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# Structure and Evolution of the Lunar Interior: EM Sounding and Paleomagnetism

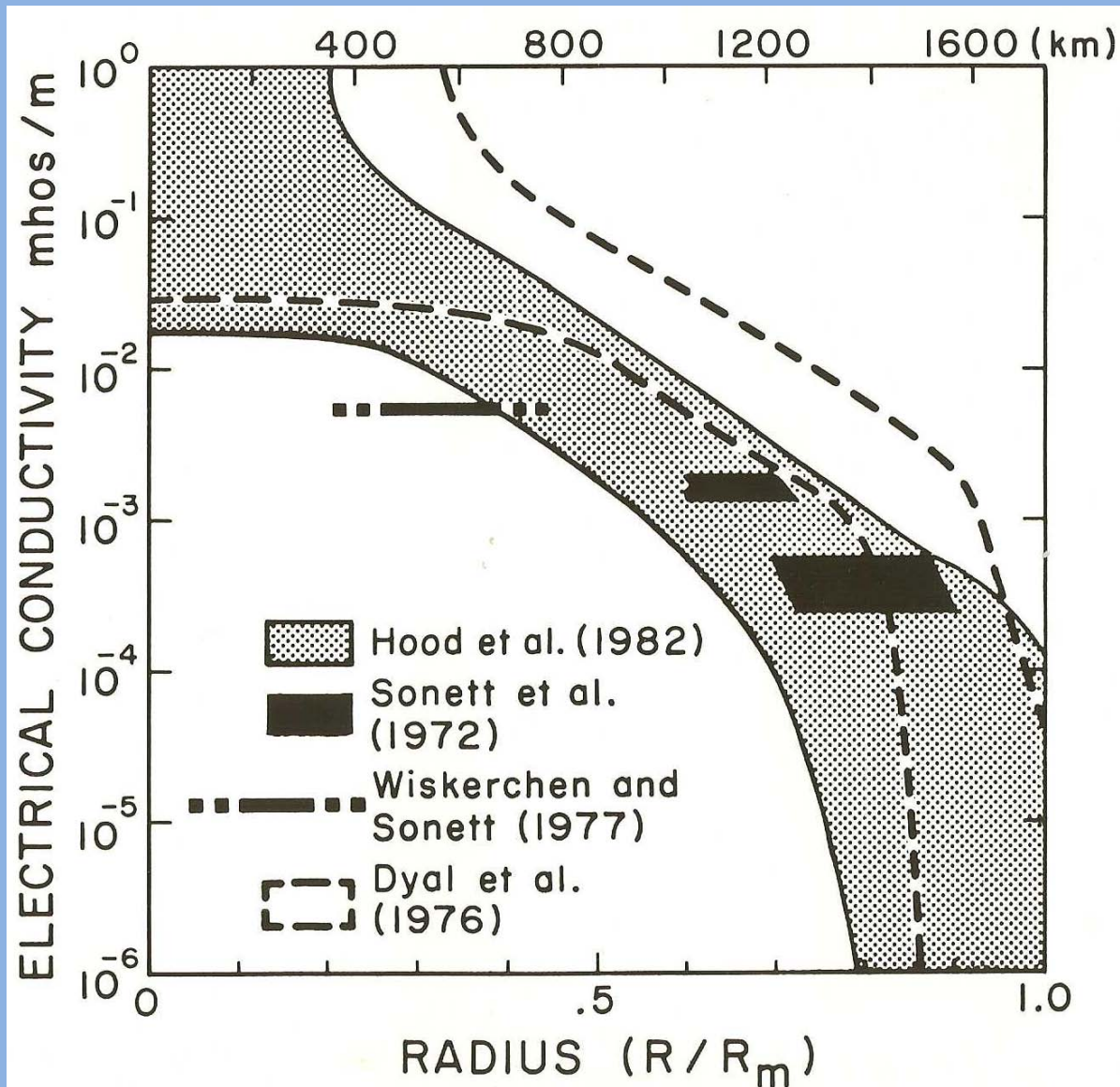
Lon Hood  
Lunar and Planetary Laboratory  
University of Arizona  
Tucson, Arizona

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Lunar Exploration Workshop  
Tempe, Arizona  
Feb. 27 - March 2, 2007





