Dynamic rupture simulation of 2018, Hokkaido Eastern Iburi earthquake: Role of non-planar geometry

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The 2018, Hokkaido Eastern Iburi, Japan, earthquake is an event characterized by complexity of the rupture process and slip pattern, which may involve both reverse and strike slip motion depending on the locations on the fault surface. We perform dynamic rupture simulations based on simple physical laws, conditions for stressing and fault friction, and the non-planar fault geometry constrained by the aftershock observation. The complex fault geometry is numerically treated by the boundary integral equation method accelerated by the fast domain portioning method. The fault geometry is characterized primarily by the combination of six fault planes. As a result, we are able to explain several observed features of the event, including the spatial variation of the final fault slip and rupture velocity, which are inferred from the kinematic slip inversion. We also succeed in refining the constraint of the regional stress field in the focal area based on the simulation. Our results show that the overall patterns of the complex rupture event can be reproduced by a relatively simple model of the regional stress and the fault friction if the geometrical complexity of the fault is properly taken into account.

