Analysis of Pc 3-5 amplitudes by using inversion method

Yuki Obana[1], Akimasa Yoshikawa[1], Kiyohumi Yumoto[2], Circum-pan Pacific Magnetometer Network Group

[1] Earth and Planetary Sci., Kyushu Univ., [2] Space Environ. Res. Center, Kyushu Univ.

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In order to understand several factors, which affect Pc 3-5 magnetic amplitudes, Pc 3-5 magnetic pulsations at the coordinated Circum-pan Pacific Magnetometer Network (CPMN) stations were analyzed.

Amplitudes of magnetic pulsations observed on the ground can be expressed by

$$B = A\, F(MLT)\, f(LT) S$$

where A is amplitude of source wave, F(MLT) indicates magnetic local time dependence of amplitude in the magnetosphere , f(LT) is a function of ionospheric conductivities at local time of a station, and S is an amplification factor for each stations (Chi et al, 1996).

The geomagnetic data used here are from the CPMN stations at Chokurdakh (CHD; M.lat.=64.67 deg.,M.lon.=212.12 deg., L=5.46), Kotzebue (KOT; 64.52, 249.72, 5.40), and Macquarie Isl. (MCQ; -64.50, 247.84, 5.40) during the equinox seasons of 1994 and 1995. In the equinox, northern and southern hemispheres asymmetry of ionospheric conductivities can be neglected, thus, power ratio between KOT and MCQ can be considered to include a component of the local time difference factor: f(LT+dLT)/f(LT). By using the inversion method, contaminated information of F(MLT) and f(LT) can be derived from daily variation of power difference between CHD-KOT and CHD-MCQ. While, pure f(LT) component can be extracted from daily variation of power difference between KOT-MCQ, because they are geomagnetic conjugate points each other.

From the analysis, the following results are obtained.

The F(MLT) of H component of Pc 4 showed different diurnal variation by months and years. The f(LT) of H component of Pc 4 has the maximum around 6 and 18 LT, and minimum around 12 LT. The S of Pc 4 normalized by S at MCQ are 1.71~0.02 at KOT and 1.53~0.01 at CHD in the H component, and are 3.10~0.24 at KOT and 1.94~0.03 at CHD in the D component.

The minimum of f(LT) around local noon implies that the H component of Pc 4 is shielded by high conductivity ionosphere around noon. The very stable values of S are remarkable, because this result indicates a possibility that S is a good index of geological effects on magnetic pulsations.