Stratigraphy of Al- and Fe-Rich Phyllosilicates in Southern Sinus Meridiani. S. M. Wiseman[1], R. E. Arvidson[1], R. V. Morris[2], F. P. Seelos[3], and J. C. Andrews-Hanna[4], [1]Washington University in Saint Louis, [2]NASA Johnson Space Center, [3]Johns Hopkins Applied Physics Laboratory, [4]Colorado School of Mines..

Introduction: In southern Sinus Meridiani, Noachian aged fluvially dissected, heavily cratered highlands are embayed by the Late Noachian/Early Hesperian sulfate- and hematite-bearing unit that was explored by the Opportunity rover [e.g., 1, 2]. Phyllosilicates have been detected in multiple locations throughout the southern highlands and are generally inferred to predate the formation of sulfate rich layered rocks [3]. Our new analysis of MRO data shows an unconformable contact between the younger sulfate-rich unit and the older phyllosilicate-bearing Noachian cratered terrain in southern Meridiani.

Stratigraphy and Mineralogy: Deeply incised channels in Noachian aged cratered terrain in southern Meridiani are separated by high standing interfluves in which light toned layers are exposed (Fig. 1a). Analysis of MRO CRISM, CTX, and HiRISE data reveals that at least two distinct layers are exposed in the upper portions of the interfluves. For simplicity, the lower layer will be referred to as Unit A and the upper layer as Unit B (Fig. 1a). Unit A consists of light toned indurated rock that exhibits spectral signatures of multiple hydrated phases. Unit B caps unit A and is also indurated. Unit A is exposed in areas where Unit B has been stripped via erosion. Remnants of Unit B occur as high standing knobs (Fig. 1a).

Unit A exhibits multiple textures and spectral signatures. The bulk of the unit has a weak to moderate 1.9 µm hydration feature (Fig. 1b, blue). Some areas within Unit A exhibit both a 1.9 and a 2.3 (Fe/Mg-OH) µm feature (Fig. 1b, magenta) indicative of Fe/Mg smectite (Fig. 1c, red spectrum). Al-rich phyllosilicates, which exhibit an Al-OH feature near 2.2 µm, are also detected in Unit A (Fig. 1b, green). Although exposures of Al-rich phyllosilicates are not extensive, spectra indicative of both montmorillonite and kaolin group minerals occur (Fig. 1c, green and black spectra). Areas from which Al-rich phyllosilicate spectra were extracted exhibit a distinctive morphology relative to areas dominated spectrally by Fe/Mg smectites in HiRISE images. Some portions of unit B exhibit a Fe/Mg-OH feature at 2.3 µm (Fig. 1b, red).

Discussion: An unconformable contact between younger sulfate- and hematite-bearing plains and older phyllosilicate-bearing cratered terrain occurs in Southern Sinus Meridiani. The phyllosilicate alteration likely occurred in a hydrologic regime dominated by meteoric water with a high water to rock ratio at moderate pH, whereas the sulfate-and hematite unit formed under ground water dominated evaporitic conditions with a lower water to rock ratio at low pH.

References: [1] B. M. Hynek et al. (2002) *JGR, 107,* E10, 5088. [2] R. E. Arvidson et al. (2006) *JGR, 11,* E12S09. [3] J.-P. Bibring et al. (2005) *Science, 307,*1576-1581.

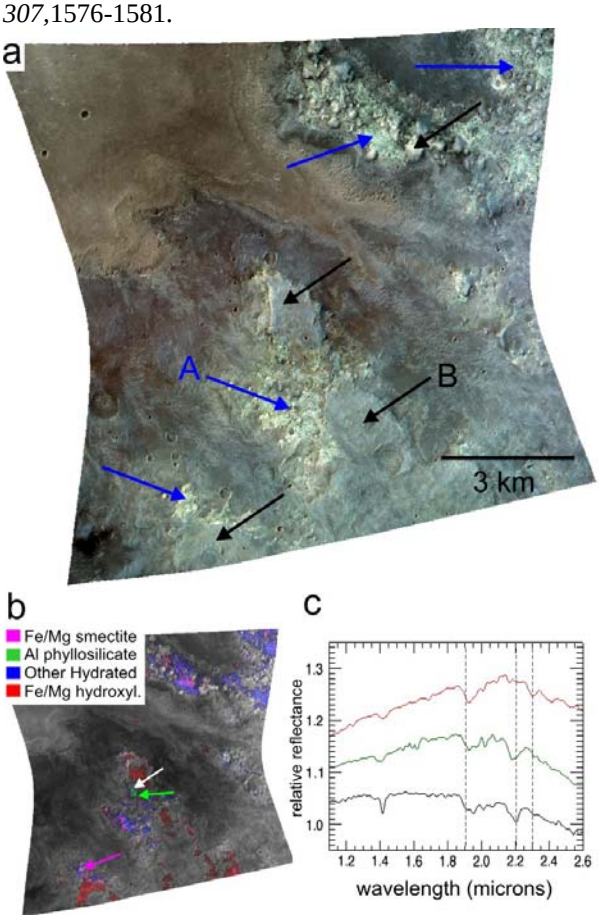

Figure 1. a) CRISM FRT000091C5 (-3.5°N, -5.4°E) false color composite (R=2.5, G=1.5, B=1.1 µm). Interfluves in the cratered terrain exbit light toned layers and are embayd by younger sulfate- and hematite-bearing plains (appear brownish). Blue arrows indicate unit A and black arrows unit B. b) CRISM false color parameter composite (R=D2300, G=D2200, B=D1900) overlain on a 1.1 µm albedo image. Blue areas exhibit an H_2O feature at 1.9 µm, red areas exhibit a Mg/Fe-OH feature at 2.3 µm, magenta areas have both 1.9 and 2.3 µm features, and green areas exhibit an Al-OH feature at 2.2 µm. c) CRISM relative reflectance spectra extracted from locations shown with arrows in part b.