

Plan for Next Generation Attenuation for Subduction Earthquakes NGA-Sub



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Executive Director,

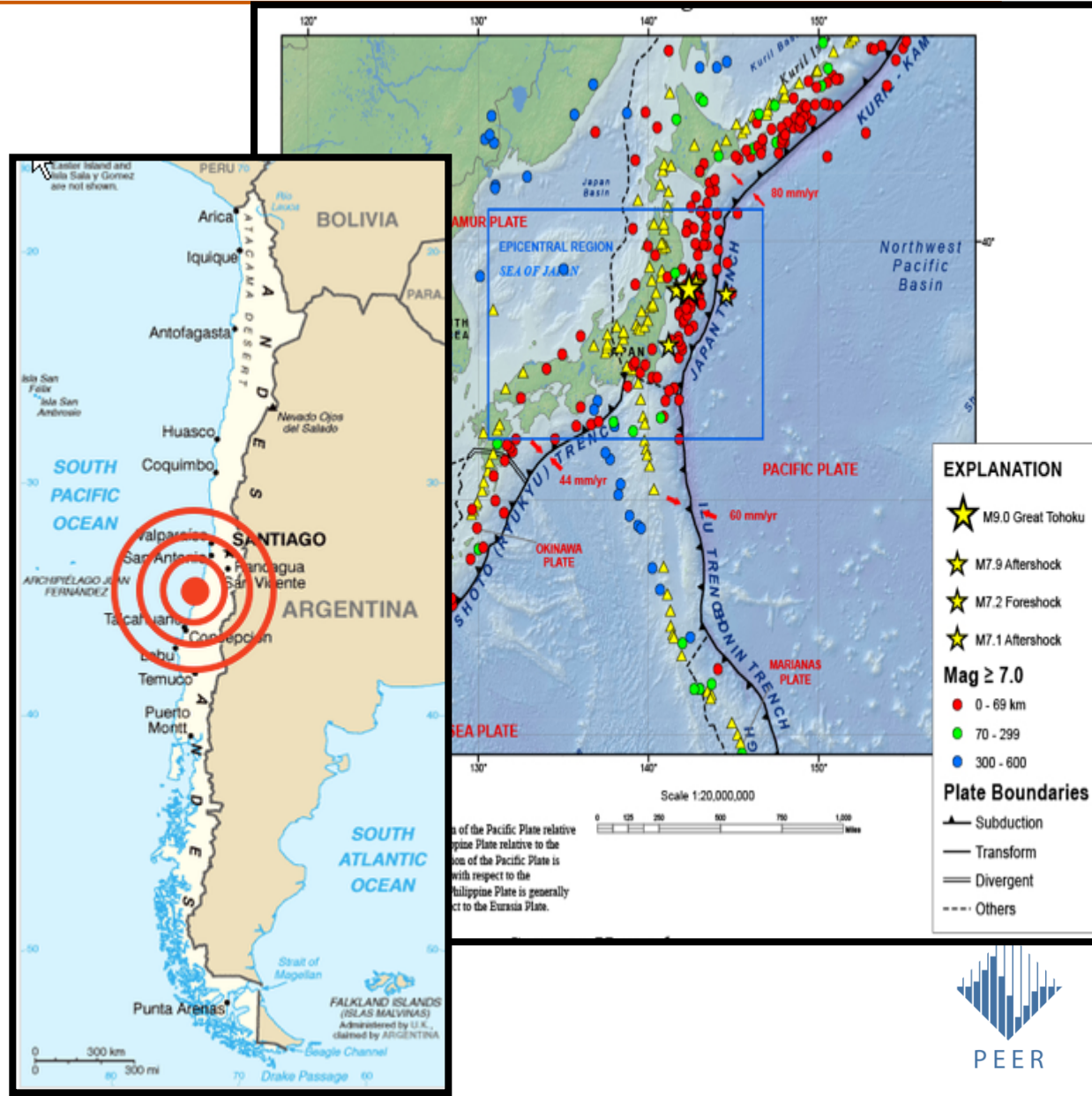
*Pacific Earthquake Engineering Research
Center (PEER)*

