Geophysical Research Abstracts
Vol. 21, EGU2019-18931, 2019
EGU General Assembly 2019


# Mapping Three-Dimensional Deformation Related to the 2018 Sulawesi Earthquake Using Multi-Kernel Offset Tracking Method

Won-Kyung Baek (1), Hyung-Sup Jung (1), and Sang-Wan Kim (2)

(1) Dept. of Geoinformatics, University of Seoul, 163, Seoulsiripdae-ro, Dongdaemoon-gu, Seoul, Korea , (2) Dept. of Energy and Mineral Resources Engineering, Sejong University, Seoul, Korea

Synthetic aperture radar (SAR) multi-kernel offset tracking method has provided the efficient measurement of large and complex surface deformations, which is about three times better accuracy than conventional offset tracking approach. The method enables us to measure precise two-dimensional (2D) surface deformation from one interferometric pair by the azimuth and slant-range offset measurements, and eventually precise three-dimensional (3D) surface deformation has been observed from the ascending and descending interferometric pairs. It is very important to measure precise 3D deformation, because the 3D deformation measurement is allowed for better understanding of geological events such as earthquake, volcanic eruption, glacier movement or etc. The 2018 Sulawesi earthquake, when occurred at 28th September 2018, was recorded a magnitude of 7.5. In addition of the magnitude, the depth of the hypocenter was only 10 km, hence it caused large and complex deformation for the extensive areas. The phase decorrelation because of large/complex deformation made it difficult to measure surface deformation using SAR interferometry. For this reason the precise 3D surface deformation related to the 2018 Sulawesi earthquake was not retrieved yet. In this study, we suggested the 3D deformation field caused by the 2018 Sulawesi earthquake using the integration of multi-kernel based offset tracking measurements from ascending and descending interferometric pairs of spaceborne SAR sensors. Two ALOS-2 PALSAR-2 and Sentinel-1 interferometric pairs were collected. Both ALOS-2 PALSAR-2 and Sentienl-1 dataset includes both ascending and descending pairs. By preliminary research, we generate initial 3D measurement using ALOS-2 PALSAR-2 dataset. The maximal deformation reached about -3.5, 3.7 and -2.5 m in east, north and up directions respectively. The preliminary results could describe the fault movements and mechanism well. However we discussed that the 3D measurements, especially the east-west and up directional measurements were degraded. The reason why is low spatial resolution of both slant-range acquisitions, which were about 12 m respectively, from ALOS-2 PALSAR-2 ascending and descending pairs. Therefore in further study we plan to enhance the precisions of final 3D measurements. For that we would additionally process Sentinel-1 dataset of about 5 m resolution in slant-range direction. we expected that these 3D measurements for a wide area enable us to understand more accurate fault mechanism and its present conditions.

Keywords

Synthetic Aperture Radar (SAR); multi-kernel offset method; three-dimensional deformation; the 2018 Sulawesi earthquake.