

# Coupled reanalysis simulation for North and Baltic seas and DAS-Basisdienst “Climate and Water”

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In the newly established service DAS-Basisdienst “Climate and Water” several German federal agencies under the governance of the Federal Ministry of Transport and Digital Infrastructure (BMVI) working together to determine the effects of climate change for the fields of actions “Climate and Water” in Germany. With this focus, many guidelines and process chains are addressed that deal with weather extremes, hydrological extremes and potential sea level changes..

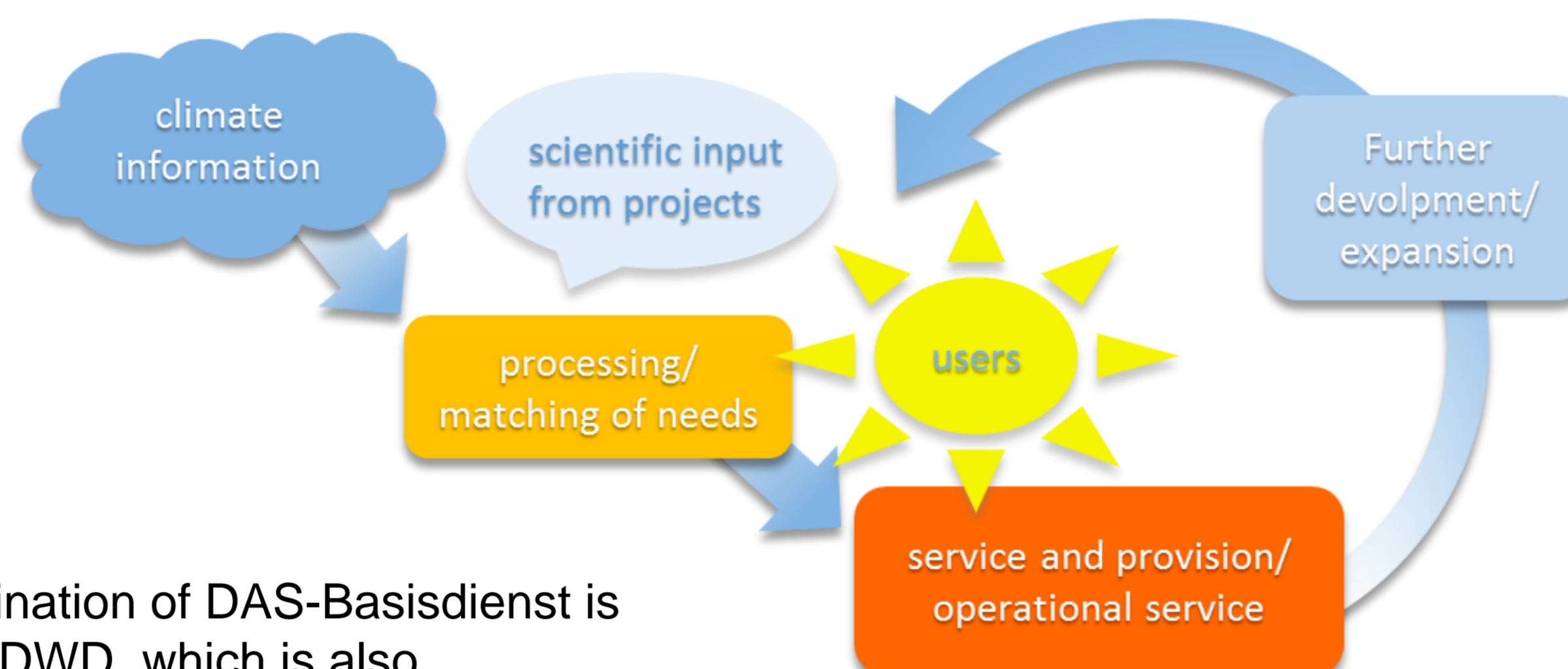
In this framework, DWD will provide climate projections with the Regional Ocean Atmosphere Model (ROAM). Results of the reanalysis simulation with ROAM from the predecessor project ProWaS are presented here and future plans outlined.

