

PREFACE

Coupled Ocean–Atmosphere Processes and European Climate (COAPEC): Improved Understanding of the Coupled Climate System

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Climate researchers are now well aware that to understand climate properly, it is not sufficient to investigate the individual components of the Earth System independently of each other, we must also investigate and understand the interactions between components. In the late 1990s the United Kingdom's Natural Environment Research Council (NERC) recognized a specific need to advance understanding of interactions between the ocean and atmosphere, and their influence on climate, particularly in the European region. Furthermore, it was recognized that a new community of researchers, drawn from across the traditional oceanographic and atmospheric research disciplines, was needed to address the new challenges. As a result, the NERC funded COAPEC (<http://coapec.nerc.ac.uk>): a five-year Directed Science Programme that had this community at its core. Early leadership was provided particularly by Professor Alan O'Neill and, as first chair of the Scientific Steering Committee, Professor Alan Thorpe. The program focus was on the shorter time scales of climate fluctuations—the seasonal-to-decadal range that is now a key focus for prediction activities. Emphasis was also placed on the Atlantic Ocean, the role of which had at that time received much less attention than the more intensively studied Pacific.

The program ran from 2000 to 2005, and is now reaching a conclusion. This special section presents a cross section of the research undertaken. COAPEC was primarily a modeling program, but important work was also carried out on the development and analysis of observational datasets and the use of these datasets to evaluate models. Studies in this special section address such diverse topics as the influence of declining Arctic sea ice cover on climate, the generation and propagation of North Atlantic Mode Water anomalies, and the feedback of sea surface temperature on the North Atlantic Oscillation.

This special section presents only a fraction, albeit an important one, of the research undertaken in COAPEC. The development and testing of new coupled models was an important dimension of the program. These new models included a coupled GCM in which the ocean component uses a hybrid isopycnic vertical coordinate, fast models suitable for exploring model uncertainty using large ensembles of parameter perturbations, a high-resolution quasigeostrophic model for investigating the influence of small-scale ocean processes on the coupled system, and validated ice models for coupled modeling. A further important component of the program addressed the potential value of climate forecasts, particularly seasonal forecasts for two sectors of the U.K. economy: energy and health. Results from the research in this last area have appeared in *Journal of Applied Meteorology*. Further information about the outputs of the COAPEC program may be found at <http://coapec.nerc.ac.uk>.