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**Title:** Statistical study of characteristics of boundary layer between the magnetosheath and Martian ionosphere

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### **Abstract**

Since Mars has no intrinsic global dipole magnetic field, the direct interaction between the solar wind and Martian upper atmosphere occurs. This interaction cause the momentum and energy transport from the solar wind to the Martian upper atmosphere in the boundary layer. Recently, in-situ observations from the Martian spacecraft show the Martian plasma region and boundary have some fluctuations. However, it has not been clarified what physical mechanisms occur in that layer.

We statistically investigated the Martian ion and electron data from Mars Express (MEX) satellite for 10 years (2004/01-2013/12) in order to know the characteristics in the Martian plasma boundary between the magnetosheath and the Martian ionosphere. We found that there are two patterns of the electron flux variation in the boundary layer. One of two patterns has the monotonic increasing of the electron flux over 50 eV in the boundary layer (monotonic boundary event). The other does not have the monotonic increasing (non-monotonic boundary event). We report the dependence of those events on the solar wind moments (dynamic pressure, density, and velocity).