

Crustal deformation of earthquakes that occurred in Italy on 2016 detected by ALOS-2/PALSAR-2

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Three earthquakes of magnitude 6 classes occurred in the central of Italy on 2016 (August 24: Mw 6.2, Depth of 4.4 km - 10 km SE of Norcia; October 26: Mw 6.1, Depth of 10 km - 3 km NNW of Visso; October 30: Mw 6.6, Depth 8 km - 7 km N of Norcia). In any of the earthquakes, a lot of buildings collapsed near the each of epicenter, causing great damage. In addition, in the vicinity of this epicenter, there was a case where an earthquake of M 6.0 or more occurred in the past. In recently, the moment magnitudes 6.0 earthquake occurred mainly at L'aquila in April 2009 located in the 10-15 kilometers south of the current earthquake. This earthquake caused severe damage that over 295 dead and more than 1,000 injured. In Italy, very complicated and many active fault are reported by Istituto Nazionale Geofisica e Vulcanologia (INGV). The reason is that the African plate and the Eurasian plate collide with each other, and the area is pushing each other, and it is complex both tectonically and geologically. Especially, in the Apennine Mountains where these earthquake occurred, it is the place where the earthquake occurs due to the forces to the east and the west of the province. As evidence by this fact, the result of the source process analysis shows a normal fault.

ALOS-2, was launched on May 24, 2014, has an L-band SAR (PALSAR-2) and survey all over the world. We calculated the crustal deformation by differential interferometry analysis on three earthquakes occurred in Italy. In addition, we compared with the slip distribution acquired by the source process of JMA and tried to estimate the fault plane. The earthquake that occurred on October 26 and 30 detected the westward displacement near the epicenter and the west side and detected the eastward displacement on the east side of the epicenter. In addition, subsidence components were detected near the epicenter. Therefore, we judged that the mechanism of these earthquakes is a normal fault of W-dip.

Some of PALSAR-2 data were prepared by the Japan Aerospace Exploration Agency (JAXA) via Geospatial Information Authority of Japan (GSI) as part of the project 'ALOS-2 Domestic Demonstration on Disaster Management Application' of the SAR analysis of earthquake Working Group. Also, we used some of PALSAR-2 data that are shared within PALSAR Interferometry Consortium to Study our Evolving Land surface (PIXEL). PALSAR-2 data belongs to JAXA. We would like to thank Dr. Ozawa (NIED) for the use of his RINC software. In the process of the InSAR, we used Digital Ellipsoidal Height Model (DEHM) based on the Shuttle Radar Topography Mission (SRTM 4.1) provided by Consortium for Spatial Information (CSI) of the Consultative Group for International Agricultural Research (CGIAR), and Generic Mapping Tools (P.Wessel and W.H.F.Smith, 1999) to prepare illustrations.

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