



Koninklijk Nederlands
Meteorologisch Instituut
Ministerie van Infrastructuur en Milieu

Climate indices and UERRA validation

UERRA GA5 & evaluation workshop

Else van den Besselaar & Gerard van der
Schrier

Introduction



What datasets and metrics did we use

Observational dataset

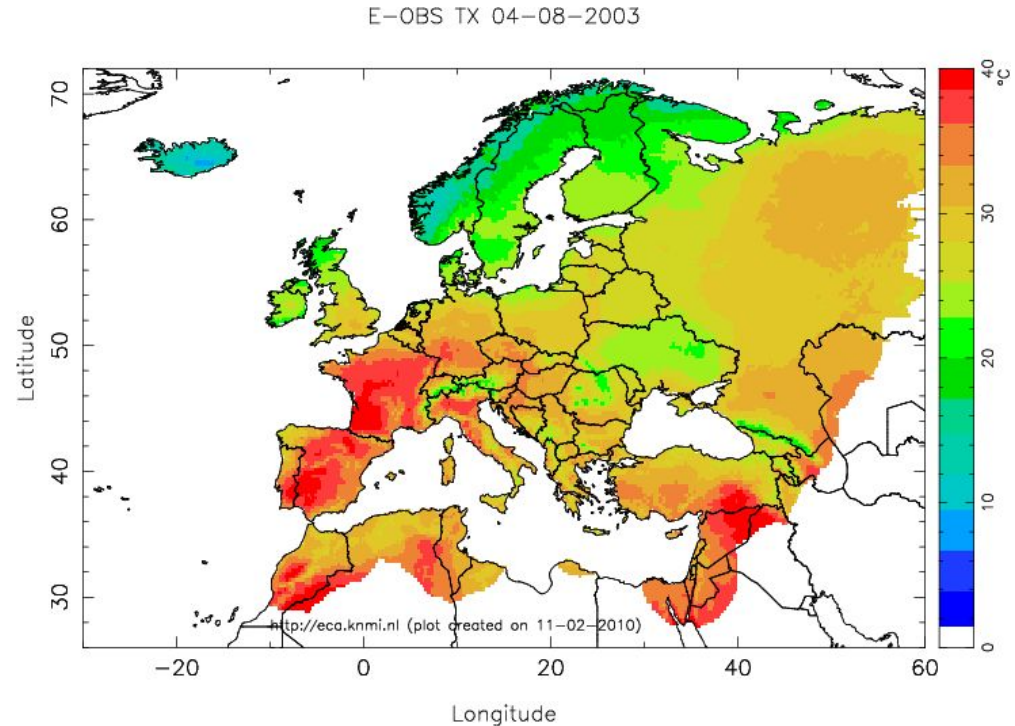
- E-OBSv16.0
- E-OBSv16.0e (ensemble)

Reanalysis used

- SMHI (single realization)
- UKMO (single realization)
- COSMO (ensemble)
- UKMO (ensemble)

Metrics used

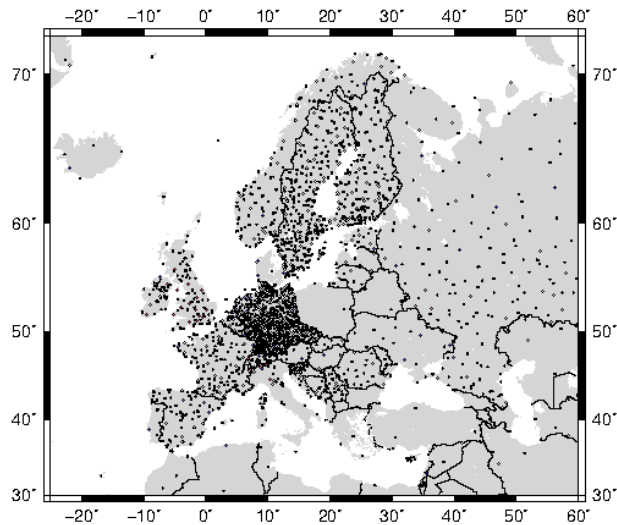
- Frost days ($TN < 0$)
- Summer days ($TX \geq 25$)
- Tropical Nights ($TN \geq 20$)
- Ice Days ($TX < 0$)



Issues with E-OBS



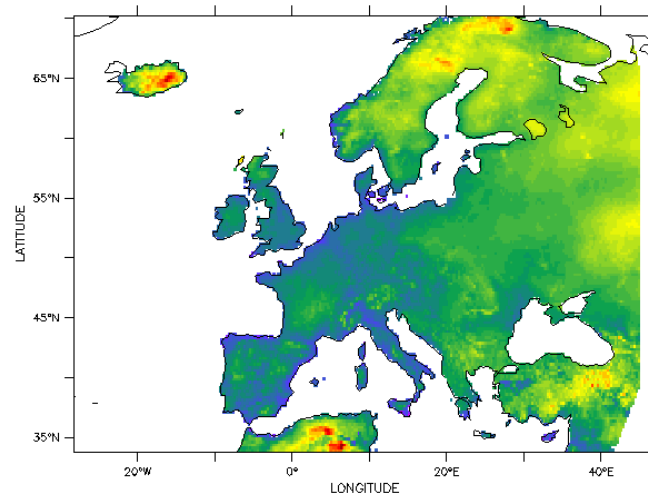
Before we compare against E-OBS: we need to be aware of any issue



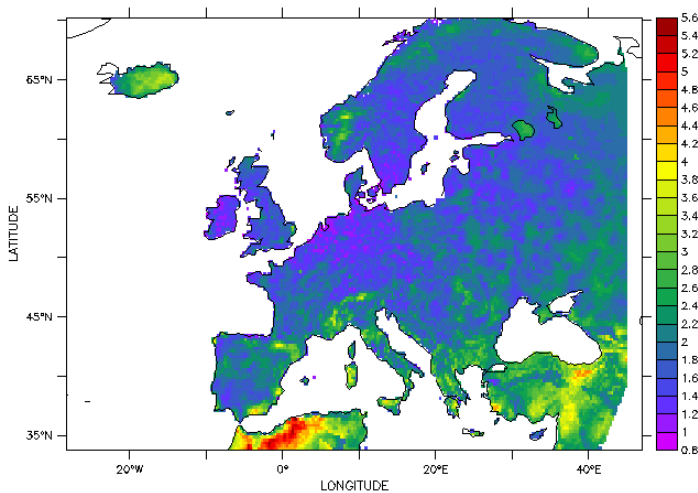
E-OBS station density (TX) for the overlapping years

- Inhomogeneous coverage
- A few areas with no coverage.....

A quick comparison against the SMHI reanalysis shows 'bulls-eyes'

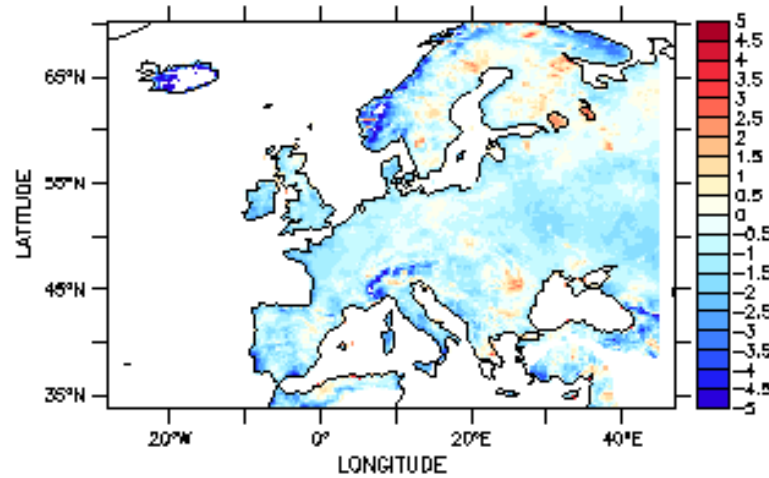


'standard deviation difference SMHI - E-OBS, TN'



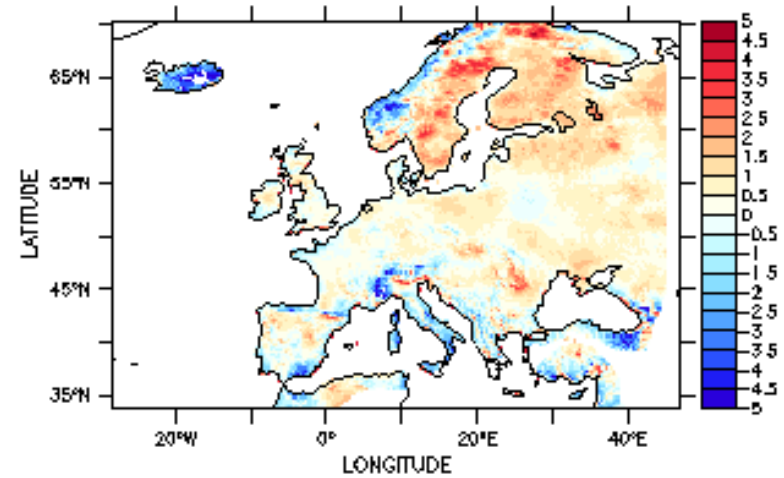
'standard deviation difference SMHI - E-OBS, TX'

