

Review on “Retrieval of sea ice drift in the Fram Strait based on data from Chinese satellite HaiYang (HY1-D)”

The Arctic sea ice reacts strongly to climate change. The common and well-recognized features are thinning of sea ice thickness and shrinking of sea ice extent. As a consequence, the ice drift pattern may differ significantly during the past few decades. The Fram Strait is an important pathway for the sea ice export. For this reason, sea ice drift in the Fram Strait is retrieved based on improved method of the template matching and the Coastal Zone Imager (CZI) imagery from HaiYang-1D (HY-1D) satellite in this study. The authors illustrated the reliability of the product and the spatial and temporal variability of the sea ice motion by comparing with the IABP buoy and CMEMS SAR products. I see it is important and necessary to have different satellite products added to the pool of Arctic data archive. High-resolution sea ice drift product is valuable for the study of sea ice kinematic and deformation, and sea ice export through the Fram Strait is very pertinent to study sea ice changes. For these reasons, I would like to see this manuscript published in TC. However, I see further improvements of this manuscript are necessary in order to warrant acceptance. Please see my comments below and I hope authors can make improvement accordingly.

General comments:

The authors used the IABP buoy to validate the product, but due to lacking of on-site observation data, there are uncertainties for the quality of product. The quality control is used to ensure the quality of product and the distribution of these parameters magnitude requires discussion. The spatial resolution of retrieved sea ice drift is different with those of the IABP buoy and CMEMS SAR products. How the authors process the problems during the comparisons between them. Additionally, the authors should illustrate the uncertainties for CMEMS SAR products and IAMP buoy which will bring biases for comparative results. I suggest the authors to carefully proofread the manuscript and resolve all language issues, as it would be very difficult to

pin-point all such issues.

Special comments:

Line 16: “has been retrieving” should be “has been retrieved”

Line 37-38: “and it is the process of sea ice as it moves across the sea surface in response to winds, currents and other forces”- Rephrase this statement.

Line 39: the word “consist of” is not quite appropriate. Please recheck it

Line 40: “the TPD” should be “TPD”

Line 51: “With the launch of many remote sensing satellites...” this statement is too colloquial and rewrite it.

Line 55: “Products” should be “products”

Line 56: “...yield lower-resolution due to”- Please recheck this sentence.

Line 57: “OSI SAF scatterometer and radiometer based on SID products are available for many years...” should be “OSI SAF SID products based on scatterometer and radiometer are ...”-Please recheck it.

Line 63: the word “geo-parameter retrieval” is not quite appropriate here.

Line 65: “optical remote sensing data” should rewrite as optical imagery, check the whole manuscript.

Line 76-77: the sentence of “but the defect in which feature tracking cannot produce vectors...” is hardly comprehended. Please rephrase this sentence.

Line 80-81: “However, it has been observed that the accuracy of the SID product with AVHRR is not good in s regions...”-Recheck this sentence

Line 91-93: “Multiyear ice (MYI) drift...exist as drift ice”-Recheck this sentence.

Line 95-99: “For our study, in comparison with other products, the retrieved SID from CZI images achieves good accuracy in the FS...” can be as the conclusions and should not put it here.

Line 98: “a sophisticated method was needed to retrieve the motion of drift ice”, the sophisticated method should have references.

Line 98: “The data enhancement process can aid our algorithm”, the word “aid” is not quite appropriate here.

Line 110: “The wide swath and high resolution of CZI give us an opportunity to understand the sea ice motion in the FS in detail”, the sentence is colloquial and need to refine.

Line 132-133: How about the validated result? it should be provided in the manuscript.

Line 134-135: “The CMEMS product with more overlay...”-Recheck this sentence.

Line 250: “The utilization of correlation coefficients and their derived parametric filtering and neighborhood filtering enhances the quality of the results”, the word “enhances” is not quite appropriate here.

Line 259: In this study, higher-resolution SID fields are retrieved using CZI with a resolution of approximately 4 km while the grid resolution of the CMEMS SID product is 10 km. How the authors process the discrepancy of spatial resolution for the two products during the comparisons?

Line 271: “...recovered SID...” – is it “retrieved SID”?

Line 283-284: “In our study, a small template is chosen considering the retrieved...less than 0.25m/s”-why a small template will result in this result, authors can illustrate the reasons.

Line 320-321: “an RMSE” should be “a RMSE”

Line 336: “combined with Table 4 and Table 5”-is it “Table 3 and Table 4”?

Line 391: Figure 14 shows the time interval of SAR images used for the CMEMS SID products while the legend in figure 14 shows day -level (CZI)? Please recheck it.

The red line in Figure 18 is unnecessary.

Line 438: “As seen from the mean values, each quality ... than for ...”-the statement is incomplete.

Line 515: “Our method using the multi-template matching and subpixel estimation approach to retrieve SID in the FS produces a promising result. “a promising result” is not quite appropriate here.

Other comments:

The differences of quality control parameters in different regions of Fram Strait should be explained.

The paper should introduce more detailed information about HaiYang series satellites and the level of data.

The relationship between drift distance and velocity retrieval accuracy should be explained.

Whether the time interval of images is appropriate for mosaicking images?

The study explored how the distance of sea ice motion affects the accuracy of flow direction retrieval, but the theory still not clear yet.