A MINERALIZED ZONE IN WESTERN CANDOR CHASMA, MARS

P.E. Geissler, R.B. Singer and G. Komatsu, Planetary Image Research Laboratory, Department of Planetary Sciences, University of Arizona, Tucson, AZ 85721

Spectral evidence from Viking and Phobos orbiting spacecraft suggests the local development of crystalline ferric oxides in a small region within Mars' equatorial Valles Marineris canyon system [1-5]. This is the same area noted for its anomalous coloration in Viking Orbiter image 583A by McEwen [6]. The unique hue of the region in Viking color data is due to a reduced green filter reflectance, relative to violet and red, in comparison to surrounding materials of similar albedo or average reflectance. For this reason the region does not appear spectrally distinctive in later Survey Mission images which were acquired without the green filter.

In high resolution, the spectral unit can be seen to correspond to two 20 km long depressions on the margins of Candor Mensa, a heavily eroded plateau-forming deposit on the canyon floor (Figure 1). Laminae (layers or erosional benches) are conspicuous in several places on the plateau (marked "L" in Figure 1), particularly within the mineralized depression at the northwestern margin of Candor Mensa where 15 to 20 cycles of alternating bright and dark laminae are exposed at approximately 200 meter vertical intervals. Laminae are also visible on the steep, vertically fluted cliffs to the south of this depression. Concentric laminae ("Lc" in Figure 1) indicate a basin in the depression on the southeastern margin of Candor Mensa at the location of the less pronounced hue anomaly (the toe of the "boot"). A distinct lineation ("F") at the base of the scarp at the western end of the canyon transects mottled canyon floor deposits believed to be among the youngest in the Valles Marineris [7].

Water is implicated in the formation of the iron oxides, since the steep surfaces of layered sediments elsewhere on Candor Mensa show no evidence of unusual coloration despite the fact that these materials were deposited concurrently with the strata exposed in the depressions. This suggests that the mineralization is secondary in nature and developed locally in association with the depressions, which could have ponded surface runoff or groundwater seepage.

References: [1] Komatsu et al., Stratigraphy and Erosional Landforms of Layered Deposits in Valles Marineris, Mars, submitted to J. Geophys. Res., 1992. [2] Geissler, P. and Singer, R., An Unusual Spectral Unit in West Candor Chasma: Evidence for Aqueous or Hydrothermal Alteration? (abs.), MSATT Workshop on Chemical Weathering on Mars, L.P.I. Tech. Rep. 92-04, p. 12-13, 1992. [3] Singer, R. and Geissler, P., An Unusual Spectral Unit in West Candor Chasma: Evidence for Aqueous or Hydrothermal Alteration? (abs.), B.A.A.S., 24, 977, 1992. [4] Geissler et al.., manuscript in prep. [5] Singer et al., this volume. [6] McEwen, A., Temporal Variability of the Surface and Atmosphere of Mars: Viking Orbiter Color Observations (abs.), L.P.S.C. XXIII, 877-878, 1992. [7] Lucchitta, B.K., Young volcanic deposits in the Valles Marineris, Mars, Icarus, 86, 476-509, 1990.

CANDOR CHASMA MINERALIZED ZONE: Geissler, P., R. Singer and G. Komatsu

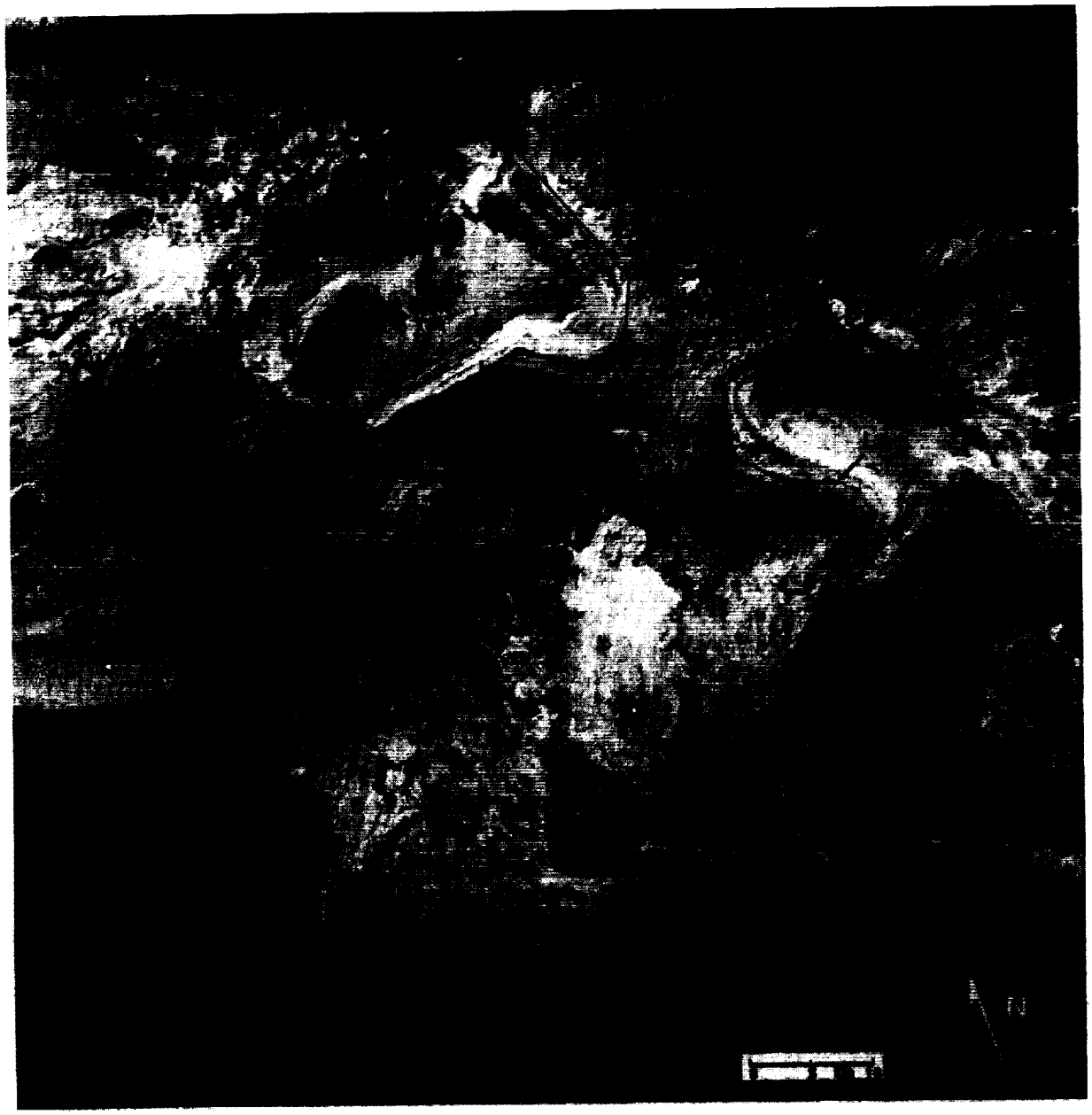

Figure 1. Candor Mensa in Western Candor Chasma.
The spatial resolution of this mosaic of Viking images 065A27, 066A20 and 066A22 is similar to Landsat MSS scenes of the Earth. Shown are the locations of spectrally anomalous regions interpreted to be zones of local enrichment of crystalline ferric oxide minerals. Also shown are the locations of laminae (L), concentric laminae (Lc), and a probable young fault at the western margin of the canyon (F).