



*Supplement of*

## **Spatial distributions of iron and manganese in surface waters of the Arctic's Laptev and East Siberian seas**

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Figure S1

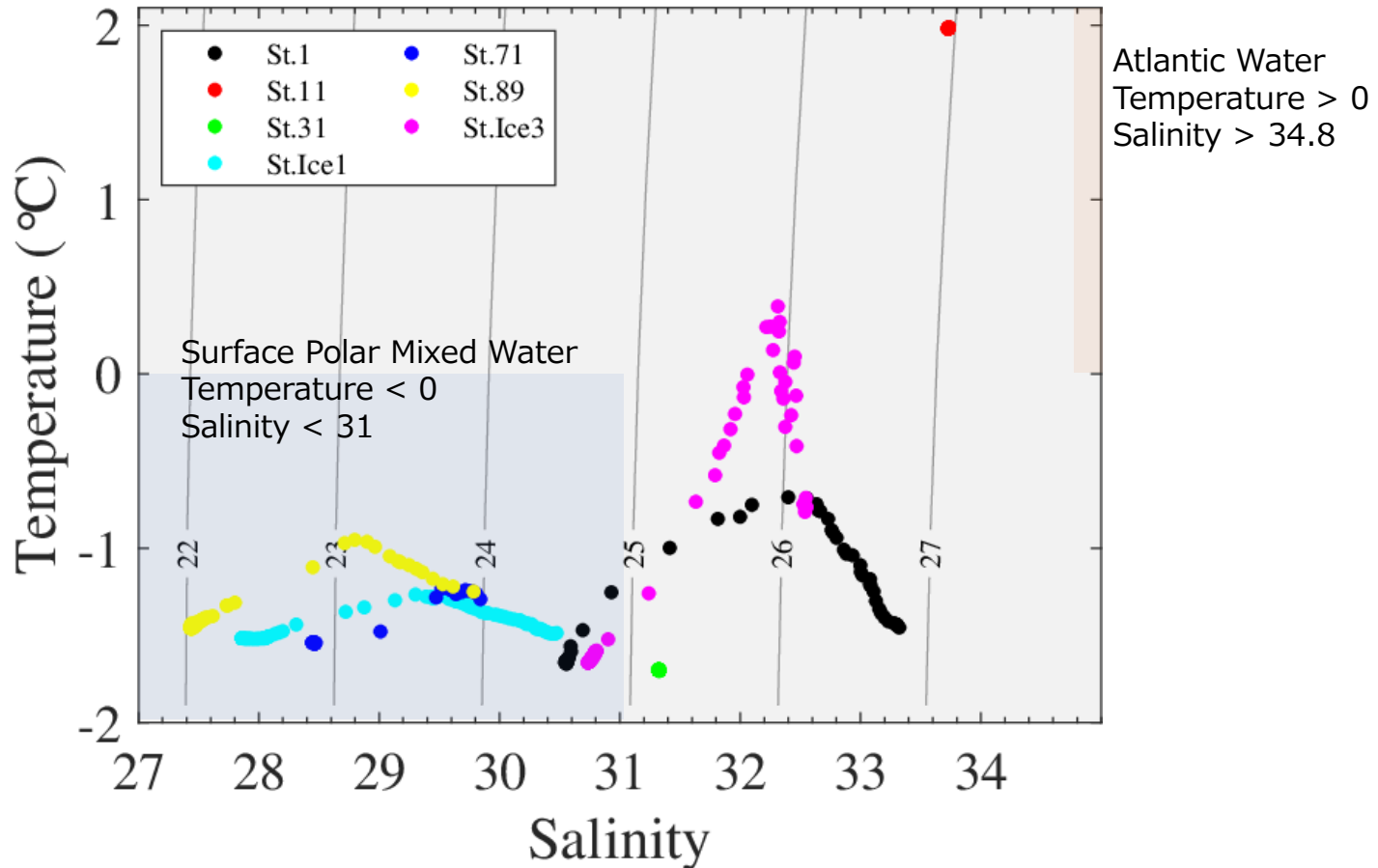
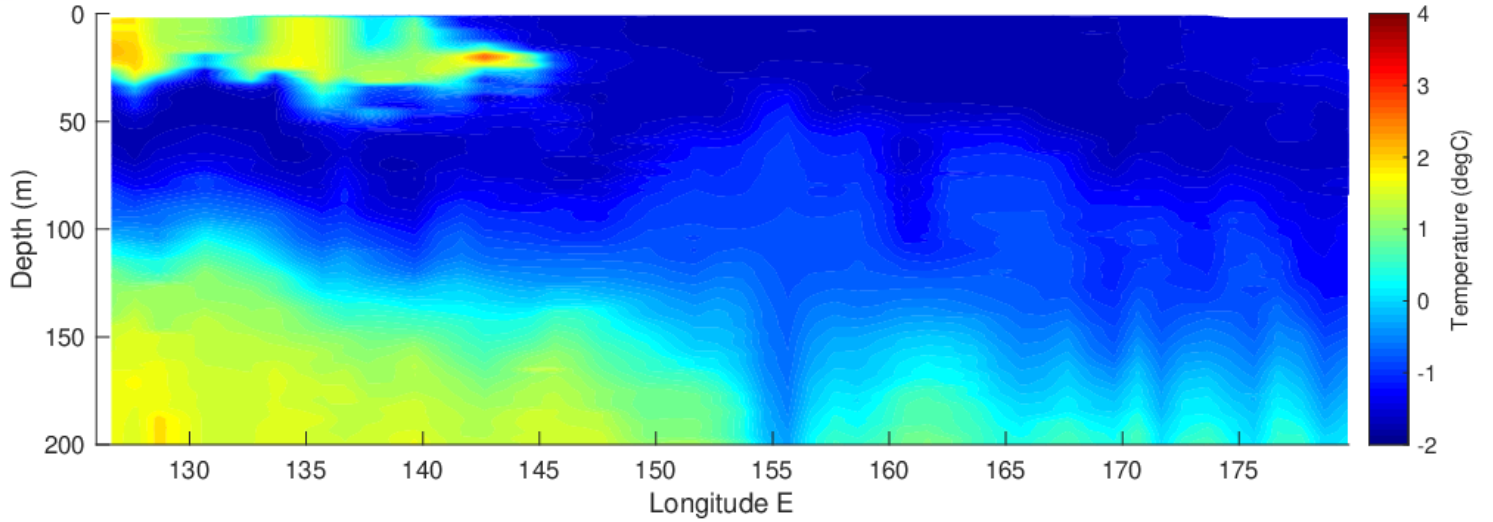
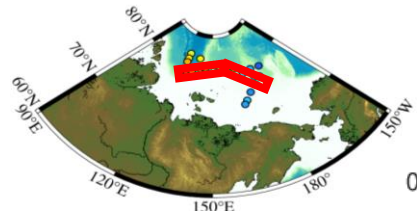


