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Compositional Interpretation of PFS/MEx and TES/MGS Thermal Infrared Spectra of Phobos

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The origin of the Martian satellites presents a puzzle of long standing. Addressing the composition of Phobos will help constrain theories of its formation. Visible and near-infrared spectra of Phobos lack of deep absorption features, making the compositional interpretation a tricky task.
PFS/MEx and TES/MGS observations in the thermal infrared show several spectral features that can be used to investigate the composition of the surface. Our results show that the majority of the spectra are consistent with a dominance of inosilicates (pyroxenes) and tectosilicates (fledspars). Spectra in the area northeast of Stickney also suggest a phyllosilicate component.
Comparison of the TES and PFS data to the meteorites shows that no class of chondrites provide significant agreement with the spectral features observed. The lack of consistency of the PFS and TES spectra to analogs of ultraprimitive materials (organic residues) suggests that an origin via capture of a transneptunian object is not supported by these observations.
In conclusion, the spectral compositional results suggest mafic assemblages and perhaps some alteration products represented by the phyllosilicates. The former is consistent with the position of the Christiansen frequency in the TES data that suggests ultramafic rock types.