

Interactive comment on “Arctic Ocean geostrophic circulation 2003-2014” by Thomas W. K. Armitage et al.

Anonymous Referee #1

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Arctic Ocean Geostrophic Circulation, 2003-2014 by Armitage et al.

I enjoyed reading this paper which is well written and clearly set out. It describes the geostrophic circulation of the Arctic over the past 10 years or so derived from thermal wind calculations based on dynamic height estimates given in Armitage et al (2016). It is not clear to me the extent to which the study moves the field forward – I am not an Arctic expert and it is difficult for me to judge. The study is rather descriptive, however, and needs to be firmed up.

I have some suggestions that make help to make the paper more substantive.

1. How do the analysis presented here (and in Armitage, 2016) compare with other state estimates of the Arctic such as MIMOC, WOA, PHC or the NCEI climatology, or, eg., ocean data assimilative products? Do other analyses lead to essentially the same

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circulation, T, S, ice pattern changes over the last decade? Is it possible to estimate the error bars or uncertainty on your estimates somehow?

2. The paper is very descriptive and there is little discussion of underlying mechanisms. Can the authors delve a little deeper and do more than describe what is happening and reporting that 'so-and-so said this' etc. At the moment the paper is very value-neutral and not very deep. It would be good to have some viewpoint expressed.

3. There has been considerable effort by the community to measure time-series across key Straits - Fram, Davis etc. Why not compare the estimates derived here with those that are directly measured? Is it because one needs the Ekman transport too? – but that would be directly and readily given by the wind, mediated by ice. Instead we are presented with geostrophic transports through the mini-sections shown in Fig.4, sections that have not been instrumented and thus not directly measured. This is a rather serious shortcoming of the paper I believe.

4. The paper would benefit from a plot of timeseries of key metrics such as FWC, AOO, sea-ice extent etc etc, so that they can be compared with those presented by, e.g, Proshutinsky.

Fig.1 is key, could be a very useful figure, and yet not easy to read. The labels need to be more distinctive and the confluence of dark blue and dark grey is not easy to parse. Could this be redrawn with attention to labels, colors etc so that they can be more easily read.

Fig.7 also needs some attention. Many of the details cannot be discerned.

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