Figure S1 Temperature versus salinity diagram on the 0–30 m depth with stations sampled in the Arctic’s Laptev and East Siberian Seas. The temperature and salinity ranges of Surface Polar Mixed Water and Atlantic Water are indicated by blue- and red-hatched areas, respectively.

Figure S2



Surface Polar Mixed Water

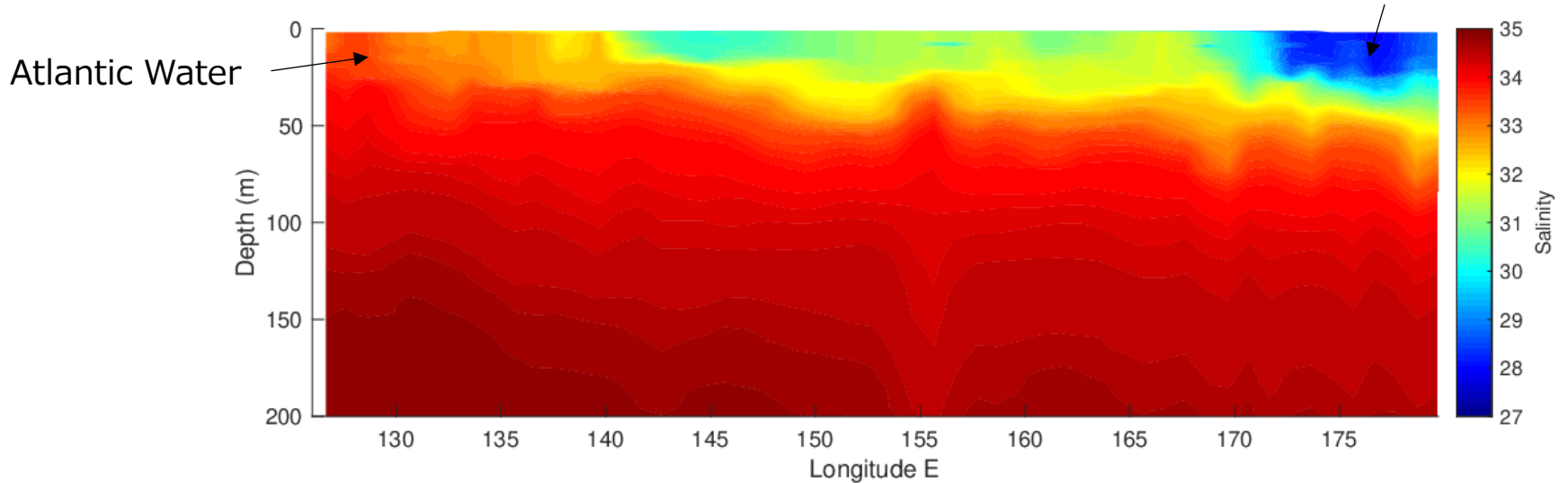


Figure S2 Longitudinal vertical section of temperature and salinity in the Arctic's Laptev and East Siberian Seas.

Figure S3

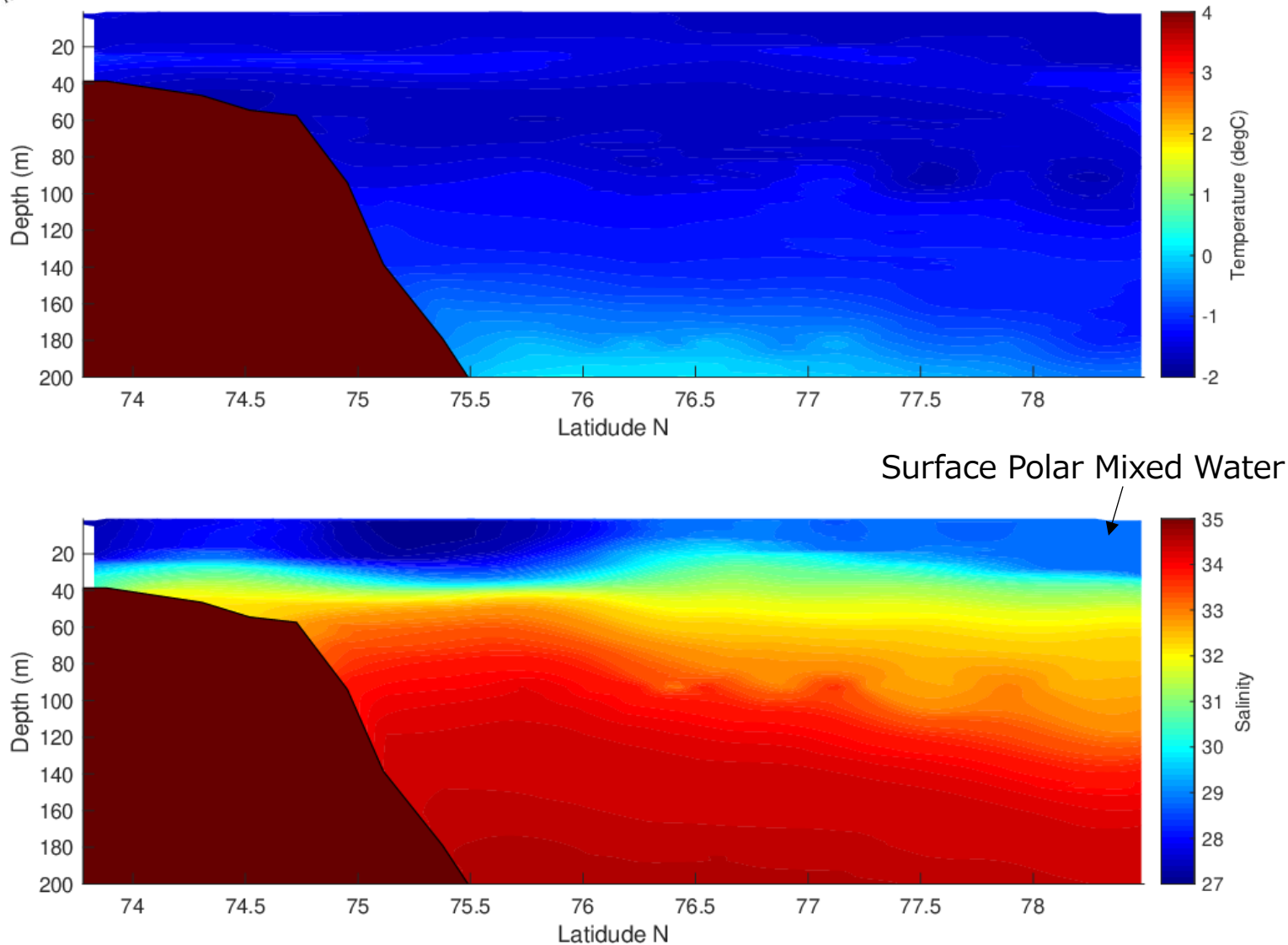
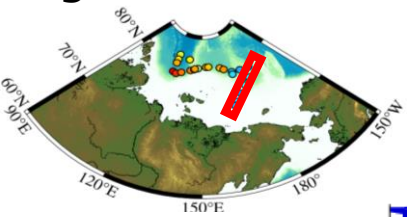


