Supporting Information for
"Southern Ocean BGC-Argo Detect Under Ice Phytoplankton Growth Before Sea Ice Retreat"

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Additional Supporting Information

Figures S1-S4 provide additional examples to supplement Figure 3 in the paper. Figures for all time series analysed in this study can be provided on request. Panels in Figure S5 are identical to Figure 6 in the paper, but show the relation between sea ice concentration and phenology for the other 3 study regions in the Weddell and Bellingshausen/Amundsen Seas. Note that the marked early decrease in sea ice concentration shown in Figure S5B is due to the formation of an open ocean polynya associated with the Maud Rise seamount 2017 only (see *Jena et al.* [2019]), all other years have concentrations above ~90% until retreat in late November.

References

Jena, B., M. Ravichandran, and J. Turner (2019), Recent Reoccurrence of Large Open-Ocean Polynya on the Maud Rise Seamount, *Geophysical Research Letters*, *46*(8), 4320–4329, doi:10.1029/2018GL081482.

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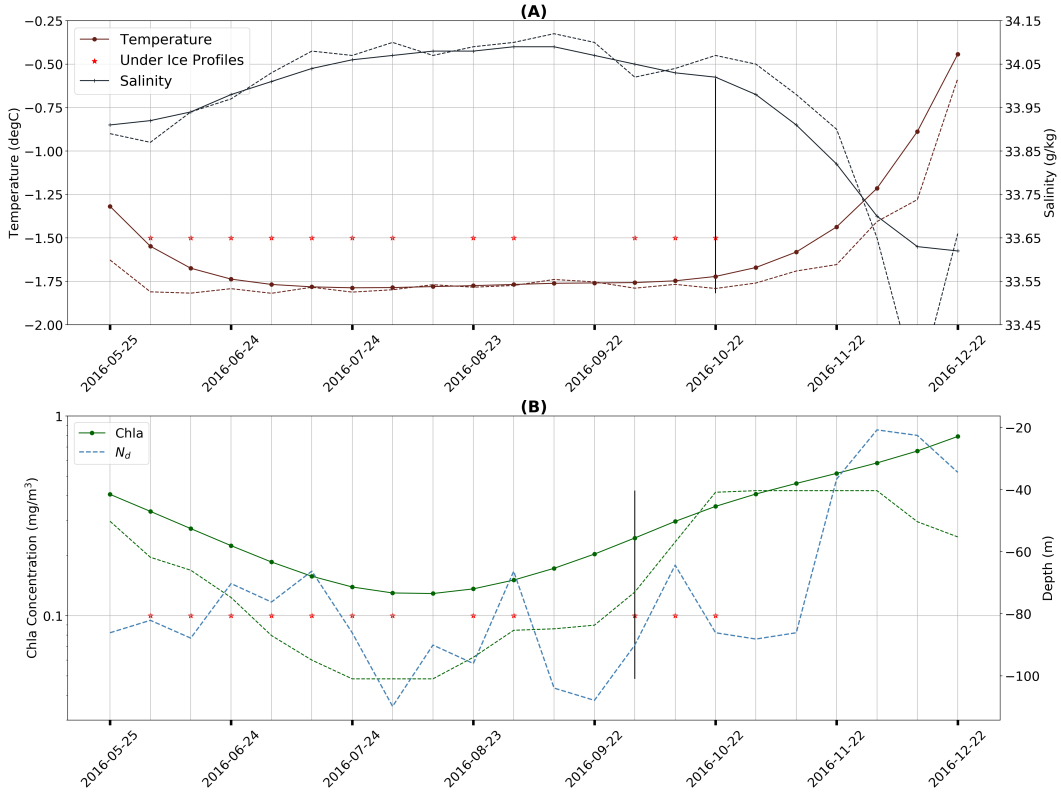

Figure 1. Additional time series of key properties as in Figure 3, but for a float in the Indian Ocean sector at ~63°S in 2016.

