



Future Scenarios of Droughts with focus over Pakistan

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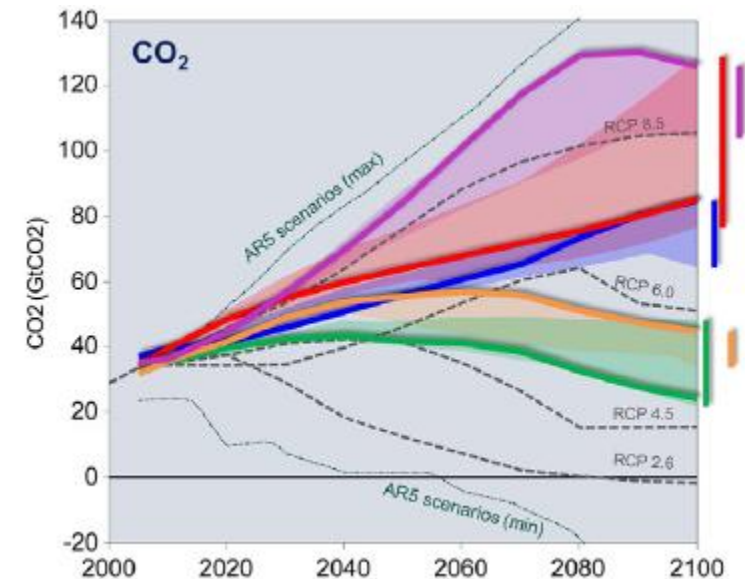
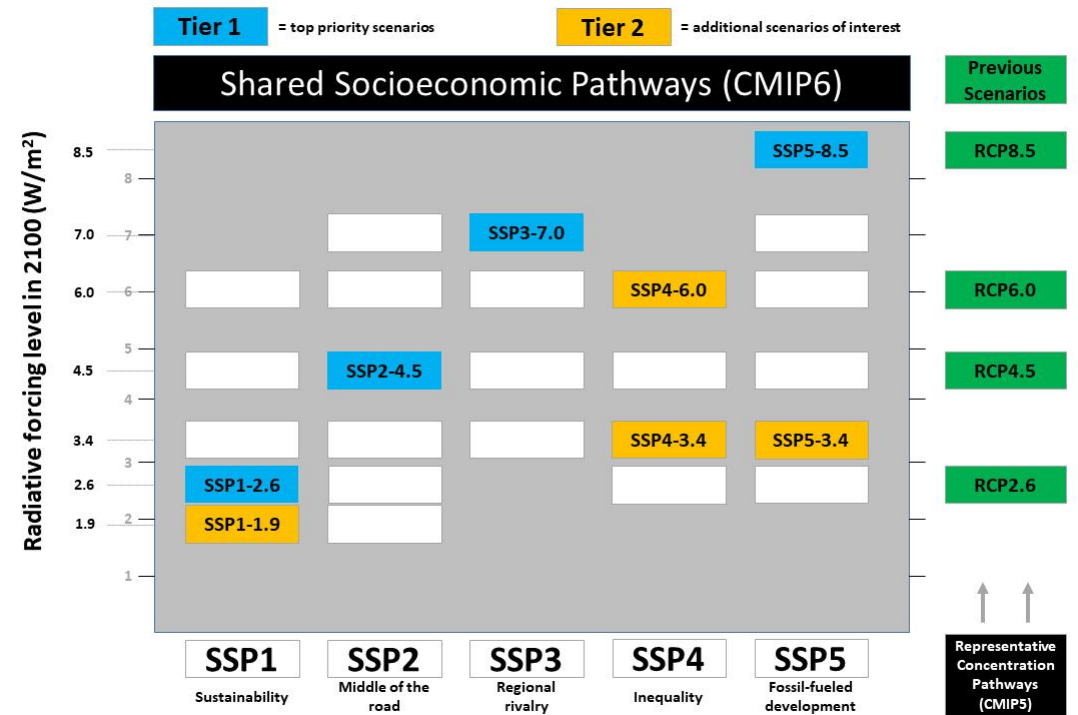
Pakistan Meteorological Department

Shared Socioeconomic Pathways (SSPs) are climate change scenarios of projected socioeconomic global changes up to 2100 as defined in the IPCC Sixth Assessment Report on climate change in 2021. They are used to derive greenhouse gas emissions scenarios with different climate policies.