**Electrical conductivity vs. lunar radius as derived from analyses of simultaneous Apollo 12 surface and Explorer 35 orbital magnetometer data.**



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# Constraining the composition and thermal state of the moon from an inversion of electromagnetic lunar day-side transfer functions

A. Khan <sup>a,\*</sup>, J.A.D. Connolly <sup>b</sup>, N. Olsen <sup>c</sup>, K. Mosegaard <sup>a</sup>

<sup>a</sup> *Niels Bohr Institute, University of Copenhagen, Denmark*

<sup>b</sup> *Earth Sciences Department, Swiss Federal Institute of Technology, Zurich, Switzerland*

<sup>c</sup> *Danish National Space Centre, Copenhagen, Denmark*

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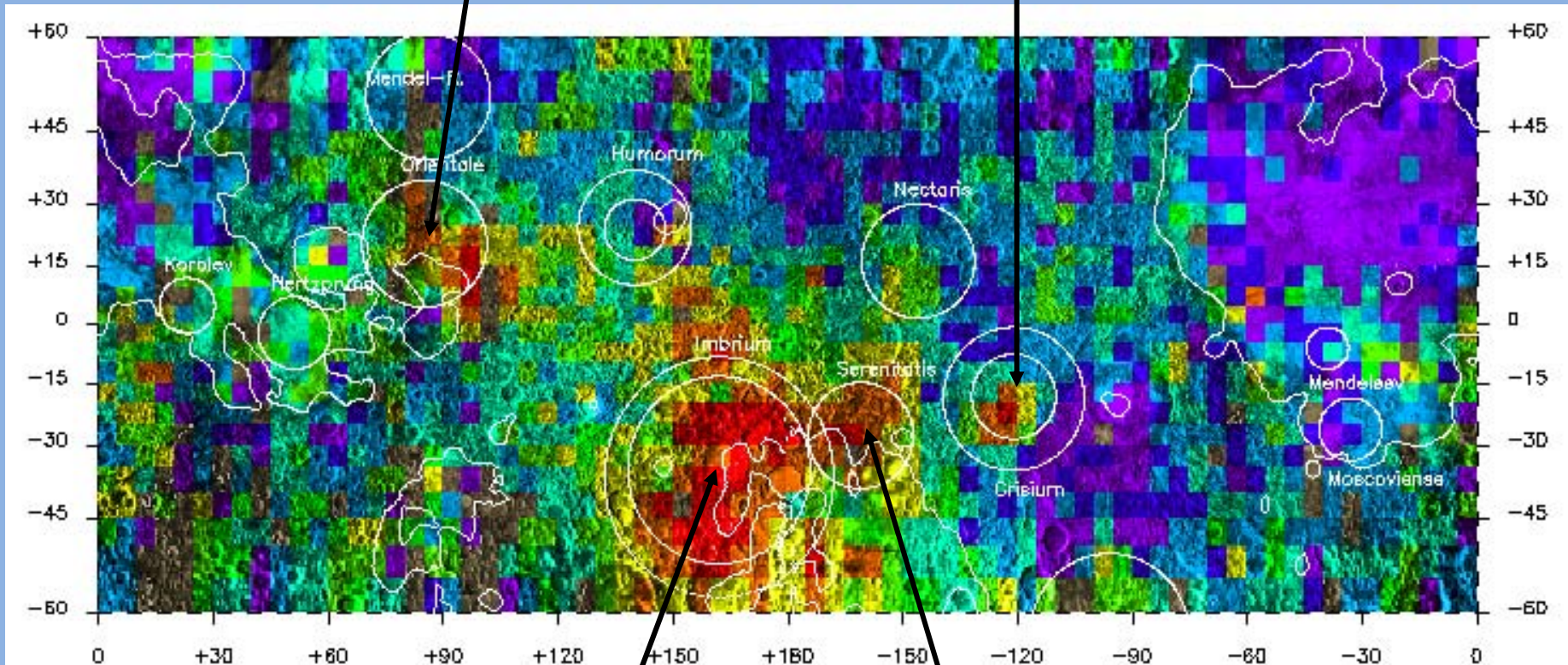
Available online 27 June 2006

Editor: V. Courtillot

**More sophisticated inversion techniques are now available to constrain both the composition and thermal state of the lunar interior using e.m. transfer function data. The main limitation is sparsity of laboratory data for relevant minerals.**

