

Using the Moon to Characterize the Near-Earth Meteoroid Environment

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Abstract. The Lunar Dust Experiment (LDEX), aboard NASA's Lunar Atmosphere and Dust Environment Explorer (LADEE) mission detected multiple impact rate enhancements throughout its orbit around the Moon. LDEX measures impacts from dust grains launched from the surface of the Moon in ejecta plumes generated by impacts of cometary or asteroidal micrometeoroids striking the lunar surface. LDEX typically recorded a single hit per minute, it would periodically detect bursts of 10's to 100's of particles in less than a minute. These bursts are attributed to LDEX flying through an uncharacteristically dense ejecta cloud. Four out of the five largest enhancements to LDEX's impact rates are attributed to known meteor showers. However, one of the five enhancements does not belong to any well-established meteor streams, and a previously uncatalogued stream is proposed to have encountered the Earth-Moon system in late March, 2014. We use the Geminids as a test case to verify the accuracy of identifying the radiant for a known meteor stream. An estimate for the radiant of the putative meteor stream is calculated and will be discussed. Identifying and characterizing the spatial and temporal variability of the dust environment of airless planetary bodies provides a novel way to understand their meteoroid environment by effectively using these objects as large surface area meteoroid detectors. Measurements from similar dust detectors orbiting the moons Phobos and Deimos would greatly improve our knowledge of the Martian meteoroid environment, and improve the safety for future manned and unmanned missions to Mars.