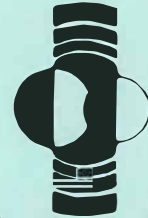


LUNAR AND PLANETARY INSTITUTE

3303 NASA ROAD 1 HOUSTON, TEXAS 77058



SYMPOSIUM ON MARS: EVOLUTION OF ITS CLIMATE AND ATMOSPHERE
Hirshhorn Museum, Washington, D.C.
July 17-19, 1986

FINAL ANNOUNCEMENT

June, 1986
Houston, Texas

Plans for the symposium "Mars: Evolution of its Climate and Atmosphere" are rapidly falling into place. The symposium, co-sponsored by the Lunar and Planetary Institute and the National Air and Space Museum will begin with a welcoming social and registration on the evening of July 16th from 7:30 - 9:30 p.m. in the Mars Room at the Holiday Inn. Thursday morning July 17th, registration will be open from 7:30 - 8:30 a.m. at the Hirshhorn Museum. The meeting will begin at 8:30 a.m. in the Hirshhorn Auditorium. A preliminary program is enclosed.

The registration/information desk in the Hirshhorn Museum will continue to be staffed for registration and logistics assistance from 8:00 a.m. until 5:00 p.m. both Thursday and Friday. Saturday hours will be 8:00 a.m. to 11:00 a.m. Should there be a need for someone to contact you during the meeting, messages may be left at 202-357-1424 (dial last seven digits only for direct FTS dialing) Messages will be posted near the registration area.

Please take a minute to complete and return the enclosed pre-registration form so that we can have your badge and materials ready for you when you arrive. If you return the pre-registration form (with or without fee enclosed) by July 11th, the fee for the symposium is \$45 for participants, and is \$25 for students and guests. Registrations received after July 11th or at the meeting will be \$50 for participants and \$30 for students and guests.

The enclosed map has the Hirshhorn Museum and the National Air and Space Museum indicated by number. Letter designations indicate the location of the Holiday Inn and Washington area restaurants listed on the "Hotel Information and Area Map Designations" enclosure.

National Airport's location makes it the most convenient for ground transportation to the Hotels located near the Museum (2 1/2 miles or 10 minutes from the Holiday Inn). The approximate taxi charge from National Airport is \$8. A taxi from Dulles will be about \$15. Rental cars are of course available but with Metrorail service between the hotels and the Museum being close and easy, renting a car should not be necessary. At National Airport you can take the Metrorail to The Mall area. A map of the Metrorail route is enclosed. A courtesy shuttle bus service is available between the National Airport terminals and the Metro Station. From Dulles ground transportation services (bus/van) to the central city area are available for about \$11.

If you have not made your hotel reservation, now is the time to act. A list of conveniently located hotels is again enclosed. Securing a hotel reservation will be the responsibility of each participant. A savings on your airline fare is available through American Air Lines by you or your travel agent calling the toll free 1-800-433-1790 and asking for STAR NUMBER S51245. Discounted rates are good up to 14 days prior to departure, and includes travel days between July 15-21, 1986.

A hosted reception will be held at the National Air and Space Museum's Exhibit Gallery "Looking at Earth" on Thursday, July 17 beginning at 6:00 p.m. Participants and their guests are invited to enjoy mixed drinks with hot and cold hors d' oeuvres until 7:15 when the group will have the opportunity to view the museum's newest IMAX movie "On the Wing".

The post symposium publication will be a special issue of Icarus. The deadline for papers submitted to Icarus is October 17, 1986. Instructions for these papers will be made available to all symposium participants as well as all those on the current MECA mailing list. Anyone who is not able to attend but who has a paper to contribute is encouraged to submit to this special issue of Icarus.

Participants wishing to display poster material must contact Ted Maxwell (202-357-1424) to reserve one of the few available easels. Material for displays must be on rigid material and no more than approximately 3 feet square for easel display.

If you have any questions about the symposium please feel free to call the LPI Projects Office (713-486-2150) for information or assistance.

The Organizing Committee

Victor Baker, University of Arizona
Michael Carr, NASA Ames Research Center
Steven Clifford, Lunar and Planetary Institute
Fraser Fanale, University of Hawaii
Ronald Greeley, Arizona State University [Co-convener]
Robert Haberle, NASA Ames Research Center
Conway Leovy, University of Washington
Ted Maxwell, National Air and Space Museum [Co-convener]
Tobias Owen, State University of New York, Stony Brook
Robert Pepin, University of Minnesota
Stephen Saunders, Jet Propulsion Laboratory

P R E L I M I N A R Y P R O G R A M

SYMPOSIUM ON MARS: EVOLUTION OF ITS CLIMATE AND ATMOSPHERE

Hirshhorn Museum Auditorium

July 17-19, 1986

Thursday, July 17, 1986

7:30 a.m. Registration

8:30 a.m. Welcome - Walter J. Boyne, Director of National Air & Space Museum

Opening Remarks - Ronald Greeley, Chairmen, MECA Steering Committee

SESSION I - SEASONAL CYCLES

8:45 a.m.

