Review of

A near-surface sea temperature time series from Trieste, north Adriatic Sea (1899-2015)

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GENERAL COMMENTS

Recommendation: Minor revisions

This manuscript gathers, develops, and describes a long-term near-surface sea temperature time series from Trieste, north Adriatic Sea in northern Italy. It uniquely uses and gathers historical documents and data records to produce a composite time series of near-surface sea temperature over a 117-year period (1899-2015). The authors discuss the differences in each of the data sets used (vertical position in the water column, horizontal location along the harbor, temporal resolution of the data sampling, time of sampling, etc.), duly noting the caveats associated with homogenizing the data sets into a composite time series. The authors also calculate and discuss data errors and availability. The referee does think that the authors use as sound of a methodology to produce the composite time series as possible, given the limitations in data heterogeneity. The major comment that I have is that it is very difficult to follow in Table 1 the description of Data set A and B (specifically the dates of the data). Otherwise, I have several minor edits and individual scientific questions. Because most of my comments are minor in nature, I recommend overall minor revisions.

SPECIFIC COMMENTS

--Page 1

--Line 12: “1.1+/-0.3 C per century was estimated”: Could you mention here also the 1946-2015 1.3+/-0.5C per century trend, as that is a more continuous and thus robust trend?

--Line 26: “Even though these data are coastal”: What is meant by this? That coastal data may not be most useful for climate change indicators? Why? Please explain in manuscript.

--Page 3

--Lines 1-10: How were the Pinsel thermometer measurements taken? Were they affected by sea level change similar to how the thermographs were affected?

--Line 14: “Usually, ocean temperature should be measured to the 0.01 C accuracy”: can you provide a reference for this? Seems to me that this accuracy would change based on the end user.

--Lines 28-31: Are the time (9 am to 10:30 am to 8 am to 9 am) and space (300 m apart) changes too large to produce a sufficiently homogeneous dataset here? Please comment in the manuscript.

--Page 4:

--Lines 1-12: This is very difficult to follow along with Table 1. Suggest somehow adding “Data set A” and “Data set B” to Table 1 to make it clearer what is indicated by what in Table 1.

--Line 8: “Manual observations continued until 2008” where is 2008 in Table 1? I only see dates after 1990 on the last row of Table 1, and nowhere else.

--Line 10: “From 1964 to 1970”: isn’t it 1968 in Table 1 row 2?

--Line 12: “From 1980 to 2008” where is 2008 in Table 1 besides at the bottom?

--Line 16: Where is 1983-1986 in Molo Sartorio in Table 1?

--Line 19: Where is 1919 in Molo Sartorio in Table 1?

--Line 25: “2.3 Data set B (1986-2015)”: Is this all in just the last row of Table 1? If so, how is Data set A going to 2008? (can’t find this in Table 1).

--Line 27: “In 1992” What about 1989-1992?

--Page 5

--Lines 3-4: How was 2-m temperature estimated from the observations at other depths? Please briefly explain in manuscript.

--Line 7: “Although the mean daily temperature range is generally within 0.5 C” What does this mean? How is “mean daily temperature range generally within 0.5 C”?

--Line 8: “24 hourly data” what is this? Hourly data (24 per day)? Please clarify in text. Also, what does “which can be regarded as a standard” mean? Awkwardly worded.

--Page 7:

--Line 4: Is rounding occurring here to get +/- 0.25 C (0.5 C band) and +/- 0.1 C (0.2 C band)? What about using the maximum range, e.g. 0.54 and 0.23 C bands?

--Line 9: Where is 0.18 C in Table 2? Please clarify as there are several within the 4th column.

--Line 13: Where are the overall errors between 0.2 and 0.4 C for data set A and 0.1 and 0.2 C for data set B in Table 2?

--Line 15: "1986-2008" again, where is this for data set A in Table 1?

