Authors' response to Short Comment 1 (D. Dukhovsky)

We would like to thank Dr. Dukhovsky for taking the time to read our manuscript and provide his comments which we find very useful. We realize that some text should be rewritten, however, our understanding of the specific issues raised by the reviewer is that they are mostly misunderstandings of our manuscript.

We first acknowledge that terms like 'displacement' and 'distance' may not be intuitively regarded as mathematically precise terms. In our manuscript various definitions in Sect. 2 are given in order to define the terminology that we have adopted. When we have received all comments to our manuscript, we will revisit the topic of terminology.

We did not provide a definition of the term "ice edge displacement", this will be included in a revised manuscript version. Tentatively, our definition is likely to be:
"In the present manuscript the ice edge displacement is the shortest distance from an ice edge position in one product to the ice edge in another product."
Metrics are then defined as various functions of the gridded displacements, as given by Eq. (4)-(7).

If we denote an 'ice edge position in one product' by a and the other product's full ice edge by B, the ice edge displacement as given above is then the distance denoted by $d(a, B)$ by Dukhovskoy et al. (their p. 5914). We reject the alternative definition that the ice edge displacement is the distance from an ice edge position in one product to any ice edge position in another product: we require that the ice edge displacement is 0 if the ice edges in two products overlap. (The comment we reply to refers to a $dist$ function which is not defined, hopefully the item has been covered by our response here.)

The comment that "d0 and dm" are not defined is incorrect ('d0' should be 'do'). We provide a definition of d in Eq. (2), and the use of subscripting has been explicitly stated in the first paragraph of Sect. 2. Nevertheless, when we revise our manuscript we will add a sentence or two for Eq. (2) to make the link between this definition and d_m, d_o even more clear.

Given the above definitions, our expression for the Haussdorf distance in Eq. (7) is identical to Eq. (10) in Dukovskoy et al. In order to remove any ambiguity, we will add a comment to the effect that d_o, d_m are the full sets of gridded displacements as given by Eq. (2). Hence, results for the Haussdorf distance are provided and discussed in our manuscript.

The comment that the modified Haussdorf distance (D_{MH}^{IE}) has not been tested is correct, and we have not stated that we test this metric. Using our definitions in Sect. 2, the term defined as D_{MHD} by Eq. (11) in Dukhovskoy et

al. becomes

$$D_{MH}^{IE} = \max\left[\frac{1}{N_O}\sum_{n=1}^{N_O} d_o^n, \frac{1}{N_M}\sum_{n=1}^{N_M} d_m^n\right]$$

using our terminology. Although we don't test this metric, we are aware of its use and discuss the close relation between D_{MH}^{IE} as given here with D_{AVG}^{IE} as given by our Eq. (5) (p. 8, l. 20-24).

Reference

Dukhovskoy, D. S., Ubnoske, J., Blanchard-Wrigglesworth, E. , Hiester, H. R., and Proshutinsky, A.:
Skill metrics for evaluation and comparison of sea ice models, J. Geophys. Res. Oceans, 120, 5910-5931, doi:10.1002/2015JC010989, 2015.