

# **Supporting Information for "Variation of ventilation in the North Atlantic over the past three decades - a climate change signal"**

Haichao Guo<sup>1</sup>, Wolfgang Koeve<sup>1</sup>, Iris Kriest<sup>1</sup>, Ivy Frenger<sup>1</sup>, Toste Tanhua<sup>1</sup>,

Peter Brandt<sup>1,2</sup>, Yanchun He<sup>3</sup>, Tianfei Xue<sup>1</sup>, and Andreas Oschlies<sup>1,2</sup>

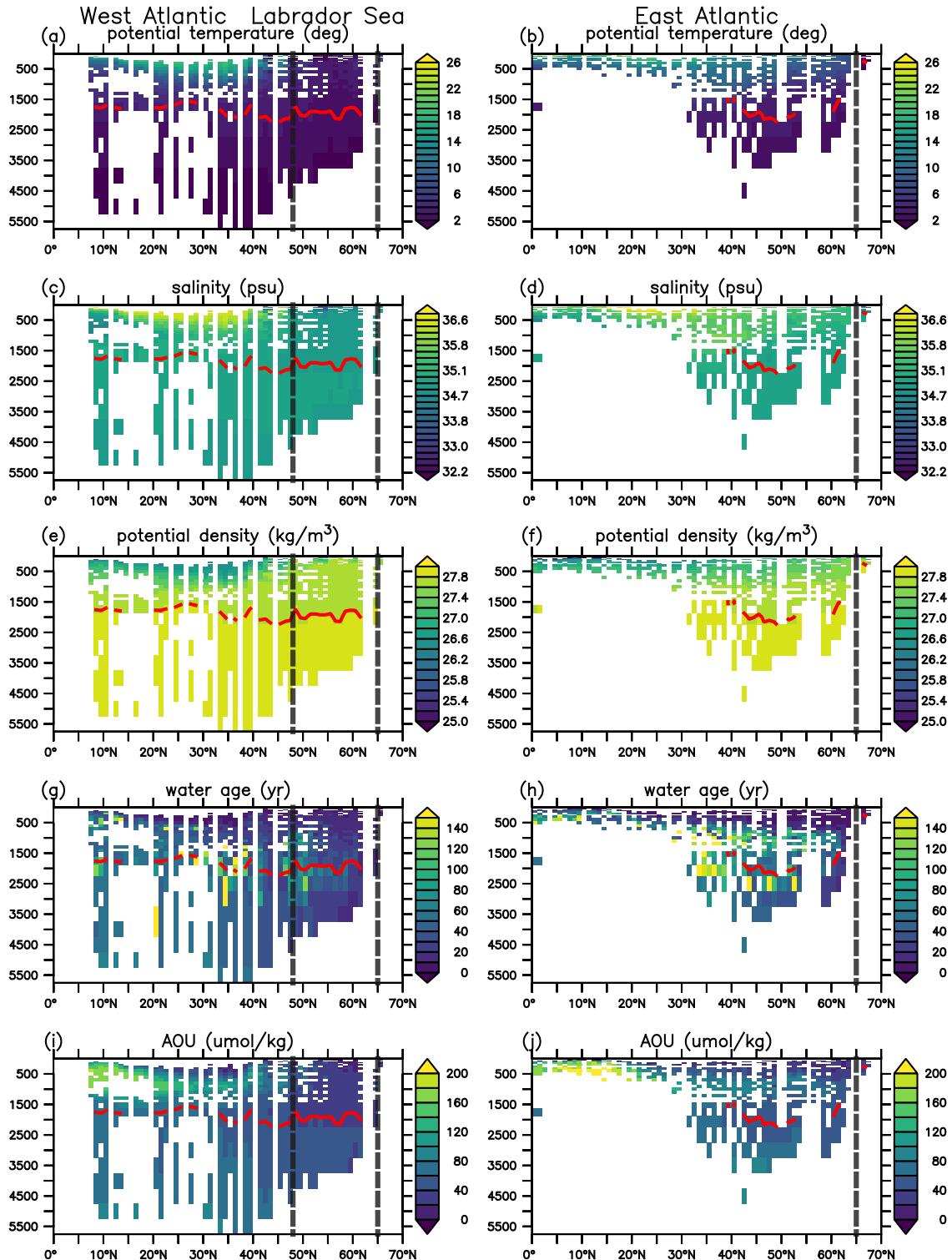
<sup>1</sup>GEOMAR Helmholtz Centre for Ocean Research Kiel, 24148, Kiel, Germany

