Magnitude-Area Scaling and Surface Slip-Length Scaling: Data, Physical Implications, and Application to Seismic Hazard

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Scaling laws relating the size of rupture to the magnitude of an earthquake play an important role in seismic hazard estimates. This presentation reviews various scaling laws used in seismic hazard analysis, comparing them against observations, and discusses uncertainties. Connecting seismologically inferred magnitude-area scaling laws to implied slip-length scaling allows the use of further geological observations of surface slip-length scaling to be used. Goodness of fit to the data, and consistency of scalings in large and small scale limits are discussed. Scalings built on a hypothesis of constant stress drop across the whole range of magnitudes while accounting for finite seismogenic depths are shown to best fit the data, in an AIC sense.