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A NEW PAYLOAD TECHNIQUE ON SMALL SATELLITE FOR IONOSPHERIC  
SCINTILLATION/TEC DETERMINATION

**Abstract**

Ionosphere is a part of near-earth space environment of human survival. Total Electron Content(TEC) and Scintillation are two factors to evaluate how ionosphere affects on satellites navigation and communication. Retrieving high precision TEC and obtaining scintillation while different frequency radio signals propagating in the ionosphere are very significant to study its structure mechanism and variety.

This paper based on characteristic of radio signals propagating in the ionosphere, combine radio occultation technique and Tri-Band beacon technique to study a new payload technique in space for ionospheric scintillation/TEC determination—the Cooperative Ionosphere 3D Mapping Observing System(CIMOS). CIMOS instruments which carried on small LEO satellites receive GNSS radio occultation signals and ground multi-frequency beacon signals synchronously and continuously. High vertical and horizontal resolution of 3D ionospheric TEC with multi-frequency(VHF/UHF/L/S) ionospheric scintillation will be obtained. CIMOS is composed of RO signals receiving antennas, multi-frequency beacon signals receiving antennas, CIMOS receiver and an Ultra-Stable Oscillator. The CIMOS RO antennas which receive dual-frequency RO signals emitted from BDS, GPS, Galileo, GLONASS are pointed to velocity and anti-velocity direction of the LEO satellite. The CIMOS beacon antenna which receives multi-frequency beacon signals emitted from Doris(France) and TOPS(China) is pointed to nadir direction. The CIMOS receiver is developed to provide for measurement of global 3D ionosphere TEC and radio scintillations. New algorithms will be developed for TEC determination by data processing centre. Finally, the data will be used to ionosphere weather models, satellites navigation and communication systems.