Hydro - CH2018 Coordination Meeting

10. May 2017, Haus des Sports, Ittigen

Kuno Strassmann (C2SM/ETHZ)
Andreas Fischer (MeteoSchweiz)

What's new in CH2018

- Better climate simulations
- Observations of past trends and variability
- Additional variables and sector-specific indices
- Quantitative information on extreme weather events
- Improved scenarios at local scale
- Increased attention to user's needs and intensified stakeholder dialog

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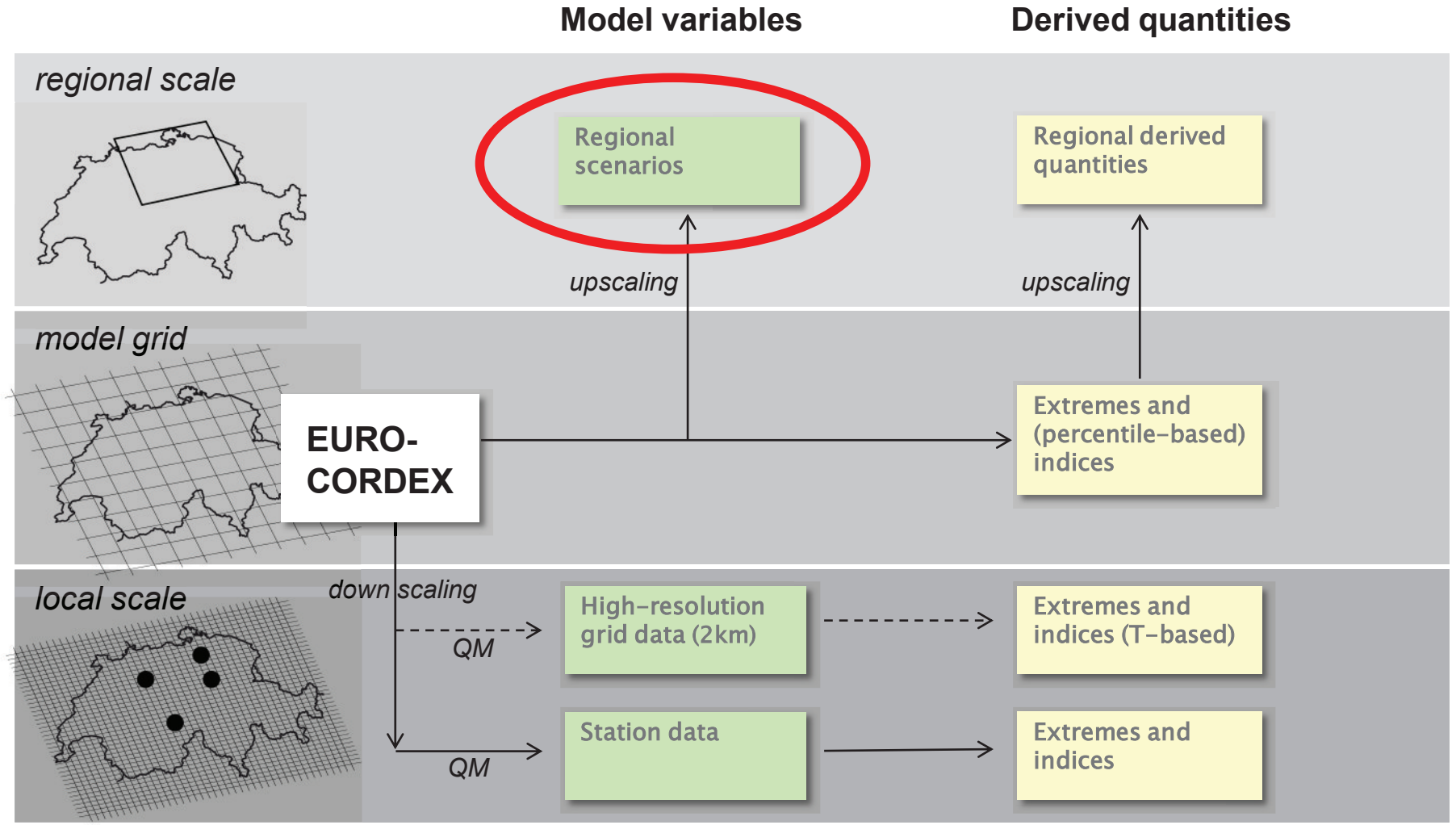
Outline

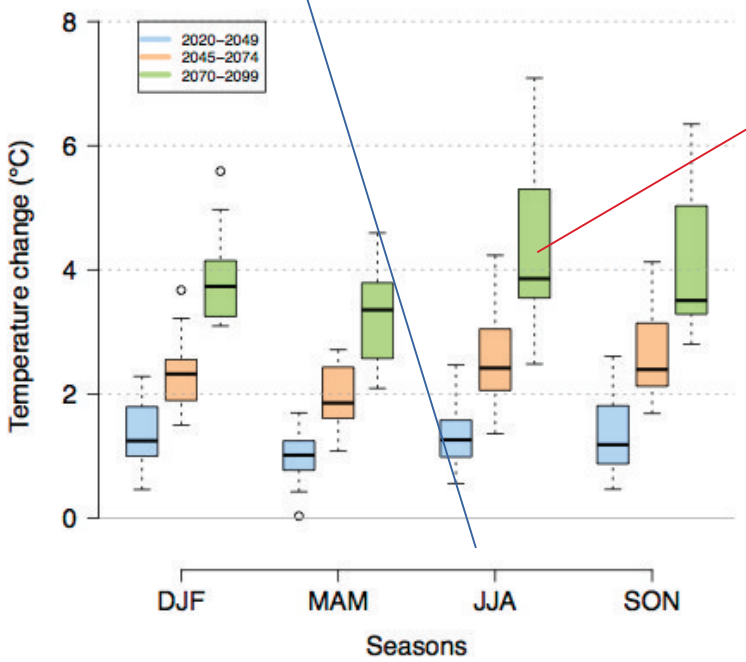
- Part 1: Data products
- Part 2: Simulation ensemble and availability


Model variables
Derived quantities
regional scale
Regional scenarios
Regional derived quantities
upscaling
upscaling
model grid
EURO-CORDEX
Extremes and (percentile-based) indices
down scaling
local scale
QM
High-resolution grid data (2km)
Extremes and indices (T-based)
QM
Station data
Extremes and indices

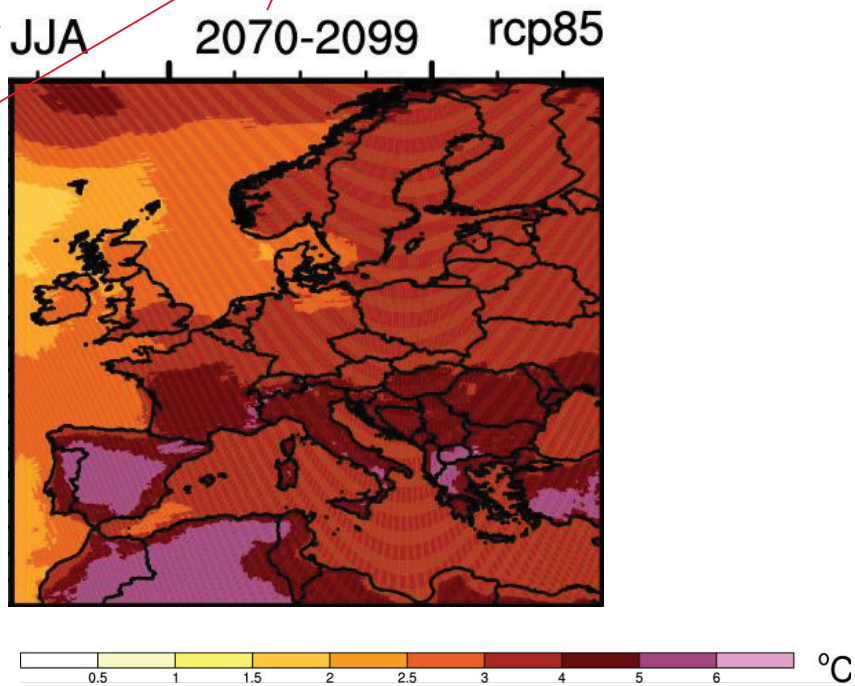
Mean temperature change (like CH2011)

Seasons

Time periods

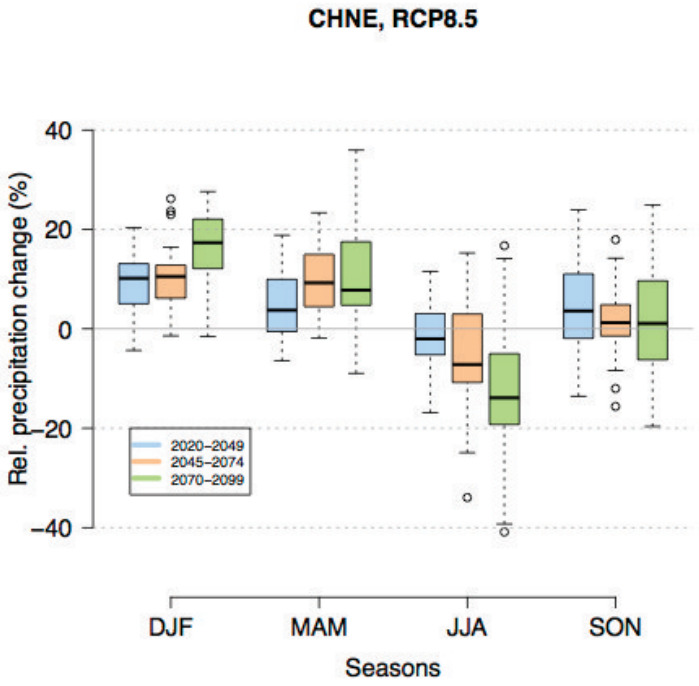


Projected future change of temperature (in °C) for winter (DJF: December - February), spring (MAM: March - May), summer (JJA: June - August) and autumn (SON: September - November) in northeastern Switzerland (CHNE). Projections are for 30-years averages centered at 2035 (blue), 2060 (orange) and 2085 (green) with respect to the reference period 1981-2010 (C. Spirig, S. Soerland).

