



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

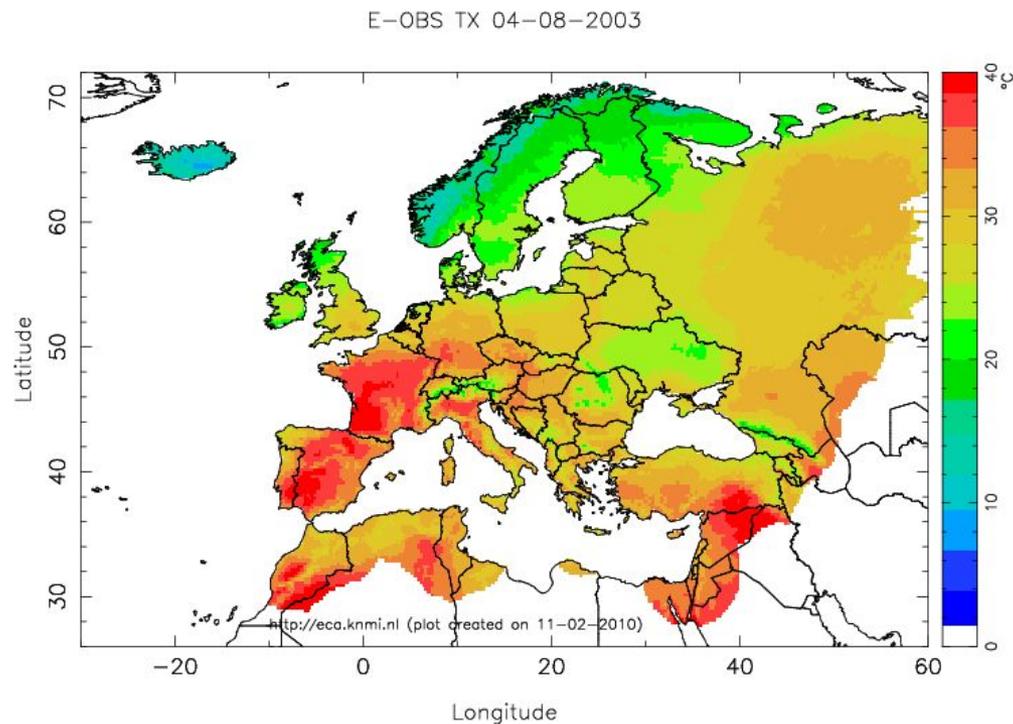
- E-OBSv16.0
- E-OBSv16.0e (ensemble)

## Reanalysis used

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

## Metrics used

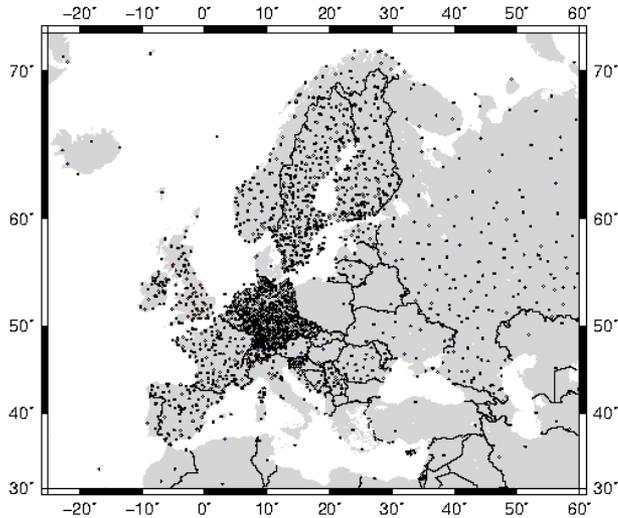
- Frost days ( $TN < 0$ )
- Summer days ( $TX \geq 25$ )
- Tropical Nights ( $TN \geq 20$ )
- Ice Days ( $TX < 0$ )



# Issues with E-OBS



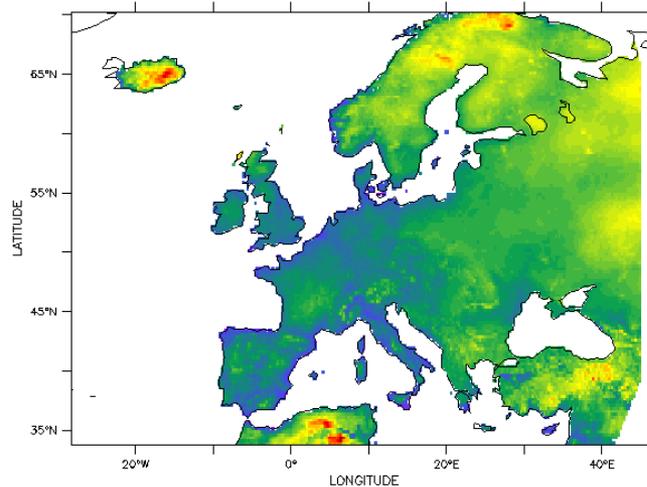
Before we compare against E-OBS: we need to be aware of any issue



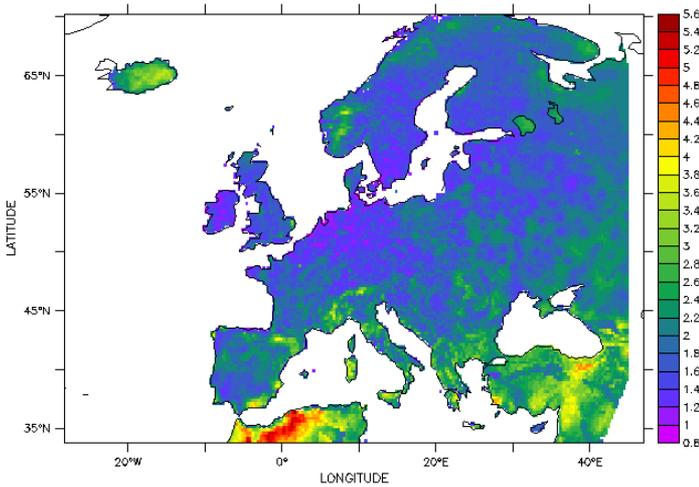
E-OBS station density (TX) for the overlapping years

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

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

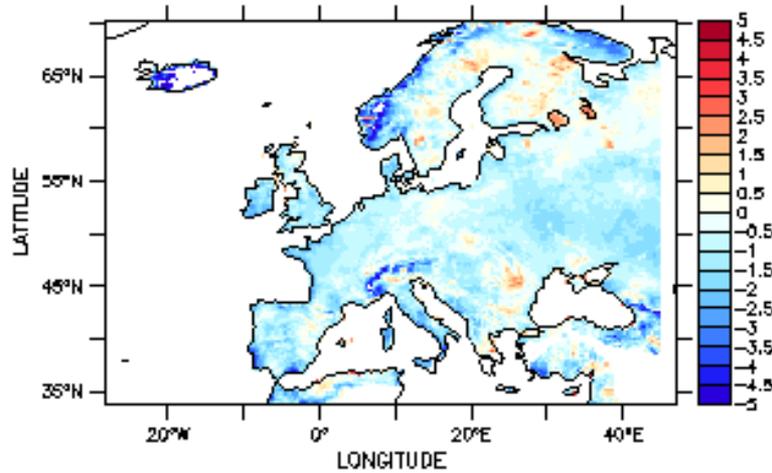


'standard deviation difference SMHI - E-OBS, TN'



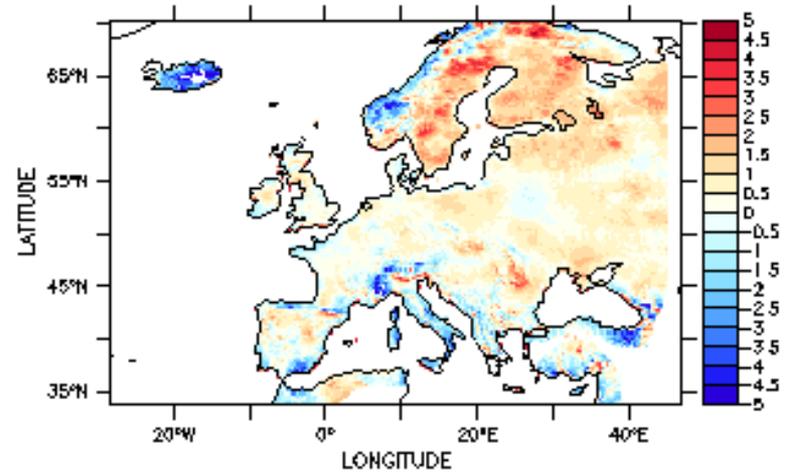
'standard deviation difference SMHI - E-OBS, TX'

