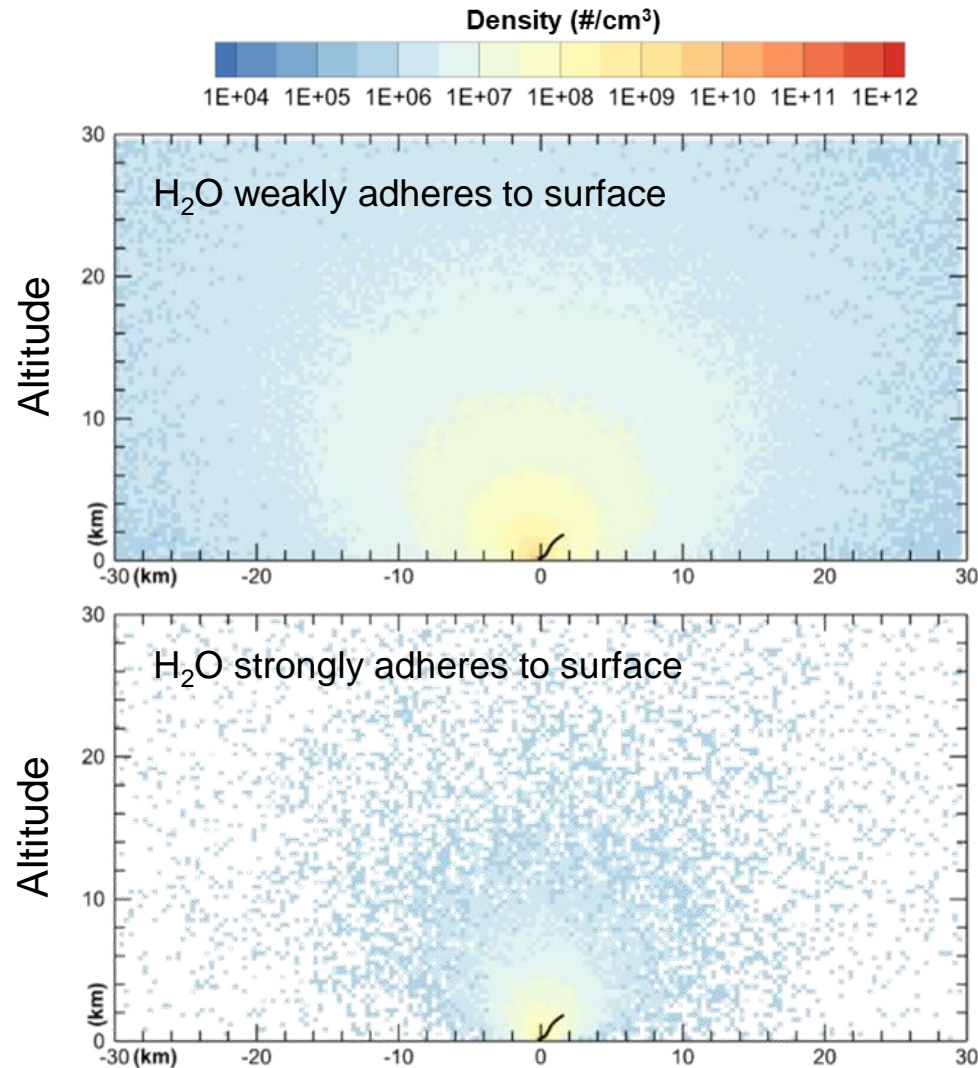


Simulating Artificial Lunar Atmospheres

- Almost any lunar landing will involve the release of spacecraft exhaust gases into the lunar environment, creating a thin, temporary lunar atmosphere.
- Computer simulations can predict how these gases behave. Comparing simulation results to observations of the lunar exosphere during future lunar landings can address important questions, such as:
 - How do spacecraft systems alter their environments?
 - Specific science questions are:
 - How far should a rover travel to reach an area uncontaminated by exhaust gases?
 - How fast does water (a common exhaust gas) migrate to permanently shadowed regions near the lunar poles?

Monitoring the lunar atmosphere during and after lunar landings can help in planning missions and can address outstanding science questions.

P. Prem, D.M. Hurley, D.B. Goldstein, P.L. Varghese (2020), The Evolution of a Spacecraft-Generated Lunar Exosphere. *JGR Planets* (<https://doi.org/10.1029/2020JE006464>).



Views showing the H₂O gas density at 155 s after thruster firing commences. The descent trajectory is marked in black. Possible outcomes depend on how strongly water adsorbs to the surface.

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