

A comprehensive **sensitivity analysis** for discharge and nitrogen loads involving **multiple input factors**

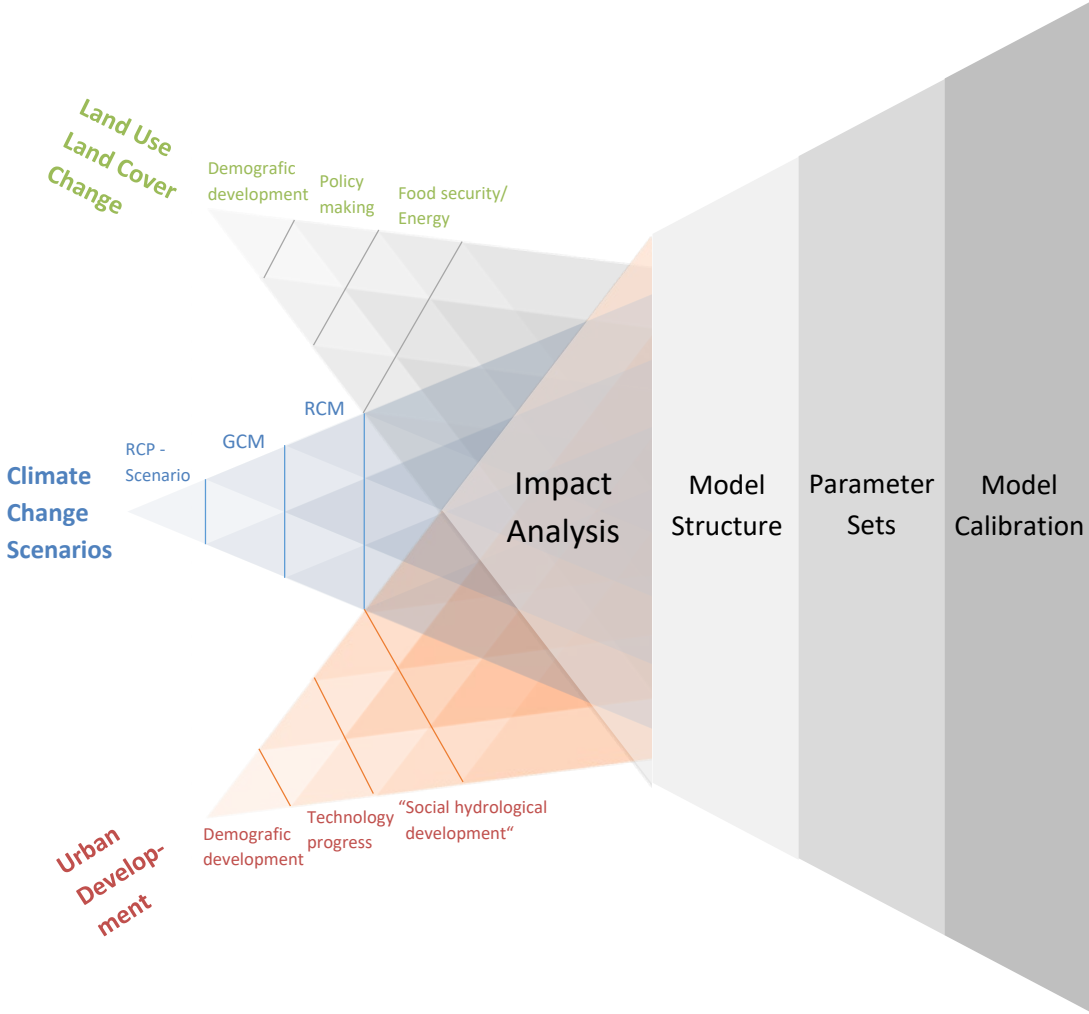
Christoph Schürz¹, Bano Mehdi¹, Brigitta Hollosi³, Christoph Matulla³, Alexander Pressl², Thomas Ertl², and Karsten Schulz¹

