

## **Analyzing Space Weather at Mars with MAVEN**

Gina A DiBraccio, Phil Chamberlin, Christina Lee, Janet Luhmann, Leila Mays, Yari Collado-Vega, Michelangelo Romano, Dave Mitchell, Shannon Curry, Masha Kuznetsova  
And the MAVEN, M2M, CCMC teams

To understand the processes driving Martian atmospheric escape to space, the MAVEN mission has been monitoring solar inputs at Mars since the spacecraft went into orbit in September 2014. MAVEN's payload provides in situ measurements of solar wind ions and electrons, solar energetic particles, extreme ultraviolet radiation, and magnetic fields. With this comprehensive suite of instruments, the MAVEN team has monitored space weather at Mars for nearly a decade, over various parts of Solar Cycles 24 and 25. MAVEN observations have determined that space weather activity can deposit enough energy into the Martian system to enhance atmospheric escape by an order of magnitude. As the mission continues, monitoring space weather at Mars has become increasingly important to understand the Sun's influence on the Martian environment. The MAVEN team provides regular reports of space weather activity, such as the occurrence and arrival time of coronal mass ejections as well as flare magnitude and peak times, to the Mars community when predictions suggest that a space weather-impacting event may be directed towards Mars. MAVEN provides observations of solar activity on the 'far side' of the Sun when Earth and Mars are near solar conjunction to augment measurements of solar observatories (e.g., SDO, STEREO, GOES, PSP, Solar Orbiter), providing a more global coverage of solar activity. Additionally, MAVEN is working closely with the Community Coordinated Modeling Center (CCMC) and the Moon to Mars (M2M) Space Weather Analysis Office, both located at NASA GSFC, to form the Mars Space Weather Collaboration. This collaboration utilizes MAVEN observations of space weather activity to facilitate model and prediction validation while creating tools that are available to the science community. These activities are in support of future human and robotic exploration as we identify needs to enhance current capabilities for analyzing space weather at Mars.