Reply to RC1: 'Comment on essd-2024-394', Anonymous Referee #1, 27 Nov 2024

We have meticulously addressed each of your comments and suggestions to enhance the quality of our manuscript, the figures and the ReefTEMPS database in general. Please find our replies are shown in red font below.

Review of the manuscript:

ReefTEMPS: *1 The Pacific Islands Coastal Temperature Network*

By Romain Le Gendre, David Varillon, Sylvie Fiat, Régis Hocdé, Antoine de Ramon N'Yeurt, Jérôme Aucan, Sophie Cravatte, Maxime Duphil, Alexandre Ganachaud, Baptiste Gaudron, Elodie Kestenare, Vetea Liao, Bernard Pelletier, Alexandre Peltier, Anne-Lou Schaefer, Thomas Trophime, Simon Van Wynsberge, Yves Dandonneau, Michel Allenbach and Christophe Menkes

This paper presents coastal temperature data from the ReefTEMPS network of moored stations at a number of PICTS in a broad region of the western and central South Pacific, from New Caledonia to French Polynesia. The in situ temperature time series are considered unique in several respects, both in terms of the longevity of some historical stations - the oldest dating back to 1958 and providing daily data for more than 65 years - and in terms of the number of countries surveyed (16 PICTS) and the diversity of coral ecosystems monitored (from atolls to high islands and from outer reef slopes to narrow, shallow lagoons). All data from the stations are publicly accessible via the dedicated ReefTEMPS information system, which also enables rapid visualization of the time series, or via the marine data platform SEANOE. The longevity of these temperature time series makes it possible to diagnose long-term trends, show the influence of various processes on temperature dynamics and document the temporal evolution of extreme events.

General Comments

The manuscript (ms) is well structured and written and demonstrates the importance of continuous measurements, especially on moored systems, to determine the physical and biochemical processes that influence biodiversity. However, some improvements should be made before publication; adding some information that I think is missing could improve the text. I found that the authors are vague in some parts of the text and use a very discursive approach without being precise. In particular, in section 3, the authors show the evolution of the sensors used without specifying where (stations, areas) the changes took place. It is difficult to say whether the improvements or changes have taken place at all stations in the network or only in certain areas. See my specific comments.

I appreciate the inclusion of examples of key applications in Chapter 6. Since these are processes determined by long-term measurements on various time scales, it

would be interesting to relate these changes, especially those in temperature, to ENSO. This topic is already briefly discussed on the website, but it would be an added value to discuss it in the handbook.

Specific comments

In the abstract:

Line 50: 16 PICTS are indicated, while only 14 are mentioned on the ReefTemps website; which number is correct?

The correct number of PICTS covered by the ReefTEMPS network is 16 (see appendix A1 in supplementary material). The ReefTEMPS portal has been modified accordingly (see https://www.reeftemps.science/). It should be noted that the portal displays 17 countries, as a new monitoring station has recently been added in the Indian Ocean (La Réunion).

Line 57: Quality control is mandatory before sharing data and showing possible trends, while the length of a time series is the added value and the key factor for its determination. Please delete quality control from the sentence.

The reference to “quality control” has been removed from this sentence.

2.1 History:

Figure 1 is missing information mentioned in this chapter as the start of AusAID support in 2011, which led to the deployment of several sensors on different islands. In 2012, the station on Wallis and Futuna was taken over by NC University, so it became the network? In line 57 a dot is missing after GOPS

An arrow indicating the year (2011) when the Pacific network extension began thanks to SPC and AusAid has been added. From our point of view, the network is more a network of stations than of implied organisations. But if we consider the network as being dependent of the number of involved organisations, we can say that ReefTEMPS became a network from 2012 onwards. A dot has been added at the end of this sentence line 57 (and a whitespace removed).

2.2 The current ReefTEMPS network

Line 85: again 16 or 14 PICTS? Please enter the number of actual stations or monitored sites here (active, inactive and dismissed). Later in line 92 you indicate that the New Caledonian components of the backbone component of the ReefTEMPS network include 43 stations, so it would be interesting to indicate the total number of stations belonging to this network right at the beginning of the ms.

