Plasmapause detection by analysis of high-latitude Pc 4-5 spectral patterns obtained at the CPMN stations

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One of the techniques for identifying the eigenfrequency of ULF waves is the dual-station H-component ratio method. In this paper, we have applied this technique to data sets obtained at three stations that belong to the Circum-pan Pacific Magnetometer Network, and found that the frequency dependence of the obtained dynamic spectral pattern in the afternoon sector is opposite to that in the morning sector. We suppose that drastic decrease in plasma density in the plasmapause boundary layar cause the opposite spectral pattern in the afternoon sector. This result suggests a possibility of plasmapause detection by using the ground magnetometer network.

One of the techniques for identifying the eigenfrequency of ULF waves is the dual-station H-component ratio method. In this paper, we have applied this technique to data sets obtained at TIK (L=5.98), CHD (L=5.55) and ZYK (L=3.97) that belong to the Circum-pan Pacific Magnetometer Network (CPMN), and found that the frequency dependence of the obtained dynamic spectral pattern in the afternoon sector is opposite to that in the morning sector. The pattern in the morning sector is that naturally expected for the Alfvén speed decreasing with increasing L-value, which is expected for the geomagnetic field strength decreasing with increasing L and the plasma density whose L dependence is not strong; such an Alfvén speed profile leads to the resonant frequency decreasing with increasing L, consistent with the observation in the morning sector. Our explanation for the afternoon-sector pattern is as follows: Because the plasmasphere has a larger radius in the afternoon sector than in the morning sector, we can expect that the ground stations were located within the plasmapause boundary layer in the afternoon sector. In the plasmapause boundary layer, the plasma density drastically decreases, and thus the Alfvén speed increases, with increasing L. Thus, the resonant frequency there increases with increasing L; this L dependence is opposite to that outside the boundary layer, and is consistent with the observed afternoon-sector pattern. This result suggests a possibility of plasmapause detection by using the ground magnetometer network.