Kriging Interpolation of Ground Motion Intensity Measure Residuals for the Next Generation Liquefaction Project

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Introduction Accurate estimates of ground motion (GM) intensity measures (IMs) at liquefaction case history sites is crucial as it is the demand side of the equation for regressing liquefaction triggering and consequence models. Therefore, it is desirable to have a more accurate estimate than that provided from ground motion models (GMMs) or interpolation of IMs between recording stations. Instead, a spatial interpolation of IM residuals can provide an earthquake-specific modification to GMM predicted IMs. It is ideal to do the kriging interpolation on the residuals rather than directly on IM values because doing so removes site effects and other regional path and source effects built into the GMM.

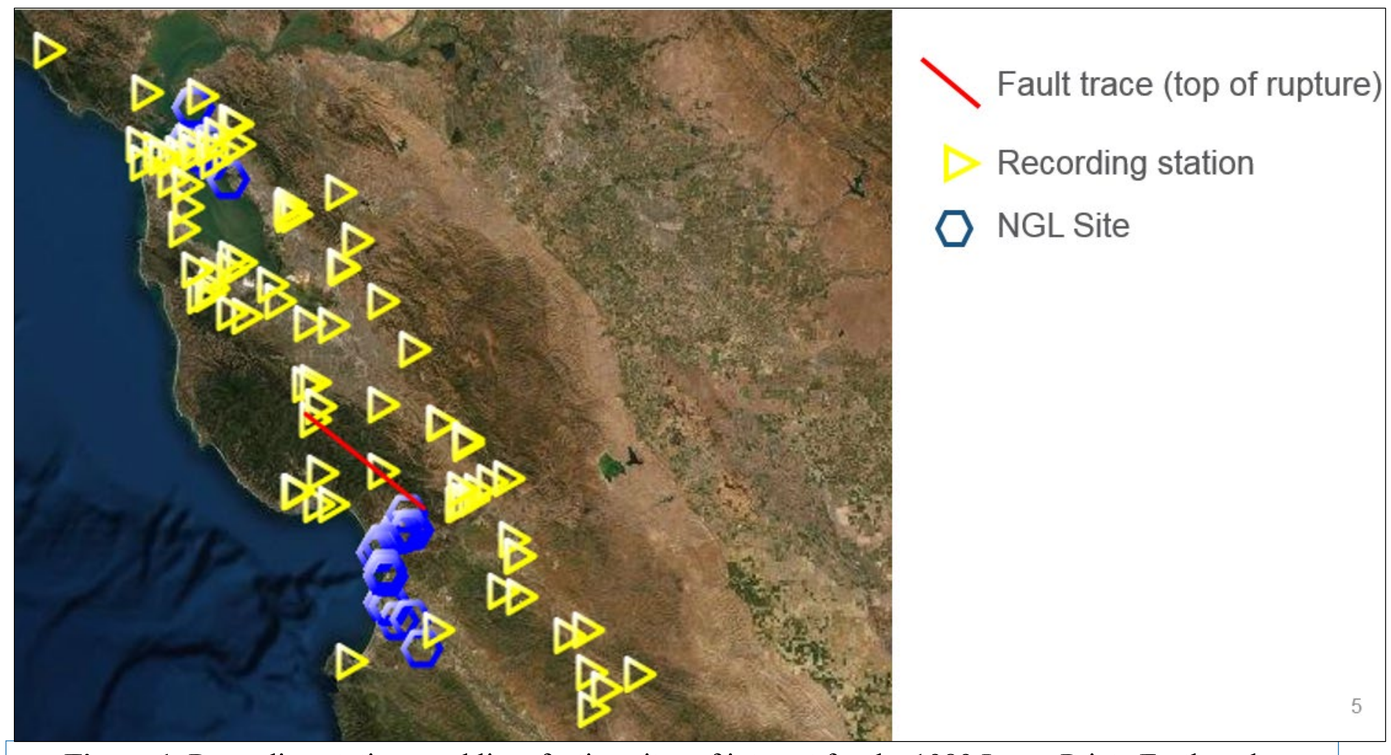

Figure 1. Recording stations and liquefaction sites of interest for the 1989 Loma Prieta Earthquake