¹ IWHW BOKU University Vienna

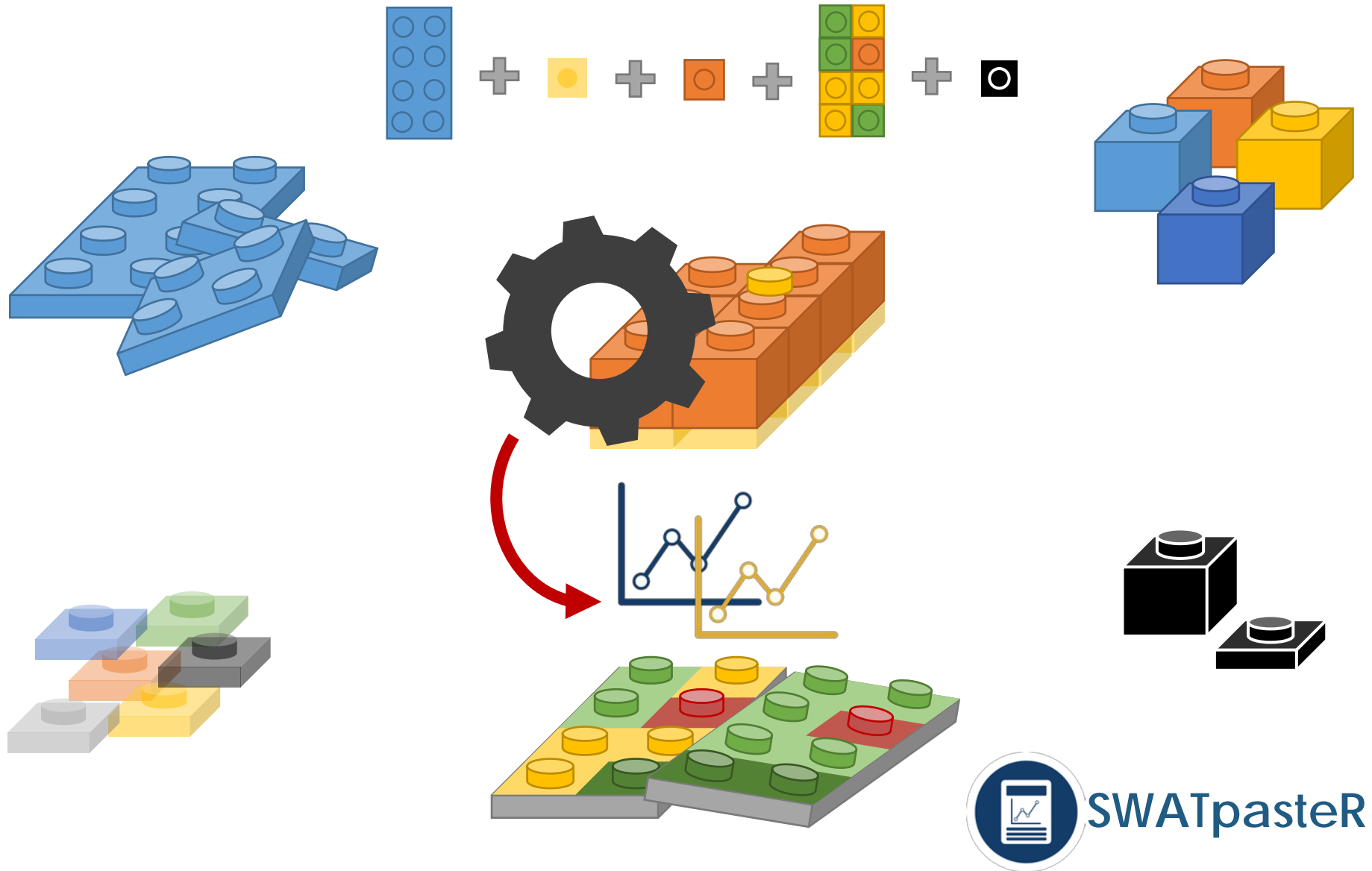
² SIG BOKU University Vienna

³ ZAMG Vienna

The aim of the project UnLoadC³

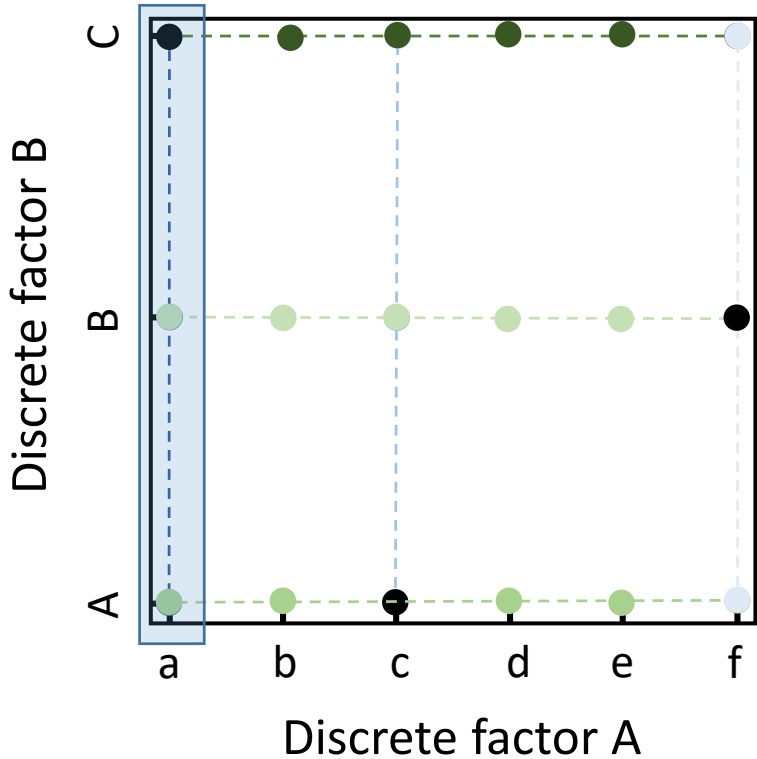


The concept of the sensitivity framework (I)

