Fire Weather Research and Development

John Bally
TC Hadi -- 10 Min
Halls Gap fire and Vic / NW Tas cool change
17 January 2014
Radars
TOP PRIORITY FOR IMMEDIATE BROADCAST

SYDNEY SEVERE THUNDERSTORM WARNING

Issued at 3:14 PM Thursday 20 March 2003.

The Bureau of Meteorology in SYDNEY has issued a Severe Thunderstorm Warning for the following areas:

Gosford and Wyong Council Areas.

This warning is current from 3:15 PM until 4:15 PM.

Thunderstorms were located near Dooralong and Calga at 3:15 PM. These thunderstorms are moving towards the east to southeast. Severe Thunderstorms are forecast to affect Wyong, Gosford and Woy Woy in the next 30 minutes and waters off Palm Beach and waters off Terrigal within 60 minutes.

Large hailstones and damaging winds are possible.
Predicting extremes: Pilot heatwave service

Pilot Heatwave Forecast
for the three days starting 14/01/2014

Heatwave Status
- Extreme Heatwave
- Severe Heatwave
- Heatwave
- No Heatwave

Australian Government
Bureau of Meteorology
Climate
New dynamical seasonal outlooks
ACE CRC/UTas (with BoM involvement)

Future fire danger climatology recently completed using CFT data
Plot of percentile values for each fire season 1960-2006 at Hobart Airport. The 95\textsuperscript{th} percentile values are plotted in blue, 99\textsuperscript{th} in pink and 99.5\textsuperscript{th} in green. Linear regression lines are plotted in corresponding colours.

Fuels
Landscape dryness
Warning for fires, floods, heatwaves and landslips.

Strong positive feedbacks between soil moisture and rainfall

B&NH CRC  D4: Improvements of land dryness measures and forecasts.
Grassland satellite curing algorithms
Optional gap filling

- Gaps in 8-day observing window
- Optionally fill gaps with values from earlier windows, and show age

Unfilled
Observed over 21-28 July

Filled
Observed up to 28 July

Observation age
Days before 28 July

These examples are from winter - Filling and the age layer were introduced after the 2013/14 season
Vic CFA curing

MODIS Map / Victoria (from Bureau)

Field Data (Collated at CFA HQ)

Vic CFA blends satellite and field data
- Extensive network of visual observers
- Satellite data adjusted towards nearby field data

Images from Danielle Martin, Vic CFA
Local BoM research
(Paul Fox-Hughes)
Sudden low humidity events

Abrupt increases in fire danger:
Climatology and characteristics
Advanced warning signs
Abrupt FFDI increases can be extremely dangerous (e.g. Wangary SA 2005)

"Normal" events, while still dangerous, are less unpredictable.

Which type of event is likely can be distinguished by synoptic structures, potentially days in advance.
Weather Models
Increasing accuracy of numerical models...

Weather Model forecast skill score  
(12-month moving average)
The Centre for Australian Weather and Climate Research (CAWCR)
High Impact Weather Group

Investigate the capability of ACCESS to model severe weather situations at high resolution (Gr Sp ~ 1 km) and very high resolution (Gr Sp < 1 km)

Modelling Dunalley 4 January 2013
Ensemble predictions at medium range

Meteograms of meteorological variables daily for 43 locations in NSW

To be added: meteograms of FFDI and GFDI

(will replace with wind roses)
Smoke plumes - ECMWF fire emissions

Modelled vs. observed smoke plumes 18th Mar '13
FireDST
Comparison of ensemble at 240 minutes with reconstruction fire isochrones
Information Delivery