Potential Chloride Salt MSL Landing Sites

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Examples of a spectrally unique material

THEMIS Multi-spectral IR images
Observed IR Spectral Character

- Virtually featureless slope downward toward long wavelengths in THEMIS spectral data
- TES spectra and ratio spectra show slope mixed with residual basaltic shape
- Source of slope?
  - No good mineral fit
  - Material with non-unit emissivity
Effect of non-unit emissivity component

- Current method for converting from radiance to emissivity assumes unit emissivity
- If material has <unit emissivity, a slope will be introduced
- Candidates:
  - Halogens $\rightarrow$ Chlorides

\[
\begin{align*}
\epsilon_{\text{max}} &= 1.0 \\
\epsilon_{\text{max}} &= 0.95
\end{align*}
\]
Terra Sirenum (-39° S; 1300 m)
THEMIS/TES Chloride Salt Identification Sites

Osterloo et al., submitted
Sites at Elevation < 1 km
Site 2  (-31°S; 400m)
Sites at Elevation < 1 km
Sites at Elevation < 1 km

350° E
Site 1 (-11° S; -1400 m)
Site 9  (-12° S; -1000 m)

DCS 25 km
Site 12  (-6° S; -1200 m)
Candidate 1: Site 15  \((-18^\circ S; 250\, m)\)
Candidate 2: Site 10  (-13° S; -1200 m)
Relevance to MSL Objectives

- Habitability
  - Chloride concentrations would indicate significant water abundances
  - Occur in basins
  - Associated with channels and layered strata
  - In situ precipitated minerals within a sedimentary sequence

- Preservation (and access)
  - Chloride salts excellent for preserving organic material
  - Occur in eroded layers - exposed units
Summary

- New class of mineralogic sites
- Spectral evidence for chlorides in significant abundance
- Relatively common
- Morphologic evidence consistent with meters-thick chloride (halite?) stratigraphic layer
- Occur in Noachian cratered highlands
- Often occur in basins associated with channels and layered units
- Exhumed
- Propose further investigation of these sites before elimination
  - Need HiRISE and CRISM
Site 15