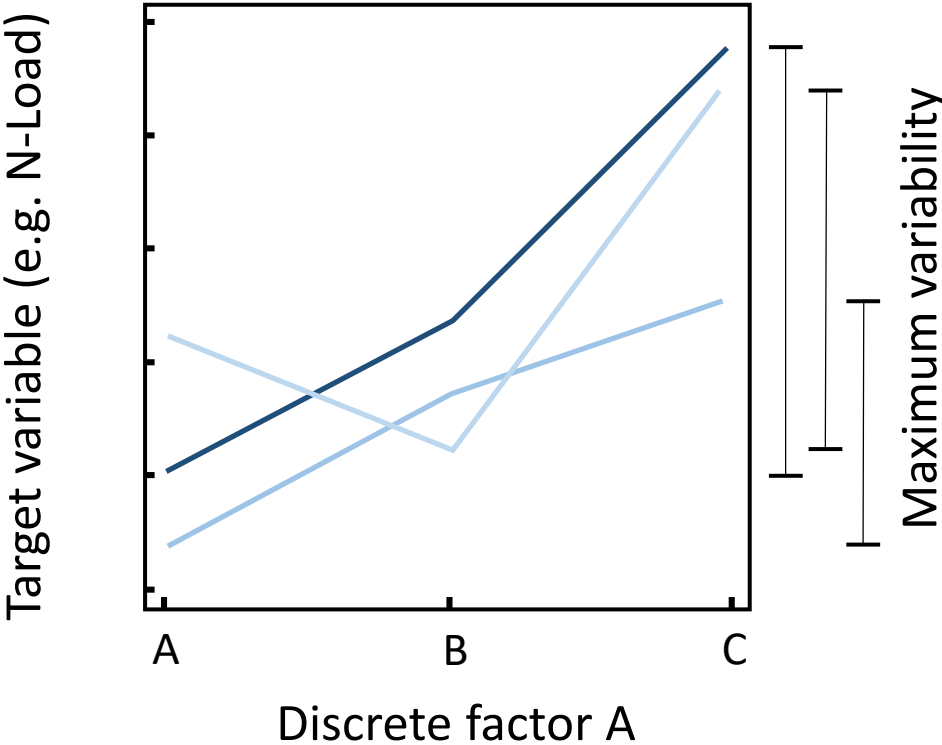


The concept of the sensitivity framework (II)

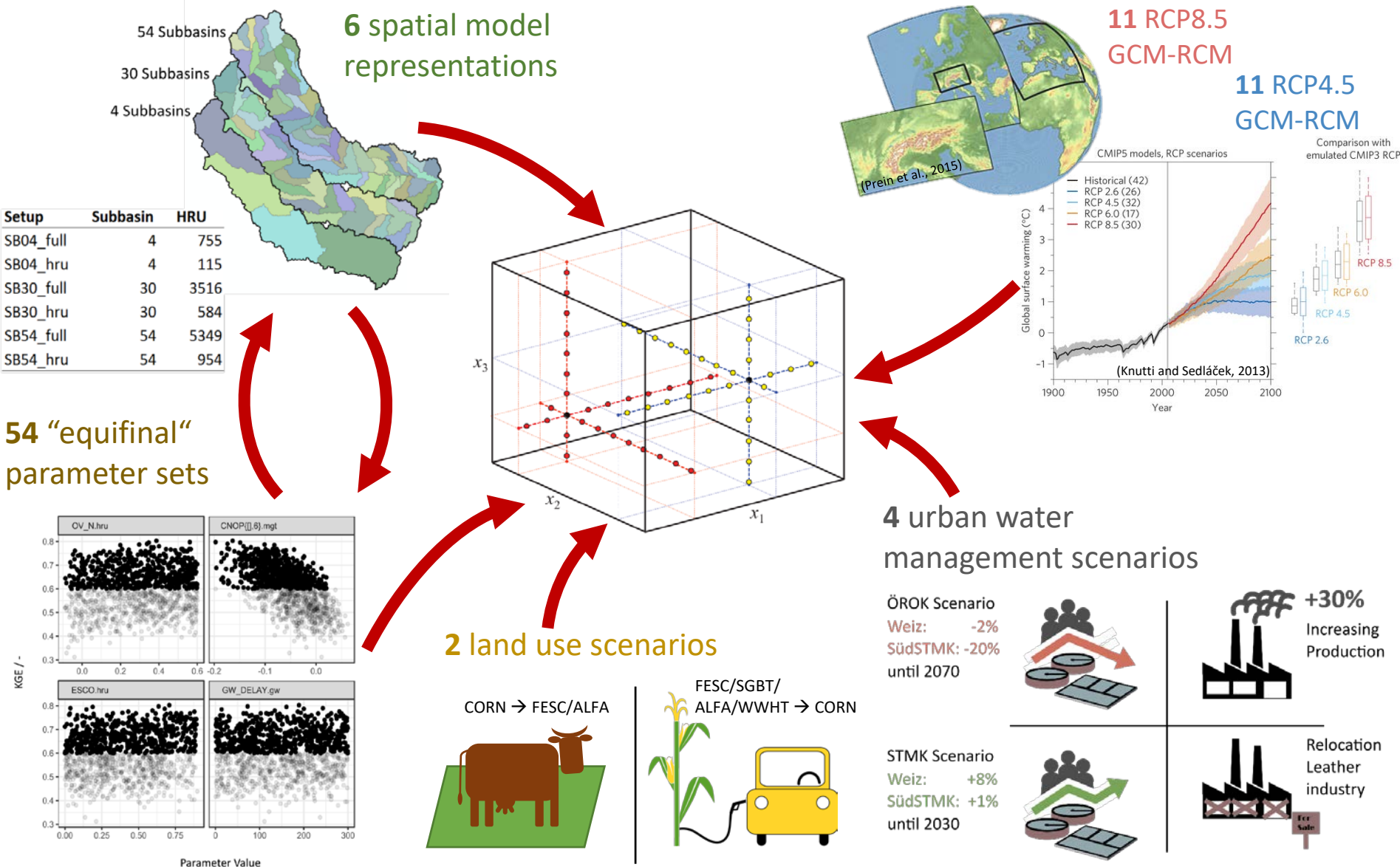
STAR Sampling:



