



Determination Of Ionospheric TEC Changes Using Cors-Tr Data

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GNSS is a navigation and positioning system used globally. GNSS signals pass through troposphere and ionosphere. Ionosphere is a natural plasma showing dispersive characteristics for electromagnetic signals of GNSS. Total electron content (TEC) of ionosphere keeps changing due to radiation coming the sun. The main factors for these changes are: solar period of 11 years, coronal mass attraction, sun spots, geographic location, season and time of the day. The affects of these solar events on ionosphere are illustrated by the magnitude of Kp and Dst indices.

Continuously Operating Reference Stations (CORS), which are collecting signals from GNSS satellites passing through ionosphere, are commonly used for the determination of TEC values. By using these signals, TEC values can be determined, the change of electron density can be modeled and sporadic e-layer and bid scale ionospheric irregularities can be investigated. In addition, these signals can be used in tropospheric studies for precise meteorological forecasting.

For the determination of ionospheric TEC values, we can use powerful software packages, which are mainly developed for scientific research, such as Bernese 5.0 and Gamit GlobK. Actually, these packages are academic packages mainly developed for the determination of precise positioning, the study of tectonic movements and analysis of GNSS data. There are also other techniques, such as IONOLAB developed by F. Arikan and his group, for the determination of TEC values.

In the present study, Bernese 5.0 GNSS package, which was developed by Bern University of Switzerland, was used for the determination of TEC values using CORS-TR data. The CORS-TR network was established in Turkey during 2006-2009. This network, which consists of 147 stations, is now serving surveying and mapping community for real time and post positioning. In addition, this network is serving scientific community for the studies related to plate tectonics, crustal deformations, earthquake engineering and atmospheric research.

As part of our study, first, monthly changes of Kp indices of TEC values were determined. in April 2010, Kp indices range between a minimum of 1 and a maximum of 7. Therefore, in this study, during April 2010, analyses were carried out for daily TEC changes in general and hourly TEC changes for specific days when Kp indices are high.

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