R005-38
Zoom meeting C ：11/2 PM1 (13:45-15:30)
13:45～14:00

火星熱圏電離圏にみられる密度擾乱の励起源

#中川 広務 [1), 吉田 奈央 [2), 堺 正太朗 [3), 原田 裕己 [4), 寺田 香織 [5), 寺田 直樹 [6), 藤原 均 [7), 今村 剛 [8), 関 華奈子 [9)
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Relative importance of possible sources on density perturbations in the Martian thermosphere and ionosphere

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Atmospheric waves are recognized as an important part of the upper atmospheric system. This work offers the in-depth compositional study of wave perturbations in density profiles in the Martian thermosphere and ionosphere. Recent missions revealed highly variable nature of the Martian upper atmosphere, which is the reservoir region for atmospheric escape to space. Large-amplitude perturbations (>50 %) of density and temperature ubiquitously exist in the Martian thermosphere (Bougher et al., 2015; Yigit et al., 2015; Terada et al., 2017; England et al., 2017; Nakagawa et al., 2020) and ionosphere (Mayyasi et al., 2019). The excitation sources of density perturbations in the Martian thermosphere and ionosphere are still open question. There are two possible sources to drive the perturbations: (1) atmospheric waves propagating from lower atmosphere, and (2) energy injected from above by external forcing, such as solar wind (SW), and solar energetic particle (SEP). In order to constrain the possible sources to drive perturbations, we examine the in-situ observations of CO2, N2, O, CO2+, and O+ density perturbations by NGIMS onboard MAVEN. Longer-wavelength perturbations caused by atmospheric gravity waves presumably from below are dominant in both dayside and nightside in thermosphere. The relative perturbations between CO2 and CO2+ indicates the thermosphere-ionosphere coupling. The effective thermosphere-ionosphere coupling in perturbations can be found in dayside northern hemisphere. On the other hand, ion-specific perturbations can be additionally identified in dayside southern hemisphere. In nightside, ion-specific perturbations are notably significant rather than dayside, especially in southern hemisphere. This is the effect of the crustal magnetic field in southern hemisphere, which possibly leads perturbations by precipitating electrons of the solar wind. Negative correlation between CO2+ and O+ perturbations caused by photochemical reactions can be found only in dayside. Photochemical imprint in dayside ionospheric perturbations suggests slow perturbations, longer than photochemical lifetime at these altitudes (10-100 sec), originated from thermospheric composition, in addition to fast perturbations with well in-phase between CO2+ and O+. Fast perturbations which immediately fluctuate all species in phase, presumably caused by precipitating electrons is the main driver especially in nightside ionosphere. This result coincides with the notable decrease of positive correlations between CO2 and CO2+ perturbations toward nightside, which suggests less coupling in perturbations between thermosphere and ionosphere in nightside.