Linking extreme rain–wind and wave–wind compounds to Mediterranean cyclones
Supplementary Material

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List of material

- Threshold maps for extreme-event identification (Fig. SM1);
- Frequency maps of uni-variate extremes (Fig. SM2);
- Frequency maps of compound $R \wedge W$ extremes, with uni-variate extremes defined based on the 95th percentile threshold (Fig. SM3) - instead of the 98th percentile threshold used to produce Fig. 4 in the main manuscript;
- Maps showing the ratio of compound over uni-variate extremes, i.e., the compounding ratio (Figs SM4, SM5);
- Frequency maps of the cyclone features used in the analyses of Figs 6, 8 in the main manuscript (Fig. SM6);
- Maps of the first, second and third dominant cyclone cluster in terms of absolute impact-area frequency (Fig. SM7).

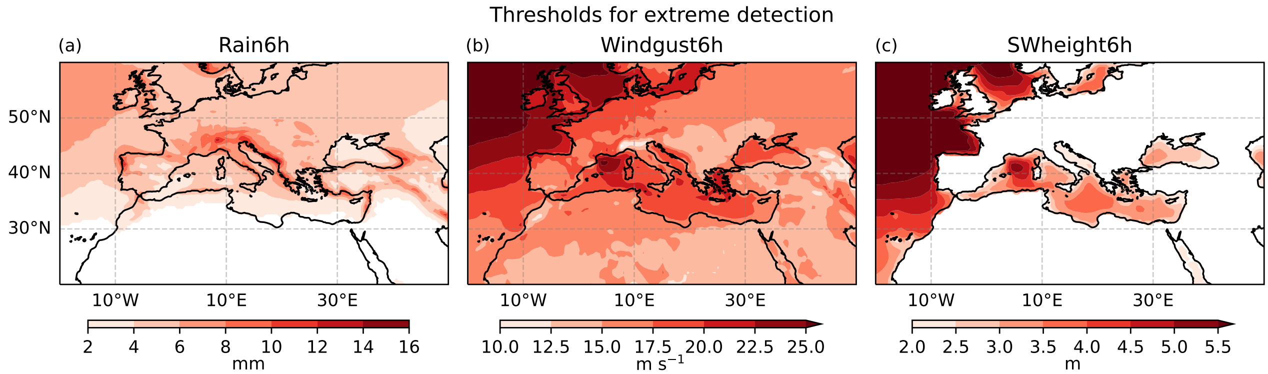

Figure SM1. Thresholds used for the identification of (a) Rain, (b) Windgust and (c) Swell-Wave height moderate extremes. These are defined as the 98th percentile of the variable distribution at each grid point, provided it exceeds a minimum value of 2 mm, 10 m s^{-1} and 2 m, respectively

