Fire Weather History of Southeast Australia

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bushfire CRC
Project A 2.1 Fire weather

Understanding the role of climate variability on bushfire activity is a crucial step in the production of seasonal forecasts for use in bushfire strategic planning. To accomplish this, historical records of fire weather are needed.

Creating historical records of fire weather necessitates the compilation of high-quality, homogeneous climate data sets free from the effects of factors like site moves and instrument changes. The calculations here use homogenized records of temperature, rainfall and humidity extending from 1957 to 2003.

The calculations here are of the Fire Danger Rating (FDR), based on the McArthur Forest Fire Danger Index (FFDI). This index is derived daily from observations of maximum temperature, minimum relative humidity, maximum wind speed and precipitation for a given fuel load and type. While this fuel structure is not observed at all the sites, the index provides a useful metric for comparing the interannual variability of climate related fire risk.

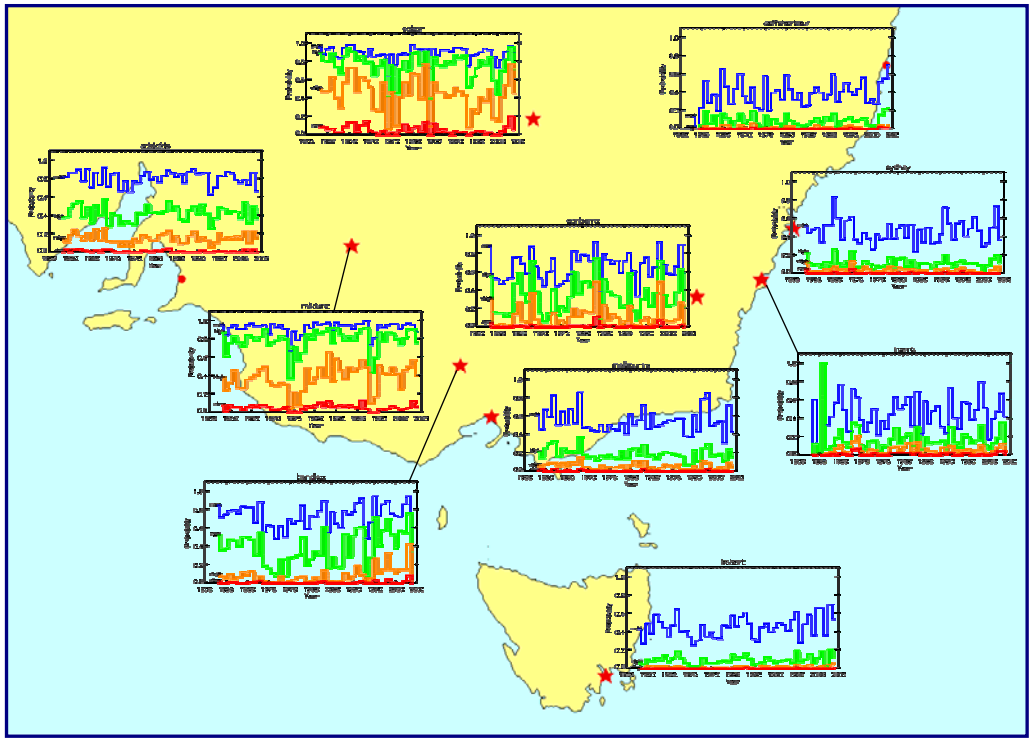

Fig.1 *Individual plots show the fraction of days exceeding the Moderate (FFDI >5), High (FFDI >12), Very High (FFDI >25) and Extreme (FFDI >50) FDR in a given fire season (defined as October through March) for 10 stations across southeast Australia. A star indicates a significant correlation with ENSO at that station.*

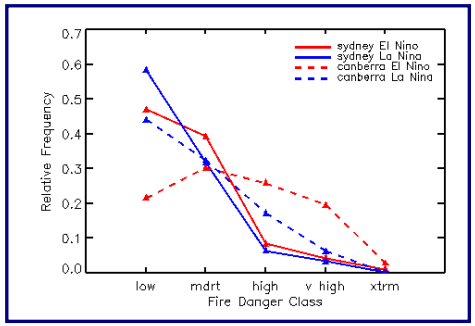

Fig. 2 *Frequency of fire danger ratings observed during El Nino (red) and La Nina (blue) seasons for Sydney (solid) and Canberra (dashed).*

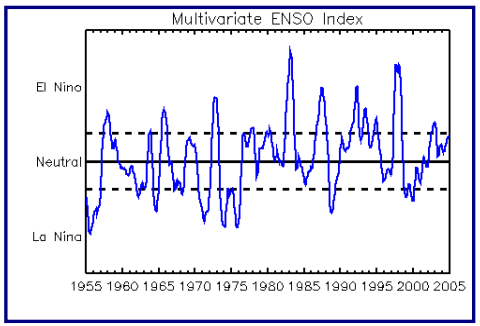

Fig. 3 *Monthly time series of the Multivariate ENSO Index, showing the phase and strength of ENSO. Data from http://www.cdc.noaa.gov/people/klaus.wolter/MEI/mei.html*

The results (Fig. 1) indicate that most locations in southeast Australia experience a significant amount of interannual variability in fire danger. Inland stations have higher variability; coastal stations experience less. Inland stations also have a greater probability of reaching an FDR of 'Very High' or greater.

Analysis shows that most stations are significantly correlated with the El Nino/ Southern Oscillation (ENSO) phenomenon. This correlation results (Fig. 2) in the El Nino (warm) phase of ENSO having higher FDRs compared to the La Nina (cold) phase. This effect is strongest at the inland stations.

At several stations, an upward trend in the FDR probabilities since the mid-1970s is apparent. This rise is coincident with the more frequent and stronger El Nino seen since that time (Fig 3). Whether this shift in ENSO is due to natural decadal-scale variations or global warming is unclear. Regardless of the cause, the potential impact on southeast Australia fire weather is great.

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