

Statistical analysis of ionospheric Pi2 pulsations observed at mid and low latitude by the SuperDARN Hokkaido radar

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Ultra-low-frequency waves with the periods of 40-150 s are categorized as Pi2 pulsations, which occur over a wide range of latitude in the night side at substorm onsets. To identify the generation mechanism of Pi2 pulsations, a number of studies using different devices such as ground-based magnetometers and satellites have been carried out. These studies provide spatial properties of Pi2 pulsations on the ground and in the inner magnetosphere and suggested that high- and mid-latitude Pi2 pulsations are associated with Alfvén waves in the auroral region, while the cavity mode resonance established in the plasmasphere by the fast mode waves has been proposed as a possible Pi2 source at mid and low latitudes.

The interaction of Pi2 pulsations with the ionosphere creates current systems that modify the amplitude and spatial scale size of the waves. In order to construct a coherent view of Pi2 signals measured by ground-based magnetometers, radars and satellites, the effect of the ionosphere needs to be understood.

In present study, statistical studies of Pi2 pulsations in the ionosphere were performed with the SuperDARN Hokkaido radar at Rikubetsu (AACGM magnetic coordinates: 36.5°, 214.7°). The radar can observe the Doppler velocity of ionospheric plasma due to the electric field of Pi2 pulsations in the mid- and low-latitude ionosphere. We investigated the spatial characteristics of the similarity, amplitude ratio, and cross phase between Pi2 pulsations observed by the radar and a ground magnetometer Memanbetsu (MMB) which is located close to the radar site. We will present the results and discuss the interaction of Pi2 pulsations with the ionosphere.