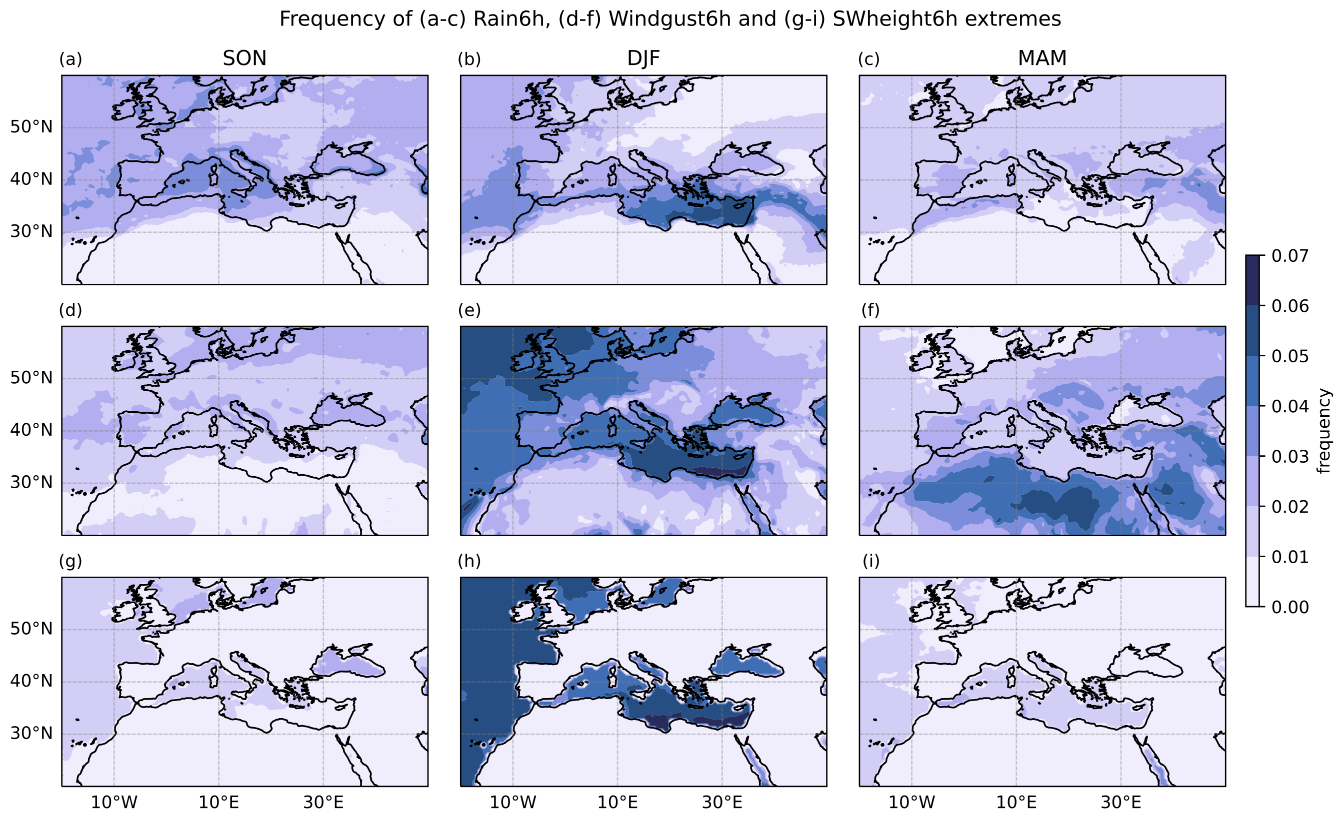

Figure SM2. Frequency of (a-c) Rain, (d-f) Windgust and (g-i) Swell-Wave height moderate extremes, computed as the number of extreme occurrences over the total number of 6-hourly time steps

