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Supplement of

Large-scale forcing of the European Slope Current and associated inflows to the North Sea

Robert Marsh et al.

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4 **Figure S1. Particle density maps ($0.5^\circ \times 0.5^\circ$ resolution) for all ensembles of forward**
5 **trajectories starting on 1 July, 1988-2007. The logarithmic scale for density, ranging**
6 **from -4 to -1, equates to 0.01-10% of all particle positions.**

7 **Figure S2. Particle age maps (binned at $0.5^\circ \times 0.5^\circ$ resolution) for all ensembles of**
8 **forward trajectories starting on 1 July, 1988-2007 (days since 1 July).**

9 **Figure S3. Particle salinity maps (binned at $0.5^\circ \times 0.5^\circ$ resolution) for all ensembles of**
10 **forward trajectories starting on 1 July, 1988-2007 (days since 1 July).**

11 **Figure S4. As Fig. S1, for backward trajectories.**

12 **Figure S5. As Fig. S2, for backward trajectories.**

13 **Figure S6. Monthly-mean transport at the three Slope Current sections and the JONSIS**
14 **section.**

15 **Figure S7. (a) mean absolute dynamic topography (MADT); (b) mean σ_0 at 500m; (c)**
16 **meridional gradient of MADT, i.e., the left hand side of Eq. (7); (d) meridional gradient**
17 **of σ_0 , scaled by $-H/\rho$ (nominally $1027 \text{ m}/1027 \text{ kg m}^{-3}$) i.e., the right hand side of Eq. (7).**

18 **Figure S8. Potential density (σ_0) at 500 m, 1-5 January biennially, 1988-2006, ORCA12-**
19 **N01.**

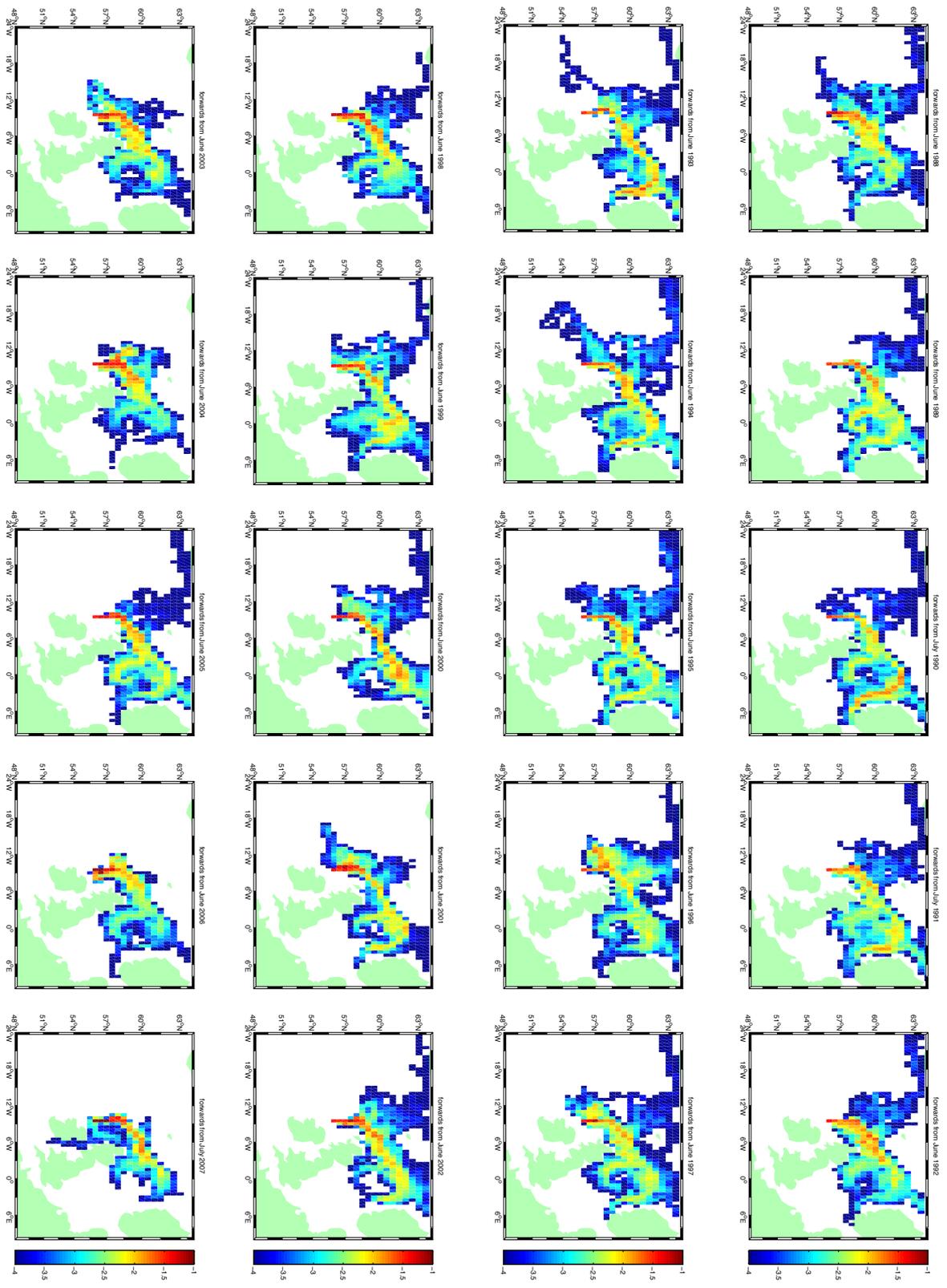
20 **Figure S9. Potential density (σ_0) at 947 m, 1-5 January biennially, 1988-2006, ORCA12-**
21 **N01.**

22 **Figure S10. Monthly salinity at the four sections over 1980-2016, sampling NCEP Global**
23 **Ocean Data Assimilation System (GODAS) analysis fields.**

