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TELLUS

Preface

This issue is a collection of 29 papers on various studies of land ecosystem atmosphere processes. The collection is based on first international integrated Land Ecosystem Atmosphere Processes Study (iLEAPS) Science Conference held in Boulder, Colorado, USA in January 2006. iLEAPS is the 10-yr land-atmosphere core project of the International Geosphere-Biosphere Programme (IGBP). The scientific goal of iLEAPS is to provide understanding how interacting physical, chemical and biological processes transport and transform energy and matter through the land-atmosphere interface. The project studies interactions and feedbacks from the cell level to global scale. Times scales range from diurnal to centennial, past to future. iLEAPS encourages international and inter-, multi- and cross-disciplinary collaboration, particularly involving scientists from the developing countries.

The land surface-atmosphere interface is particularly crucial for the functioning of the Earth System through interactions via mass, energy and momentum fluxes, as well as through the biogeochemical cycles. At the same time, climate variability and atmospheric processes, such as transport and deposition of chemicals are major constraints on biogeochemical cycles, natural as well as anthropogenic ones. Human-driven change in land cover is likely to result in significant regional and global climate change. In turn, climate change affects terrestrial ecosystems at all spatial and temporal scales, maybe even to the extent of destabilizing large regions. The response of, for example, forests on climate change is versatile.

The processes and properties in forest and atmosphere are strongly connected with each other. For example, atmospheric CO_2 concentration effects on photosynthesis and VOC emissions by trees on aerosol formation. Simultaneous measurements of several phenomena in a forest ecosystem enable combination of different processes and analysis of the connections between the components of the system. Recently, the rapid development of measuring techniques has enabled versatile field measurements. New trace compounds can be measured in field conditions, the measuring accuracy and precision is increasing and the required response time is decreasing. In addition, large measuring systems can be automated with digital technique.

In order to make significant progress in understanding numerous feedback mechanisms in the land-atmosphere system, the focus of iLEAPS research, combining measurements (at a multitude of scales) with modelling at local, regional and global scale (with biologically, chemically and physically valid processes included) is essential. Typically, iLEAPS aims at international collaborative research that is integrative, multi- and cross-disciplinary, considers simultaneously a multitude of spatial and temporal scales, processes, variables and interactions, focusing on feedbacks in particular. iLEAPS activities work across traditional, scientific and organizational boundaries, and are open to participants from all countries and organizations, with a strong capacity building component especially in developing countries.

Finally; I would like to thank all authors to this special issue, and also iLEAPS International Project Office (IPO) for all their efforts.

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