

# LUNAR SCIENCE INFORMATION BULLETIN

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NUMBER 3

*The Lunar Science Institute*  
3303 NASA Road 1  
Houston, Texas 77058

AUGUST 23, 1974

713-488-5200

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## ANTHONY CALIO GETS SLOAN FELLOWSHIP

Anthony J. Calio, Director of Science and Applications for the NASA Johnson Space Center, Houston, has been accepted by the Stanford Graduate School of Business as a Stanford-Sloan Fellow. During Dr. Calio's 10-month leave of absence (beginning August 12, 1974), Dr. Owen K. Garriott, Deputy Director of Science and Applications and former scientist-astronaut on Skylab 3, will be Acting Director.

## NOEL W. HINNERS APPOINTED NASA ASSOCIATE

### ADMINISTRATOR FOR SPACE SCIENCE

Dr. Noel W. Hinners has been appointed Associate Administrator for Space Science, succeeding Dr. John E. Naugle, who is now the Deputy Associate Administrator. Dr. Hinners remains cognizant of the Lunar Programs Office in an acting director capacity until plans are firmed up regarding specific assignments. In the meantime, Mr. Floyd I. Roberson is Acting Deputy Director and is responsible for the day-to-day activities of the office.

No immediate change in the overall Office of Space Science organization is envisioned. The overriding consideration regarding the lunar program is to maintain the enthusiasm, vigor, and high quality science generated during the Apollo programs. Dr. Hinners looks upon the lunar program as the foundation of the OSS orientation toward comparative planetology and as the basis for integrating the past results and future goals of individual lunar and planetary projects.

## LUNAR POLAR ORBITER

NASA Headquarters expects to circulate an Announcement of Opportunity (AO) in late August 1974 for experiments to be flown on an unmanned Lunar Polar Orbiting Spacecraft. The proposed briefing is tentatively planned for September 1974. General information and AO requests should be directed to Mr. Floyd Roberson, Acting Deputy Director, Lunar Programs Office, Code SM, NASA Headquarters, Washington, D. C. 20546 (202) 755-1602. The L.P.O. is being considered for a 1979 launch date.

## IN MEMORIAM

It is with deepest sympathy that we report the deaths of three members of the lunar science community

*William W. Rubey*  
*December 19, 1898-April 12, 1974*

*W. Maurice Ewing*  
*May 12, 1906-May 4, 1974*

*Roald H. Fryxell*  
*February 18, 1934-May 18, 1974*

## LUNA 22

The 22nd probe in the Soviet Union's Luna series was launched on May 29, 1974. This unmanned observer entered a 20-28° orbit on June 2, at an altitude of approximately 25 Km. This initial phase of the mission at low altitude was to obtain high resolution photography over a ground track very similar to the track of Apollos 15 and 17. Other instrumentation reported to be on board includes a gamma ray spectrometer with a 5-7 cm. sodium iodide crystal with a plastic anticoincidence mantle, and a 256 channel analyzer. This equipment was to begin transmitting data on June 15 when the altitude of the probe was changed to 110 Km.

## PROCEEDINGS OF THE FIFTH LUNAR SCIENCE CONFERENCE

After much hassle over deadlines and many hours on the telephone, all manuscripts for the Fifth Proceedings were sent to Pergamon Press on time, i. e., July 1. Much of the credit for meeting the deadline goes to the editors Dave McKay (volume I), Larry Nyquist (volume II), and Jim Dorman (volume III) and their associate editors. A total of 207 manuscripts was accepted which compares to 228 manuscripts last year. Again we are expecting a December 1 publication date so that all authors should have a copy of the Fifth Proceedings before the next lunar science conference.

