Dynamic Rupture Simulation Reproduces Spontaneous Multifault Rupture and Arrest During the 2016 Mw 7.9 Kaikoura Earthquake

*Ryosuke Ando[1], Yoshihiro Kaneko[2]

1. Graduate School of Science, University of Tokyo, 2. GNS science

The 2016 Kaikoura (New Zealand) earthquake is characterized as one of the most complex multifault rupture events ever observed. We perform dynamic rupture simulations to evaluate to what extent relatively simple forward models accounting for realistic fault geometry can explain the characteristics of coseismic observations. Without fine parameter tuning, our model reproduces many observed features including the multifault rupture, overall slip distribution and direction, and the locations of the maximum slip and rupture arrest. In particular, our model shows spontaneous arrest of dynamic rupture at the both ends of the ruptured fault system due to smaller prestress levels expected from a regional tectonic stress field. Both the simulated and the observationally inferred source time functions show similar double peaks with a larger second peak. The results illuminate the importance of the 3-D fault geometry in understanding the dynamics of complex multifault rupture.

Keywords: Dynamic rupture, Boundary integral equation method, Fault geometry

