LRO-Lyman alpha mapping project (LAMP) far-UV maps of the lunar poles

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Abstract. The Lyman Alpha Mapping Project (LAMP) instrument on-board Lunar Reconnaissance Orbiter (LRO) is a UV spectrograph covering the spectral range of 57-196 nm. LAMP produces 240 m/pixel far ultraviolet (FUV) albedo maps. The albedo maps can be used to investigate the intriguing albedo differences that occur within permanently shaded regions (PSRs) near lunar poles. The FUV albedo maps of the lunar poles indicate that the coldest, permanently shadowed regions (PSRs) in deep polar craters have significantly lower Lyman-alpha albedo than the surrounding regions, which is best explained by a high surface porosity there-possibly related to the accumulation of volatile frosts. LAMP measurement indicate ~1-2% surface water frost abundances in a few PSRs based on spectral color comparisons, and we find that many PSRs may have porosities of ~0.7 based on relatively low albedos at Lyman-α[1]. Also, to better interpret LAMP observations of the moon and its PSRs, we've developed an experiment to measure the reflectance properties of Apollo samples, lunar simulants, and water ice at FUV wavelength regions. Named the Lunar Ultraviolet Reflectance Experiment (LURE), the characterization of the FUV bidirectional reflectance distribution function (BRDF) of these materials will help improve LAMP data analysis and improve its search for surface water features on the Moon.

[1]Gladstone, G. R. et al., *J. Geophys. Res.*, 117, E00H04 (2012)