EGU21-4767
https://doi.org/10.5194/egusphere-egu21-4767
EGU General Assembly 2021

The Vertical Coseismic Deformation Field of the Samos-Izmir Earthquake (Mw6.9)

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The Samos-Izmir Earthquake (Mw=6.9) of October 30, 2020 is among the strongest earthquakes that occurred in recent years throughout the Eastern Aegean. The epicenter of this earthquake was 14 km away from Samos Island and 25 km away from Gümüldür-İzmir region. The local tsunami with the wave heights reaching ~2m was triggered by the mainshock. The most affected areas were Sigacik and Akarca in Tukey (Yalciner et. al.,2020) and Vathy Town (NE Samos Island) in Greece (Triantafyllou et. al.,2020).

In this study, we present an estimation of co-seismic deformations using an indirect approach based on GNSS, InSAR and Tide Gauge data. GNSS time series were used from 25 continuous GNSS stations data obtained from TUSAGA-Aktif in Turkey and NOANET in Greek, and the campaign GNSS measurement for 10 GNSS sites located at the western Turkey coast has been carried out after the earthquake. Moreover, InSAR deformation analyses have been performed using Sentinel-1 data. In addition, relative sea level changes have been analyzed in KOS, PLOMARI, and MENTES tide gauge stations.

The vertical components of GPS stations have shown 10 cm uplift in Samos Island and 10 cm subsidence in the coast of Turkey. The results of the geodetic (GNSS, InSAR) analysis are consistent with each other. The rise time estimated here may correspond to the time elapsed shortly before the generation of tsunami waves reached up to 6 meters that propagated rapidly and caused significant damage around the source region. Also, it has been seen that whereas relative sea level in KOS and PLOMARI tide gauge stations are affected by the local tsunami, but relative sea level changes could not be observed in the MENTES station.