<sup>2</sup>Kiel University, Kiel, Germany

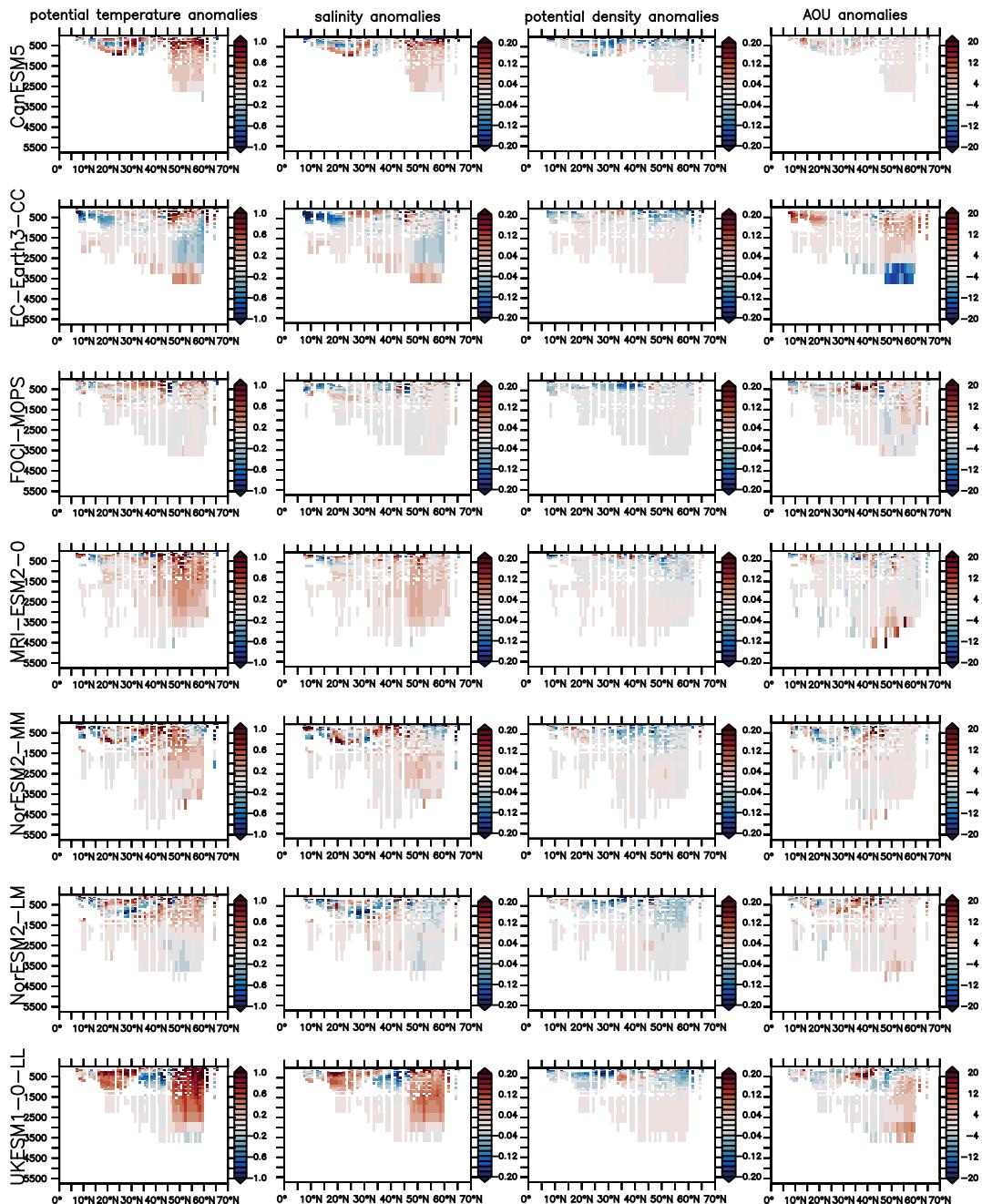
<sup>3</sup>Nansen Environmental and Remote Sensing Center, Bjerknes Centre for Climate Research, Bergen, Norway

## **Contents of this file**

1. Figures S1 to S10



**Figure S1.** The same as Fig. 2 but with measurements in the 1990s.



**Figure S2.** Anomalies of subsampled potential temperature (in  $^{\circ}\text{C}$ , left panels), salinity (in psu, middle left panels), potential density (in  $\text{kg}/\text{m}^3$ , middle right panels), and apparent oxygen utilization (AOU, in  $\mu\text{mol}/\text{kg}$ , right panels) in the Labrador Sea and West Atlantic, as depicted in Fig. 1, across seven Earth System models.

