SEASONAL MOVEMENT OF MATERIAL ON DUNES IN PROCTOR CRATER, MARS: POSSIBLE PRESENT-DAY SAND SALTATION. L. K. Fenton, Arizona State University (Mars Space Flight Facility, Mail Code 6305, Tempe, AZ, 85287, lkfenton@asu.edu).

Introduction: Much of the martian surface is covered with dune fields, ventifacts, yardangs, and other aeolian features that require sand saltation to form [e.g., 1]. However, there is little evidence for present-day sand saltation. Images of dunes since the Viking mission and during the Mars Global Surveyor (MGS) mission show no visible dune migration [1,2]. Lander experiments rarely, if ever, measure winds strong enough to saltate sand [3,4]. Yet, MOC NA (Mars Orbiter Camera Narrow Angle) images of sand dunes show sharp, uneroded crests [e.g., 1], suggesting that these dunes may still be active.

Investigation of MOC NA images of an intercrater dune field has led to the discovery of possible evidence for dune activity and sand saltation during the MGS mission.

Study Area: Proctor Crater is a 150 km diameter crater located in Noachis Terra (30º E, 47.5º S), in the southern highlands of Mars and roughly 900 km west of Hellas Planitia (see Fig. 1). It contains numerous aeolian features, including a 35 x 65 km wide dark dunefield that is prominent in Figure 1.

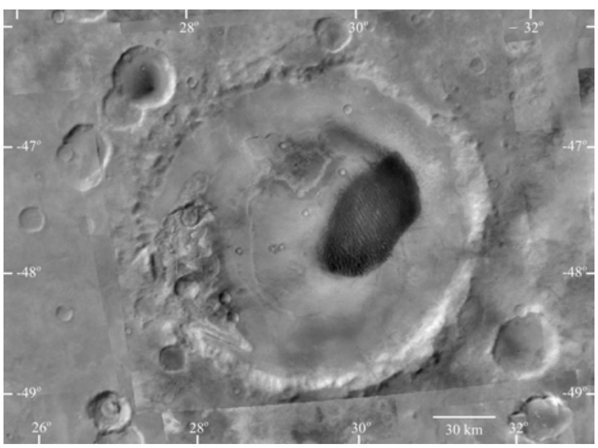

Figure 1. MOC Wide Angle mosaic of Proctor Crater

Observations: Figure 2 shows two MOC NA images of the same area at different times of the martian year. This area is near the eastern edge of the dune field, where the bright material is visible on the dunes. Although the large dunes are quite dark (TES bolometric albedo of 0.115 [5]), relatively bright material appears on the tops of the dunes, as shown in Figures 2a and 2b.

Upon first inspection, the dunes in Figs. 2a and 2b appear to be barchanoid, with slipfaces on their west-southwestern side (see esp. Fig. 2b). However, closer inspection reveals another set of slipfaces on the north-eastern sides of the dunes (see esp. Fig. 2a). This is a morphology not observed in terrestrial dunes, where oppositely oriented slipfaces lead to reversing transverse dunes [6,7]. It is possible that the martian dunes are somewhat indurated (providing resistance to wind erosion), preventing each slipface from being erased by opposing winds.

Finding the bright material becomes a study in discriminating between surfaces that have a higher albedo from those that are lit by sunlight. Figure 2a shows mid-fall (possibly frosted) dune surfaces with apparent bright material on the northeast slopes. Figure 2b shows an overlapping image from the following year during the late spring, with fully defrosted dune surfaces bearing bright material on western slopes. The bright material appears to have moved from one side of the dunes to the other. Note that although the solar azimuth is similar in Figs. 2a and 2b, the solar incidence angle is much lower (i.e., the sun is higher in the sky) in Fig. 2b, leading to fewer shadows and an increased emphasis on albedo contrast. The albedo contrast in Fig. 2b is also enhanced relative to Fig. 2a by a lack of frost cover.

Figures 2c and 2d illustrate the slipface brinks (with yellow and magenta lines, respectively) and interpreted accumulations of bright material (in white). Figure 2e shows both slipface brinks, emphasizing that they truly are on opposite sides of the barchanoid dunes.

Discussion: One interpretation of this observation is that wind moves bright material from one slipface to the other within a single martian year. It is possible that the bright material is sand saltating on the dark dunes (which may or may not be indurated). It is unlikely that the bright material is dust that has settled out of suspension, because it is difficult to explain why dust would settle only on the lee side of the dunes, and why this only occurs on the eastern edge of the Proctor Crater dune field. The movement of bright material provides some evidence of (limited) dune activity and possible present-day sand saltation.

