THERMAL TRANSFORMATION OF PHYLLOSILICATES AND THEIR IMPLICATIONS ON MARS

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INTRODUCTION

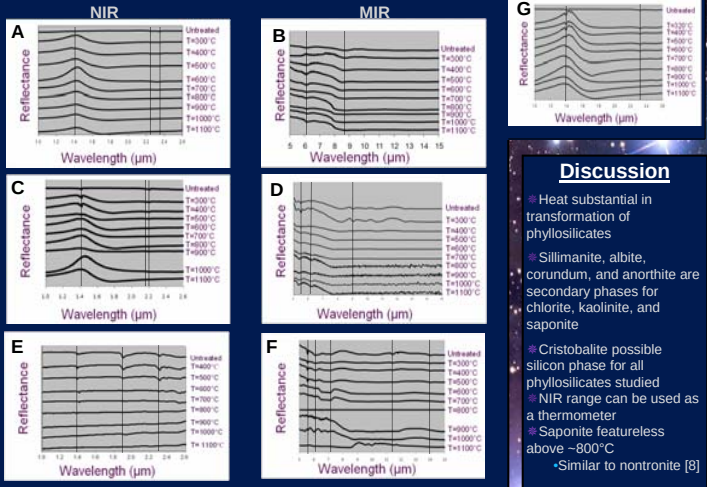
- Phyllosilicates found in some of the oldest martian terrains [1-3]
  - Found in ejecta of small impact craters and outcrops surrounded by lava flows[4]
- Phyllosilicate Formation:
  - From earliest history of Mars due to surface water activity [5] or…
  - Due to impact-induced hydrothermal processes [6, 7]
- Better classify phyllosilicate spectra on Mars (untreated versus altered) [8]

METHODS

- 1 gram samples of kaolinite, serpentine, and chlorite
- 0.5 gram samples of saponite
- Heat samples for 24 hours, cool, and weigh samples
- Samples heated from 300°C to 1100°C in one hundred degree increments
- Reflectance spectrometry in mid and near infrared range (MIR/NIR)

RESULTS

Figure 1: Phyllosilicate spectra of (A, B) chlorite, (C,D) kaolinite, (E,F) saponite, and (G) NIR spectra of serpentine. The reflectance is offset for clarity.



Discussion

- Heat substantial in transformation of phyllosilicates
- Sillimanite, albite, corundum, and anorthite are secondary phases for chlorite, kaolinite, and saponite
- Cristobalite possible silicon phase for all phyllosilicates studied
- NIR range can be used as a thermometer
- Saponite featureless above ~800°C
  - Similar to nontronite [8]

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