Figure S3 Latitudinal vertical section of temperature and salinity in the Arctic's Laptev and East Siberian Seas.

Figure S4

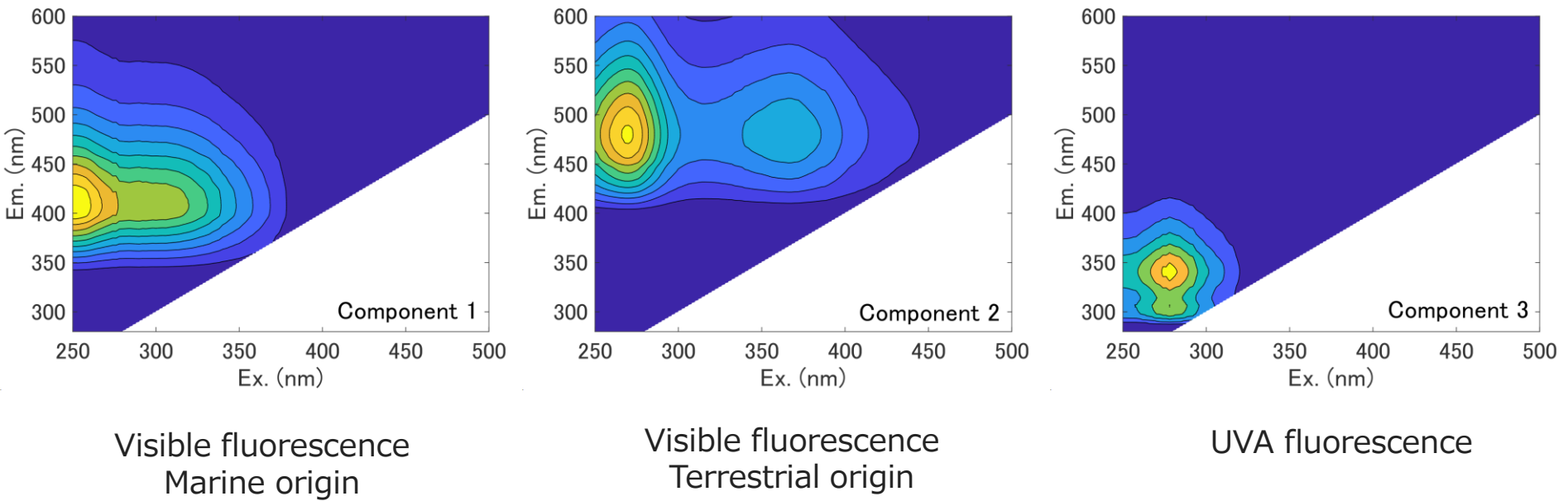


Figure S4 A three-component model validated on the PARAFAC modeling

Figure S5

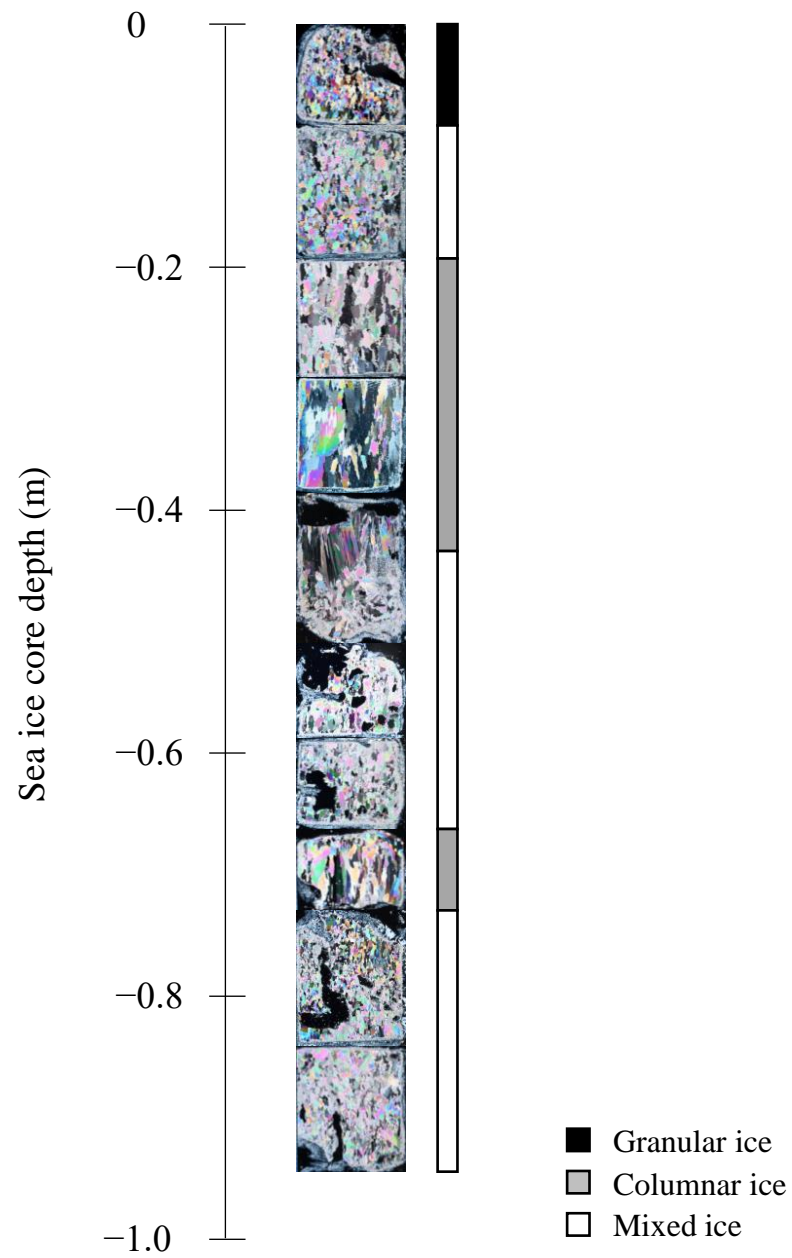


Figure S5 Result from thin section analysis of an ice core at St. Ice 2. Mixed ice indicates a mixture of granular and columnar ice.

