

The Cryosphere Discuss., author comment AC3
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Response to Xuying Liu

Anne Braakmann-Folgmann et al.

Author comment on "Tracking changes in the area, thickness, and volume of the Thwaites tabular iceberg "B30" using satellite altimetry and imagery" by Anne Braakmann-Folgmann et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-13-AC3>, 2021

Thank you for your short comment and interest in the paper. We added the following paragraph to discuss this in the paper:

"Besides the observed thinning, the iceberg also seems to slightly thicken between mid-2014 and early 2015. During this time B30 was very close to the coast (Fig. 3b-d). Therefore, a range of processes – both physical processes that impact the actual thickness of the iceberg and processes that impact the freeboard measurement – could have caused this gain in thickness: First of all, iceberg thickness can increase through marine ice formation, when the iceberg is surrounded by very cold water. It can also grow through snow accumulation on the surface, which we account for, but only based on reanalysis data and there might be additional local snowfall or snow accumulation through strong katabatic winds from the near-by continent. Furthermore, external forcing from fast ice and/or collisions with the adjacent ice-shelf might have led to a deformation and hence a compression in some parts. All of these processes can cause a physical increase in iceberg thickness. Apart from that, a short (partial) grounding could lead to higher measured iceberg freeboards. Also surface melting could shift the scattering horizon of CryoSat-2 and therefore appear like a freeboard increase. Indeed we observe a steep increase in degree hours around the turn of the year 2015. What caused the signal in this instance is hard to disentangle. Most probably, it was a combination of several of the mentioned effects."