R006-64
Zoom meeting B ：11/4 PM2 (15:45-18:15)
17:00〜17:15

ULF modulation of the D-region ionosphere observed by VLF/LF transmitter signals

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The Very low-frequency (VLF; 3-30 kHz)/low-frequency (LF;30-300 kHz) technique is most sensitive to the ionization of the D-region ionosphere, which is caused by energetic electron precipitation (EEP) with energies typically $>$100 keV (Rodger et al., 2012). Several studies have reported ionospheric modulations due to ultra low-frequency (ULF) Pc5 and Pi2 modulations (Asnes et al., 2004). Modulation of D-region due to ULF waves during a substorm was reported (Miyashita et al., 2020). However, it is still now clear how the ULF waves cause the modulation in VLF/LF transmitter signals. In this study, we investigate another EEP event which is associated with the ULF modulation that occurred in North America at 11:20-11:35 UT on October 9, 2017, using the VLF/LF transmitter signals. The four transmitters were NLK, WWVB, NDK, and NAA in USA. One receiver at Athabasca (ATH, 54.7 N,246.7 E,L=4.3), Canada was used. The time at 11:20-11:35 UT on October 9, 2017, was quiet time because the SYM-H, AE indices, the solar wind speed and dynamic pressure were stable up to 6 hours before this event. During magnetically quiet time, oscillations in amplitude of VLF/LF waves with a period of 200-300 s were observed on the NLK-ATHA and NDK-ATHA paths. Furthermore, the H-component of ground-based magnetic field variations around ATH and the low-latitudes showed periodic variations of 200-300 s. In this presentation, we will discuss the cause of these VLF/LF oscillations.