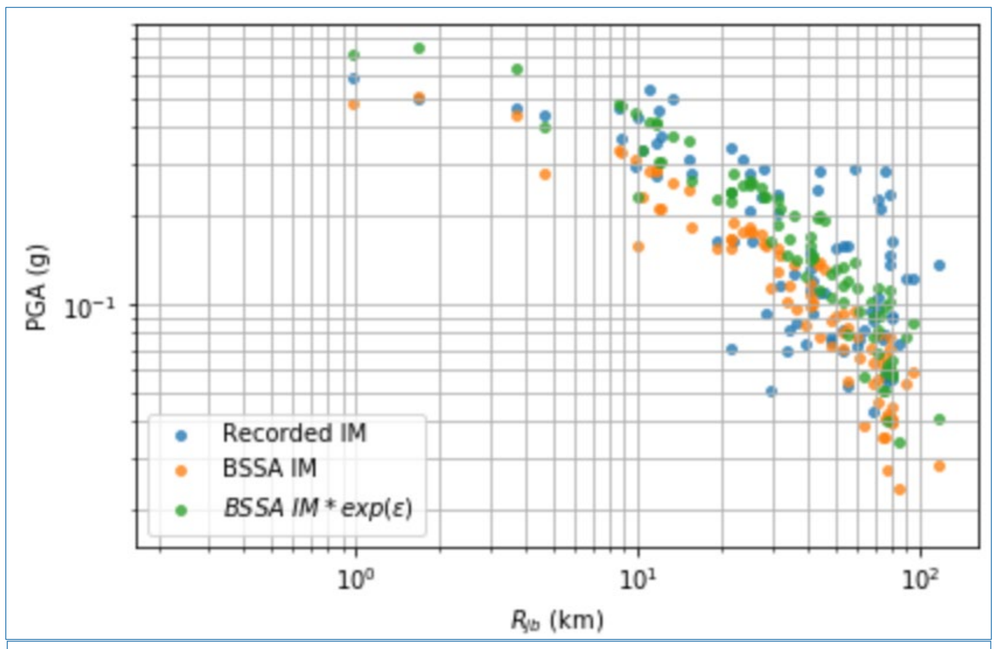

Figure 2. Loma Prieta recording stations recorded PGA, Boore et al. (2014) estimated PGA, and event residual adjusted GMM PGA estimate.

