R009-18
B 会場 ：11/7　AM1 （9:00-10:30）
10:00〜10:15

#益永　圭 [1)], 寺田　直樹 [2)], 堺　正太朗 [3)], 横田　勝一郎 [4)], 原田　裕己 [5)], 原　拓也 [6)], 臼井　寛裕 [1)]
([1] 宇宙研,[2] 東北大・理・地物,[3] 東北大・理・地球物理,[4] 大阪大,[5] 京大・理,[6]SSL, UC Berkeley

Variations of hot oxygen corona of Mars during a comet approach

#Kei Masunaga[1)], Naoki Terada[2)], Shotaro Sakai[3)], Shoichiro Yokota[4)], Yuki Harada[5)], Takuya Hara[6)], Tomohiro Usui[1)]
([1]JAXA/ISAS,[2]Dept. Geophys., Grad. Sch. Sci., Tohoku Univ.,[3]Dept. Geophys., Science, Tohoku Univ.,[4]Osaka Univ.,[5]Kyoto Univ.,[6]SSL, UC Berkeley

Ion pickup by the solar wind is a ubiquitous feature in space plasma. Because pickup ions are originally generated by ionization of the exospheric neutral atmosphere, their measurements contain information on the exospheric number densities. Here we establish a method to retrieve exospheric number densities, by analyzing ion velocity distribution functions of pickup ions measured by the SupraThermal And Thermal Ion Composition (STATIC) instrument on Mars Atmosphere and Volatile EvolutioN (MAVEN) spacecraft. We successfully reproduced exospheric oxygen density distributions from ˜500 to 10,000 km altitudes of Mars.

Using the retrieval method of exospheric number density, we examined variations of hot oxygen corona during a period when the comet Siding Spring approached Mars in October in 2014. We examined variations of O number density profiles every MAVEN orbit and found that number density of hot oxygen corona above 2000 km increased by a factor of a few after the comet approach. However, a Coronal Mass Ejection (CME) hit Mars ˜2 days before the comet approach, and a regional dust storm started to expand ˜2 days after that, and these events could have also affected the upper atmosphere of Mars. Thus, it was not straightforward to identify the cause of the change in hot oxygen corona and careful data analysis was necessary to understand effects of the comet approach.

In this presentation, we will show variations of the retrieved O number density profile before and after the CME, comet approach, and dust storm events, and discuss their time scales to discuss possibilities of direct cometary water transportation, sputtering by cometary pickup ions, and the Martian atmospheric heating effects by cometary atmosphere. We also discuss the CME and dust storm effects on the hot oxygen corona based on their onset timings and variation time scales.