Simple averages Tn



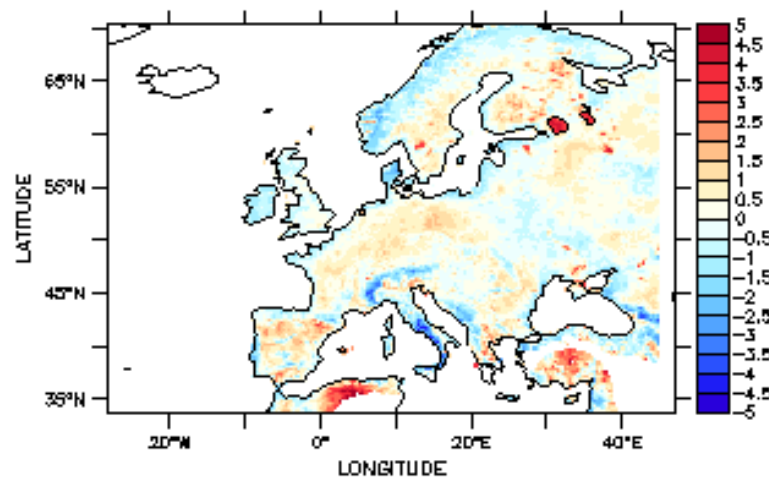
'SMHI - E-OBS, average Tn, winter'

TIME : 30-AUG-2008 00:00 DATASET: tn_SMHI-EOBS_JJA_avg

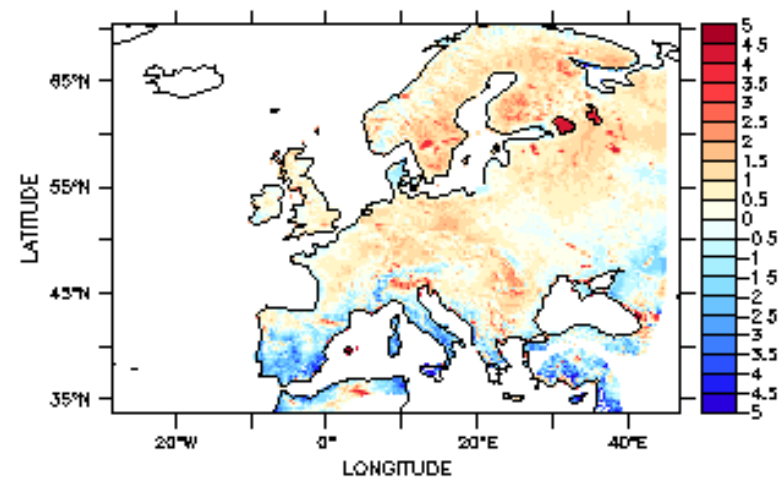


'UKMO - E-OBS, average Tn, winter'

TIME : 15-JAN-2008 12:00 DATASET: tn_UKMO-EOBS_JJA_avg

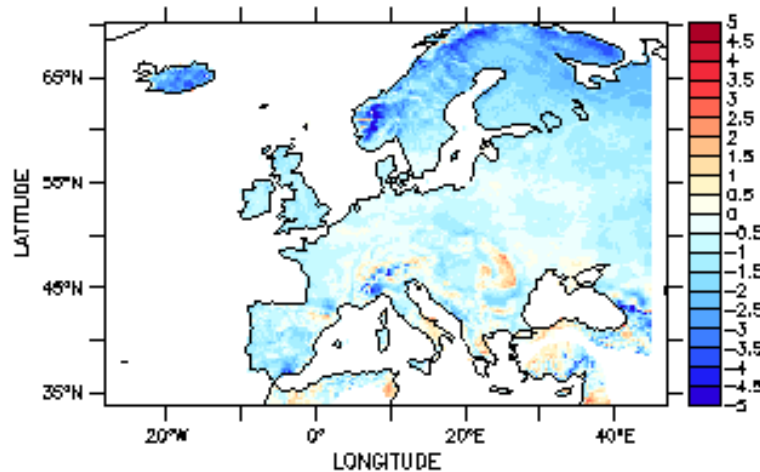


'SMHI - E-OBS, average Tn, summer'



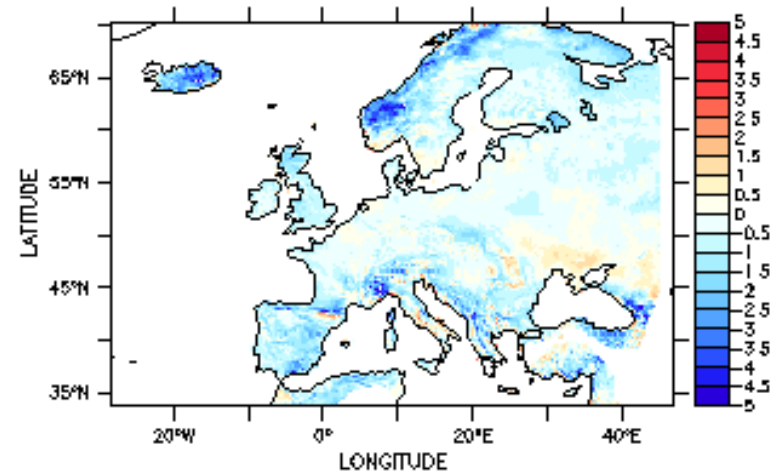
'UKMO - E-OBS, average Tn, summer'

Simple averages Tx



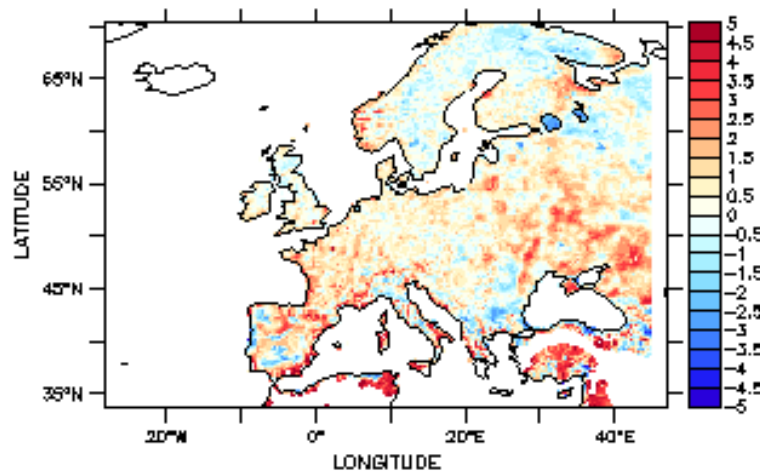
'SMHI - E-OBS, average TX, winter'

TIME : 15-JAN-2008 12:00 DATA SET: tx_SMHI-EOBS_JJA_avg

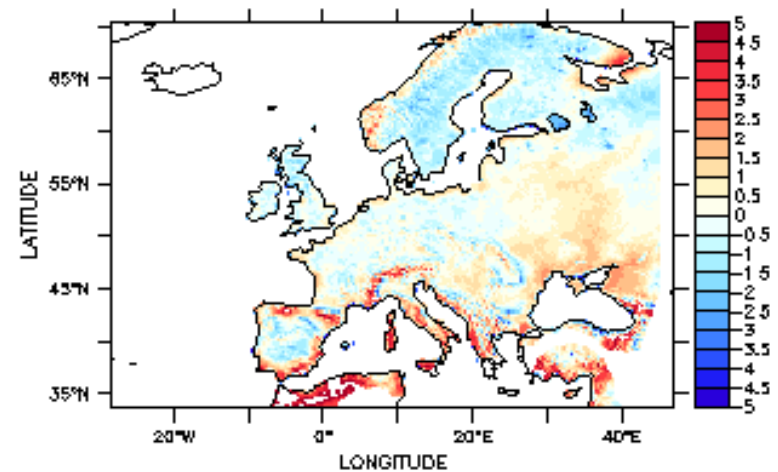


'UKMO - E-OBS, average TX, winter'

TIME : 15-JAN-2008 12:00 DATA SET: tx_UKMO-EOBS_JJA_avg



'SMHI - E-OBS, average TX, summer'

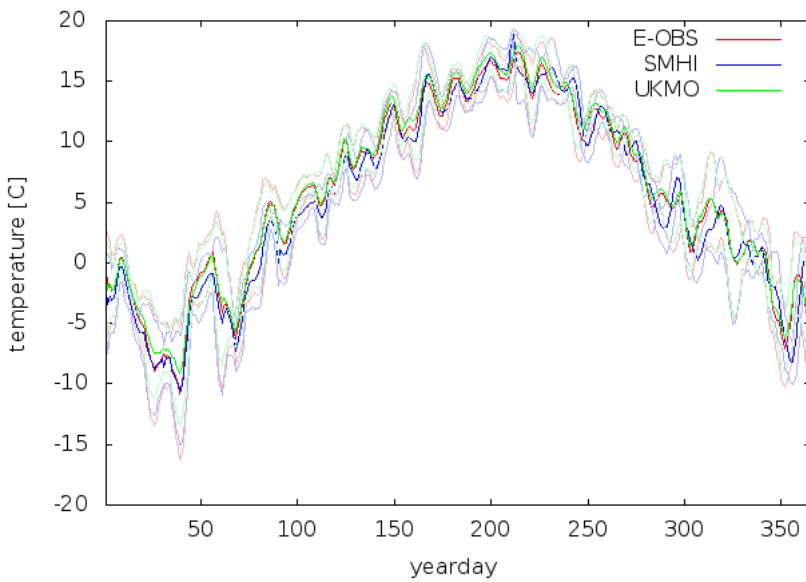


'UKMO - E-OBS, average TX, summer'

