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Longitudinal phase structures of Pc5 on the ground during Relativistic Electron Flux Enhancement at the Radiation Belt

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In this study, the magnetic data observed at H057 (MLat.=-66.42, MLong.=72.29) and Skallen (MLat.=-66.42, MLong.=70.53) in Antarctica are used to estimate the azimuthal wave number(m) of the Pc5 pulsations with the period of 150-600s. These two stations are located at the same latitude and spread in longitudes of 1.7 degrees. In general, the estimation of the azimuthal wave number of the Pc5 pulsations is difficult due to a strong latitudinal dependence of the field line resonance of the Pc5. The pair of the stations used in this analysis is quite suitable to estimate the azimuthal wave number.

In order to compare the temporal variations of Relativistic Electron flux Enhancement (REE) observed by GOES 10 satellite, the superposed epoch analysis for 24 CIR (Corotating Interaction Region) events is conducted for the horizontal component of the magnetic field data. As a result, although the Pc5 power increases corresponding to the increase of the solarwind velocity, the power of the H component becomes predominant after 0.5 days from enhancement of the Pc5 power, which corresponds to the apparent start time of relativistic electron flux enhancement (REE). This indicates that the toroidal oscillation of PC5 becomes predominant in the inner magnetosphere at the start time of the REE. Second, although the phase difference between two stations largely fluctuates before the start of REE, it shows certain values with small variances during the REE events. The estimated azimuthal wave numbers (m) of the H and D components are 1.62+/-0.99 and -2.25+/-2.86, respectively. The eastward propagation of the toroidal Pc5 with the low m number of 1.62 suggests that the relativistic electrons at the inner magnetosphere are accelerated by the drift resonance with the toroidal Pc5 pulsations.

Keywords: radiation belt, relativistic electron, ULF wave