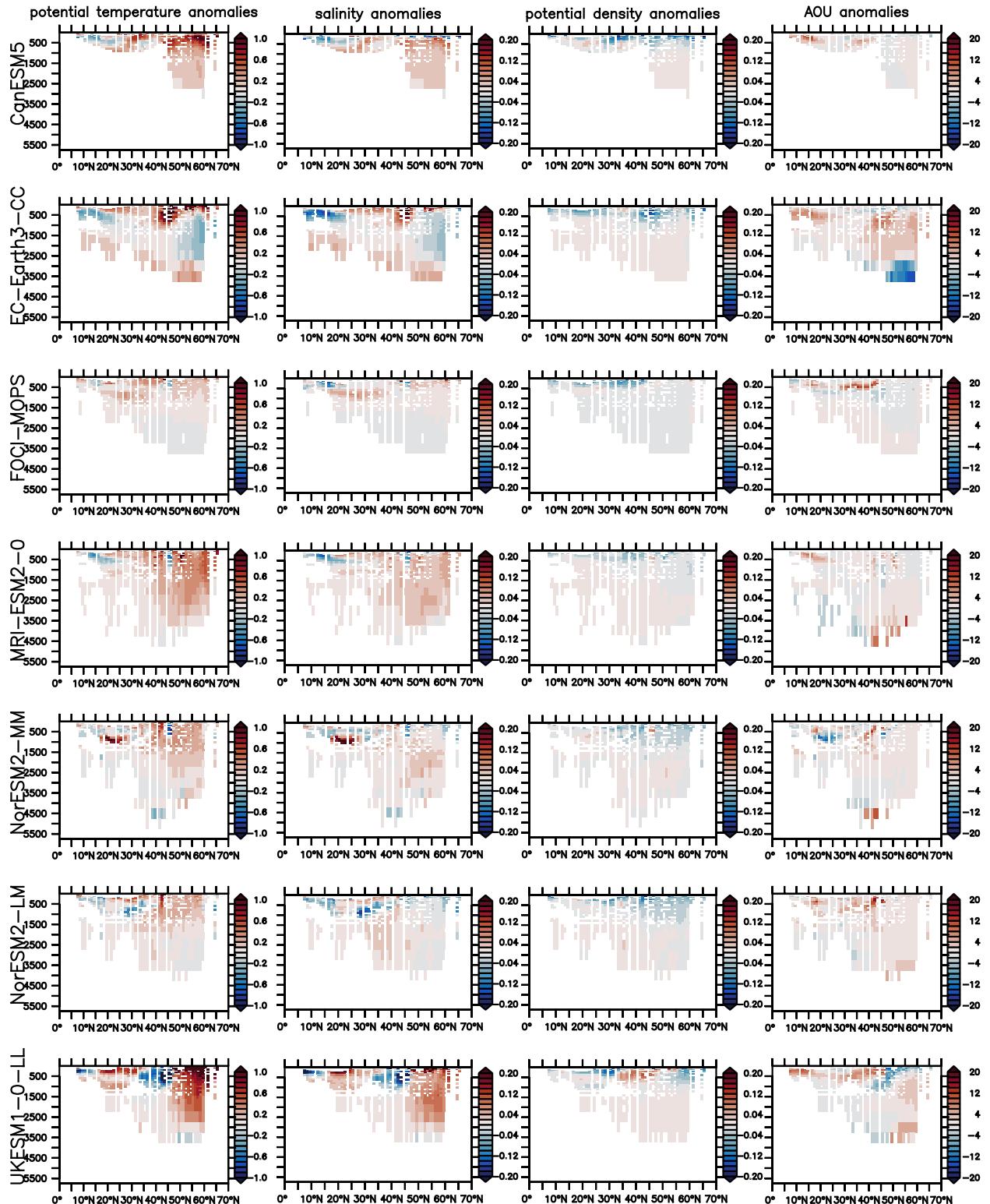
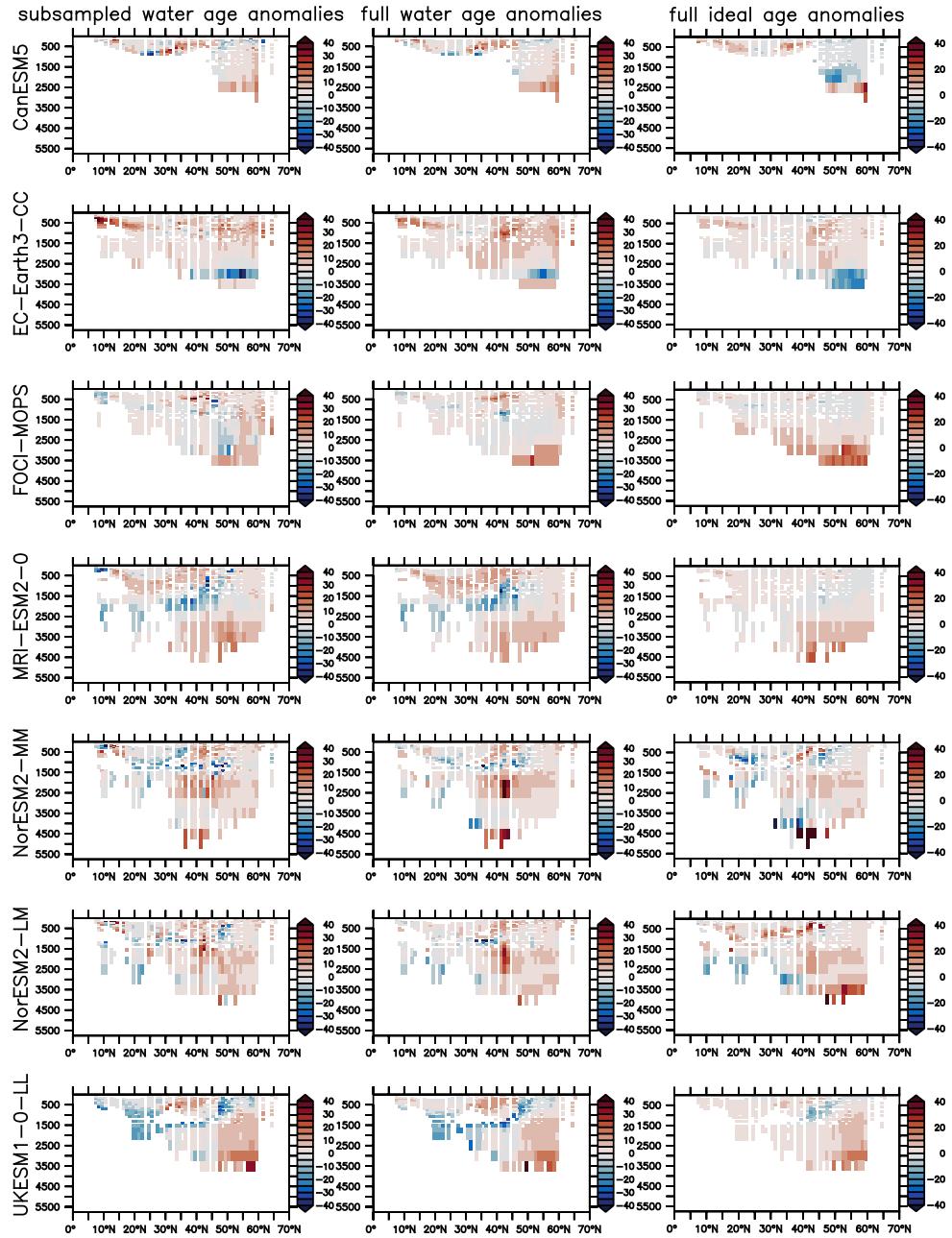