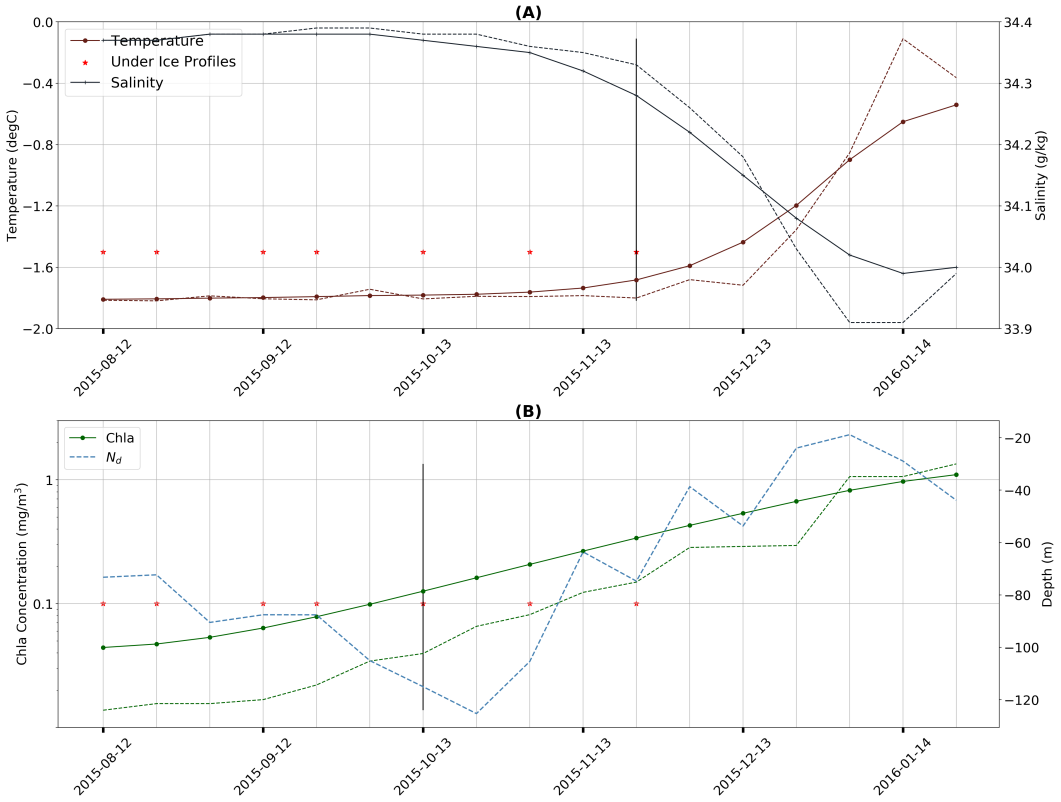

Figure 2. The same as above, but for a float in the western Weddell Sea (~ 40°W) at ~68.5°S in 2015.

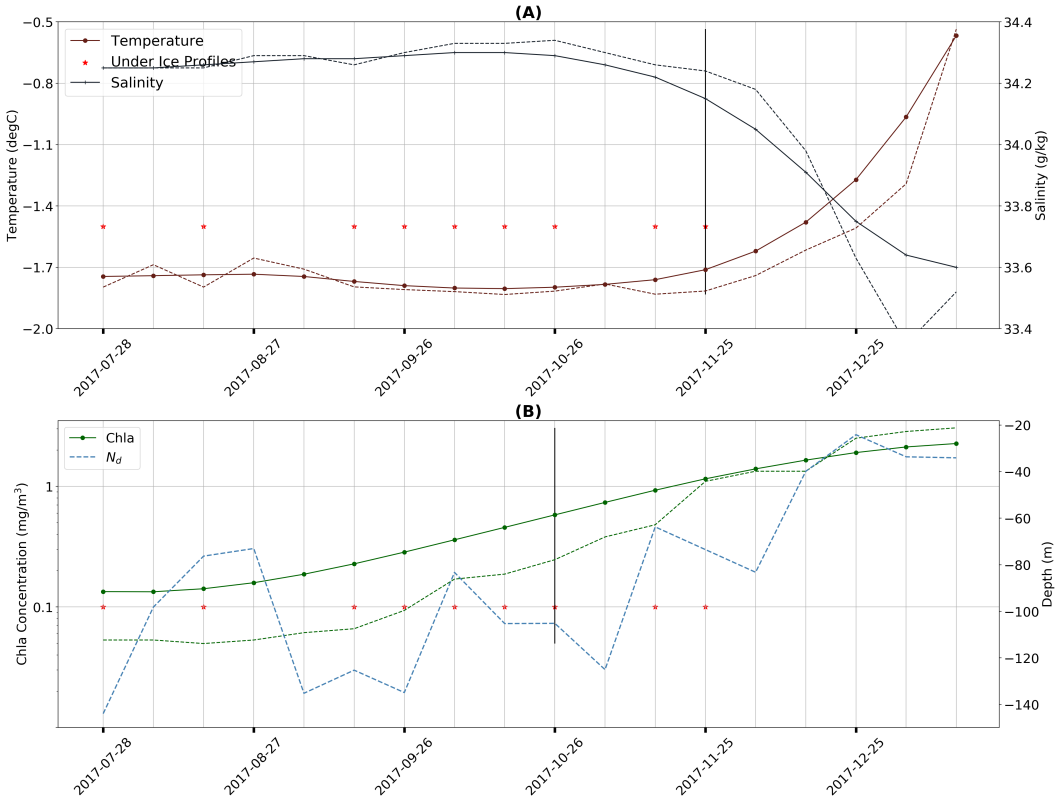

Figure 3. The same as above, but for a float north east of the Ross Sea at ~65°S, ~168°E in 2017.

