

Future climate change A1B scenario downscaling. Results for the Baltic and for the North Seas

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Model description and setup



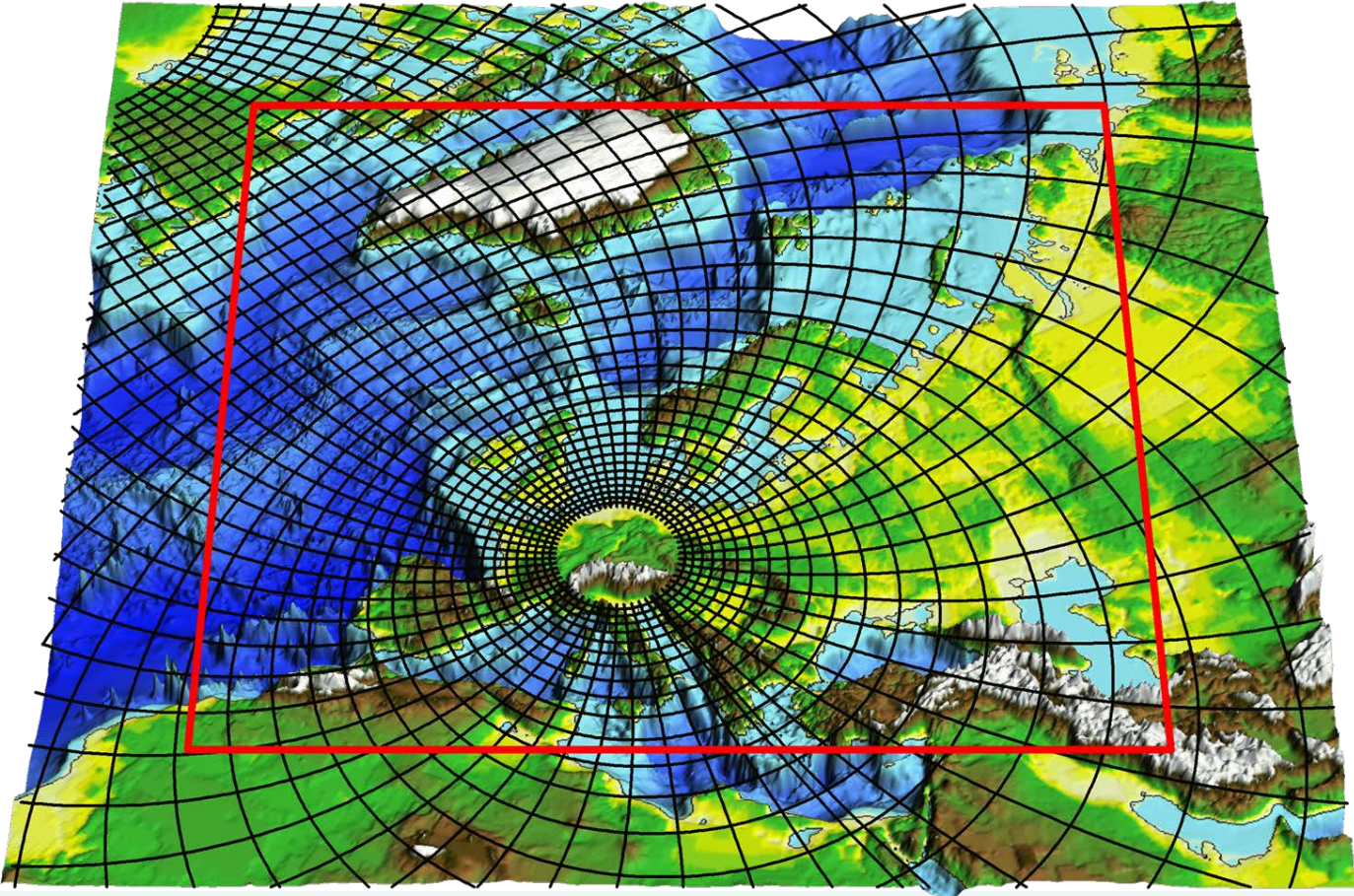
REMO/MPIOM/HAMOCC/HD model

atmosphere

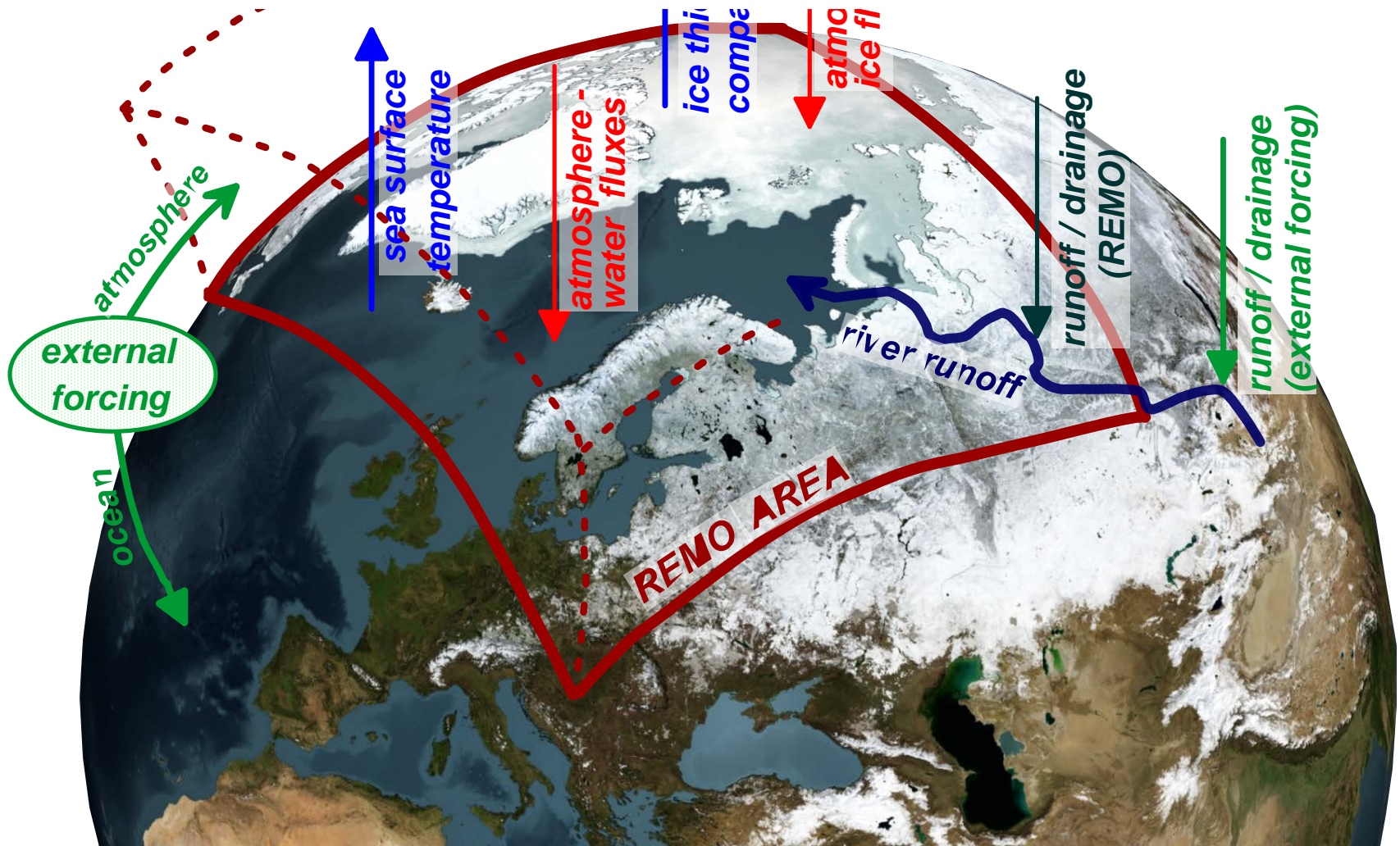
ocean

ocean
biogeochemistry

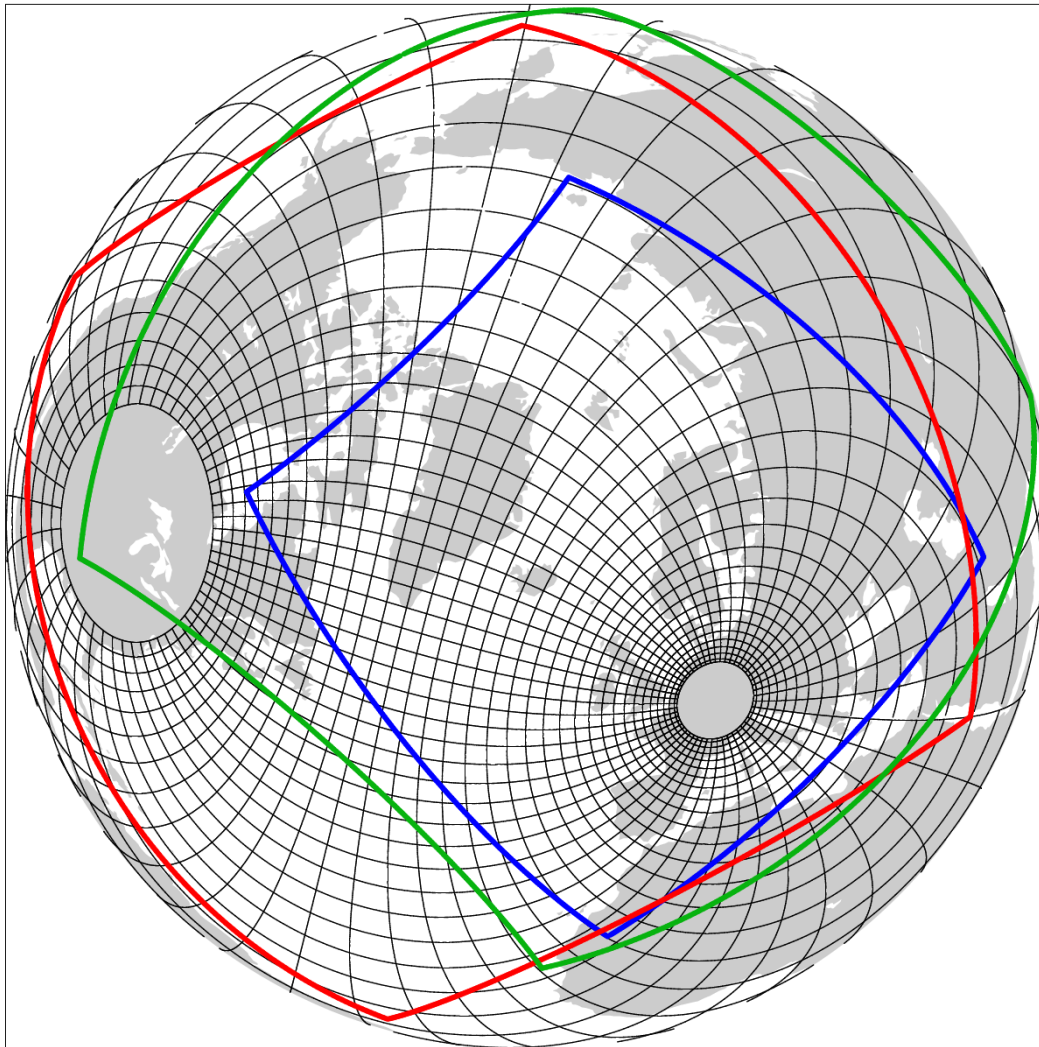
terrestrial
hydrology



MPIOM / REMO / HD coupling



REMO / Global MPIOM setups



—— MPIOM grid (every 12th grid line is shown)