Figure S3. The same as Fig. S2 but from temporally comprehensive model outputs.



**Figure S4.** Anomalies of subsampled water age inferred from CFC-12 (left panels, in years), temporally complete water age (middle panels, in years), and temporally complete ideal age (right panels, in years) in the Labrador Sea and West Atlantic, as depicted in Fig. 1, across seven Earth System models.

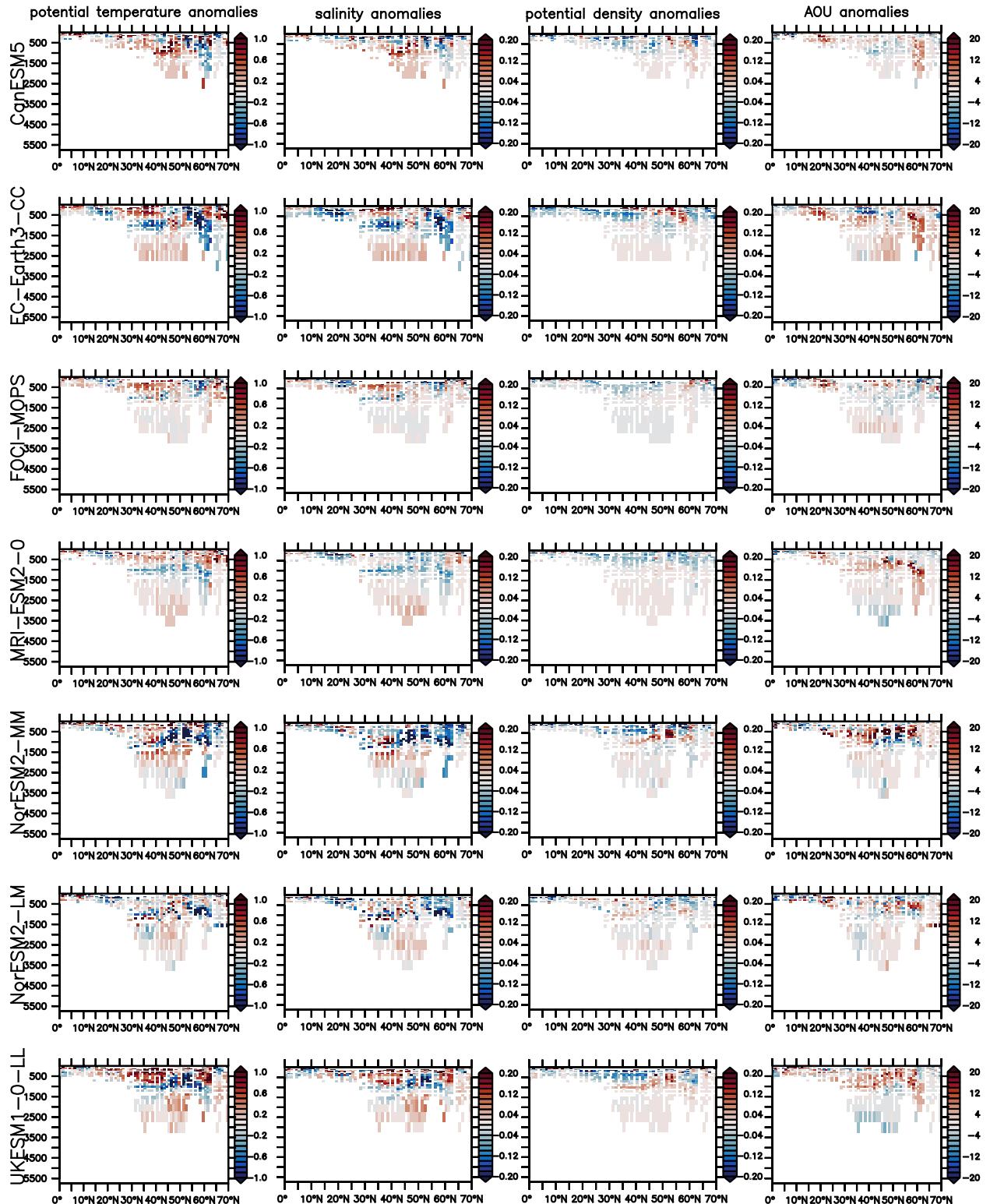
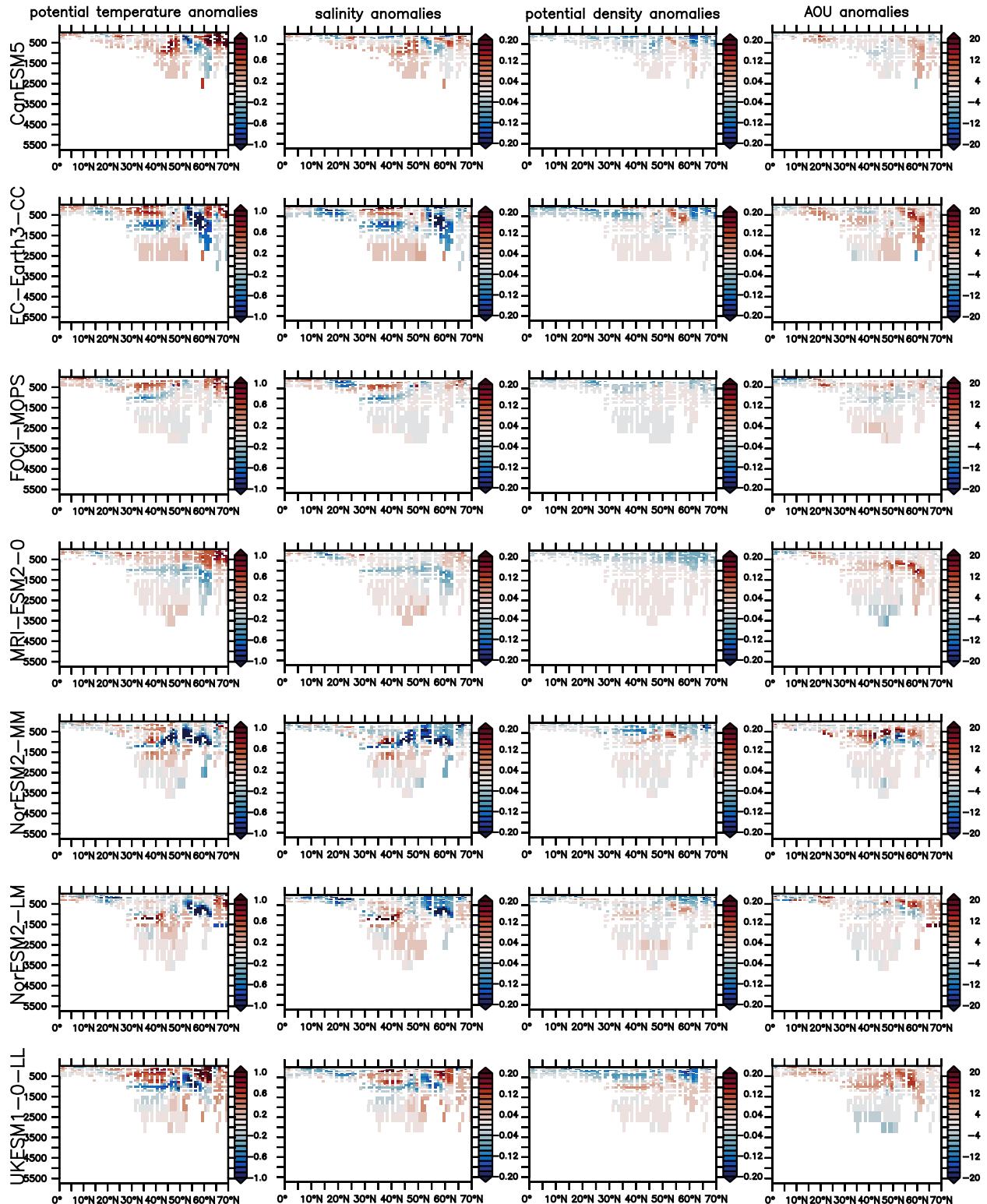
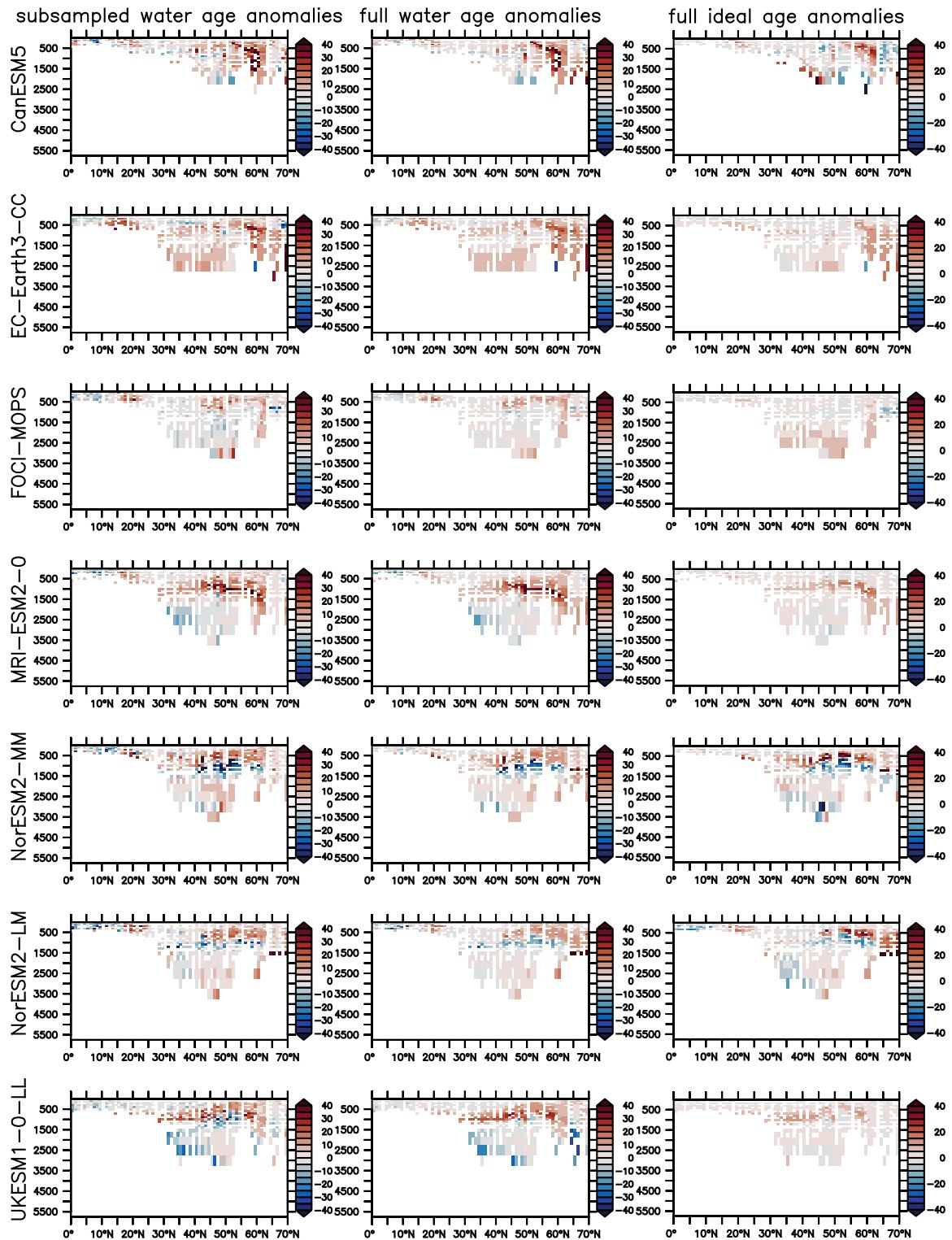


