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Czech Republic

*On the optimization of the model:
The attempts with RegCM for
CORDEX region at CUNI*

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Introduction

model



reality



Introduction

model

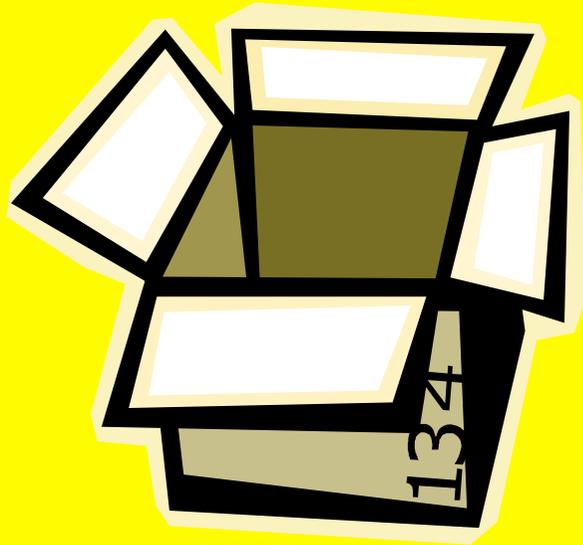


reality



Introduction

model

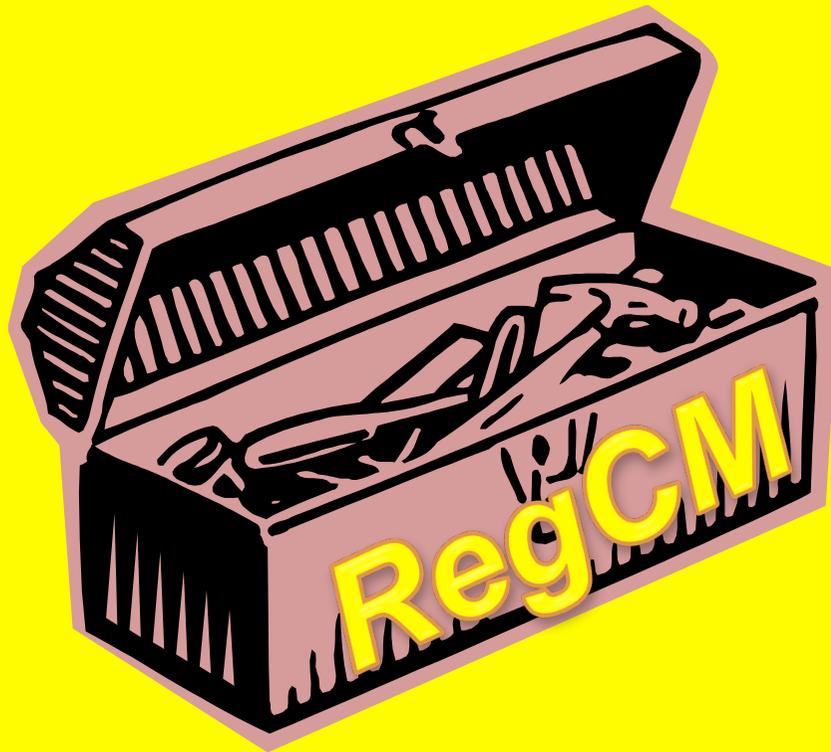


reality



Introduction

model

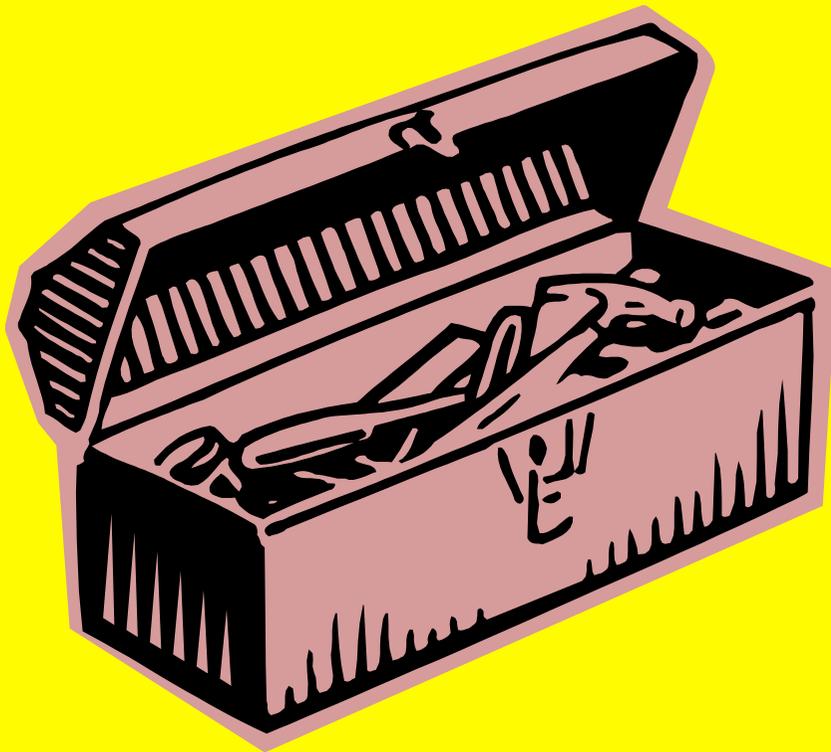


reality



Introduction

optimization - tuning



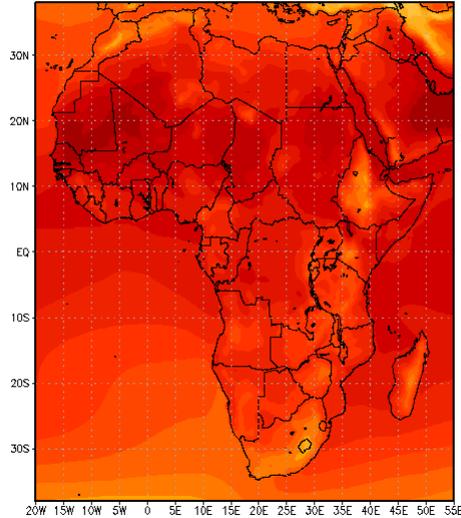
Laws of physics



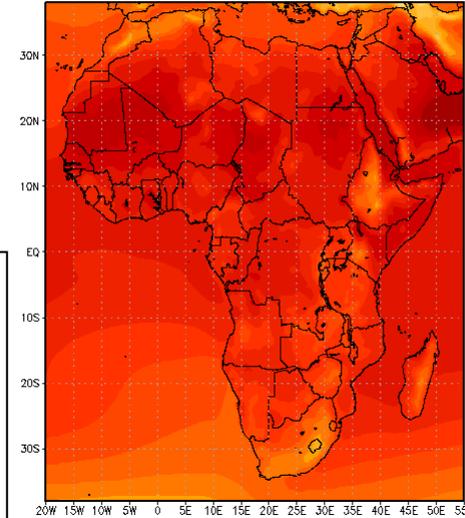
Not always perfect - Africa

All models and CRU 1990-2002 Temperature (°C)

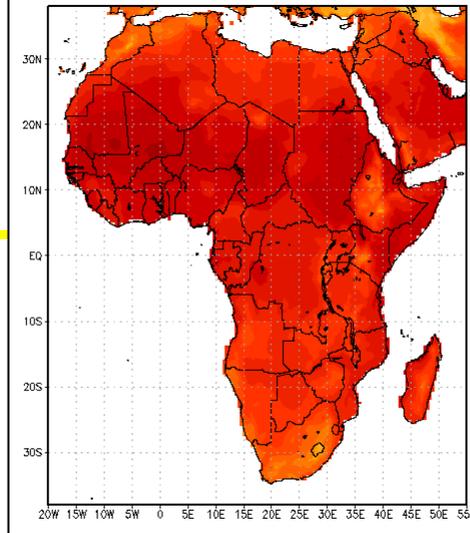
RegCM kuo TA year



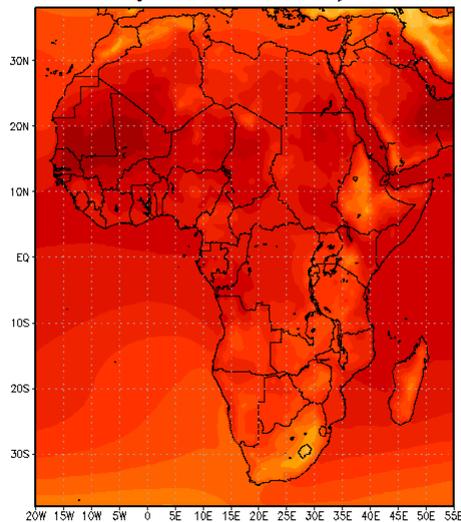
RegCM grell TA year



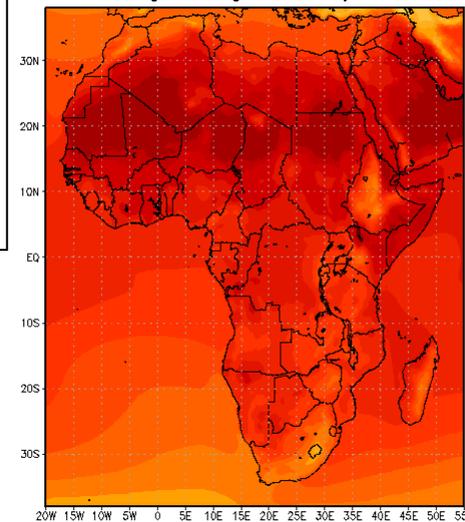
CRU TA year



RegCM emanuel TA year



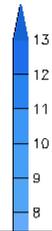
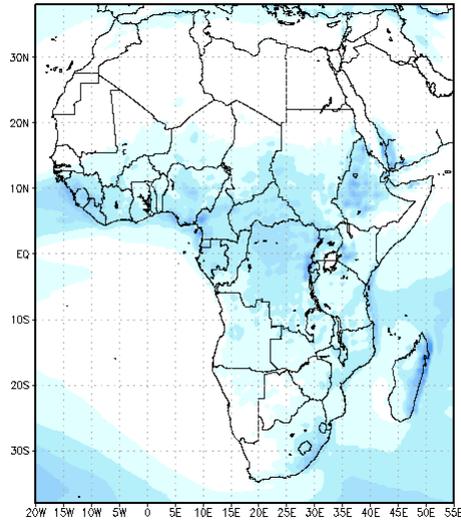
RegCM regcm4 TA year



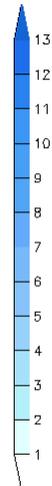
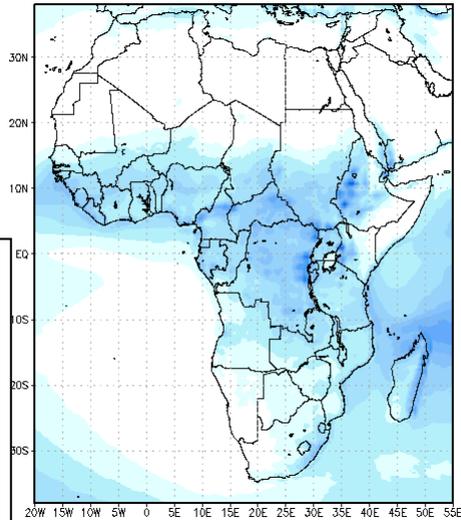
All models and CRU 1990-2002

Precipitation (mm/day)

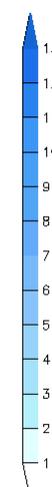
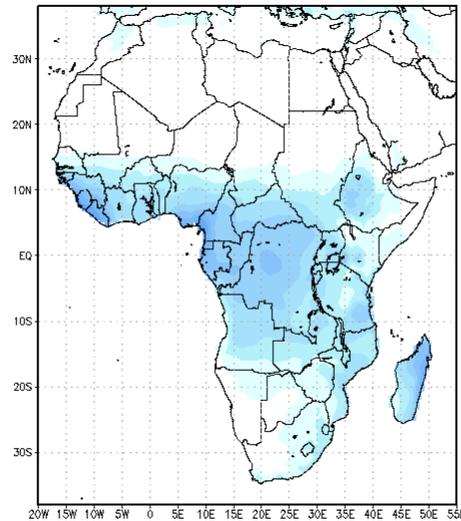
RegCM kuo RT year



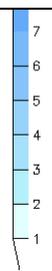
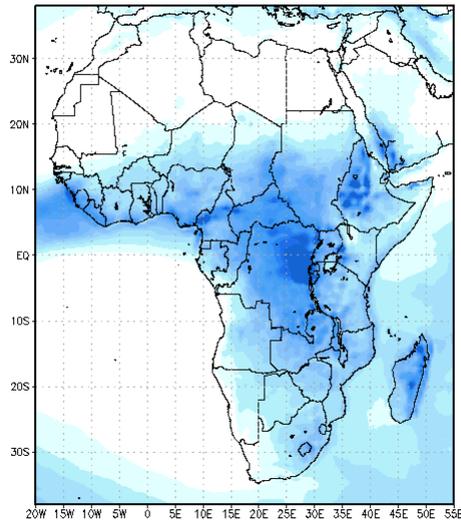
RegCM grell RT year



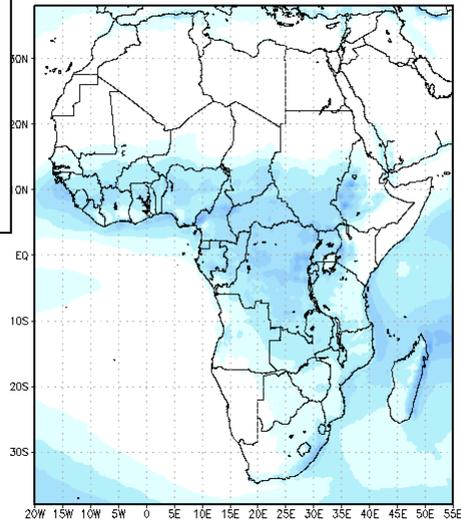
CRU RT year



RegCM emanuel RT year



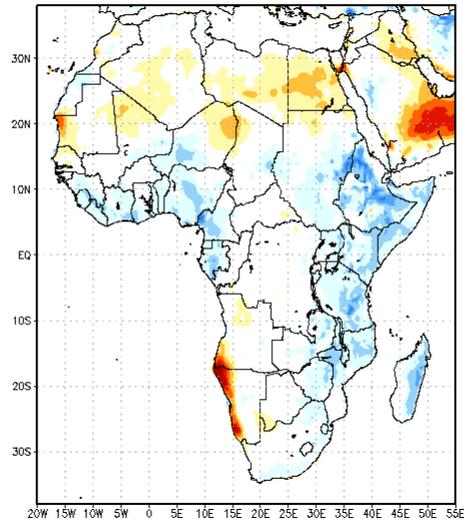
RegCM regcm4 RT year



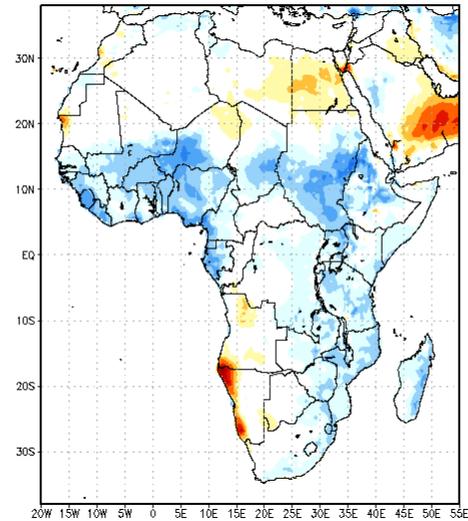
All models-CRU 1990-2002

Temperature (°C)

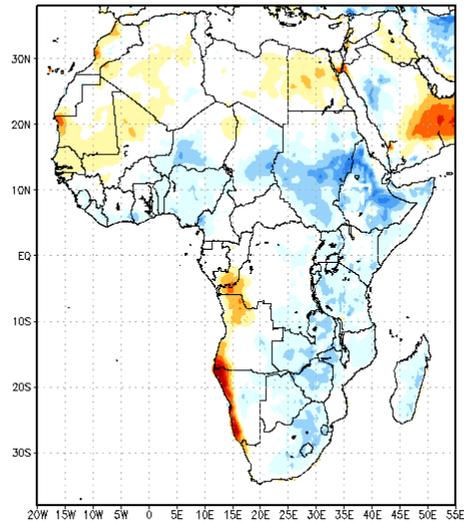
RegCM-CRU kuo TA year



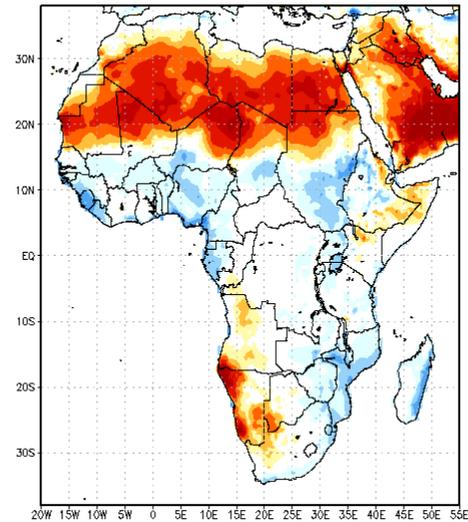
RegCM-CRU grell TA year



RegCM-CRU emanuel TA year



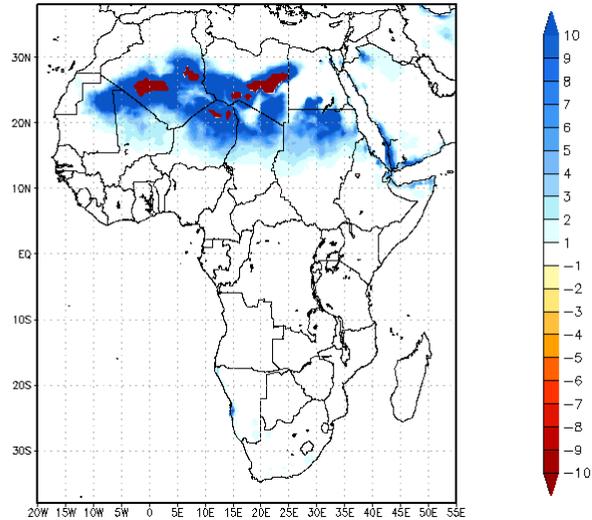
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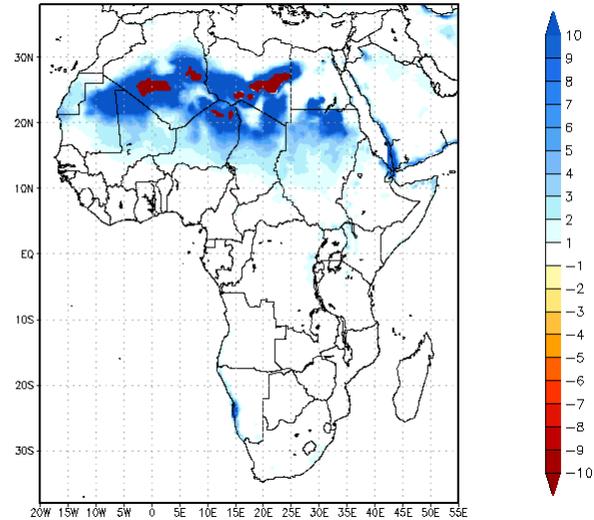
All models-CRU 1990-2002

Precipitation (%)

