

Crustal deformation caused by the 2015 Nepal earthquake detected by ALOS-2 data and the fault model

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Emergency observations have been conducted by ALOS-2 in order to know damage situation caused by the 2015 Nepal earthquake (Mw 7.8, USGS). GSI has applied an interferometric analysis to the ALOS-2 data and has successfully detected large crustal deformation caused by the earthquake. In addition, we constructed a fault model from the InSAR result. The following are the details.

[Features of the crustal deformation]

- A major displacement (>10 cm) area extends with a length of about 160 km in the east-west direction.
- The observed deformation can be explained by upward/downward motion in the southern/northern area.
- A maximum displacement (>1.2 m) moving toward the satellite is observed around 30 km east from Kathmandu.
- An area with large displacement caused by the main shock on April 25 is consistent with an aftershock region.
- No clear earthquake surface fault is identified.

[Fault model]

- A maximum slip (>4 m) is estimated beneath the area 20-30 km northeast from Kathmandu.
- A reverse fault motion with a slight right-lateral component is estimated on north-northeast-dipping plane, consistent with analyses by seismic waves.
- The estimated moment magnitude is 7.9 (seismic moment 8.2×10^{20} Nm).
- The largest slip is located in 80 km east-southeast of the hypocenter. The seismic rupture is thought to have propagated toward the east because there is no large slip in the western side of the hypocenter.

Keywords: InSAR, ALOS-2, Crustal Deformation, Nepal Earthquake, Fault Model