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#### A review of: "Planetary sciences"

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## BOOK REVIEW

### PLANETARY SCIENCES

edited by T. M. Donahue with K. K. Trivers, D. M. Abramson  
National Academy Press, Washington, D. C., 1991, 293 pp.

The Academy of Sciences of the USSR and The National Academy of Sciences of the United States of America sponsored a workshop on Planetary Sciences at the Institute for Space Research in Moscow, January 2-6, 1989. The purpose of the workshop, which was attended by Soviet and American scientists, was to examine the current state of our theoretical understanding of how the planets were formed and how they evolved to their present state. This workshop focused on the present status of observational and theoretical understanding of the clearing of stellar nebulae, planetesimal formation, and planetary accretion; the evolution of atmospheres; the relationship of still existing primitive bodies to these topics; and the relationship of ground-based and in situ measurements. The book is the proceedings of the US-USSR Workshop on Planetary Sciences. The papers published in this volume were presented by 13 American authors and 14 Russian authors from the Institute of Space Research, Vernadsky Institute of Geochemistry and Analytical Chemistry, and Schmidt Institute of the Physics of the Earth.

One part of papers considers problems of the early protoplanetary disk evolution. It discusses such topics as the properties and environment of the primitive solar nebulae, numerical two-dimensional calculations of the formation of the solar nebula, three-dimensional evolution of the early solar nebula, formation and evolution of the protoplanetary disk, physical-chemical processes in a protoplanetary cloud, and magnetohydrodynamic puzzles in the protoplanetary nebula.

Further, problems of the Solar System formation are discussed. The formation of planetesimals, formation of the terrestrial planets from planetesimals, the rate of planet formation and the Solar System's small bodies, studies of astrophysical dust grains in circumstellar shells, late stages of accumulation and early evolution of the planets, and formation of giant planets and their satellites are considered in a number of papers.

In relation to a new Venera spacecraft data, the following items are discussed: the thermal conditions of Venus, degassing, the role of impacting processes in the chemical evolution of the atmosphere of primordial Earth, lithospheric and atmospheric interaction on the planet Venus, and applications of the runaway greenhouse

atmospheres to the Earth and Venus. New theoretical suggestions are described in papers concerning the dynamics of comets and the problems of the Oort Cloud.

The Solar System's existence poses this fundamental question: Are planetary systems a common by-product of star formation? The last paper of the volume is focused on the current progress in the extra-solar planet detection.

In the Foreword, the volume's editor Thomas M. Donahue writes: "As the papers presented at the workshop and published in this volume show, astronomical observations are now at hand that will reveal the sequence of events occurring in circumstellar disks with sufficient precision to define the models of planetary formation. Moreover, theories for the origin of the Solar System have reached a point where it is now possible, indeed it is essential, to examine them in the broader context of the origins of planetary systems. Until recently, it has not been possible to select among a range of feasible scenarios the one that is most likely to be correct, in the sense that it satisfies observational and theoretical constraints. We are now advancing to that stage".

That is the main purpose of the book.

V. V. SHEVCHENKO