NGA-Sub

- PEER has just initiated a multidisciplinary multi-year research program to develop Next Generation Attenuation models for Subduction earthquakes: NGA-Sub
- NGA-Sub has three parallel phases

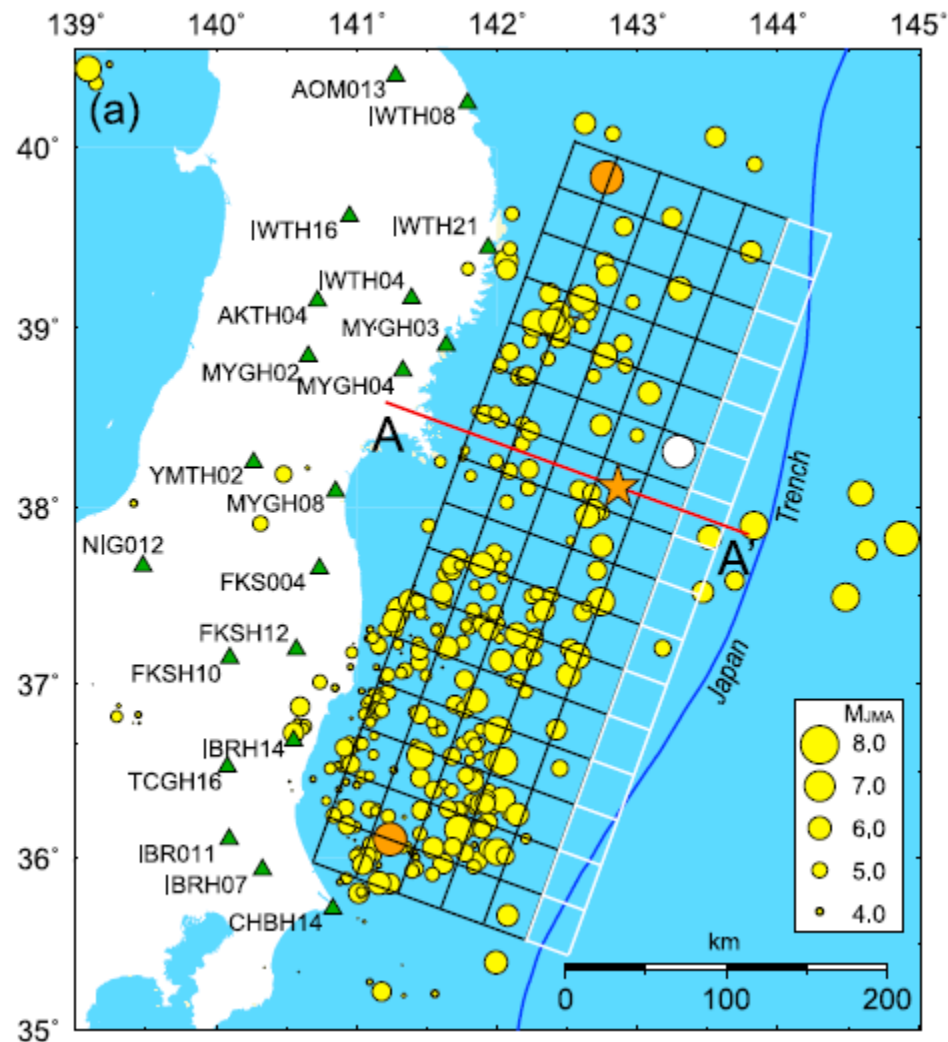
NGA-Sub: Phase I

- Collection of recorded data and metadata from the
 - Feb 2010 Maule, Chile (M 8.8), and
 - March 2011 Tohoku, Japan (M 9.0)



