EPSC Abstracts
Vol. 13, EPSC-DPS2019-2036, 2019
EPSC-DPS Joint Meeting 2019

EPSC
EPSC-DPS Joint Meeting 2019
15–20 September 2019 | Geneva, Switzerland

A New Experiment on MAVEN at Mars: Recent Results from the Radio Occultation Science Experiment (ROSE)

Michael Mendillo (1,2), Clara Narvaez (2) Paul Withers (1,2) and Marianna Felici (2)
(1) Department of Astronomy, Boston University, Boston, Massachusetts, USA, (2) Center for Space Physics, Boston University, Boston, Massachusetts, USA.

(Mendillo@bu.edu)

Abstract

In July 2016, a radio occultation science experiment (ROSE; [1]) was added to the Mars Atmosphere and Volatile EvolutioN (MAVEN) satellite that arrived at Mars in 2014 to study atmospheric and ionospheric escape. ROSE was made possible by using MAVEN's existing radio communications system with specialized receiver capabilities at the National Aeronautics and Space Administration Deep Space Tracking Network. MAVEN's *in-situ* instruments sample the Martian ionosphere along a trajectory that typically spans several degrees of latitude and longitude as it traverses the topside ionosphere (h > 150 km, and occasionally to ~130 km during deep-dip campaigns). ROSE complements these data sets by providing the full vertical electron density profile [N_e(h) from ~80 km to > 400 km] above essentially fixed locations. A total of 274 ROSE profiles have been obtained for the period of July 2016 – October 2018. The ROSE science yield comes from several aspects of variability linked to known morphologies. These include (1) *Ratios of secondary to main ionospheric layers* versus solar zenith angle (SZA) used to calibrate and validate the Mars Initial Reference Ionosphere (MIRI) model; (2*) Ratios of multiple layers* within the bottom-side ionosphere to provide information on variable meteoritic fluxes that penetrate to different depths within the lower atmosphere; (3) *Ionopause detections* versus SZA conditions and crustal magnetic field locations.

References

[1] Withers, P., Felici, M., Mendillo, M., Moore, L., Narvaez, C., Vogt, M. F., and Jakosky, B. M: First ionospheric results from the MAVEN Radio Occultation Science Experiment (ROSE). *Journal of Geophysical Research: Space Physics*, *123*, 4171–4180, 2018.