PREFACE

The International H_2O Project (IHOP_2002) was a large international field experiment that took place over the southern Great Plains of the United States from 13 May to 25 June 2002. The chief aim of IHOP_2002 was to improve the characterization of the four-dimensional distribution of water vapor and its application to improving the understanding and prediction of convection. There were over 250 investigators and technical participants who were involved in the experiment. In addition, six aircraft and more than 60 research instruments were deployed in the field. IHOP_2002 was composed of four coordinated and overlapping research components. The goal of the quantitative precipitation forecast (QPF) component was to determine the degree of improvement in forecast skill that occurs through improved characterization of the water vapor field. The goal of the convection initiation component was to further the understanding and eventually predict the processes that determine when and where convection forms. The atmospheric boundary layer processes research component strived to improve understanding of the relationship between atmospheric water vapor and surface and boundary layer processes as they relate to warm season QPF. The instrumentation research component evaluated various instruments and techniques to optimize the measurement of the four-dimensional distribution of water vapor.

The rich dataset was collected during the experiment and a majority of the research goals were satisfied. Indeed, the principal investigators for the convection initiation component of IHOP_2002 concluded that the voluminous results warranted publication in a special issue of *Monthly Weather Review*. The series of articles contained in this document begins with an overview of the outstanding issues in convection initiation that will provide the reader with the appropriate background material and set the context for the papers that follow. Many of the articles highlight novel methods for measuring water vapor, a critical thermodynamic parameter that has often been absent in past studies on convection initiation. The readers will note that, like many experiments, a few days stand out based on the meteorological conditions and the quality of the collected datasets. The use of numerical simulations, detailed case studies, and state-of-the-art instrumentation to understand when and where deep convection first develops are major themes of this issue. We hope the readers will find the results presented in this treatise both informative and an important resource for scientists and students who would like to learn more about the subject.

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Guest Editor