# Simple averages Tn



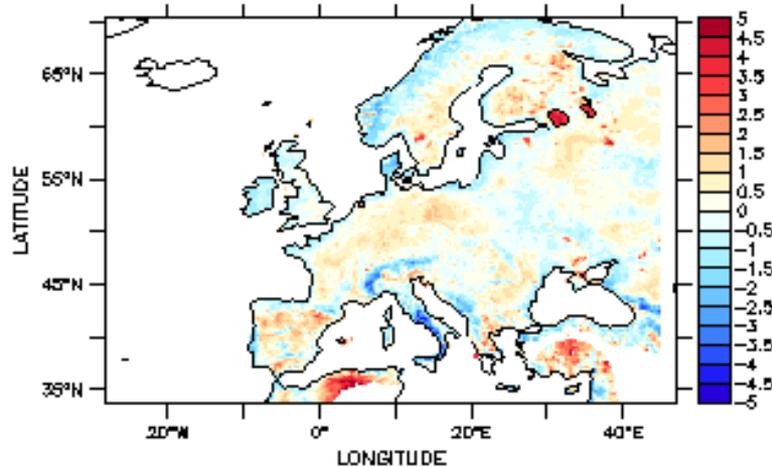
'SMHI - E-OBS, average TN, winter'

TIME : 30-AUG-2008 04:00 UTC REF: tn\_SMHI-EOBS\_JJA\_avg

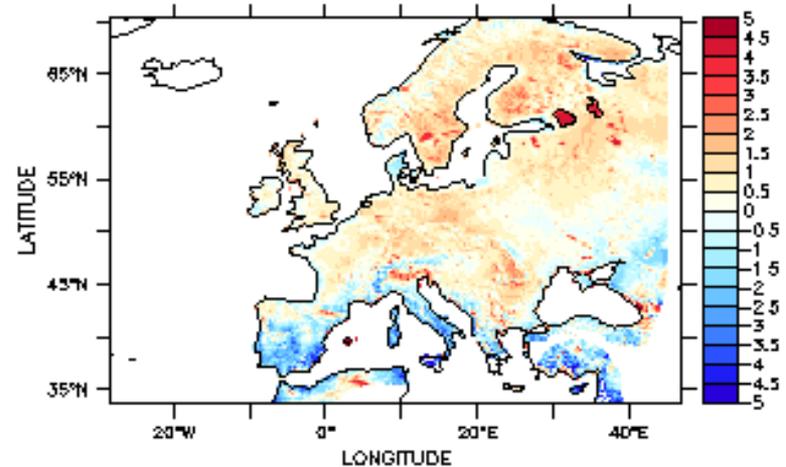


'UKMO - E-OBS, average TN, winter'

TIME : 15-JAN-2008 04:00 UTC REF: tn\_UKMO-EOBS\_JJA\_avg

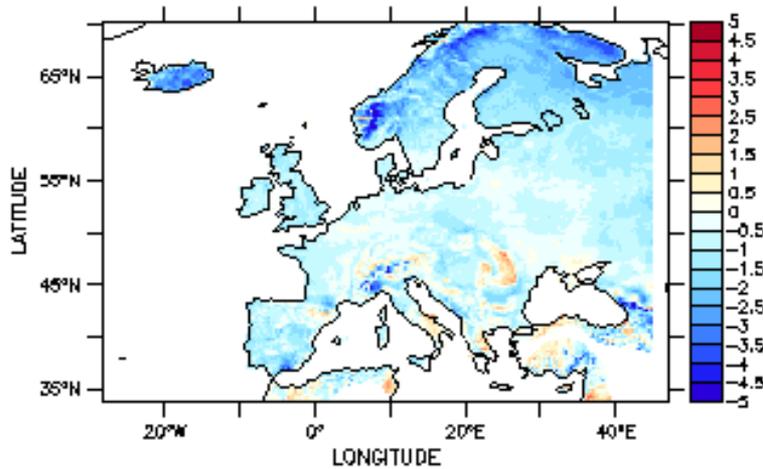


'SMHI - E-OBS, average TN, summer'



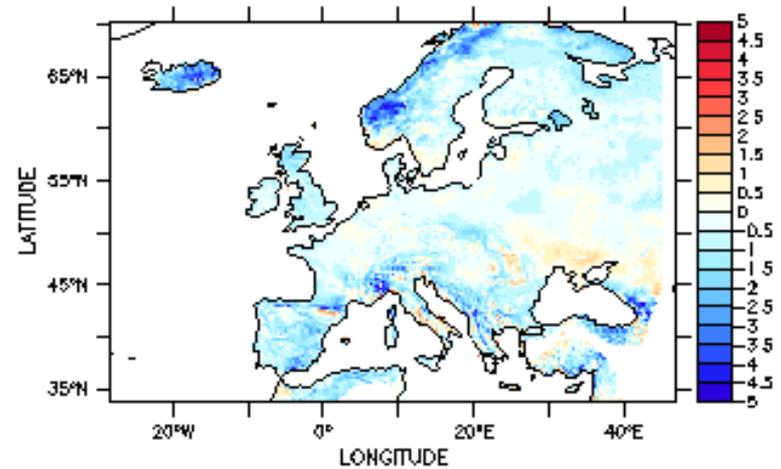
'UKMO - E-OBS, average TN, summer'

# Simple averages Tx



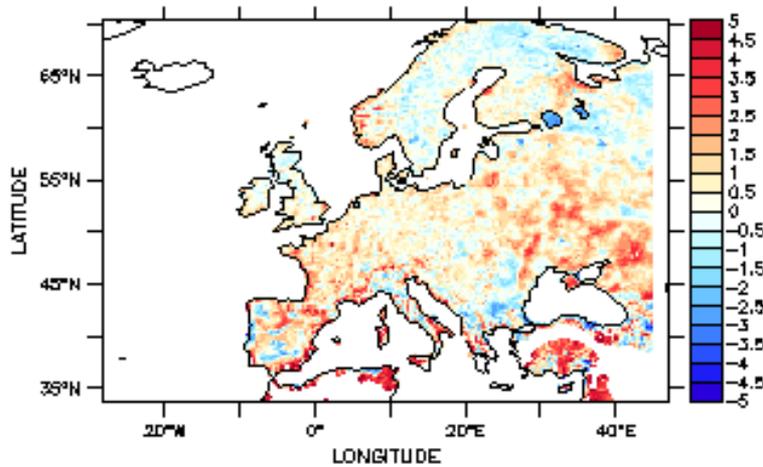
'SMHI - E-OBS, average TX, winter'

TIME : 15-JAN-2008 04:08 DATASET: tx\_SMHI-EOBS\_JJA\_avg

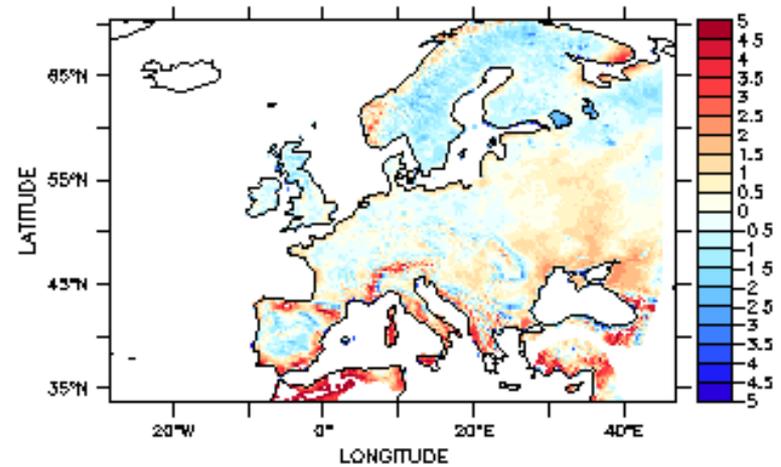


'UKMO - E-OBS, average TX, winter'

TIME : 15-JAN-2008 04:08 DATASET: tx\_UKMO-EOBS\_JJA\_avg



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

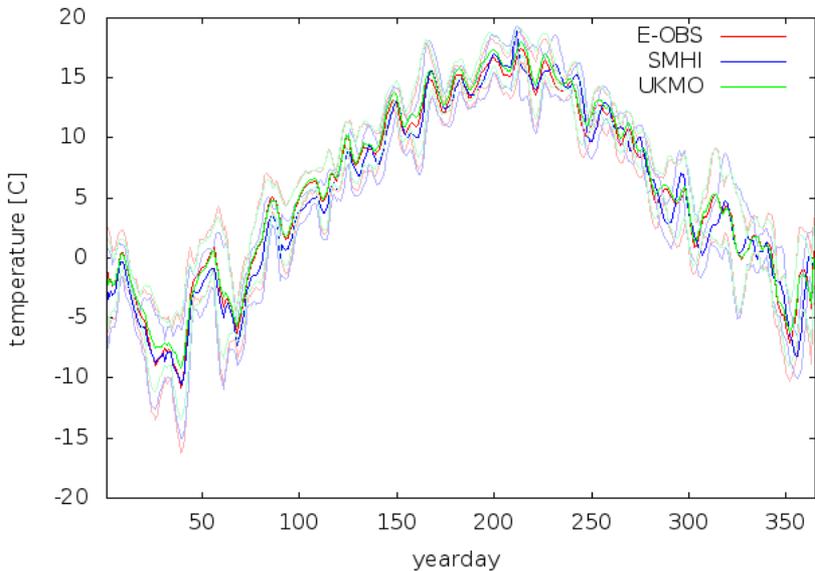


'UKMO - E-OBS, average TX, summer'

