



Australian Government

Bureau of Meteorology

Australian Climate Observations Reference Network – Surface Air Temperature (ACORN-SAT)

Bureau of Meteorology response to the recommendations of the Technical Advisory Forum's second annual report

October 2016



Cover image: Dramatic view at Victor Harbor from Granite Island, photograph by Andrey Moisseyev (iStockPhoto)

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The Bureau of Meteorology welcomes the release of the second annual report of the Technical Advisory Forum established to advise the Bureau on the development and operation of the Australian Climate Observations Reference Network – Surface Air Temperature (ACORN-SAT) dataset.

The Forum was established in response to one of the recommendations of an independent peer review of the dataset undertaken in 2011, which expressed overall confidence in the Bureau's practices and found its data and analysis methods to be among the best in the world.

The Forum members were appointed by the Parliamentary Secretary to the Minister for the Environment for a three-year period to meet annually and provide recommendations on further development of ACORN-SAT.

The Forum met in March 2015 and released its first annual report in June the same year. The Forum found that the ACORN-SAT dataset was complex and well-maintained, making five recommendations to support and inform the Bureau's continuous improvement.

The Forum met for a second time in June 2016 to consider the Bureau's progress to date against the five recommendations and, in view of that progress, provide additional advice. The Forum's second report provides the Bureau with valuable suggestions on the future management of the dataset and we are fully supportive of all recommendations as noted in our response that follows.

We are pleased to note that the Forum was satisfied with the Bureau's commitment to continuous improvement and approach to the development and operation of the ACORN-SAT dataset. The Forum's report notes the Bureau's progress in: improving communication and accessibility for the public; improving the access and handling of metadata; and expanding the ACORN-SAT data and supporting analyses. The Forum notes the Bureau intends to release an update to the ACORN-SAT dataset in late 2016, thereby implementing more of the recommendations related to communication and accessibility identified in the Forum's 2015 report.

The Bureau notes the Forum's conclusion that properly applied adjustments to historic data play an essential role in eliminating artificial, non-climate, systematic errors in temperature observations, so that a meaningful and consistent set of records can be maintained over time.

The recommendations in the Forum's report, when implemented, will further enhance the public understanding and use of the ACORN-SAT dataset more generally.

In its second report, the Forum has made three new specific recommendations, namely:

- Support continued progress on improving the communication and accessibility of the ACORN-SAT dataset;
- Build on existing domestic and international engagement with the statistical research community on the ACORN-SAT dataset; and
- Support continued progress in the handling of ACORN-SAT metadata and homogenisation.

We note these replace the five recommendations from the first report, noting the earlier recommendations have been largely met by the Bureau. The three new recommendations, together with their sub-points, align well with the Bureau's own plans and priorities for ACORN-SAT development going forwards.

The Bureau wishes to record its sincere appreciation to the Forum members and the valuable and specific insights they provide. We also acknowledge and thank the support provided to this work from the Department of the Environment and Energy.

As highlighted by progress since the 2011 independent peer review and the 2015 Forum meeting, the Bureau is committed to a process of continuous improvement drawing on the best of climate science and statistics.

Noting the opportunities and challenges that climate change pose for all Australians, ensuring accurate and accessible information to inform decision making is a high priority for the Bureau. As highlighted at the Forum meetings, ACORN-SAT and related data feature widely in many decisions, including wildfire risks, mitigating human health impacts of extreme heat, and mapping regions suitable for agriculture.

The Bureau looks forward to working closely with the Forum for the duration of its term to further enhance the quality and value of the ACORN-SAT dataset. The Bureau's detailed response to the recommendations of the Forum is provided in the following table.

