

Ground-based observations at Polar Geophysical Institute during conjunctions with Arase flybys over Scandinavia and Kola Peninsula

*Andrei G Demekhov^{1,2}, Boris V Kozelov¹, Alexey V Larchenko¹, Yury V Fedorenko¹, Elena E Titova¹, Alexey V Roldugin¹, Jyrki Manninen³

1. Polar Geophysical Institute, 2. Institute of Applied Physics RAS, Nizhny Novgorod, Russia, 3. Sodankylä Geophysical Observatory, Sodankylä, Finland

We present capabilities of optical and very-low frequency (VLF) ground-based observations of Polar Geophysical Institute (PGI) at Kola Peninsula and discuss perspectives of their use for conjugate ground/Arase studies of wave-particle interactions in the magnetosphere. We show examples of observations during Arase conjunctions with PGI sites. In particular, characteristics of the electron fluxes causing pulsating auroras have been obtained by triangulation techniques using data of Multiscale Aurora Imaging Network (MAIN) in Apatity. Two cameras with diagonal field of view 18 degrees are separated by 4 km distance that gives a possibility to deduce the altitude of auroral structures near local magnetic zenith. The time resolution of the data is 1 second. The cameras are equipped by optical filters that separate the blue-green part of the spectrum to exclude the influence of long-lived red emission line. Typical altitude of pulsating aurora forms was found to be in the range of 85-100 km. Simultaneous observations of VLF waves at Kola Peninsula are analyzed to find correlations with pulsating aurora patches observed by the cameras in Apatity and Lovozero. The estimated altitudes of pulsating auroras are in good agreement with the predicted energies of electrons that are in cyclotron resonance with the observed VLF waves. We discuss joint use of the data obtained by PGI and Sodankylä Geophysical Observatory which is located about 500 km westward. Simultaneous VLF measurements can help in locating probable directions to the geomagnetic flux tube from which the waves exit to the ground.

Keywords: pulsating auroras, VLF waves, conjugate observations