

Crustal deformation of the 2016 Kumamoto Earthquake

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Coseismic deformation derived from the 2016 Kumamoto Earthquake was observed by GNSS stations of the permanent GPS Earth Observation Network system (GEONET) and ALOS-2/PALSAR-2 interferometric SAR.

Clear coseismic displacements due to the Kumamoto earthquake were observed by GEONET. NE displacement of 75 cm and subsidence of 20 cm and SW displacement of 97 cm and uplift of 28 cm were detected at sites 0465 and 0701, which are located near the Futagawa fault zone, respectively. We have also successfully detected distributed ground displacements for the Kumamoto Earthquake by applying a SAR interferometry analysis of Advanced Land Observing Satellite 2 (ALOS-2) L-band data. The interferograms suggest that fault motion of the main shock has right-lateral motion on the Futagawa fault and the Hinagu fault.

We invert the InSAR results with GNSS data to construct a fault model of the earthquake. A fault model consists of 3 rectangular faults with a uniform slip in an elastic half-space. The fault model shows that: a total major rupture length is about 35 km; a total moment magnitude is 7.07.

Postseismic deformation following the Kumamoto earthquake was detected by GEONET and ALOS-2 InSAR. Postseismic deformation up to 3 cm also has been observed by GEONET, showing a roughly similar deformation pattern to those associated with the mainshock. ALOS-2 interferograms show that subsidence about ~5 cm along the Futagawa fault zone.

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