**Oriente Antipode**

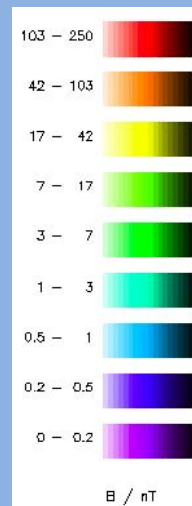
**Crisium Antipode**



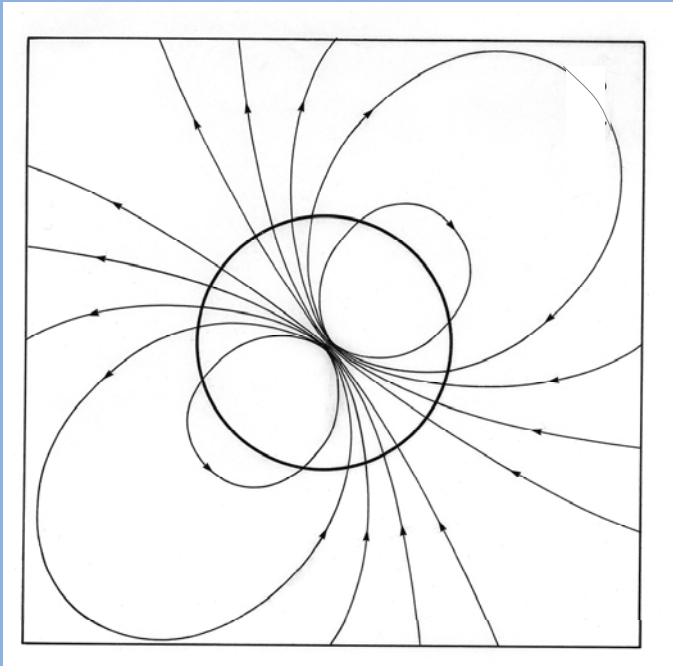
**Imbrium Antipode**

**Serenitatis Antipode**

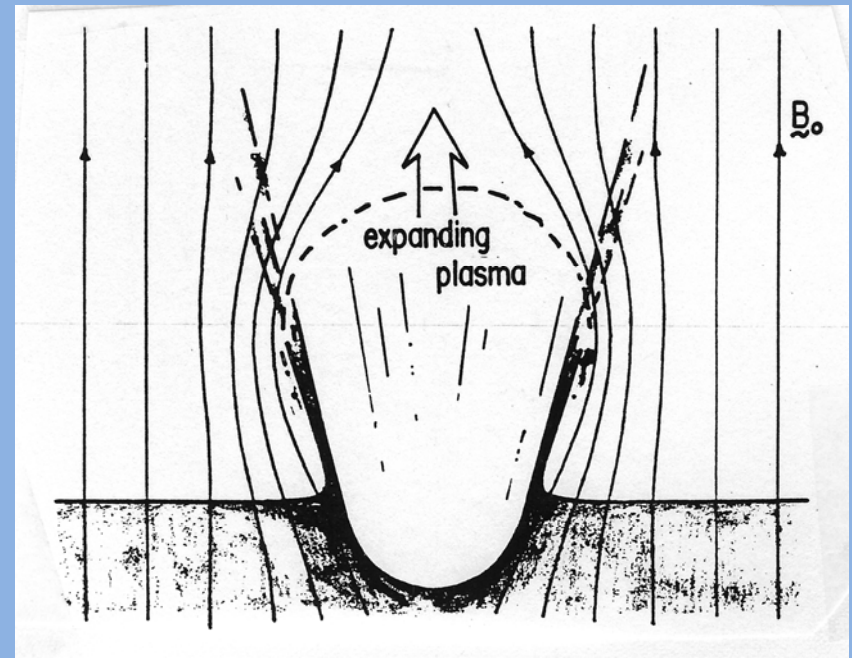
**Distribution of lunar surface magnetic fields (nT) as derived from Lunar Prospector Electron Reflectometer (ER) data (D. Mitchell, J. Halekas, R. Lin, and others, 1999). Circles are centered on the antipodes of the indicated basins.**



