

## Microsymposium 53 Announcement

Dear Colleague:

You are cordially invited to attend Microsymposium 53, "Early History of the Terrestrial Planets: New Insights from the Moon and Mercury", March 17-18th, 2012, at The Woodlands Waterway Marriot, The Woodlands, Texas, just prior to LPSC 43.

Microsymposium 53: *Early History of the Terrestrial Planets: New Insights from the Moon and Mercury*

Co-Sponsored by Brown University, Vernadsky Institute, Massachusetts Institute of Technology, and the NASA Lunar Science Institute (NLSI)

Beginning with Luna 1, over 50 years ago, the Moon has evolved into a paradigm for the early history of the terrestrial planets. Extensive human and robotic exploration of the Moon has provided a comprehensive data set that has outlined the basic events, themes and processes in the first half of Solar System history. Generally accepted and debated theories and paradigms abound for lunar origin from a giant impact into proto-Earth, magma ocean formation and solidification, depleted mantle layer overturn, early magnetic field and dynamo, late heavy bombardment, impact basin formation, mare basalt volcanism, one-plate planet tectonism, and the general thermal evolution of the Moon.

Recent lunar research results from spacecraft mission data analysis, theory and laboratory analyses are challenging many of these fundamental views. Crustal asymmetries may involve large slow impactors, anorthosites may have formed well after the solidification of the magma ocean, a lunar core dynamo may have started and lasted much longer than previously thought, more mantle volatiles than envisioned by many models have been discovered, outer planets may have migrated, causing perturbations of the inner solar system projectile flux, and we are on the verge of high resolution measurements of the gravity field with the two orbiting GRAIL spacecraft that will enable significant advances in understanding of internal structure.

Furthermore, comprehensive new data from ongoing exploration of Mercury by the MESSENGER spacecraft has rejuvenated interest in this planet and the lessons it holds for early Solar System history. Long known to be different in terms of its size and density, but thought by many to be Moon-like in terms of its surface features and geological evolution from Mariner 10 data, Mercury is emerging as fundamentally different from the Moon. MESSENGER data have revealed crustal compositions quite unlike those anticipated: crustal volatiles (up to 4 wt% sulfur), a relatively iron-poor crust, large areas with average major-element ratios intermediate between basaltic and more ultramafic values, and compositions consistent with derivation from highly reduced precursory materials such as enstatite chondrite-like objects with higher Fe abundance or other unusual materials not sampled in the current meteorite collection. MESSENGER data also reveal a cratering record that differs from the Moon in interesting ways, volcanism concurrent with the period of heavy bombardment, evidence for huge outpourings of lava in flood basalt mode, abundant and globally distributed pyroclastic deposits and hollows that imply the presence of interior volatiles, and a global magnetic field with an unusually

strong asymmetry about the planetary equator.

These findings have clearly challenged an earlier vision of a "Moon-like" Mercury, and have placed into question most earlier paradigms for the origin and evolution of the innermost planet. Although the two bodies are different, it is clear that comparison between the Moon and Mercury may help to resolve outstanding problems in the origin and evolution of each, and shed new light on the fundamental themes and events in the histories of the terrestrial planets.

The goal of Microsymposium 53 is to present a summary of these new discoveries, and to bring together representatives of the geology, mineralogy, petrology, spectroscopy, geochemistry, geophysics and dynamics communities to discuss these new findings and to ponder their implications for the next generation of significant scientific problems. A critical aspect of this discussion will be to assess the implications of this new perspective for future goals and destinations for exploration of the Moon and Mercury.

The Microsymposium will emphasize open discussion format but will be anchored by invited overviews, commentaries and posters. Invitations for overviews are currently being extended in the areas of origin, earliest differentiation history, internal structure, magnetism, bombardment history, petrogenesis, volcanic and tectonic evolution and volatile history. We will also have space for posters on these topics, including those that are relevant that are planned for LPSC.

The Microsymposium will be held at the Woodlands Waterway Marriot Hotel and Convention Center, March 17-18th, 2012, at the site of the 43rd Lunar and Planetary Science Conference taking place March 19-23, 2012. Microsymposium 53 will begin at 1 PM on Saturday, March 17th, and will conclude Sunday, March 18th, by 1 PM.

If you are interested in participating in the Microsymposium, please complete the registration form online.

We ask that requests for posters by February 1, 2012 through the registration site. Those wishing to attend the conference can register any time, including up to the time of the conference, but advance notice helps us to plan refreshments and seating. Please forward this announcement to interested students and colleagues. For further updates on the program, to be posted soon, please visit Microsymposium 53.

Co-conveners: Carle Pieters, Maria Zuber, James Head, Alexander Basilevsky, Amy Barr and Harald Hiesinger

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