—— REMO setups

MPIOM:

Horizontal resolution:

~5 – 30 km in NA

Vertical resolution:

30 levels

REMO:

Horizontal resolution:

$1/3^\circ$ (37 km)

Vertical resolution:

27 hybrid levels

Coupling: 1 hour

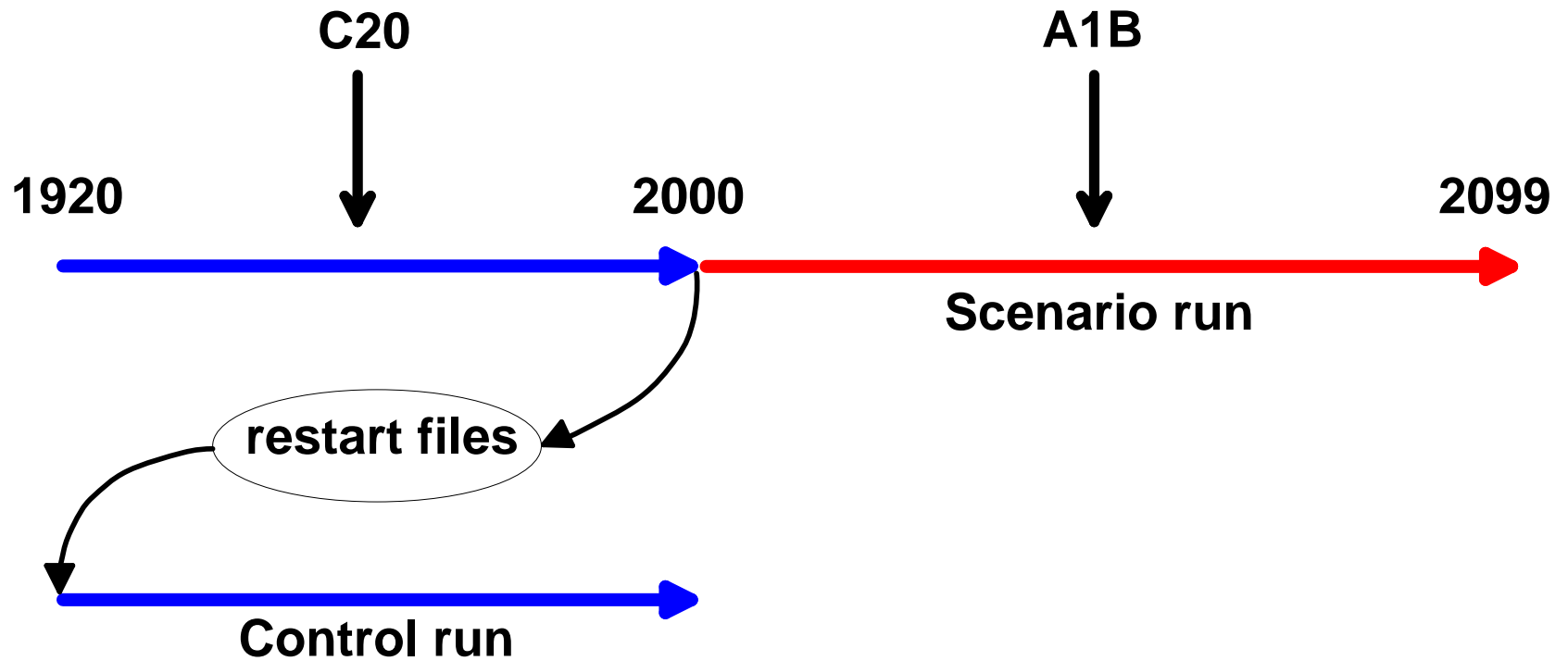
IPCC AR4 ECHAM5/MPIOM downscaling



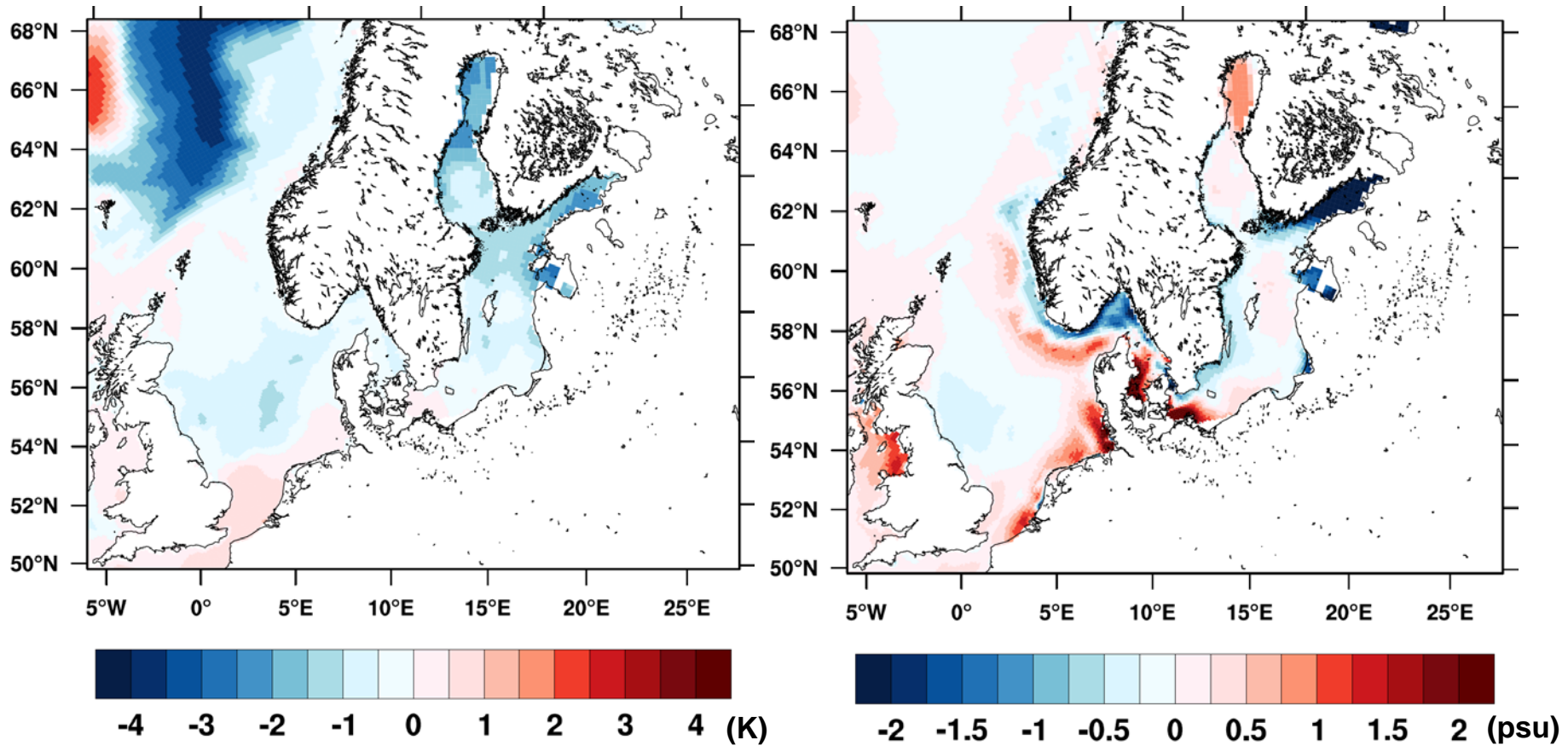
Simulations with ECHAM5/MPIOM forcing

ECHAM5/MPIOM data from IPCC AR4:

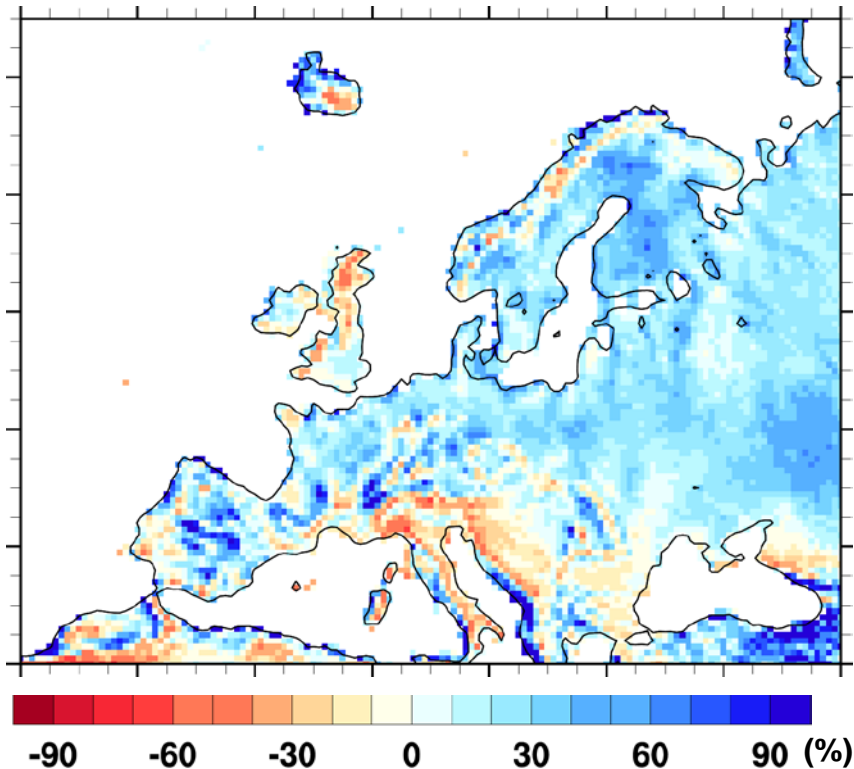
C20(3): 1920 – 2000 + A1B(3): 2001 - 2099



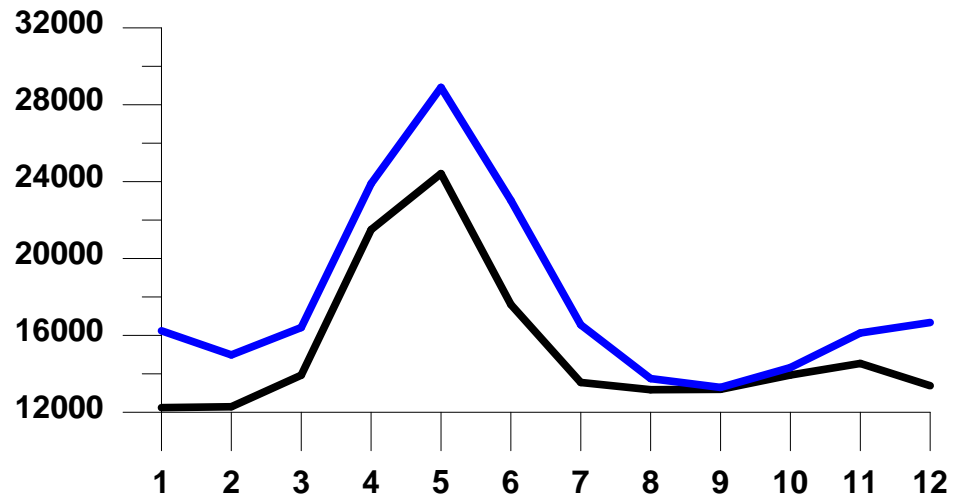
1980-2000 mean SST (left) and SSS (right) difference: model – GDEM climatology.



