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Anatomy of sigma as suggested by a global dataset of digital acceleration waveforms and associated metadata

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The misfit of an empirical GMPE to the data used to derive it (σT) is considered as total uncertainty. σT is typically split into at least a between-event (also called inter-event), τ, and a within-event (or intra-event) uncertainty component, φ, in order to isolate event-specific and path-site specific aleatory variability (randomness). Removing the ergodic assumption used to develop GMPEs yields to replacing φ with φSS, the so-called single site within-event sigma , that can significantly reduce the predicted ground-motion variability and the resultant hazard at long return periods. Selectively presented in this contribution are investigations on the components of GMPE uncertainty based on a large dataset of worldwide digital records and their metadata. Our investigations are based on a calibration dataset comprising $\sim$ 2000 $\times$ 2 orthogonal horizontal accelerometer records with RRUP < 150km from 98 global earthquakes with 4.5 $\leq$ MW $\leq$ 7.9. Emphasis is on understanding the variation of sigma and its components as a function of the vibration period and predictors given the choices adopted in terms of dataset composition, explanatory variables and functional forms.