

Optical and radar observation of the dynamic auroral forms

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Ionosphere disturbances caused by the auroral electron precipitations are studied using auroral images taken by Auroral Large Imaging System (ALIS) and ionospheric parameters measured by EISCAT UHF radar that were conjugate with ALIS field-of-view. ALIS consists of several remote controlled stations located in northern Scandinavia, separated by approximately 50 km. Each station is equipped with a high-resolution CCD detector with 1024×1024 pixels, and a filter wheel with six positions for narrow-band interference filters. In this study we use the data obtained with the 557.7 nm filter, which show the auroral emission originated from the atomic oxygen. EISCAT UHF radar located in northern Norway near Tromsø operating in the BEATA program provides the ionospheric electron density, electron and ion temperatures, and ion velocity with the time resolution of 5 s and the spatial resolution of 1.5 km. The auroral images from the different ALIS stations were used for triangulation of the auroral forms in order to determine the aurora position in relation to the radar beam. For each auroral arc, the electron density, the electron and ion temperatures measured inside and in the vicinity of the auroral forms were analyzed with the aim of understanding the ionospheric response to the different types of auroral electron precipitations.

Keywords: aurora, ionospheric parameters, electron precipitations