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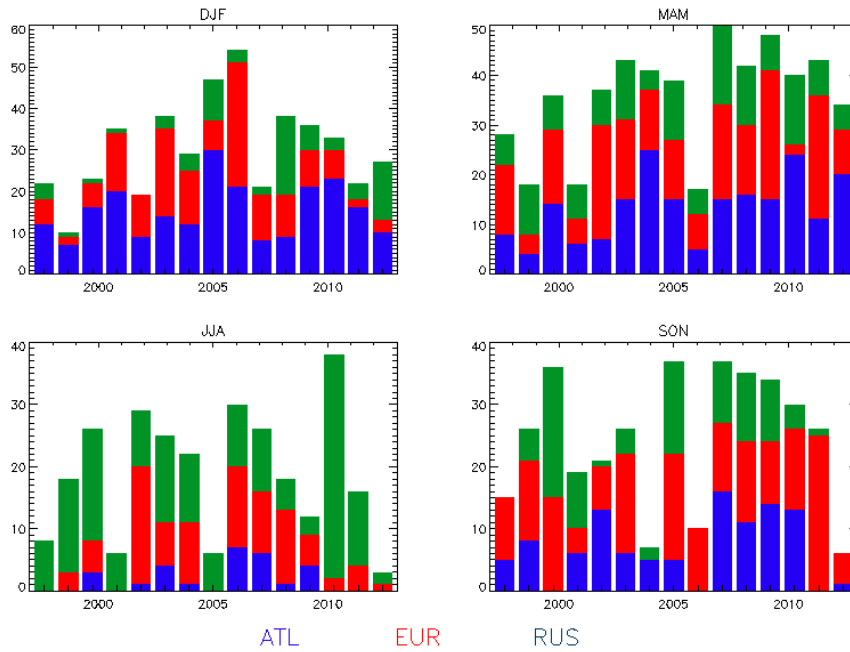
Regional responses of surface ozone in Europe to the location of high-latitude blocks and subtropical ridges