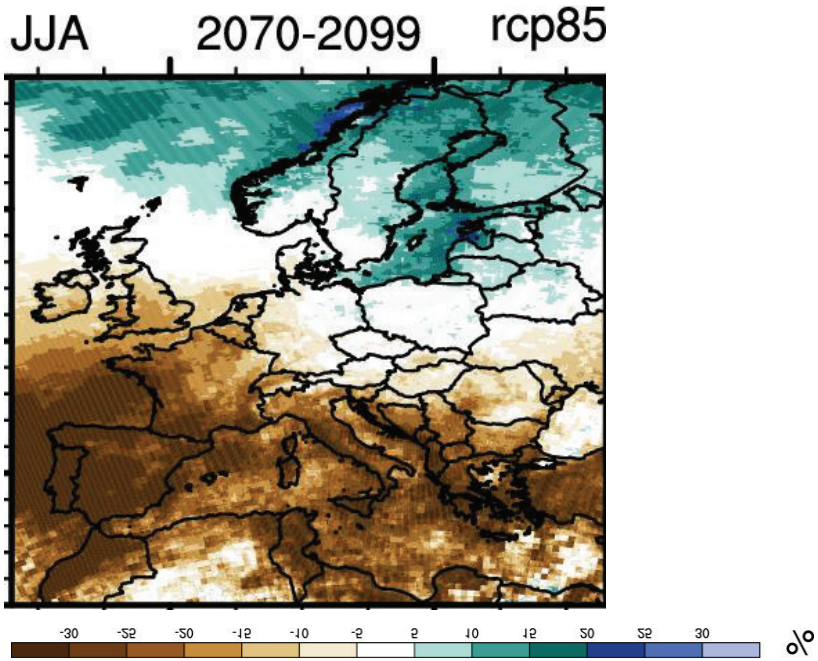


Projected future change of temperature (in °C) over Europe by 2035, 2060 and 2085 for summer (JJA: June – August). Shown is the multi model median of the combined simulations of different resolutions from the EURO-CORDEX ensemble (see Chapter 2.3) for RCP8.5 (C. Spirig, S. Soerland).

Mean precipitation change (like CH2011)

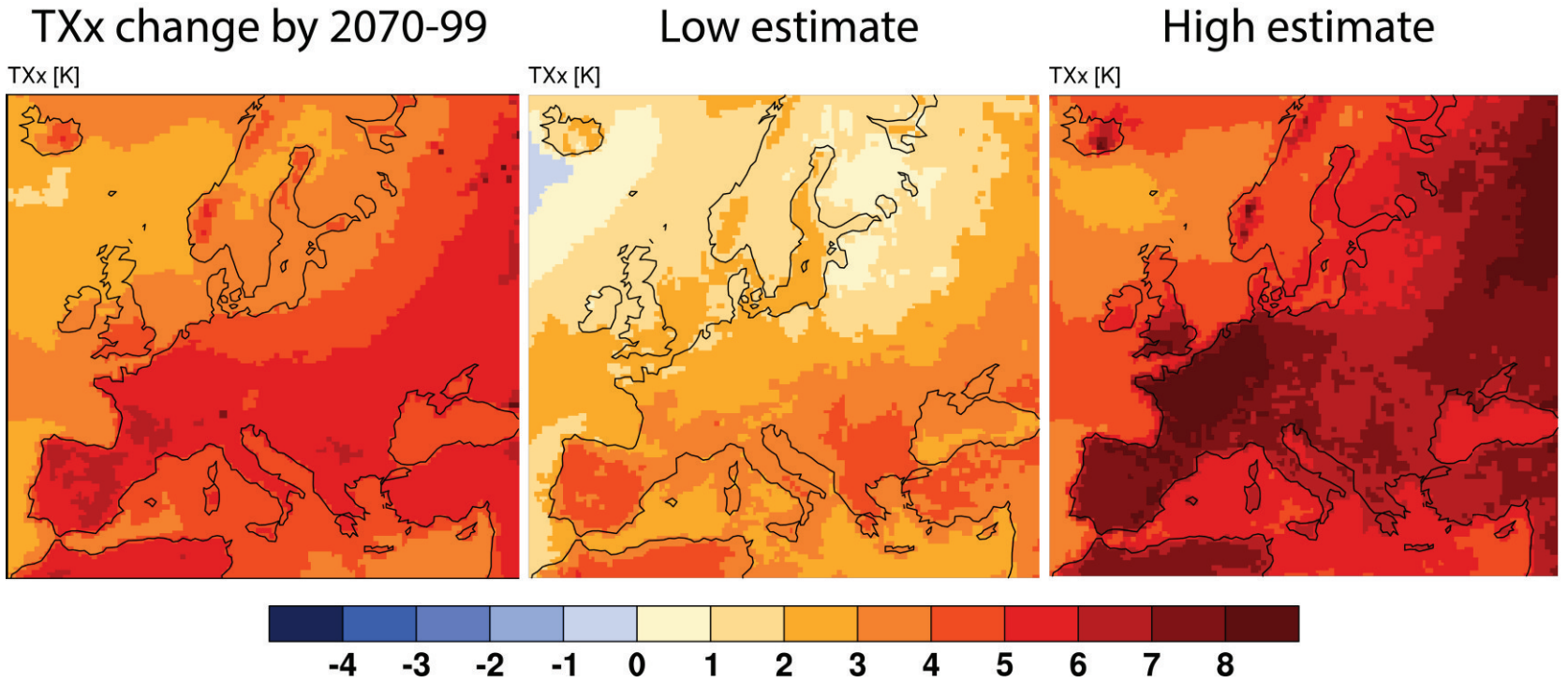


Projected future change of precipitation (%) for winter (DJF: December - February), spring (MAM: March - May), summer (JJA: June - August) and autumn (SON: September - November) in northeastern Switzerland (CHNE). Projections are for 30-years averages centered at 2035 (blue), 2060 (orange) and 2085 (green) with respect to the reference period 1981-2010 (C. Spirig, S. Soerland).



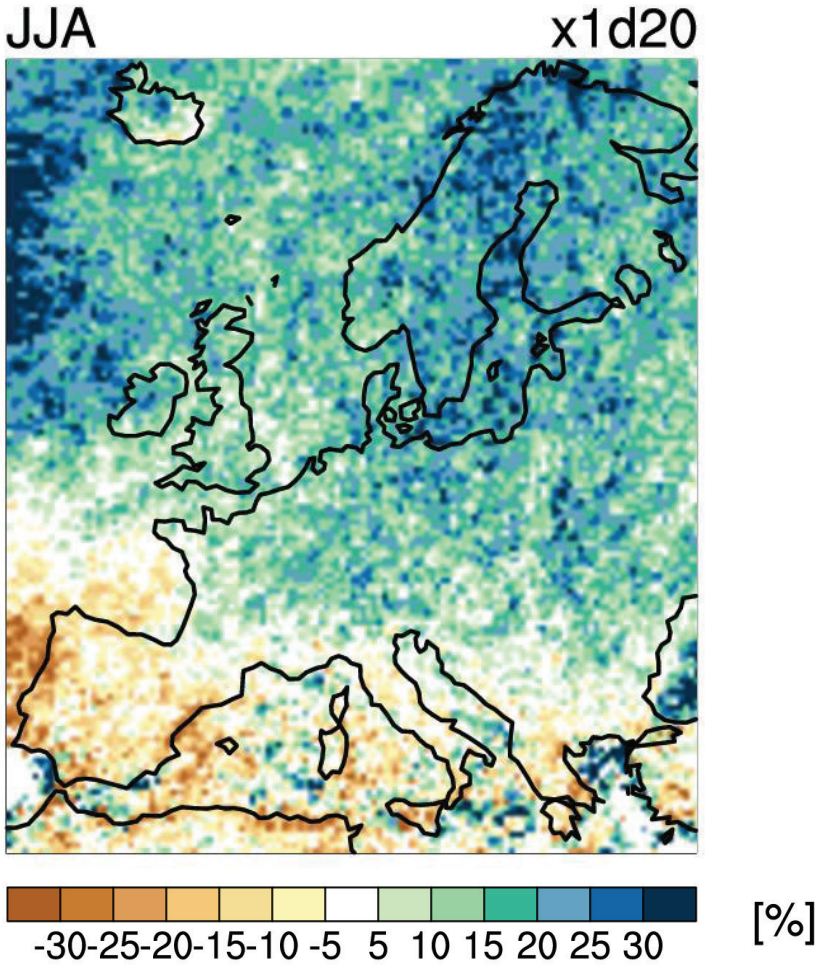
Projected future change of temperature (%) over Europe by 2035, 2060 and 2085 for summer (JJA: June – August). Shown is the multi model median of the combined simulations of different resolutions from the EURO-CORDEX ensemble (see Chapter 2.3) for RCP8.5 (C. Spirig, S. Soerland).

