

# Projected climate change for Germany in the CORDEX/ReKliEs-De ensemble

Steger, C., J. Brauch and B. Früh (Deutscher Wetterdienst)



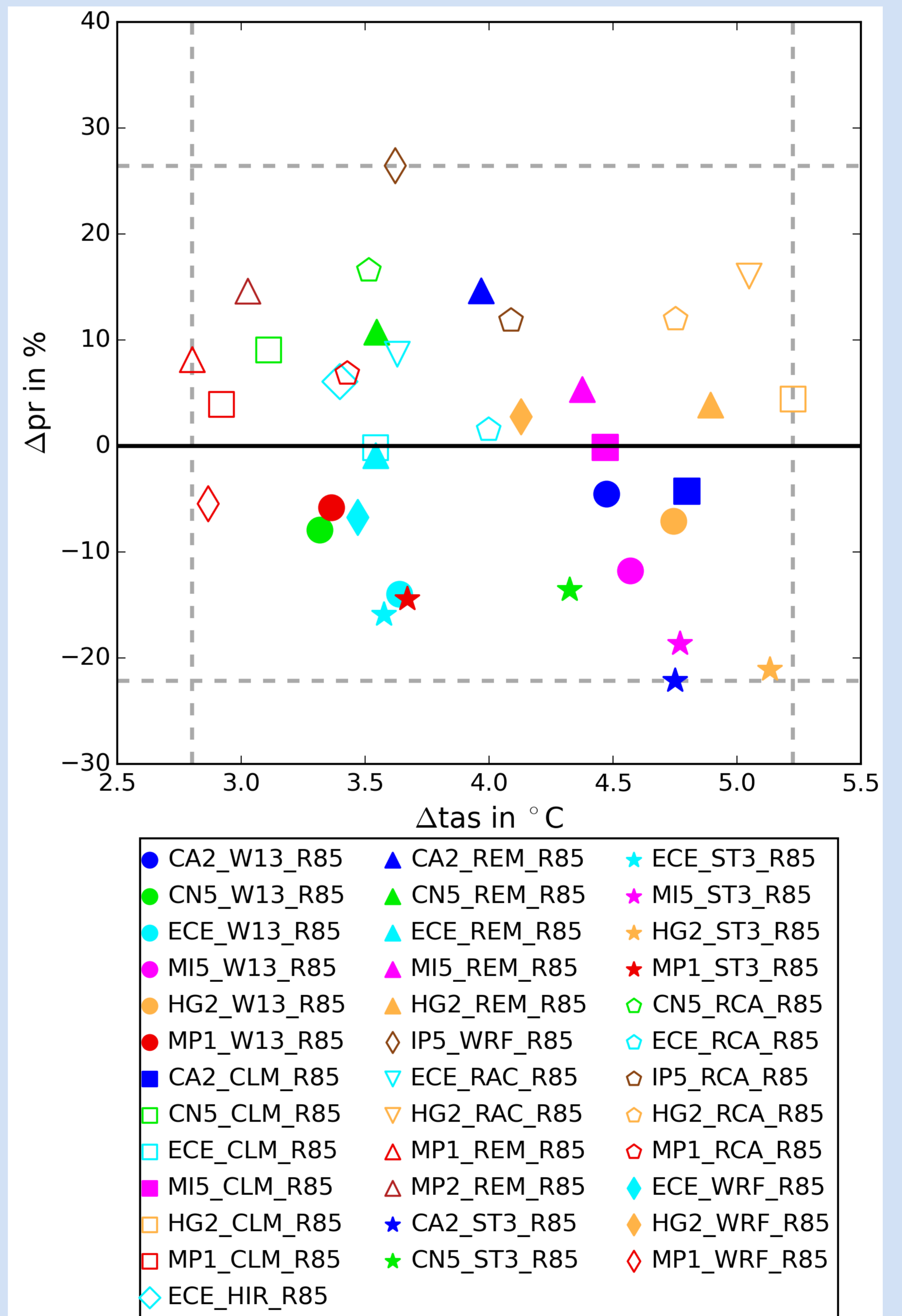
The latest generation of climate projections for the 21st century are built on new emission scenarios based on Representative Concentration Pathways (RCPs). Within the world wide coordinated effort of the Coupled Model Intercomparison Project Phase 5 (CMIP5), their impact on climate is simulated with global models of the climate system. A sample of the global simulations is dynamically downscaled for Europe in the framework of EURO-CORDEX. Many members of the COSMO-CLM Community have already contributed to this major project. Further simulations, based on both dynamical and statistical methods, with focus on Germany and the river catchments draining into Germany, are conducted within the framework of the project ReKliEs-De to account for the full range of model variability. Here we present projected climate change signals for Germany for the high emission scenario RCP8.5 from this large and unique ensemble.

