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

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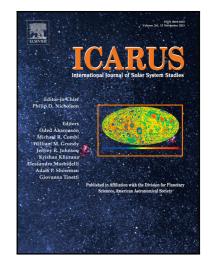
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Highlights

- 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 Marsrelevant materials yielded fairly constant surface coverage and enthalpy values, θ = 0.336, corresponding to 2.96 x 10⁻⁷ kg of H₂O/m² and ΔH = 52.783 +/- 1.206 kJ/mol, respectively. With our modeled BET adsorption coefficient, *C* = 89.4, and ideal specific surface area, *SSA* = 1.7 x 10⁴ 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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