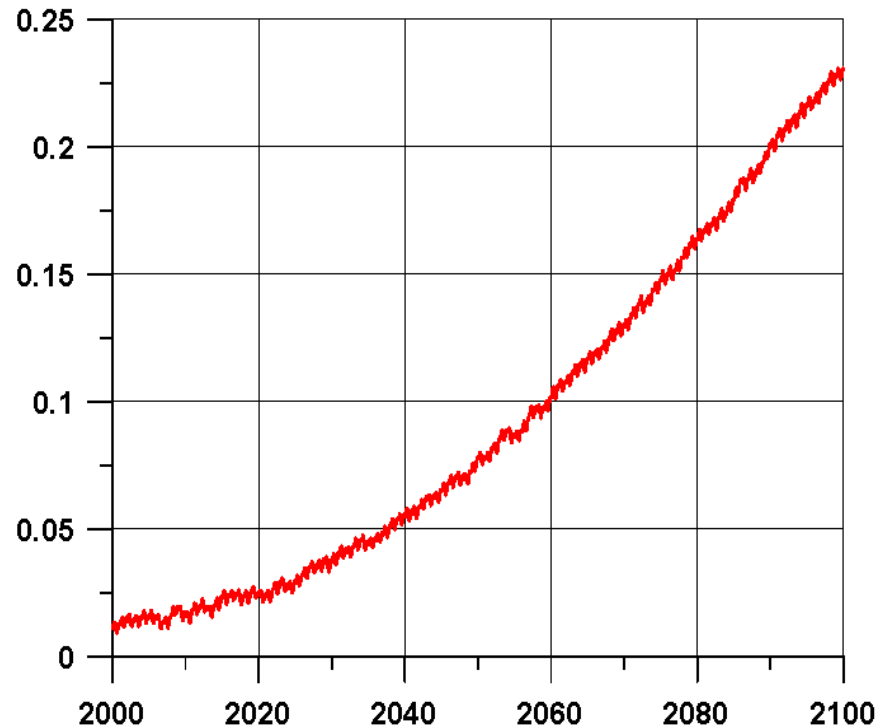
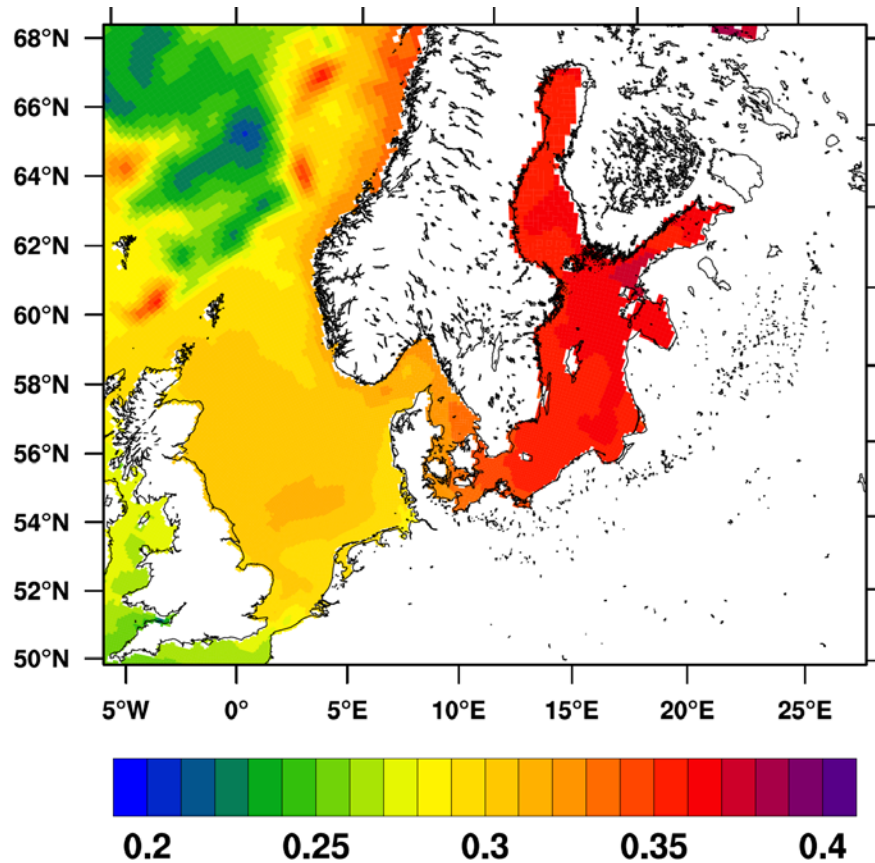
Mean 1970-1999 relative precipitation difference: model – CRU divided by CRU.



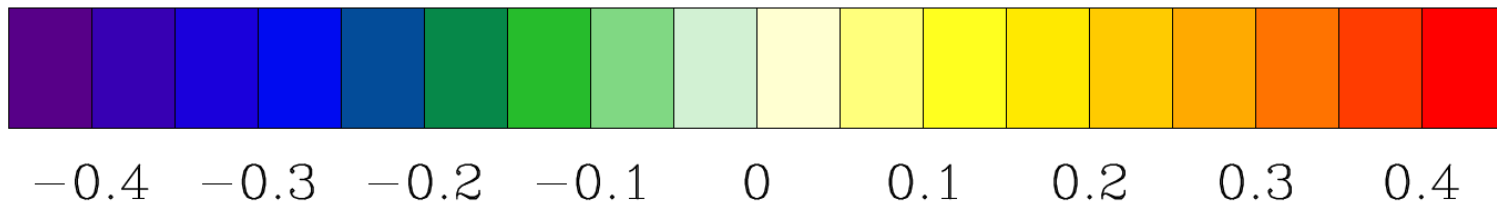
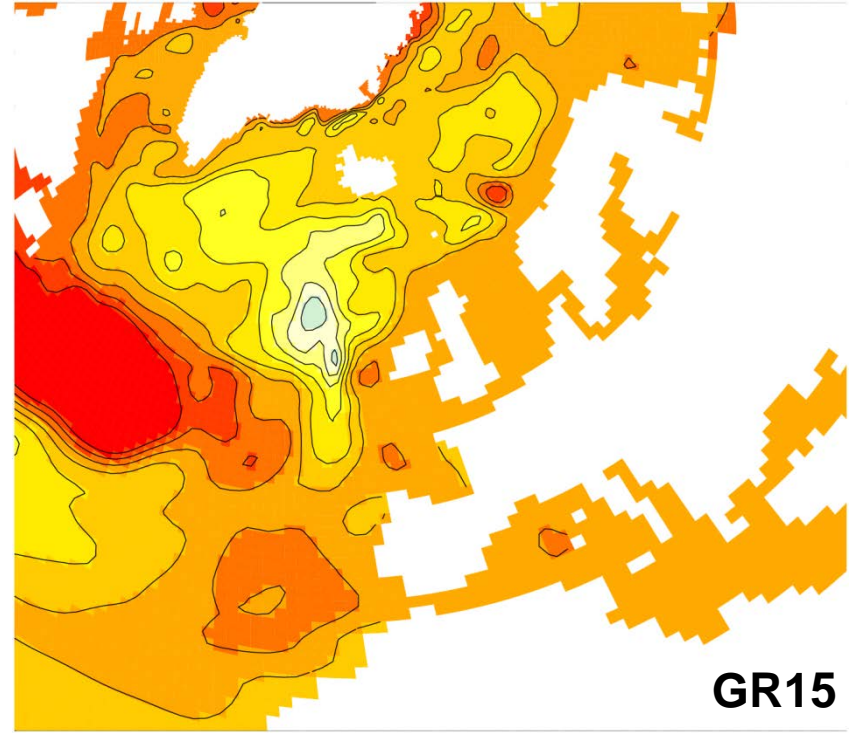
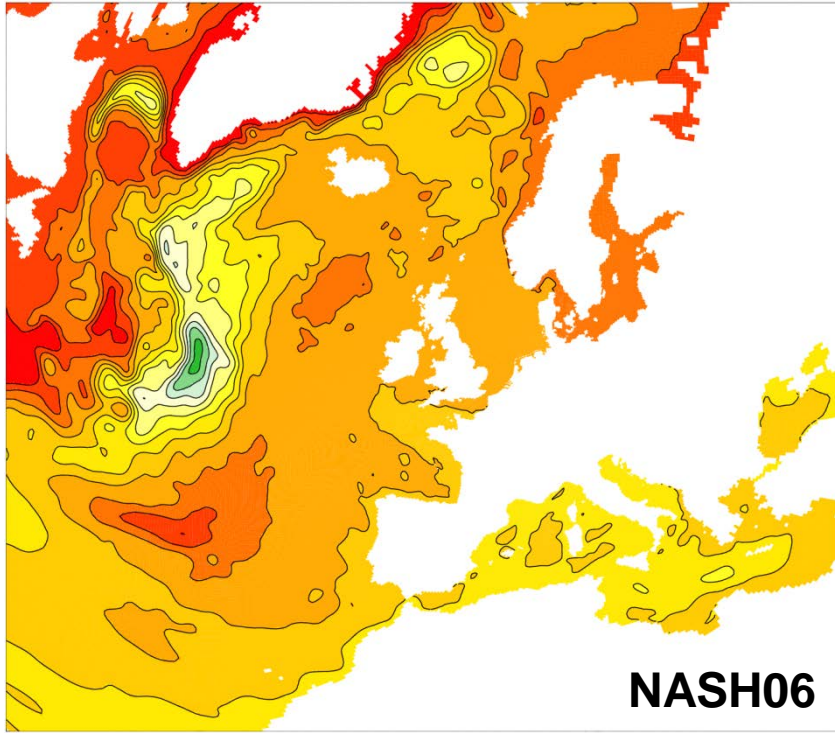
Mean 1970-1999 Observed (black) and modeled (blue) climatological river runoff (m³/s) into the Baltic Sea.



