Selection of representative models for a defined area of interest

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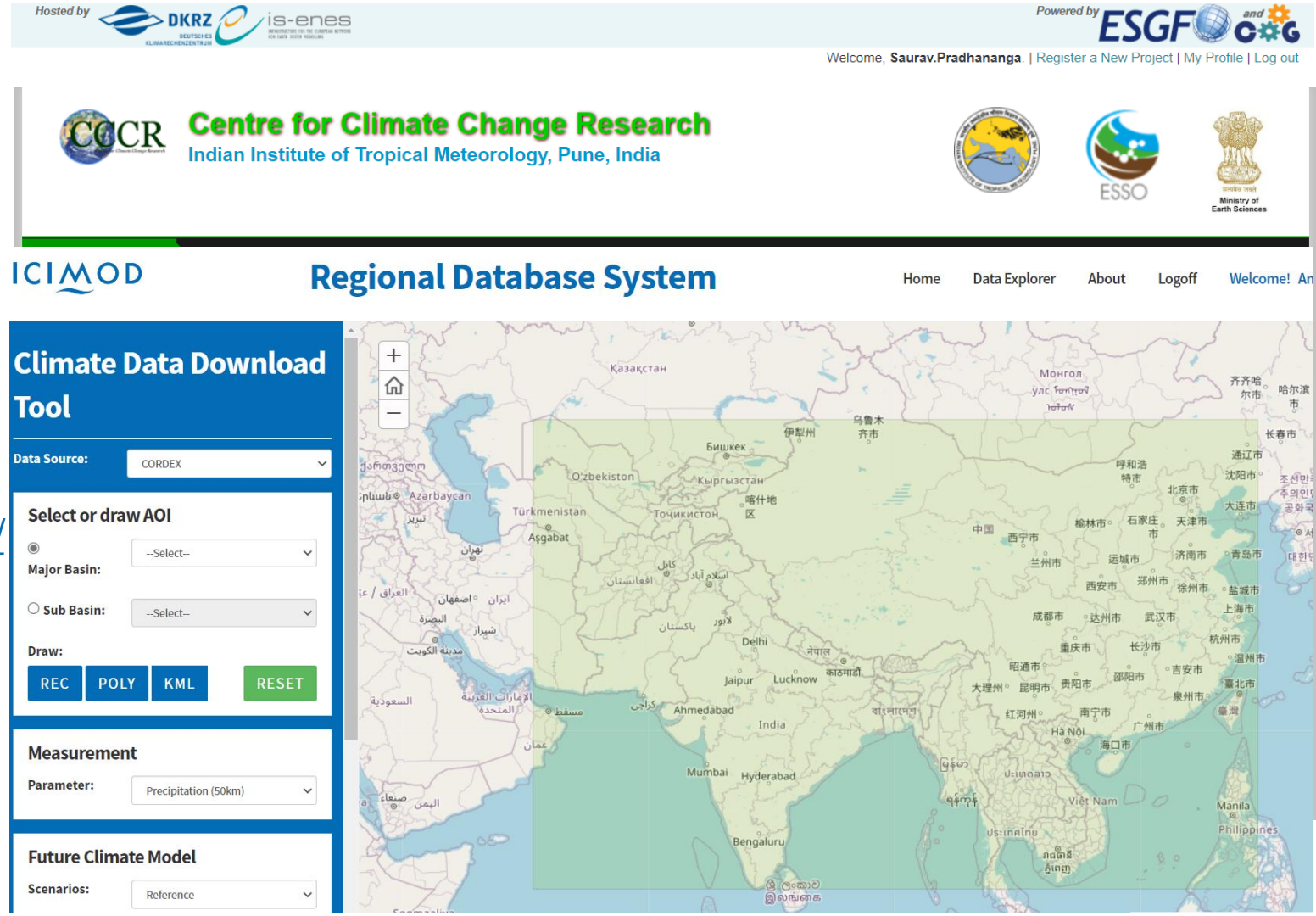
Overview of the training

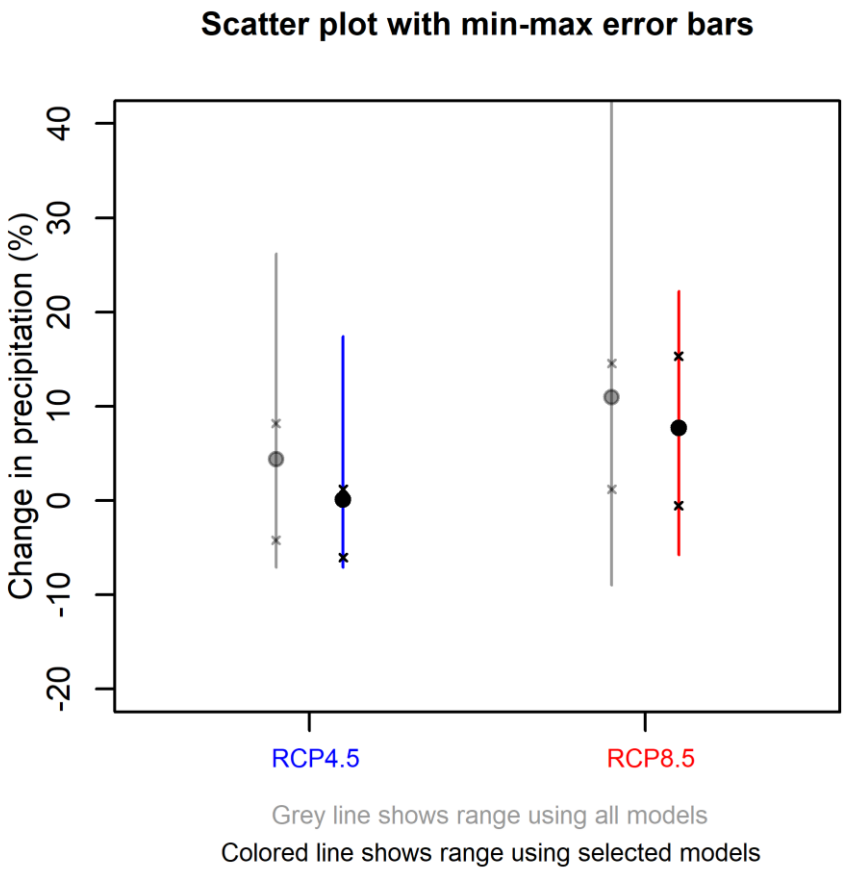
- Installing required software and packages
- Selection of 4 representative models based on
  - Annual bias
  - Seasonal bias
- Two RCPs (RCP4.5 and RCP8.5)
- Use CDI Tool to calculate different climate indices and perform spatial and temporal analysis