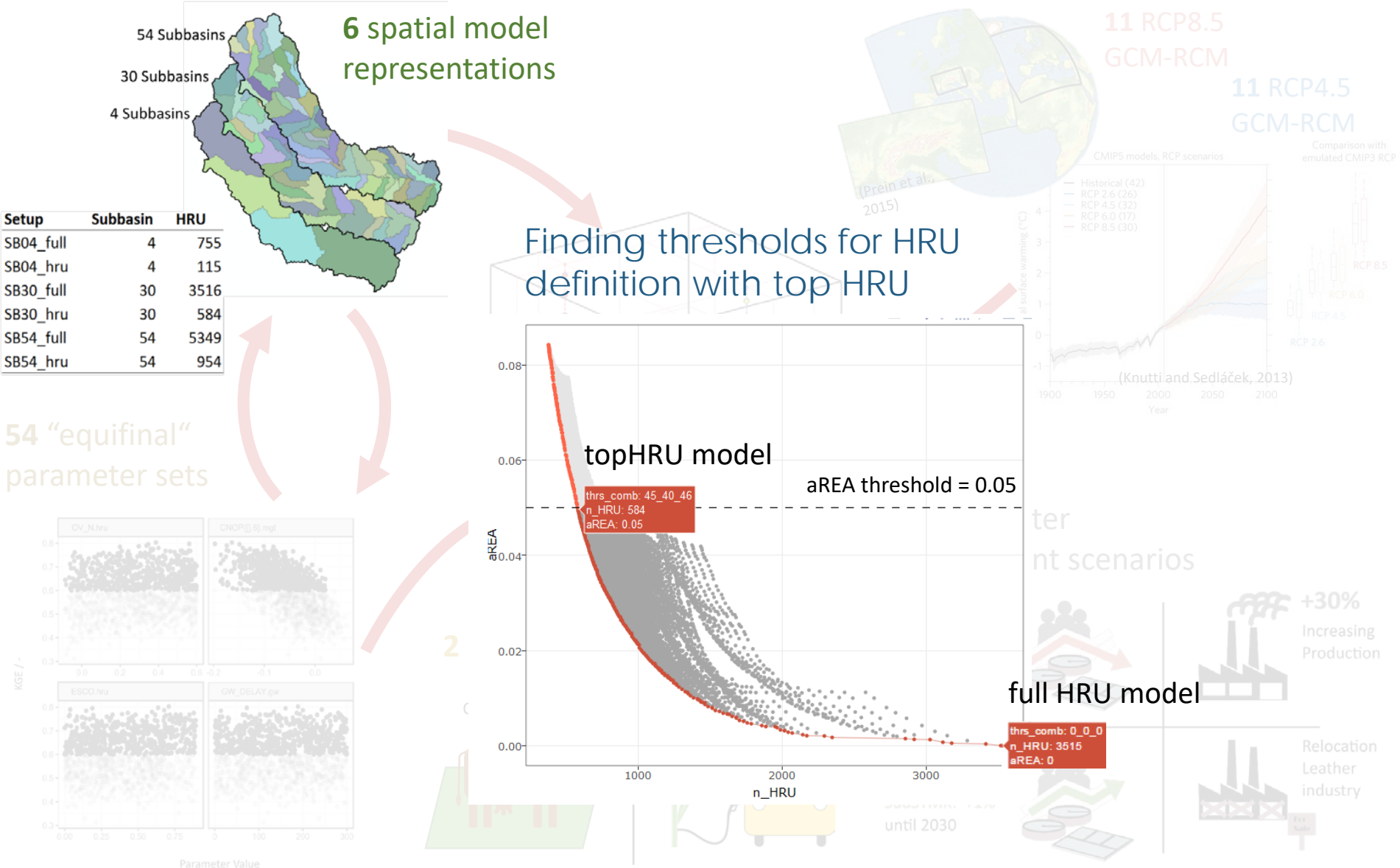
Transects response:



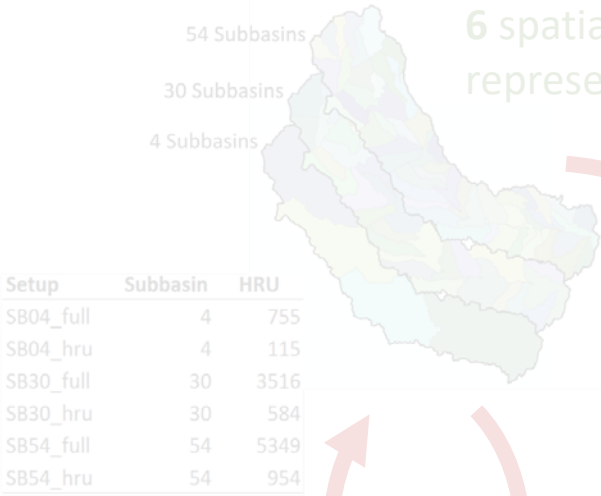
The framework in practice: River Raab case study



