

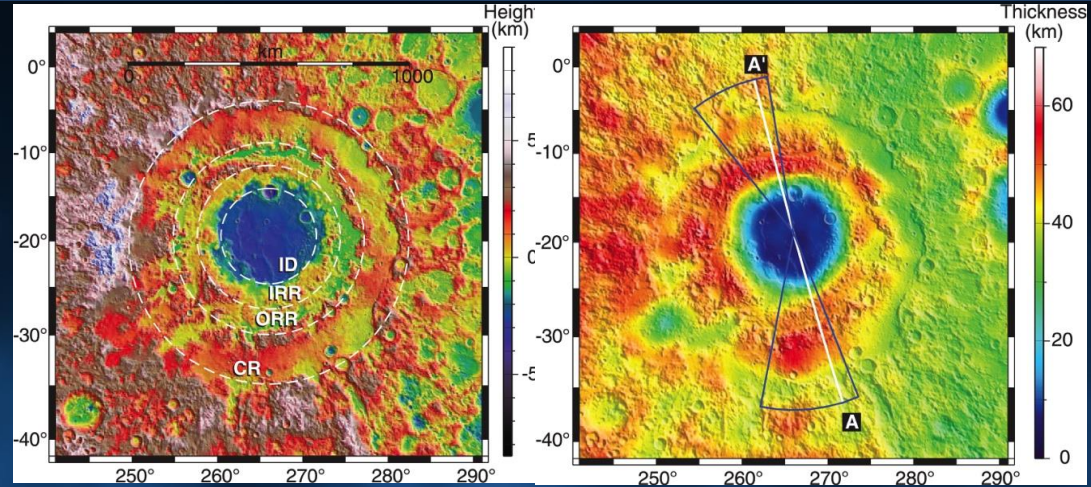
Bullseye!: Forming the Orientale Basin, the Moon's Youngest Basin

The Orientale Basin is the best preserved, and therefore youngest, lunar impact basin.

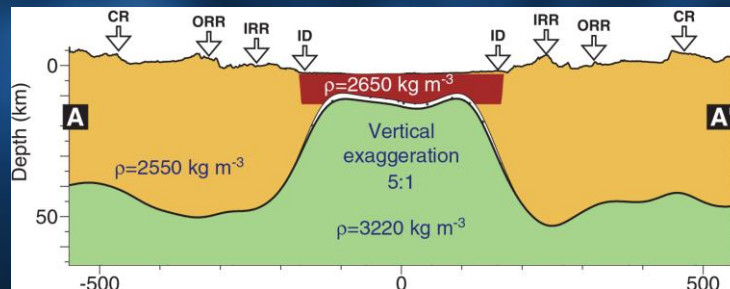
High-resolution topographic data from LRO's LOLA instrument coupled with gravity derived data from the GRAIL mission are used to evaluate the crustal structure of the Orientale basin and how it formed.

The results reveal the effects of basin formation pushing mantle material upward and the formation of basin rings (top, left figure) from the excavated crustal material (top, right & bottom figure).

These observations are the highest resolution topographic and gravity measurements of a basin ever made. Combined, they provide parameters to produce a high-fidelity 3-D model for basin formation, which in turn is applied to other planetary bodies.



Top, Left: LOLA-derived topography of the Orientale Basin. The locations of ring structures are labeled ID, IRR, ORR, and CR for the Inner Depression, Inner Rook Ring, Outer Rook Ring, and Cordillera Ring. **Top, Right:** LOLA and GRAIL derived crustal thickness at Orientale. Line A-A' shows the cross section illustrated below.



Above: Cross-section through the lunar crust, showing the thinned lower-density crust (yellow) and the corresponding denser mantle uplift (green). A thick intermediate density impact-melt sheet sits in the middle of the basin (red). The well-preserved state of Orientale means the basin structure serves as a basis of understanding of how other basins may have modified the crust and pushed the mantle upward in the impact.