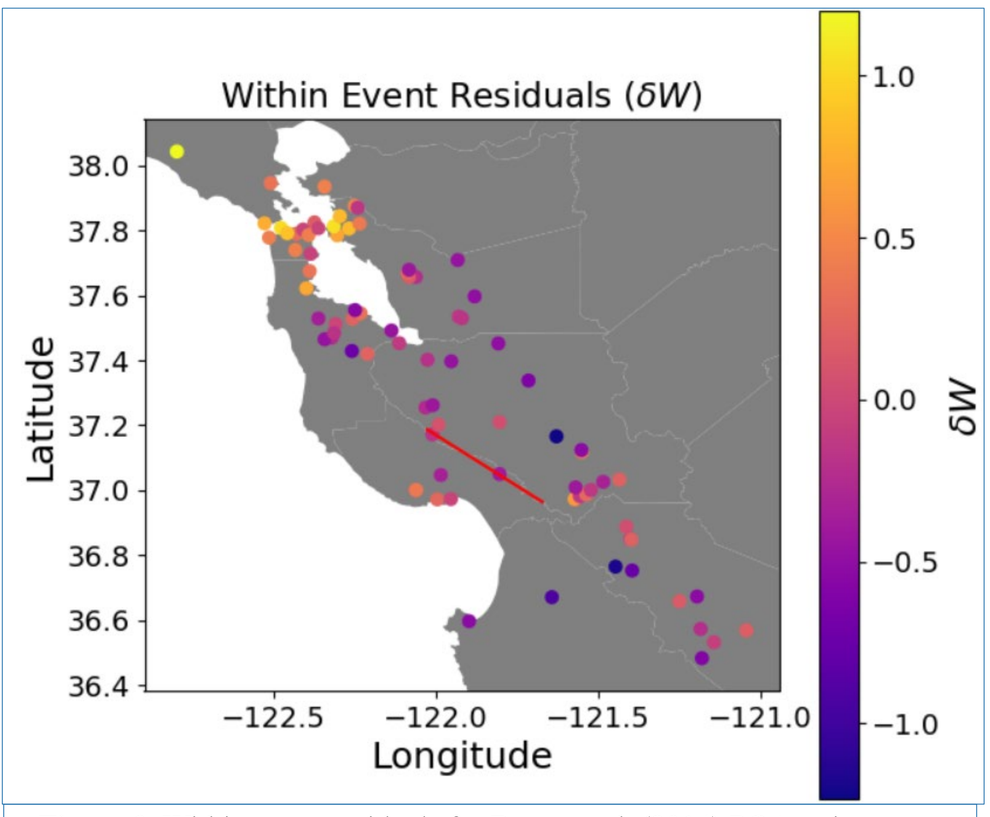

Figure 3. Within-event residuals for Boore et al. (2014) PGA estimates at recording stations for the Loma Prieta earthquake