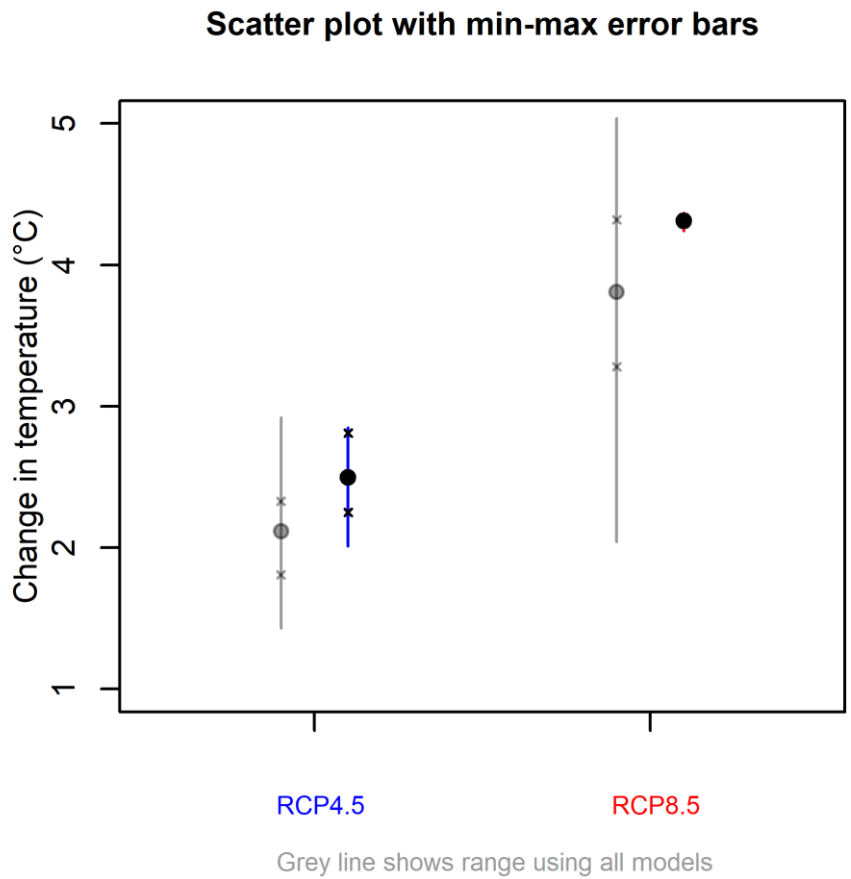
Extracting CORDEX dataset for a area of interest

- Download CORDEX dataset (*needs registration*)
  - ESGF node: https://esgf-data.dkrz.de/search/esgf-dkrz/
  - IITM data download tool: http://cccr-dx.tropmet.res.in:8000/cccrindia/
  - ICIMOD RDS: http://rds.icimod.org/clim



