

KAIRA receiver as a multi-frequency riometer

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Continuous monitoring of the D-region ionosphere by a multi-frequency riometer mode has been carried out at the KAIRA receiver site, Kilpisjärvi, Finland. The main advantage of this technique over the traditional riometer is a possibility to invert the D-region electron density profiles from the measured absorption at multitude of frequencies. The inversion problem, however, turns out to be highly ill-posed and therefore the solution must be strongly regularised. In practise, there are two approaches to overcome this difficulty; one can either use a physical model proposing electron density profiles to match to the observed absorption, or then just propose parameterised smooth electron density profiles without physical constrains.

In this presentation, the analysis methods are discussed against the data gathered by KAIRA. In particular, we'll show a comparison between KAIRA data, analysed by a simplified physical model, and a simultaneous EISCAT VHF measurement, during intense electron precipitation. We also show some preliminary results of an active heating effect observed by the KAIRA multi-frequency riometer.