The five scenarios are:

- SSP1: Sustainability ("Taking the Green Road")
- SSP2-4.5: "Middle of the Road"**
- SSP3: Regional Rivalry ("A Rocky Road")
- SSP4: Inequality ("A Road Divided")
- SSP5-8.5: Fossil-fueled Development ("Taking the Highway")**

Predicted atmospheric CO₂ concentrations for different shared socioeconomic pathways (SSPs) across the 21st century



The Coupled Model Intercomparison Project (CMIP) and Coordinated Regional climate Downscaling Experiment (CORDEX)

Global Climate Models (GCMs) employed in CMIP6 (35 models – SSP2-4.5 and 5-8.5 scenarios) for temperatures, precipitation and derived extreme indices

Regional Climate Models (RCMs) employed in the Coordinated Regional climate Downscaling Experiment (CORDEX) South Asia (26 Models)

Near Term : 2021-2040

Medium Term: 2041-2060

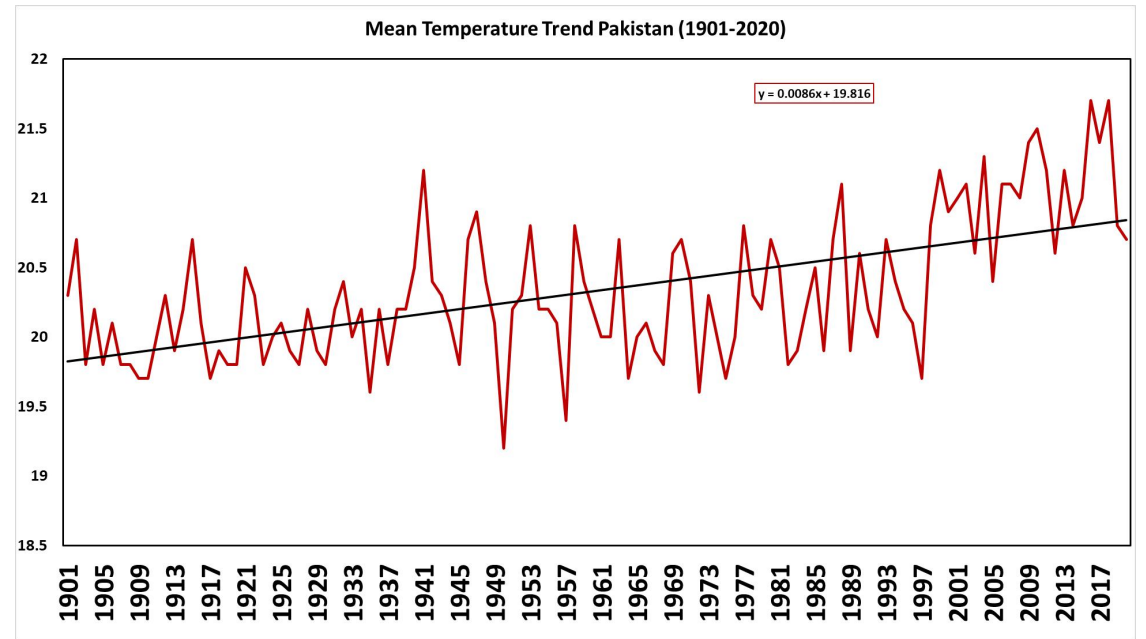
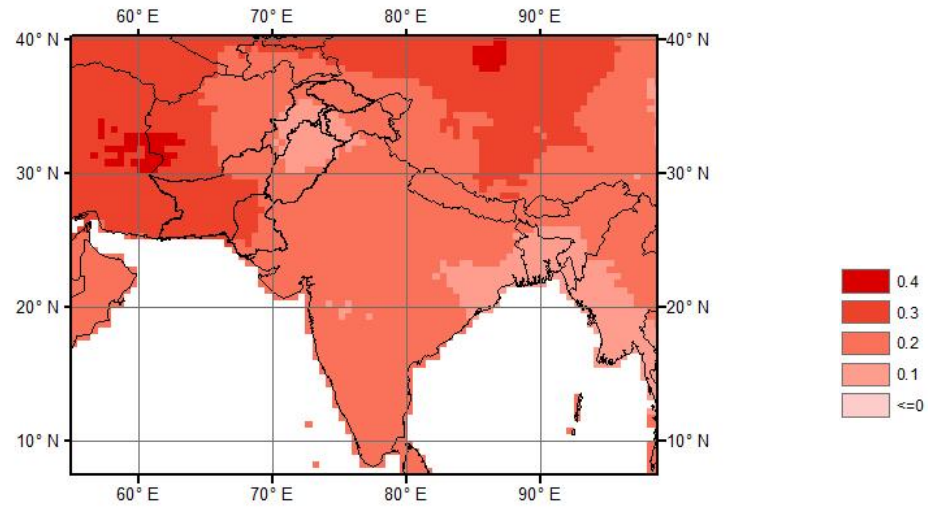
Long Term: 2081-2100