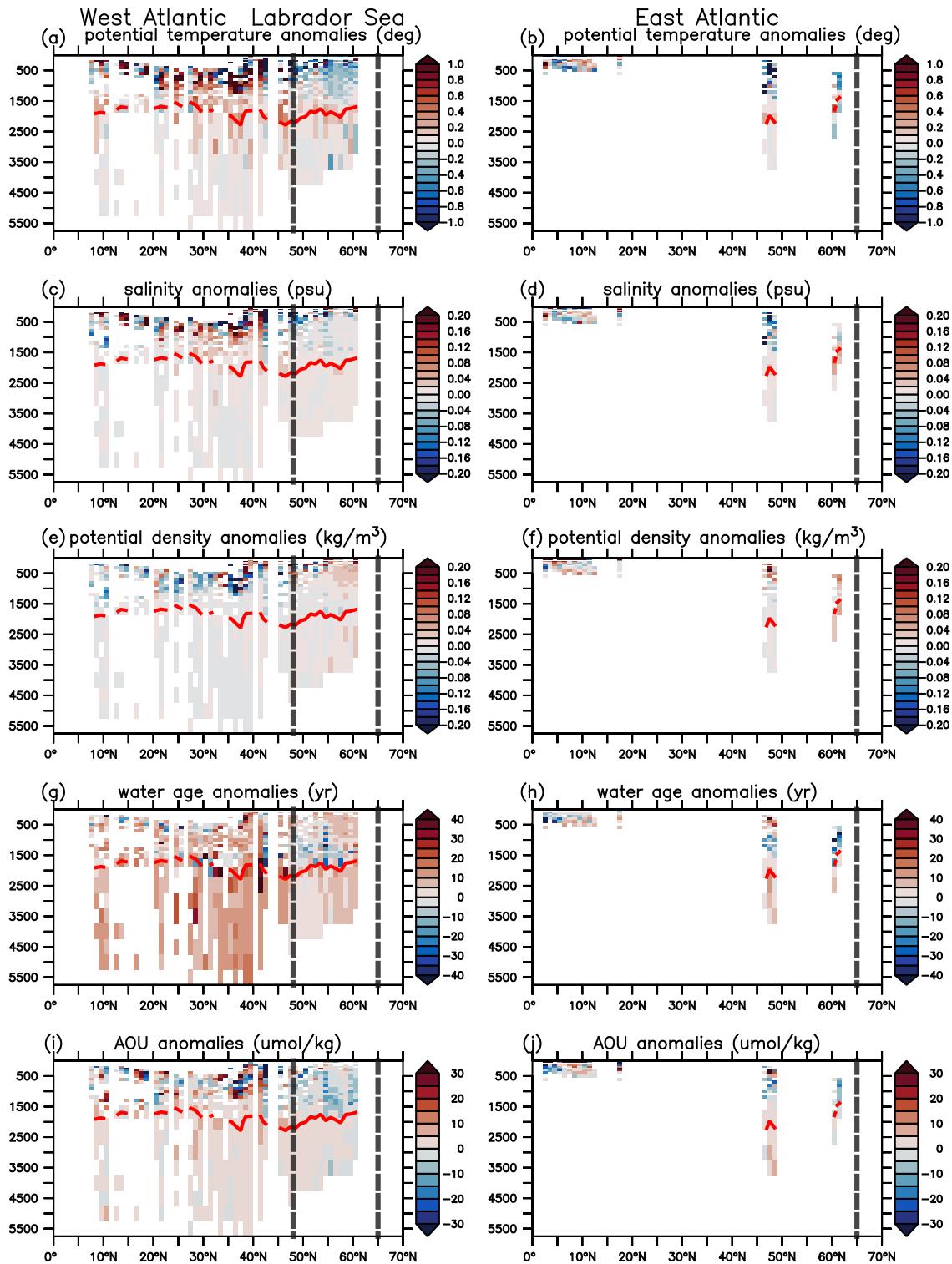
Figure S5. The same as Fig. S2 but for the East Atlantic subregion.



