



[Geophysical Research Letters]

Supporting Information for

CMIP6 Models Overestimate the North Atlantic Eddy-Driven Jet Persistence

Albert Ossó¹ and Florian Ennemoser¹

¹ Wegener Center for Climate and Global Change, University of Graz, Graz, Austria

Corresponding author: Albert Ossó (albert.osso-castillon@uni-graz.at)

Contents of this file

Figures S1 to S9

Tables S1

Additional Supporting Information (Files uploaded separately)

Captions for Tables S1

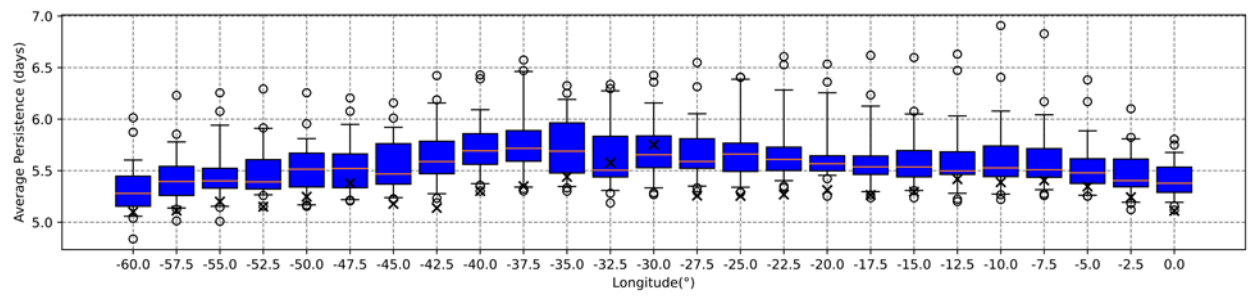


Figure S1: Boxplots illustrating the P.AVG for 2.5 longitudinal intervals across the NATL for CMIP6 models and ERA5. The orange line within the box shows the CMIP6 median and the solid black crosses show ERA5 values.

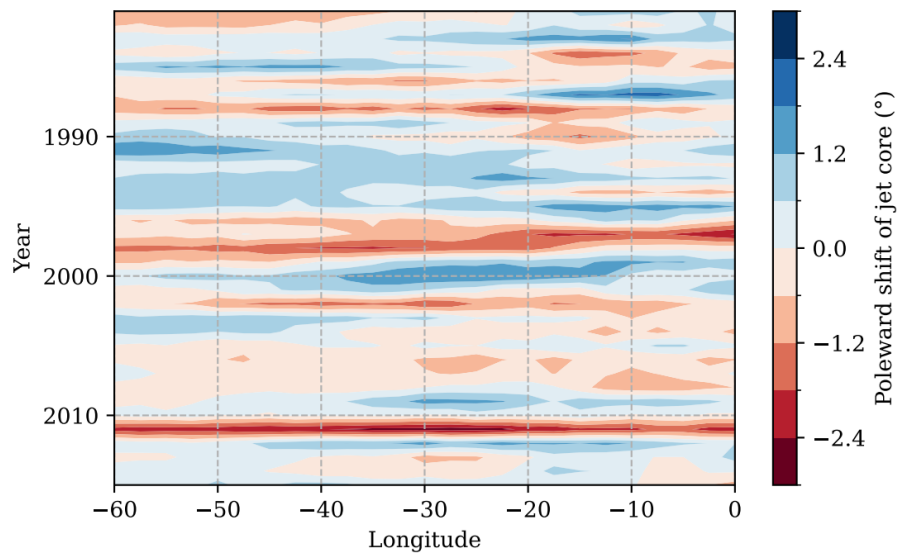


Figure S2: Jet core latitudinal anomalies as a function of time and longitude for ERA5.

