



Stratosphere Troposphere Interactions: An Introduction

By K. Mohanakumar

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Stratospheric processes play a significant role in regulating the weather and climate of the Earth system. Solar radiation, which is the primary source of energy for the tropospheric weather systems, is absorbed by ozone when it passes through the stratosphere, thereby modulating the solar-forcing energy reaching into the troposphere. The concentrations of the radiatively sensitive greenhouse gases present in the lower atmosphere, such as water vapor, carbon dioxide, and ozone, control the radiation balance of the atmosphere by the two-way interaction between the stratosphere and troposphere. The stratosphere is the transition region which interacts with the weather systems in the lower atmosphere and the richly ionized upper atmosphere. Therefore, this part of the atmosphere provides a long list of challenging scientific problems of basic nature involving its thermal structure, energetics, composition, dynamics, chemistry, and modeling. The lower stratosphere is very much linked dynamically, radiatively, and chemically with the upper troposphere, even though the temperature characteristics of these regions are different. The stratosphere is a region of high stability, rich in ozone and poor in water vapor and temperature increases with altitude. The lower stratospheric ozone absorbs the harmful ultraviolet (UV) radiation from the sun and protects life on the Earth. On the other hand, the troposphere has high concentrations of water vapor, is low in ozone, and temperature decreases with altitude. The convective activity is more in the troposphere than in the stratosphere.

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Editorial Review

From the Back Cover

This textbook describes various physical, radiative, dynamical and chemical processes involved in the coupling between the Stratosphere and Troposphere. This textbook is intended for graduate students in middle atmosphere stratospheric physics, dynamic and atmospheric science courses and will be useful to all research workers in meteorology, aeronomy, atmospheric physics, atmospheric chemistry and environmental sciences. Current areas of interest, such as Antarctic ozone hole, global warming effects on stratospheric cooling are also addressed. Stratosphere troposphere exchange, transport processes in the upper troposphere and lower stratosphere and the role of stratosphere on tropospheric weather systems are presented. The information provided in the textbook will have broad applicability in other branches of atmospheric science, and will be of interest to those studying such areas as climate change, extreme weather events, and potential for the prediction of tropospheric weather systems.

- A comprehensive stratosphere troposphere coupling textbook
- Highly illustrated with diagrams and figures
- Includes latest developments and provides problem sets
- A valuable reference for all atmospheric scientists

2008 ASLI Choice Award !

Springer is proud to announce that Stratosphere Troposphere Interactions has been awarded for 2008 ASLI Choice, this is an award for the best book of 2008 in the fields of meteorology, climatology, atmospheric sciences.

K. Mohankumar is Dean of the Faculty of Marine Sciences, Cochin University of Science and Technology, India. He has been a visiting scientist at the Stratospheric Research Group in Freie University Belin, Germany. With 25 years of postgraduate teaching experience in the field of atmospheric sciences, he has published over 75 research papers.

About the Author

K. Mohanakumar is the holder of Masters degree in Meteorology (1979) and Ph. D. degree in Atmospheric Science (1994). In 1995 he joined as Lecturer in Cochin University of Science and Technology (CUSAT), India, for post graduate teaching in Atmospheric Science. He worked as a Visiting Scientist in 1990-1991 with the Stratospheric Research Group in Freie University Belin, Germany under the support of EU Commission. At present, he is a Dean of Faculty of Marine Sciences, CUSAT, India.

The author is a member of Interenational Union of Geodesy and Geophysics (IUGG), Interanational Association of Meteorology and Atmospheric Sciences (IAMAS), International Association of Geomagnetism and Aeronomy, Committee on Space Research (COSPAR), Climate and Weather of the Sun Earth System (CAWSES), Solar Terrestrial Energy Program (STEP).

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