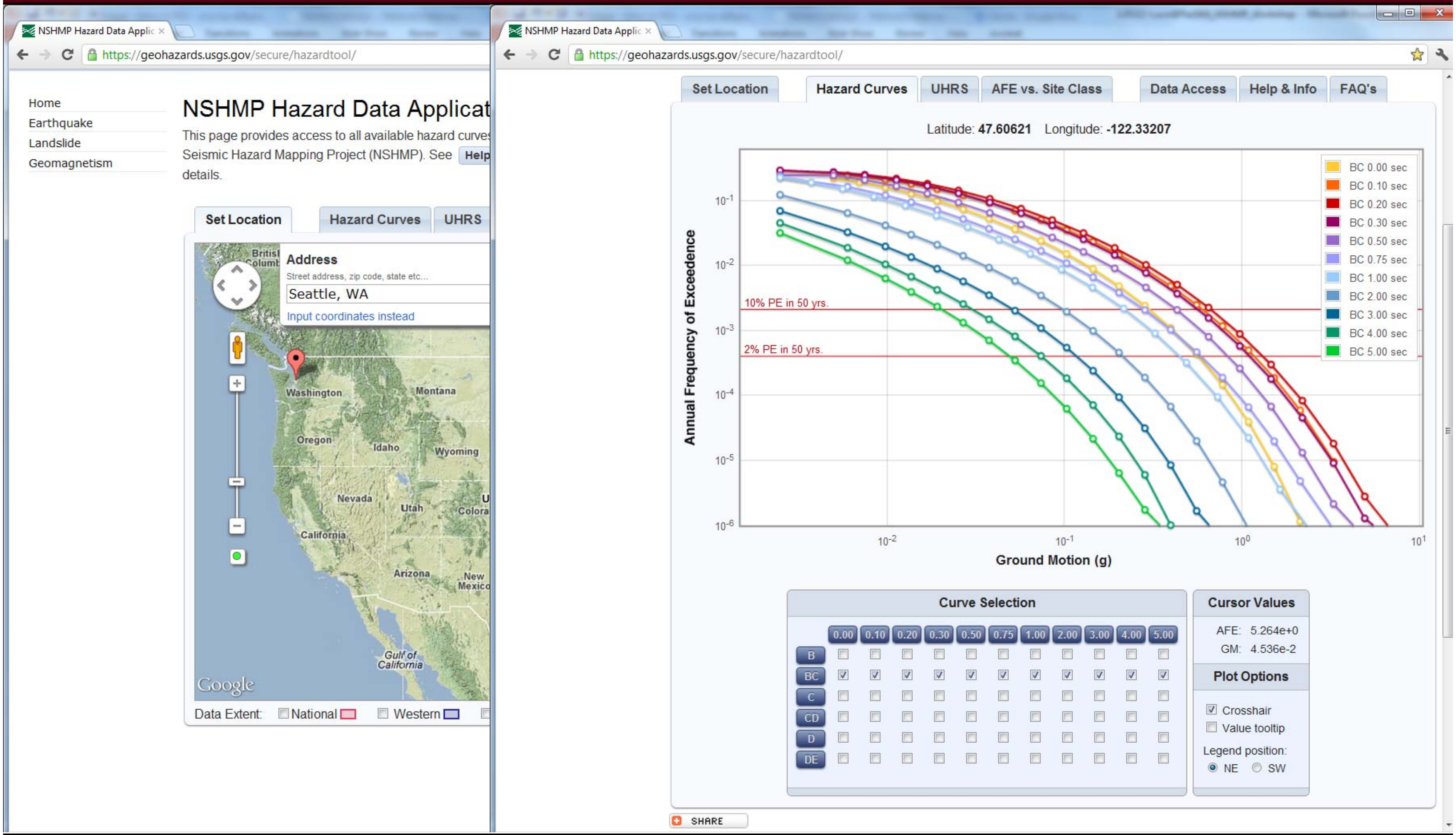
1) Update *design* maps for *2014 Provisions* based on updates from USGS National Seismic *Hazard* Mapping Project
2) Prepare "supplemental" *design* values from additional USGS *hazard* values (e.g. for V_{S30}≠760) and compare with design maps
3) Review USGS-proposed scenarios for deterministic ground motion computations
4) Prepare Serviceability Level design maps analogous to MCE_R maps
5) Look into improvement of T_L map (probably waiting until next cycle)
6) Address S_S values greater than 3g (for equipment qualification)
7) Contribute to planning of USGS User's Workshop
8) Consider reshaping design/MCE_R spectrum with more spectral periods (than 0.2 & 1.0 seconds)
9) Design maps for American Samoa & Guam