NGA-Sub: Phase I

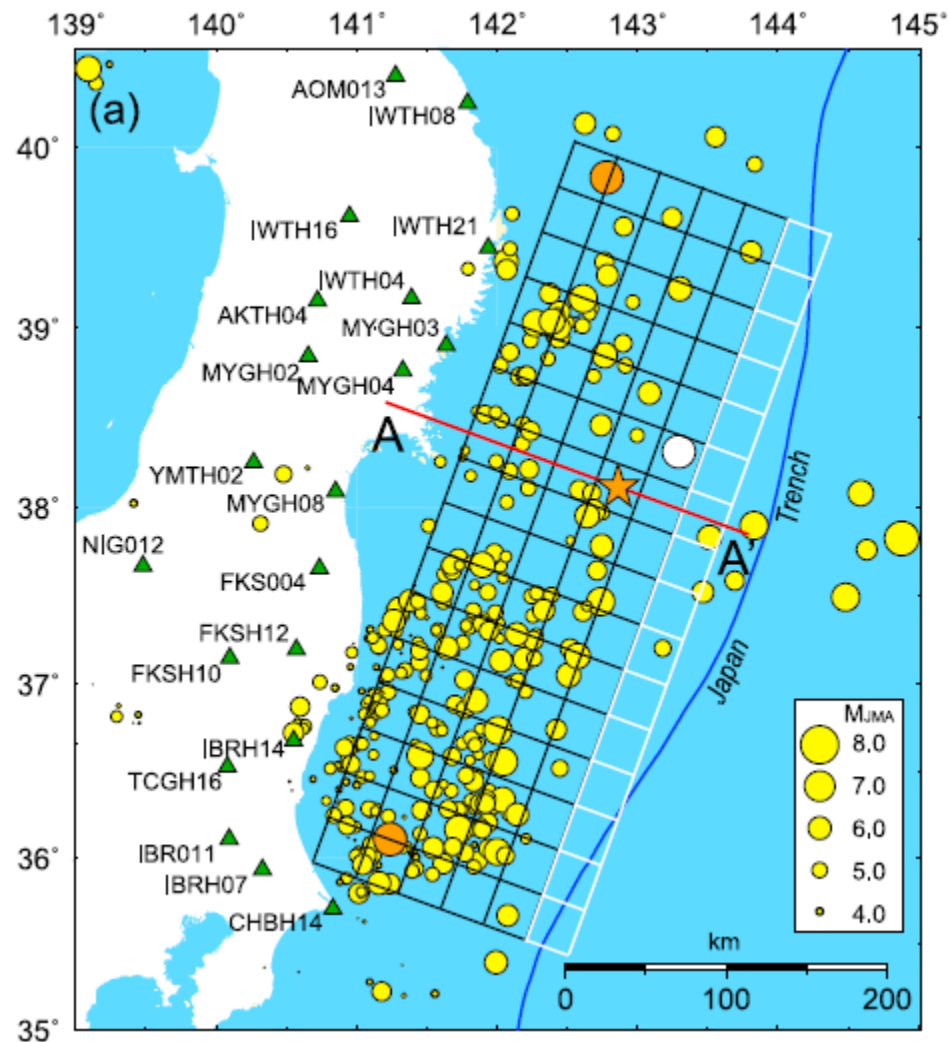
- For Tohoku EQ, PEER already processed:
 - More than 427 recordings for the main shock
 - 7 foreshocks (about 600 recordings total)
 - 45 aftershocks from M 6-7.7 (>3000 recordings total)



Courtesy: Yokota, et al (2011)

NGA-Sub: Phase I

- For Tohoku EQ:
- In collaboration with Japanese colleagues we will receive another set of:
 - **1,190** recordings from JMA and other local networks for the main shock
- In the entire set:
 - PGA > 0.5g was recorded at 210 sites
 - PGV > 50 cm/sec was recorded at 110 sites



Courtesy: Yokota, et al (2011)

NGA-Sub: Phase I

- **Phase I: For the 2010 Chile EQ:**
 - Data have been collected
 - But not yet processed
 - Dr. Rob Kayen (of USGS) will travel to Chile to carry out surface-wave site measurements at recording sites
 - Collaborative efforts among PEER, USGS, and University of Chile
 - At the PEER side: UC Berkeley, UCLA, PEA, Individual Experts



