

lifelineMDD

Climate Change / Hydrology

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November 25, 2021

Project co-funded by European Union funds (ERDF, IPA), DTP3-308-2.3- lifelineMDD

INTRO

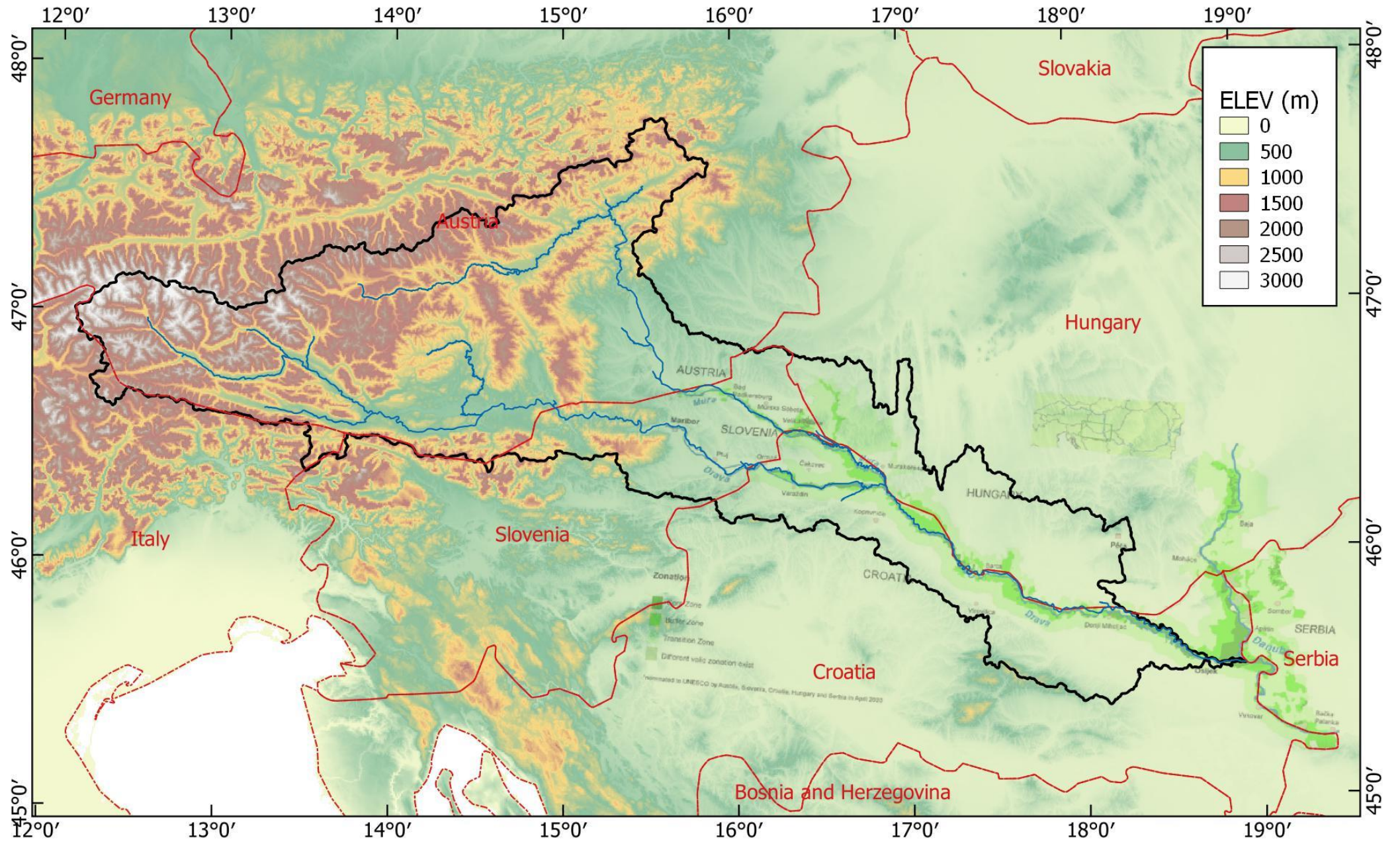
QUESTIONS ADDRESSED:

- What are the likely changes in temperature and precipitation under different emission scenarios in the future for Biosphere Reserve MDD as predicted by state-of-the-art regional climate model simulations from EURO-CORDEX
- Which models perform better in the region as compared to observed historical data and how to select the models for downscaling which cover the full spread of climate change in future

