



THE UNIVERSITY OF  
MELBOURNE

# Revealing South-eastern Australia's Rainfall History

## EXTENDING AUSTRALIA'S RAINFALL RECORD

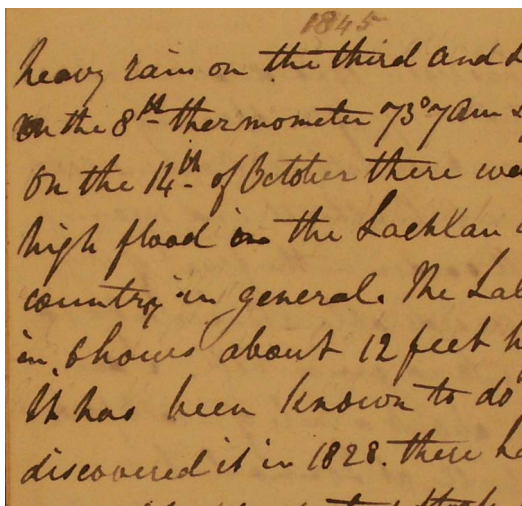
Despite being one of the countries most influenced by the adverse impacts of El Niño–Southern Oscillation (ENSO) events, our knowledge of Australian drought is largely confined to the 20th century.

Pre-1900 weather station data, colonial archive reports, personal diaries and newspaper accounts provide an opportunity to extend our rainfall record to the time of first European settlement of Australia in 1788.

In 2012 the SEARCH team at the University of Melbourne completed a study that combines documentary accounts, early weather station records and palaeoclimate records to produce the most comprehensive and extensive rainfall chronology for Australia to date.



Artwork: *The effects of a drought in NSW.*  
Image courtesy of National Library of Australia.



Excerpt: Hugh Hamilton describing heavy rain in his diary. Image courtesy National Library of Australia.

## BUILDING A DOCUMENTARY INDEX

The research team compiled qualitative historical data covering 1788 to 1860 and produced twelve documentary-based rainfall chronologies for five sub-regions of south-eastern Australia (SEA).

Analysis of the chronologies confirmed that SEA has experienced considerable rainfall variability that has influenced past Australian societies. Researchers identified 27 drought years between 1788 and 1860, and 14 years of high rainfall between 1788 and 1840.

Of the droughts identified by this study, 1837–1841 was the longest and most widespread event. The 1793–1809 period was particularly wet, with periods of above-average rainfall often resulting in devastating floods in the Hawkesbury River region.

## EARLY METEOROLOGICAL DATA

High quality instrumental rainfall records are available for 1900–2008 through the Bureau of Meteorology. Their archives also contain records for NSW that extend back to 1860.

The SEARCH team extended the instrumental record even further to 1832 by incorporating observations from official government observatories (Port Jackson and Parramatta) and amateur meteorologists keen to learn more about the climate of Australia (Petersham and Double Bay).

Early annual rainfall observations published in the *Sydney Monitor and Commercial Advertiser* and the *Sydney Herald* newspapers for Sydney from 1832–1858 were also compared to the documentary index for the period of overlap.