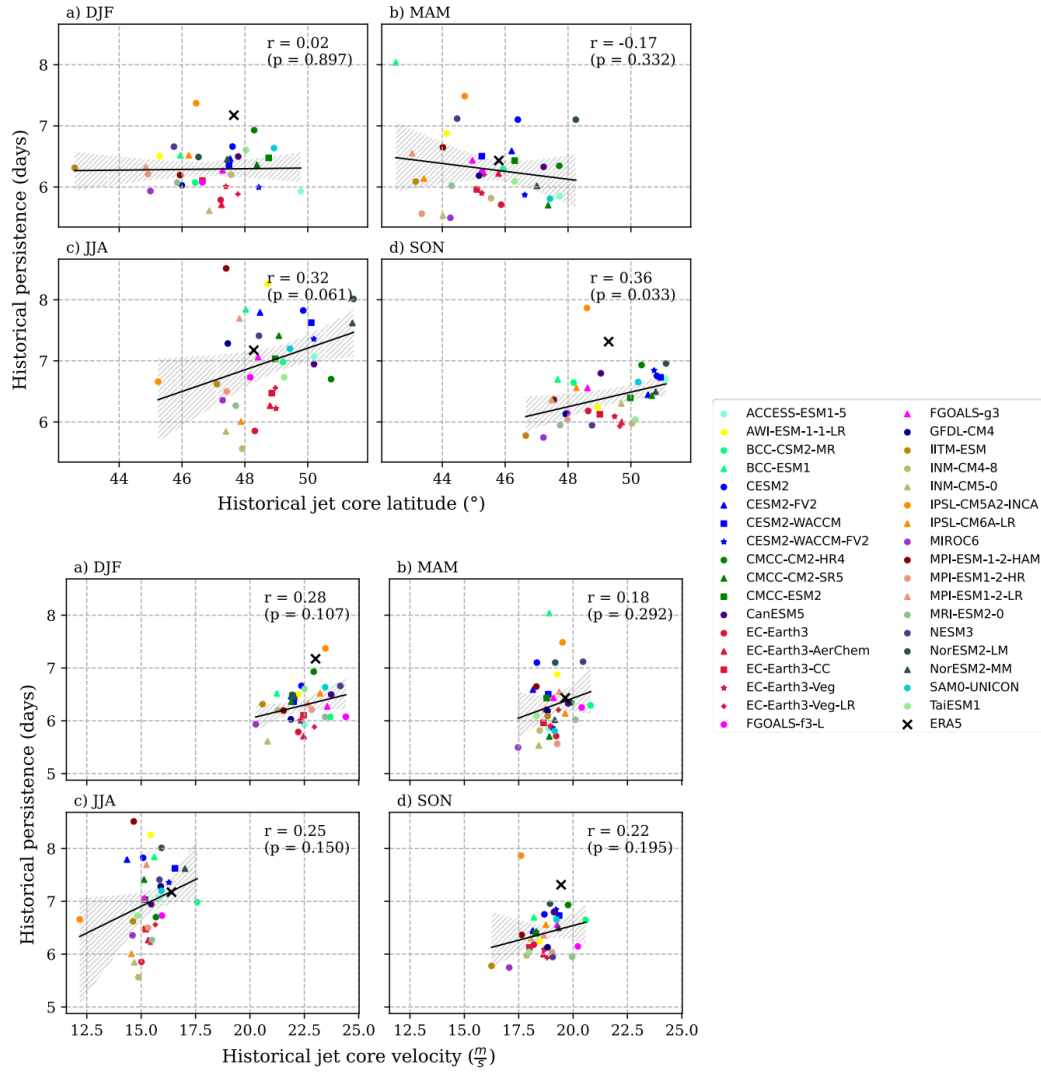


Figure S3: Left column: Scatter plot between P.AVG and the jet mean latitudinal position during the HIST period. CMIP6 models are shown by coloured symbols. Models from the same institution are indicated by the similarity of colours. The black cross shows ERA5. The solid black line is the regressed linear fit, with a hatched 95th percentile confidence interval estimated with a 10000 bootstrap resampling test. Additionally, the correlation value r and the p -value are shown. Right column: As left but for the jet mean velocity.

