

Conjugate ground-based observations of field line resonance frequencies with high-spatial resolution in the auroral zones

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Surrounding Syowa station in Antarctica (mlat. -66.25, mlong. 71.62), three fluxgate magnetometers were installed in 2003. Four magnetometers including the one at Syowa formed a square of 100 ~150 km. We analyzed the data from the four Antarctic stations together with the geomagnetically conjugate station, Tjornes in Iceland (mlat. 66.53, mlong. 72.30).

In the coherence and phase analyses of geomagnetic pulsations, broadband noises with the period of 15 - 1000 sec were presented over the Antarctic stations, and the signature of field lines resonances (FLRs) were lost among the noises.

On the other hand, interhemispheric coherence analysis could filter out the broadband noises, and thus we could identify the resonance structure and determine the eigenfrequencies of the field lines between each station pairs. We infer that, in each hemisphere, broad ionospheric electrojets flowed in the ionosphere, and their temporal and spatial variations caused the broadband noises.

Coherence and phase analyses such as this study will be useful to monitor the eigenfrequencies of the magnetospheric field lines and infer the equatorial mass density with a high resolution ($dL \sim 0.01 - 0.23$) in the auroral zones.