EGU22-11152, updated on 15 Aug 2022
https://doi.org/10.5194/egusphere-egu22-11152
EGU General Assembly 2022

Source parameters of the 2021 Hovsgol earthquake (Mw 6.7) in Mongolia estimated by using Sentinel-1 and ALOS-2 DInSAR

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Understanding the mechanism of fault rupture is important to minimize earthquake damage and to estimate the impacts of future earthquakes. In this study, we observed surface displacements caused by the Hovsgol earthquake (Mw 6.7) in January 2021 using three Differential Interferometric SAR (DInSAR) pairs of Sentinel-1B at descending node and ALOS-2 at ascending and descending nodes, and then estimated the source parameters of the earthquake by the inversion of the observed displacement fields. The maximum surface displacement in the radar look direction was 21 cm at the Sentinel-1 descending node, and 32 cm and 26 cm at the ALOS-2 ascending and descending node, respectively. All differential interferograms showed three fringe patterns near the epicenter, which suggests that there were three rupture planes with different slips. We performed the inversion modeling of the DInSAR-observed surface displacements assuming three rupture planes with different slip magnitudes and directions. The values of normalized root mean square error (NRMSE) between the modelled and observed displacements were smaller than 4% for all DInSAR observations. The spatial distribution of modelled displacements was matched to the observed one. The source parameters of fault estimated by the inversion were closely consistent with the measurements by United States Geological Survey and Global Centroid Moment Tensor. The inversion results demonstrated that the assumption of our inversion modeling (three rupture planes) is reasonable.