

The Canadian CASSIOPE/e-POP Small Satellite Mission: Scientific Targets, Mission Strategies, and International Collaborations

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The scientific target of the Canadian Enhanced Polar Outflow Probe (e-POP) mission is mesoscale and microscale space weather processes in the topside polar ionosphere, specifically the microscale characteristics of plasma outflow and related plasma processes, the occurrence morphology of neutral escape, and the effects of auroral currents on plasma outflow and those of plasma microstructures on radio propagation.

International collaboration is an important and integral part of the three elements of the e-POP mission strategy, which are: high-resolution in-situ plasma and field measurements using a suite of 8 plasma and field instruments and a large-capacity (terabyte and >300 megabits-per-second) data storage and downlink system, coordinated observations using ground facilities such as magnetic and optical observatories, radars and heaters, and mission-specific theoretical modeling and data assimilation.

E-POP will be flown on the Canadian CASSIOPE small satellite, which is scheduled for launch in late 2007 into a polar orbit (300 x 1500 km, 80 deg inclination). E-POP includes imaging plasma and neutral particle sensors, magnetometers, dual-frequency GPS receivers, CCD cameras, a radio wave receiver and a beacon transmitter. The imaging plasma sensors will measure particle distributions and the magnetometers will measure field-aligned currents on the time scale of 10 ms and spatial scale of ~100 m. The CCD cameras will perform auroral imaging on the time scale of 100 ms. The GPS and radio-wave receivers will perform near real-time imaging studies of the ionosphere in conjunction with ground-based radars, and the beacon transmitter in conjunction with ground receiving stations.

We discuss planned investigations in e-POP and the importance of international collaborations in these investigations, and opportunities for additional international collaborations that will significantly enhance the science returns of the e-POP mission, particularly those in conjunction with other spacecraft missions.