

Range of possible variations in the atmospheric escape from Mars

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We discuss the dependence of the ion escape flux from the Martian atmosphere on the solar wind and ionospheric conditions. The escape occurs through the vertical and horizontal transport of ions under the electric field produced by the solar wind-Mars ionosphere interaction. We show that the sign and the magnitude of the vertical drift of ions depend critically on several solar wind/ionospheric parameters including the solar wind dynamic pressure, ionospheric electron temperature, and ion-neutral drag force which depends on the atmospheric density.

Based on the MHD simulation results including the ionospheric chemical processes and ion-neutral collisions, we discuss the possible ranges of atmospheric escape from Mars for various ranges of solar wind and ionospheric conditions in the history of Mars.