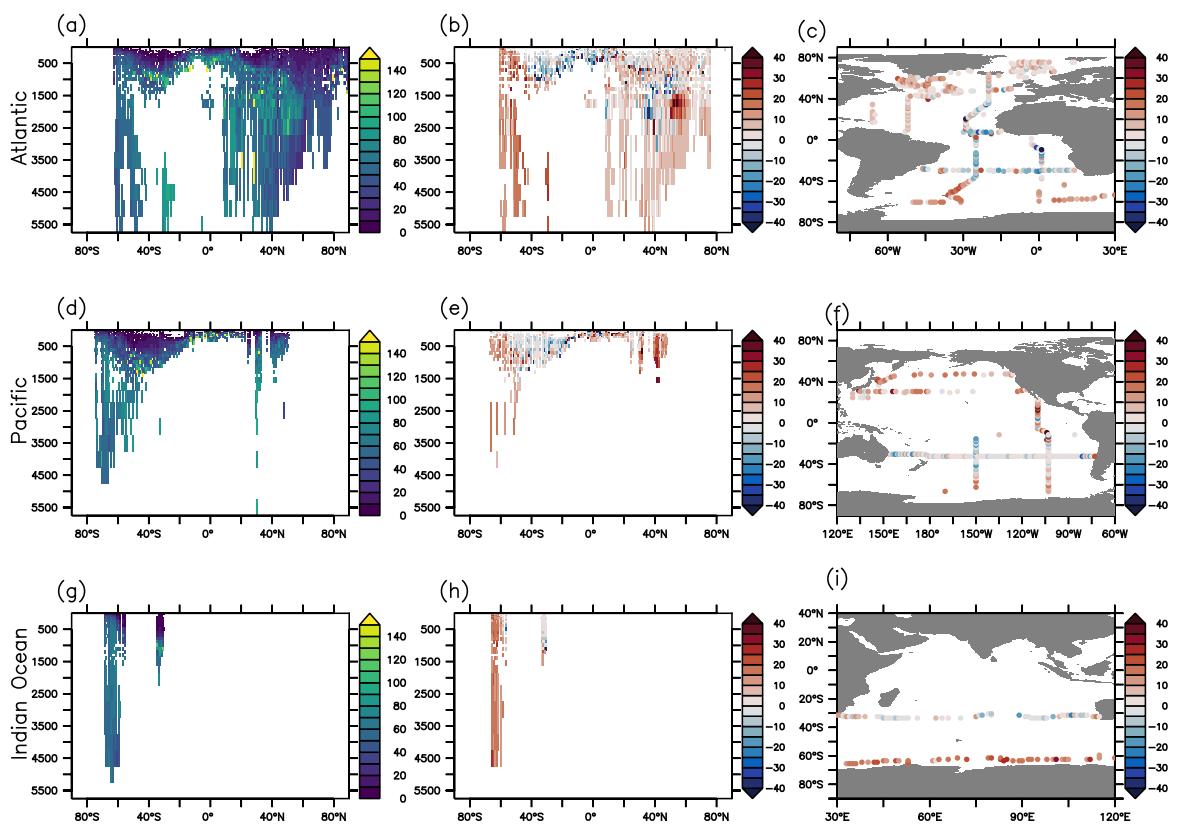
**Figure S6.** The same as Fig. S3 but for the East Atlantic subregion.



