

Interactive comment on “Late Holocene temperature variability in Tasmania inferred from borehole temperature data” by Asadusjjaman Suman et al.

Anonymous Referee #2

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General comments

This paper presents: (i) inversions for temperature-depth profiles from 36 boreholes in eastern Tasmania, (ii) comparison of the resultant individual temperature histories against observational data, and (iii) spatial correlation analyses to explain the potential drivers of temperature variability seen in the borehole data. The manuscript structure is sound and the introduction, study setting and methodology are clearly written. However, I have concerns about the data interpretation and therefore the conclusions drawn by this study (see specific comments below). It would also be easier to review this paper if the companion paper cited throughout (Suman and White,

C1

in review) was published. The figures are generally clear, although I have made some recommendations below to improve clarity in some cases. The text would benefit from a thorough grammatical check.

Specific comments

It is difficult to determine how the primary data presented in the present manuscript (Suman et al.) may differ from the unpublished Suman and White (in review) manuscript mentioned in the text. From the present citations this separate manuscript also presents the borehole data (line 219), borehole temperature inversions with comparison to observational data (line 263), and exploratory spatial correlation analyses (line 377). I presume that the unique aspect of the present Suman et al. manuscript is the consideration of the climatic mechanisms responsible for the observed temperature variability. However I am unconvinced that the authors' interpretations are sufficiently supported by the data. I question the authors' conclusion that there are significantly different maximum amplitudes of ground surface temperature between the bores situated in northern/eastern coastal sites, compared to southern/non-coastal sites. For example the data presented in Fig. 9 displays a very weak negative correlation, which appears to be mis-quoted in the text (line 359). The summary of temperature change presented on the map in Fig. 8 also does not provide a convincing argument for any spatial gradients. This weak conclusion thus undermines the connection made to the changing ocean currents made in the underdeveloped paragraphs of section 5.2. Are there any borehole data from the west coast? If the authors could clearly show an east-west gradient in the temperature variability then this would make for a more compelling connection to the EAC.

Even if the present interpretation of spatial temperature variability in the suite of east coast boreholes is robust, the paucity of data concerning land use changes prior to 1980 precludes rejection of an alternative hypothesis that temperature variability

C2

between boreholes is the principally the product of changing vegetation cover. To that end, the most robust finding of this study is the c. 1 K warming during the 20th Century, which is common to all borehole records. The significance of this finding is weak given that there appears to be reasonable observational data that covers this time window.

Technical corrections

Line 331: The substrate lithology does not make these records 'highly reliable' in an absolute sense. Rather, these records may be relatively more reliable than mixed lithology bores

Line 359: the reported correlation statistics do not match those in Fig. 9. The data shown in Fig. 9 appears to exhibit a very weak correlation between temperature change and distance from the coast.

Fig. 1: Needs a small legend to easily discriminate dashed/full lines. Also redefine T0 in the legend

Fig. 5 remove arrowhead lines – these interfere with the data on the left hand plot

Fig 7. I suggest splitting this figure into two panels. First have the figure as currently presented, but in the second panel I suggest presenting just the 20th Century portion of the data on a higher resolution x-axis, so that the finer details of individual records are more clearly visible.

Also, I am confused about the y-axis. What is the reference datum from which

C3

temperature has changed? Is it the AD1500? If so, to what datum is the observational data referenced? Please define this in the axis label or figure caption

Fig. 8. It is somewhat counterintuitive to have sites with low misfits represented by bigger symbols, and vice-versa. More importantly, the classification of these categories appears arbitrary, yet is used to support arguments of significant spatial variability in the dataset. What, if any, is the significance of the <2.0> area misfit division?

Interactive comment on Clim. Past Discuss., doi:10.5194/cp-2016-127, 2016.