Geophysical Research Abstracts
Vol. 16, EGU2014-8914-1, 2014
EGU General Assembly 2014

A Precession-Driven Lunar Dynamo Model

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Currently, the Moon does not have an active dynamo. However, paleomagnetic studies of Apollo samples suggest that the Moon generated a magnetic field until at least 3.56 Ga. The small size of the Moon makes the persistence of a thermally or compositionally-driven dynamo difficult. Another possible energy source for the dynamo is mechanical stirring brought on by dynamical evolution of the lunar orbit. During times of high obliquity, precession of the lunar spin axis about the orbit normal could be strong enough to mechanically drive flow in the liquid-iron core, and possibly generate a dynamo. Here we test the hypothesis of a lunar dynamo driven by precession of the lunar spin axis using magnetohydrodynamic simulations. We will look for scaling laws in our models to extrapolate surface field intensities for various obliquities and precession rates experienced by the Moon during its orbital evolution.