

Recent Progress on Advanced Ionospheric Probe Onboard FORMOSAT-5 Satellite

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Advanced Ionospheric Probe (AIP) is a piggyback science payload developed by National Central University for FORMOSAT-5 satellite since 12 January 2012. The AIP is an all-in-one plasma sensor to measure ionospheric plasma concentrations, velocities, or temperatures in a time-sharing way. Meanwhile, the AIP is capable of measuring ionospheric plasma irregularities with sampling rate up to 8,192 Hz over a wide range of spatial scales. Electroformed gold grids used in the AIP can reduce quasi-hysteresis effect on current-voltage curves in a plasma injection test and approximate ideal electrical potential surfaces for accurate data available in the future. The AIP flight model has passed through preliminary and critical design review, functional and environmental tests, and then was delivered to the NSPO on 8 October 2013. It is scheduled to launch into a low Earth orbit on a Falcon 9 rocket manufactured by Space Exploration Technologies Corp. from Vandenberg Air Force Base in the 2nd quarter 2016 to carry out a two-year scientific mission on space weather and seismic precursors. At the beginning the AIP will be routinely operated within $\pm 75^\circ$ latitude in the night-side sector to meet a 5-W limit in average power per orbit due to high power consumption and a heat dissipation issue. Up to 1.5 gigabits per day in data storage, the AIP is capable to perform 8,192 electric current readings per second with duty cycle under 10% to resolve fine structure of equatorial ionospheric plasma irregularities within $\pm 18^\circ$ latitude.

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