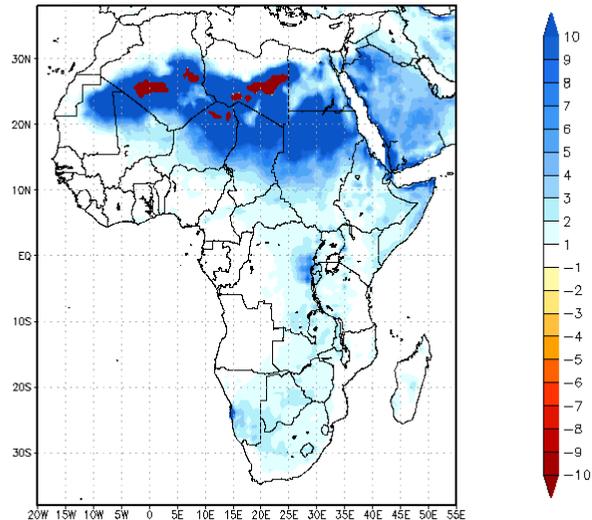
(RegCM-CRU)/CRU kuo RT year



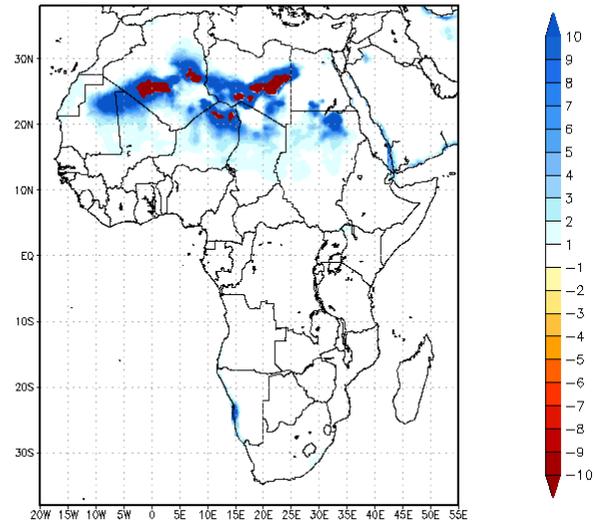
(RegCM-CRU)/CRU grell RT year



(RegCM-CRU)/CRU emanuel RT year



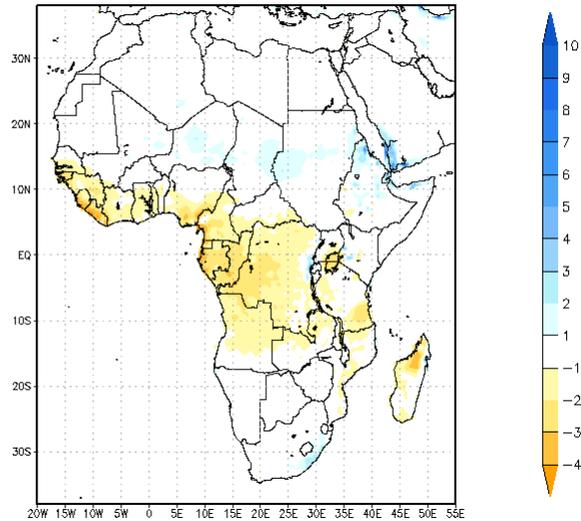
(RegCM-CRU)/CRU regcm4 RT year



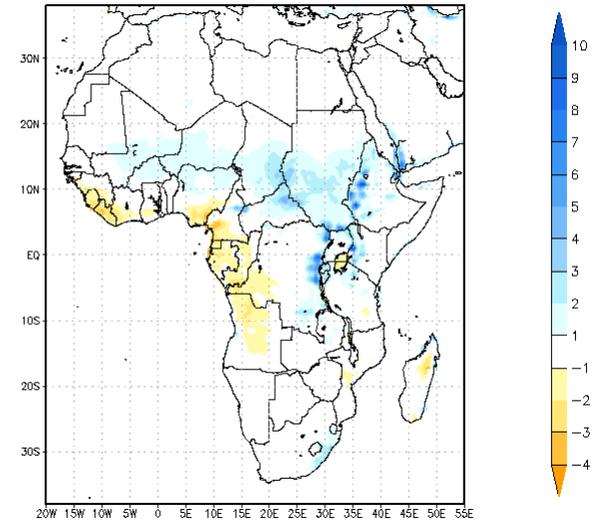
All models-CRU 1990-2002

Precipitation (mm/day)

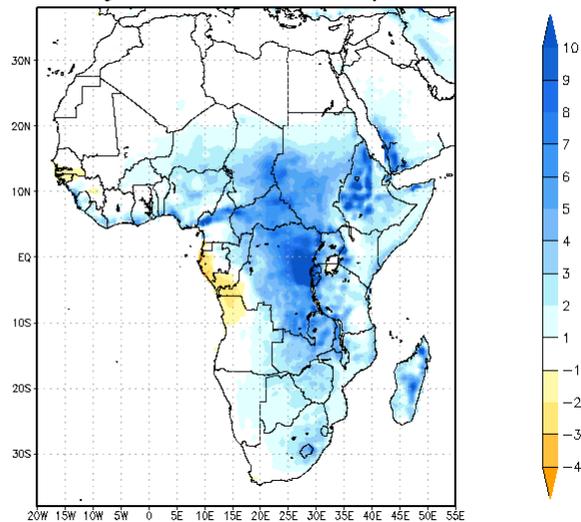
RegCM-CRU kuo RT year



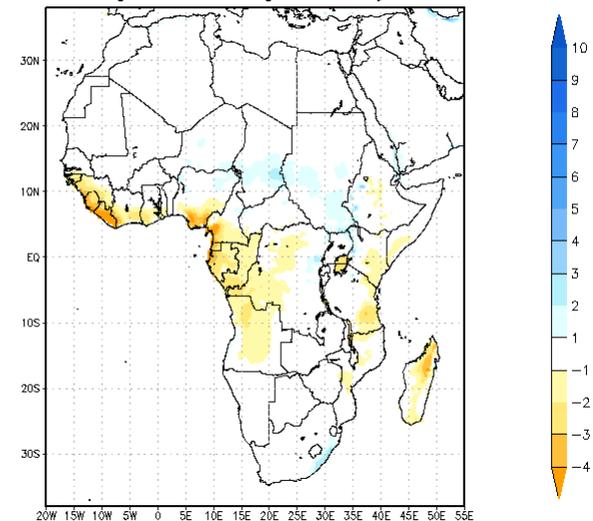
RegCM-CRU grell RT year



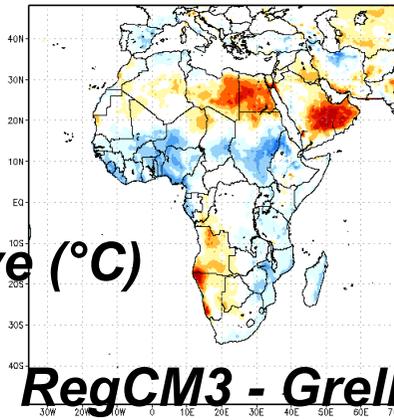
RegCM-CRU emanuel RT year



RegCM-CRU regcm4 RT year

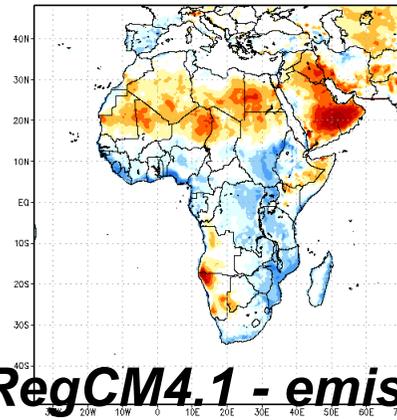


Tave (°C)

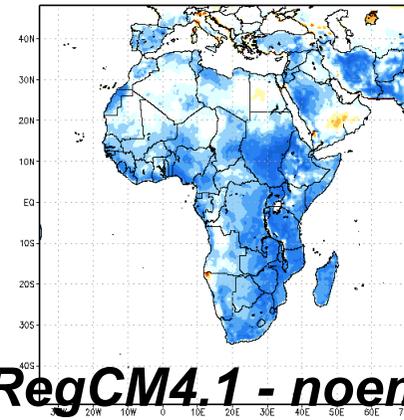


RegCM3 - Grell

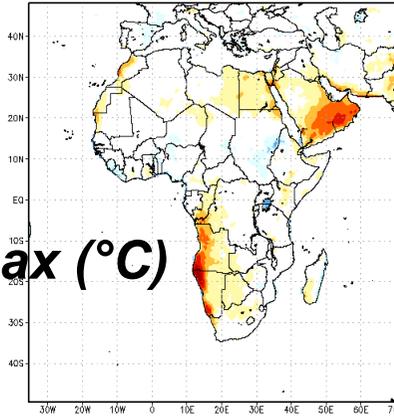
RegCM4.1 - emisvar



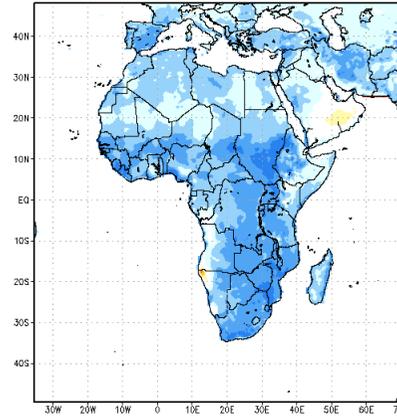
RegCM4.1 - noemis



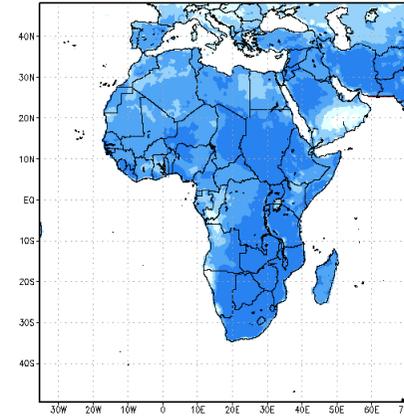
Tmax (°C)



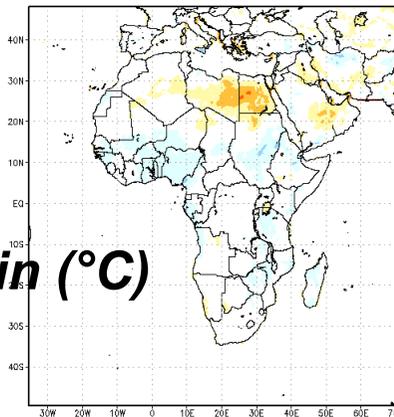
RegCM4.1 - emisvar



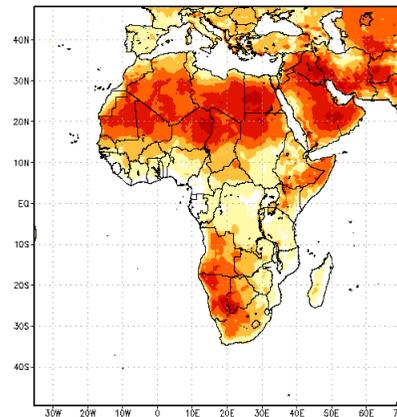
RegCM4.1 - noemis



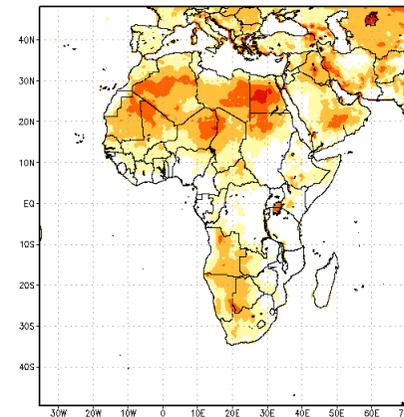
Tmin (°C)



RegCM4.1 - emisvar

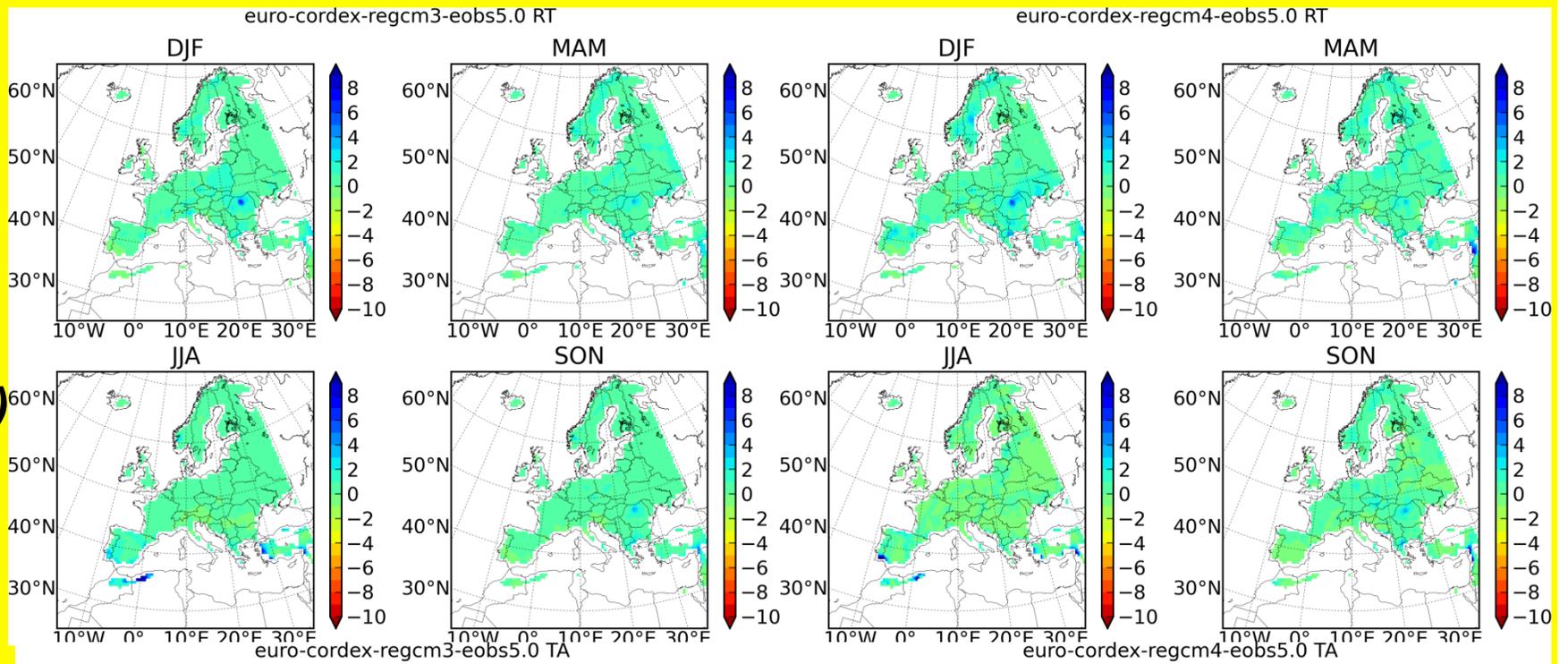


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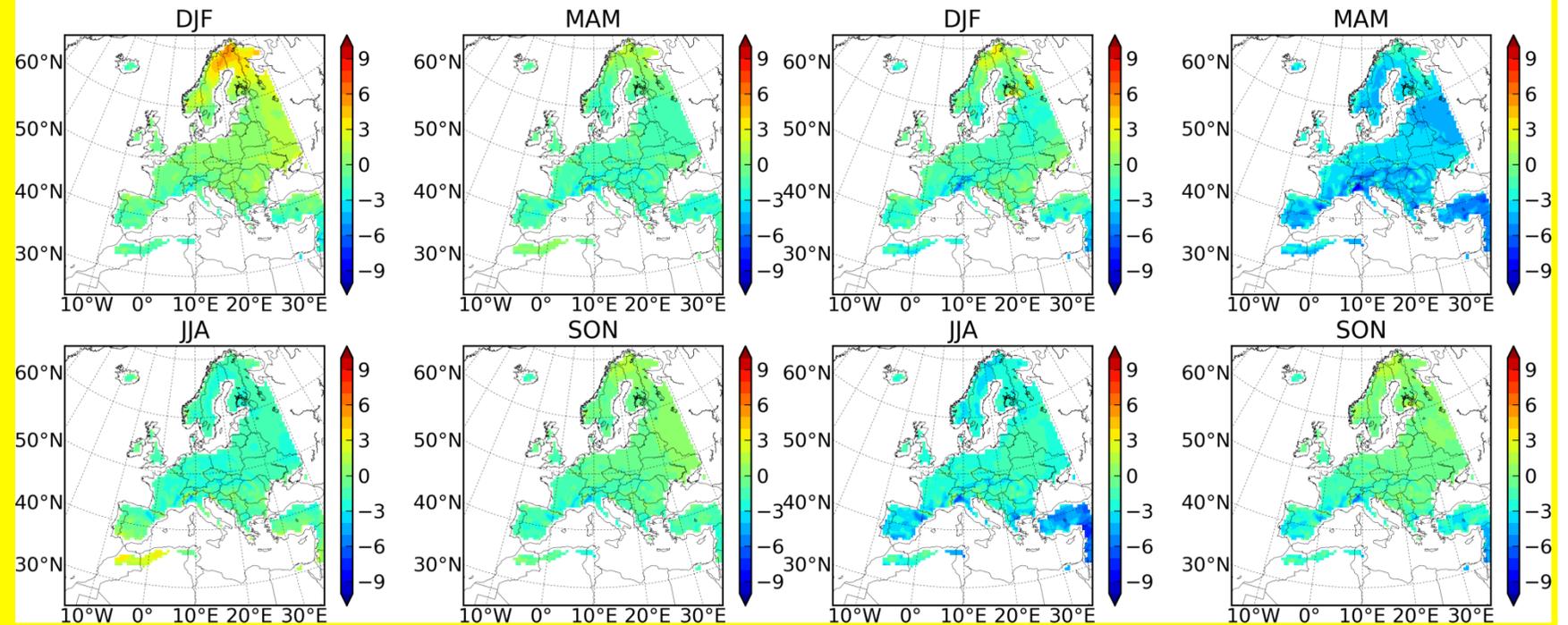


Euro-CORDEX

**Prec
(100%)**

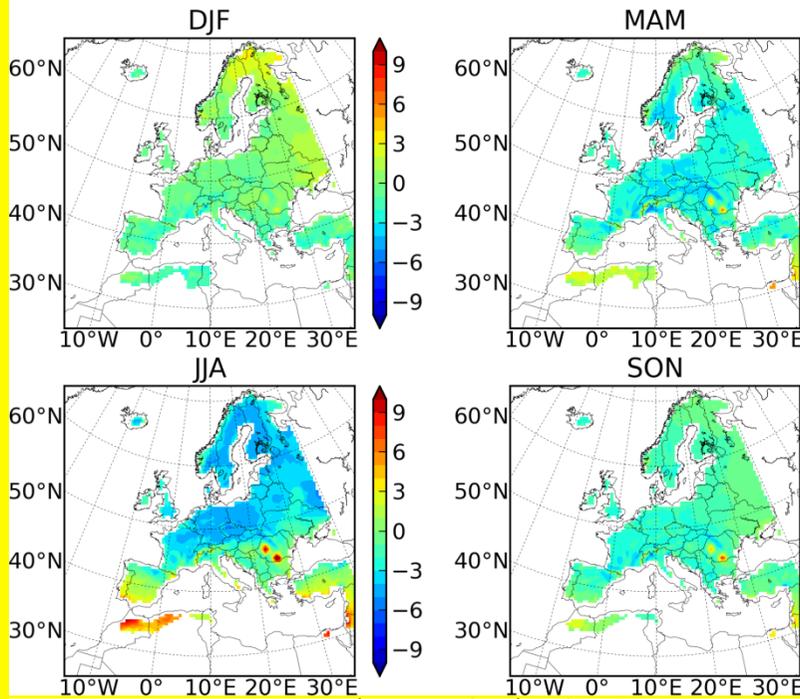


**Tave
(°C)**

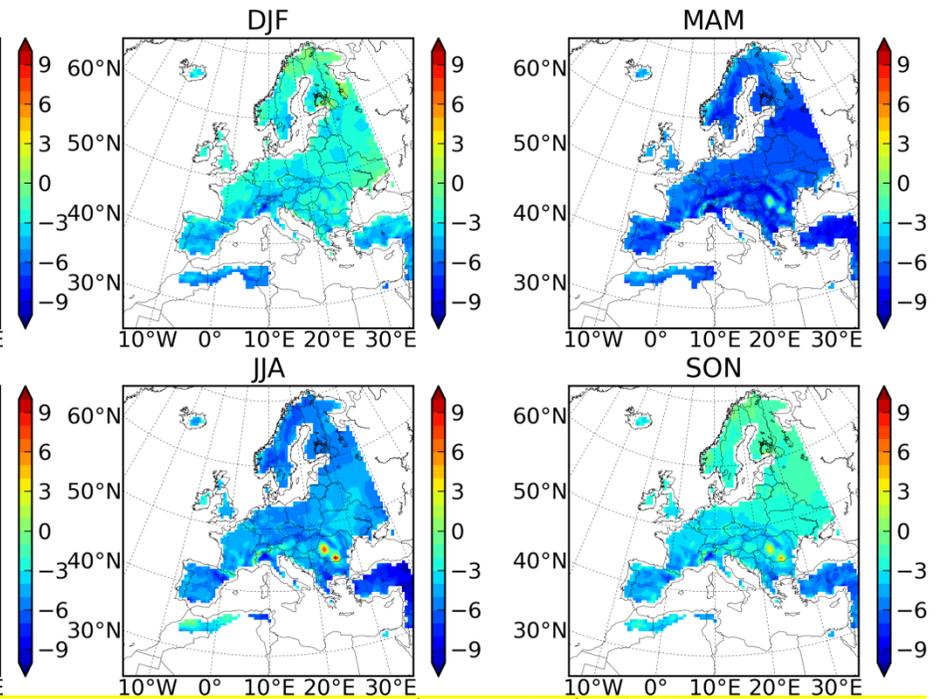


Tmax
(°C)