## DISTRIBUTION OF LUNAR ORBITAL DATA POSTERS

The presentation of orbital data in the form of colored maps in the Proceedings of the Fourth Lunar Science Conference was generally received with great enthusiasm. It was, therefore, decided to reprint those maps for general distribution. A poster format was chosen to facilitate comparison of the different data. During the months of June and July about 2,500 copies were mailed to all PI's and Co-I's and all geoscience departments in the U. S. Special thanks is due to the contributors who, at the time, were not only fighting the deadlines for their own manuscripts but also undertook the extra burden of preparing the maps. Similar maps will appear in the Fifth Proceedings.

CALL FOR ABSTRACTS (DEADLINE 30 AUGUST 1974)"INTERACTIONS OF THE INTERPLANETARY PLASMA WITH THE  
ANCIENT AND MODERN MOON"

This interdisciplinary conference will be devoted to the broader aspects of the interactions of moon-like bodies with their environments. It will be held 30 September-4 October 1974 at the Lake Geneva Campus of George Williams College by Lake Geneva, Wisconsin. Request abstract forms, conference program, and meeting details from Dr. David R. Criswell, Interactions Conference, Lunar Science Institute.

CONFERENCE: ORIGIN AND EVOLUTION OF THE LUNAR REGOLITH

On November 13-15, at the LSI all scientists are invited to participate in this exchange of basic information and ideas. Proposed session topics include Origin of Regolith Materials/Evolution of Regolith Materials/Horizontal and Vertical Transport/Interaction of Regolith with Environment/Soil Mechanics/Formation of Soil Breccias/Regolith as a Function of Time. Suggestions have been solicited through a questionnaire mailed on August 9.

For further information please contact D. Heymann, Department of Geology, Rice University, Houston, Texas 77001 (713) 528-4141, x463. (Deadline, August 31).

CONFERENCE: HISTORICAL AND PRESENT DAY OBSERVATIONS OF LUNAR AND  
PLANETARY ORBITS . . . GEOPHYSICAL AND COSMOLOGICAL IMPLICATIONS

On January 6-9, 1975 a conference sponsored by the Royal Astronomical Society will be held at the School of Physics, University of Newcastle-upon-Tyne, England. The organizers of the conference are Dr. F. R. Stephenson, Paul M. Muller, and Prof. S. K. Runcorn.

The aim of the conference is to discuss the following related topics:  
(1) Lunar and planetary secular accelerations; (2) the determination of the rate of change of G from lunar and planetary observations;  
(3) historical variation of the Earth's rotation.

For additional information contact Mr. W. F. Mavor, School of Physics, University of Newcastle-upon-Tyne, NE1 7RU, England.

ROYAL SOCIETY MEETING

On June 9-11, 1975 a discussion meeting will be held at the Royal Society in London. The topic of the conference is "The Moon: A New Appraisal from Space Missions and Laboratory Analyses." Professors G. Eglinton, G. M. Brown, S. K. Runcorn, and H. C. Urey are organizing the conference. Additional information is available from the Executive Secretary, Royal Society, 6 Carlton House Terrace, London SW1Y 5AG, England.



## LUNAR SCIENCE V ABSTRACTS

Copies of LUNAR SCIENCE V: abstracts of papers submitted to the Fifth Lunar Science Conference are available from the Lunar Science Institute. The abstracts which are printed in two parts with a total of 900 pages, can be obtained by sending check or money order for \$1.00 in Continental U. S. and \$6.00 for Foreign mailing, to: Mrs. Carolyn Watkins, Lunar Science Institute. Payment must be sent with order.

## SAMPLE INVENTORY REPRINT AVAILABLE

A limited supply of reprints is available of the "Lunar Sample Inventory for Apollo 11, 16 and 17" published in the Proceedings of the Fourth Lunar Science Conference, Pergamon Press, 1973. They will be distributed as requests are received until the supply is exhausted. If you can use a copy send your name and address to the Lunar Science Institute Library and ask for Lunar Sample Inventory.

