

## Response to RC2

Thank you for your time and constructive comments on the manuscript “Impacts of anomalies in Arctic sea ice outflow on sea ice in the Barents and Greenland Seas during the winter-to-summer seasons of 2020”. We would carefully consider each comment, and make corresponding changes based on the feedback provided in all cases.

### Minor comments:

Lines 19–20: I think “an extremely low Chlorophyll-a concentration observed over the BGS in April” is not supported by Figure 9. The anomaly of Chlorophyll-a concentration over the BGS in April 2020 is small shown by Figure 9a.

Reply: Thank you for comments. We will revise this sentence. In fact, the extremely low Chlorophyll-a concentrations only occur over the southern Greenland Sea in April 2020.

Line 47: Change “in the BGS” to “in the Barents Sea”.

Reply: We will revise the inappropriate description.

Figure 2: Add ice drift velocity anomalies to the second and fourth columns.

Reply: Thank you for the reminder. We will calculate corresponding anomalies of sea ice drift velocity and add them to the second and fourth columns of Figure 2.

Lines 251–253: “the anomalies of sea ice volume outflow in winter–spring 2020 were expected more obvious than the SIAF anomalies” may be not true. Because the ice thickness has larger negative trend than ice concentration during winter–spring over these regions, so it may lead to the volume outflow anomaly ranking is less obvious than the SIAF anomalies.

Reply: We realize that such a sentence is not as rigorous, although we assume that most of these outflows are relatively thicker ice to reach such a conclusion. Since we lack observations of sea ice thickness in the outflow regions to quantify the sea ice volume outflow anomaly, we will revise this supposition.

Lines 319–320: How to estimate SIT changes using the Eq.4 is not very clear. I think the surface heat flux anomalies shown in Figure 7 are the results for the whole BGS. Considering parts of BGS are ice-free, it is not a good idea to estimate SIT using the anomalies over the whole BGS. Using the surface heat flux anomalies only over the climatological ice-covered regions is more reasonable.

Reply: This is a good point. Using surface heat flux anomalies in the entire BGS to estimate SIT changes is really not reasonable. We will re-estimate the change in SIT using Equation 4, using the surface heat flux anomaly over the climatological ice-

covered regions of the BGS.

[Line 343-345: How many years with extreme high or low are examined here?](#)

Reply: According to the definition of extreme high (low) phase of AO and CAI, there are 2 (5) years of extreme positive (negative) for AO and 6 (4) years of extreme positive (negative) for CAI in the period 1988–2020. The number of extreme high (low) years will be given in appendix Figure A1 for illustration purposes.

[Line 388-389: It's good to add an appendix figure to support the conclusion of "The Chl-a over the southern Greenland Sea in April 2020 was smaller compared to the previous 5 years".](#)

Reply: Following this suggestion, we will add a figure in the appendix, which is a time series plot of regional mean Chl-a concentration, to show the changes in Chl-a over the southern Greenland Sea in April 2005–2020.