2080-2099 – 1980-1999 mean sea level change (left) and global steric sea level change (right)

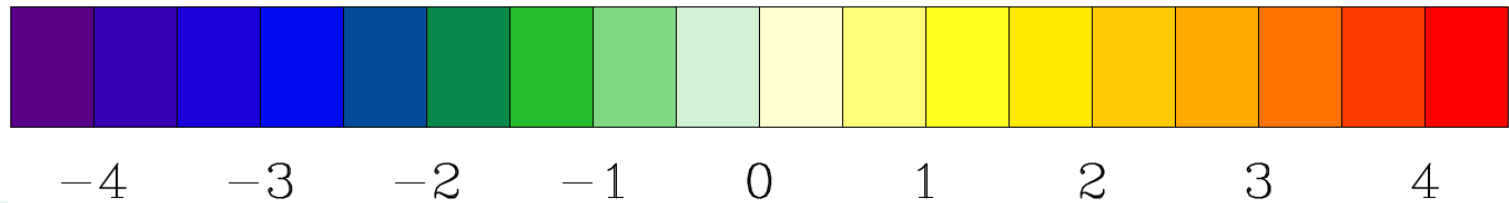
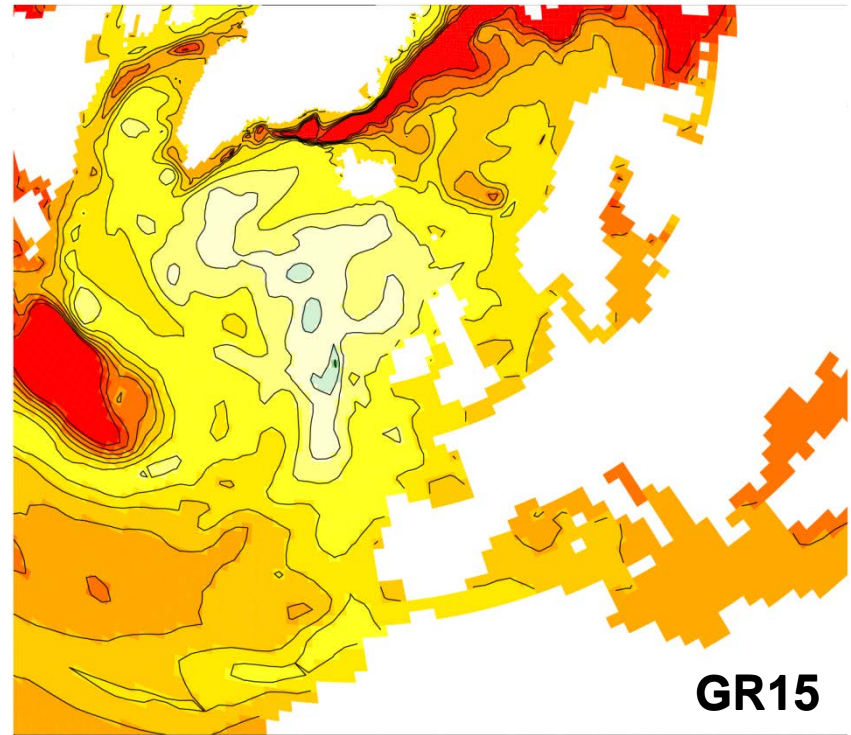
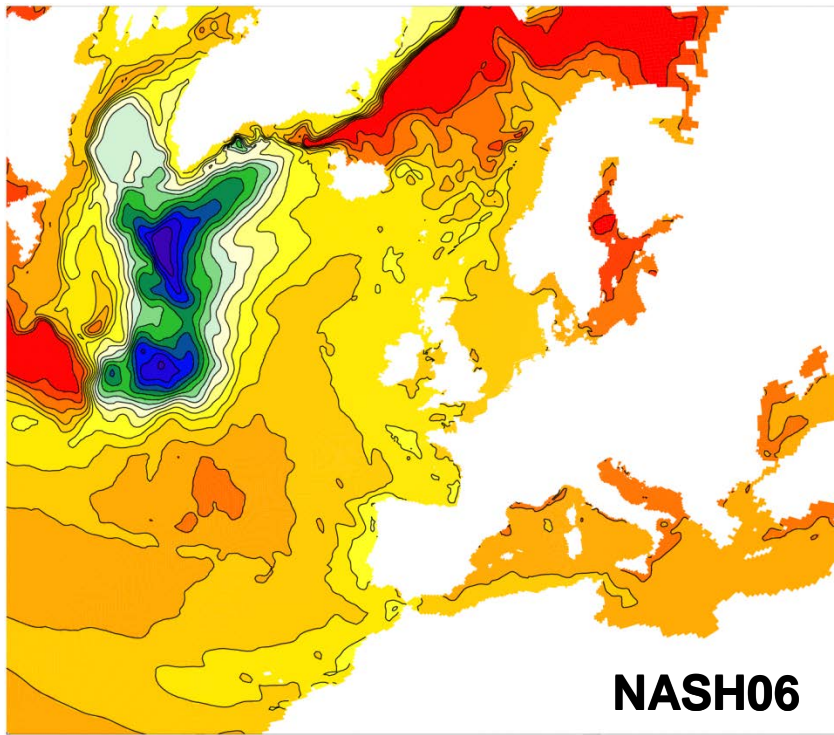


Mean sea level change (2080-2099 - 1980-1999)

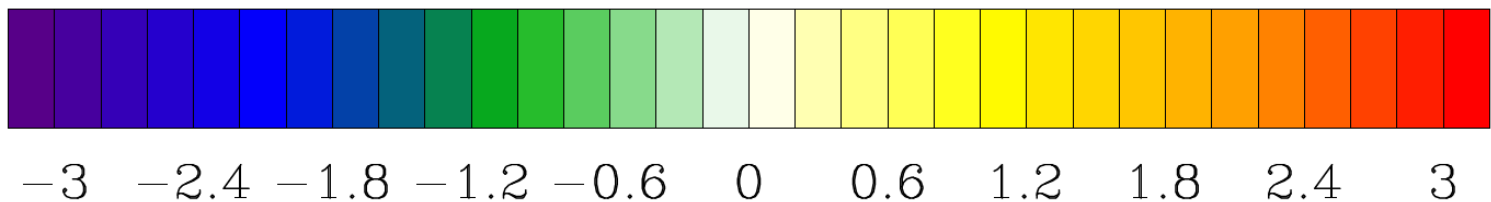
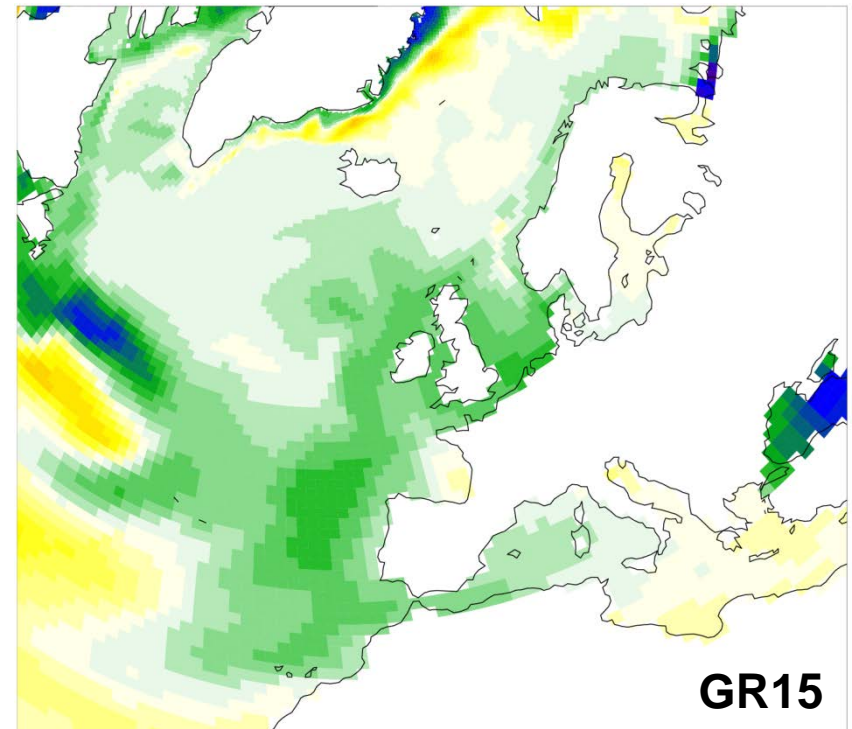
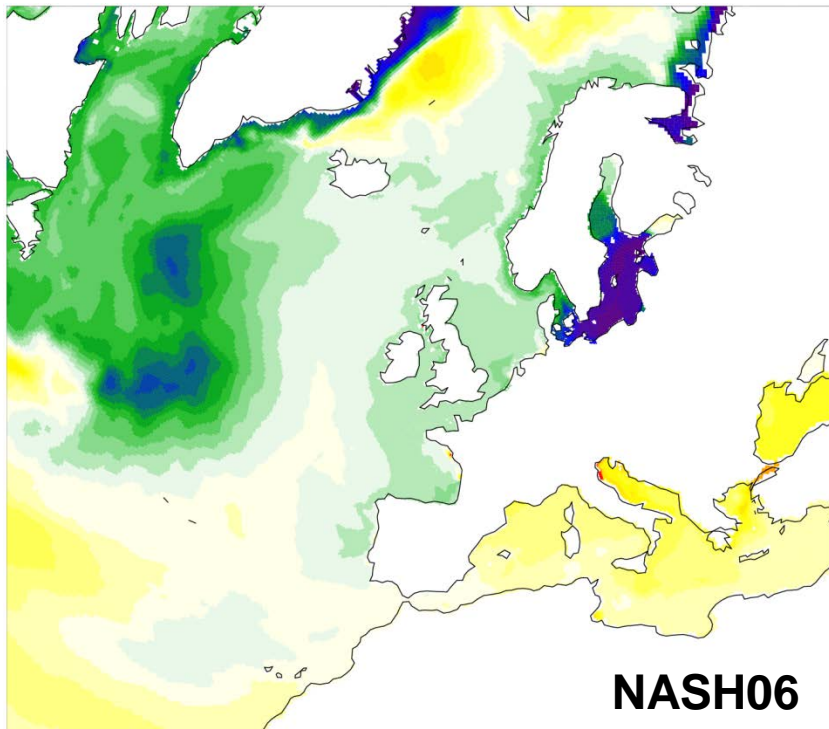


