

Determination of Regional TEC Values by GNSS Measurements, A Case Study: Central Anatolia Sample, Turkey

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SUMMARY

The atmosphere surrounding the earth as a cover is divided into different layers depending on its characteristics such as density, heat and height. A part of the atmosphere containing free electrons and ions is called the ionosphere. The ionosphere is a natural plasma environment located at an altitude of 70 km to 1000 km of the atmosphere and shaped by radiation from the Sun. The radiation from the sun forms positively charged ions and free electrons by ionizing the atoms and molecules in the ionosphere. The ionosphere is an important layer affecting GNSS (Global Navigation Satellite System) measurements. The quality of the GNSS measures is directly related to the changes in the ionosphere. Total Electron Content (TEC) is one of the important parameters expressed to character of the ionosphere which has great importance for satellite based positioning, shortwave and satellite communication systems. Determination of the TEC change is important for modeling the ionosphere.

CORS-TR network which have 146 points was established at 2009. In this study, data obtained from 12 IGS stations and 8 CORS-TR stations were evaluated in order to form regional ionosphere model. Bernese 5.2 GNSS software which was developed at the Astronomical Institute of the University of Bern (AIUB) have been used in evaluation. The TEC values for 2015 have been calculated at intervals of two hours. TEC values which were obtained from GNSS measurements compared with global ionosphere maps produced by CODE, ESA, JPL and IRI-2012 TEC produced by international reference model. In addition, correlation coefficients were calculated to determine the relationship between the regional TEC values obtained from result of study and the global TEC values. The best approach to the regional ionosphere model as a result of comparison is obtained respectively CODE, ESA and JPL global models. In the study, a TEC map was produced for the determined region by using regional and global TEC values.

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