2) Supplemental Design Values



- ***Hazard*** values for other site classes (besides B-C) and other vibration periods (besides 0.2 & 1.0s) already available
- Prepare corresponding ***design*** (“MCE_R”) values? By 2014, probably not.

2) Supplemental Design Values



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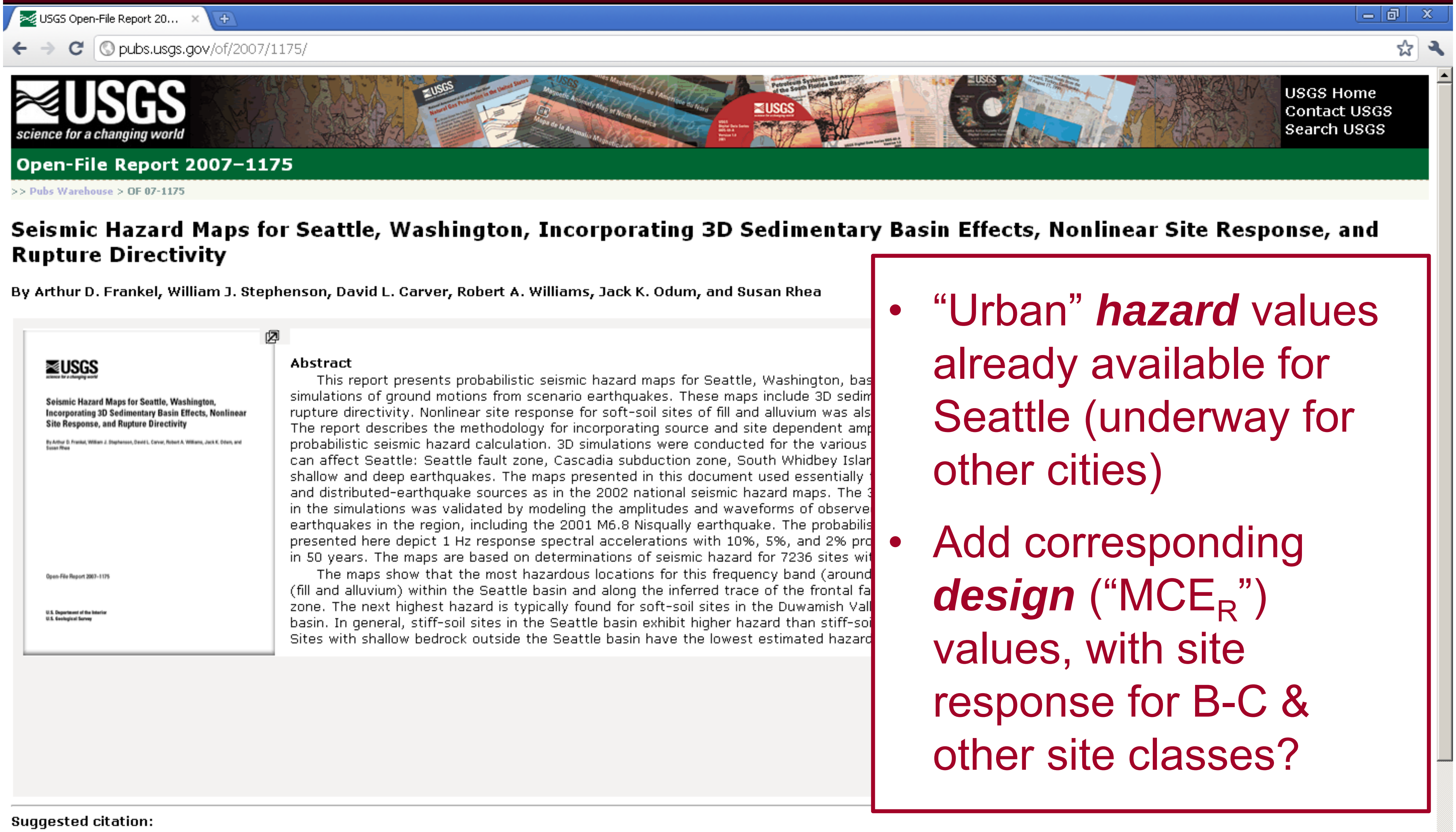
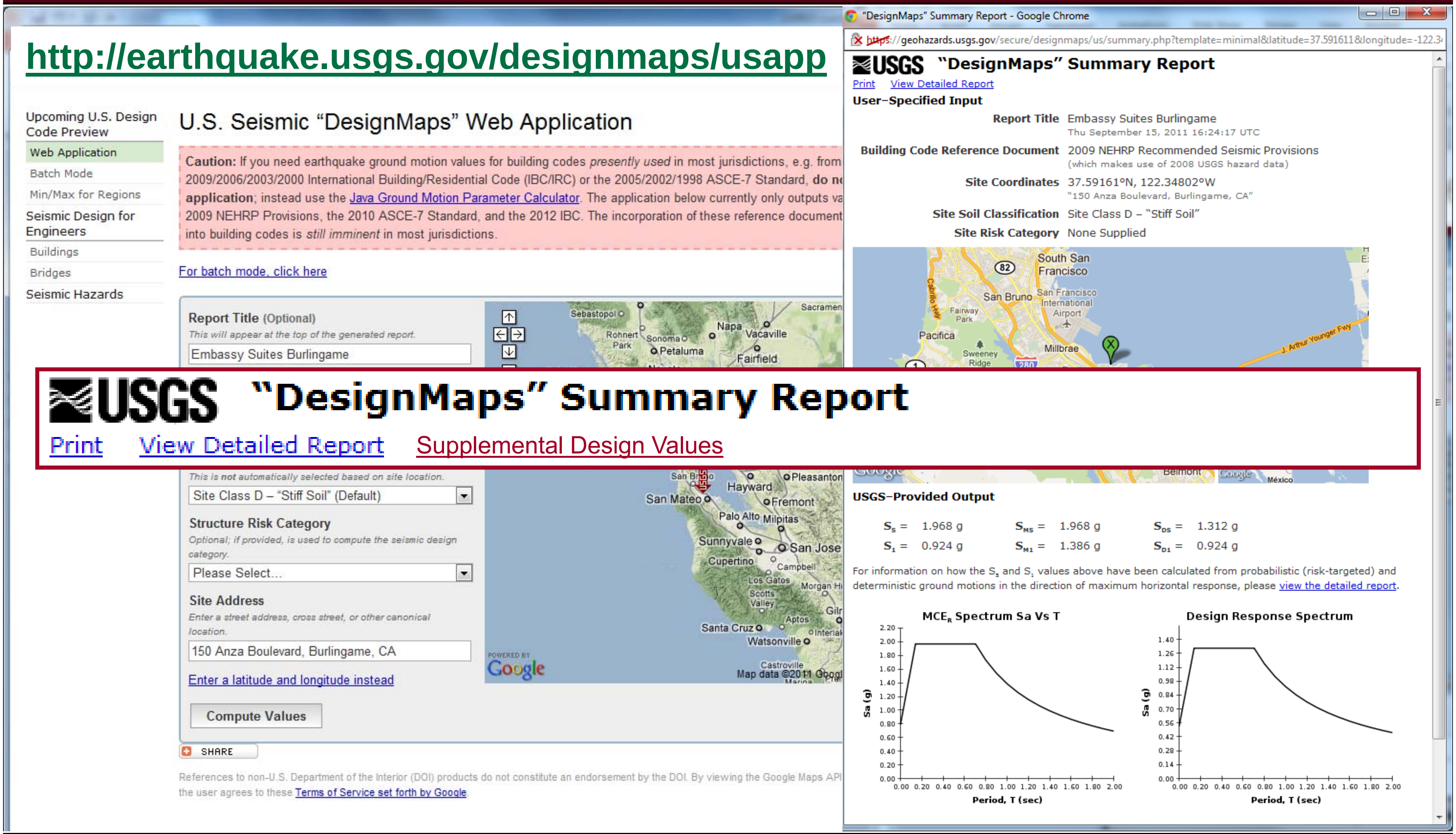