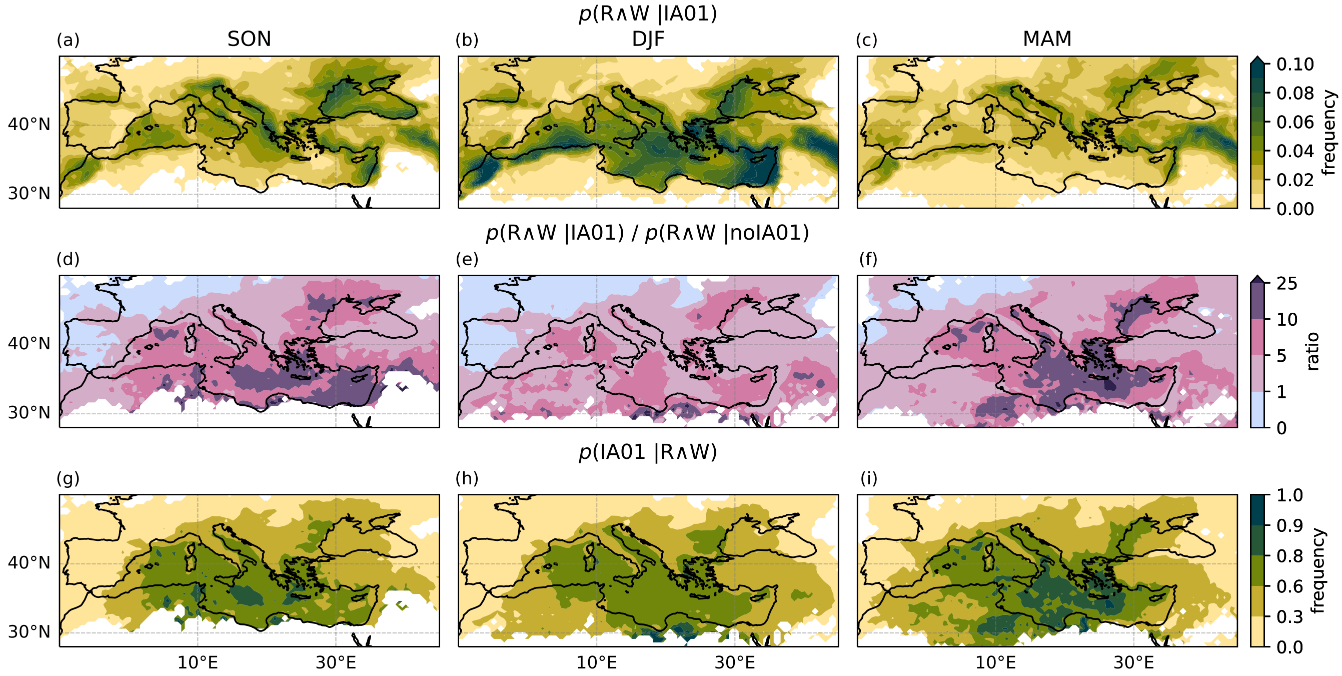

Figure SM3. As Fig. 4 in the main manuscript, but with extremes defined based on a local 95th percentile threshold. (a-c) The frequency of R∧W compound conditional to the presence of a cyclone, (d-f) the ratio of R∧W compound frequency during cyclone occurrence over the R∧W compound frequency during times when cyclones do not occur, (g-i) the cyclone frequency conditional to the presence of R∧W compounds. Seasonal results for autumn - SON, winter - DJF and spring - MAM are displayed on the left, centre and right panels, respectively. Grid points displaying less than four (R∧W |IA01) events are masked out

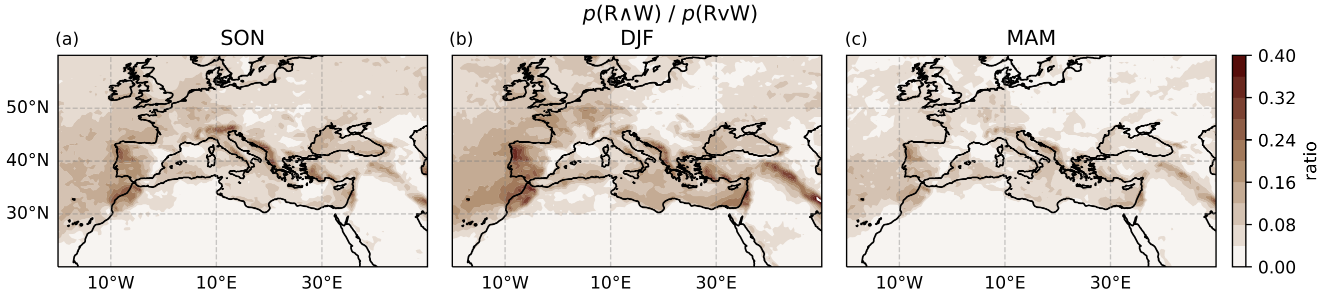

Figure SM4. Ratio of R∧W over R∨W (shading), computed as the number of compound extreme occurrences over the number of uni-variate or compound extreme events

