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Ocean Science
Discussions

Interactive comment on "Comparing historical and modern methods of Sea Surface Temperature measurement – Part 2: Field comparison in the Central Tropical Pacific" *by* J. B. R. Matthews and J. B. Matthews

Anonymous Referee #1

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Comparing historical and modern methods of SST measurement - Part 2: Field comparison in the Central Tropical Pacific

General comments

This paper presents some potentially rather valuable observations made with 3 different types of bucket (wood, canvas and rubber). However the analysis of the differences, and differences with deeper observations is disappointing. The measurements are not placed in their environmental context. A multivariate analysis would be required to

understand whether there are any signals, but only single variable correlations seem to have been performed.

It is not made clear what signals are actually expected in the difference between the bucket types, especially given the short exposure time chosen. A plot in Folland (1991, Climate Research Technical Note, No. 14, Sea temperature bucket models used to correct historical SST data in the Meteorological Office) suggests that for the Folland and Parker (1995) wooden bucket model, cooling of around 0.05degC would be expected for a wind speed of 15 m/s, RH of 75%, SST of 30degC, Air Temp of 28degC. By 4 minutes the cooling was predicted to rise to 0.2degC. For the canvas bucket model the difference is 0.3degC rising to around 1degC for 4 minute exposure. The canvas bucket used in the present study is larger than that either of those modelled by Folland and Parker (1995) so the difference might be expected to be less. So for these environmental conditions, at night, the models suggest that the heat loss difference at 1 minute should be around 0.2degC and therefore detectable.

One of the main conclusions is that bucket measurements of SST do not need correction, this is based on the 1 minute exposure time observations made in the present study, and a selective review of the literature in Part 1. As it stands the study can make no comment on the accuracy, or otherwise, of the Folland and Parker (1995) adjustments. Their choice of a longer exposure time was based on the instructions provided to the observers and evidence from the signals in the data. Other factors such as whether the sample was stirred are also questioned but the conclusions drawn are not based on any new evidence.

The results on the flow model are interesting (with the James and Shank 1964 study) in demonstrating that heating of the water in the pipe by the warmth of the engine room is unlikely to be important. However Saur (1963) concludes that other factors are likely to have a greater effect, as noted.

Overall the conclusions of the study with regard to the climate record are not well-

supported by the evidence presented. It is possible that the measurements made could make a useful contribution to understanding the adjustments applied to historical SST observations, but further analysis would be required. The authors should decide what the goal of their analysis should be and ensure that their conclusions are supported by the analyses presented in the context of a more thorough review of the literature.

Specific comments

Page 2981, line 5: the tropospheric lapse rate is not the appropriate method for adjusting near surface air temperatures. No analysis using the adjusted air temperatures is presented.

Page 2981, line 22: accuracy only if recently calibrated. Was it?

Page 2982, line 25: 70% relative humidity is actually rather low over the ocean

Page 2985, lines 19-22: hard to understand what is being said

Page 2986, lines 24-26: Figure 8b looks by eye to have a decreasing difference with increasing ship speed.

Page 2991, lines 20-24: In Part 1 it is suggested that the contribution of engine intakes may be substantially underestimated, here it is suggested that there aren't very many so excluding them won't make much difference.

Page 3016, Fig A1: This diagram is different to that given in Part 1 (Figure 1) which has a sea chest.

Interactive comment on Ocean Sci. Discuss., 9, 2975, 2012.