Monday, March 11, 2002
EARLY EVOLUTION OF THE MOON: THE WONDER YEARS
8:30 a.m.  Salon A

Chairs:  C. R. Neal  
S. Tompkins

Shearer C. K.*  Borg L. E.  Papike J. J.  
Trace Element and Petrologic Constraints on the Age of Lunar Ferroan Anorthosites [#1517]  
We investigate the distribution of trace elements in minerals in FAN 62236 to evaluate the role of lithology mixing on the Sm-Nd isotopic system.

Oberst J.*  Mizutani H.  
A New Inventory of Deep Moonquake Nests Visible in the Apollo 12 Area [#1704]  
A new search for “Deep Moonquakes” was carried out among the approx. 3000 seismic events that have hitherto been listed as “unclassified” in the Apollo Seismic Event Catalog.

Borg L. E.*  Shearer C. K.  Nyquist L. E  Norman M. D.  
Isotopic Constraints on the Origin of Lunar Ferroan Anorthosites [#1396]  
Ferroan anorthosites have whole rock Nd isotopic compositions that are too radiogenic to have crystallized from a chondritic magma ocean. Mechanisms to disturb the whole rock Sm-Nd isotopic compositions are explored.

Nyquist L. E.*  Bogard D. D.  Shih C. Y.  Wiesmann H.  
Negative $\epsilon_{Nd}$ in Anorthositic Clasts in Yamato 86032 and MAC88105: Evidence for the LMO? [#1289]  
The LMO model predicts flotation cumulates with negative $\epsilon_{Nd}$ values, but Apollo 16 FANs have positive $\epsilon_{Nd}$ values. Ar-Ar ages plus bulk-rock Sm-Nd data for two FAN breccias from two lunar meteorites give negative $\epsilon_{Nd}$ values.

Takeda H.*  Nyquist L. E.  Kojima H.  
Mineralogical Study of a Gray Anorthositic Clast in the Yamato 86032 Lunar Meteorite: Windows to the Far-Side Highland [#1267]  
We performed a mineralogical study of a large gray clast (Y86032,83-1). Comparing our data and an Ar-Ar age of 4.49 Ga and negative $\epsilon_{Nd}$ data (Nyquist et al.), we propose that the original anorthosite is an important FAN of the farside highland.

Tompkins S.*  
Indications of Magma Ocean Variability in Fresh Highland Craters [#1829]  
Craters with mafic lithologies are rare in the highlands, but where they do occur there is evidence for large, near-surface units of relatively uniform composition. Several such craters are analyzed for insight into magma ocean variability.

Shervais J. W.*  Snow C. A.  
Plagioclase Dissolution in the Lunar Magma Ocean: A New Model for the Origin of Lunar Ferroan Anorthosites and the Rapid Growth of Highlands Crust [#1029]  
A new model for the rapid formation of lunar highlands crust which explains the negative slope of the ferroan anorthosite suite on the Fo-An diagram.

Longhi J.*  
The Extent of Early Lunar Differentiation [#2069]  
New calculations with a revised partial melting model show that a deep (> 1000 km) source with very low $\text{Al}_2\text{O}_3$ concentration (<1.5 wt %) is required to produce the green mare volcanic glasses. No substantial amounts of primitive material could have been present.
Neal C. R.* Ely J. C.
* Sulfide Immiscibility in the Lunar Magma Ocean: Evidence for a Primitive Lunar Lower Mantle and the Origin of High-µ Mare Basalts [#1821]
Chalcophile, lithophile, and highly siderophile elements are used to examine the source of mare volcanic products. The lunar magma ocean experienced extraction of an immiscible sulfide liquid during its crystallization. This accounts for the extreme high-µ values exhibited by mare basalts.

Stegman D. R.* Richards M. A. Baumgardner J. R.
* Mare Volcanism and the Early Thermal History of the Lunar Core [#1977]
The evolution of a dense layer enriched in heat producing elements surrounding the lunar core may account for 1) the heterogeneous distribution of mare volcanism 2) the absence of a lunar magnetic field before 4 Ga and 3) the sudden appearance of one afterwards.

Wieczorek M. A.* Zuber M. T.
* The “Core” of the Moon: Iron or Titanium Rich? [#1384]
Various lines of evidence have been used to suggest that the Moon possesses a small iron-rich core. Here we show that the geophysical data is equally consistent with the Moon, instead possessing a dense titanium-rich molten silicate “core.”

Khan A.* Mosegaard K.
* Investigating the Lunar Velocity Structure Using Bayesian Statistics [#1548]
We have presently applied bayesian statistical analysis to our results obtained from a Monte Carlo inversion of the Apollo lunar seismic arrival time data. Using this type of analysis a thinner crust with a thickness of around 40 km is strongly favored.

Chenet H.* Gagnepain-Beyneix J. Lognonné P.
* A New Geophysical View of the Moon [#1684]
We present here the results of a complete re-processing of the Apollo seismic data, and interpret seismic models in terms of chemical composition.