## JUPITER PHOTOS

Requests for Pioneer 10 Jupiter photos should be addressed to: Public Affairs Office, NASA Ames Research Center, Moffett Field, California 94035. The queries should be specific as to the intended use of the photo materials. Planetariums can arrange loans of a Planetarium Package which includes a script, slides and audio tape, but plan ahead; a waiting list already exists. If NASA Ames cannot supply the needed material due to the size or type of request, a price list for the official photo reproduction service will be sent to the requestor.

## MERCURY AND VENUS PHOTOS AND SLIDES

The Jet Propulsion Laboratory in Pasadena, California, has selected the Photographic Illustration Company as the official source for purchasing Mariner 10 B/W photos and slides of Venus and Mercury. The 5 Venus frames and 15 Mercury frames are available as 35mm slides (\$.65 each) or 8' x 10' glossy photos (\$.75 each). A complete set of all 20 frames is priced at \$10.00 for photos and \$10.50 for slides. Shipping charges: Western U.S.--\$1.00; all other U.S.--\$1.50; outside U.S.--\$2.00. Ordering address: PIC, P. O. Box 6699, Burbank, California 91510.

## LUNAR ARTICLES APPEARING IN JOURNALS

RECEIVED IN LSI LIBRARY, JUNE-JULY, 1974

Beginning with this listing and in the future, we shall try to indicate the address of the first author so that those desiring copies of the paper may easily contact the author for a reprint.

- Hodges, R. R., Jr. (University of Texas at Dallas, Texas 75080) Model atmospheres for Mercury based on a lunar analogy. JOURNAL OF GEOPHYSICAL RESEARCH 79, 2881-2886 (1974).
- Howe, H. C., Lin, R. P., McGuire, R. E., Anderson, K. A. (Space Sciences Laboratory, University of California, Berkeley, CA 94720) Energetic electron scattering from the lunar remanent magnetic field. GEOPHYSICAL RESEARCH LETTERS 1, 101-104 (1974).
- Husain, T. (Dept. of Earth and Space Sciences, State University of New York, Stony Brook, NY 11790) Ar-<sup>39</sup> chronology and cosmic ray exposure ages of the Apollo 15 samples. JOURNAL OF GEOPHYSICAL RESEARCH 79, 2588-2606 (1974).
- Ivanov, A. V., Stakeev, Yu. L., Tarasov, L. S., Florenskii, C. P. Nature of the material returned by the automatic lunar station Luna 16. PHYSICS OF THE EARTH & PLANETARY INTERIORS 7, 466-476 (1973)
- Levy, M. C., Levy, C., Johan, Z. (Laboratoire de mineralogie-cristallographie, associe au C.N.R.S., Universite Paris VI) Etudes de mineraux metalliques lunaires de quelques echantillons d'Apollo 16. BULLE-TIN DE LA SOCIETE FRANCAISE DE MINERALOGIE ET DE CRISTALLOGRAPHIE 96, 359-364 (1973) (in French, English abs).
- Lindeman, R. A., Vondrak, R. R., Freeman, J. W., Snyder, C. W. (Space Physics & Astronomy Dept., Rice University, Houston, TX 77001) Interaction between an impact produced neutral gas cloud and the solar wind at the lunar surface. JOURNAL OF GEOPHYSICAL RESEARCH 79, 2287-2296 (1974).
- Lindsay, D. H., King, H. E., Jr., Turnock, A. C. (Dept. of Earth & Space Sciences, State University of New York, Stony Brook, NY 11790) Compositions of synthetic aguite and hypersthene coexisting at 810°C: application to pyroxenes from lunar high-lands rocks. GEOPHYSICAL RESEARCH LETTERS 1, 134-136 (1974).
- Hodges, R. R., Jr., Hoffmann, J. H., Johnson, F. S. (University of Texas at Dallas, Richardson, Texas 75080) Lunar atmosphere. ICARUS 21, 415-426 (1974).
- Averbukh, A. I., Girschovich, B. V., Approximate determination of geometrical characteristics of Moon-Earth trajectories. COSMIC RESEARCH 11, 607-611 (1974).
- Carr, M. H. (U. S. Geological Survey, Menlo Park, CA 94528) Role of lava erosion in the formation of lunar rilles and Martian channels. ICARUS 22, 1-23 (1974).
- Chapman, W. B., Middlehurst, B. M., Fritsillo, A. L. (NASA/Johnson Space Center, Houston, TX 77058) Moonquake predetermination and tides. ICARUS 21, 427-436 (1974).
- Classen, J., Degassing of the Moon. I. Sites on the Moon where luminosity has been observed. SOLAR SYSTEM RESEARCH 7, 178-182 (1974).
- Evsukov, N. N. (Astronomy Dept., Khar'kov University) Colorimetric structure of the lunar maria. SOVIET ASTRONOMY 17, 801-804 (1974).
- Eroshkin, G. I. (Institute of Theoretical Astronomy, Acadamy of Sciences of the USSR, Leningrad) Influence of the asphericity in the force field of the Moon on the motion of its center of mass. SOVIET ASTRONOMY 17, 808-810 (1974).
- Florenskii, K. P., Rode, O. D., Ivanov, A. V., Bochko, R. A. Study of the micromorphology of lunar soil particles by scanning electron microscopy. COSMIC RESEARCH 11, 841-846 (1974).
- Friedman, I., Hardcastle, K. G., Gleason, J. D. (U. S. Geological Survey, Denver, Colorado 80225) Water and carbon in rusty lunar ionospheric and oceanic dynamo variations. GERLANDS BEITRAGE ZUR GEOPHYSIK 83, 1-15 (1974).
- Gupta, J. C. (Division of Geomagnetism, Earth Physics Branch, Dept. of Energy, Mines and Resources, Ottawa, Canada KIA 0E4) Lunar ionospheric and oceanic dynamo variations. GERLANDS BEITRAGE ZUR GEOPHYSIK 83, 1-15 (1974).
- Hodges, R. R., Jr., Hoffmann, J. H., Johnson, F. S. (University of Texas at Dallas, Richardson, Texas 75080) Lunar atmosphere. ICARUS 21, 415-426 (1974).



