The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2019-293-RC2, 2020

The Cryosphere Discussions
Open Access
EGU

Interactive comment on "Seasonal and interannual variability of landfast sea ice in Atka Bay, Weddell Sea, Antarctica" *by* Stefanie Arndt et al.

Anonymous Referee #2

Received and published: 16 March 2020

The paper summarizes a decade of annual in-situ fast-ice observations in Atka Bay, which is the longest and most continuous time series within the Antarctic Fast Ice Network (AFIN). The main dataset is a semi-continuous record of fast-ice thickness, snow depth, freeboard, and sub-ice platelet layer thickness that was collected by overwintering teams between 2010 and 2018. In addition to determining the spatio-temporal variability of the fast-ice cover, this data is co-analyzed with meteorological and oceanographic observations in order to determine how snow and platelet ice influence the local fast-ice mass budget. The discussion at l, 47 p.20 starts with: "In contrast, the relatively thick snow layer on the fast ice in Atka Bay prevents a significant light input to the sea-ice bottom and thus additional biomass production." This statement is speculative considering the absence of light measurements and associated biological production

Printer-friendly version

Discussion paper

under the fast ice reported in this study. There is no basis for assuming that the snow cover leads to reduced light and effects on the biological production without specific knowledge of either the light field or the particular organisms that may be, for example, highly shade adapted. Further speculation in subsequent lines that cracks and leads and distance from the ice edge presumes another effect, the increasing light level on the ecosystem. While light may be one component of the algal development in platelet ice, the exchange of seawater with nutrient loads may be even more important for example. As these statements are clearly outside the scope and measurements reported here, I recommend this discussion be deleted. In general, the paper represents a good description of the fast ice features within Atka Bay although lacking some important considerations of the work in McMurdo Sound that the other reviewer has provided more details on. With some modification as outlined here and there, I recommend the paper be published.

Specific Comments

l.27 Replace images with image l. 92 change “today” to 2018/2019 (here and elsewhere) l. 95 delete “a” l.:83 6.2 5m sounds off compared to surrounding values. Is it 0.625 m instead? (See Fig 4 for ATKA11)

l.:88-89 sounds confusing: in summer showing sea ice growth rates increasing, or should it be decreasing? l.05 (105 pg.15?) should decrease be decreases? p.19 l.31 change plate to platelet? p.20 l.47 change concealed to congealed p.20 l-47-54 Heavy algal formation in platelet ice also observed in McMurdo Sound, many km from the light sources mentioned here(ice edge, cracks etc), so organisms may be instead very shade adapted. The strong accumulations also suggest continuous supply of nutrients into the platelet layer so the processes of convective overturning (possibly tidal forcing also) may be responsible for the high algal growth rates in the platelet layer. Experiments by Sullivan and colleagues with varying depths of snow artificially placed on or removed from the ice surface showed that growth proceeded best with an optimal snow depth, rather than no snow. Probably delete this discussion since it is not

Printer-friendly version

Discussion paper

supported by measurements or adequate referencing.

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2019-293, 2020.