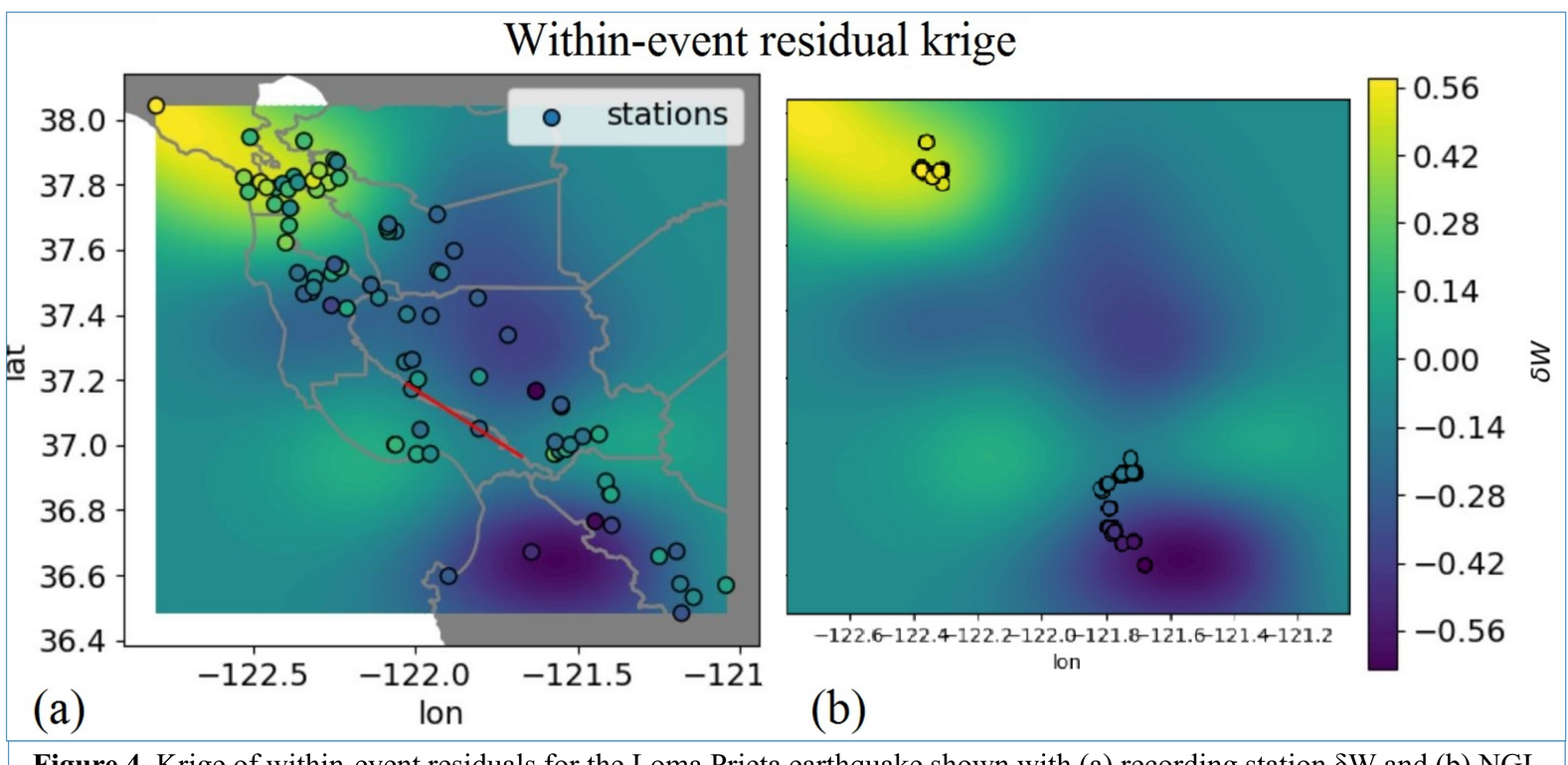

Figure 4. Krige of within-event residuals for the Loma Prieta earthquake shown with (a) recording station δW and (b) NGL sites queried for δW

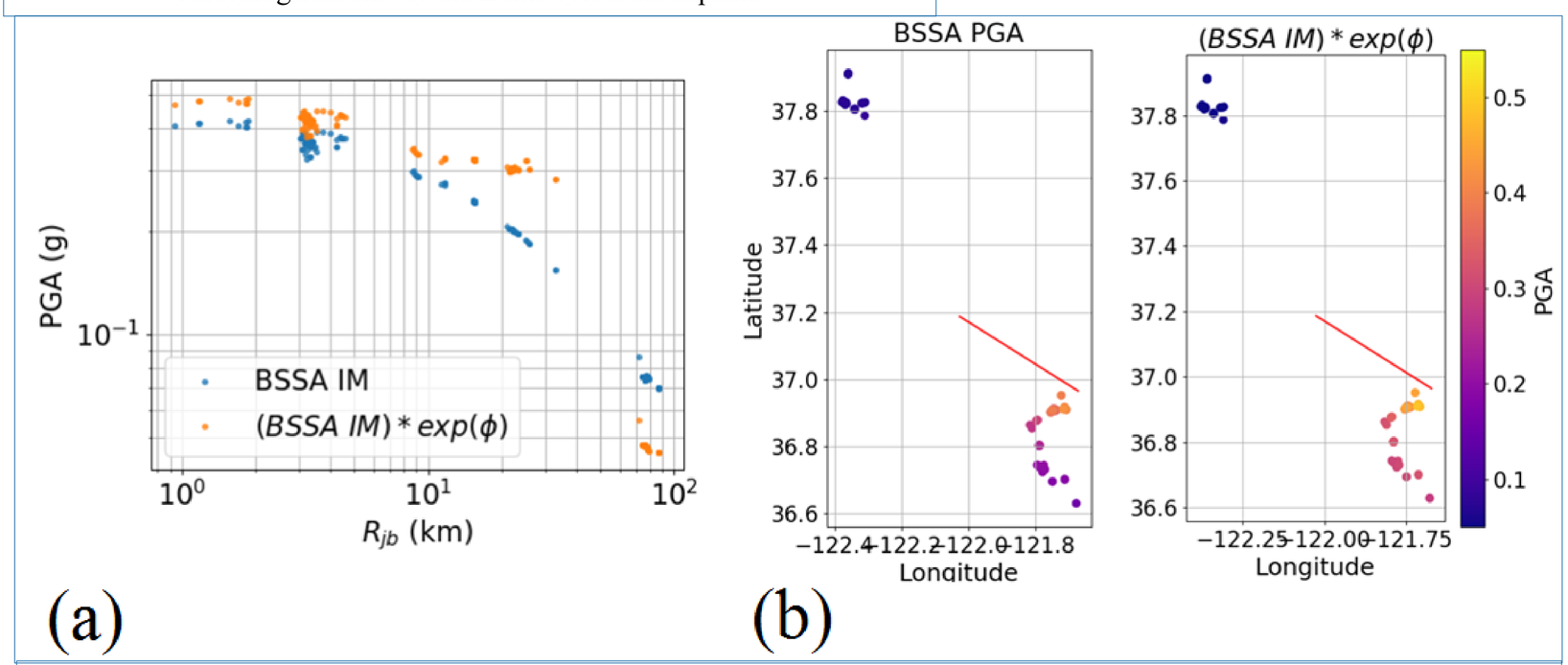

Figure 4. PGA estimated at the NGL site observations with Boore et al. (2014) and then adjusted by the total residual taken from the krige shown in (a) PGA-Rjb space and (b) latitude-longitude space

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