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Radiation and Cloud Processes in the Atmosphere

Theory, Observation and Modeling

Kuo-Nan Liou



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Description

The field of atmospheric radiation and remote sensing has seen significant advances in recent years. This monograph addresses those advances and fills the need for an up-to-date, cohesive integration of radiative transfer and cloud physics, allowing for the better forecast of weather on medium and long-range levels. The author here offers a systematic discussion of the transfer of solar and thermal infrared radiation in the atmosphere, and of aspects of cloud processes pertinent to radiative transfer. The book focuses largely on the physical principles and approximations that are required to develop important topics in atmospheric radiation, cloud physics, and thermal equilibrium. Aspects of the interactions and feedbacks of radiation-cloud and dynamic and climate processes are discussed using a hierarchy of atmospheric models. Radiometric data obtained from the ground, the air, and space are frequently employed to illustrate physical processes in the atmosphere as well as to cross check theoretical results. The author also cogently discusses the application of the radiative transfer principle to remote sensing of atmospheric and cloud parameters. This book for the first time bridges the gap between cloud-radiation and dynamic processes in the atmosphere. It will be welcomed by meteorologists, earth scientists, and researchers interested in atmospheric modelling and radiation.

Reviews

"Liou discusses thoroughly the intricate interactions involving cloud and radiation processes in the atmosphere. Radiative transfer in clouds is covered here in more depth than it has been in other books. Many references and a good index add to the value of this book." -- *Choice*

"Published at a most welcome time. It provides a comprehensive summary of current scientific knowledge on atmospheric radiation, devoting special attention to cloud-radiative interactions. . . . written in an easily readable form with theoretical derivations presented in a clear and logical manner. It is recommended both as a useful text book for students of atmospheric radiation and as an important reference for scientists researching such problems." -- *Pure and Applied Geophysics*

"Makes a timely contribution to a subject that is central to current physical climate models. . . . covers a wide range of cloud interactions. . . . an admirably broad compendium of information. . . . a handy reference for researchers in the field." -- *Physics Today*

"There is a great deal of valuable material in this book, presented in an attractive format, and that makes it a welcome contribution to the literature in this important area of research." -- *Bulletin of the American Meteorological Society*

"The author is an expert in the field of cloud-radiation interaction. His book presents basic material in a clear and very interesting manner, mentioning very recent publications. . . . the book is destined to become a classic reference in the subject." -- *Times Higher Education Supplement*

"This book discusses the significant advances in the field of atmospheric radiation and remote sensing in the past 20 years." -- *Bulletin of the American Meteorological Society*

Product Details

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