The right number of PICTS is definitely 16 (see answer above and Table A1 in supplementary material). The total number of stations has been added in sentence line 85 and the number of actually active stations has been specified in brackets. During the review process some new stations has been implemented. Tables, maps and numbers may slightly change from submitted version.

3.1 Oceanographic bucket

Line 22: Please move “The nominal acquisition time for both stations was 7 am local time and the targeted depth using the bucket was 0.5 m" in line 20 after “…nearly 47 years”.

The sentence has been moved, making it easier to read.

3.2 Compact autonomous loggers

Line 27: ".... Were used to monitor coastal temperatures"... please specify where?

The three territories concerned by the use of these sensors have been indicated in the sentence: New Caledonia, French Polynesia, Wallis.

Facilities: It is difficult for the reader to tell at first glance which of the platforms listed in Table 1 are still active. I suggest dividing them into active and inactive or color-coding the two/three cases.

The new table (Table A4 in supplementary material) listing all stations has been reformatted with active stations at the top and also sorted by duration of observations. In addition, a new feature has been added to the data portal page, allowing user to filter active or stopped time series.

4. Processing and quality control

The overall strategy is well described for data measured after 2010; however, I cannot see a clear description of procedures when you recovered the instrument. Have CTD casts been taken each time you recover and redeploy the sensors? How often do you replace the instrument? It seems like you are only removing outliers, what about sensor drift? How do you compensate for any discrepancy (align mismatch) between the end of the time series and the new time series?

CTD casts are not taken each time a sensor is retrieved since this procedure is quite recent. Depending on the location of the stations (territory/remote island), this procedure could not be implemented everywhere. Nevertheless, the ReefTEMPS consortium is doing it utmost to generalize this approach to New Caledonia stations.

The frequency of sensor replacement depends on the type of sensor used. Typically, for today's sensors, the same instrument stays in water approx. for 3 months (JFE Thermosalinograph), 6 months (RBR Temperature/Pressure sensors), up to 1-year (SBE56 Thermistor).

Outliers and drifts are actually not really removed but (if visible by expert check) flagged to "probably" bad data. The ReefTEMPS team is currently considering to deploy homogenization methods on the raw frequency data (which will compensate drift or alignment mismatch) and other statistical tests to further improve the quality of this temperature dataset and move to higher level of processing state. This is part of the planned improvements, but the current temperature quality-flagged dataset is already of a high-quality standard as only a very small number of drifts or misalignments have been observed and flagged.

4.2 The procedure for obtaining the homogenized monthly long-term data is very interesting and impressive. It could be of additional value to show how the data was corrected. I propose to include a time series as an example of a raw and a QC-corrected time series (Anse Vata or Phare Amédée).

A new figure has been added in Appendix C (Figure 2). It allows us to illustrate the differences between the monthly data derived from the raw data (bucket and sensor) and the data after the homogenization procedure. A sentence about this figure has also been added in 4.2.

6.2 Characterize physical processes at various timescales

Line 9-10 please rephrase the sentence and highlight the importance of the parameters time series in identifying physical processes at various time scales.

We are not quite sure we understand this comment, so we could not change the sentence.

Appendix A - Table A1.

Not everyone knows the area in which the stations are located, and it is not immediately obvious from the "nom_station". Please add a first column with the area/region (example Cook Island).

The area/territory concerned by the observations is present in the Station Name column of table A4 and is coded with 3 characters. An additional A1 table has been added with all the territories covered by the ReefTEMPS Network. We thus decided not to include a new column in Table A4.

Add the last sensor type that was used in the table heading after the positions.

See my previous comment on the "active" column

The new A4 table take these comments into account.

Latest type sensor column: explain why you use full names for the sensor types such as “Thermistor" and “Multiparameter" and then abbreviations such as TSG, MG and SEAU (I could not find what this means in Table 3). I suggest standardizing the information in the column and giving the full name for all instruments.

Since the abbreviations are also used for naming the NetCDF files (data portal download or Seanoe), we’ve added an additional table A2 that describe the instrument types.

End of reply to RC1.