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Accuracy Analysis of GNSS Networks Based On Observing-Session Duration in Different Years

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The aim of this study is to investigate the accuracy of GPS (Global Positioning System) positioning.The observations have been analyzed to determine how the accuracy of derived relative positions of GPS stations depends on the baseline length, the duration of observing session in different years.

For this purpose, we selected three days of each year in 2011, 2012 and 2013 from the GPS observations made in CORS-TR Network in Turkey with 15 stations. The GPS observations were processed in the ITRF 2008 reference frame using the Bernese 5.2 GPS software. The baseline length varies between 82 km and 369 km, session duration varies between 4 h and 24 h.

The repeatability of the daily solutions belonging to each year was analyzed carefully to scale the Bernese software cofactor matrices. The root mean square (RMS) values for daily repeatability with respect to the combined 3-day solution are computed. The RMS values are less than 3 mm in the horizontal directions (north and east) and < 8 mm in the vertical direction.

The results from the investigation agree with the results derived from the previous models in a few mm level. Moreover, a linear relationship between the observing session duration and the accuracy is observed: accuracy for a station decrease when the distance to the fixed station increases.

Keywords: Accuracy, GNSS, Session duration, RMS