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Does the gravity signature of lunar basins correlate with their relative ages?

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We use high-resolution gravity data obtained by the Gravity Recovery and Interior Laboratory (GRAIL) mission for detailed modeling of subsurface structures of lunar basins. Based on work by Neumann et al. [1] we investigated the correlation between the gravity signature and relative ages of basins. Bouguer gravity anomalies of lunar basins reveal a bulls-eye pattern with a positive anomaly in the center surrounded by a gravity low. The difference between the maximum signal in the center and the lowest decrease is defined as the Bouguer anomaly contrast [1].

Since the lithosphere was much warmer and less viscous in the past, structures, formed during an impact, probably relaxed faster than structures from later events. However, no correlation between Bouguer anomaly contrast and relative age was found. Probably, in addition to age, other factors such as the size of the basin, differences in temperature, and thickness of mare fill have an effect on the gravity signature, which may mask any first-order correlations.

[1] Neumann, G. et al. (2015) Science Advances, 1, 9, 1-10.

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