Supplementary figures

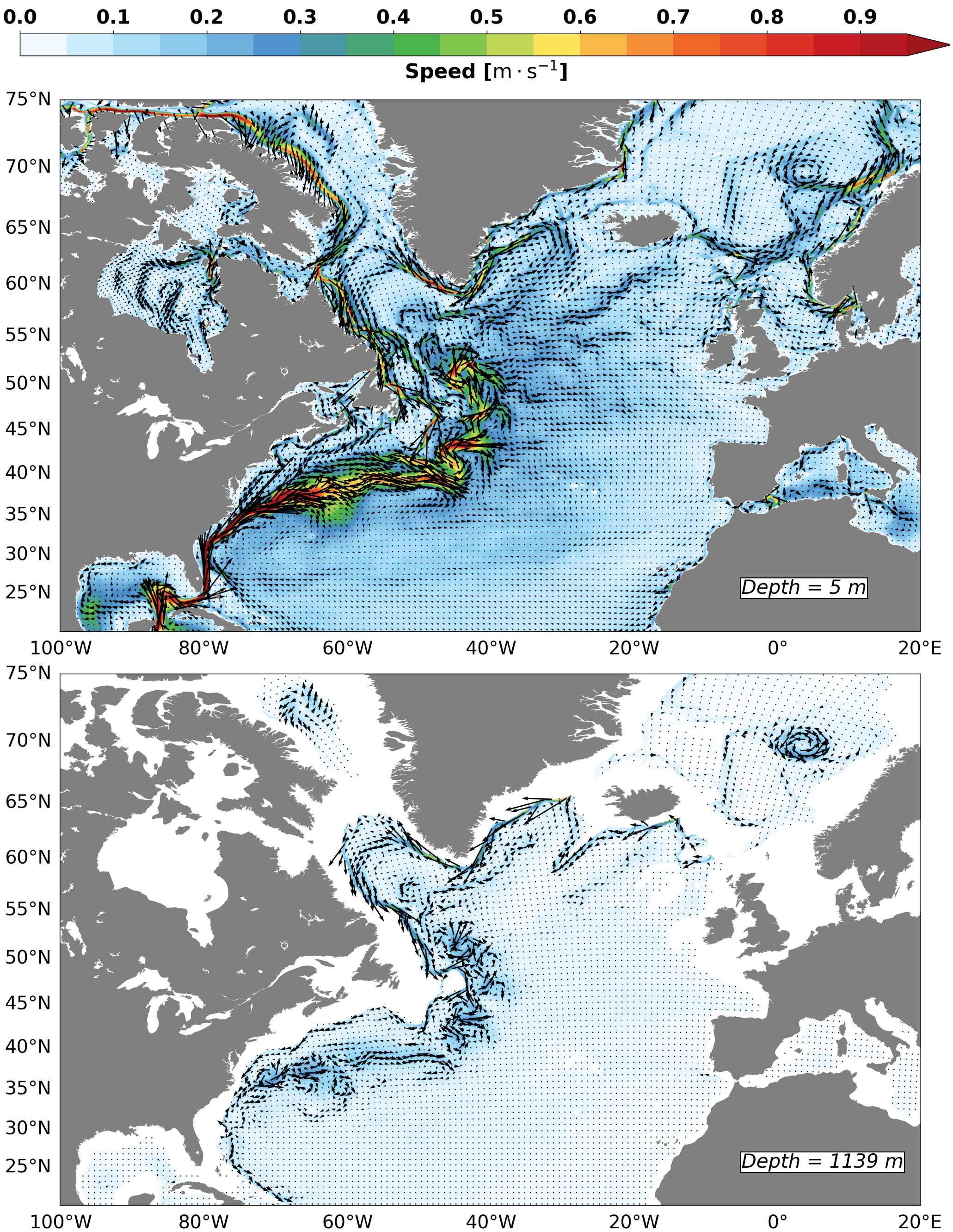

Figure S1. North Atlantic mean ocean circulation from the control run for years 260 to 274 at the surface (top panel) and at a depth of 1139 m (bottom panel). The shading color is the horizontal speed in $\mathrm{m \cdot s^{-1}}$, $\sqrt{u^2+v^2}$, and the black vectors represent the direction of the currents. Only 1 of every 10 vectors are drawn.

