

CONSTELLATION OBSERVING SYSTEM FOR METEOROLOGY, IONOSPHERE AND CLIMATE: OVERVIEW OF THE COSMIC-2 MISSION

William Schreiner⁽¹⁾

(1) University Corporation for Atmospheric Research, Boulder, CO 80301,
www.cosmic.ucar.edu

Measurements from constellations of low Earth orbiting (LEO) satellites are proving extremely useful for weather and space weather studies. The Constellation Observing System for Meteorology Ionosphere and Climate (COSMIC), a joint US/Taiwan mission launched in April 2006, is a six micro-satellite constellation flying GNSS radio occultation (RO) payloads on each spacecraft. COSMIC has collected a large amount of useful data from these scientific payloads and is still currently collecting 1,000-1,500 RO measurement events per day on average. The GPS RO dual-frequency L-band phase and amplitude measurements can be used to observe neutral atmospheric bending angle for weather applications, and absolute Total Electron Content (TEC), phase and amplitude scintillation and electron density profiles (EDP) for space weather studies. The large number and complete global and local time coverage of COSMIC data are allowing scientists to observe weather and ionospheric phenomena that are difficult to see with other instruments. The success of COSMIC has prompted U.S. agencies to execute a COSMIC follow-on mission (called COSMIC-2) with Taiwan that will put twelve satellites with GNSS (Global Navigation Satellite System) RO payloads into orbit on two launches in the 2016-19 time frame. The first launch scheduled in Sept 2016 will place six satellites in a near Equatorial orbit, which is ideal for hurricane prediction and space weather forecasting. COSMIC-2 will also carry twelve space weather payloads that will fly on the first launch into low inclination orbits: six RF Beacon transmitters, and six Ion Velocity Meter instruments. COSMIC-2 will make use of an advanced radio occultation receiver with an innovative antenna design, and will produce at least 8,000 high-quality atmospheric and ionospheric profiles from GPS and GLONASS signals to support operational weather prediction, climate monitoring, and space weather forecasting. This presentation will give a short overview of the COSMIC and COSMIC-2 missions, and then discuss details of the RO data processing algorithms and some selected science applications.