CMIP6 EKE bias

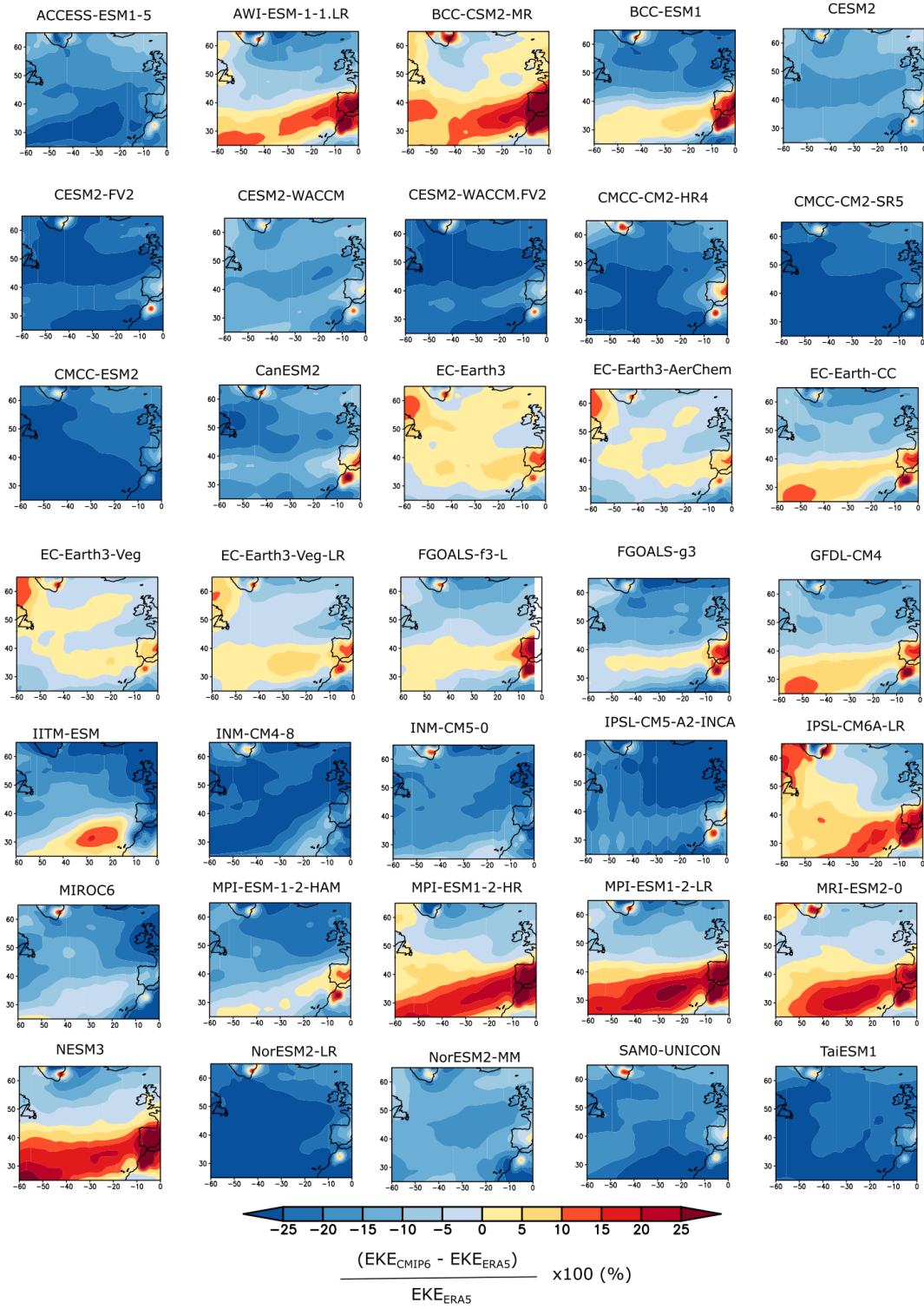


Figure S4: EKE bias for the CMIP6 models expressed as a percentage.