- “Urban” ***hazard*** values already available for Seattle (underway for other cities)
- Add corresponding ***design*** (“MCE_R”) values, with site response for B-C & other site classes?

2) Supplemental Design Values



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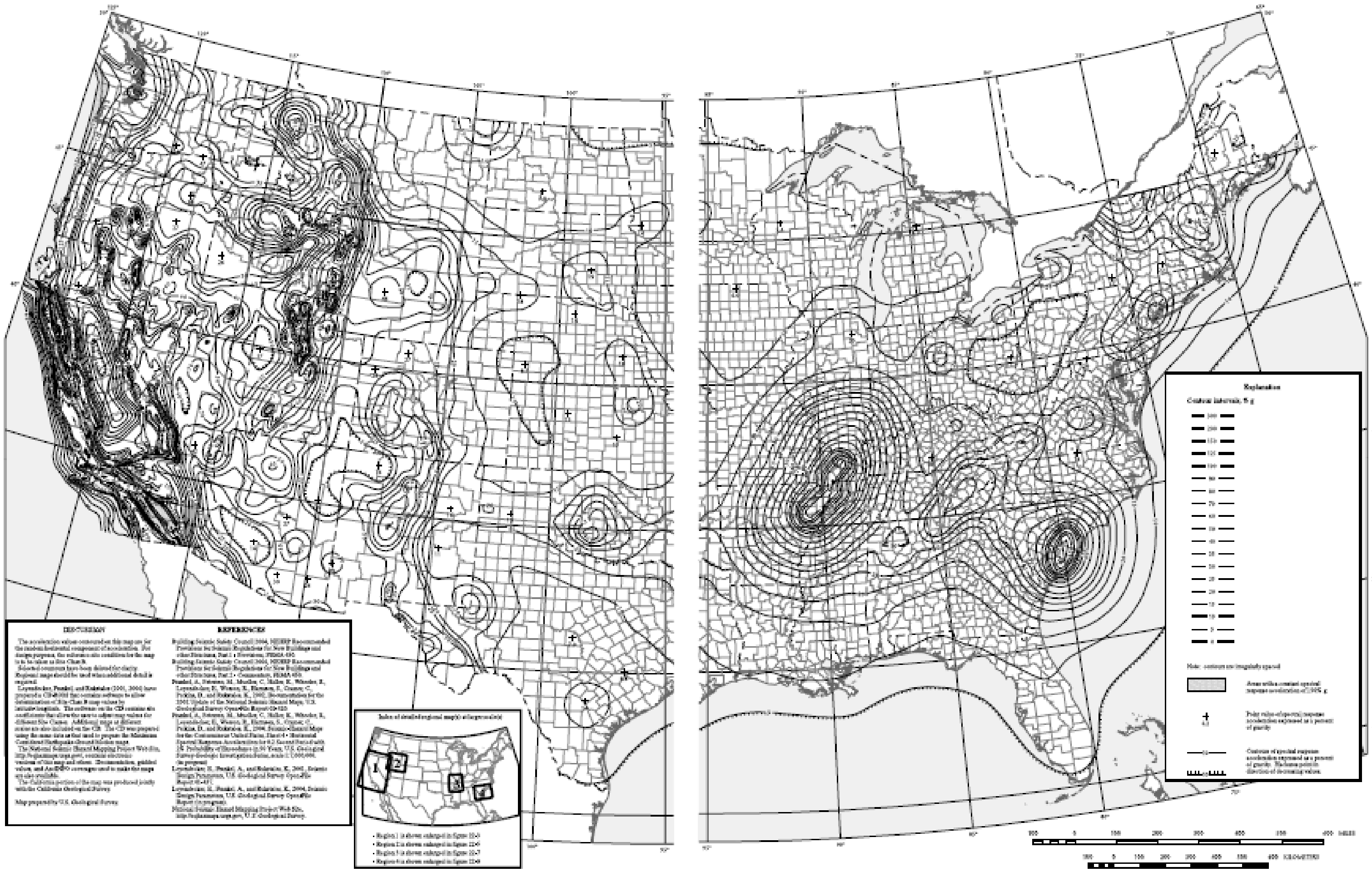
2012 International Building Code