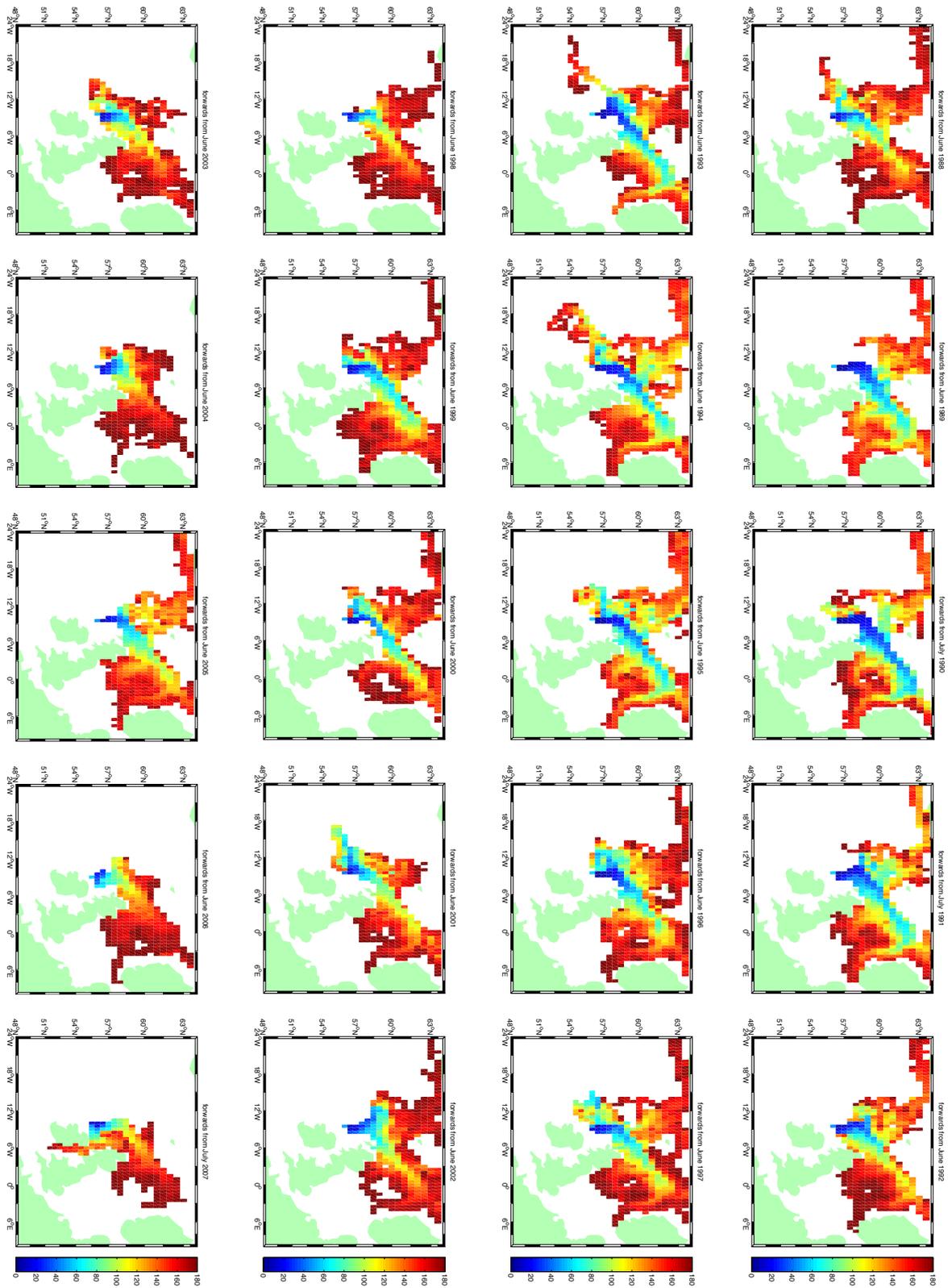
24 **Figure S11: Monthly salinity anomalies at the four sections over 1980-2016, obtained by**
25 **subtracting climatological seasonal cycles from the time series in Fig. S10.**

26 **Figure S12. Comparison of ORCA12-N01 and ORCA12-N06 hindcasts over 1988-2007:**
27 **5-day averages of sea level difference, Lerwick minus Torshavn (top panel); ORCA12-**
28 **N01 minus ORCA12-N06 differences (middle panel); scatterplot of individual sea level**
29 **differences.**

