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Supplement of

Coastal and regional marine heatwaves and cold spells in the northeastern Atlantic

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Supplementary files

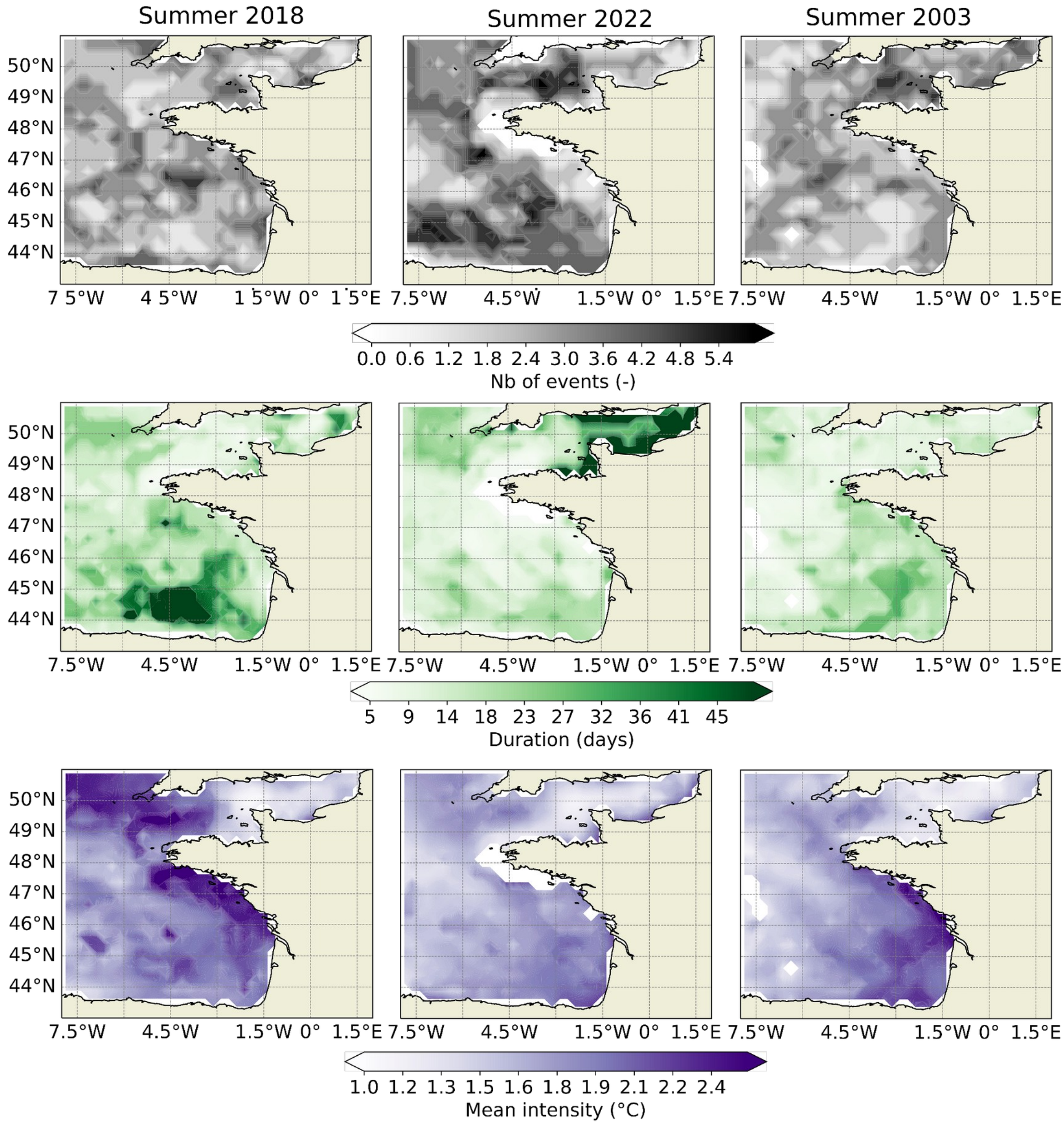


Figure S1: Summer (JJAS) number of events (first row), average duration (second row; in days) and average intensity (third row; in °C) for the top 3 summer in term of total activity in the whole domain (from left to right)

