



On the horizontal distribution of high-latitude plasma density irregularities under particle precipitation

Hiroatsu Sato (1), Jun Su Kim (2), Norbert Jakowski (1), and Ingemar Häggström (3)

(1) Institute of Communication and Navigations, German Aerospace Center, Neustrelitz, Germany, (2) Microwaves and Radar Institute, German Aerospace Center, Wessling, Germany, (3) EISCAT Scientific Association, Kiruna, Sweden

We present small-scale plasma density irregularities simultaneously observed by L-band Synthetic Aperture Radar (SAR) and European Incoherent Scatter (EISCAT) radar in Tromsø, Norway. The irregular electron density is characterized by tens of kilometers of band-like structures aligned in the east–west direction with small patch-like structures. We estimate the local change of total electron content (TEC) and the height of ionospheric irregularities. This event occurred under high levels of ionization of up to approximately 300 km in height triggered by nighttime particle precipitation. The observed structures are likely to be caused by precipitating electrons and may have been cascaded into smaller scales. This study demonstrates an example of spaceborne SAR imaging as a new tool for exploring small-scale horizontal variations in ionospheric electron density.