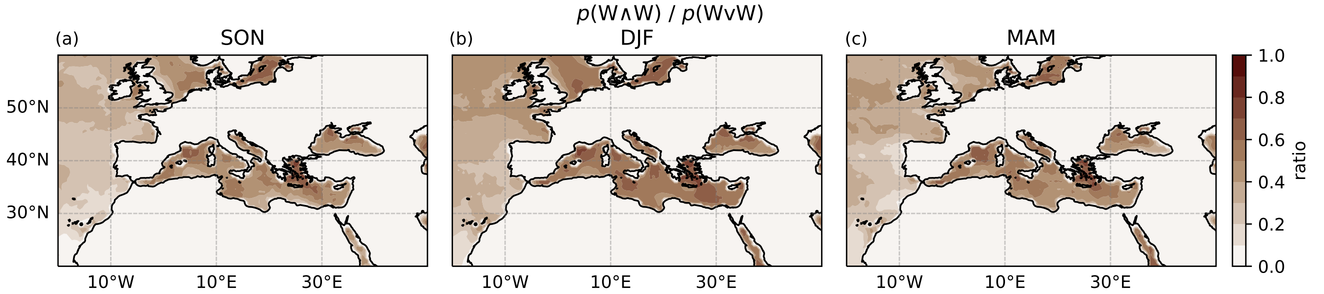

Figure SM5. As in Fig. SM4 for W∧W compound (note difference in colour scale)

