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*Supplement of*

## **Extratropical cyclones over the North Atlantic and western Europe during the Last Glacial Maximum and implications for proxy interpretation**

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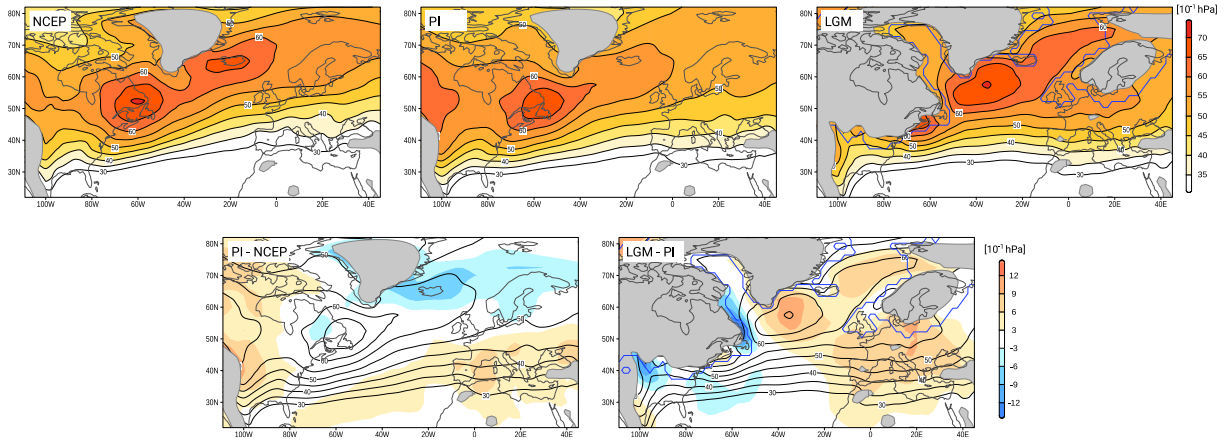


Fig. S1: Top: storm tracks (2–6 days band passed filter of daily MSLP data [ $1/10$  hPa]) for the NCEP Reanalysis data and the MPI-ESM-P simulations for PI and LGM. Bottom: differences (shaded) between PI (lines) and NCEP and between LGM (lines) and PI. Areas with topography higher 1000 m shaded grey, LGM ice sheet extent marked by the blue line.

