

## CONTENTS

<b>Preface</b> <i>Chunzai Wang, Shang-Ping Xie, and James A. Carton</i> .....	vii
<b>A Global Survey of Ocean-Atmosphere Interaction and Climate Variability</b> <i>Chunzai Wang, Shang-Ping Xie, and James A. Carton</i> .....	1
<b>Theme I: Pacific Climate Variability</b>	
<b>Understanding ENSO Physics—A Review</b> <i>Chunzai Wang and Joel Picaut</i> .....	21
<b>Westerly Wind Events in the Tropical Pacific and Their Influence on the Coupled Ocean-Atmosphere System: A Review</b> <i>Matthieu Lengaigne, Jean-Philippe Boulanger, Christophe Menkes, Pascale Delecluse, and Julia Slingo</i> .....	49
<b>The Control of Meridional Differential Surface Heating Over the Level of ENSO Activity: A Heat-Pump Hypothesis</b> <i>De-Zheng Sun</i> .....	71
<b>Broadening the Atmospheric Bridge Paradigm: ENSO Teleconnections to the Tropical West Pacific-Indian Oceans Over the Seasonal Cycle and to the North Pacific in Summer</b> <i>Michael A. Alexander, Ngar-Cheung Lau, and James D. Scott</i> .....	85
<b>Predicting Pacific Decadal Variability</b> <i>Richard Seager, Alicia R. Karspeck, Mark A. Cane, Yochanan Kushnir, Alessandra Giannini, Alexey Kaplan, Ben Kerman, and Jennifer Velez</i> .....	105
<b>Theme II: Tropical Atlantic Climate Variability</b>	
<b>Tropical Atlantic Variability: Patterns, Mechanisms, and Impacts</b> <i>Shang-Ping Xie and James A. Carton</i> .....	121
<b>On the Role of the South Atlantic Atmospheric Circulation in Tropical Atlantic Variability</b> <i>Marcelo Barreiro, Alessandra Giannini, Ping Chang, and R. Saravanan</i> .....	143
<b>Toward Understanding Tropical Atlantic Variability Using Coupled Modeling Surgery</b> <i>Lixin Wu, Qiong Zhang, and Zhengyu Liu</i> .....	157
<b>Thermodynamic Coupling and Predictability of Tropical Sea Surface Temperature</b> <i>R. Saravanan and Ping Chang</i> .....	171
<b>Internal Variability of the Tropical Atlantic Ocean</b> <i>Markus Jochum, Raghu Murtugudde, Paola Malanotte-Rizzoli, and Antonio J. Busalacchi</i> .....	181
<b>Theme III: Indian Ocean Climate Variability</b>	
<b>Coupled Ocean-Atmosphere Variability in the Tropical Indian Ocean</b> <i>Toshio Yamagata, Swadhin K. Behera, Jing-Jia Luo, Sebastien Masson, Mark R. Jury, and Suryachandra A. Rao</i> .....	189

<b>Role of the Indian Ocean in Regional Climate Variability</b> <i>H. Annamalai and Raghu Murtugudde</i> .....	213
<b>Interannual Indian Rainfall Variability and Indian Ocean Sea Surface Temperature Anomalies</b> <i>Gabriel A. Vecchi and D. E. Harrison</i> .....	247
<b>Theme IV: Tropical-Extratropical Interaction</b>	
<b>Shallow Overturning Circulations of the Tropical-Subtropical Oceans</b> <i>Friedrich A. Schott, Julian P. McCreary, Jr., and Gregory C. Johnson</i> .....	261
<b>Seasonal Variation of the Subtropical/Tropical Pathways in the Atlantic Ocean from an Ocean Data Assimilation Experiment</b> <i>Meyre P. Da Silva and Ping Chang</i> .....	305
<b>Gyre-Connected Variations Inferred From the Circulation Indices in the Northern Pacific Ocean</b> <i>Dongxiao Wang, Yun Liu, and Dejun Gu</i> .....	319
<b>Theme V: Cross-Basin Issues</b>	
<b>Observed Associations Among Storm Tracks, Jet Streams and Midlatitude Oceanic Fronts</b> <i>Hisashi Nakamura, Takeaki Sampe, Youichi Tanimoto, and Akihiko Shimpo</i> .....	329
<b>The Relationship of Western Boundary Current Heat Transport and Storage to Midlatitude Ocean-Atmosphere Interaction</b> <i>Kathryn A. Kelly and Shenfu Dong</i> .....	347
<b>Two Different Regimes of Anomalous Walker Circulation over the Indian and Pacific Oceans Before and After the Late 1970s</b> <i>Ryuichi Kawamura, Hiromitsu Aruga, Tomonori Matsuura, and Satoshi Iizuka</i> .....	365
<b>Tropical Tropospheric Temperature and Precipitation Response to Sea Surface Temperature Forcing</b> <i>Hui Su, J. David Neelin, and Joyce E. Meyerson</i> .....	379
<b>Convection, Cloud-Radiative Feedbacks and Thermodynamic Ocean Coupling in Simple Models of the Walker Circulation</b> <i>Adam H. Sobel, Christopher S. Bretherton, Hezi Gildor, and Matthew E. Peters</i> .....	393

## PREFACE

It is more than 30 years since the publication of Jacob Bjerknes' groundbreaking ideas made clear the importance of ocean-atmosphere interaction in the tropics. It is now more than 20 years since the arrival of a massive El Niño in the fall of 1982 set off a cascade of observational and theoretical studies. During the following decades, the climate research community has made exceptional progress in refining our capacity to observe earth's climate and theorize about it, including: new satellite-based and *in situ* monitoring systems and coupled ocean-atmosphere predictive numerical models – a result of efforts to clarify the dynamical principles controlling climate variability. Of equal importance is the expanding scope of research, which now reaches far beyond the Pacific El Niño and includes climate phenomena in other ocean basins.

In order to cover the now global context of ocean-atmosphere interaction we have organized this monograph around five principal themes, each introduced by one or more broad overview papers. Theme I covers interaction and climate variability in the Pacific sector, with extensive discussion of El Niño-Southern Oscillation, and with the possible causes and consequences of variability on both shorter and longer timescales. Theme II is devoted to interaction in the Atlantic sector. This basin exhibits complex behavior, reflecting its geographic location between two major zones of convection as well as neighboring the tropical Pacific. Theme III reviews the recent, exciting progress in our understanding of climate variability in the Indian sector. Theme IV addresses the interaction between the tropics and the extratropics, which are linked through the presence of shallow meridional overturning cells in the ocean. Finally, Theme V discusses overarching issues of cross-basin interaction.

Indeed, this monograph represents the climate community's first effort to summarize the modern science of ocean-atmosphere interaction and the roles that the interaction plays in climate variability on the basin and global scales. We believe that the material covered here will be of interest to the climate research community as well as members of the broader scientific community who want to learn about the current state of climate research, to students studying climate and related topics, and to those members of the public who find themselves increasingly fascinated by the patterns of climate and climate change now revealed by climate monitoring tools.

This monograph derives from a special session at the 2002 American Geophysical Union Fall Meeting entitled, "Ocean-Atmosphere Interaction and Climate Variability", which attracted a large audience. The session was remarkable for having brought together many of the scientific leaders in the field, and for providing the first clear overview of this rapidly evolving discipline spanning all three ocean basins — Pacific, Atlantic, and Indian, as well as the interactions among these basins. Of equal significance is the character of the monograph, which while drawing from the session also presents a majority of papers by invitation.

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