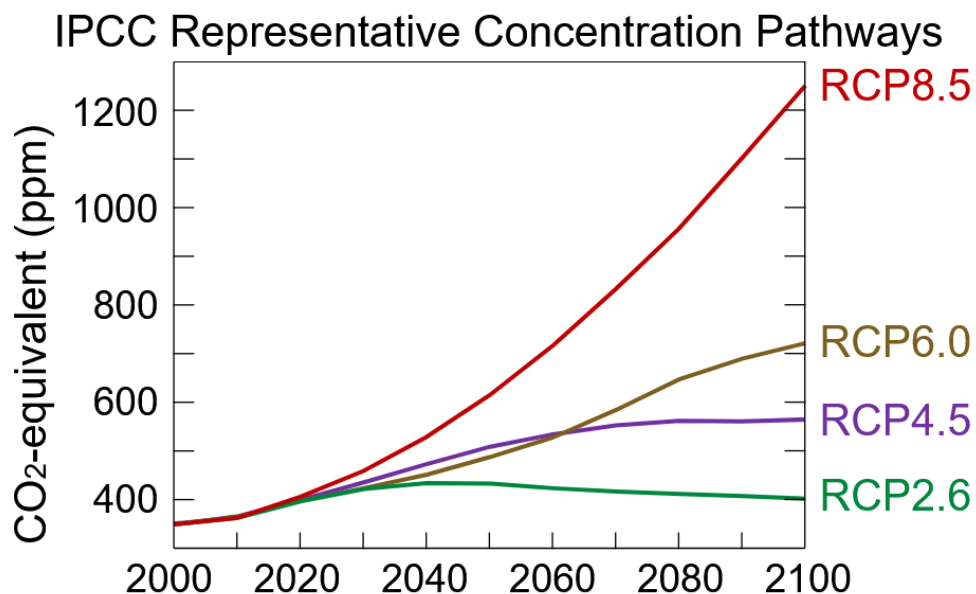


Outline of the Talk

1. Review of available data from EURO-CORDEX, Model Selection, and data Retrieval
2. Evaluation of climate model simulations against observations
3. Selection of models based on historical evaluations
4. Selection of models based on Future climate change signals
5. Statistical Downscaling / Bias-Correction of Selected Models
6. Validation of Bias-Correction
7. Analysis / Data provision for Hydrologic Study