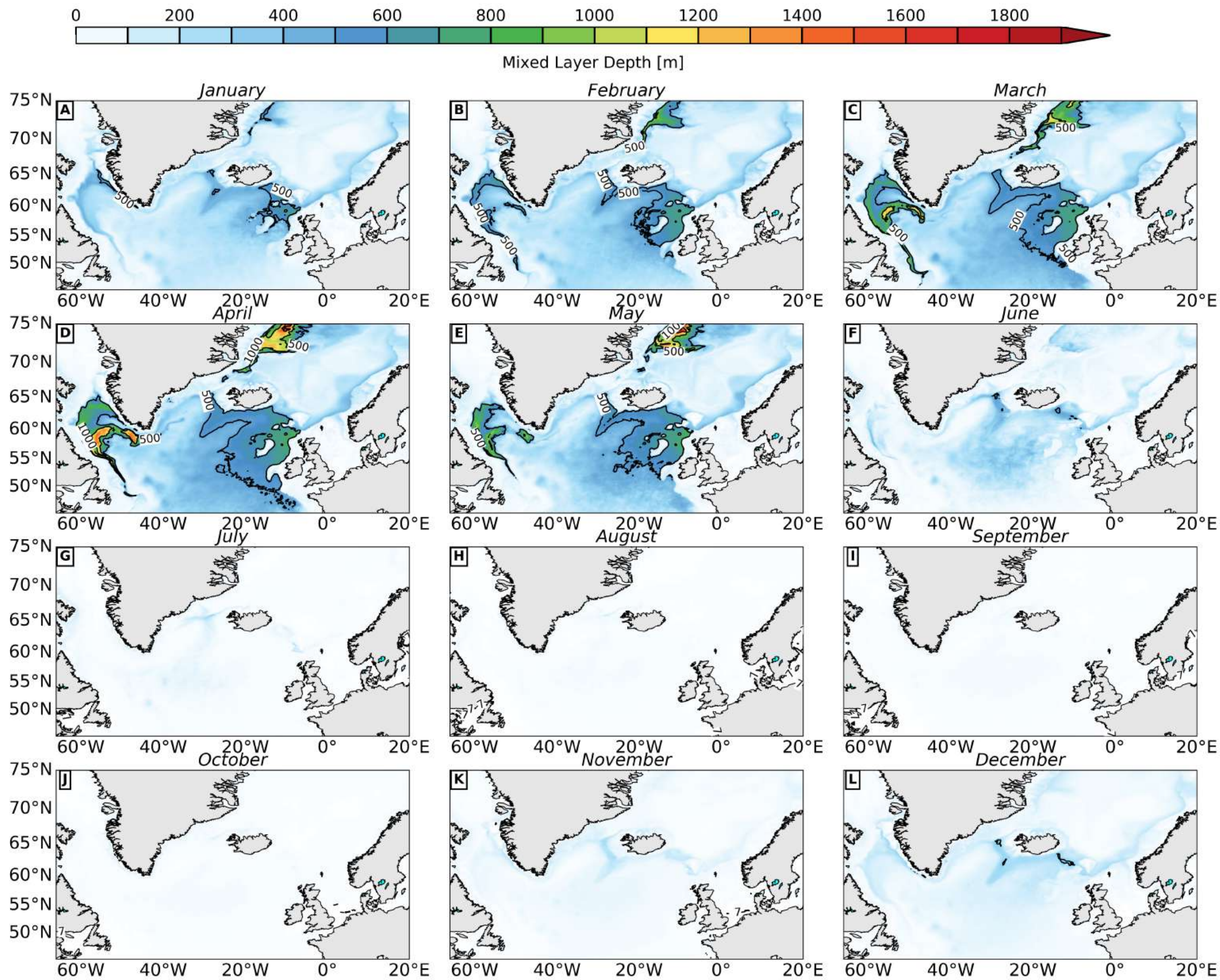

Figure S2. 15-year climatology of mixed layer depth fields from the control simulation (years 260 to 274). Black contours are plotted for 500 and 1000 m. Units in m.

