

# Preface

The results of experimental and theoretical studies of isotopic composition of natural waters of the Earth's hydrosphere are analyzed and summarized in this book. These studies represent a modern direction of science of the natural waters actively developed in hydrology, hydrogeology, oceanography, and climatology starting from the middle of last century. The book is a further development and improvement of the earlier published author's works: *Cosmogenic Isotopes of the Hydrosphere*, Nauka, Moscow, 1984; *Isotopy of the Hydrosphere*, Nauka, Moscow, 1983; *Environmental Isotopes in the Hydrosphere*, Nedra, Moscow, 1975 and *Environmental Isotopes in the Hydrosphere*, Wiley, Chichester–New York, 1982.

More than 25 years have passed since the above books were published. During that period, together with everyday application of isotopic content of water for solution of different problems in hydrology, new original fields of use of isotope tracers for scientific and practical purposes have appeared. Many of such applications found a place in this work, but the fundamentals of methods and interpretation of isotope studies, which were developed mainly in the second part of last century, were preserved in the book together with references of their authors.

The successful development of the isotope methods and practical application for natural water studies was in many respects obliged to the international cooperation of scientists from different countries. Its start was initiated by UNESCO in implementation of the International Hydrological Decade (1965–1974) Program which is continued until now. The other important form of cooperation was the International program on collection and publication of experimental data about concentration of the tritium, deuterium, and oxygen isotopes in precipitation, sampling of which was organized on the global network of the IAEA/WMO and on the national hydrometeorological stations. This program was initiated and headed by Isotope Hydrology Section of the IAEA which up to now continues this work including processing and publication of the data and organizing regular symposia and advisory group meetings and publication of proceedings.

Active role in research and cooperation on isotope hydrology in Russia belongs to the Water Problems Institute and Institute of Ecology (St. Petersburg branch) of the Russian Academy of Sciences, All Russian Research Institute in Hydrogeology and Engineering Geology and All Russian Geological Research Institute of the

Ministry of Natural Resources, Institute of Experimental Meteorology of the Russian Hydrometeorological Service, which organized and implemented the research, international cooperation, and national symposia.

In this book, the authors summarized large experimental material and data on isotopic content of atmospheric moisture, oceanic water, surface and subsurface continental waters. The theoretical fundamentals on the fractionation of isotopes in water and of interacting water and rocks are presented. The theoretical and experimental data on dating of natural waters using the cosmogenic and radiogenic isotopes are discussed. Based on isotope data and theoretical solution, the problem of the origin of the Earth and its hydrosphere is also discussed.

In preparation of a number of the book's chapters the following colleagues have taken part: Yu. B. Seletsky put significant contribution into the preparation of Chaps. 6–8; Chap. 12 was written together with V. V. Romanov, Chaps. 15 and 16 were prepared together with V. M. Kuptsov, Chap. 19 was written together with S. V. Ferronsky.

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