Mean 2089-2099 global steric sea level change +0.1978 m

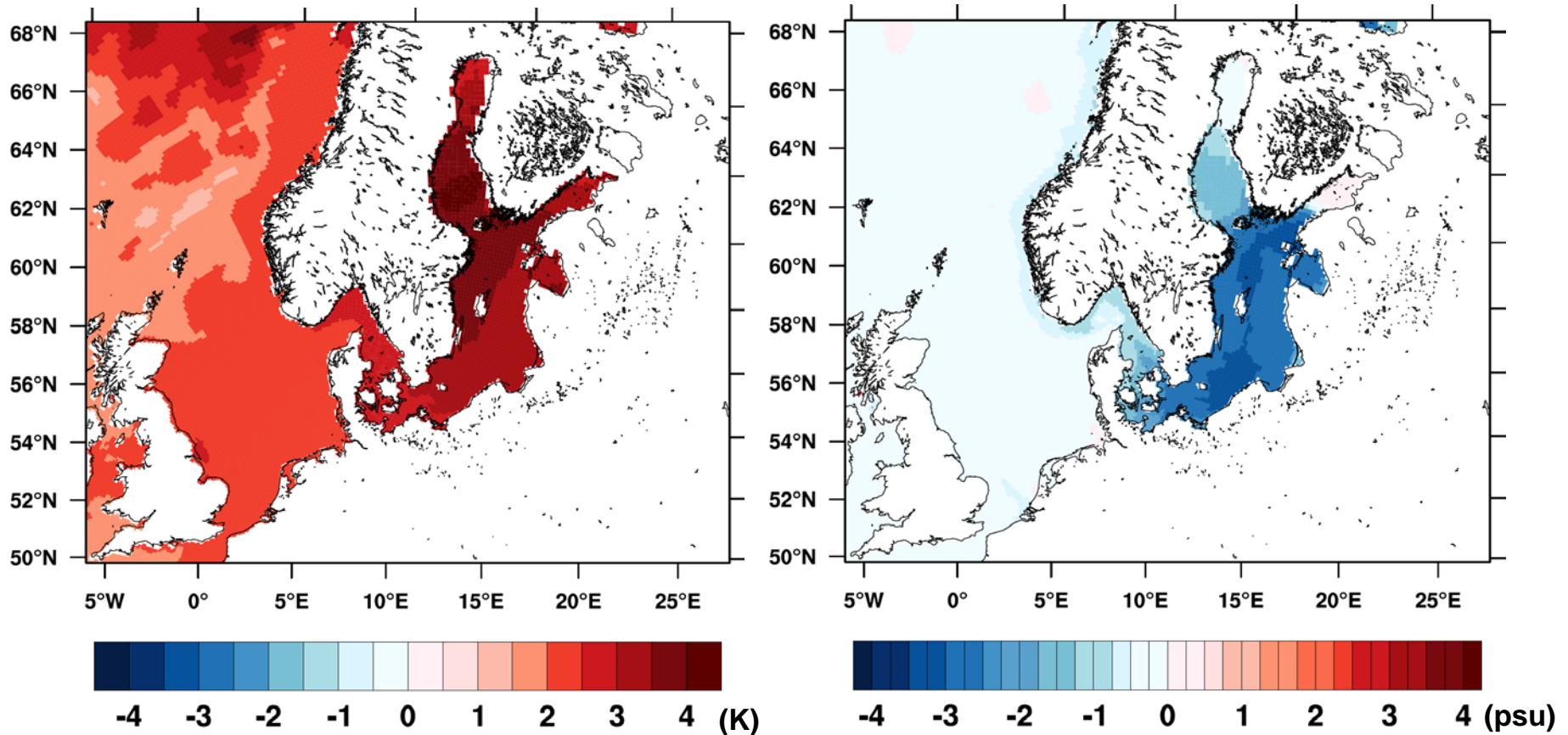
Mean SST change (2080-2099 - 1980-1999)



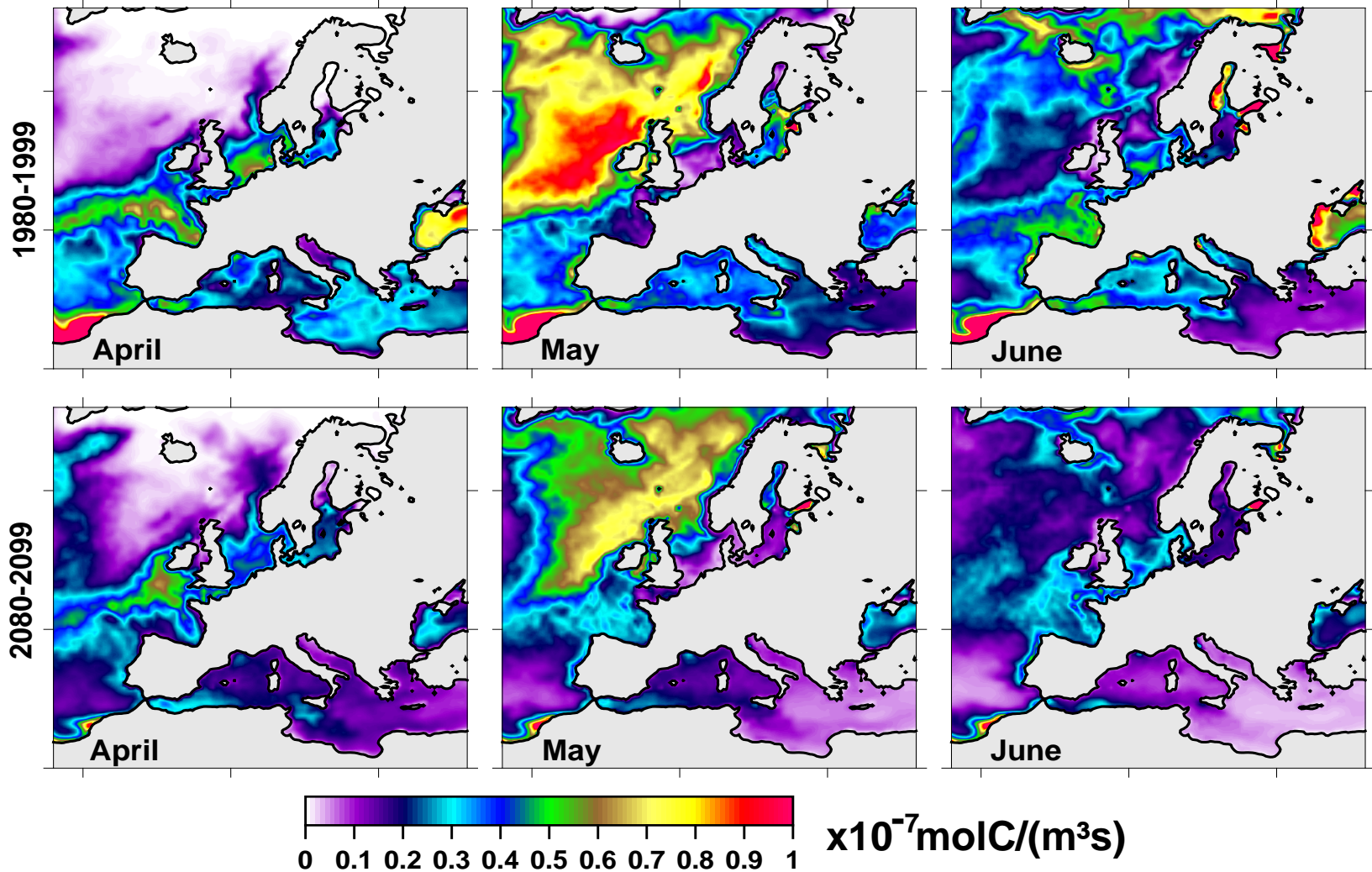
Mean SSS change (2080-2099 - 1980-1999)



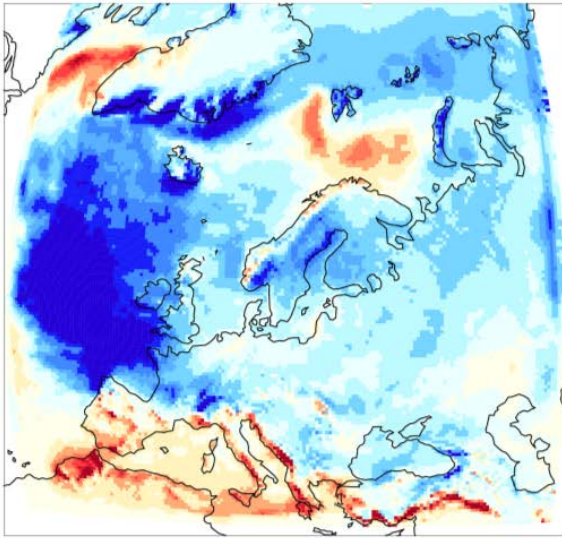
Mean SST (left) and SSS (right) change: 2080-2099 – 1980-1999



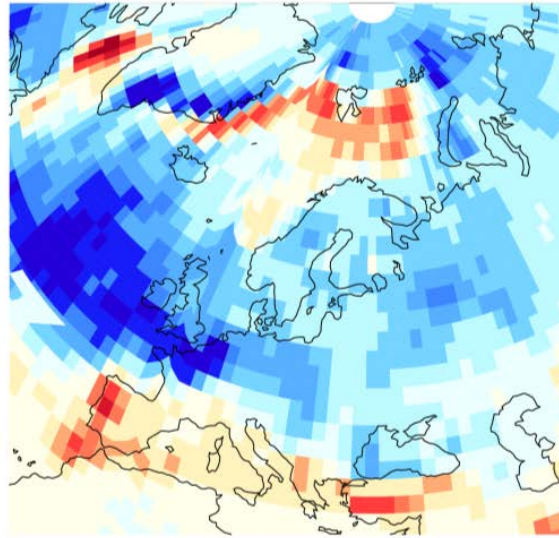
PHOTOSYNTHETIC ACTIVITY



MPIOM/REMO

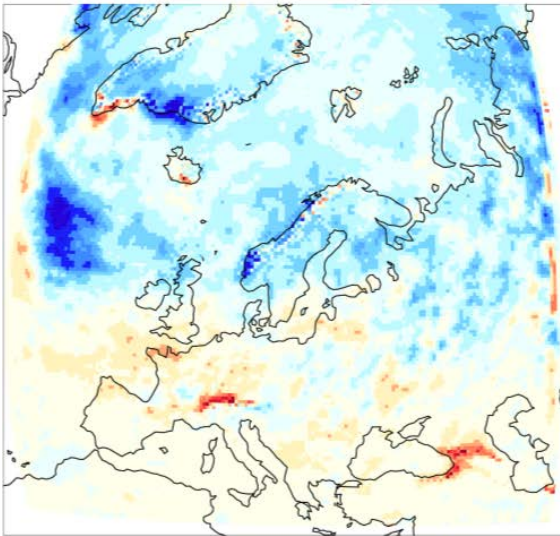


MPIOM/ECHAM5

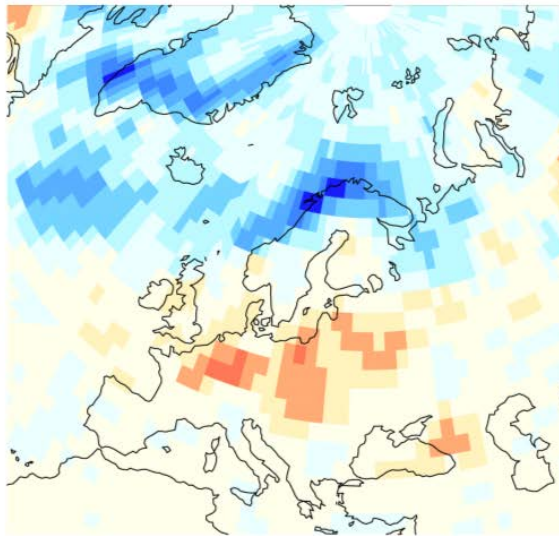


2080-2099 - 1980-1999 (DJF)