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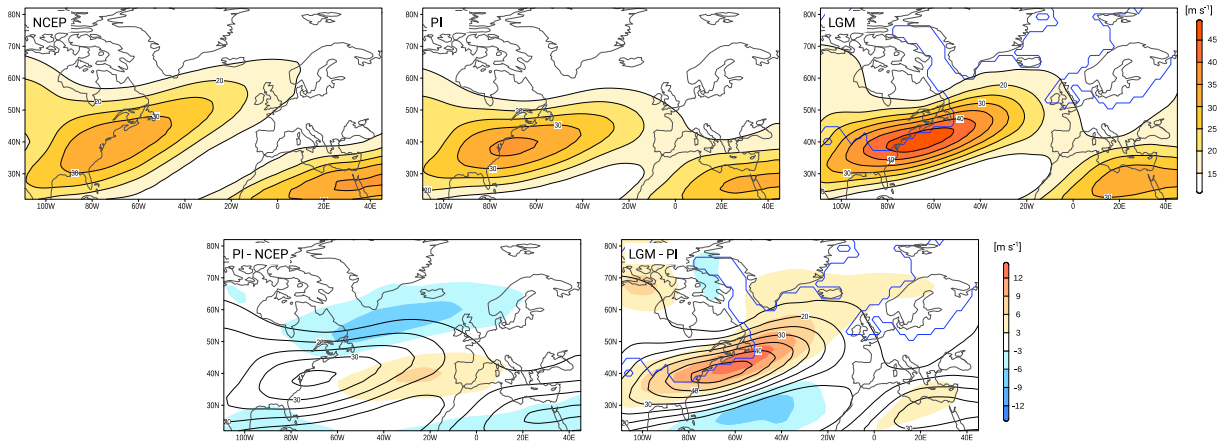
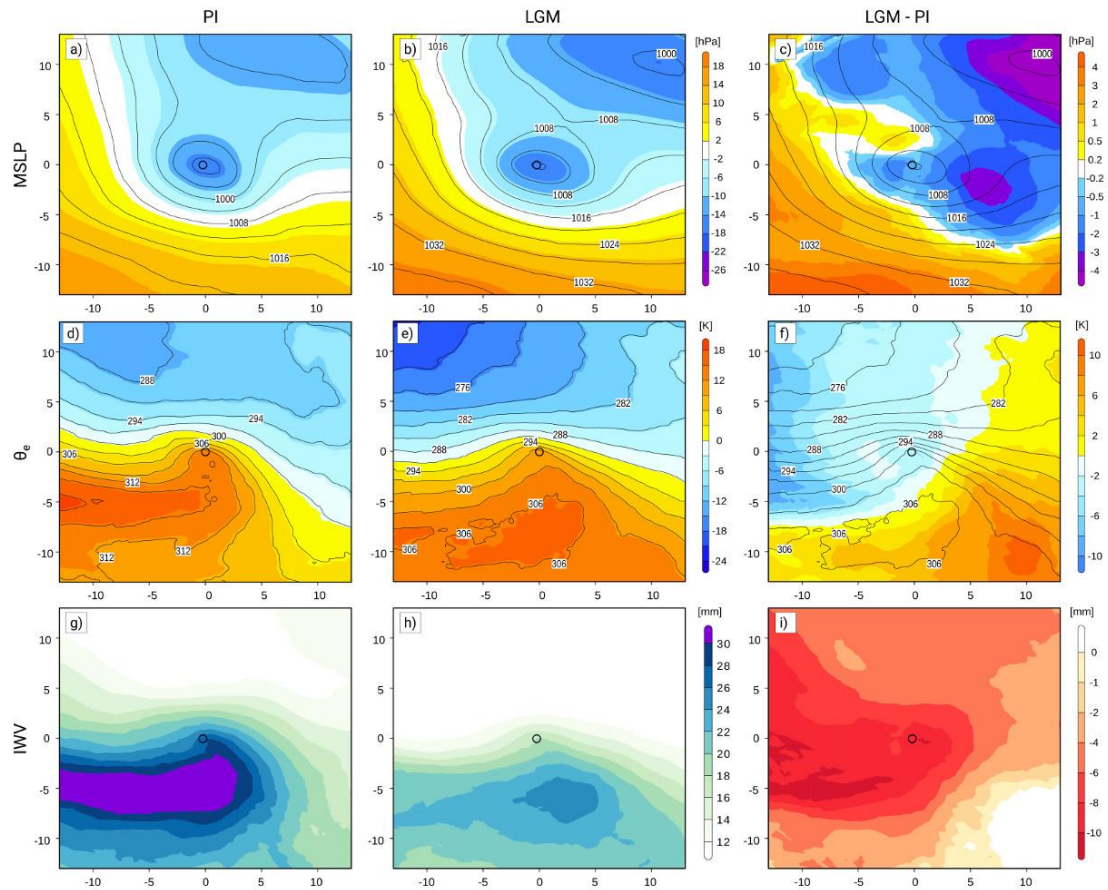


Fig. S2: Top: Upper level jet stream (wind speed at 300 hPa [ $m/s$ ]) for the NCEP Reanalysis data and the MPI-ESM-P simulations for PI and LGM. Bottom: differences (shaded) between PI (lines) and NCEP and between LGM (lines) and PI. LGM ice sheet extent marked by the blue line.

