

Spillage of Polar Crater Resources onto Adjacent Terrains, W. M. Farrell^{1,3}, M. I. Zimmerman^{2,3}, & D. M. Hurley^{2,3}, 1. Solar System Exploration Division, NASA/Goddard SFC, Greenbelt MD; 2. Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; 3. NLSI/SSSERVI, NASA/Ames RC, Moffett Field, CA. (William.M.Farrell@nasa.gov)

Abstract: We present an investigation of the release and transport of polar crater volatiles onto topside regions adjacent to the cold traps. The volatiles are liberated via surface energization processes associated with the harsh space environment, including solar wind plasma sputtering and impact vaporization. We demonstrate that such processes can transport cold-trapped volatiles to lower latitudes, possibly accounting for a portion of the mid-latitude water and OH veneer observed in the IR (the 3 micron absorption feature). We also demonstrate that some fraction of these volatiles can migrate from crater floors onto regions directly adjacent to the polar craters, and that the topside terrains should contain a sampling of the material originating within the crater itself. It is concluded that to derive volatile content in the crater, it may not be necessary to explore the cold, non-illuminated crater floors. Instead, the nature of the crater volatiles can be obtained by sampling the surface volatiles that have migrated or 'spilled out' onto the adjacent terrain. This 'spillage' effect could make human or robotic exploration of crater resources significantly easier, since an analysis may not require direct entry into the very harsh polar crater environment.