euro-cordex-regcm3-eobs5.0 TAMAX

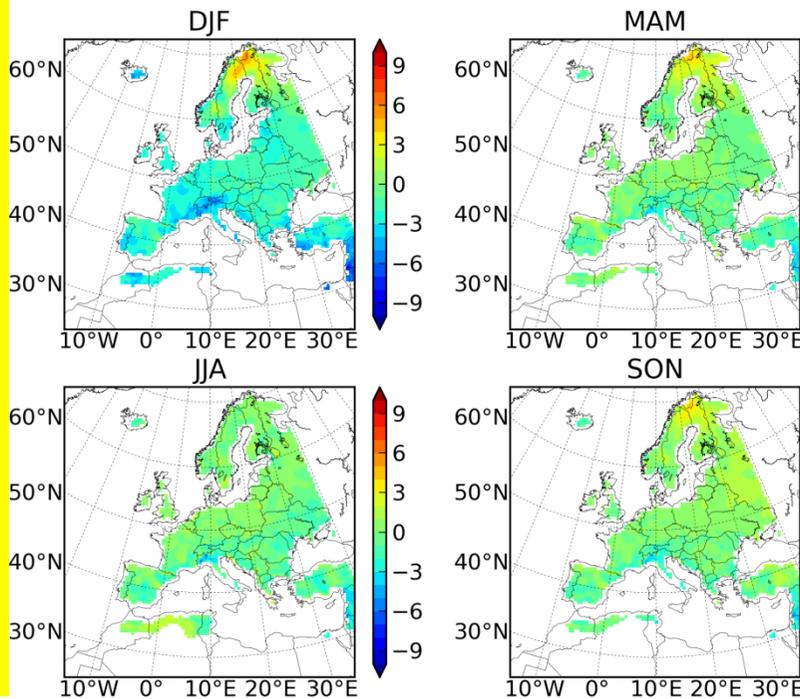


euro-cordex-regcm4-eobs5.0 TAMAX

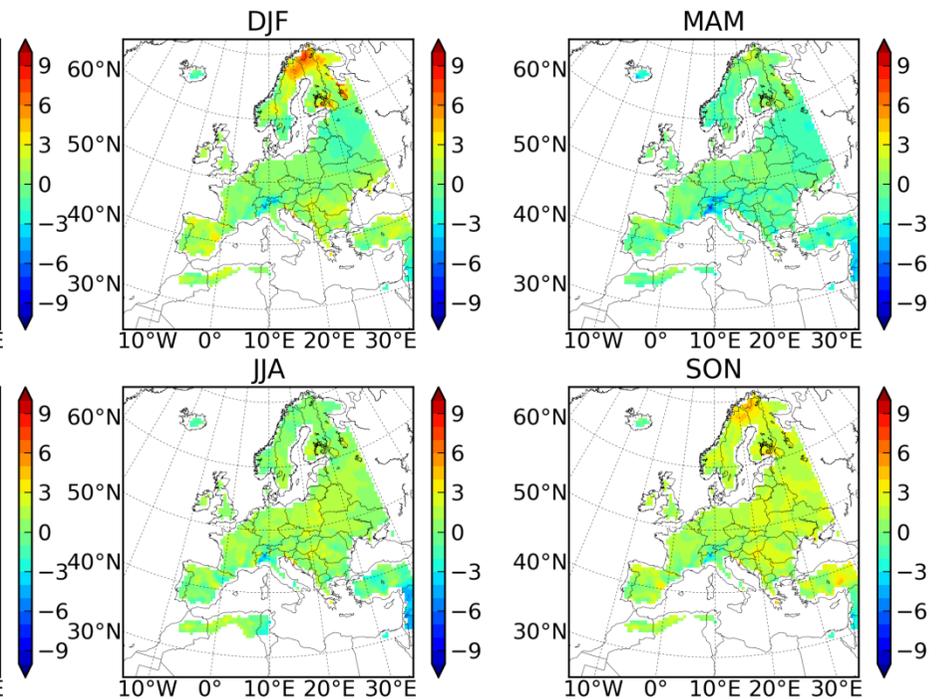


Tmin
(°C)

euro-cordex-regcm3-eobs5.0 TAMIN

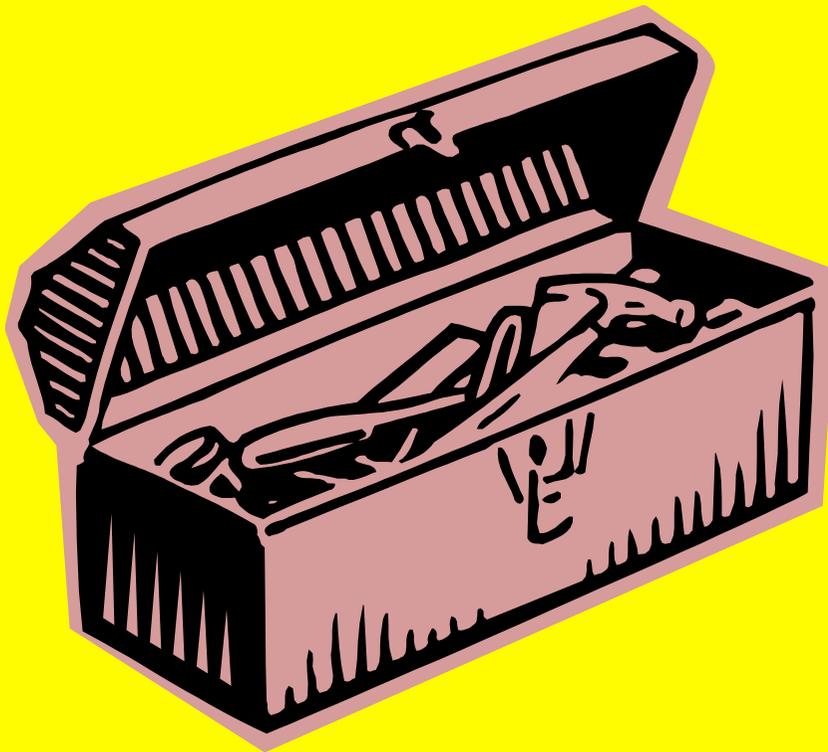


euro-cordex-regcm4-eobs5.0 TAMIN

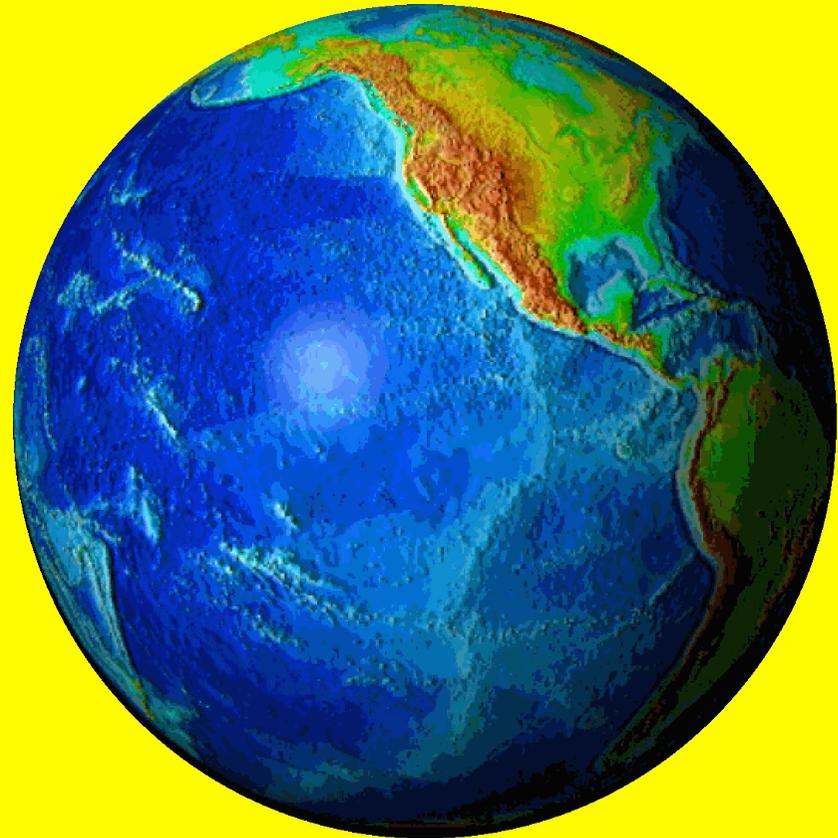


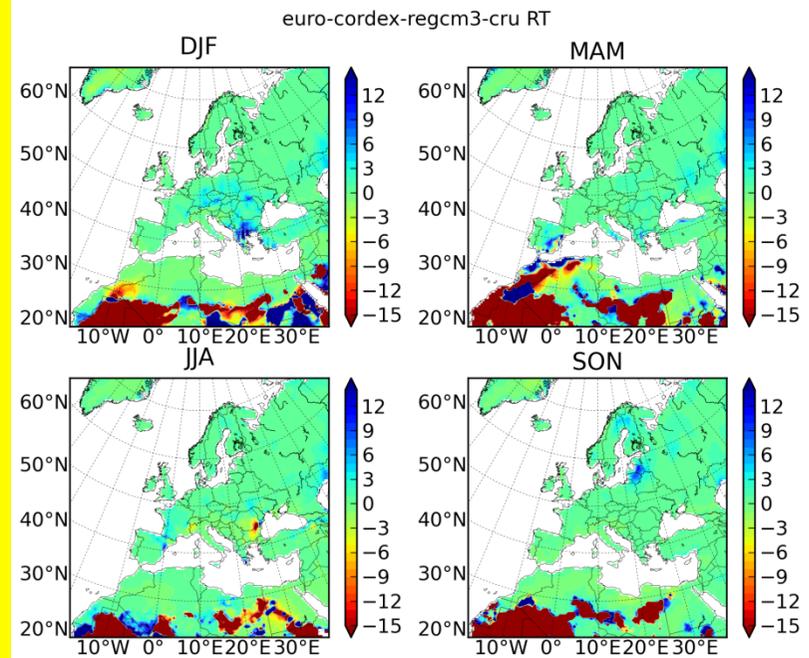
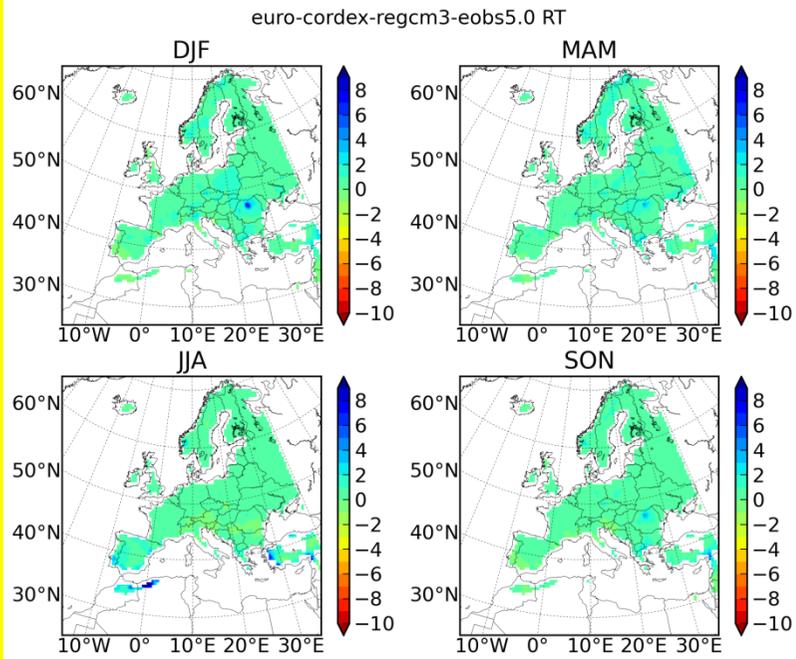
Introduction

model



Reality ?

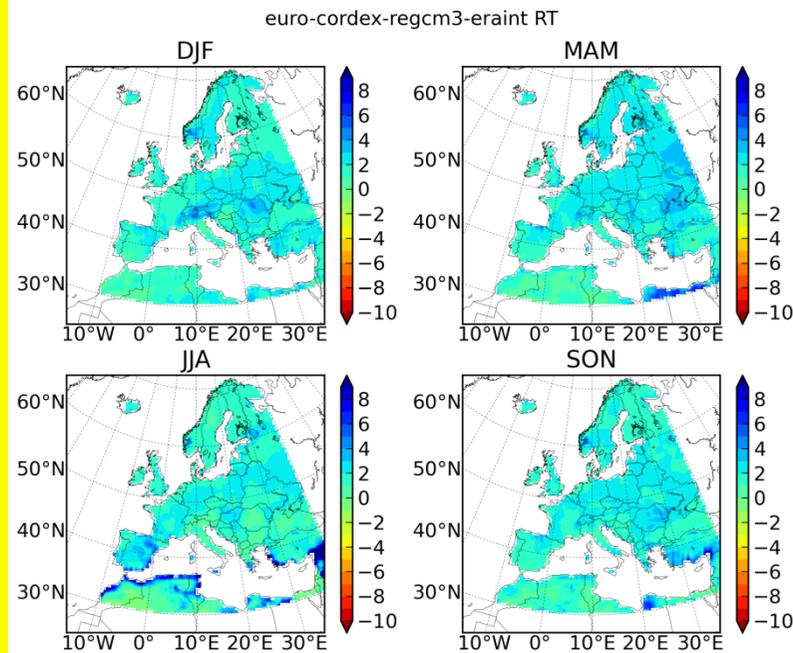




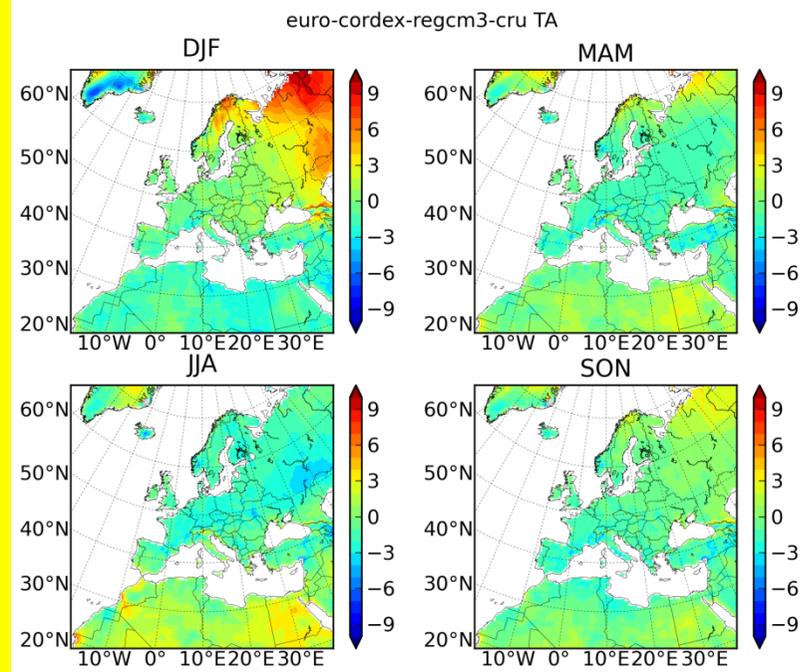
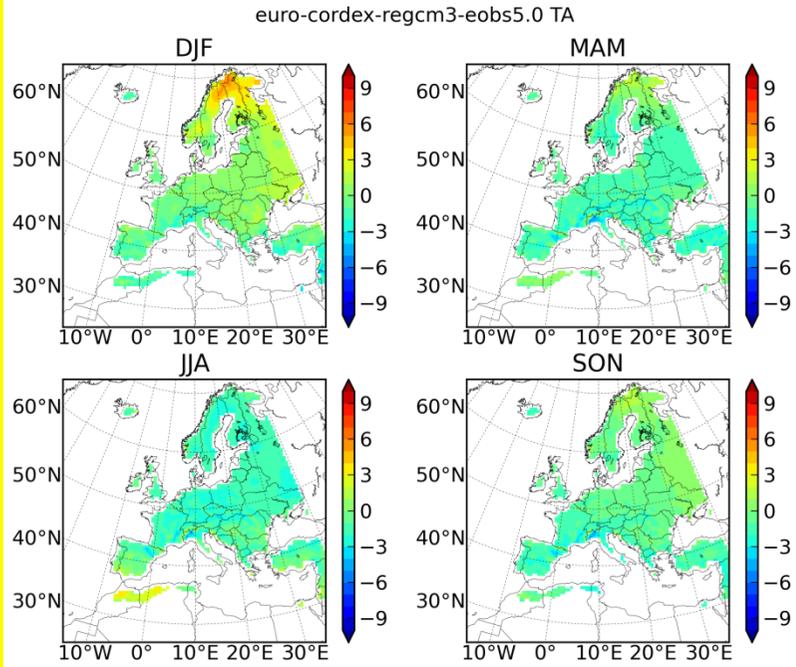
E-OBS

