

Interactive comment on “Opportunistic evaluation of modelled sea ice drift using passively drifting telemetry collars in Hudson Bay, Canada” by Ron R. Togunov et al.

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>> **We thank the reviewer for their quick response and valuable feedback.**

The manuscript aims to assess the accuracy in the sea ice drift products provided by NSIDC, by comparing them to drift collars. The manuscript is well written and clear.

>> **Thank you for this positive comment.**

The area investigated is relatively limited. How are the drift speeds compared to other regions, i.e. would the underestimate also extend to other regions and what would the

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effect then be on the Pan-Arctic scale?

>> **We agree, the area investigated is relatively limited. As mentioned in our previous version “The drift biases we report are limited by availability of telemetry collar data, and we cannot definitively extrapolate our accuracy estimates beyond this spatiotemporal extent.” (lines 219-220). Nevertheless, to expand on the generality of the results while accounting for this limitation, we have added the following statement regarding our observed underestimates extending to other regions:**

“However, areas with similar characteristics may show similar biases in the estimated speed and direction of drift. This includes other seasonal systems (e.g., Baffin Bay), and those with slower drift (e.g., Kara and Laptev Seas) or without IABP buoys (see IABP, 2020 and Rampal et al., 2009 for coverage). Further, we observed the relative degree of bias increases with speed. If such scaling in bias exists in other areas, then the magnitude of underestimation may be greater in areas with faster speeds (e.g., Chukchi Sea).”

References:

IABP: International Arctic Buoy Program - Animated Buoy Movies, Univ. Washington. [online] Available from: http://iabp.apl.washington.edu/data_movie.html (Accessed 9 April 2020), 2020.

Rampal, P., Weiss, J. and Marsan, D.: Positive trend in the mean speed and deformation rate of Arctic sea ice, 1979-2007, J. Geophys. Res. Ocean., 114(5), C005066, doi:10.1029/2008JC005066, 2009.

There are some minor comments that needs to be addressed before publication.

>> **No response needed.**

Row 44. What is meant with ecology? Ecological studies?

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>> **Yes - now reads “ecological research.”**

Row 87. 4h.

>> **The Cryosphere formatting guidelines require spaces between number and unit**

Row 87. Are – > have a; Row 99. The – > the; Row 99. Replace – with for; Row 100. AMSRE – > AMSR-E

>> **Changes made.**

Row 156. Please explain what: intercept, CI, df, t and p stands for

>> **Our methods explain that “we used an intercept-only [*GLMM_{PQL}*] ... wherein a significant intercept represents a significant difference between the model and the collar speeds.” We have defined ‘CI’ and ‘df’ and clarified ‘t’ and ‘p’ throughout the manuscript. Parenthetical now reads: “(*GLMM_{PQL}*: intercept \pm 95 % confidence interval (CI) = $-3.0 \pm 1.2 \text{ km d}^{-1}$, degrees of freedom (df) = 1657, t-value = -4.8, p-value > 0.0001; Figure 5)”**

Row 181. What kind of biases were identified?

>> **We have clarified the biases identified in the first discussion sentence, which now reads: “Using drifting collars as reference data for validation, we identified biases in the estimated speed and direction of NSIDC modelled sea ice drift model.”**

Row 199. Remove “but see”

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>> **Change made.**

Does TC allow for paper in review to be included in the reference list? If not please remove Klappstein et al. in review from the reference list.

>> **This paper is now in press and its reference updated.**

Row 257-258. Please provide the link to the data here.

>> **The data is available at <https://doi.org/10.7939/DVN/KUIZ7G>. This link has been added in text.**

Row 266. Please provide the link to the data here.

>> **Change made.**

Row 326. What type of reference is this? PhD thesis? Report?

>> **This is a BSc thesis. The citation now includes “BSc Thesis, Department of Physics Lund University”**

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-26>, 2020.

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