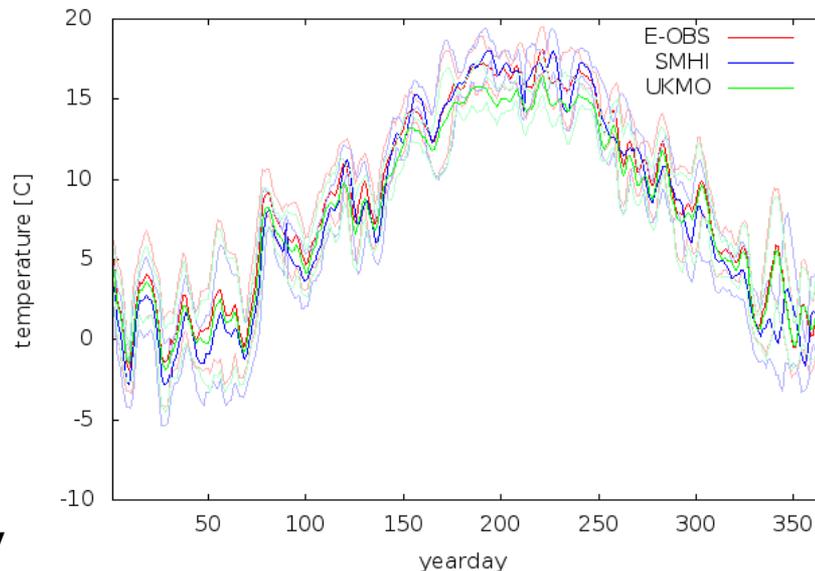
# Seasonal cycle Tn



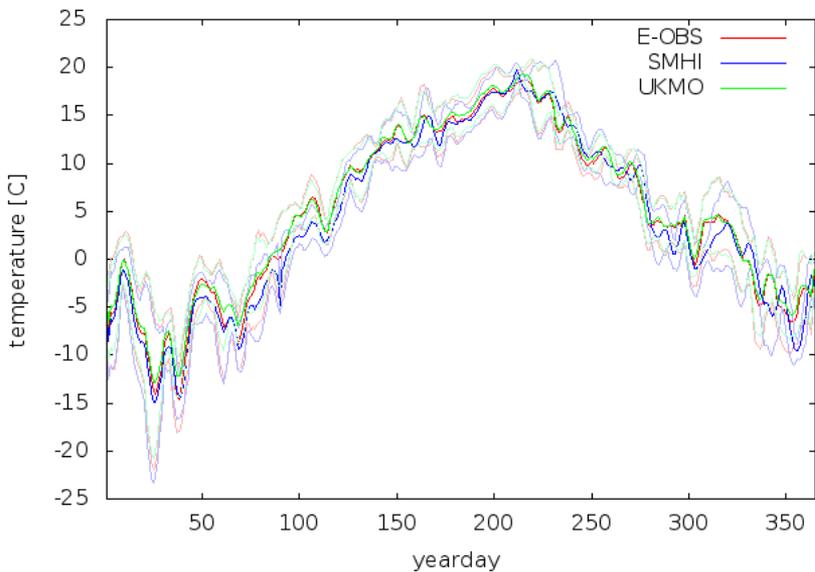
Seasonal cycle for tn over Balkan



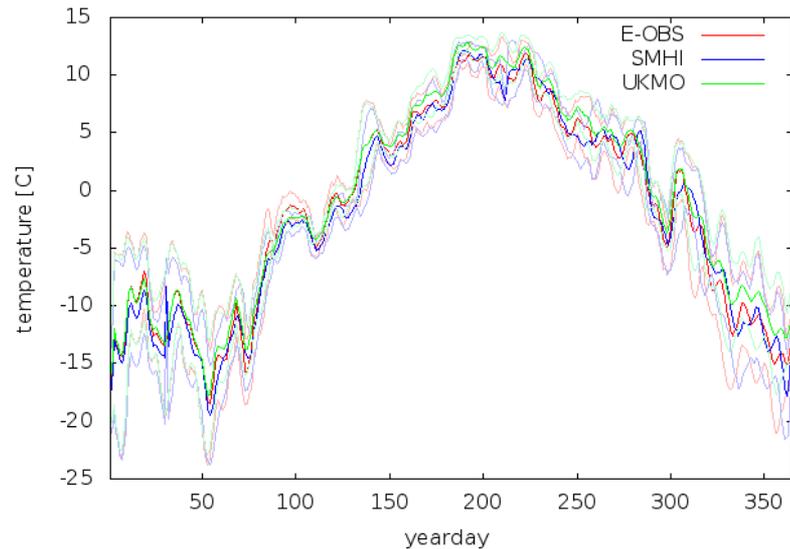
Seasonal cycle for tn over Iberia



Seasonal cycle for tn over EasternEurope



Seasonal cycle for tn over Scandinavia



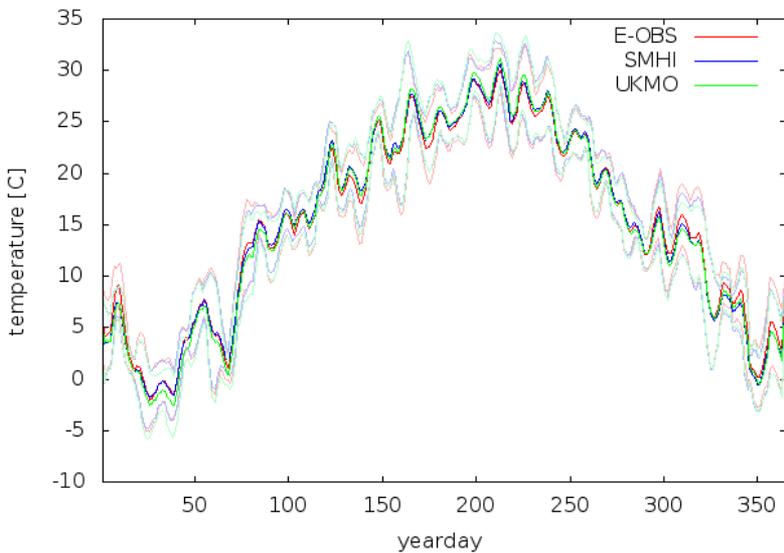
Actually  
pretty  
good!



