



PROGRAM A

→ **Understanding the interactions of climate and bushfire in Australia**

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 Australian Government
Bureau of Meteorology

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PROGRAM A : Understanding the interactions of climate and bushfire in Australia

→ **Objective**

- Summarize climate issues as they relate to bushfires
- Highlight research that the CRC is doing in these areas
 - Understanding the past and present climate/bushfire interactions
 - Identifying future fire/climate interactions

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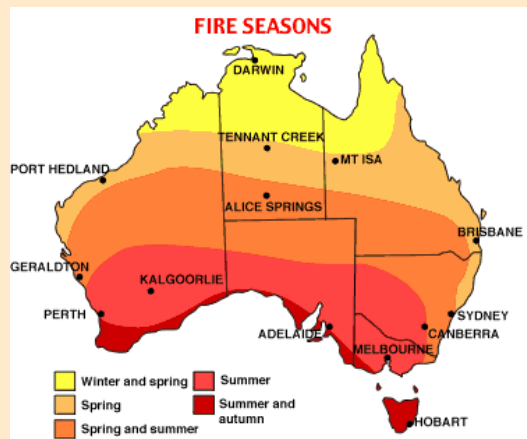


Why study climate and bushfires?

- Observed seasonal variations are reflection of climate



Fire Seasons in Australia



<http://www.bom.gov.au/climate/c20thc/fire.shtml>

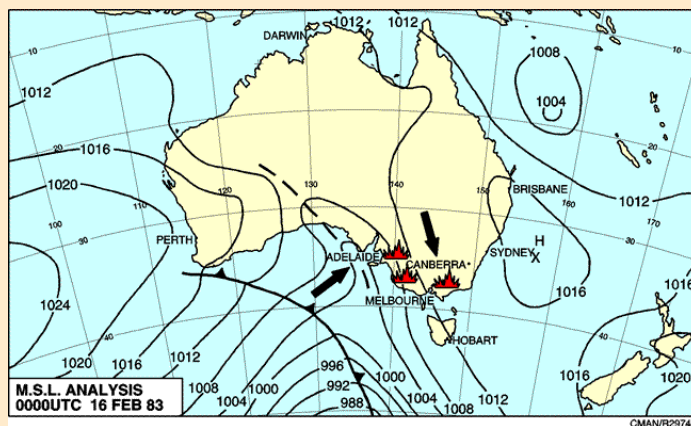


Why study climate and bushfires?

- Observed seasonal variations are reflection of climate
- Impacts on the day-to-day weather variability



Surface Map -- 16 February 1983



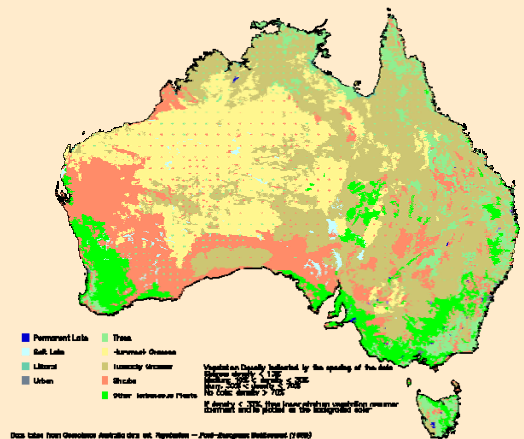


Why study climate and bushfires?

- Observed seasonal variations are reflection of climate
- Impacts on the day-to-day weather variability
- Long-term effects on vegetation



Australian Vegetation Types





Understanding the past and present

- Compile a historical dataset for fire weather
- Understanding the variability of fire weather

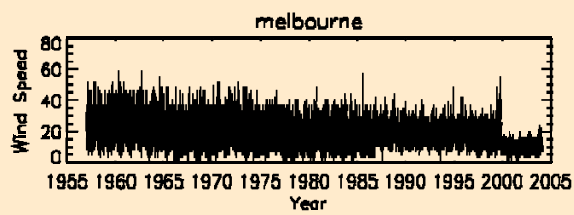
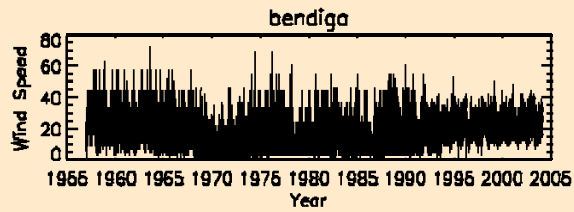


Creating the FFDI dataset

- 54 climate stations across Australia
- Extends from 1957 through 2003
- Use high-quality humidity and maximum temperature data sets
- Station data rainfall and wind speed
- Drought factor based on KBDI
- 'Extreme' FFDI - daily worse case scenario
- Use as a relative weather index rather than a fire-behaviour index
- See my poster!



