The relationship among relativistic electron flux in the radiation belt, solar wind and Pc 5 at the dip equator

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To clarify the mechanism of relativistic electron (>2MeV) flux increase in the outer radiation belt, we investigated the relationship among relativistic electron flux, solar wind parameters and Pc 5 pulsation at the dayside dip equator.

As the first step, we counted the number of electron flux increase events which occurred during 2005/01/01~2013/12/31 and checked whether magnetic storm occurred or not before electron flux increased by using the Dst index (WDC for Geomagnetism, Kyoto University). As a result, we found that storm events (Dst <-50nT) are 44% and storm-free events (Dst >-50nT) are 56%. Most of the previous studies investigated storm events, while storm-free events received little attention.

We selected storm-free events and investigated the variation of solar wind parameters (data of the ACE satellite, NASA GSFC) and Pc 5 at the dayside dip equator (data of the MAGDAS/CPMN, Kyushu University) before the electron flux (data of the GOES satellite, NOAA SEC) increased. As a result, we can see large increases of solar wind velocity (at least 300km/s) before relativistic electron flux increase. We can also see enhancement of Pc 5 activity at the dayside dip equator during relativistic electron flux is increasing. Enhancement of Pc 5 activity at the dayside dip equator means that convection electric field penetrated to the dip equator. This result suggests that monitoring of Pc 5 activity at the dayside dip equator can be good clue to clarify the mechanism of relativistic electron flux increases in the outer radiation belt. (i.e. Identification the type of Pc 5 which can cause radial diffusion.)