

Thursday, March 20, 2003
MARS WET AND WILD:
VALLEY NETWORKS, OUTFLOW CHANNELS, AND BASIN FLOODING
8:30 a.m. Salon B

Chairs: R. A. Craddock
J. M. Boyce

Rice J. W. Jr.* Christensen P. R. Ruff S. W. Harris J. C.

Martian Fluvial Landforms: A THEMIS Perspective After One Year at Mars [#2091]

Martian fluvial landforms (outflow and valley networks) have been imaged with THEMIS and are revealing new morphologies and histories.

Hanna J. C. * Phillips R. J.

A New Model of the Hydrologic Properties of the Martian Crust and Implications for the Formation of Valley Networks and Outflow Channels [#2027]

Results will be discussed from a new hydrologic model for the Martian crust, which allows for a detailed representation of the porosity, hydraulic conductivity, and compressibility of the crust as functions of depth and pore pressure.

Craddock R. A. * Irwin R. P. III Howard A. D.

Characteristics of Martian Valley Networks and the Implications for Past Climates [#1888]

New data suggest that martian valley networks are much more complicated, integrated systems than have been previously reported. Drainage densities are comparable to terrestrial systems and agree well with slope, suggesting that the early climate supported precipitation and surface runoff.

Stepinski T. F. O'Hara W. J. IV*

Vertical Analysis of Martian Drainage Basins [#1659]

Longitudinal profiles and the slope-area relation in drainage basins are calculated for 20 martian and 19 terrestrial basins. Martian basins have linear profiles and smaller values of concavity exponent, except for basins on the slopes of volcanoes.

Hynek B. M. * Phillips R. J.

New Data Reveal Mature, Integrated Drainage Systems on Mars Indicative of Past Precipitation [#1842]

We analyzed recent data with new techniques and found far more valley networks and integrated drainage systems on Mars than previously observed. Early precipitation and surface runoff may be necessary to explain the mature drainage basins.

Coleman N. M. Dinwiddie C. L. *

Groundwater Recharge in an Epoch of Climax Lakes in the Valles Marineris, Mars [#1399]

Episodic volcanism in areas west and south of Valles Marineris could have produced meltwater equivalent to many volumes of the Valles Marineris canyons during Hesperian time. Very small recharge rates would have sufficed.

Fairén A. G. Dohm J. M.* Baker V. R. de Pablo M. A. Ruiz J. Ferris J. C. Anderson R. C.

Tharsis-triggered Flood Inundations of the Lowlands of Mars [#1093]

Three main stages for water evolution are recorded on Mars: a Noachian /Early Hesperian ocean, portrayed by an almost equipotential line we name Contact 0; a Late Hesperian sea (Contact 2); and minor lakes representing Late Hesperian ponded waters.

Wilson L. * Head J. W.

Oceans in the Northern Lowlands of Mars? Assessment of Dike Emplacement as a Mechanism for Rapid Release of a Confined Subcryosphere Aquifer [#1186]

We show that cracking of the cryosphere by dike injection and subsequent release of water from a confined aquifer can take place fast enough to form an ocean in the northern lowlands of Mars.

Grimm R. E. * Harrison K. H.

A Parochial View of Groundwater Flow on Mars [#2053]

The global flow of groundwater on Mars is modeled numerically under a range of conditions prevailing at different stages in Mars' history. Special attention is given to the global connectivity of the flow.

Clarke J. * Stoker C.

Mound Spring Complexes in Central Australia: An Analog for Martian Groundwater Fed Outflow Channels? [#1504]

The Dalhousie Springs complex in central Australia is a possible analog for Martian outflow channels composed of spring mounds, playa lakes, a large outflow channel dispersing into a dune field, surrounded by groundwater eroded mesas.

De Hon R. A. * Washington P. A. Thibodeaux C. J.

Excavation Time for the Vedra and Maumee Channels (Mars) by Application of Equilibrium Sediment Transport Theory [#1178]

Improved measurements of channel gradients and configurations provided by MOLA allow estimates of sediment load and calculation of probable excavation times for martian outflows. Excavation of Maumee and Vedra Valles required more than a martian year.

Webb V. E. * McGill G. E.

Assessing the Geomorphic Development of Putative Shorelines Contiguous to Northern Arabia Terra, Mars [#1132]

Using GIS software we have conducted detailed evaluations of proposed shorelines within a relatively small area along the dichotomy boundary. Results suggest that two of the three putative shorelines may represent zones of significant coastal erosion.

Boyce J. M. * Mouginiis-Mark P. J. Garvin J. B. Garbeil H.

Evidence for a Thick Mantle of Volatile-rich Materials in the Utopia Basin, Mars, Based on Crater Depth/Diameter Measurements [#1967]

This is a study of the depth/diameter relationship of 1,430 impact craters in Utopia Planitia, Mars. Two different trends are identified, which we propose are due to a thick volatile-rich mantle in N. central region, caused by flooding of the basin.