# Relations between GM_AR, GMRotI50, and RotD50

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Presented at the
**USGS National Seismic Hazard Map (NSHMp) Workshop
on Ground Motion Prediction Equations (GMPEs)
for the 2014 Update**
December 12-13, 2012
I-House, Berkeley, CA

# Computing RotD50

- Project the two as-recorded horizontal time series into azimuth Az
- For each period, compute PSA, store Az, PSA pairs in an array
- Increment Az by $\delta\alpha$ and repeat first two steps until Az=180
- Sort array over PSA values
- RotD50 is the median value
- RotD00, RotD100 are the minimum and maximum values
- **NO geometric means are used**

To convert GMPEs using random component as the IM (essentially, the as-recorded geometric mean), multiply by RotD50/GM_AR

To convert GMPEs using GMRotI50 as the IM (e.g., 2008 NGA GMPEs), multiply by RotD50/GMRotI50
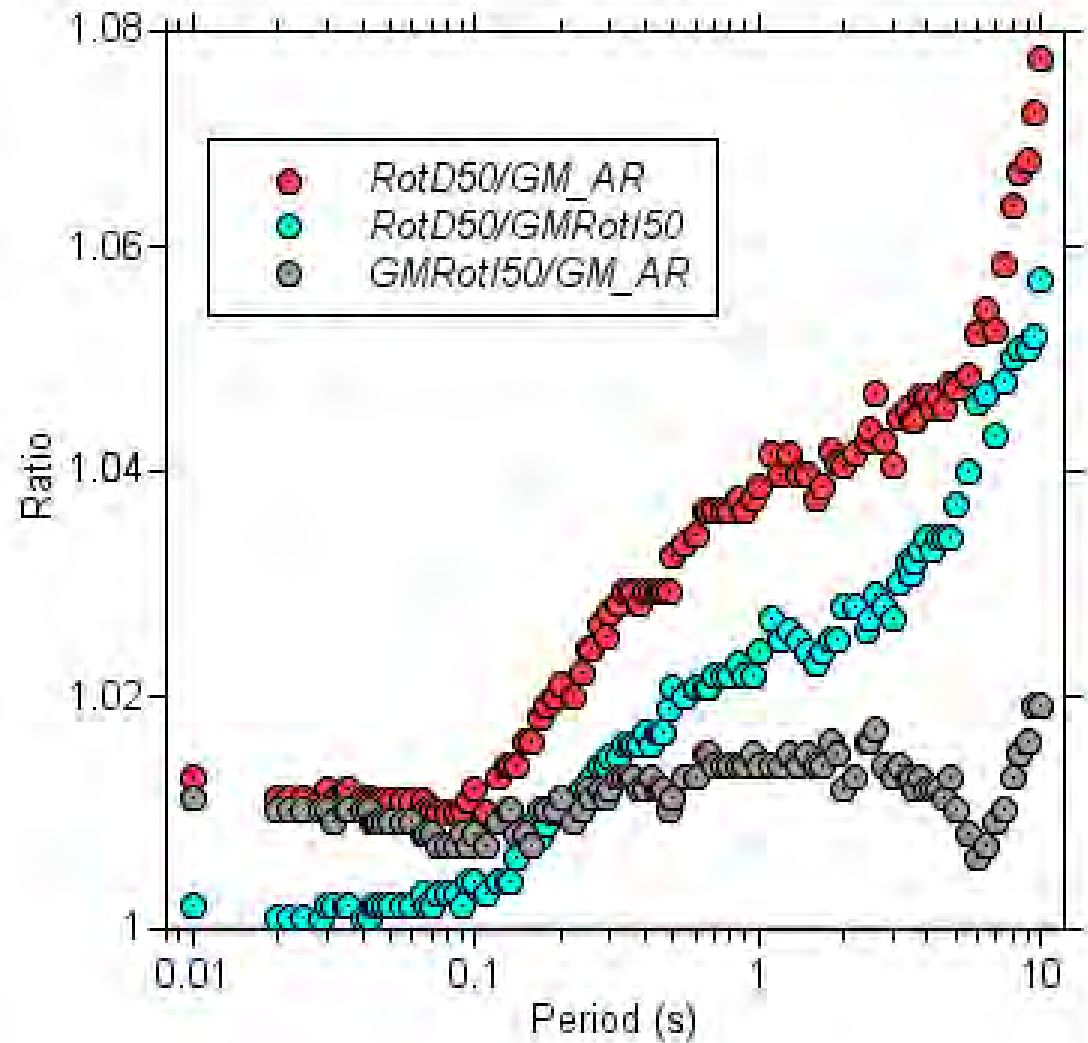
# References

Boore, D. M., J. Watson-Lamprey, and N. A. Abrahamson (2006). Orientation-independent measures of ground motion, *Bull. Seismol. Soc. Am.* **96**, 1502-1511.

Boore, D. M. (2010). Orientation-independent, non geometric-mean measures of seismic intensity from two horizontal components of motion, *Bull. Seismol. Soc. Am.* **100**, 1830-1835.

# Conclusions (Ground-motion intensity measure)

- WNA-E should use RotD50 for consistency with NGA-West2

- A factor of 1.04 for T=1 s.  Is this important?

- Converting GMPEs in terms of random horizontal component, geometric mean, or GMRotI50 to RotD50 can be done using correlations shown in the figure (**although these were derived for NGA-W flatfile—should compare GM_AR, GMRotI50, and RotD50 for CENA data**)