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One of the largest drivers of planetary evolution is the sun. Not only is the nominal solar wind an important energy input, but space weather events today, such as flares, coronal mass ejections (CMEs) and stream interaction regions (SIRs) offer a glimpse of what solar conditions may have looked like during an earlier and more active epoch of the sun. Over solar cycles 22-25, numerous spacecraft have observed the sun-planet interaction. In particular, the Mars Atmosphere and Volatile EvolutioN (MAVEN) mission has made the most detailed observations to date of how the upper atmosphere responds to the solar wind and space weather events.

In this talk, I will present how robotic spacecraft have observed solar activity at Mars and what we can learn scientifically as well as how to safeguard future assets. I will present a full catalogue of the space weather and solar activity that MAVEN has observed since orbit insertion and quantify the effects of solar activity on atmospheric erosion. Atmospheric escape is particularly important for understanding the history of water on Mars; for water to have existed in liquid form on the surface, the atmospheric pressure had to have been substantially higher than it is today. I will also present extrapolations of these results back in time when our sun was younger and more active, serving as an analogue for other stellar systems with exoplanets.
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