SLAM: synthetic lunar atmosphere mission

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Abstract: Tenuous exospheres, such as the Moon's, are among the most common planetary atmospheres found in the solar system[1]. The Synthetic Lunar Atmosphere Mission (SLAM) is a concept to explore the behavior of the lunar surface boundary exosphere in response to a comet-like impact. The concept of SLAM consists of using the Atlas V launch vehicle to send a large payload of H_2O or other volatiles on a low-energy Hohman transfer orbit, which will impact the lunar surface. The resulting impact and volatile transport can then be observed via earth-bound and orbiting observatories. Furthermore, SLAM may provide the means for low-cost water resupply to a lunar outpost by harvesting water from the impact site. I present here the architecture needed to observe such an event, as well as initial experiments to assess the efficacy of using SLAM as water resupply technique for a lunar outpost. The experiments include impact studies about vaporization yields upon impact, as well as sublimation rates of water embedded in the lunar regolith.

[1] Stern, S.A., *Reviews of Geophysics*, 37, 453-491, 1999.