

C. Jakob: From Regional Weather to Global Climate: Challenges and Progress in Improving Models

Predictions of regional and global phenomena from days to centuries ahead are all united through a common thread - they apply models of the atmosphere, ocean, land, and more recently, the biosphere. Some model components, e.g, the atmosphere, are common to all timescales of prediction, while others are applied for only a subset. The use of models across timescales creates the possibility to develop them in a unified, or seamless, fashion harnessing knowledge about the model behavior on all scales in its development.

Progress in our ability to simulate weather and climate over the last decades has been impressive. Global numerical weather forecasts have improved by about one day per decade, predictions at seasonal timescales have become commonplace, and climate projections now include an impressive array of processes, such as aerosols and biogeochemical processes. Despite this progress, solutions to several long-standing problems in models remain elusive. A recent community survey highlights that many of these problems are beginning to hinder further progress.



To achieve the ambitious goals of the weather and climate communities to improve their predictive capabilities necessitates a significant acceleration in developing the tools that underpin the predictions. In particular it is necessary to accelerate model development. Using global atmospheric models as an example, this presentation will i) analyze the model development process; ii) highlight key existing impediments for faster progress; and iii) make suggestions on how to overcome those impediments. It will be shown that improved community interactions, focussed initiatives and well-integrated research programs, as well as an increased appreciation of model developers are at the heart of achieving the required rate of acceleration in model

development.

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Christian Jakob has been a professor at Monash University since 2007. He has a major interest in the global energy and water cycle and its representation in weather and climate models, as well as innovative use of observations in the evaluation of climate models. In addition to those topics, he is also interested in the role of convection in the tropical circulation, its representation in climate models and the role of clouds in the climate system.

Dr Jakob earned a Dipl.-Met. (German MSc-equivalent) at Humboldt University in Berlin and a PhD at Ludwig Maximilian University in Munich, Germany. After that he worked as Research and Senior Research Scientist at the European Centre for Medium-Range Weather Forecasts before moving to the Australian Bureau of Meteorology as Senior and Principal Research Scientist.

Between 2003 and 2006, Dr Jakob co-led the Tropical Warm Pool International Cloud Experiment (TWP-ICE) and chaired the GEWEX Cloud System Study. He has also chaired several panels and working groups, such as the GEWEX Modelling and Prediction Panel (2007-2010). Dr Jakob is also co-chair of the WCRP Working Group on Numerical Experimentation, Theme Leader of the Monash Weather and Climate Theme, lead author of the IPCC Fifth Assessment Report, Working Group I, and Deputy Director of the ARC Centre of Excellence for Climate System Science.