Figure S6

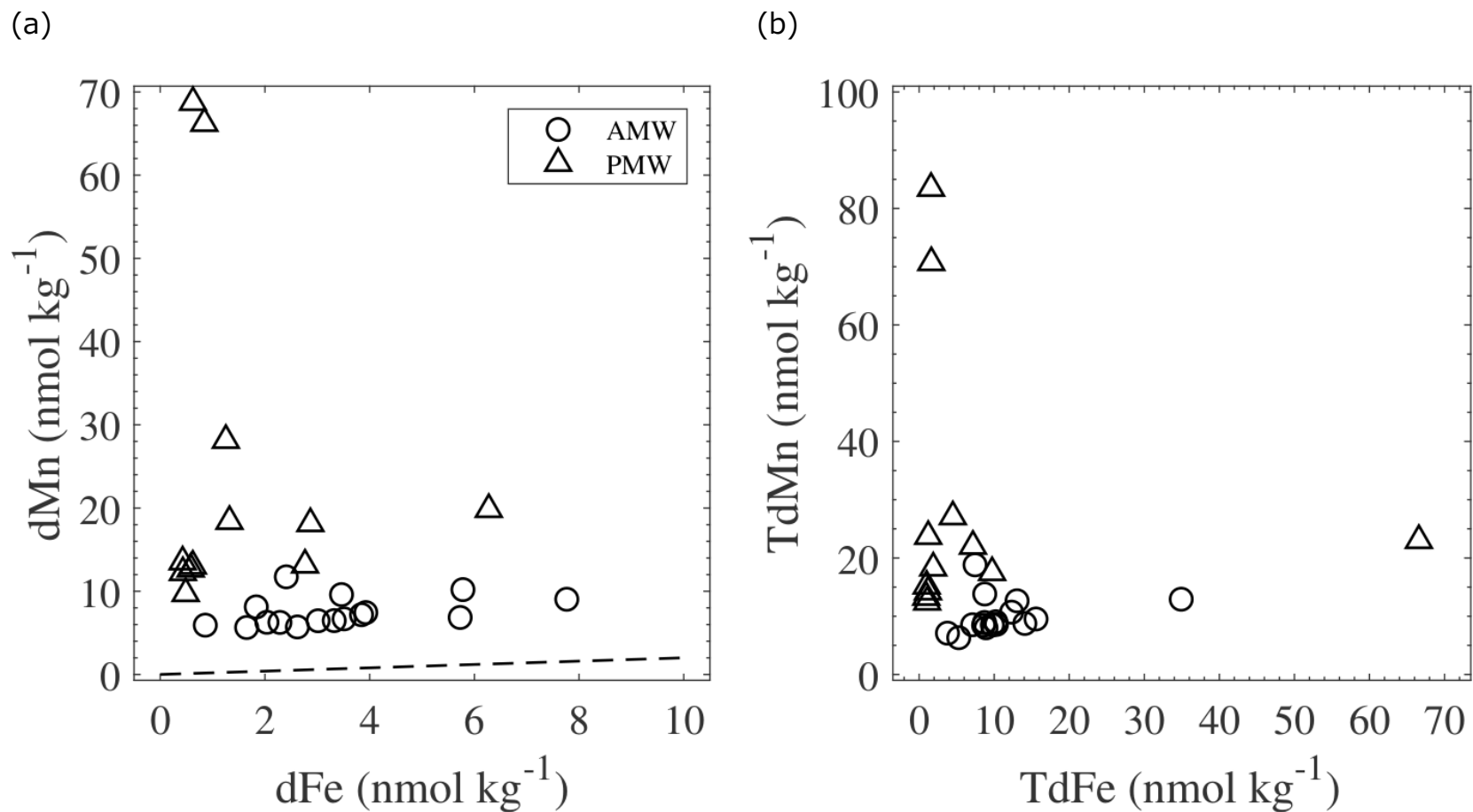


Figure S6 (a) Plot of dMn in Surface Atlantic Mixed Water (AMW) and Surface Polar Mixed Water (PMW) against dFe. (b) Plot of TdMn against TdFe. The dashed line in (a) presents the relation of both metals found in the deeper waters (>3000 m) of the Amundsen and Makarov Basins, with a correlation:  $[dMn] = (0.15 \times [dFe]) / 0.75$  (Klunder et al., 2012).

