

Lunar Hydrogen Distribution after KAGUYA(SELENE)

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1 Abstract

[1] found evidence of hydrogen near the lunar poles using data collected by the neutron spectrometer on board the Lunar Prospector. [2] strongly suggested this hydrogen is concentrated into the permanently shaded ‘cold traps’ near the lunar poles. This is important because if the hydrogen is to be in the form of a volatile compound, then it is only stable within these ‘cold traps’. As the most likely candidate is water ice [3], this is of relevance both for improving the understanding of the solar system and for the upcoming lunar exploration.

If the hydrogen is distributed throughout the polar regions in a more uniform way, then it is more plausible that it is merely the result of the solar wind implanting hydrogen into the regolith [4]. The excess of polar hydrogen would then be a consequence of the lower polar temperatures reducing the rate at which it diffuses out of regolith grains. Discriminating between these two scenarios hinges on an improved determination of the spatial distribution of the polar hydrogen using a more sophisticated method of analysis and a better map of permanent shadow.

This talk presents the results of applying a Pixon image reconstruction approach to the Lunar Prospector epithermal neutron data coupled to the shadow maps drawn from the preliminary KAGUYA (SELENE) laser altimetry observations [5]. These results have been provided to the LCROSS targeting team, which is slated to impact into a potential ice-bearing permanently-shadowed location at the Moon’s south pole.

References

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