

Thursday, March 19, 2015

[R452]

**SPECIAL SESSION: TRACING THE EVOLUTION OF
THE ANCIENT MARTIAN ATMOSPHERE AND CLIMATE**

1:30 p.m. Waterway Ballroom 4

Chairs: Paul Niles

R. Aileen Yingst

- 1:30 p.m. Hurowitz J. A. * Fischer W. W. Milliken R. E. Tosca N. J.
[*Water Loss and the Net Oxidation of the Atmosphere Recorded in the Ancient Sedimentary Record of Mars?*](#) [#2796]
The ancient sedimentary rock record of Mars may record atmospheric loss processes that continue in the modern era.
- 1:34 p.m. Franz H. B. *
[*Sulfur Isotopes and Martian Climate History*](#) [#2970]
Mass-independent sulfur isotopic signatures constrain the history of the martian atmosphere.
- 1:38 p.m. Usui T. * Simon J. I. Jones J. H. Kurokawa H. Sato M. et al.
[*Hydrogen Isotopes Record the History of the Martian Hydrosphere and Atmosphere*](#) [#1593]
This study presents insights from hydrogen isotopes for the origin and evolution of martian water reservoirs.
- 1:42 p.m. Villanueva G. L. * Mumma M. J. Novak R. E. Kaufl H. U. Hartogh P. et al.
[*The Evolution of the Water Reservoirs on Mars Revealed via D/H Isotopic Mapping*](#) [#2073]
We report maps of atmospheric water and its deuterated form across the martian globe, revealing the evolution and interaction of the water reservoirs on Mars.
- 1:46 p.m. DISCUSSION
- 2:00 p.m. Putzig N. E. * Phillips R. J. Smith I. B. Thomason C. J. Mellon M. T. et al.
[*Low Radar Reflectivity in Planum Australe Points to Past Episodes of Martian Atmospheric Collapse*](#) [#2586]
South polar low radar-reflectivity zones are remnants of atmospheric collapse and sequester over half of Mars' carbon dioxide within the icy layered deposits.
- 2:04 p.m. Filiberto J. * Baratoux D. Beaty D. Breuer D. Farcy B. J. et al.
[*Constrains, Questions, and Future Directions on Volatiles in the Martian Interior: A Summary of the Workshop*](#) [#2064]
This abstract will summarize the key findings of The Workshop on Volatiles in the Martian Interior and the primary open questions.
- 2:08 p.m. McCubbin F. M. *
[*Evidence for a Heterogeneous Distribution of H₂O in the Martian Interior*](#) [#1715]
Based on estimates of the H₂O abundances of various geochemical sources from the martian interior, Mars has a heterogeneous distribution of H₂O.
- 2:12 p.m. Luhmann J. G. * Ma Y. J. Curry S. Dong C. Alvarez K. et al.
[*Are There Magnetic Storms at Mars?*](#) [#1823]
We use models of the solar wind interaction with Mars to anticipate the sensitivity of related ionospheric effects to the interplanetary field orientation.

