

Thursday, July 30, 2015
MARS EXPLORATION AND MARTIAN METEORITES:
PETROLOGY, GEOCHEMISTRY, AND WATER-ROCK INTERACTION
1:30 p.m. Sibley Auditorium

Chairs: Gretchen Benedix
Laurent Remusat

- 1:30 p.m. Nyquist L. E. * Park J. Nagao K. Habu M. K. Mikouchi T. Kusakabe M. Shih C.-Y. Herzog G. F.
["Normal Planetary" Ne-Q in Chelyabinsk and Mars](#) [#5054]
 Chelyabinsk contains "Q"-noble gases. Martian shergottite Dhofar 378 contains trapped $^{20}\text{Ne}/^{22}\text{Ne} = 7.3 \pm 0.3$, derivable from Q-Ne with $^{20}\text{Ne}/^{22}\text{Ne} = 10.67$ via fractionation by solar wind induced sputtering. Martian juvenile Ne is suggested to be Q-Ne.
- 1:45 p.m. Lin Y. * El Goresy A. Zhang J. Miyahara M. Hao H. Zhang M. Ohtani E. Gillet Ph.
[H and C Isotopes of C-Grains from Martian Meteorite NWA 6162](#) [#5039]
 C-grains were found in shocked melt pockets from martian meteorite NWA 6162, with δD from -10 to $+650\%$ and $\delta^{13}\text{C}$ from -24 to $+6\%$. The D-enriched grains are normal in C isotopes, except for one ^{13}C -depleted, suggestive of various reservoirs.
- 2:00 p.m. Michalski J. R. * Smith C. L.
[Clay Minerals on Mars: Updated Crystal-Chemistry from Infrared Remote Sensing and Comparison to Meteorite Data](#) [#5097]
 Updated crystal-chemical constraints from global remote sensing of Noachian clay. Martian clays shows that these clays have high FeO/MgO ratios compared to bulk martian meteorite compositions and compared to clay minerals within martian meteorites.
- 2:15 p.m. Tucker K. Hervig R. Till C. Wadhwa M. *
[D/H in Nominally Anhydrous Phases in Martian Meteorites: Implications for the Martian Mantle](#) [#5173]
 We present the results of analyses of H_2O contents and hydrogen isotope compositions of nominally anhydrous phases in five (enriched and depleted) shergottites and three nakhlites, based upon which we make inferences about mantle composition on Mars.
- 2:30 p.m. Maltsev O. V. * Ziegler K. Sharp Z. D. Agee C. B.
[Water in Martian Meteorites: Oxygen Isotope Compositions](#) [#5299]
 We present the results of oxygen isotope analysis of water extracted from shergottites Tissint and Zagami using stepwise heating between temperatures of 20° and 1000°C .
- 2:45 p.m. Irving A. J. * Kuehner S. M. Ziegler K. Andreasen R. Richter M. Lapen T. J. Pitt D.
[Chlorophaeite-Bearing Nakhlite Northwest Africa 10153: Petrology, Oxygen, and Hafnium Isotopic Composition, and Implications for Magmatic or Crustal Water on Mars](#) [#5251]
 The ninth known nakhlite contains interstitial chlorophaeite-like material that may signify addition of martian crustal water.
- 3:00 p.m. Breton H. * Lee M. R.
[Martian Fluid Evolution Recorded in Smectite from the NorthWest Africa \(NWA\) 817 Nakhlite Meteorite](#) [#5107]
 We investigate the texture, mineralogy and chemical composition of alteration products of the NWA 817 nakhlite to better understand the martian fluid composition and evolution.

- 3:15 p.m. Remusat L. * Zanda B. Beck P. Lorand J.-P. Pont S. Leroux H. Hewins R.
[*New Constraints on the Water Budget in the Martian Breccia Meteorite NWA 7533*](#) [#5125]
We measured by NanoSIMS the water content and D/H of ilmenite and apatite clasts in NWA 7533. They have recorded a late hydrous alteration event on Mars. Besides, oxyhydroxide grains around pyrites are products of terrestrial weathering.
- 3:30 p.m. Liu Y. * Ma C. Chen Y. Beckett J. Guan Y.
[*Rare-Earth minerals in Martian Meteorite NWA 7034/7533: Evidence for Fluid-Rock Interaction in Martian Crust*](#) [#5051]
Previously, we reported finding of monazite, chevkinite-perrierite and xenotime in the 'Black Beauty' meteorite (NWA 7034/7533). Here, we show textural and compositional evidence of these minerals that suggest hydrothermal fluids in martian crust.
- 3:45 p.m. Bridges J. C. * MacArthur J. L. Hicks L. J. Burgess R. Joy K.
[*Alteration of a Martian Impact Regolith Recorded in NWA 8114*](#) [#5284]
A TEM, XANES, Ar-Ar study of martian breccia NWA 8114 shows it underwent high T oxidation and breakdown of px to Fe oxide, amorphous silicate and recrystallised px. This together with veining and accretionary rim formation reset the Ar-Ar.
- 4:00 p.m. Waesermann N. Humayun M. * Yang S. Hewins R. H. Zanda B. Leroux H.
[*Siderophile Elements in Pristine and Altered Clasts in NWA 7533*](#) [#5358]
Elemental relations of Ni, Ge, etc., discriminate five pristine igneous-textured clasts from coarse-grained impact melt rocks in NWA 7533. An altered pyroxene clast was weathered or hydrothermally altered on Mars.
- 4:15 p.m. Santos A. R. * Agee C. B. McCubbin F. M. Shearer C. K.
[*Evidence for Exotic Fe-, Ti-, and P-Enriched Magmas on Mars from Meteorite Northwest Africa 7034*](#) [#5279]
A group of lithic clasts within martian meteorite NWA 7034 are enriched in Fe, Ti, and P, and are similar to a group of terrestrial rocks enriched in these elements. We investigate the petrogenesis of this martian rock type.
- 4:30 p.m. Dunham E. * Wadhwa M. Tucker K. Balta J. B. McSween H. Y.
[*Rare Earth Element Geochemistry of the Shergottites LAR 12095, 12240, and 12011*](#) [#5289]
REE geochemistry confirms pairing of shergottites LAR 12095 and LAR 12240, and of LAR 12011 with LAR 06319. Calculations of magmatic fO₂ suggest that these shergottites originated from martian mantle sources with different redox conditions.
- 4:45 p.m. Benedix G. K. * Hamilton V. E. Reddy S. M.
[*Assessing Mineral Orientation in Martian Meteorites Using IR Microspectroscopy and EBSD Techniques*](#) [#5202]
Spectral features of minerals are dependent on composition and orientation. Using electron backscatter diffraction and microspectroscopy techniques, we can unravel these effects from each other.
- 5:00 p.m. Sharp T. G. * Walton E. L. Hu J.
[*Shock Effects in NWA 8159: A Martian Plagioclase-Augite Basalt*](#) [#5346]
The purpose of this study is to determine the high-pressure phases in and associated with the shock veins. High-pressure minerals in the shock veins indicate a shock pressure of approximately 16 GPa and a relatively long shock duration.