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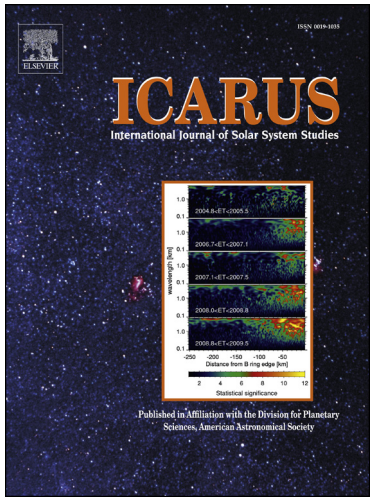

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Analysis of Isolated Magnetic Anomalies and Magnetic Signatures of Impact Craters: Evidence for a Core Dynamo in the Early History of the Moon

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***Abstract*:**

We investigate the possibility that a strong core dynamo of the Moon has magnetized the lunar crust. The magnetic data from two missions, Lunar Prospector and Kaguya, are used and the magnetic fields of two different features are examined: The isolated small magnetic source bodies with almost no topographic signatures, and the impact craters with diameters larger than 100 km. Five data sets are examined separately for each of the isolated magnetic anomalies: the r, θ, and φ components of the Lunar Prospector data, the r component of a 150-degree spherical harmonic model of the lunar magnetic field, and the r component of the Kaguya data. The r component of the Lunar Prospector data is also used to derive the magnetic field over the impact craters. We conclude that most of the ancient lunar far side crust is heterogeneously magnetized with coherency wavelength about a few hundred km. The paleomagnetic north poles determined from modeling the magnetic field of both features show some clustering whereas the source bodies are widely distributed, suggesting that the magnetizing field may have been a core dynamo field. Paleintensity data suggest that the core field intensity was at least 1 mT at the core mantle boundary. There is also evidence for core field reversals, because further clustering occurs when the south poles of some features are considered.

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