

**Using the Moon to explore early solar system bombardment**

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A decade-long campaign to test the lunar cataclysm hypothesis continues to support an intense period of bombardment several hundred million years after solar system formation. Geological, geochemical, and isotopic data imply that (i) basin-forming impacts occurred on the Moon  $\sim 4$  Ga and (ii) impacts occurred on asteroids  $\sim 3.6$ – $4.1$  Ga, implying the lunar cataclysm is actually an inner solar system cataclysm. Geochemical and petrological fingerprints (iii) point to asteroids as the main source of debris hitting the Moon, while geological fingerprints (iv) independently point to the asteroid belt as the source of projectiles hitting the Moon, Mercury, and Mars, and also (v) indicate the asteroid belt was sampled in a size-independent manner. This suggests (vi) that resonances swept through the asteroid belt, which implies that (vii) Jupiter's orbit moved. Thus, analyses of the Moon are (viii) revealing details about the accretion and orbital evolution of planets in both the inner and outer solar system. Recent results also suggest, however, that (ix) the oldest and largest basin on the Moon was produced by a different dynamic process more closely related to the accretional epoch of solar system evolution, which is also (x) recorded among the most ancient impact melt specimens from asteroids. The timing of the transition between that early accretional phase of basin formation and the later dynamically-excited phase of basin formation on the Moon remains uncertain.