## DAS-Basisdienst “Climate and Water”

The service of DAS-Basisdienst will be developed in an exchange between research institutions, federal and state authorities and representatives of many policy fields and economic sectors and continuously updated in line with new findings. Based on a uniform, quality-checked data basis, practice-relevant parameters and information products will be generated with a well-founded methodology and tailored to a variety of specialized applications and questions. Special attention is to be paid to the coherence of the product range so that the transport ways rail, road and waterway, as well as departments and actors, can use comparable, consolidated bases for their decisions. Area of interest in Germany and its river catchment areas.



Climate information is provided by DWD, processed and refined there and at the partner agencies (BfG, BSH and BAW) to create products in form of maps, data (i.e. time series), indices and consulting for the users. Scientific input from research projects like the BMVI Network of Experts will be taken into account when relevant for the service and included in the operational service.



The coordination of DAS-Basisdienst is located at DWD, which is also responsible for the provision of gridded data via the ESGF portals (i.e. esgf.dwd.de).

The organization of the service follows in general the structure of the project ProWaS with modules like estuaries (BAW), inland water quality (BfG) and inland shipping (BAW) to name just a few. Webservices will be designed to offer the products to users together with background information and news around the DAS

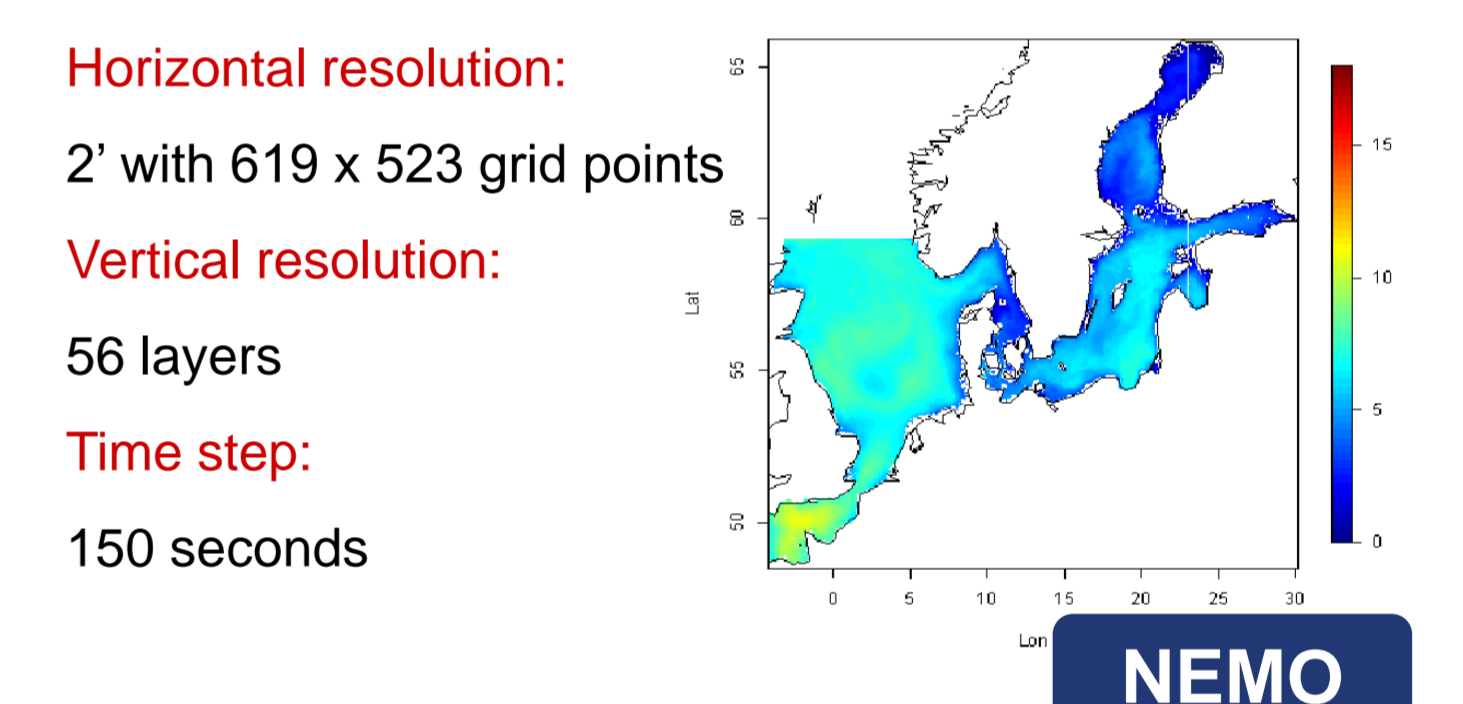
Together with the Federal Maritime and Hydrographic Agency (BSH) the ocean component of ROAM will be improved in the modules ROAM@DWD and OCEAN@BSH. And the atmospheric components updated to ICON-CLM in collaboration with the CLM Community. Forcing data for the impact models of BfG and BAW will be distributed and reference data sets will be provided for the recent past and future via an ESGF node

