

Survey of dayside reconnection signatures at Mars with MAVEN

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We present a preliminary survey of magnetic reconnection signatures observed in the upper ionosphere of Mars. A variety of recent measurements from MAVEN suggested that magnetic reconnection likely takes place on both dayside and nightside of Mars. For nightside reconnection signatures in the Mars' magnetotail, a statistical analysis revealed notable asymmetry in their spatial distributions with respect to the motional electric field in the upstream solar wind (Harada et al., 2017), demonstrating that these statistical properties could provide valuable information on the driving mechanisms of magnetic reconnection processes at Mars. In contrast to the relatively well-studied nightside counterpart, the dayside reconnection at Mars has been examined only for very limited cases (Halekas et al., 2009; Harada et al., 2018), and its statistical properties remain unclear. Such information would have important implications for global dynamics of the Martian magnetosphere because it is proposed that the dayside reconnection plays a major role in changing magnetic topology and morphology not only in the dayside upper ionosphere but also in the nightside magnetotail, thereby globally modifying pathways of escaping ionospheric ions. Here we conduct a systematic survey of dayside current sheet crossings and reconnection signatures embedded therein in a similar manner to the previous nightside survey. We will discuss the occurrence rate, spatial distributions, and upstream driver control of the reconnection signatures detected in the dayside upper ionosphere of Mars.

Keywords: Mars, magnetic reconnection