Tuesday, March 14, 2000
NEW VIEWS OF THE MOON: THERMAL EVOLUTION AND NATURE OF THE LUNAR INTERIOR I
8:30 a.m. Room A

Chairs: L. R. Gaddis
J. J. Gillis

Hood L. L. *
Geophysical Constraints on the Lunar Interior: Status and Remaining Issues **[#1249]**
Since the post-Apollo period, a series of developments has led to significant refinements of geophysical constraints on lunar internal structure and bulk composition. These constraints, if they are valid, would impose new limits on lunar origin and early evolution.

Khan A. * Mosegaard K. Rasmussen K. L.
Lunar Models Obtained from a Monte Carlo Inversion of Apollo Lunar Seismic P and S-Waves **[#1341]**
Results from a Monte Carlo inversion of the Lunar Seismic P and S-waves has revealed information on the lunar interior down to a depth of 1100 km, indicating a homogenous upper mantle and a high velocity middle mantle.

Neal C. R. * Ryan J. Jain J. C. Chazey W.
The Nature of the Lunar Mantle: Generally Chondritic for the Mare Basalt Sources, but with Garnet in the Source of the Volcanic Glasses **[#1944]**
New ICP-MS data for mare basalts demonstrate that the source region is generally chondritic in nature. Differences in trace element ratios between the basalts and volcanic glasses are attributed to garnet in the glass source.

Parmentier E. M. * Zhong S. Zuber M. T.
On the Relationship Between Chemical Differentiation and the Origin of Lunar Asymmetries **[#1614]**
We explore a model in which gravitational differentiation of dense, heat producing element-rich magma ocean cumulates can explain and the global asymmetry in KREEP layer thickness and mare basalt distribution.

Lee D-C. * Halliday A. N. Snyder G. A. Taylor L. A.
Lu-Hf Systematics and the Early Evolution of the Moon **[#1288]**
Here we present preliminary MC-ICPMS Lu-Hf results for a suite of lunar samples, including the first Lu-Hf data for lunar highland rocks, lunar volcanic glasses, and KREEP basalts, in an attempt to better constrain the origin and chemical evolution of the Moon.

Loper D. E. * Werner C.
On the Cause of Lunar Crustal Asymmetries **[#1746]**
We propose that lunar crustal asymmetries are produced by tilted convection within the lunar magma ocean with the orientation of tilt being controlled by a small lateral variation in cooling rate produced by the proximity of Earth.

Longhi J. *
Anorthosite Petrogenesis Revisited **[#2097]**
New calculations show that 300–500 km Magma Ocean crystallization plausibly leads to anorthosite formation.

Werner C. * Loper D. E.
On the Origin of Lunar Mascons **[#1752]**
Mascons are the result of non-hydrostatic volcanic emplacement of dense basalts within the near-side impact basins. The overpressures were produced by “second boiling” of the residues of the lunar magma ocean beneath these basins.

Ojima K. * Abe Y.

Constraints on the Origin of Large-Scale Lunar Topographies from the Observed Admittance: Viscous Relaxation with Lunar Thermal History **[#1727]**

The formation mechanism of the large-scale lunar topographies is constrained from the topography-gravity relationship and visco-elastic relaxation model. Acceptable mechanisms include large impacts and/or underplating with strong dynamic support.

Wiechert U. * Halliday A. N. Lee D. C. Snyder G. A. Taylor L. A. Rumble D.

Oxygen Isotope Homogeneity of the Moon **[#1669]**

High precision ^{16}O, ^{17}O, and ^{18}O measurements for 33 lunar samples are reported and consequences for the origin of non-chondritic tungsten isotope ratios of some lunar samples are discussed.

Shearer C. K. * Righter K.

Tungsten Partitioning in Silicates. A Key to Understanding the Early Evolution of the Moon **[#1411]**

We investigate the partitioning behavior of W in a variety of silicates that may have been stable during LMO crystallization, evaluate their role in generating W isotopic signatures, and speculate about the early differentiation of the Moon.

Hess P. C. *

Petrogenesis of Lunar Troctolites — Implications for the Moon and Its Evolution **[#1389]**

Source rocks for lunar troctolites are very Mg* olivine-rich, orthopyroxene cumulates hybridized with ferroan anorthosite and small quantities of KREEP. Implications are that the Moon is Mg*88, has low Cpx norms and $^{(Sm/Nd)}CH^{>1}$.

Jakes P. * Jambon A.

The Composition of the Earth's Lower Mantle and the Bulk Composition of the Moon **[#1228]**

New model of lower mantle composition of the Earth (Albarede and van der Hilst) corresponds much better with the refractory composition of the bulk Moon.