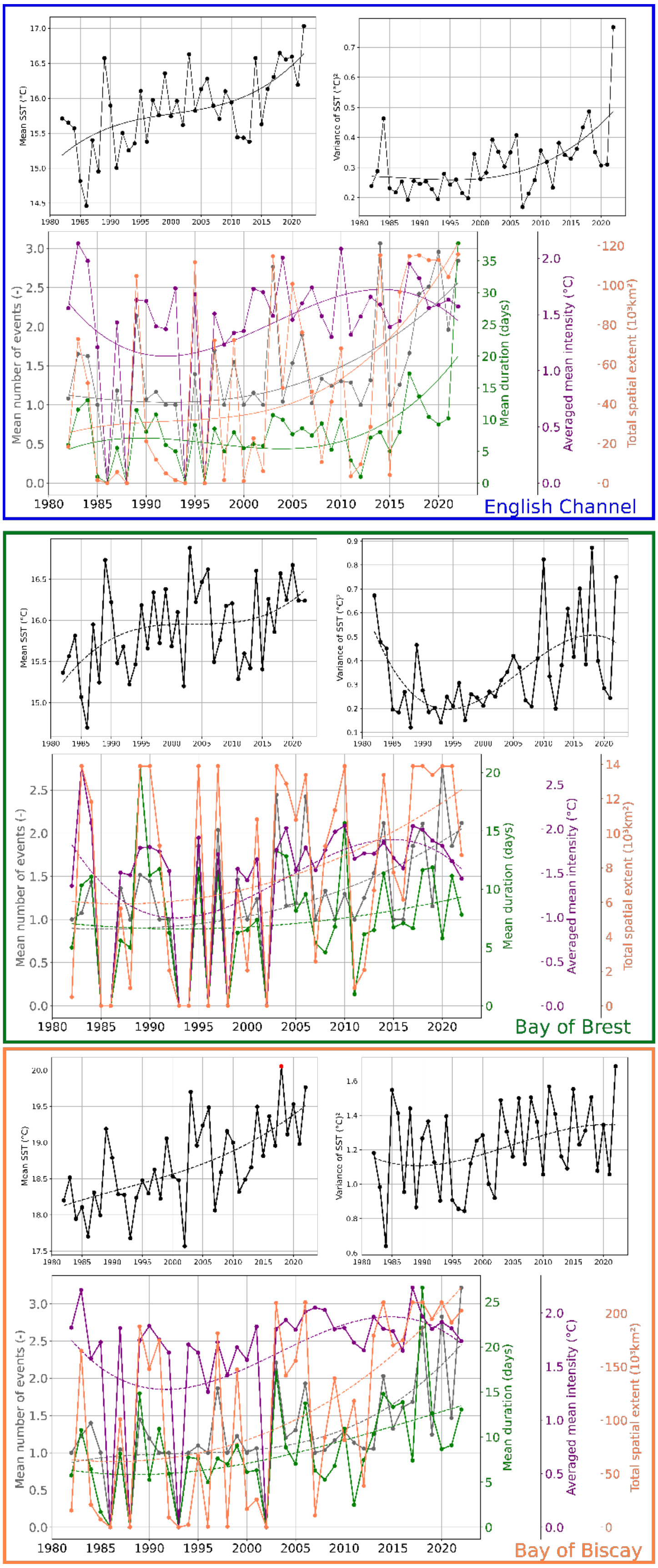


Figure S2: Same as for Figure 3 for summer MHWs but for three subregions: the English Channel (top), the Bay of Brest (middle) and the Bay of Biscay (bottom).

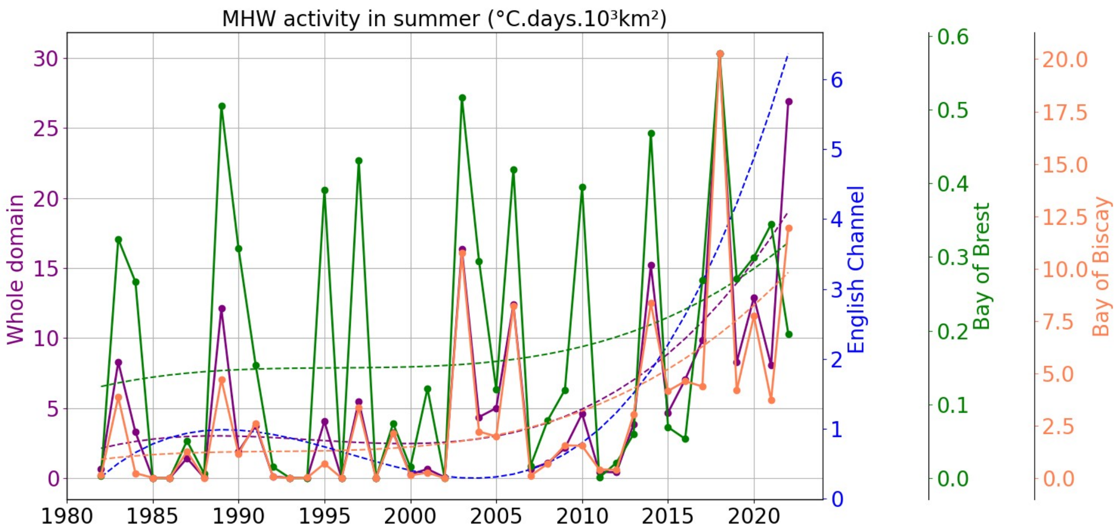


Figure S3: Time series of summer (JJAS) MHWs activity (°C.days.10^3km²) for the whole domain (purple curve), the English Channel (blue curve), the Bay of Brest (green curve) and the Bay of Biscay (orange curve). Dash lines represent the regression of a third-order polynomial of the solid line with the same color.

