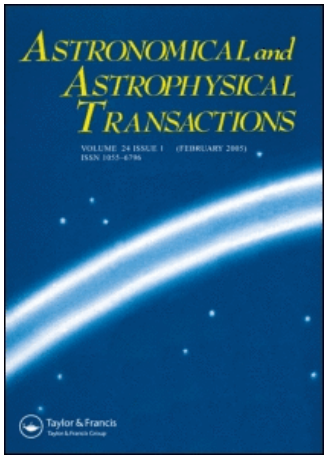

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Conference: The scientific problems of creating a lunar base

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CONFERENCE

THE SCIENTIFIC PROBLEMS OF CREATING A LUNAR BASE

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On February 5–8, 1991, the scientific conference on the problems of creating a permanent lunar base as the initial stage of using the Moon, was held at the P. K. Sternberg State Astronomical Institute of the Moscow State University. The preliminary forecasts of experts estimate the real possibilities of implementing such a project not earlier than the first half of the next century. At the same time, the comprehensive character of the problem, and the far-reaching consequences of its realization, call for complex and careful scientific and technological examination. Since State space research programmes so far do not envisage the solution of specific problems associated with the use of the Moon, a large team of specialists in different fields has undertaken, on its own initiative, to carry out preliminary studies. The Solar System Section, and the Moon and Mercury Working Group of the USSR Academy of Sciences' Astronomical Council, acted as the organizer of the conference. The holding of the conference was entrusted to the P. K. Sternberg State Astronomical Institute of the Moscow State University. This institute successfully conducts lunar studies, including the study of the problem of extraterrestrial natural resources.

The conference was opened by Professor Yu. P. Pskovsky, deputy director of the Sternberg Institute. In his opening address M. Ya. Marov, Corresponding Member of the USSR Academy of Sciences, Chairman of the Solar System Section, noted the topicality of holding the conference due to the fact that at the world level the plans of exploring and using the Moon, Mars, and other solar systems bodies, are assuming a concrete content.

The conference included four topical sessions. The topic of the first session is "General Problems of the Prospects for Creating a Manned Lunar Base". It has united papers of a conceptual character.

V. V. Shevchenko in the paper "Present-Day Problems of Creating a Lunar Base" considered, in detail, scientific programmes for longstanding lunar bases, the tasks of exploring and using lunar resources as they look at the modern level of knowledge about lunar nature, as well as problems of choosing the site for bases of different functions—to study the Moon, to conduct observations from the lunar surface, to establish experimental production types on the Moon, and so

forth. He specially stressed the opportunities of remote sensing aimed at forecasting local parameters of the environment, and natural resources that makes it possible, even now, to carry out purposeful studies with the use of ground-based observations.

Ye. A. Narimanov and S. A. Lebedev in the paper "Systems Analysis of the Concept of Constructing and Programmes of Establishing a Lunar Base" pointed out that already the first lunar settlements will be of specialized character in accordance with scientific or industrial objectives. In the paper "On the Possibility of the Implementation of the Lunar Base Project at the Modern Technical Level," B. I. Sotnikov, G. M. Baidal and G. A. Sizentsev considered the possible ways of the delivery of dwelling and technological modules to the lunar surface for setting up a lunar base on the basis of heavy boosters of the Energiya type with the use of reusable spacecraft of the Buran type. In the paper "The Moon in the Concept of the Earth's Space Economy" V. I. Florov and E. G. Semenenko, analysed the social and economic consequences of using the Earth's natural satellite. A. A. Gurshtein submitted the paper "The Prospects of a Lunar Base," which focused on the problems of international cooperation and pooling of scientists' efforts.

