Climate of the Past Discussions

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Comment on cp-2021-127

Stephen Burt (Referee)

Referee comment on "Insights from 20 years of temperature parallel measurements in Mauritius around the turn of the 20th century" by Samuel O. Awe et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2021-127-RC1, 2021

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.

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.

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

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?

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

page 20 line 21, Samoa not Somoa

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.

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?

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.

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.

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.

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

References

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