

LOCATING THE IONOSPHERIC EXIT POINT OF ELF/VLF EMISSIONS BY TRI-STATIC AMPLITUDE AND PHASE MEASUREMENT ON THE GROUND NEAR L=6.

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Tri-static ground-based observation of ELF/VLF waves has started around Syowa Station (L=6.1) in February 2006 in order to locate the ionospheric exit point of the natural ELF/VLF emission. These emissions are generated in the magnetosphere, propagate to the polar ionosphere, and then leak to the ground from some exit points where the condition for the wave penetration is favorable. The location of the exit point will be dependent upon a wave guide (duct) in the magnetosphere if it exists. Absorption condition at the D layer ionosphere also controls the exit point. ELF/VLF emissions are usually associated with energetic electron precipitation due to wave-particle interaction in the magnetosphere, and these electrons form a region of excess ionization in the D layer which absorbs the emissions. It is found from the imaging riometer observation that the absorption regions are not always uniform and there are sometimes spots of small absorption within them. These spots are candidate of the exit points. It is found from full wave calculation of a finite width whistler-mode wave beam penetrating the ionosphere, that the polarization on the ground is right-handed when the observation site is just below the exit point, and it varies to linear, and then left-handed as the observation site moves away. It is, therefore, possible to locate the exit point from amplitude and polarization measurement at multiple observation sites on the ground. We have deployed observation systems at two remote sites, H100 and Skallen, together with Syowa Station. They are ~80 km toward magnetic south and southwest direction from Syowa, respectively. We measure NS and EW components of the wave magnetic field by crossed vertical loops, and obtain intensities and relative phase between the two components at 4 frequency bands (0.5k, 1k, 2k and 6 kHz) with a sampling interval of 6s. Observed data are transferred to Japan via Iridium satellite telephone every day. Electric power of the system is supplied from a solar panel and lead acid batteries of 400 Ah. Data transfer by Iridium will be stopped during 4 winter months in order to save the power consumption within 1 W.