CMIP6 EKE 2-6days bandpass filtered bias

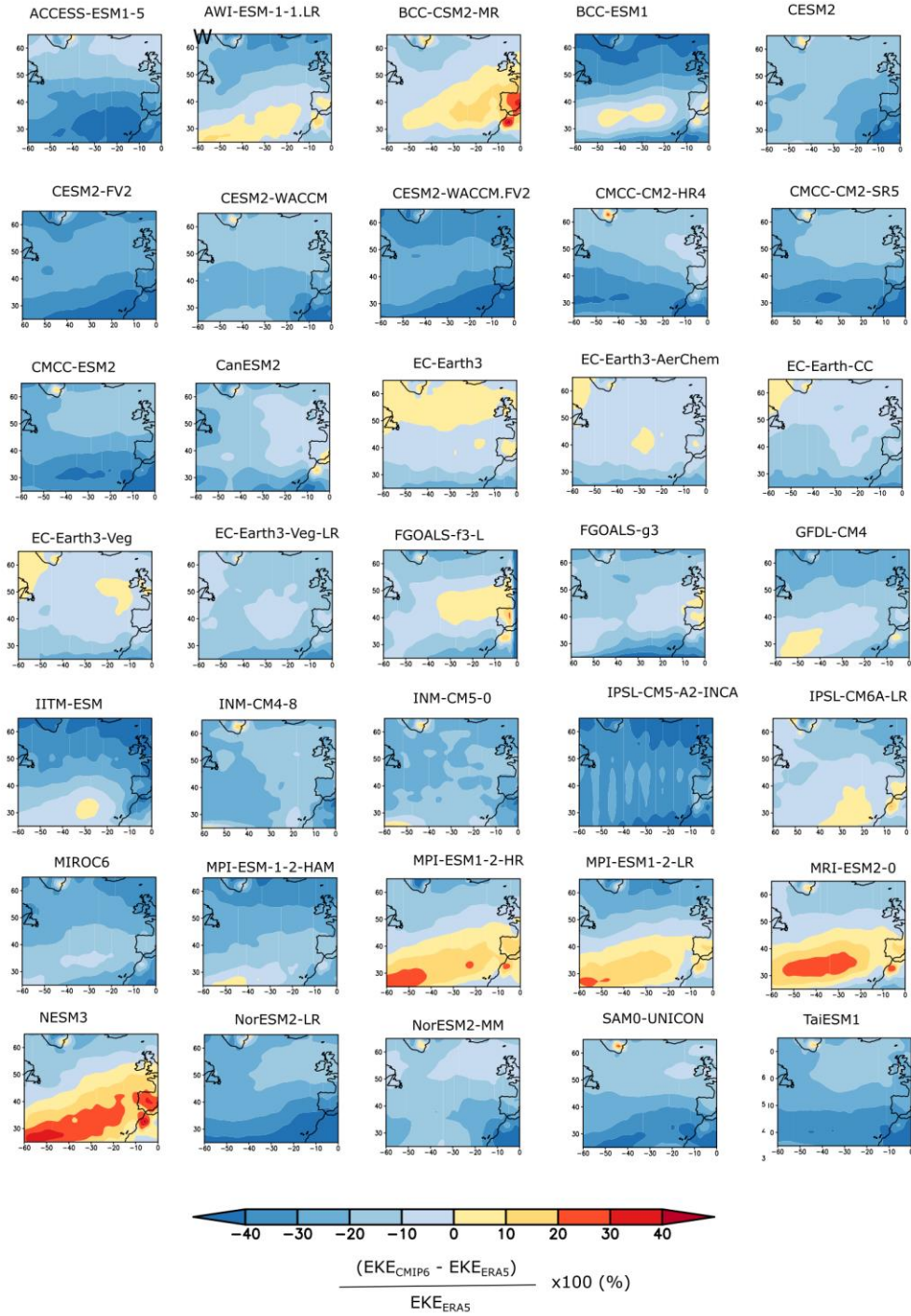


Figure S5: 2-6 day bandpass filtered EKE bias for the CMIP6 models expressed as a percentage.

