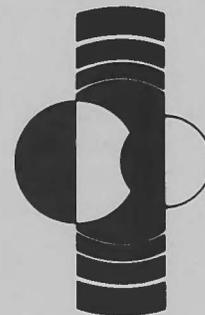


# LUNAR AND PLANETARY INSTITUTE

3303 NASA Road 1 HOUSTON, TEXAS 77058 CABLE ADDRESS: LUNSI



## LPI Topical Conference on PLANETARY VOLATILES

October 9-12, 1982

### FIRST ANNOUNCEMENT

The Lunar and Planetary Institute is organizing a topical conference on the history of volatile components in the solar system and their role in the evolution of planets. The meeting will be held at the Arrowwood Conference Center, Alexandria, Minnesota October 9-12, 1982.

Volatile elements and their compounds are greatly depleted in inner solar system planets, and in most meteorites, relative to their cosmic abundances. The fractions that remain are the source of atmospheres surrounding these planets and have played an important role in the histories of their interiors. The nature of preplanetary carriers of volatiles, and how they were associated with the bulk of planetary matter, are subjects of active debate. But recent determinations of the atmospheric compositions of Mars and Venus, and recognition that primordial gases are still being released from the interior of the Earth, now provide data for comparing the volatile inventories of meteorites and the terrestrial planets with the predictions of different models for their origin and distribution.

Volatiles are a controlling factor in many of the details of planetary development. Initial distributions, abundances, and chemical compositions of these components may determine the evolutionary tracks taken by primitive planetary assemblages as they accrete and differentiate to form a core, mantle, crust, and hydrosphere-atmosphere. The types, time scales, and ultimate degrees of petrologic and tectonic processing in differentiation are sensitive to the influence of volatile species such as H<sub>2</sub>O and CO<sub>2</sub> on mineral associations, chemical partitioning, and dynamics of heat and mass transport. Masses and compositions of planetary atmospheres (and hydrospheres, biospheres, and sedimentary columns, if they exist) provide lower limits on primordial volatile inventories. The challenge is to read the integrated record of volatile fluxes contained in these reservoirs for what they can reveal about the initial distribution of volatiles within planets, the rates and mechanisms of their transfer between planetary surfaces and interiors, and the physical states and chemical compositions of the species that took part in these exchanges during the geologic history of a planet. Knowledge of recycling processes along with understanding of irreversible transfers such as loss of atmospheric gases to space are essential elements of any comprehensive theory for the evolution of planetary atmospheres and hydrospheres. On Earth, the origin and development of the earliest biosphere must have been sensitively related to the chemical nature of its environment. One of the goals of paleobiology is to deduce the interrelations between evolving life and the physical and chemical properties of Earth's atmosphere, ocean, and crust.

The conference is intended to attract informed scientists from the many different disciplines necessary for a provocative, profitable, and — within the time constraints of the sessions — a comprehensive discussion of volatiles and their influence on planetary evolution. Participants will be selected to represent different approaches and viewpoints. The program and the conference setting will be informal and conducive to the individual and group interactions that can lead to the discovery and exploration of promising new research directions within and across disciplinary lines. Both invited and contributed papers should be planned for possible inclusion in a post-conference publication, as well as in the conference itself.

The program committee has formulated the following general topical areas to be addressed, with examples of possible subtopics:

**1. Initial and Present Volatile Inventories and Distributions in the Earth, Other Planets, Meteorites and Comets**

Initial conditions and processes (*preplanetary form, distribution and carriers of volatiles; how, when and where did planets accrete volatiles?; where, when, and to what extent did early fractionation and loss of volatiles from parent bodies and planets occur?*); present inventories, reservoirs and fluxes (*atmospheric, surficial, crustal, mantle, core*).

**2. Observational Evidence on the Time History of Volatile Transfer among Reservoirs**

Early catastrophic degassing of the terrestrial planets (*extent, energy sources*); the significance of continuing juvenile degassing; changes in the chemical compositions and masses of planetary atmospheres and hydrospheres with time (*astrophysical influences, oxidation states, greenhouse gases, climate impacts*); development of volatile element cycling among surficial and interior reservoirs (*geochemical, geological, and biological constraints; possible prebiotic cycles and the evolution of biological redox processes*); chemical and isotopic heterogeneity in planetary interiors, and relation of volatile reservoirs to chemical reservoirs.