- McGill, G. E. (Dept. of Geology & Geography, University of Massachusetts, Amherst, MA 01002) Morphology of lunar craters: a test of lunar erosional models. ICARUS 21, 437-447 (1974).
- Mints, R. I., Mil'man, I. I., Kryuk, V. I., Tarasov, L. C. (Uralian Polytechnical Institute, Sverdlovsk and V. I. Vernadsky Institute of Geochemistry and Analytical Chemistry, Academy of Sciences USSR, Moscow, Russia) Exoelectron emission from the fragments of lunar anorthosite returned by Luna 20. GEOCHEMISTRY INTERNATIONAL 10 (3) 525-529 (1973).
- Nakamura, Y., Latham, G., Lammlein, D., Ewing, M., Duennebier, F., Dorman, J. (Earth and Planetary Sciences Division, Marine Biomedical Institute, University of Texas Medical Branch, Galveston, TX 77550) Deep lunar interior inferred from recent seismic data. GEOPHYSICAL RESEARCH LETTERS 1, 137-140 (1974).
- Newton, R. R. (Applied Physics Laboratory, Johns Hopkins University, Silver Spring, MD 20910) Authenticity of Ptolemy's parallax data--Part II ROYAL ASTRONOMICAL SOCIETY QUARTERLY JOURNAL 15, 7-29 (1974) (for Part I: SEE Ibid 14, 367-388 (1973)):
- Pike, R. J. (U. S. Geological Survey, Menlo Park, CA 94528) Craters on Earth, Moon and Mars; multivariate classification and mode of origin. EARTH & PLANETARY SCIENCE LETTERS 22, 245-255 (1974).
- Priboeva, N. W., Color differences in selected regions of the lunar surface. I. Sinus Iridium and Copernicus region. SOLAR SYSTEM RESEARCH 7, 172-177 (1974).
- Schubert, G., Lichtenstein, R., Russell, C. T., Coleman, P. J., Jr. (Dept. of Planetary and Space Sciences, and Institute of Geophysics & Planetary Physics, University of California, Los Angeles, CA 90024) Lunar dayside plasma sheet depletion: Inference from magnetic observations. GEOPHYSICAL RESEARCH LETTERS 1, 97-100 (1974).
- Smith, P. J. (NATURE correspondent) Changing views of the Moon's magnetism. NATURE 249, 209-210 (1974).
- Steverding, B. (Physical Sciences Directorate, U. S. Army Missile Command, Redstone Arsenal, Alabama) Origin of the lunar surface. PHYSICS OF THE EARTH AND PLANETARY INTERIORS 8, 287-291 (1974).
- Surkov, Yu. A., Fedoseev, G. A., Sobornov, O. P., Tarasov, L. S. Radioactivity of regolith brought back from the vicinity of the Apollonius-S crater by the Luna-20 lunar probe. COSMIC RESEARCH 11, 835-840 (1974).
- Toksoz, M. N., Johnston, D. H. (Dept. of Earth & Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139) Evolution of the Moon. ICARUS 21, 389-414 (1974).
- Tolland, H. G. (Dept. of Geophysics and Planetary Physics, School of Physics, The University, Newcastle-upon-Tyne, England) Electrical properties of a synthetic lunar pyroxenite and the internal temperature of the Moon. PHYSICS OF THE EARTH AND PLANETARY INTERIORS 8, 292-294 (1974).
- Tremaine, S. D., Groth, E. J., Nelson, M. R. (Joseph Henry Laboratories, Physics Dept., Princeton University, Princeton, NJ 08540) Observation of a lunar occultation of Geminorum. ASTRONOMICAL JOURNAL 79, 649-650 (1974).
- Van'yan, L. L., Egorov, I. V. (Academy of Sciences of the USSR. Institute of Cosmic Investigations, Moscow State University) Electromagnetic induction in the Moon. COSMIC RESEARCH 11, 823-834 (1974).
- Van'yan, L. L., Berdichevskiy, M. N., Yegorov, N. V., Krass, M. S., Okuleskiy, B. A., Fadeyev, V. Ye. (Academy of Sciences of the USSR. Institute of Cosmic Investigations. Moscow State University) Apparent electrical resistivity on the Moon and its interpretation. AKAD. NAUK SSSR. IZVESTIYA. PHYSICS OF THE SOLID EARTH no. 11, 693-697, Nov. 1973.
- Whitford-Stark, J. L. (Lunar & Planetary Unit, Dept. of Environmental Sciences, University of Lancaster, United Kingdom) Detailed structural analysis of the Deslandres Area of the Moon. ICARUS 21, 457-465 (1974).
- Zisk, S. H. (Haystack Observatory, Westford, MA 01886) Lunar surface topography; computer generation and display of high resolution radar astronomy maps. ASTRONOMY & ASTROPHYSICS SUPPLEMENT SERIES 15, 255-261 (1974).

