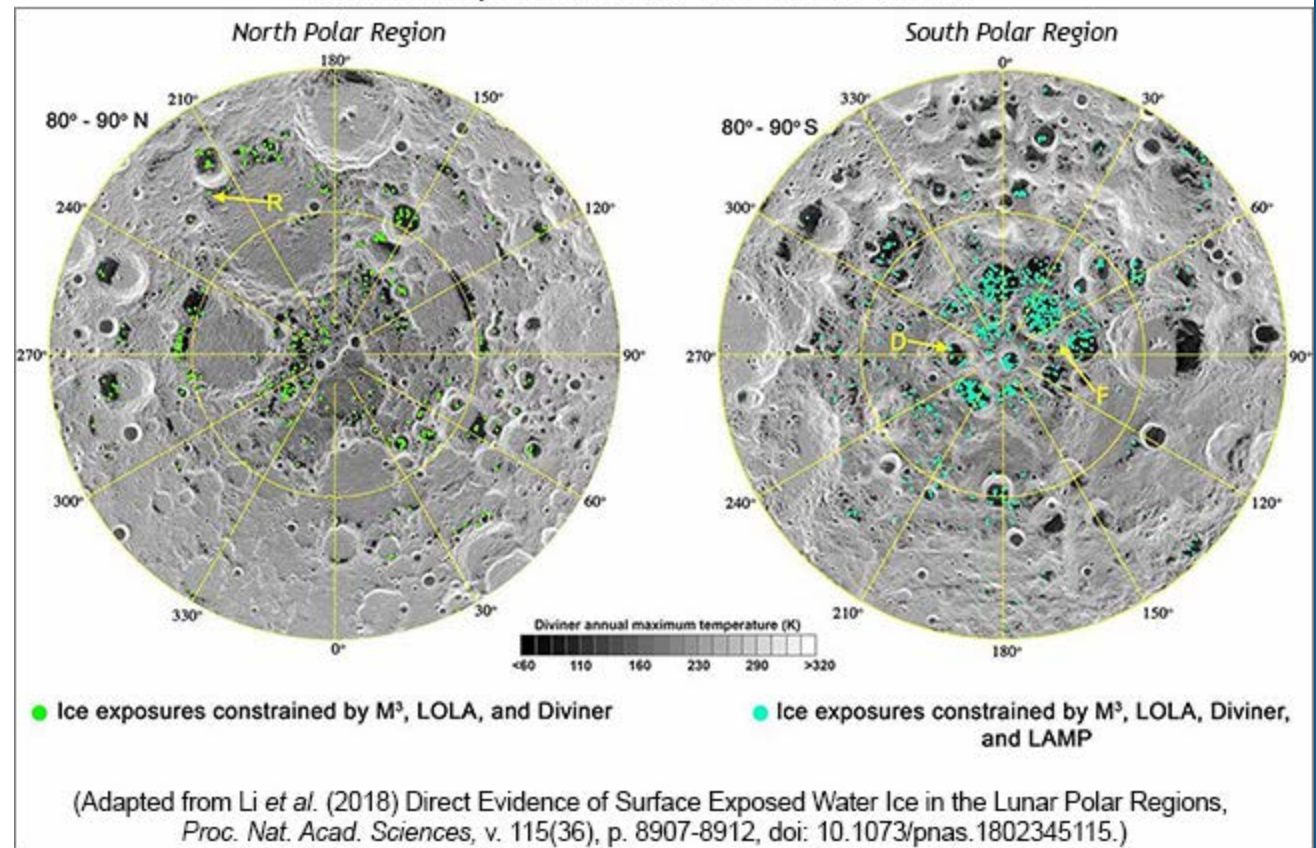


Refueling Space Exploration

Starting with the foundational knowledge provided by multiple science missions that water ice exists on the Moon (see figure below for example), people have been researching ways to extract and use the water ice for human benefit.

Surface Exposed Water Ice on the Moon



Colored data points show where exposures of ice are indicated by multiple data sets.

A team of 30 from academia, government, and industry, with David Kornuta (United Launch Alliance) serving as first author, published a comprehensive review of how and why to create a lunar polar ice processing plant for water-derived products such as propellant. The propellant could be used in reusable surface rovers and rockets for travel throughout the Earth-Moon system and beyond. The authors examine the current challenges (including meeting the demands of power and equipment for a processing plant and fleshing out the business case and legal considerations) and future payoffs (including new economic opportunities in space) of developing the business of extracting the water resource from the lunar regolith by **sublimation**. Readers interested in the science and technology of fueling space exploration and settlement with lunar-ice resources will find this report fascinating.

See Reference:

- Kornuta, D. and 29 others (2019) Commercial Lunar Propellant Architecture: A Collaborative Study of Lunar

Propellant Production, *REACH—Reviews in Human Space Exploration*, v. 13, 100026, doi: 10.1016/j.reach.2019.100026. [[open access article](#)]

See also:

· Martel, L. M. V. (October 2010) An Icy Treat—Water ice Confirmed on the Moon, *PSRD*, www.psrд.hawaii.edu/CosmoSparks/Oct10/Moon-surfacewater.html.

· Spudis, P. D. (December 1996) Ice on the Bone Dry Moon, *PSRD*, www.psrд.hawaii.edu/Dec96/IceonMoon.html.

· Taylor, G. J. and Martel, L. M. V. (April 2018) New Age for Lunar Exploration, *PSRD*, www.psrд.hawaii.edu/April18/lunar-exploration.html.

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