4CF17-2017-000250
Note schedule request (previously emailed) limits me to a Saturday presentation

Abstract for an Invited Paper
for the 4CF17 Meeting of
the American Physical Society

Gone with the (solar) wind: Escape to Space of the Ancient Martian Atmosphere[1]

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The Martian atmosphere today is too cold and thin for liquid water to be stable on the surface of the planet, yet the Martian surface contains abundant evidence that long-lived liquid water has played a prominent role in shaping the surface. We infer that the atmosphere has changed considerably over time, from a more substantial atmosphere billions of years ago to the tenuous atmosphere that exists today. What happened to the ancient atmosphere? Some portion could have been incorporated into the surface and subsurface over time, and some could have been removed to space via several distinct physical processes. Due to the small size of Mars relative to Earth and the lack of a global magnetic field to shield the atmosphere from the impinging solar wind, it is thought that escape to space could have been considerable over Martian history. The Mars Atmosphere and Volatile EvolutioN (MAVEN) mission has been in Mars orbit since late 2014, making measurements relevant to the removal of atmospheric particles to space. We will discuss the rationale for the important of atmospheric escape at Mars, the physical processes involved (Ohm's Law! Thermal Escape! Photochemistry! Collisions!), and the MAVEN observations that have allowed us to evaluate the importance of atmospheric escape in altering the Martian climate. Finally, we will discuss the implications of MAVEN's observations for atmospheric evolution at planets everywhere.

[1]The MAVEN mission is funded by NASA's Mars Exploration program