CALENDAR OF EVENTS

1974

- Sept. 8-13 American Chemical Society Annual Meeting, Atlantic City, New Jersey. Sept. 10-11, Division of Nuclear Chemistry & Technology sessions on "Particle Exposure Record of Lunar Materials"  
For Information Contact: Meetings and Expositions Office  
American Chemical Society  
1155 16th Street, N. W.  
Washington, D. C. 20036
- Sept. 30-  
Oct. 4 "Interactions of the Interplanetary Plasma with the Modern and Ancient Moon". Lake Geneva, Wisconsin.  
For Information see page 3 this issue.
- Oct. 1 DEADLINE--American Geophysical Union Fall Meeting--ABSTRACTS DUE. (See EOS; Transactions of the AGU, July 1974 for new format.)
- Oct. 10-11 Eighth Geodesy/Solid-Earth and Ocean Physics (GEOP) Research Conference Lunar Dynamics and selenodesy. Keynote speaker: William M. Kaula.  
For Information Contact: American Geophysical Union  
1707 L Street, N. W.  
Washington, D. C. 20036  
(202)293-1144
- Nov. 13-15 "Origin and Evolution of the Lunar Regolith"  
Lunar Science Institute, Houston, Texas.  
For Information see page 3 this issue.
- Nov. 18-20 Geological Society of America annual meeting. Miami Beach, Fla.  
For Information Contact: Geological Society of America  
3300 Penrose Place  
Boulder, Colorado 80301  
(303)447-2020
- Dec. 12-17 American Geophysical Union Fall Annual Meeting. Jack Tar Hotel, San Francisco, California. (EOS, July 1974 for Program Chairman)  
For Information Contact: American Geophysical Union  
1707 L Street, N. W.  
Washington, D. C. 20036  
(202)293-1144