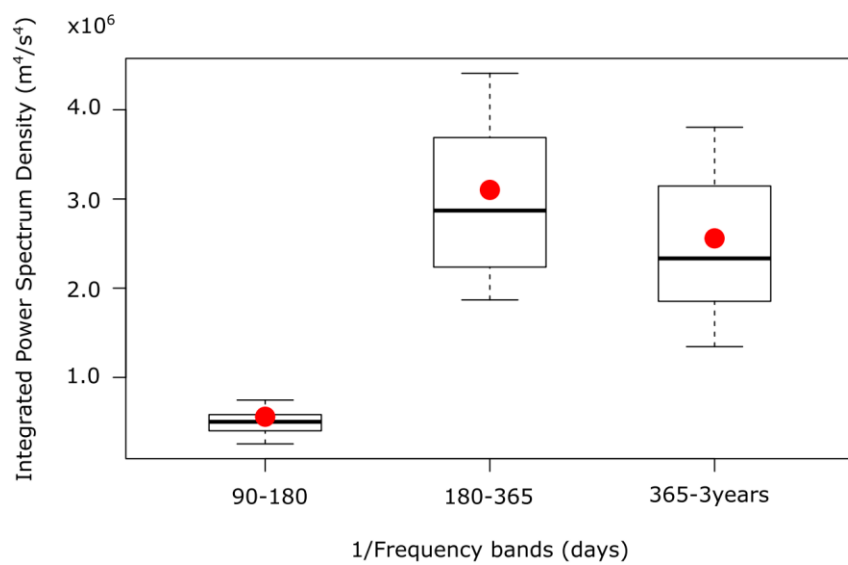


Figure S6: Power spectral density of the EKE spatially average over the NATL (60°W – 10°W, 30°N-60°N) and integrated over the indicated frequency bands for CMIP6 and ERA5 (red solid dot).

