NORTHWESTERN SLOPE VALLEYS (NSVS) REGION: PRIME CANDIDATE SITE FOR MSL EXPLORATION OF MARS. James M. Dohm[1,2], Robert C. Anderson[3], Vic Baker[1,2], Trent M. Hare[4] , Shawn J. Wheelock[1] , [1]Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 85721, jmd@hwr.arizona.edu, [2]Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ, [3]Jet Propulsion Laboratory, Pasadena, CA. [4]U.S. Geological Survey, Flagstaff.

Introduction: Mars is a water-enriched planet theorized to have had Earth-like conditions during its embryonic stages of evolution (Early into Middle Noachian or > 3.8 GA) [1]. This includes plate tectonism, an active hydrosphere resulting in higher erosion rates and the presence of layered sedimentary deposits, and a potential biosphere [2]. Due to its smaller size and lower gravity, its internal energy rapidly declined, sending the planet into a permanent forever-binding monoplate setting [1]. The Tharsis and Elysium superplumes [3-5] and structural discontinuities in the lithosphere are the sites of long-lived energy releases and hydrothermal activity [e.g., 6-7]. In addition, as its atmosphere thinned, and as it cooled, the Earth-like hydrological cycle transitioned into a persisting cold desert climate, approximating the present-day climate of the Dry Valleys, Antarctica [8]. Stratigraphic, hydrogeomorphic, and paleotectonic information, however, indicate an active Mars (e.g., late-stage superplume activity) that experienced punctuated periods of magmatic-driven hydrologic activity [9], possibly very recently [e.g., 10].

Existing geological, geomorphic, geophysical, topographic, impact cratering, spectral, and elemental information collectively point to a prime target site for future exploration that has the potential to yield significant geologic, and paleoclimatic, paleohydrologic, and possibly exobiologic environmental information. The Northwestern Slope Valleys region is a prime candidate site for future science-driven Mars exploration [11] because it records Noachian to Amazonian Tharsis development in a region that encapsulates (1) a diverse and temporally extensive stratigraphic record, (2) at least three distinct paleohydrologic regimes, (3) gargantuan structurally-controlled flood valleys that generally correspond with gravity and magnetic anomalies, possibly marking ancient magnetized rock materials exposed by fluvial activity, (4) water enrichment, as indicated by Mars Odyssey and impact crater analyses, (5) long-lived magma and ground water/ice interactions that could be favorable for the development and sustenance of life, (6) Mars Odyssey Gamma Ray Spectrometer (GRS)-based elevated chlorine [e.g., 10], and (7) potential paleosol development. This region has high probability to yield significant geologic, climatic, and exobiologic information that could revolutionize our understanding of Mars.

Unfortunately, it appears that most of this area has slightly higher TES albedo values than what is allowed from the current engineering constraints. However, there are several small areas which would qualify as potential landing sites. Additionally, we are hopeful that by using THEMIS to assess the albedo characteristics, additional 50-km radius windows may be revealed, permitting us to safely target this site. Nevertheless, MRO-based information may add to the feasibility of this prime candidate site.

References: [1] V.R. Baker et al. (2002) *Lunar Planet. Sci. Conf.* [CD-ROM], XXXIII, abstract 1586. [2] D. Schulze-Makuch et al., (2005a) *J. Geophys. Res.* 106, 110, E12S23, doi:10.1029/2005JE002430. [3] S. Maruyama et al. (2001) *GSA*, 33(7), A310. [4] V.R. Baker et al. (2001) *GSA*, 33(7), A432. [5] J.M. Dohm et al. (2001) *GSA*, 33(7), A309. [6] R.C. Anderson et al. (2001) *J. Geophys. Res*. 106, 20,563-20,585R.C. Anderson, *et al., J. Geophys. Res.* 106, 20,563. [7] J.M. Dohm et al. (2001) *J. Geophys. Res*. 106, 32,943-32,958 (2001).J. M. Dohm *et al., J. Geophys. Res.* 106, (2001) [8] W.C. Mahaney et al. (2001) *Icarus* 154, 113-130. [9] V.R. Baker et al. (2000) *Lunar Planet. Sci. Conf.* [CD-ROM], XXXI, abstract 1863. [10] J.M. Dohm et al. (2006) *Lunar Planet. Sci. Conf.* [CD-ROM], XXXVII, abstract 1131. [11] J. M. Dohm et al., *Planetary and Space Science, 52*, 189-198, 2004. [13] Keller et al., J. Geophys. Res.,GRS Special Edition, submitted.

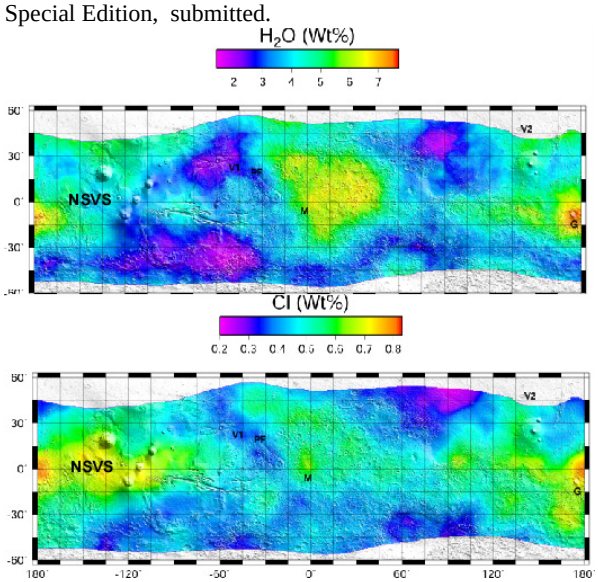

Fig.1. Elevated H_2O (top) and Cl (bottom) concentrations in the NSVs region may indicate possible aqueous activity related to the interactions of magma with water/water-ice and fluvial activity [e.g., 10], as well as other contributors such as acid fog [13].