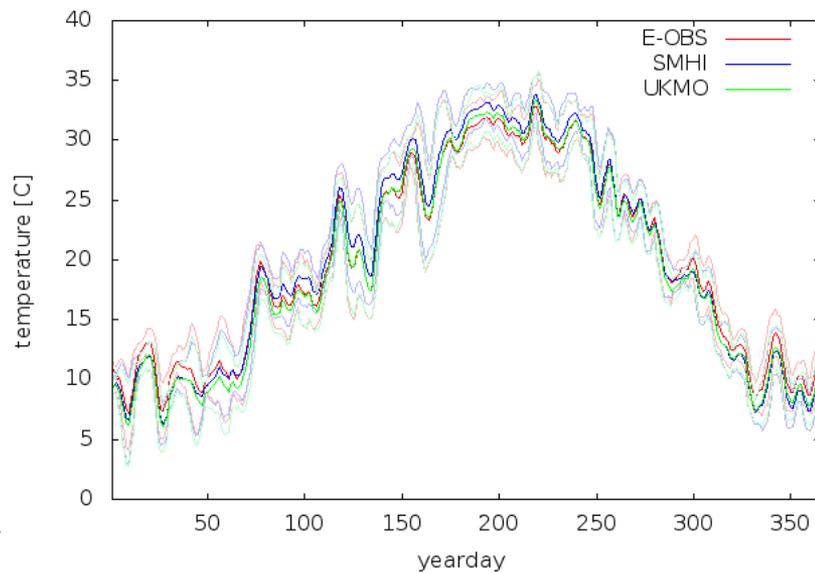
# Seasonal cycle Tx



Seasonal cycle for tx over Balkan

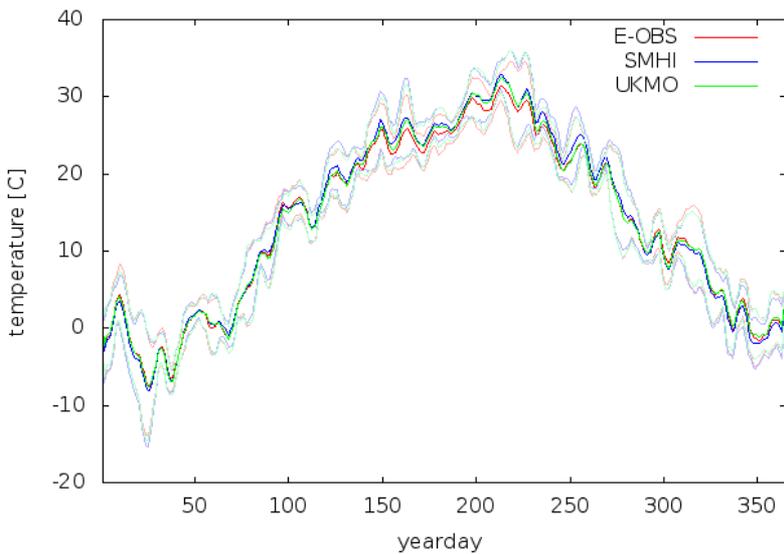


Seasonal cycle for tx over Iberia

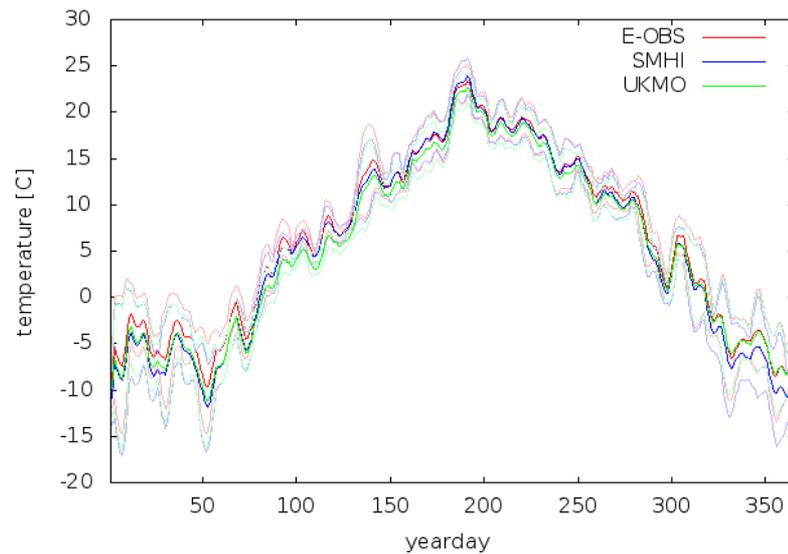


Actually  
pretty  
good!

