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太陽風と太陽紫外線による土星オーロラ電波の長期変動
Long-Term variations of Saturn's Auroral Radio Emissions by the Solar Ultraviolet Flux and Solar Wind

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The long-term variations of Saturn's auroral current system have been suggested to be controlled by the seasonal variations of the polar ionospheric conductivities and atmospheric conditions associated with the solar ultraviolet (UV) flux. However, that long-term variations are not investigated in terms of the other controlling factors such as the solar wind variations in the timescale of the solar cycle. This study investigated the long-term variations of Saturnian Kilometric Radiations (SKR) as a proxy of the auroral current, which were observed by Cassini's radio and plasma wave experiment mostly during the southern summer (DOY 001, 2004 to DOY 193, 2010). We deduced the height distribution of the SKR source region in the northern (winter) and southern (summer) hemispheres from the remote sensing of SKR spectra. It was found that on average the southern (summer) SKR was 7 dB grater than the north (winter) in the spectral density, and the altitude of the southern flux peak (0.7 Rs) was lower than the north (0.9 Rs). The southern and northern spectral densities became comparable with each other around the equinox in August, 2009. These results suggest the stronger field aligned acceleration during the summer than the winter by the seasonal UV effect as opposed to the terrestrial one. The long-term correlation analysis was performed for the SKR and solar wind parameters extrapolated from Earth's orbit by the MHD simulation focusing on variations at timescales beyond several weeks. We found the clear positive correlations between the solar wind parameters and peak flux density in both of the southern and northern hemispheres during the declining phase of the solar activities. It is concluded that the solar wind variations in the timescale of the solar cycle controls the SKR source region in addition to the seasonal solar UV effect. The variation of SKR activity over both seasonal and solar cycles are discussed comparatively to the terrestrial case.

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