

## CASSIOPE e-POP Radio Occultation Observations of High Latitude Ionization Structures

Chris Watson<sup>1</sup>, Richard. B. Langley<sup>2</sup>, Andrew Yau<sup>1</sup>, and P. T. Jayachandran<sup>3</sup>

<sup>1</sup>University of Calgary Department of Physics and Astronomy, Calgary, Alberta, Canada.  
(E-mail: watson@phys.ucalgary.ca)

<sup>2</sup>University of New Brunswick Department of Geodesy and Geomatics Engineering, Fredericton, New Brunswick, Canada.

<sup>3</sup>University of New Brunswick Physics Department, Fredericton, New Brunswick, Canada.

### ABSTRACT

The enhanced polar outflow probe (e-POP) onboard the Cascade, Smallsat and Ionospheric Polar Explorer (CASSIOPE) satellite is a scientific instrument suite designed for detailed observation/study of the high latitude ionosphere and its coupling to the magnetosphere and solar wind. In 2013, CASSIOPE/e-POP was launched into a polar, elliptical low Earth orbit (325-1500 km), and includes a high-data-rate (20-100 Hz) Global Positioning System (GPS) receiver for radio occultation (RO) measurements of the ionosphere's plasma density [1]. The high inclination of e-POP, combined with the high resolution of e-POP RO measurements, allows for detailed observation of high latitude ionospheric structuring from a new perspective [2]. In addition, simultaneous total electron content (TEC) measurements of the e-POP RO receiver and ground-based GPS receivers in high latitude regions (e.g. Canadian High Arctic Ionospheric Network (CHAIN) [3]) allows for observation of small-scale ionization structures in both vertical and horizontal directions. Preliminary e-POP RO observations of small-scale structuring in the auroral and polar ionosphere will be presented, including simultaneous e-POP RO and ground based TEC observations of these structures.

### References:

[1] Kim, D. and R.B. Langley (2010), The GPS attitude, positioning, and profiling experiment for the enhanced polar outflow probe platform on the Canadian CASSIOPE satellite, *Geomatica*, 64(2), 233-243.

[2] Shume, E. B., Komjathy, A., Langley, R. B., Verkhoglyadova, O., Butala, M. D. and Mannucci, A. J. (2015), Intermediate-scale plasma irregularities in the polar ionosphere inferred from GPS radio occultation, *Geophys. Res. Lett.*, 42, 688–696, doi:10.1002/2014GL062558.

[3] Jayachandran, P. T., R. B. Langley, J. W. MacDougall et al. (2009), Canadian High Arctic Ionospheric Network (CHAIN), *Radio Sci.*, 44, RS0A03, doi:10.1029/2008RS004046.