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Cryptic impact cratering during lunar magma ocean solidification

The lunar cratering record is traditionally used to constrain the bombardment history of both the Earth and the Moon. It was suggested from different perspectives, including asteroid dynamics, lunar Apollo samples, impact simulations, and lunar evolution modelling, that the Moon could be missing evidence of its earliest cratering record. Recent studies suggested that lunar magma ocean (LMO) solidification could have been prolonged up to ~200 Myrs. This would then suggest that a significant portion of the large impact bombardment on the Moon must have occurred while the LMO was still solidifying. Our impact simulations show that impact basins forming during this time should have been susceptible to immediate and extreme crustal relaxation, rendering them likely invisible to gravitational, and possibly topographic, surveys. Any impact bombardment that occurred during LMO solidification is unlikely to have been entirely retained in the Moon's cratering record.

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