**3. Volatiles in Planetary Bodies, their Mechanisms of Transport, and their Relation to Thermal, Chemical, Geological and Biological Evolution**

Thermal histories (*time variations of surface and interior temperatures, melting, differentiation*); transport mechanisms (*styles of mass transport, depths and modes of convection, relation of heat and volatile transport*); styles of outgassing (*point volcanism (Io mode) plate tectonics, flood volcanism, shield volcanism*); geochemistry of volatiles in planetary interiors (*solubility, diffusivity in mantle phases, stability and mobility of volatile-rich phases, oxidation and thermodynamic state of mantle*); recycling of volatiles into planetary interiors (*incorporation of volatiles into solid phases, biological and nonbiological recycling mechanisms*); loss of volatiles to space (*mechanisms, past and present rates*).

Principal focus will be on Earth, Mars and Venus for comparative discussion of volatiles in major—and very different—planetary systems, and on meteorites and comets for estimates of the initial complement of volatile elements and compounds in preplanetary matter.

We invite expressions of interest and potential participation from all relevant areas of research. Inquiries should be addressed to: Planetary Volatiles Conference, Lunar and Planetary Institute, 3303 NASA Road 1, Houston, Texas 77058. **Complete and return the enclosed form. The deadline for abstracts is August 2, 1982.** Abstract forms and information on preparation and submission will be sent only to those who return the "Indication of Interest" form. Please feel free to propose additional discussion areas or specific topics, and to copy and distribute this announcement and form to interested colleagues who may not have received it.

**The Organizing Committee**

Arthur L. Boettcher  
University of California, Los Angeles

Richard O'Connell (Co-Convener)  
Harvard University

Sherwood Chang  
NASA Ames Research Center

Robert O. Pepin (Co-convener)  
University of Minnesota

Fraser P. Fanale  
University of Hawaii

James B. Pollack  
NASA Ames Research Center

John M. Hayes  
Indiana University

Norman H. Sleep  
Stanford University

\*Pamela H. Jones (Conference Administrator)  
Lunar and Planetary Institute

W. Randall Van Schmus  
University of Kansas

James Kasting  
NASA Ames Research Center

# LUNAR AND PLANETARY INSTITUTE

3303 NASA ROAD 1 HOUSTON, TEXAS 77058 CABLE ADDRESS: LUNSI

CONFERENCE OFFICE  
(713) 486-2150

## LPI Topical Conference on PLANETARY VOLATILES

October 9-12, 1982

### SECOND ANNOUNCEMENT

The Lunar and Planetary Institute is organizing a topical conference on the history of volatile components in the solar system and their role in the evolution of planets. The meeting will be held October 9-12, 1982, at the Arrowwood Conference Center, Alexandria, Minnesota. This second announcement is being circulated to those who responded positively to the first announcement and to other potential participants. A third announcement containing logistic details and a pre-registration form will be mailed in August.

Volatile elements and their compounds are greatly depleted in inner solar system planets, and in most meteorites, relative to their cosmic abundances. The fractions that remain are the source of atmospheres surrounding these planets and have played an important role in the histories of their interiors and surfaces. This conference will provide a forum for interactive discussion of the influences of volatile components on geological, geophysical, geochemical and biological evolution, by scientists representing many different disciplines, approaches, and viewpoints. Responses to the first announcement, and to invitations to present papers in certain key areas, promise wide-ranging contributions, and discussion in the following major topical areas:

1. **Initial and Present Volatile Inventories and Distributions in the Earth, Other Planets Meteorites and Comets**
2. **Observational Evidence on the Time History of Volatile Transfer among Reservoirs**
3. **Volatiles in Planetary Bodies, their Mechanisms of Transport, and their Relation to Thermal, Chemical, Geological and Biological Evolution.**

Contributed papers are welcome in any of the sub-topics listed in the first announcement, or in other areas that seem particularly relevant.

