EISCAT レーダーと多波長フォトメータを用いた電離圏電気伝導度推定

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Estimation of the ionospheric conductivity using data taken with the EISCAT radar and the multi-wavelength photometer

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An important aspect of the coupled magnetosphere-ionosphere system at high latitudes is to know horizontal two-dimensional distributions of the electron density or the conductance in the ionosphere. This is because the energy deposition in the coupled magnetosphere-ionosphere system is characterized by the fine structure, which tends to vary with time. Many researchers proposed methodology to estimate the two-dimensional distribution by using optical data taken with various wavelengths. While these researching activities allowed us to estimate the horizontal map of the ionospheric conductance with some confidence, the methodology has not yet been in complete agreement with results from the incoherent-scatter (IS) radar, which can provide height-resolved ionospheric data with better quality but in a restricted area. One of important issues to reduce the discrepancy is to develop more sophisticated method to be employed for estimating ionospheric parameters from the optical data.

To improve the method, we believe that the best way is to conduct experiments with the IS radar and the multi-wavelength photometer by fixing both line-of-sights along a magnetic field line. The experiment provides data taken in the same volume and at a same time resolution. Since this method can reduce uncertainty associated with spatiotemporal discrepancies in the monitored area with two instruments, differences between results from the two instruments should be attributed to the method employed on analyzing optical data except for some contaminations from the data error.

In this paper we analyzed data sets obtained for simultaneous observations between the European Incoherent Scatter (EISCAT) radar and the multi-wavelength photometer collocated at Tromsoe, Norway (69.6N, 19.2E). The presentation will address dependencies of the emission intensity measured with the multi-wavelength photometer on the height-integrated conductivity or conductance estimated from the EISCAT-radar data.