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Plasma Characteristic Determination During the Coronal Mass Ejection Associated with the January 27, 2012 Solar Storm

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On January 27, 2012, an X-class flare was launched from the Sun at 18:15 UT. The X-class flare generated a high-energy particle stream flowing along the Interplanetary Magnetic Field (IMF) which arrived at Mars in about 39 minutes, with the resulting Coronal Mass Ejection (CME) arriving at Mars several days later. The Electron Spectrometer (ELS), part of the Analyzer of Space Plasmas and Energetic Atoms (ASPERA-3) experiment on the European Mars Express (MEx) Spacecraft, is used to show that the effect of the CME plasma caused an increase in the intensity of the energy flux within the Martian magnetosheath. Models of this event predicted the speed of the CME, which is used to identify which increase of the magnetosheath signature is due to the CME relating to this flare as several increases in Martian magnetosheath plasma are observed during the flare period. The Mars reaction, being an induced magnetosphere, responds to changes in solar wind conditions by continually self adjusting its magnetosheath to stand off the solar wind. Since the ion component of the solar wind interaction carries momentum away from the Sun, it is the electrons which must self adjust in order to maintain charge neutrality within the plasma and the proper induced current flow in order to stand-off changes in the solar wind. Here we examine the electron plasma properties during the forward CME shock in the Martian magnetosheath and describe the plasma conditions.