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Impact of the receiver fault distribution on aftershock activity

S. Hainzl (1), G. Zoeller (2), and R. Wang (1)

(1) Deutsches GeoForschungsZentrum (GFZ), 2.1 Natural Disasters, Potsdam, Germany (hainzl@gfz-potsdam.de), (2) University of Potsdam, Germany

Aftershock models are usually based either on purely empirical relations ignoring physical mechanism or on deterministic calculations of stress changes on a predefined receiver fault orientation. Here we investigate the effect of more realistic interacting fault systems in aftershock models based on static Coulomb stress changes. For that purpose, we perform earthquake simulations with elastic half-space stress interactions, rate-and-state dependent frictional earthquake nucleation and extended ruptures with heterogeneous (fractal) slip distributions. We find that the consideration of more realistic distributions of receiver fault orientations significantly changes the spatial patterns, in particular, so-called stress shadows with decreased activity vanish and activation occurs almost everywhere. The total aftershock productivity also increases but the temporal Omori-type decay remains unchanged. Aftershock interactions lead to a further increase of the triggered seismicity, however, the impact is less important than the distribution of receiver faults.