**OPTICAL DETECTION OF THE LUNAR IMPACT-GENERATED DUST EJECTA CLOUD BY LRO/LAMP.** D. A. Glenar¹, T. J. Stubbs², C. Grava³, and K. Retherford¹ ¹University of Maryland, Baltimore Co., Baltimore, MD, ²NASA Goddard Space Flight Center, Greenbelt, MD, ³Southwest Research Institute, San Antonio, TX. *Corresponding author: dglenar@umbc.edu

**Introduction:** Sunlight scattered by dust ejected into the lunar exosphere from meteoroid impacts has been detected in limb observations using the Lyman Alpha Mapping Project (LAMP) UV slit spectrograph aboard the Lunar Reconnaissance Orbiter (LRO) spacecraft. This demonstrates the potential for remote sensing observations to characterize the Moon’s ejecta cloud, complementing the information learned from in situ measurements.

Four dawn and four dusk observations, made by LAMP during 2012 and 2013 as part of a search for low altitude dust [1] were reanalyzed. Forward scattering by dust was observed above the low latitude dawn limb and near the long wavelength end of the spectrograph coverage (~167-192 nm) with the spacecraft in lunar shadow. The dust signal was observed to be superimposed on the UV zodiacal light (ZL) background, which appears above both dawn and dusk limbs.

**Supporting Simulations:** The dust measurements were confirmed by comparing the measured excess light with dust scattering simulations, using the low latitude dust distribution inferred from in situ measurements by the LADEE Lunar Dust Experiment (LDEX) [2,3]. Line-of-sight dust concentration could be computed using the known LAMP pointing geometries. Scattering properties of nonspherical grains were taken from a library of Discrete Dipole (DDA) computations [4]. The zodiacal light component was simulated using visible wavelength ZL maps [5], extrapolated to UV wavelengths based on results of early UV rocket photometry [6].

**Results:** Uncertainties in the measured dust measurements arise from several sources: (i) low measurement signal-to-noise, (ii) the uncertain zodiacal light brightness, (iii) grating scattered Lyman alpha within the instrument and (iv) spatially variable background light from faint, unresolved UV stars, which becomes worse for observations pointed near the galactic plane. Approximate corrections for (iii) and (iv) could be made by differencing the dust-band data with that from a shorter wavelength reference band where dust scattering is minimized.

To within these uncertainties, the LAMP measurements are in agreement with the dust detector results that show an asymmetric, impact-generated ejecta cloud with much higher abundances around dawn than dusk. This is illustrated in the sample result figure below which compares a dawn simulation and smoothed measurement. Contour lines show solar elongation angle. The LAMP measurements also reveal significant brightness contributions from grains smaller than the LDEX discrete detection threshold radius of ~ 0.3 microns.

This study provides a motivation for future ejecta cloud measurements by LAMP, as well as specific guidance for improving the quality of those measurements. Optimized observations by LAMP should be able to further constrain the properties of the ejecta cloud as well as its high latitude spatial distribution.

![DAWN Simulation (Dust + ZL)](image)