

FORMOSAT-3 Mission

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The FORMOSAT-3 (FS-3) mission, also known as COSMIC (Constellation Observing System for Meteorology, Ionosphere and Climate), is an international cooperation program between NSPO of Taiwan and UCAR (University Corporation for Atmospheric Research) of USA. The mission goal is to launch a constellation of six micro-satellites. Three payloads will be carried on each satellite, including GPS Occultation Receiver (GOX) which tracks GPS occultation signals; Tiny Ionospheric Photometer (TIP) which measures the night sky photon emission; and Tri-Band Beacon (TBB) which transmits three-frequency phase coherent signals. The data collected by these instruments are for weather prediction simulations, global climate change analysis, and ionosphere and gravity research. The FORMOSAT-3 satellites are planned for launch before early 2006.

The FORMOSAT-3/COSMIC mission will significantly improve the coverage and accuracy of atmospheric data collection of weather study and ionospheric electron density measurement for space weather study. The GOX instrument will provide the atmospheric density, pressure and vapor data by inferring from the refracted GPS signals. Most weather forecasting currently relies on traditional balloon-borne radiosonde systems from some 900 locations, which are restricted to certain terrestrial regions. The FORMOSAT-3 micro-satellite constellation will provide at least 2500 sounding points with uniform coverage around the globe, which gives about three times more data than the current observations. The precise determination of each satellite's orbit can be employed to study the gravitational field. For space weather studies, the TIP payload will measure the ionospheric total electron content (TEC) at the satellite's nadir direction, by means of the ultraviolet emissions from radiative recombination of O⁺ ions and electrons. The measurements can be used to map the auroral boundaries and improve the retrieval of electron density in the ionospheric RO soundings. The signals from the TBB payload will be received on the ground and used to generate a global ionospheric TEC map.

Keywords: FORMOSAT-3; COSMIC; Atmosphere, Ionosphere.