

CLIMATE SERVICES TO HELP MANAGE THE RISKS ASSOCIATED WITH CLIMATE EXTREMES OVER AUSTRALIA

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1. INTRODUCTION

Government, industry and community interest in extremes associated with climate variability and change has increased dramatically in Australia in recent years. Expectations of the Bureau of Meteorology have increased accordingly and climate services are evolving to meet these new demands. More data are being made available and user-focused services being developed to help Australians manage the risks associated with climate extremes.

2. ENHANCED ACCESS TO HISTORICAL DATA

More data are being made accessible online for the analysis of historical extremes. The Climate Data Online (CDO) website (<http://www.bom.gov.au/climate/averages/>) aims to provide efficient access to a range of statistics, weather observations and historical climate data for more than 1000 sites across Australia. Numerous extreme value statistics are available (Fig. 1).

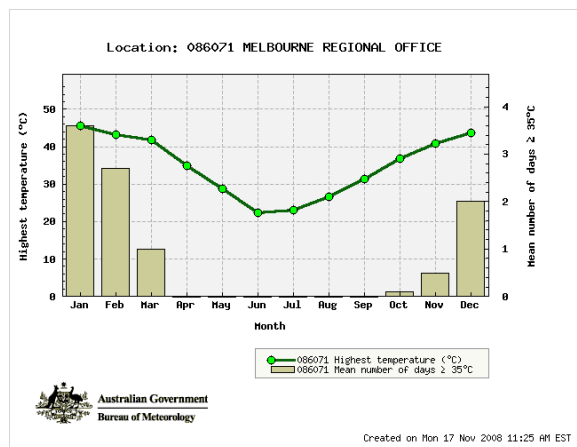


Figure 1. Example of extreme value statistics available from the Climate Data Online website.

Several high-quality (homogenised) datasets have been developed over the past two decades to identify, monitor and attribute changes in the Australian climate, including changes in the frequency and intensity of extreme events. A new website (http://www.bom.gov.au/cgi-bin/climate/hqsites/site_networks.cgi) has been developed in which data from single sites can be visualised and downloaded. Daily data suitable for analysis of extremes is available.

The Bureau's Tropical Cyclone archive provides historical Tropical Cyclone information for the Australian region and the Southern Hemisphere. The

archive's website (<http://www.bom.gov.au/cgi-bin/silo/cyclones.cgi>) allows users to display cyclone tracks for a particular period (Fig. 2), as well as view details for individual cyclones. The cyclone track data has been corrected for obvious errors, omissions and duplications. However, a thorough reanalysis is planned to address some remaining quality issues.

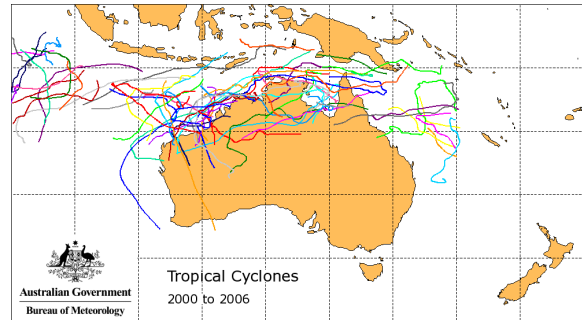


Figure 2. Example of Tropical Cyclone track information available from the Australian Tropical Cyclone archive.

3. DROUGHT MONITORING

The Bureau currently provides a comprehensive drought monitoring service which places recent rainfall totals in historical context (Fig. 3) (<http://www.bom.gov.au/climate/drought/>). This monitoring is being enhanced with drought measures of increased relevance to land and water managers, including the widely recognised Palmer Drought Severity Index.

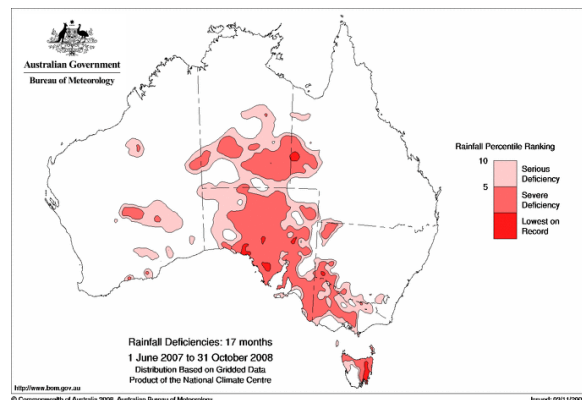


Figure 3. Example of a rainfall deficiency map issued as part of the Bureau's drought monitoring service.

Climate extremes can have great impacts on water availability in Australia, both in urban centres and rural areas. The Bureau has recently been given responsibilities for providing water information services and is developing systems to provide better water resource assessments for monitoring changes in water availability.

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4. MONITORING CLIMATE EXTREMES

Climate change monitoring has been extended to include changes in extreme events using a set of indices based on international standard definitions (Fig. 4)

(http://www.bom.gov.au/silo/products/cli_chg/). It is planned to extend this monitoring to include indices tailored to particular industries, such as agriculture.