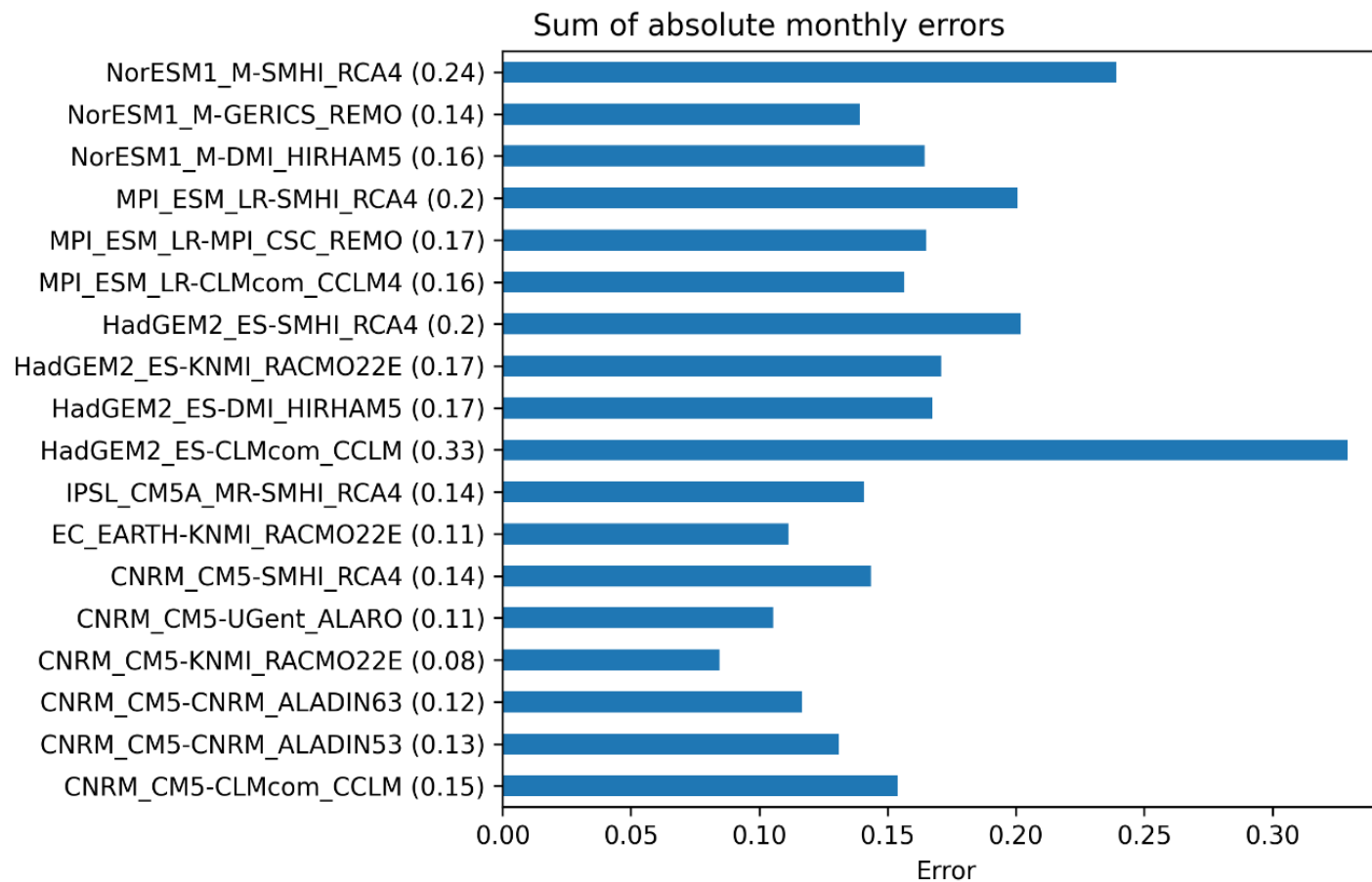


EURO-CORDEX Climate Models



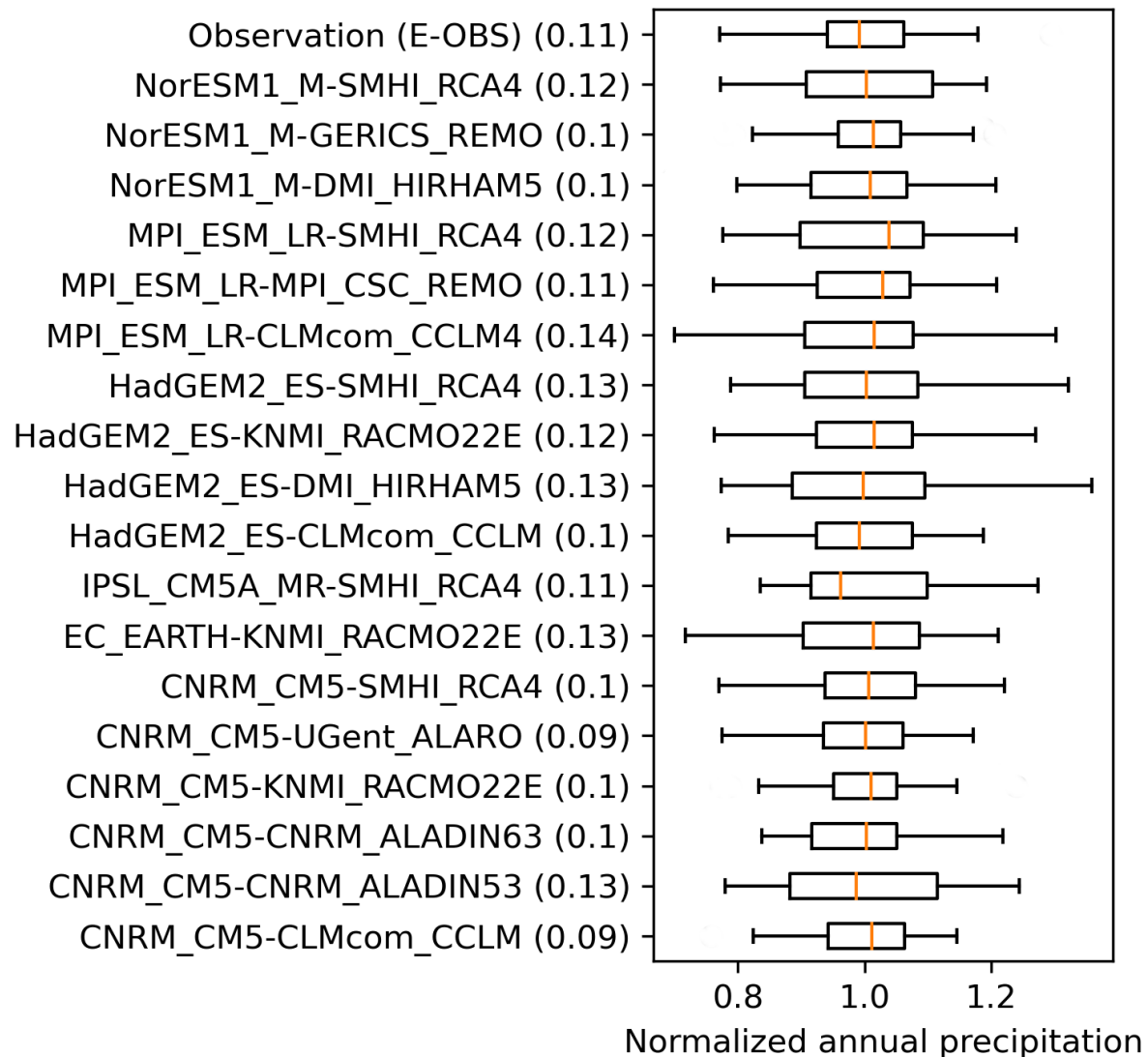
Global_Model	Regional_Model	HIST	RCP26	RCP45	RCP85	Selected
CNRM-CERFACS-CNRM-CM5	CLMcom-CCLM4-8-17_v1	✓	NIL	✓	✓	Y
CNRM-CERFACS-CNRM-CM5	CLMcom-ETH-COSMO-crCLIM-v1-1_v1	✓	NIL	NIL	✓	N
CNRM-CERFACS-CNRM-CM5	CNRM-ALADIN63_v1	✓	✓	✓	✓	Y
CNRM-CERFACS-CNRM-CM5	CNRM-ALADIN63_v2	✓	✓	✓	✓	Y
CNRM-CERFACS-CNRM-CM5	DMI-HIRHAM5_v2	✓	NIL	NIL	✓	N
CNRM-CERFACS-CNRM-CM5	GERICS-REMO2015_v2	✓	✓	NIL	✓	N
CNRM-CERFACS-CNRM-CM5	ICTP-RegCM4-6_v2	✓	NIL	NIL	✓	N
CNRM-CERFACS-CNRM-CM5	KNMI-RACMO22E_v2	✓	✓	✓	✓	Y
CNRM-CERFACS-CNRM-CM5	MOHC-HadREM3-GA7-05_v2	✓	NIL	NIL	✓	N
CNRM-CERFACS-CNRM-CM5	RMIB-UGent-ALARO-0_v1	✓	✓	✓	✓	Y
CNRM-CERFACS-CNRM-CM5	SMHI-RCA4_v1	✓	NIL	✓	✓	Y
ICHEC-EC-EARTH	CLMcom-ETH-COSMO-crCLIM-v1-1_v1	✓	NIL	NIL	✓	N
ICHEC-EC-EARTH	DMI-HIRHAM5_v1	✓	NIL	NIL	✓	N
ICHEC-EC-EARTH	KNMI-RACMO22E_v1	✓	NIL	✓	✓	Y
ICHEC-EC-EARTH	SMHI-RCA4_v1	✓	NIL	NIL	✓	N
IPSL-IPSL-CM5A-LR	GERICS-REMO2015_v1	✓	✓	NIL	NIL	N
IPSL-IPSL-CM5A-MR	DMI-HIRHAM5_v1	✓	NIL	NIL	✓	N
IPSL-IPSL-CM5A-MR	GERICS-REMO2015_v1	✓	NIL	NIL	✓	N
IPSL-IPSL-CM5A-MR	KNMI-RACMO22E_v1	✓	NIL	NIL	✓	N
IPSL-IPSL-CM5A-MR	SMHI-RCA4_v1	✓	NIL	✓	✓	Y