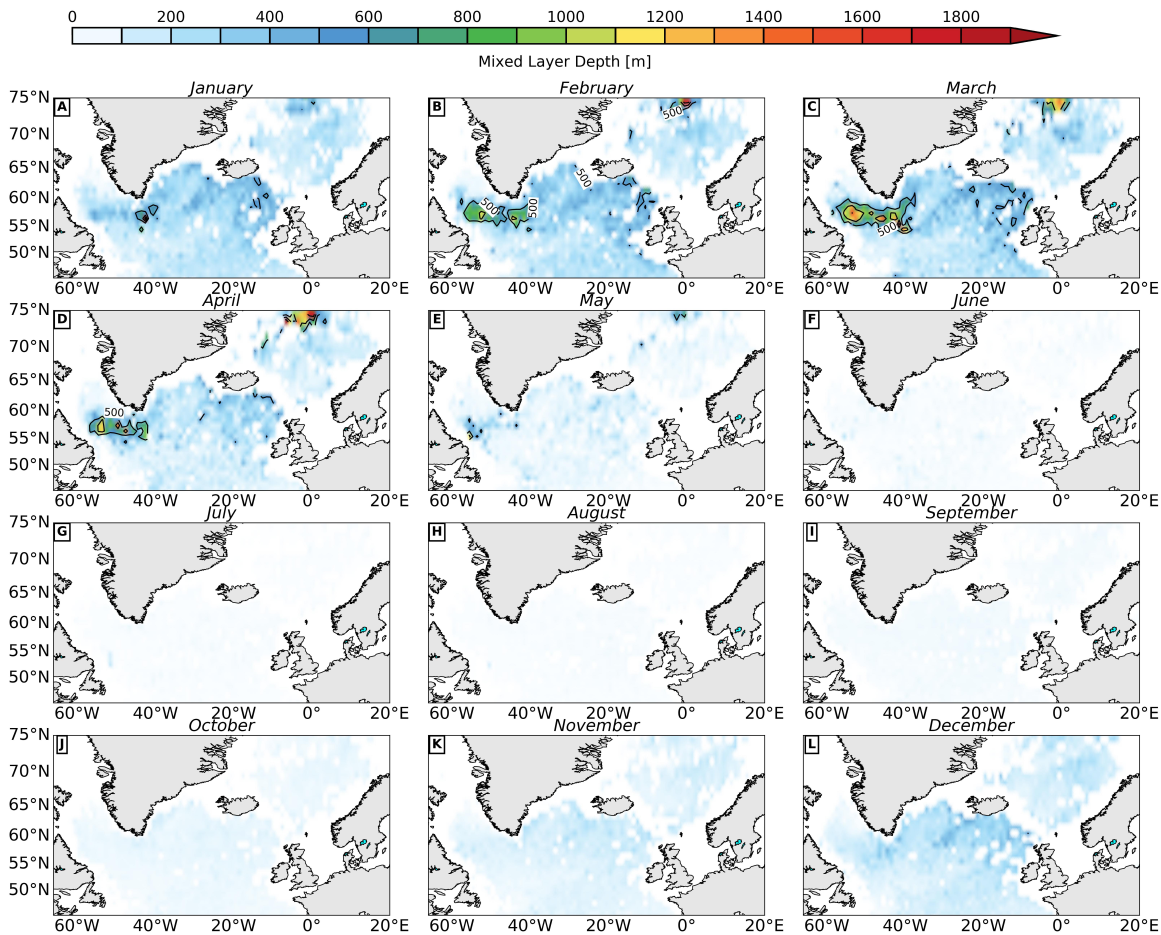

Figure S3. Climatology of mixed layer depth from ARGO floats based on the dataset described in Holte et al. (2017). The mixed layer depth has been computed using the temperature threshold method (de Boyer Montégut et al., 2004). The size of each interpolated grid cell is $1^\circ \times 1^\circ$. Contours highlight the mixed layer depth at 500 and at 1000 m. Units in m.