FIGURES 1613.3.1(1-6) RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION …

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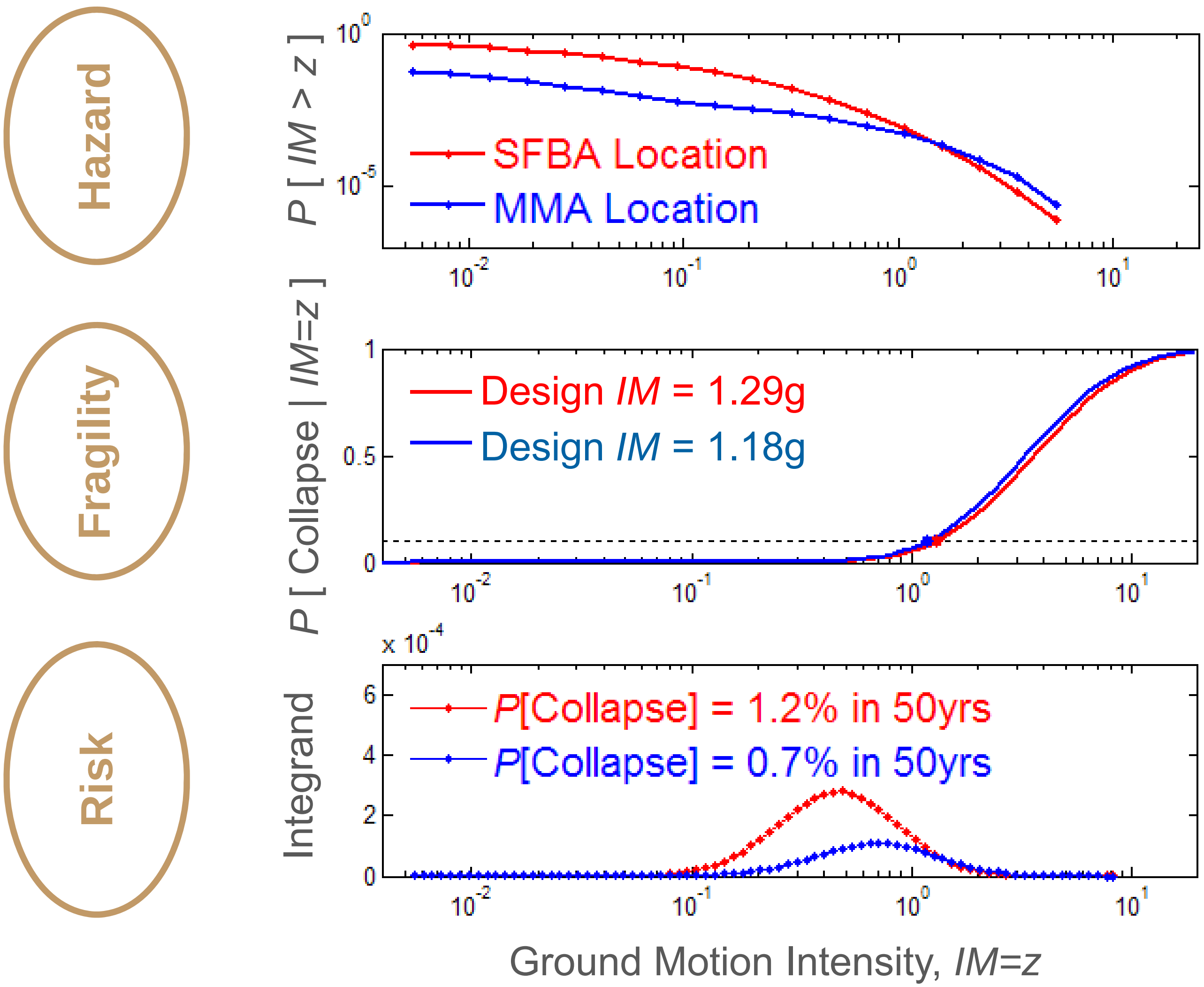
Google "EERI NGA Seminar Presentations" for Video or email nluco@usgs.gov for just PowerPoint

