

Supplementary Material

Drivers of marine heatwaves in a stratified marginal sea

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S1 - Composites

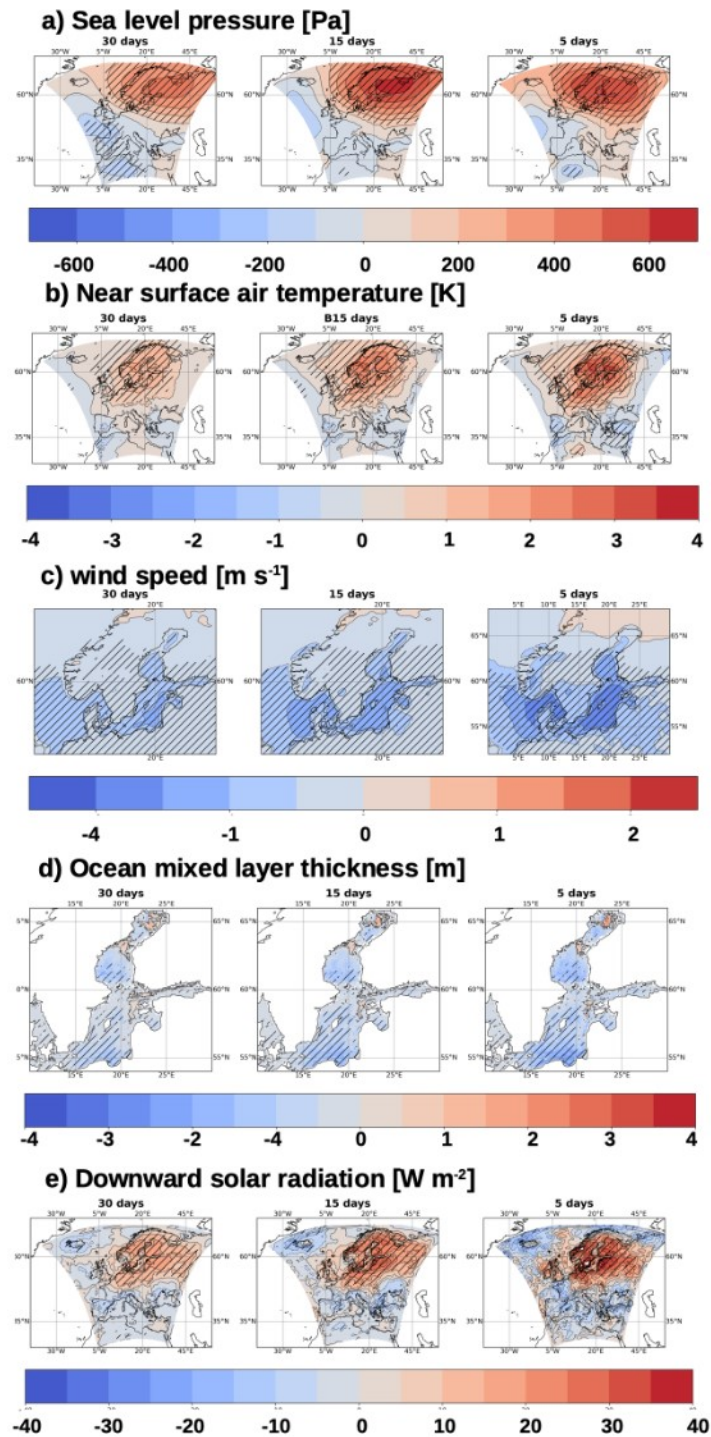


Figure S1. Summer composite anomalies for a) sea level pressure, b) near surface air temperature, c) wind speed, d) ocean mixed layer thickness, and e) downward solar radiation. The anomalies are for periods of 20 days (left), 15 days (middle), and 5 days (right) before the day of maximum MHW extent. Areas where the signal-to-noise ratio exceeds two standard deviations are hatched.

