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Relatioships between High-latitude Pc5 and MeV electron flux at the geosynchronous orbit

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The high-energy (MeV) Electron flux is well known as a cause of the serious internal charging of the spacecraft at the geosynchronous orbit. The enhancement of the MeV electron flux is thought to be related with the solar wind disturbances such as CME or CIR. However, the physical process that accelerate the seeds electrons to more than MeV cloud not be cleared, although some physical models has been discussed in the recent studies. Especially the ULF wave which is caused by the solar wind disturbances is recognized as the one of the potential candidate of the acceleration.
We investigated the wave characteristics of Pc5 (150-600s) pulsations observed on the ground to compare the enhancement of the MeV electron at the geosynchronous orbit. The stations used in this study are Syowa (MagLat.=-66.08, MagLon.=71.65), H057 (-66.42, 72.29), and Skallen (-66. 42, 70.53) where are in Antarctica. We note here the stations H057 and Skallen are located at the same magnetic latitude and at longitudes with distance of 2 degrees.
In this study, we attempted the three event-studies of enhancement of MeV electron flux which were observed by GOES satellite and DRTS satellite at the geosynchronous orbit on 25-31 Mar. 2 008, 7-11 Jul. 2008 and 27-29 Jul. 2008. In the First two events, typical CIRs were reached to the earth so that the solar wind velocities observed by the ACE increased up to 650km/s. The MeV electron flux at the geosynchronous orbit increased two days after the passage of stream interface. In these case the power of the Pc5 pulsations increased during the decreasing of the electron flux just before the enhancement, then decreased during the enhancement of the electron flux. The phase difference between the H057 and Skallen become small during the interval that the electron flux was increasing, though the phase difference was ~10 degrees before the increasing of the electron flux. On the other hand, in the third event, the electron flux decreased at the timing of the passage of the stream interface and there was no enhancement after that. In this case, the Pc5 power increased during the depression of the electron flux as well as the first two events. However the phase difference was not decreased in the third event.
The present result indicates that the azimuthal wave structures of the Pc5 pulsation may be an important point of the acceleration of the electrons rather than the Pc5 ower. The global mode oscillation of the Pc5 which represents the low azimuthal wave number could accelerate the electron by the drift-resonance.

Keywords: MeV electron, ULF wave, Geosynchronous Orbit