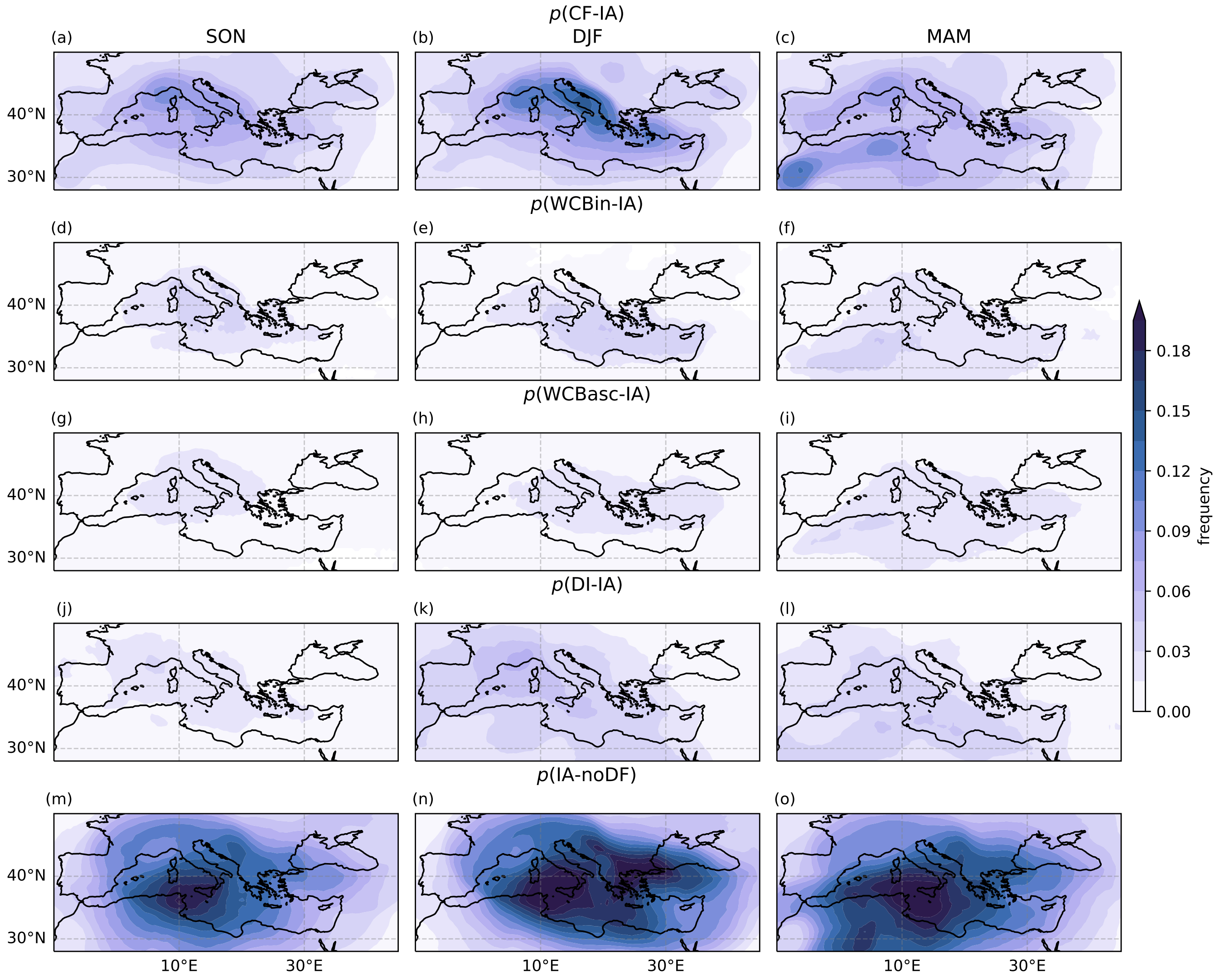

Figure SM6. Frequency of the cyclone features corresponding to cold fronts (a-c, CF-IA), regions of warm conveyor belt inflow (d-f, WCBin-IA) and ascent (g-i, WCBas-IA), dry intrusions (j-l, DI-IA), and the 1000 km radius around the cyclone centre after removal of the aforementioned dynamical features' masks (m-o, IA-noDF), computed as the number of occurrences over the total number of 6-hourly time steps

