



Monitoring of the ionosphere by using FORMOSAT-3/COSMIC

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A new era of studying the ionospheric space weather effects has come after launch on 15 April 2006 of the innovative constellation of six micro-satellites in the low-Earth orbit, named as Formosa Satellite 3 or Constellation Observing System for Meteorology, Ionosphere, and Climate (abbreviated as FORMOSAT-3/COSMIC or F3/C in short), performing a radio occultation experiment capable of observing the global ionosphere three-dimensionally. This is the first time that a satellite constellation provides instantaneously the ionospheric electron density up to the satellite 800 km altitude. With more than 2500 soundings of the ionospheric vertical electron density profiles inverted from occultation TEC (total electron content) measurements every day, ionospheric plasma structures over many continents and most of oceans, where ground-based observation is limited, are now observed continuously. Important ionospheric research topics, such as space weather effects to the ionosphere, variations of ionospheric plasma structure and dynamics produced by solar outputs can be widely studied and modeled based on the three-dimensional ionospheric images constructed by the F3/C observations. After four years in orbit, a great amount of radio occultation soundings allow us to construct global ionospheric maps to study the ionospheric seasonal effects. Taking advantage of the uniqueness of dense global coverage, the two large scale structures of the equatorial ionization anomaly and the mid-latitude trough in the ionosphere are given.