Supporting Information for "Persistent artifacts in the NSIDC ice motion dataset and their implications for analysis"

S. Szanyi,[1] J.V. Lukovich,[2] D.G. Barber,[2] G. Haller[1]

Introduction

As we wrote in the main body of the paper, in order to ascertain that buoys are responsible for the observed circular features, we have compared NSIDC dataset with the Ocean and Sea Ice Satellite Application Facility (OSI SAF) low resolution ice motion dataset.

---

[1]Institute for Mechanical Systems, ETH
Zurich, Zurich, Switzerland

[2]Centre for Earth Observation Science,
Faculty of Environment, Earth, and
Resources, University of Manitoba,
Winnipeg, Manitoba, Canada

Data

The low resolution sea ice drift product is from the European Organization for the Exploitation of Meteorological Satellites Ocean and Sea ice Satellite Application Facility (EUMSTAT OSI SAF, www.osi-saf.org) High Latitude Processing Centre.

OSI SAF ice motion vectors are calculated by a continuous maximum cross correlation method on pairs of satellite images over 2-day intervals (Lavergne et al. 2010). Low resolution ice drift datasets are computed daily from aggregated maps of passive microwave (SSMIS, SSM/I, AMSR-E) or scatterometer (ASCAT) signals. In this comparison we use the merged (multi-sensor) dataset that combines single-sensor products and provides contiguous spatial coverage of the daily ice drift fields. As a result 48 hour global ice drift vectors at a spatial resolution of 62.5 km on a polar stereographic grid are available, for fall, winter, and spring, namely from October to May, from 2006 - 2015.

Results

We conducted an animation-based comparison, where we have checked several years of data. Since the animation-based comparison cannot be shown here, we select a time slice for ice drift speed and Eulerian divergence that most clearly depicts the circular features associated with the buoy locations. Since OSI SAF provides their data every day based on the last 48 h movements, we computed weekly averaged data and compare that with the NSIDC weekly 25km gridded data. In order to display our findings we also averaged the NSIDC data on a 50 km grid.

The ice drift speed map (Figure 1) for week 17 in 2008 shows that the two datasets capture similar large scale patterns in the speed distribution. However, some distinctive

circular artifacts can be found in the NSIDC dataset that do not exist in the OSI SAF data. An exceptionally strong feature has been highlighted by the black dashed rectangle, which can also be found on the 50 km averaged data.

The Eulerian divergence maps show the corresponding three strong circular features in the 25 km and 50 km averaged NSIDC data, as opposed to OSI SAF, where no such features are observed.

Animation appendix

In the animation appendix we show the divergence maps for 2014.

References

Lavergne, T., Eastwood, S., Teffah, Z., Schyberg, H. and L.-A. Breivik (2010), *Sea ice motion from low resolution satellite sensors: an alternative method and its validation in the Arctic*. J. Geophys. Res., 115, C10032, doi:10.1029/2009JC005958.

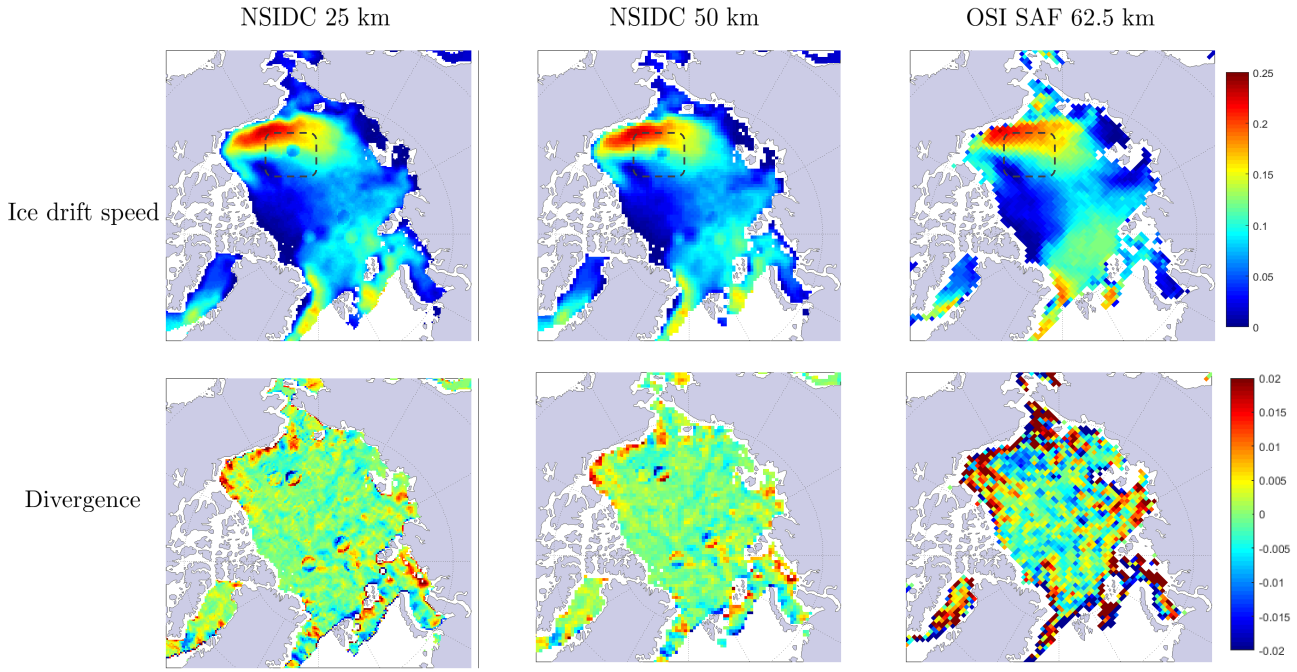

Figure 1. Comparison of the ice drift speed and the Eulerian divergence maps.