Temperature extremes

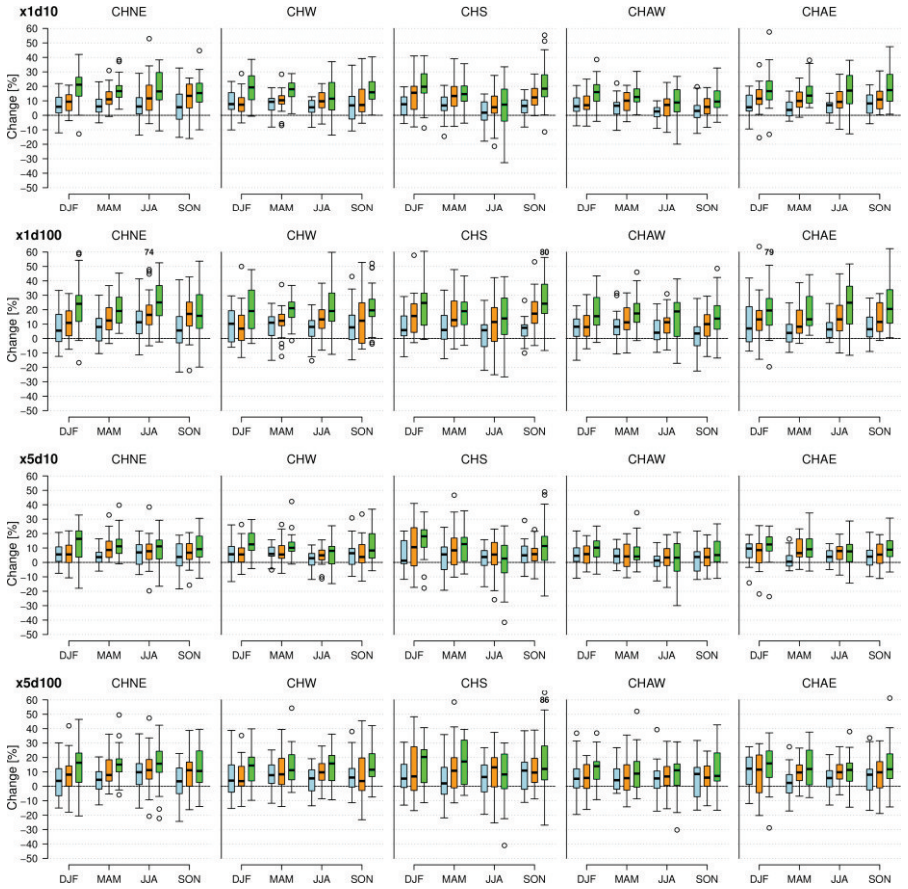


Multi-model mean change in hot extremes (TXx) by end of 21st century with respect to present-day conditions along with low and high estimate (E. Fischer).

Precipitation extremes

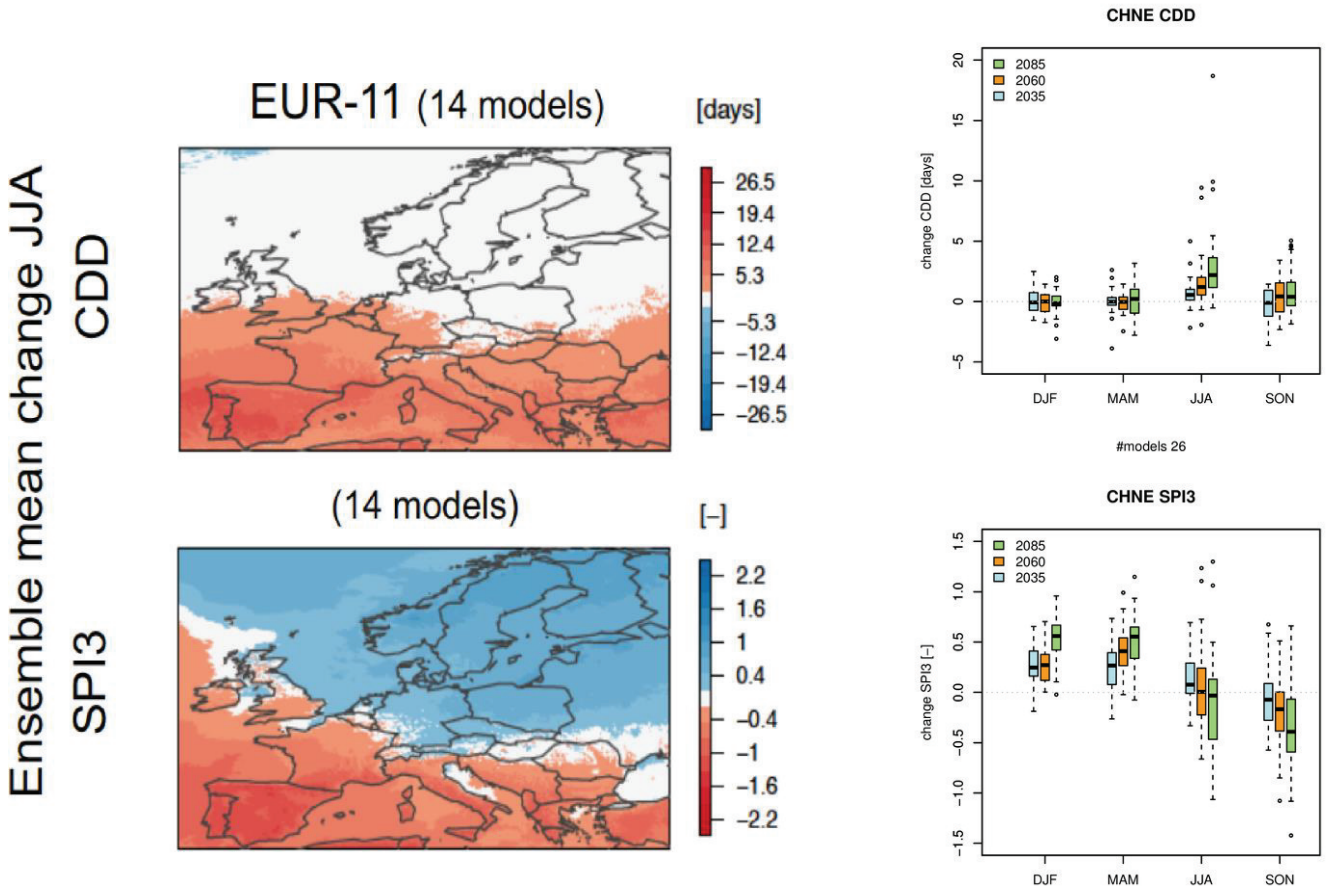


Multi-model median projected change in the 20-year return value (x1d20) for summer (JJA) and RCP8.5 period 2070-2099 with respect to 1981-2010 (J. Rajczak).

