

MAVEN/IUVS Nadir Observations of Discrete Aurora on Mars: Insights into Regional Local Time Control and Magnetic Reconnection

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The following is an excerpt from a longer piece. For full text, please visit https://scholar.colorado.edu/concern/undergraduate_honors_theses/cj82k859v

Abstract

Discrete aurora are sporadic ultraviolet emissions on Mars. These emissions, which occur globally and in the upper atmosphere of Mars, are strongly correlated with martian crustal magnetic field. Crustal fields on Mars form from remanent magnetism locked in the crust, and vary in strength across the disk, with the strongest fields located in the southern hemisphere. Previous studies using data taken by the MAVEN spacecraft has revealed hundreds of detections in limb viewing and a single detection in the nadir observations. Further analysis of all nightside MUV nadir-viewing observations taken by the MAVEN Imaging Ultraviolet Spectrograph (IUVS) instrument has revealed approximately two hundred additional discrete aurora detections. While aurora occur globally and sporadically, events in the strongest crustal magnetic field regions of the martian southern hemisphere show high repeatability. Previous work reported using IUVS limb observations (Schneider et al., 2021) revealed detections occurring before midnight; the emissions identified in the nadir dataset show detections both occurring before midnight and after midnight in the strong field region. We find a previously unreported correlation and between local time and geographic location, with two distinct auroral event groups manifesting pre- and post-midnight in separate but adjacent locations in the strong field region. Magnetic field reconnection may explain this regional local time control of discrete aurora on Mars.

