

Weather Regimes and cyclonic activity in the North Atlantic European region: present and future climates

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Cyclone Tracking

Method: Murray and Simmonds, applied to 6-hourly 850 hPa geopotential height.

Models: ERA 40, ECHAM 5, HADCM, BCM,CNRM-CM3
Climates: Recent-past climate (1961-1990), Near Future (2021-2050), Far Future (2069-2098)

Weather Regimes

Daily 500 hPa geopotential height from four CMIP3 simulations were clustered using the ERA 40 centroids

Analysis

- Relationships between several cyclone characteristics: intensity, depth, radius, cyclogenesis, cyclolysis, and total number of cyclones;
- Links to four large-scale weather regimes (WRs) over a North Atlantic-European sector (NAE, 90W-30E, 20N-80N);
- Projected changes for future climates under emission scenarios. Four WRs are identified by a 4-means clustering of the daily 500 hPa geopotential height fields (Blocking, Zonal or NAO+, Atlantic Ridge, and Greenland Anticyclonic).

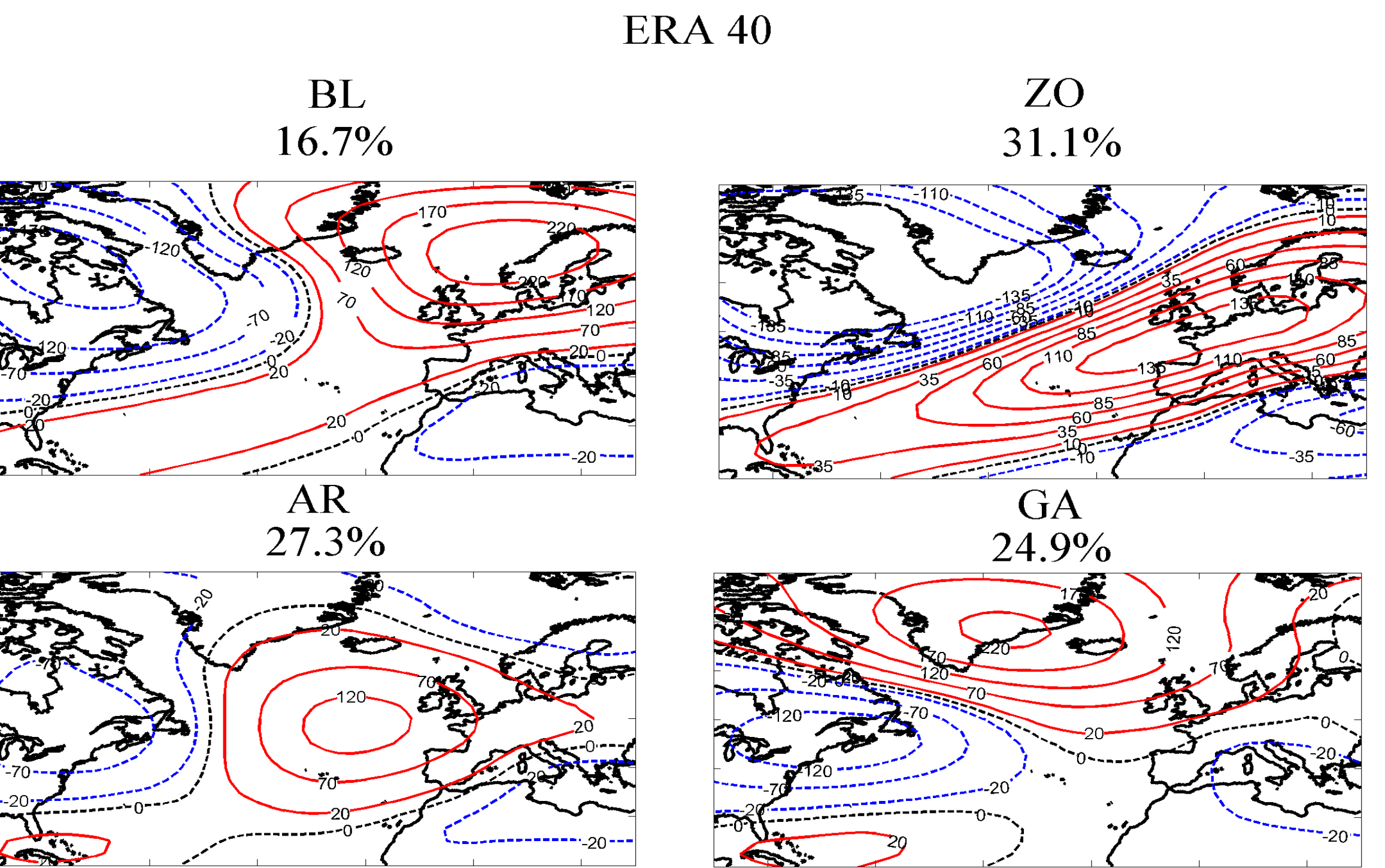


Fig. 1 – Weather regimes determined by a four-means clustering of the daily 500 hPa geopotential height anomalies in the period 1961-1990 from ERA-40 reanalysis. Four regimes are isolated: Blocking (BL), Zonal or NAO+ (ZO), Atlantic Ridge (AR), and Greenland Anticyclonic (GA). Frequencies of occurrence are: 16,7% (BL); 31,1% (ZO); 27,3% (AR); 24,9% (GA).