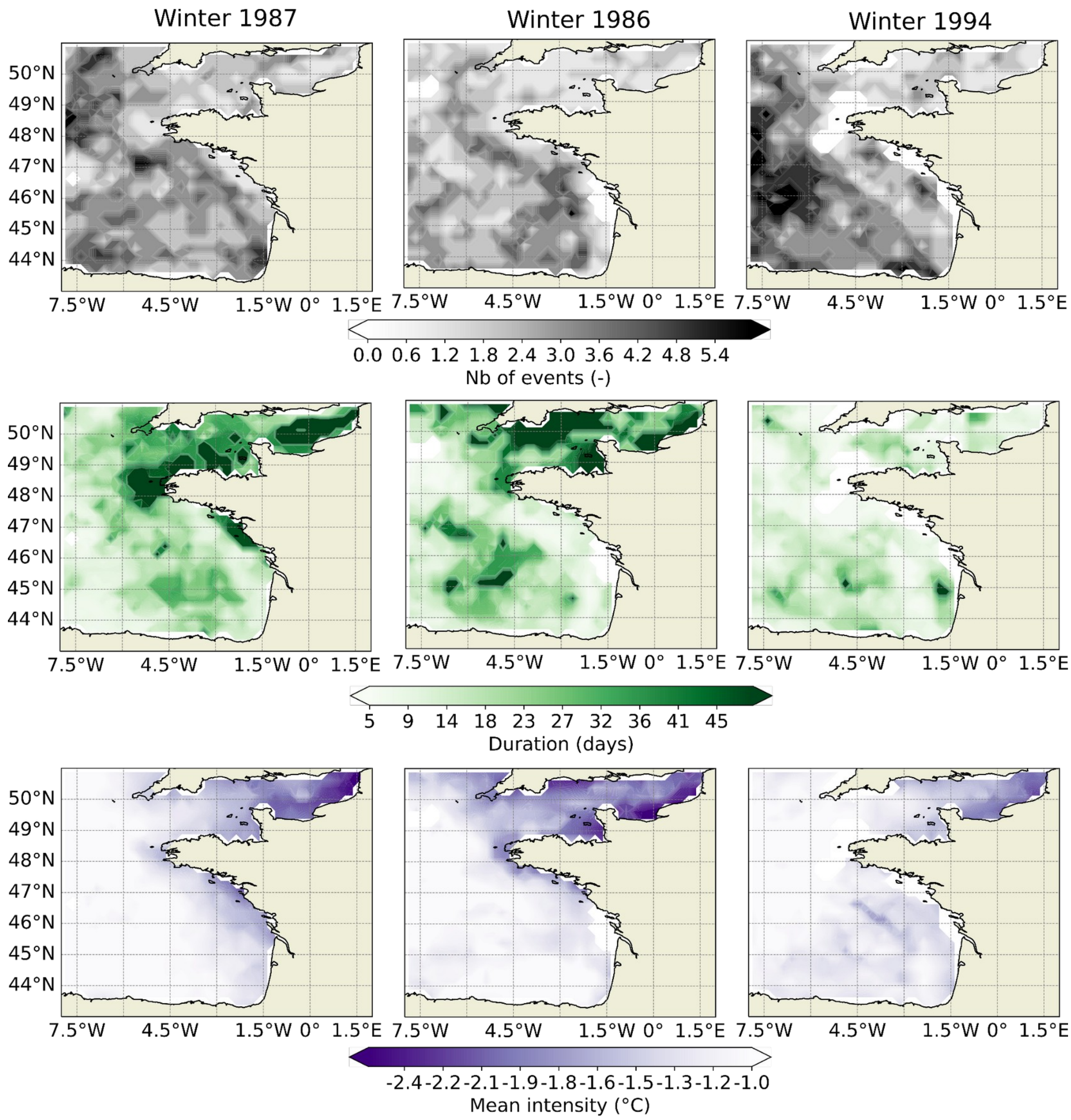


Figure S4: Same as Figure S1 but for MCSs in winter (DJFM).

