Chronology of planetary surface modification processes

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LRO Chandrayaan-1 NASA DoD Mini-RF

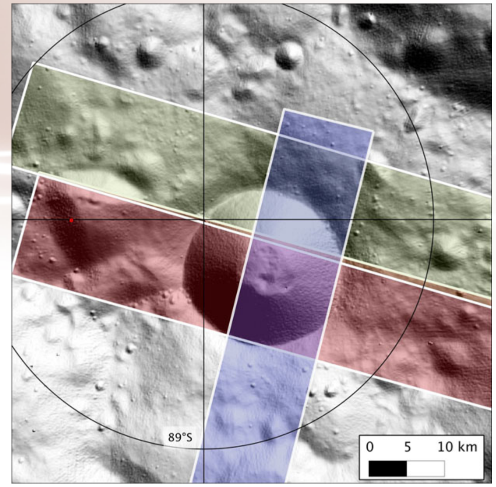
An upper limit for ice in Shackleton crater

- Certain impact craters near lunar poles are situated so that sunlight never strikes their interiors, maintaining very cold temperatures inside (as cold as 40 Kelvin). These craters may trap tiny bits of water ice and other volatiles that can accumulate over time.

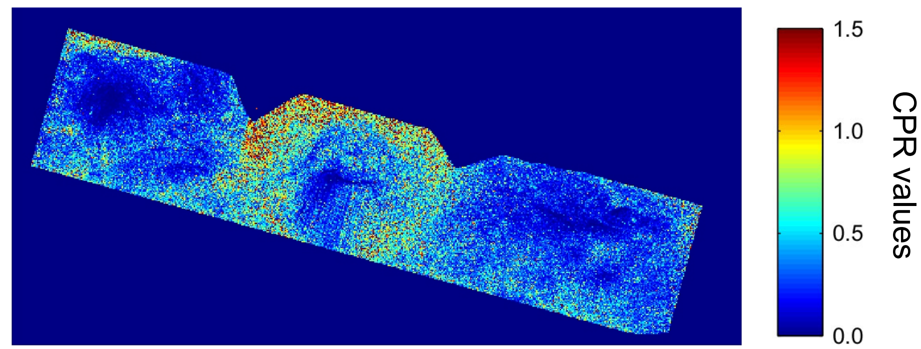
- The Mini-RF radar instrument on the Lunar Reconnaissance Orbiter (LRO) can "see in the dark" and explore these permanently shadowed craters. LRO rolled 19° to observe the crater Shackleton near the lunar south pole on 18 April, 2010.

- The radar return measured by Mini-RF is consistent with a model with about 5% water ice mixed into the (normally) dry lunar soil.

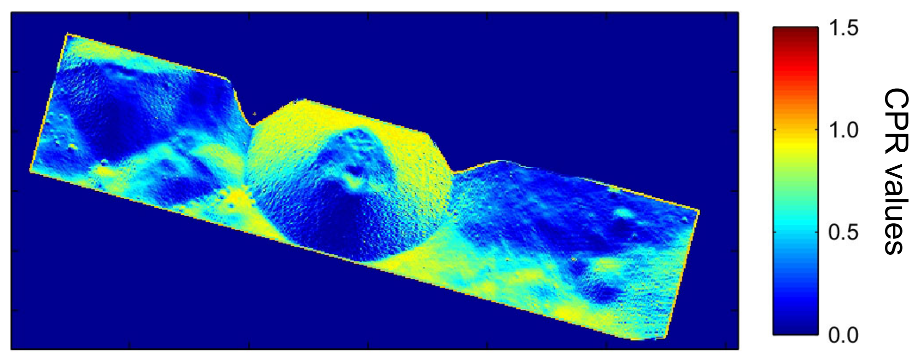
- This ice content represents an upper limit as other effects (such as roughness) cannot be entirely ruled out.



Topographic map with locations of Mini-RF observations of Shackleton Crater



Radar return (CPR) of Shackleton Crater (CPR = Circular Polarization Ratio)



Modeled radar return (CPR) with 5% water ice