Comparing RCM outputs to observational data sets for extreme rainfall

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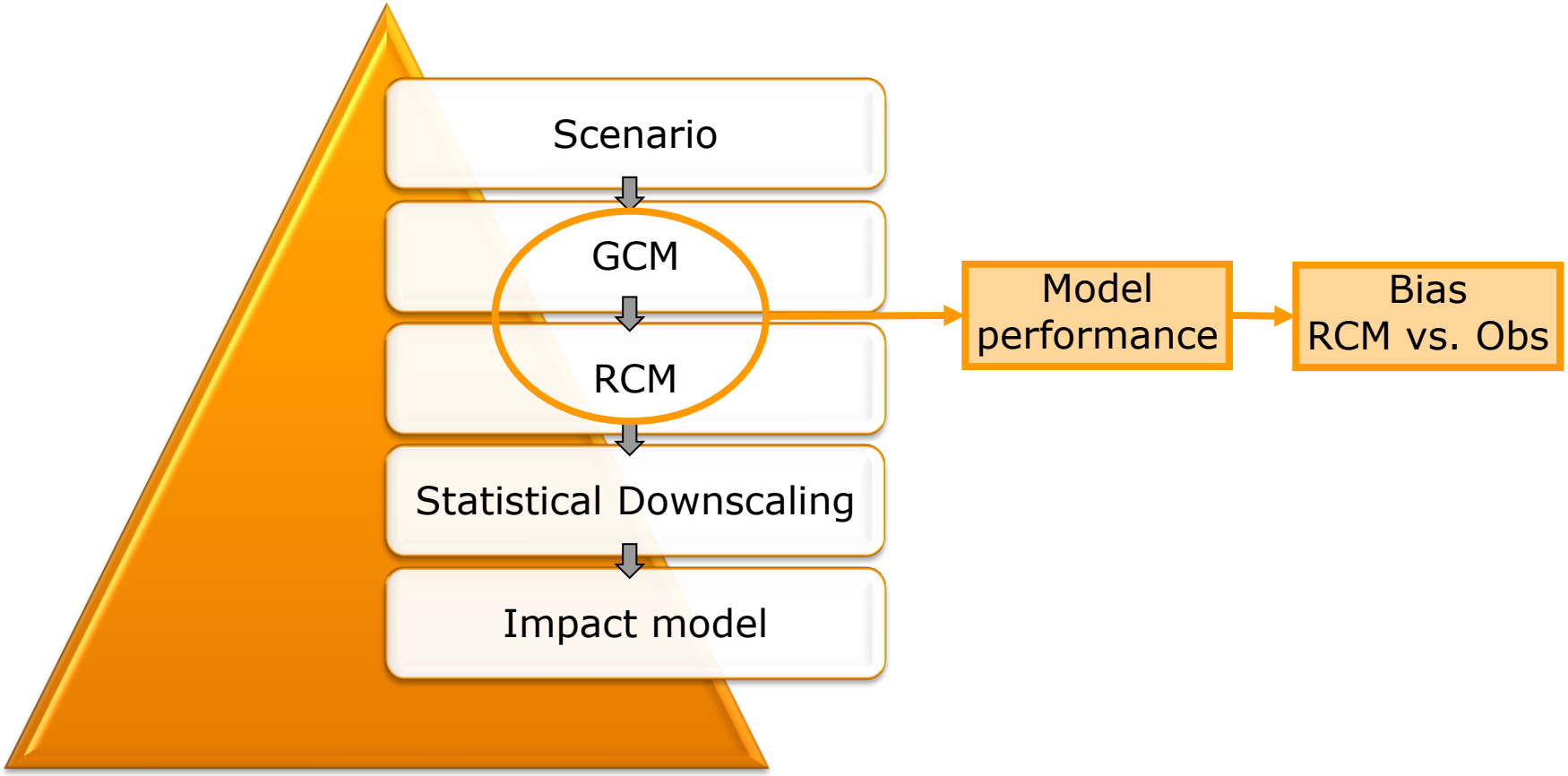
Introduction