MOHC-HadGEM2-ES	CLMcom-CCLM4-8-17_v1	✓	NIL	✓	✓	Y
MOHC-HadGEM2-ES	CLMcom-ETH-COSMO-crCLIM-v1-1_v1	✓	NIL	NIL	✓	N
MOHC-HadGEM2-ES	CNRM-ALADIN63_v1	✓	NIL	NIL	✓	N
MOHC-HadGEM2-ES	DMI-HIRHAM5_v2	✓	✓	✓	✓	Y
MOHC-HadGEM2-ES	ICTP-RegCM4-6_v1	✓	✓	NIL	✓	Y
MOHC-HadGEM2-ES	KNMI-RACMO22E_v2	✓	✓	✓	✓	Y
MOHC-HadGEM2-ES	MOHC-HadREM3-GA7-05_v1	✓	✓	NIL	✓	Y
MOHC-HadGEM2-ES	SMHI-RCA4_v1	✓	✓	✓	✓	Y
MPI-M-MPI-ESM-LR	CLMcom-CCLM4-8-17_v1	✓	NIL	✓	✓	Y
MPI-M-MPI-ESM-LR	CLMcom-ETH-COSMO-crCLIM-v1-1_v1	✓	NIL	NIL	✓	N
MPI-M-MPI-ESM-LR	CNRM-ALADIN63_v1	✓	NIL	NIL	✓	N
MPI-M-MPI-ESM-LR	DMI-HIRHAM5_v1	✓	NIL	NIL	✓	N
MPI-M-MPI-ESM-LR	ICTP-RegCM4-6_v1	✓	✓	NIL	✓	N
MPI-M-MPI-ESM-LR	KNMI-RACMO22E_v1	✓	✓	NIL	✓	N
MPI-M-MPI-ESM-LR	MOHC-HadREM3-GA7-05_v1	✓	NIL	NIL	✓	N
MPI-M-MPI-ESM-LR	MPI-CSC-REMO2009_v1	✓	✓	✓	✓	Y
MPI-M-MPI-ESM-LR	SMHI-RCA4_v1a	✓	✓	✓	✓	Y
NCC-NorESM1-M	CLMcom-ETH-COSMO-crCLIM-v1-1_v1	✓	NIL	NIL	✓	N
NCC-NorESM1-M	CNRM-ALADIN63_v1	✓	NIL	NIL	✓	N
NCC-NorESM1-M	DMI-HIRHAM5_v3	✓	NIL	✓	✓	Y
NCC-NorESM1-M	GERICS-REMO2015_v1	✓	✓	✓	✓	Y
NCC-NorESM1-M	ICTP-RegCM4-6_v1	✓	✓	NIL	✓	N
NCC-NorESM1-M	KNMI-RACMO22E_v1	✓	✓	NIL	✓	N
NCC-NorESM1-M	MOHC-HadREM3-GA7-05_v1	✓	NIL	NIL	✓	N
NCC-NorESM1-M	SMHI-RCA4_v1	✓	✓	✓	✓	Y
NOAA-GFDL-GFDL-ESM2G	GERICS-REMO2015_v1	✓	✓	NIL	NIL	N