CRU

PREC



ERA-int

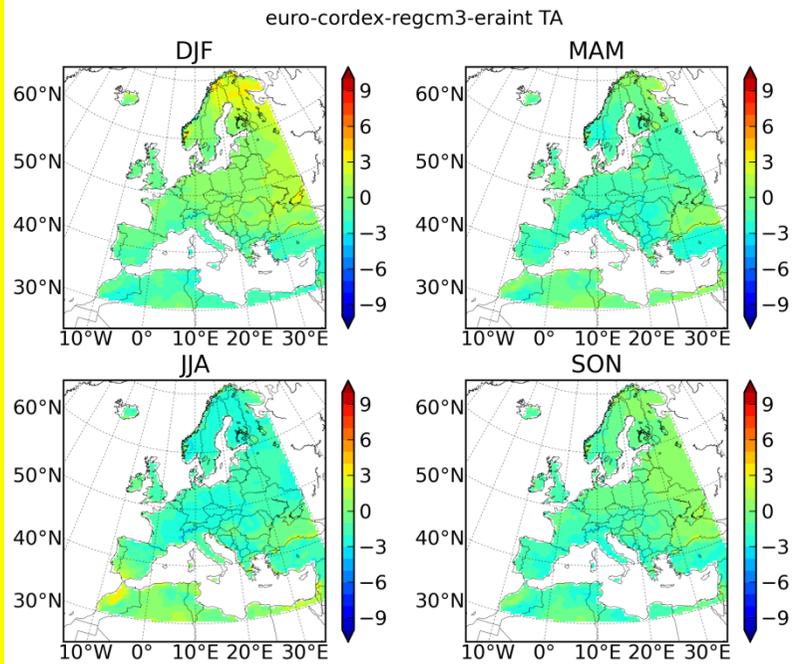


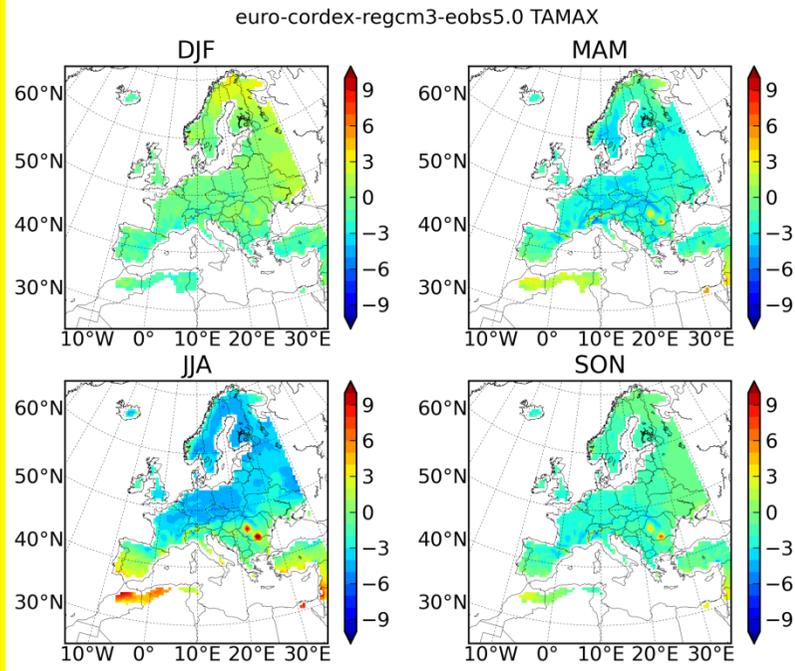
E-OBS

CRU

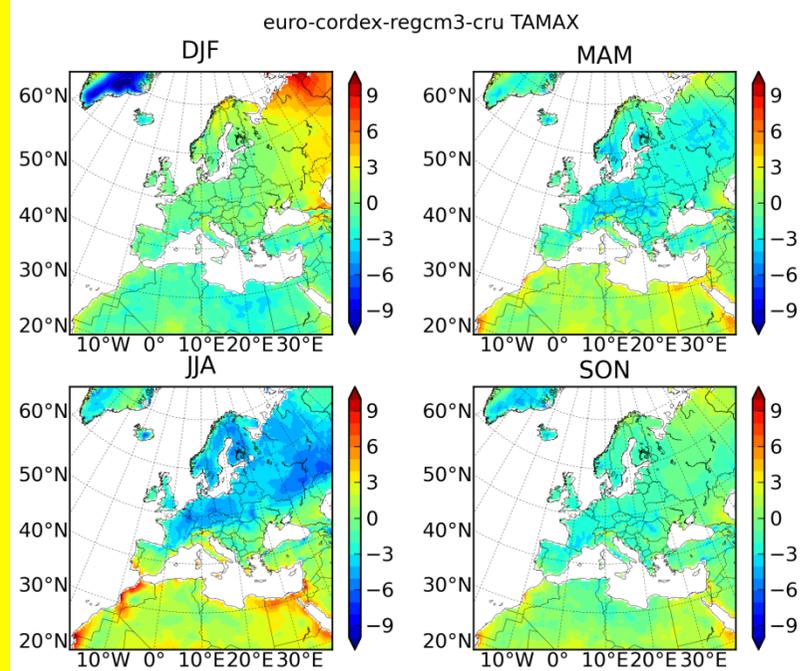
TAVE

ERA-int



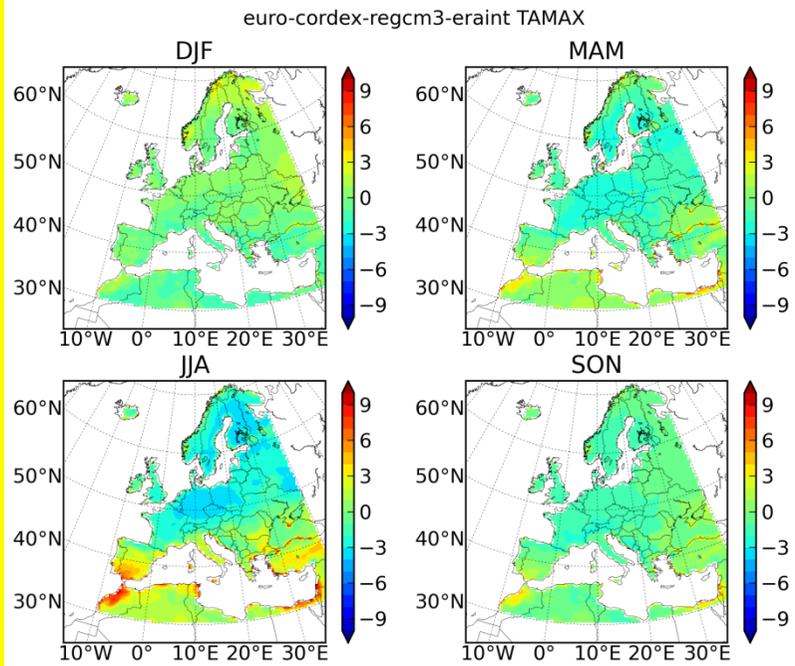


E-OBS



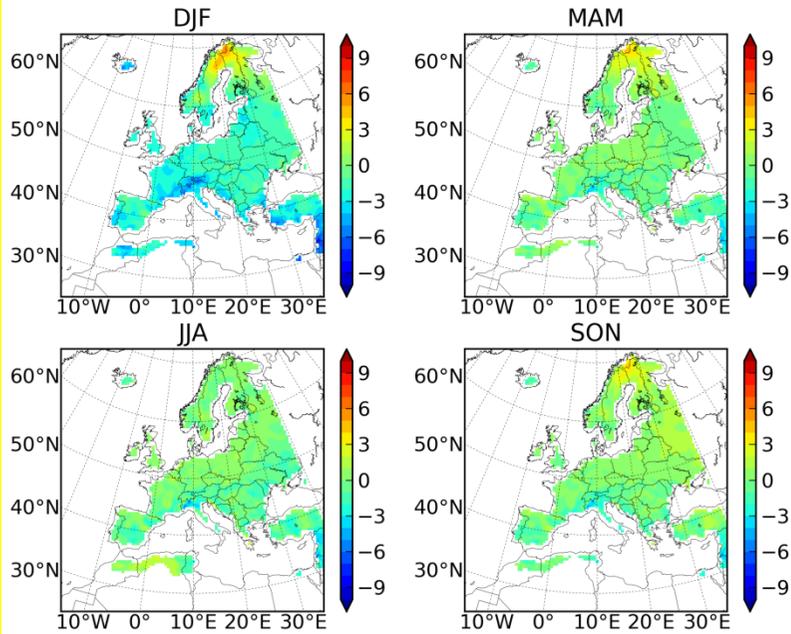
CRU

TMAX



ERA-int

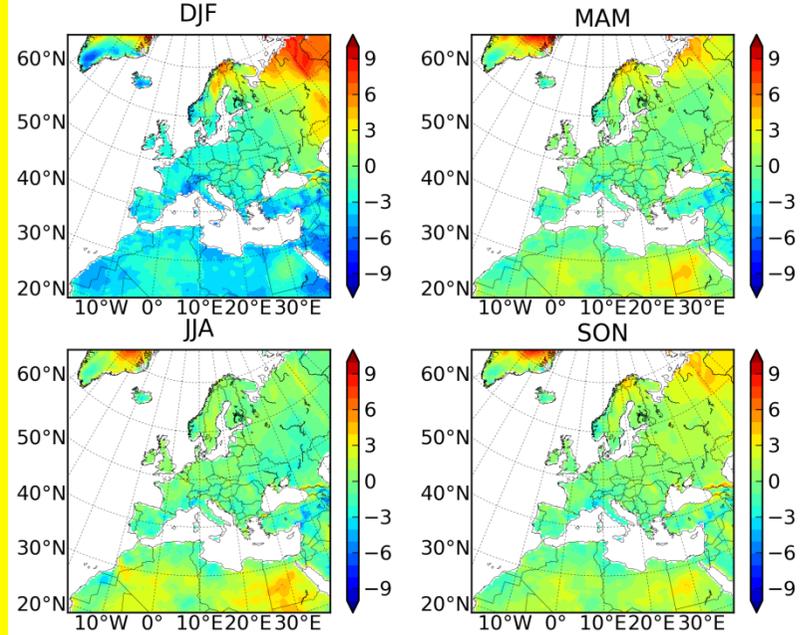
euro-cordex-regcm3-eobs5.0 TAMIN



E-OBS

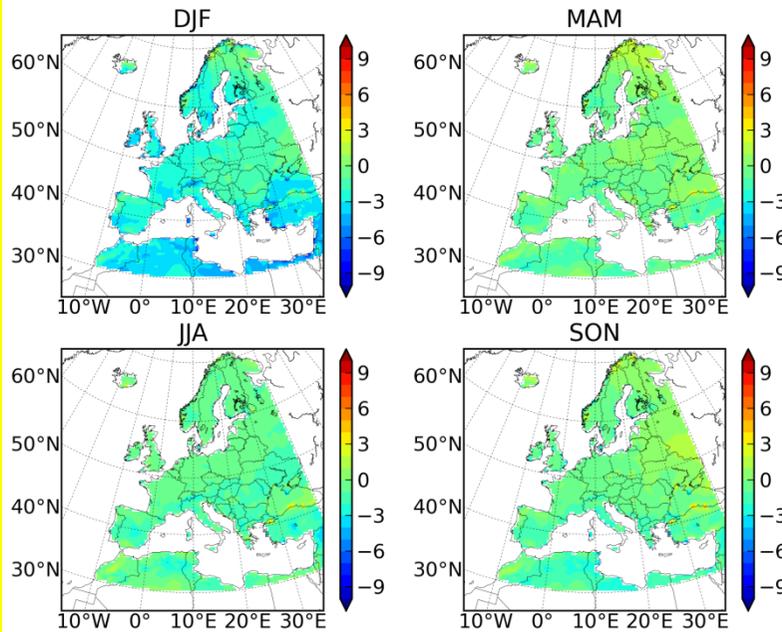
TMIN

euro-cordex-regcm3-cru TAMIN



CRU

euro-cordex-regcm3-eraint TAMIN



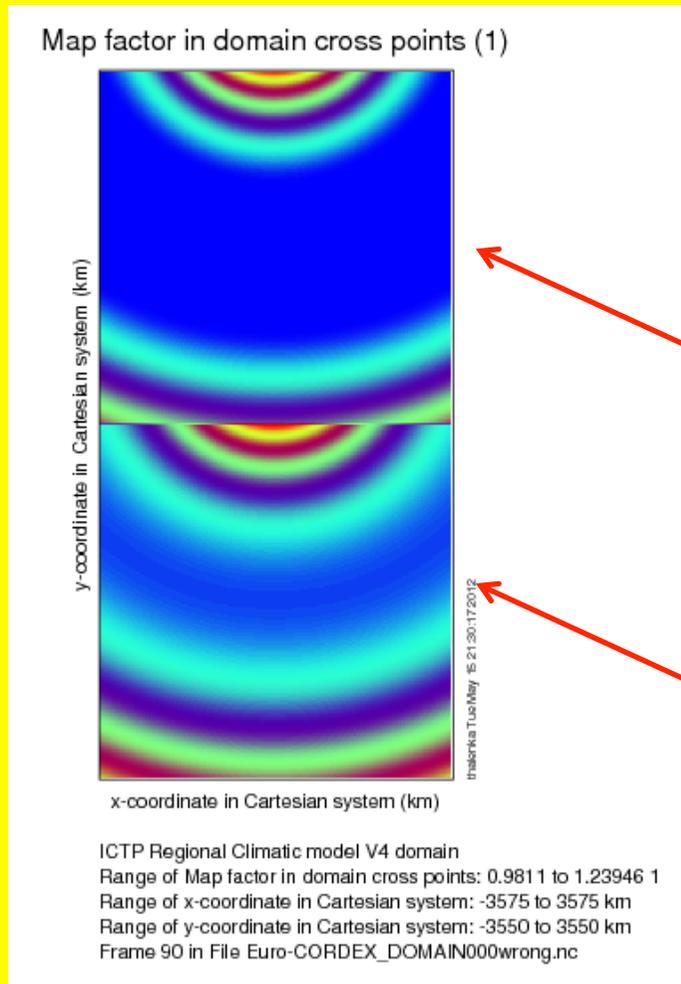
ERA-int

Revisited...

- domain definition
- some model settings

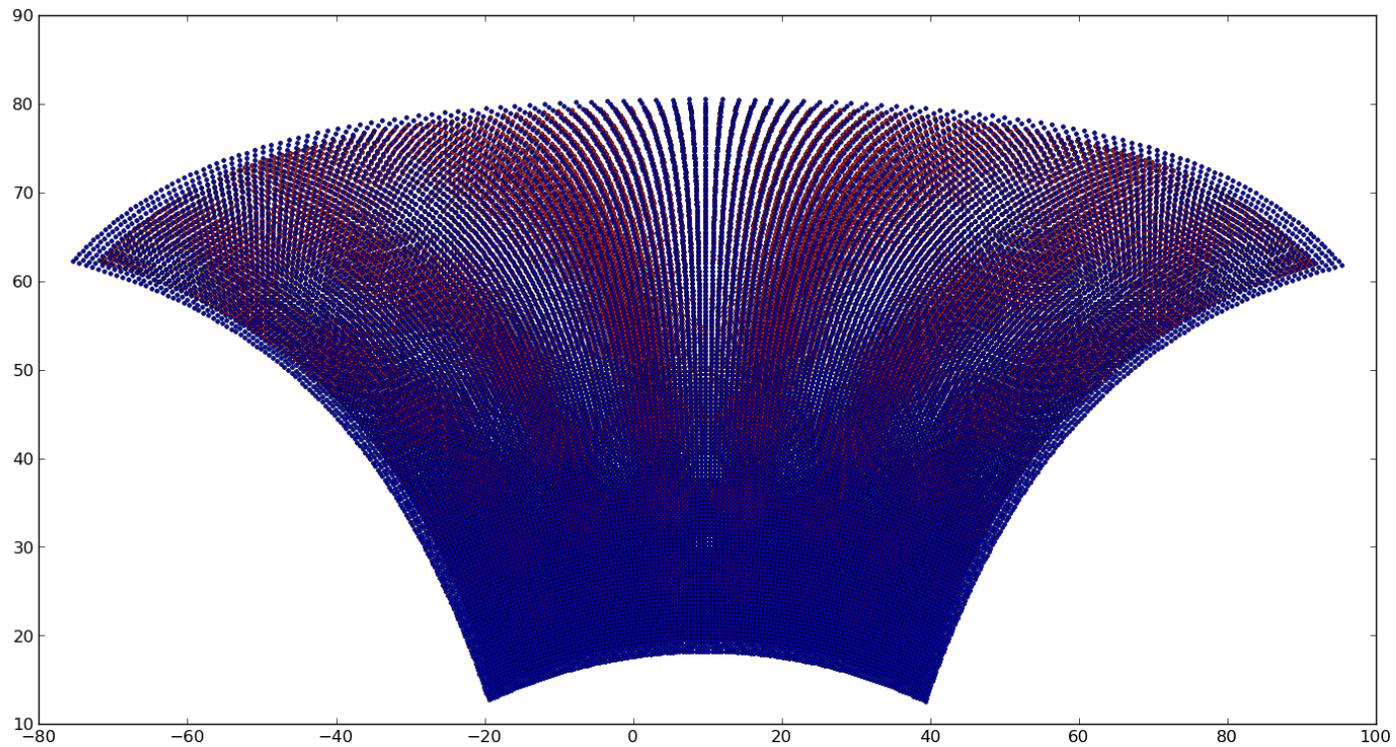
to get comparable to RegCM simulations of
DHMZ for further comparisons and RCM x
GCM models matrices

Domain setting issue

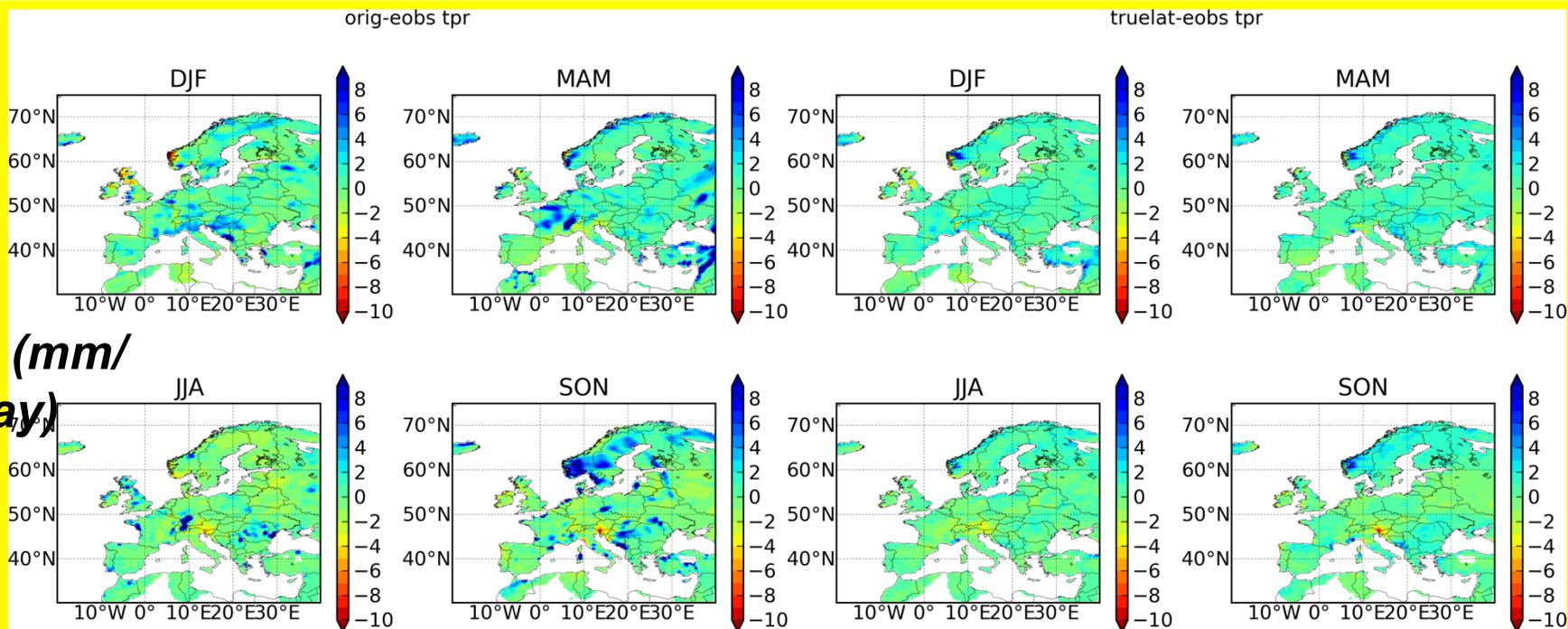


- 144 x 144 grid
- resolution 50 km
- centre 49.68 N, 9.75 E
- truelat 30N, 65N
- original trulats 45N, 55N