Figure S7

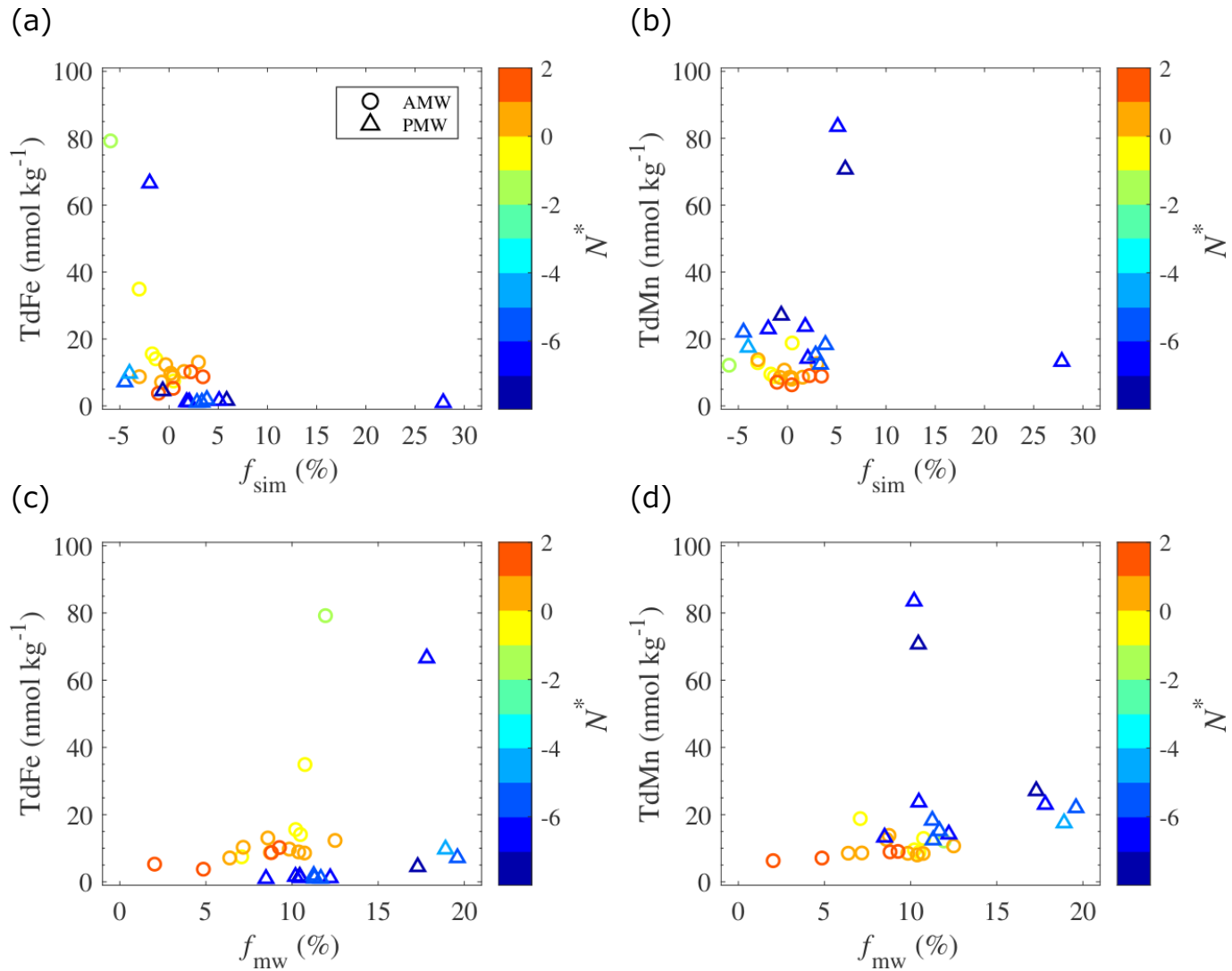


Figure S7 Plots of TdFe and TdMn in Surface Atlantic Mixed Water (AMW) and Surface Polar Mixed Water (PMW) against fractional sea ice meltwater ( $f_{sim}$ ) in (a) – (b) and meteoric water ( $f_{mw}$ ) in (c) – (d). The color