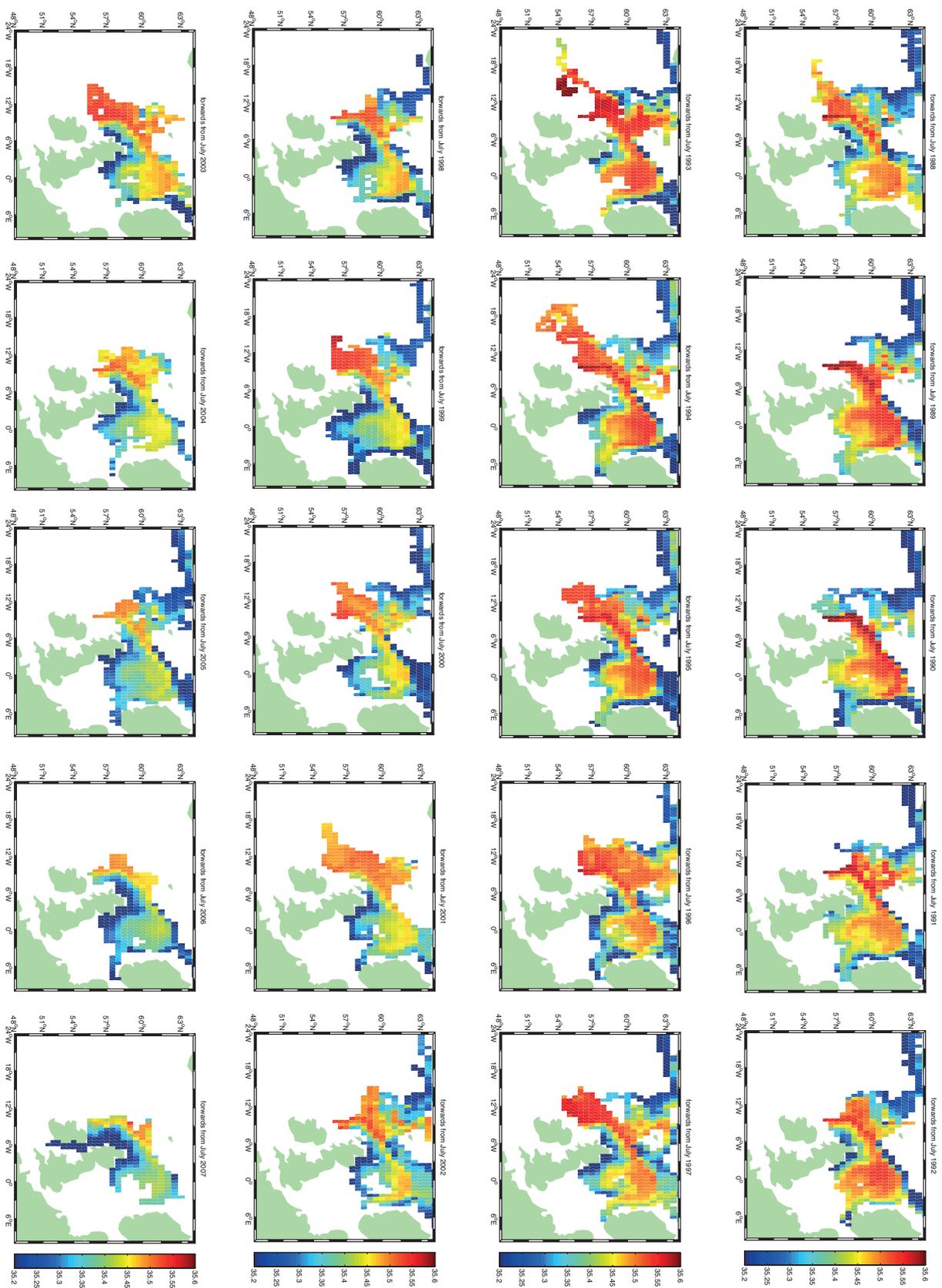
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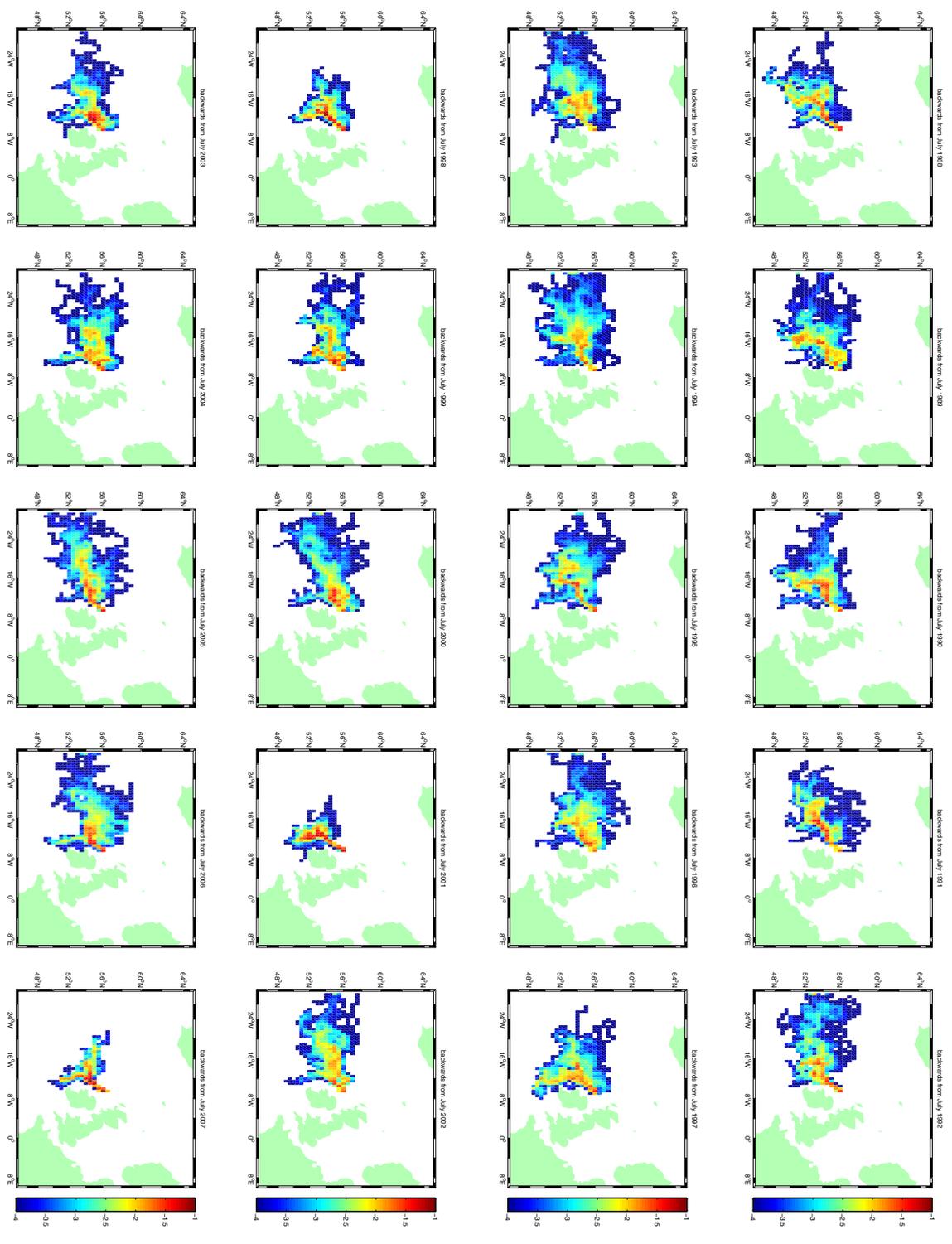