Risk-Targeted GM Example



$$P[Collapse] = \int_0^\infty \frac{dP[Collapse|IM=z]}{dz} P[IM>z]\, dz$$

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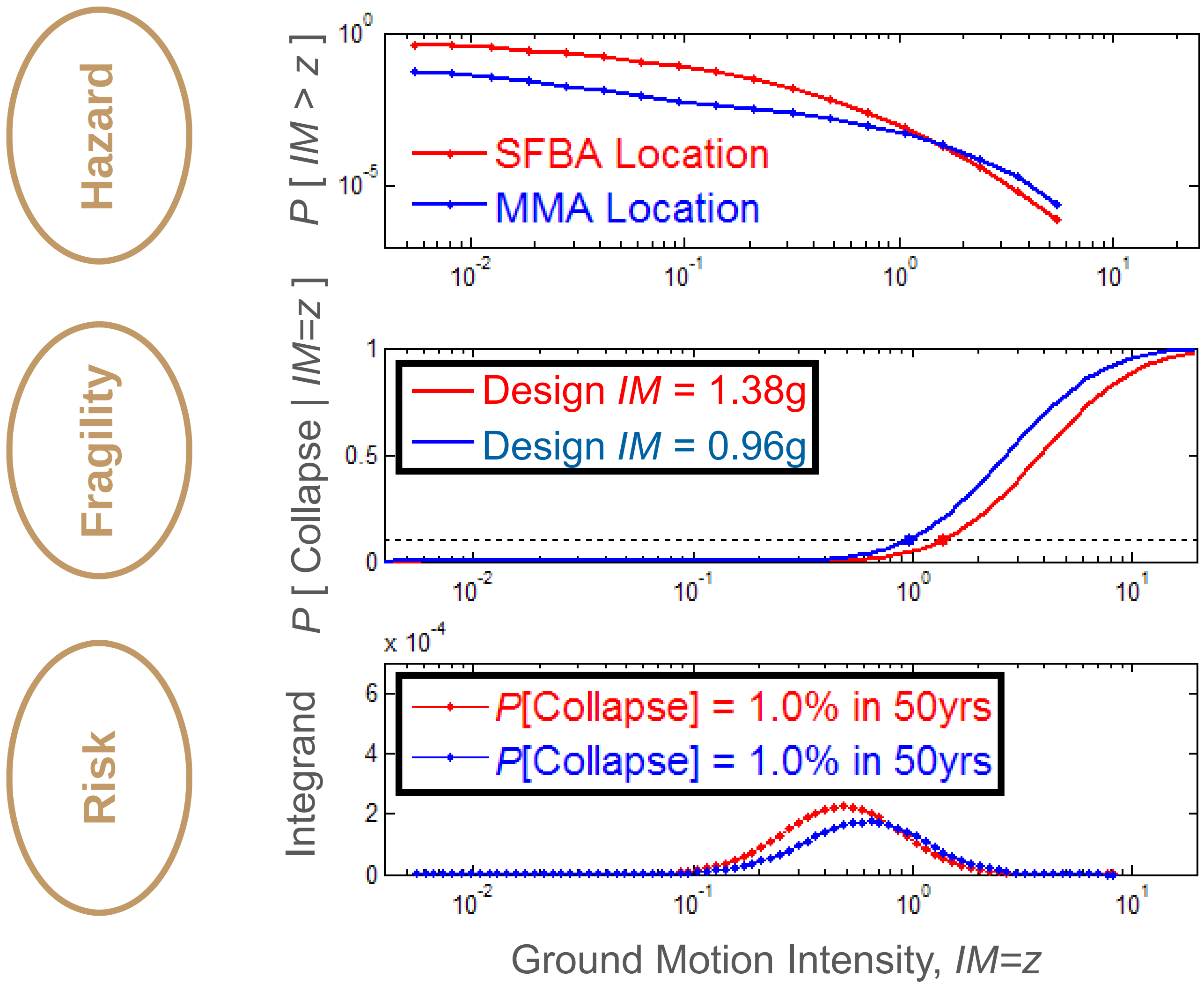