scale shows the  $N^*$  values of each water sample.



Figure S8

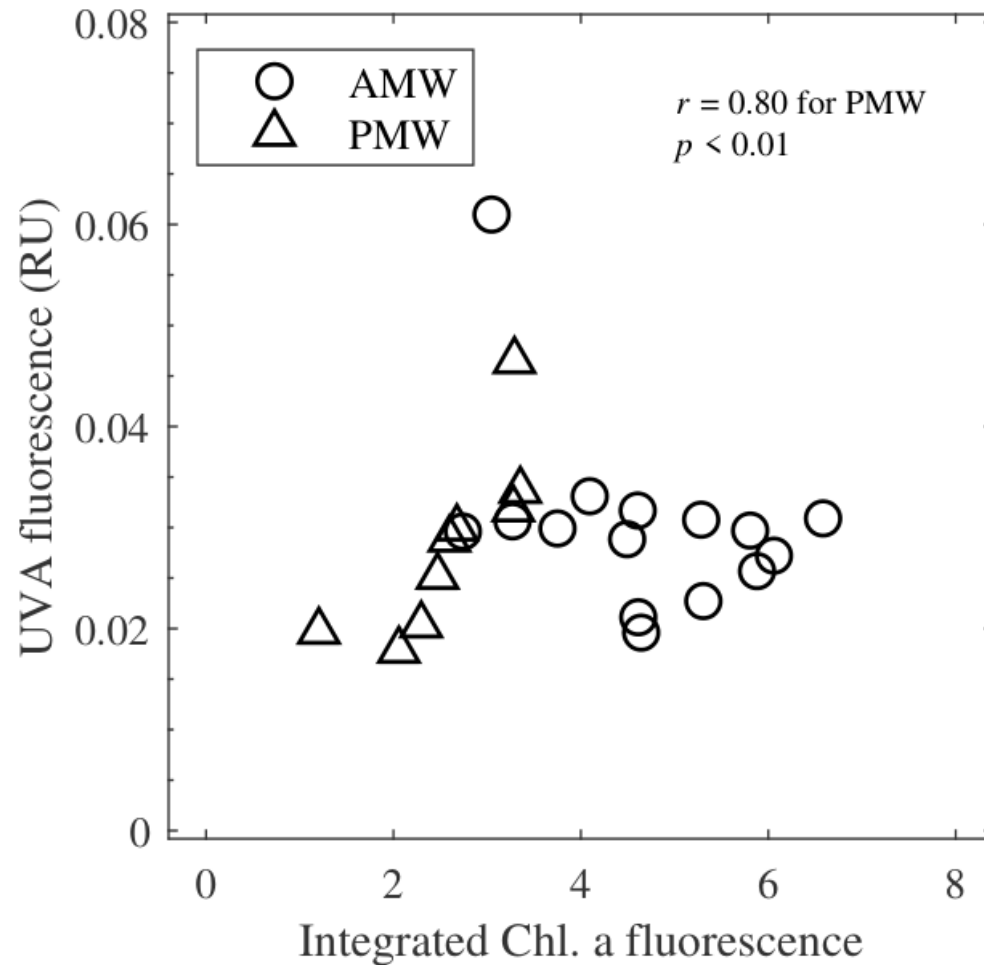


Figure S8 UVA fluorescence versus integrated Chlorophyll a fluorescence over the water depth of 0-10 m in Surface Atlantic Mixed Water (AMW) and Surface Polar Mixed Water (PMW).