Seasonal cycle for tx over EasternEurope



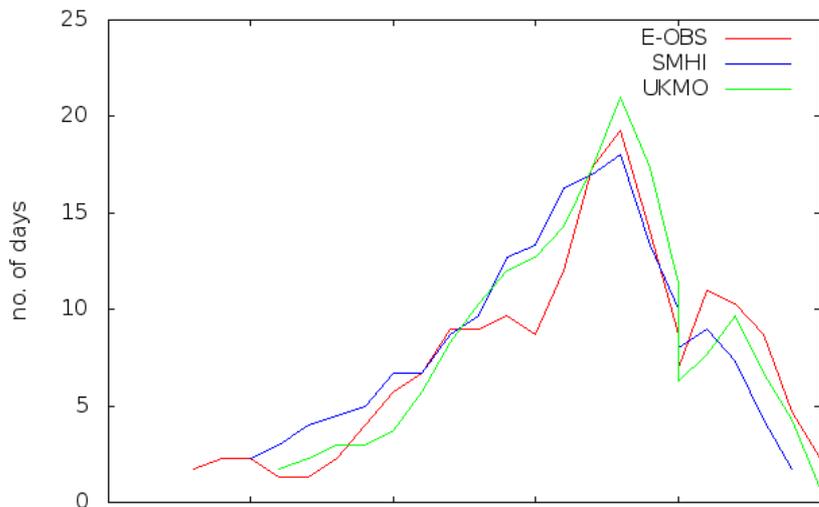
Seasonal cycle for tx over Scandinavia



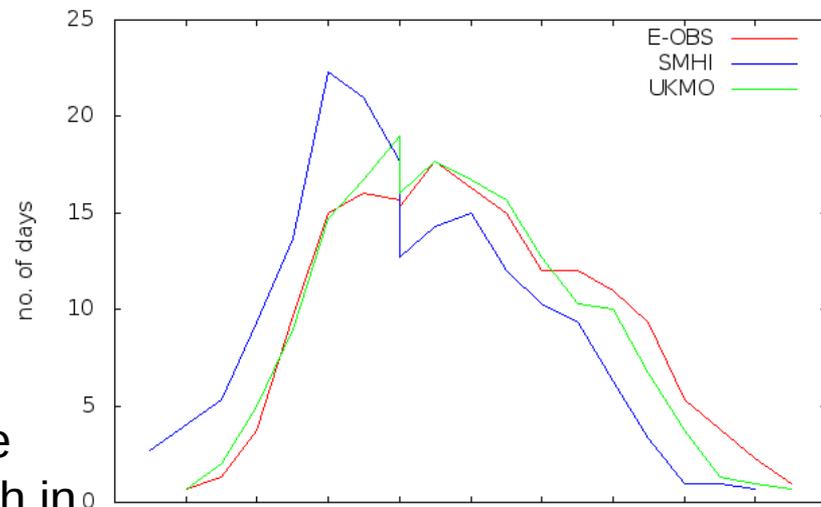
# Probability plots



daily tn over Balkan - Winter

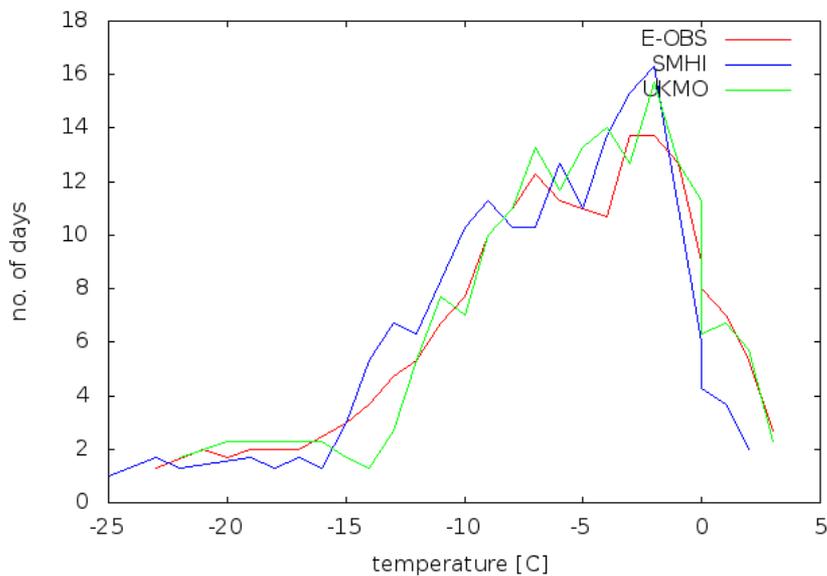


daily tn over Iberia - Winter

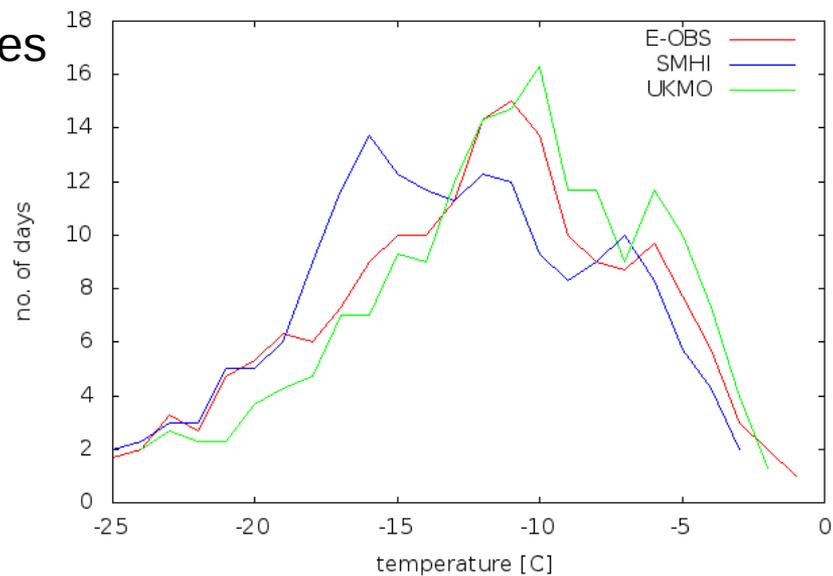


Some mismatch in the extremes

daily tn over EasternEurope - Winter



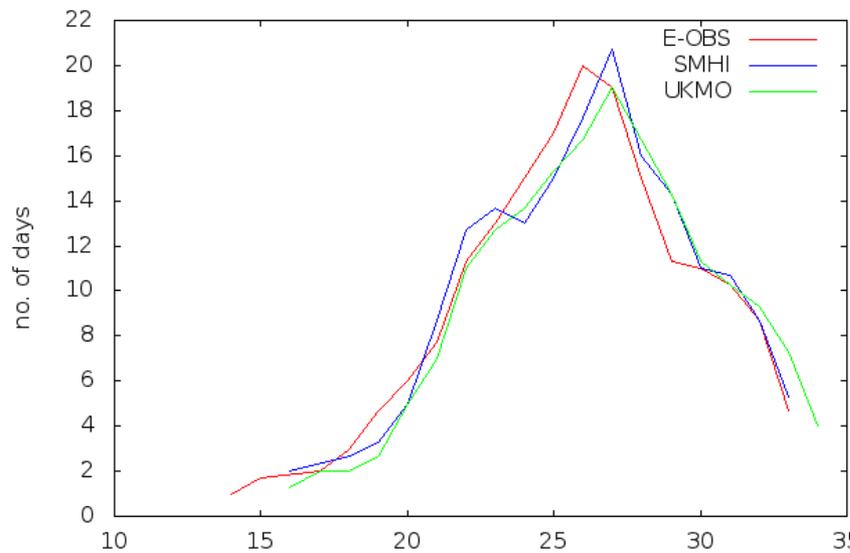
daily tn over Scandinavia - Winter



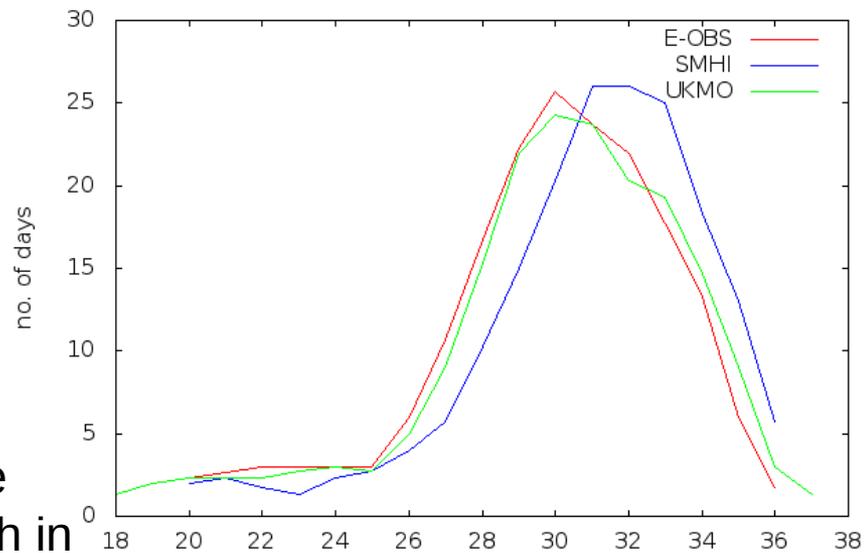


# Probability plots

daily tx over Balkan - Summer

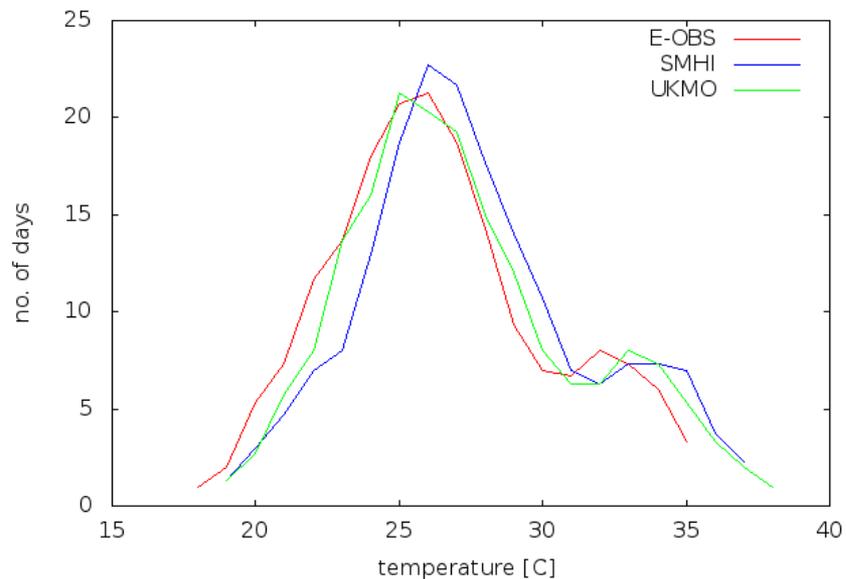


daily tx over Iberia - Summer

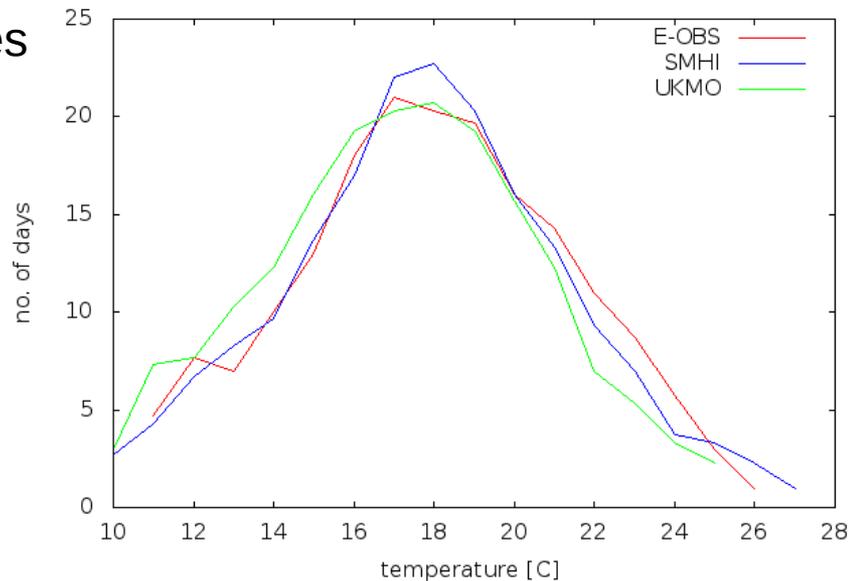


Some mismatch in the extremes

daily tx over EasternEurope - Summer



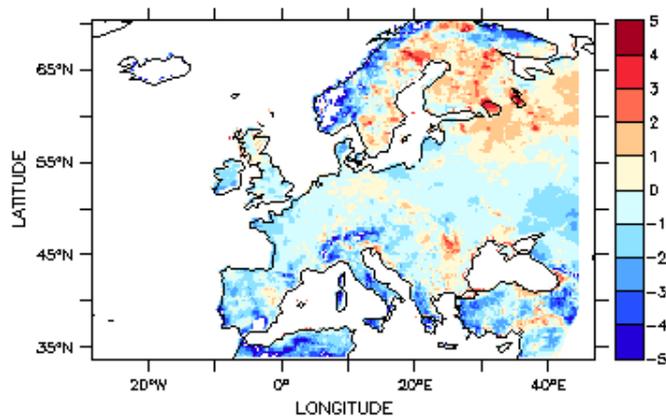
daily tx over Scandinavia - Summer



# Extremes in Tn

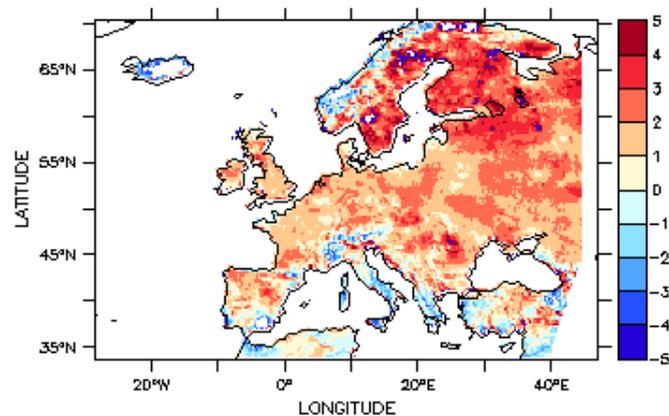


TIME : 17-FEB-2010 DATE: tn\_min\_SMHI-EOBS\_DJF



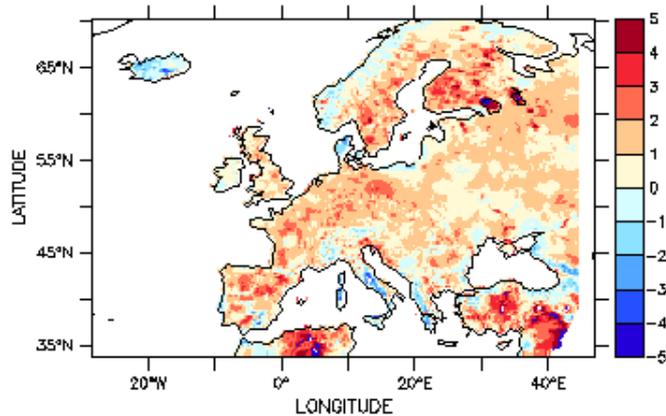
'SMHI - E-OBS, lowest TN, winter'