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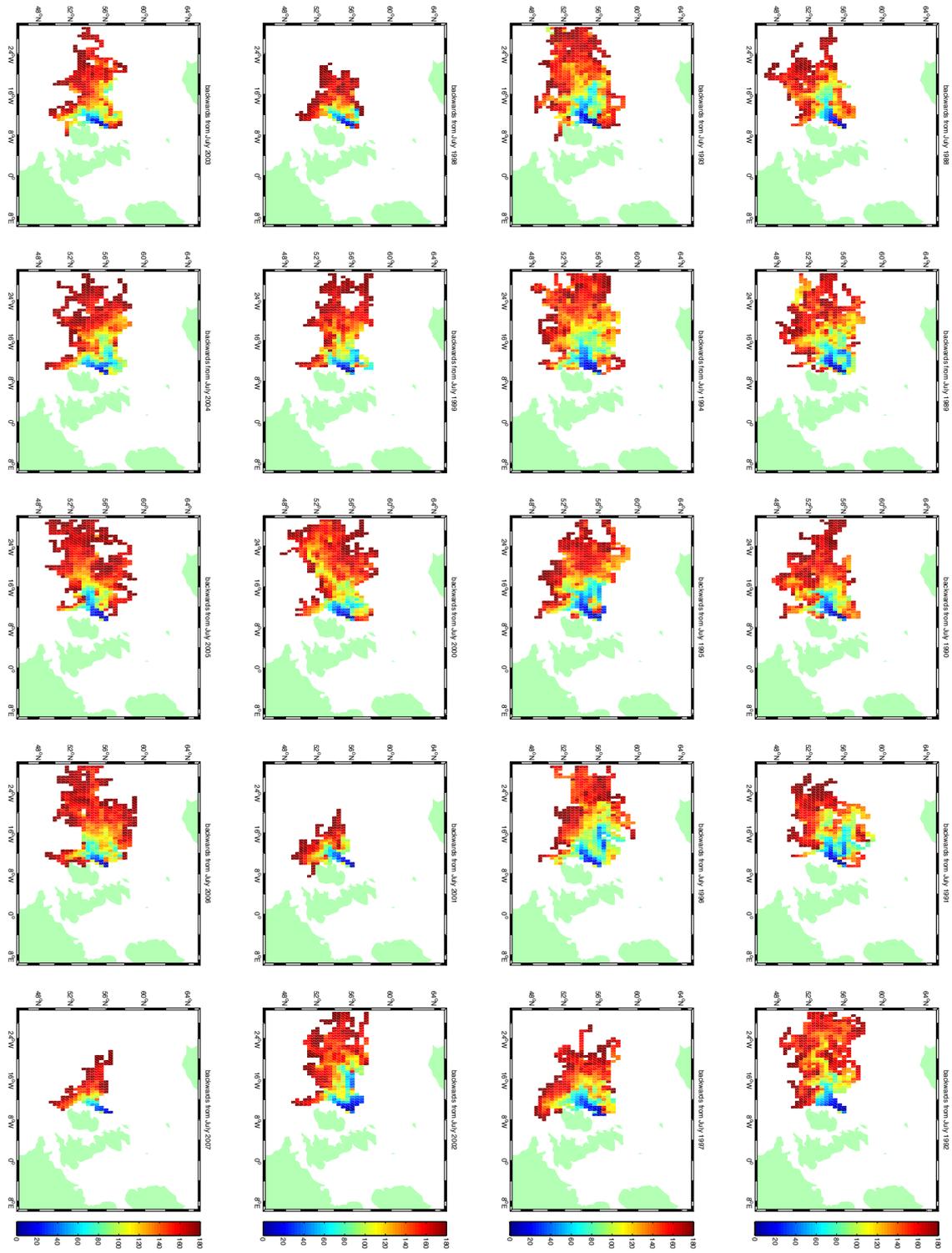


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Figure S3. Particle salinity maps (binned at 0.5° x 0.5° resolution) for all ensembles of forward trajectories starting on 1 July, 1988-2007 (days since 1 July).

