

Using GPS and satellite altimetry for combined Global Ionosphere Maps

S. Todorova, T. Hobiger, H. Schuh

Institute of Geodesy and Geophysics, Vienna University of Technology, Vienna, Austria

The ionosphere is a dispersive medium for the observables of all space geodetic techniques operating in the microwave band, such as the Global Positioning System (GPS) and satellite altimetry missions. When the signals pass through the ionosphere, both their group and phase velocity are disturbed. The effect is in first approximation proportional to the Slant Total Electron Content (STEC) along the ray path. Thus, observations carried out on two distinct frequencies can be used to obtain information about the TEC values. This study aims at the development of precise Global Ionosphere Maps (GIMs) by combination of various space geodetic techniques. As a basis for the combined model global ionosphere maps from GPS data in two hours intervals have been created. The inhomogeneous distribution of the GPS stations can be partly compensated by adding satellite altimetry data. The combination is done by applying a least-squares adjustment (Gauss-Markov model) on each set of observations and then combining the normal equations by adding the relevant matrices. The integrated ionosphere model is expected to be more accurate and reliable than the results derived by the two individual methods. Some first tests of the combination of GPS GIMs with altimetry data will be shown.