Need for model selection

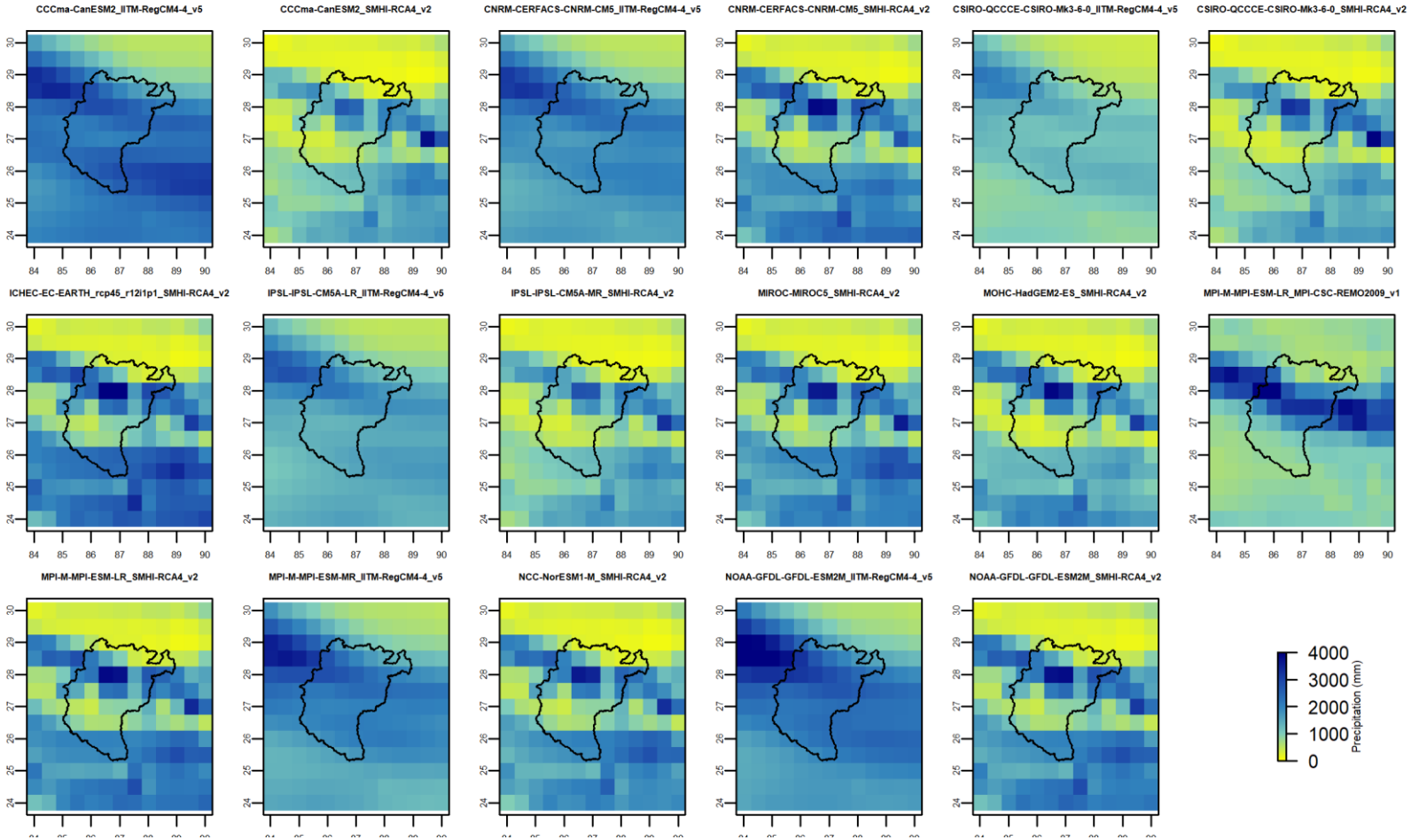




CORDEX precipitation dataset

Reference period: 1976-2005

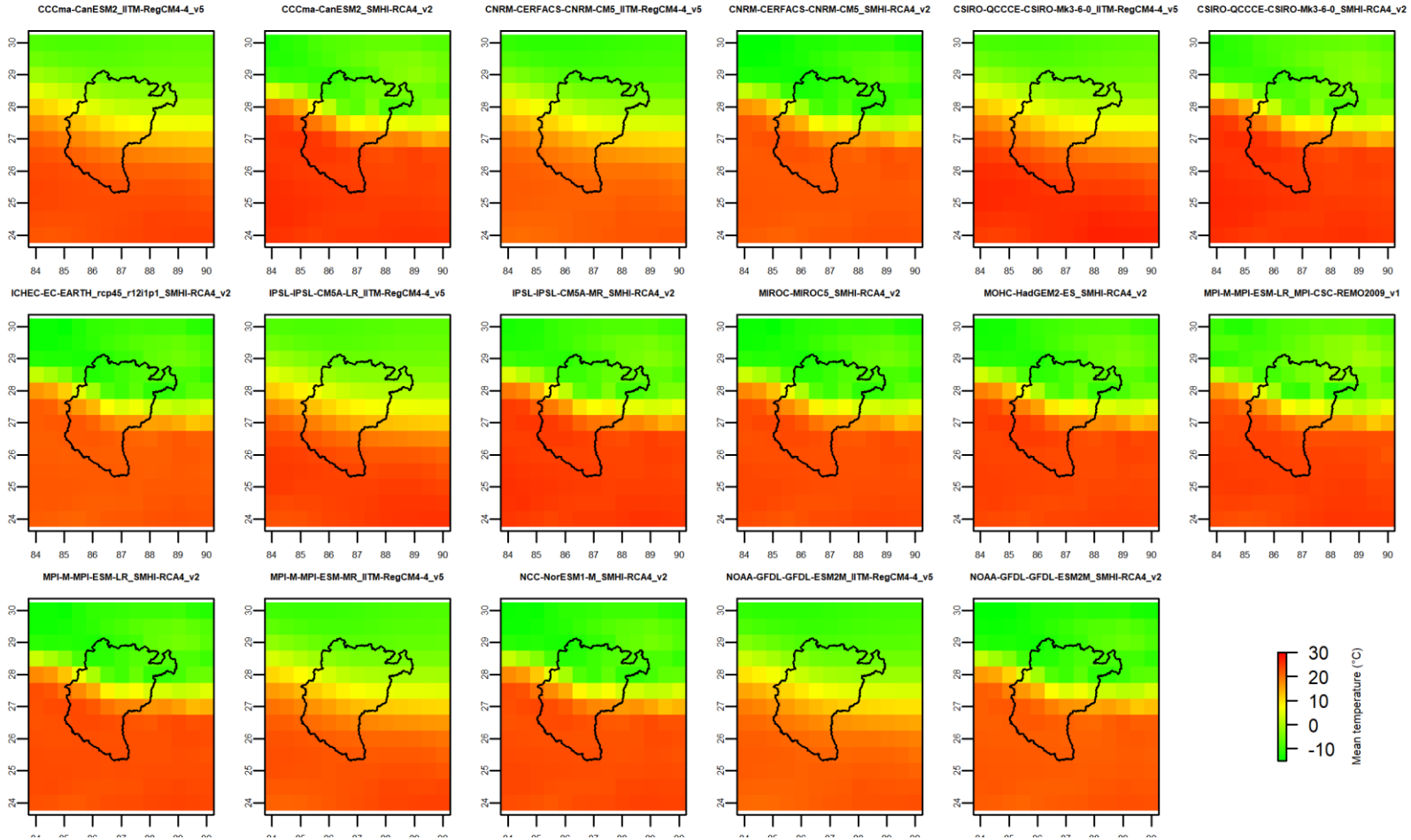
Temporal scale: Average annual



CORDEX temperature dataset

Reference period: 1976-2005

Temporal scale: Average annual



Reference dataset

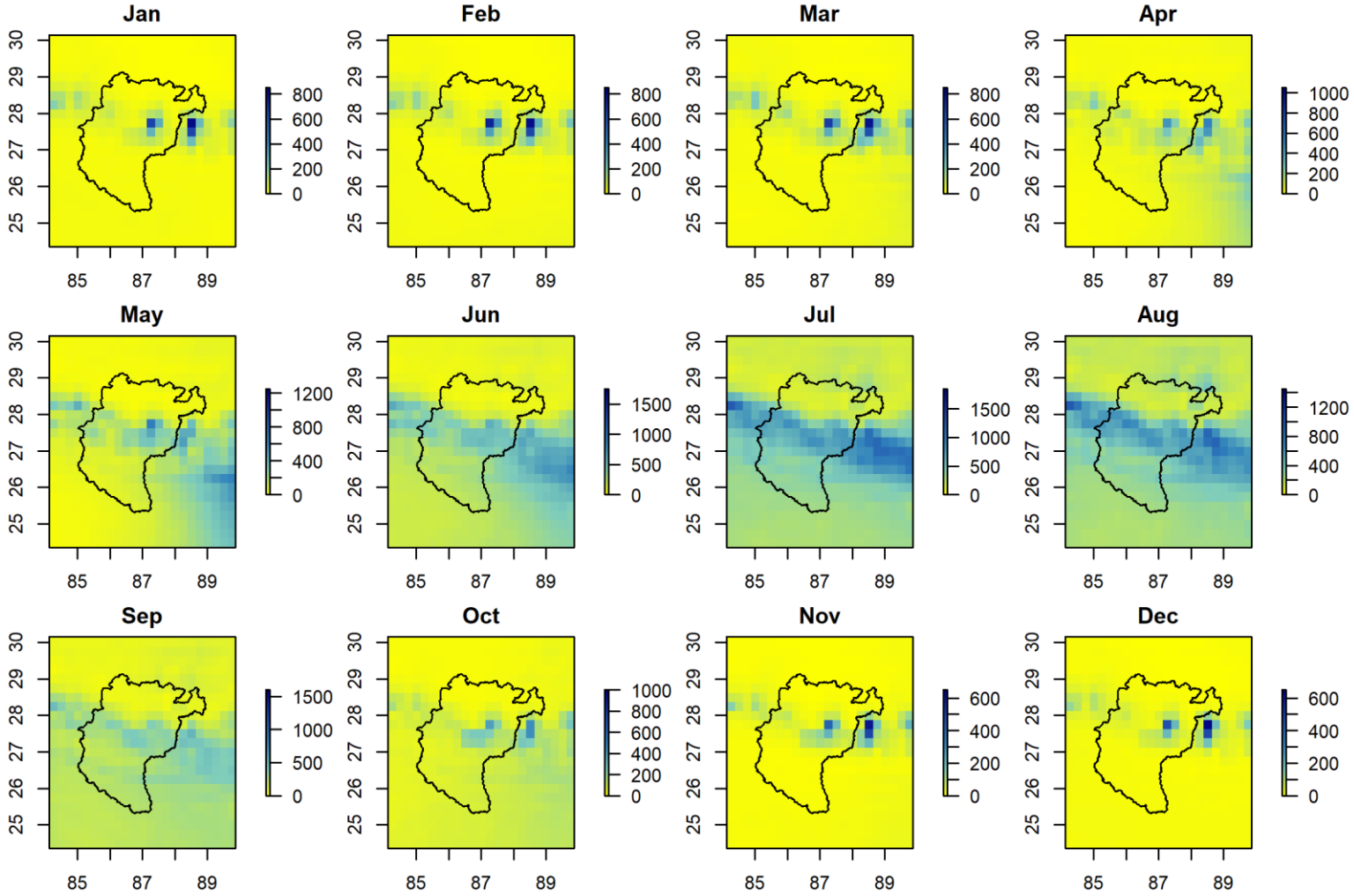
Precipitation:

ERA5 hourly dataset

Over the Monsoon Asia region

Resolution: 0.25°

https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels?tab=form



Reference dataset

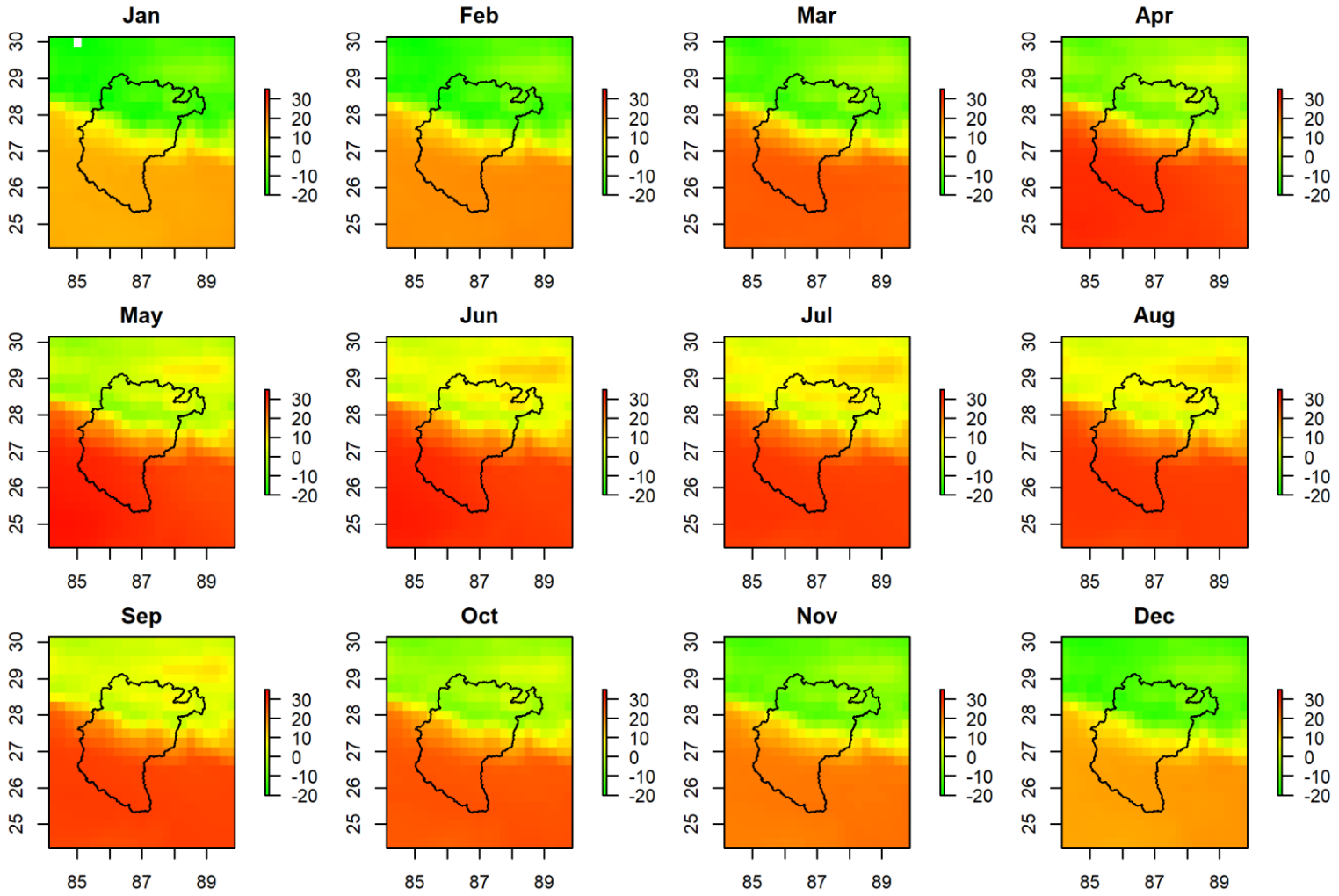
Temperature:

ERA5 dataset

Over the Monsoon Asia region

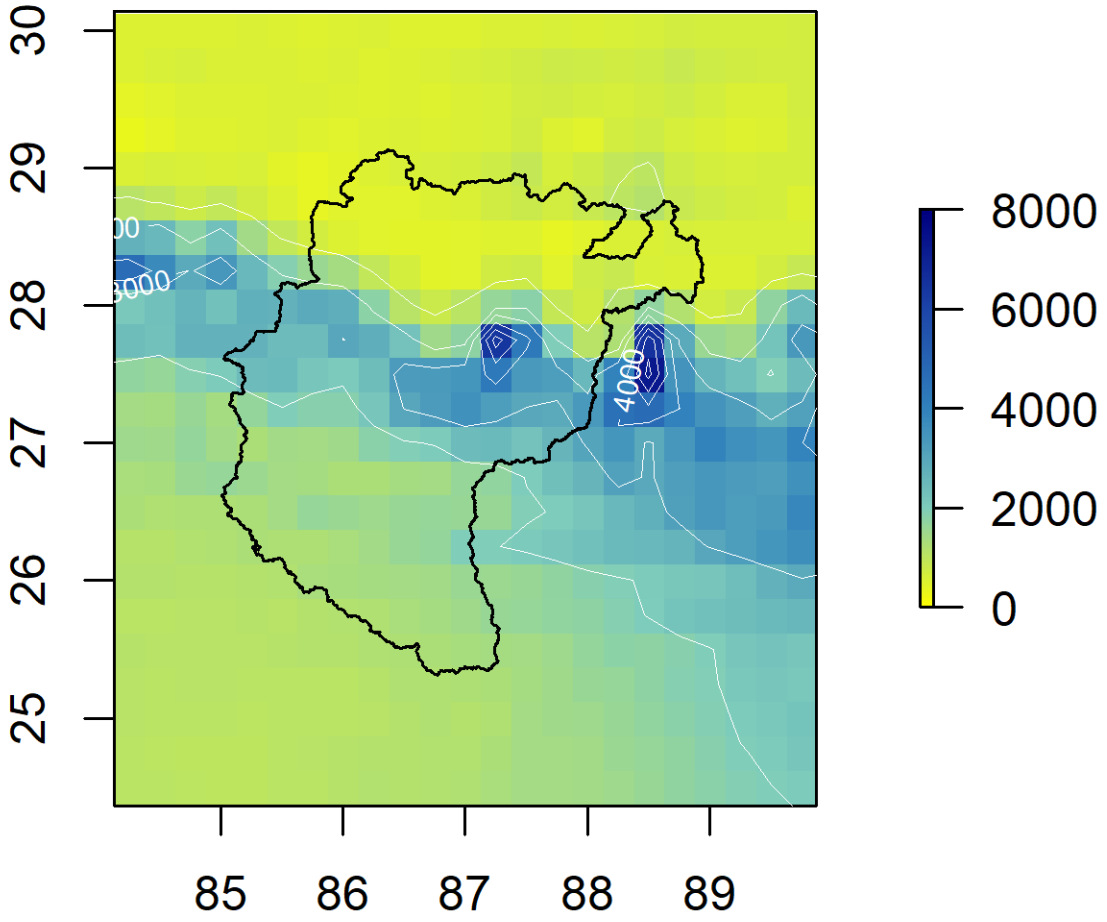
Resolution: 0.25°

[ERA5 hourly data on single levels from 1959 to present (copernicus.eu)]

