

Exploring the Structure of the Giant Impact Sites That Formed the Lunar Basins

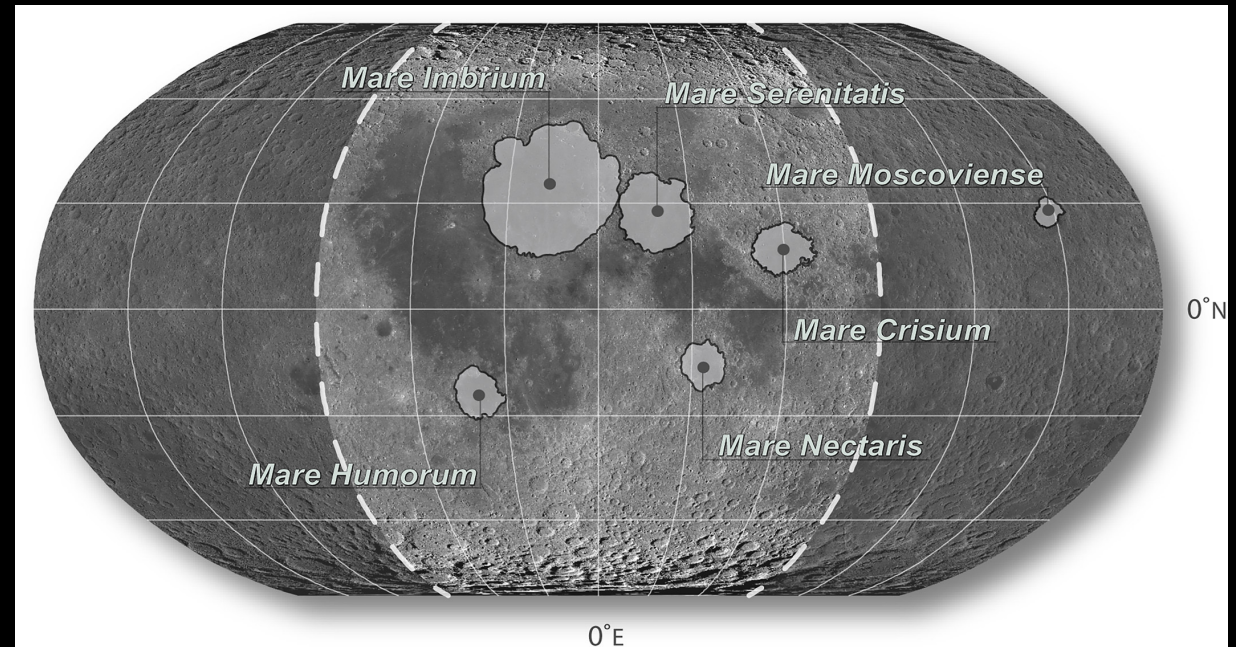
The history of the Moon is violent and characterized by giant impacts, the largest of which are expressed as vast depressions that were later filled with basaltic lavas. The topography within these impact basins suggests that they have been tectonically deformed, with the source of this tectonic deformation long subject to debate. This work seeks to better characterize these structures in order to understand their origins.

Several large impact basins were studied that host a concentration of mass, or a “mascon,” under the ground. This mascon can be observed with the lunar gravity field data and is a result of the impact event itself. Features attributed to compressive stresses called “wrinkle ridges” are typically found in a circular pattern around the boundary of this mascon.

Results of this work show that these structures sit on top of thrust faults that extend several tens of kilometers into the Moon's interior, and faults have been discovered in several basins on the lunar near- and far sides, including Maria Crisium, Serenitatis, Nectaris, Moscoviense, Humorum, and Imbrium.

Similar structures also may be present on other rocky worlds such as Mercury and Mars.

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Projection of a global mosaic of the lunar surface showing the location of each basin detailed in this study. Dashed white lines of longitude demarcate the boundary between the near- and far-side hemispheres.