### Weekly Meteorological Table.

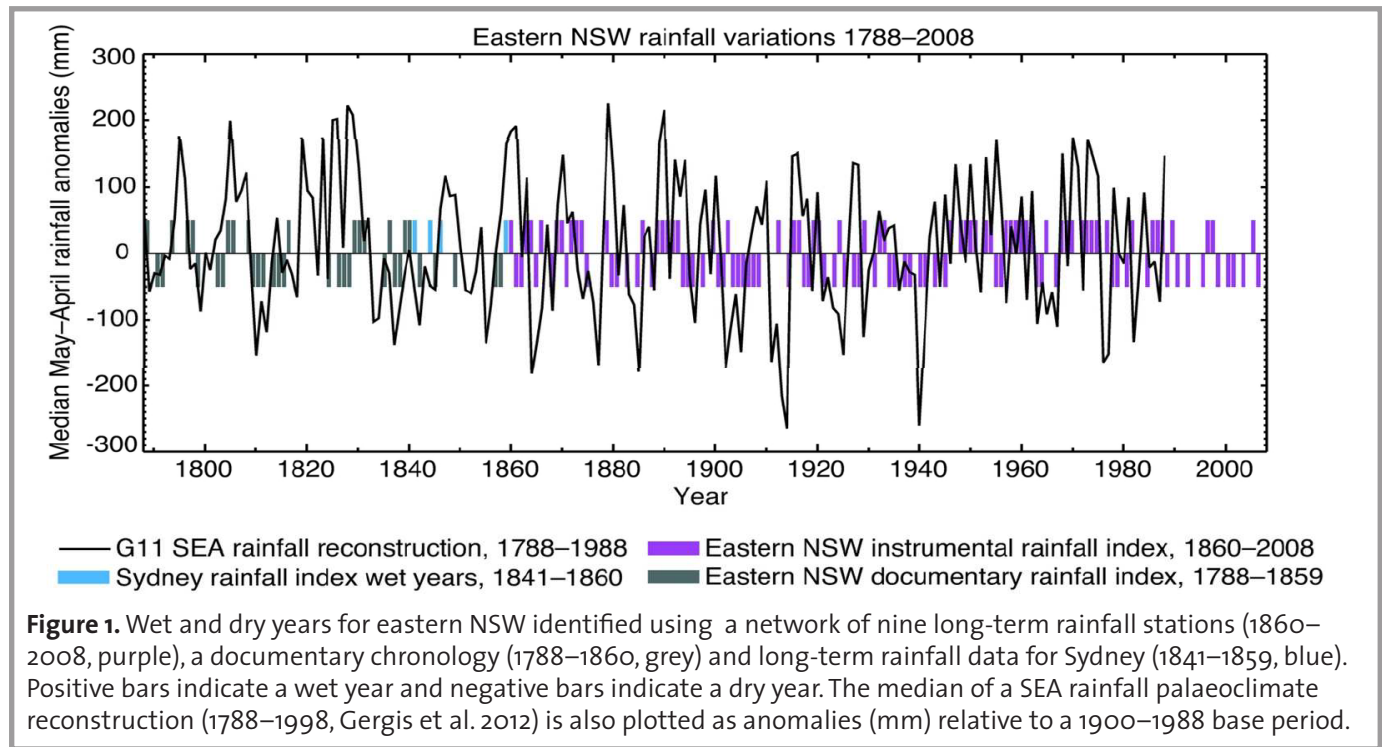
The WEATHER and variations of the THERMOMETER during the past week, in Sydney, at 6 in the morning at noon, and at 6 o'Clock in the evening.						
Mon. 6 a. m. Windy 60 ESE	Tues. 6 a. m. Sultry 61 W	Wed. 6 a. m. Rainy 58 S	Thurs. 6 a. m. Cloudy 62 Calm	Friday. 6 a. m. Fine 66 S	Sat. 6 a. m. Sultry 70 NW	Sun. 6 a. m. Windy 63 WNW
12 noon Windy 72 ESE	12 noon Fine 71 ENE	12 noon Cloudy 67 EsE	12 noon Wind. 75 NE	12 noon Fine 72 E by N	12 noon Windy 86 N	12 noon Windy 82 NW
6 p. m. Rainy 66 E	6 p. m. Stormy 63 S	6 p. m. Cloudy 65 Calm	6 p. m. Fine 68 N	6 p. m. Cloudy 70 N	6 p. m. Windy 77 N	6 p. m. Fine 75 E
Mean Temperature, 69.						

Excerpt: Meteorological table published in the *Sydney Herald* in November 1833.



## DEVELOPING A RAINFALL INDEX

Documentary records, early instrumental data and Bureau of Meteorology rainfall observations were combined to develop an eastern NSW rainfall index over the 1788–2008 period. This index was also compared to palaeoclimate reconstructions of SEA rainfall since 1788.



## DROUGHTS AND FLOODING RAINS

The SEARCH team used the chronology to investigate the relationship between drought and flood years in eastern NSW and ENSO since 1788. While it is clear that ENSO influences rainfall variability in the broader SEA region, the signal recorded along the NSW coast is weak. This is most likely reflecting local orographic rainfall effects associated with the mountains of the Great Dividing Range and deficiencies in the wet phase of the documentary record.

### Further Information

1. Gergis, J., Gallant, A. J. E., Braganza, K., Karoly, D. J., Allen, K., Cullen, L., D'Arrigo, R., Goodwin, I., Grierson, P. and McGregor, S. (2012). On the long-term context of the 1997–2009 'Big Dry' in south-eastern Australia: insights from a 206-year multi-proxy rainfall reconstruction. *Climatic Change* 111 (3): 923–944.
2. Fenby, C. and Gergis, J. (2012) A rainfall history of south-eastern Australia Part 1: a consolidation of pre-instrumental evidence from documentary sources, 1788–1860. *International Journal of Climatology* (in revision).
3. Gergis, J., and Ashcroft, L. (2012). A rainfall history of south-eastern Australia Part 2: a comparison of documentary, early instrumental and palaeoclimate records, 1788–2008. *International Journal of Climatology* (in revision).

Or visit the SEARCH website: [www.climatehistory.com.au](http://www.climatehistory.com.au)

