

7 Weather and Environmental Prediction (WEP)

Leader: Dr Beth Ebert

7.1 Overview

The Weather and Environment Prediction (WEP) program provides the bulk of the meteorological research and applications expertise in Australia. WEP brings together skills in developing and applying numerical models to make forecasts and climate projections for high impact weather events, air quality, and environmental resources (wind and solar) for the renewable energy sector. The focus is on weather and environmental processes which have an impact on public health and safety as well as energy demand and renewable energy production. WEP researchers also do research to understand how such events will change in the future with Australia's development and under climate change scenarios.

The WEP Program is part of CMAR's joint operation with the Bureau of Meteorology (Bureau), the Centre for Australian Weather and Climate Research (CAWCR), with 71% of its members being employed by the Bureau. Thus, much of the Program's work is aimed toward research and development of a variety of forecasting and modelling systems to be used by the Bureau, including improved prediction and scientific understanding of tropical cyclones, dust storms, bushfires, severe storms, heavy rain, and strong wind events. The Bureau capability is not part of this review.

The CMAR capability in WEP is focused on environmental prediction (air quality, renewable energy resources) and dynamic downscaling of climate projections. The CMAR staff are leaders in Australian air quality science and prediction and are sought after as collaborators and advisors on a variety of local, regional, and national air quality and science policy issues by industry, government, and the community. A key strength is the ability to apply science to develop solutions for end-users. Modelling systems have been developed by WEP researchers and applied to a wide variety of problems, including: downscaling climate projections to get a better understanding of future regional weather (including extremes); providing specialised weather and wind forecasts for sporting events such as the Olympic Games and the America's Cup; predicting the concentrations of chemical pollutants and particulates in urban airsheds both now and under climate change scenarios; and simulating wind and solar energy fields for renewable energy prediction. We are involved in developing and testing technologies for grid distribution and energy storage in addition to developing renewable energy prediction systems.

The 14 CMAR staff in WEP have produced 155 publications in the open literature over the last five years plus 71 confidential reports to industry and government. The staff have been recognised for their expertise in their fields. For example, Dr Alberto Troccoli is a member of the expert panel of the Energy Sector Management Assistance Program of the World Bank and Drs' Mark Hibberd and Dale Hess have been editors of *Boundary Layer Meteorology*. Dr John McGregor contributed to the Intergovernmental Panel on Climate Change (IPCC) assessments.

A significant strength of the WEP Program is the opportunity to incorporate CSIRO expertise in mesoscale modelling, air quality measurement, and forecasting, chemical transport, and renewable energy applications within operational systems run by the Bureau. Leveraging the scientific capabilities within WEP to the Bureau's operational services focus ultimately leads to more accurate, informative, and timely weather and environmental information for users in government, industry, and the public.

The Program addresses Australia's National Research Priority of An Environmentally Sustainable Australia (environmental monitoring and climate change). The research undertaken by WEP scientists specifically addresses CSIRO's strategic goals in the Climate Outcome Domain.