



Magnetic Storms at Mars

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In analogy with magnetic storms at the Earth, periods of significantly enhanced global magnetic activity also exist at Mars. The extensive database of magnetic measurements of the Mars Global Surveyor (MGS), covering almost an entire solar cycle, is used in combination with solar wind measurements near Earth to investigate these events. Based on superposed epochs analysis and examination of individual events the time-development of typical magnetic storms is described. Solar wind parameters measured by ACE are propagated to Mars, and the resulting predicted solar wind variations near Mars are compared and verified using clock-angle estimates based on the MGS-data. Large-scale heliospheric structures can be clearly distinguished, and the analysis shows that many storms are associated with compression regions in front of co-rotating interaction regions.

The investigation is made in preparation of the Mars Surface Magnetic Observatory, an experiment planned as part of the Humboldt payload on ExoMars, with a wide range of science objectives from the upper atmosphere to the planetary interior. Due to the solar wind interaction with the Martian atmosphere an induced magnetosphere is formed. Currents are generated to shield the day-side ionosphere, but, particularly during storms, this shielding is believed to brake down. With the MSMO we will investigate the efficiency of the shielding and the morphology of the ionospheric currents, as well as monitor the state and the variability of the induced magnetosphere by monitoring the magneto-tail.