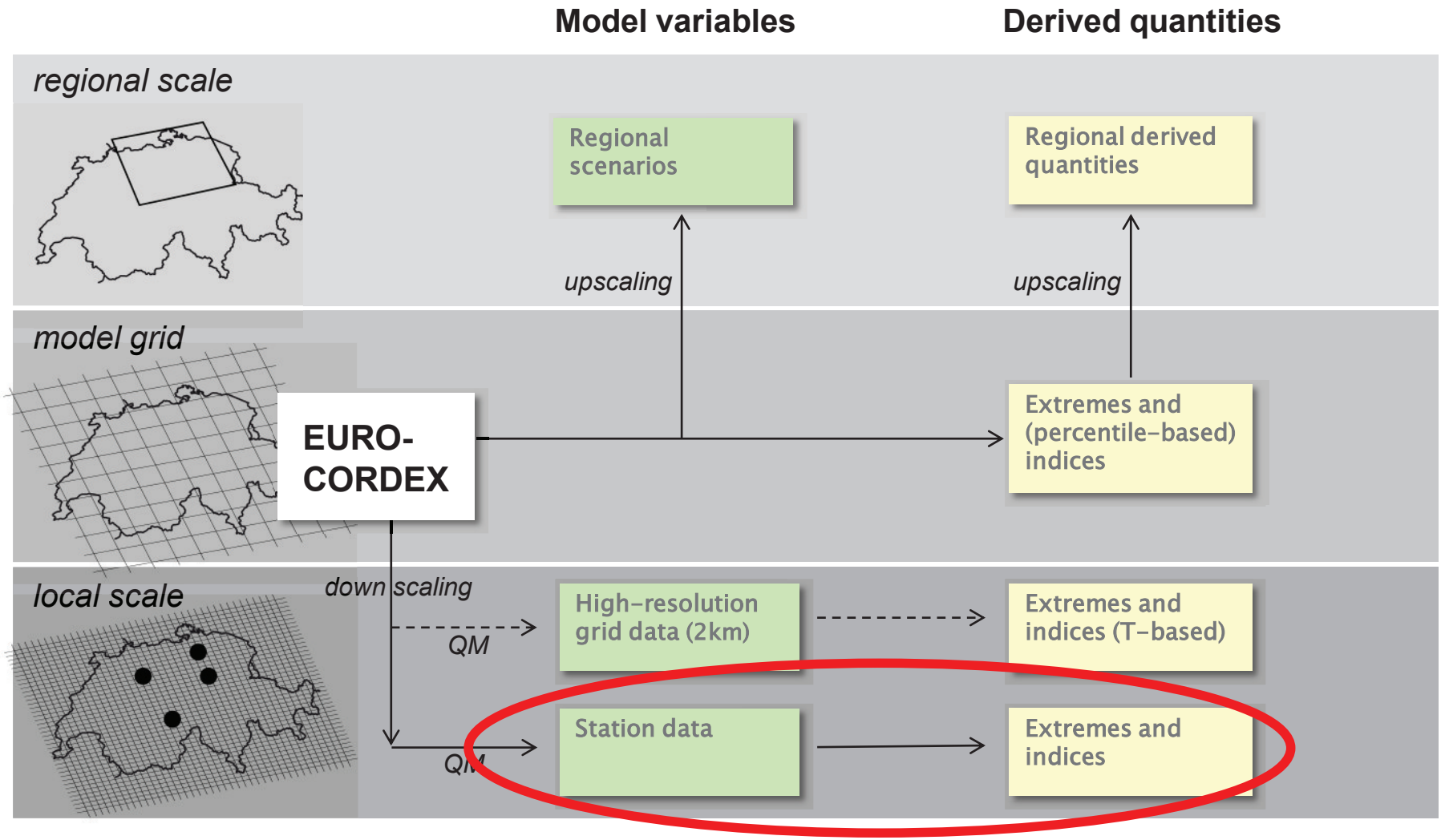


Multi-model ensemble estimates of projected change … (J. Rajczak).

Drought indices



Ensemble mean changes of the meteorological drought indices (CDD and SPI3) by 2070-2099 (M. Hirschi, R. Wartenburger).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regional scale
Regional scenarios
Regional derived quantities
upscaling
upscaling
model grid
EURO-CORDEX
Extremes and (percentile-based) indices
down scaling
local scale
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High-resolution grid data (2km)
Extremes and indices (T-based)
QM
Station data
Extremes and indices

Station data (Quantile-Mapping)

- Temperature

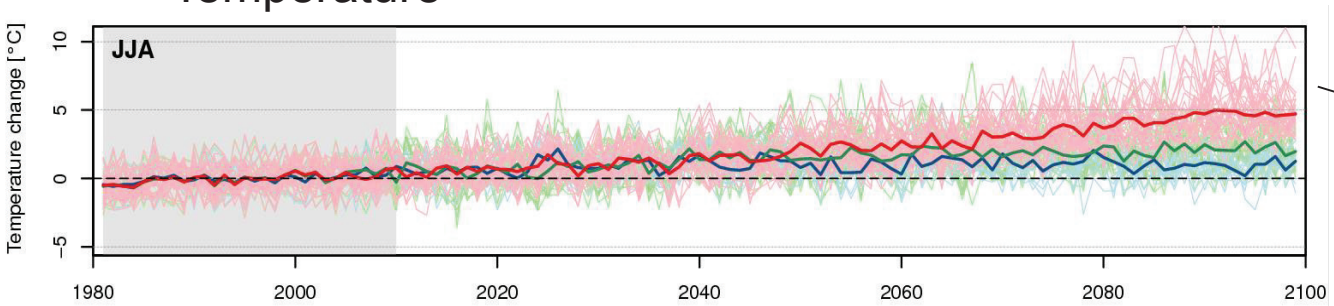
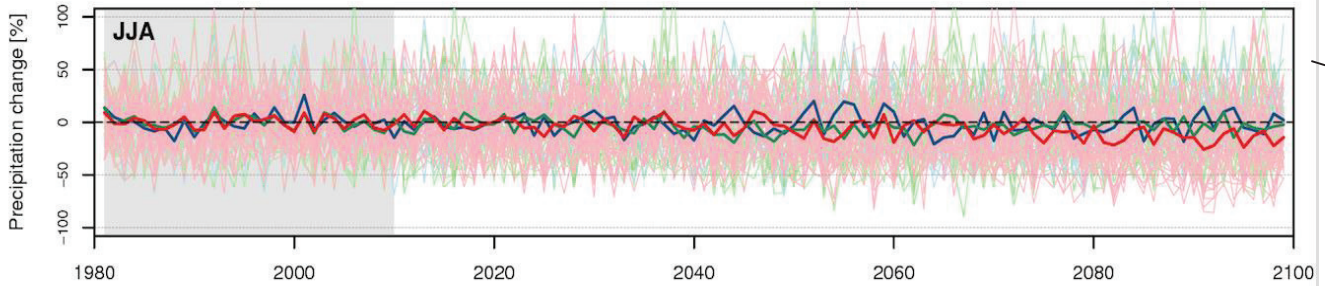


Figure 4.19. Temporal evolution of mean seasonal temperature climate change signal at station SMA for all model chains (colour-coded by RCP; S. Kotlarski et al.).

- Precipitation



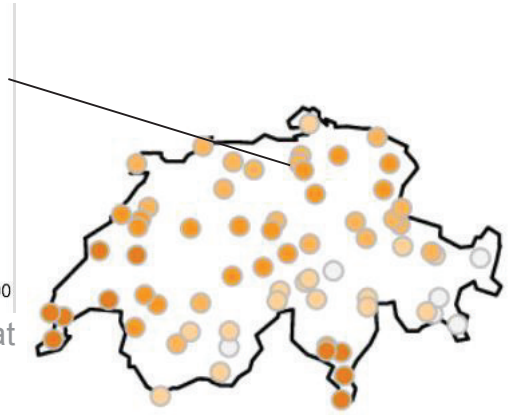
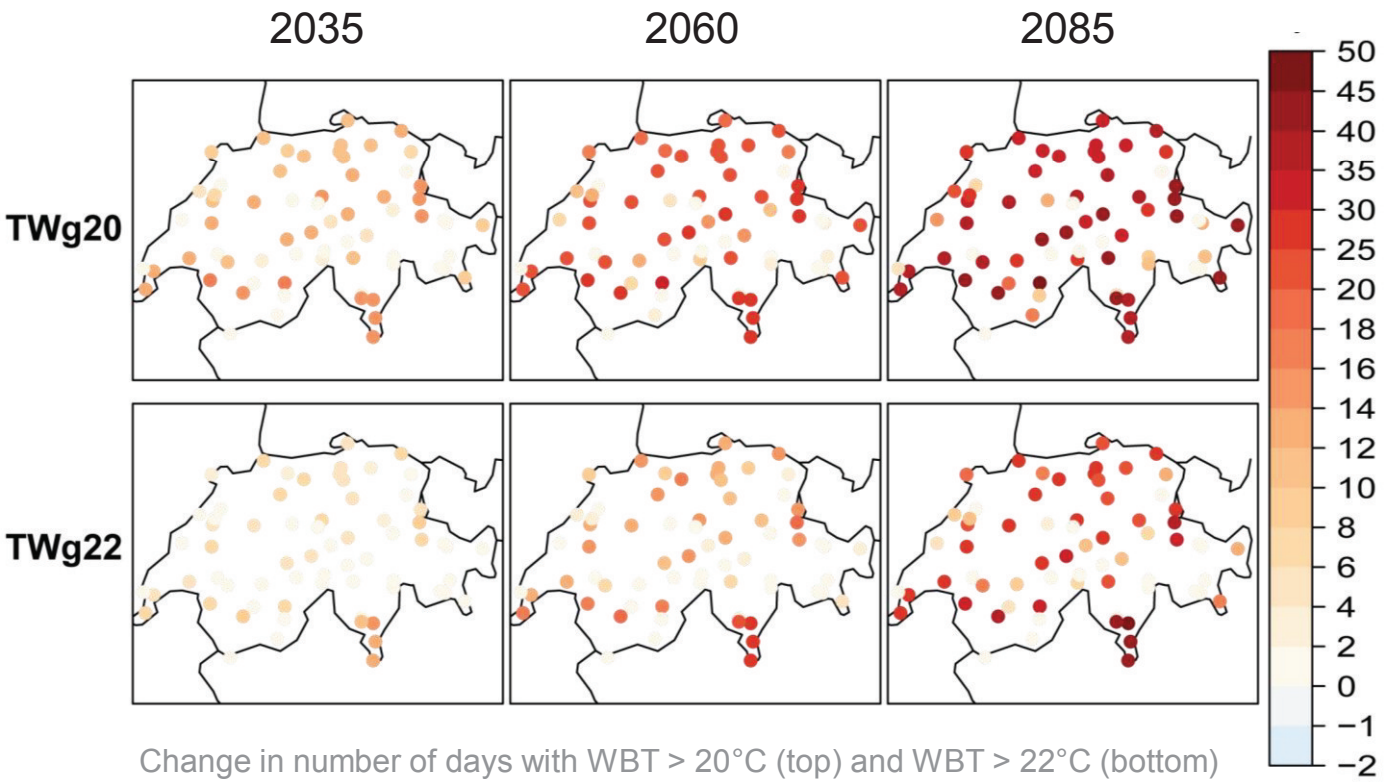