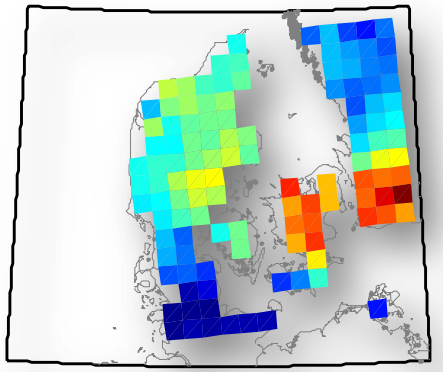


Datasets

Model performance → Bias **RCM** vs. Obs

Daily precipitation data

Ensembles of 15 RCMs



ENSEMBLES

	ARPEGE RM5.1	ECHAM5 -r3	BCM	HadCM3 Q3	HadCM3 Q16	HadCM3 Q0	ARPEGE
Aladin	1						
RACMO		1					
RCA		1	1	1			
REMO		1					
RCA3					1		
CLM						1	
HadRM3Q0						1	
HadRM3Q3				1			
HadRM3Q16					1		
HIRHAM5		1	1				1
RegCM		1					

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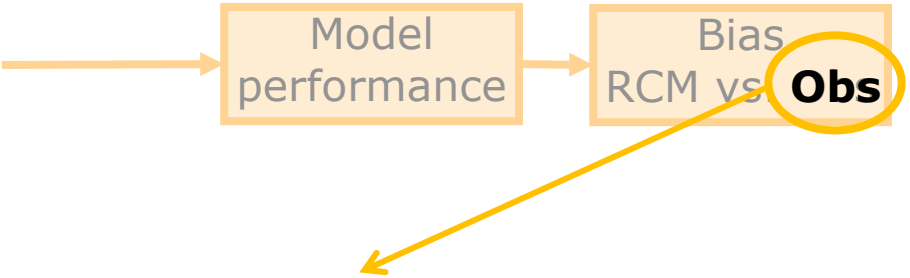
Datasets



Daily precipitation data

- ECA&D – station data
- E-Obs – grid data
- ERA-Interim – reanalysis data

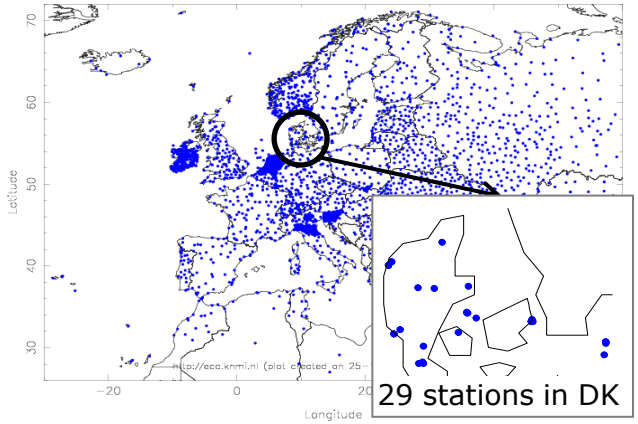
Datasets

Model performance → Bias RCM vs **Obs**

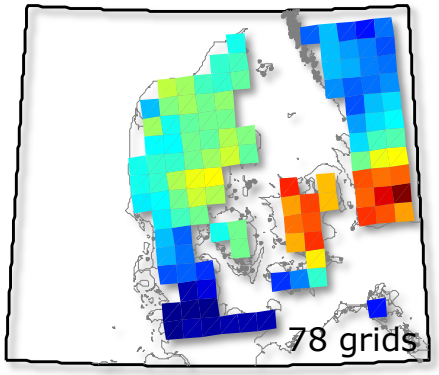
- **ECA&D**
- **E-Obs**
- ERA-Interim
  - Global atmospheric reanalysis (ECMWF)
  - 1979-2011

