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MAGADS/CPMN共役点磁場データを用いたFLR同定3手法によるプラズマ圏診断

Plasmasphere diagnosis by applying three FLR-detecting methods to data from MAGDAS/CPMN conjugate stations

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The plasmasphere has the radius of several Re, and is filled with high-density cold plasma of ionospheric origin. The plasmapause is the boundary layer of the plasmasphere, and the plasma density drastically decreases with increasing L in this region. Since the frequency of the field line resonance (FLR) is related to the plasma density, the ground-observed ultra low frequency (ULF) waves generated by the FLR are used for the purpose of diagnosing the plasmasphere. One method to determine the frequency of the FLR is the amplitude-gradient method, and another method is the cross-phase method. These methods use magnetometer data obtained at two stations close to each other. On the other hand, the H/D ratio method uses the magnetometer data obtained at a single station. This method is based on the theoretical expectation that the H-component oscillation should be strongest relative to the D-component oscillations at the FLR frequency. That is, a dynamic spectrum of the ratio of H to D-components shows a maximum or ridge at the FLR frequency.

MAGDAS/CPMN is a magnetometer network covering a wide range of the world, and has a long chain at the Japanese magnetic meridian. However, the chain has low spatial resolution for the amplitude-gradient and cross-phase methods. Thus, it is very important to use an FLR detection method that uses a single station.

In this paper, in order to examine in detail the consistency of the three methods when they are used for the plasmasphere diagnosis, we apply these three methods to the data from two MAGDAS/CPMN stations pairs observed from 2008 to 2009, and analyze the results on a statistical basis. The two station pairs are PTK (L=2.84) and MGD (L=2.09) located in the northern hemisphere, and HOB (L=2.92) and MLB (L=2.37) located in the southern hemisphere. We apply the amplitude-gradient method and the cross-phase method to the PTK/MGD and HOB/MLB pairs, and apply the H/D ratio method to each of the four stations. As a result, we found many signs of the FLR at the PTK/MGD pair and the HOB/MLB pair by using the amplitude-gradient and cross-phase methods. We could also detect signs of the FLR by using the H/D ratio method. The L-values of the field lines running through the midpoint of TIK/CHD and PTK/MGD

are 2.65 and 2.47, respectively. Thus, we could also check and compare the features of these methods at the near-conjugate points. We will show detailed results and discuss them in this conference.