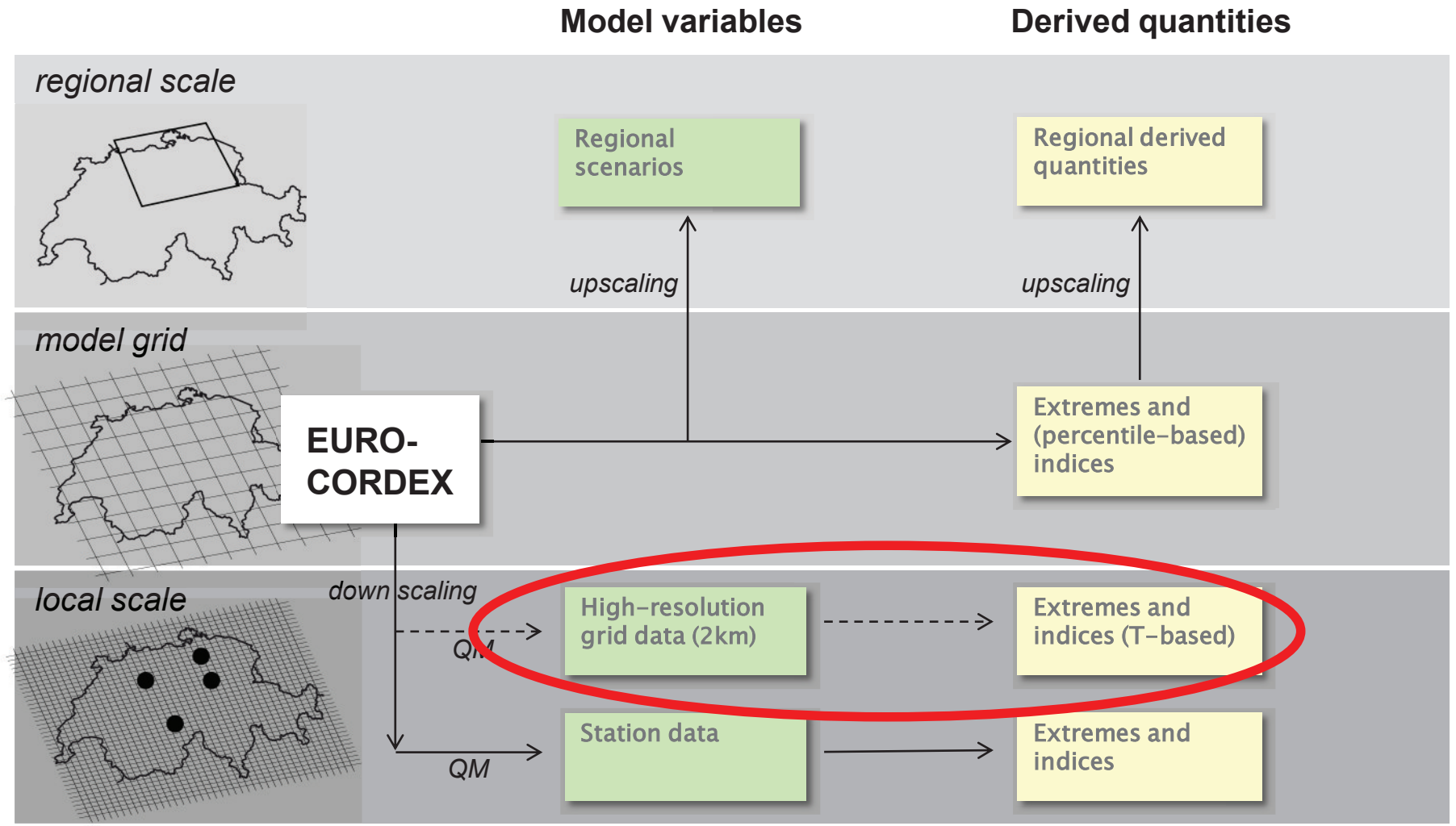
Figure 4.23. Temporal evolution of mean seasonal precipitation climate change signal at station SMA for all model chains (colour-coded by RCP; S. Kotlarski et al.).

- Wind
- Humidity
- Global radiation

Heat stress (QM wet bulb temperature)



Change in number of days with WBT > 20°C (top) and WBT > 22°C (bottom) w.r.t. 1981-2010, for the bias corrected RCMs (combination of EUR-11 and EUR-44) and the RCP8.5 scenario (A. Casanueva).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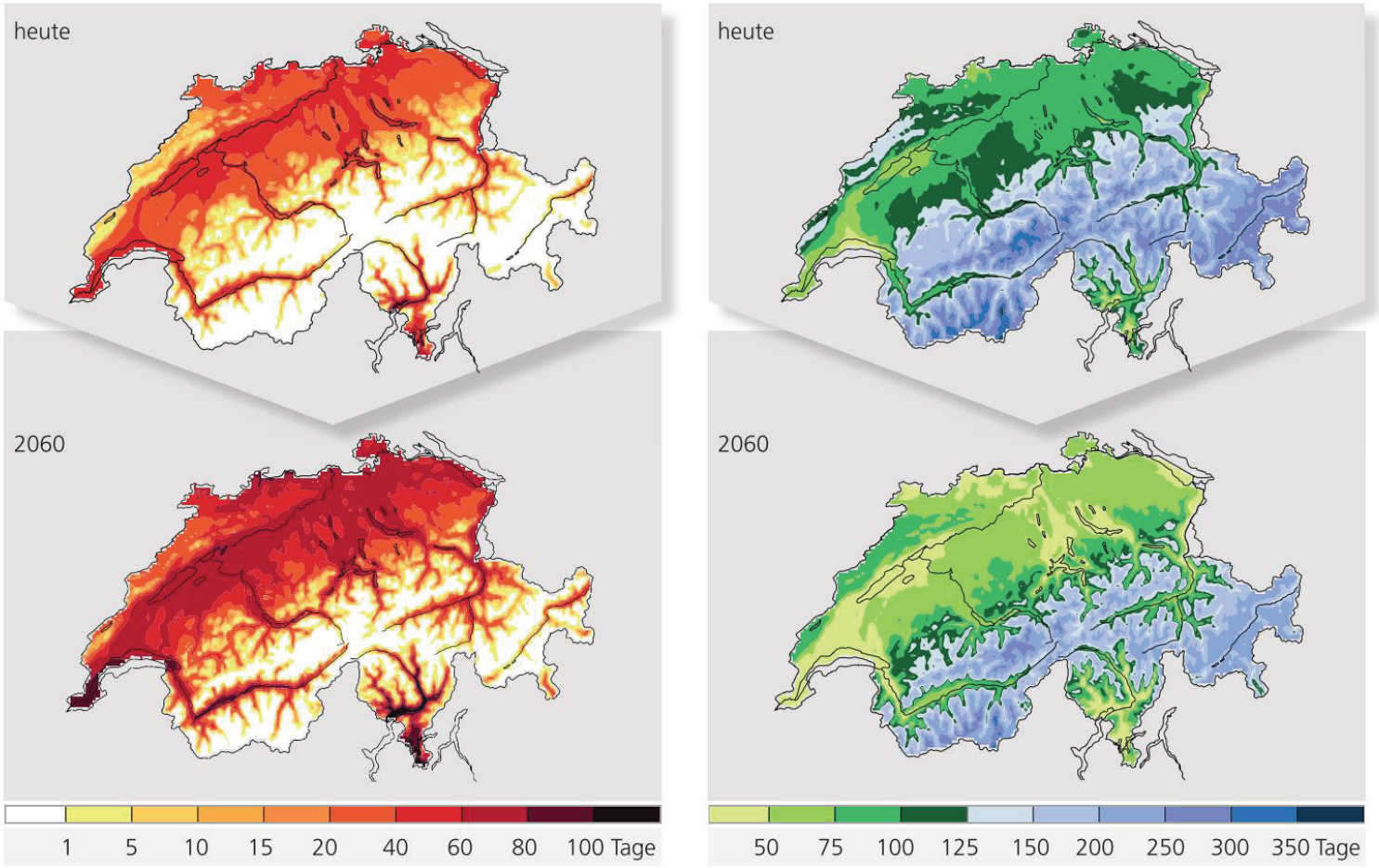
Extremes and indices

High-resolution Temperature-based indices (QM)

Something like this…



MeteoSchweiz, 2014, «Klimaszenarien Schweiz – eine regionale Übersicht», Fachbericht MeteoSchweiz, 243, 36 pp.

