MARCI OBSERVATIONS OF SPRING RECESSION OF MARTIAN SOUTH POLAR CAP. P. B. James[1], W. M. Calvin[2], S. W. Lee[3], and P. C. Thomas[4] [1]Space Science Institute, 4750 Walnut St., Boulder, CO, 80301 pjames@spacescience.org, [2]Dept. Geological Sciences and Engineering, University of Nevada, Reno, NV 89557, [3]Denver Museum of Nature & Science, Denver, C 80205. [4]Center fo Radiophysics and Space Research, Cornell University, Ithaca NY 14853.

Introduction: Seasonal recessions of the south polar cap of Mars have been observed since the Eighteenth Century. Comparisons of recession curves from ground based telescopic observations have suggested a significant amount of interannual variability [1.2], But intercomparisons of observations from orbiting spacecraft have failed to reveal any such deviations between years; in particular, Mars Orbiter Camera (MOC) images acquired in Mars years 24-26 failed to show any differences at scales of ~ 8 km/pixel (1/8°) (Figure 1) [3,4].

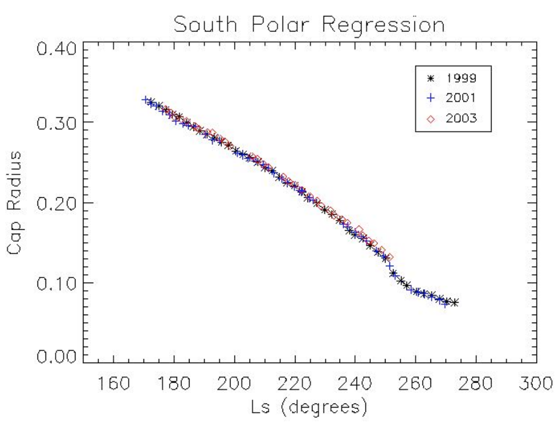

Figure 1: Size of south polar cap as a function of Ls for MY 24-26.

MARCI Camera: The Mars Color Imaging camera (MARCI) on Mars Reconnaissance Orbiter brings new synoptic capabilities to the study of the south polar cap. The intrinsic resolution of the MARCI wide-angle images is 1 km / pixel, similar to the resolution of the south cap available for Viking and about 8x that of the MOC wide angle maps. The five narrow bandpass filters provide superior wavelength resolution in the visible portion of the spectrum. Multiple orbits cross the polar region permitting significant diurnal coverage during the mid and late spring. A sample MARCI image is shown in Figure 2.

Asymmetric Cap Retreat: The spring recession of the south polar cap is very asymmetric. A significant fraction of the cap, roughly between 150° and 300° W, appears to defrost prematurely, creating large dark areas within the retreating cap edge of bright frost that were noted by ground based astronomers. Mars Global Surveyor Thermal Emission Spectrometer (TES) observations revealed that although these regions had low albedo, similar to bare ground, they were still at the sublimation temperature of CO_2 , indicating that the surface CO_2 had not sublimed [5].

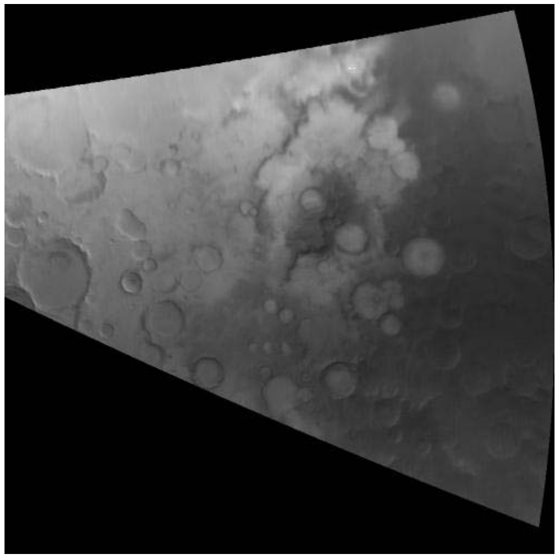

Figure 2: MARCI image of the edge of the south polar cap at Ls = 190 shows details of the recession such as frosted outlier craters. This particular image, centered near 270° W longitude, is projected as a polar stereographic image with scale 1 km/ pixel.

Those authors suggested that the material was large grain slab ice as opposed to the brighter, finer grain material in the opposite side of the cap and that the absorption occurred in the ground beneath the transparent slab. Mars Express Omega observations suggest instead that extensive dust contamination of the ice near the surface is responsible for its low albedo [6]. Observations of dark and bright features within the south polar cap in MY 24 and 25, before and after the major 2001 planet encircling storm, show that the atmospheric dust did affect the seasonal evolution of these features although it had little long term effect on the recession [7,8]. MARCI multi-spectral observations in the visible are sensitive to the dust content of the ice and to atmospheric dust and will therefore be relevant to this question.

Results: In this work we report the initial results of MARCI observations of the spring recession of the south polar cap in MY 28. In addition to comparison of the current recession to recessions in prior Mars years, this includes study of special bright and dark features in the south polar cap and comparisons to earlier data. We also will study the seasonal evolution of visible spectra of regions within the south polar cap in order to constrain the dust content of the surface ice in these locations.

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