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PREFACE

Prelude

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The West African Monsoon (WAM) is one of the major monsoons in the global climate system. The climate variability in West Africa shows one of the strongest interdecadal signals on the planet in the twentieth Century. Decision makers in this region use information from seasonal to interannual climate model predictions for planning agricultural activities, water management and infrastructures management. The papers in this special issue document achievements made by state-of-the-art GCMs and RCMs in WAM research and identify major challenges and weaknesses that still remain in modeling the WAM.

Despite recent progress in the development of climate models, it turns out that the proper simulation of WAM at different scales and WAM association with external forcing is a daunting task. This *Climate Dynamics* Special Issue on West African Monsoon presents recent research in WAM modeling with the following themes: (1) Evaluation of current state-of-the-art general circulation models (GCM) and regional climate models (RCM) in simulating the WAM precipitation and relevant processes; (2) Representation of the major WAM characteristics and possible physical and dynamic mechanisms that can be attributed to these features at different time scales; (3) Application of African Monsoon Multi-disciplinary Analysis (AMMA) observational and assimilation data in providing a pathway for model physics evaluation and improvement.

Several papers in this special issue comprehensively evaluate the Atmospheric GCMs (AGCM) and Coupled Atmospheric and Oceanic GCMs' (AOGCM) ability in properly simulating the WAM climate features in several model intercomparison projects and explore possible causes that contribute to model deficiencies. These studies apply the AGCM results from the West African Monsoon Modeling and Evaluation project (WAMME) first experiment (Xue et al. 2010), the Third Coupled Model Intercomparison Project (CMIP3) simulations (Caminade and Terry 2010), and multi-model runs in the frame of the AMMA-EU project (Losada et al. 2009). In addition to model evaluation, the model intercomparison has also been applied for identification of major WAM seasonal modes (Xue et al. 2010), and elucidation of the effects of the interaction between Atlantic Equatorial mode and West African convection (Losada et al. 2009).

Since the West African climate is strongly affected by external forcings, such as SST, land surface processes, and aerosols, the role of these external forcing in WAM variability and their effects on the WAM simulation have also been investigated by a number of papers in this special issue. Among them, Fontaine et al. (2010) investigates the relationship between Mediterranean sea surface temperature (SST) and WAM. Meanwhile, the effect of aerosol direct radiative forcing on the WAM over West Africa and the adjacent Atlantic oceans has also been explored (Kim et al. 2010). To assess the WAMME models' simulation of land surface processes, surface energy fluxes simulated by an ensemble of land surface models from AMMA Land-surface Model Intercomparison Project (ALMIP) have been used as a proxy for the best estimate of the ''real world'' values to assess model performance (Boone et al. 2010). ALMIP data has also been applied to identify the association between surface fluxes and WAM components (Xue et al. 2010). Furthermore, to explore the cause of model deficiencies, the grid point nudging technique has been applied to disentangle the remote versus regional

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factors that contribute to such deficiencies (Bielli et al. 2010).

A number of studies in this special issue use regional climate models for the WAM investigation. Among them, Druyan et al. (2010) analyze results from five RCMs participating in the 1st WAMME experiment; Moufouma-Okia and Rowell (2010) investigate the impact of initial soil moisture anomalies and lateral boundary conditions in the RCM simulation; Sylla et al. (2010) examines the ability of their RCM to reproduce seasonal mean climatologies, annual cycle and interannual variability over Africa; and Patricola and Cook (2010) uses an RCM to downscale the IPCC AR4 future projections for the West Africa.

Note: Papers cited in this article are all included in this special issue.