Wind data problems

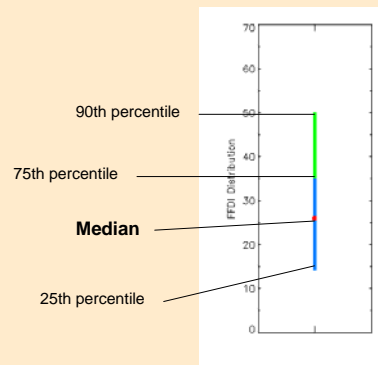


Historical Fire Weather Dataset

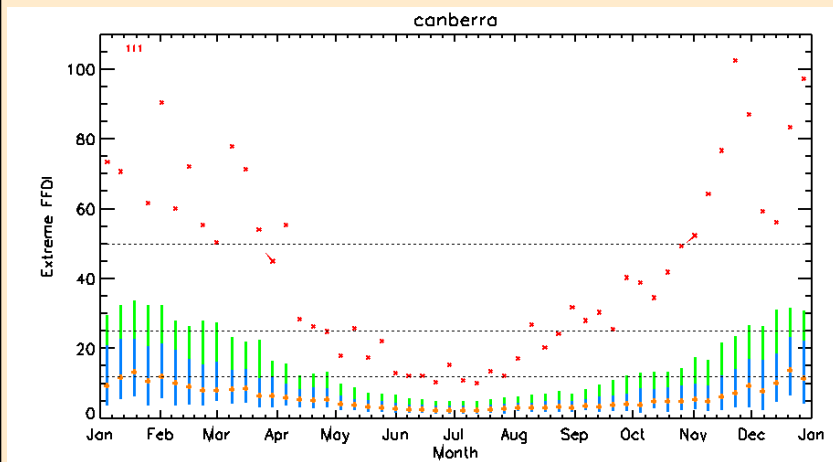


Interpreting the plots

- Portion of frequency distribution shown for different time periods
- Box-and-whiskers plot
- Focus on upper percentiles
- Some plots show red line or mark above indicating highest observation over period

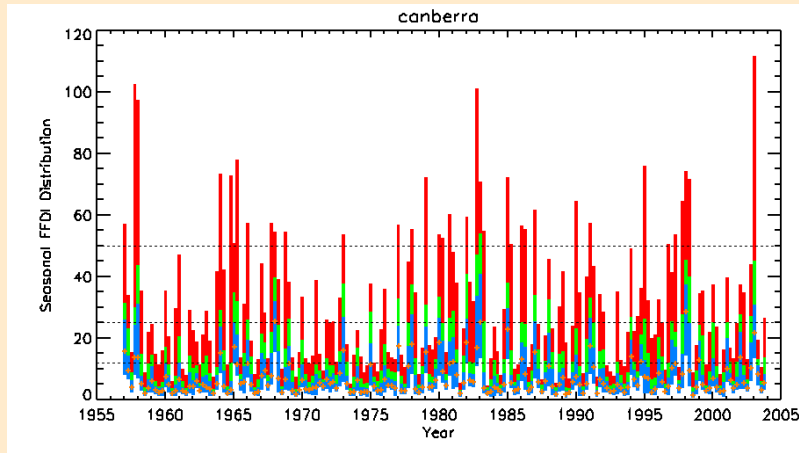


Canberra weekly distribution - all years





Interannual variability of seasonal FFDI



El Niño-Southern Oscillation (ENSO)