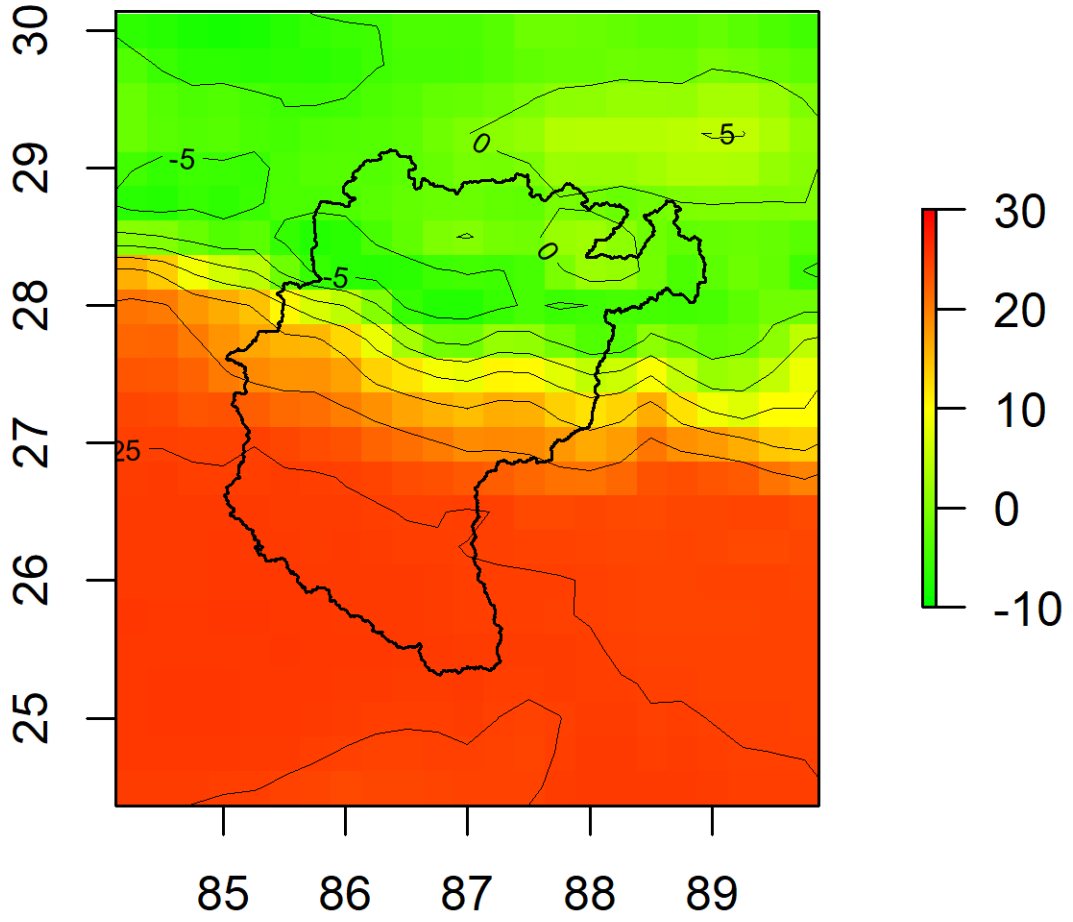


Reference dataset

Annual Precipitation (mm)



Annual mean temperature (°C)



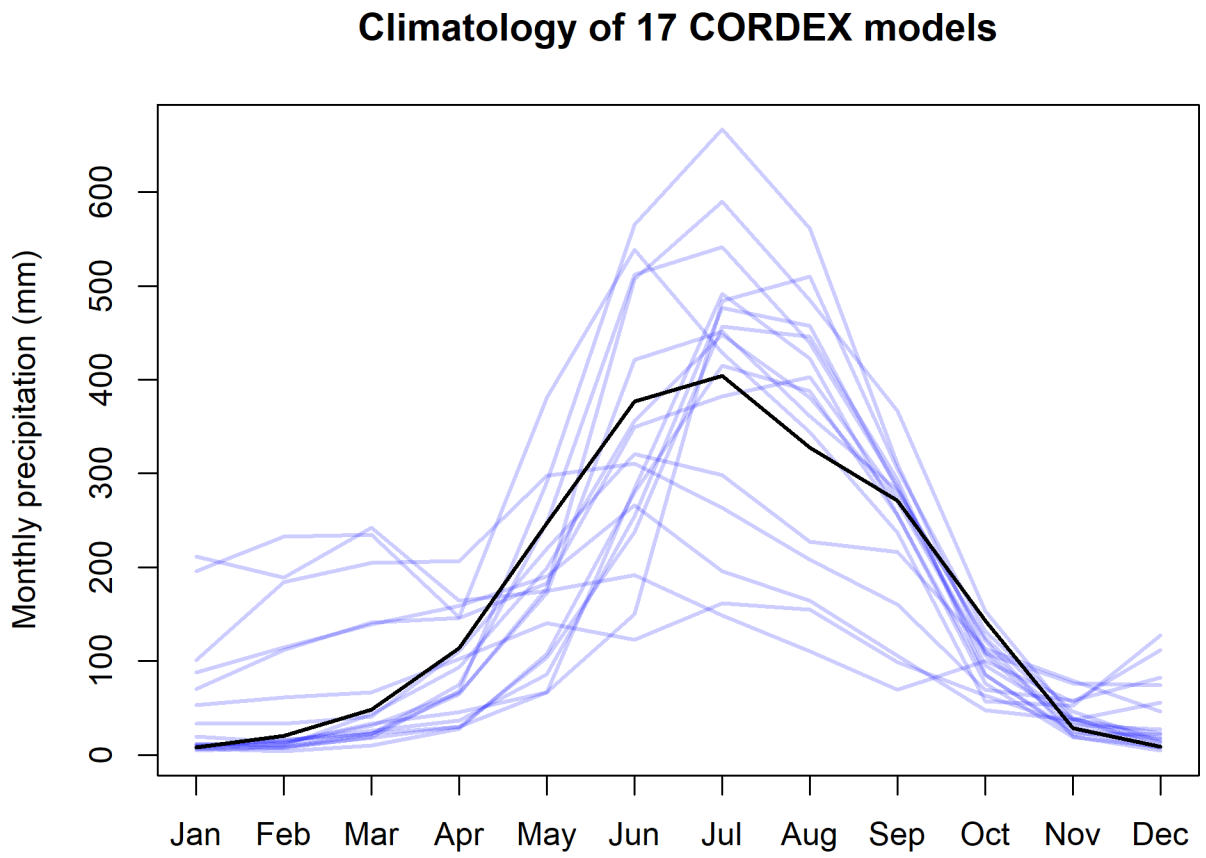
Monthly precipitation for the reference period

Reference data (APHRODITE)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation (mm)	8	21	48	114	247	377	404	327	271	143	28	9
Temperature (°C)	17.6	21.1	25.3	27.8	28.3	28.5	28.2	28.4	28.1	26.9	23.6	19.7

Monthly precipitation for the reference period

Model	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CCCma-CanESM2_IITM-RegCM4-4_v5	196	233	235	147	381	539	429	344	237	57	52	128
CCCma-CanESM2_SMHI-RCA4_v2	8	12	23	30	104	237	457	446	293	86	22	21
CNRM-CERFACS-CNRM-CM5_IITM-RegCM4-4_v5	70	112	141	146	183	349	382	403	275	108	76	74
CNRM-CERFACS-CNRM-CM5_SMHI-RCA4_v2	5	8	22	64	178	508	590	485	367	153	39	9
CSIRO-QCCCE-CSIRO-Mk3-6-0_IITM-RegCM4-4_v5	53	61	67	102	140	122	161	155	99	63	32	27
CSIRO-QCCCE-CSIRO-Mk3-6-0_SMHI-RCA4_v2	8	15	26	37	85	254	477	457	283	122	19	4
ICHEC-EC-EARTH_rcp85_r12i1p1_SMHI-RCA4_v2	11	8	19	68	291	565	667	562	310	110	35	13
IPSL-IPSL-CM5A-LR_IITM-RegCM4-4_v5	211	189	242	164	175	192	148	110	69	100	56	112
IPSL-IPSL-CM5A-MR_SMHI-RCA4_v2	7	9	18	30	66	150	484	510	304	132	46	14
MIROC-MIROC5_SMHI-RCA4_v2	12	10	43	93	200	356	448	381	269	106	29	17
MOHC-HadGEM2-ES_SMHI-RCA4_v2	6	4	10	28	108	280	415	388	255	85	25	7
MPI-M-MPI-ESM-LR_MPI-CSC-REMO2009_v1	33	33	41	110	220	321	298	227	217	113	79	46
MPI-M-MPI-ESM-LR_SMHI-RCA4_v2	9	16	22	75	248	512	541	439	287	95	38	23
MPI-M-MPI-ESM-MR_IITM-RegCM4-4_v5	88	115	139	159	190	266	196	165	106	48	37	56
NCC-NorESM1-M_SMHI-RCA4_v2	11	12	33	46	66	284	491	423	256	76	19	9
NOAA-GFDL-GFDL-ESM2M_IITM-RegCM4-4_v5	101	184	204	207	297	311	263	208	160	70	58	83
NOAA-GFDL-GFDL-ESM2M_SMHI-RCA4_v2	19	13	31	66	172	421	451	361	282	125	38	18