The framework in practice: Spatial model representation



The framework in practice: Parameter sets

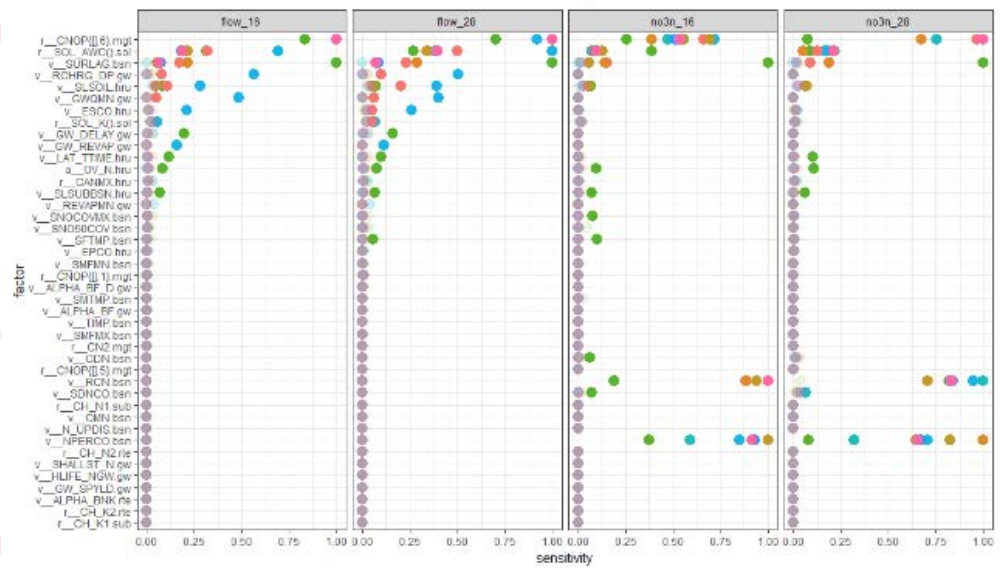


6 spatial model representations

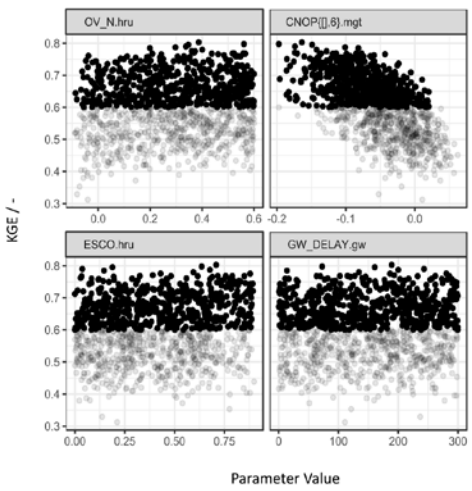
Multicriterial parameter sensitivity analysis for all 6 model setups

Setup	Subbasin	HRU
SB04_full	4	755
SB04_hru	4	115
SB30_full	30	3516
SB30_hru	30	584
SB54_full	54	5349
SB54_hru	54	954

54 "equifinal" parameter sets



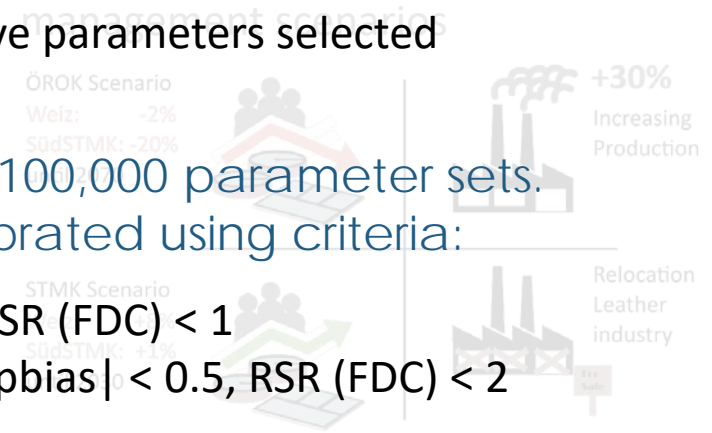
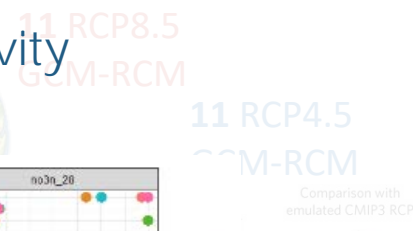
16 sensitive parameters selected



