

Three-Dimensional Ionospheric Data Product of the FORMOSAT-3/COSMIC

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Abstract

Most of our knowledge of the ionosphere comes from remote sensing by radio waves. Currently, there are about two hundreds standard ionosondes routinely recording electron density profiles of the bottom-side ionosphere up to the maximum density peak. Although sophisticated incoherent scatter radars have the ability to make measurements of the entire ionosphere, they are rather limited in number, of about 10. Recently, the satellite-borne radio beacon signals of the global positioning system (GPS) have been used to derive the ionospheric total electron content (TEC). By applying an interpolation and/or a model smoothing on the derived data from thousands of ground-based GPS receivers, a two-dimensional global ionospheric map can be constructed for studying the global horizontal structure of the ionospheric TEC. All these existing ground-based observations suffer from a significant shortcoming that they cannot yield data over oceanic areas as well as a large part of the continents. Before the era of FORMOSAT-3/COSMIC (F3/C), 3-D ionospheric images are limited and only ionospheric tomographic image constructed by regional observation chains can provide detailed images of 3D ionospheric structure. With the worldwide dense occultation observations carried out by GPS occultation experiment (GOX) onboard the F3/C, 3-D ionospheric images can be constructed routinely. We present new F3/C 3-D ionospheric image products which will be available online at the data center.