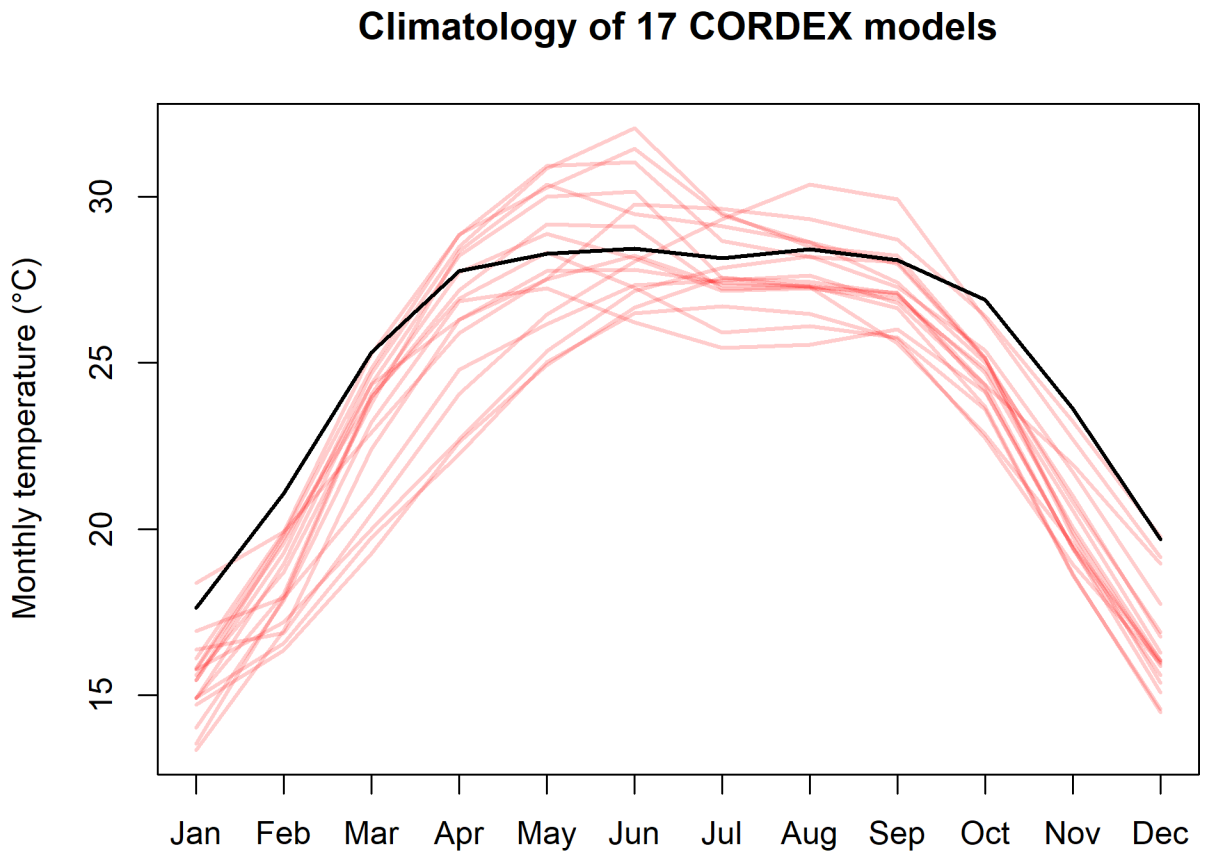
Climatology of all 17 models



Monthly temperature for the reference period

Model	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
CCCma-CanESM2_IITM-RegCM4-4_v5	16.9	17.9	21.1	24.8	26.2	27.3	27.5	27.6	26.8	24.3	21.9	18.9
CCCma-CanESM2_SMHI-RCA4_v2	15.8	19.8	24.8	28.9	30.3	31.4	29.4	28.6	28.0	25.1	20.8	16.9
CNRM-CERFACS-CNRM-CM5_IITM-RegCM4-4_v5	14.9	16.6	19.7	22.3	25.0	26.5	26.7	26.5	25.7	22.7	18.9	15.9
CNRM-CERFACS-CNRM-CM5_SMHI-RCA4_v2	13.5	17.9	24.0	26.9	28.3	27.3	25.9	26.1	25.8	23.6	18.6	14.6
CSIRO-QCCCE-CSIRO-Mk3-6-0_IITM-RegCM4-4_v5	18.4	19.9	22.9	25.9	27.5	29.8	29.6	29.3	28.7	26.4	23.2	19.8
CSIRO-QCCCE-CSIRO-Mk3-6-0_SMHI-RCA4_v2	16.1	19.9	25.3	28.9	30.9	31.1	28.7	28.2	28.0	25.1	19.8	15.4
ICHEC-EC-EARTH_rcp85_r12i1p1_SMHI-RCA4_v2	14.0	17.8	23.2	26.9	27.2	26.2	25.5	25.5	26.0	24.1	19.4	15.1
IPSL-IPSL-CM5A-LR_IITM-RegCM4-4_v5	16.4	16.9	20.5	24.1	26.5	28.1	29.3	30.4	29.9	26.3	22.7	19.1
IPSL-IPSL-CM5A-MR_SMHI-RCA4_v2	15.4	19.3	24.7	28.5	30.9	32.1	29.5	28.5	28.2	25.1	19.9	15.9
MIROC-MIROC5_SMHI-RCA4_v2	15.8	19.6	24.4	26.3	27.5	28.2	27.4	27.3	27.0	24.7	20.1	16.0
MOHC-HadGEM2-ES_SMHI-RCA4_v2	14.9	18.9	24.4	28.2	30.0	30.2	27.6	27.4	27.1	24.3	19.4	15.6
MPI-M-MPI-ESM-LR_MPI-CSC-REMO2009_v1	15.6	18.7	23.8	28.4	30.4	29.5	29.1	28.6	27.4	25.0	21.0	16.8
MPI-M-MPI-ESM-LR_SMHI-RCA4_v2	14.9	18.0	24.1	27.7	28.9	28.1	27.2	27.2	26.9	24.8	20.6	16.3
MPI-M-MPI-ESM-MR_IITM-RegCM4-4_v5	15.8	17.2	20.0	22.7	25.4	27.2	27.9	28.2	27.3	25.4	21.7	17.7
NCC-NorESM1-M_SMHI-RCA4_v2	15.4	19.7	23.9	27.2	29.2	29.1	27.2	27.3	27.1	24.2	19.4	16.0
NOAA-GFDL-GFDL-ESM2M_IITM-RegCM4-4_v5	14.7	16.3	19.3	22.6	24.9	26.7	27.6	27.3	25.6	22.8	19.5	16.0
NOAA-GFDL-GFDL-ESM2M_SMHI-RCA4_v2	13.3	16.9	22.4	26.3	27.8	27.8	27.4	27.3	26.7	23.7	18.7	14.5

