## SCIntillation and IONosphere –eXtended (SCION-X) –A Small Satellite for Ionospheric and Atmospheric Science

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With the advent of the new era of space science and technology and the effects of climate change, SCION-X, a small satellite under development by National Central University in Taiwan has the ability to provide more accurate observations for atmospheric measurements and air quality from the lower atmosphere, as well as ionospheric plasma density for space weather monitoring and forecasts. SCION-X will carry three science payloads. One of the payloads for SCION-X mission is a GNSS Radio Occultation Receiver (GROR), which uses measurements of GPS L1 and L2 pseudorange, phase, and carrier to noise ratio (Cb/No) to derive the vertical profiles of ionospheric electron density and S4 amplitude scintillation index. These observations will be further complemented by the Compact Ionospheric Probe (CIP), which is an in-situ plasma sensor with high Technological Readiness Level (TRL) and high sampling rates to measure ionospheric parameters and irregularity structure at sub-kilometer scales. These observations will help to correct and predict the positioning errors and satellite communications disruptions caused by ionospheric anomalies such as the generation and propagation of plasma bubbles. In addition to ionospheric studies, GROR can also provide observations of the water vapor and temperature distribution in the troposphere. Assimilation of the tropospheric observations into weather forecast models will be beneficial for global climate research and improve the accuracy of tropical cyclone forecasts. The third payload is Hyper-SCAN, which is a newly developed hyperspectral imager. By analyzing the spectrum between 380 - 1020 nm and comparing with in-situ PM2.5 aerosol measurements on the ground, a first calibration test of Hyper-SCAN will be performed to serve as a reference for the study of PM2.5 pollution distribution and its sources.

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