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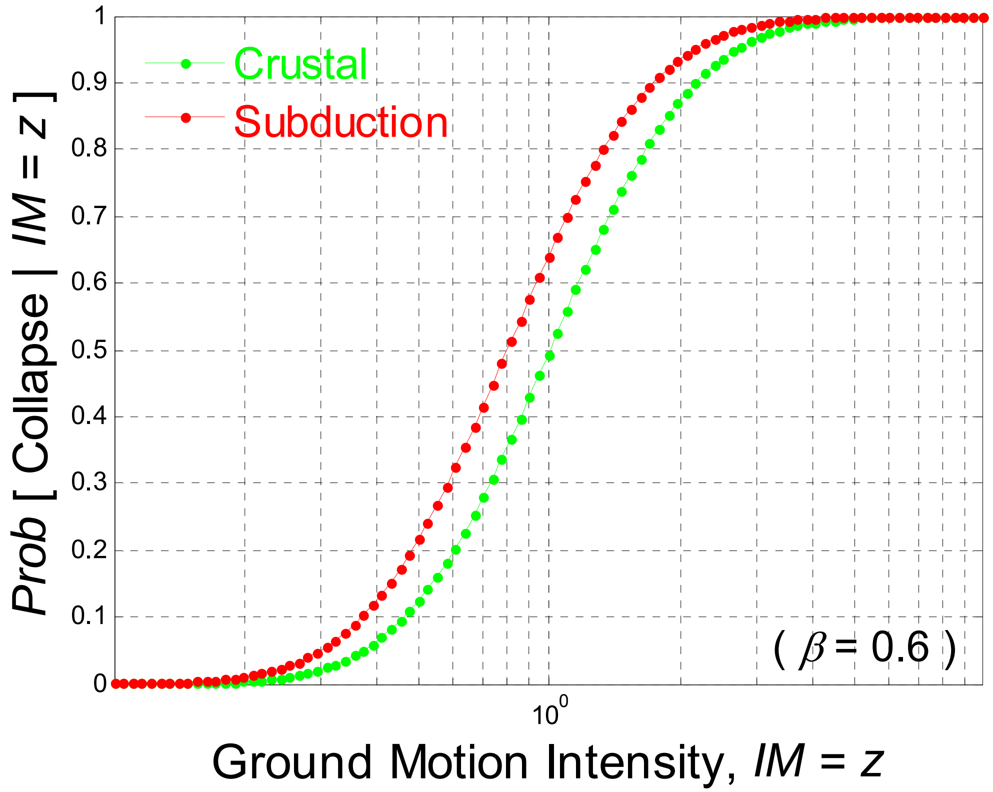
Subduction vs. Crustal Fragility Curves

