

Review of the manuscript:
A near-surface sea temperature time series
from Trieste, north Adriatic Sea (1899-2015)
No: esd-2019-15

General view

The manuscript is clearly written, the content is interesting, suitable for the journal ESSD. It describes a synthesis of a collection of coastal sea temperature data over 116 years in the northernmost part of the Mediterranean Sea (Trieste, Italy). This is rare and it deserves attention. A minor revision is suggested.

It seems that the paper could gain in relevance if two points would be added.

I.

There is no comparison with the trend of (surface) sea temperatures of either coastal, nor 'global' ocean sea surface temperature data. This 'global warming trend' is a hot topic, relevant nowadays. Authors confined themselves mostly to the methodology of 'combining' the data of different measurements techniques, of different sea temperature 'sampling', on elaborating the time series (filtering the data) and on the trend of sea temperature rise that they reveal from those data. There are certainly many research papers that describe centennially temperature trends elsewhere. Moreover, there are reports of IPCC (although quality reports are lately blurred with reports of IPCC meetings...) that still somehow 'matter', e.g. the IPCC Report 'Global warming of 1.5°C', in Chapter 1: [Allen, M.R., et al., 2018: *Framing and Context. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, et al. (eds.)]. In Press.]. There one may find a few 'useful sentences' already at the beginning, e.g.: 'Human-induced warming reached approximately 1°C (likely between 0.8°C and 1.2°C) above pre-industrial levels in 2017, increasing at 0.2°C (likely between 0.1°C and 0.3°C) per decade (high confidence)', and also 'Accordingly, warming from preindustrial levels to the decade 2006–2015 is assessed to be 0.87°C

(likely between 0.75°C and 0.99°C).’ These sentences are just very modest examples about how the result (the temperature trend in the ‘intestines’ of the central middle Europe, facing the sea) of authors makes sense and is ‘in line’ with the trends others have found. There are also differences (e.g. in the trend within last 30 years) with other findings, which would well be described in Discussion. In the Introduction, though, the relevance of this particular, long time series has to be emphasized and compared with other very long term studies.

II. The second topic for which it seems just to be linked to the paper, is the matter of the sea-level rise. A brief look on publications of authors clearly shows that at least one of them has a solid reputation in ‘knowing this matter well’. Authors may relatively easily combine their sea temperature rise finding with the sea level rise simply due to steric effect – they can estimate it and may also estimate the error of the estimation (they showed how nicely they know how to estimate errors...) of sea level rise due to temperature expansion of water (e.g. the effect of salinity (variability)). There is quite a large number of papers over the Adriatic and the Mediterranean Sea that handle separately the sea level rise and the temperature rise, but only a few link these two trends. This is a good chance ‘to do it right’!

Specific comments

Page, 1. Line 16: is the text in this line in ‘bold’?

Page 3, line 24: Fig. 3 is referred. Should it be the Fig. 2? There was no Fig. 2 before in the text and it looks from Figure and figure caption of Fig. 2 that this should be Fig. 2.

Page 5, line 13: $T_0(h,d,m,y,z) \rightarrow T_0(h,d,m,y,z)$

Page 5, line 18: ‘...between 13 and 17 values of T_0 .’ Could it be added ‘out of (?) 24×365.25 ’ on average per year?

Page 5, expression (3): In the expression (2) T_{24c} is written down. However, it somehow follows from the expression (3) and the comment below it that T_{24c} should be expressed as the average of N values of T_c the number of available

observations on the relevant day, and not the average of '24' values (expression (2)). Correct?

Page 6, expression (5): It looks OK...

Page 7, line 9: 'observational error $\sigma_0=0.18$ °C, we obtain $\sigma_c=0.05$ °C and $\sigma_{24c}=0.01$ °C' → observational error $\sigma_0=0.18$ °C, we obtain $\sigma_c=0.05$ °C and $\sigma_{24c}=0.01$ °C.

Page 7, line 23: '...was increased by 0.5 °C, as discussed above.'. Do authors refer to the line 18 in which $\Delta T = 0.5 \pm 0.5$ °C is written? If so, then they could write this more clearly and on line 18: $\Delta T = 0.5 \pm 0.5$ °C → $\Delta T = 0.5 \pm 0.5$ °C. The same for another ΔT in the same line.

Page 7, line 27: there is a redundant copy of the sentence about Figure 4 from the line 25....