

## Response to Editor's Comments, Version 2

Editor's Comments to the Author:

Dear authors,

thank you for addressing the reviewer's comments so well and congratulations to a fine paper. Please could you consider to make the following, minor changes before we move ahead with the final publication:

P3, L18 ff: please write Envisat (lower case s)

done

P4, L27 and elsewhere: please consider to use AEM instead of Air-EM

We sympathize with the desire to be consistent with the nomenclature used in other publications, but the label Air-EM has already been used other places, most notably in the ice thickness data set Sea Ice CDR and publications that use data from it. We would prefer to keep the Air-EM nomenclature.

P7 L7-8: data: plural or singular?

Plural, fixed

P 7 bottom: check RiEdel references; should be ie?

Thanks, fixed.

P8 L10 and bottom: could you state in what sense spatial autocorrelation is accounted for, and what typical correlation lengths are assumed?

The autocorrelation is accounted for by taking a random subsample of the icesat data. The autocorrelation length scale of the residuals to the fit is about 300 km for the both icesat products and for the submarines ( a little smaller for the subs). The length scale of the observations, as opposed to the residuals, is much larger (1000 km or more) and reflects the overall thickness pattern in the Arctic.

P9 bottom: how is the decision about  $I$  made, weather it is 1 or 0?

$I$  is 1 for observations from the corresponding source and zero otherwise. This is added to the text.

P10, L15: if  $b_i$ 's are positive, doesn't that indicate that the thicknesses are thinner (not thicker) than the reference? Because adding  $b_i$  reduced the error? Maybe this isn't explained well enough; might change/revers some conclusions later on?

No, as stated the  $b_i$ 's are added to the regression expression, not to the observations. We added a few words to try to make this clearer.

P13, top: found IN the error...

Right, fixed.

P16, L20: ...Western Arctic NOW DOMINATED BY FIRST-YEAR ICE...?

Right. This has been added.

Table 1: AEM goes from 2001 to 2009; but you use data up to 2012... how come?!

Typo. Thanks.

Table 2: improve formatting

Right, Sorry.

Table 2: what coefficient is Coefficient actually? Is this the  $b_i$  from Eq 2 (see also comment above)?

The indicator coefficients are the  $b_j$  and the time and space coefficients are the  $a_i$ .  
This is now added to the table to make it clear.

Table 4: SCICEX (first S missing)

Thanks. Fixed.

Other changes:

The significance of the reference data set is made clearer on pages 10 and 13.

A map of the mean thickness is added to Figure 5 so it is more similar to Figure 4.