The second session dealt with the topic: "The Technical Opportunities of Using the Moon". In the paper "A Lunar Base—the Concept and the Problem of Its Creation", V. P. Barmin, I. V. Barmin, A. A. Shevchenko, and A. S. Borisov, presented the projects of lunar structures, their technical equipment, transport facilities, design solutions of dwelling, and technological modules of a longstanding lunar complex. In the paper "The Concept of the Mobile Manned Lunar Base", I. A. Kozlov described an original design of a sophisticated structure that can move on the lunar surface in accordance with the required research tasks. In the paper "Transport Operations in the Course of Creating a Lunar Base" S. S. Klimov and Ye. A. Narimanov discussed the ways of the delivery of cargoes to the lunar surface with the use of various rocket-transport systems. The paper "Lunokhods (Moon Cars) for a Lunar Base" by A. L. Kemurdzhian, V. V. Gromov, I. S. Bolkhovitinov and P. S. Sologub dealt with transport systems for moving cargoes and crews on the lunar surface with due account of specific requirements for their universality and the high degree of trafficability in extreme conditions. In the paper "Subsurface Structures—Prospects of Building a Lunar Base" G. A. Lejkin, A. N. Sanovich and V. V. Shevchenko suggested the use of natural voids (for instance, sections of lava tubes) for establishing premises of lunar bases.

Papers of the third session were united by the topic "Scientific Problems of Choosing the Site of a Lunar Base and Forecasting Natural Resources." In the report "On the Choice of the Site for the First Lunar Outpost" V. I. Chikmachev analysed the topographic characteristics of Lacus Veris. L. A. Akimov, Yu. G. Shkuratov and N. V. Oponasenko presented the paper "The Forecasting of the Structural Characteristics of the Lunar Surface with a View to Choosing Promising Regions for a Lunar Base" in which they considered the possibilities of remote studies with the use of ground telescopic observations. The same problems were treated in papers "The Remote Appraisal of the Mechanical and Chemical–Mineralogical Characteristics of Lunar Soil" by V. V. Novikov, Kh. G. Tadzhidinov and O. I. Kvaratskhelia, "On the Estimate of the Moon's Natural Resources (Ilmenites as Oxygen-Bearing Mineral)" by V. V. Busarev. Problems

of the topographic analysis of the lunar surface in connection with the choice of the site for lunar bases, were discussed in papers "The Simulation and Forecasting of Roughnesses of the Lunar Surface on the Basis of the Crater Distribution Density" by I. S. Bolkhovitinov, S. G. Pugacheva and Zh. F. Rodionova and "The Use of Computers for the Automated Measuring and Analysis of Elements of the Lunar Surface" by A. A. Karlov, A. K. Lomov, T. F. Smolyakova, Zh. F. Rodionova and V. V. Shevchenko. B. V. Krasnopevtseva and K. B. Shingareva submitted the paper "The Cartographic Representation of Comprehensive Information on the Moon." In the paper "The Specific Features of the Structure of Multi-Ring Planetary Features in Connection with the Forecast of Natural Resources (Volatiles, Water, Diamonds)" G. G. Kochemasov put forward some interesting hypotheses based on the experience in studying similar structures on the Earth.

The fourth session was devoted to the topic "Scientific Research Programmes for a Lunar Base." In papers "The Comprehensive Study of the Dynamics of the Earth–Moon System by Methods of Terrestrial and Lunar Astronometry" by V. S. Kislyuk, "Astronomical-Geodesic and Selenodesic Problems in the Programme of Work on a Lunar Base" by I. I. Krasnorylov and Yu. V. Plakhov, and "The Telescope of a Lunar Base Competes with an Orbital Telescope" by L. M. Shulman, the range of tasks of observational astronomy from the lunar surface were considered. In the paper "Geochemical Studies in the Area of a Lunar Base," L. S. Tarasov and A. F. Kudryashova generalized the problems of studying lunar material directly in lunar conditions.

In addition to the papers mentioned above, at each session communications on more specific problems concerning various aspects of creating a lunar base were submitted and discussed.

The conference was attended by more than 70 specialists from 20 research and research-production organizations of the USSR. All told, 35 papers and brief communications were presented. A general discussion on the problems was held.