

The Low-Latitude Ionosphere/Thermosphere Enhancements in Density (LLITED) Mission

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The Low-Latitude Ionosphere/Thermosphere Enhancements in Density (LLITED) CubeSat mission is a funded mission through NASA HTIDs program. It is a 3-year grant with CubeSat delivery at 23 months and a 1-year on-orbit mission life. The mission is to provide both ionosphere and thermosphere measurements related to the Equatorial Ionization Anomaly (EIA) and the Equatorial Temperature and Wind Anomaly (ETWA). The EIA and ETWA are two of the dominant ionosphere/thermosphere interactions on the low-latitude duskside. While the EIA has been extensively studied both observationally and with modeling, the ETWA is less well known since observations are infrequent due to a lack of suitably instrumented spacecraft at appropriate altitudes. LLITED will, for the first time, provide coincident high-resolution measurements of the duskside ionosphere/thermosphere at lower altitudes that will characterize and improve our understanding of the ETWA, provide insight into the coupling physics between the ETWA and EIA, and increase our knowledge of the duskside dynamics that may influence space weather.

The LLITED mission will consist of two 1.5U CubeSats in a high-inclination circular orbit, with an orbit altitude between 400 and 500 km. The CubeSats will maintain a 1/4 to 1/2 orbit separation to each other in order to observe any temporal changes as the ETWA evolves. The bus and subsystems are provided by The Aerospace Corporation. Both CubeSats will host three payloads: an ionization gauge (IG), planar ion probe (PIP), and GPS radio occultation sensor (GPSRO). The Aerospace Corporation is providing the IG and GPSRO sensors and Embry-Riddle is providing the PIP. The products provided are in-situ neutral pressure/density, in-situ plasma density, and slant TEC. The observations from LLITED will be combined with other available data, such as the remote sensing observations of ICON, to provide a comprehensive and compelling dataset of the ETWA.