Those interested in participating who have not already responded to the first announcement should address or telephone their intention to attend and the title of their contribution, if one is planned, to Planetary Volatiles, Lunar and Planetary Institute, 3303 NASA Road 1, Houston, Texas 77058, telephone 713-486-2150.

**Publications:** Written contributions to the abstract volume should arrive at the Lunar and Planetary Institute as camera-ready copy by August 2, 1982. Detailed instructions and forms for preparing two-page abstracts are enclosed with this mailing. Abstracts are not limited to papers intended for oral presentation, but should address the subject of the meeting directly. The abstract volume will be distributed to all participants during conference registration.

As indicated in the initial announcement, a post-conference publication is planned. This publication will consist of papers solicited from among the contributions to the conference based upon review of submitted abstracts. Manuscripts will be due one month following the conference. Publication arrangements are being made for early, widespread dissemination. Further details on proceedings plans will be provided at the conference.

**Poster Presentations:** Space will be allocated for poster presentations to be exhibited. These presentations are being offered as an alternative to oral presentation. In addition, display and exhibit space will be available. Please write to reserve space if you wish to bring a display.

**Pre-registration:** A pre-registration fee of \$50 (\$55 late registration) will be assessed each participant to help offset meeting costs. Forms for pre-payment of this fee will be included in the final announcement, to be sent in August.

**Meeting Location:** The meeting will take place at the Radisson Arrowwood Inn and Resort at Alexandria, Minnesota, located approximately 130 miles northwest of Minneapolis. The facility is a 450-acre lakeside resort for all seasons, offers excellent meeting rooms, a comfortable climate, reasonable rates, and a beautiful setting. A complimentary hospitality room at the Radisson South Hotel in Minneapolis will be available to attendees arriving October 8 in Minneapolis. Departure by bus will be arranged from the Radisson South to the Radisson Arrowwood Inn. The rate for a single room is \$68 per day; \$52.50 per day for a double room. This rate includes lodging plus three meals per day, tax, and gratuities to be paid directly to Arrowwood by individual participants. Rental of speedboats, sail boats, water ski equipment, canoes and other water sport equipment is available at the private marina. Detailed information on overall costs, reservations, transportation, etc. will be included in the final announcement.

**Audio-visual Aids:** Single and dual screen projection of 35-mm slides and viewgraphs will be available. Please contact Pam Jones at LPI if you will need other equipment. We need two students who would be willing to serve as projectionists during the meeting in return for having their registration fees waived. Please contact Pam at LPI if interested.

We look forward to meeting with you in October.

#### The Organizing Committee

Arthur L. Boettcher  
University of California, Los Angeles  
213-825-8868

Sherwood Chang  
NASA Ames Research Center  
415-493-2220

Fraser P. Fanale  
University of Hawaii  
808 948-6488

John M. Hayes  
Indiana Unniversity  
812-335-5610

\*Pamela H. Jones (Conference Administrator)  
Lunar and Planetary Institute  
713-486-2150

James Kasting  
NASA Ames Research Center  
415-965-5233

Richard O'Connell (Co-convenor)  
Harvard University  
617-495-2532

Robert O. Pepin (Co-convenor)  
University of Minnesota  
612-373-7874

James B. Pollack  
NASA Ames Research Center  
415-965-5530

Norman H. Sleep  
Stanford University  
415-497-0882

W. Randall Van Schmus  
University of Kansas  
913-864-3676

\*Please direct telephone inquiries concerning logistics to Pamela Jones

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CONFERENCE ON PLANETARY VOLATILES  
October 9-12, 1982

CONFERENCE OFFICE  
(713) 486-2150

## FINAL ANNOUNCEMENT

August 31, 1982

Dear Colleague:

This is the final announcement concerning the topical Conference on Planetary Volatiles sponsored by the Lunar and Planetary Institute, the National Aeronautics and Space Administration and the National Science Foundation. The meeting will be held at the Arrowwood Inn and Resort, Alexandria, Minnesota, October 9-12, 1982. Response to previous announcements has been excellent, and we look forward to an exciting and productive meeting. A tentative program is enclosed. If you have colleagues who are interested in attending this meeting, but who have not received previous mailings, please feel free to duplicate this announcement and to pass it along to them.