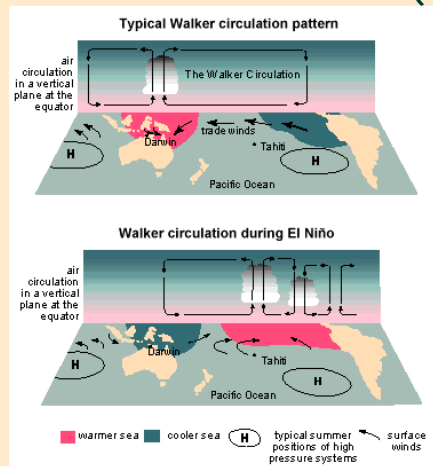
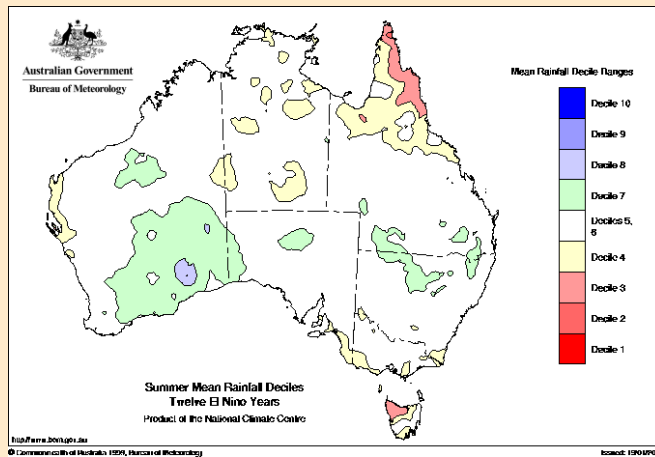


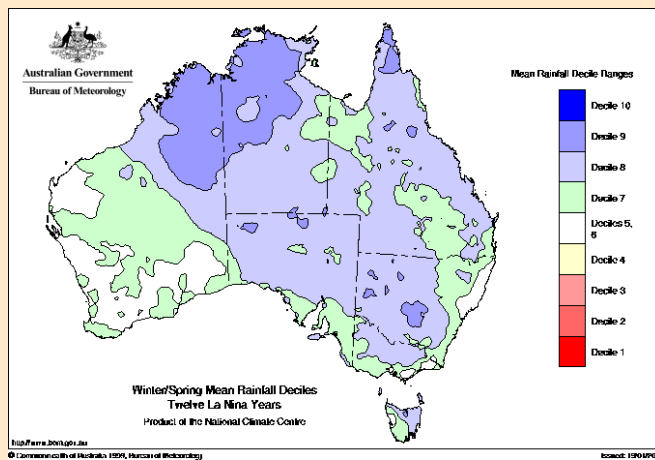
Image from: <http://www.bom.gov.au/lam/climate/levelthree/analclim/elniño.htm>



ENSO and Rainfall in Australia - El Nino

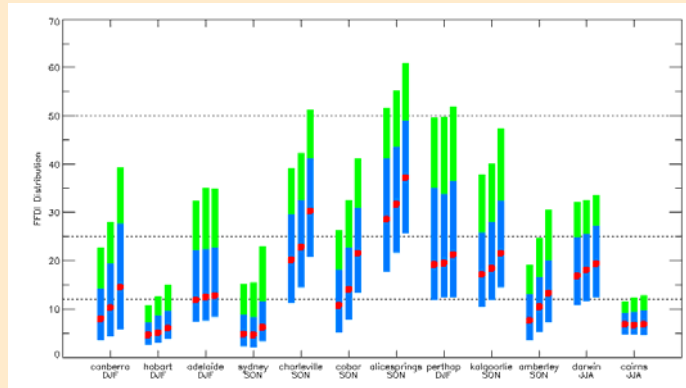


ENSO and Rainfall in Australia - La Nina

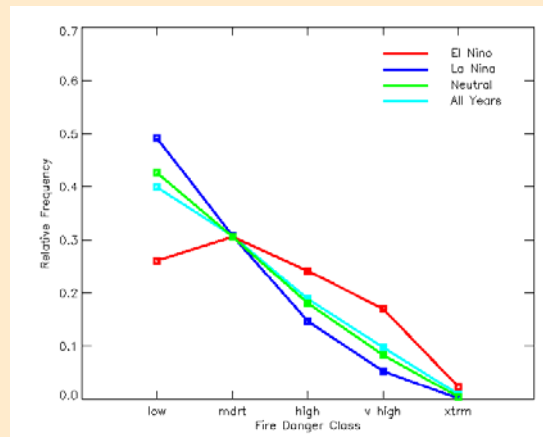




ENSO phase and the distribution of FFDI



Fire danger rating and ENSO





Other possible climate factors affecting Australian bushfires

- Indian Ocean dipole
- Madden-Julian Oscillation
- Southern Annular Mode
- Antarctic Circumpolar Wave
- etc