Outline

- Part 1: Data products
- Part 2: Simulation ensemble and availability

GCM
CNRM-CERFACS-CNRM-CM5
ICHEC-EC-EARTH
MOHC-HadGEM2-ES
MPI-M-MPI-ESM-LR
MIROC-MIROC5
CCCma-CanESM2
CSIRO-QCCCE-CSIRO-Mk3-6-0
IPSL-IPSL-CM5A-MR
NCC-NorESM1-M
NOAA-GFDL-GFDL-ESM2M

GCM	init
CNRM-CERFACS-CNRM-CM5	r1i1p1
ICHEC-EC-EARTH	r1i1p1 r3i1p1 r12i1p1
MOHC-HadGEM2-ES	r1i1p1
MPI-M-MPI-ESM-LR	r1i1p1 r2i1p1
MIROC-MIROC5	r1i1p1
CCCma-CanESM2	r1i1p1
CSIRO-QCCCE-CSIRO-Mk3-6-0	r1i1p1
IPSL-IPSL-CM5A-MR	r1i1p1
NCC-NorESM1-M	r1i1p1
NOAA-GFDL-GFDL-ESM2M	r1i1p1

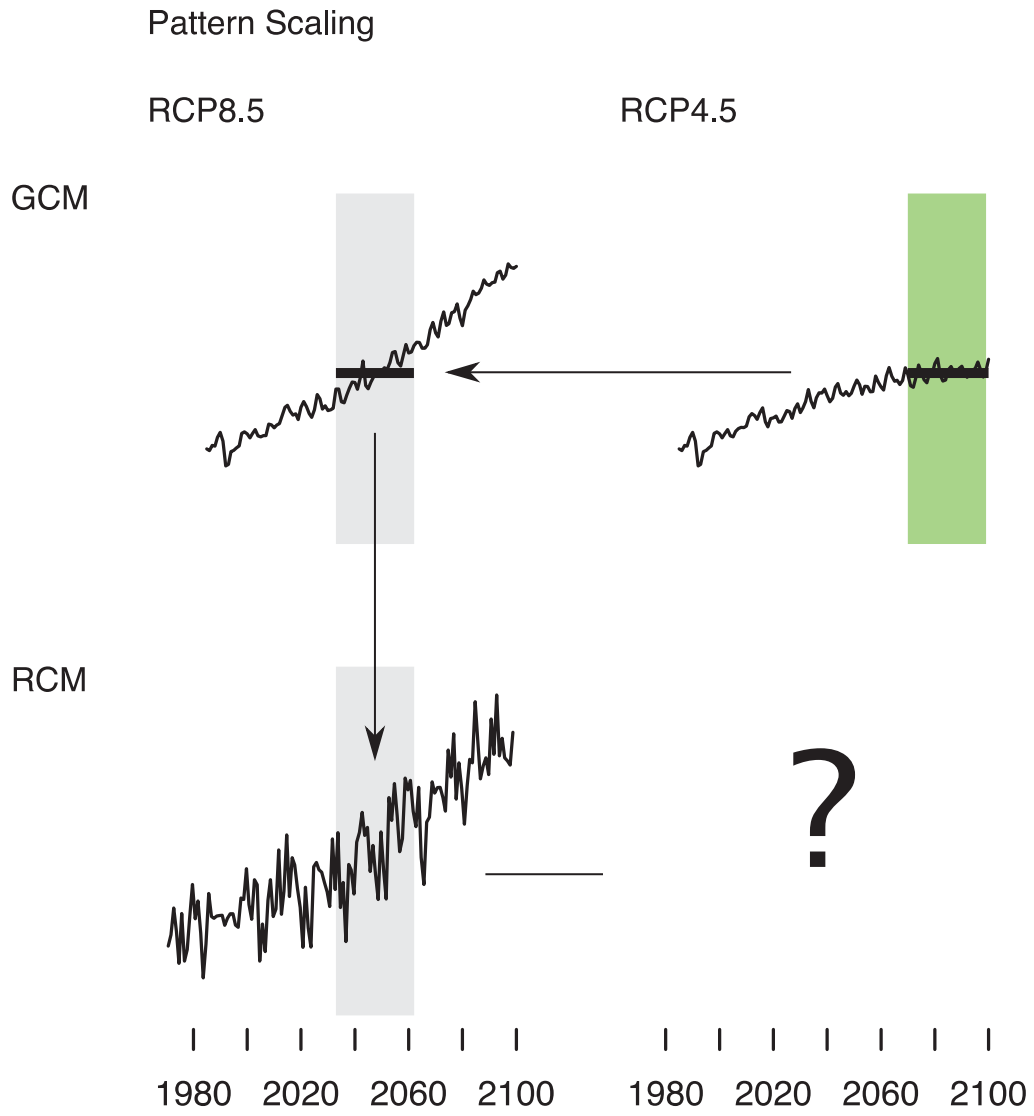
GCM	init	RCM
CNRM-CERFACS-CNRM-CM5	r1i1p1	CLMcom-CCLM4-8-17
		CLMcom-CCLM5-0-6
		CNRM-ALADIN53
		HMS-ALADIN52
		SMHI-RCA4
ICHEC-EC-EARTH	r1i1p1	KNMI-RACMO22E
	r3i1p1	DMI-HIRHAM5
	r12i1p1	CLMcom-CCLM4-8-17
		CLMcom-CCLM5-0-6
		SMHI-RCA4
MOHC-HadGEM2-ES	r1i1p1	CLMcom-CCLM4-8-17
		CLMcom-CCLM5-0-6
		ICTP-RegCM4-3
		KNMI-RACMO22E
		SMHI-RCA4
MPI-M-MPI-ESM-LR	r1i1p1	CLMcom-CCLM4-8-17
		CLMcom-CCLM5-0-6
		MPI-CSC-REMO2009
		SMHI-RCA4
	r2i1p1	MPI-CSC-REMO2009
MIROC-MIROC5	r1i1p1	CLMcom-CCLM5-0-6
		SMHI-RCA4
CCCma-CanESM2	r1i1p1	SMHI-RCA4
CSIRO-QCCCE-CSIRO-Mk3-6-0	r1i1p1	SMHI-RCA4
IPSL-IPSL-CM5A-MR	r1i1p1	SMHI-RCA4
NCC-NorESM1-M	r1i1p1	SMHI-RCA4
NOAA-GFDL-GFDL-ESM2M	r1i1p1	SMHI-RCA4

GCM	init	RCM	RCP8.5		RCP4.5		RCP2.6	
			0.11°	0.44°	0.11°	0.44°	0.11°	0.44°
CNRM-CERFACS-CNRM-CM5	r1i1p1	CLMcom-CCLM4-8-17	✔		✔			
		CLMcom-CCLM5-0-6		✔				
		CNRM-ALADIN53	✔	✔	✔	✔	✔	
		HMS-ALADIN52		✔				
		SMHI-RCA4	✔	✔	✔	✔		
ICHEC-EC-EARTH	r1i1p1	KNMI-RACMO22E		✔		✔		
	r3i1p1	DMI-HIRHAM5	✔	✔	✔	✔		
	r12i1p1	CLMcom-CCLM4-8-17	✔		✔			
		CLMcom-CCLM5-0-6		✔				
		SMHI-RCA4	✔	✔	✔	✔	✔	✔
MOHC-HadGEM2-ES	r1i1p1	CLMcom-CCLM4-8-17	✔	✔	✔			
		CLMcom-CCLM5-0-6		✔				
		ICTP-RegCM4-3		✔				
		KNMI-RACMO22E		✔		✔		✔
		SMHI-RCA4	✔	✔	✔	✔		✔
MPI-M-MPI-ESM-LR	r1i1p1	CLMcom-CCLM4-8-17	✔	✔	✔	✔		
		CLMcom-CCLM5-0-6		✔				
		MPI-CSC-REMO2009	✔	✔	✔	✔	✔	✔
		SMHI-RCA4	✔	✔	✔	✔		✔
	r2i1p1	MPI-CSC-REMO2009	✔	✔	✔	✔	✔	✔
MIROC-MIROC5	r1i1p1	CLMcom-CCLM5-0-6		✔				
		SMHI-RCA4		✔		✔		✔
CCCma-CanESM2	r1i1p1	SMHI-RCA4		✔		✔		
CSIRO-QCCCE-CSIRO-Mk3-6-0	r1i1p1	SMHI-RCA4		✔		✔		
IPSL-IPSL-CM5A-MR	r1i1p1	SMHI-RCA4	✔	✔	✔	✔		
NCC-NorESM1-M	r1i1p1	SMHI-RCA4		✔		✔		✔
NOAA-GFDL-GFDL-ESM2M	r1i1p1	SMHI-RCA4		✔		✔		