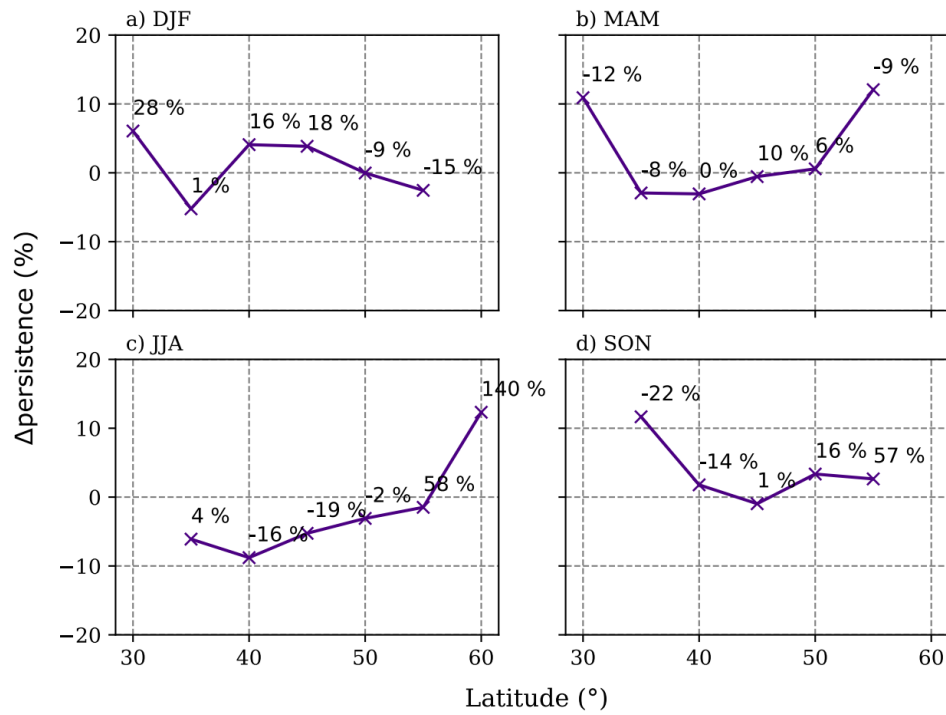


Figure S7. Δ persistence is the CMIP6 multimodel mean difference between the average duration of the JLI for the FUT and HIST periods in a moving 5° latitude window for the indicated seasons. The difference is normalized with the JLI duration in the HIST period and expressed as a percentage. The difference in the number of persistent events between the FUT and HIST periods at each bin is shown above each point and expressed as a percentage. The extremes of the distribution containing less than one event in the HIST or FUT period have been removed.

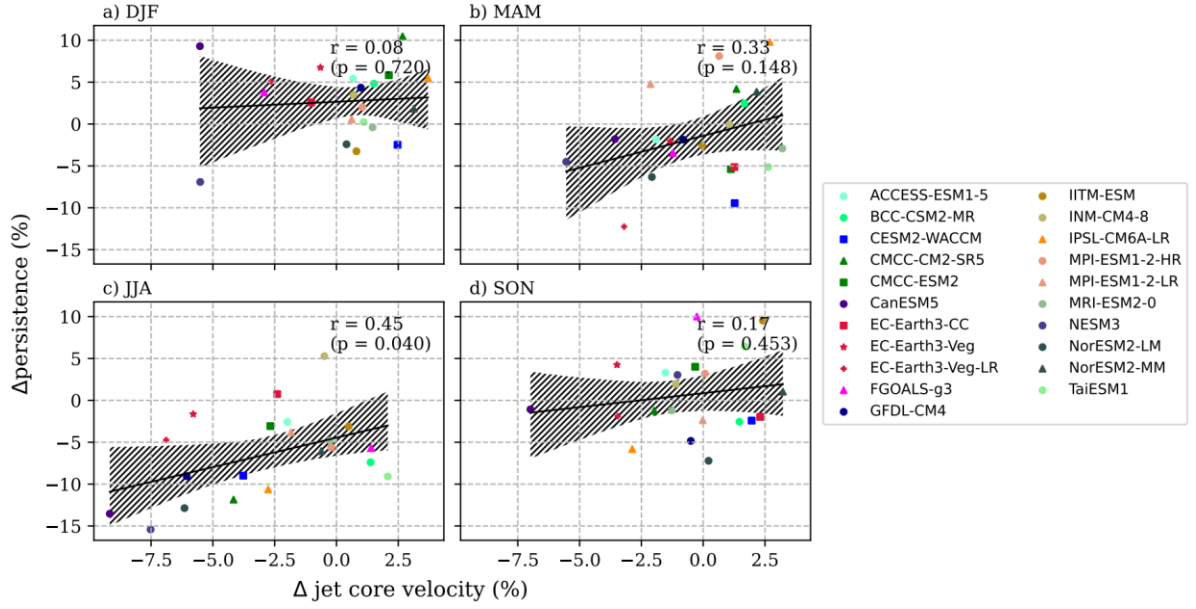


Figure S8: Scatter plots between P.AVG (FUT) - P.AVG(HIST) and Vel(FUT) - Vel(HIST). Colored symbols show CMIP6 models. The similarity of colors indicates models from the same institution. The solid black line is the regressed linear fit, with a hatched 95th percentile confidence interval estimated with a 10000 bootstrap resampling test. Additionally, the correlation value r and the p -value are shown.

