Supporting Information for
“Recent sea ice decline did not significantly increase the total liquid freshwater content of the Arctic Ocean”
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Supporting Information, Figure S1: Anomaly of Arctic (a) sea ice volume and (b) September sea ice extent. The simulated sea ice volume is compared to the PIOMAS model result [1]. The sea ice extent observational data is provided by Fetterer et al. (2016) [2].

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Supporting Information, Figure S2: Difference of the sea ice (a) concentration, (b) thickness and (c) thermodynamic growth rate and (d) the ocean evaporation rate between the “control” run and the “climatology” run averaged from 2006 to 2015. The difference of the evaporation rate between the runs is much smaller than that of the sea ice thermodynamic growth rate. The black contour lines indicate the 500 m, 2000 m and 3500 m isobaths.

Supporting Information, Figure S3: Difference of mean sea surface height (SSH) between the two simulations (“control” minus “climatology”) averaged over the last 10 years. The black contour lines indicate the 500 m, 2000 m and 3500 m isobaths.
Supporting Information, Figure S4: Sea level pressure (SLP) anomaly for 2012 (referenced to the mean over 1971–2015).

Supporting Information, Figure S5: (a) Time series of mean Barents Sea Opening (BSO) passive tracer averaged above the S=34.8 isohaline in the Eurasian Basin in the two simulations. (b) The same as (a) but for the BSO passive tracer averaged below the S=34.8 isohaline. Note that the passive tracer concentration is not saturated, at least in the lower layer. So the trend in the curves just indicates that the tracer is still filling up the ocean. What is relevant to our discussion is the different situations in the upper and lower layers: “control” has a higher tracer value in the upper layer, while it has a lower tracer value in the lower layer.
Supporting Information, Figure S6: (a) The winter (March and April) mixed layer depth (MLD) in the period 2011–2015 in the “control” run. (b) The same as (a) but for the mean over 1980–2010. The black contour lines indicate the 500 m, 2000 m and 3500 m isobaths.

Supporting Information, Figure S7: Difference of ocean potential temperature between the “control” and the “climatology” runs averaged from 2011 to 2015: (a) at the surface and (b) at 100 m. The black contour lines indicate the 500 m, 2000 m and 3500 m isobaths.
Supporting Information, Figure S8: Anomaly of the liquid freshwater content (FWC) in the (a) Amerasian Basin and (b) Eurasian Basin. The plots indicate that the ocean warming over the continental shelves does not impact on the liquid FWC.

Supporting Information, Figure S9: (a) Vertically integrated FWC (m) simulated in the control run averaged from 1975 to 2000. (b) Vertically integrated FWC from the PHC3 climatology [3]. The model overestimates the mean state of the liquid FWC. Accordingly, the anticyclonic circulation is stronger than it should be, which shifts the front between the Pacific and Atlantic Waters towards the Siberian Shelf.

References