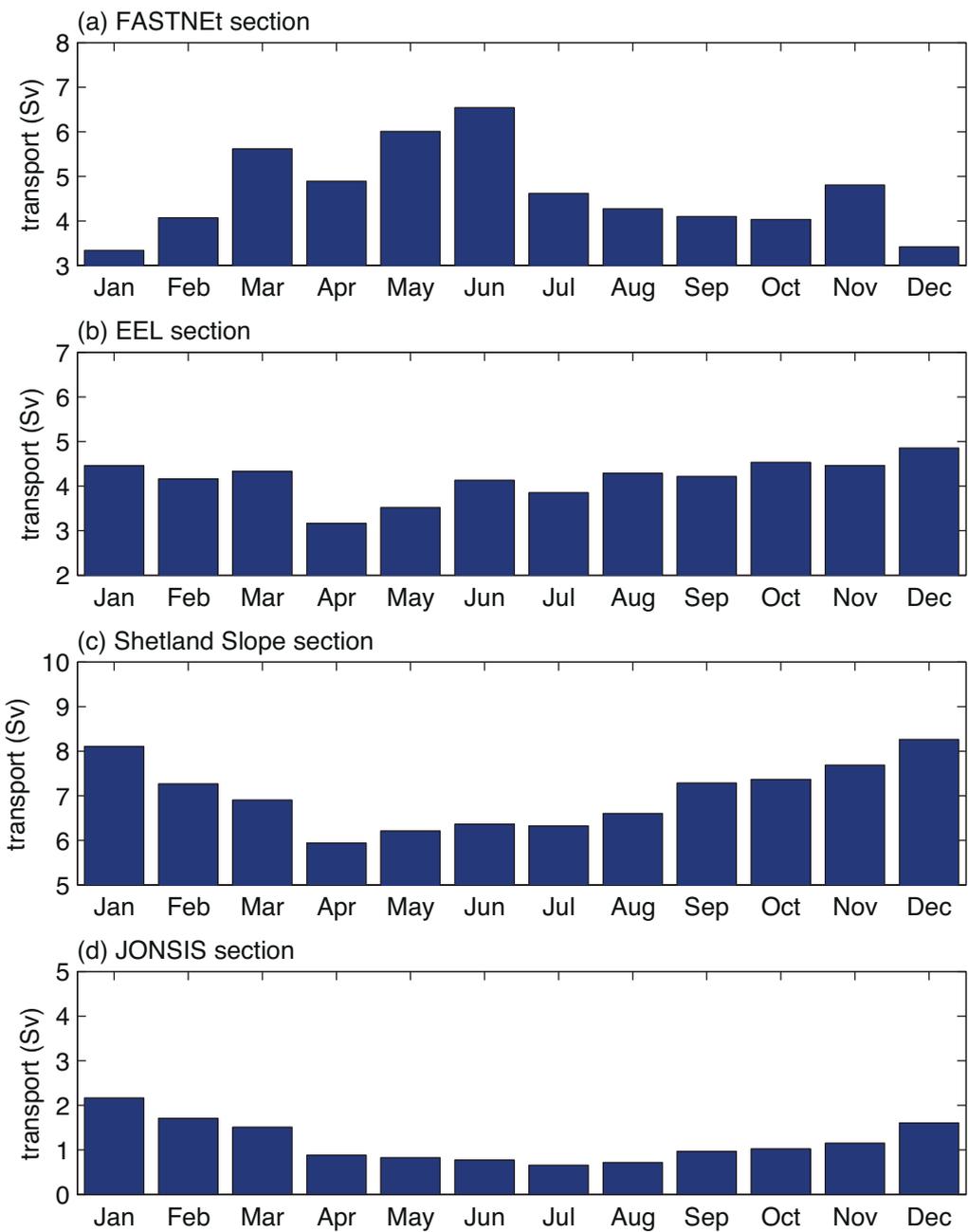


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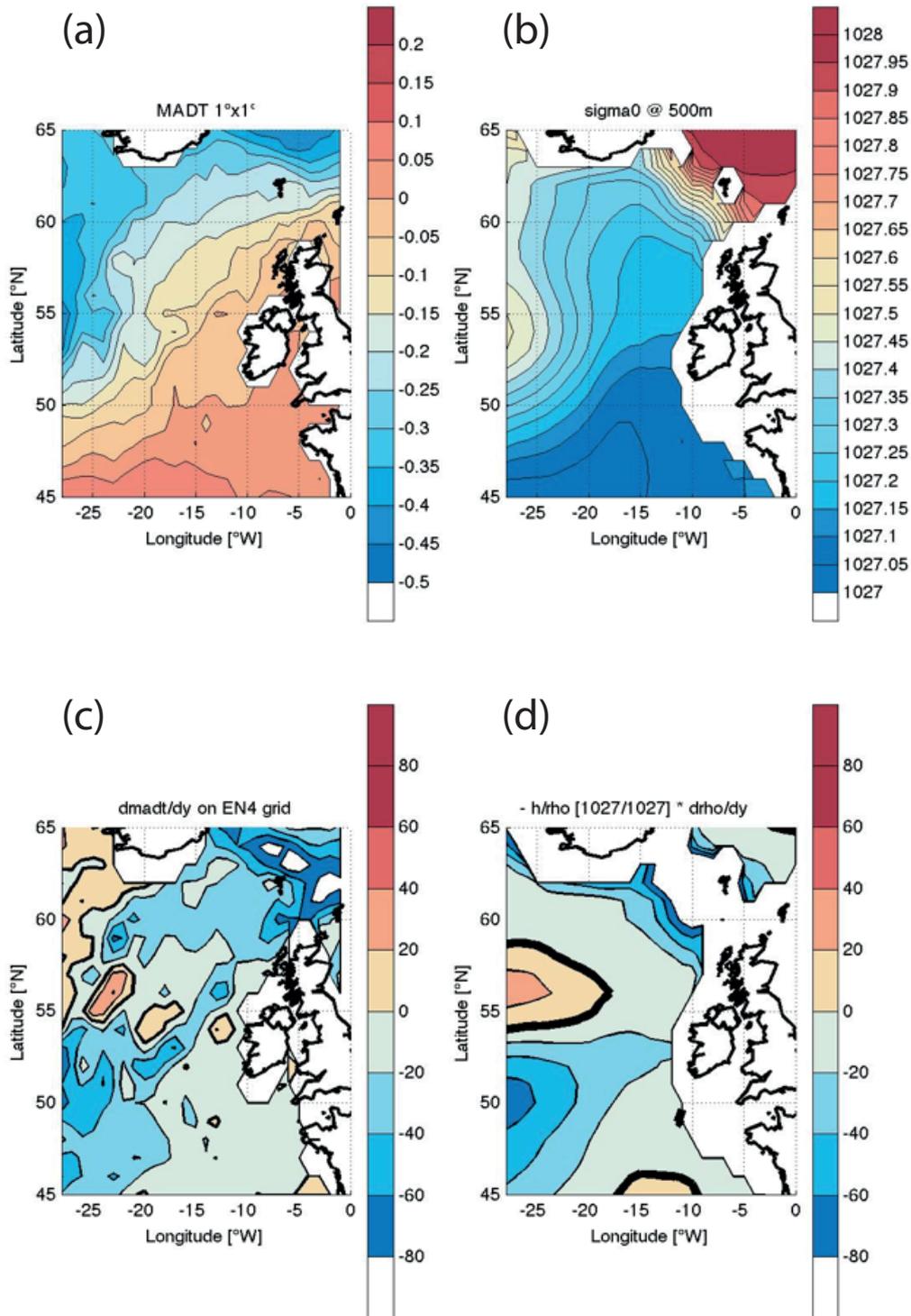
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Figure S5. As Fig. S2, for backward trajectories.