## ROAM 1.0

The chosen atmosphere model is **COSMO-CLM (CCLM)**.



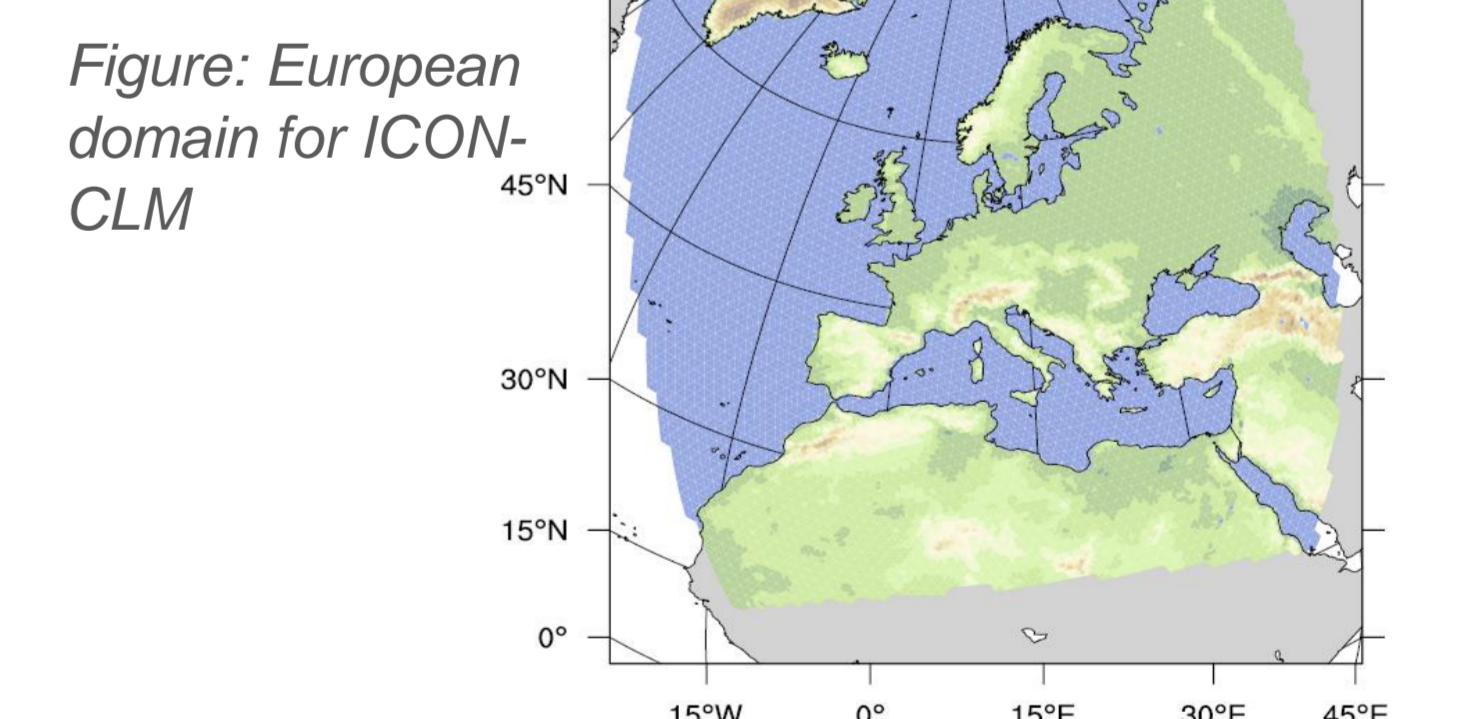
## OASIS3-MCT



**NEMO3.3** (provided by SMHI) gets prescribed tides and river run-off. More details see Pham et al 2014.

## Outlook: ROAM 2.0

**ICON-CLM** was adapted at DWD for regional climate simulations in the project ProWaS.



For the DAS-Basisdienst “Climate and Water” this model will be coupled to a state-of-the-art version of ocean model for North and Baltic Sea as provided by the BSH, based on **NEMO4**. It will be able to represent the processes between the atmosphere, ocean and sea-ice more accurately and includes the north-western shelf of Great Britain. The setup was developed by HZG.