- 1950-2011

ECA&D ~4000 stations



E-OBS 25*25km



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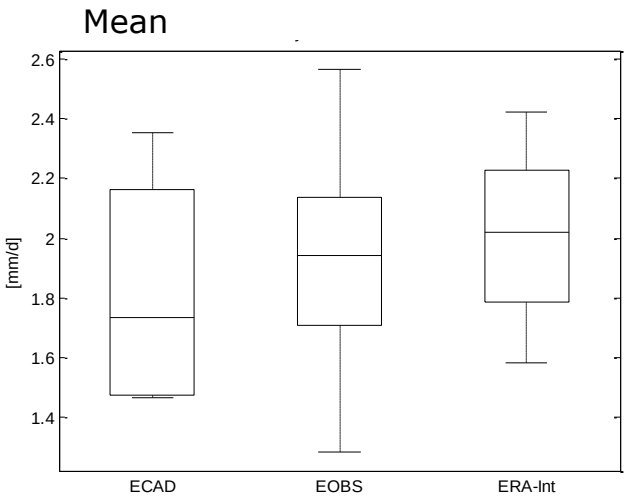
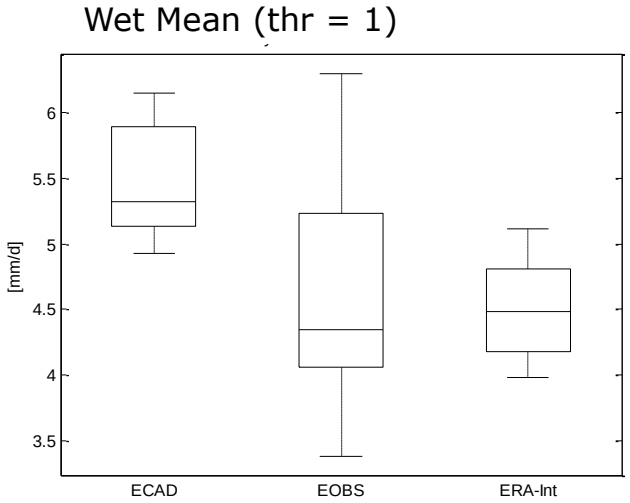
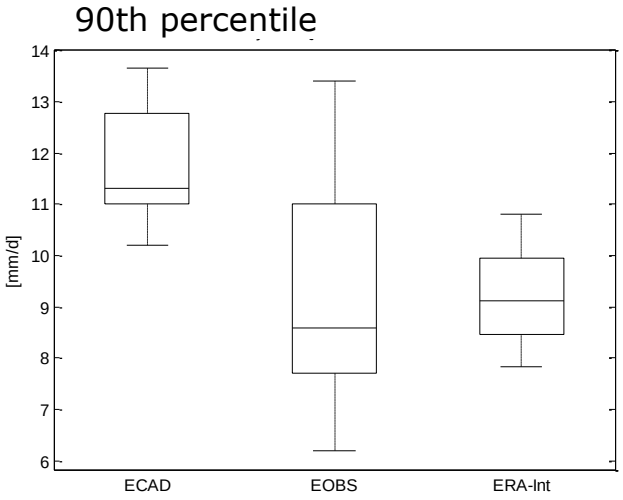
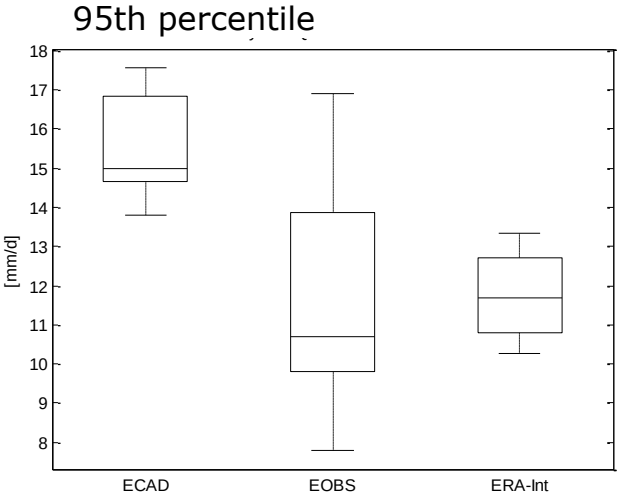
3 observational datasets