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blocks



ridges

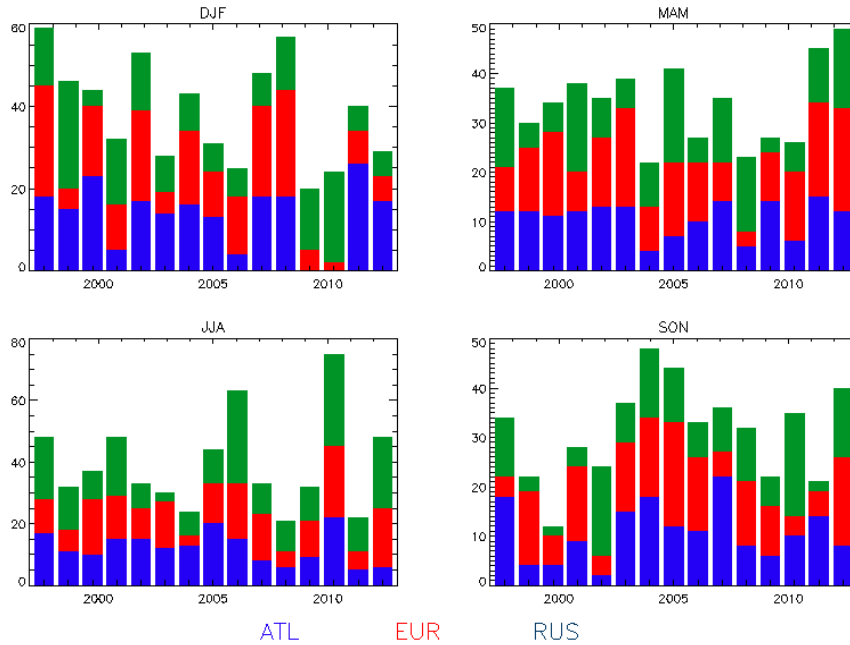
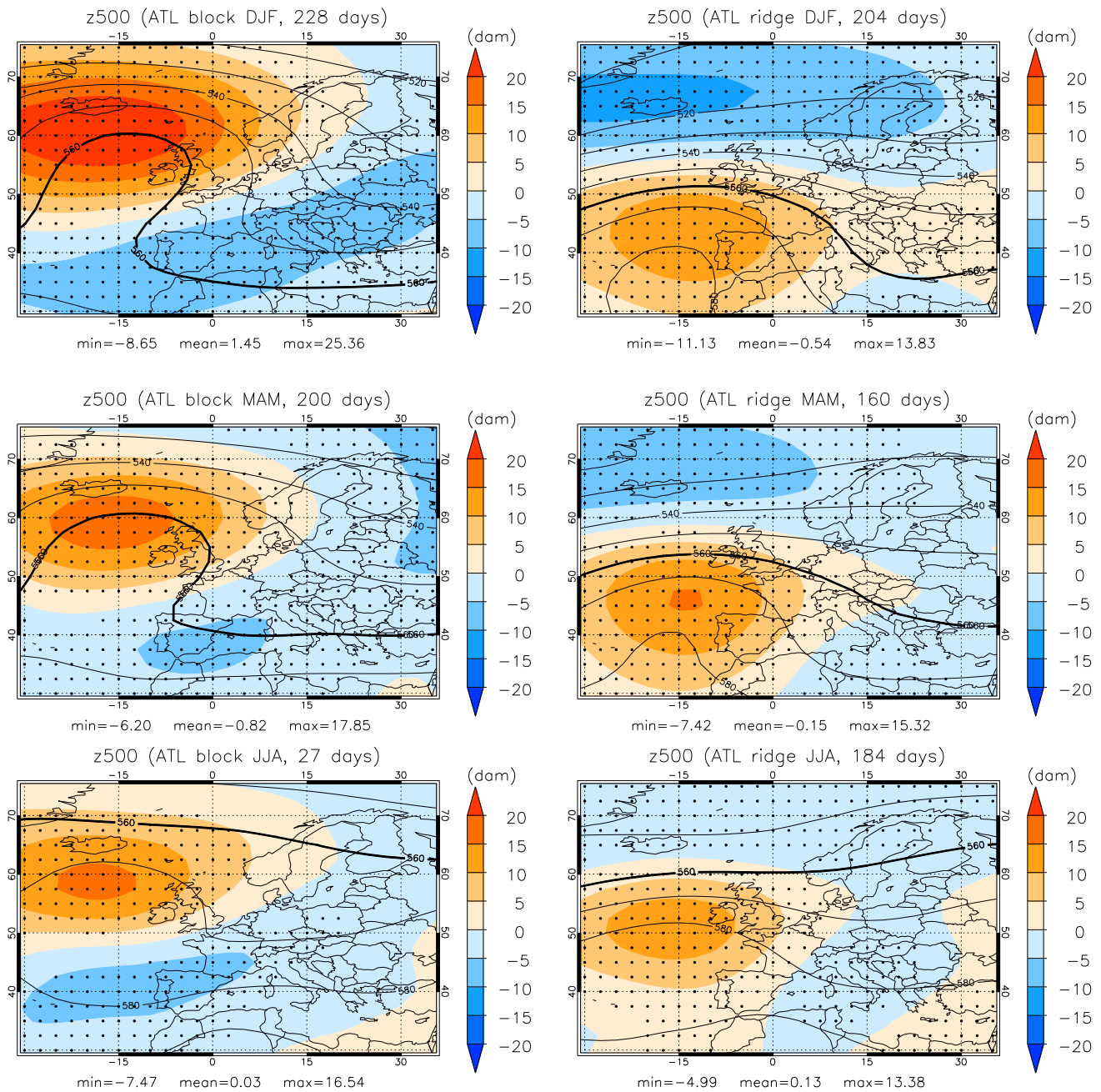


