A REVIEW OF THE BOOK "RADIATION AND CLOUD PROCESSES IN THE ATMOSPHERE. THEORY, OBSERVATION, AND MODELLING" BY K.N. LIOU (Oxford University Press, New York, Oxford, 1992), 487 pp.

The most important problem in the system of priorities developed by the USA specialists for the International Geosphere–Biosphere Program (IGBP) is the dynamics of a cloud cover. Though such a choice from the point of view of the IGBP priorities is controversial, it is indubitably adequate since it reflects a primary importance of studies of cloudiness and its interaction with radiation not only in connection with climate problems but also for a much wider variety of problems related to global environmental measurements. The World Climate Research Program (WCRP) and "The IPCC Report" developed by the Intergovernmental Panel on Climate Change (IPCC) and published by the Oxford University in 1990 determine the problems of cloudiness and radiation as being of vital importance for climate change studies. The fact that these problems are the "hottest" areas in current research is supported by the development of the program of Global Energetics and Water Experiment (GEWEX) as a key component of WCRP.

Thus how timely is the book "Radiation and Cloud Processes in the Atmosphere. Theory, Observation, and Modeling" by Prof. K.N. Liou from the Utah University, an eminent american scientist engaged in studying radiation and cloudiness, which was published by Oxford University Press in 1992. The book is a guide, and it is of great importance as the authorized source of knowledge. Unfortunately, it should be noted that the author does not always meet the present–day requirements. This is especially true in regard to "Introduction" where the up–to–date concepts are still lacking. It would appear reasonable to think that it could be useful to include there the analyses of conceptional aspects of the problems under discussion in the context of the WCRP, IPCC Report, and IGBP (and, what is of particular importance, by the GEWEX). This is primarily responsible for the random choice of a list of references in "Introduction" which is turned out to be sufficiently "archaic" (this is especially true in regard to those publications which are devoted to studies of the Earth's radiation balance (ERB)).

Full of interest are Chapter 2 "Theory and Parameterization of Thermal IR Radiation Transfer" and Chapter 3 "Theory and Parameterization of Solar Radiation Transfer" which deal with regularities of long– and short–wave radiation transfer in the atmosphere. The reader will find there a comprehensive and up–to–date description of radiation transfer theory. Unfortunately, the author is unaware that there is a number of papers published by Russian scientists (in English too) containing the important results on this point. These are, e.g., the very interesting studies of the spectral line profile (and a fine structure of absorption spectra) carried out at the Institute of Atmospheric Optics (Tomsk). It would be appropriate to describe the potentialities of the Monte Carlo technique in Chapter 3 (it is only briefly mentioned in Chapter 5).

Chapter 4 "Theory, Observations and Modeling of Cloud Processes in the Atmosphere" could be much more useful if the results of the Russian papers were used in it (the references to the 30–40s – standing works by Borovikov et al. and Zaitsev are of little significance here). Of special note here are the results of the field experimental observations carried out within the framework of the GAREX program in 1970–80 (the most important results were published in English). It is not quite clear why in Chapter 4 there is no description of the International Satellite Cloud Climatology Project (ISCCP) which is an important component of the WCRP (it might make Section 4.1 more interesting). In that part of the chapter which is devoted to numerical simulation of cloud dynamics it would be useful to describe the results of development and application of integrated mesoscale models of cloud formation and, in particular, interaction between the cloudiness and radiation (see, e.g., K.Ya. Kondrat'ev and V.I. Khvorost'yanov, *Three–dimensional Model of the Formation of the Energy–Active Zone of the Ocean*, Boundary–Layer Met. **46**, 229–249, 1989 where a concept of energy–active zones being of interest for the problems of the reviewed book is illustrated by the specific example). Chapter 4 has one more significant disadvantage: there is no discussion of the problem of cloudiness interaction with aerosol.

Chapter 5 "Radiation Transfer in Clouds" gives a detailed description of the processes determining the dynamics of a cloud cover. This chapter is full of interest in view of its fundamental significance as well as available numerous original results of author's and his collaborators' studies (in particular, of cirrus) which made them the world–famous scientists.

Chapter 6 "Atmospheric Situations in the State of Radiative and Thermal Equilibrium Balance" the title of which reflects its content not quite clear, describes the problems of two categories: (1) formation of a vertical temperature profile (radiative and radiative convective balances) and (2) radiative budget of the underlying surface, atmosphere, and underlying surface––atmosphere system as well as energy transfer in the atmosphere and ocean. As to the analysis of the results of satellite–based observations of the ERB it should be noted that one could expect there the discussion of present–day data (see, e.g., G.I Marchuk, K.Ya. Kondrat'ev, and V.V. Kozoderev, *Earth Radiation Budget: Key Aspects* (Nauka Publishers, Moscow, 1990, 232 pp. This monograph was published in Russian in 1988).

Of paramount importance is Chapter 7 "Role of Radiation and Cloud Processes in the Atmospheric Models" in which the author analyzes sequentially the importance of taking the radiation processes in 1–, 2–, and 3–D models of climate into account. The most interesting here is the climate–forming role of minor gaseous and aerosol components of the atmosphere (including the effect of the increased CO_2 concentration on climate). The author justly emphasizes that in the context of further development of physically justified techniques of cloud–formation parameterization two aspects are especially actual: first, verification based on the observational results and second, an adequate account for interaction between cloudiness and radiation. I would like to add that it is of particular importance the prospects for using the "built–in" mesoscale models. The book is completed with useful appendices and a subject index.

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It should be noted in conclusion that top–level qualification of Prof. K.N. Liou makes the book of high quality. The aforementioned critical notes are true not for the quality of the book but the volume of discussed material and they are caused by the desire to find the most up–to–date scientific data (for fairness sake I must say that in contrast to many foreign authors K.N. Liou quotes the Russian papers in each of the chapters but, unfortunately, these references cannot be considered representative both from the point of view of their content and the date of publication).

The chief disadvantage of the book as a guide is that the relations of the considered specific results with the large international present–day programs and projects are not considered in this book. All of these disadvantages can be easily eliminated during preparation of the following issuance of the book.

K.Ya. Kondrat'ev