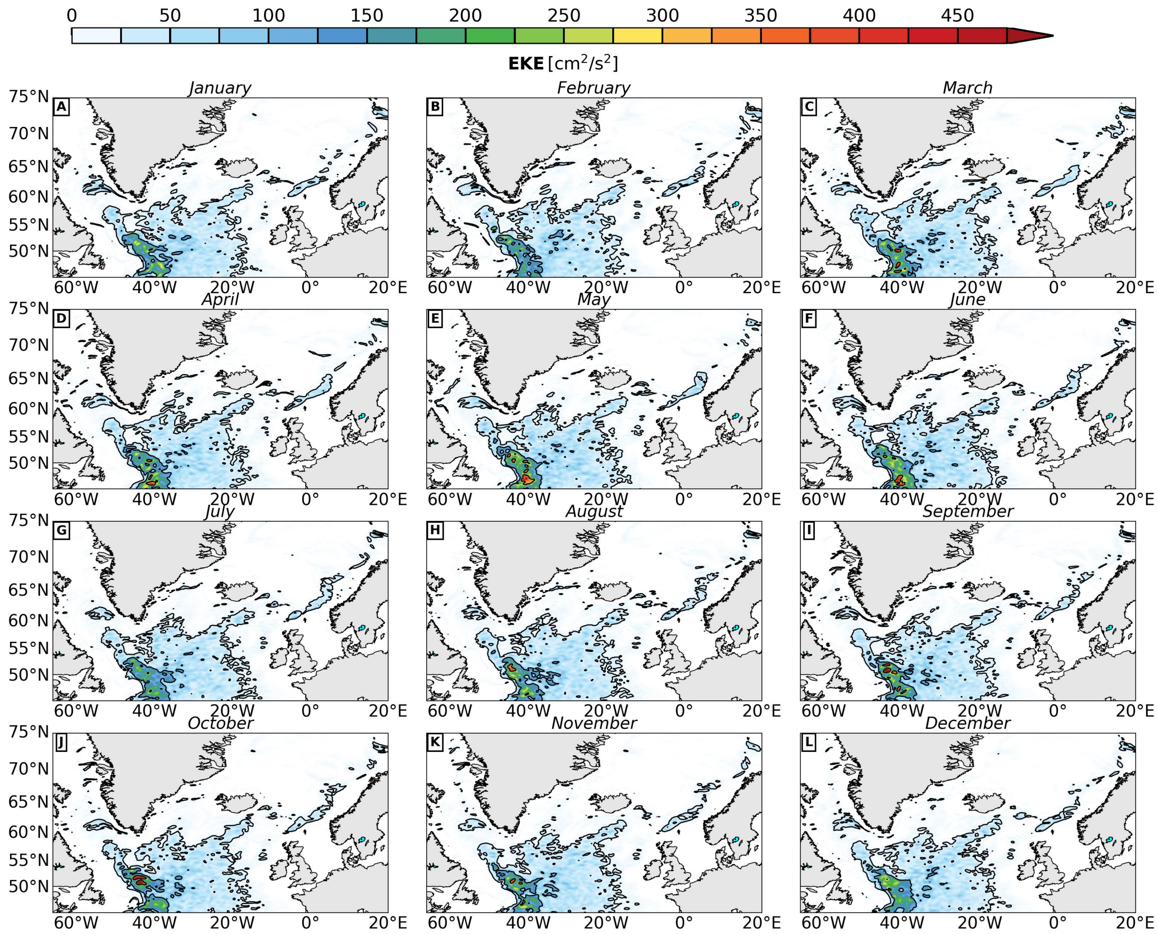

Figure S4. 15-year climatology of eddy kinetic energy (EKE) averaged between z-layers 14 and 24 (including depths from ~ 220 to 1650 m) from the control simulation (years 260 to 274). Black contours are plotted for 20, 100 and 300 $\mathrm{cm}^2 \cdot \mathrm{s}^{-2}$. Units in $\mathrm{cm}^2 \cdot \mathrm{s}^{-2}$.

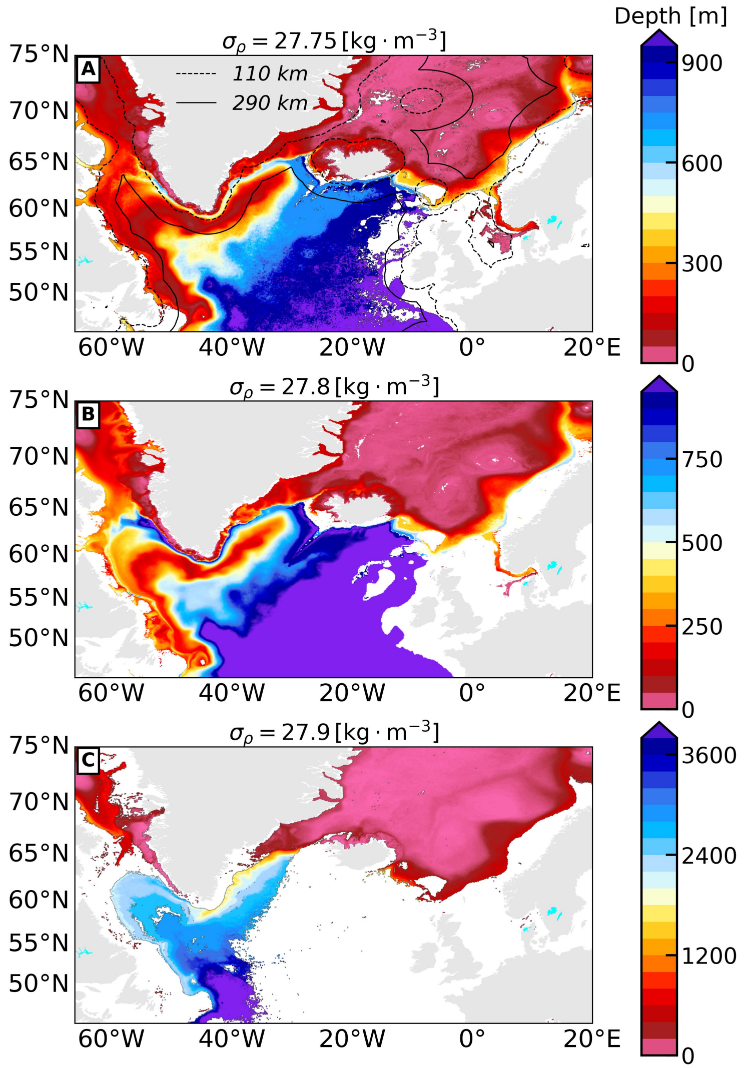

Figure S5. 15-year mean depth for the following isopycnal anomalies ($\sigma_\rho = \rho - 1000\,\mathrm{kg \cdot m^{-3}}$): (A) $\sigma_\rho = 27.75\,\mathrm{kg \cdot m^{-3}}$; (B) $\sigma_\rho = 27.8\,\mathrm{kg \cdot m^{-3}}$; (C) $\sigma_\rho = 27.9\,\mathrm{kg \cdot m^{-3}}$. Contours in panel A refer to the limits of the proposed sinking regimes **I** (dashed black line) and **II** (solid black line). A tolerance of $\pm 0.01\,\mathrm{kg \cdot m^{-3}}$ has been used to construct the maps. Units in m.