TIME : 17-FEB-2010 DATE: tn\_min\_UKMO-EOBS\_DJF



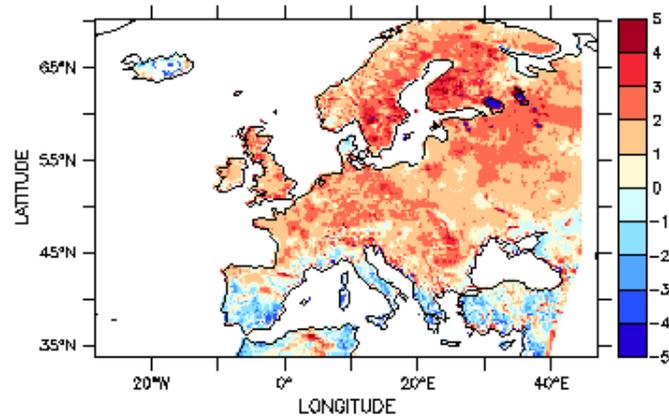
'UKMO - E-OBS, lowest TN, winter'

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

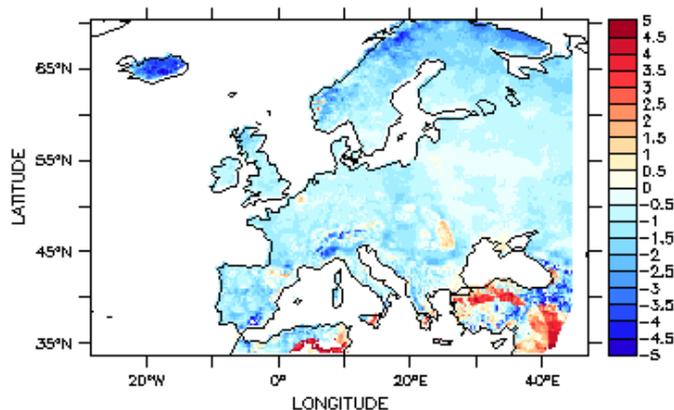


'UKMO - E-OBS, lowest TN, summer'

# Extremes in Tx

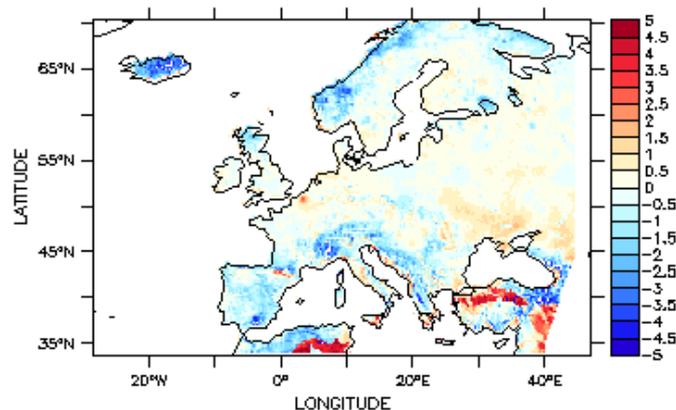


TIME : 17-FEB-2010 DATE GET: tx\_max\_SMHI-EOBS\_DJF



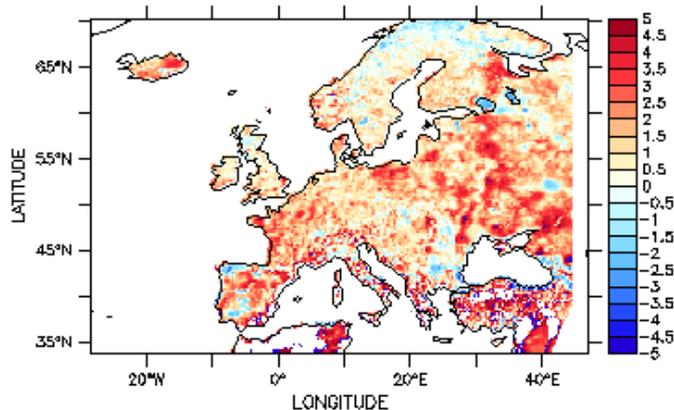
'SMHI - E-OBS, highest TX, winter'

TIME : 17-FEB-2010 DATE GET: tx\_max\_UKMO-EOBS\_DJF



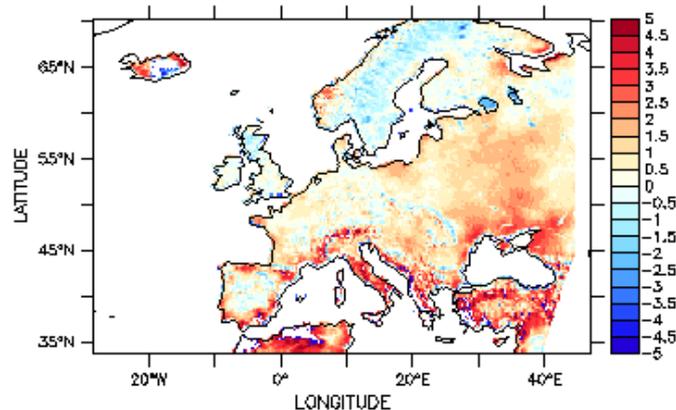
'UKMO - E-OBS, highest TX, winter'

TIME : 17-JUL-2010 DATE GET: tx\_max\_SMHI-EOBS\_JJA



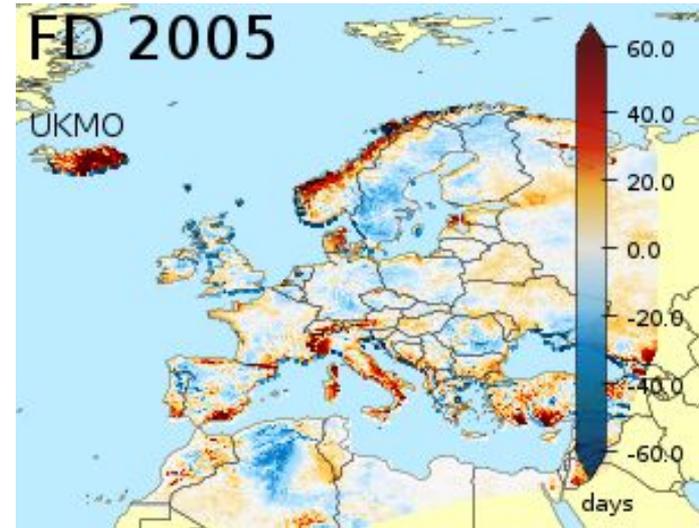
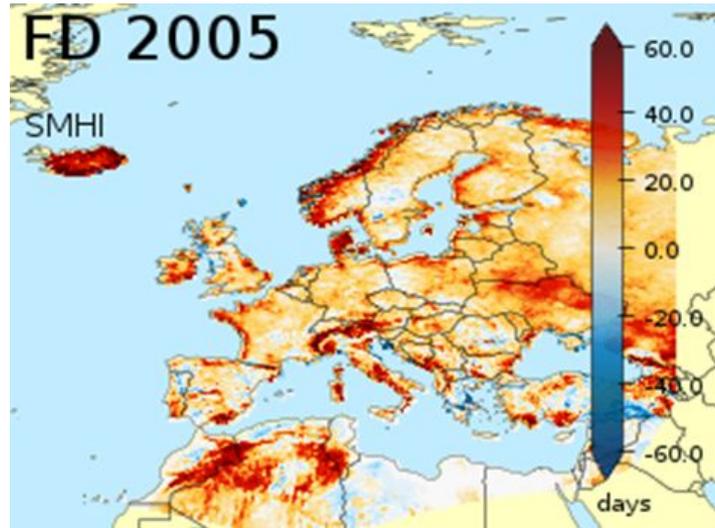
'SMHI - E-OBS, highest TX, summer'