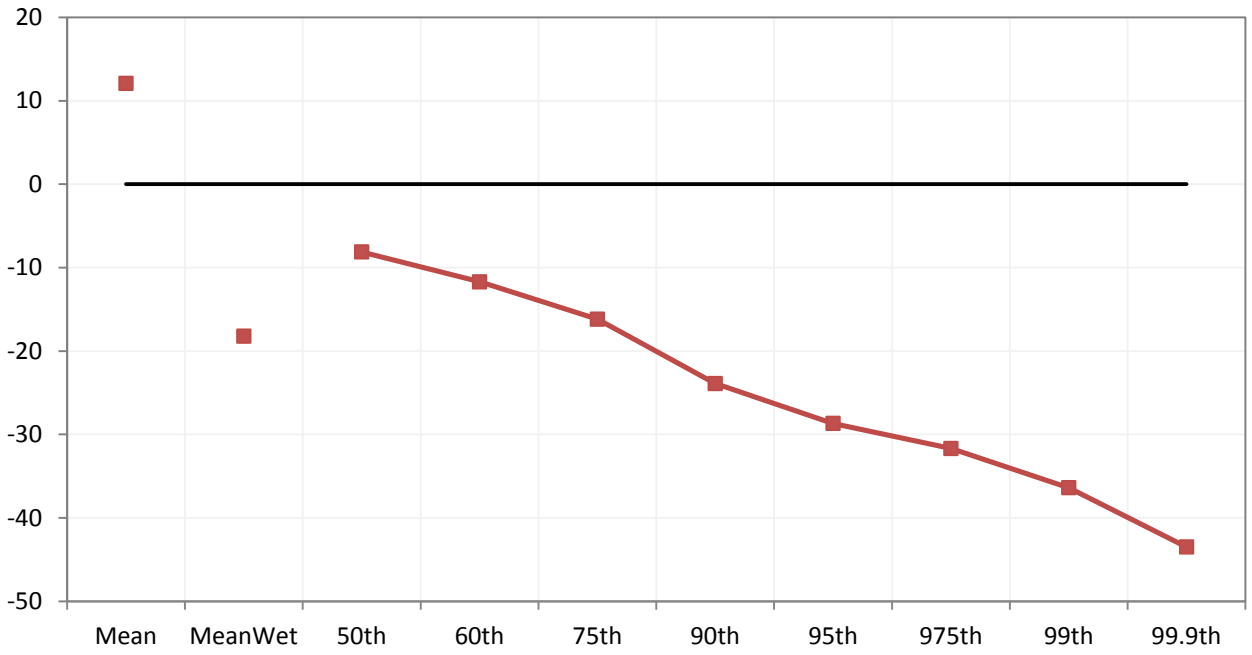




Grid vs. Station

- E-Obs compared to statistics form ECA&D

$$\frac{EObs - ECAD}{ECAD} \cdot 100$$



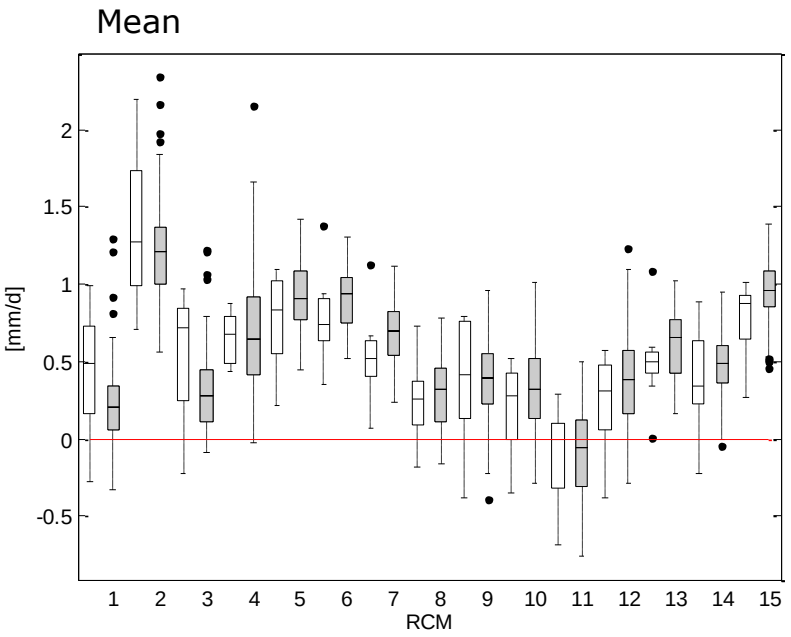
Observations vs. RCMs

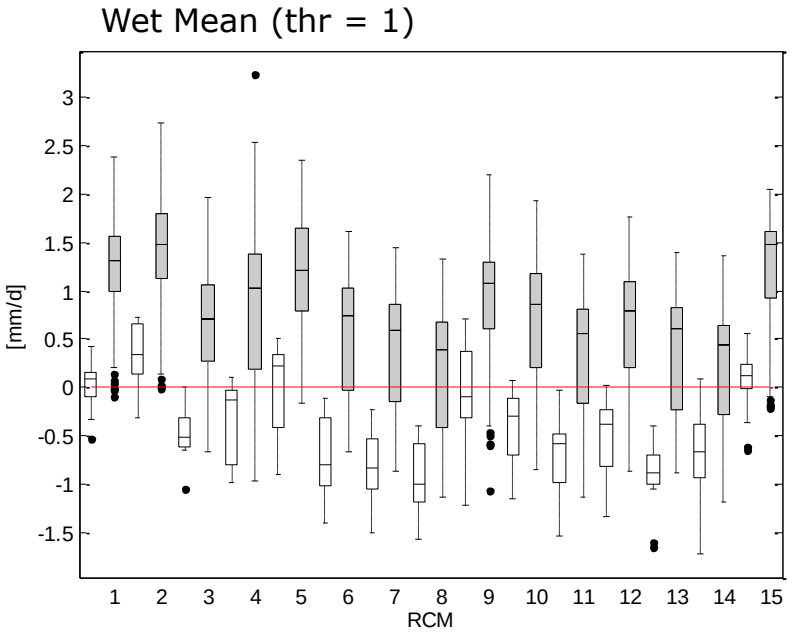
Bias = RCM - Obs

- Mean statistics