Chairmen: Robert Haberle
Conway Leovy

A. Water and CO₂

Jakosky B. M. LaPointe M. R. Zurek R. W.
The Observed Day-to-Day Variability of Mars Water Vapor

Narumi Y.
Optical Thickness of the Olympus Cloud

James P. B.
The Direction of Water Transport on Mars: A Possible Pumping Mechanism

Iwasaki K. Saito Y. Akabane T.
Interannual Differences in the Regressions of the Polar Caps of Mars

Kieffer H. H. Paige D. A.
Influence of Polar-cap Albedo on Past and Current Martian Climate

10:25 a.m. COFFEE BREAK

B. Dust and Dynamics

Greeley R.
The Martian Dust Cycle: A Proposed Model (BY TITLE ONLY)

Lee S. W.
Regional Sources and Sinks of Dust on Mars: Viking Observations of
Cerberus, Solis Planum, and Syrtis Major

Martin L. J. James P. B.
The Great Dust Storm of 1986(?)

Haberle R. M.
Interannual Variability of Global Dust Storms on Mars

11:40 a.m. LUNCH BREAK

Dust and Dynamics - Continued
1:30 p.m.

Barnes J. R. Hollingsworth J. L.
Numerical Simulations of Dust Transport into Northern High Latitudes During
a Martian Polar Warming

Murphy J. Leovy C. Tillman J.
Seasonal Wind Variations in the Martian Subtropics

Tillman J. E.
Mars Global Atmospheric Oscillations: Transients and Dust Storm Relations

Tyler A. L. Hunten D. M.
Vertical O₃ Distribution as a Diagnostic for Eddy Diffusion Profile

2:50 p.m. COFFEE BREAK

SESSION II - VOLATILE SOURCES, INVENTORIES & OUTGASSING HISTORY
3:05 p.m.

Chairmen: Tobias Owen
Robert Pepin

Pepin R. O.
Volatile Inventory of Mars - II: Primordial Sources and Fractionating
Processes

Rao A. S. P.
Implications of Isotopic Signatures of Noble Gases for the Origin and
Evolution of Terrestrial Atmospheres (BY TITLE ONLY)

Owen T.
Could Icy Impacts Reconcile Venus with Earth and Mars?

Wänke H. Dreibus G.
Water on Mars

Greeley R.
Release of Magmatic Water on Mars: Estimated Timing and Volumes

Clark B. C.
Comets, Volcanism, the Salt Rich Regolith and Cycling of Volatiles on Mars

Carr M. H.
Mars: A Water-Rich Planet

5:05 p.m. ADJOURN

6:30 p.m. RECEPTION at National Air & Space Museum

7:15 p.m. IMAX MOVIE "On the Wing"

Friday, July 18, 1986

SESSION III - SURFACE PROCESSES AND CLIMATE HISTORY

8:30 a.m.

Chairmen: Victor Baker
Fraser Fanale

A. Atmosphere

Kasting J. F.
Climatic Effects of Enhanced CO₂ Levels in Mars' Early Atmosphere

Pollack J. B. Kasting J. Richardson S.
Partitioning of Carbon Dioxide Between the Atmosphere and Lithosphere on
Early Mars

Warren P. H.
Mars Regolith Versus SNC Meteorites: Evidence for Abundant Crustal
Carbonates?

B. Regolith, Surface Properties, Weathering

Zent A. P. Fanale F. P. Postawko S. E.
Adsorption on the Martian Regolith: Specific Surface Area and Missing CO₂

Fanale F. P. Postawko S. Zent A. P. Salvail J. R.
Is Regolith Adsorption the Explanation for the Transition from Early to
Present Mars Climate?

10:10 COFFEE BREAK

Harris S. L. Huguenin R. L.
Chemical Frost Weathering of Olivine: Experimental Study and Implications

Huguenin R. L.
Photochemical Weathering and Contemporary Volatile Loss on Mars

Paige D. A. Kieffer H. H.
The Thermal Properties of Martian Surface Materials at High Latitudes:
Possible Evidence for Permafrost

Zimbelman J. R.
Thermal Properties of Channels in the Aeolis Quadrangle: Topographic Traps
for Aeolian Materials

Huguenin R. L.
Mars Low Albedo Regions: Possible Map of Near-Surface H₂O

Garvin J. B. Ulaby F. T. Smith D. E. Frey H. V. Solomon S. C.
Zwally H. J.
Martian Surface Physical Properties to be Derived by Radar Altimeter on the
Mars Observer Spacecraft

12:25 LUNCH BREAK

C. Geomorphology
2:00 p.m.

Clifford S. M.
Mars: Crustal Pore Volume, Cryospheric Depth, and the Global Occurrence of
Groundwater

Mouginis-Mark P. J.
Ice or Liquid Water in the Martian Regolith? Morphologic Indicators from
Rampart Craters

Schultz P. H.
Crater Ejecta Morphology and the Presence of Water on Mars

Anderson D. M. Brandstrom G. W.
Evidence for Glaciation in Elysium

Moore H. J. Davis P. A.
Ablation of Martian Glaciers

3:40 COFFEE BREAK

Lucchitta B. K.
Water and Ice on Mars: Evidence from Valles Marineris

Nedell S. S. Squyres S. W.
Formation of the Layered Deposits in the Valles Marineris, Mars

Parker T. J. Schneeberger D. M. Pieri D. C. Saunders R. S.
Geomorphic Evidence for Ancient Seas on Mars

Brandenburg J. E.
The Paleo-Ocean of Mars

5:15 p.m. ADJOURN

Saturday, July 19, 1986

**SESSION IV - MARS; THE FUTURE
8:30 a.m.**

**Chairmen: Michael Carr
Stephen Saunders**

Carr M. H.