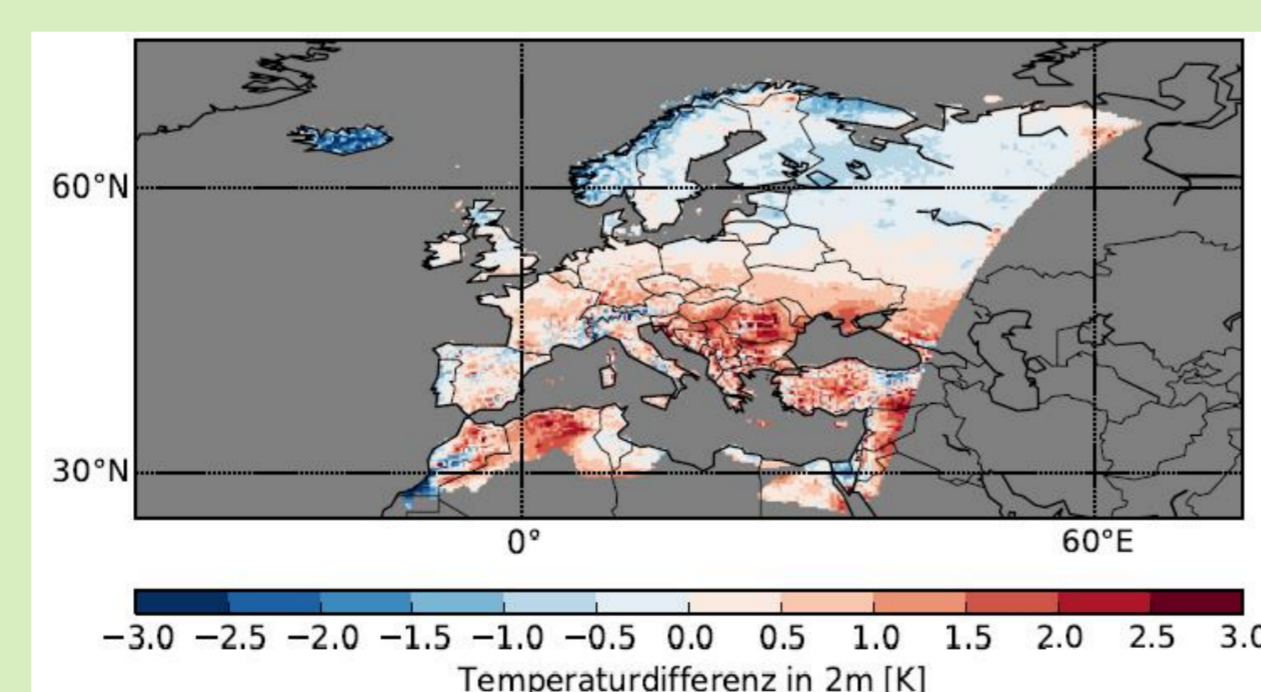
## Literature

Pham T. V., Brauch J., Dieterich C., Früh B., and B. Ahrens, 2014, New coupled atmosphere-ocean-ice system COSMO-CLM/NEMO: assessing air temperature