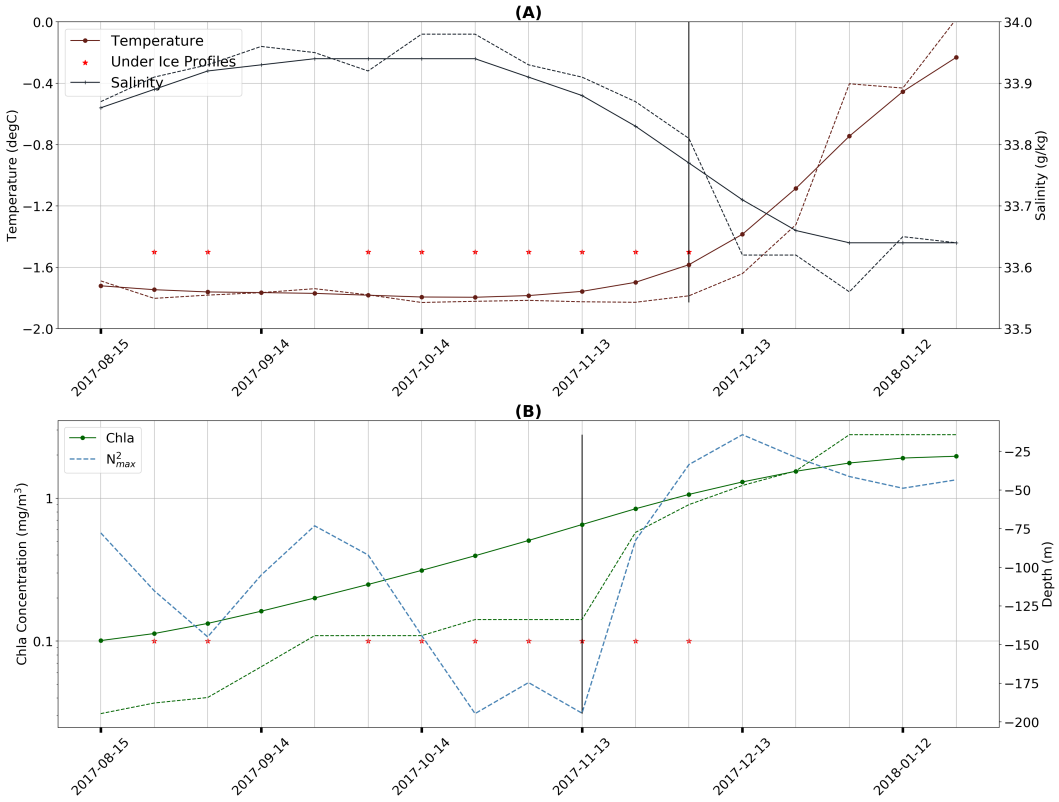

Figure 4. The same as above, but for a float in the Bellinghausen/Amundsen Sea at ~68°S in 2017.