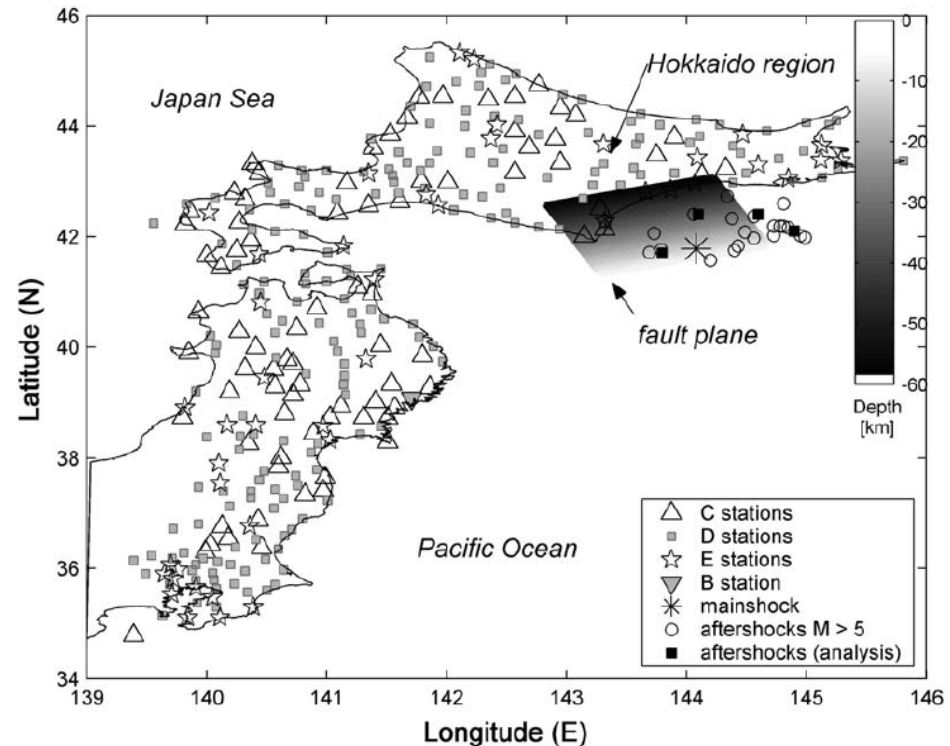
NGA-Sub: Phase I

- **Phase I:** Comparison of the data with current GMPEs used in the USGS National Seismic Hazard Map for subduction area
- Phase I is funded by USGS/NEHRP; and PEER Transportation Systems Program
- Started Jan 2012; will be completed by Early 2013