TECHNICAL CORRECTIONS

Abstract

--Line 8: "The measurements compose two data set": suggest changing to "The measurements are comprised of two data sets"

Short Summary

-"We described" should be "We describe"
-"variability on different time scale" should be "variability on different time scales"

1. Introduction

--Page 1

--Line 15: should be "Knowledge of the processes and evolution of the Earth system…"

--Line 16: "earth's" should be "Earth's"

--Line 17: "the scientific community, and civil society"

--Lines 20-21: "a key element in climate studies, based on **both** data analysis and model reconstructions, and **thus** the sustainability of suitable observing systems is critical"

--Page 2

--Line 3: "February **to** 25…" (not **and**)

2. Data description

--Line 28: "Figure 2 shows the chart for 1-8 July 1935" should this be "Figure 3"? If so, will likely want to change order of figures so they are referenced in order.

--Line 32: "linear vertical scale corresponding to 1.5 mm C^{-1}" is this at 15 C like the first thermograph which had a vertical scale of 2.1 mm C^{-1} at 15 C? If so, please indicate.

--Page 3

--Line 3: "to a range of astronomical tide"

--Line 15: "better; nevertheless" (change comma to semicolon)

--Line 16: "which is strongly influenced by atmospheric forcing" (delete "the")

--Line 21: "2.2 Data set A (1899-2008)" where is 2008 in Table 1?

--Line 24: "The sheet for 1916 is shown in Fig. 2" (not Fig. 3—see Line 28 comment above, may want to switch Figures 2 and 3)

--Line 25: "1909-1914, **and** 1918-1919 are missing"

--Page 4

--Line 7: "failure;" change comma to semicolon

--Line 16: What are 1295 and 299 indicating?

--Line 23: "but this was not **always the case**"

--Line 24: "These analogue records were reported to 0.1 C precision, **and** occasionally **to** 0.05 C"

--Line 33: "reported to 0.01 C precision." (remove "the")

3. The time series at 2-m depth

--Page 6

--Line 1: "the daily means are possibly estimated" "possibly" is awkwardly worded, please change

--Line 9: "These corrections concern estimates" "concern" is awkward, perhaps use "affect"?

--Line 17: “computed from those on the observation” is awkwardly worded, please change. Also, why do you need “respectively” here?

--Line 19: “An observation is affected by” (delete “basically”)

--Line 21: “the curve thickness determine a reading error” (delete “probably”)

--Line 23: “due to turbulence and circulation. Therefore…”

--Line 24: “representative of the hourly value” (delete “really”)

--Line 27: change to “only nominal times, and not the actual observation times, are reported.”

--Line 28: “This time uncertainty **affects** temperature…”

--Line 29: “the time uncertainty until 1917” should this be 1919 or 1934 based on section 2.2?

--Page 7

--Line 1: “half an hour; therefore” (change comma to semicolon)

--Line 15: “by comparing **the data sets**”

--Line 23: “as discussed **in the above paragraph**”?

4. Data availability

--Line 25: “as **a** percentage of valid days” also, valid is awkward, maybe use “total days”?

--Line 26: what is meant by 80% valid days here? Same question for “valid months”?

--Line 27: better word for arbitrarily? Seems very unofficial. Also, remove the repeat “Figure 4 illustrates…” sentence.

--Page 8

--Line 2: “in the first part **of the period**”?

5. Conclusive remarks

--Line 8: “Near-surface sea temperature data” (remove the “s” in temperatures)

--Line 9: “from 1899 to 2008, **while** the second consists…”

--Lines 12-13: “study sea-temperature variability **on** the synoptic time scale connected to meteorological forcing, and on decadal and secular time scales related to climate changes.” Also, what is meant by “secular time scales”?

--Line 14: “The search for undiscovered data will continue**, in order** to possibly fill the existing gaps.”

Author contribution

--Line 16: “the data sets and **led**”

--Line 17: “and collaborated **on** the paper writing”

Figures

Figures 2 and 3: these are somewhat difficult to read, may want to ensure very high quality images of these are included so readers can clearly read them.

Figure 5: Can you add the 1946-2015 trend line on this figure? Also, should the caption read “from 1899 to 2015”?

Tables

Table 1: several comments as indicated above

Table 2:

--Line 5: “number of observation**s**”. “instrumental **error**”

--What are the 1st and 2nd numbers before and after the semicolons, e.g. 0.18; 0.31? Finally, can you somehow indicate that the errors are ½ the band (e.g. +/- 0.15 C)?