Recommendation 1

1. To support continued progress on improving the communication and accessibility of the ACORN-SAT dataset, the Forum recommends that the Bureau:

Forum recommendation		Bureau response
1a	Continues to implement its communication and accessibility work plan for the release of the updated ACORN-SAT dataset, and advise the Forum when this work has been completed so it can be reviewed against the relevant 2015 recommendations.	Agreed. It is expected this activity will be completed by the 2017 Forum meeting.
1b	Develops case studies that illustrate how the ACORN-SAT dataset and similar data can be used to support climate analyses and decision-making, and make them available on the Bureau website.	Agreed. It is expected this activity will be completed by the 2017 Forum meeting.
1c	Refines its articulation of the ACORN-SAT dataset's value and purpose both in its context of providing an accurate description of Australia's historical temperature record and also in relation to its potential use in testing or calibrating climate models. Clarity in this regard could be enhanced by expanding the details provided in response to ACORN-SAT Frequently Asked Question 19 to more explicitly state the way that ACORN-SAT is used in validation and testing of climate models. The Bureau could also identify other appropriate areas on the website and in public communication material to clarify the dataset's purposes.	Agreed. It is expected this activity will be completed by the 2017 Forum meeting.
1d	Publishes, as part of the ACORN-SAT dataset, effective weights for every ACORN-SAT station at each time point as well as an explanation of how each station influences the national average temperature anomaly, to further improve the transparency and robustness of the ACORN-SAT dataset. The Bureau should seek further guidance and advice from the Forum as needed within the process of developing and communicating such effective weights.	Agreed. It is expected this activity will be completed by the 2017 Forum meeting.
1e	Continues to expand its practice of making source code available for the ACORN-SAT dataset, despite low demand for the source code from users to date. This will improve the transparency of the Bureau's data adjustment procedures and further align their practices to trends of open access and reproducibility. In making this recommendation, the Forum acknowledges that this is a longer-term project that will be subject to resourcing considerations.	Agreed. It is expected this activity will be completed by the 2017 Forum meeting.

Recommendation 2

2. To build on existing domestic and international engagement with the statistical research community on the ACORN-SAT dataset, the Forum recommends that the Bureau:

Forum recommendation		Bureau response
2a	Undertakes targeted and active consultation with expert statisticians about the Bureau's work plan on understanding and communicating uncertainty. This work should recognise the disciplinary differences between meteorologists, climatologists and statisticians in describing and estimating uncertainty, with a view to optimising the Bureau's approach by adopting appropriate methods from each of these disciplines.	Agreed. Engagement with the statistical community remains a priority for the Bureau, both as part of the Forum and more generally.
2b	Continues with its preparations to hold a one-day homogenisation workshop prior to the 2017 ACORN-SAT Forum meeting. The Forum is available to assist the Bureau to identify relevant literature and participants for the workshop if required.	Agreed. We intend to hold a dedicated workshop on the preparation of historical climate data preceding the next Forum meeting in 2017.
2c	Seeks opportunities to present their work on understanding and analysing climate data, for example by presenting at relevant conferences or by publishing in appropriate peer-reviewed journals.	Agreed. The Bureau will continue to ensure that all its methods are fully documented and published in appropriate peer-reviewed literature.
2d	Considers options to undertake a comparative analysis of pre-1910 data at southeastern sites (for example, by supporting an honours student) to assess whether the inclusion of pre-1910 data is worthwhile in attempting to understand current temperature patterns. Within this recommendation, the Forum acknowledges the Bureau's current efforts to engage with the research community on this question.	Agreed. The Bureau will continue to work with the research community to explore the potential use of pre-1910 climate data.

Recommendation 3

3. To support continued progress in the handling of ACORN-SAT metadata and homogenisation, the Forum recommends the Bureau:

Forum recommendation		Bureau response
3a	Continues to develop high-level metadata factsheets for each station following the release of the next ACORN-SAT dataset. The factsheets should specify the timing of and reasons for adjustments and the reference stations used in making those adjustments.	Agreed. It is expected this activity will be completed by the 2017 Forum meeting.
3b	Further considers the need for and feasibility of transition to an automated homogenisation process, acknowledging that this would require a longer term program of work and be subject to resourcing considerations.	Agreed. Increased automation of all methods remains a long-term goal for the Bureau noting the benefits this brings in terms of reproducibility, efficiency and capturing corporate knowledge. We anticipate this process will occur over a number of years.