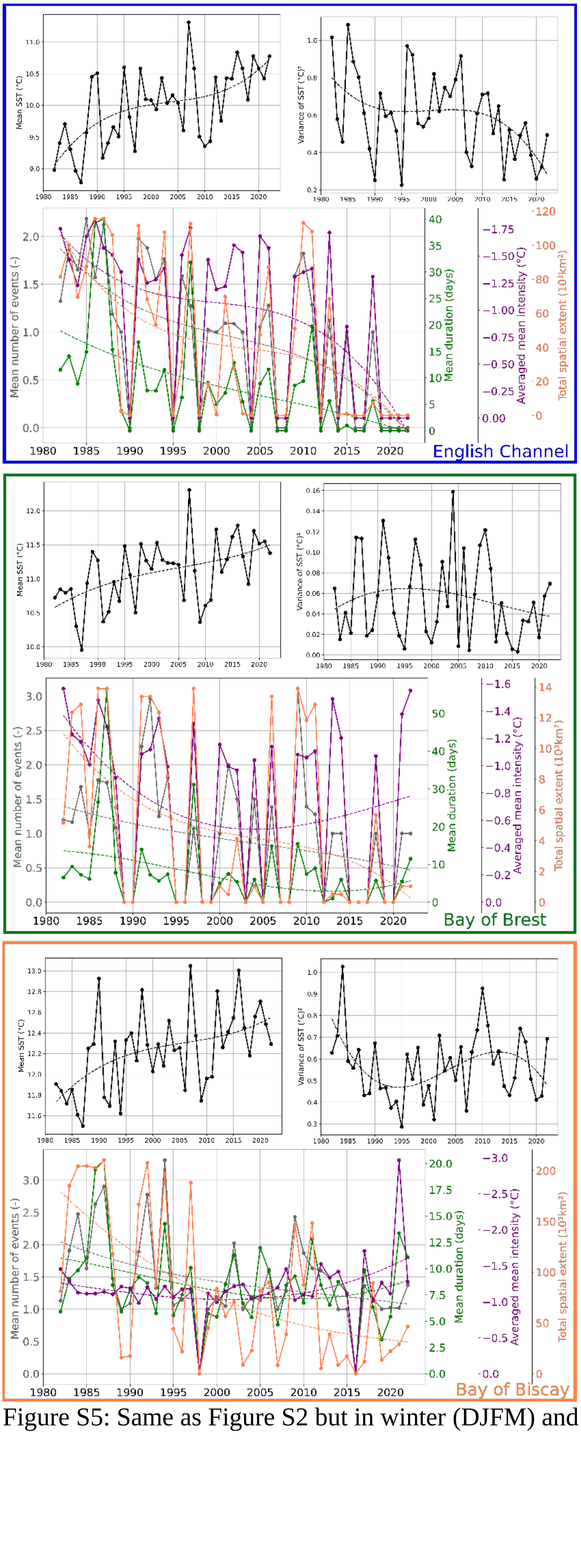


Figure S5: Same as Figure S2 but in winter (DJFM) and MCSs (blue curve).