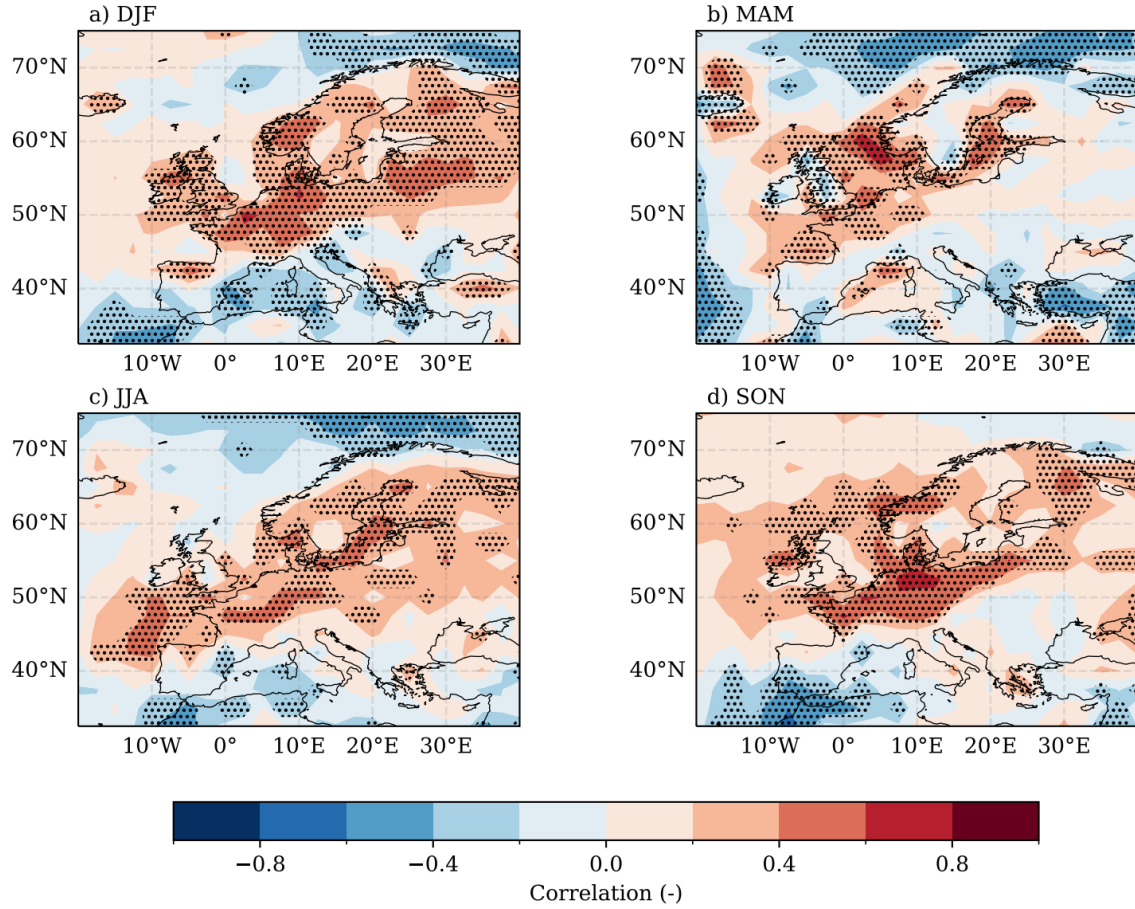


Figure S9. Each grid point displays the correlation (r) between the average precipitation duration CMIP6 intermodel spread and the jet P.AVG intermodel spread during the HIST period. Note that the square of r would indicate the fraction of the intermodel precipitation duration spread explained by the jet P.AVG model spread. The precipitation duration is calculated for each model and grid point as the number of consecutive days with at least 1mm of precipitation. Stippling indicates correlation values statistically significant at the 90% level.

