

Determination of Surface Deformations with Global Navigation Satellite System Time Series

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Abstract : The development of GNSS technology has led to increasingly widespread and successful applications of GNSS surveys for monitoring crustal movements. However, multi-period GPS survey solutions have not been applied in monitoring vertical surface deformation. This study uses long-term GNSS time series that are required to determine vertical deformations. In recent years, the surface deformations that are parallel and semi-parallel to Bolvadin fault have occurred in Western Anatolia. These surface deformations have continued to occur in Bolvadin settlement area that is located mostly on alluvium ground. Due to these surface deformations, a number of cracks in the buildings located in the residential areas and breaks in underground water and sewage systems have been observed. In order to determine the amount of vertical surface deformations, two continuous GNSS stations have been established in the region. The stations have been operating since 2015 and 2017, respectively. In this study, GNSS observations from the mentioned two GNSS stations were processed with GAMIT/GLOBK (GNSS Analysis Massachusetts Institute of Technology/GLOBal Kalman) program package to create a coordinate time series. With the time series analyses, the GNSS stations' behavior models (linear, periodical, etc.), the causes of these behaviors, and mathematical models were determined. The study results from the time series analysis of these two 2 GNSS stations shows approximately 50-80 mm/yr vertical movement.

Keywords : Bolvadin fault, GAMIT, GNSS time series, surface deformations

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