- 2:16 p.m. DISCUSSION
- 2:30 p.m. Fassett C. I. * Goudge T. A. Head J. W. Mustard J. F.
[*Open-Basin Lakes and the Climate and Surface Environment of Early Mars*](#) [#1880]
Open-basin lakes/Are evidence for wet Mars/Was it warm or cold?
- 2:34 p.m. Hynek B. M. *
[*Valley Networks and the Nature of the Late Noachian Mars Climate*](#) [#2166]
Valley networks remain the best evidence for long-lived precipitation and surface runoff operating under a clement climate. But the devil is in the details.
- 2:38 p.m. Mustard J. F. *
[*Mineralogic Constraints on Late Noachian Climate*](#) [#2362]
Coupling between the atmosphere and hydrosphere effect aqueous fluids and thus aqueous mineralogy. Consequences for Late Noachian climates is explored here.
- 2:42 p.m. Ehlmann B. L. * Dundar M.
[*Are Noachian/Hesperian Acidic Waters Key to Generating Mars' Regional-Scale Aluminum Phyllosilicates? The Importance of Jarosite Co-Occurrences with Al-Phyllosilicate Units*](#) [#1635]
Jarosite, discovered associated with regional-scale Al phyllosilicates, may indicate a more acid Mars rather than a more clement Mars during the late Noachian.
- 2:46 p.m. DISCUSSION
- 3:00 p.m. Poulet F. * Carter J. Arvidson R. E. Bibring J.-P.
[*Constraints on the Past Climate of Mars from Merging of In Situ and Orbital Analyses of Martian Hydrated Minerals*](#) [#2509]
From a coordinated analysis of aqueous-related mineral phases revealed by both orbital and in situ instruments, we discuss the past climatic environments.
- 3:04 p.m. Ming D. W. * Morris R. V. Clark B. C.
[*Mineralogical Indicators for Climate Change on Mars: Evidence from Landed Missions*](#) [#2582]
We summarize the detection of secondary minerals at Mars landing sites to place constraints on the evolution of the martian climate.
- 3:08 p.m. Yingst R. A. * Edgett K. S. McBride M. Minitti M. E. Stack K. et al.
[*Sedimentary Early Mars Revealed at the Microscale: The Gale Crater Example*](#) [#1378]
Microscale textures demonstrate that mechanical aqueous processes dominated the sedimentary record at Gale Crater, and were thus active in early Mars.
- 3:12 p.m. Stack K. M. * Grotzinger J. P.
[*Constraining the Relative Timing and Duration of an Ancient Fluvio-Lacustrine System in Gale Crater Using MSL Curiosity Rover Observations*](#) [#2012]
Summary of ancient sedimentary environments observed by Curiosity and constraints on relative timing of depositional and erosional events in Gale Crater.
- 3:16 p.m. DISCUSSION
- 3:30 p.m. Quantin-Nataf C. * Craddock R. A. Dubuffet F. Lozac'h L. Martinot M.
[*Estimates of the Erosion Rates on Mars Over Time and Their Implications for the Evolution of the Atmosphere*](#) [#1990]
We decipher from the geological record how quantitatively the erosion (or deposition) rate have changed over time on Mars and waned gradually over time.

- 3:34 p.m. Haberle R. M. *
[Early Mars Climate Modeling and the Faint Young Sun Paradox](#) [#2111]
The faint young Sun paradox for Mars is not yet solved. We still do not know what environmental conditions prevailed during its early history.
- 3:38 p.m. Kite E. S. * Armstrong J. C. Wordsworth R. Forget F.
[Late Bursts of Habitability on Mars-Like Planets](#) [#2674]
We ran >100 simulations to quantify the effect of obliquity on intermittent surface liquid water on Mars <3.5 G.y. as the Sun brightened and the atmosphere was lost.
- 3:42 p.m. Forget F. *
[On the Challenge of Understanding the Early Mars Environment with Climate Models](#) [#2982]
I will review the current status of the early Mars climate models and the major challenges and enigmas that remain.
- 3:46 p.m. DISCUSSION
- 4:00 p.m. Niles P. B. * Michalski J. R.
[Exploring the Cold Icy Early Mars Hypothesis Through Geochemistry and Mineralogy](#) [#2860]
We outline a series of arguments supporting a cold early Mars hypothesis with emphasis on the mineralogical and geochemical data collected thus far.
- 4:04 p.m. Head J. W. * Wordsworth R. Forget F. Madeleine J.-B. Halevy I.
[Tracing the Evolution of the Ancient Martian Atmosphere and Climate: A Synthesis of Outstanding Geomorphological and Mineralogical Questions](#) [#2176]
We outline a series of fundamental questions designed to encourage interdisciplinary discussion about the evolution of the Late Noachian atmosphere and climate.
- 4:08 p.m. Kerber L. *
[Geology and Atmospheric Science for Early Mars: Synthesis and Synergies](#) [#2946]
The best synergy between atmospheric modelers and geologists takes place when important model parameters and model limitations can be clearly communicated.
- 4:12 p.m. Milliken R. E. *
[The Nature of Hydrated Minerals on Mars: Linking Orbital and Rover Observations to Constrain the Climatic Evolution of Mars](#) [#2736]
Integrating rover and orbital data is critical to understand the nature of hydrous minerals on Mars and whether they reflect local or global conditions.
- 4:16 p.m. DISCUSSION