MPIOM/REMO



MPIOM/ECHAM5

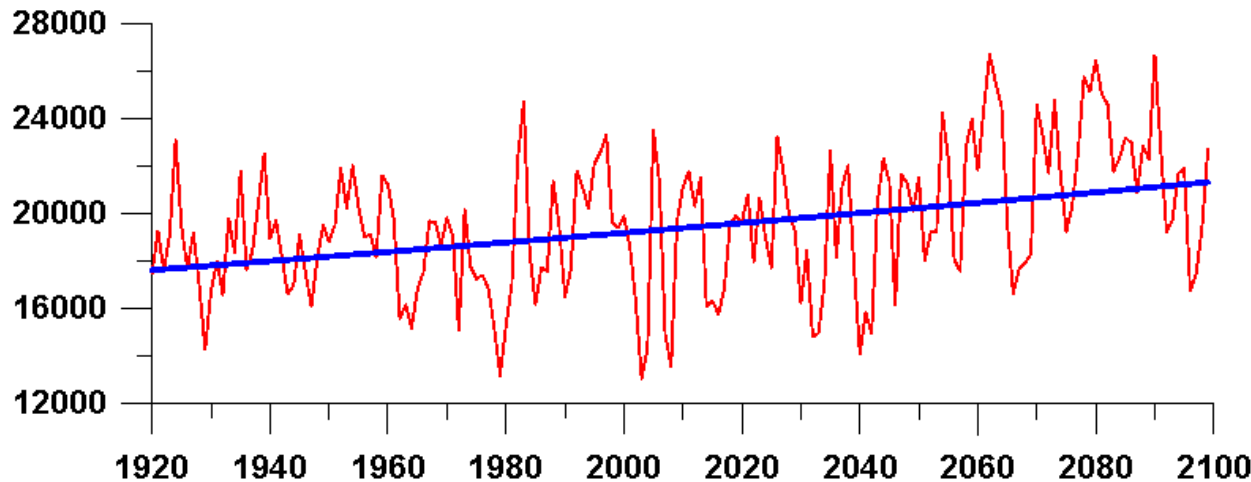
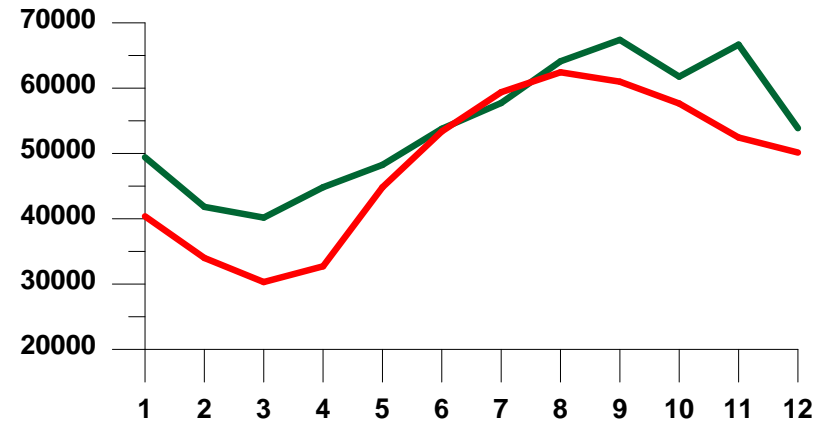
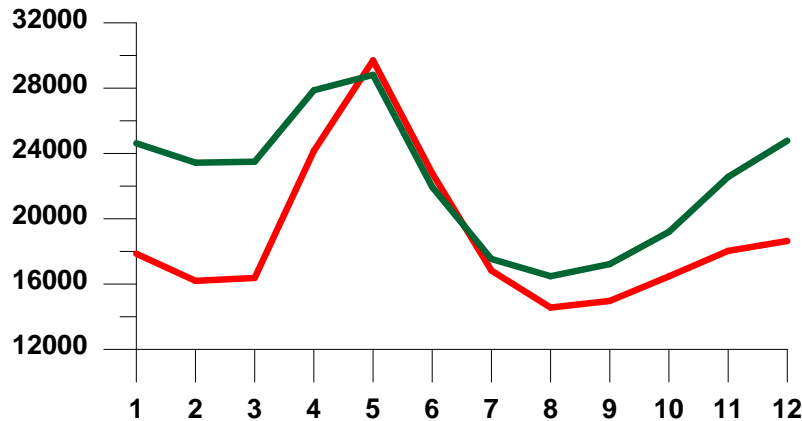


2080-2099 - 1980-1999 (JJA)



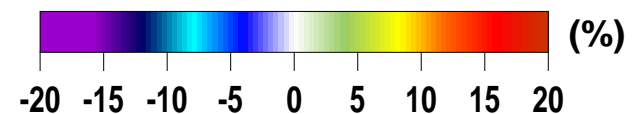
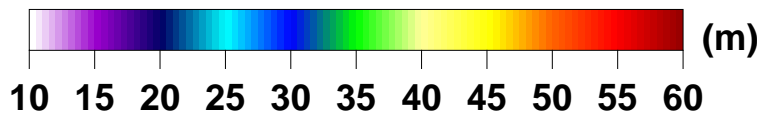
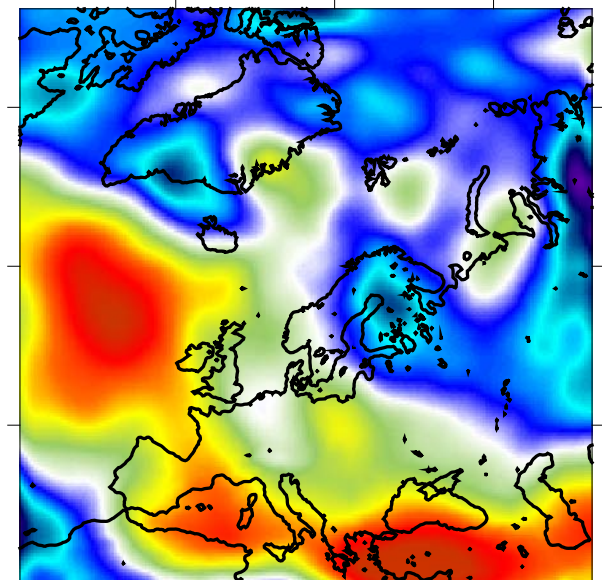
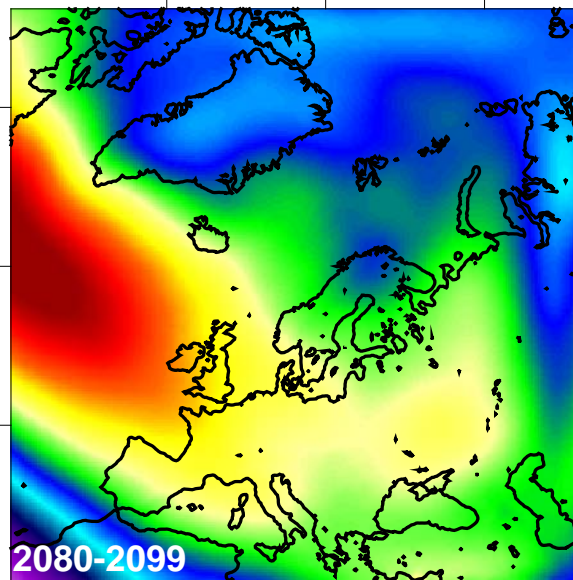
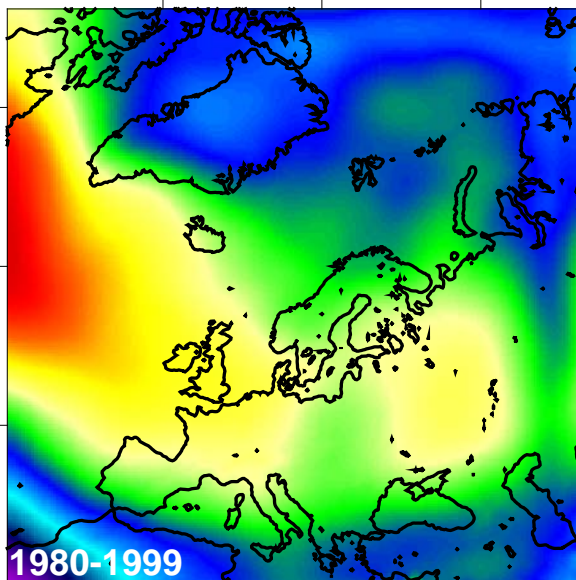
Changes in precipitation simulated by REMO/MPIOM (left) and ECHAM5/MPIOM (right)

1970-1999 (red) and 2070-2099 (green) climatological river runoff (m^3/s) into the Baltic Sea (left) and mean total precipitation integrated over the Baltic sea catchment (m^3/s).

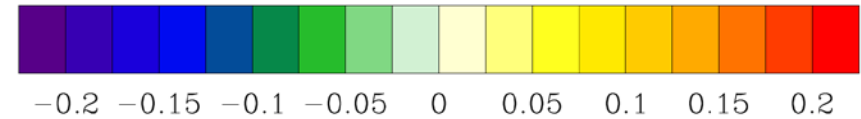
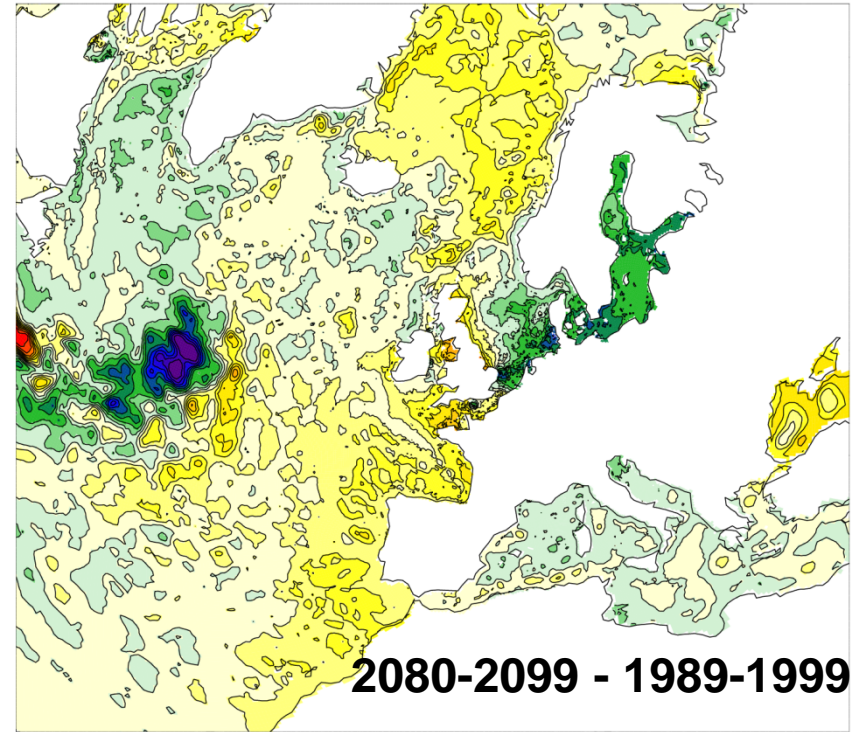
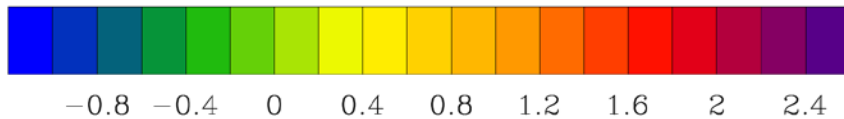
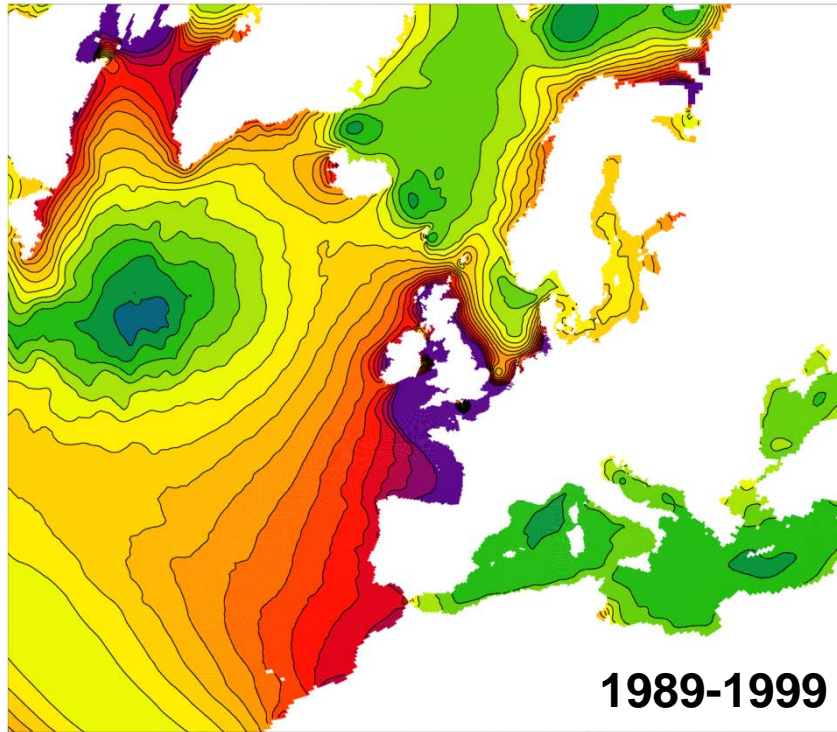