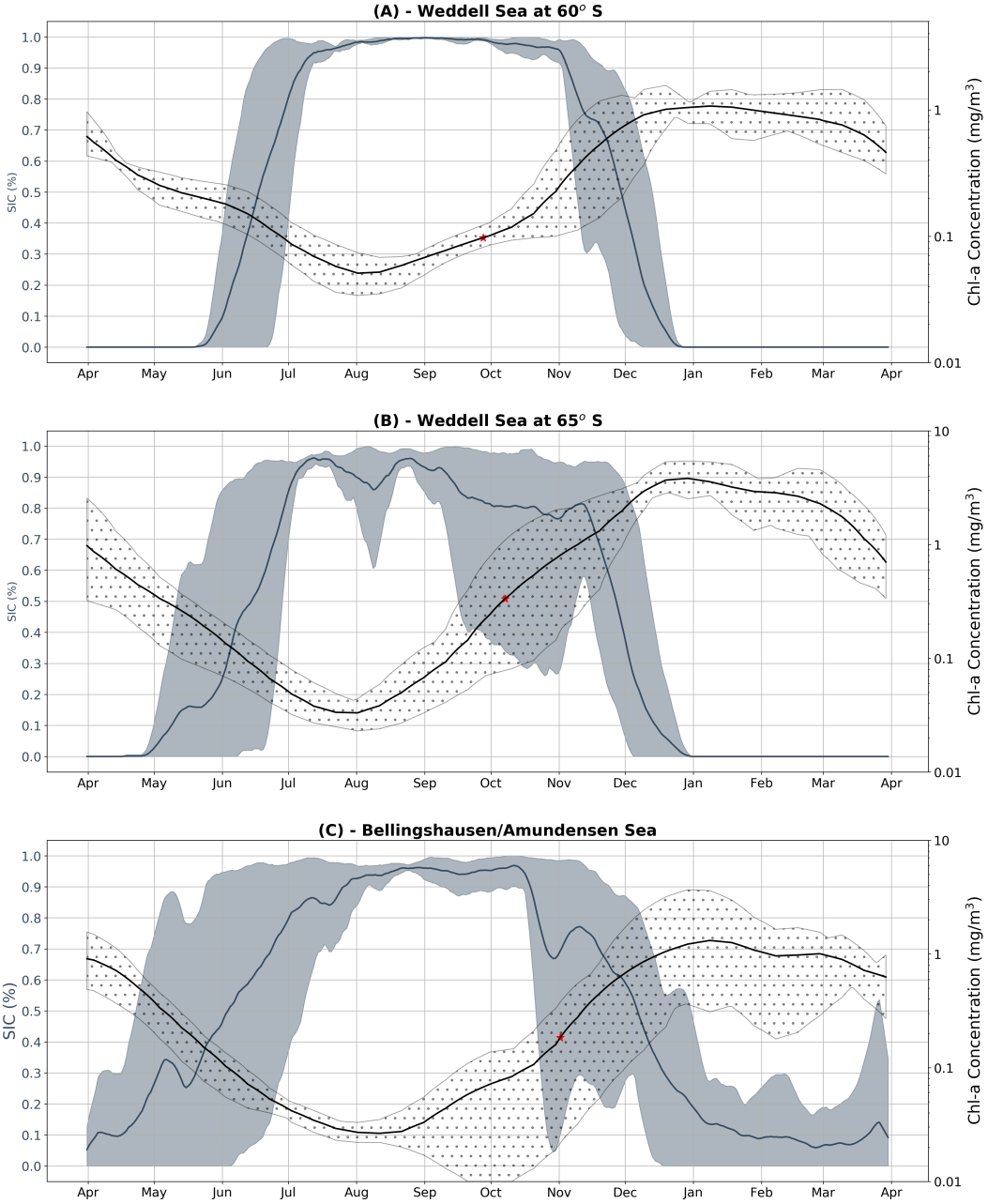

Figure 5. Time series of satellite sea ice concentration versus float mixed layer chl-a as in Figure 6, except for regions **(A)**: W60 , **(B)** W65 and **(C):**B70.

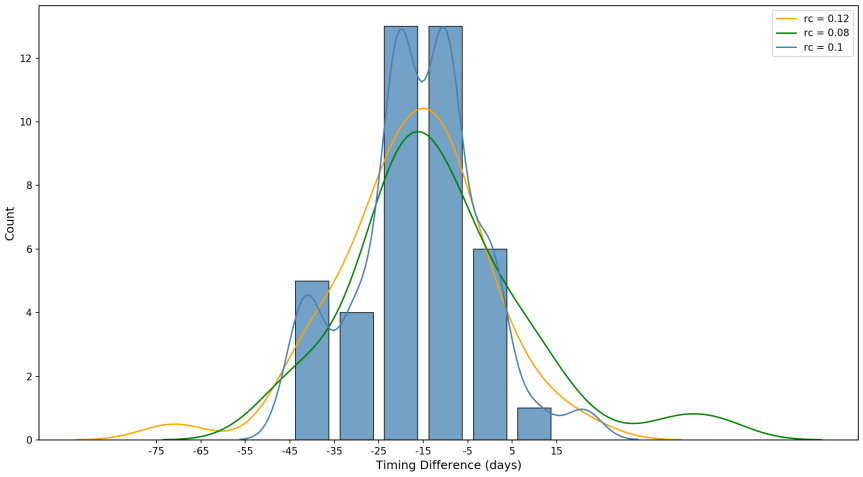

Figure 6. The same as Figure 5 in the paper, but with GI computed using the mean mixed layer POC rather than chl-a.