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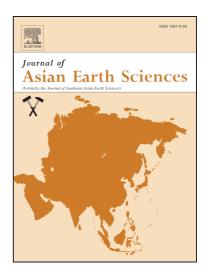
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Seismotectonics and Seismogenesis of Mw7.8 Gorkha Earthquake and its Aftershocks

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Abstract:

The April 25, 2015, Mw7.8 Gorkha Earthquake in central Nepal was followed by intense aftershock activity, including Mw6.7 shock on April 26, 2015 and Mw 7.3 shock on May 12, 2015. Synthesis of the focal mechanisms, space-time distribution of seismic activity in relation to previously imaged crustal velocity and resistivity structures reveals focusing of the Mw7.8 Gorkha earthquake near the upper surface of the thin fluid-filled low velocity and high conducting layer immediately above the plane of the detachment. On the geophysical sections, the detachment is identified as a sharp positive velocity interface. Modulation of frictional coupling and mechanical weakening by high-pore pressure fluids counteract the arc-normal stresses creating conditions for failure and nucleation of the Gorkha earthquakes on a plane subparallel with the detachment. Spatio-temporal patterns in aftershock activity indicate rapid alteration of main shock-induced stress fields, triggering a strong aftershock of Mw 6.7. Large stress drop and increased energy released by the Mw6.7 event facilitates upward injection of high pore-pressure fluid fluxes into the hidden out-of-sequence thrust. It is suggested that

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