TIME : 17-JUL-2010 DATE GET: tx\_max\_UKMO-EOBS\_JJA



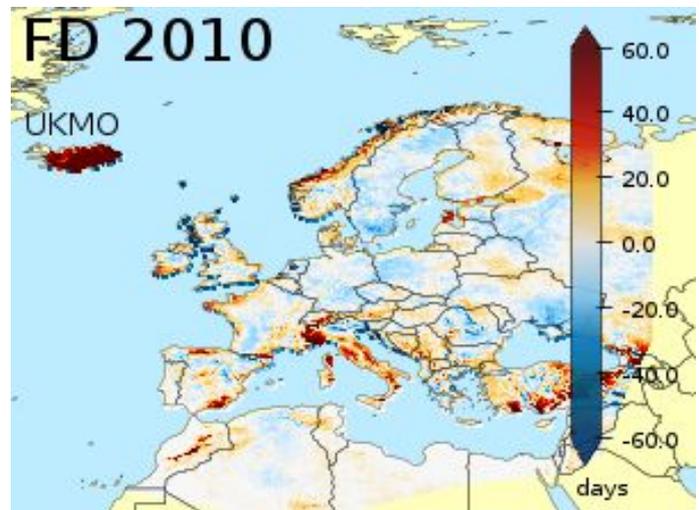
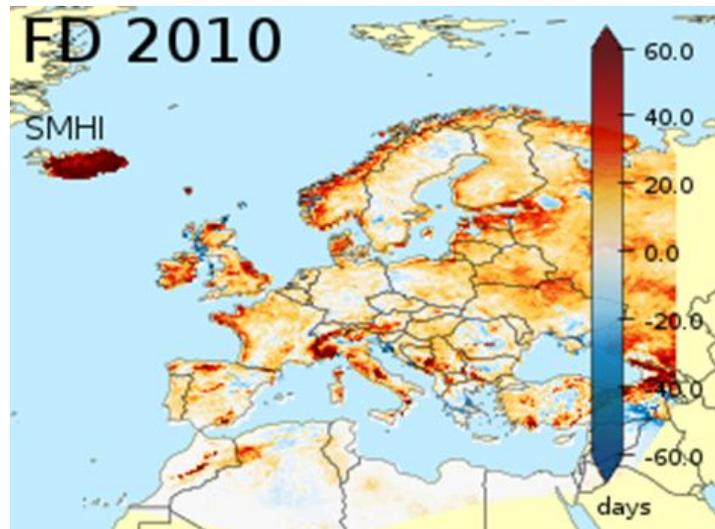
'UKMO - E-OBS, highest TX, summer'

# Frost Days

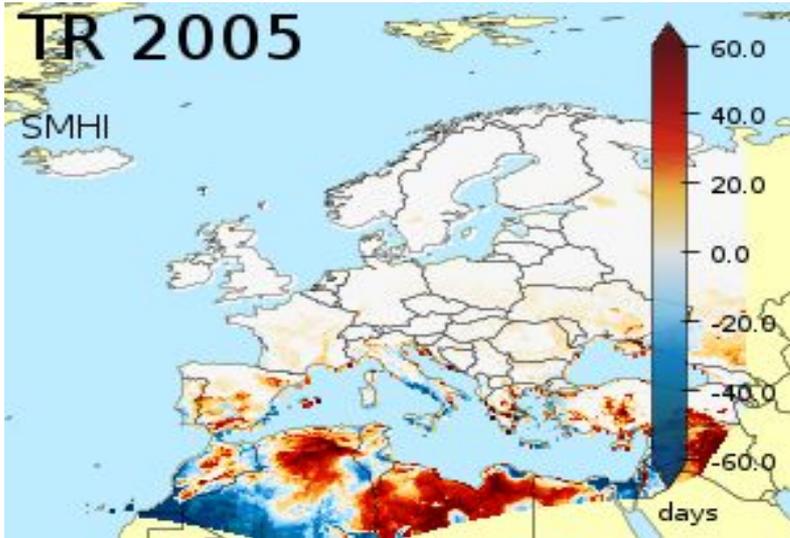


SMHI reanalysis: overestimation

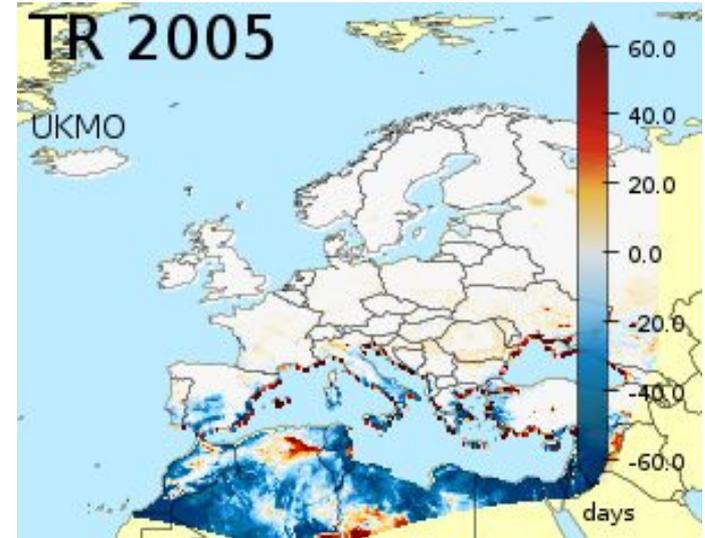
UKMO reanalysis: more balanced



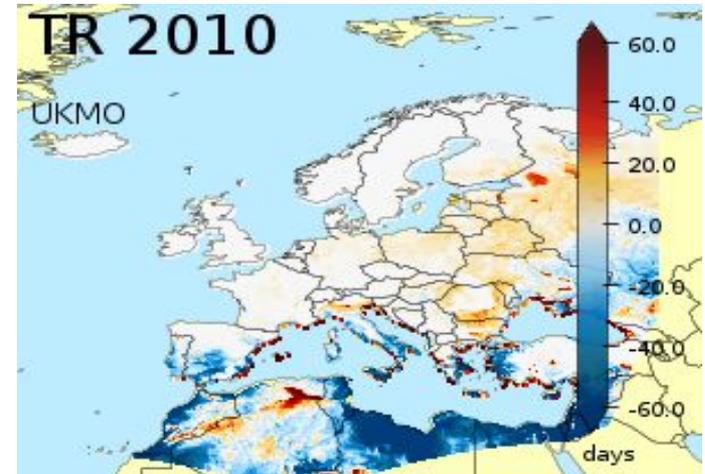
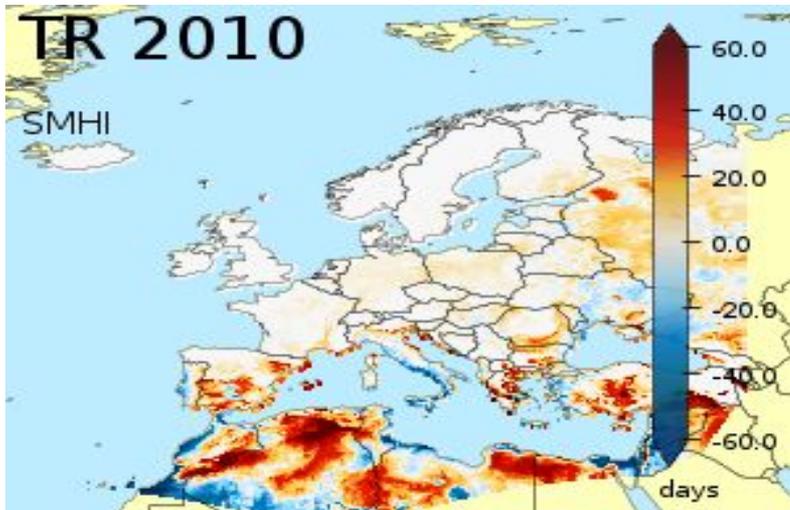
# Tropical Nights