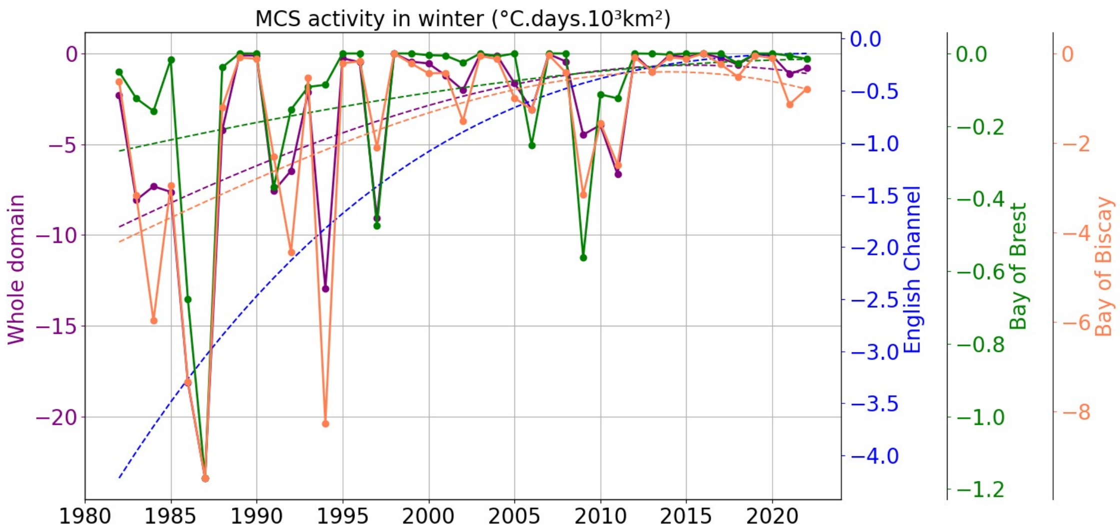


Figure S6: Same as for Figure S3 but for winter (DJFM) MCSs

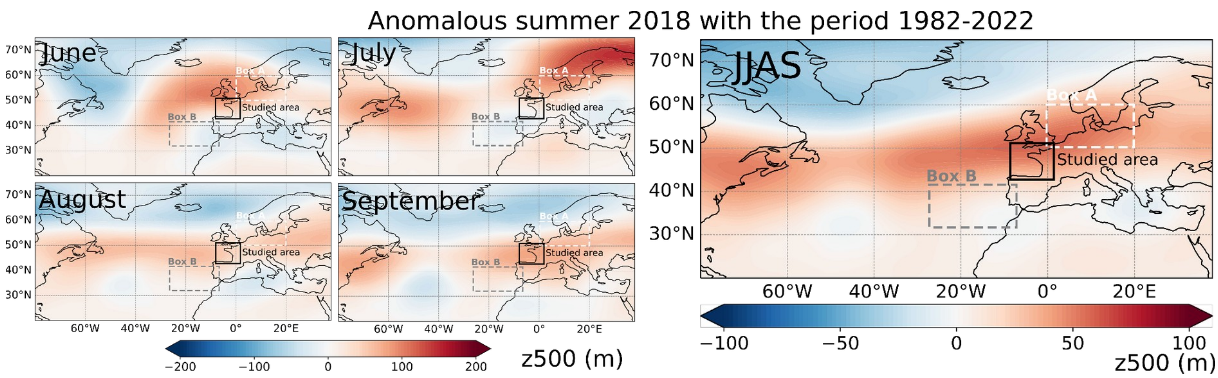


Figure S7: Anomalous geopotential height at 500 hPa (left panel) in June (top-left), July (top-right), August (bottom-left) and September (bottom-right) and June to September with the period 1982-2022 (right panel). Box A is the domain 50–60° N, 0–20° E and box B is the domain 31–41° N, 33–13° W.

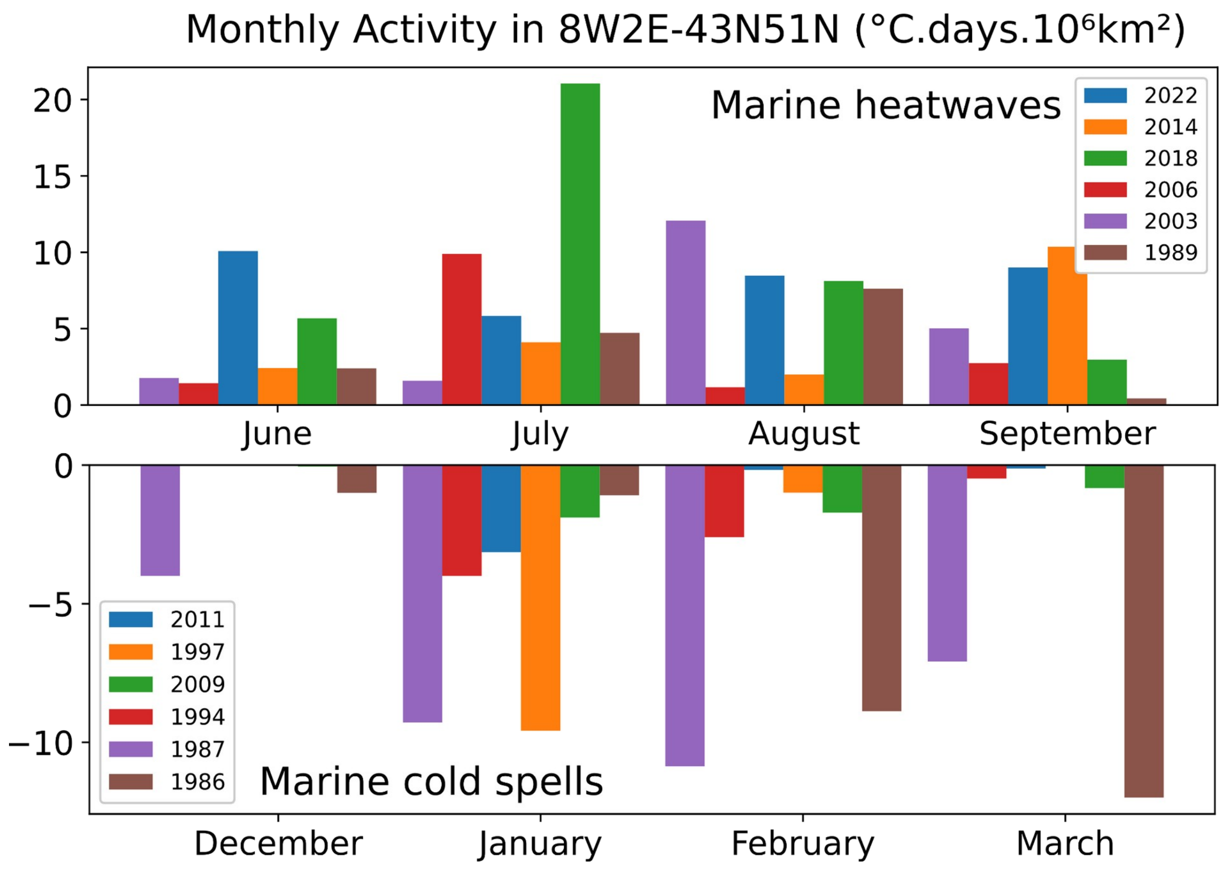


Figure S8: Total monthly activity in the Northeast Atlantic studied area (43–51° N, 8° W–2° E) for marine heatwaves in summer months (top) and for marine cold-spells in winter months (bottom).