Annual mean modeled river runoff into the Baltic sea (m^3/s)

Standard deviation of DJF 500 hPa height (m) due to transient eddies in the bandpass regime (2.5-6 days) and its relative change (right)



Upper 1% Percentil of daily sea level maxima and its change (mean sea level change is excluded)



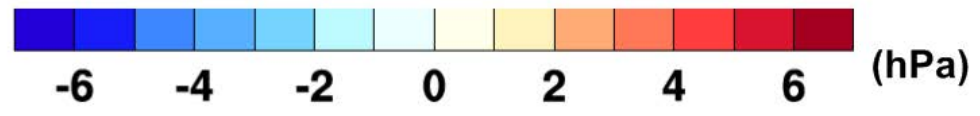
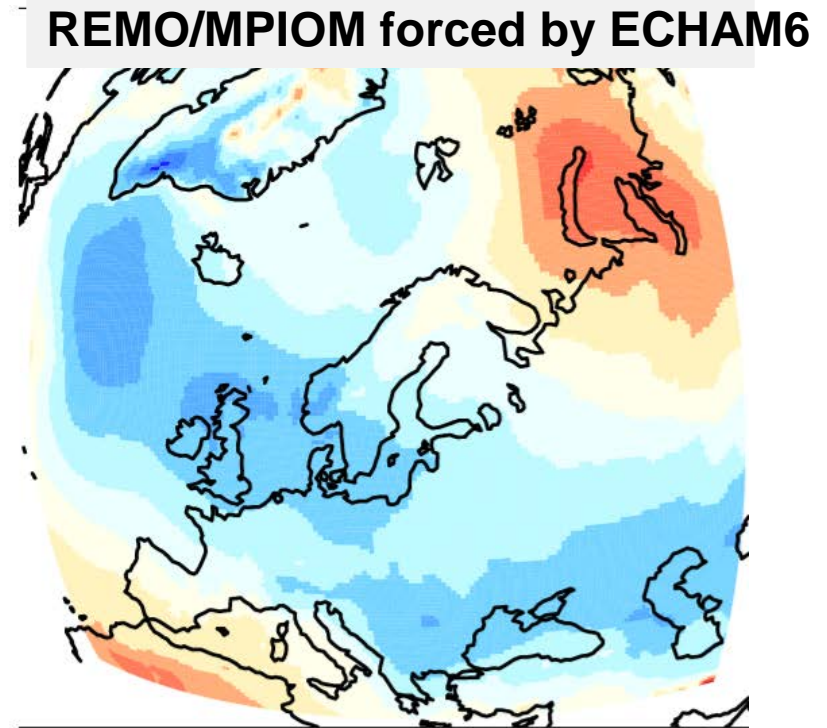
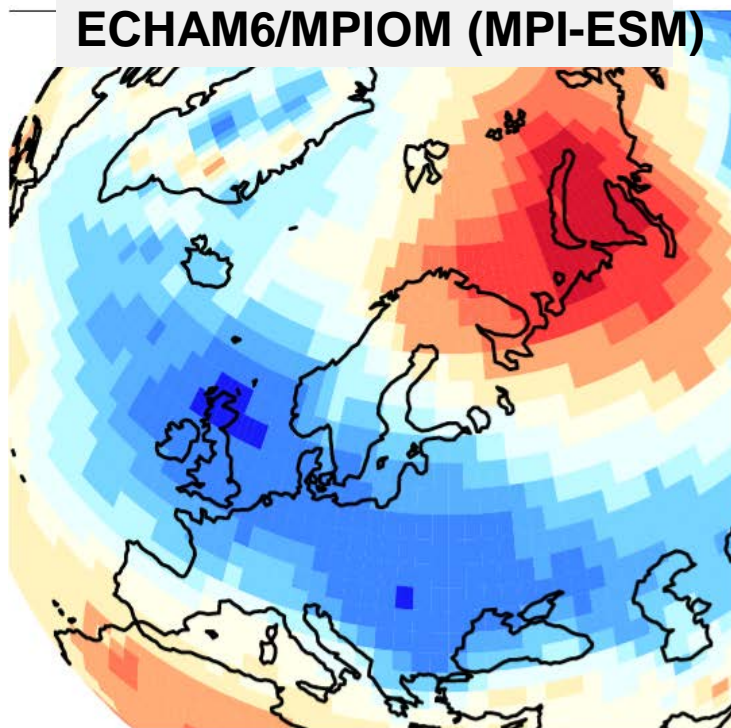
Outlook:

