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Geophysical Monograph 186

Amazonia and Global Change

Michael Keller

Mercedes Bustamante

John Gash

Pedro Silva Dias

Editors

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PREFACE

Writing about Amazonia demands superlatives: the world's most extensive area of tropical forest, the world's greatest river, the world's most species-diverse ecosystem, the world's largest store of aboveground carbon; the list goes on. We add one more: Amazonia, subject of the largest, coordinated, scientific study into a specific region of the world's land surface. That study, an international experiment led by Brazil, is the Large-Scale Biosphere-Atmosphere Experiment in Amazonia, also known as LBA. The ambitious objective of LBA was to understand how Amazonia functions as an entity, as a whole ecosystem. This task was made all the more urgent, yet equally all the more difficult, by the fact that Amazonia is in a state of flux. Climate change, combined with land cover change in the form of deforestation, has created a three-dimensional moving picture of interacting causes and effects. To capture this dynamic situation, LBA adopted the design philosophy that the big picture would only emerge from an understanding of the component pieces and the interactions between them, building up regional-scale understanding from local measurements. This book synthesizes the results of that LBA research, bringing together the most important new scientific results and the new understanding that has resulted. The statistics on LBA are impressive: nearly 2000 scientists (including over 500 Ph.D. and masters students) producing at least 1300 scientific papers. Reviewing all of this research in a single book is a daunting task and a process that inevitably reflects the personal perspectives of the editors and authors. Nevertheless, we hope to have covered the whole spectrum of research: the human dimensions, the meteorology and atmospheric chemistry, the ecology and biogeochemistry of the land surface, and the hydrology. Despite the integration of research within LBA, there is a continuing need to improve communications between disciplines and for individual scientists to see their own research in the context of the overall

effort to understand the Amazonian ecosystem. Recognizing this need, the Scientific Steering Committee of LBA asked us to edit this book, to bring all this research together within one cover. An important legacy of LBA has been the training of a new generation of young environmental scientists who are now responsible for continuing the next phase of LBA. We envision that this book will be a resource to underpin that future research.

LBA is a special program of the Brazilian Ministry of Science and Technology (MCT), and we acknowledge their continuing support in the planning and implementation of this research. Funds have been provided by a number of Brazilian national and state agencies and funding agencies in the United States, the European Union, and elsewhere. In particular, we acknowledge major funding from MCT, NASA, and the European Commission. We acknowledge a debt to Carlos Nobre and Diane Wickland for their vision and leadership, particularly in the early stages of the design of LBA. Our personal thanks also go to Lorena Brewster for coordinating the editing of this volume.

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