NGA-Sub: Phase II

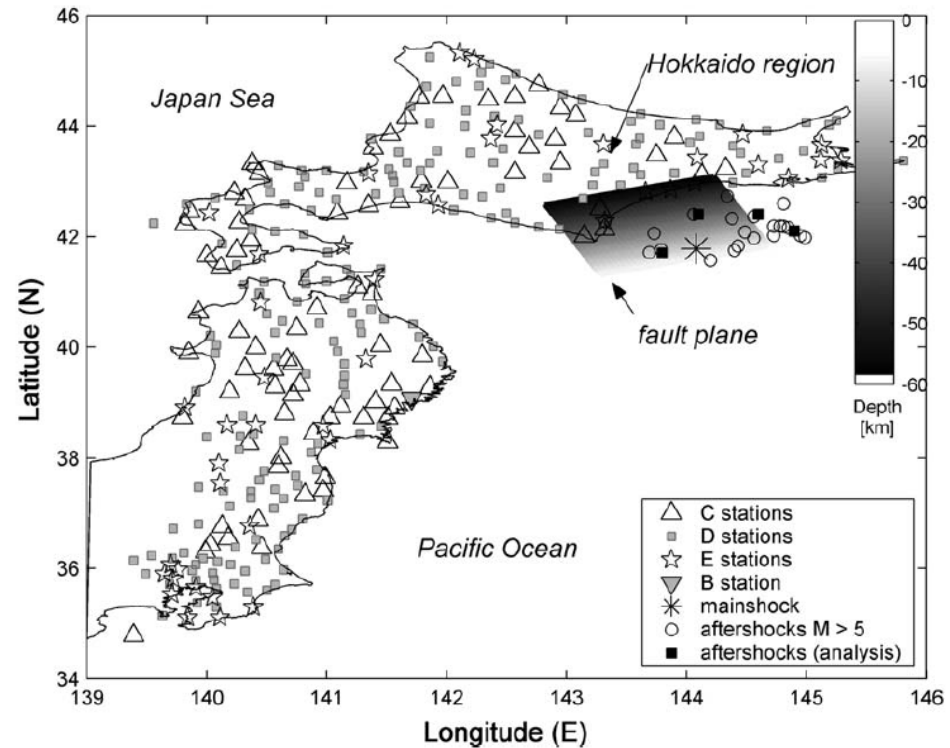
- **Phase II:** Collection and processing of data and metadata from other subduction earthquakes worldwide:
 - Other Japan EQs, e.g., 2003 Tokachi-Oki EQ, M 8.3
 - Alaska, Chile, Mexico, Peru, Taiwan, CSZ, ...
- Collect and process aftershock data



Reference: Tokachi-Oki EQ, by Macias, Atkinson, and Motazedian (2008)

NGA-Sub: Phase II

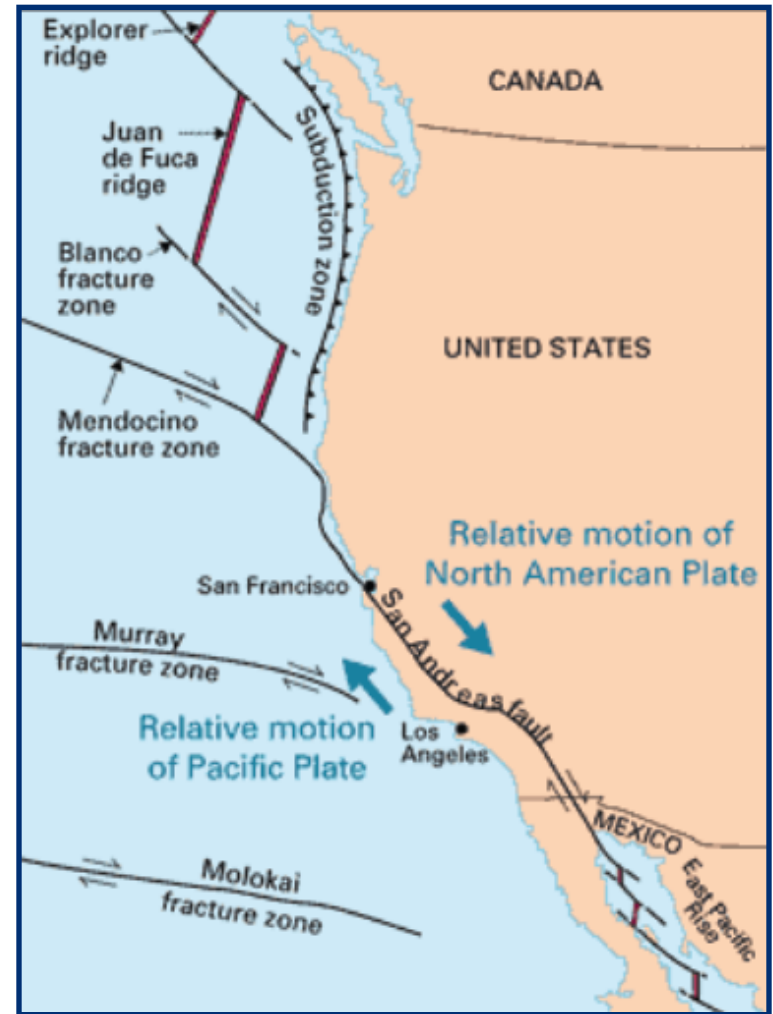
- **Phase II:** Develop/update one GMPE for subduction earthquakes
- Funded by FM Global
- With supplemental funding from Caltrans
- With in-kind from: BC Hydro, Validus Research, PG&E
- To be completed by May 2016