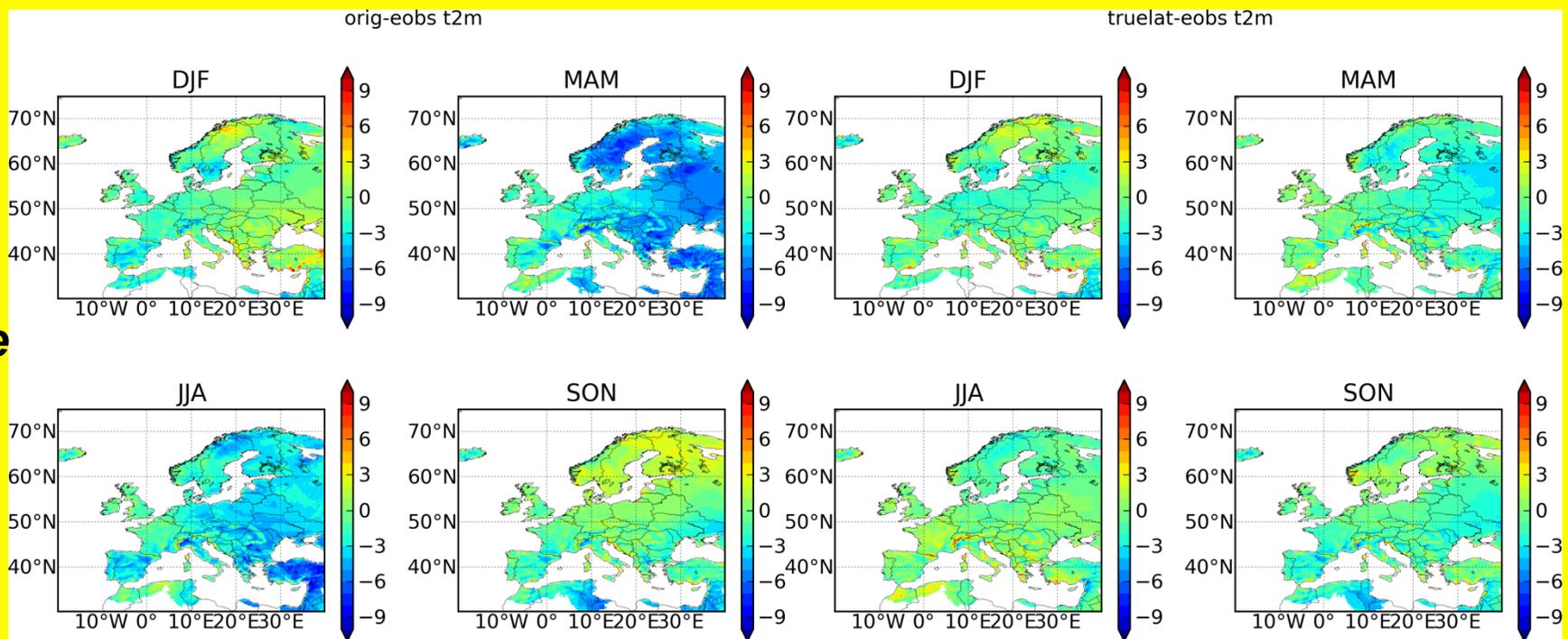
Domain setting issue



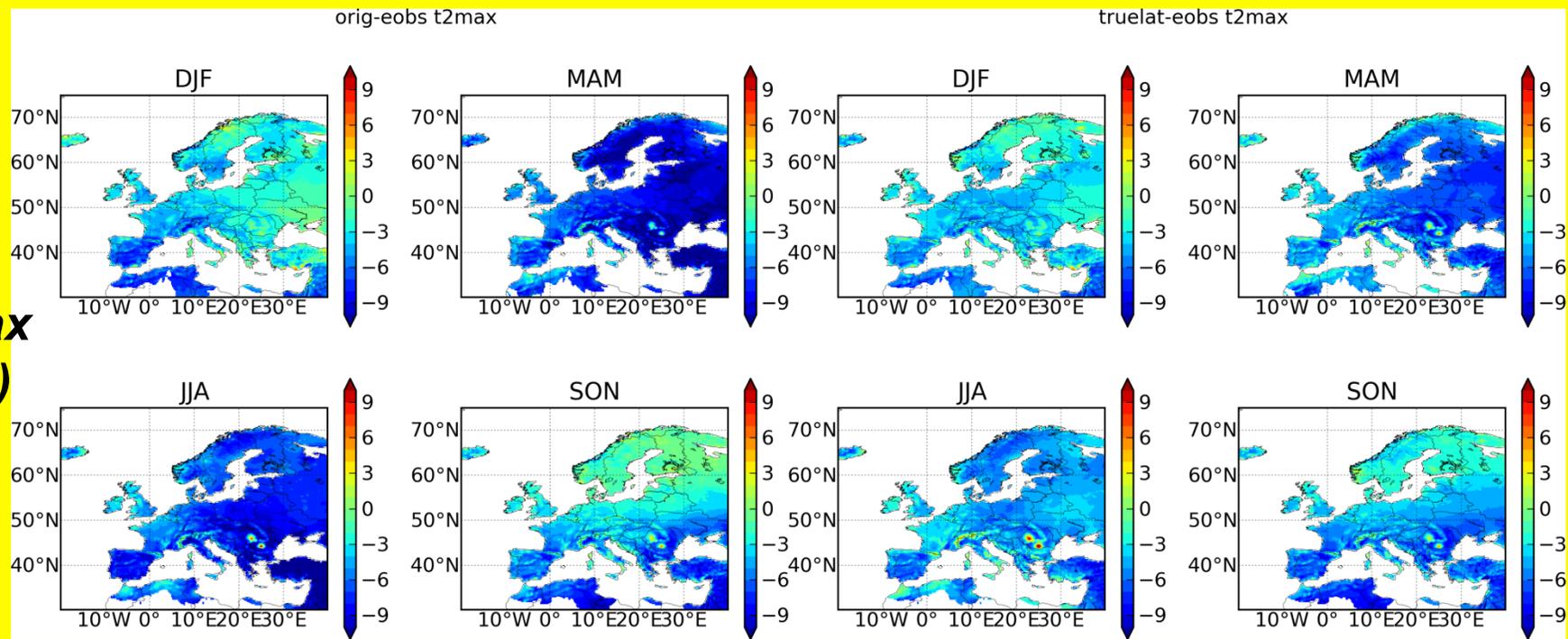
**Prec (mm/
day)**



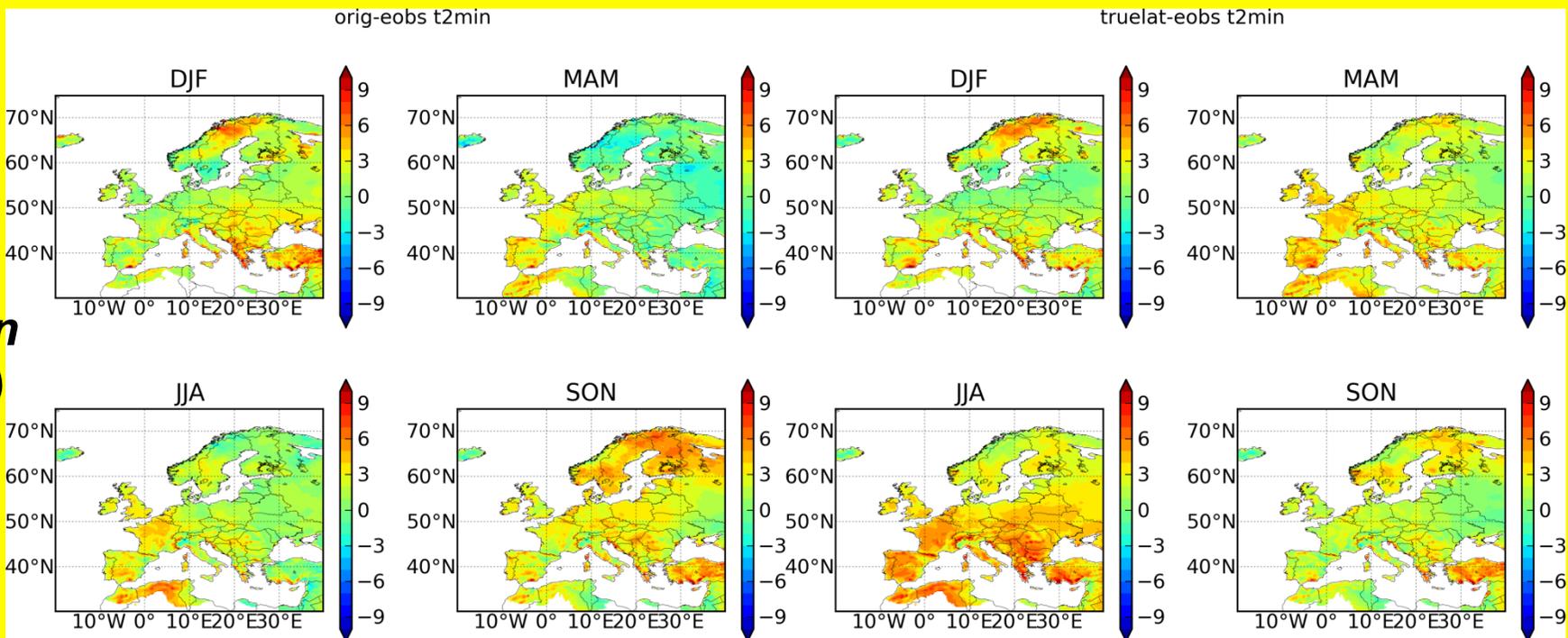
**Tave
(°C)**



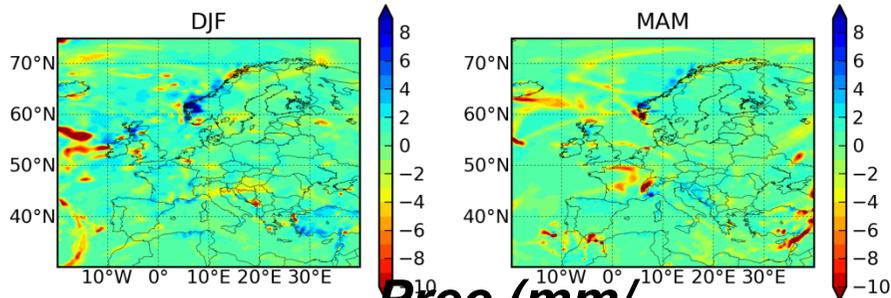
Tmax
(°C)



Tmin
(°C)

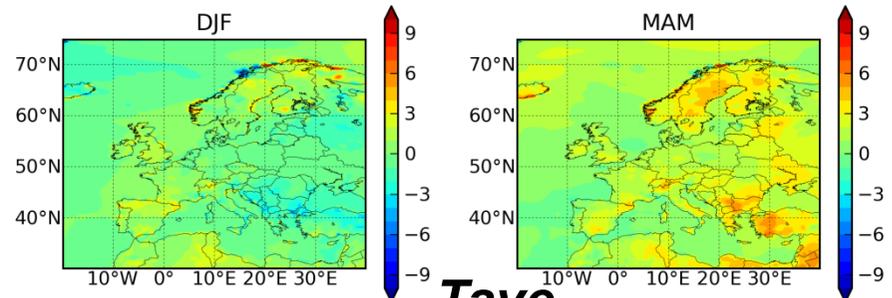


CORDEX_SRF-truelat-orig tpr

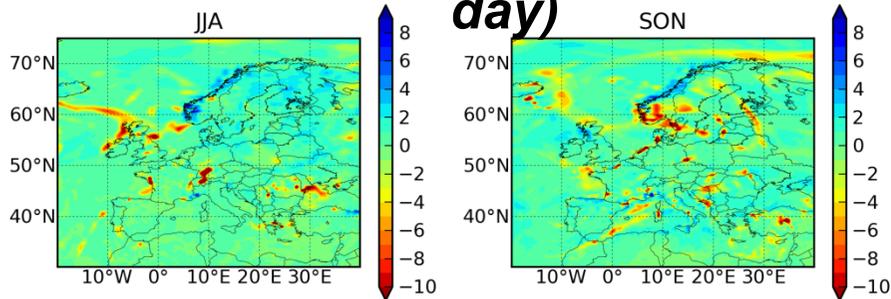


Prec (mm/day)

CORDEX_SRF-truelat-orig t2m

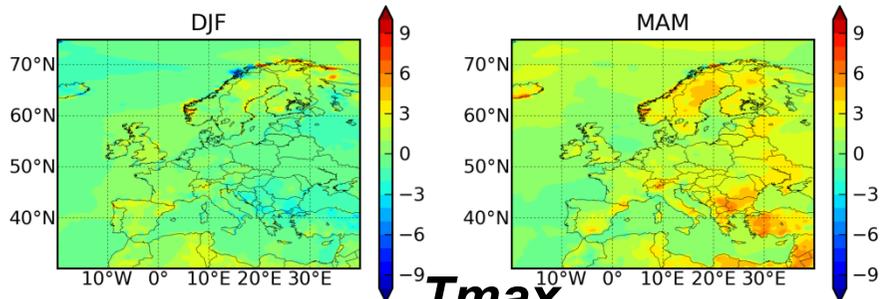


Tave (°C)



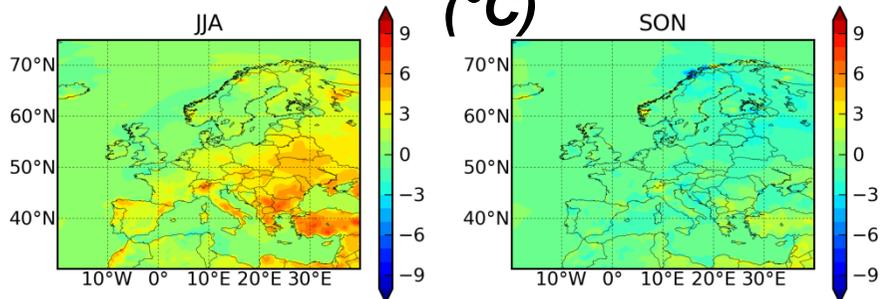
CORDEX_SRF-truelat-orig t2max

CORDEX_SRF-truelat-orig t2min



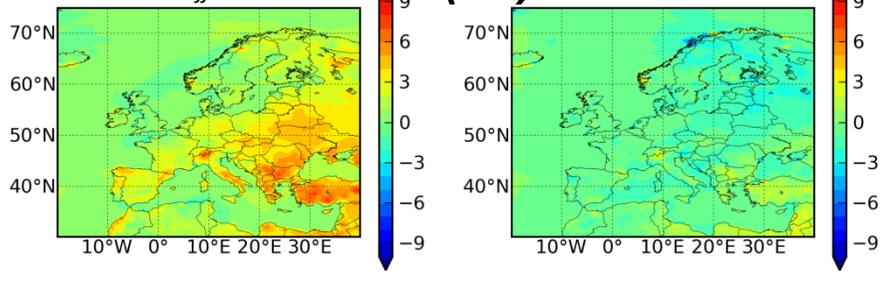
Tmax (°C)

Tmin (°C)



(°C)

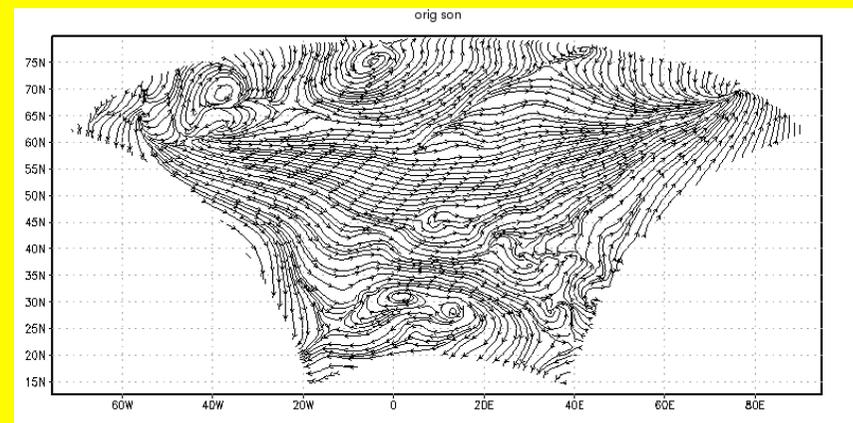
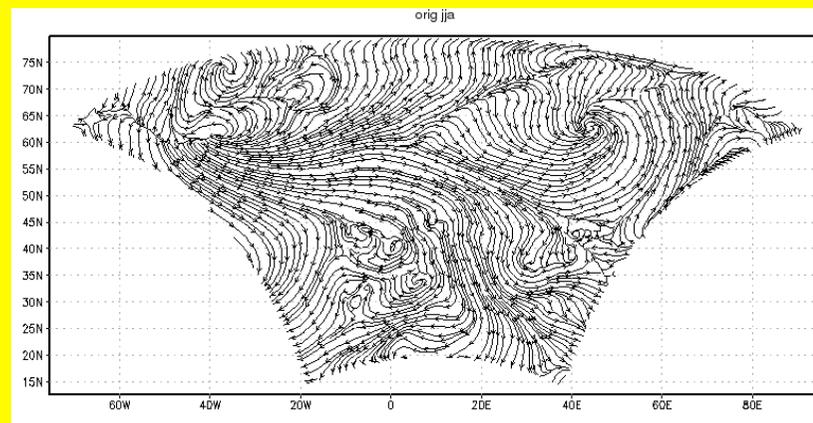
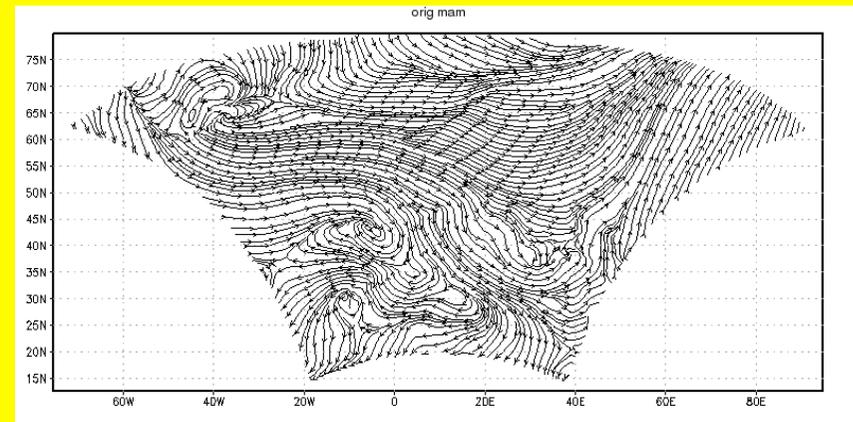
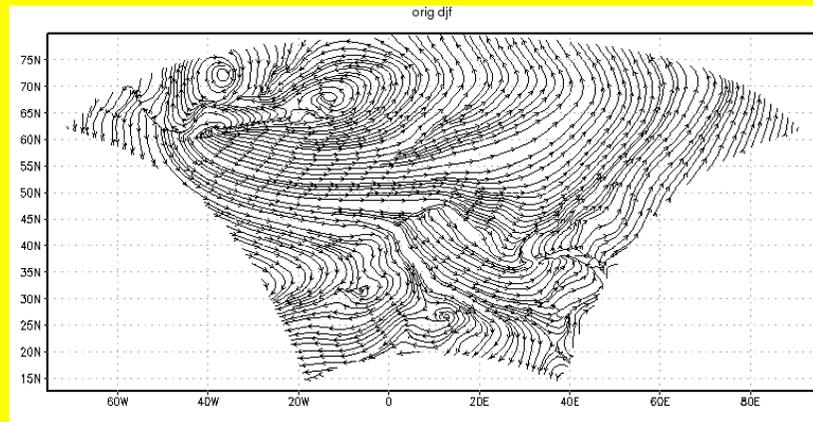
(°C)



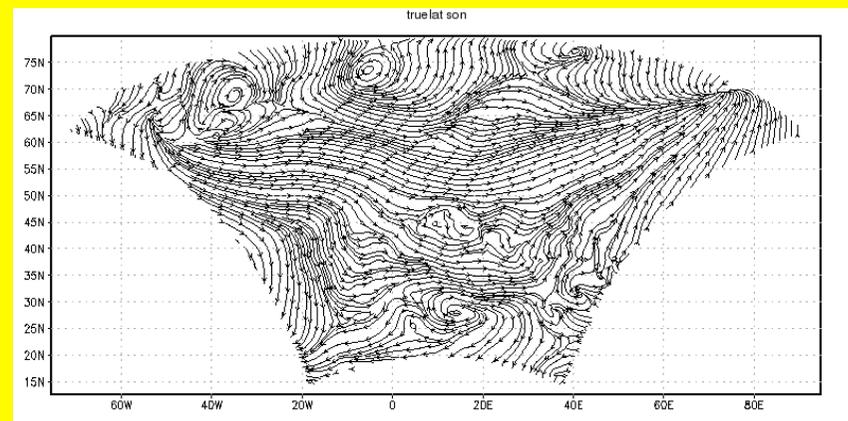
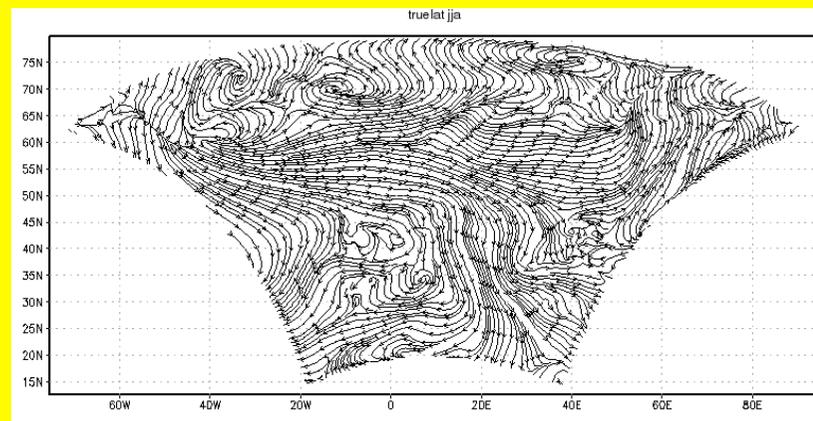
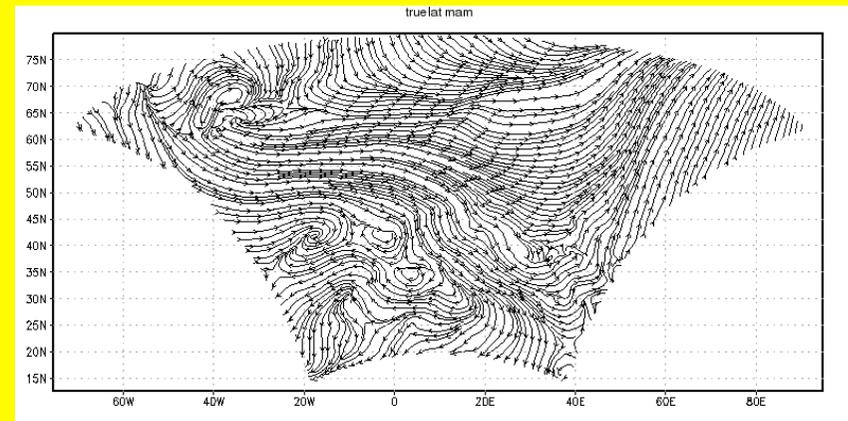
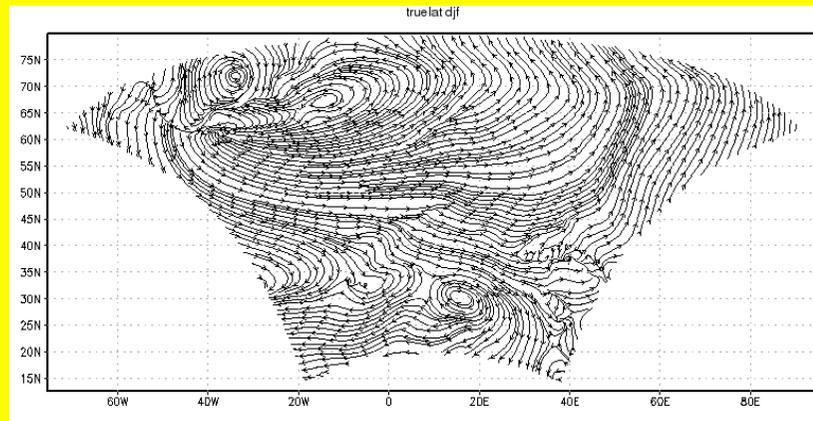
(°C)

(°C)