Climatology of all 17 models

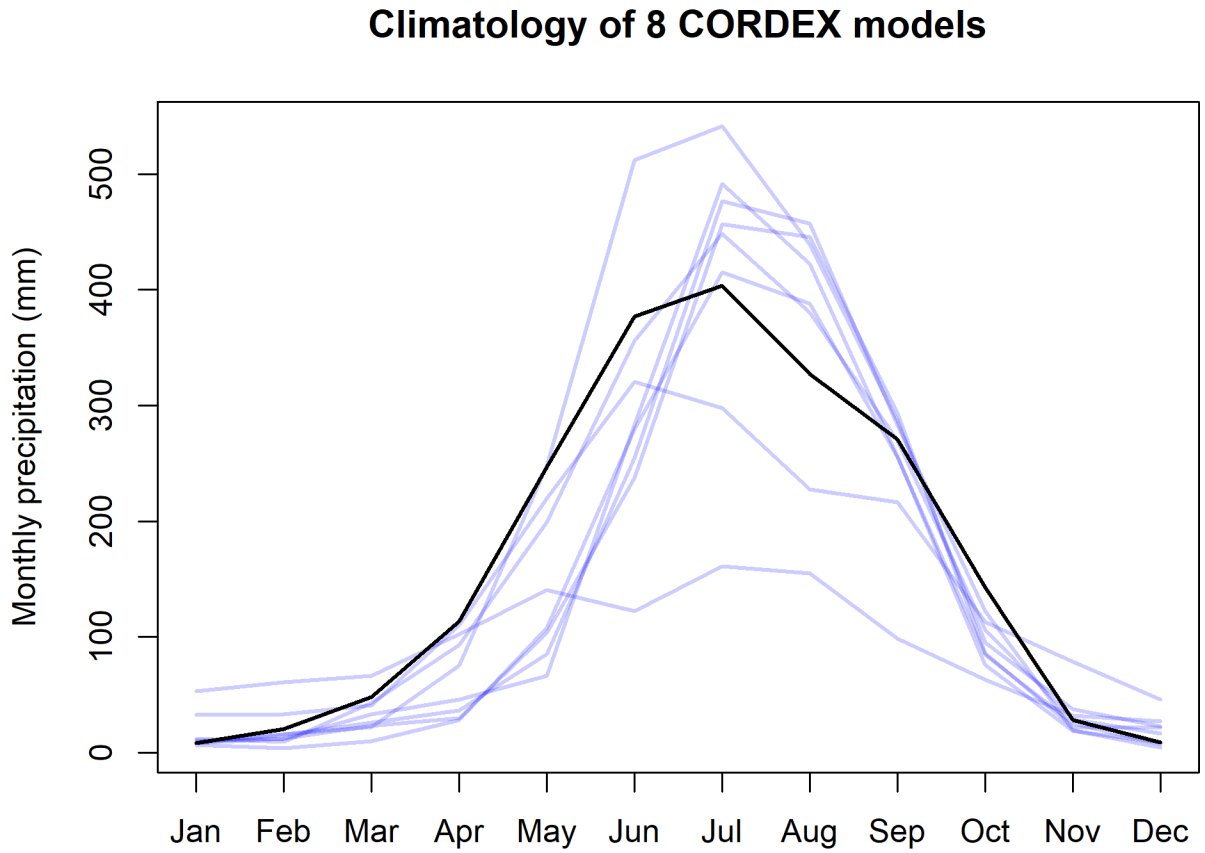


Model selection

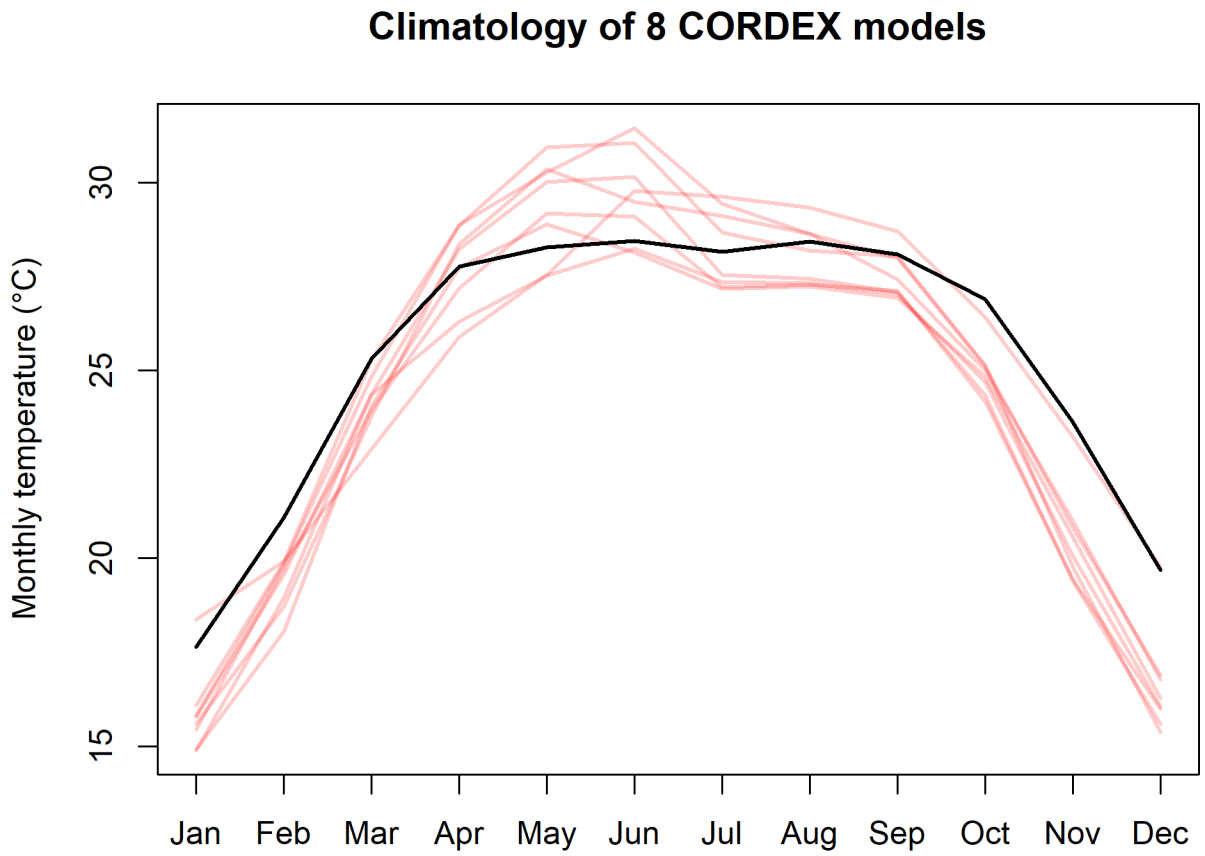
Step 1: based on seasonal bias (shape)

- 4 seasons: Winter – Dec, Jan, Feb; Pre-monsoon – Mar, Apr, May; Monsoon – Jun, Jul, Aug, Sep; Post-monsoon – Oct, Nov
- Monsoon precipitation bias(Jun – Sep) for precipitation
- Average absolute bias of all seasons for mean temperature

