Unique Mafic Mound on the Lunar Farside

11/13/2015

Data from sensors onboard Chandrayaan-1, LRO & GRAIL have characterized an unusual feature found in the center of the gigantic basin South Pole-Aitken on the far side of the Moon.

- The Moon's South Pole-Aitken Basin (SPA) is one of the solar system's largest impact basin with a diameter of ~2500 km (~1550 miles). This ancient basin excavated deep into the crust and upper mantle.
- Unlike most nearside basins, the SPA interior was not completely flooded by later basalts and is the deepest exposed lunar terrain.
- An unusual feature found in the center of the SPA, 75km (~46 miles) in diameter and elevated up to ~1 km (~0.6 miles) above surrounding terrain, has a distinctive mafic composition that contains Fe & Ca-rich pyroxene throughout and a small positive gravity anomaly.
- None of the common lunar processes are sufficient to explain the formation of this Mafic Mound (labeled MM in the photos at right), and new research indicates that this unique magmatic construct was formed by some combination of impact melt from the SPA impactor & melting and uplift of underlying mantle from post-impact rebound of the surface.
- This type of viscous magmatism would represent a newly recognized product of basin-forming impacts on the terrestrial planets.

Moriarty and Pieters (2015) *Geophys. Res. Letters*