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Adsorption driven regolith-atmospheric water vapor transfer on Mars:
An analysis of Phoenix TECP data

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Highlights

- Analysis of Phoenix Thermal and Electric Conductivity Probe (TECP) instrument data and previous experimental data to present constraints on the parameters for regolith-driven adsorption at the Phoenix landing site.
- Modeling Brunauer-Emmett-Teller (BET) adsorption of the data across Mars-relevant materials yielded fairly constant surface coverage and enthalpy values, $\theta = 0.336$, corresponding to 2.96×10^{-7} kg of H₂O/m² and $\Delta H = 52.783 \pm 1.206$ kJ/mol, respectively. With our modeled BET adsorption coefficient, $C = 89.4$, and ideal specific surface area, $SSA = 1.7 \times 10^4$ m²/kg.
- The regolith at the Phoenix landing site is most likely a mixture, which we bracket with a range of possible adsorption conditions.
- We explain adsorbed water content in the regolith at the Phoenix landing site and thus, adsorption being driven by localized, diurnal variations in the relative humidity.

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