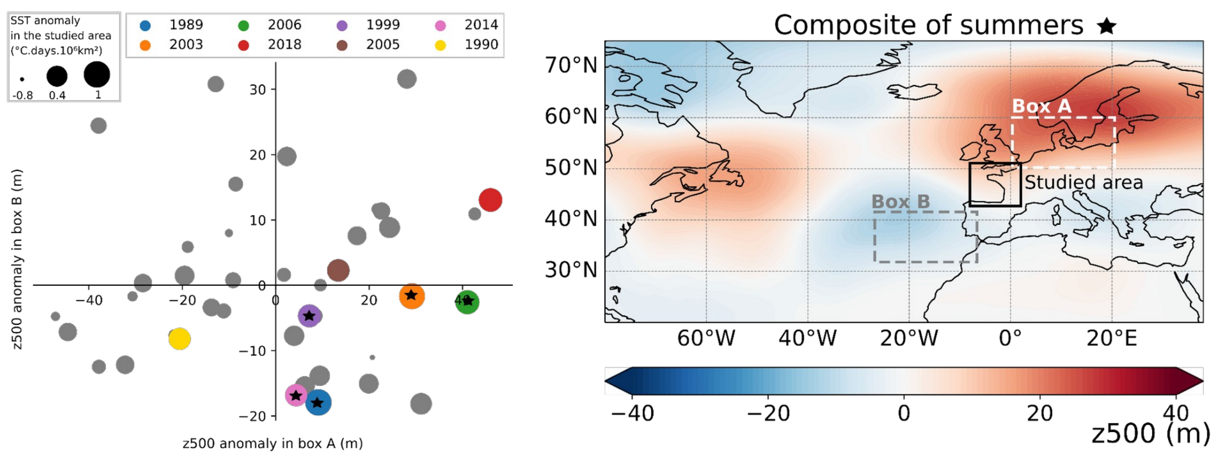


Figure 9: Same as Figure 8 but with SST instead of marine heatwave activity. SST anomalies are calculated with respect to the third-order trend (dashed black line in the Figure 3a). Coloured mark summer is for anomalous SST averaged of the studied area exceeding 0.4 ºC.