Reference: Tokachi-Oki EQ, by Macias, Atkinson, and Motazedian (2008)

NGA-Sub: Phase III

- **Phase III:**
- Carry out validated simulations to fill the gap in empirical data
- Develop multiple GMPEs by multiple developer teams (epistemic uncertainty)
- Examine directivity,....
- To be funded by XYZ (we working on it!)
- To start February 2013 and complete by May 2016

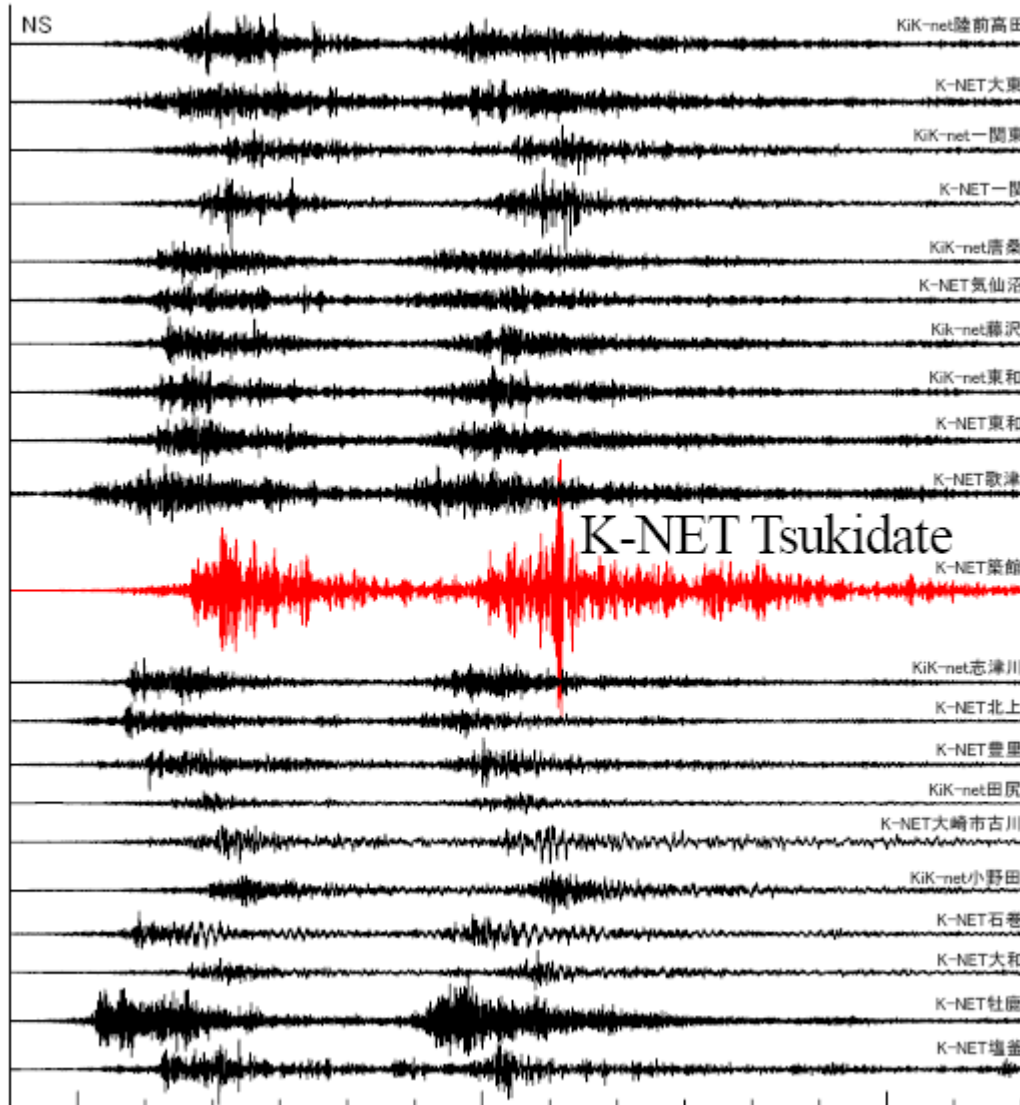


Thank You!



