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THE CANADIAN CASSIOPE SMALL SATELLITE MISSION: THE ENHANCED POLAR OUTFLOW
PROBE AND CASCADE TECHNOLOGY DEMONSTRATION PAYLOAD**Abstract**

The Canadian CASSIOPE small satellite was successfully launched on September 29, 2013 into an elliptic polar orbit of 325 x 1500 km at 81-deg inclination. The multiple-purpose CASSIOPE mission has three interconnected objectives, viz. small satellite bus development, space environment research, and advanced telecommunications technology demonstration. The CASSIOPE spacecraft uses a satellite bus to carry the Enhanced Polar Outflow Probe (e-POP) scientific (space weather research) payload and the CASCADE communications technology demonstration payload into orbit. The e-POP payload is comprised of a suite of eight high-resolution plasma, magnetic field, radio, and optical instruments designed for in-situ observations in the topside high-latitude ionosphere at the highest-possible resolution. The payload utilizes the advanced data storage and telemetry downlink capability of CASCADE to meet its large data downlink bandwidth requirements - and to help demonstrate the capabilities of CASCADE

in the process. The e-POP scientific objective is to study plasma outflows, neutral atmospheric escape, and associated effects of auroral currents and plasma microstructures on radio propagation at an unprecedented level of detail. In this paper, we present preliminary results from the first several months of CASSIOPE mission operation, to illustrate the performance of both payloads and the satellite bus, and to demonstrate the scientific capabilities of the e-POP mission in coordination with other observing facilities.