STUDYING THE VIABILITY OF KINEMATIC RUPTURE MODELS AND SOURCE TIME FUNCTIONS WITH DYNAMIC CONSTRAINTS

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Earthquake is one of the greatest natural hazards and a better understanding of the physical processes causing earthquake ruptures is required for appropriate seismic hazard assessment. Kinematic modelling is a standard tool to provide important information on the complexity of the earthquake rupture process and for making inferences on earthquake mechanics. Despite recent advances, kinematic models are characterized by uncertainties and trade-offs among parameters. Prescribing the slip velocity on extended faults is one of the crucial components in the models because it contains key information about the dynamics. However, in kinematic inversions this function is assumed a-priori using different shapes, although functions compatible with rupture dynamics should be preferred. To investigate the effect of the slip velocity function on kinematic inversion models we run a series of forward and inverse models. We generate spontaneous dynamic models and use their ground motion as real events and we invert the data with kinematic models. Kinematic inversions have been conducted assuming both single-time and multi-time windowing and to investigate the uncertainties we adopt four different source time functions. In this way we examine how the slip velocity function influences the slip distribution on the fault plane and if the inferred kinematic parameters are consistent with the dynamic models. We also examine the variability of PGV from synthetic seismograms up to 1 Hz, obtained with forward models assuming the same slip distribution, rise time and rupture velocity, but changing the source time functions. Those results provide a glimpse of the variability that kinematic slip velocity functions might have when used as a constraint to model the earthquake dynamics.