Model name	Institution	Original atmospheric gridsizes (longitude \times latitude)
1 <i>ACCESS-ESM1-5</i>	Australian Community Climate and Earth System Simulator	1.875×1.25
2 AWI-ESM-1-1-LR	Alfred Wegener Institute Helmholtz Centre of Polar and Marine Research	1.875×1.25
3 <i>BCC-CSM2-MR</i>	Beijing Climate Center	1.125×1.125
4 BCC-ESM1	Beijing Climate Center	2.8125×2.8125
5 <i>CanESM5</i>	Canadian Centre for Climate Modelling and Analysis, Environment and Climate Change	2.8125×2.8125
6 CESM2	National Center for Atmospheric Research Climate and Global Dynamics Laboratory	1.0×1.0
7 CESM2-FV2	National Center for Atmospheric Research Climate and Global Dynamics Laboratory	2.5×1.8
8 <i>CESM2-WACCM</i>	National Center for Atmospheric Research Climate and Global Dynamics Laboratory	1.25×0.9375
9 CESM2-WACCM-FV2	National Center for Atmospheric Research Climate and Global Dynamics Laboratory	2.5×1.875
10 CMCC-CM2-HR4	Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici	1.25×0.9375
11 <i>CMCC-CM2-SR5</i>	Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici	1.25×0.9375
12 <i>CMCC-ESM2</i>	Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici	1.25×0.9375
13 EC-Earth3	EC-Earth consortium, Rossby Center, Swedish Meteorological and Hydrological Institute	0.703125×0.703125
14 EC-Earth3-AerChem	EC-Earth consortium, Rossby Center, Swedish Meteorological and Hydrological Institute	0.703125×0.703125
15 <i>EC-Earth3-CC</i>	EC-Earth consortium, Rossby Center, Swedish Meteorological and Hydrological Institute	0.703125×0.703125
16 <i>EC-Earth3-Veg</i>	EC-Earth consortium, Rossby Center, Swedish Meteorological and Hydrological Institute	0.703125×0.703125
17 <i>EC-Earth3-Veg-LR</i>	EC-Earth consortium, Rossby Center, Swedish Meteorological and Hydrological Institute	0.703125×0.703125
18 FGOALS-f3-L	Chinese Academy of Sciences	1.0×1.0
19 <i>FGOALS-g3</i>	Chinese Academy of Sciences	2.0×2.25
20 <i>GFDL-CM4</i>	National Oceanic and Atmospheric Administration Geophysical Fluid Dynamics Laboratory	1.0×1.0
21 <i>IITM-ESM</i>	Indian Institute for Tropical Meteorology	1.875×1.915
22 <i>INM-CM4-8</i>	Institute for Numerical Mathematics Russian Academy of Science	2.0×1.5
23 INM-CM5-0	Institute for Numerical Mathematics Russian Academy of Science	2.0×1.5
24 <i>IPSL-CM6A-LR</i>	Institute Pierre Simon Laplace	2.5×1.267606
25 IPSL-CM6A-LR-INCA	Institute Pierre Simon Laplace	2.5×1.267606
26 MIROC6	Japan Agency for Marine-Earth Science and Technology	1.40625×1.40625
27 MPI-ESM-1-2-HAM	Max Planck Institute for Meteorology	1.875×1.875
28 <i>MPI-ESM1-2-HR</i>	Max Planck Institute for Meteorology	0.9375×0.9375
29 <i>MPI-ESM1-2-LR</i>	Max Planck Institute for Meteorology	1.875×1.875
30 <i>MRI-ESM2-0</i>	Meteorological Research Institute	1.875×1.875
31 <i>NESM3</i>	Nanjing University of Information Science and Technology	1.875×1.875
32 <i>NorESM2-LM</i>	NorESM Climate modeling Consortium	2.5×1.875
33 <i>NorESM2-MM</i>	NorESM Climate modeling Consortium	1.25×0.9375
34 SAM0-UNICON	Seoul National University	1.25×0.9375
35 <i>TaiESM1</i>	Research Center for Environmental Change	1.25×0.9375
36 <i>ERA5</i>	European Centre for Medium-Range Weather Forecasts	0.25×0.25

Table S1. A list of CMIP6 models and observations considered in this study. The models used for both the HIST and FUT periods are in bold italics.