

Preliminary Results of Advanced Ionospheric Probe Onboard FORMOSAT-5 Satellite

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A remote sensing satellite, FORMOSAT-5, was launched by a SpaceX Falcon 9 launch vehicle from Vandenberg Air Force Base Space Launch Complex 4E at 2:51 25 August 2017 CST into a 98.28° inclination sun-synchronous circular orbit at 720 km altitude along 1030/2230 local time sector with a 2-day re-visit period. Advanced Ionospheric Probe (AIP) is a piggyback science payload developed by National Central University for FORMOSAT-5 satellite to explore space weather/climate and seismic precursors associated with strong earthquakes. The AIP is an all-in-one plasma sensor that measures ionospheric plasma concentrations, velocities, and temperatures in a time-sharing way and is capable of measuring ionospheric plasma irregularities at a sample rate up to 8,192 Hz over a wide range of spatial scales. Validation on retarding potential analyzer mode has been performed in Space Plasma Simulation Chamber at lab, in a flight test on sounding rocket, and during in-orbit checkout phase of the FORMOSAT-5 satellite. No significant hysteresis on measured current-voltage curves indicates that the AIP grids are almost free of contamination and could make an accurate measurement of ionospheric plasma parameters. Meanwhile, some typical ion density profiles measured by the FORMOSAT-5/AIP in night-side orbits with a geographic latitude coverage from -60° to 60° will be presented. Low latitude ionospheric plasma irregularities can be identified from the individual profiles. Mid-latitude electron density enhancement, equatorial plasma depletion bay, and non-migrating tide (wave-4) can be observed from synthesized global ion density maps every two days.

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