sensitivity over the North and Baltic Seas, Oceanologia, 56 (S), 1-23, doi:10.5697/oc.56-S.000, 2014.

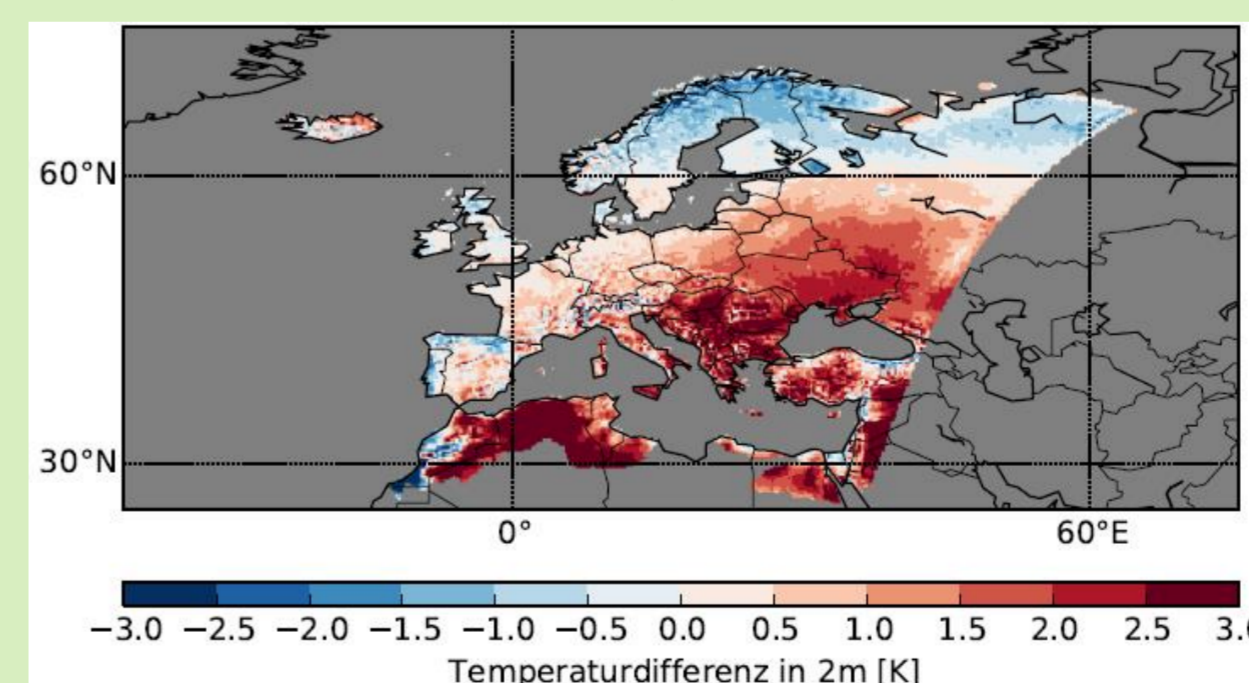
## ROAM 1.0 – Reanalyses with ERA-Interim and ORAS4 forcing