1975

- Jan. 6-9 "Historical and Present Day Observations of Lunar and Planetary Orbits . . . Geophysical and Cosmological Implications"  
The University, Newcastle-Upon-Tyne.  
For Information see page 3 this issue.
- June 9-11 "The Moon: A New Appraisal from Space Missions and Laboratory Analyses"  
Royal Society, London.  
For Information see page 3 this issue.



## LUNAR SCIENCE INSTITUTE HAS NEW DIRECTOR

The Board of Trustees of the Universities Space Research Association announced the appointment of Dr. Robert O. Pepin as Director of the Lunar Science Institute, succeeding Dr. James Head, who served as Interim Director. Professor Pepin, who is on leave of absence from his position on the faculty of the School of Physics and Astronomy at the University of Minnesota, assumed his duties in early June.

Dr. Pepin has been actively engaged in lunar research for many years and in 1966 became a Principal Investigator in the Lunar Sample Analysis Program. In addition to his own research, he has made many important contributions to the lunar program as an active participant in key NASA advisory groups. These include the Lunar Sample Analysis Planning Team (LSAPT) from 1969-1972, the Science Working Panel (SWP) from 1970-1972, and the Advisory Groups for Lunar Surface Operations during Apollo missions 14, 15, 16, and 17.

In October of 1971, Dr. Pepin was the recipient of the NASA Medal for Exceptional Scientific Achievement. He was a National Sigma Xi Lecturer in 1971 and has served as an Associate Editor of Geochimica et Cosmochimica Acta since 1970.

A native of Massachusetts, Dr. Pepin received his baccalaureate from Harvard College in 1956 and his Ph. D. from the University of California at Berkeley in 1964, both in the field of physics. He was a University Fellow in Oceanography in 1959-1960. In addition to his well-known research activities in the mass spectrometric studies of lunar materials, he has also applied similar techniques to the study of terrestrial and meteoritic materials. His other interests have involved research in such diverse areas as the origin and history of the solar system, and sea-floor stratigraphy and ocean current circulation.

Dr. Pepin has served as a consultant to numerous industrial laboratories. He is a member of the American Association for the Advancement of Science, the American Meteoritical Society, and from 1971-1973 he served as a Trustee of the Universities Space Research Association.

He is married to the former Miss Lillian Barford of South Bend, Indiana.

## LSI PHOTO COLLECTION

The Photo/Map Library includes positive transparencies and/or prints of the following types of photography: Apollo Hasselblad (70 mm) surface and orbital; Apollo Pan and Metric; Lunar Orbiters; Surveyor and Ranger series; miscellaneous lunar (Zond, Hycon, 16 mm, 35 mm); some Mercury, Mars, Jupiter, and Venus; and various earth-based photographs. A condensed (106 hr.) version of the Apollo EVA television transmission will soon be added to the collection.

Use of the collection, housed in Room 102 of the Institute, is not limited to scientists holding LSI appointments. Access to the facility, or arrangement for inter-library loan of materials can be arranged by contacting the Photo/Map Librarian, Mrs. Jody Heiken (713-488-5200, x36).