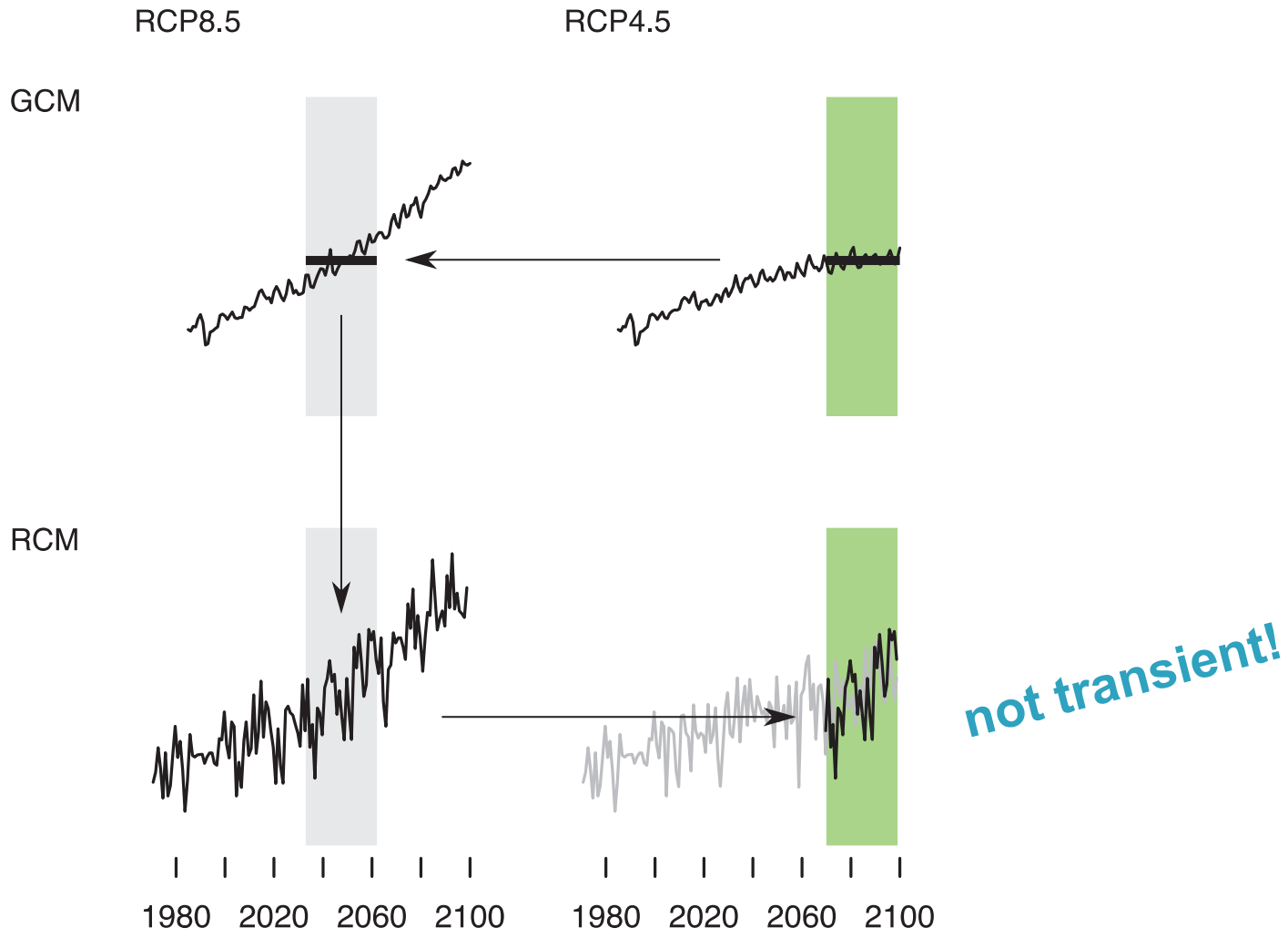
GCM	init	RCM	RCP8.5		RCP4.5		RCP2.6	
			0.11°	0.44°	0.11°	0.44°	0.11°	0.44°
CNRM-CERFACS-CNRM-CM5	r1i1p1	CLMcom-CCLM4-8-17	✔		✔			
		CLMcom-CCLM5-0-6		✔				
		CNRM-ALADIN53	✔	✔	✔	✔	✔	
		HMS-ALADIN52		✔				
		SMHI-RCA4	✔	✔	✔	✔		
ICHEC-EC-EARTH	r1i1p1	KNMI-RACMO22E		✔				
	r3i1p1	DMI-HIRHAM5	✔	✔	✔			
		CLMcom-CCLM4-8-17	✔		✔			
	r12i1p1	CLMcom-CCLM5-0-6		✔				
		SMHI-RCA4	✔	✔	✔	✔	✔	✔
MOHC-HadGEM2-ES	r1i1p1	CLMcom-CCLM4-8-17	✔	✔	✔			
		CLMcom-CCLM5-0-6		✔				
		ICTP-RegCM4-3		✔				
		KNMI-RACMO22E		✔		✔		✔
		SMHI-RCA4	✔	✔	✔	✔		✔
MPI-M-MPI-ESM-LR	r1i1p1	CLMcom-CCLM4-8-17	✔	✔	✔	✔		
		CLMcom-CCLM5-0-6		✔				
		MPI-CSC-REMO2009	✔	✔	✔	✔	✔	✔
		SMHI-RCA4	✔	✔	✔	✔		✔
	r2i1p1	MPI-CSC-REMO2009	✔	✔	✔	✔	✔	✔
MIROC-MIROC5	r1i1p1	CLMcom-CCLM5-0-6		✔				
		SMHI-RCA4		✔		✔		✔
CCCma-CanESM2	r1i1p1	SMHI-RCA4		✔		✔		
CSIRO-QCCCE-CSIRO-Mk3-6-0	r1i1p1	SMHI-RCA4		✔		✔		
IPSL-IPSL-CM5A-MR	r1i1p1	SMHI-RCA4	✔	✔	✔	✔		
NCC-NorESM1-M	r1i1p1	SMHI-RCA4		✔		✔		✔
NOAA-GFDL-GFDL-ESM2M	r1i1p1	SMHI-RCA4		✔		✔		

