

## ***Interactive comment on “Ocean acidification state in western Antarctic surface waters: drivers and interannual variability” by M. Mattsdotter Björk et al.***

### **Anonymous Referee #3**

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#### General Comments

Surface data from 4 Antarctic cruises along the Amundsen and Ross Sea are the main motivation of this manuscript. Although these areas have been poorly studied in terms of carbonate system and were qualified as regions very sensitive to the pH decrease, the proposed article shows only an interannual comparison of carbonate variables, trying to relate them with the sea-ice coerture, salinity and chlorophyll levels. The manuscript seems to be rather a preliminary report with a short inclusion of a general discussion about the trends in the saturation levels of CaCO<sub>3</sub>, which are not very well supported by the data shown in the manuscript. The authors link directly the chlorophyll level with the net primary production when it is only a proxy. Besides, the authors

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introduce the term ‘drivers’ to describe ‘state variables’ as total dissolved CO<sub>2</sub> and saturation levels. It is not enough clear why the changes found in different years are due to interannual changes or changes in the seasonal cycle phase. Depending of the phase of the seasonal cycle, the low salinity lens produced by the melting are accompanied of high chlorophyll levels, high pH and high saturation CaCO<sub>3</sub>. But, it is depending of the other physical drivers that the low salinity water could also be associated with low saturation CaCO<sub>3</sub>. The interannual variability is rather difficult to address when data are quite scarce and the cruise tracks are quite different. Even the spatial patterns show not statistically significant differences between the drivers for the two regions analysed. The future predictions of the CaCO<sub>3</sub> trends assessed in the paper are not based in the data shown but in the tentative assumption of total inorganic CO<sub>2</sub> increase without any evaluation of the uncertainty. Besides, the conclusions are rather general.

Other comments: CT measurement is not clearly explained. The Principal Component Analysis description and results are barely explained and it does not give any additional assessment of the results. Could it be used for future predictions? What does it mean: “All carbonate system parameters showed modest variability in the PFZ north of 65°N” in line 17 of pag 7890. Line 1 in page 7894 “regard to aragonite,” should be “regard to calcite” Figures are quite difficult to see, especially fig 6.

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