

**Review of “A compilation of sea surface temperature anomalies from the Southwest Atlantic during the Common Era: challenges and opportunities to support future research” by França et al., submitted to Earth System Science Data**

The manuscript by França et al. examines sea surface temperature (SST) records in the Southwest Atlantic during the Common Era. It focuses on an important aspect of paleoclimate studies, as the Southern Hemisphere remains relatively underrepresented in paleoclimatic and paleoceanographic records compared to the Northern Hemisphere, which may lead to misinterpretations of past climate changes.

The authors discuss strategies for data acquisition aimed at minimizing errors and biases and argue that the scientific community should recognize the importance of paleoreconstructions for improving our understanding of future climate change, as well as for informing policymakers. This initiative complements previous efforts highlighting the scarcity of paleorecords in South America and the South Atlantic. Therefore, the topic addressed in this manuscript is of considerable importance.

Overall, the manuscript is well written and presents a discussion grounded in the existing literature. The authors refer to global paleoclimate compilations for the last two millennia (e.g., the PAGES 2k Consortium) and emphasize the lack of data in the region targeted by this study. In this sense, França et al. clearly demonstrate the existence of a significant knowledge gap that warrants further investigation.

I believe the structure of the manuscript could be further improved by addressing the points outlined below, with the aim of developing a more critical assessment of the scientific gap identified by the authors.

### **Major Comments**

1. **Overall comment.** I understand that the authors aim to raise awareness of the importance and quality of Common Era data in the Southwest Atlantic, and I recognize this as a major gap in paleoclimate studies. However, stronger arguments and a more in-depth discussion are needed to convince the reader—particularly those less familiar with Southern Hemisphere datasets. This is especially relevant for the Introduction, which is currently too brief. Moreover, given that this journal focuses on datasets, a detailed description of the compiled data should be central to the manuscript. The authors should clarify why this compilation is suitable for publication in this journal. While the global importance of this region is evident from PAGES 2k records, the manuscript should better articulate the regional significance—specifically for South Atlantic and South American studies. In my view, several aspects of the manuscript require further explanation and clarification to ensure a proper understanding of both the dataset and its contribution to the identified scientific gap.
2. **Abstract.** The Abstract presents the main objective and briefly describes the data used; however, it does not clearly describe the methods applied, the main findings, or how

the analysis leads to the stated conclusions. Temperature values are presented without units, and a definition of the “Common Era” is missing. In addition, the sentence beginning with “We aim to...” is overly long, making it difficult to identify the study’s main objectives. I recommend rewriting this sentence. More generally, it is not clear whether the stated objectives are achieved. The Abstract reads as fragmented and lacks clear connections between sentences, and I therefore suggest a more thorough revision.

3. **Introduction.** The authors successfully place the study within a global context by referring to PAGES 2k results (Figure 1), clearly highlighting the scarcity of data in the Southern Hemisphere and within the study region. However, the Introduction is very brief and lacks a more detailed discussion of previous regional studies and the broader implications of these data gaps for paleoclimate research. This section would benefit from further development, including discussion of: (i) the underlying reasons for the data gap; (ii) whether this limitation is specific to the Common Era or also affects other time periods; (iii) recent regional studies (as most cited references are global and pre-2020).
  
4. **Data Section.** Supplementary Table 1 provides detailed information on the records; however, key general information should also be included in the main text. For example, the authors should report the age range of the records (oldest and most recent) and clearly describe the criteria used for record selection, especially since some records do not meet PAGES 2k criteria. This could be achieved by moving Figure 5 to appear earlier in the manuscript (perhaps as Fig. 1?), as it provides essential information on the records, such as age range and proxy types. The information from this Figure should also appear summarized in the main text. When stating that the records are “influenced by diverse oceanographic conditions” (L. 53), the authors should specify what these conditions are. Additionally, the methodology used to compute anomalies is not sufficiently clear (e.g., whether they were averaged over the entire domain), and the construction of Figure 2 requires further explanation. I recommend providing more methodological details in the main text.
  
5. **Summary and conclusions.** In the Abstract, the authors state that “We aim to highlight the challenges and opportunities in advancing our understanding of regional ocean variability and to understand the reasons behind the notable scarcity of such records, as well as to explore how mechanisms can be improved to prevent misinterpretation and support future research.” I do not see a clear connection between this statement and what is developed in the main text. I suggest that the authors clarify this point, possibly by revising the Conclusions section.

### Minor Comments

1. Please define “Common Era (CE)” in terms of ages (i.e., CE begins in year 1 AD and extends to the present day), as this term, although well established, is not defined in the manuscript. The expression “the last two thousand years” (Line 24) is too vague. In

addition, in Line 80 the Roman Warm Period is described as starting in year 0 CE, but year zero does not exist. I recommend revising these aspects accordingly.

2. In Lines 13–14, the sentence presenting the SST anomaly values is not well integrated with the surrounding text. I suggest either removing it or rephrasing it to better place it in context.
3. Figure 1 clearly shows the study domain; however, in panel (b) the colors and marker sizes make it difficult to distinguish the record locations. I suggest increasing the marker size and improving the color contrast.
4. It is not clear why subsection 2.1 is included if there are no additional subsections. I suggest revising the section structure.
5. Please revise the sentence in Lines 51-52 for clarity.
6. Lines 65–67: The terms “pre-industrial cold and warm periods” are not clearly defined. Please clarify their meaning and revise the sentence accordingly.
7. Figure 2 caption: The definition of the time intervals should also be included in the main text.
8. Figure 3. It is not clear how the data used in this figure were obtained. In the main text, the authors refer to “tropical global SST anomalies presented by Abram et al. (2016)” (Line 68), whereas the figure refers to global, Southwest Atlantic, and Southern Hemisphere SST anomalies. Please clarify this information in both the figure and the text.