## F THERMAL TRANSFORMATION OF UNIVERSITY PHYLLOSILICATES AND THEIR **IMPLICATIONS ON MARS** Arkansas Center for 8 Space Alexis Gillett<sup>1,2</sup>, Patricia Gavin<sup>2</sup>, Vincent Chevrier<sup>2</sup>, Richard Ulrich<sup>2</sup> Planetary Sciences <sup>1</sup>Arkansas Tech University, Russellville, AR 72801, <sup>2</sup>Arkansas Center for Space and Planetary Sciences, University of Arkansas, Fayetteville, AR 72701 INTRODUCTION RESULTS Figure 1: Phyllosilicate spectra of (A, B) chlorite, (C,D) kaolinite, (E,F) saponite. Phyllosilicates found in some of the oldest martian terrains [1-3] and (G) NIR spectra of serpentine. The reflectance is offset for clarity. G Found in electa of small impact NIR MIR craters and outcrops surrounded Reflectance Α в r=300°C by lava flows[4] T+400°C Reflectance Reflectance =50010 T+500'C Phyllosilicate Formation: Taktore F=600'C T=700 C =000's •From earliest history of Mars T=900 C due to surface water activity [5] Wavelength (um) T#10001C +110010 7 8 9 10 11 12 13 14 15 Due to impact-induced Wavelength (µm) Wavelength (µm) hydrothermal processes [6, 7] Discussion С D Better classify phyllosilicate Heat substantial in Intrastad spectra on Mars (untreated versus Reflectance Reflectance transformation of T+300°C altered) [8] T=400°C phyllosilicates T=500 T=500 T=700 T=500 Sillimanite, albite. METHODS 100010 corundum, and anorthite are =1100°C =1000°C secondary phases for \*1 gram samples of kaolinite. 14 18 10 12 14 14 chlorite, kaolinite, and serpentine, and chlorite Wavelength (µm) Wavelength (µm) saponite 0.5 gram samples of saponite Е \*Cristobalite possible Heat samples for 24 hours, cool. silicon phase for all T=300°C Reflectance #400 V Reflectance T+500°C and weigh samples phyllosilicates studied T=500't THEOD'C +6001 NIR range can be used as T=700°C =700 0

\* Samples heated from 300°C to 1100°C in one hundred degree increments

Reflectance spectrometry in mid and near infrared range (MIR/NIR)

## REFERENCES

Wavelength (um)

[1] Poulet, F., et al., (2005) Nature 481, 623-627. [2] Mustard, J., et al., (2007) JGR 112 (E08S03). [3] Bishop, J., et al., (2008) Science 321, 830-833, [4] Mangold, N., et al., (2007) JGR 112, [5] Chevrier, V., et al., (2007) Nature 448, 60-63. [6] Naumov, M., et al., (2005) Geofluids 5, 165-184. [7] Fairen, A., et al., (2008) Workshop on Martian Phyllosilicates: Recorders of Aqueous Processes?, #7021. [8] Gavin, P. and V. Chevrier, (2009) Icarus, submitted.

T=800°C

T+900 C

TH 10001

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Similar to nontronite [8]

a thermometer

above ~800°C

\* Saponite featureless

T=800'C

9001

10001

Wavelength (µm)