Space Studies Board

On Scientific Assessment of NASA's Solar System Exploration Roadmap

Membership Report

On August 23, 1996, Committee on Planetary and Lunar Exploration Chair Ronald Greeley and Space Studies Board Chair Claude R. Canizares sent the following letter report to NASA Science Program Director for Solar System Exploration Jurgen Rahe.

In your letter of March 26, 1996, you requested that the Committee on Planetary and Lunar Exploration (COMPLEX) assess NASA's Solar System Exploration Roadmap 1s and report on the degree to which the Roadmap is responsive to the scientific priorities outlined in past National Research Council (NRC) reports. COMPLEX understands that you need this assessment by September 1, 1996, because the Roadmap is an integral part of a new solar system exploration strategic plan to be developed by NASA this fall.

As you requested, the assessment was conducted at COMPLEX's June 24-28, 1996, meeting held at the National Academies' Arnold and Mabel Beckman Center. The assessment was based on material sent to committee members for review prior to the meeting, extensive briefings by Dr. Larry Soderblom of the Roadmap development team, and subsequent discussions in executive session throughout the week of the meeting.

COMPLEX finds the goals and objectives set forth in the Roadmap to be generally consistent with the recommendations and priorities contained in past NRC reports, including *An Integrated Strategy for the Planetary Sciences: 1995-2010* ,2 T*he Search for Life's Origins: Progress and Future Directions in Planetary Biology and Chemical Evolution,* 3 and *Origin and Evolution of Life—Implications for the Planets: A Scientific Strategy for the 1980s.* 4 Moreover, the fact that the Roadmap was developed jointly by scientists and technologists is a strength consistent with recommendations in the 1995 NRC report *Managing the Space Sciences.* 5

COMPLEX's general assessment of the Roadmap is that it outlines a rich and ambitious program of planetary exploration through the year 2012. In particular, COMPLEX commends the Roadmap development team for adopting an approach to planetary exploration advocated by the *Integrated Strategy,* that is, systematically addressing key physical and chemical processes rather than taking the more traditional approach of cataloging and classifying planetary bodies.

It is, however, important for the Roadmap's scientific objectives to be brought into sharper focus with some indication of priorities for study and critical measurements to be made. Although COMPLEX recognizes that NASA committees will be charged with identifying priority mission sets, it notes that the Roadmap, in its current form, provides no obvious framework within which such priorities can be set. COMPLEX also notes that the Integrated Strategy's highest priorities for solar system exploration, i.e., intensive studies of comets, Mars, and the Jupiter system, are not singled out for special attention, although all are, admittedly, included in the Roadmap.

Three other specific issues that COMPLEX wishes to raise here concern the quests related to human destiny and life's origins and the issue of nonflight programs. The human destiny quest is disconnected from the actual proposed campaigns and their scientific objectives. The connection should be clearly stated in the Roadmap report. The quest regarding life's origins is recognized as a high priority in previous NRC studies, [6,7] but it is essential that the Roadmap's stated expectations for fulfilling the quest not be exaggerated. This part of the Roadmap report should be carefully assessed to ensure that it rests on realistic statements. COMPLEX also notes that the Roadmap does not recognize the role of nonflight programs. Although their exclusion may have been a consequence of the Roadmap development team's charter, it is clear that laboratory experiments, modeling, Earth- and space-based telescopic observations, and field studies are essential to an understanding of the solar system, as documented in NRC reports. [8,9,10]

Despite these shortcomings and other criticisms outlined in the accompanying Assessment, the program of planetary exploration described in the Roadmap has both significant potential for scientific discovery and the prospect of wide public appeal. The Space Studies Board and COMPLEX recognize that the Roadmap is an evolving document and that modifications will be made in response to changing circumstances and new developments (e.g., the recent announcement of the possible discovery of microfossils in a martian meteorite). Accordingly, we offer our services to you should you wish a review of a later draft of the Roadmap. In addition, the SSB and COMPLEX, in particular, look forward to the implementation of the Roadmap and will be pleased to review this phase of the solar system exploration program at an appropriate time.

REFERENCES

1. Roadmap Development Team, Mission to the Solar System: Exploration and

Discovery—A Mission and Technology Roadmap (Version A), Jet Propulsion Laboratory, Pasadena, California, June 21, 1996.

2. Space Studies Board, National Research Council, An Integrated Strategy for the Planetary Sciences: 1995-2010, National Academy Press, Washington, D.C., 1994.

3. Space Studies Board, National Research Council, The Search for Life's Origins: Progress and Future Directions in Planetary Biology and Chemical Evolution, National Academy Press, Washington, D.C., 1990.

4. Space Science Board, National Research Council, Origin and Evolution of Life—Implications for the Planets: A Scientific Strategy for the 1980s, National Academy Press, Washington, D.C., 1981.

5. Space Studies Board, National Research Council, Managing the Space Sciences, National Academy Press, Washington, D.C., 1995.

6. Space Studies Board, National Research Council, An Integrated Strategy for the Planetary Sciences: 1995-2010, National Academy Press, Washington, D.C., 1994, pp. 58-61.