Selection based on Historical Evaluations (1976-2005)



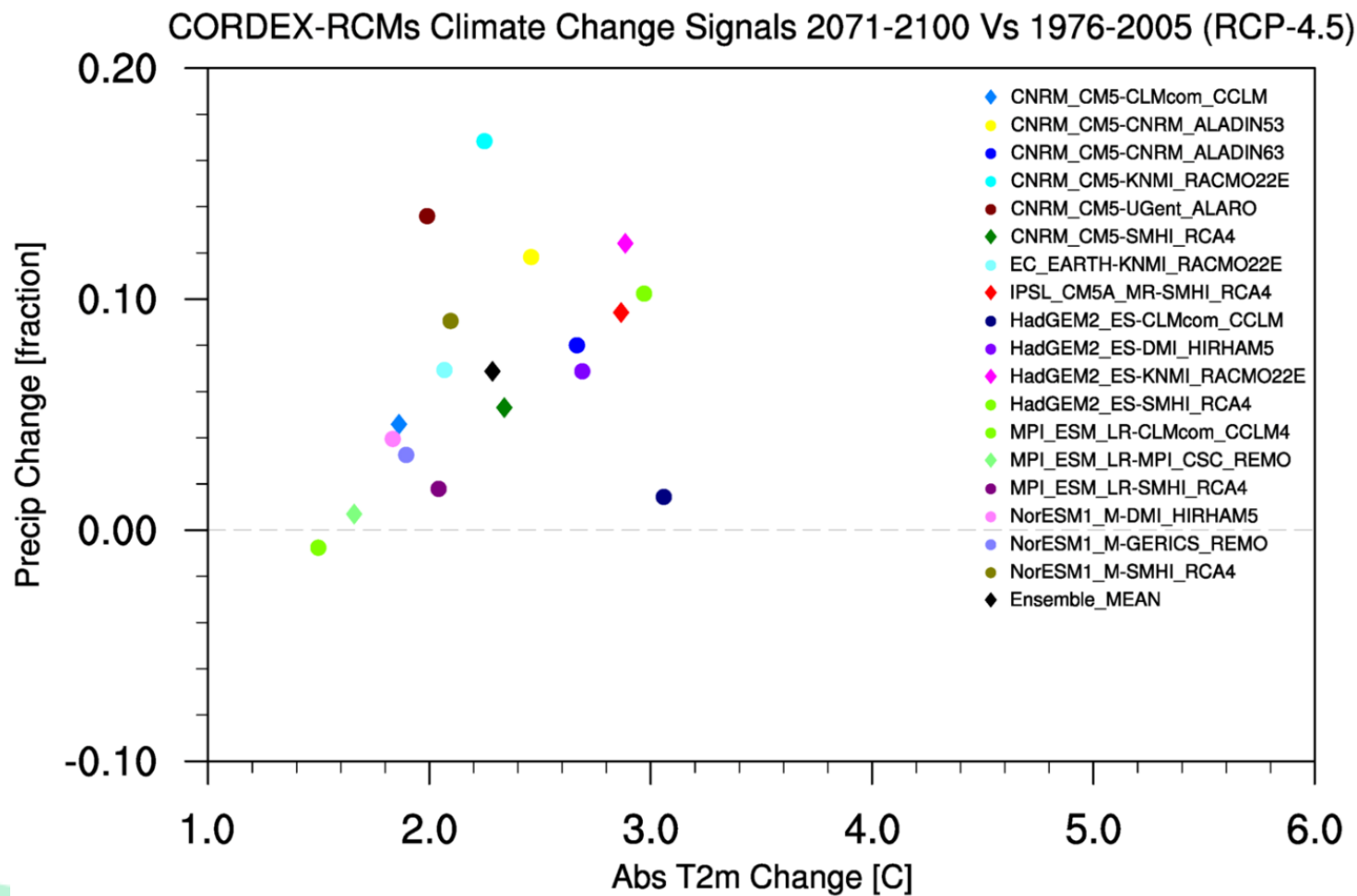
Selection based on Historical Evaluations (Contd.)