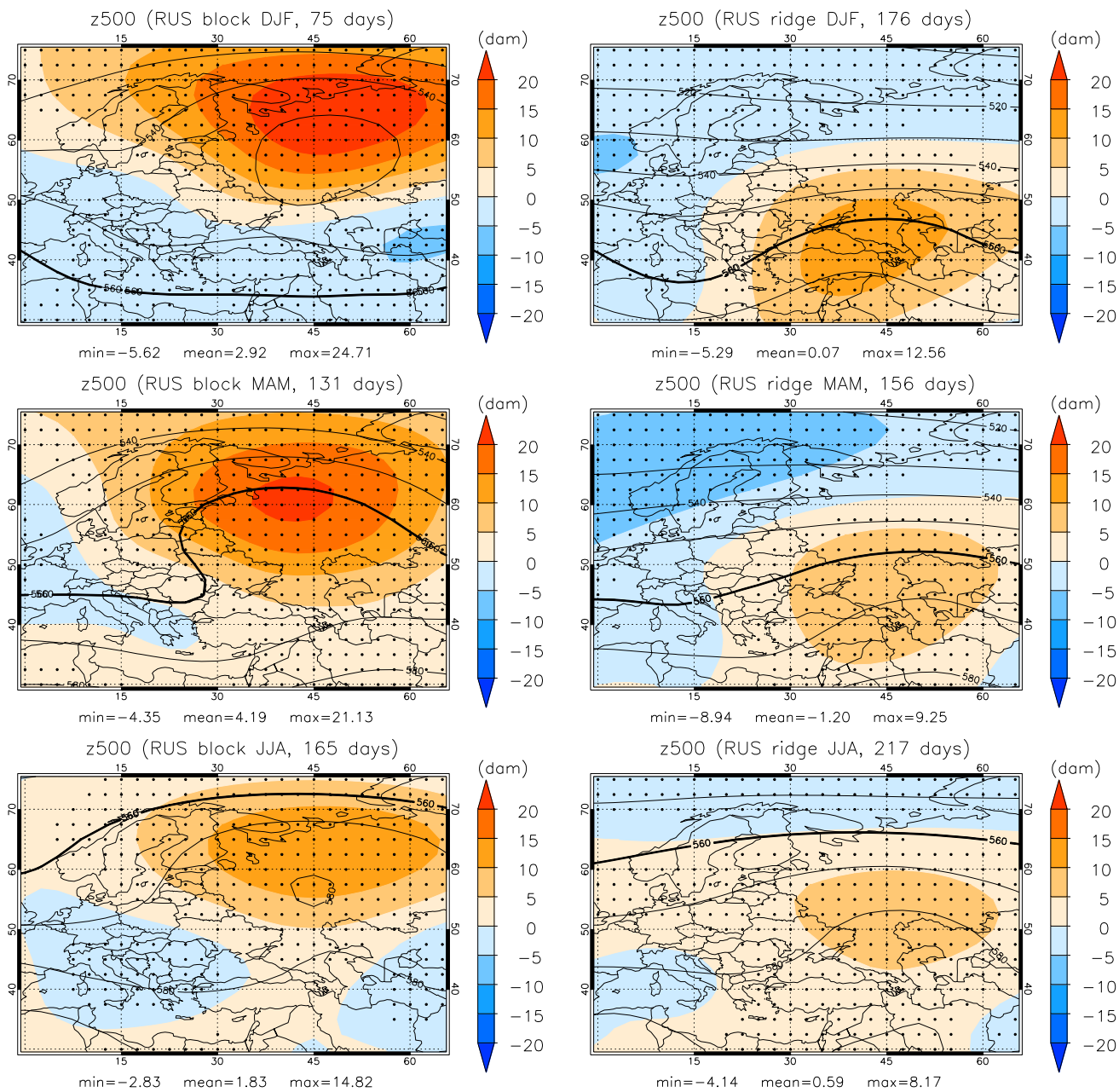
Figure S1. Interannual variability of the number of days with block (upper panel) and ridge (lower panel) centres detected over each sector (Atlantic, ATL; European, EUR; Russian, RUS) during 1998–2012.



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Figure S2. Composites of the daily anomalies with respect to the 1998–2012 climatology (shaded areas) as well as absolute values (black contour lines) of 500 hPa geopotential height (Z500) for blocking (left) and ridge (right) centres within the Atlantic sector in winter (top), spring (middle) and summer (bottom). Stippling indicates statistically significant anomalies at the 5% level (two-sided t-test). All values are in decametres (dam) and the thick line represents the 560 dam isohypse. The total number of days considered is indicated on the top of each panel.