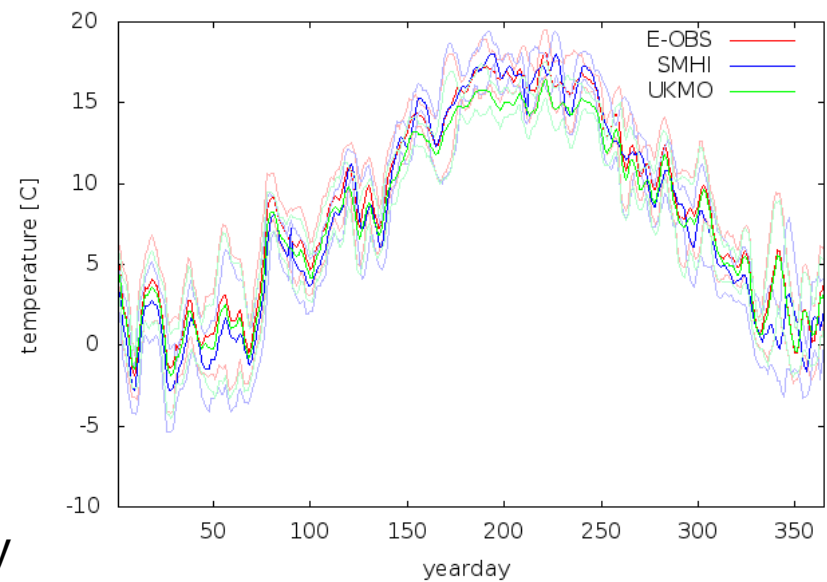
Seasonal cycle Tn



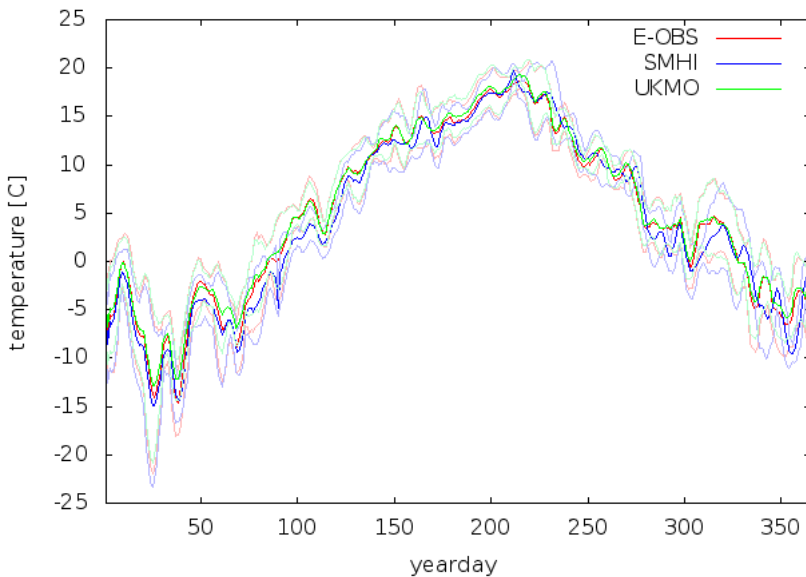
Seasonal cycle for tn over Balkan



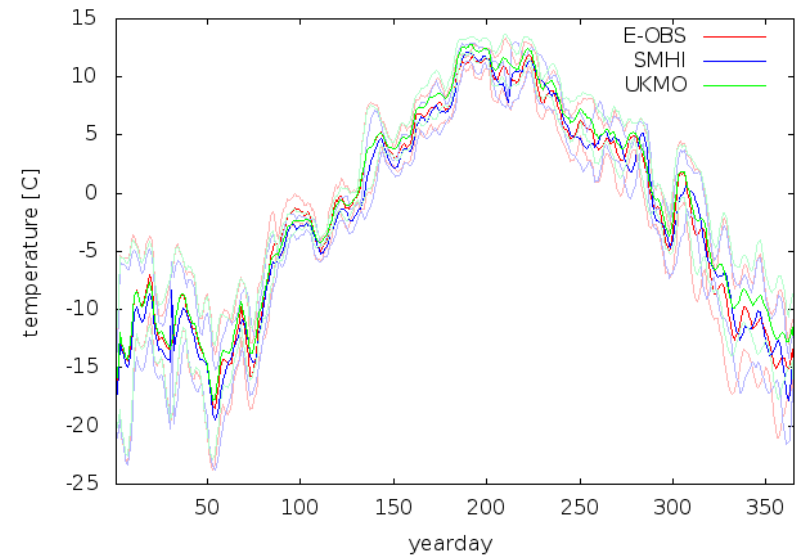
Seasonal cycle for tn over Iberia



Seasonal cycle for tn over EasternEurope



Seasonal cycle for tn over Scandinavia

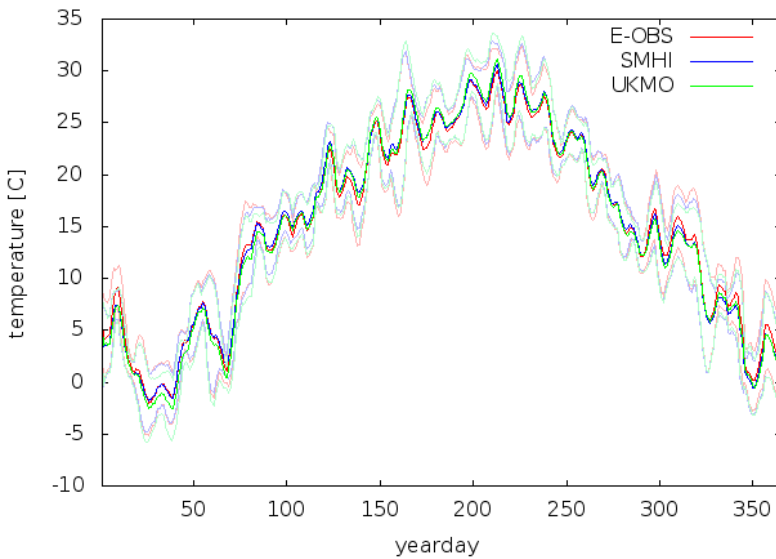


Actually
pretty
good!