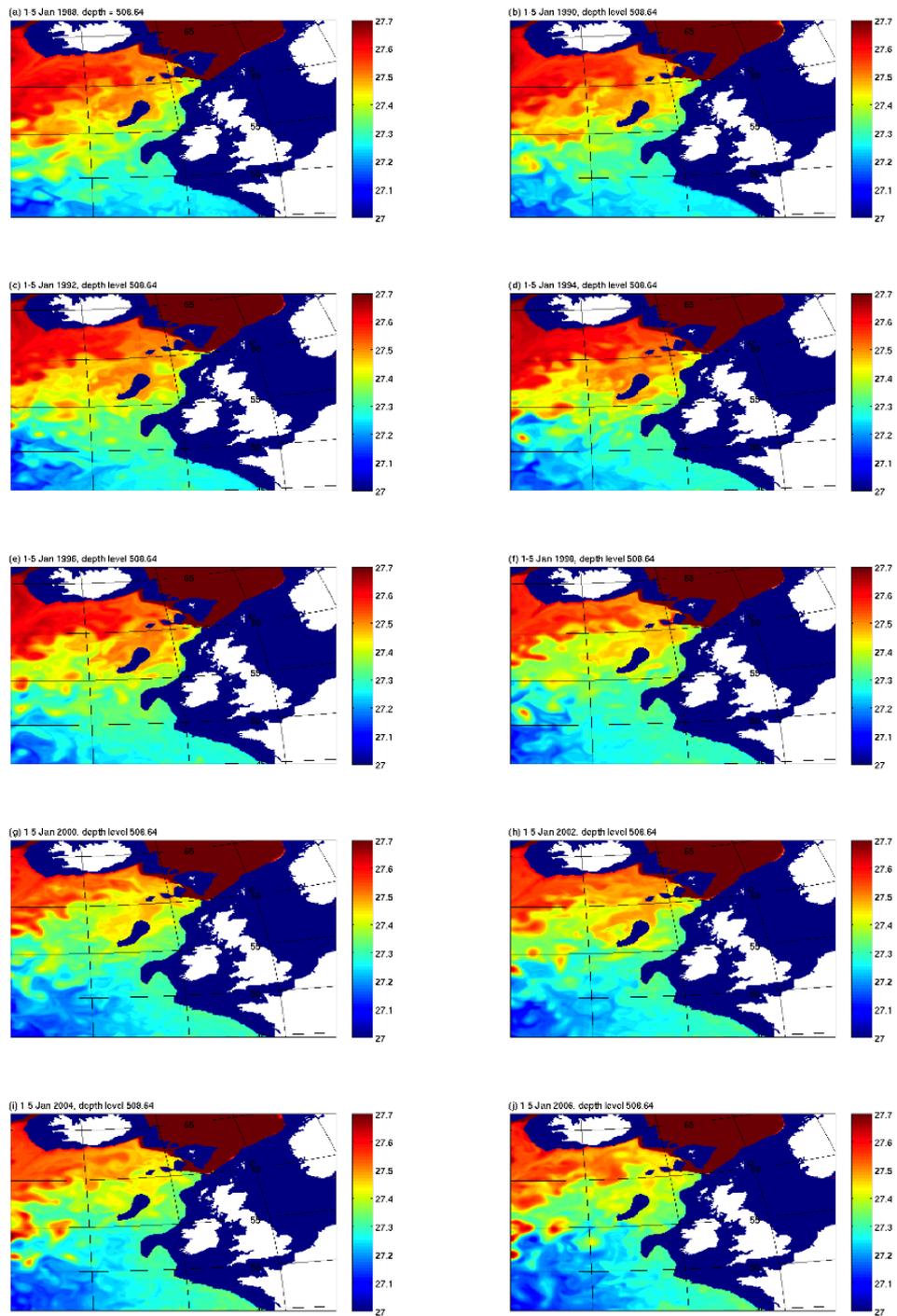
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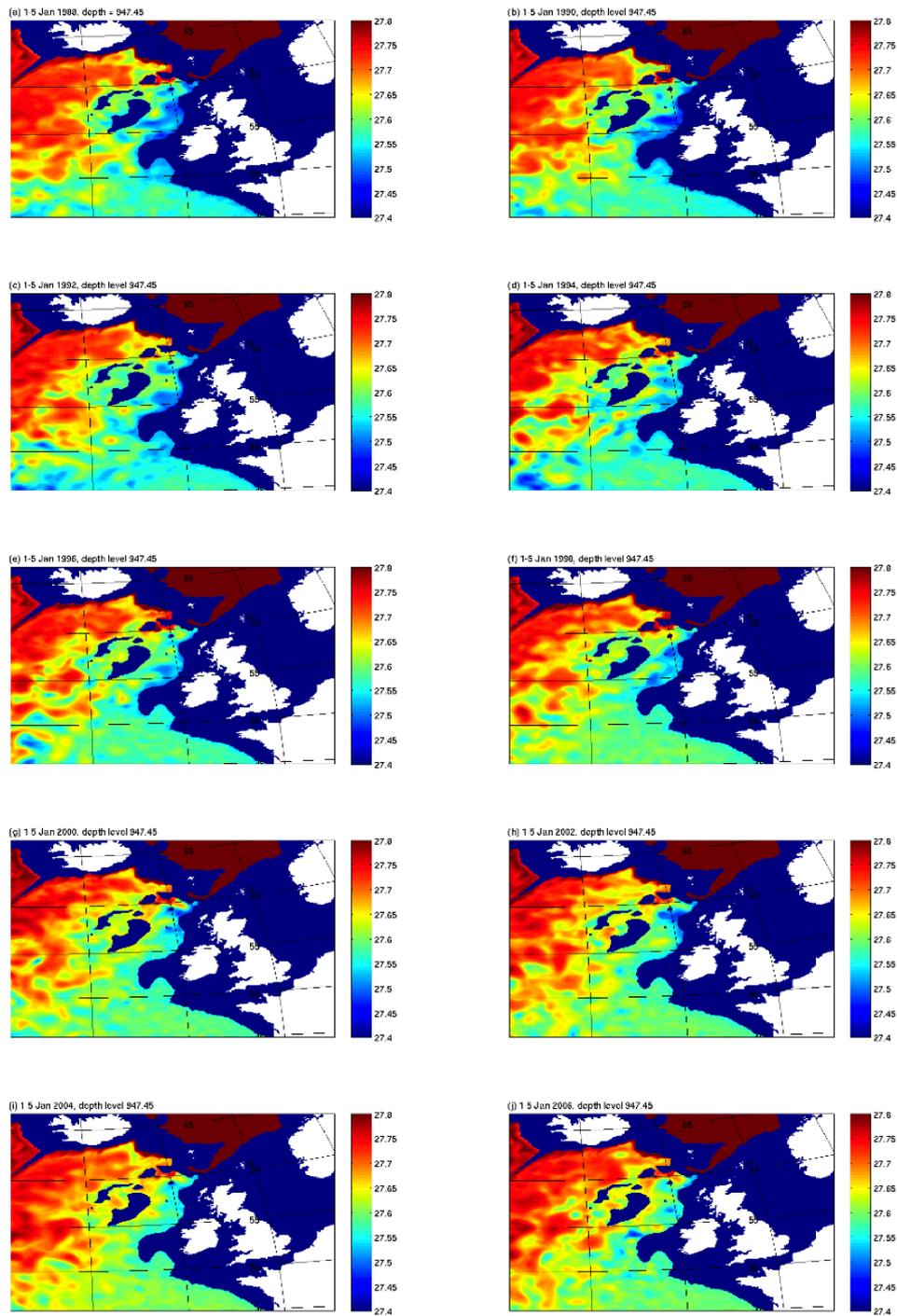
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