EObs

ECAD





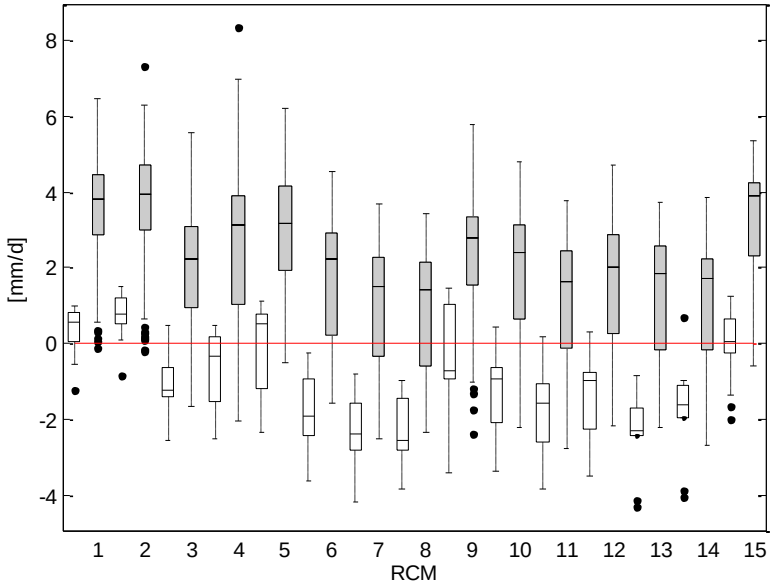
Observations vs. RCMs

Bias = RCM - Obs

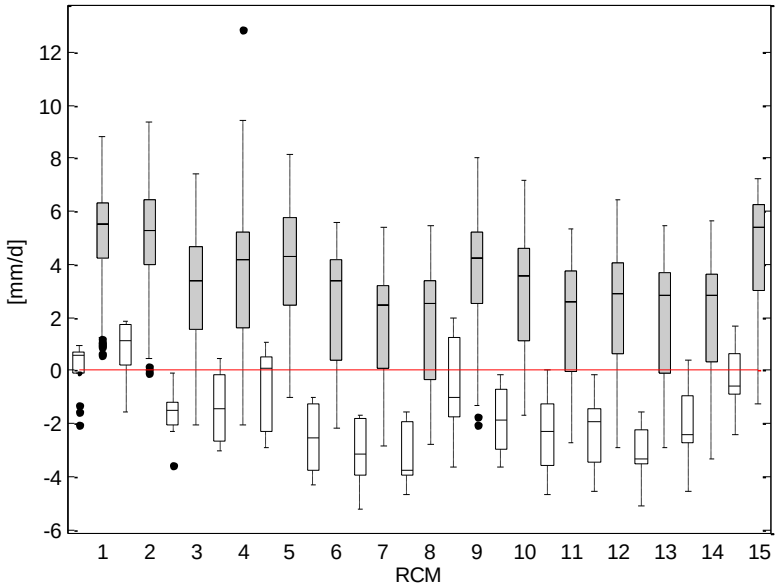
- Upper tail

EObs
ECAD

90th percentile



95th percentile



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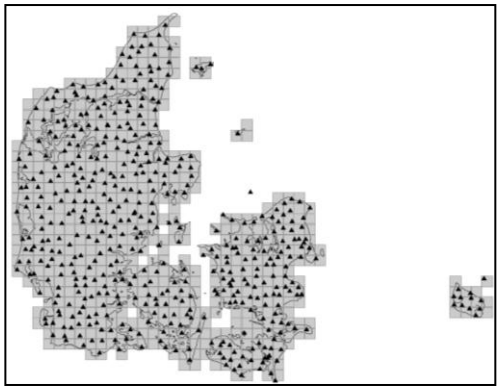
Ranking RCMs

	Mean	
Ranking	ECAD	EOBS
1	11	11
2	8	1
3	10	3
4	12	10
5	14	8
6	9	12
7	1	9
8	13	14
9	7	4
10	4	13
11	3	7
12	6	5
13	5	6
14	15	15
15	2	2

Danish gridded data vs. E-Obs

- 2 issues:
  - Scale problem (Grid versus station comparison)
  - Quality of gridded data
    - DMI vs. EObs