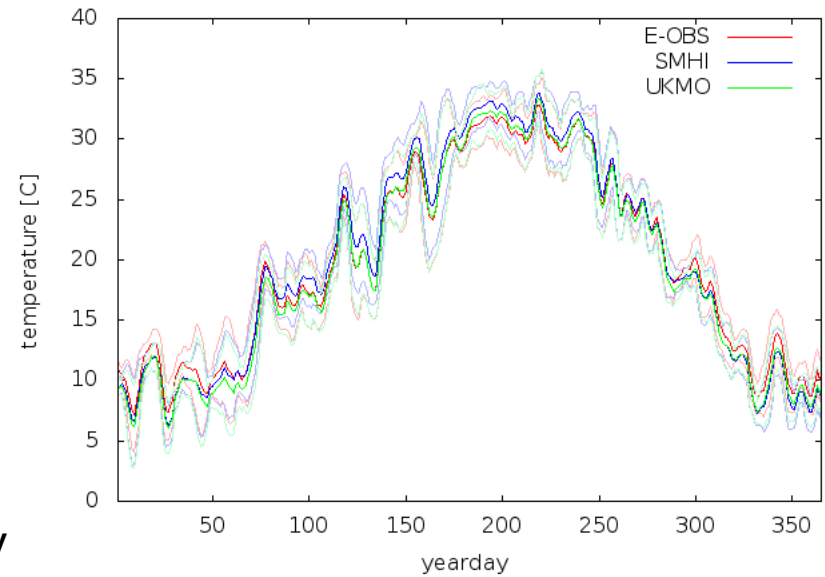
Seasonal cycle Tx



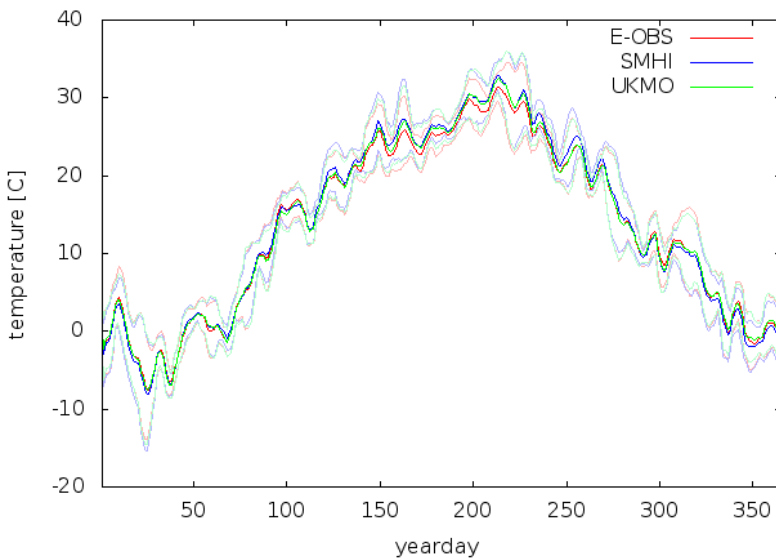
Seasonal cycle for tx over Balkan



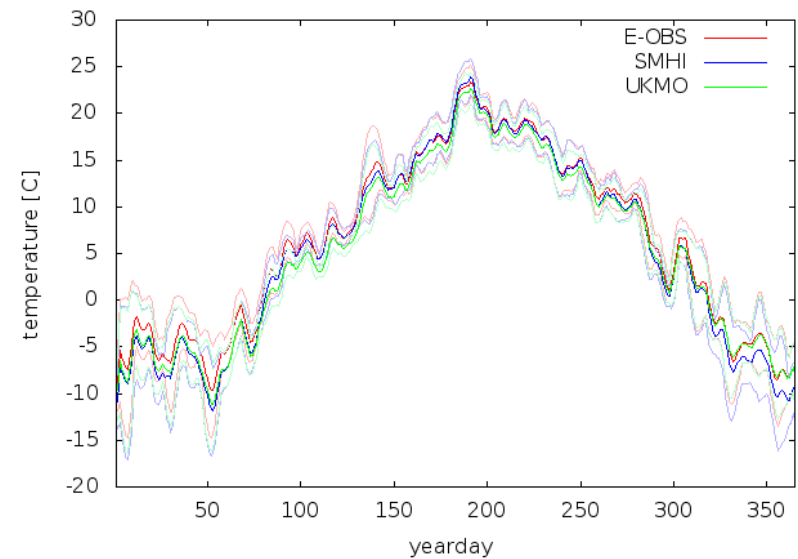
Seasonal cycle for tx over Iberia



Seasonal cycle for tx over EasternEurope



Seasonal cycle for tx over Scandinavia

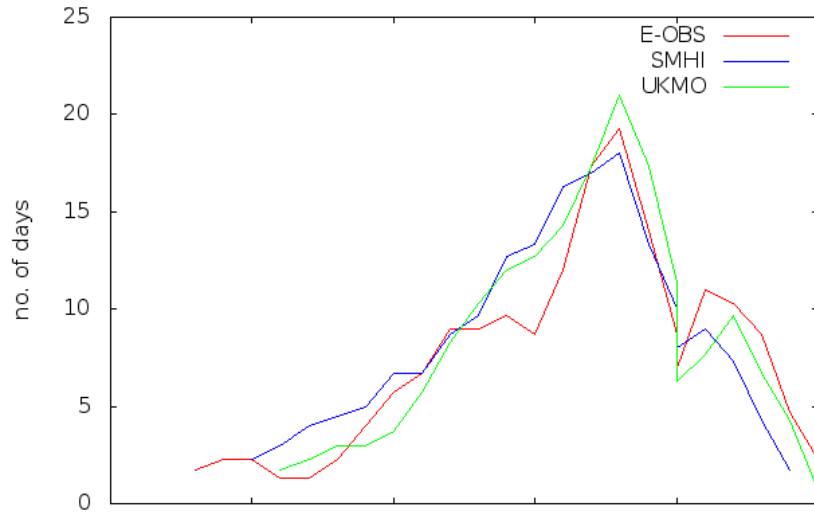


Actually
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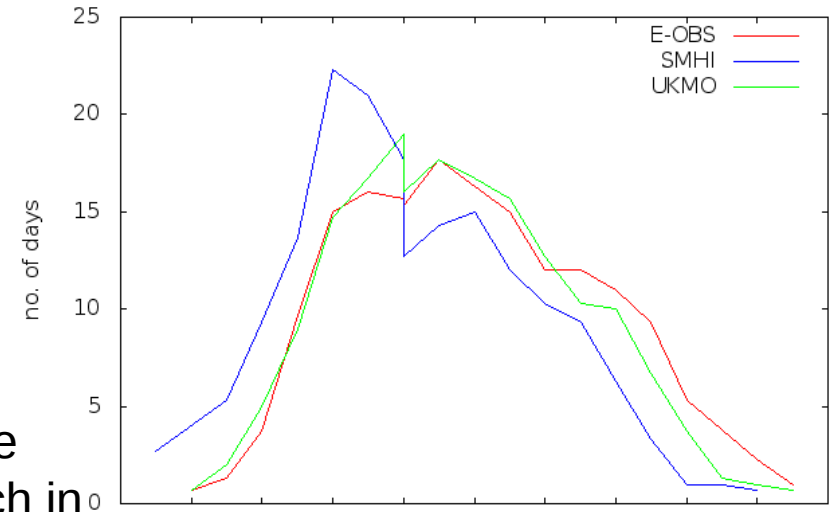
Probability plots