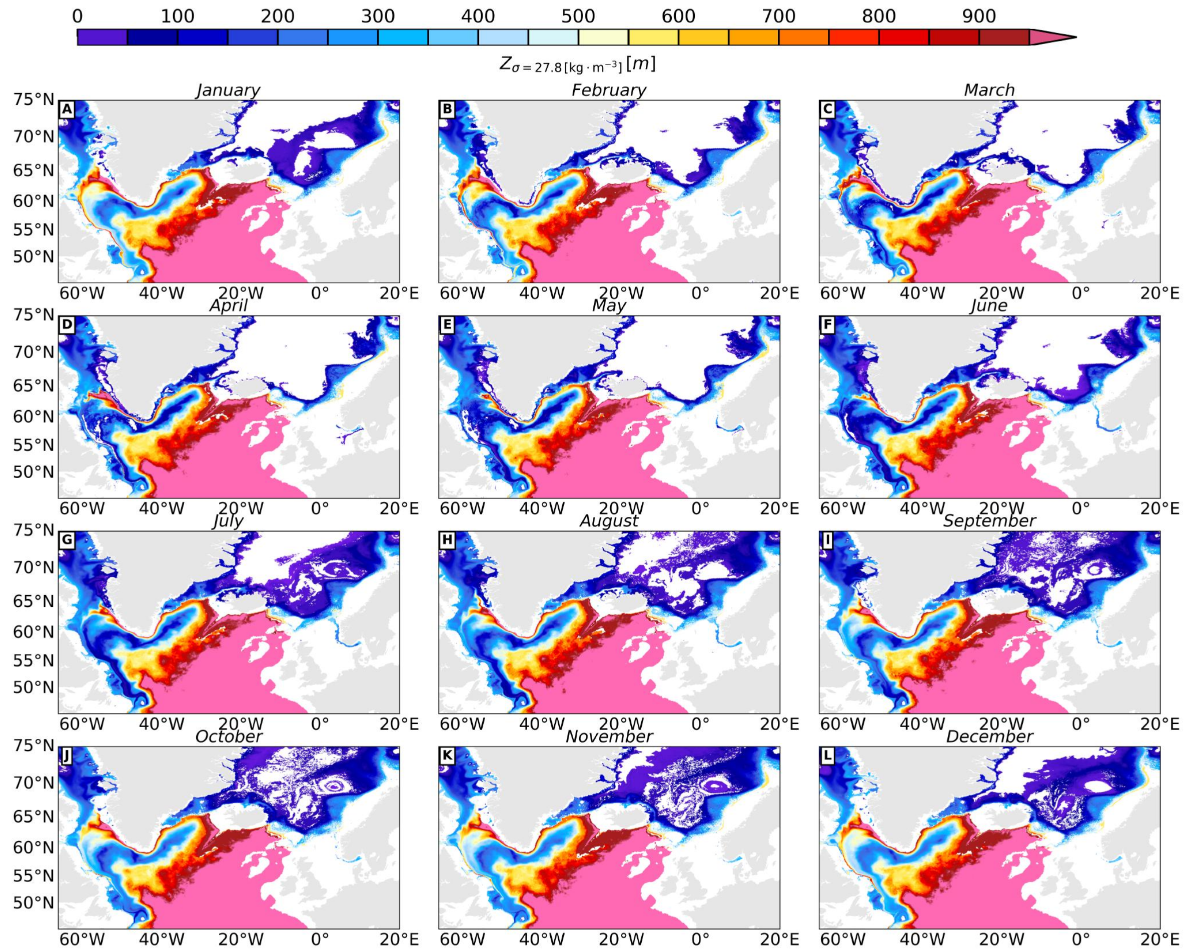

Figure S6. 15-year monthly mean depth of the isopycnal $\sigma_\rho = 28.8\ \mathrm{kg}\cdot\mathrm{m}^{-3}$. Where $\sigma_\rho = \rho - 1000\ \mathrm{kg}\cdot\mathrm{m}^{-3}$ denote the potential density anomalies and ρ is the potential density. Units in m.

