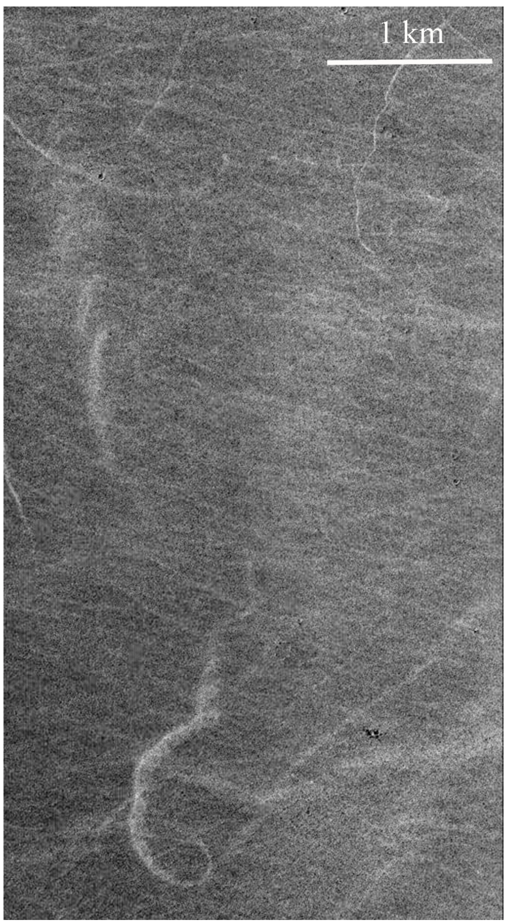
**BRIGHT TRACKS ON MARS: ALTERNATE DUST DEVIL TRACKS.** Mary Pendleton Hoffer[1] and Ronald Greeley[1], [1]Arizona State University, School of Earth and Space Exploration, Box 871404, Tempe, AZ 85287.

**Introduction:** Some linear, curved and "curlicue" albedo features on Mars are attributed to the tracks left by the passage of dust devils. Most such features are lower in albedo than the surrounding terrain, and result from the removal of bright dust from the surface by atmospheric vortexes, exposing a darker substrate. Some dust devil tracks, however, are of higher albedo than the surrounding terrain (Figure 1).




MOC E13/01381 *(NASA/JPL/MSSS)*

Figure 1: Bright linear, curved and "curlicue" tracks (12.3S, 257.8E).

This survey covers an area from 240E to 260E longitude and 35N to 90S latitude over a three-year period (1999-2002), revealing 2,727 bright tracks. It is based upon work by Whelley [1,5], using 2,163 Mars Global Surveyor Mars Orbiter Camera (MOC) images. Of the total, 70 images display the bright tracks. These tracks were evaluated for morphologic features, and the density of tracks/km$^2$ was determined [1,2]. Density was compared to latitude with regard to Mars Orbiter Laser Altimeter (MOLA) elevation, Thermal Emission Spectrometer (TES) Lambert albedo and TES Thermal Inertia maps.

Bright tracks are similar to their dark counterparts. Most are linear and of uniform width, between 10 and 200 meters wide [2,3]. Curved and "curlicue" shapes are much less common with the latter exhibiting the greatest widths. Like dark devil tracks, bright tracks are not associated with surface features, and can cross most topography.

Abundant dark tracks have been found in some of the lowest elevations on Mars (Hellas Basin, Argyre Planitia [1,2,5], Casius [4]), but they can be seen at most elevations and latitudes on the planet. Some latitude dependence has been noted at mid-latitudes north and south [1,4,6]. In these areas, albedo values are relatively low and thermal inertia values are moderate to high. Both indicate relatively dust-free surfaces [2,7].

In our survey region the bright tracks cluster in two groups. The larger group (2,691 tracks) occurs near the equator, 35N to 17S latitude, where elevations range from 2.2 to 12.5 km, albedo is high (0.2-0.313), and thermal inertia is low (~150-24 J m$^{-2}$ s$^{-1/2}$ K$^{-1}$). The smaller group (36 tracks) occurs in the south polar region, 67S to 88S, where elevations range from 0.9 to 2.8 km, albedo is low (0.8-0.14), and thermal inertia is moderate to low (~179-58 J m$^{-2}$ s$^{-1/2}$ K$^{-1}$).

The bright tracks have been evaluated for morphologic characteristics and identified as dust devil tracks. These tracks occur in locations where dark dust devil tracks are less often seen and most are associated with high elevations and thick dust. Previous research suggested that dust devil tracks would be unlikely at these locations [1,2]. However, active dust devils have been imaged on the Tharsis volcanoes [3,6], some leaving visible bright tracks [6].

Although dark dust devil tracks can be explained by the removal of bright dust exposing darker substrate material, the formation of bright tracks is not clear. However, wind tunnel experiments with fine grains (crushed basalt grains smaller than 80 microns in diameter) provide some clues. Smooth, flat deposits of the grains were subjected to wind speeds too low to initiate particle detachment, but after exposure to this wind for ~five minutes or more, the albedo became qualitatively higher. We attribute this change to the reorientation of individual grains by "jostling" in situ under the influence of wind, resulting in closer packing to produce a slightly higher reflective surface. Such a process could occur on Mars by the passage of atmospheric vortexes to produce bright streaks in dusty areas.

**Acknowledgement:** Patrick Whelley generously provided his substantial database for use in this survey.

**References:** [1] Whelley, P.L. & Greeley, R. (2006) *JGR, 111,* E10003. [2] Balme, M.R., Whelley, P.L. & Greeley, R. (2003) *JGR, 108* (E8), 5086. [3] Edgett, K.S. & Malin, M.C. (2000) *LPS XXXI,* Abstract #1073. [4] Fisher et al. (2005) *JGR, 110,* E03004. [5] Whelley, P.L. & Greeley, R. (2008) *JGR, 113,* E07002. [6] Cantor et al. (2006) *JGR, 111,* E12002. [7] Ruff, S.W. & Christensen, P.R. (2002) *JGR, 107* (E12), 2127.