**ARRIVALS** It will be necessary to fly to the Minneapolis International Airport, which is located about 130 miles from the conference site. From there, take the airport limousine to the Radisson South Hotel, where we have arranged for a hospitality area in the "sunken lobby" (ask the Bell Captain upon arrival for location). Coffee and soft drinks will be available, as well as conference abstract volumes to browse through while you wait for bus departure. Buses will depart from the Radisson South to the Arrowwood Conference Center at about 7:00 p.m. and 9:30 p.m. Bus tickets will cost \$8 per person, and will be sold at the Radisson South by LPI staff. Please reserve your space on the buses for both arrival and departure by completing and returning the enclosed pre-registration form. The trip to Alexandria will take about 2-1/2 hours. Those who cannot make either of the scheduled buses will need to make their own arrangements for transportation to the conference facility. One option is to use the Twin City Passenger Service which operates between Alexandria and Minneapolis at a cost of \$18 per person each way. Reservations should be made in advance by calling 612-726-9157. Rental cars are, of course, available at the Minneapolis airport. There is a Hertz Rental Agency in Alexandria; their number is 612-763-3553. Based on information from the pre-registration forms, we will try to put those arriving after the departure of the last LPI bus in touch with each other so that transportation may be shared to keep individual costs down.

**POST-CONFERENCE DEPARTURES** Two buses will depart from the conference center on the 12th, one bound for the Minneapolis airport, and the other for the field area with field trip participants. Tickets will be sold in the registration area for the airport-bound bus. It is estimated that the Minneapolis airport bus will arrive at the airport at about 5:00 p.m. It is recommended that departing flights not be scheduled before 5:30 p.m., at the very earliest. For those who may be unable to make flights out on the 12th, a small block of rooms has been reserved at the Radisson South Hotel in Minneapolis. Field trip participants can expect to be delivered to the Minneapolis airport by 5:00 p.m. on the 13th, with the same reservation options at the Radisson South. Both groups spending the night at the Radisson South will be dropped at the hotel by the buses. An inexpensive (about \$4) limousine is available from the Radisson South to the airport. Please note that there are two reservation

envelopes enclosed: 1) one for accommodations at Arrowwood (see below) and 2) one for lay-over reservations in Minneapolis on either the 12th or 13th. You needn't return the envelope to the Radisson South in Minneapolis unless you will need a room following the conference due to flight scheduling problems. The rate for the Radisson South rooms is \$50 per room (\$25 shared-double).

**CONFERENCE ACCOMMODATIONS** The Arrowwood Inn and Resort in Alexandria provides a casual and informal atmosphere in a beautiful rural setting. Free time following short afternoon sessions on the 10th and 11th will allow some chance to explore the area. Both the riding stables and the marina will be closed, but small boats may be available. All other facilities described in the brochure will be open. Although we are hoping for a beautiful Minnesota Indian Summer, quite cool weather is a possibility, and one should pack accordingly. The enclosed Arrowwood reservation envelope should be completed and mailed with your deposit immediately to reserve your space.

Rates at Arrowwood are determined by whether or not your room faces the lake. Our group block includes approximately 1/3 "inland rooms," and 2/3rds "lakeside," and are available on a first-come, first-served basis. Rates are as follows:

Arrowwood Inn and Resort  
Nights for October 8-11, 1982

Single, inland	\$43
Double, inland	\$55 (27.50 per person)
Single, lakeside	\$48
Double, lakeside	\$60 (\$30 per person)
(All rates subject to 5% Minnesota state sales tax)	

**REGISTRATION** Registration will begin on October 8th at 5:00 p.m. at the Radisson South for those who have pre-registered, and continue on the 9th at Arrowwood in the Big Fork room at 7:30 a.m. It will be open each day of the conference from 8:00 a.m. until 2:00 p.m. The fee will be \$65 for those sending in pre-payment, and \$70 at the meeting. A form for pre-registration is enclosed. Its completion and return will greatly help with pre-meeting planning, and we ask that you return it as soon as possible. Guests may register for \$35. This fee will entitle them to participate in the meals and social events described below. Please note that while guests are welcome, there will be no formal program arranged for them.