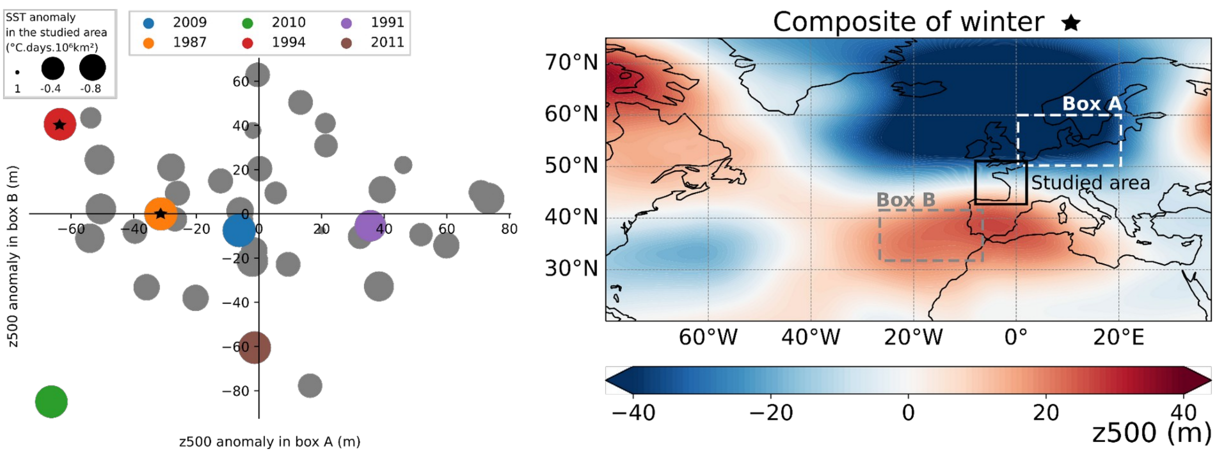
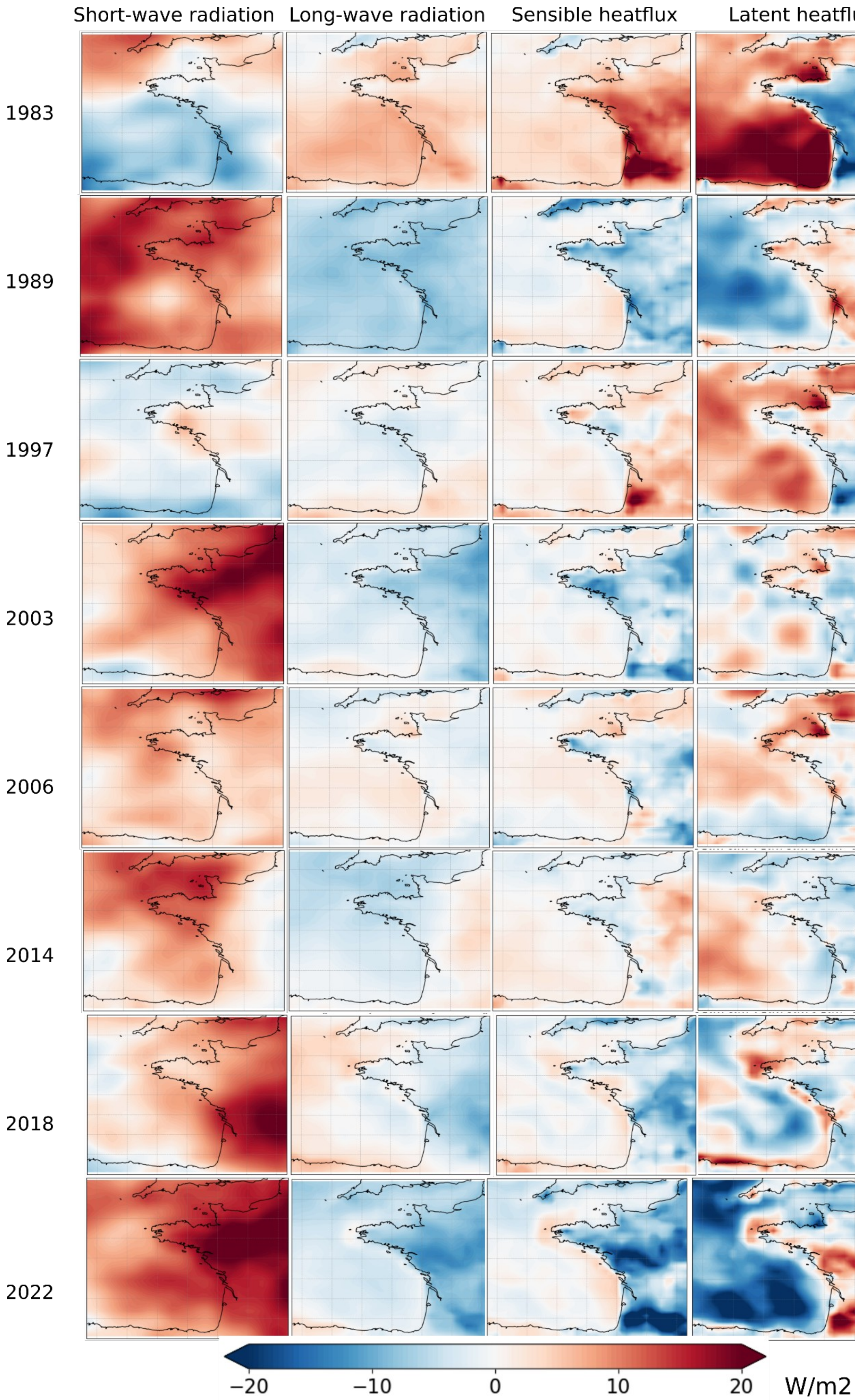


Figure S10: Same as Figure 9 but with SST instead of marine cold-spells activity. SST anomalies are calculated with respect to the quadratic trend (dashed black line in Figure 6). The colored mark winter is for anomalous SST averaged of the studied area below -0.4 ºC.



Short-wave radiation
Long-wave radiation
Sensible heatflux
Latent heatflux
1983
1989
1997
2003
2006
2014
2018
2022
−20
−10
0
10
20
W/m2

Figure S11: Anomalous short-wave radiation (first column; W/m2), long-wave radiation (second column; W/m2), sensible heat flux (third column; W/m2) and latent heat flux (fourth column; W/m2) compared to the period 1982-2022 for the eight most severe interannual summer (JJAS) MHWs. Positive fluxes are downward.

