Reply by Björn-Martin Sinnhuber

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Sincere thanks to reviewer Dmitry Divine for his very constructive comments on the manuscript. I will provide a point-by-point response in my final author's comments. Here I will address only the point raised, to expand more on the drift of the wreckage of the *Jeannette* to south-western Greenland. In particular, I followed the suggestion to look into buoy data to provide estimates of the drift time along the east coast of Greenland. While a comprehensive analysis of all available buoy data contains more than enough material for an own publication beyond the scope of the present study, I decided to illustrate the drift along the east coast of Greenland with the example of one particular buoy. Interestingly, this buoy drifted in 2022-23 at essentially the same speed as the Soviet North Pole station NP-01 in 1938-39. I believe this example provides an interesting new aspect, worth to be included in the revised version of my manuscript with an additional Figure 10. However, I do not believe that it is possible to constrain this enough to take the drift of the *Jeannette* as another independent data point for the transpolar drift. Below is the intended revised discussion on this point.

"Coming back to the detection of the remnants from the Jeannette-expedition that provided much of the motivation for Nansen's historic *Fram* expedition: Nansen (1897, p.12) estimates that the *Jeannette*'s remnants have travelled "at least 400 days" from the north-east coast of Greenland at 80°N to the place found near Julianehåb at about 60°45'N and 47°9'W. This would leave "at most 700 days" (Nansen, 1897) for the drift across the Arctic Ocean from the *Jeannette*'s last position at 77°15'N, 154°59'E to 80°N at the north-east coast of Greenland, a direct shortest distance of about 2500 km. This would correspond to an average drift of 3.6 km/day, measured at long interval, which is much faster than the *Fram*'s drift of 2.0 km/day, measured at long interval, even faster than the *Sedov* drift. But how sure can we be about the drift time along the east coast of Greenland? An inspection of present-day buoy data shows that the sea ice drift between 80°N on the northeast side of Greenland and 60°N at the southern tip of Greenland typically takes only about 90 to 130 days. One particular example is shown in Figure 10: buoy "2022c39", a Compact Air Launched Ice Beacon (CALIB) manufactured by MetOcean (www.metocean.com) was air-dropped on 15 Aug 2022 at 86.868°N, 21.431°W. It travelled during the following months with the ice through the Fram Strait, along the east coast of Greenland and reached in early May 2023 the area near Qassimiut and Qaqortoq (Julianehåb), where the wreckage from the *Jeannette* was found. Because buoys of the CALIB type by themselves will not float, we can be sure that it travelled on the ice. The buoy stopped operation on 9 May 2023 at 60.2426°N, 48.030°W, likely because of final melting of the ice flow. The satellite derived sea ice concentration for early May 2023 confirms the presence of open drift ice in this area. Interestingly, buoy "2022c39" in 2022-23 travelled at essentially the same speed as the Soviet North Pole station "NP-01" in 1938-39 (Figure 10B). A sharp transition in the drift speeds occurred for both drifts at about 82°N, justifying the definition of the "finish gate" of the transpolar drift at 82°N. Of course, we don't know how long the remnants of the *Jeannette* drifted in 1883-84 along the east coast of Greenland, but based on this analysis it seems likely that Nansen's estimate of "at least 400 days" is much too long. If we assume a travel-time in the order of 130 days for the drift south of 80°N, this would correspond to an average speed of 2.6 km/day for the remnants of the *Jeannette* along the transpolar drift, compatible with the statistical range of values to be expected for the *Fram* drift (Figure 9).

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References

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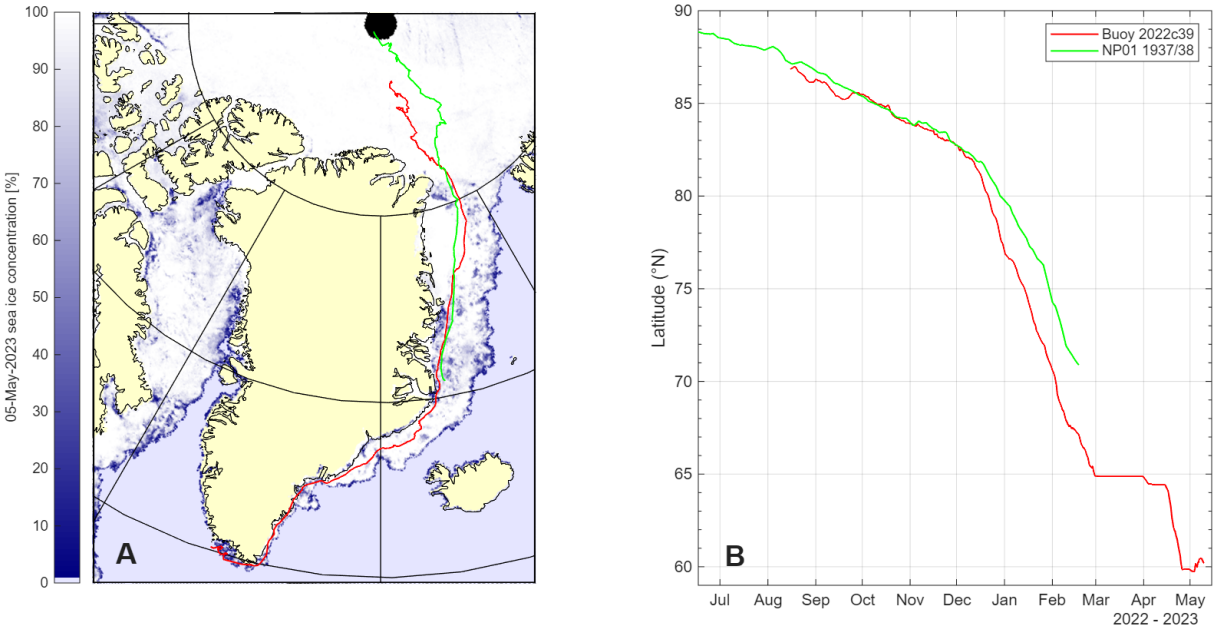

Figure 10. Drift tracks of buoy "2022c39" in 2022-23 (red) and North Pole station "NP01" in 1937-38 (green). **A**: drift tracks together with sea ice concentration on 05-May-2023 from AMSR2 satellite data using the ARTIST sea ice algorithm (ASI). **B**: Latitudinal position against time, showing that NP01 and buoy 2022c39 travelled at very similar speeds." *(Remark: although I generally avoid red and green lines in the same plot, here I checked on https://www.color-blindness.com/coblis-color-blindness-simulator/ that the colours used can well be distinguished under different colour vision deficiencies.)*