



Nightside Ionosphere Structure Measured by ECLIPSE

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The Experiment for Characterizing the Lower Ionosphere and the Prediction of Sporadic-E (ECLIPSE) is a CubeSat-class experiment that operates from the International Space Station (ISS) as part of the Space Test Program Houston 9 (STP-H9) Mission. ECLIPSE consists of four individual sensors, two to measure the nightside ionosphere and two to measure magnesium ions as a tracer for Sporadic-E. ECLIPSE uses one of each sensor type to scan both the Earth's disk below the ISS as well as the limb along the orbit plane in the wake direction. The ECLIPSE ionosphere sensor is called the Triple-Tiny Ionosphere Photometer (Tri-TIP) and is a 1U compatible instrument originally developed for the Coordinated Ionospheric Reconstruction Cubesat Experiment (CIRCE). Tri-TIP has a fixed field of view and measures the OI 135.6 nm emission line as the proxy for ionospheric density on the Earth's nightside at low and mid-latitudes. In addition, the Triple-Magnesium Ion Photometer (Tri-MIP) measures the mid-ultraviolet doublet emission near 280 nm as the tracer for Sporadic-E. A separate 1U scan mirror module is used to raster both the Tri-TIP and Tri-MIP fields of view and produce 2D information within the instrument field of regard. The multiple orientations of ECLIPSE sensors enables both mapping of horizontal structures in the ionosphere and the tomographic reconstruction of vertical structure along the ISS orbit. Early test results from the ionosphere sensors will be presented and compared with other ionosphere sensors for on-orbit calibration. These results also provide validation of the sensor technology and a pathway to future proliferation of these types of sensors in low-Earth orbit.

Acknowledgement: Authors are funded by the Office of Naval Research