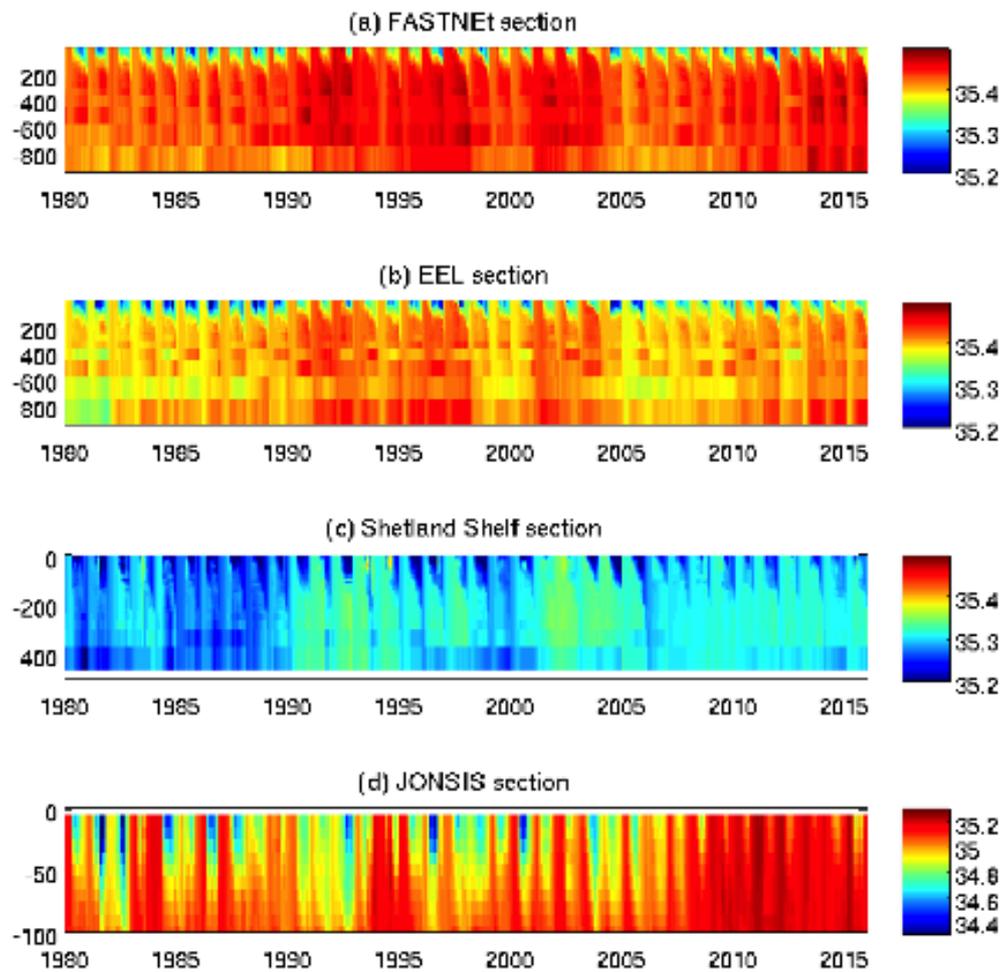
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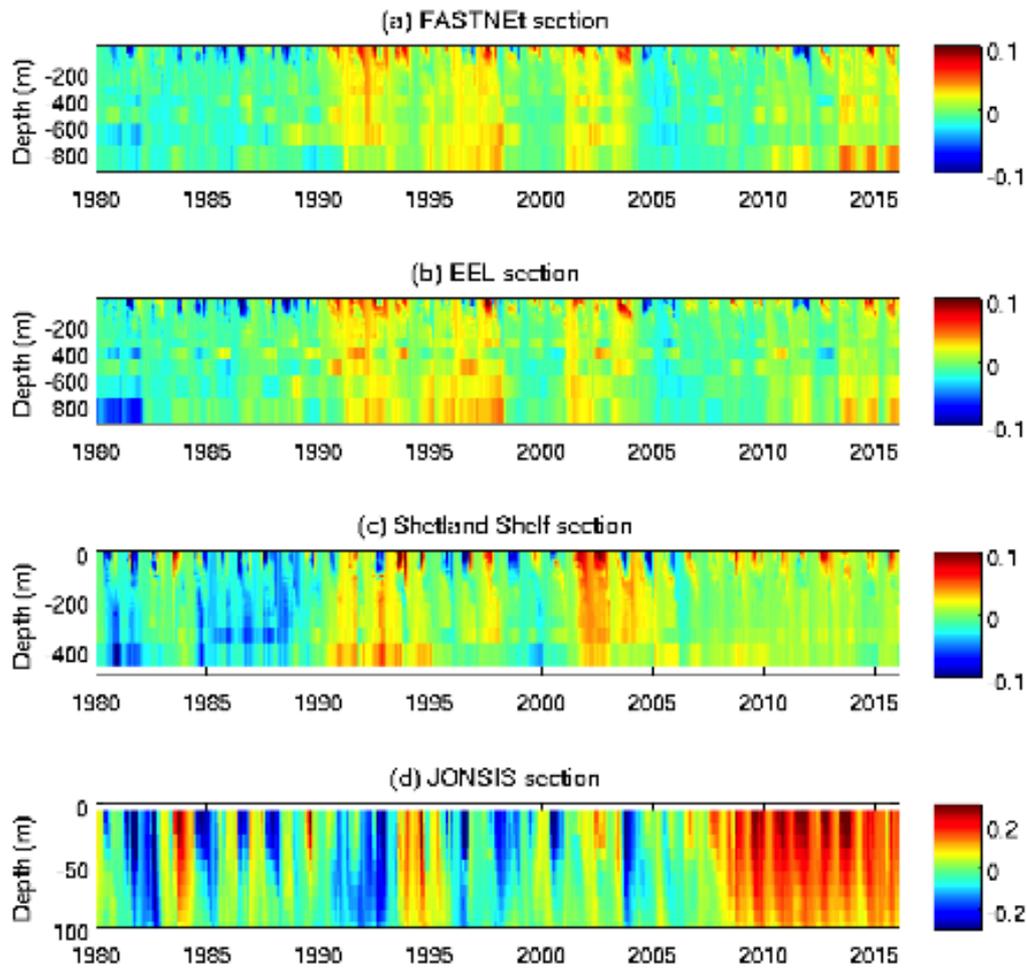