**DINING** The registration fee includes the cost of catered lunches on the 9th and 11th, a continental breakfast in the registration-meeting room area from 7:30 to 8:00 a.m. on the 10th, a box lunch on the buses back to Minneapolis, or to the field trip site on the 12th, and a pre-dinner social on the 9th. All other meals will be left to the individual. A large restaurant is located on the premises, and some others in nearby Alexandria. Arrowwood serves a "locally famous" Sunday brunch. The morning sessions on the 10th will break early so that those who want to try it can be first in line.

**FIELD TRIP** The field trip has been scheduled for Tuesday and Wednesday, October 12th and 13th, following the conference. It will be a traverse (by chartered bus) of Archean gneisses exposed along the Minnesota River Valley from Montevideo to Redwood Falls, led by P. W. Weiblen and W. C. Day of the Minnesota Geological Survey and the Department of Geology and Geophysics, University of Minnesota. The bus departs from

Arrowwood shortly after the conference closes, bound for late afternoon field work, dinner, and overnight in the Montevideo area. An early enough breakfast and start downriver on the 13th will allow field stops in Sacred Heart, Granite Falls, the Morton quarries, Redwood Falls, lunch, and the final run into Minneapolis in time to deliver participants to the airport by 5:00 p.m. It will be possible to collect samples from the outcrops along the way. This trip will NOT require field clothing; street wear (with protection for possible cool and/or wet weather) is adequate, and participants will be delivered at the airport in socially acceptable condition for travel home. Those who will miss the last flight out on the 13th can reserve a room at the Radisson South as mentioned above and leave early the next morning.

The field trip fee is \$35. It includes transportation, the trip leaders' expenses, an outdoor field dinner on the 12th, and lunch on an outcrop on the 13th. Additional expenses will include a motel room on the 12th (\$22 single occupancy, \$29 shared-double occupancy) and breakfast on the 13th.

Important! Let us know on the enclosed form whether you are planning to participate in the field trip. The head count on the return forms will determine the size bus we need. If you wait until the conference to sign up, there may be no room for you.

**AUDIO-VISUAL AIDS** Dual screen projection of 35mm slides and of overheads will be available. Speakers should complete the enclosed cue sheet and give it together with presentation materials to the projectionists 30 minutes prior to the start of the session in which they are scheduled to speak. If you require equipment other than 35's or overheads, please let me know at once.

**PUBLICATIONS** Copies of conference abstract volume will be distributed during registration. There will be no publication of conference proceedings as such. We expect the conference papers will appear in the journal literature in a timely fashion. Following the conference, contributors will be encouraged to submit revised, fully referenced, and in some cases expanded abstracts of up to two pages (excluding references) for inclusion in a final post conference abstract volume, to be distributed by the LPI to all attendees, and to others upon request. Further information on this volume will be available at the conference.

**STUDENT GRANTS** NASA and the National Science Foundation have provided funds for partial support grants for students to encourage student attendance at the conference. Applications for these grants should include a brief description of research interests and relevance of the conference to those interests, a letter of recommendation from the student's research advisor, and an estimate of total expenses, specifying both the requested level of support from the program committee, and funds that could be contributed from other sources if the application is accepted. Most grants will not cover all expenses. We hope to be able to provide partial support for six to ten students. Application for grants should be made at once to the LPI to my attention. Deadline for receipt of applications is September 20.

MESSAGES During times that the conference is in session, messages will be recieved by Arrowwood front desk personnel, and given to LPI staff for posting near the meeting room. The number for all incoming messages is 612-762-1124.

If you have questions regarding the program or conference logistics, please feel free to call any member of the Program Committee or me. I look forward to seeing you in October.

Sincerely yours,

*Pam Jones*

Pamela Jones  
Conference Administrator  
for the Program Committee

Enclosures

Tentative program  
Reservation Envelope/Arrowwood Inn and Resort  
Reservation Envelope/Radisson South Hotel  
Audio-visual cue sheet  
Pre-registration form  
Arrowwood brochure

PROGRAM COMMITTEE

Arthur L. Boettcher  
University of California, LA  
213-825-8868

Robert O. Pepin (Co-Convener)  
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