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Role of Subducted Seamounts in Earthquake Rupture and Aseismic Slip: Insights from Multi-Cycle Simulations

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Shallow slow slip events (SSEs) within seismogenic zones have been increasingly reported to be related to subducted seamounts (*Wang and Bilek*, 2014; *Vallée et al.*, 2013; *Wallace et al.*, 2016; *Yokota and Ishikawa*, 2016). However, the underlying mechanisms of this phenomenon is unclear. Slow slip events are commonly inferred to occur under high pore-pressure conditions, based on analyses of low-frequency seismic spectra and numerical simulations (*Rogers and Dragert*, 2003; *Shelly* et al., 2006; *Liu and Rice*, 2009*; Li and Liu*, *2016*). Investigating the role of seamounts in alternating shallow SSEs and coseismic rupture propagation will provide important insights into long-term fault slip budgets. Here we conduct numerical simulations in the framework of rate-and-state dependent friction with the "aging" evolution law, in which a curved interface representing the subducted seamount is set in a velocity weakening zone on a two-dimensional subducted fault model. Our preliminary results suggest: 1) Slow slip events and slow aseismic creep can appear in the seamount leading area, where coseismic slip is suppressed; 2) the seamount can play a crucial role in stopping large rupture propagation when it is located at intermediate depths within the velocity-weakening zone; 3) irregular geometry will introduce diversity in long-term slip partitioning on the subduction fault regardless of constant velocity-weakening friction and consistently effective normal stress. This study will provide invaluable insights on understanding the interactions between large earthquakes and aseismic slip, as well as the influence of fault geometry such as a subducted seamount.

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