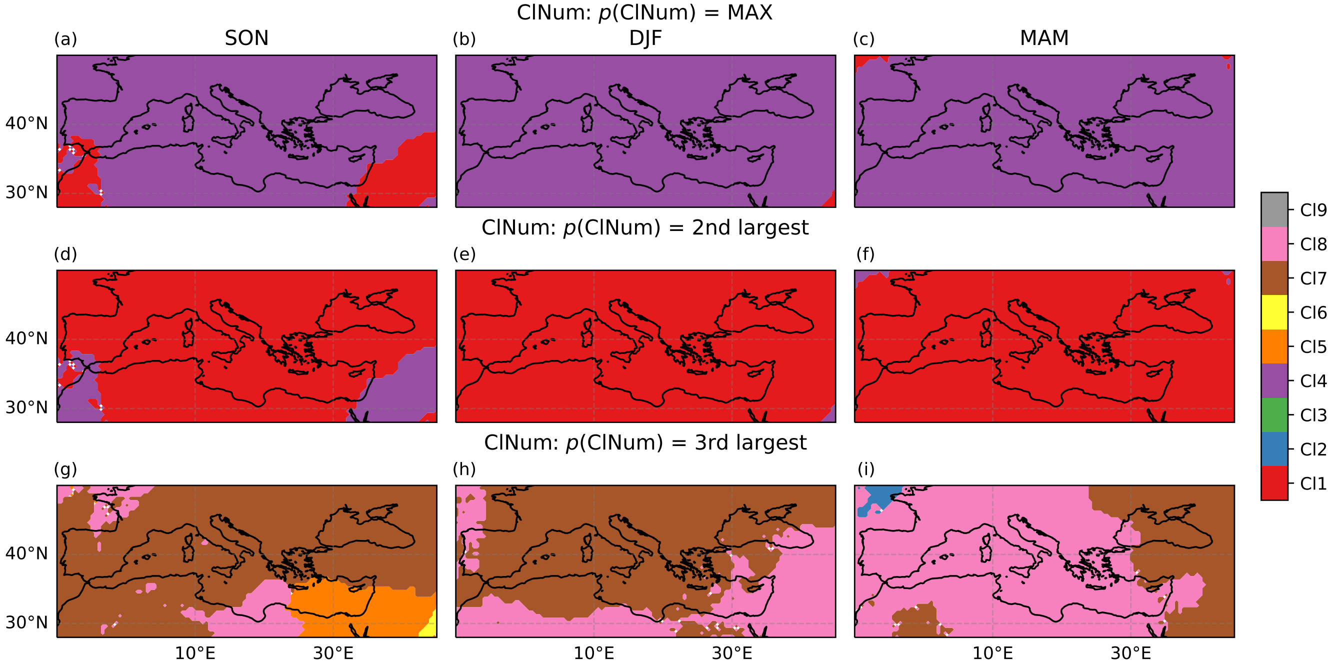

Figure SM7. The first, second and third cyclone cluster for frequency in (a,d,g) autumn - SON, (b,e,h) winter - DJF and (c,f,i) spring - MAM. Note that grid points simultaneously within the IA01 of multiple cyclones contribute to the frequencies of all the relevant clusters

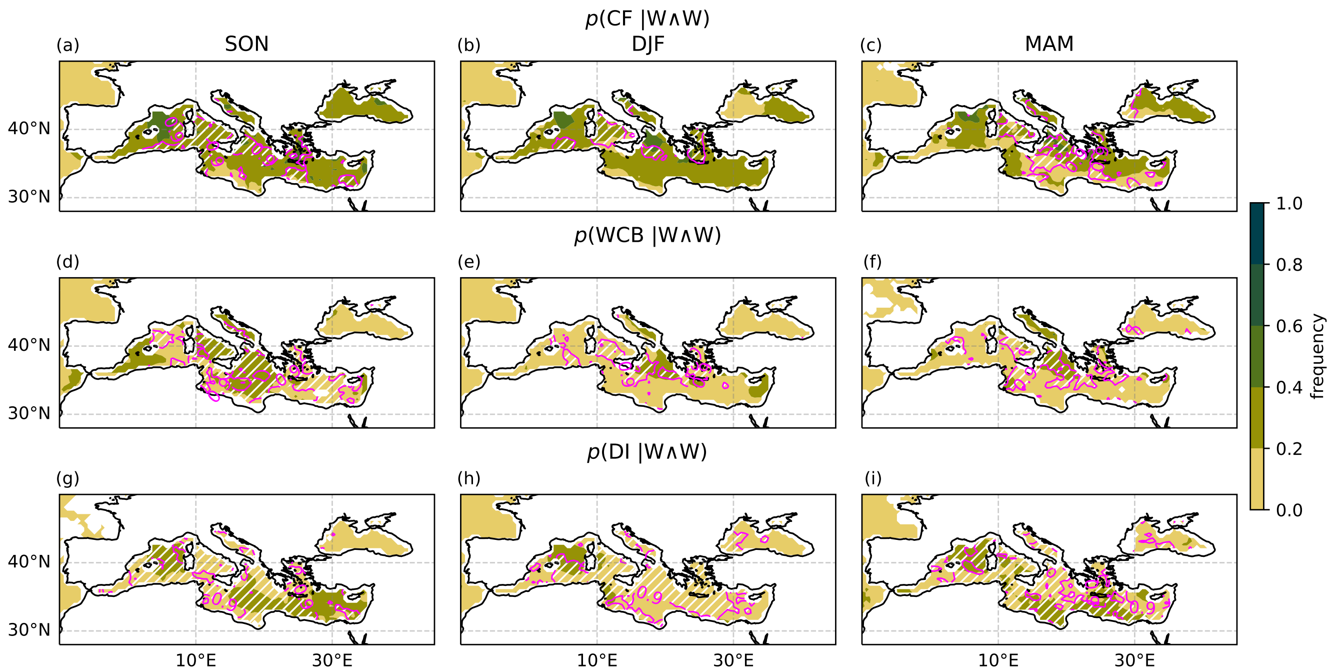

Figure SM8. Frequency of (a-c) CFs, (d-f) WCBs and (g-i) DIs conditional to W∧W compound occurrence. Magenta contours and slanted white hatching identify regions where more than 90% of the selected dynamical features are associated with cyclones, according to the definitions of cyclone impact area in Section 3 of the main manuscript