- Approx. 500 stations
- 10*10km
- 1989-2010

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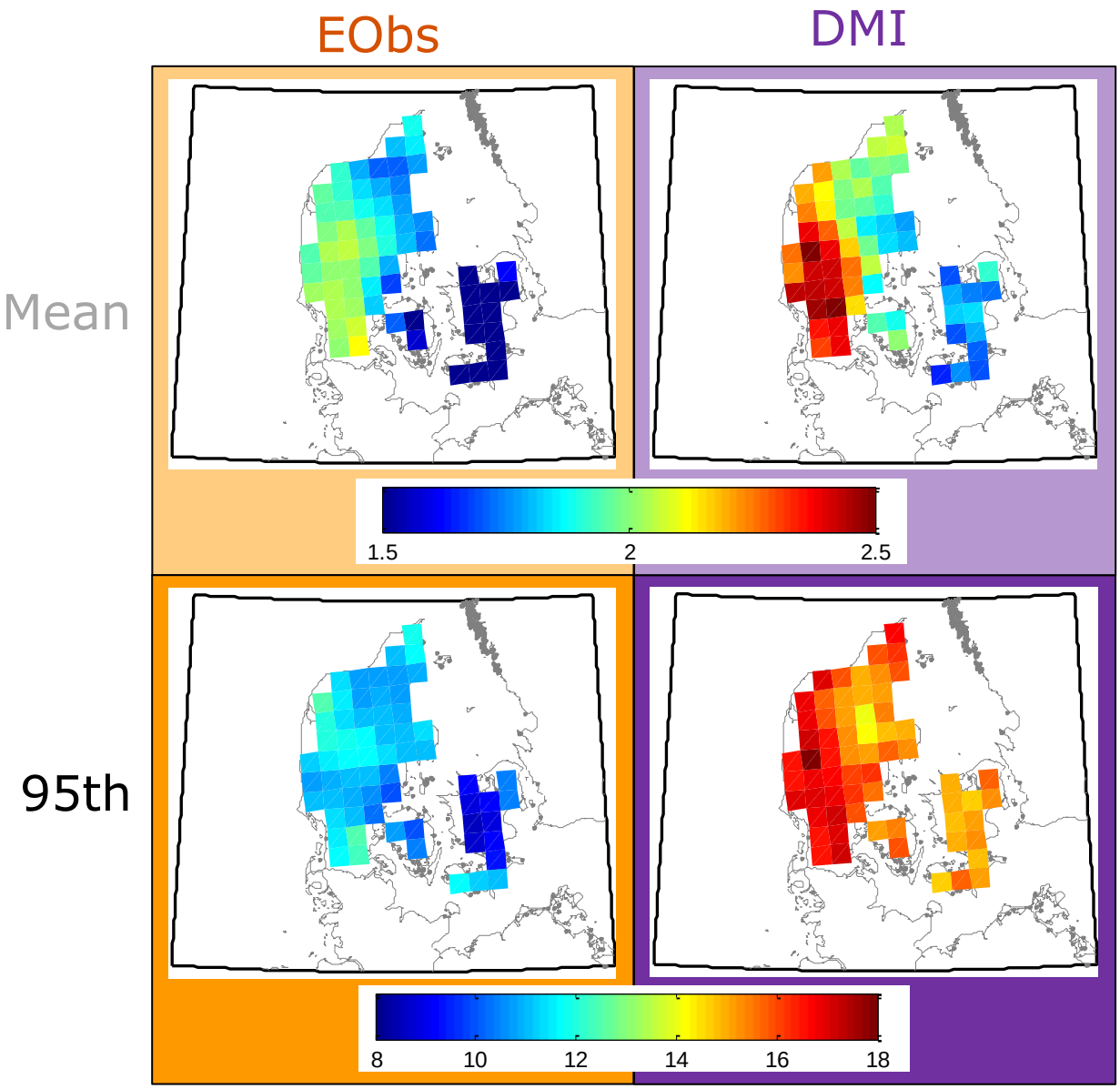