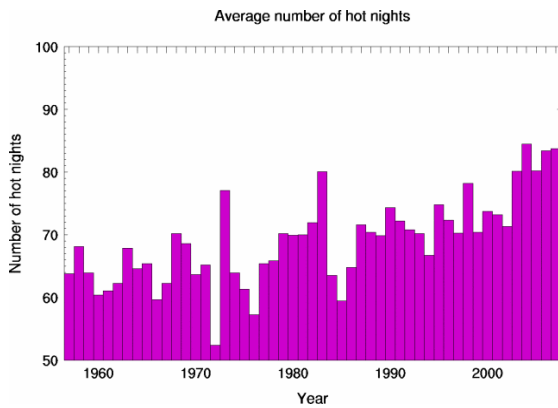


Figure 4. Example of indices used to monitor long-term changes in extreme events (hot night = overnight minimum temperature > 20 °C).

The routine monitoring of climate variability is also placing a greater emphasis on extremes, with new services being developed to identify locations and regions recording extreme daily temperatures and rainfall in near-real time (Fig. 5).

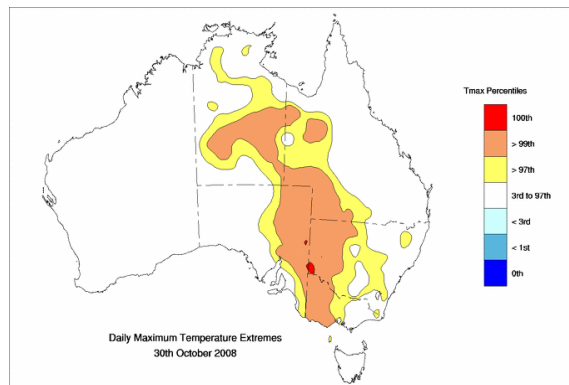


Figure 5. Example of products in development to identify regions recording extreme daily temperatures.

5. ENHANCED CLIMATE PREDICTIONS

The Bureau's seasonal outlook service is transitioning from a statistical model to a dynamical one. The Predictive Ocean Atmosphere Model for Australia (POAMA) (<http://poama.bom.gov.au/>) will provide seasonal and inter-annual predictions for a greater range of climate variables, including extremes. Unlike the existing statistical forecasting system, POAMA is not limited by historical relationships and consequently can better predict how an El Niño or La Niña event might differ to those of the past. Another benefit of a dynamical model is that ensemble forecasts can be generated (Fig. 6), allowing the likelihood of extreme events to be assessed.

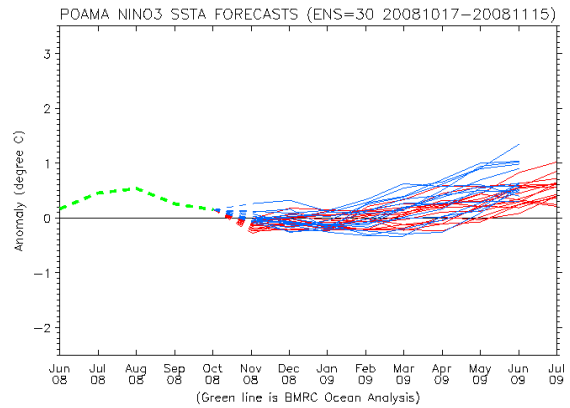


Figure 6. Example of an ensemble of POAMA forecasts for NINO3 sea-surface temperature.

6. ENHANCED CLIMATE PROJECTIONS

Due to climate change, the past is no longer a reliable indicator of the future. Consequently, a real challenge exists for national meteorological services to integrate historical climate data with future climate projections. The Climate Projections On-Line (CPOL) project aims to make projections data, including data on extremes, as accessible as historical observations. The project also aims to develop services to help manage the risks posed by climate change (Fig 7).

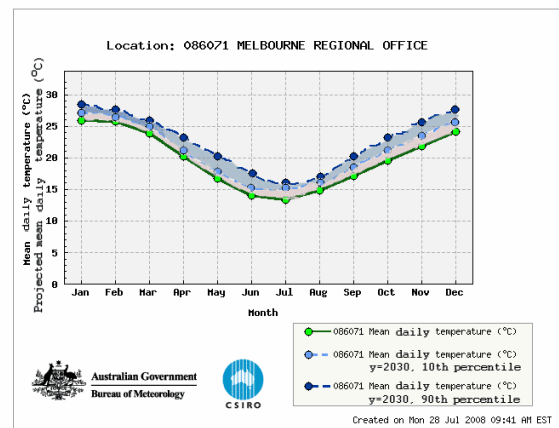


Figure 7. Mock-up of a potential CPOL product showing current climatology modified for projected climate change.

7. TAILORED CLIMATE INFORMATION

Not only is the breadth information about extremes expanding to meet user needs, but delivery mechanisms are also being developed with user needs in mind. The Water and the Land (WATL) website (<http://www.bom.gov.au/watl/index.shtml>) provides an integrated suite of weather and climate information for users involved in primary production and natural resource management. In addition, much improved information about the impacts of climate variability and change will be available through the development of an Australian Water Resource Information System.