Martian Volcanism: A Review

Katterfeld G. N. Vitayz V. I.

Areal and Time Distributions of Volcanic Formations on Mars (BY TITLE ONLY)

Phillips R.

Martian Tectonics: A Review

Singer S. F.

Phobos and Deimos: A Base for Sampling the Martian Past

Page T.

Seismic Exploration for Water on Mars (BY TITLE ONLY)

Albee A.

Mars Observer Review

10:40 a.m. Discussion MEVTV (MECA Follow-on Project)

11:00 a.m. ADJOURN

SYMPOSIUM ON M A R S: EVOLUTION OF ITS CLIMATE AND ATMOSPHERE
July 17-19, 1986

Second Announcement - CALL FOR ABSTRACTS
(Abstract Deadline May 28, 1986)

April 4, 1986
Houston, Texas

Thank you for your indication of interest in the symposium "Mars: Evolution of its Climate and Atmosphere". Since the mailing of the first announcement in January of 1986 over 200 people have returned forms indicating interest in the meeting. It is the sincere hope of the organizing committee that you will be able to join us at the symposium. As mentioned in that announcement, the symposium is co-sponsored by the Lunar and Planetary Institute and the National Air and Space Museum. The number of days for the meeting has been increased due to the excellent response; the new dates are July 17-19, 1986.

The program committee hereby extends a call for abstracts which address topics I, II or III outlined in the program below. Oral presentations will be invited by the program committee on the basis of submitted abstracts. Forms and instructions for the preparation of 3-page abstracts (due at LPI May 28, 1986) are enclosed. If you have questions regarding abstract preparation please phone the LPI Publications Office (713-486-2143). Plans are in progress to produce a symposium Proceedings. Details regarding the Proceedings will be available to participants at the symposium.

Securing a hotel reservation will be the responsibility of each participant. A list of some convenient properties with July rates is enclosed. Conference sessions will be held in the Hirshhorn Museum (near the Air and Space Museum). There is a Metro stop close to the Museum, which reduces the need to rent a car. Parking in the area of the meeting will be very difficult, at best. Further details on logistics will be included in the final circular. It is recommended that you make hotel reservations early, however, as the meeting is scheduled during the height of tourist season in Washington. If you have any questions about the symposium please feel free to call Pam Jones at the LPI Projects Office (713-486-2150) for information or assistance.

PROVISIONAL PROGRAM

I. Bulk Chemical Composition and Outgassing History

Session Organizers: R. Pepin, University of Minnesota, 612-373-3333
T. Owen, SUNY, Stony Brook, 516-246-6705

- A. What is the range of possible absolute and relative abundances of the initial Mars volatile inventory?
- B. What evidence exists that the planet has undergone significant oxidation? Is the oxidation only on the surface? Are there plans to try to measure martian atmospheric D/H? Has the composition of degassed volatiles changed with time?

- C. Styles of volcanism in time and space (inputs from climate history/surface morphology)?
- D. What does the present atmosphere tell us about integrated outgassing, modified by loss processes to the regolith and to space over martian geologic time? Implications of isotopic signatures ($^{15}\text{N}/^{14}\text{N}$, $^{129}\text{Xe}/^{132}\text{Xe}$, $^{40}\text{Ar}/^{36}\text{Ar}$)?

II. Seasonal Cycles

Session Organizers: R. Haberle, NASA Ames Research Center, 415-965-6343
C. Leovy, University of Washington, 206-543-4952

- A. What are the physical processes that control the present seasonal cycles of dust, water and CO_2 ?
- B. How do the seasonal cycles change from year to year?
- C. How can models of the seasonal cycles be extended to long-term variations?

III. Surface Processes and Climate History

Session Organizers: V. Baker, University of Arizona, 602-621-6003
F. Fanale, University of Hawaii, 808-948-6488

- A. What are the causative agents of climate change on Mars?
- B. How have the abundances of surface volatiles changed with time?
- C. What are the major volatile reservoirs, and how have they changed with time?
- D. What has been the climatic history of Mars and how has it been affected by A-C?
- E. What observations and modeling will help resolve A-D?

IV. Mars Evolution of Volcanism, Tectonism (Invited Papers Only)

Session Organizers: M. Carr, NASA Ames Research Center
S. Saunders, Jet Propulsion Laboratory

V. Mars Observer Briefing/Status (Invited Papers Only)

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- Michael Carr, NASA Ames Research Center
- Steven Clifford, Lunar and Planetary Institute
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