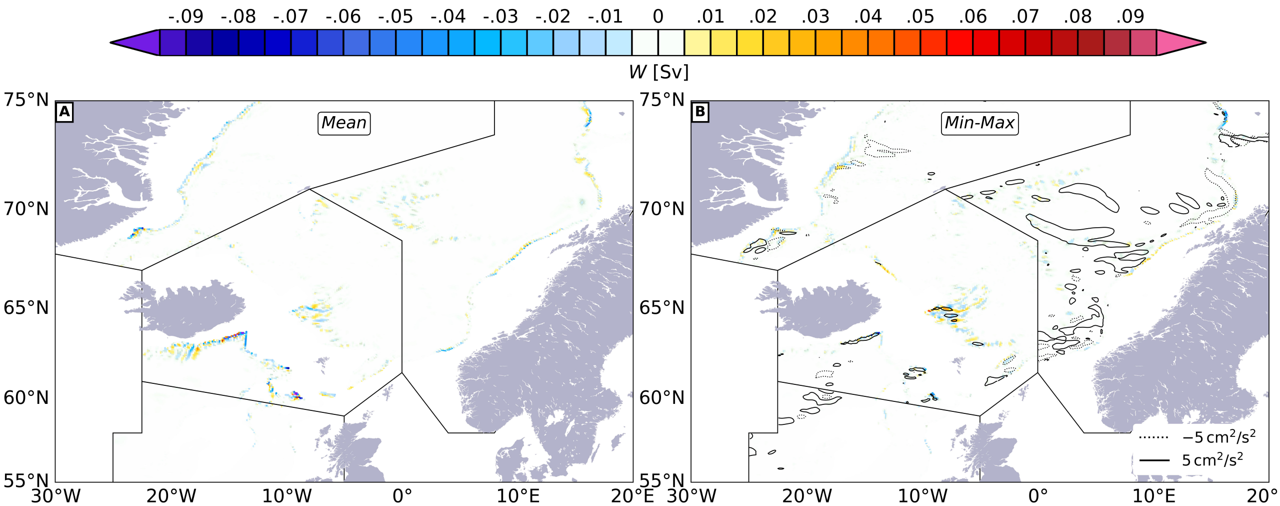

Figure S7. (A) Composite map of time-mean vertical transport (W) for the eastern regions of study (Greenland Sea, Iceland-Scotland, Rockall, Norwegian Sea) at the corresponding depth of minimum time-mean W_{Σ}, which differs for each region according to Table 2. (B) Same as (A) but now it is plotted the mean net vertical transport (W, shading) and EKE (blacks contours, see legend) at the month of minimum W_{Σ} minus the time-mean W at the month of maximum W_{Σ}, which also change for each region according to Table 2. Units of W in Sv and of EKE in $\mathrm{cm}^2 \cdot \mathrm{s}^{-2}$.