Precipitation: Annual range (1976-2005)

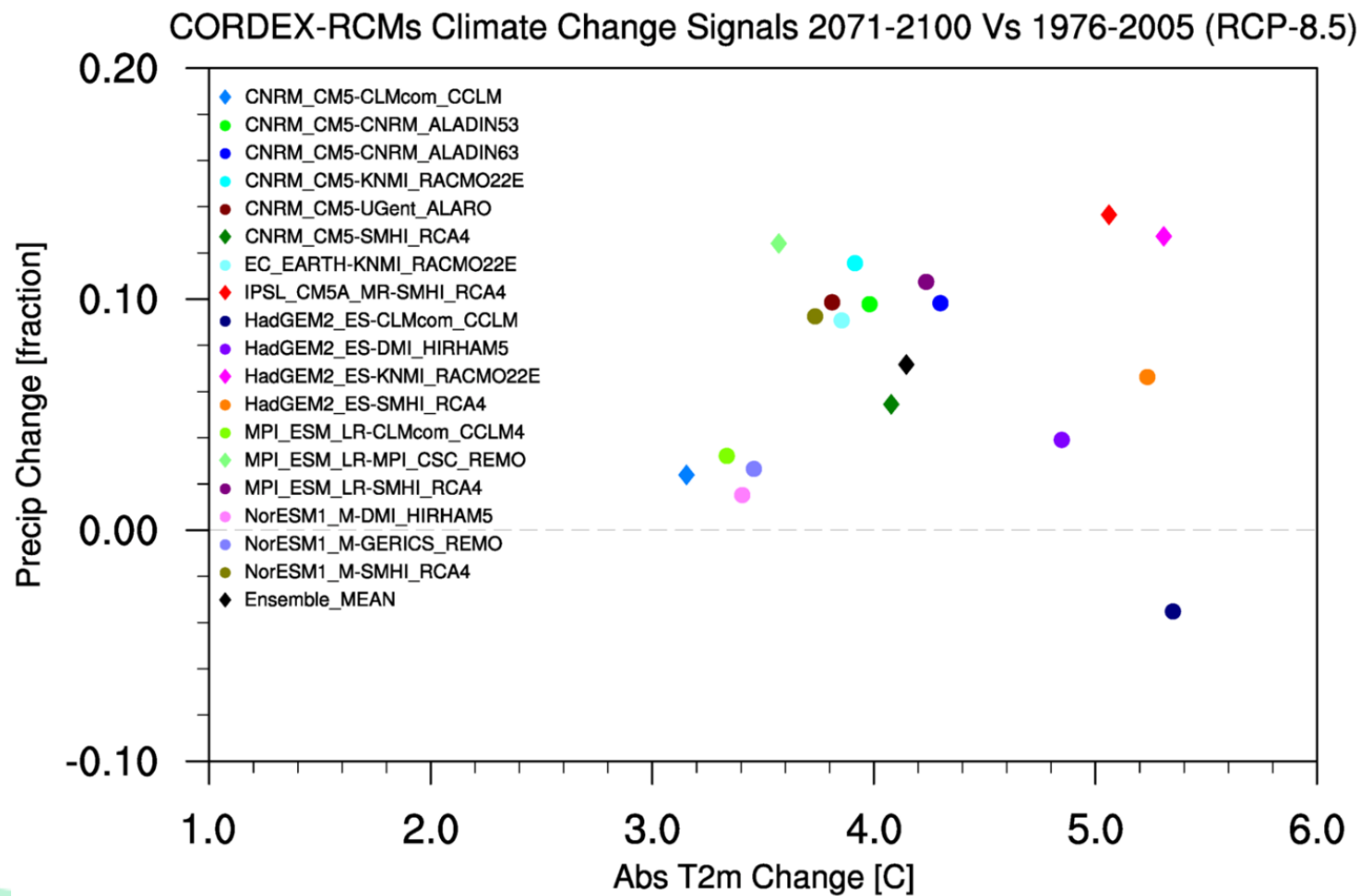


The Good, The Bad and The Worst

(Selection based on Future Scenarios)



