



An embedding method to quantify rupture model variation

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Spatial pattern analysis of slip over the fault area of earthquakes is a useful tool for understanding slip model variability and its implication for seismic hazard analysis. In this study, we apply multidimensional scaling to compare rupture models. This approach embeds the dissimilarities between all pairs of slip models in low dimensional Euclidean space. Our analysis then commences in defining the slip model dissimilarity.

In this study, we consider slip models in the context of the Source Inversion Validation (SIV) exercise and for the 2011 Mw 9.0 Tohoku-Oki. These choices illustrate cases with and without reference model. Our results show that this approach helps to reveal common features and inconsistencies in slip models, and thus facilitates defining a ranking scheme for inverted rupture model. In addition, we compare our result to the Spatial Prediction Comparison Test (SPCT) that consists of testing a null hypothesis of equal predictive ability of each slip model with respect to an average model. We find that both techniques deliver consistent results.