

## **FORMOSAT-3/COSMIC: A new satellite for aeronautical meteorology studies**

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The FORMOSAT-3/Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC) mission were launched on 14 April 2006. The FORMOSAT-3/COSMIC mission is composed of 6 low Earth orbiting satellites (LEOs) at 700-800 km altitude. The mission uses the Global Positioning System (GPS) radio occultation (RO) technique to obtain atmospheric temperature profiles with high spatial (about 1 km in the vertical and 100-300 km in the horizontal) and temporal resolutions (about 1550 temperature profiles per day during July 2007) [Lin et al., 2007; Wang and Lin, 2007; Narayana Rao et al., 2007]. About 2,500 vertical atmospheric profiles will be taken everyday when the FORMOSAT-3/COSMIC satellites reach their designated orbits, approximately three times the number of daily ground-based radiosonde observations which are located mainly over land areas. The discrepancies in temperature profiles between the FORMOSAT-3/COSMIC and radiosondes are less than 0.5 K for the tropical (30S-30N) troposphere [Lin, 2007]. Previous comparisons between the GPS-derived vertical temperature profiles and radiosondes also showed errors of less than 0.6 K between 5 and 15 km [Hajj et al., 2004].

The goal of this work is to explore the use of FORMOSAT-3/COSMIC GPS RO data on environmental studies. On the regional scales, there is a lack of observational data for Taiwan-affecting weather system originating from the atmosphere over the Western North Pacific. On the global scales, very limited sounding data are available per day over oceanic atmosphere and remote regions for initializing the three-dimensional models for global weather and air pollution predictions. Hence, the availability of the FORMOSAT-3/COSMIC data opens many new opportunities in the analysis and prediction of weather, air pollution, and climate. In this work we demonstrate the use of FORMOSAT-3/COSMIC data in the study of temperature structure inside the Antarctic polar vortex where the time varying temperatures are critical to the stratospheric ozone depletion. The FORMOSAT-3/COSMIC data are also very valuable in understanding the development of the tropical storms over the Atlantic Ocean, and the effect of volcanic eruption on regional and global temperature distribution. Works are in progress in employing the FORMOSAT-3/COSMIC data into models so that the benefit of the FORMOSAT-3/COSMIC data can be more directly linked to predictions that are relevant to the society.