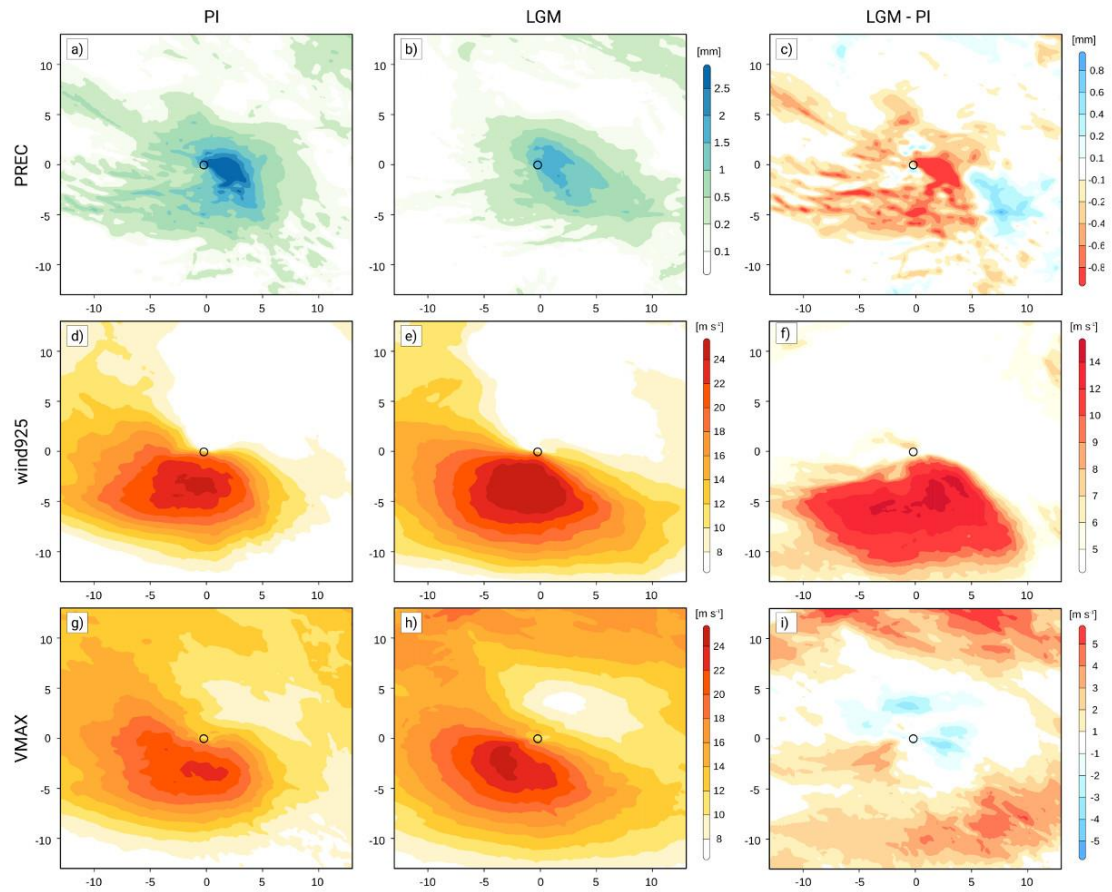
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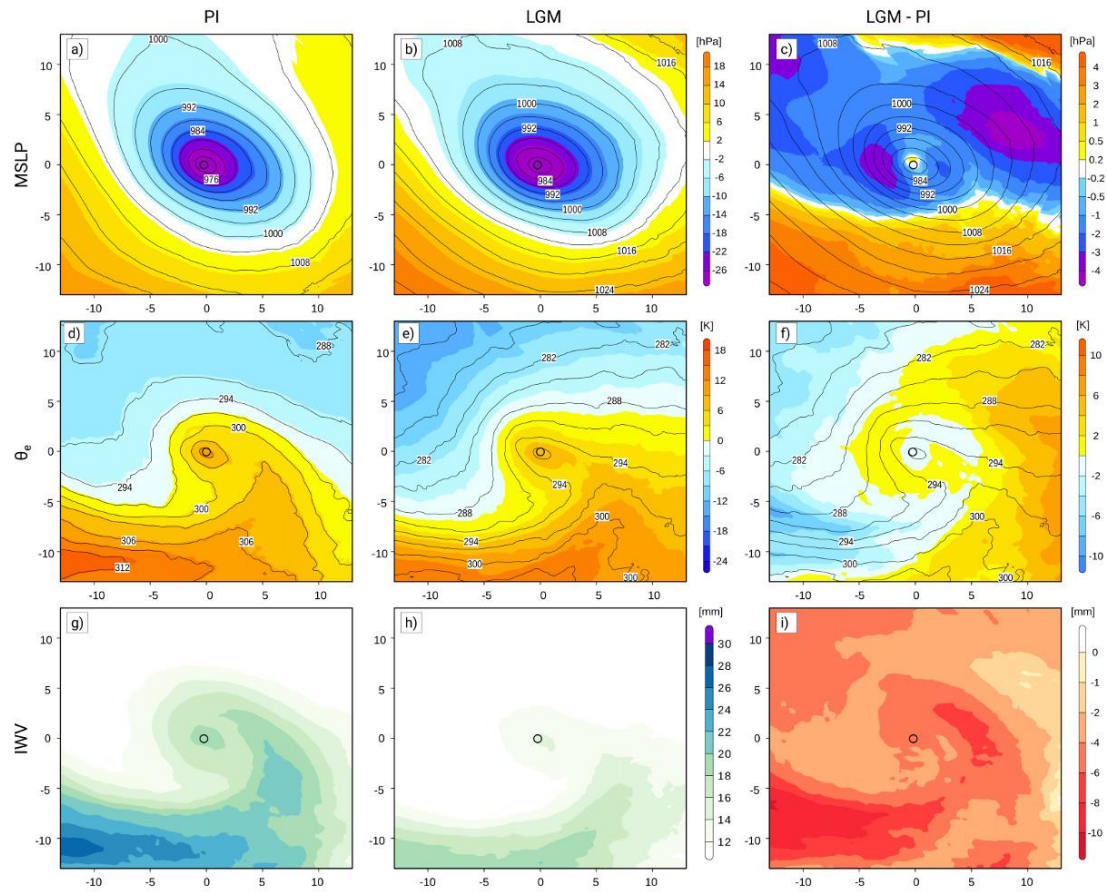
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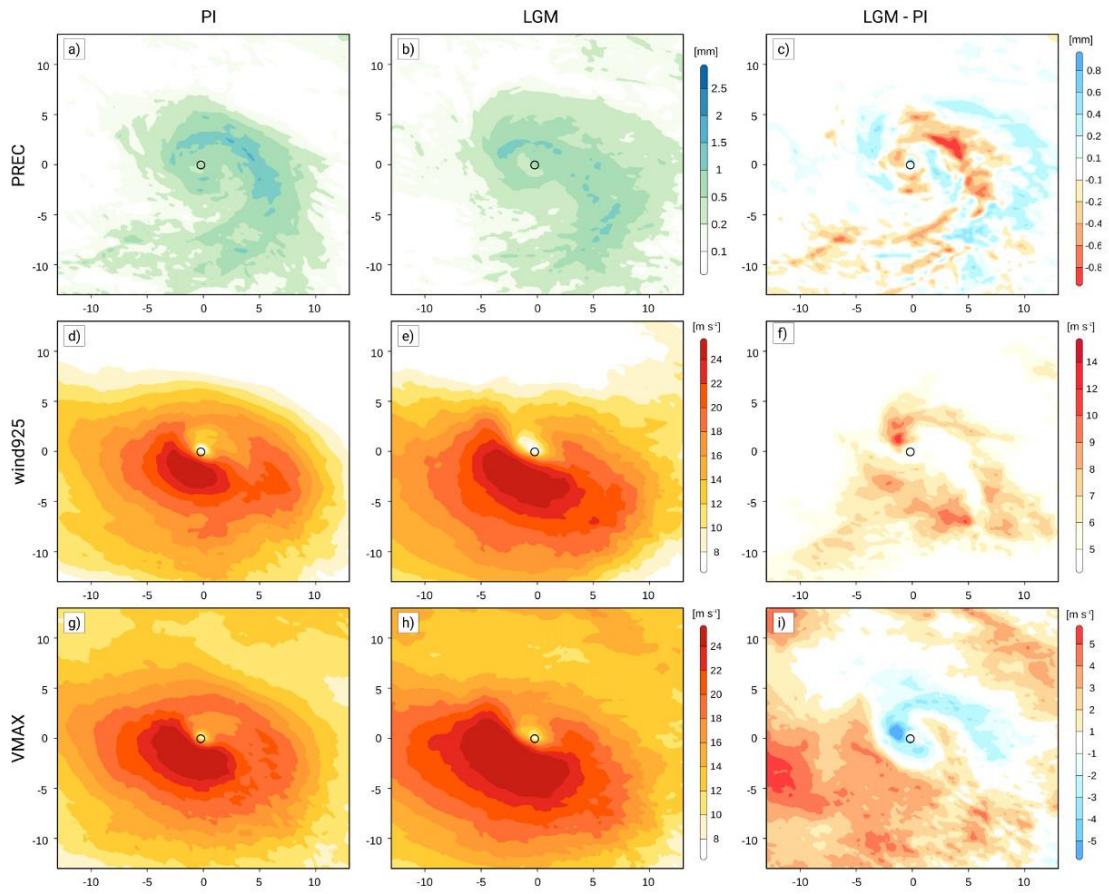
**Figure S3.** Composites of (a - c) mean sea level pressure, (d - f) ThetaE, and (g - i) vertical integrated water vapour (IWV) for PI, LGM and difference LGM – PI 12 hours before peak intensity as defined by the maximum of the Laplacian of MSLP. (a, b) absolute MSLP values (lines, [hPa]), anomalies [hPa] from mean over displayed area (coloured); (c) absolute MSLP values (lines, [hPa]) from LGM, differences of the anomalies between LGM – PI in colours; (d, e) absolute ThetaE values (lines, [K]) and anomalies [K] from mean over displayed area (coloured); (f) absolute ThetaE values (lines, [K]) from LGM, differences of the anomalies between LGM – PI in colours; (g, h) absolute IWV values [mm], (i) difference [mm] LGM – PI.



