MAVEN RADIO OCCULTATION SCIENCE EXPERIMENT (ROSE) OBSERVATIONS OF THE IONOSPHERE OF MARS. P. Withers and M. Felici, Boston University, 725 Commonwealth Avenue, Boston, MA 02215, USA (withers@bu.edu, mfelici@bu.edu).

Introduction: Since July 2016, the MAVEN Radio Occultation Science Experiment (ROSE) has measured approximately 300 vertical profiles of ionospheric electron density. These profiles are distributed across all latitudes and cover solar zenith angles from 55 to 125 degrees. Vertical resolution is on the order of 1 km and electron density uncertainty is on the order of 2000/cm³. MAVEN ROSE performs two-way radio occultations at X-band frequencies on occultation ingress and egress. Initially, these observations occurred during dedicated Deep Space Network communications tracks using MAVEN's High Gain Antenna. This limited the observing cadence to two pairs of observations per week. Recently, additional ingress observations have been acquired using MAVEN's Low Gain Antenna, which improves the observing cadence at modest cost in data quality.

Context: ROSE electron density profiles complement MAVEN’s other ionospheric measurements, such as LPW electron densities, by covering altitudes below MAVEN’s periapsis. The main ionospheric peak is usually below MAVEN’s periapsis altitude and the lower ionospheric layer is always below MAVEN’s periapsis altitude. Furthermore, these observations can provide an independent calibration for MAVEN’s in situ density measurements. The MAVEN ROSE electron density profiles can be interpreted and analyzed in the context of simultaneous MAVEN observations of the solar irradiance, solar wind, and magnetospheric conditions, which will enhance research into how the state of the ionosphere is affected by these highly-variable external forcings. The topside ionosphere is of particular interest as a reservoir of escaping volatiles.

Scope: This presentation will provide an overview of these ionospheric observations. It will highlight: variations with solar zenith angles over a range 3 times greater than sampled by Mars Global Surveyor, including observations on the deep nightside; comparison to near-simultaneous density measurements by MAVEN’s in situ instruments; rare instances of low-altitude plasma layers; ionospheric responses to large and small dust events; and the ability to acquire observations using MAVEN’s Low Gain Antenna.