



## IPIR - Global study of ionospheric plasma irregularities with Swarm satellites

**Wednesday, 13 February 2019**

**17:30 - 19:30**

**📍 Westin Pasadena - Fountain III/IV**

The Earth's ionosphere is often subject to instabilities and turbulence, which can create irregularities in plasma density at various scales and at all latitudes. Plasma density irregularities are one of the space weather effects, as they depend on the geomagnetic activity and can influence propagation of trans-ionospheric radio signals. As such they can increase the uncertainty of positioning with the Global Navigation Satellite Systems (GNSS), such as GPS, Galileo or GLONASS. Examples of measurable effects are radio wave scintillations in the phase and amplitude, which are significant issues at low geomagnetic latitudes and in the polar regions. Thus, a comprehensive characterization of ionospheric irregularities over all geomagnetic latitudes is important for both research and operations that rely on trans-ionospheric radio signals.

To study and characterize plasma irregularities at all latitudes, one can employ in-situ measurements by satellites in polar orbits, such as the European Space Agency's Swarm mission. For the Swarm mission, we have developed the Ionospheric Plasma IRregularities (IPIR) product for a global characterisation of ionospheric irregularities along the whole satellite track. This new Level-2 data product combines complementary datasets from the Swarm satellites, i.e. the electron density from the electric field instrument, the GPS data from the onboard GPS receiver, and the magnetic data. The data product is a new tool for the global studies of ionospheric irregularities and turbulence.

In this work, we present the first dataset of the IPIR-product. We analyse the results together with the measurements from our ground-based scintillation receivers located in the Scandinavian Arctic and in Antarctica as well as optical instruments. Satellite in-situ data combined with the ground-based observations can provide better understanding of the phenomena associated with the largest disturbances of the GNSS signals. The development has been carried out within the framework Swarm-DISC, Data, Innovation and Science Cluster consortium.

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