References: [1] Malin, M. C. and Edgett, K. S. (2001), *JGR, 106*, 23,429–23,570. [2] Williams, K. K. et al. (2004) *LPS XXXV*, Abstract #1639. [3] Hess, S. L. et al. (1977) *JGR, 82,* 4559–4574. [4] Schofield, J. T. et al. (1997) *Sci., 278,* 1752–1757. [5] Fenton, L. K. et al. (2003), *JGR, 108,* doi:10.1029/2002JE002015. [6] Sharp, R. P. (1966) *Geol. Soc. Am. Bull, 77,* 1045-1074. [7] Lindsay, J. F. (1973) *Geol. Soc. Am. Bull., 84,* 1977-1806.

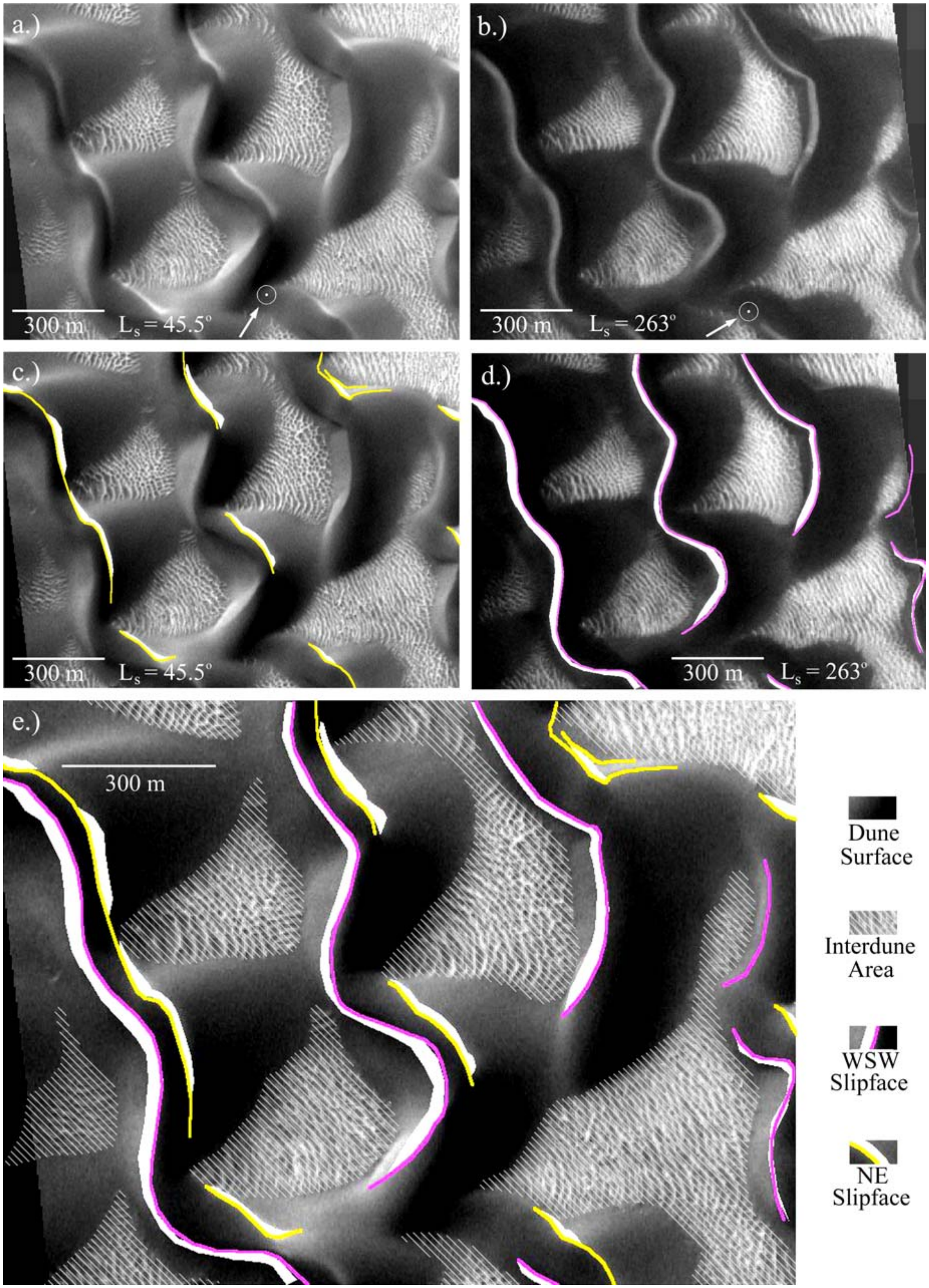

Figure 2. Overlapping parts of a.) MOC NA M19/00307, b.) MOC NA E09/02707, showing the same dunes on the east edge of the Proctor Crater dunefield. c.) and d.) The same, but with outlined brinks (yellow and magenta, resp.) and bright material (white). e.) Both slipfaces on one image, showing shifting locations of bright material from one slipface to the other.