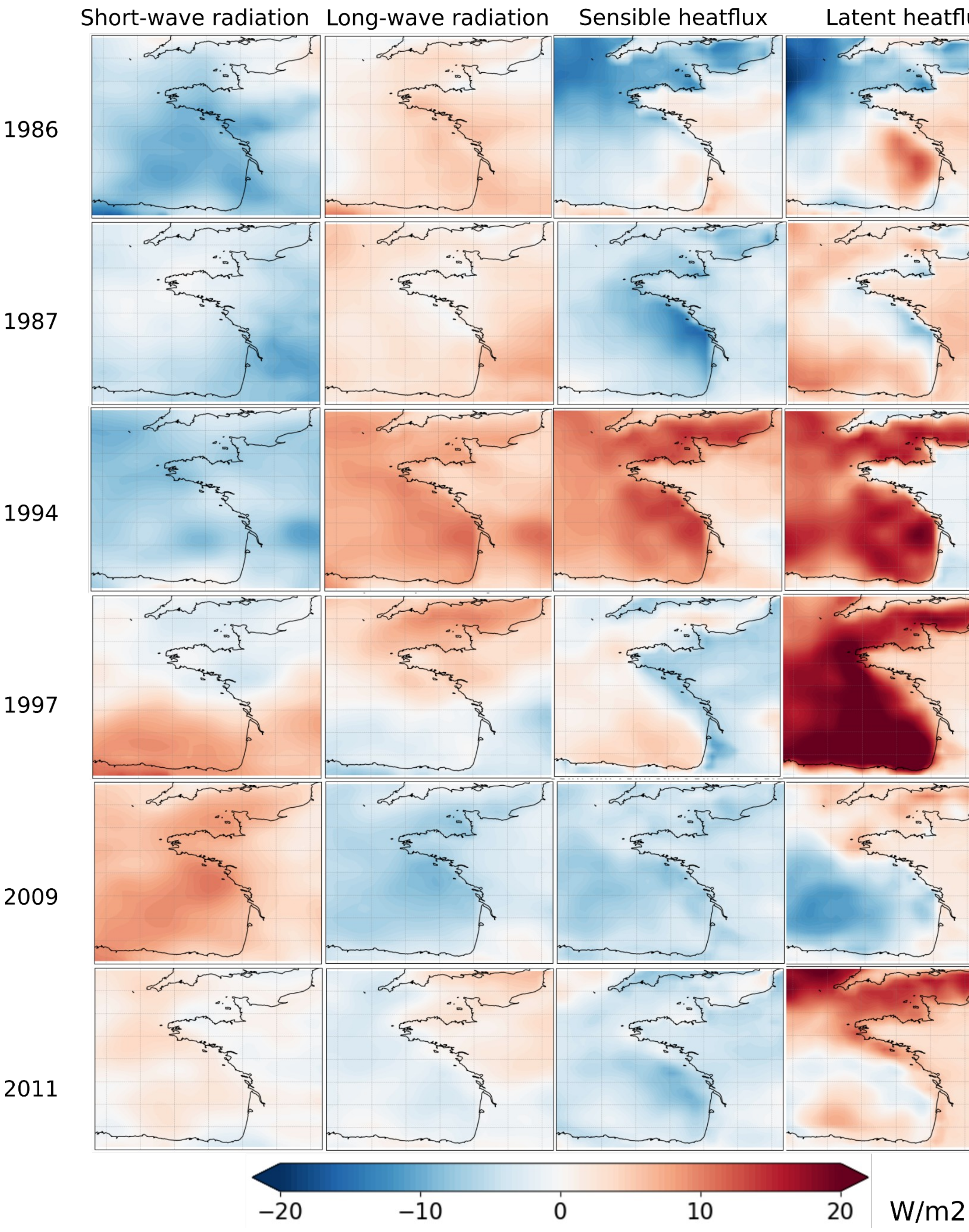


Figure S12: Same as Figure S13 but for the six most severe interannual winter MCSs.

Buoy names	Coordinates	Start acquisition
CARNot	1.56°E, 50.74°N	2004
GREENwich	0.04°E, 50.41°N	2006
SMILe	0.30°W, 49.34°N	2015
CHANnel	2.86°W, 49.90°N	1991
L4_Q	4.13°W, 50.15°N	2009
SEVEn stones	6.07°W, 50.09°N	1995
ASTAn	3.93°W, 48.77°N	2015
IROIse	4.55°W, 48.35°N	2000
SMARt	4.33°W, 48.31°N	2016
MOLIt	2.65°W, 47.46°N	2008
ARCAchon	1.23°W, 44.63°N	2017
BILBao	3.14°W, 43.41°N	2004
GIJOn	5.68°W, 43.64°N	2004

Table S1: Characteristics of the 13 *in situ* measurement buoys. Buoys indicated in blue are located in the English Channel, in green in the Bay of Brest and in orange in the Bay of Biscay.

Summer MHWs	Number of events (-)	Duration (days)	Mean intensity (°C)
Northeast Atlantic	1.4	8.9	1.7
English Channel	1.4	8.0	1.4
Bay of Brest	1.2	7.3	1.5
Bay of Biscay	1.3	8.3	1.6

Table S2: Mean properties (number of events, duration, mean intensity) of summer (JJAS) MHWs over the period 1982-2022 in the Northeast Atlantic, English Channel, Bay of Brest and Bay of Biscay

Winter MCSs	Number of events (-)	Duration (days)	Mean intensity (°C)
Northeast Atlantic	1.4	9.1	-1.4
English Channel	0.9	8.3	-1.0
Bay of Brest	0.9	7.0	-0.7
Bay of Biscay	1.4	8.4	-1.2

Table S3: Same as Table S2 but for winter (DJFM) MCSs