

Interactive comment on “A spurious jump in the satellite record: is Antarctic sea ice really expanding?” by I. Eisenman et al.

I. Eisenman et al.

eisenman@ucsd.edu

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The comments by Grant Foster and Kevin Cowtan both raise a helpful point. If Version 1 does not contain an error and Version 2 does, then the finding of no statistically significant trend in the IPCC AR4 is correct. But is the trend significantly positive when data is included for the additional years since the AR4?

As suggested in both comments, we can make an approximation of the effect of the additional years in the record by using the Version 2 dataset with $0.16 \times 10^6 \text{ km}^2$ subtracted from all points after December 1991 (0.16 is chosen to best match the Version 1 trend for the record endpoints plotted in Fig. 1B). We have included this in the revised manuscript, where we call this record “Version 1B”: it is an approximation to Version 1 that extends to 2012 rather than 2004. The IPCC AR4 assessed statistical

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significance by using annual data and a 90% confidence interval. They used Version 1 data and reported a 1979–2005 trend of $5.6 \pm 9.2 \times 10^3 \text{ km}^2/\text{yr}$. Retaining this methodology, we find that the 1979–2012 trend in Version 1B is 10.5 ± 6.7 . If instead we use monthly data (still with a 90% confidence interval), as in the IPCC AR5, we find a trend during 11/1978–12/2012 of 10.3 ± 3.5 in Version 1B, compared to 16.5 ± 3.5 reported in the IPCC AR5 which used Version 2.

In other words, this suggests that if Version 1 is correct, and if Version 1B is an accurate approximation of it, then the current trend would be smaller than has been reported, but it would still be significantly positive when data is updated to 2012. The numbers above imply that somewhat more than half of the increase in trend from the AR4 to the AR5 can be attributed to the change in dataset rather than just the additional years of data. It should be emphasized that the 90% error bars mentioned here do not include any uncertainty associated with the satellite retrieval, and the systematic differences between datasets discussed in the Discussion paper suggest that this may be a considerable source of uncertainty which could expand the error bar substantially.

We appreciate both commenters suggesting this point, which we address in the revised manuscript. We have changed the title of the revised manuscript to “A spurious jump in the satellite record: has Antarctic sea ice expansion been overestimated?”, adjusted the text in the revised manuscript to explain that these results raise the possibility that the trend has been overestimated (rather than that it is insignificant), and added trends computed from Version 1B to the discussion and supplementary figures. These trends are summarized in the revised manuscript in a new Table S1.

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