

Response to review by Dr. Stephen Burt

We thank Dr. Burt for his careful evaluation of the manuscript. We include below on a point-by-point basis responses in red to the points made in review.

Overall impression

This is a well-researched and useful piece of work. As the paper describes, multi-instrument comparisons are few and far between, particularly for the tropics in the 19thC, and placing the insights resulting from this analysis on record will be helpful to others attempting to unravel any biases in other similar record types. I have no hesitation in recommending acceptance subject to minor revisions. Some suggestions are given below.

Thanks for your positive assessment of the paper

Minor comments and suggestions

Fig. 2 caption: the thatched screen at Hong Kong is, contrary to the caption, still very much in use today! - certainly it was on my most recent visit in October 2018.

Thanks – you are correct. What we meant to imply is that although maintained it no longer constitutes the operational measurement series. We have changed used to operational in the caption to avoid this source of evident confusion.

Fig. 3: a scale on the island map would be helpful.

A scale has been added as suggested.

Fig. 4: A date for the photograph, even approximate, would be helpful. It appears to have been taken from a book - perhaps include the source as a reference, or at least the date of publication of the book?

That image is actually a postcard, making it difficult to date without a hard copy, but our best guess is that it's from around 1909. Magasins Réunis was a chain of department stores, so they would count as the publisher here. A very similar photograph (we think identical but with a different crop) was published in Walter's 1910 *Sugar Industry of Mauritius*, so it's certainly no later than that. Unfortunately we don't seem to have a good quality scan of Walter's version though. We have amended the figure caption to give some of this detail.

Figs 11 and 15: spelling error in legend, should read 'ventilated'

Thanks for spotting this. Corrected in all relevant figures

page 20 line 21, Samoa not Somoa

Thanks. Corrected

Page 9 ff: the term 'thermograph' in this context clearly differs from the modern usage, viz. a small portable instrument housed in a Stevenson screen, with a bimetallic coil as the sensor, recording on daily or weekly paper charts wound around a clock drum. Perhaps it may be advisable to make this distinction clear at first usage. I would also suggest 'thermograph' (lower case t) in place of Thermograph.

We have clarified the distinction when the Thermograph metadata is introduced as that makes it easiest for a reader to draw the distinction in methods. We prefer to retain methods of observation as capitalised proper nouns for ease of readability.

A minor point, but the thermograph is described as being by Adie on p8 line 36, but by Hicks on p10 line 1. Perhaps one was a subsequent replacement?

Thanks for catching this. Indeed, this mismatch is intriguing. Once a Thermograph measurement series is available the metadata consistently refers to as Hicks and not Adie and yet the early metadata about shipment of a Thermograph consistently refers to an Adie model. We have clarified this by extension of the paragraph that was on p.8 in the discussion version of the paper.

There are various references in the text to differing sizes of Stevenson screens. It should perhaps be borne in mind that the modern 'large' or double-width Stevenson screen did not appear until well after the period described in this paper - they were introduced in World War I to allow autographic instruments to be sited alongside conventional thermometry - and that screen size differences referred to may have been less than those between modern 'standard' and 'large' thermometer screens. Two contemporary papers (Mawley 1884, Council RMetS 1884) provide details and dimensions of the (slightly smaller) original pattern of Stevenson screen, and the larger model approved following trials by the RMetS Thermometer Screen Committee in 1883-84, where the dimensions differ by only 5 cm or so. It could be that these are what is meant by the 'small' and 'large' screens. From Mawley 1884: 'old' screen W 16 in, D 9 in, H 16.5 in; 'new' screen W 18 in, D 11 in, H 16.5 in.

Thanks for this detailed information, some of which we have directly incorporated into the paper. The metadata in the report series suggests that this is distinct from the Mawley documented analysis in that there is a far more considerable distinction between the screen sizes – perhaps more akin to the difference between what may be considered a modern screen and the small screen as discussed in Mawley. We have inserted comment to this end in an appropriate point of the revised manuscript.

The larger 'thermograph' screen is referred to as a Kew pattern (although it is likely that it was first developed at Oxford's Radcliffe Observatory about 1849). At Kew it became known as the North Wall Screen, with the bulbs of the thermometers sitting outside the building wall within a large louvred screen, the stems recording via photographic paper on a drum mounted inside the building. (This remained in use until the Observatory was closed in 1980.) The Mauritius setup sounds very similar; there is a contemporary plate in Anon 1892 and photographs of the Kew screen in Drummond (1947, Plate II) and in Galvin (2003, Fig 2). Inclusion of one of these images may be worth considering. There is no doubt, however, that the size of the thermometer bulbs and stem required would have increased the response time considerably, and this factor when combined with thermal inertia of the building would have resulted in lower maxima and higher minima, and thus reduced DTR, when compared to a Stevenson screen record in the open air.

Thanks for this additional information. We have added much of it to the revised manuscript. Given the length of the manuscript we feel we cannot add a figure as suggested but do refer the reader to the suggested materials given which we agree greatly aid reader interpretation.

The radiation errors of large Stevenson screens in a subtropical desert climate were found to be less than other types of screen in a WMO trial in Algeria (Lacombe, 2011). In mid-latitudes, it is well-known that strong solar radiation can result in considerable heating of the louvred sides of the screen and result in screen temperatures warming over 'true' air temperature (as measured by, for instance, an aspirated sensor); but in tropical latitudes, with higher or overhead solar angle, the radiation errors did not appear to be as great as might have been expected, probably owing to shadowing of the louvres from the screen roof. Midlatitude screen comparisons are unlikely to be representative of tropical sites for this reason.

Thanks. We use this information directly in the revisions to provide a valuable caveat.

Throughout: metadata are plural not singular. Suggest omission of all imperial dimensions, leaving only metric units, unless there is a clear case for retention.

We have tried to be more consistent in using metadata as plural. We prefer to retain original units where relevant while also providing metric equivalents. That way the trace is more direct and also if we have introduced a conversion error the reader can identify and correct for this.

References

Anon, 1892: Weather watchers and their work. London: The Strand Magazine, 3, 182-189.

Council of the Royal Meteorological Society, 1884: Report of the council for the year 1883: Appendix 1, Report of the thermometer screen committee. Quart. J. Royal Meteorol. Soc., 10, 92-94.

Drummond, A. J., 1947: Kew Observatory. Weather, 2, 69-76.

Galvin, J. F. P., 2003: Kew Observatory. Weather, 58, 478-484.

Lacombe, M., D. Bousri, M. Leroy et al, 2011: Instruments and observing methods report no. 106: WMO field intercomparison of thermometer screens/shields and humidity measuring instruments, Ghardaia, Algeria, November 2008 – October 2009. Instruments and Observing Methods Report No. 106, WMO/TD-No. 1579, Geneva, Switzerland.

Mawley, E., 1884: Report on temperatures in two different patterns of Stevenson screens. Quart. J. Royal Meteorol. Soc., 10, 1-7.

All suggested references have been added

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