A correlation between ULF Pc5 wave power and geosynchronous relativistic electrons during solar wind high speed stream

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Significant flux enhancements of relativistic electrons have been commonly observed at geosynchronous orbit during the intervals of high-speed solar wind streams. ULF (Ultra Low Frequency) Pc5 wave has been considered as one of acceleration mechanisms for the relativistic electrons in the outer magnetosphere. Although Pc5 activity is responsible for the relativistic electron acceleration, it is not well understood whether Pc5 power is sufficient to make long-duration intervals of relativistic electron enhancement during high-speed solar wind streams. In our study we investigate the relationship between Pc5 power and the intervals of enhanced relativistic electron fluxes for a period characterized by high-speed solar wind streams from July 2003 to December 2003. We observed that the initial phase of the relativistic electron enhancement is associated with the Pc5 power enhancement. The enhanced Pc5 power, however, decreased quickly with decreasing solar wind speed even though the relativistic electrons remained enhanced level for several days. This indicates that all of the enhanced relativistic electron intervals are not associated with Pc5 activity. Using solar wind data, geosynchronous satellite data and low-latitude ground station data, we examine what are important physical factors to enhance relativistic electrons without Pc5 activity. In addition, we examine if there is compressional wave enhancement in the Pc5 band, which is associated with solar wind speed variations, at geosynchronous orbit.