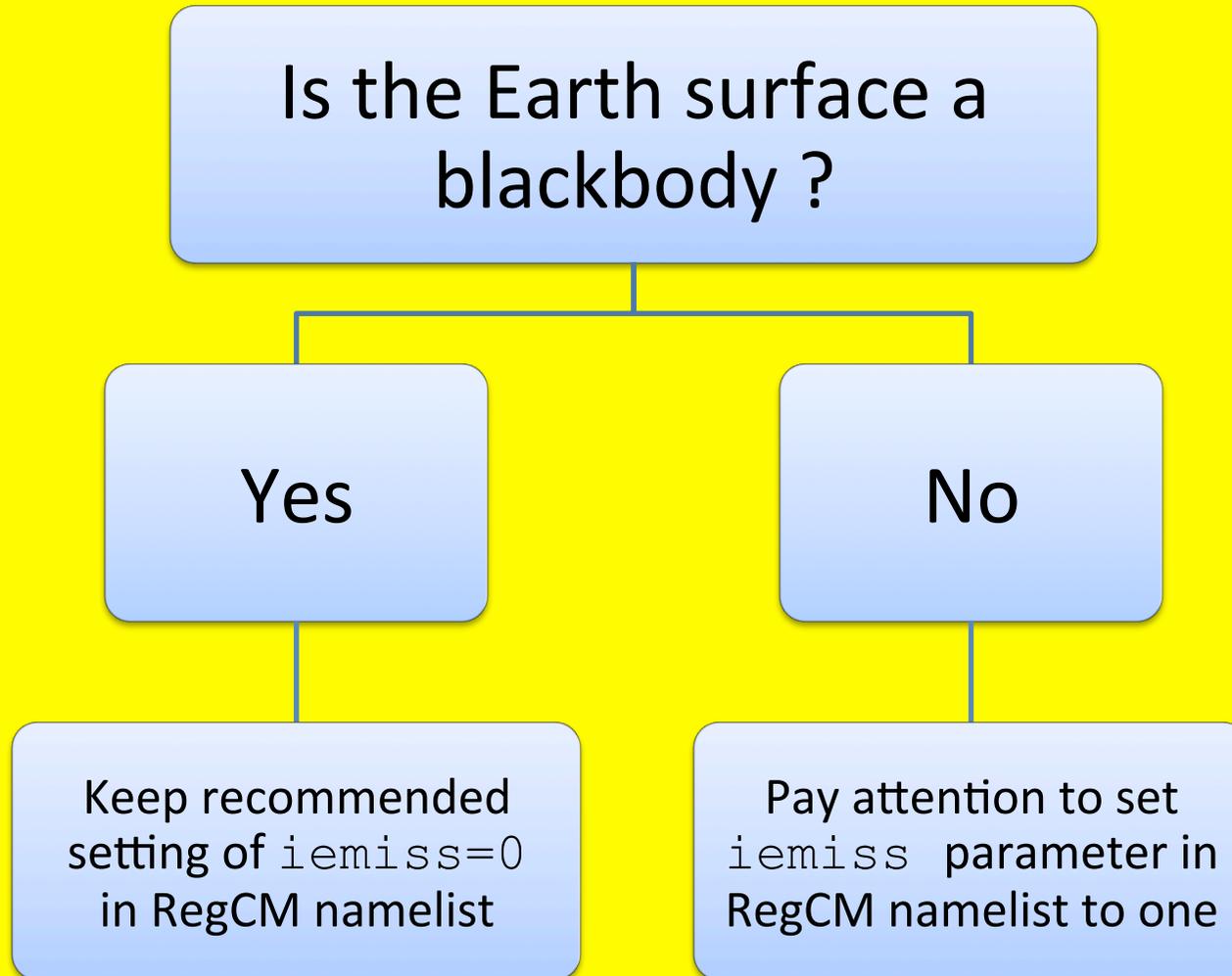
Streamfunctions - original



Streamfunctions – new definition

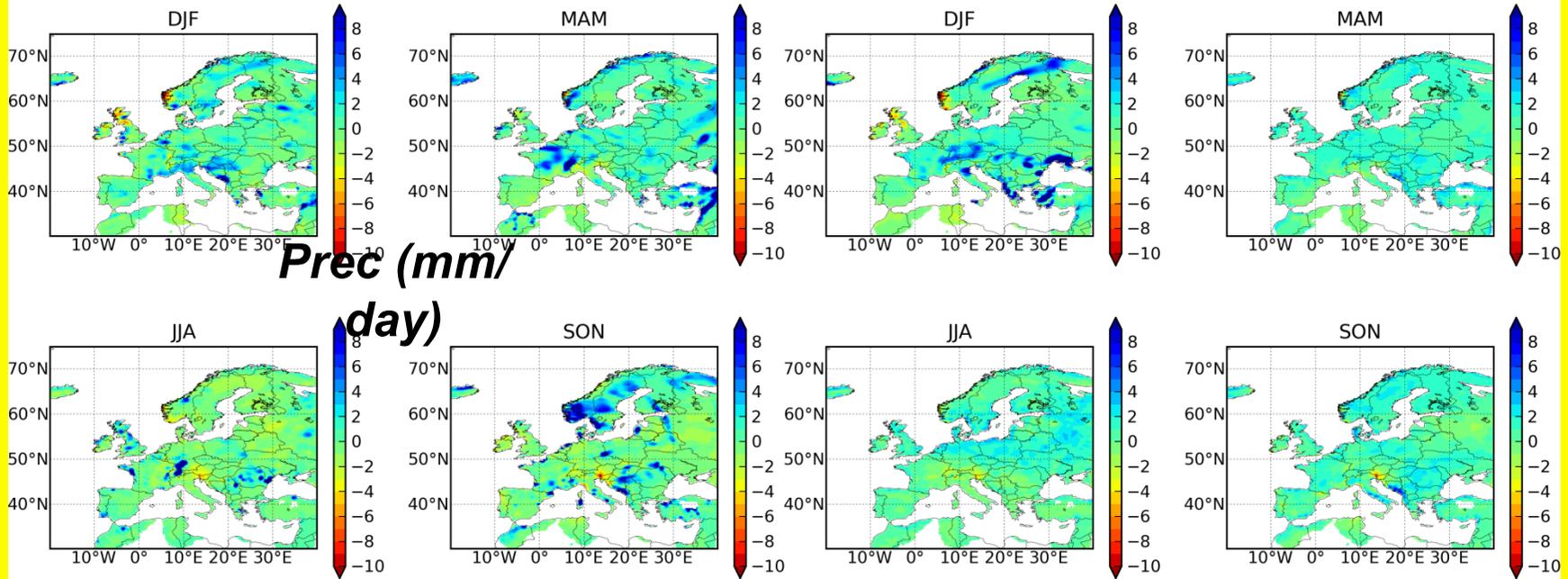


From geometry to physics



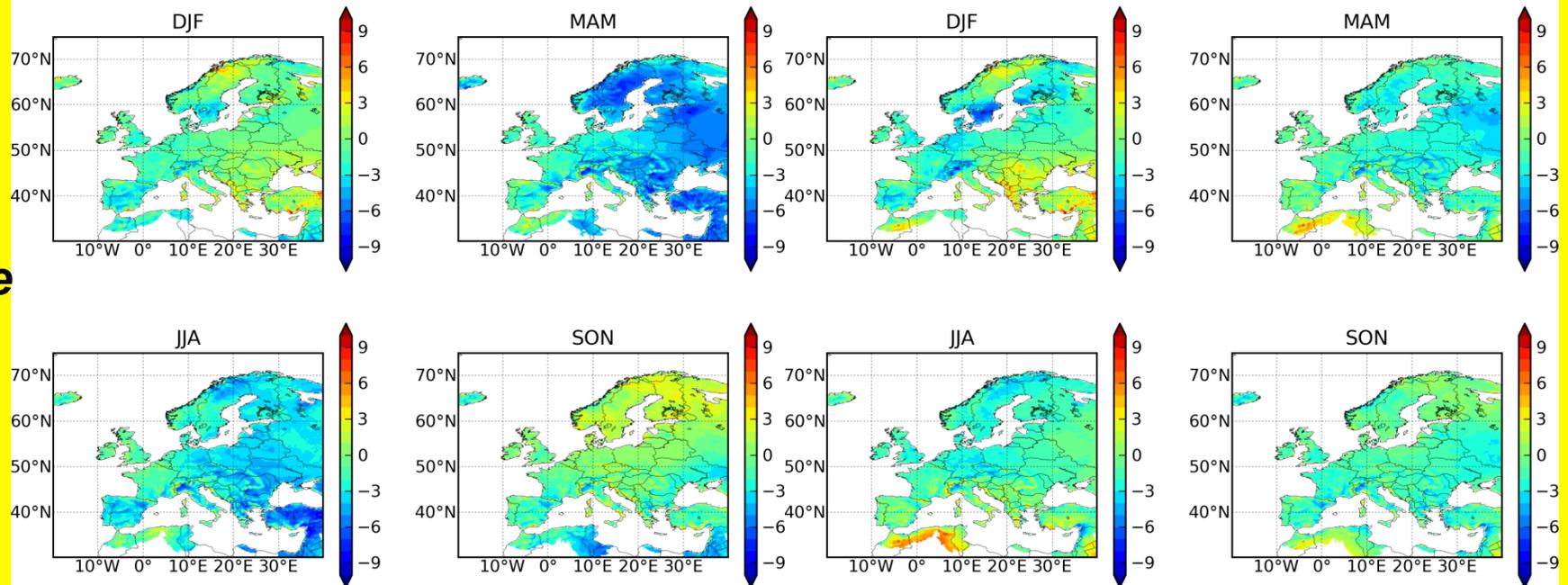
orig-eobs tpr

iemiss-eobs tpr



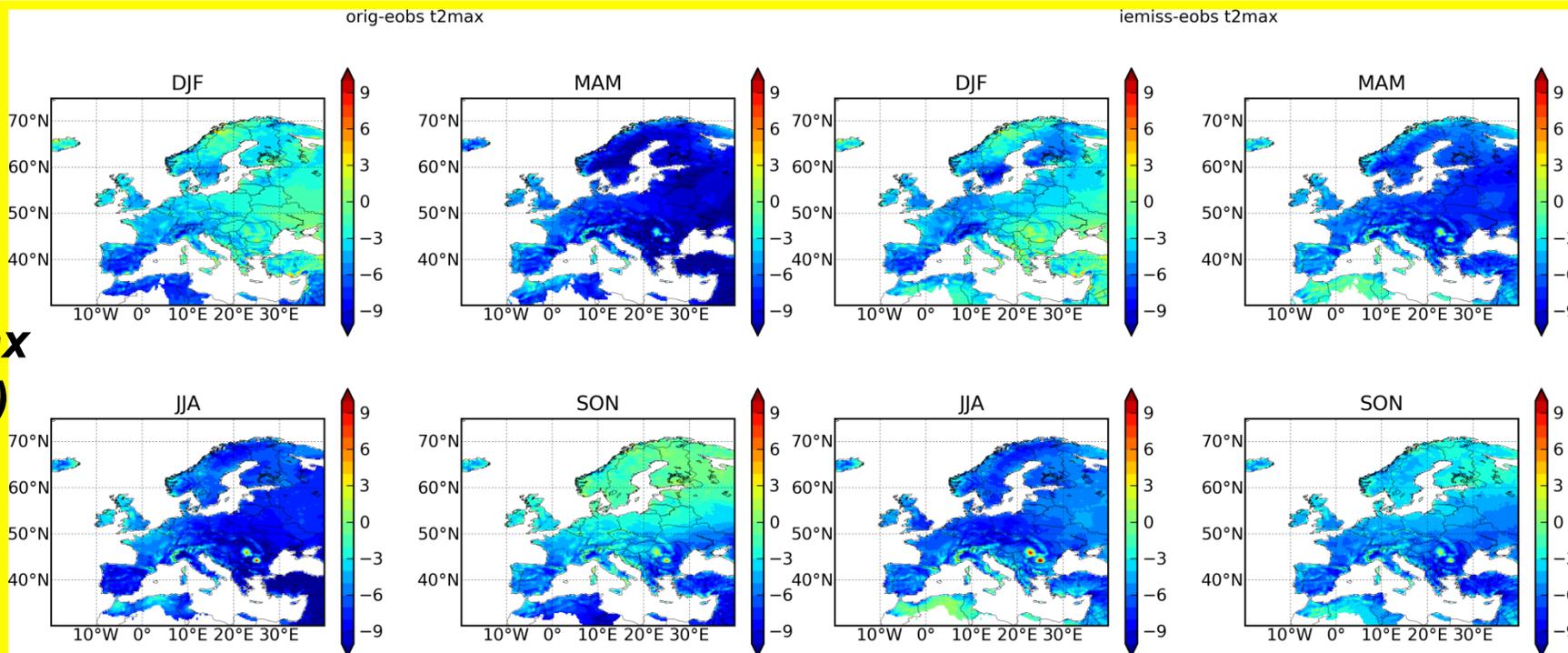
orig-eobs t2m

iemiss-eobs t2m

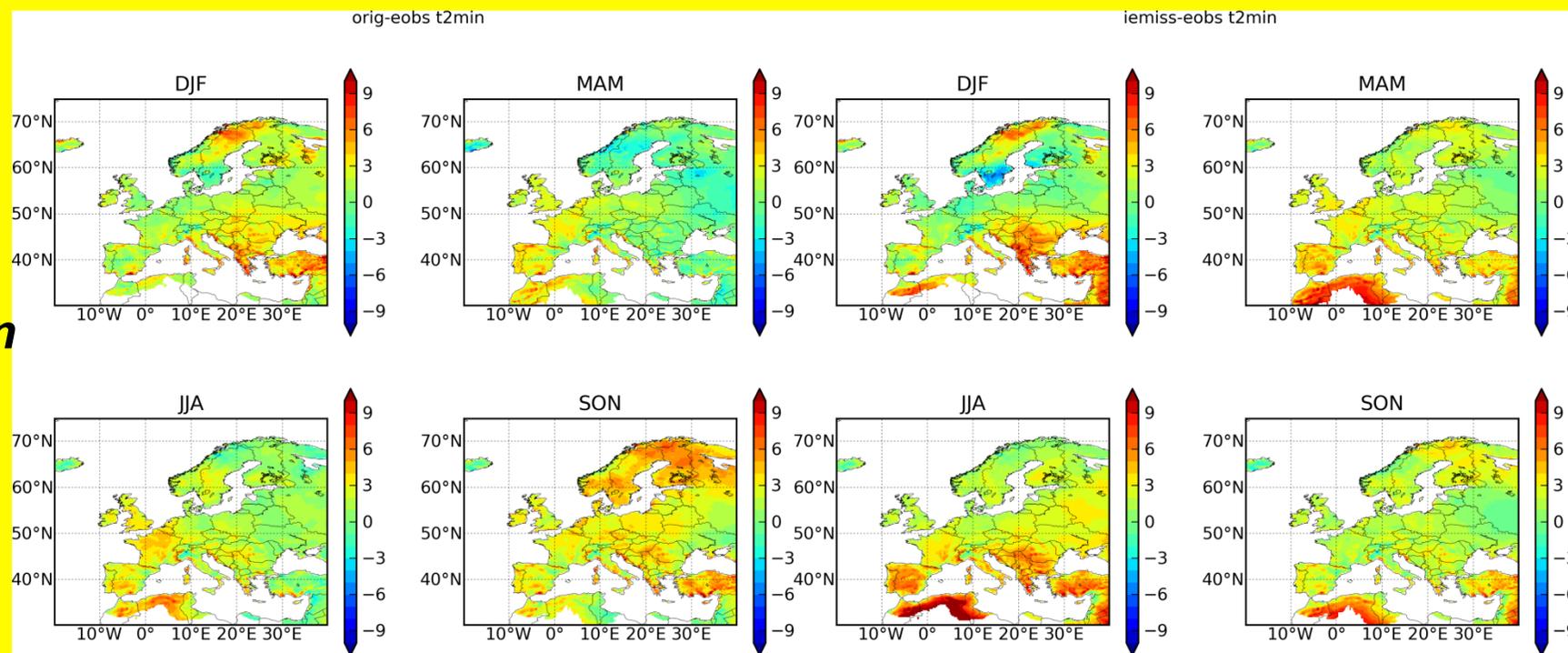


Tave (°C)

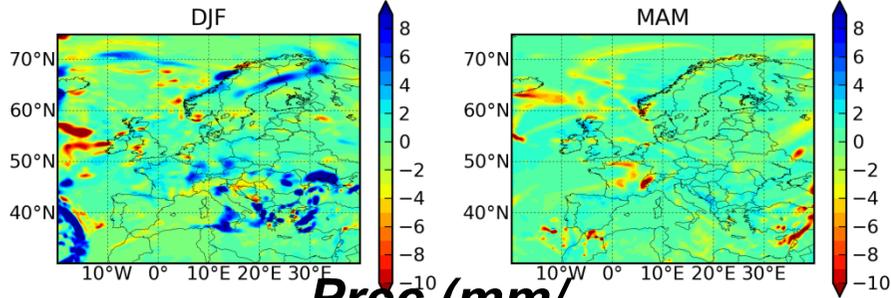
**Tmax
(°C)**



**Tmin
(°C)**

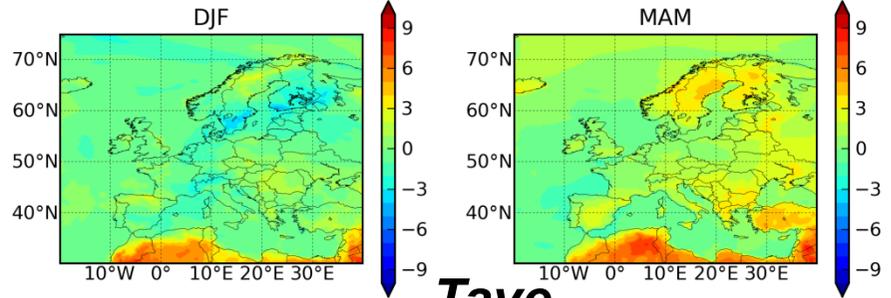


CORDEX_SRF-iemiss-orig tpr

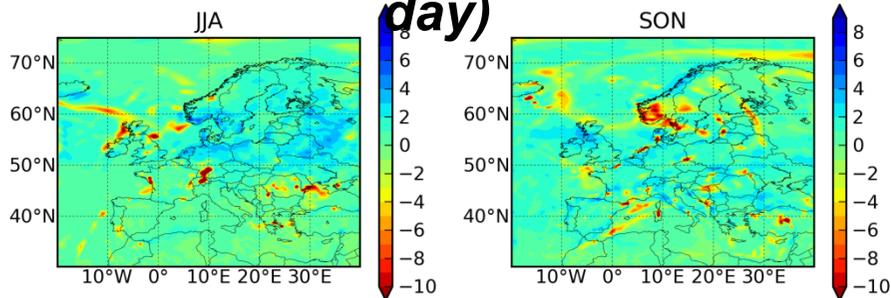


Prec (mm/day)

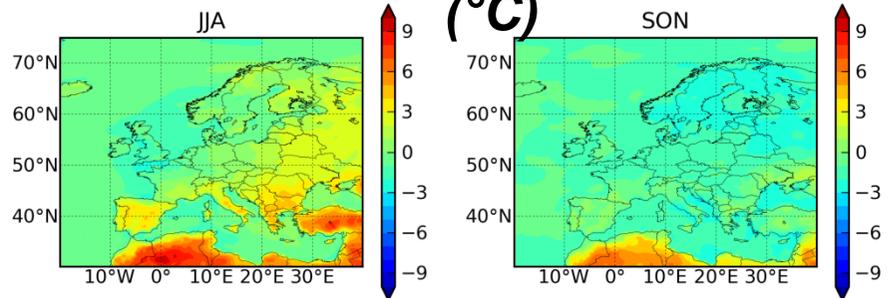
CORDEX_SRF-iemiss-orig t2m



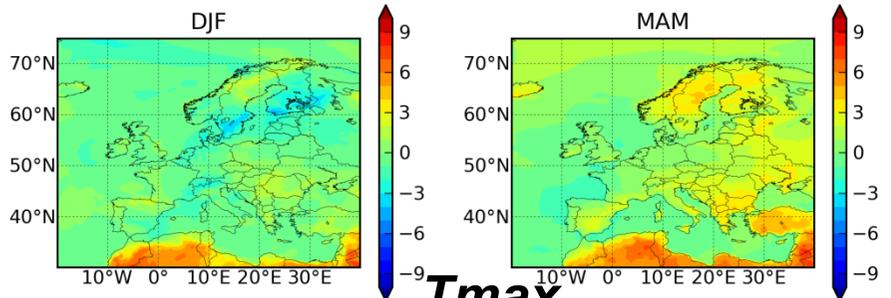
Tave (°C)



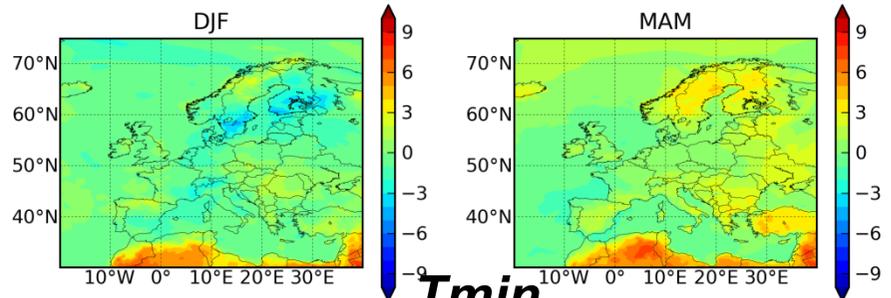
CORDEX_SRF-iemiss-orig t2max



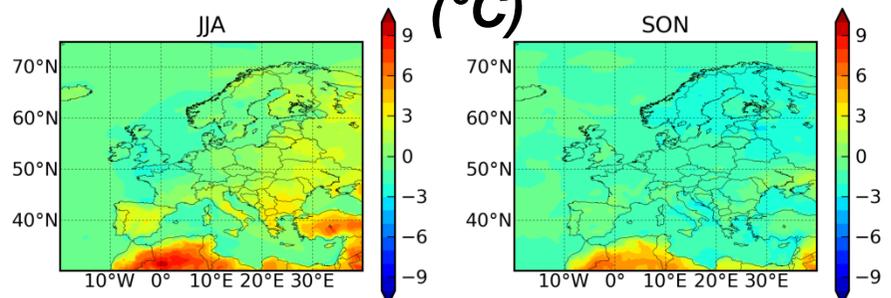
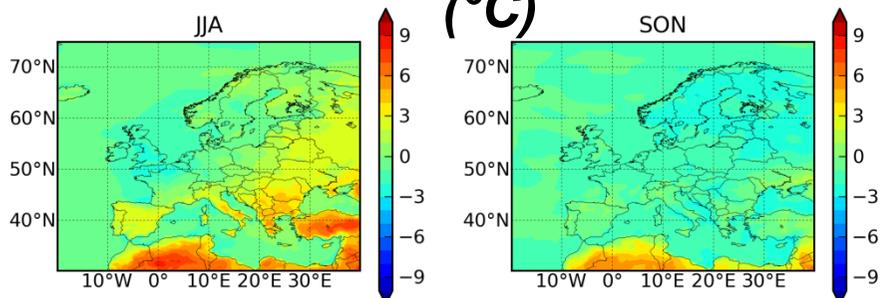
CORDEX_SRF-iemiss-orig t2min



Tmax (°C)



Tmin (°C)



Deeper into reality

Is the LW absorptivity and emissivity unchanged during 18 hours ?