10



5 **Figure S3. As Figure S2 but for blocks and ridges over the Russian sector.**

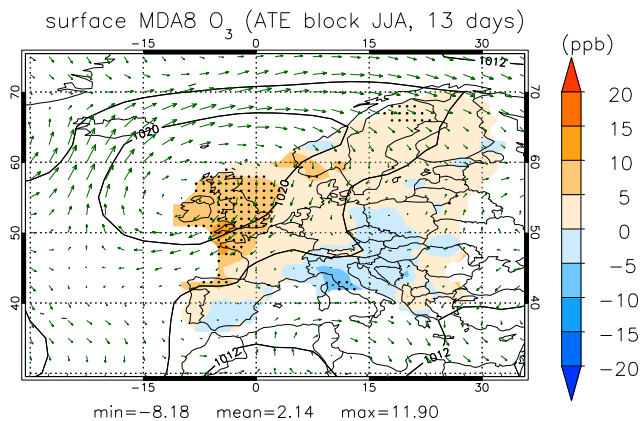
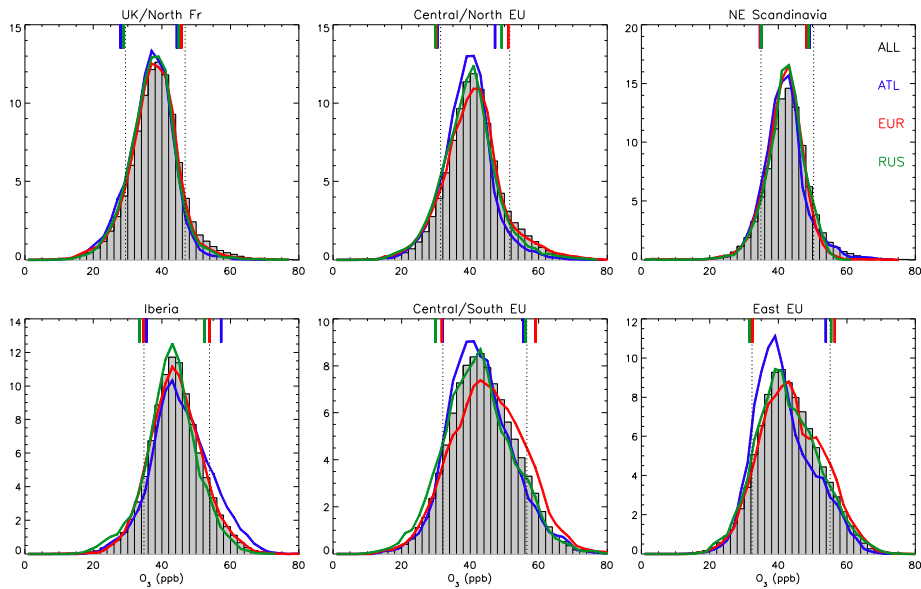


Figure S4. Composites of the seasonal anomalies of surface MDA8 O₃ (ppb) for days with blocking centres over the east flank of the Atlantic sector (15°–0° W) in summer. Anomalies have been calculated with respect to the MDA8 O₃ mixing ratios on days without blocking in that sector and season during the 1998–2012 period. Stippling indicates statistically significant anomalies at the 5 % level (two-sided t-test). The black contour lines depict the composites of MSLP (hPa) for those days. Horizontal wind fields at 850 hPa are displayed by arrows. The total number of days considered is indicated on the top.

Subtropical ridges (spring)



Subtropical ridges (summer)