Differences between 2mT from an ERA-Interim-forced reanalysis run and E-OBS data. The simulation was conducted with ROAM 1.0 from 1990 until 2015. There is a warm bias in the yearly mean (Figure A) in the eastern Mediterranean areas and a cold bias in west Scandinavia and Iceland. In summer (Fig. C) the differences are more pronounced, up until 3K warmer temperatures compared to E-OBS whereas in winter (Fig B) the differences are smaller and with a reverse sign, aka cold bias over central Europa and the Mediterranean area and warm bias in the north of Scandinavia. The absolute error between the coupled and uncoupled simulation is shown in Fig D. Blue areas show where the uncoupled simulation is closer to E-OBS, red where the coupled simulation is better.

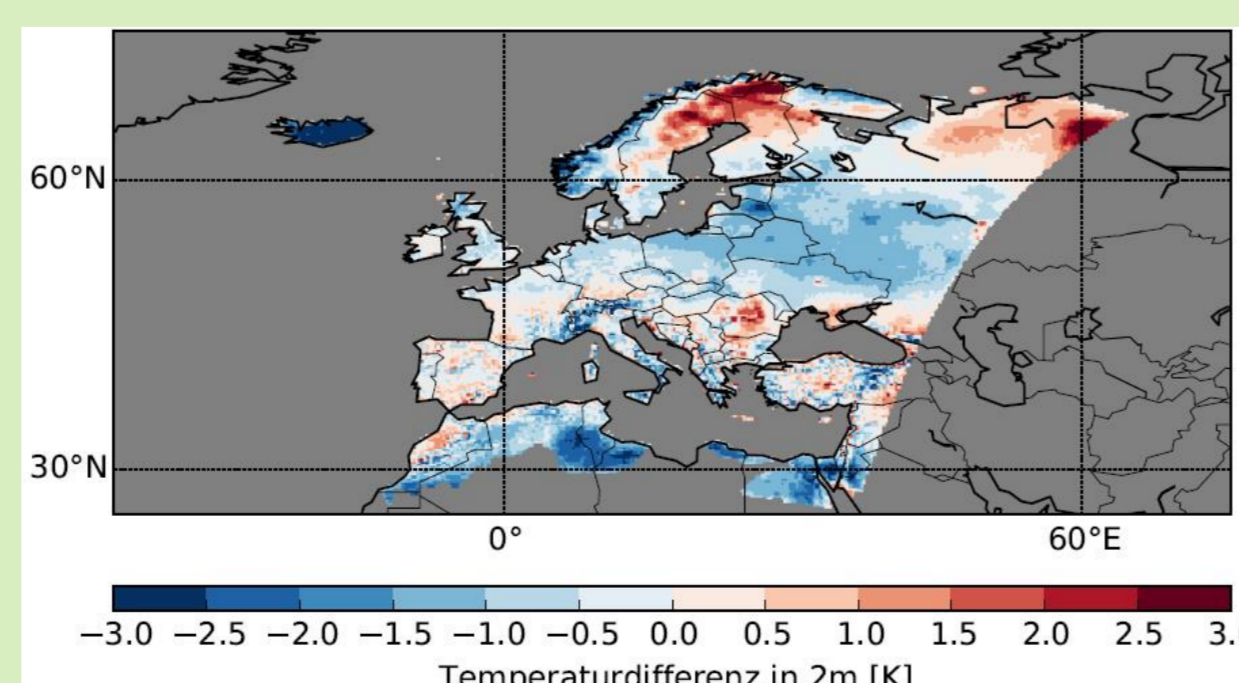
A. Diff of ROAM – E-OBS, year mean



C. Diff of ROAM – E-OBS, JJA



B. Diff of ROAM – E-OBS, DJF



D. Diff of ROAM – uncoupled, year mean

