POSTSEISMIC DEFORMATION FOLLOWING THE APRIL 25, 2015 GORKHA EARTHQUAKE: AFTERSLIP VERSUS VISCOUS RELAXATION

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Abstract

The postseismic deformation consecutive to the April 25, 2015 Gorkha earthquake (Mw 7.8) is estimated in this paper based on a cGNSS network installed prior to the earthquake and supplemented by cGNSS stations installed after the main shock. Postseismic velocities are obtained from recorded velocities corrected for interseismic deformation and seasonal variations. The maximum postseismic displacement is found north of the rupture area, where locally it reached 100 mm between the date of the earthquake and late 2016. The postseismic deformation affects the northern part of the rupture area but not the southern part, along the southern part of the Main Himalayan Thrust. Three hypotheses for the mechanisms controlling postseismic deformation are tested through numerical simulations of the postseismic time series: (i) viscous relaxation, (ii) afterslip, or (iii) a combination of these two mechanisms. We can exclude postseismic deformation controlled by viscous relaxation of a thick deformation zone along the northern and lower flat of the MHT. However, it is impossible to discriminate between postseismic deformation controlled by either afterslip along the MHT (northern part of the rupture zone, crustal ramp, and lower flat of the MHT) or a combination of afterslip along the MHT (northern part of the rupture zone, crustal ramp) and viscous relaxation along a thin (_˜3 km thick) low-viscosity body centered on the lower flat of the MHT.

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