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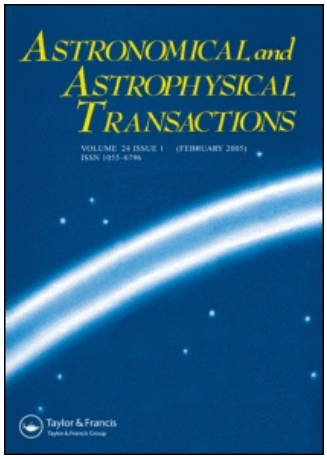

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BOOK REVIEWS

Mars. Review

The book under review, "Mars", has been published by H. H. Kiefer, B. M. Jakosky, C. W. Snyder and M. S. Matthews as editors with 114 collaborating authors at University of Arizona Press in 1992. This book belongs to the Space Science Series. The book consists of 1498 pages, including 18 coloured pictures. Detailed global geologic and topographic maps of Mars at 1:15,000,000 scale, published by U.S. Geological Survey supplement this volume.

The 38 chapters of this book form nine logical parts. Part 1 consist of Introduction, basic physical and chemical data for Mars, a history of ground-based and spacecraft observations, and a list of books about Mars consisting of 60 references. Part 2 deals with the origin and thermal evolution, composition, mineralogy and internal structure, analyses of gravity and topography, state of stress and tectonics, long-term orbital and spin dynamics, global geodesy and cartography. In Part 3, the global stratigraphy and geologic history, and the role of impact cratering, volcanizm and ice in formation of the main features of the surface are discussed. Chapters including the analysis of composition and mineralogy, physical and chemical weathering, radar determination of surface properties, aeolian processes, and polar deposits constitute Part 4. Part 5 is devoted to the atmosphere and Part 6, to the exosphere and the magnetic field. Climate changes on Mars are discussed in Part 7. Part 8 includes a discussion of the search for extant life on Mars and the possibility of life on Mars during a water-rich past. Martian satellites—geologic history, regolith, impact craters and ejecta distribution, grooves on Phobos—are discussed in Part 9. Appendix includes the martian nomenclature, glossary on 40 pages and bibliography on 94 pages. Color section consists of photographs taken with the 61 cm telescope at Mauna Kea Observatory, the maps of Mars geoid heights, geologic maps, maps showing the relative ages of surface units and the distribution of viscous creep features on *Mars* and *Viking* orbiter images of the different parts of Mars.

Among the authors of this issue are: R. M. Batson, M. H. Carr, D. Crukshenk, M. E. Davies, A. Dollfus, T. C. Duxbury, P. Esposito, R. Greely, R. O. Kuzmin, V. I. Moroz, T. Owen, J. B. Polack, W. L. Sjogren, L. A. Soderblom and other famous investigators.

This book summarizes what is known about Mars and its two satellites. It is the most complete work about Mars. The book "Mars" will be very useful for many scientists interested in martian surface and environments.

One small note may be made. The reason of global dichotomy of Mars is discussed in Chapter 4 (page 139): "One of the possibilities is that the low-laying northern plains are a gigantic impact scar (Wilhelms and Squyres 1984)". We cannot agree with such an opinion, because the dichotomy in the distribution of the plains and highlands was also observed on the Moon, Mercury, Venus and the Earth. An interesting regularity was revealed in the plain distribution over

latitudinal bands on Venus, Mars, Mercury and the Moon. The areas occupied by plains are larger in the northern latitudes than in the southern ones for these celestial bodies. Besides, the total area of plains depends on the size and mass of a celestial body: on Venus, plains occupy 60% of the surface; on Mars, 35%; on Mercury, 23% and on the Moon, 17%. Such regularities of the plain distribution cannot be explained by impacts.

J. F. RODIONOVA

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Review of NASA's Report "TOWARD OTHER PLANETARY SYSTEMS" (TOPS)

The topic of the NASA's Science Working Group report is a strategy for discovery and study of other planetary systems, considering both short-term and long-term aspects.

The problem is one of fundamental problems of nowadays. Many urgent issues in different fields of human activity (from philosophy to investigation of the Earth and life) are connected with it. For instance, we still cannot conclude with confidence, is the origin of life (including the intelligent one) on the Earth the matter of cosmic chance or is it a natural consequence of the formation and development of our planetary system? Probably, truth is somewhere between these extreme points of view. Very likely discovery and investigation of other planetary systems will help to specify the answer to this important question.

The authors pay a quite justified attention to the analysis of modern technical possibilities of astronomical science and the employment of the latter for the search and study of other planetary systems in vicinities of neighbouring stars. To resolve the problem, it is necessary to use the largest of contemporary ground-based telescopes (for example, 10-m telescope of W. M. Keck on Mauna Kea, Hawaii *et al.*) working in the best atmospheric conditions and equipped with specialized hardware. They should include instruments for direct and indirect (astrometric and radial-velocity spectral) detection of other planets, adaptive optics, facilities for interferometric measurements, etc. The detailed investigation of other planets and planetary systems is unthinkable without using astronomical instruments in space (at near-Earth orbits or even on the lunar surface). Only then it is possible to achieve the diffraction limit in optical image quality of the objects and to get rid of the interfering influence of the atmosphere.

Moreover, the report contains a strategic program of the creation and development of specialized astronomical instruments for discovering and investigation of other planets and, actually, of carrying-out of the work which is divided into the stages: TOPS-0, TOPS-1, and TOPS-2.

The TOPS-0 stage is related to the period of building and improvement of large ground-based telescopes (e.g., 10-m Keck 1 and Keck 2) mainly for discovering the nearest extrasolar Jupiter-like planets and for the studies of a synoptic nature. TOPS-1 will spread all over the period of realization of a number of specialized space projects (e.g., NASA's Orbiting Stellar Interferometer, the Astrometric Imaging Telescope, and the Optical Interferometer in Space) and the continued

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use of the largest ground-based telescopes. The main scientific goals of these instruments during this phase are the direct imaging of extrasolar planets and debris disks around young stars, understanding of the processes that lead to stellar and planetary formation; wide surveys of the sky for discovering significant number of new planetary systems hidden by bright sources. TOPS-2 covers very long-range goals of the TOPS program which will be reached during prolonged space missions. The authors think that "Whereas TOPS-0 and TOPS-1 aim to identify significant numbers of Jupiter-like planets around other stars, the ambitious objective of TOPS-2 is to discover Earth-type planets that may, like Earth, sustain life. The TOPS-2 goal is to determine more basic planetary properties: the nature of the surface, its temperature, whether there is an atmosphere, and possibly the constituents of that atmosphere".

Thus TOPS is a result of modern comprehensive analysis of the problem of discovery and study of extrasolar planets relying on known properties of solar system, and at the same time, it is a program of solution of the problem taking into account the level of astronomical techniques. As a matter of fact, however, TOPS is a USA national program. In order to unite the efforts of scientists working in this direction in different countries, it might be useful to carry out several international meetings for discussing the program and forming a common one. Probably, the grandiose problem will be resolved by combined efforts. By the way, during the international meetings it will be possible to draw attention of wide public and government circles of various countries to this problem for very possible support of its resolving.

Dr. V. V. BUSAREV