Monday, March 19, 2012
NEW VIEWS ON LUNAR VOLATILES
8:30 a.m. Waterway Ballroom 4

Chairs: **James Greenwood**
G. Jeffrey Taylor

8:30 a.m. Evans A. J. * Zuber M. T.
The Possible Role of Water in the Early Thermal Evolution of the Moon **[#2406]**
Recent work suggests a water concentration of at least 260 ppm was present in the lunar mantle ~3 Ga. Through a lunar convection model of post-magma ocean solidification, we examine the possible role of water and its effect on lunar thermal evolution.

8:45 a.m. Chen Y. * Zhang Y.
Initial Water Concentration and Degassing of Lunar Basalts Inferred from Melt Inclusions in Olivine **[#1361]**
We report preliminary data on water concentration in olivine-hosted melt inclusions in lunar basalts. Our results raise important questions about the budget and distribution of water in the Moon and its roles in the magma evolution.

9:00 a.m. Saal A. E. * Hauri E. H. Van Orman J. A. Rutherford M. J.
D/H Ratios of the Lunar Volcanic Glasses **[#1327]**
Here we report the first in-situ measurements of the isotopic composition of hydrogen dissolved in primitive volcanic glass and their melt inclusion samples recovered from the Moon by the Apollo 15 and 17 missions. We discuss the origin of the lunar water.

9:15 a.m. Greenwood J. P. * Itoh S. Sakamoto N. Warren P. H. Taylor L. A. Yurimoto H.
Towards a Wetter Moon: Implications of High Volatile Abundances in Lunar Apatite **[#2089]**
New results on water and D/H of lunar apatite are presented. Implications of high volatile abundances of lunar apatite for the water inventory of the Moon are considered in light of degassing of molecular hydrogen and low oxygen fugacities.

9:30 a.m. Taylor G. J. * Robinson K. L.
Distinct Volatile Reservoirs in the Moon: Evidence for Late Addition of Volatiles and Water **[#2443]**
Concentrations of highly volatile elements are roughly chondritic among pyroclastic glasses, mare basalts, and KREEP basalts and vary directly with water contents, suggesting late addition of a chondritic component containing a few tenths % water.

9:45 a.m. Sharp Z. D. * McCubbin F. M. Shearer C. K. Jr.
A Unifying Theory for H-Bearing Volatiles on the Moon **[#2751]**
The low oxygen fugacity of the Moon requires that H_2 gas is the dominant phase in the O-H system. H_2 is easily lost to space, so that the low H content of most basalts, high D/H ratios, presence of Fe(o) and high Cl-isotope ratios are all explained.

10:00 a.m. Liu Y. * Guan Y. Zhang Y. Rossman G. R. Eiler J. M. Taylor L. A.
Lunar Surface Water in Agglutinates: Origin and Abundances **[#1864]**
We report in situ measurements of the abundances and H-isotope compositions of lunar surface water stored in lunar soil samples.

10:15 a.m. Poston M. J. * Grieves G. A. Aleksandrov A. B. McLain J. L. Hibbitts C. A. Dyar M. D. Orlando T. M.
Formation and Time Evolution of Hydroxyl on Lunar Regolith by Proton Implantation and Diffusion **[#2801]**
A 1D discretized source-sink-transport simulation of solar wind proton implantation into lunar regolith. Trends with time of day, differing material, and differing latitude are described.

10:30 a.m. Dyar M. D. * Hibbitts K. A. King P. L. Breves E. A. Orlando T. M. Poston M. J. Grieves G. A. Tucker J. M. Seaman S. J.
Remote Sensing of H in Lunar Surface Materials: The Effect of Composition on Hydrogen Solubility and Quantification **[#2264]**
This paper explores the relationship between 3-µm band strength and the composition of lunar surface materials through transmission FTIR spectroscopy of a suite of synthetic lunar-analog glasses.

10:45 a.m. Miller R. S. * Nerurkar G. Lawrence D. J.
New Insights Into Hydrogen at the Lunar Poles from the Detection of Fast and Epithermal Neutron Signatures **[#1538]**
We report the first definitive detection of a fast-neutron signature consistent with enhanced lunar hydrogen abundances, and present new spatial distributions for epithermal-derived hydrogen at the lunar poles using a combined LP-LRO dataset.

11:00 a.m. Elphic R. C. * Paige D. A. Siegler M. A. Vasavada A. R. Teodoro L. A. Eke V. R.
Limits on the Abundance and Burial Depth of Lunar Polar Ice Deposits **[#1895]**
Water equivalent hydrogen abundances in the extensive subsurface cold traps must be less than 1 wt% generally, but can exceed this in specific locations. Observations of thermal neutrons help constrain abundance and burial depth.

11:15 a.m. Sanin A. B. * Mitrofanov I . G. Litvak M. L. Boynton W. V. Chin G. Droege G. Evans L. G. Garvin J. B. Golovin D. V. Harshman K. McClanahan T. P. Malakhov A. Mokrousov M. I. Milikh G. Sagdeev R. Z. Starr R. D.
Testing of Lunar Permanently Shadowed Regions for Water Ice **[#2134]**
The Lunar Exploration Neutron Detector (LEND) data have been used to look at distribution of neutron flux at the Moon's poles. LEND's narrow field of view provides the possibility to test the hypothesis if all major PSRs are reservoirs of hydrogen or water ice.

11:30 a.m. Eke V. R. * Teodoro L. F. A. Lawrence D. J. Elphic R. C. Feldman W. C.
What is the LEND Collimated Detector Really Measuring? **[#2211]**
A comprehensive analysis of data from the Lunar Exploration Neutron Detector Collimated Sensors for Epithermal Neutrons is performed, with significant implications for the lunar hydrogen distribution.