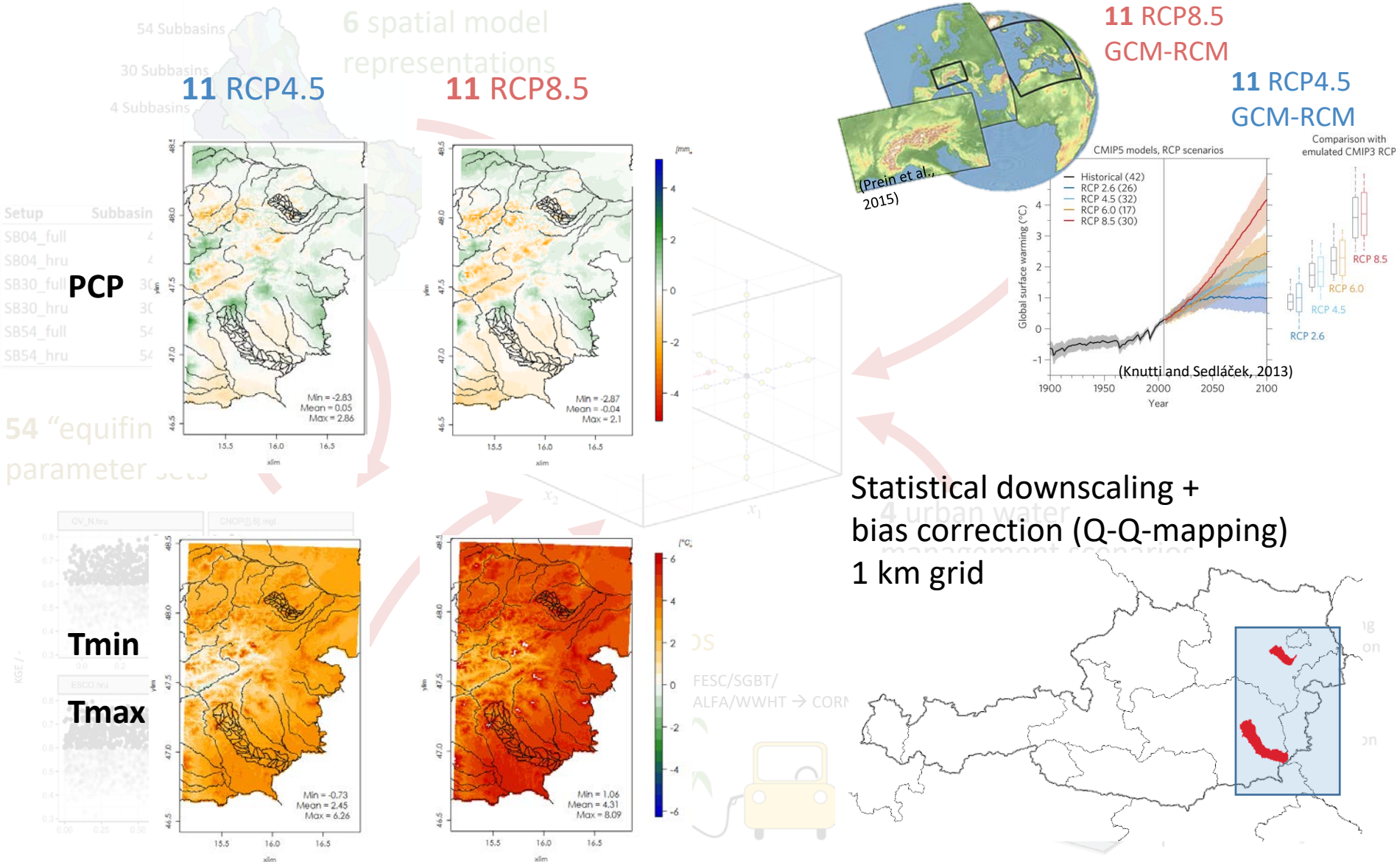
2 land use scenarios

LHS sample with 100,000 parameter sets.
All 6 models calibrated using criteria:

Q daily: $KGE > 0.6$, $RSR (FDC) < 1$
N daily: $KGE > 0.4$, $|pbias| < 0.5$, $RSR (FDC) < 2$



The framework in practice: Climate scenarios



The framework in practice: Land use

- Biofuel and extensive pasture scenarios implemented:

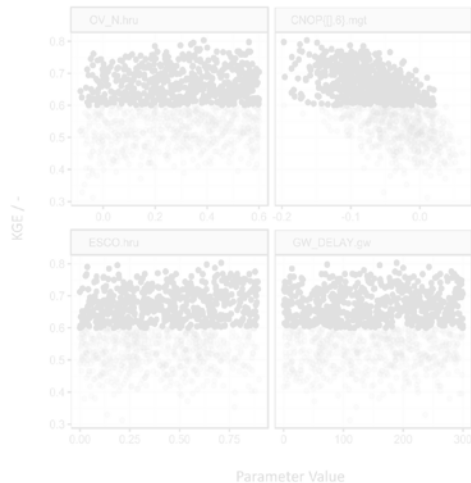
Setup	Sub	LUSE from	LUSE to	fraction
SB04_full		FESC	CORN	0.75
SB04_hru		SGBT	CORN	0.80
SB30_full		ALFA	CORN	0.70
SB30_hru		WWHT	CORN	0.30

LUSE from	LUSE to	fraction
CORN	FESC	0.275
CORN	ALFA	0.275

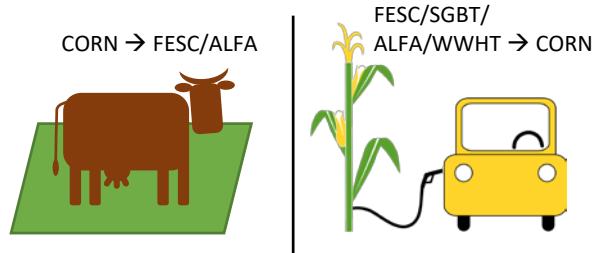


- Implemented in SWAT with land use update (.LUP)

54 "equifinal" parameter sets



2 land use scenarios



4 urban water management scenarios

ÖROK Scenario
Weiz: -2%
SüdSTMK: -20%
until 2070



+30%
Increasing
Production



STMK Scenario
Weiz: +8%
SüdSTMK: +1%
until 2030

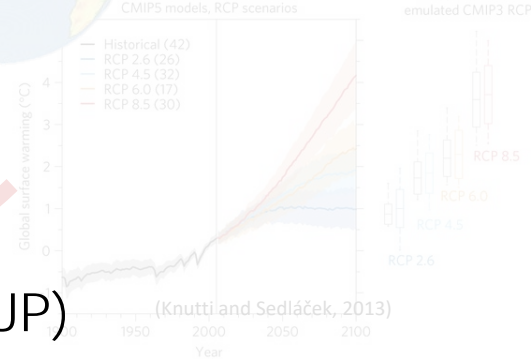


Relocation
Leather
industry



11 RCP8.5
GCM-RCM

11 RCP4.5
GCM-RCM



The framework in practice: Urban WM

- Synthetic time series developed from observations for all municipal and industrial point sources