### Data base

	CCLM (RCM)	REMO (RCM)	WRF (RCM)	WR13 (ESD)	STARS3 (ESD)	RCA4 (RCM)	RACMO (RCM)	HIRHAM5 (RCM)
EC-EARTH RCP 2.6	EURO-CORDEX				ReKliEs	EURO-CORDEX	EURO-CORDEX	EURO-CORDEX
HadGEM2-ES RCP 2.6					ReKliEs	EURO-CORDEX	EURO-CORDEX	
MPI-ESM-LR RCP 2.6	ReKliEs	2 EURO-CORDEX	ReKliEs	ReKliEs	ReKliEs	EURO-CORDEX		
CanESM2 RCP 8.5	ReKliEs	ReKliEs		ReKliEs	ReKliEs			
CNRM-CM5 RCP 8.5	EURO-CORDEX	ReKliEs		ReKliEs	ReKliEs	EURO-CORDEX		
EC-EARTH RCP 8.5	EURO-CORDEX	ReKliEs	ReKliEs	ReKliEs	ReKliEs	EURO-CORDEX	EURO-CORDEX	EURO-CORDEX
HadGEM2-ES RCP 8.5	EURO-CORDEX	ReKliEs	ReKliEs	ReKliEs	ReKliEs	EURO-CORDEX	EURO-CORDEX	
IPSL-CM5A RCP8.5			EURO-CORDEX			EURO-CORDEX		
MIROC5 RCP 8.5	ReKliEs	ReKliEs	(ReKliEs)	ReKliEs	ReKliEs			
MPI-ESM-LR RCP8.5	ReKliEs	2 EURO-CORDEX	ReKliEs	ReKliEs	ReKliEs	EURO-CORDEX		

- RCP2.6:
  - ReKliEs-De: 6 simulations
  - EURO-CORDEX: 9 simulations
  - Total: 15 simulations
- RCP8.5:
  - ReKliEs-De: 24 (23) simulations
  - EURO-CORDEX: 14 simulations
  - Total: 38 (37)

### Climate change signals temperature and precipitation for RCP8.5 2071-2100 vs. 1971-2000



ReKliEs-De = filled      EURO-CORDEX = not filled

### Methods

- very large (37 simulations) and unique ensemble of statistical (ESD) and dynamical (RCM) downscaling techniques
- long-term annual mean values for the periods 1971-2000 (reference period) and 2071-2100
- spatial means for the ReKliEs-De domain (Germany and river catchments draining into Germany)
- climate change signal is the difference between values for 2071-2100 and 1971-2000

### Results

- the projected range of temperature change for RCP8.5 is +2,8°C to +5,2°C
- the projected range of precipitation change for RCP8.5 is -22% to +26%
- temperature signals are mainly influenced by the driving global model
- temperature signals of ESDs and RCMs cover almost the same range
- precipitation signals are stronger influenced by the regional model
- the precipitation signals derived from ESDs show a decrease in precipitation while the signals derived from RCMs show usually an increase in precipitation
- The precipitation signals derived from the two different downscaling techniques differ in sign!**