

# Establishment of Regional GNSS Network for Tropospheric Tomography

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**Key words:** Engineering survey; GNSS/GPS

## SUMMARY

### ESTABLISHMENT OF GNSS REGIONAL NETWORK FOR TROPOSPHERIC TOMOGRAPHY

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## ABSTRACT

In Turkey, severe weather events have increased severely since beginning of years 2000s. In 2015, the numbers of severe weather events, 959, have reached to record level. More than one fourth of these events are flood and heavy rain. Blacksea Region has been affected by hydrological origin severe weather events. Moreover, according to climate change scenarios until 2100, it has been foreseen that East Blacksea Region will be one of the region where severe weather events especially heavily rain and flood will increased related to climate change. This situation states a necessity of reliable weather monitoring and prediction system.

Precipitable water vapor (PWV) can be estimated via GNSS meteorology by using Zenith

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Tropospheric Delay (ZTD) estimated at GNSS stations and meteorological data. By using a regional network of GNSS reference stations, it is possible to recover estimates of the slant wet delay (SWD) to all satellites in view. SWD observations can then be used to model the vertical and horizontal structure of water vapor over a local area, using a tomographic approach.

This study introduces the research project of “Using Regional GNSS Networks to Strengthen Severe Weather Prediction” which has been performed at Department of Geomatics Engineering of Karadeniz Technical University and explain criteria to establish GNSS network for tropospheric tomography. The first aim of the project, to determine of atmospheric water vapor distribution by GNSS meteorology and GNSS tomography software developed by ourselves using observation data of network designed with 2 new constructed GNSS reference station, 10-20km apart from Samsun rawisonde station and to compare of independent techniques derived water vapor distribution. Water vapor distribution derived by GNSS meteorology and GNSS tomography will be compared with water vapor distributions derived by independent techniques such as rawisonde and numerical weather models (NWM). Therefore, it is targeted to perform accuracy analysis of water vapor distributions derived by GNSS meteorology and GNSS tomography. Additionally, GNSS tomography model applied in Samsun test region will be applied in a small network designed by TRAB Permanent GNSS station, TRBN CORS-TR station and a new constructed GNSS station near to those stations in Trabzon.

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