daily tn over Balkan - Winter

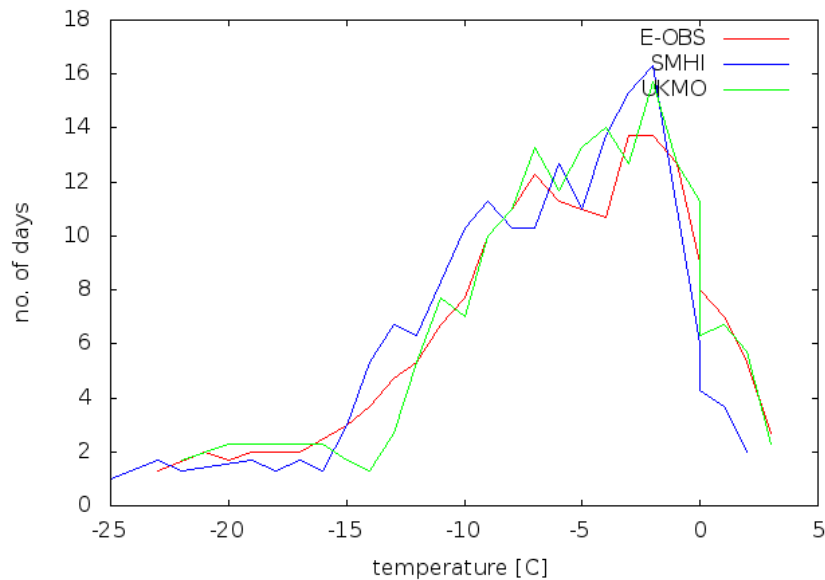


daily tn over Iberia - Winter

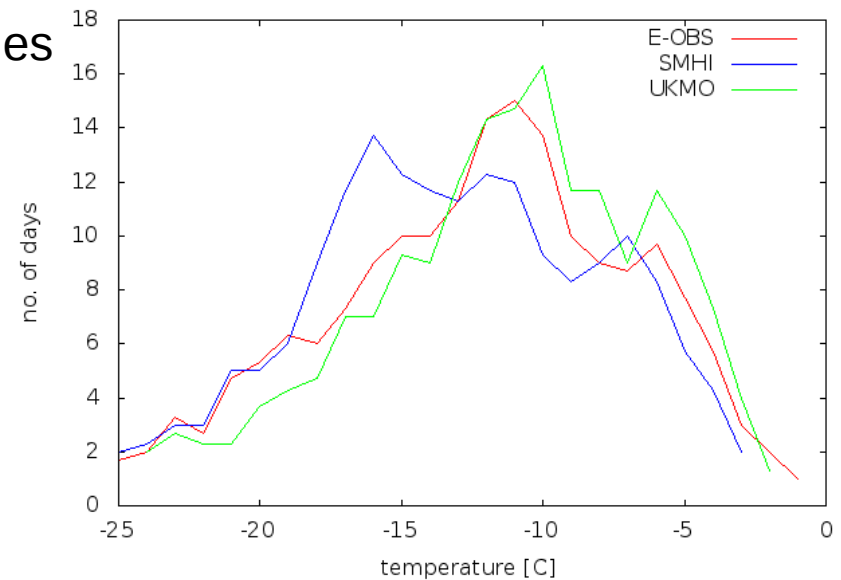


Some mismatch in the extremes

daily tn over EasternEurope - Winter



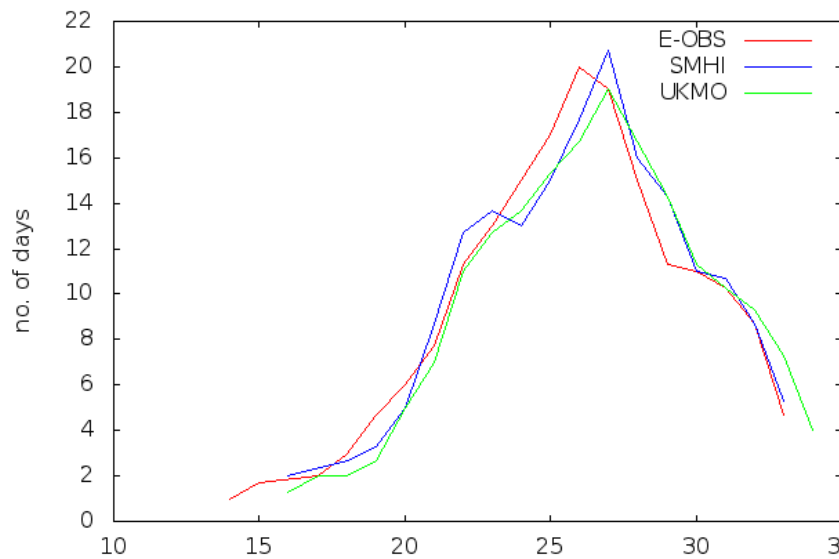
daily tn over Scandinavia - Winter



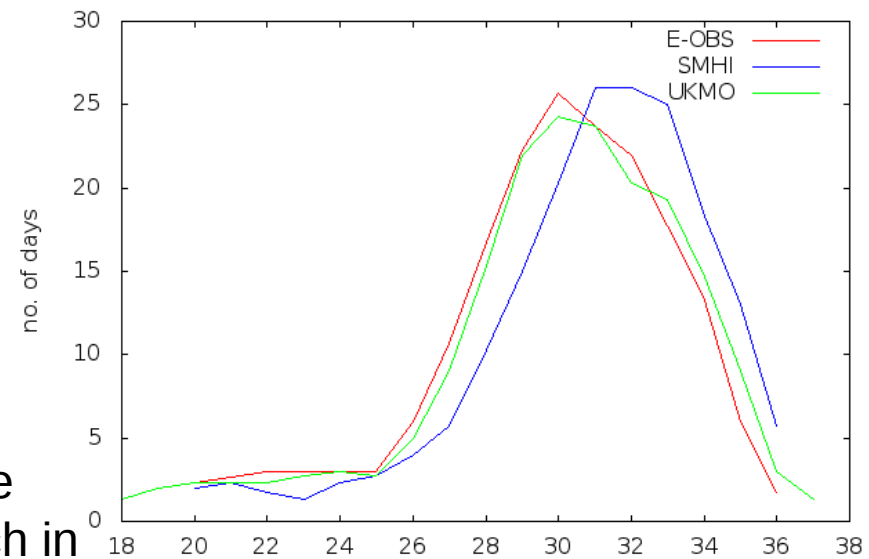
Probability plots



daily tx over Balkan - Summer

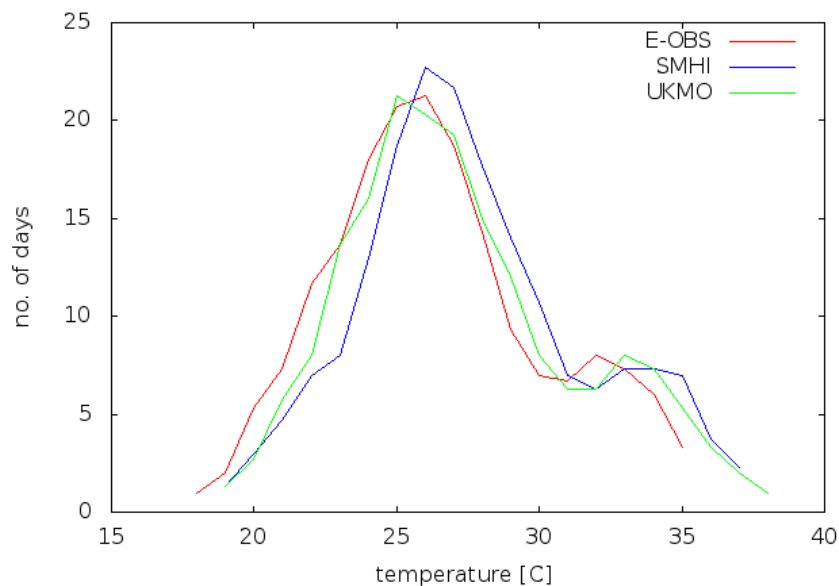


daily tx over Iberia - Summer

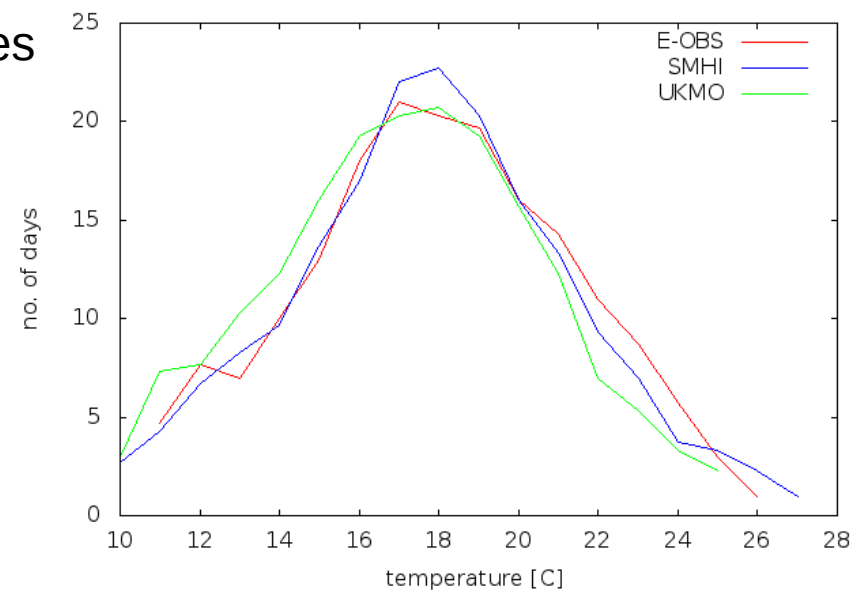


Some mismatch in the extremes

daily tx over EasternEurope - Summer



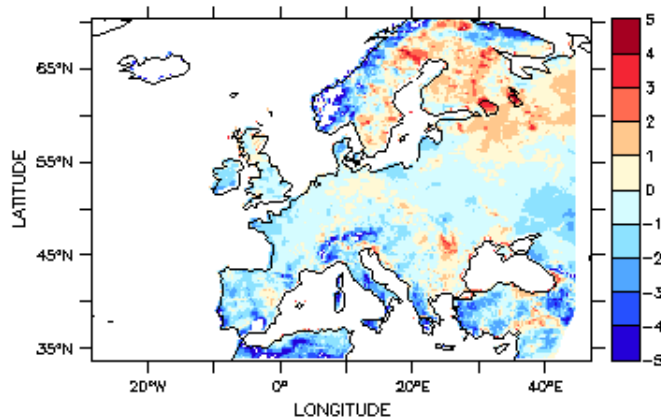
daily tx over Scandinavia - Summer



Extremes in Tn

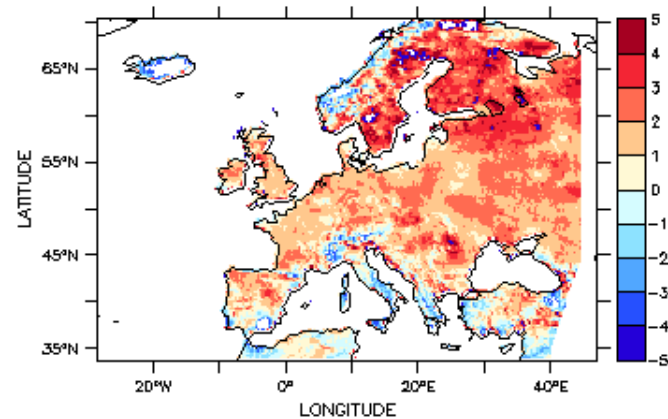


TIME : 17-FEB-2010 DATE: tn_min_SMHI-EOBS_DJF



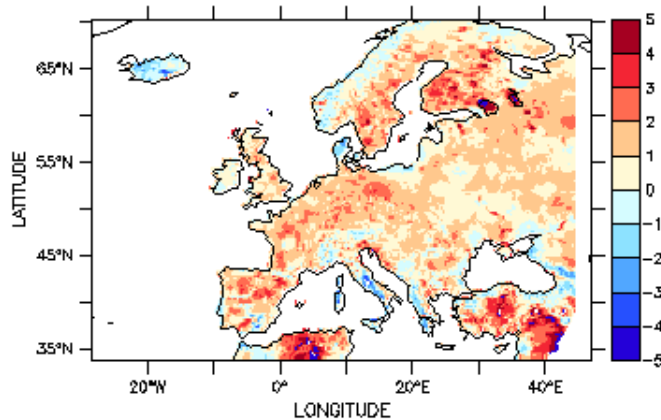
'SMHI - E-OBS, lowest TN, winter'

