

Wednesday, March 19, 2003
EVOLUTION OF THE MARTIAN INTERIOR
1:30 p.m. Salon C

Chairs: C. B. Agee
D. S. Musselwhite

Zhang Y. *

Volatiles on Mars [#1336]

The abundance of volatiles on Mars is much less than that on Earth. Is the depletion a primary feature or a secondary feature? In this contribution, I outline a model for volatile budgets of Mars, and implications for water on Mars.

Marti K. * Mathew K. J. Marty B.

Martian Xenology: Indigenous, Radiogenic and Fission Components [#1816]

We identify Martian interior, radiogenic and fission components in recently recovered shergottites, which further constrain the differentiation and evolution of the mantle.

Goreva J. S. * Leshin L. A. Guan Y.

Ion Microprobe Measurements of Carbon Isotopes in Martian Phosphates: Insights into the Martian Mantle [#1987]

In situ measurements of C in the phosphates from meteorites Los Angeles, Zagami, QUE94201 and ALH84001 predict isotopically light martian magmatic C, heavier than previous estimates yet significantly lighter than the terrestrial value.

Herd C. D. K. * Treiman A. H. McKay G. A. Shearer C. K.

Light Lithophile Elements in Natural and Experimental Phases in Martian Basalts: Implications for the Degassing of Water from Martian Magmas [#1635]

We tested prior claims of magmatic water in martian basalts by obtaining LLE analyses of Shergotty and Zagami pyroxene, analyses of Pasamonte pyroxene, and silicate and phosphate partition coefficients for Li and B appropriate to martian basalts.

Ghosh A. * Nimmo F. McSween H. Y. Jr.

The Effect of Early Accretion and Redistribution of ^{26}Al on the Thermal Evolution of Mars [#2011]

Recent data from accretion models and Hf-W ages show that Mars accreted in <10 Myrs. We explore the effect of early accretion and partitioning of ^{26}Al , to the mantle during core formation, on the thermal evolution of Mars.

Foley C. N. * Wadhwa M. Janney P. E.

Tungsten Isotopic Composition of the SNC Meteorite Los Angeles: Further Implications for Early Differentiation History of Mars [#2117]

The tungsten composition has been measured in a number of terrestrial geostandards, Allende, and the SNC Los Angeles. Implications are discussed for the differentiation history of Mars.

Fei Y. * Bertka C. M.

Experimental Constraints on the Thermal Structure of the Martian Interior and Martian Magmatism [#1829]

We present experimental data on melting relations in a model Martian core composition in the system Fe-Ni-S and melting curve of the Martian mantle up to 25 GPa. Our experimental study provides essential data to estimate the core temperatures and constraints on thermal history models.

Agee C. B. * Draper D. S.

Melting of Model Martian Mantle at High-Pressure: Implications for the Composition of the Martian Basalt Source Region [#1408]

High pressure melting experiments on Homestead ordinary chondrite constrain early Martian mantle processes.

Elkins-Tanton L. T. * Parmentier E. M. Hess P. C.

A Model for Martian Magma Ocean Crystallization and Overturn [#1479]

We create a simple model for Martian magma ocean crystallization and assess the outcome of overturn due to density instability. This model may explain aspects of the Martian magnetic field and may reproduce the compositions of Martian meteorite source regions.

McLennan S. M. *

Evidence for a Distinctive Rare Earth Element-Enriched Mantle Reservoir on Mars [#1710]

La/Th ratios of shergottites are subchondritic and decrease with increasing La, consistent with mixing between depleted mantle and enriched crust. A distinctive high La/Th mantle reservoir is needed to balance low La/Th ratios of shergottites.

Treiman A. H. *

Mantle Metasomatism in Mars: Evidence from Bulk Chemical Compositions of Martian Basalts [#1413]

** (two stars) — A whodunit. Colombo-like detective seeks cause of chemical enrichments in martian basalts. The real crime is the script.

Musselwhite D. S. * Jones J. H.

Oxygen Fugacity of the Martian Mantle From Pyroxene/Melt Partitioning of REE [#2032]

This study is part of an ongoing effort. to calibrate the pyroxene/melt REE oxybarometer for conditions relevant to martian meteorite.

McCanta M. C. * Rutherford M. J. Dyar M. D. Delaney J. S.

Fe³⁺/ΣFe Ratios in Pigeonite as a Function of fO₂: A Preliminary Investigation [#1361]

We present an experimental investigation into the partitioning of Fe³⁺/Fe²⁺ between pigeonite and a basaltic shergottite melt as a function of fO₂. Once calibrated, this could serve as a potential oxybarometer for the martian meteorites.