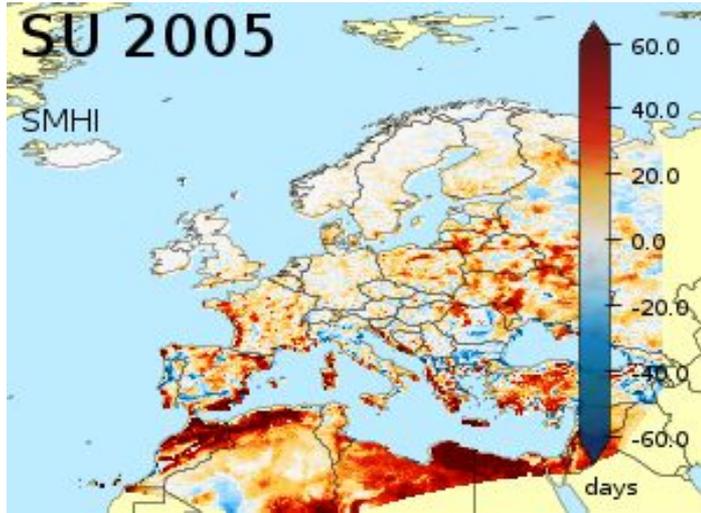
SMHI reanalysis: slight overestimation



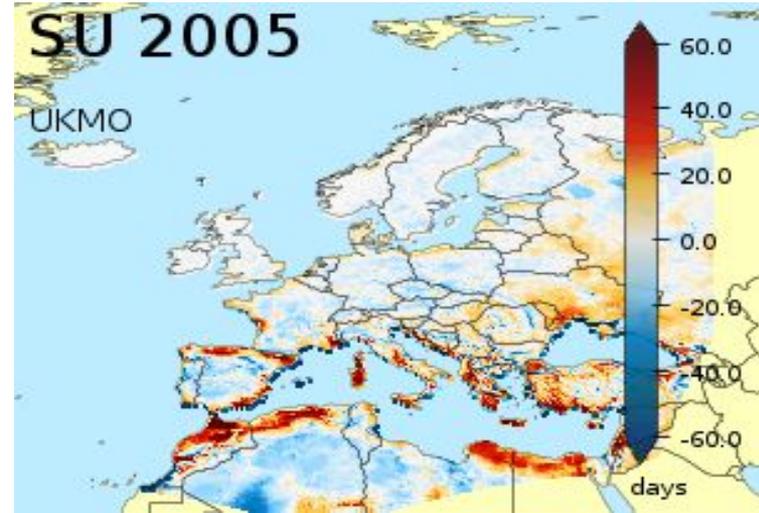
UKMO reanalysis: more mixed



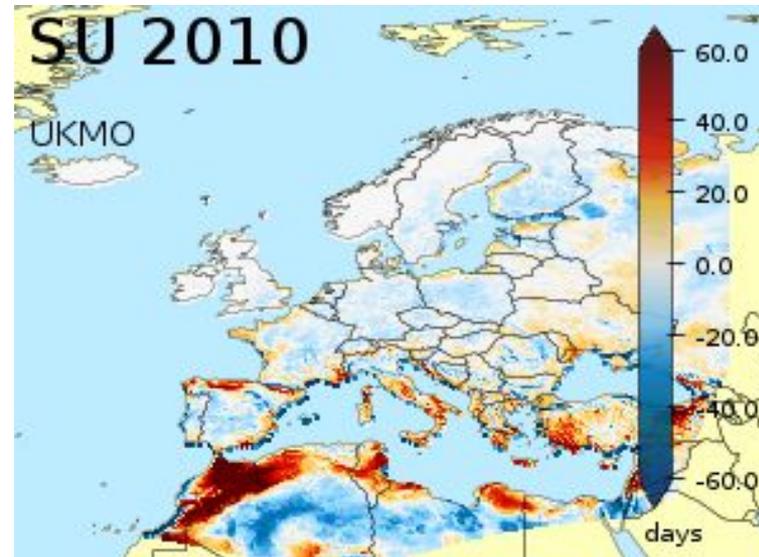
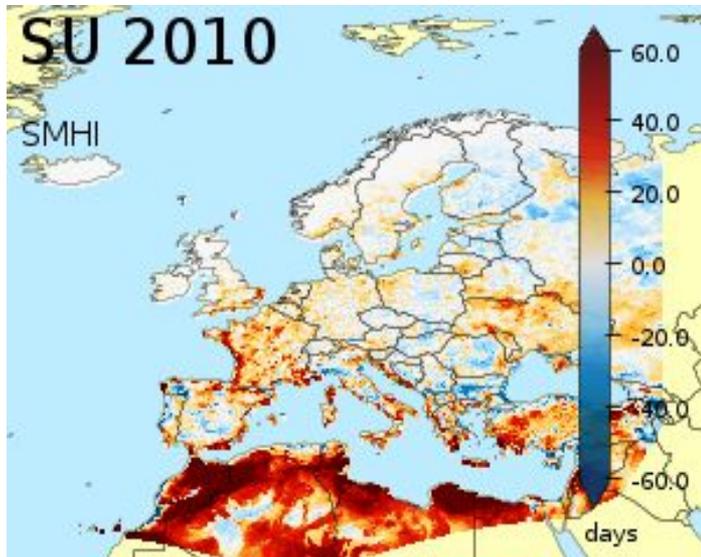
# Summer days



SMHI reanalysis: more balanced

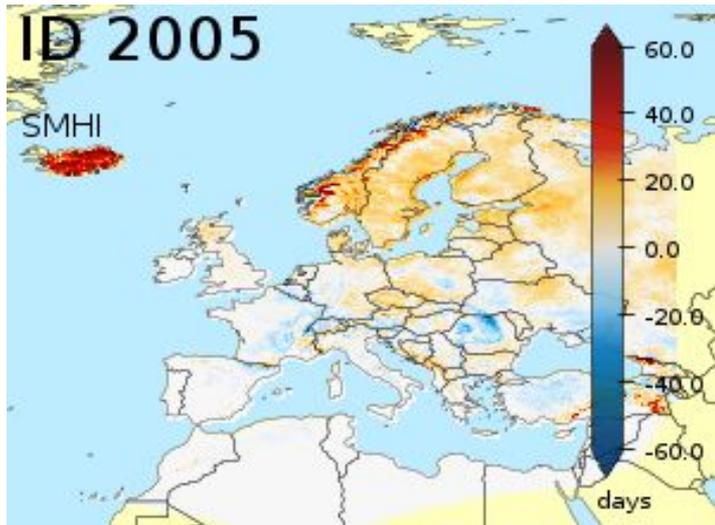


UKMO reanalysis: underestimated

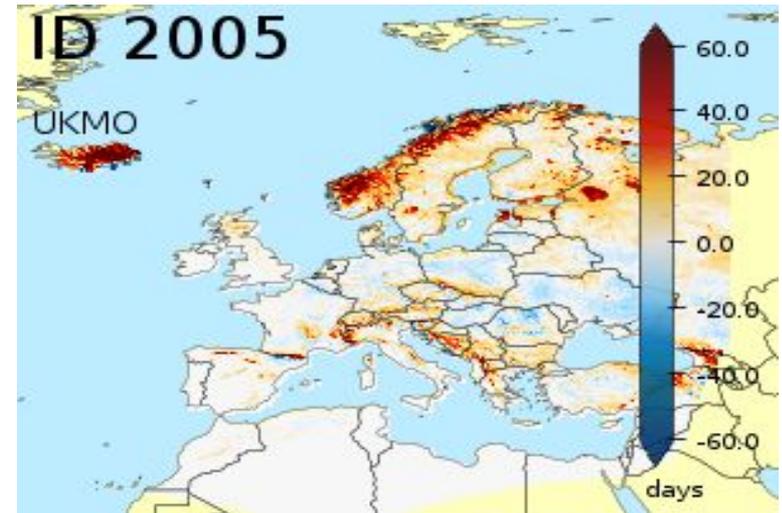




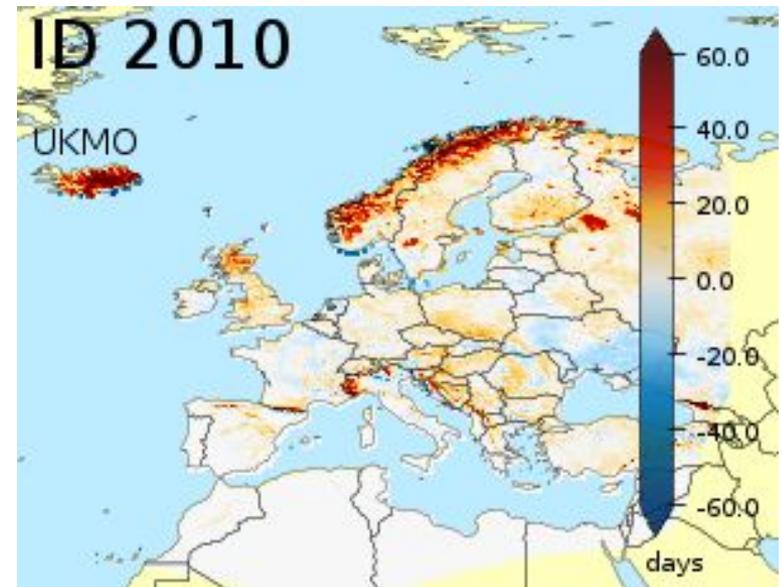
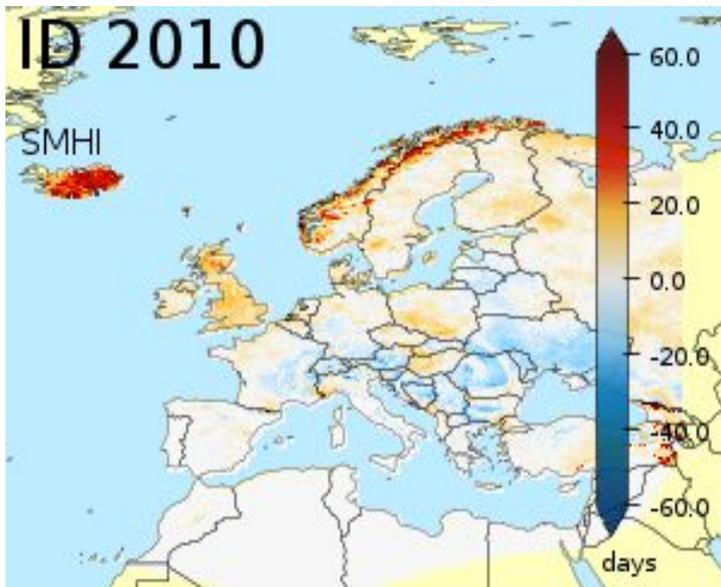
# Ice Days



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

