THE SURFACES OF THE MARTIAN SATELLITES: MYSTERIES, CONUNDRUMS, AND RELATIONS TO OTHER SMALL OBJECTS. P. C. Thomas[1] [1]Center for Radiophysics and Space Research, Cornell University, Ithaca, NY, 14853; pct2@cornell.edu.

Introduction: Sporadic exploration of the Martian moons by spacecraft and earth-based means over the last thirty years has revealed two very different objects, each presenting nearly unique assemblages of surface features among small solar system bodies. As with the origins of these moons, the development of these surfaces remains controversial. External or internal origins for the grooves on Phobos are both still proposed, and analogies among asteroidal and cometary objects studied in great detail in the last 15 years do not unequivocally resolve the issue by themselves. The apparent self-burial by Deimos has not received detailed testing, either in further work (spacecraft views after Viking are minimal compared to those of Phobos) or in advanced studies of potentially analogous objects.

The real problems: The geography of grooves, largely determined in the Viking era, still causes problems in interpretation, as they are often incorrectly referred to as being radial to the large crater Stickney, and the planes and other surfaces they define are minimally applied. Confusion about the grooves' origin(s) also complicates interpretation of more general regolith and structural properties of Phobos. Structural studies also are affected by lingering uncertainties in the masses and mean densities of the Martian satellites. Crater morphologies lack modern comparisons to those on other satellites, small and large. Deimos' smoothed character, putatively due to massive ejecta covering from a large impact, might instead represent compositional and porosity effects upon surface regolith transport. Even basic crater density data are not fully developed versus other objects.

The review: This presentation focuses on the interpretaive problems of the surfaces of the satellites and in particular ways that more recently studied objects, such as asteroids, small satellites, and even comets may help put these objects in useful context. The peculiar gravitational environment of Phobos is evaluated in the inter-object comparisons, and the satellites' utility in using scaled processes is also discussed.

Acknowledgments: This review is dependent upon work of a wide variety of investigators, and the cumulative help of many technical people over literally decades.

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