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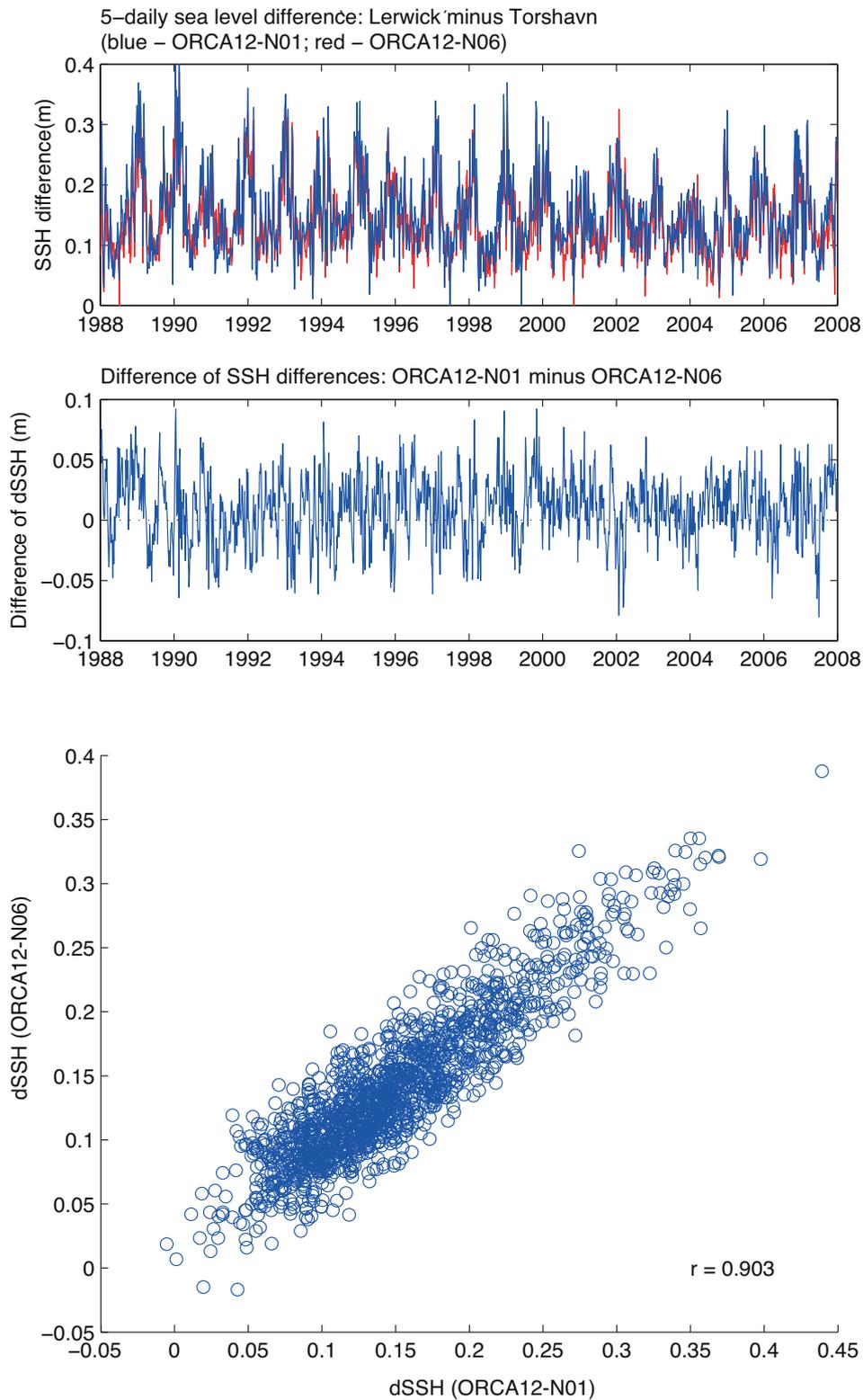
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