LANGMUIR PROBE OBSERVATION OF MARS IONOSPHERE BY MAVEN/LPW. M. W. Morooka[1] and L. Andersson[1], B. Ergun[1], C. Fowler[1], T. McEnulty[1], G. Delory[2], A. Eriksson[3], D Andrews[3], D. L. Mitchell[2], J. P. McFadden[2], J. S. Halekas[4] , D. Larson[2], J. E. P. Connerney[5], J. Espley[5], and F. Eparvier[1], [1]Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO, 80303 (michiko.morooka@lasp.colorado.edu), [2]Space Sciences Laboratory, University of California, Berkeley CA 94720, [3]Swedish Institute for Space physics, Uppsala, Sweden, [4]Department of Physics and Astronomy, University of Iowa, Iowa, [5]NASA/GSFC, Greenbelt, MD, 20771

Introduction: One of the objectives of MAVEN science is to determine the electron densities and temperature structures of the Martian ionosphere. It can affect to both ionospheric chemistry and dynamics. For instance, the ion recombination rate increases in colder plasma, affecting the production and loss in the photochemically dominated region. The plasma scale height is also a function of the electron temperature. Therefore, an accurate electron temperature profile is crucial for modeling of Mars ionosphere.

The first *in-situ* ionospheric measurements were made by instruments onboard the Viking 1 and 2 landers, measured the altitude profile of the electron and ions density and temperatures [1, 2] as well as the composition of neutral and ion. Later, Mars Global Surveyor (MGS) and Mars Express missions have additionally provided a large data set the magnetic field, thermal plasma, and density profiles from the sounder [3, 4]. However, the electron and ion temperatures from the Viking/RPA (Retarding Potential Analyzer) still remain the only *in-situ* information on thermal plasma at Mars.

The result of Viking/RPA showed that the ion temperature increases with altitudes from 100 K at 120 km and up to few 1000 K at 300 km, where the ion density decreases with the altitudes. An inversely proportional relationship between the density and the electron temperature is expected from theory [5] in planetary ionospheres and observed around weekly-magnetized objects as well [6]. Viking/RPA revealed an electron temperature of about 3000 K in the 200-300 km altitude range. The electron temperature below 200 km could not be determined due to the complexity of the Viking/RPA data.

Theoretical models of the electron and ion temperatures have been constructed based on the Viking/RPA results. They pointed out that the EUV produced photoelectron heating alone is insufficient to explain the observed temperature profiles and heat inputs from the solar wind and/or modification of the thermal conductivity by the magnetic fields are required [7, 8]. Therefore, the information of the electron temperature and density below 200 km must be further needed to understand the ionospheric chemistry and dynamics of Mars.

MAVEN/Langmuir Probe observations: LPW is a dual cylindrical Langmuir Probe onboard MAVEN and designed to measure the density and the temperature of the electrons in cold plasma [9]. There are few Langmuir Probe measurements in planetary ionospheres other than for Earth. A spherical Langmuir Probe onboard Cassini (RPWS/LP) measures the electron density and temperature in the environment of the Kronian moon Titan's ionosphere [6, 10]. A Langmuir Probe, similar sensor type to the MAVEN/LPW, was onboard the Pioneer Venus Orbiter (PVO) and measured the temperature and the density of cold ionospheric electrons with occasionally observing non-isotropic Maxwellian characteristics due to the magnetic field configuration [11]. We will show the first results of the electron density and temperature characteristics of the Mars ionosphere observed by MAVEN/LPW. The Langmuir Probe voltage-current characteristics will be shown and the measurement environment in the ionosphere will be discussed in comparison with the previous planetary measurements.

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