

Initial review of cp-2023-4: Estimating summer sea ice extent in the Weddell Sea during the early nineteenth century

General Comments:

The manuscript focusses on extending the temporal range of sea ice records beyond the satellite era or reconstruction period, through digitization of past records. The presented sea ice extent (SIE) estimates from this study seems important to understand the links between past and present SIE trend of Western Antarctica.

The figure and illustrations of the observed and satellite-based interpretation could be improved. The document could be corrected for repetition and long sentences that are compromising clarity. Overall, the manuscript can be accepted for publication after incorporating minor changes as suggested in the specific comments below.

Specific Comments:

The authors mainly rely on the ship records to recreate past SIE and have talked about the inaccuracies to some extent (sec. 2.3). To clearly understand the underlying inaccuracies, the authors should state the uncertainties in the reference British Antarctic Survey digital map of the study region. Were any checks in digitization accuracy applied for the region during 19th century? Also, it would be useful to let readers know about the landmark's used in the study to ascertain that the landmarks have not changed in the 200 years period. The errors in the route are evaluated 'relatively' and all the ship measurements were taken using chronometer. What was the reason that only ship Tula required significant adjustment? How big these corrections were? Stating this here might be of interest to researchers handling similar datasets.

The manuscript presents a significant amount of detail in observed data preparation which is commendable. However, pictorial illustrations of the records seem to be missing. For e.g., Fig. 2 should be updated with a background imagery (possibly optical satellite imagery) to reflect the different sea ice features present in the study region. The manuscript aims to 'estimate summer sea ice extent in the Weddell Sea during the early nineteenth century' and a comparative trend analysis has been discussed and presented. However, a concluding illustration is missing. The reviewer suggests adding a map (along with a proper base map) showing an appropriate combination of 1. the latitudinal locations of ice edges identified, 2. corresponding satellite dataset for selected timestamp, and 3. a final quantified SIE extent (with total estimated area in km²).

Figure 3a seems unnecessary. The caption for Figure 3 can be more descriptive. For e.g., Nineteenth-century observations of what? The number of total observations recorded is least for March and

highest for January. However, December observations are only available for one decade i.e., 1820. Did the authors investigate any effect due to this? The authors need to state this clearly in the discussions as it affects the interpretation of multidecadal DJFM analysis specially while comparing with other studies.

Technical Corrections:

The manuscript can be improved by correcting for some minor changes:

Line 200: delete 'and will be outlined below '. It is repetitive with the successive sentence.

Fig 2: All the labels are not mentioned in the caption.

Line 192-193: 'The reconstruction ... Fig. 2' can be simply written as 'The reconstructed voyages' data is shown in Fig. 2.'