# Possible Sources of Lunar Magnetizing Fields:



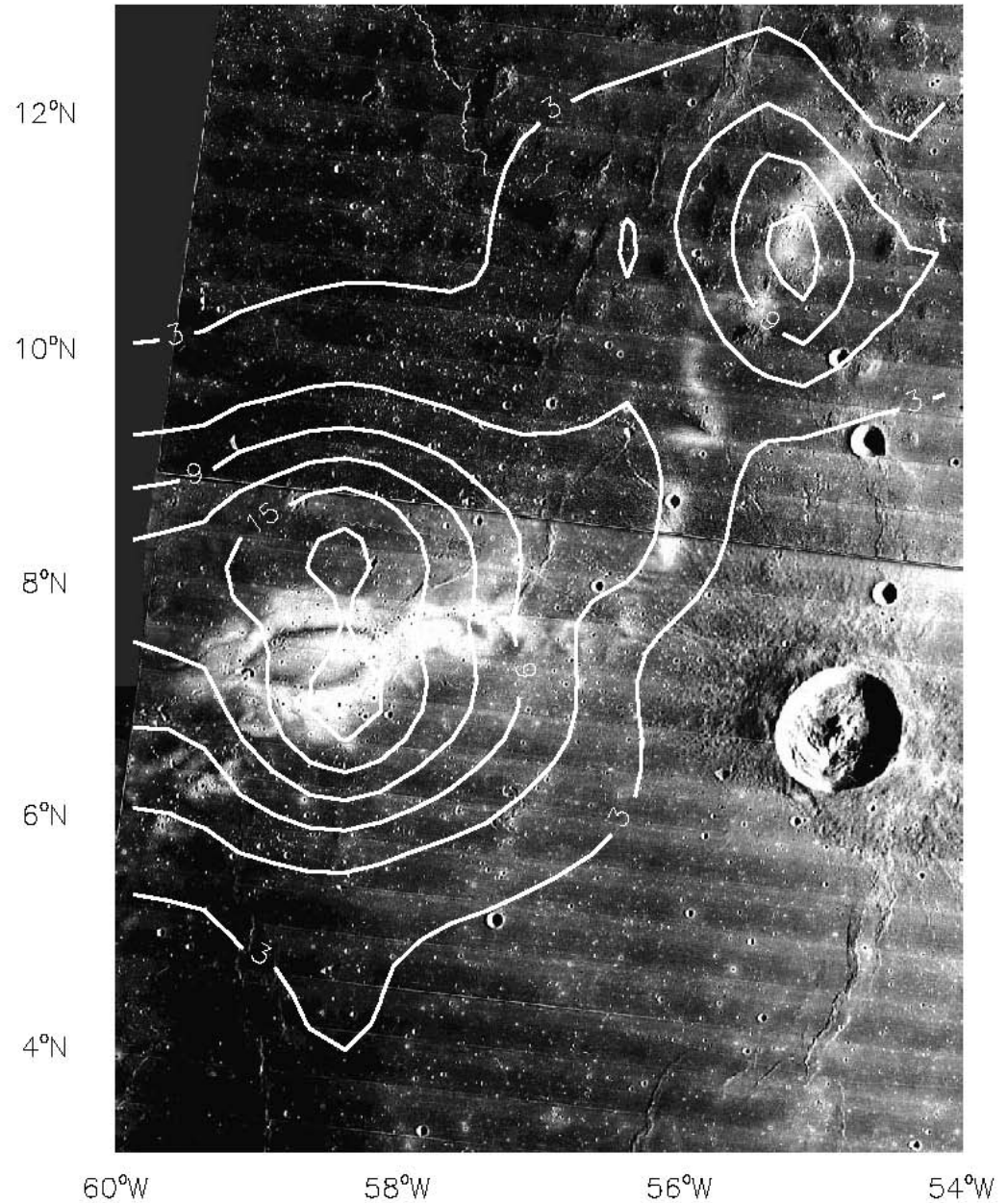
**Former Core Dynamo**

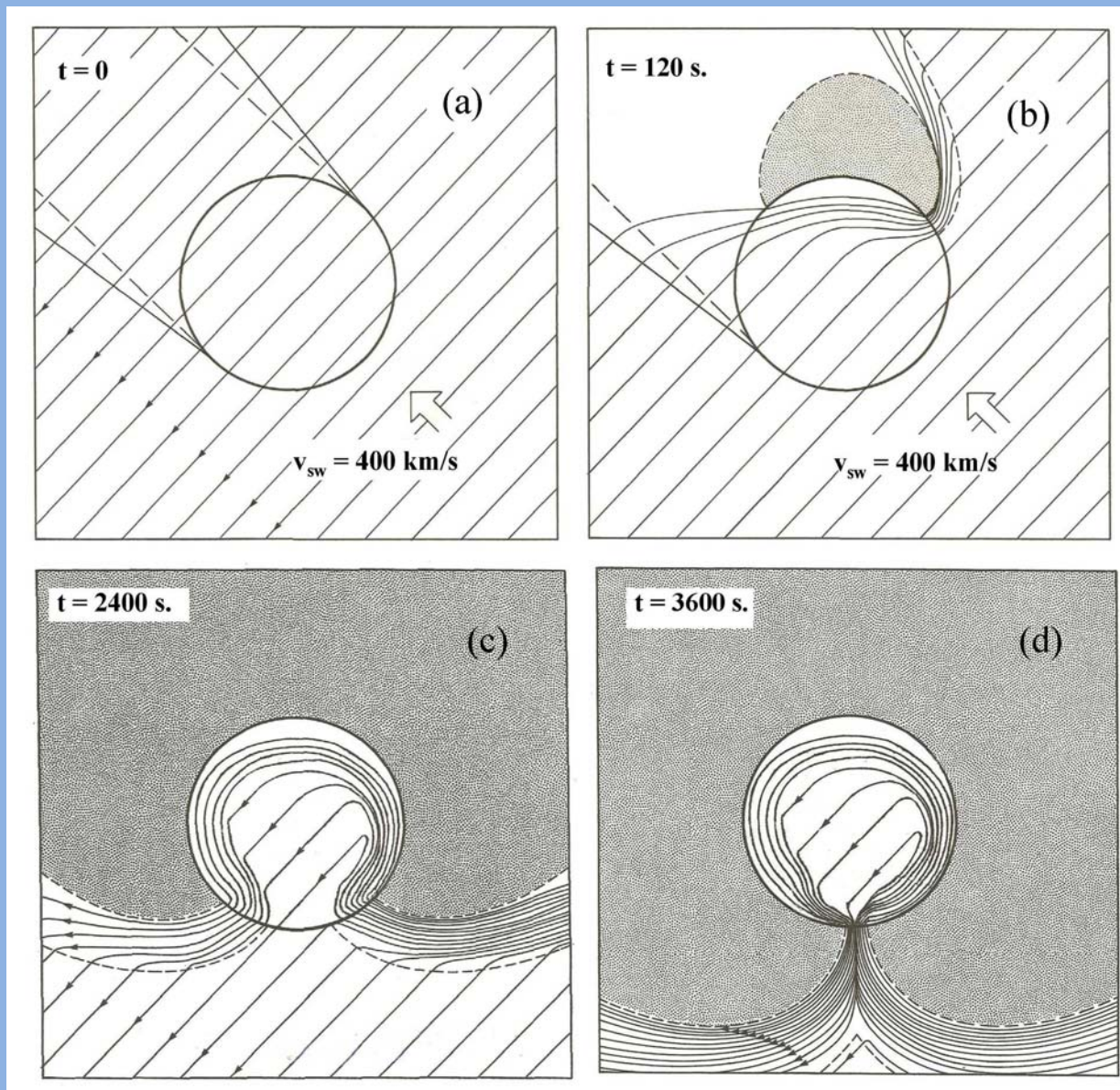


**Transient fields generated by  
impact plasmas**

Superposition of Lunar Prospector magnetometer data (field magnitude in nT) onto composite of Lunar Orbiter photos of the Reiner Gamma region.

Maximum amplitude: ~36 nT at an altitude of 19 km.





**Schematic illustration of how an initial solar wind field could be temporarily amplified at the antipode of a lunar basin-forming impact.**

# Electrical conductivity anomalies associated with circular lunar maria

Palmer Dyal

NASA Ames Research Center, Moffett Field, California 94035

William D. Daily

Eyring Research Institute, Provo, Utah 84601

**Analyses of higher-frequency Apollo surface and orbital magnetometer data yielded initial evidence for lateral variations of shallow conductivity. Future mapping of the shallow conductivity distribution could be used together with more accurate surface heat flow measurements at a few sites to produce a global heat flow map.**