Wave Penetration Through the Martian Ionopause as Observed by Mars Express

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ULF waves are considered as an essential factor in magnetospheric dynamics, since they can transfer energy and momentum from the solar wind into the inner magnetosphere. At Mars, where the magnetosphere is induced, the primary causes of low energy ion escape are the extreme ultra violet solar radiation and variations in solar wind pressure. ULF waves generated upstream in the solar wind can be converted to enhanced compressive waves in the magnetosheath. Magnetic shielding is unable to prevent that compressive ULF waves generated in the sheath can penetrate into the ionosphere. Their energy is dissipated in ionosphere and may provide additional energy to accelerate ionospheric ions, so that they can reach escape speed. thus contributing to the atmosphere erosion. Having in mind the important role of waves produced in the magnetosheath in the loss processes of the Martian atmosphere , search for evidence that ULF waves can penetrate in the ionosphere is of great value. Of special interest are cases where waves produced upstream of the bow shock can propagate through the ionopause, proving the direct effect of waves on atmospheric erosion. In order to investigate cases where the waves observed in the magnetosheath penetrate into the ionopause of Mars, magnetosheath crossings by Mars Express (MEX) have been studied. In order to conduct this survey, plasma parameters and magnetic field data from the instruments Analyzer of Space Plasmas and Energetic Atoms experiment (ASPERA-3), and Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS), respectively, onboard MEX, have been analyzed for the period between 2005 and 2015. After an analysis of a total of 428 magnetosheath crossings**,** a total of 29 cases have been selected as potential cases of wave penetration into the Mars ionosphere for more detailed analysis. A preliminary study of these cases is presented here.