MARTIAN DUST STORMS: 1999 MOC OBSERVATIONS. B. A. Cantor[1], P. B. James[1], M. Caplinger[2], M. C. Malin[2], and K. S. Edgett[2], [1]Department of Physics and Astronomy, The University of Toledo, Toledo, OH. 43606-3390 (bcantor@astro1.panet.utoledo.edu), [2]Malin Space Science Systems, Post Office Box 910148, San Diego CA 92191-0148.

Introduction: The Mars Orbiter Camera on board the Mars Global Surveyor from March 9, 1999 (L_s=107.27°, the areocentric longitude of the Sun measured in degrees from Mars' northern spring equinox) to December 14,1999 (L_s=262.78°) has obtained daily global maps of the Martian surface at a resolution of 7.5 km/pixel in two wavelength bands: violet (400-450 nm) and red (575-625 nm). Visual inspection of these maps during the 1999 dust storm season has resulted in the detection of 764 dust storms, ranging in size from "local" (>10^2 km^2) to "regional" (>$10^6$$km^2$) storms. Of the 764 dust storms, 237 (31%) were observed at a latitude ≥ |57°| (103 in the north and 136 in the south). The MOC images scans that makeup the polar sections of these maps are exceptional due to the polar orbit of MGS which allowes for the monitoring of the northern and southern polar caps about every two hours. This has allowed us to observe for the first time the evolution of a local north polar dust storm (see Figure 1).

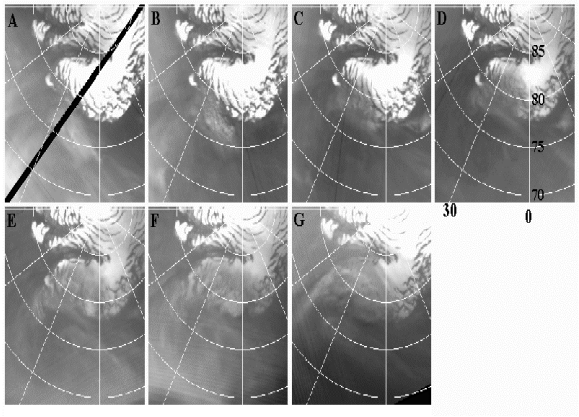

Figure 1. Evolution of a north polar local dust storm observed with the MOC WA-Red Filter on L_s = 136°.

Not only have local dust storms been observed in the polar regions during the 1999 dust storm season but four regional storms were observed to emanated from or near the northern and southern polar caps (see Table 1)

TABLE 1
1999 Regional Polar Dust Storms

L_s	Central LAT	Central LONG	Area (km^2)	Mass Loading (g/cm^2)	Length (Days)
163	74.63N	322.88	5.6E+6	3.0E-4	14
183	68.75N	309.63	1.7E+6	3.0E-4	9
227	59.50S	134.25	2.4E+6	2.6E-4	9
234	66.41S	201.51	1.8E+6	2.6E-4	8

Measurements of the sizes of these storms along with modeling the dust opacities (τ_d = 1.1 - > 2.0) has allowed for the estimation of the sedimentation rate due only to polar dust storms. What is found is that the sedimentation rate is about an order of magnitude less than that suggested by global dust storms (see Table 1) [1]. MOC observations suggest that the erosional rate for the south polar region and the depositional rate in the north polar region are variable on a yearly basis and are highly dependent on global and regional dust storm activity.

References: [1]Pollack et al. (1979) *JGR, 84,2929-2945.*