**Figure S4.** As Figure S3 but for hourly precipitation [mm] (a) PI, (b) LGM, (c) LGM – PI, (d - f) wind speed in 925 hPa [ $\text{m s}^{-1}$ ] and (g - i) maximum near surface wind gust [ $\text{m s}^{-1}$ ] 12 hours before peak intensity.



**Figure S5.** As Figure S3 but 12 hours after peak intensity.



**Figure S6.** As Figure S4 but for 12 hours after peak intensity.

35 Table S1: Summary of wind speed at 925 hPa, maximum near surface wind gust and total precipitation of the TOP 30 PI and LGM ensemble with 12.5 km resolution for 12 hours before / after and at peak intensity. Field mean and maximum corresponds to area depicted in Fig. S4, Fig. S6 and Fig. 8.

|     | wind925<br>(mean) [m/s] |       | wind925<br>(max) [m/s] |       | VMAX<br>(mean) [m/s] |       | VMAX<br>(max) [m/s] |       | PREC (mean)<br>[mm/h] |      | PREC (max)<br>[mm/h] |      |
|-----|-------------------------|-------|------------------------|-------|----------------------|-------|---------------------|-------|-----------------------|------|----------------------|------|
|     | PI                      | LGM   | PI                     | LGM   | PI                   | LGM   | PI                  | LGM   | PI                    | LGM  | PI                   | LGM  |
| -12 | 9.56                    | 11.37 | 24.71                  | 27.23 | 12.46                | 14.10 | 23.04               | 25.24 | 0.29                  | 0.20 | 3.45                 | 2.05 |
| 0   | 10.67                   | 12.25 | 25.96                  | 27.95 | 13.47                | 15.49 | 26.84               | 26.98 | 0.28                  | 0.24 | 3.56                 | 2.70 |
| 12  | 11.69                   | 12.91 | 26.68                  | 28.82 | 14.50                | 16.09 | 28.66               | 30.31 | 0.24                  | 0.24 | 1.66                 | 1.27 |