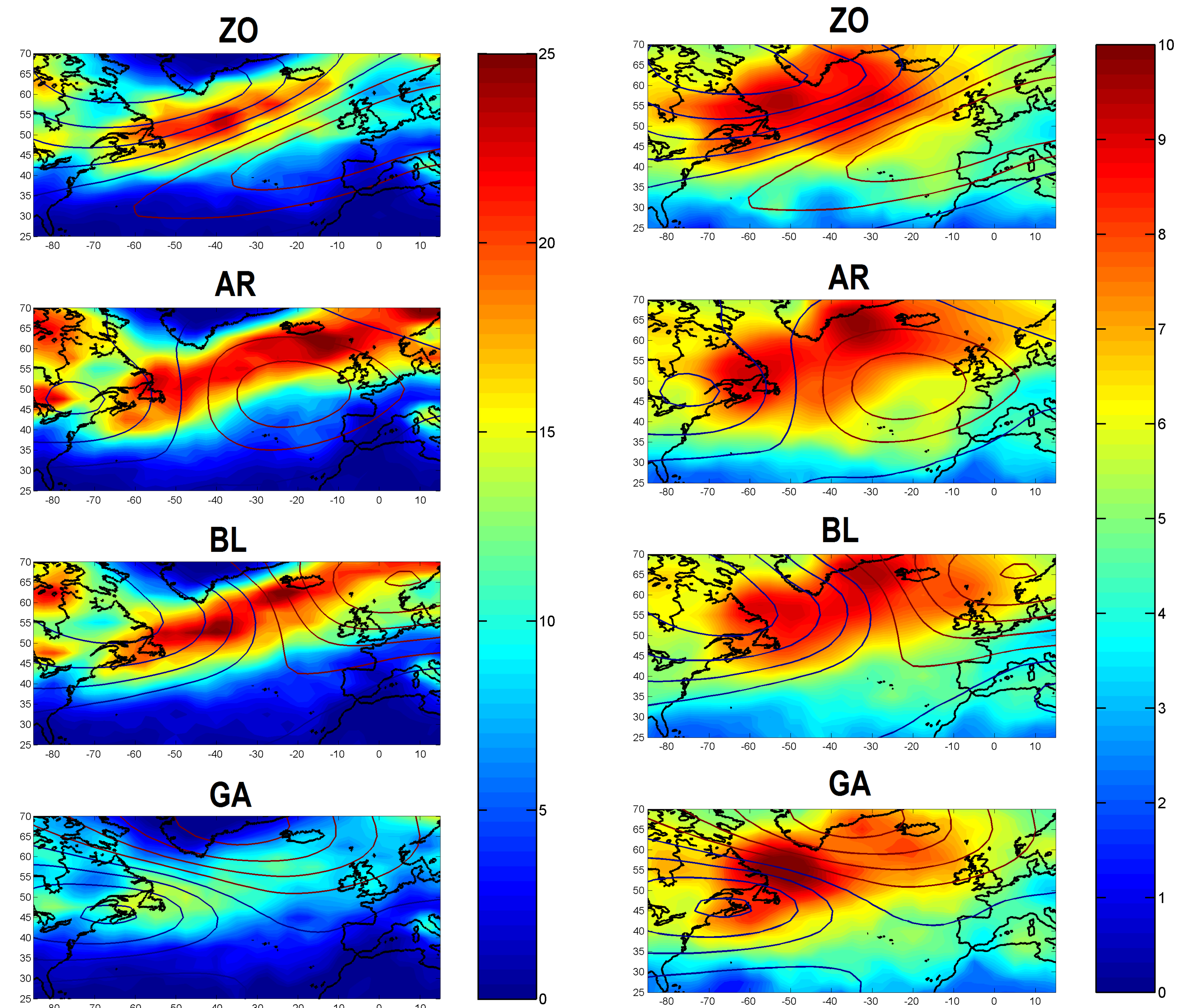


Fig. 2 – Total Number of Cyclones (left) and Mean Depth [hPa] of cyclones (right) for each regime. The Murray and Simmonds algorithm is applied for each regime on a daily basis. The mean 500 hPa geopotential height anomalies of each weather regime is also depicted (contours).

Acknowledgments: This study was supported by FEDER funds through the Programa Operacional Factores de Competitividade – COMPETE and by Portuguese national funds through FCT – Fundação para a Ciência e a Tecnologia, within the framework of Projects “Climate change of precipitation extreme episodes in the Iberian Peninsula and its forcing mechanisms” – CLIFE. PTDC/ AAC-CLI/111733/2009 and “Urban Atmospheric Quality, Climate Change and Resilience.” EXCL/AAG-MAA/0383/2012