TIME : 17-FEB-2010 DATE: tn_min_UKMO-EOBS_DJF



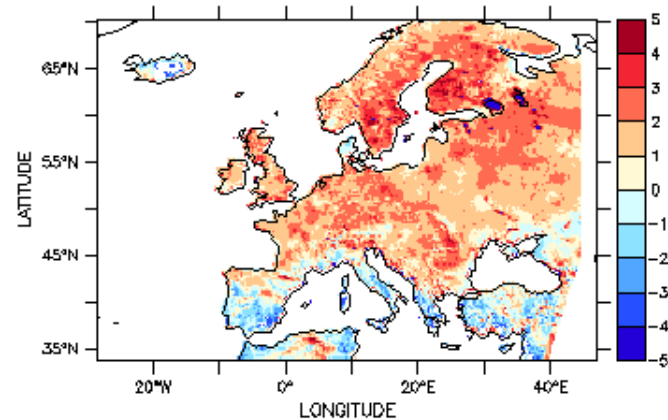
'UKMO - E-OBS, lowest TN, winter'

TIME : 17-JUL-2010 DATE: tn_min_SMHI-EOBS_JJA



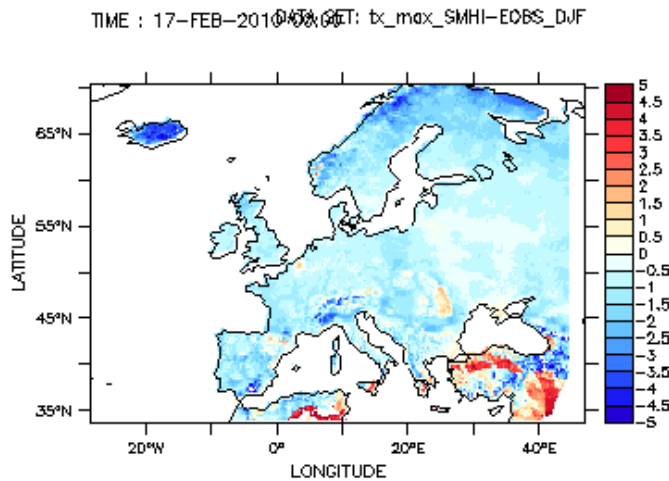
'SMHI - E-OBS, lowest TN, summer'

TIME : 17-JUL-2010 DATE: tn_min_UKMO-EOBS_JJA

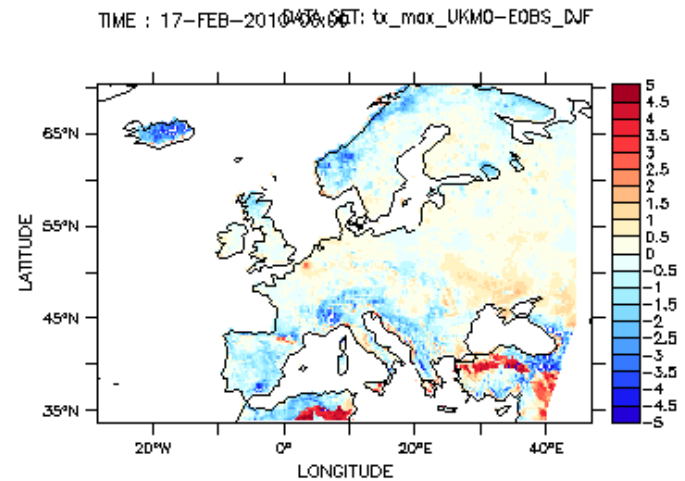


'UKMO - E-OBS, lowest TN, summer'

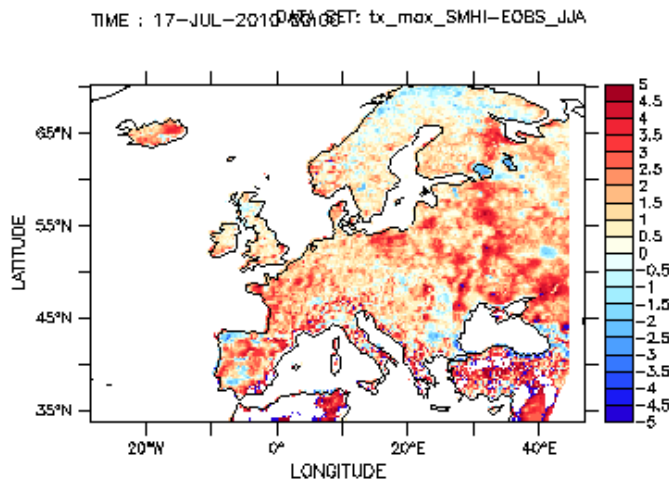
Extremes in Tx



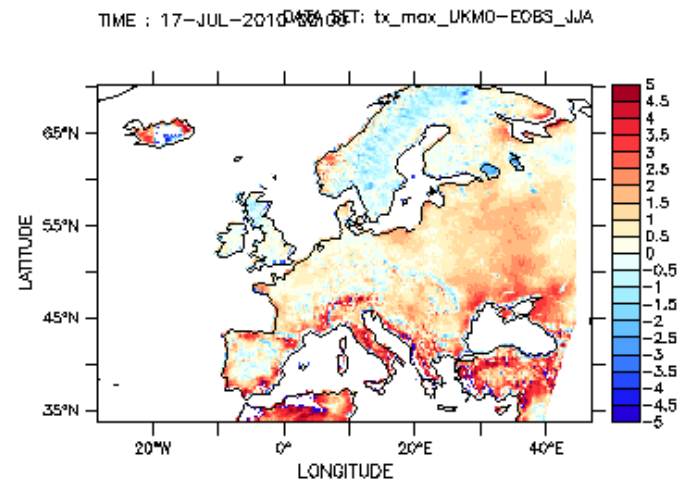
'SMHI - E-OBS, highest TX, winter'



'UKMO - E-OBS, highest TX, winter'

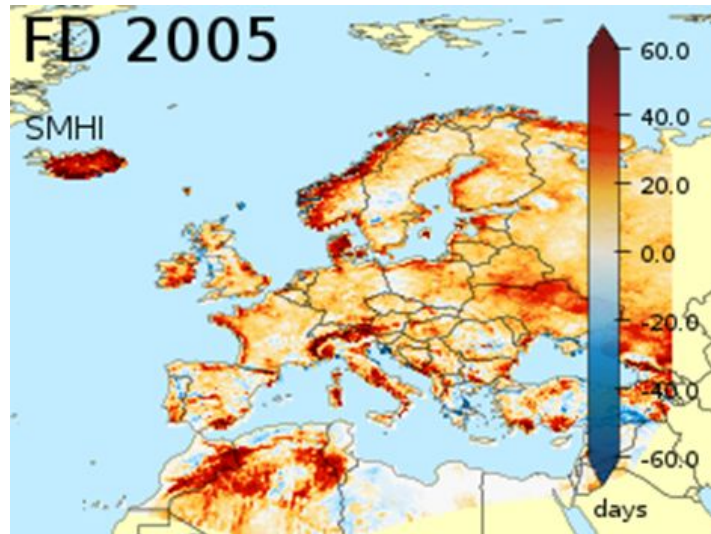


'SMHI - E-OBS, highest TX, summer'

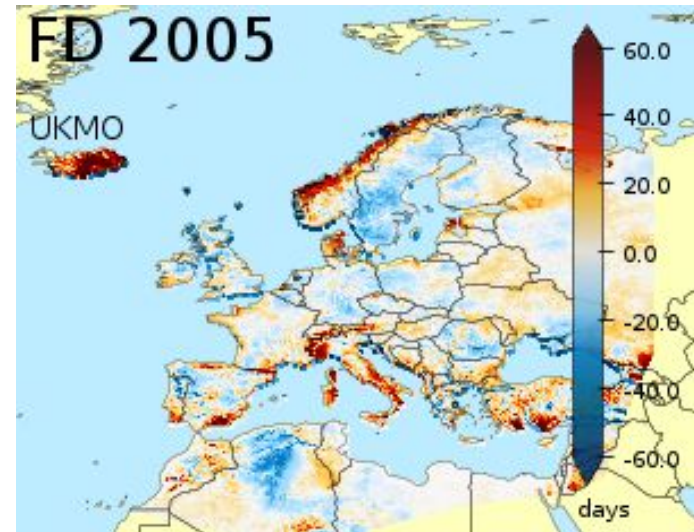


'UKMO - E-OBS, highest TX, summer'

