Enhanced dynamic triggering of a shallow slow slip event in the Nankai subduction zone due to the overlying sedimentary wedge

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The dynamic triggering of slow slip events (SSEs) is rarely observed, even though regional earthquakes often trigger tectonic tremors and very low-frequency earthquakes. Shallow SSEs have been inferred from temporal changes in borehole pressure across the DONET network (offshore of Kii Peninsula, Japan) that immediately followed the 2011 Tohoku-Oki (~700 km hypocentral distance), 2016 Mieken Nanto-Oki (occurred beneath the borehole network), and 2016 Kumamoto (~600 km hypocentral distance) earthquakes and lasted for up to two weeks in the shallow part of the Nankai subduction zone. Here we identify the shallow SSEs that may have been dynamically triggered by regional earthquakes. We identify a possible shallow SSE in 2004 that was triggered by the Kii-hanto Nanto-Oki earthquake using tectonic tremor and very low-frequency earthquakes, as the borehole network was not yet installed. We quantify the dynamic Coulomb stress changes due to causal events in the Philippine Sea Plate that could be distributed shallow SSE source faults. The passing seismic waves from the Tohoku-Oki, Mie-ken-Oki, and Kumamoto earthquakes induced calculated Coulomb stress changes of >100, 50, and 20 kPa, respectively. Furthermore, the clear causal earthquakes (Kii-hanto Nanto-Oki, Tohoku-Oki, and Mieken Nanto-Oki earthquakes) that triggered shallow SSEs induced large, long-duration Coulomb stress perturbations (>10 kPa for ~30 sec), which suggests that a shallow SSE may be triggered under these conditions. Shallow SSEs are therefore more likely to be dynamically triggered than their deep counterparts due to enhanced stress perturbations induced by the sedimentary wedge.