

## Current Climate Data Rescue Activities in Australia

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### 1. Introduction

Recovering historical instrumental climate data is crucial for identifying long-term climate variability and change, putting present climate into context and constraining future climate projections (Brunet and Jones, 2011). In other words, to understand the future, we need to improve our understanding of the past.

Climate data rescue is a well-established practice in many Northern Hemisphere countries, where the instrumental record can stretch back several centuries [e.g., Parker et al. (1992) for England, and Slonosky (2002) for France]. In Australia, however, the recovery and analysis of historical weather observations has not been the subject of such dedication until recently.

Indigenous Australians have lived in Australia for thousands of years and, while Indigenous culture is inextricably linked to the land, Aboriginal environmental history is often preserved through oral traditions, with detailed information about seasonal cycles rather than year-to-year changes (Green et al., 2010). This information is important for climate impact studies, but rarely provides sufficient detail for the study of interannual climate variations or particular events. Chronological written records of Australian history therefore only begin with British settlement in 1788.

Although documented history in Australia may be shorter than that of other regions, there are still many sources of historical climate information waiting to be rescued. Starting with the Australian Bureau of Meteorology's push in the 1990s to recover observations within their own archives (Rayner et al., 2004), several dedicated efforts have now begun recovering historical instrumental information about Australia's climatic past. Interestingly, many of these data rescue projects engage "citizen scientists" in the

identification and recovery of data, ensuring that the fascinating stories behind Australia's climate history are shared with the public.

### 2. Bringing Australia's past into the present

From 2010 to 2014, the South Eastern Australian Recent Climate History (SEARCH) project brought together historians, climatologists, hydrologists, palaeoclimatologists and volunteers to reconstruct the climate of the highly-populated southeastern region. More than 290 000 instrumental observations were recovered from national and state archives covering 1788–1860 (Ashcroft et al., 2014).

Observations of temperature, pressure and rainfall were extracted from newspapers, farmers' diaries, government documents and observatory reports, to build an instrumental picture of the first 72 years of British settlement in Australia. This includes observations from Lieutenant William Dawes, an astronomer on the First Fleet, who dutifully recorded the hot and dry conditions experienced by the early settlers in 1790 (Gergis et al., 2009).

In South Australia, the Australian Meteorological Association has been running one of the country's longest climate citizen science endeavours. For over 10 years the group have been finding and digitising Australian climate data from as far back as 1832. Their efforts include the digitisation of 40 years of weather maps drawn by the famous polymath Sir Charles Todd (Benoy, 2011; [www.charlestodd.net/Todd\\_Folios/](http://www.charlestodd.net/Todd_Folios/)), to the recovery of lighthouse records from the late 19th century across Australia's southern coastline.

In New South Wales, a team from The University of Newcastle is currently rescuing an extremely detailed weather diary from grazier Algernon Belfield. The transcription of his diary was completed in early 2016 by local and international volunteers. Belfield's journal from his farm in inland New South Wales is unique not only for its high level of detail (40 years of daily observations) but for its location in a region that is very sensitive to ENSO (Risbey et al., 2009). The

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diary covers 1882–1922, a period of high ENSO variability, and will therefore provide valuable insight into the weather experienced by colonial farmers during tumultuous climatic times.

Finally, the citizen science project “Weather Detectives”, jointly run by the Australian Broadcasting Corporation and the University of Southern Queensland, has engaged over 11 000 volunteers in the digitisation of observations from ship log books ([www.weatherdetective.net.au/](http://www.weatherdetective.net.au/)) collected by Queensland’s colourful meteorologist Clement Lindley Wragge (Adamson, 2003). More than 485 000 observations have so far been transcribed from the log books of ships that traversed the ocean surrounding Australia, as well as the wider Atlantic, Indian and Pacific oceans from 1882 to 1903.

### 3. From Australia to the world

These projects are just a few examples of Australia’s active data rescue community. The data recovered are already informing historical studies (Gergis et al., 2010), global reanalysis products (Allan et al., 2011; Cram et al., 2015) and long-term climate variability assessments (Callaghan and Power, 2014). There are still many more sources of historical climate data for Australia to be uncovered and a new regional data rescue focus of the International Atmospheric Circulation Reconstructions over the Earth Initiative (ACRE, Allan et al. 2011) — ACRE Australia — is planned. In the meantime, these efforts combined with data rescue in other parts of the Southern Hemisphere (e.g., Grab and Nash, 2010; Lorrey and Chappell, 2015) ensure that our global climate past is looking clearer than ever before.

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