Selection based on Future Scenarios



Downscaling and Bias-Correction of Selected Models

No.	Selected Models	Scenario
1	CNRM-CM5_SMHI-RCA4	RCP-4.5 & RCP-8.5
2	IPSL-CM5A-MR_SMHI-RCA4	RCP-4.5 & RCP-8.5
3	HadGEM2-ES_KNMI-RACMO22E	RCP-4.5 & RCP-8.5
4	MPI-ESM-LR_MPI-CSC	RCP-4.5 & RCP-8.5
5	CNRM-CM5_CLMcom-CCLM4	RCP-4.5 & RCP-8.5

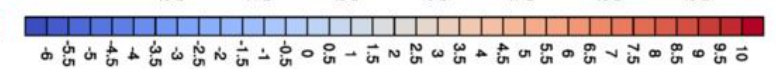
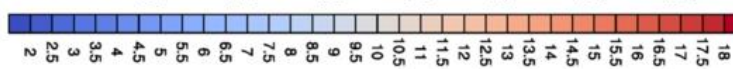
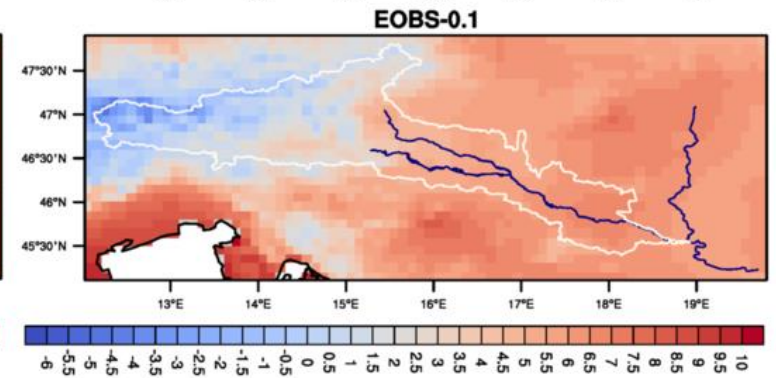
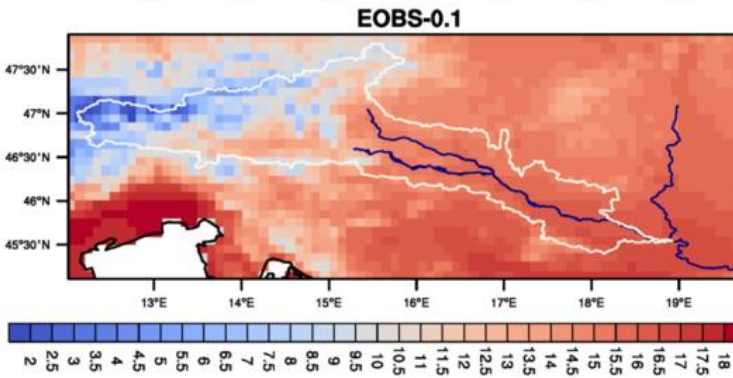
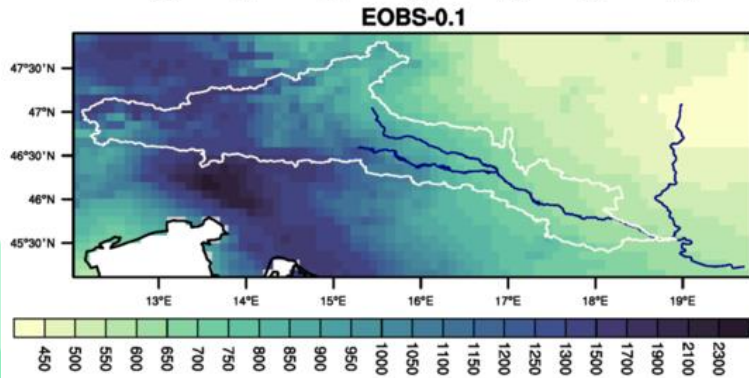
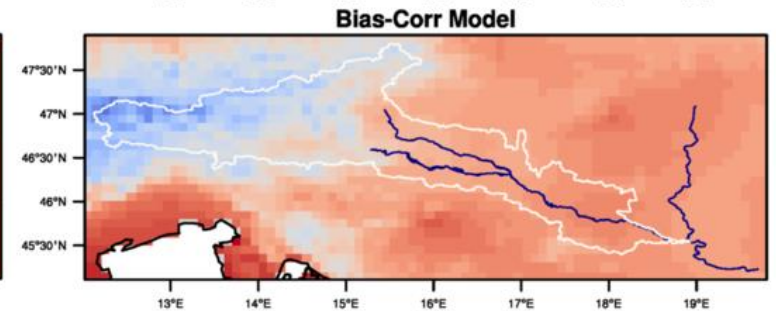
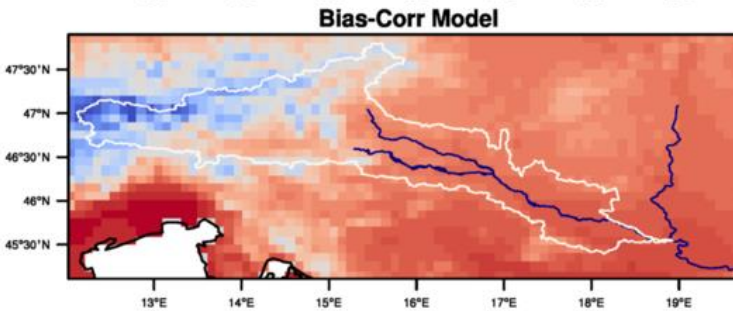
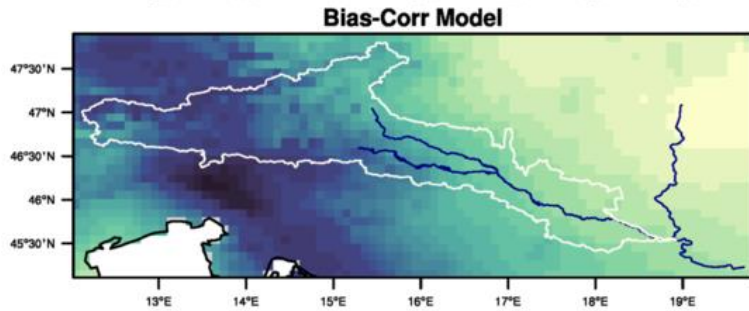
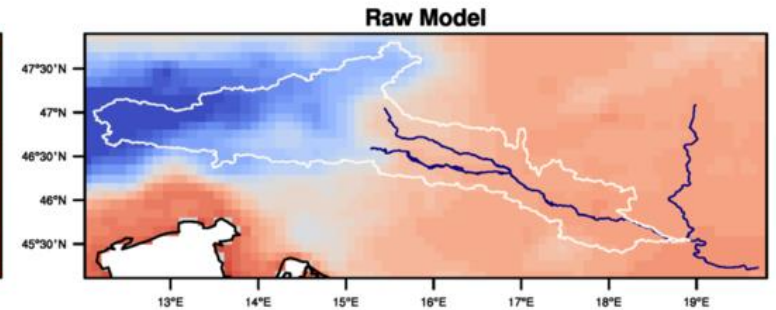
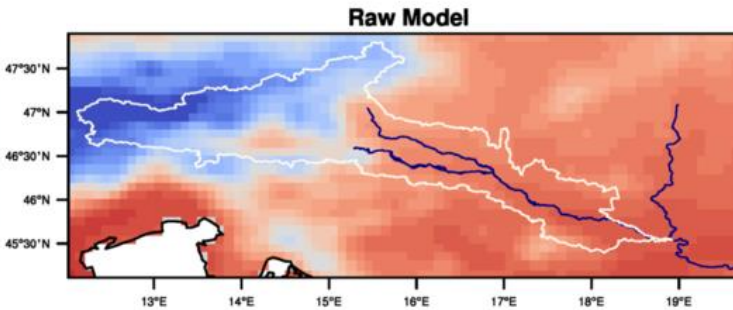
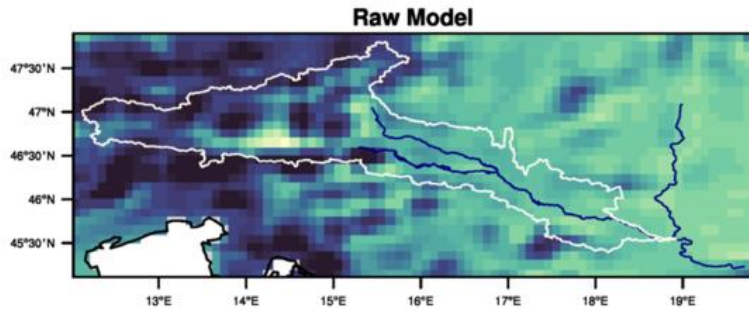
- Climate Models output is bias-corrected before using the data for impact models.
- Bias-Correction is a process to systematically remove the RCM inherit biases without affecting the climate change signals.
- **EDCDFm and Presrat:** The bias correction method used is EDCDFm [Li et al. 2010] for temperature and Presrat [Pierce et al. 2015] for precipitation.
- **E-OBS** is used observation for Bias-Correction

Evaluation of Bias-Corrected Output

Precip (mm/year) 1976-2005 CNRM-CM5_SMHI-RCA4 historical

Max. Temp (C) 1976-2005 CNRM-CM5_SMHI-RCA4 historical

Min. Temp (C) 1976-2005 CNRM-CM5_SMHI-RCA4 historical



Future Climate Change Signals for different season

Spatial plots of CC-Signals will come here.

Thank you!

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