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Session 10B Paper 1

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Investigations of Polar Cap Ionosphere Structures using the Greenland Network (GNET)

TEC values from the Greenland network (GNET), complemented with additional GPS receivers that belong to the Canadian High Arctic Ionospheric Network (CHAIN), and 630.0 nm airglow emissions recorded with an imager located at Qaanaaq in Greenland are used to identify large-scale ionospheric structures produced by the passage of polar cap patches, Sun-aligned arcs, and other type of polar cap aurorae.

The TEC measurements presented here are restricted to the month of December 2009. Multiple observations of the structures employing different GPS receivers are used to calculate the velocity of the structures. As the patches move in the anti-sunward direction and the Sun-aligned arcs move in the Dawn-dusk directions, a good differentiation can be performed and identify individual structures associated with patches and arcs.

We demonstrate that TEC continuous measurement over Greenland can be used to investigate the appearance, velocity, and evolution of arcs, and patches and relate these measurements to the IMF, other solar wind parameters, satellite (e.g. DMSP) and radar (e.g. SuperDARN) measurements. Our observations indicate that during December 2009, more than 20 patches transit across Greenland, all moving in the anti-sunward direction. Several arcs are also detected within the polar cap that occur mainly when the Bz IMF component is directed north.