Yes

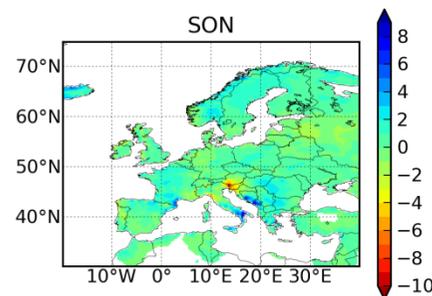
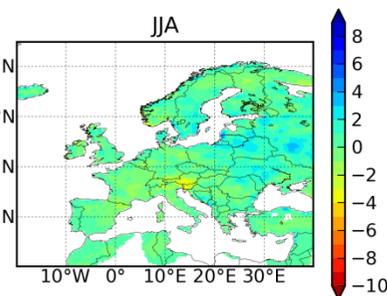
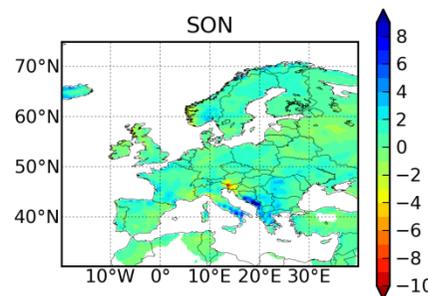
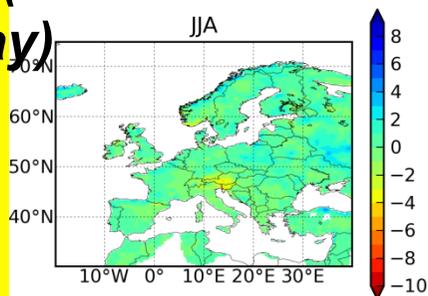
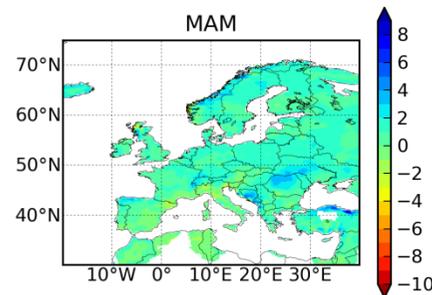
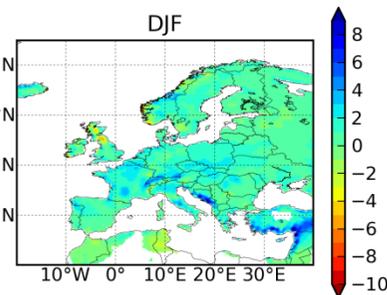
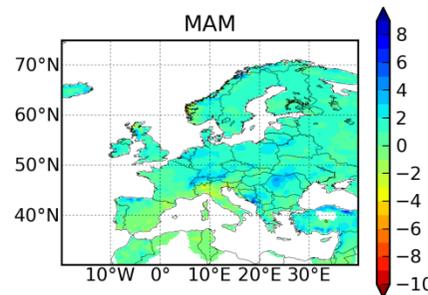
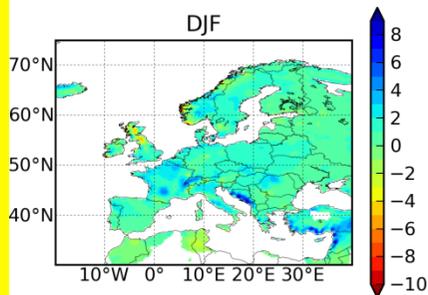
Keep recommended setting
of `dtabem=18` in RegCM
namelist

No

Pay attention to set
parameter `dtabem` in
RegCM namelist accordingly

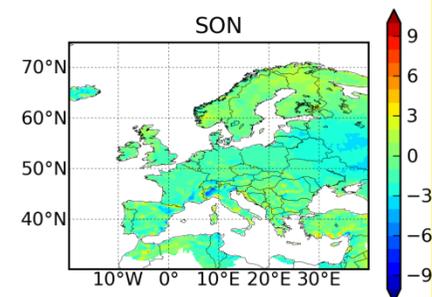
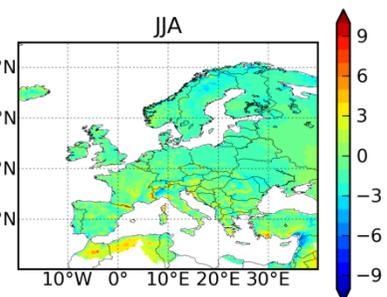
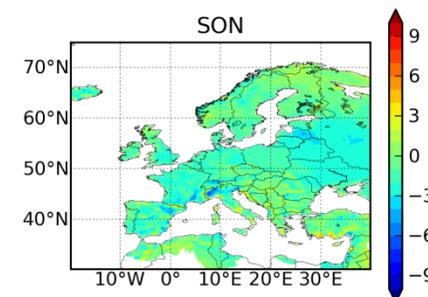
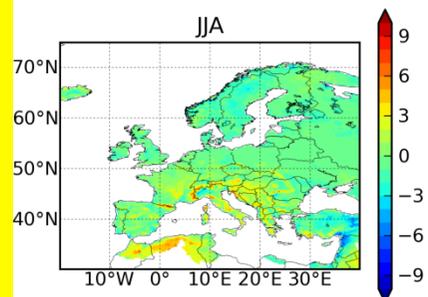
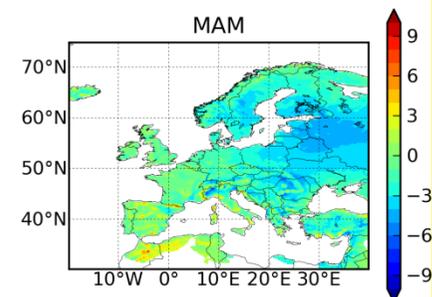
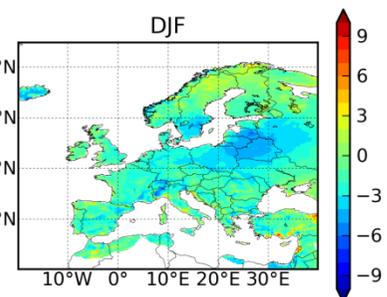
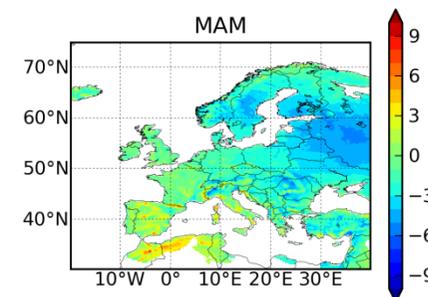
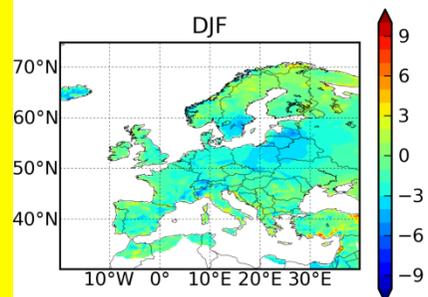
**Prec (mm/
day)**

Euro-CORDEX-18-EOBS_STS pcpavg



**Tave
(°C)**

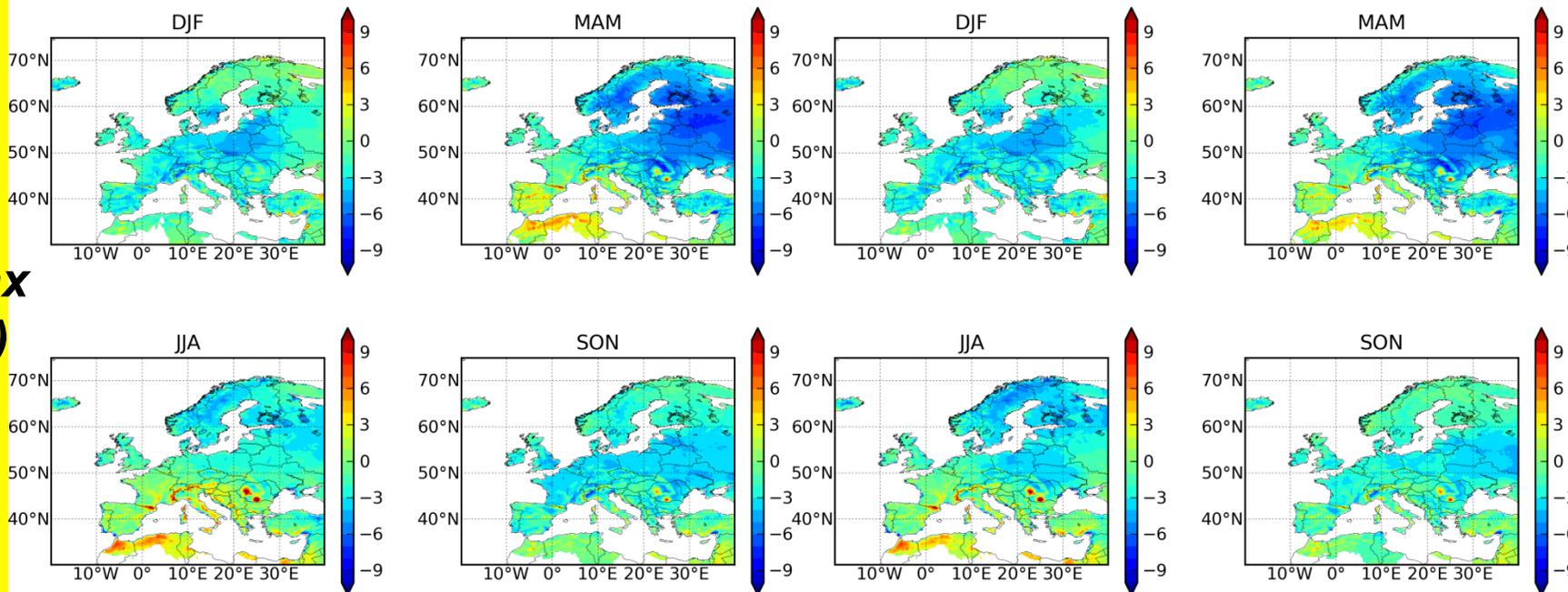
Euro-CORDEX-18-EOBS_STS t2avg



Euro-CORDEX-18-EOBS_STS t2max

Euro-CORDEX-3-EOBS_STS t2max

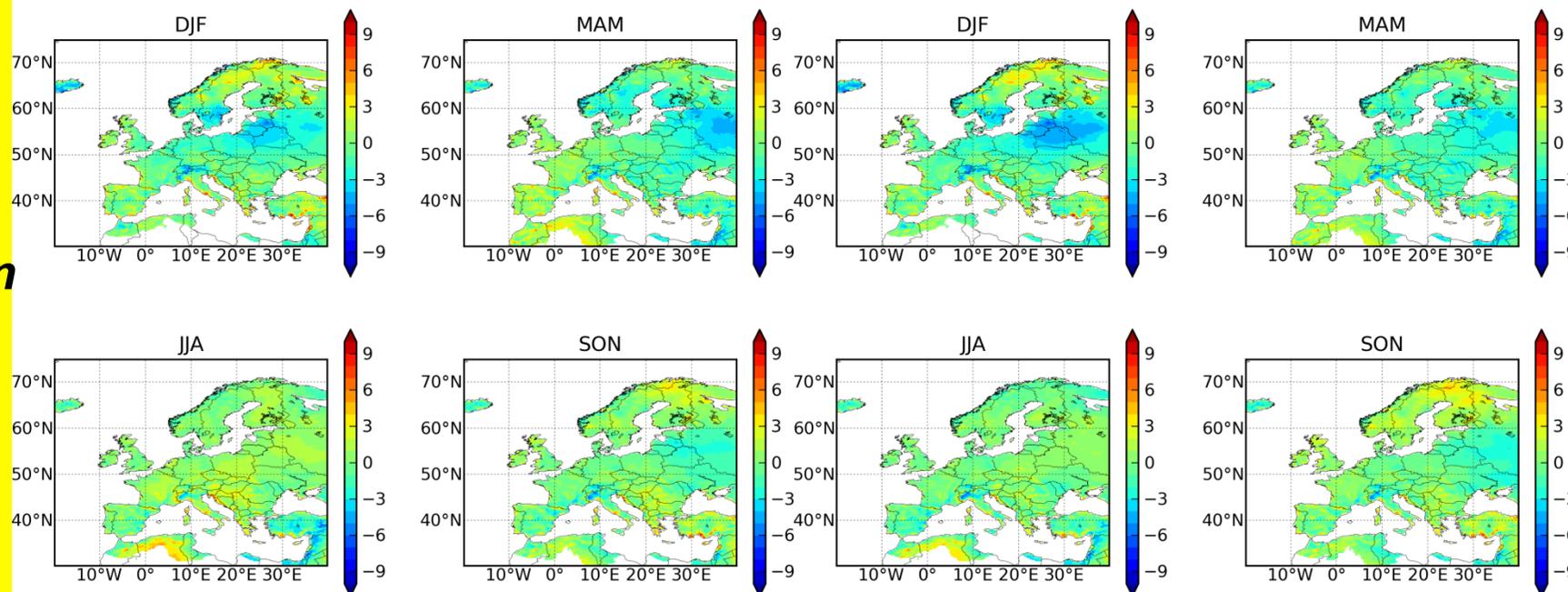
Tmax
(°C)



Euro-CORDEX-18-EOBS_STS t2min

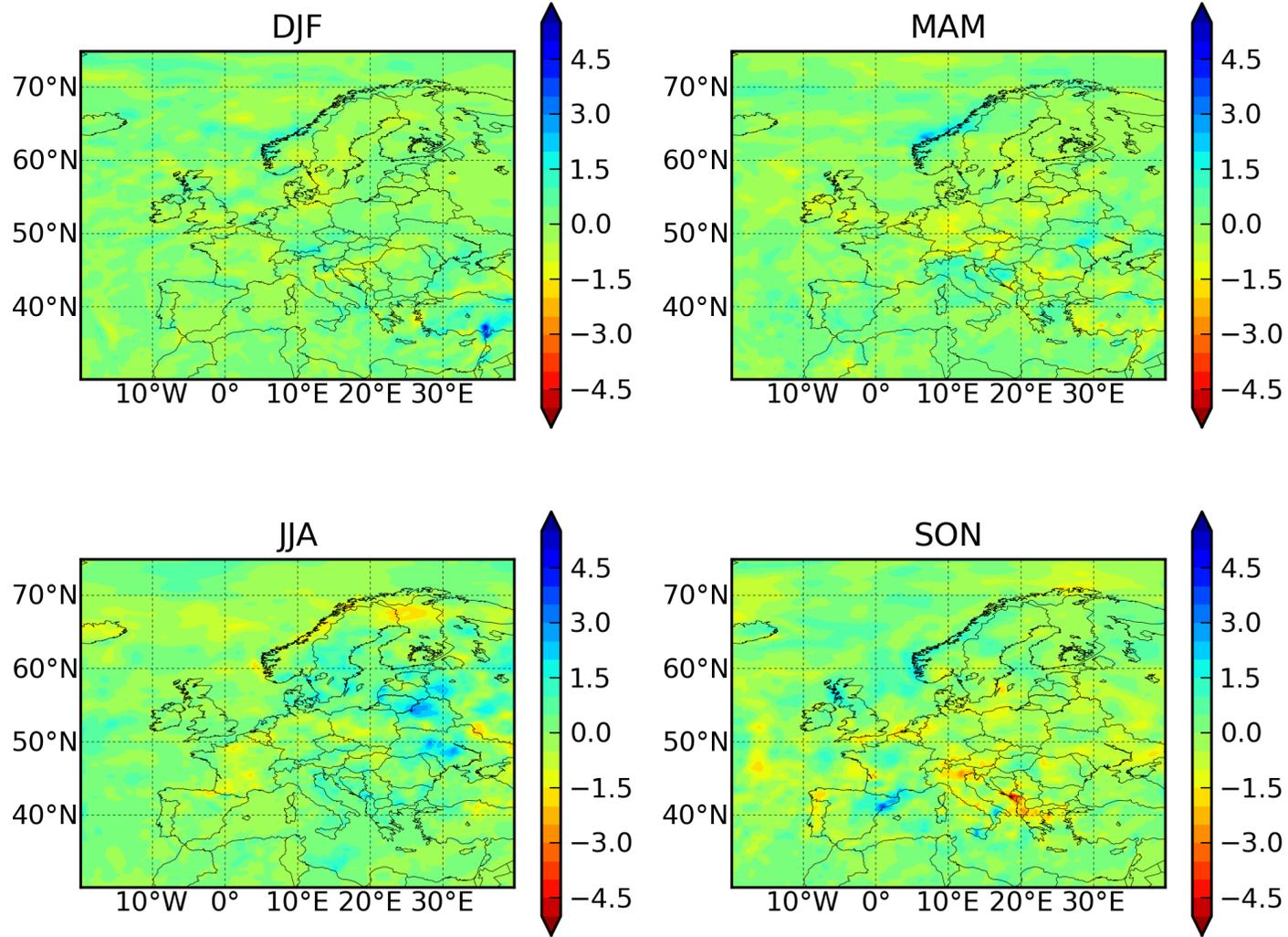
Euro-CORDEX-3-EOBS_STS t2min

Tmin
(°C)