Climatology of 8 models selected from step 1



Climatology of 8 models selected from step 1

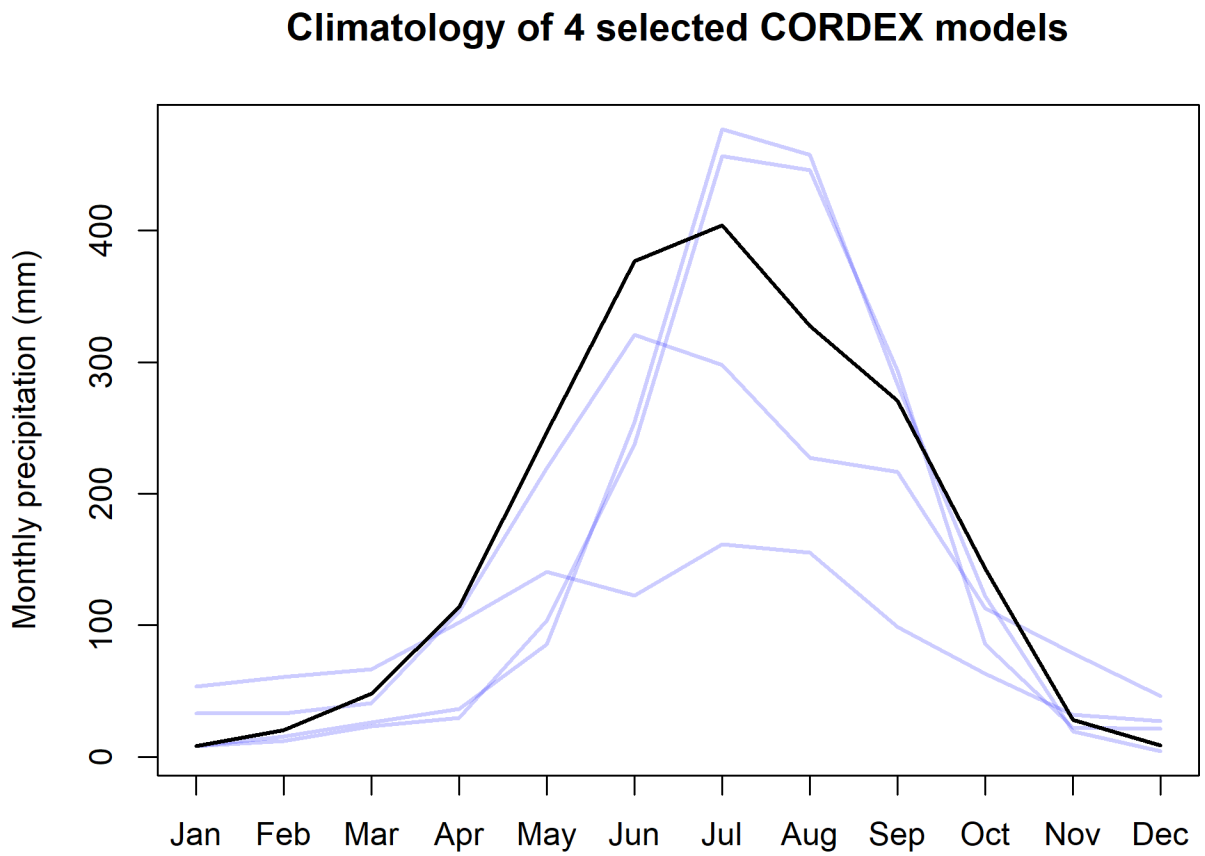


Model selection

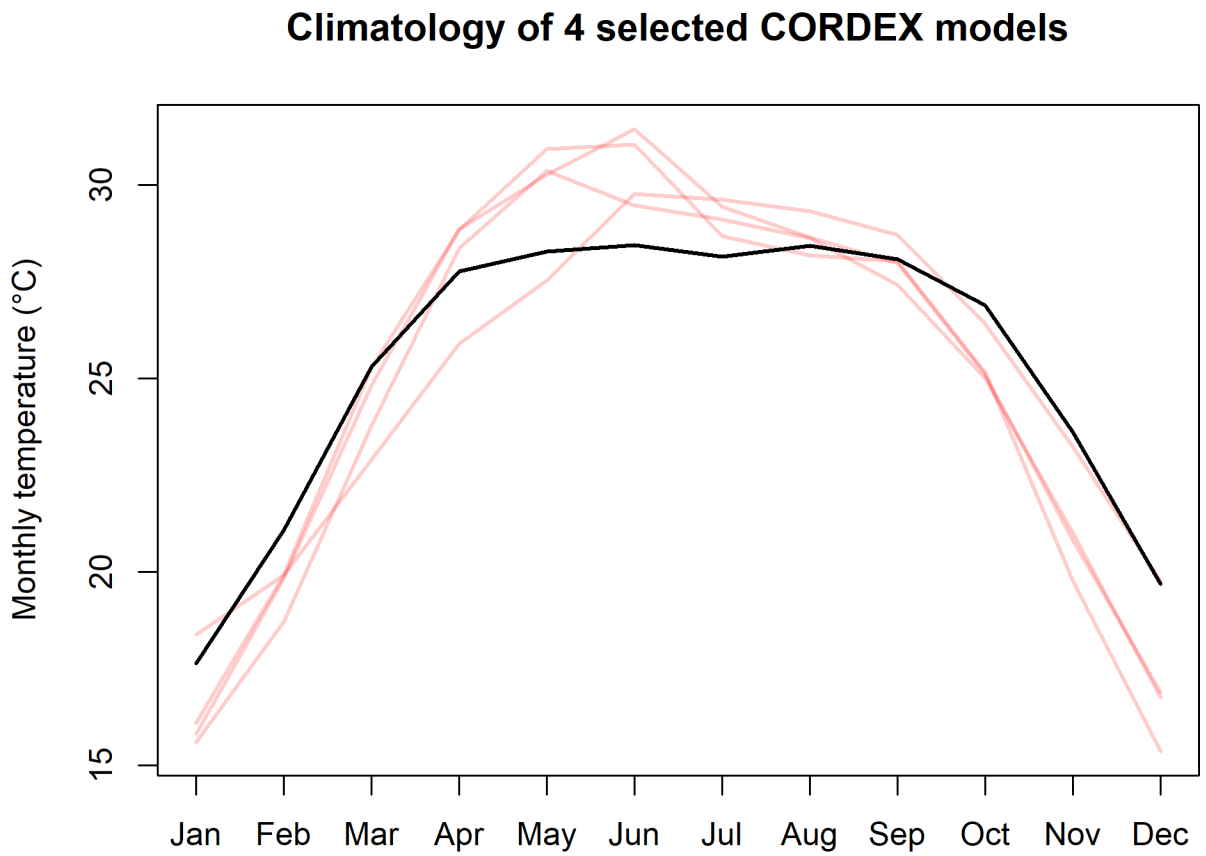
Step 2: based on annual bias (total volume)

- Total annual precipitation sum
- Average annual mean temperature

Climatology of 4 selected models



Climatology of 4 selected models



4 selected models

CCCma-CanESM2_SMHI-RCA4_v2
CSIRO-QCCCE-CSIRO-Mk3-6-0_IITM-RegCM4-4_v5
CSIRO-QCCCE-CSIRO-Mk3-6-0_SMHI-RCA4_v2
IPSL-IPSL-CM5A-MR_SMHI-RCA4_v2


Thank you
Let’s protect
the pulse.