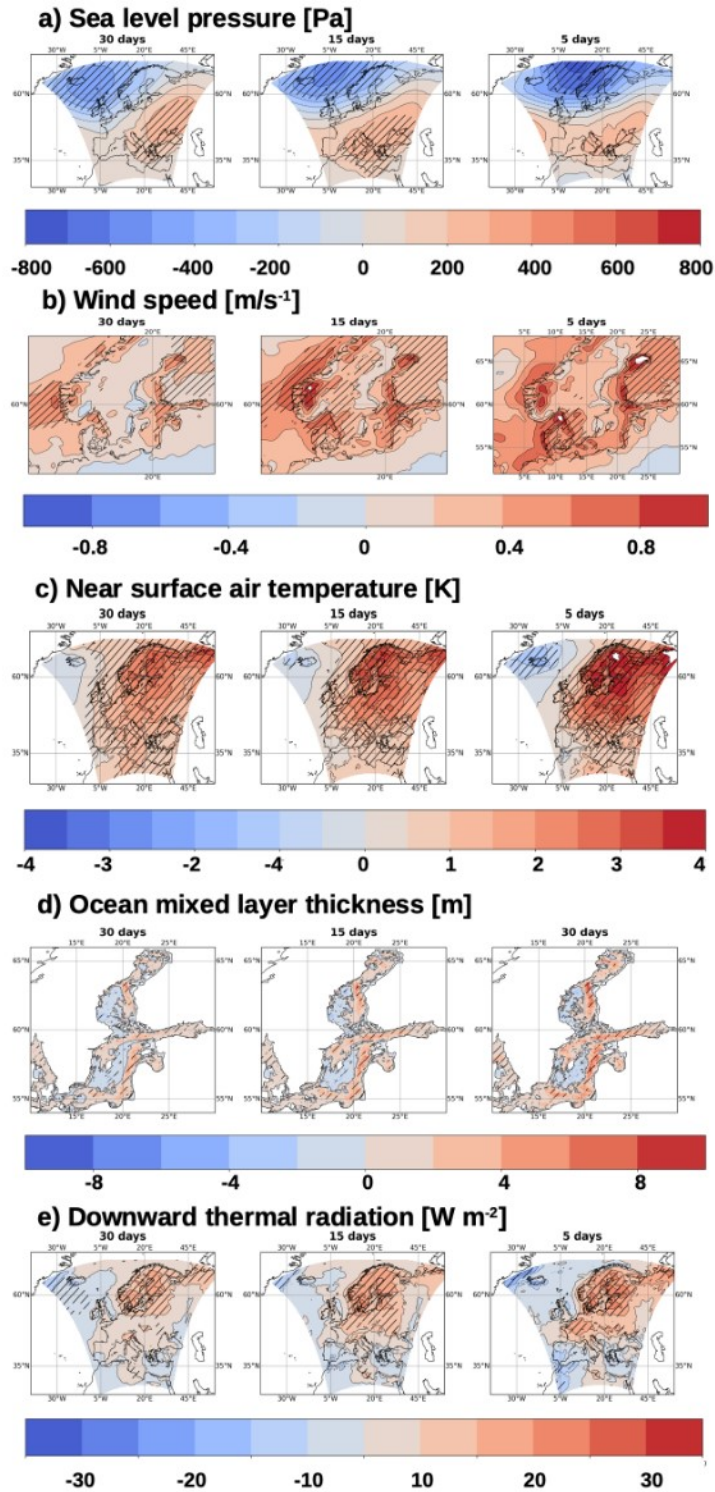


Figure S2. Winter composite anomalies for a) sea level pressure, b) wind speed, c) near surface air temperature, d) ocean mixed layer thickness, and e) downward thermal radiation. The anomalies are for periods of 30 days (left), 15 days (middle), and 5 days (right) before the day of maximum MHW extent. Areas where the signal-to-noise ratio exceeds two sigma are hatched.

S2 - Analysis of weather regimes

The dominant WRs associated with summer MHWs (ScBL) and winter MHWs (ZO) were analyzed. For this, we constructed composites of T2m, wind speed, and SLP, and MLD from all days that were assigned to the respective WRs. The results are shown in Figure S3. During summer (Figure S3a-d.) ScBL is associated with anomalous high SLP over northern Europe and low wind speeds over the Baltic Sea. This is linked to a counter-cyclonic wind regime (Figure S3b) over Scandinavia with predominantly SE winds west of Norway that advect warm air masses poleward to the Arctic. Near-surface air temperature is only slightly elevated which highlights the elevated solar influx and the weak wind speeds (associated with lowered water mixing, Fig. Figure S3.d) as main triggers for MHWs during the prevailing by the ScBL regime.

The predominant winter WR, i.e. the zonal regime ZO, is associated with a positive temperature anomaly, strong westerly winds, and the characteristic SLP dipole pattern and mixed layer thickness (Figure S3e-h).

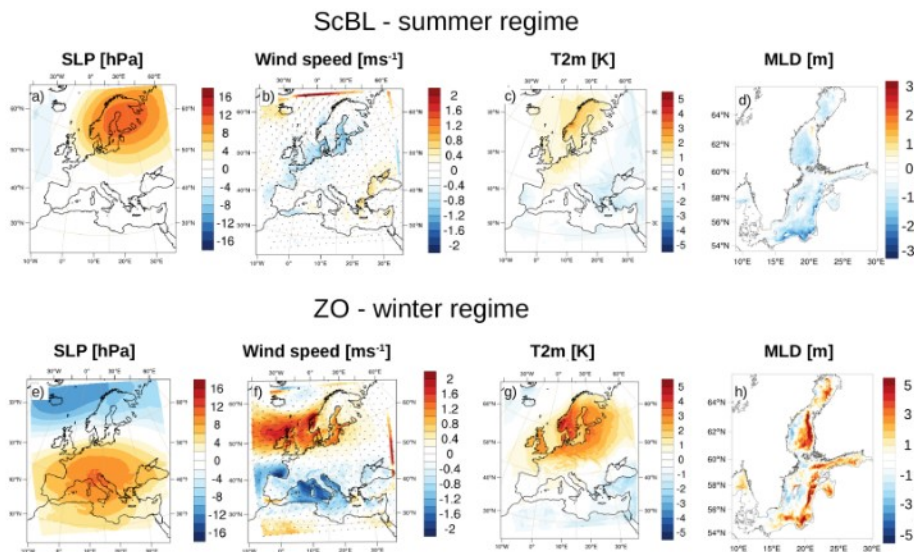


Figure S3. Composite analysis of weather regimes. a)-c) displays composite climatologies for the zonal regime in winter, i.e. surface air temperature, wind speed and sea level pressure respectively. d)-f) display the same variables the Scandinavian blocking regime during summer. The composites were extracted from the preceding 25 days before the DOMHWE was fully developed.