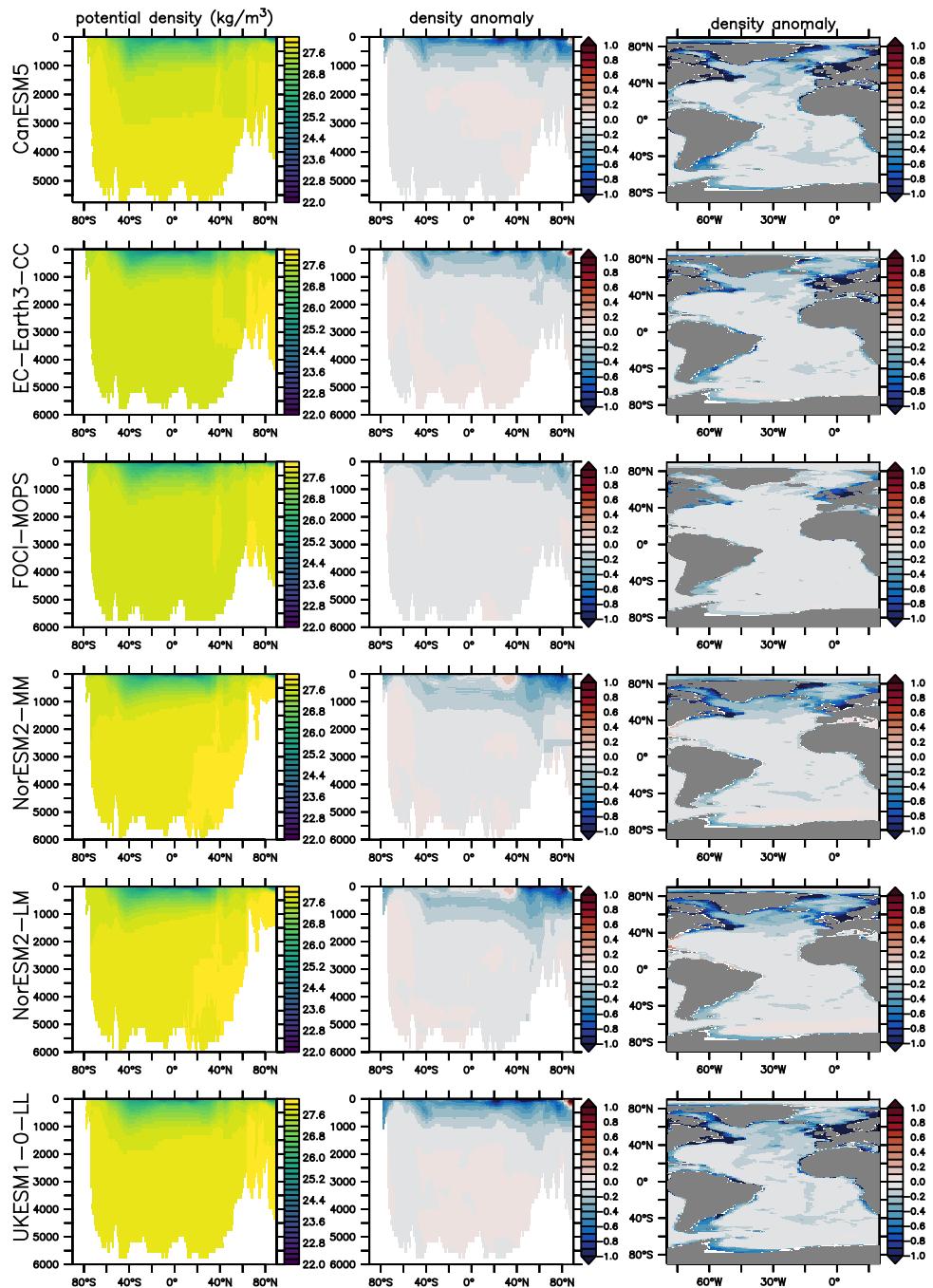
**Figure S7.** The same as Fig. S4 but for the East Atlantic subregion.



**Figure S8.** The same as Fig. 3 but for the anomalies of 2015-2021 minus 2000-2014.



**Figure S9.** Global Water age measured in 2000s (left panels), and vertical mean (middle panel) and horizontal mean (right panels) water age anomalies (2000s minus 1990s).



**Figure S10.** The same as Fig. 4 but for potential density ( $\text{kg/m}^3$ ).