Identifying future interactions

- Seasonal forecasting
- Climate change



Seasonal Bushfire Assessment Workshop

- To support decision-making needs and provide information that can assist fire managers with determining budgets, priorities, resource allocations and public education
- To improve the capabilities of states to incorporate new and long-term information into their decision-making processes
- To implement a standardized product that is evidence-based and defensible
- To build capacity between states and fire management and weather/climate partners



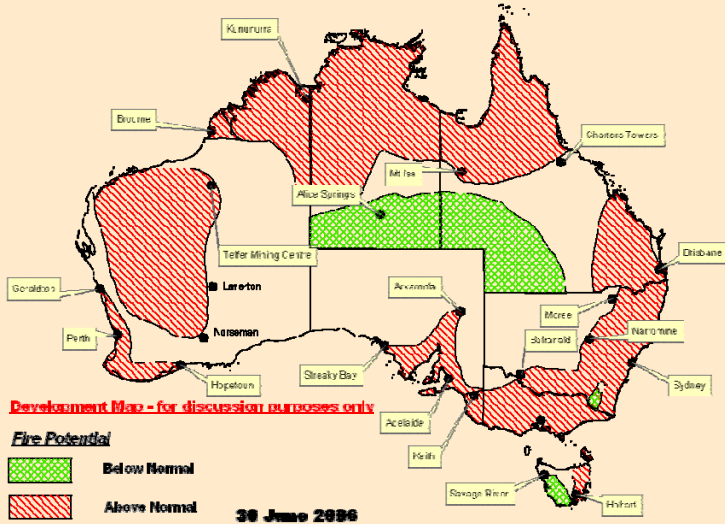
Workshop attendees

- | | |
|---|---|
| <ul style="list-style-type: none"> • Australasian Fire Authorities Council • Bushfire CRC • Bureau of Meteorology • Bushfires Council NT • Conservation and Land Management (CALM) • Cape York Fire Management Project • Country Fire Authority (CFA) • Country Fire Service (CFS) • Department of Environment and Heritage (DEH) | <ul style="list-style-type: none"> • Desert Research Institute • Department of Sustainability and Environment (DSE) • Fire and Emergency Services Authority (FESA) • Forest NSW • NSW Fire Brigades • NSW Rural Fire Service • Queensland Fire and Rescue • Tasmania Fire Service |
|---|---|

→ Fire potential definition

The chance of a fire or number of fires occurring of such size, complexity or other impact which requires resources beyond the area in which it or they originate.

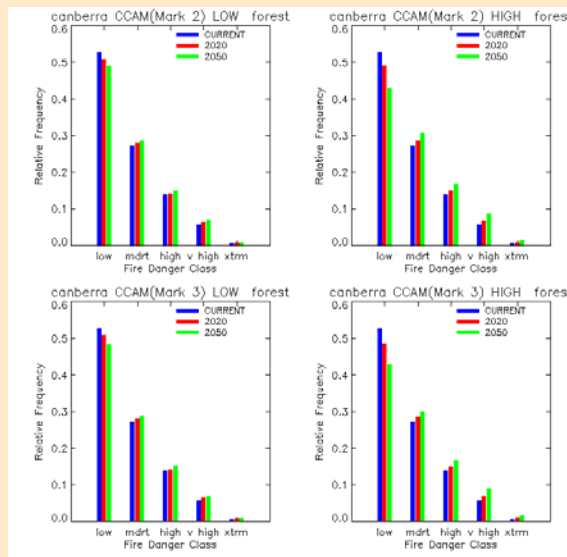
The potential for a significant fire situation is a sum of factors that includes fuels, ignition triggers, significant weather triggers and resources.





Effects of Climate Change on Fire Weather

- Modelling study with Kevin Hennessy of CSIRO (see his talk tomorrow for complete details!!)
- Two forcing scenarios on two climate models (CCAM2 and CCAM3)
- Apply changes in model distributions of temperature, humidity, wind and rain to observed data
- Recompute FFDI using new distributions
- SE Australia (NSW, VIC, TAS, ACT) only
- Report commissioned by various state government agencies





Limitations of the study

- Only SE Australia -- expand to other areas
- How will climate change affect ENSO?
 - Changes in intensity and/or frequency?
 - Changes in La Nina?
- Climate/vegetation interactions not included
 - These are already occurring
 - Increase in woody biomass, linked to increasing CO₂
 - Expansion of rain forest at expense of eucalypt forest and grassland, linked to increasing rainfall
 - See Chambers (2006) for review