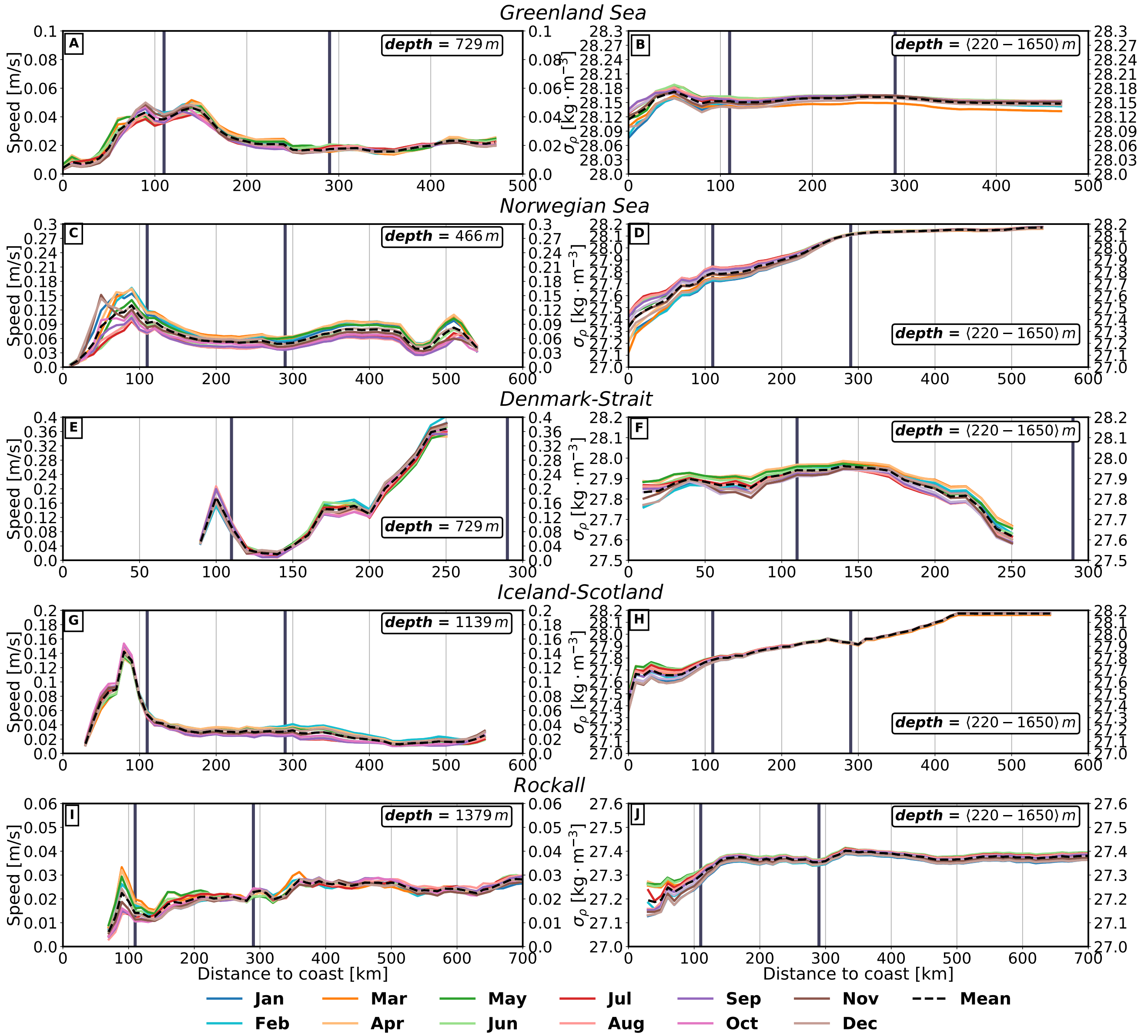

Figure S8. 15-year climatology of the following variables with respect to the distance to the coast (according to the inset map in Figure 4) for the Greenland Sea (A)-(B), Norwegian Sea (C)-(D), Denmark-Strait (E)-(F), Iceland-Scotland (G)-(H), and Rockall (I)-(J): (A)-(C)-(E)-(G)-(I) horizontal speed of current at the depth of largest sinking ($z_{\min}$, Table 2); (B)-(D)-(F)-(H)-(J) potential density anomalies ($\sigma_\rho = \rho - 1000$ $[\mathrm{kg} \cdot \mathrm{m}^{-3}]$) averaged between z-layers 14 and 24 ($\sim 220 - 1650$ m). For all panels the dashed black line depicts the mean, whereas colored lines show the monthly average. The bounds between the sinking regimes proposed in Fig. 4 are indicated with thicker solid vertical lines.