Kinetic and potential sputtering of lunar regolith: The contribution of the heavy highly charged (minority) solar wind ions

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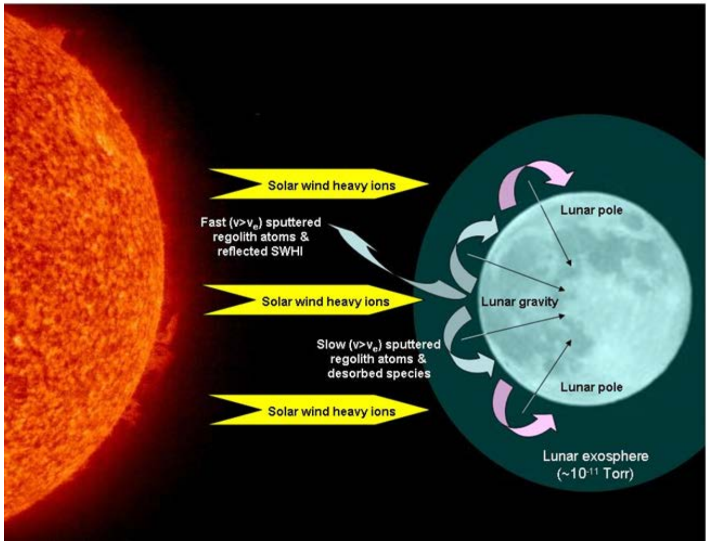
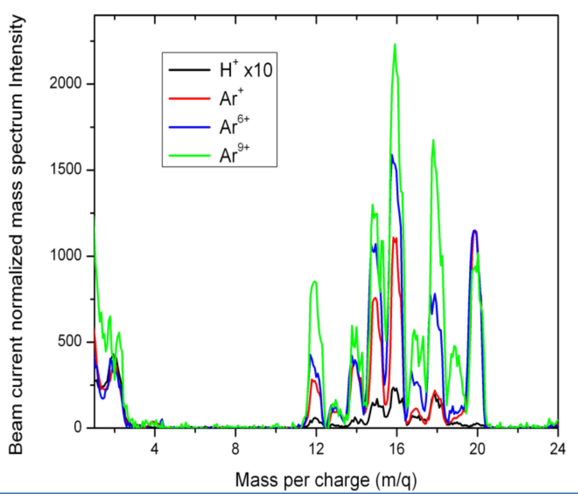
In a nutshell…

- Solar wind sputtering of the lunar surface helps determine the composition of the lunar exosphere and contributes to surface weathering.
- To date, only the effects of the two dominant solar wind constituents, H^+ and He^+, have been considered.
- The heavier, less abundant solar wind constituents have much larger sputtering yields because they have greater mass (kinetic sputtering) and they are highly charged (potential sputtering)
- Their contribution to total sputtering can therefore be orders of magnitude larger than their relative abundances would suggest



Comparison of normalized sputtering signal from lunar regolith simulant JSC 1A AGGL



The Experiment…

We have carried out laboratory sputtering measurements of lunar soil simulant, using a quadrupole mass spectrometry approach:

- 362 eV/amu H^+, Ar^+, Ar^{+6}, Ar^{+9} ions incident on JSC 1A simulant
- Proton dosing to fluences of ~ 3 x 10^{18} H^+/cm^2 prior to Ar^{q+} exposures to study enhanced OH production by Ar^{+6} and Ar^{+9}

Intermediate step of lunar water formation ??

For more, see our poster !