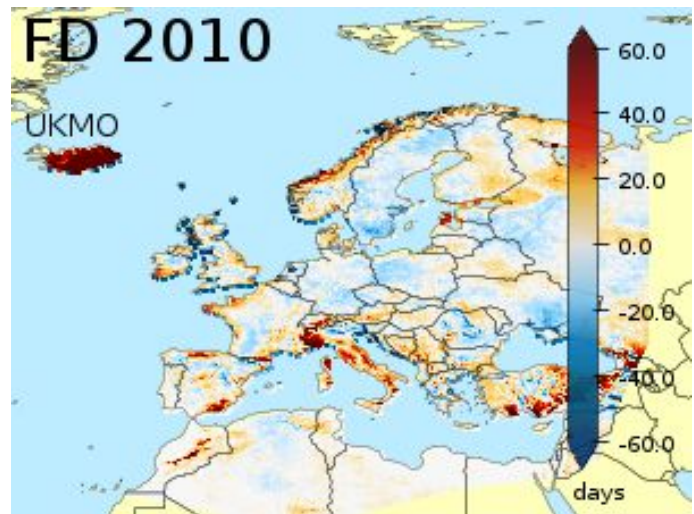
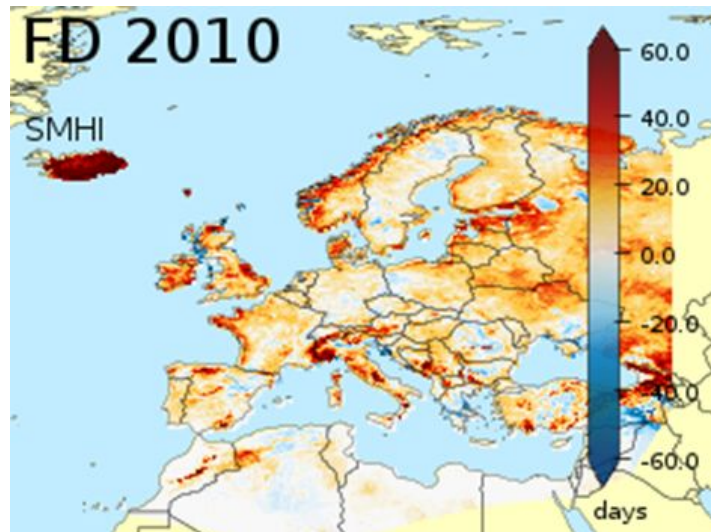
Frost Days



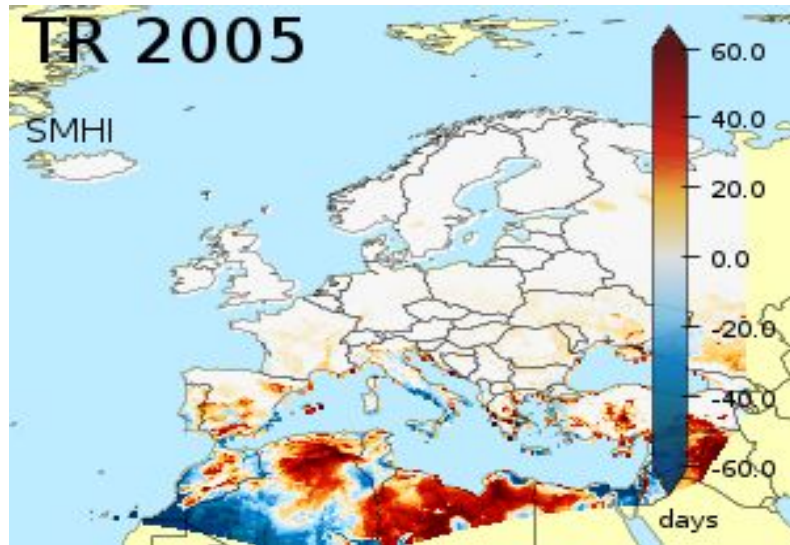
SMHI reanalysis: overestimation



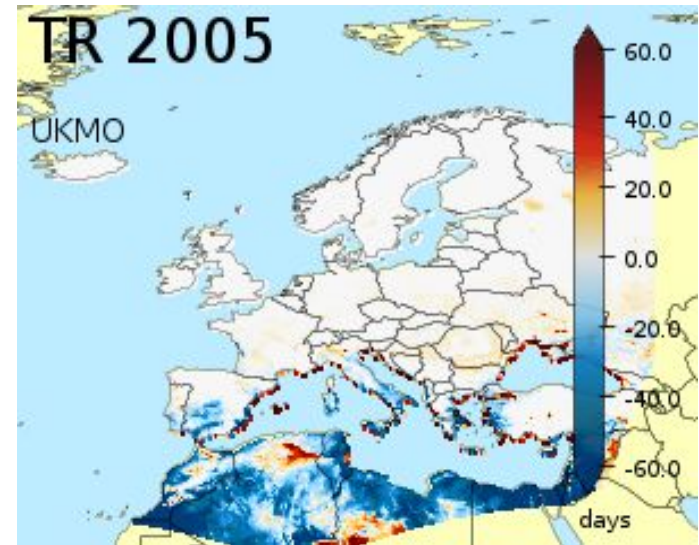
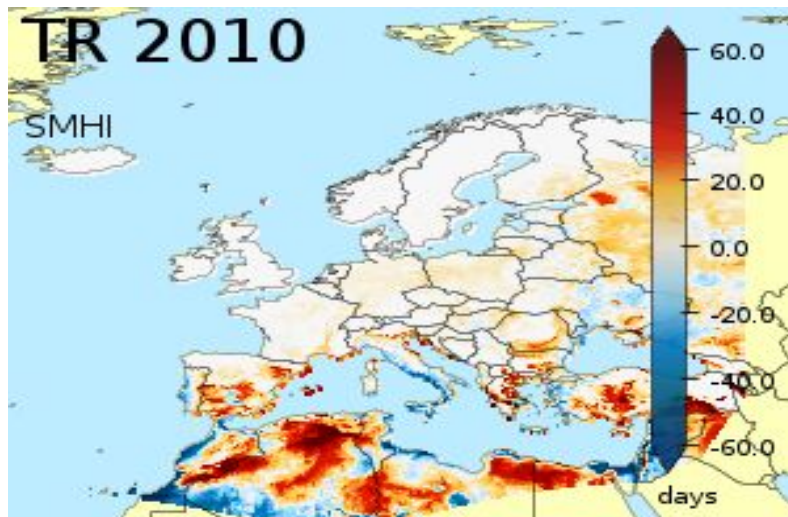
UKMO reanalysis: more balanced



