# A STATISTICAL STUDY OF ULF WAVE SCALES AROUND MARS USING MEX AND MAVEN OBSERVATIONS.

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**Abstract:** Mars has an induced magnetosphere, since the interaction between the magnetized solar wind and the ionosphere creates induced electric fields[1]. Ultra-low frequency waves have an important role in the energy transfer between solar wind and the Martian magnetosphere. In order to study the scale of wave trains in the vicinity of Mars, correlation lengths around the planet were computed for the first time, using MEX (electron density from 2004 to 2015) and MAVEN (electron density and magnetic field from 2014 to 2016) data. Correlation length is a characteristic length over which fluctuations in a variable are correlated[2]. We limited the study to the frequency range 8 to 50 mHz because previous studies have shown that ULF waves produced in the foreshock have highest power in this range. In this study the correlation length was calculated by an exponential fit employed to the autocorrelation curve. It was seen that the sizes of the plasma regions of the Martian Magnetosphere at the dayside are smaller than correlation lengths in these regions in both analyses, where it was 4.65 and 25 times the size of the magnetosheath and the magnetic pile-up region (MPR) for electron density MEX data, respectively. For MAVEN these ratios are 3.88 (magnetosheath) and 11.01 (MPB) in electron density and 1.55 and 5.51 in magnetic field, respectively. This result indicates that waves at the magnetosheath/MPR can be related to oscillations in the ionosphere. In a local region, wave trains may cause resonance effects at the planetary ionopause, which consequently can contribute to the enhanced ion escape from the atmosphere.

**References:**

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