



Radio Occultation Experiment for Probing Planetary Ionospheres

Varun Sheel and Jayesh Pabari

Physical Research Laboratory, Ahmedabad, India, 380009, e-mail: varun@prl.res.in; jayesh@prl.res.in

Radio occultation (RO) is an important measurement technique for studying planetary atmospheres. It is based on the measurement of the frequency shift of the received radio signal from the spacecraft, caused by the bending of radio waves in the atmosphere. The impact parameter and the bending angle are retrieved from the observed frequency shift, and subsequently yield vertical profiles of temperature, pressure and electron densities in the atmosphere of the planet.

Mostly the atmosphere/ionosphere of Mars is observed during the daytime [1]. Starting from Mariner to Mars Express exploration, nightside atmosphere/ionosphere is not understood in detail due to lack of measurements [2]. Only Viking 1 and 2 and Mars 4 and 5 have observed five/six electron density profiles, which represent ionospheric peaks in the nighttime. Other profiles do not show any peak in the nighttime ionosphere. The reason for disappearance of the nighttime ionosphere of Mars is not known. However, there are several models, which predict the nighttime ionosphere of Mars [1]. Therefore, the future observation in the nighttime is necessary at Mars.

In the talk I will discuss about a Radio Occultation experiment proposed for a future Indian planetary mission to Mars -its feasibility and design. I will also discuss the retrieval method and what information it will give about the planetary ionosphere

References

1. Varun Sheel and S.A. Haider, Long-term variability of dust optical depths on Mars during MY24–MY32 and their impact on subtropical lower ionosphere: Climatology, modeling, and observations, *Journal of Geophysical Research*, **121**, 2016, pp. 9123-9141.
2. S.A. Haider, K.K. Mahajan, and Esa Kallio, Mars ionosphere: A review of experimental results and modeling studies, *Rev. Geophys.*, in Press (2011).