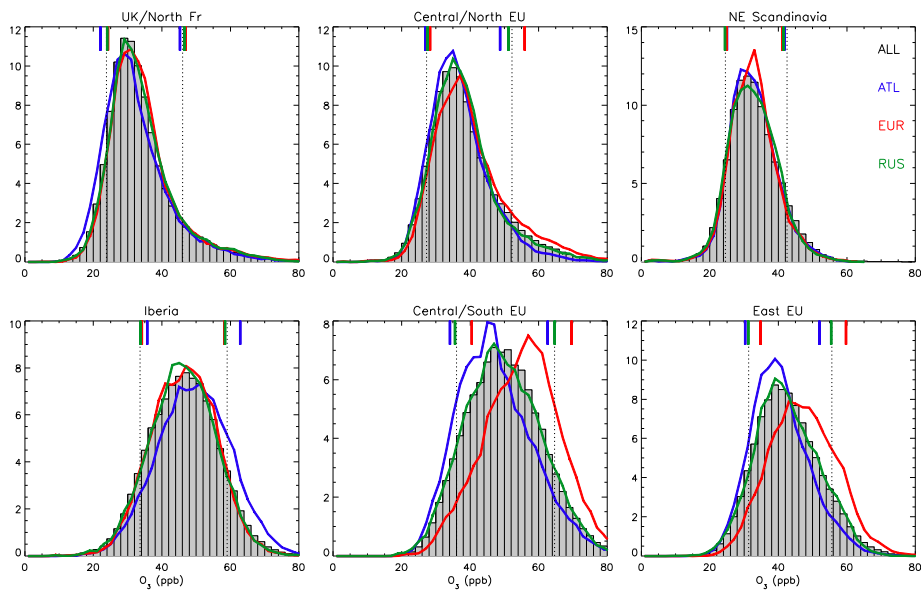
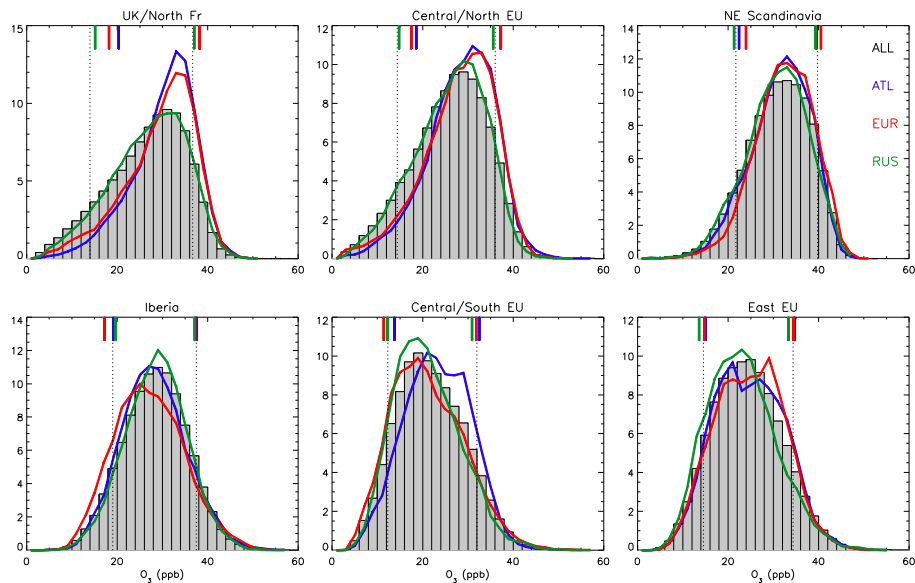
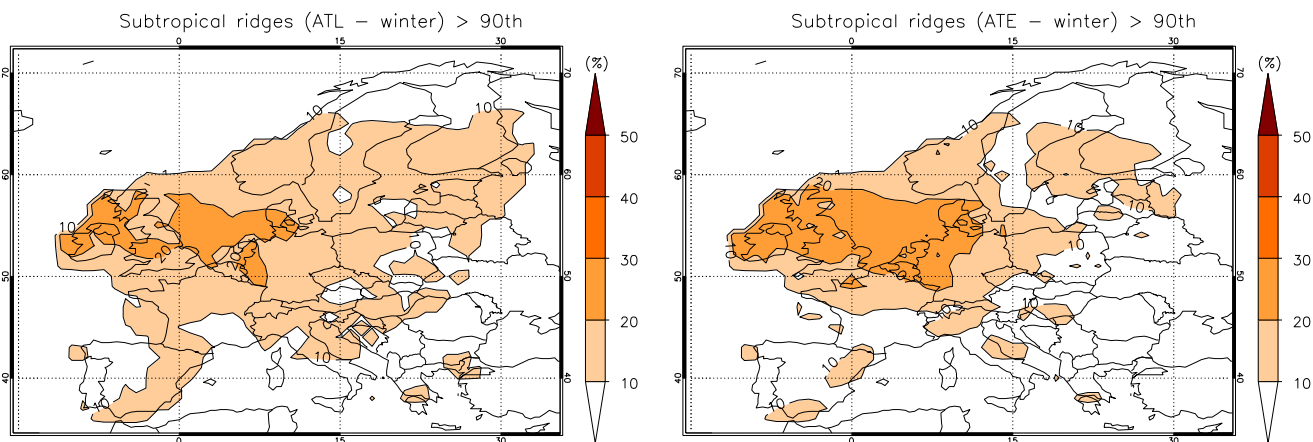


Figure S5. Spring (upper panels) and summer (lower panels) frequency distributions (%) of MDA8 O₃ for the six regional boxes presented in Figure 2 of the main text under different synoptic situations. Grey bars denote the seasonal climatology and solid lines correspond to days with subtropical ridges over the Atlantic (blue), European (red) and Russian (green) sectors.

Subtropical ridges (winter)



5 **Figure S6.** As Figure S5 but for winter.



10 **Figure S7.** Percentage of days with ridges within the whole ATL sector (30° – 0° W, left) and in the east of that sector (15° – 0° W, right) for which MDA8 O_3 is above the local 90th percentile of its seasonal distribution. Note that the 90th percentile is exceeded over 20 % of the days around the same regions where Figure 12 of the main text displays the highest positive ozone anomalies.