The relationship between solar wind parameters and dayside equatorial Pc 4 pulsations

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We examined some properties of Pc 4 geomagnetic pulsations in the dayside equatorial region. Pc 4 pulsations are known to have properties in common with Pc 3 pulsations (T=10-45s) and Pc 5 pulsations (T=150-600s). At the same time, Pc 4 waves have properties unique to Pc 4 only. Systematic analysis of these properties of Pc 4 waves has not been done in literature. We also note that past studies on Pc 4 used data from high- to low-latitude ground stations, but almost no equatorial stations. Thus, in this study, we investigated dayside Pc 4 pulsations observed at equatorial Magnetic Data Acquisition System (MAGDAS)/Circum-pan Pacific Magnetic Network (CPMN) stations. Recorded waveforms and its dynamic power spectra were analyzed. Then, the detected ground ultralow frequency (ULF) waves were compared with solar wind parameters and AE index to verify the dominant controlling factor for the generation of dayside equatorial Pc 4 waves. The results show that the occurrence of dayside equatorial Pc 4 pulsations has local time dependence and peaks in daytime. Solar wind and AE parameters mainly appear to control the equatorial Pc 4 activity in dayside. The solar-wind-controlled Pc 4 waves are related with upstream waves when IMF cone angles are less than 45 degrees. Also, a fraction of these waves observed in daytime are related with ULF waves excited by high-speed streams (HSS) greater than 450km/s. The current Kelvin-Helmholtz instability (KHI) cannot explain generation mechanism for these waves. Therefore, we suggest another mechanism called velocity shear instability at dayside high-latitude magnetopause. As for the AE-related Pc 4 waves excited after Pi 2, these ULF waves were observed for more than 20 minutes during the substorm expansion phase and the recovery phase. We attribute these waves to plasmaspheric cavity oscillations continuously driven by the enhanced magnetospheric convection just outside the plasmasphere during the expansion to recovery phases.