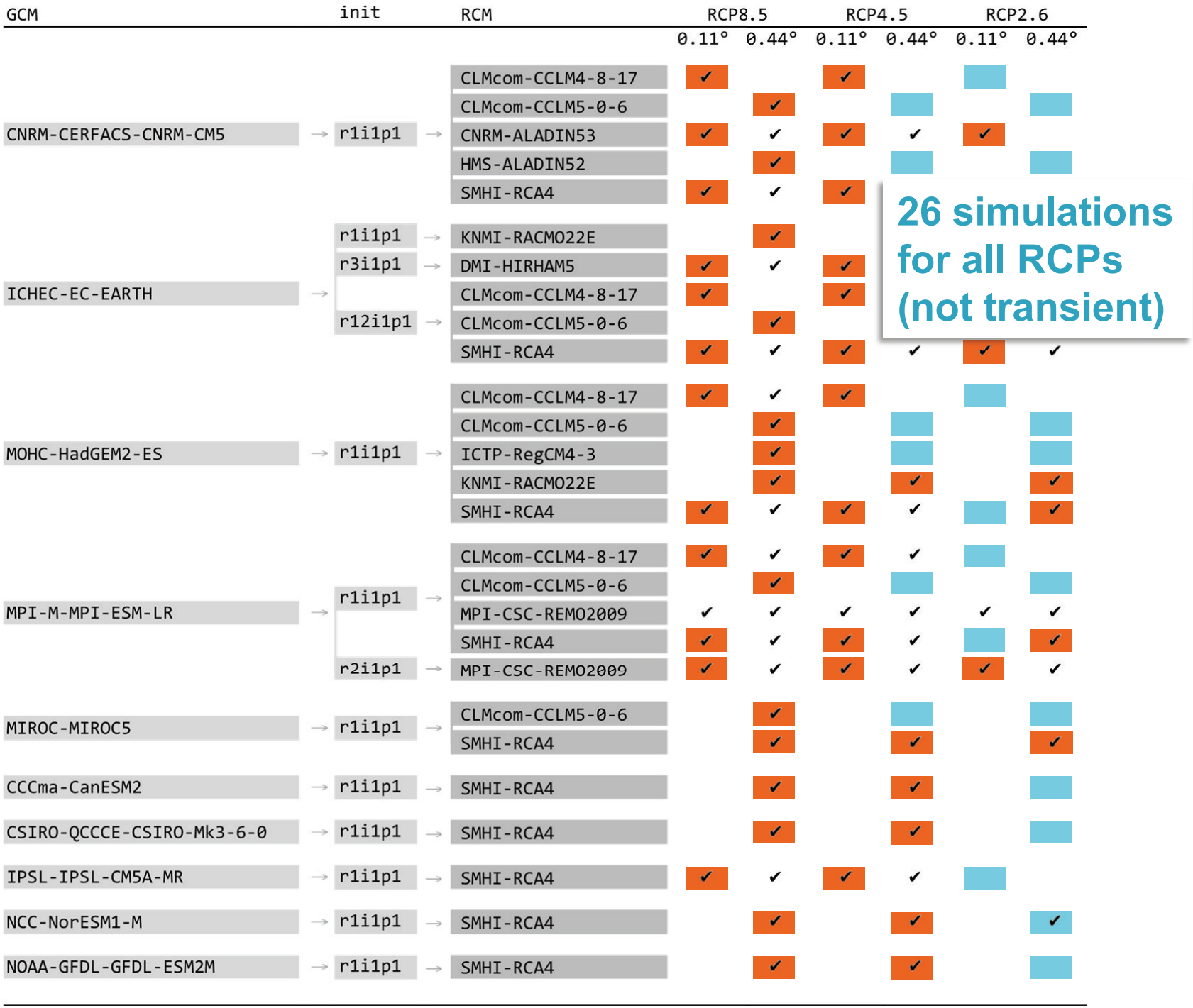
26 simulations

GCM	init	RCM	RCP8.5		RCP4.5		RCP2.6	
			0.11°	0.44°	0.11°	0.44°	0.11°	0.44°
CNRM-CERFACS-CNRM-CM5	r1i1p1	CLMcom-CCLM4-8-17	✔		✔			
		CLMcom-CCLM5-0-6		✔				
		CNRM-ALADIN53	✔	✔	✔	✔	✔	
		HMS-ALADIN52		✔				
		SMHI-RCA4	✔	✔	✔	✔		
ICHEC-EC-EARTH	r1i1p1	KNMI-RACMO22E		✔		✔		
	r3i1p1	DMI-HIRHAM5	✔	✔	✔	✔		
	r12i1p1	CLMcom-CCLM4-8-17	✔		✔			
		CLMcom-CCLM5-0-6		✔				
		SMHI-RCA4	✔	✔	✔	✔	✔	✔
MOHC-HadGEM2-ES	r1i1p1	CLMcom-CCLM4-8-17	✔	✔	✔			
		CLMcom-CCLM5-0-6		✔				
		ICTP-RegCM4-3		✔				
		KNMI-RACMO22E		✔		✔		✔
		SMHI-RCA4	✔	✔	✔	✔		✔
MPI-M-MPI-ESM-LR	r1i1p1	CLMcom-CCLM4-8-17	✔	✔	✔	✔		
		CLMcom-CCLM5-0-6		✔				
		MPI-CSC-REMO2009	✔	✔	✔	✔	✔	✔
		SMHI-RCA4	✔	✔	✔	✔		✔
	r2i1p1	MPI-CSC-REMO2009	✔	✔	✔	✔	✔	✔
MIROC-MIROC5	r1i1p1	CLMcom-CCLM5-0-6		✔				
		SMHI-RCA4		✔		✔		✔
CCCma-CanESM2	r1i1p1	SMHI-RCA4		✔		✔		
CSIRO-QCCCE-CSIRO-Mk3-6-0	r1i1p1	SMHI-RCA4		✔		✔		
IPSL-IPSL-CM5A-MR	r1i1p1	SMHI-RCA4	✔	✔	✔	✔		
NCC-NorESM1-M	r1i1p1	SMHI-RCA4		✔		✔		✔
NOAA-GFDL-GFDL-ESM2M	r1i1p1	SMHI-RCA4		✔		✔		


Pattern Scaling
RCP8.5
RCP4.5
GCM
RCM
?
1980
2020
2060
2100
1980
2020
2060
2100

Pattern Scaling




GCM
init
RCM
RCP8.5
RCP4.5
RCP2.6
0.11°
0.44°
0.11°
0.44°
0.11°
0.44°
CLMcom-CCLM4-8-17
CLMcom-CCLM5-0-6
CNRM-CERFACS-CNRM-CM5
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CNRM-ALADIN53
HMS-ALADIN52
SMHI-RCA4
r1i1p1
KNMI-RACMO22E
r3i1p1
DMI-HIRHAM5
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CLMcom-CCLM5-0-6
SMHI-RCA4
CLMcom-CCLM4-8-17
CLMcom-CCLM5-0-6
MOHC-HadGEM2-ES
r1i1p1
ICTP-RegCM4-3
KNMI-RACMO22E
SMHI-RCA4
CLMcom-CCLM4-8-17
CLMcom-CCLM5-0-6
r1i1p1
MPI-M-MPI-ESM-LR
MPI-CSC-REMO2009
SMHI-RCA4
r2i1p1
MPI-CSC-REMO2009
CLMcom-CCLM5-0-6
MIROC-MIROC5
r1i1p1
SMHI-RCA4
CCCma-CanESM2
r1i1p1
SMHI-RCA4
CSIRO-QCCCE-CSIRO-Mk3-6-0
r1i1p1
SMHI-RCA4
IPSL-IPSL-CM5A-MR
r1i1p1
SMHI-RCA4
NCC-NorESM1-M
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SMHI-RCA4
NOAA-GFDL-GFDL-ESM2M
r1i1p1
SMHI-RCA4
26 simulations for all RCPs (not transient)

Timeline

- ✓ 13.4.2017 Technical Report first internal draft
- 11.5.2017 3rd CH2018 Workshop
- 15.6.2017 Internal Review of Technical Report
- 30.9.2017 External Review of Technical Report
- Q4 2017 CH2018 Brochure draft
- Q1-2 2018 Web site preparation
- Q4 2018 CH2018 launch

Provision of CH2018 data sets

- Should become available in 2nd half of 2017 for research
  - User responsible for update to final data after deadline
  - Embargo on publications until CH2018 launch
  - Citation of CH2018 report
  - Data sharing policy not finalized yet
- Data provision concept
  - Derived quantities (indices) downloadable from NCCS web site
  - Base data available upon personal request

Reduced ensemble of simulations?

Need for a smaller, less complex set of simulations:

- Impact modeling with limited resources
- Communication
- Reduce interdependence and redundancy

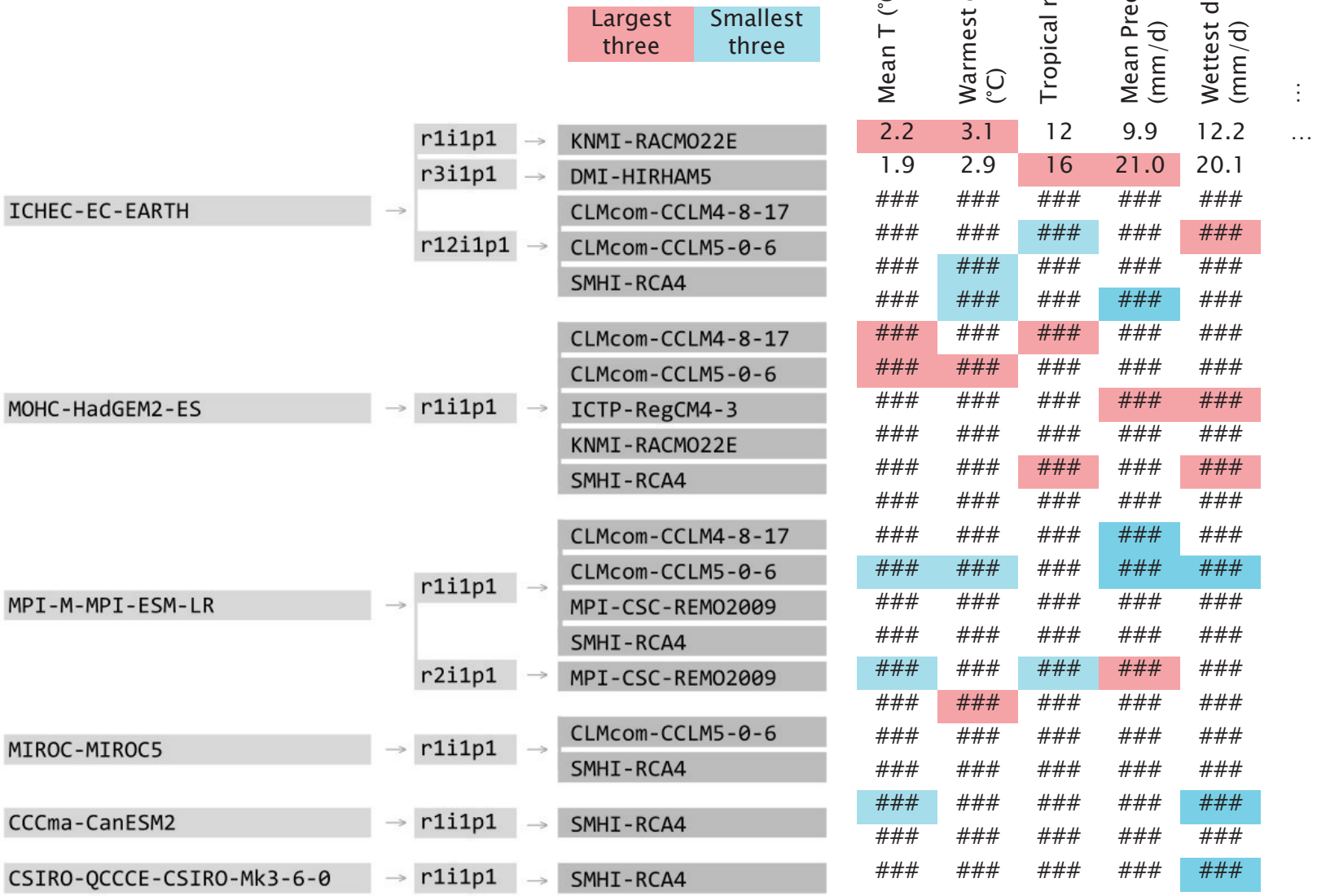
Which simulations to choose?

- No answer yet
- Depends on parameter of interest (trade-off relevance - generality)
- Pragmatic approach: simulation ranking for key parameters
- ? Sophisticated approach: dimension reduction and elimination of interdependent models (Sanderson et al. 2015)

Question to CH2018-Hydro:

- Which parameters are relevant for impacts?

Simulation ranking



Thanks!