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Combining various space geodetic techniques for regional modeling of ionospheric electron density over Iran

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Ionosphere is a layer of the upper atmosphere, between the thermosphere and the exosphere, distinguished because it is ionized by solar radiation. As an important part of human living environment, ionosphere affects our modern society in many ways. International broadcasters use this medium to reflect radio signals back toward the Earth. Ionosphere provides long range capabilities for commercial ship-to-shore communications, for trans-oceanic aircraft links, and for military communication and surveillance systems.
Space geodetic techniques have turned into a capable tool for studying the ionosphere in the last decades. Up to now, two dimensional (2-D) models of vertical TEC (VTEC) have been widely developed and used by different communities; however, due to the fact that these models provide information about the integral of the whole electron content along the vertical or slant ray path, these maps are not useful when information about the ionosphere at different altitude is required.
The aim of this study is to develop three dimensional (3-D) regional model of electron density by using combination of various space geodetic techniques. B-Spline basis functions are used for longitude and latitude variations of the electron density and Chapman profile function for altitude variations.
The National Cartographic Center of Iran (NCC) has established a network of one hundred GPS stations: The Iranian Permanent GPS Network for Geodynamics (IPGN). The main task of the GPS stations is to collect and store raw GPS data and send it to Tehran processing center on a daily basis for final processing.
The required data for our investigation are ground based measurements of permanent GPS stations over Iran and radio occultation data from Formosat-3/Cosmic for region of interest. We expect to increase accuracy and reliability of final model by integrating different observation techniques.