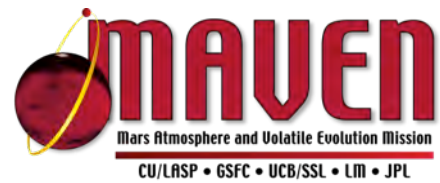
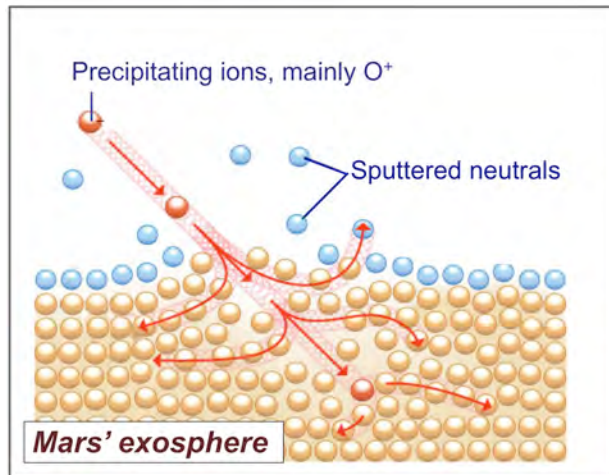
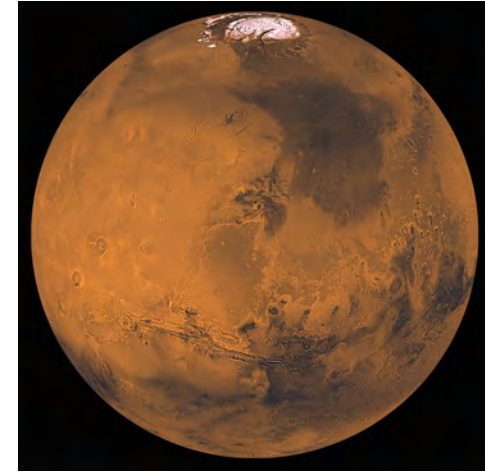


Mars Climate Change: Where Did The Gas From An Early, Thick Atmosphere Go?



- Geological and mineralogical evidence suggests Mars once had a thick atmosphere and flowing liquid water. What happened?
- MAVEN has been examining whether processes driving loss of atmospheric gases to space were important in Mars' history.
- One process called “sputtering” – in which atmospheric ions energized by the incident solar wind crash back into the atmosphere as illustrated below – can eject heavy atoms.



- Sputtering preferentially removes lighter isotopes relative to heavier ones. The ratio of argon-36, relative to the heavier argon-38 at ~200 km altitude is a particularly useful indicator of sputtering loss.
- The argon isotope ratios measured on MAVEN suggest about 66% of the argon gas was removed by this process.
- The results also apply to major atmospheric gases such as CO₂; CO₂ also has been removed by other processes, so this amount represents a minimum amount lost.

The MAVEN argon isotope results tell us that the majority of Mars' atmospheric gas was lost to space, changing Mars from its early warm, wet climate to the cold, dry planet we see today.