Simulations with MPI-ESM

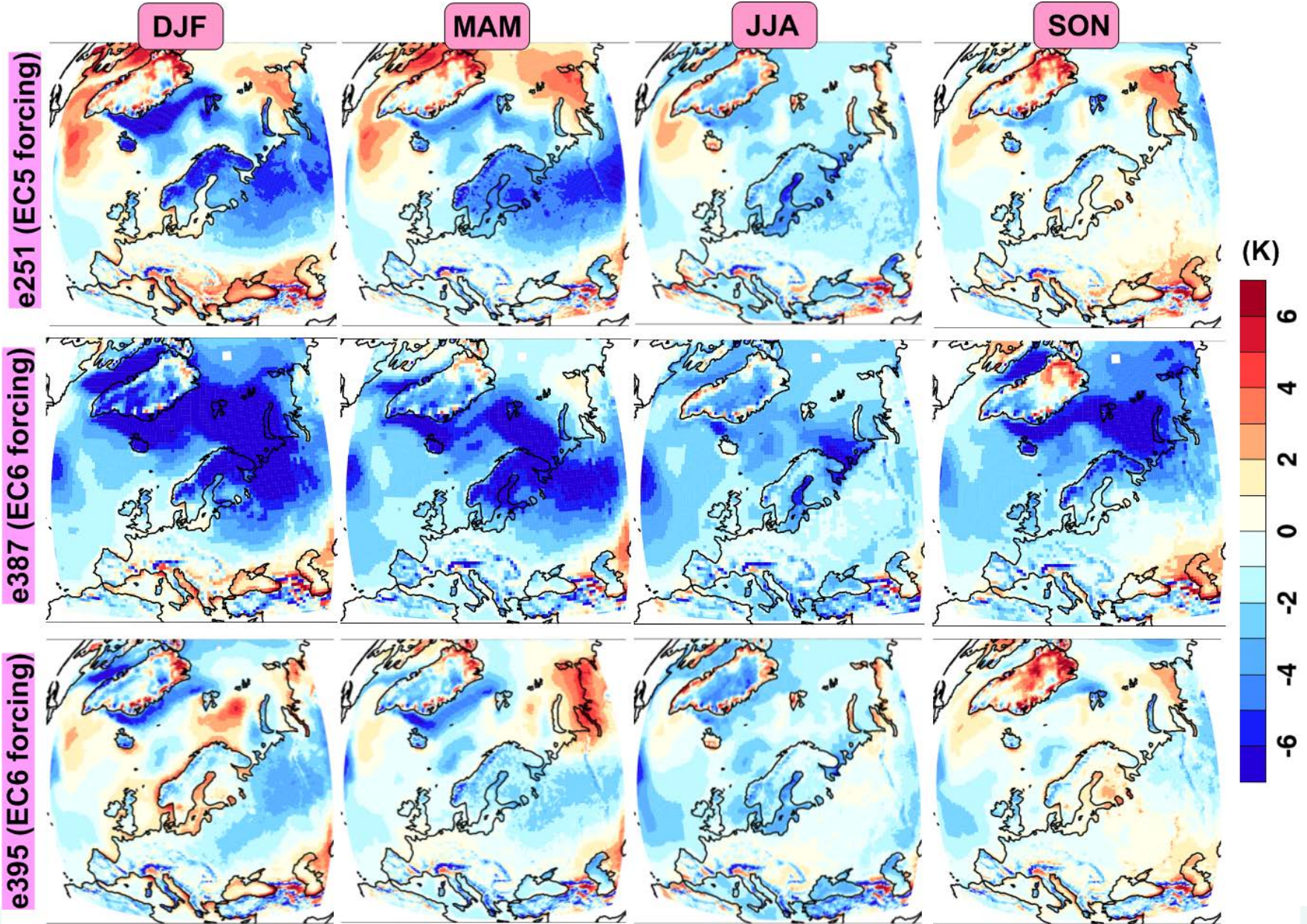
CMIP5 forcing



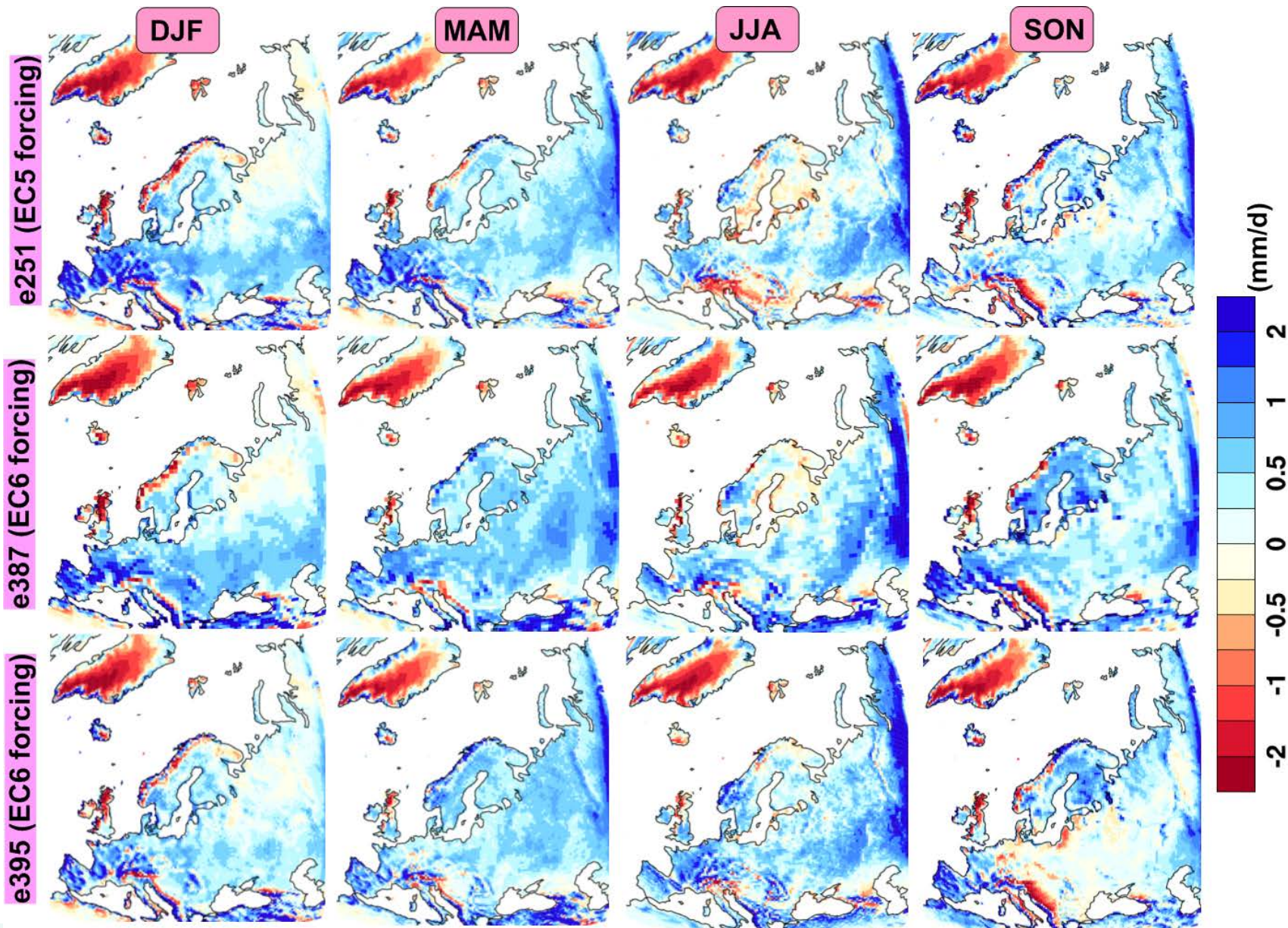
DJF mean sea level pressure difference. Model – ERA40



2m temperature difference. Model – ERA40



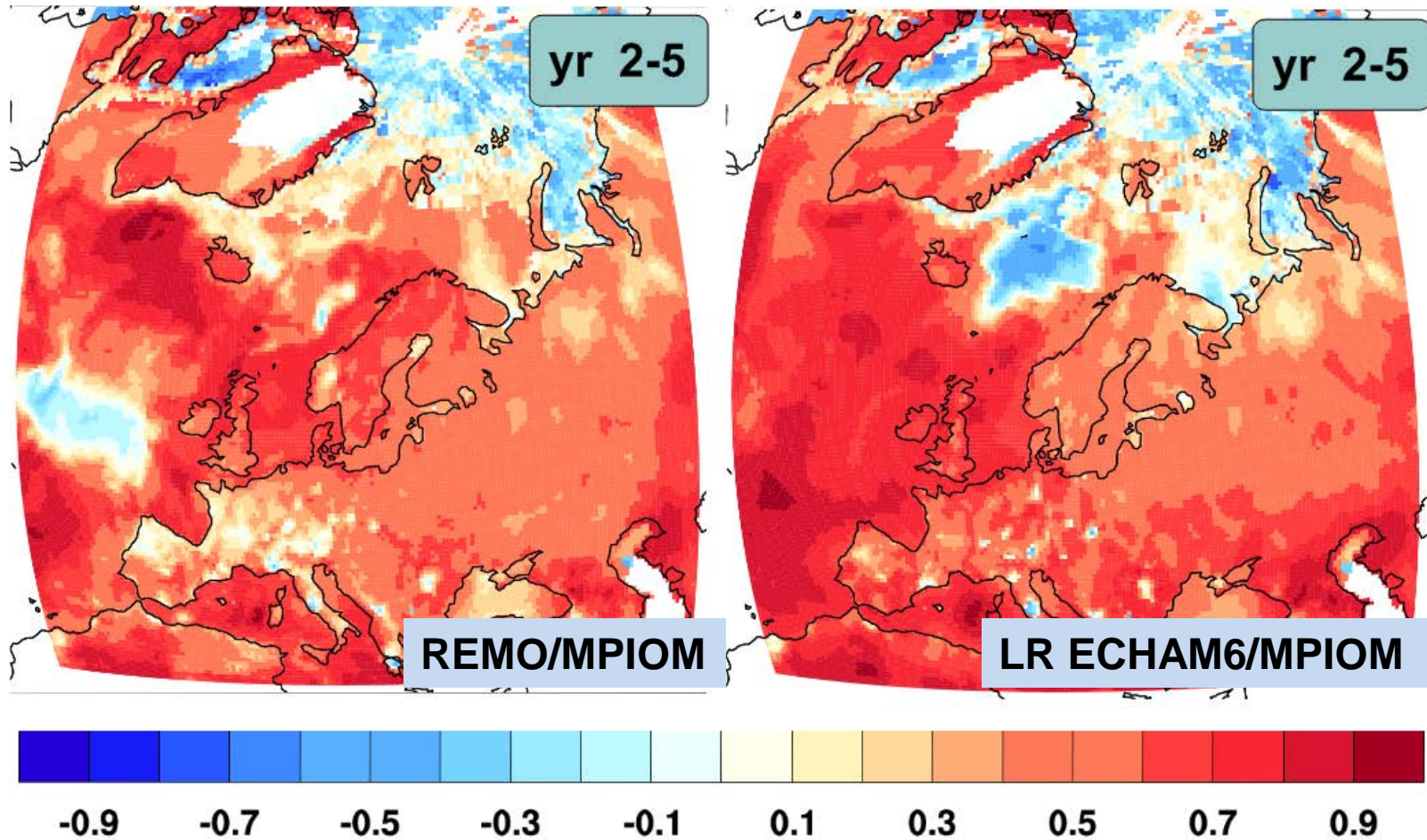
Total precipitation difference. Model – CRU



Thank you!

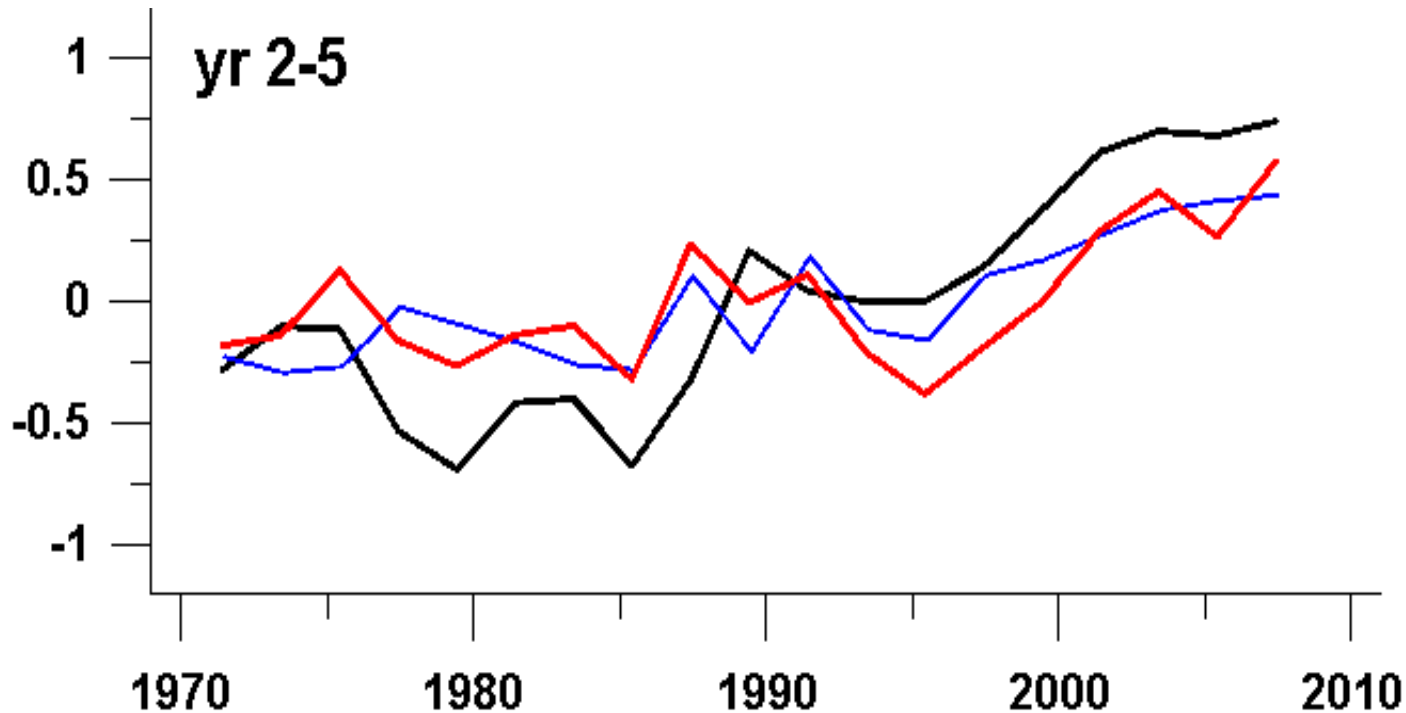


Decadal predictions downscaling



Surface temperature predictive COR skill at lead time 2-5 years. The observations were taken from HadISST for the SST and GHCN/CAMS for SAT.

Decadal predictions downscaling



Mean over the North Sea SST anomalies: **HadISST**, **SST from the global ECHAM6/MPIOM hindcast** and **SST from REMO/MPIOM** at lead time 2-5 years.

Observed (a) and modelled (b) M_2 tidal maps. Co-tidal lines are with 30° interval