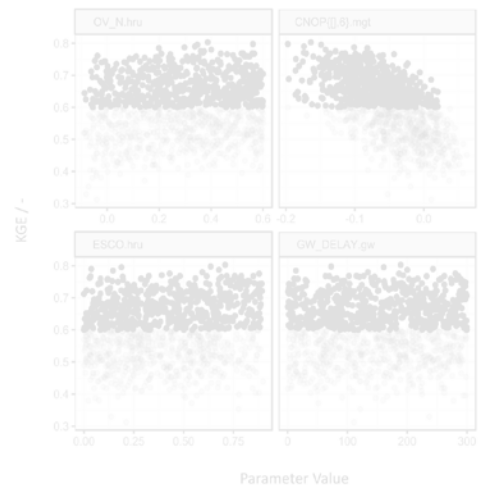
- Municipal point sources corrected by two demographic development scenarios

- Industrial sources increased by 30% or removed from data

- Written to SWAT point source files

Setup	Subbasin	WHR
SB04_full		
SB04_hru		
SB30_full	30	3516
SB30_hru	30	584
SB54_full	54	5349
SB54_hru		

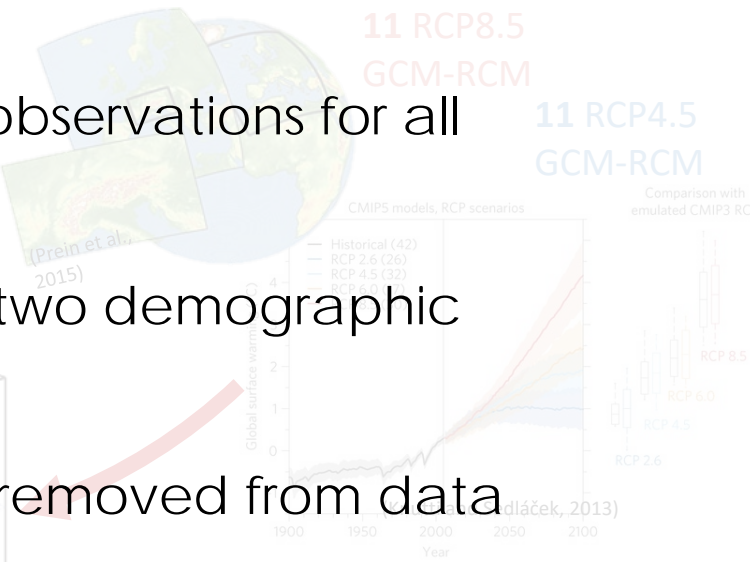
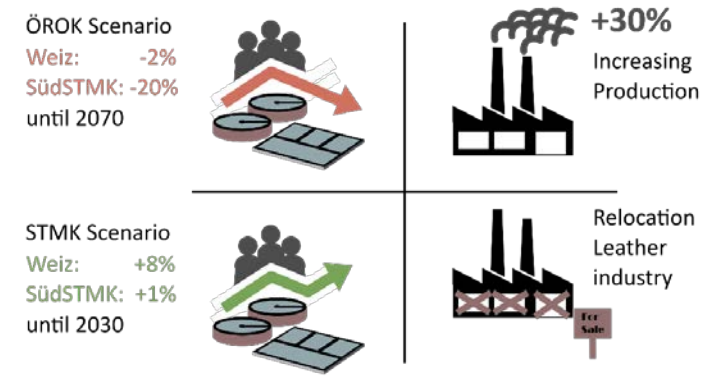
54 "equifinal" parameters