7. Space Studies Board, National Research Council, The Search for Life's Origins: Progress and Future Directions in Planetary Biology and Chemical Evolution, National Academy Press, Washington, D.C., 1990.

8. Space Studies Board, National Research Council, An Integrated Strategy for the Planetary Sciences: 1995-2010, National Academy Press, Washington, D.C., 1994.

9. Space Studies Board, National Research Council, The Search for Life's Origins: Progress and Future Directions in Planetary Biology and Chemical Evolution, National Academy Press, Washington, D.C., 1990.

10. Space Science Board, National Research Council, Origin and Evolution of Life—Implications for the Planets: A Scientific Strategy for the 1980s, National Academy Press, Washington, D.C., 1981.

Last update 2/10/00 at 2:03 pm

Site managed by the SSB Web Group.
To comment on this Web page or report an error, please send feedback to the Space Studies Board.

Subscribe to e-newsletters | Feedback | Back to Top

Space Studies Board

On Scientific Assessment of NASA's Solar System Exploration Roadmap

MEMBERSHIP

COMMITTEE ON PLANETARY AND LUNAR EXPLORATION

RONALD GREELEY, Arizona State University, *Chair*
JAMES ARNOLD, University of California, San Diego
FRANCES BAGENAL, University of Colorado
JEFFREY R. BARNES, Oregon State University
PHILIP R. CHRISTENSEN, Arizona State University
RUSSELL DOOLITTLE, University of California, San Diego
HEIDI HAMMEL, Massachusetts Institute of Technology
GEORGE McGILL, University of Massachusetts
HARRY McSWEEN, University of Tennessee
TED ROUSH, San Francisco State University
JOHN RUMMEL, Marine Biological Laboratory
GERALD SCHUBERT, University of California, Los Angeles
EUGENE SHOEMAKER, U.S. Geological Survey
DARRELL F. STROBEL, Johns Hopkins University
ALAN T. TOKUNAGA, University of Hawaii
ROGER YELLE, Boston University
MARIA T. ZUBER, Massachusetts Institute of Technology

Staff

DAVID H. SMITH, Study Director

ALTORIA B. ROSS, Senior Program Assistant

SPACE STUDIES BOARD

CLAUDE R. CANIZARES, Massachusetts Institute of Technology, *Chair*
MARK ABBOTT, Oregon State University

JOHN A. ARMSTRONG,* IBM Corporation (retired)
JAMES P. BAGIAN, Environmental Protection Agency
DANIEL N. BAKER, University of Colorado
LAWRENCE BOGORAD, Harvard University
DONALD E. BROWNLEE, University of Washington
JOHN J. DONEGAN, John Donegan Associates, Inc.
ANTHONY W. ENGLAND, University of Michigan
DANIEL J. FINK,* D.J. Fink Associates, Inc.
MARTIN E. GLICKSMAN, Rensselaer Polytechnic Institute
RONALD GREELEY, Arizona State University
BILL GREEN, former member, U.S. House of Representatives
NOEL W. HINNERS,* Lockheed Martin Astronautics
JANET G. LUHMANN, University of California, Berkeley
JOHN H. McELROY,* University of Texas, Arlington
ROBERTA BALSTAD MILLER, Consortium for International Earth Sciences Information Networks
BERRIEN MOORE III, University of New Hampshire
MARY JANE OSBORN, University of Connecticut Health Center
SIMON OSTRACH, Case Western Reserve University
CARLÉ M. PIETERS, Brown University
MARCIA J. RIEKE, University of Arizona
ROLAND SCHMITT,* Clifton Park, New York
JOHN A. SIMPSON, University of Chicago
ROBERT E. WILLIAMS, Space Telescope Science Institute

MARC S. ALLEN, Director

*Former member.

COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND APPLICATIONS

ROBERT J. HERMANN, United Technologies Corporation, *Co-Chair*
W. CARL LINEBERGER, University of Colorado, *Co-Chair*
PETER M. BANKS, Environmental Research Institute of Michigan
LAWRENCE D. BROWN, University of Pennsylvania
RONALD G. DOUGLAS, Texas A&M University
JOHN E. ESTES, University of California, Santa Barbara
L. LOUIS HEGEDUS, Elf Atochem North America, Inc.
JOHN E. HOPCROFT, Cornell University
RHONDA J. HUGHES, Bryn Mawr College
SHIRLEY A. JACKSON, U.S. Nuclear Regulatory Commission
KENNETH H. KELLER, Council on Foreign Relations
KENNETH I. KELLERMANN, National Radio Astronomy Observatory
KEN KENNEDY, Rice University
MARGARET KIVELSON, University of California, Los Angeles
DANIEL KLEPPNER, Massachusetts Institute of Technology

Space Studies Board

JOHN KREICK, Sanders, a Lockheed Martin Company
MARSHA I. LESTER, University of Pennsylvania
THOMAS A. PRINCE, California Institute of Technology
NICHOLAS P. SAMIOS, Brookhaven National Laboratory
L.E. SCRIVEN, University of Minnesota
SHMUEL WINOGRAD, IBM T.J. Watson Research Center
CHARLES A. ZRAKET, The MITRE Corporation (retired)

NORMAN METZGER, Executive Director