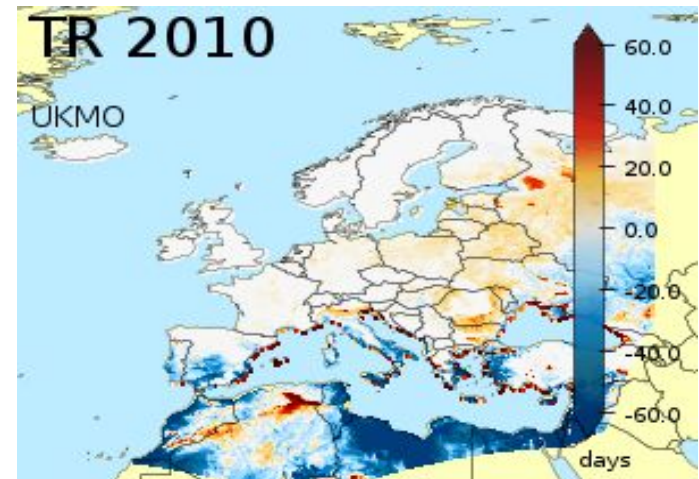
Tropical Nights



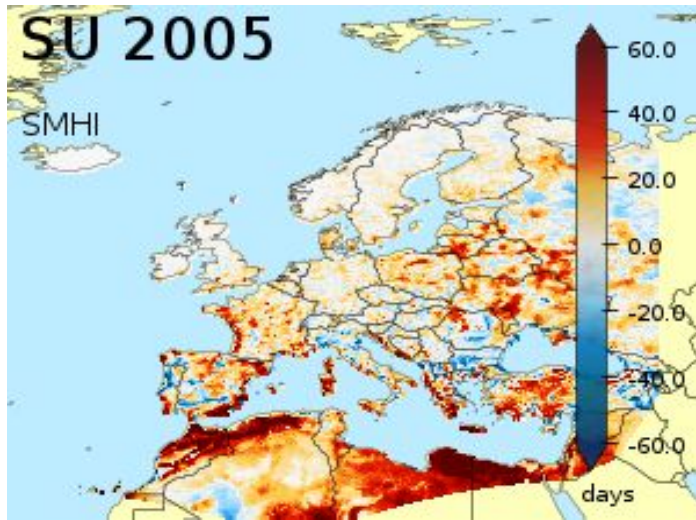
SMHI reanalysis: slight overestimation



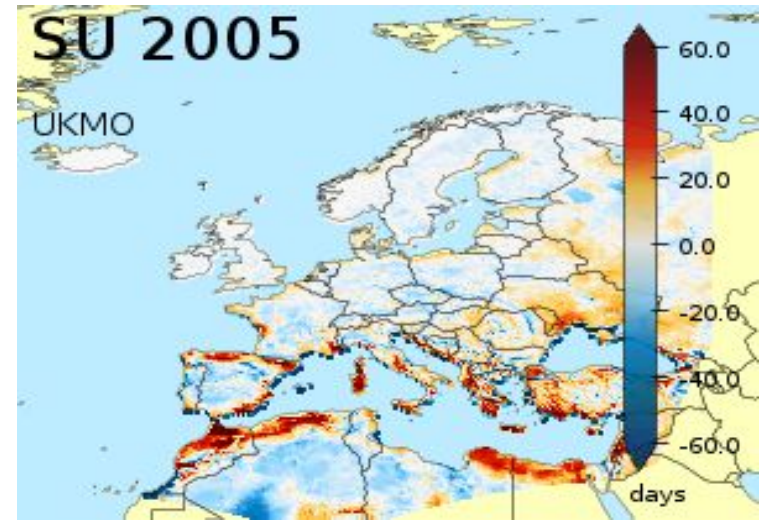
UKMO reanalysis: more mixed



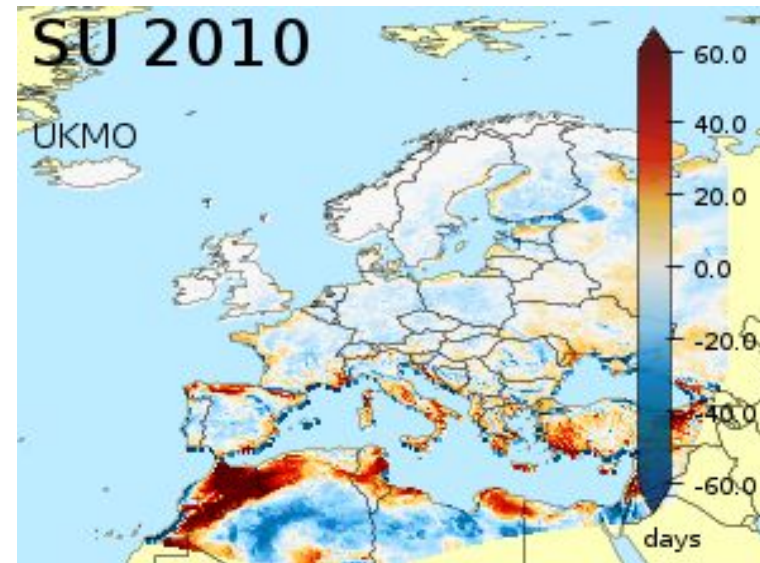
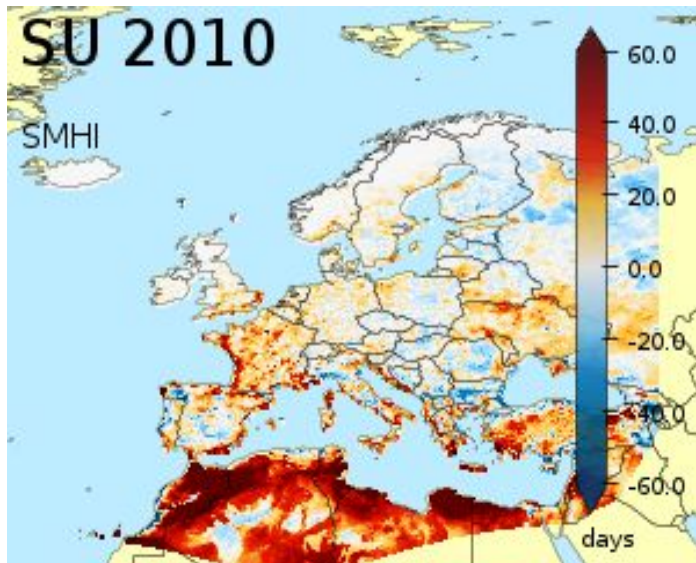
Summer days



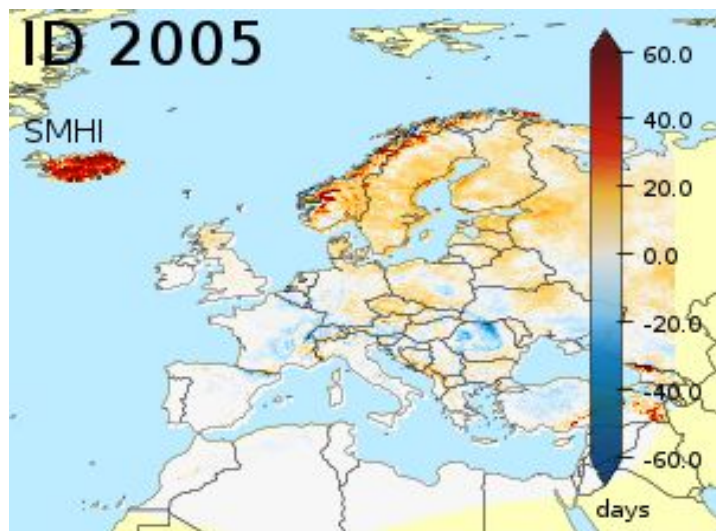
SMHI reanalysis: more balanced



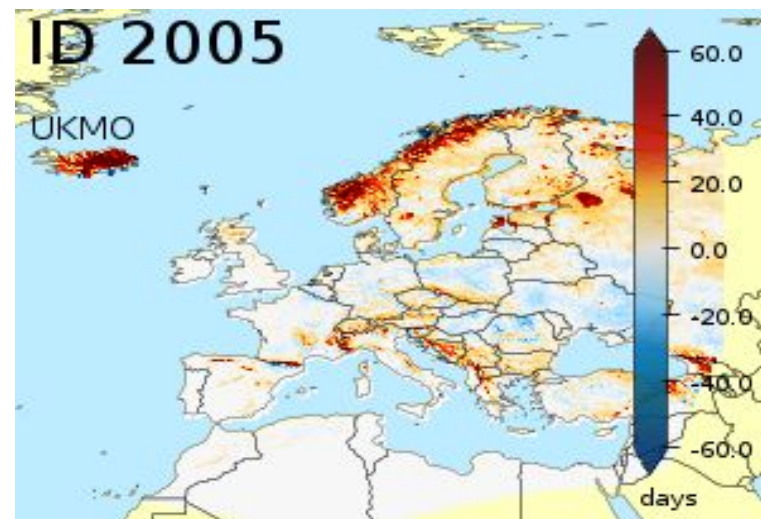
UKMO reanalysis: underestimated



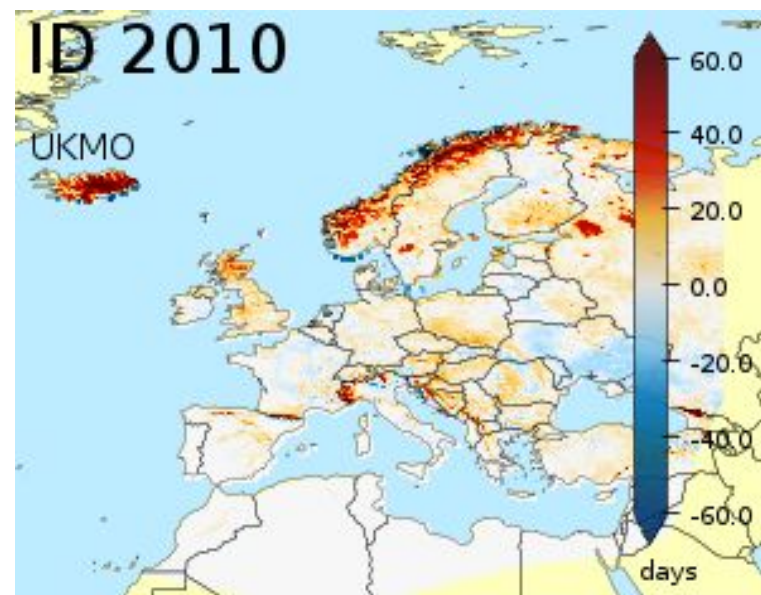
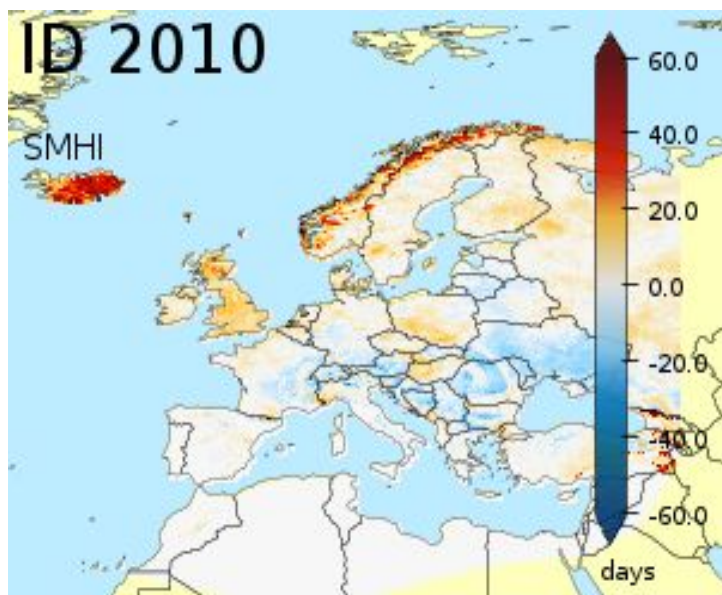
Ice Days



SMHI reanalysis: more balanced



UKMO reanalysis: more balanced





Evaluation conclusions

Comparing E-OBS against UERRA reanalysis: Summary

- They are remarkably good!
- There is an issue with the extremes
 - SMHI reanalysis' cold extremes in winter are too cold
 - ...while in summer, the warm extremes are too hot
 - UKMO reanalysis often too warm in (both) extremes
 - In terms of frost & summer days, these biases give differences of up to 40 days/year

