

FORMOSAT-3/COSMIC Mission

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Six identical micro-satellites of the FORMOSAT-3/COSMIC mission, a Taiwan-US collaboration project, were successfully launched in 2006. Each satellite carries three science payloads: a Global Positioning System (GPS) receiver which measures the amplitude and phase of GPS signals, a Tri-Band Beacon (TBB) transmitter which emits three coherent frequencies at 150 MHz, 400 MHz and 1066.7 MHz, and a Tiny Ionospheric Photometer (TIP) which measures photon emission at 135.6 nm wavelength. The FORMOSAT-3/COSMIC mission provides the first satellite constellation to obtain vertical profiles in near-real time of temperature, pressure, and water vapor in the neutral atmosphere and electron density in the ionosphere. Using the GPS radio occultation (RO) technique, the satellite constellation will take at least 2,500 measurements of vertical profiles of atmospheric air density, temperature and water vapor and ionospheric electron density every 24 hours around the globe, filling in current atmospheric data gaps over the oceans and the polar region. Combining the GPS RO data with the data from TIP and ground TBB receivers, the 3D global distribution of electron density and scintillation in the ionosphere can be obtained for space weather monitoring and modeling. Taiwan science teams have also conducted an Intensive Observation Period (IOP) campaign to cross validate RO data with other observations (ground based radiosonde, weather satellites, and balloons, radars, ionosondes, etc.), and to assess the impact of FORMOSAT-3/COSMIC observations on predictions of typhoon intensity and track over eastern Asia as well as ionospheric response to storms and substorms. Highlights of early results from the FORMOSAT-3/COSMIC mission will be presented.