Characteristics of global Pc5 Observed at CPMN Stations

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Relativistic Electron Enhancement (REE) in the outer radiation belt occasionally damages spacecraft and leads to terrestrial communication outages during magnetic storms. The above phenomenon brings hazards to our life, so we need to clarify the acceleration mechanisms of REE during magnetic storms.

ULF waves are believed to contribute to REE. Previous studies indicate that high solar wind velocity and high long-duration Pc5 power in the storm recovery phase are closely associated with the production of relativistic electrons. However, no one has proven with hard evidence (i.e., observational data) the mechanism of how electrons accelerate to relativistic velocities. Particularly with ground-based observation, the power intensity of Pc5 pulsation associated with REE has been discussed, but where and which type of Pc5 modes has not been clarified. So our research motivation is to clarify how Pc5 modes are associated with relativistic electron enhancement.

Until now, only high latitude Pc5 has been treated in the early research on ULF relating to REE. However our recent study shows that the characteristic of global Pc5 is different between each latitudinal region. Before the relation between REE and Pc5 is discussed, we need to understand the characteristics of Pc5s occurring at different latitudes (high, middle, low, and equatorial) at different local times, thereby establishing the clear description of the spatial distribution of Pc5 modes.

We compared: (1) magnetic data from the CPMN (the Circum-pan Pacific Magnetometer Network), (2) solar wind data of ACE satellite. We found that the global Pc5 is roughly divided into two groups; the substorm associated Pc5 and the solar wind associated Pc5.

We will discuss with the characteristic of global Pc5 in order to achieve our motivation.