Climate of the Past Discussions

Interactive comment on "Seasonal mean pressure reconstruction for the North Atlantic (1750–1850) based on early marine data" *by* D. Gallego et al.

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General comments

The manuscript describes the reconstruction of gridded sea level pressure (SLP) over the North Atlantic for the 1750-1850 period. It represents the first SLP reconstruction for this specific period and region, based exclusively on marine data. The methodology relies on regression analysis, performed using wind strength and direction data from European ships' logbooks (the CLIWOC project). The regression model is calibrated using data from the ICOADS database. The reliability of the reconstruction is evaluated using various validation tests and comparing it with other SLP data. The procedure is consistent and the presentation is clear. The advantages and limitations of the methodology are discussed. Guidelines to optimize future data reconstructions are also proposed. Specific comments are included below.

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Specific comments

1. page 11, paragraph 2: The spatial correlations for the 1851-2002 period (Fig. 8) show that the performance of the reconstruction decreases significantly going back in time. If these decreasing trends continue before 1850, then significant influences may be imposed on the reconstructed data quality. One may note that the trend is also observed for the winter season, for which the model performance is the best comparative with to the other seasons. The authors suggest that the reduced spatial correlations before 1900 is related to the reduced amount of available data for that period. Although this factor is likely to play a role, this is not necessary the most important element in determining these reduced spatial correlations. For example, one may note that the performance is not systematically decreasing towards the west although the coverage of the western north Atlantic is significantly poorer than that in the eastern basin (Fig. 1). Similarly, one may observe a decrease in the performance of the reconstruction towards the tropics, despite the fact that the CLIWOC data quality is similar to that in the northern squares (page 11, paragraph 3). This suggests that the amount of available data is not necessarily playing the most important role in determining the quality of the reconstruction. In this context, does the decreasing trend back in time observed for the spatial correlation (Fig. 8) reflect "objective" limitations for the quality of the reconstructed data?

2. page 11, paragraph 3: The authors suggested that the decrease of model performance towards the tropics can be related to the existence of a different relation between wind and SLP in this region, compared to the relation between these variables at higher latitudes. The reduced performance in the tropics can also be related to the relatively small values of the SLP anomalies in this region, compared to those in midlatitudes. The reduced SLP values in the tropics imply then higher errors in the reconstruction over this region.

3. The comparison of the reconstructed SLP with the L02 SLP emphasizes a 'common signal' in both reconstructions, suggested by the in-phase variations between means

and standard deviations for different seasons. The correlation test shows that, in the most favorable case, the correlation is 0.437, which implies that only about 20% of the total variance is explained in each time series by the common signal. In other words, minimum 80% of the variance in each series reflects distinct variability between them. This can be due to the comparison limitations or can suggest that important differences between the two datasets still exist. While an optimal comparison between the two SLP reconstructions is not possible, future validations using other datasets are necessary for obtaining a more complete validation of the presented reconstruction.

4. One additional sentence could be included in the last section to emphasize once more that the quality of the reconstructed data may be significantly dependent on season and region. This could be of particular importance for future reconstructions.

Minor points

1. References are made in the text to specific geographical locations but these can not be easily identified. The reader finds it hard to identify these locations because the figures do not include latitude and longitude labeling. I suggest including appropriate labels in the figures.

2. page 12, paragraph 2, line 5: a ')' is missing.

3. I found it somewhat difficult to synthesize the values in the last two columns in Table 3. Based on these values the authors argue that there is a common signal in both SLP reconstructions considered. I believe a graphical representation would make for an easier interpretation.

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