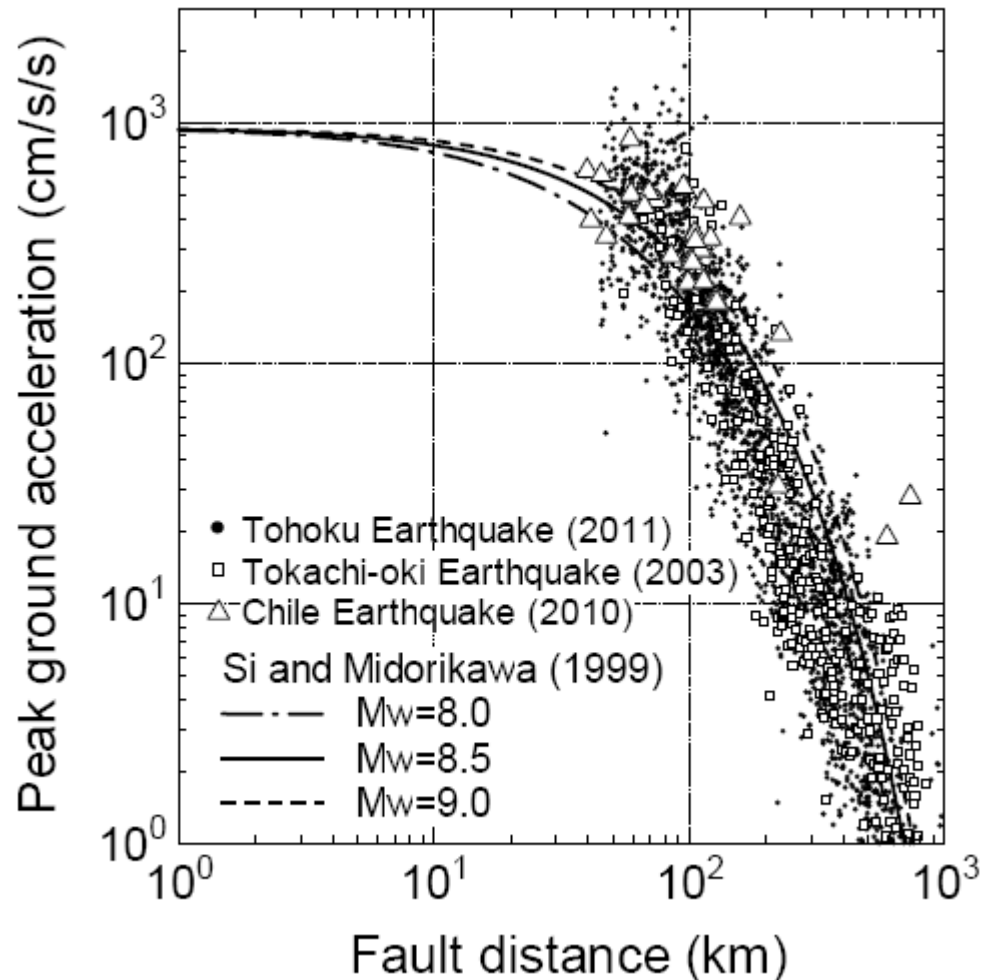
PEER

Tohoku EQ: Largest recorded PGA= 2.8g at K-Net at Tsukidate



Courtesy:
Midorikawa, et al
(2012)

PGA; Tohoku (2011) and Chile (2010)



Courtesy:
Midorikawa, et al
(2012)