

# SM34A-04 - Birkeland Current Impacts on Cusp Ionospheric Irregularities (Invited)



Wednesday, 11 December 2019



16:45 - 17:00



Moscone South - 207, L2

## Abstract

Global Navigation Satellite System (GNSS) scintillations at high latitudes have traditionally been attributed to the Gradient Drift Instability (GDI) associated with polar cap patches and flow shear instabilities such as the Kelvin-Helmholtz Instability (KHI). Previous studies have also shown that electron precipitation may play an important role for scintillations in the cusp. In this study, we combine in situ Swarm data with GNSS observations from a network of three ground based receivers around Svalbard, Norway, to further investigate the role of particle precipitation on phase scintillations in the cusp region. In particular, we examine the relation between strong scintillations and finely structured Birkeland currents. For this purpose, we identified 23 events in the winter time cusp with phase scintillations  $>0.45$  radians. We show consistent collocation between enhanced cusp scintillations and regions of filamented Birkeland currents. In addition, we relate the observations to the presence of turbulence and dispersive Alfvén waves. The observations suggest that the filamentary field aligned currents and related particle precipitations in themselves together may act as the primary driver for the creation of irregularities responsible for ground based phase scintillations measured underneath the cusp.

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