Gravity reveals the interior feature of cryptomaria

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Incomplete studies exist on the identification and formation processes of lunar cryptomaria, which stand as crucial hubs of late lunar magma ocean activity and early volcanism, presenting a mystery in their origin. In this work, we show 29 delineated cryptomaria regions based on remote sensing data. A thorough investigation of gravity anomalies within these proposed cryptomaria regions was undertaken. Through this analysis, we successfully identified and classified cryptomaria by integrating topographic features and chemical compositions. A new classification has been proposed, categorizing cryptomaria into Impact-type and Diffuse-type. Impact-type cryptomaria, more ancient, are located within crater interiors, with cryptomaria basalts originating from magma intrusion beneath the crater and rising to the lunar surface. Diffuse-type cryptomaria, younger, are found in the interiors and margins of maria, with cryptomaria basalts originating from surrounding maria units, their ages aligning with these maria units. The initial list of 29 proposed cryptomaria regions has been revised to 23 regions by integrating gravity anomaly, topographic features, and chemical compositions.

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