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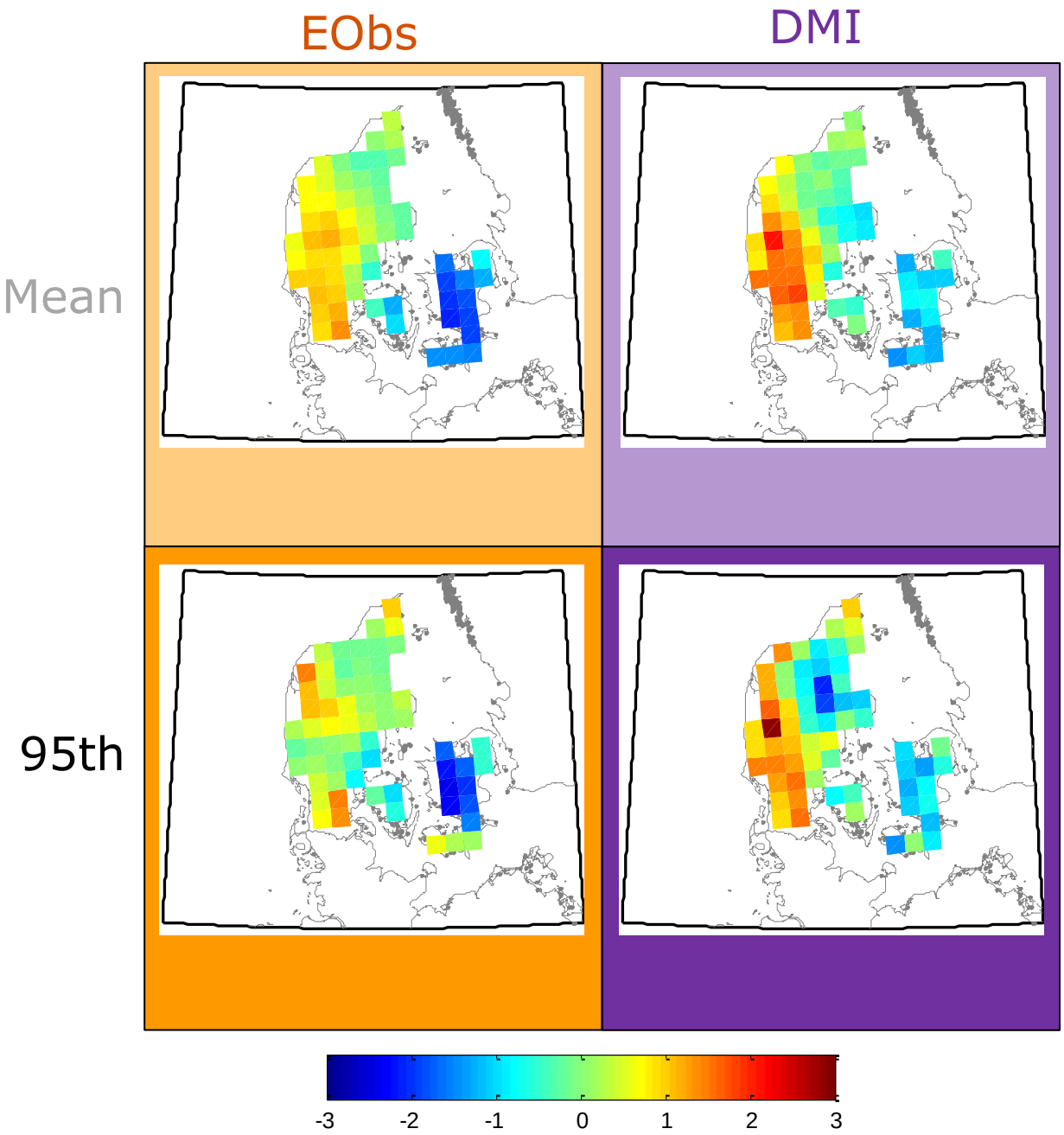

$$\frac{x_i - mean}{st.dev}$$

Summary

- Interpretation of observations – scale problem
  - In extreme rainfall ⟹ Point data – Grid data (areal mean)

- RCMs output { Point data – ECAD / Areal Mean – EObs } different ranking !

- EObs is freely available, but we need to be aware of its limitations
  ⟹ Over-smoothing due to network density

Thanks for your attention

Acknowledgments

The **ENSEMBLES** and **E-OBS** data used in this work was funded by the EU FP6 Integrated Project ENSEMBLES (Contract number 05539) whose support is gratefully acknowledged.

We acknowledge the data providers in the **ECA&D** project. Klein Tank, A.M.G. and Co-authors, 2002. Daily dataset of 20th-century surface air temperature and precipitation series for the European Climate Assessment. Int. J. of Climatol.,22, 1441-1453. Data and metadata for ECA&D and E-OBS is available at http://eca.knmi.nl.

We wish to thank ECMWF for providing **ERA-Interim** reanalysis data (http://data.ecmwf.int/data/).

This work was partly funded by the Danish Strategic Research Council through the project **RiskChange** (http://riskchange.dhigroup.com/).

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