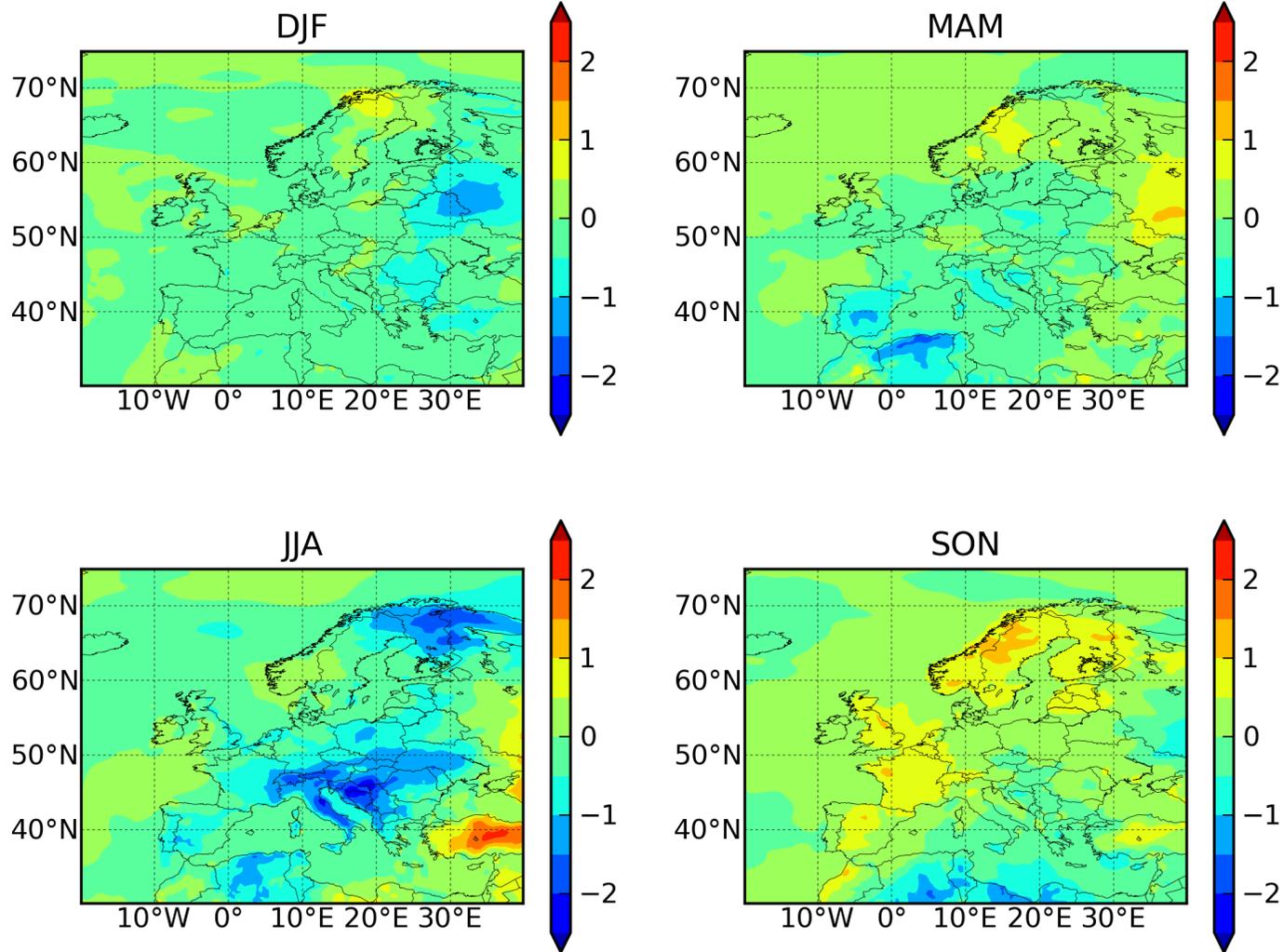
Difference 3 – 18 PREC

Euro-CORDEX-3-18 pcpavg



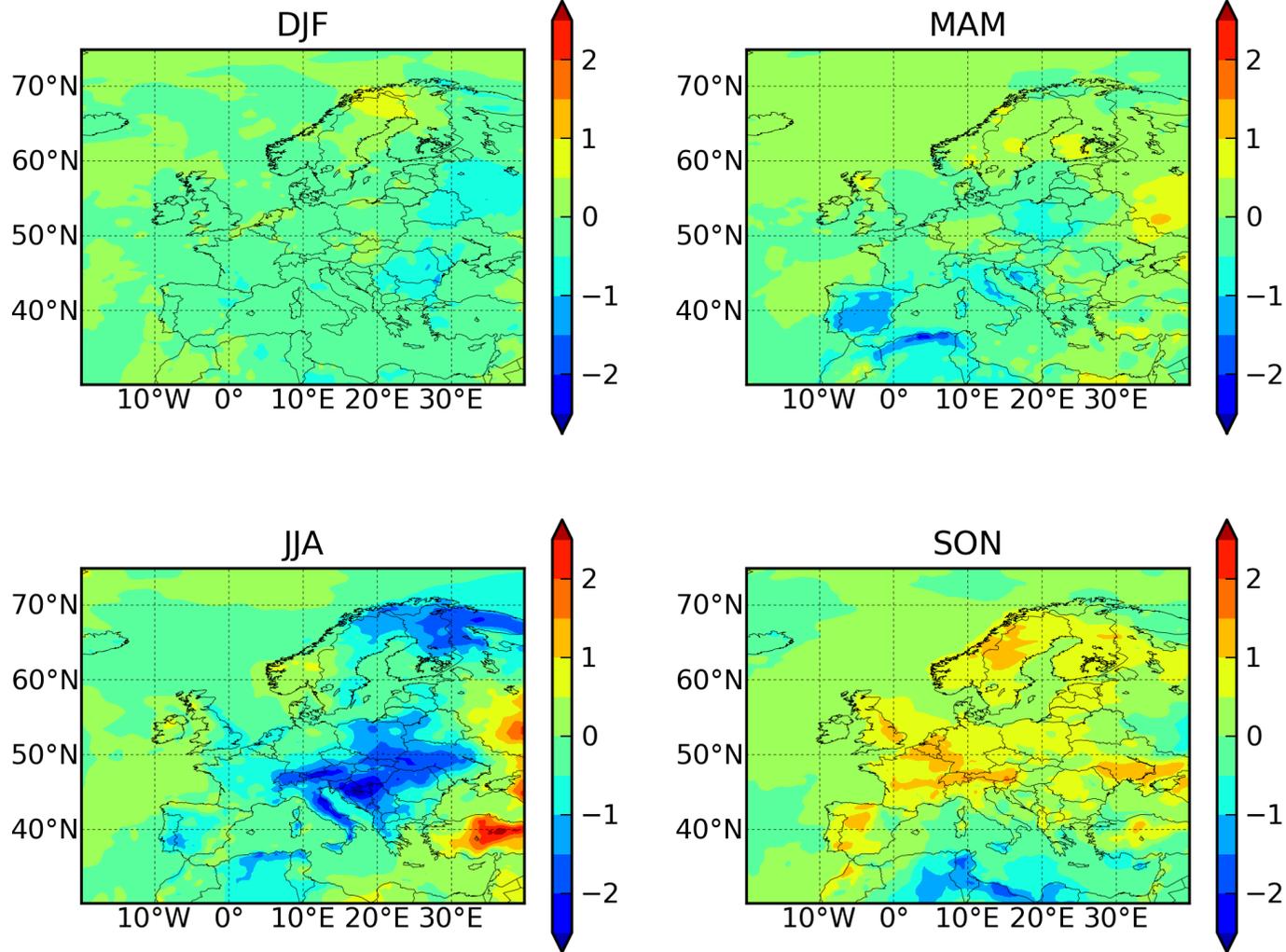
Difference 3 – 18 TAVE

Euro-CORDEX-3-18 t2avg



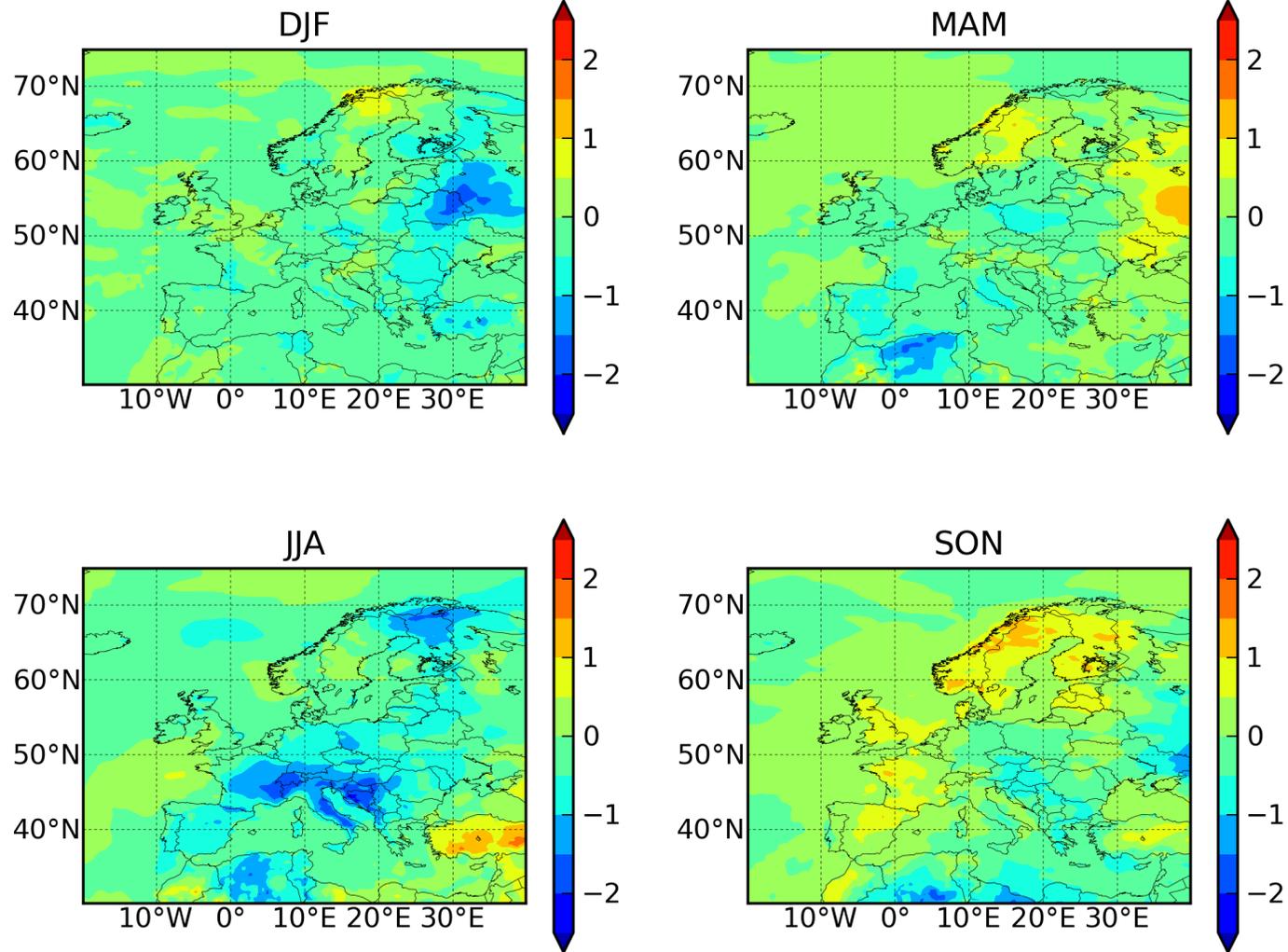
Difference 3 – 18 TMAX

Euro-CORDEX-3-18 t2max

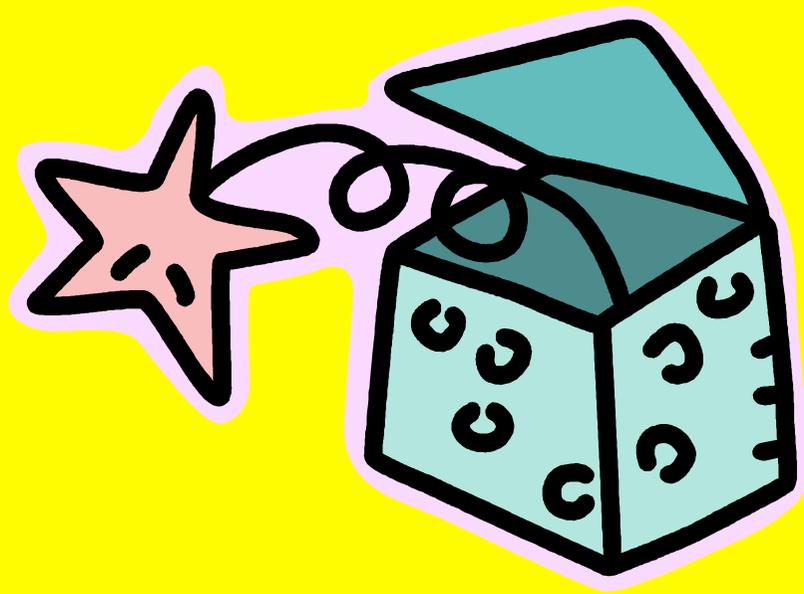


Difference 3 – 18 TMIN

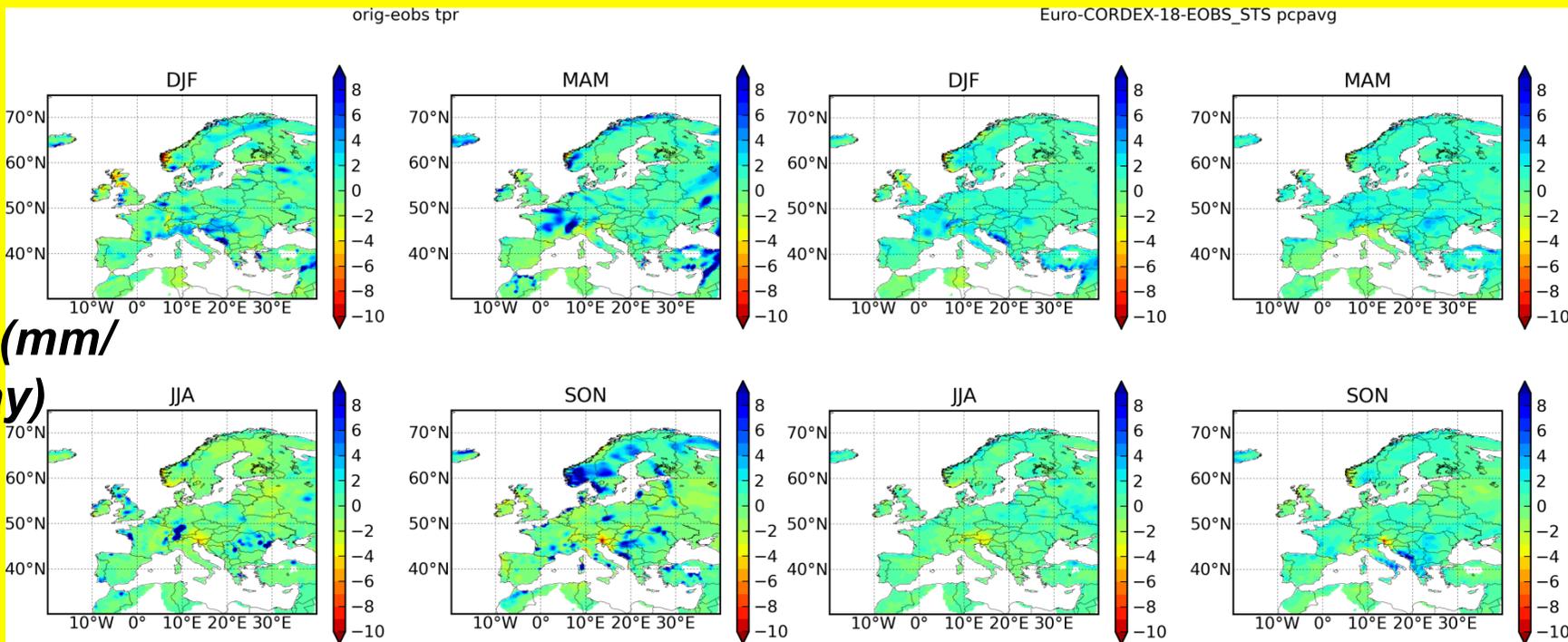
Euro-CORDEX-3-18 t2min



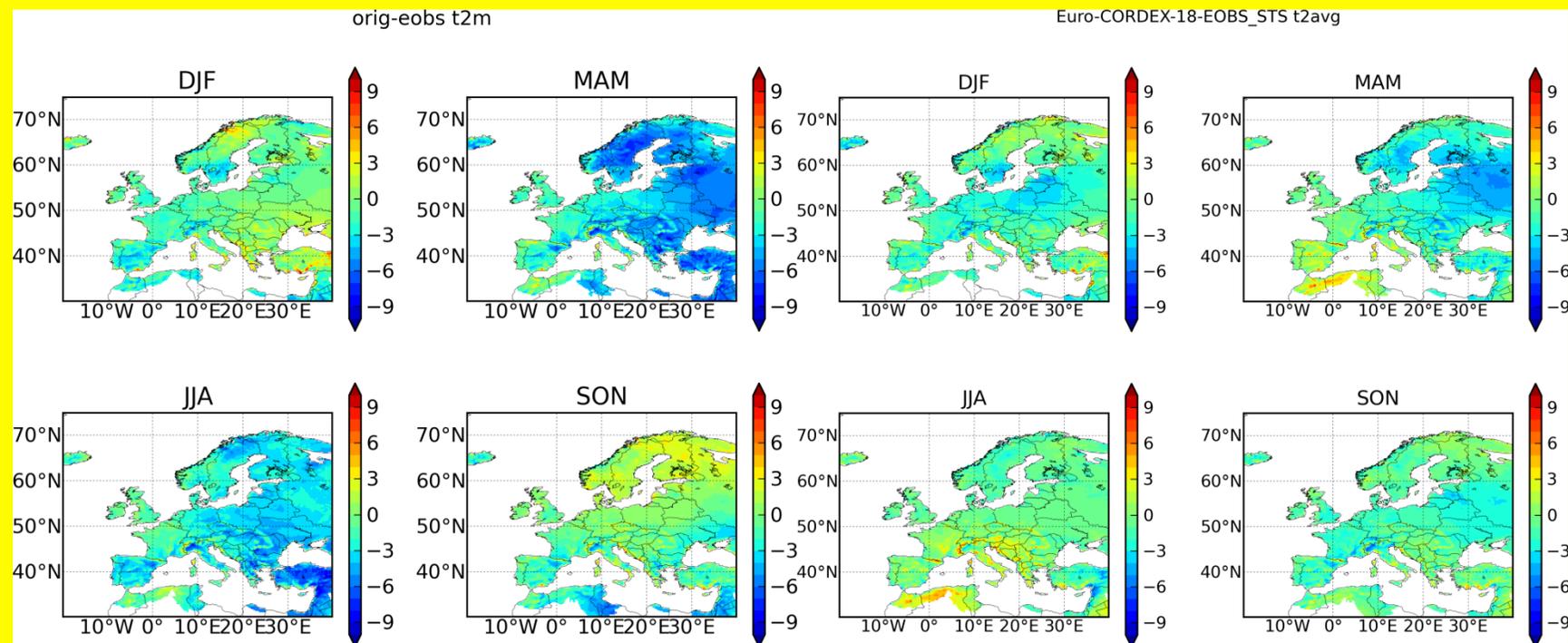
Finally ...



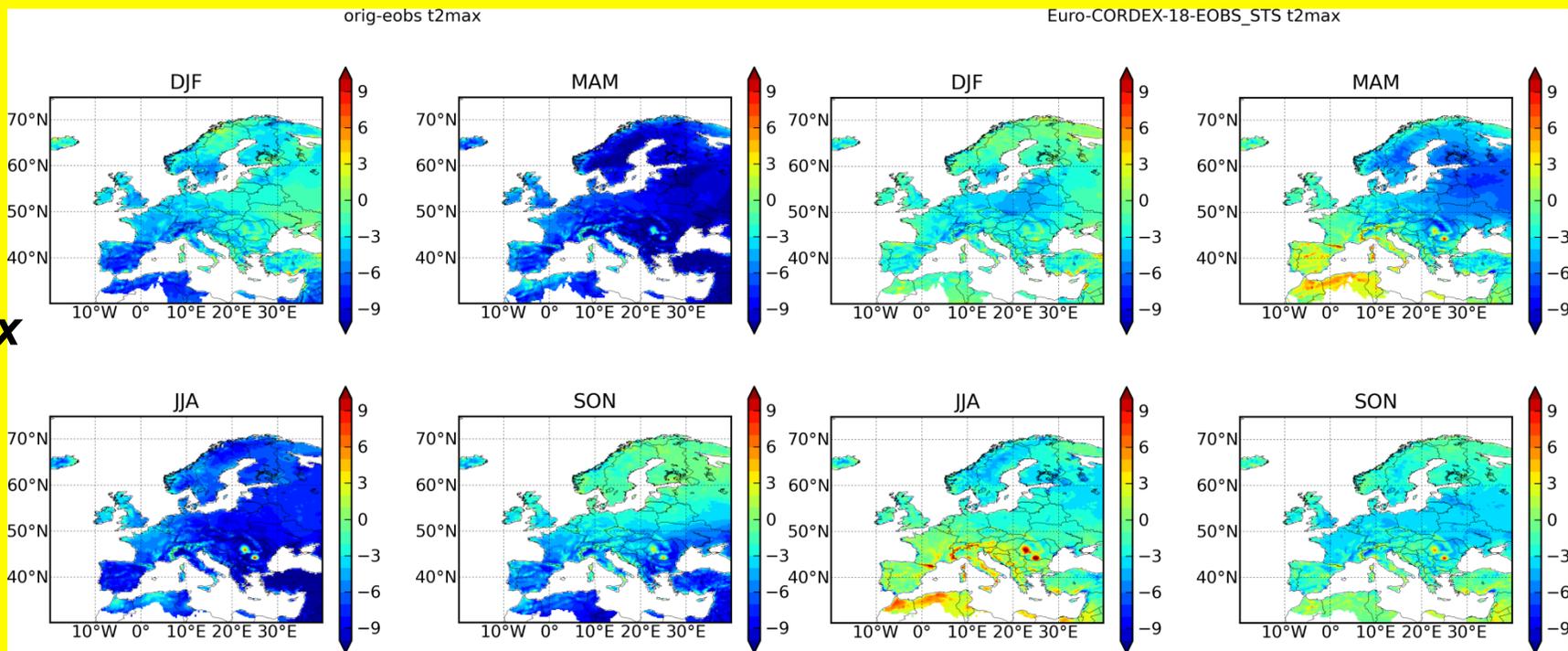
**Prec (mm/
day)**



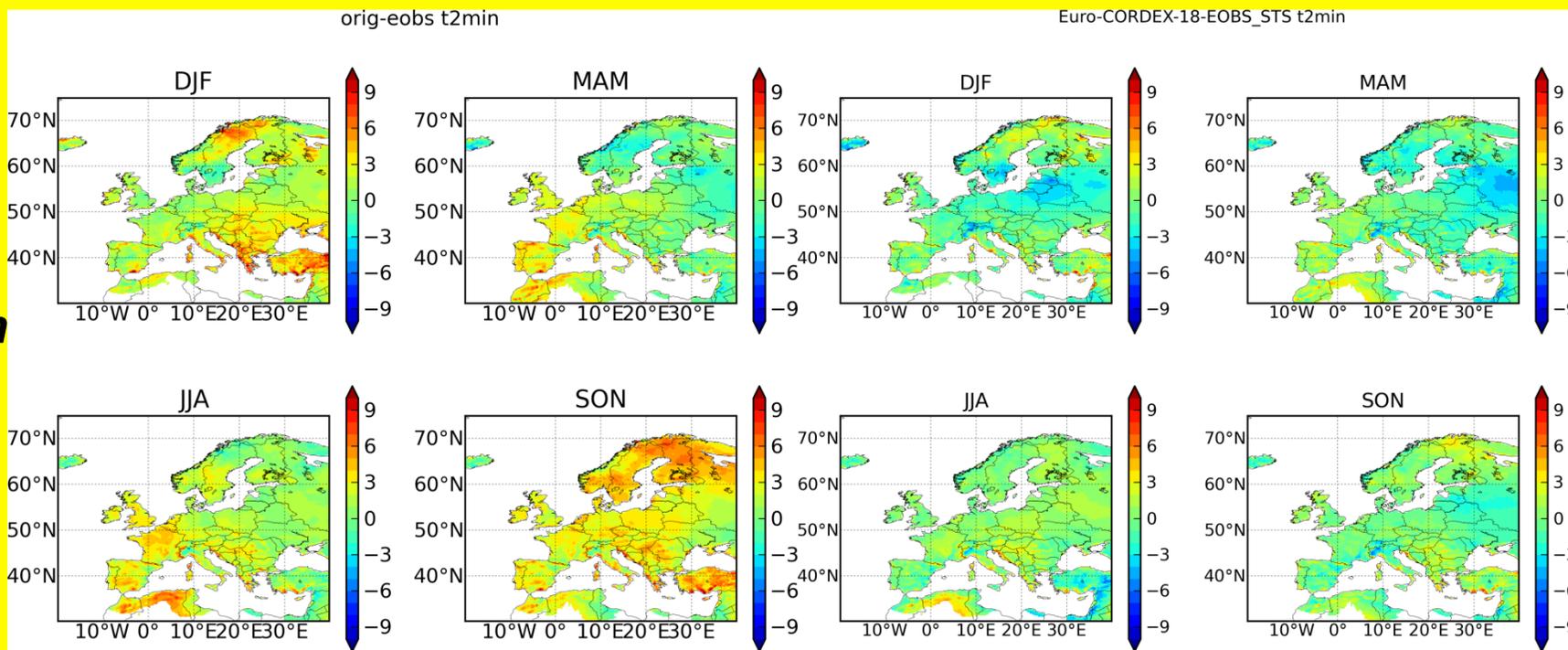
**Tave
(°C)**



Tmax
(°C)



Tmin
(°C)



Summary

- Be careful with domain settings and projection definitions
- Try to keep the model settings as close as possible to the reality – physical constants, empirical parameters etc.
- Physically the best (correct) benchmark

Outlooks, options

- Complete the long tests till 2008 (E-OBS)
- More tests for RegCM4.2 (RegCM4.3?)
- More detailed statistical analysis (regions, higher statistics)
- Scenarios – ECHAM?, ARPEGE!?

Thanks for your attention!

