

Space weather effects on the Mars ionosphere due to solar flares and meteors

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Using data from the Radio Science Experiment onboard the Mars Global Surveyor (MGS) satellite, we have observed two aspects of space weather at Mars. Following solar flares of both moderate to strong magnitude, bottomside portions of martian electron density profiles (90-110 km) show enhancements of 50 to 200%. These are caused by increases in the soft X-ray fluxes in the ~ 20 -50 Å wavelength range. We shall discuss the simultaneous responses of the ionospheres of Earth and Mars to solar flares, highlighting the importance of secondary ionization processes. The Mars ionosphere generally contains two layers, an upper layer controlled by solar EUV photons and a lower layer controlled by X-rays. Mars Express Radio Science results have shown an even lower, but sporadic, third layer attributed to meteors. We shall present MGS observations of this third layer, focusing on interannual and seasonal variability. MGS observations are particularly suited to this focus, since MGS has recorded 5000 electron density profiles over 4 Mars years.