- Assuming 20% decrease in median ground motion intensity that causes collapse (minimum from Liel's presentation) …



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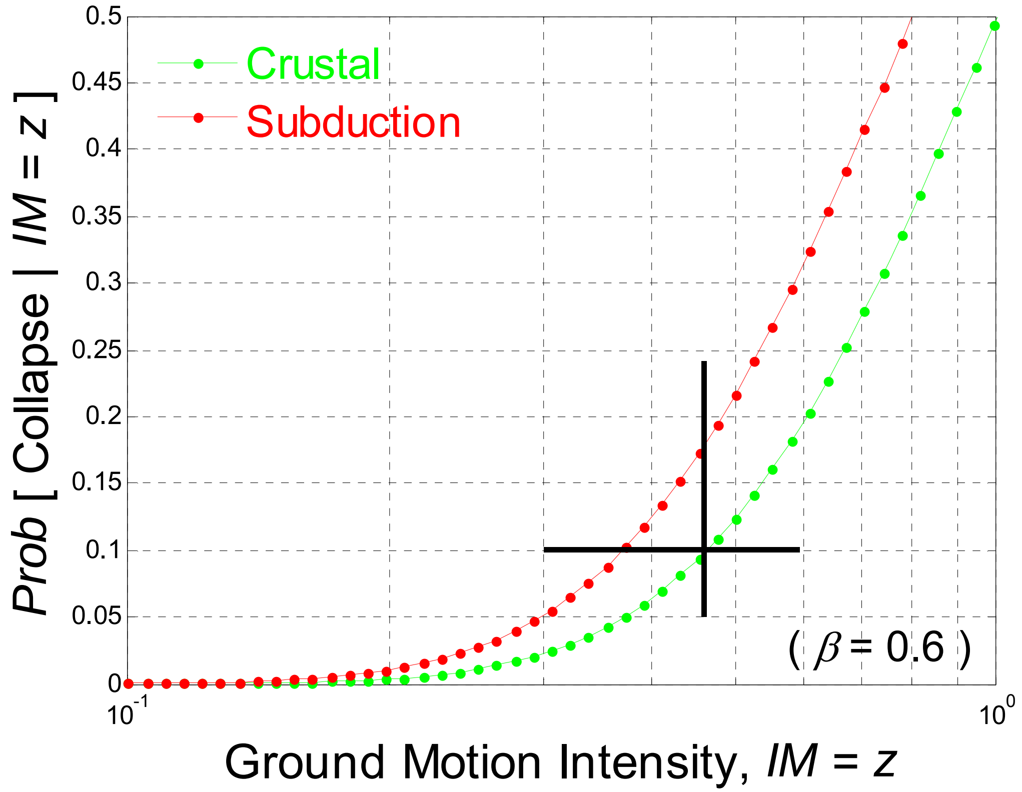

Subduction vs. Crustal Fragility Curves

- Assuming 20% decrease in median ground motion intensity that causes collapse (minimum from Liel's presentation) …

City	Crustal RTGM & C_R		Subduction		Subductoin/Crustal	
Seattle	1.29g *(0.92)*	0.51g *(0.91)*	1.61g *(1.14)*	0.64g *(1.13)*	+25%	+25%
Tacoma	1.21g *(0.93)*	0.48g *(0.92)*	1.51g *(1.16)*	0.60g *(1.14)*	+25%	+25%
Everett	1.22g *(0.91)*	0.47g *(0.90)*	1.52g *(1.14)*	0.58g *(1.13)*	+25%	+23%
Portland	0.97g *(0.89)*	0.42g *(0.88)*	1.21g *(1.11)*	0.53g *(1.10)*	+25%	+26%

- Actual duration-related increases in risk-targeted ground motions for subduction-zone earthquakes would depend on their relative contribution to total hazard

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