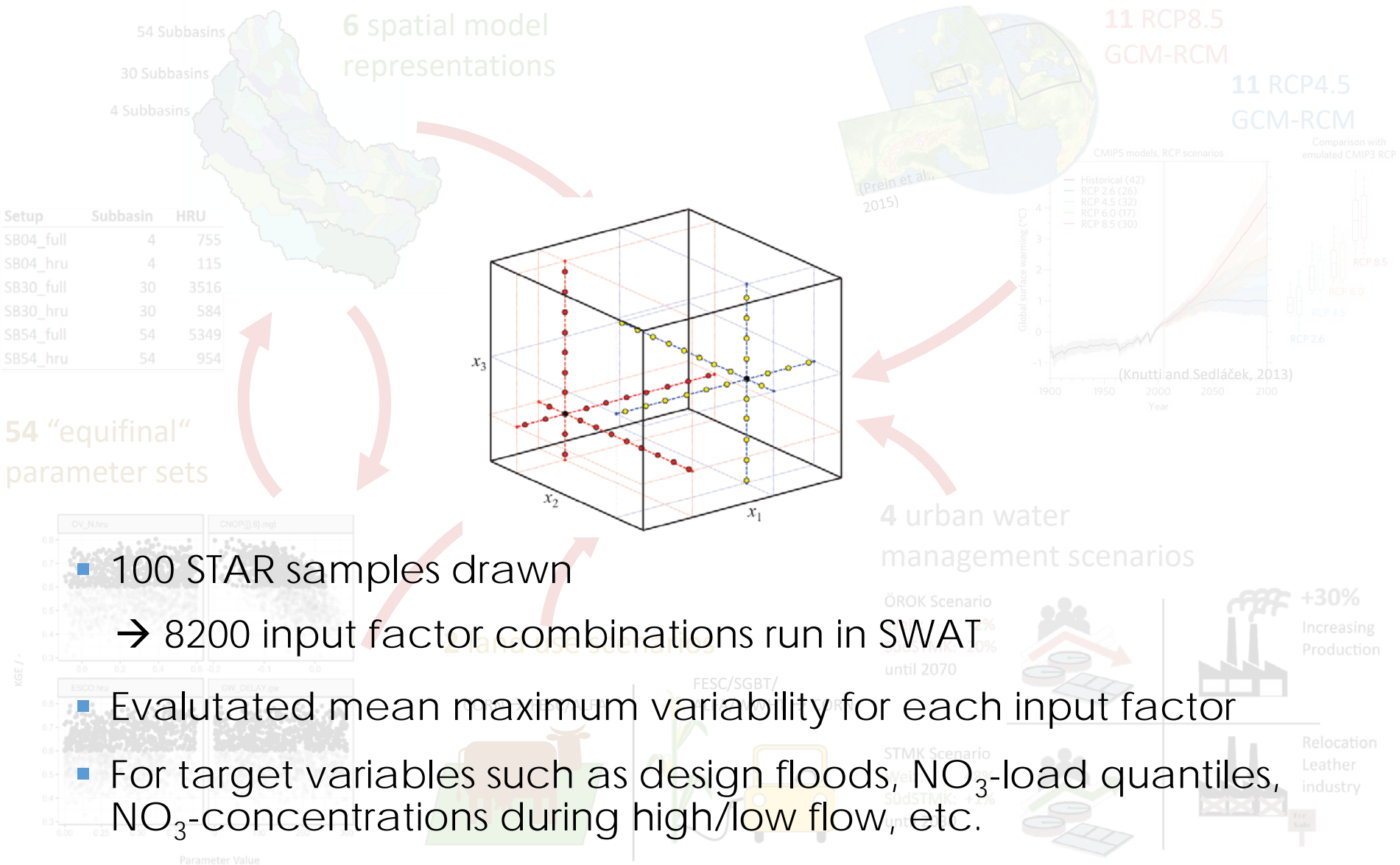
2 land use scenarios



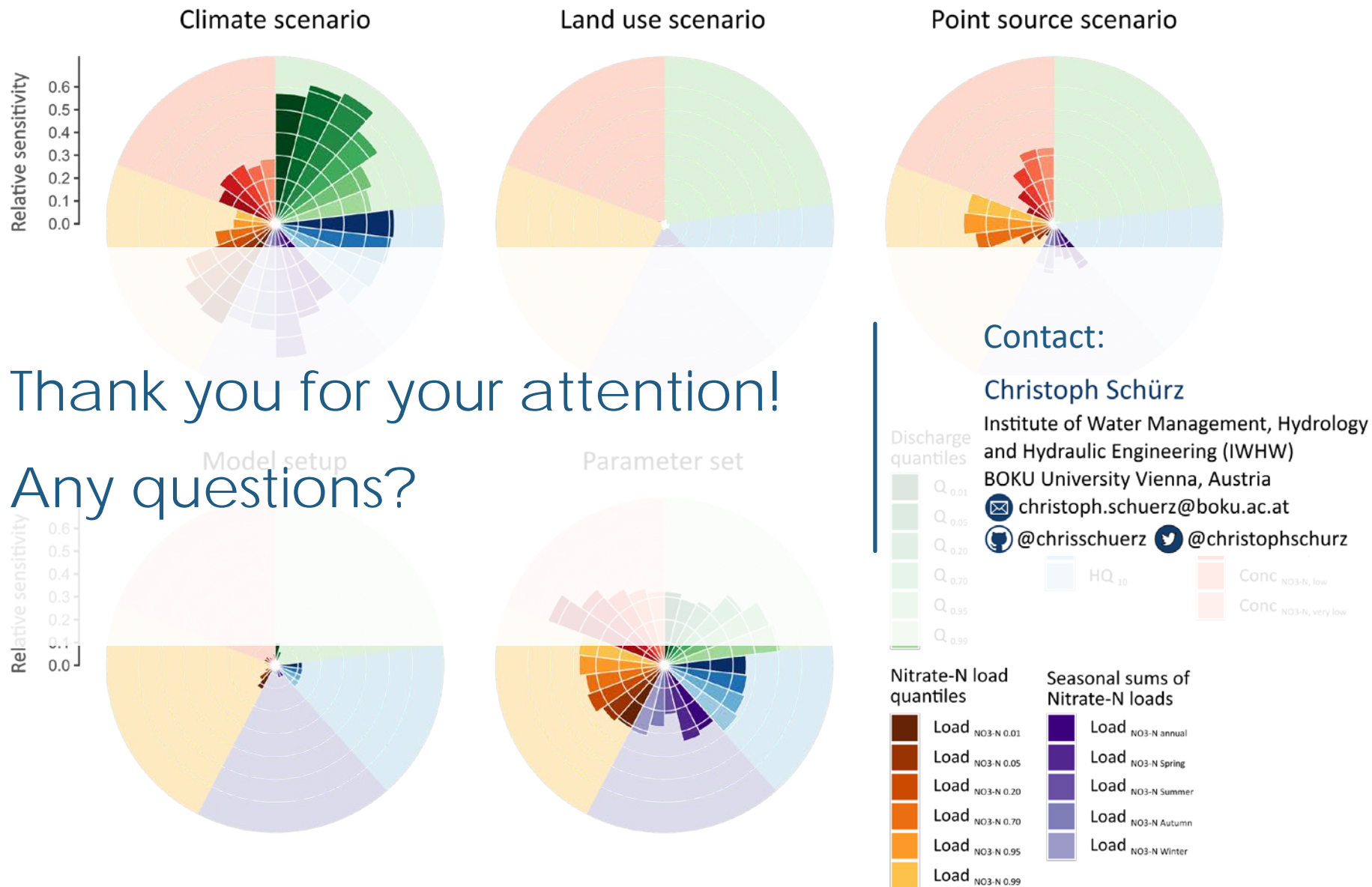
4 urban water management scenarios



The framework in practice: Sampling



The framework in practice: Results



Thank you for your attention!

Any questions?

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