Base line: 1981-2010

#	Institution	Model	Run
1	CSIRO-ARCCSS	ACCESS-CM2	r1i1p1f1
2	CSIRO	ACCESS-ESM1-5	r1i1p1f1
3	AWI	AWI-CM-1-1-MR	r1i1p1f1
4	BCC	BCC-CSM2-MR	r1i1p1f1
5	CAMS	CAMS-CSM1-0	r2i1p1f1
6	CCCma	CanESM5	r1i1p1f1
7	NCAR	CESM2	r4i1p1f1
8	NCAR	CESM2-WACCM	r1i1p1f1
9	CMCC	CMCC-CM2-SR5	r1i1p1f1
10	CNRM-CERFACS	CNRM-CM6-1	r1i1p1f2
11	CNRM-CERFACS	CNRM-CM6-1-HR	r1i1p1f2
12	CNRM-CERFACS	CNRM-ESM2-1	r1i1p1f2
13	EC-Earth-Consortium	EC-Earth3	r1i1p1f1
14	EC-Earth-Consortium	EC-Earth3-Veg	r1i1p1f1
15	EC-Earth-Consortium	EC-Earth3-Veg-LR	r1i1p1f1
16	CAS	FGOALS-g3	r1i1p1f1
17	NOAA-GFDL	GFDL-CM4	r1i1p1f1
18	NOAA-GFDL	GFDL-ESM4	r1i1p1f1
19	MOHC	HadGEM3-GC31-LL	r1i1p1f3
20	CCCR-IITM	IITM-ESM	r1i1p1f1
21	INM	INM-CM4-8	r1i1p1f1
22	INM	INM-CM5-0	r1i1p1f1
23	IPSL	IPSL-CM6A-LR	r1i1p1f1
24	NIMS-KMA	KACE-1-0-G	r2i1p1f1
25	KIOST	KIOST-ESM	r1i1p1f1
26	MIROC	MIROC-ES2L	r1i1p1f2
27	MIROC	MIROC6	r1i1p1f1
28	MPI-M	MPI-ESM1-2-HR	r1i1p1f1
29	MPI-M	MPI-ESM1-2-LR	r1i1p1f1
30	MRI	MRI-ESM2-0	r1i1p1f1
31	NUIST	NESM3	r1i1p1f1
32	NCC	NorESM2-LM	r1i1p1f1
33	NCC	NorESM2-MM	r1i1p1f1
34	AS-RCEC	TaiESM1	r1i1p1f1
35	MOHC	UKESM1-0-LL	r1i1p1f2

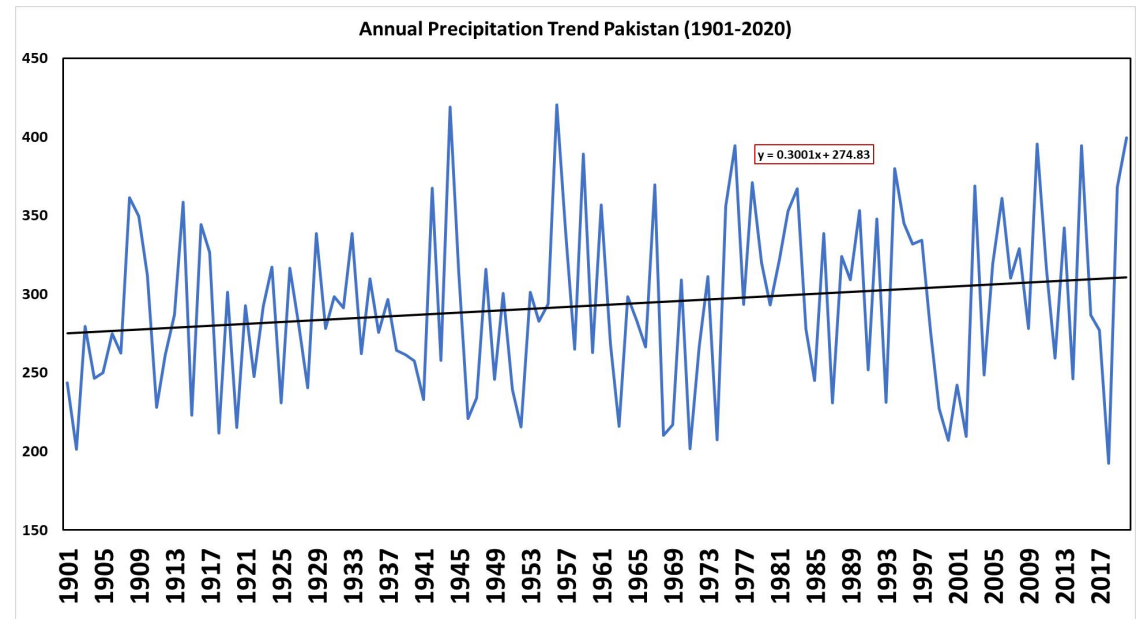
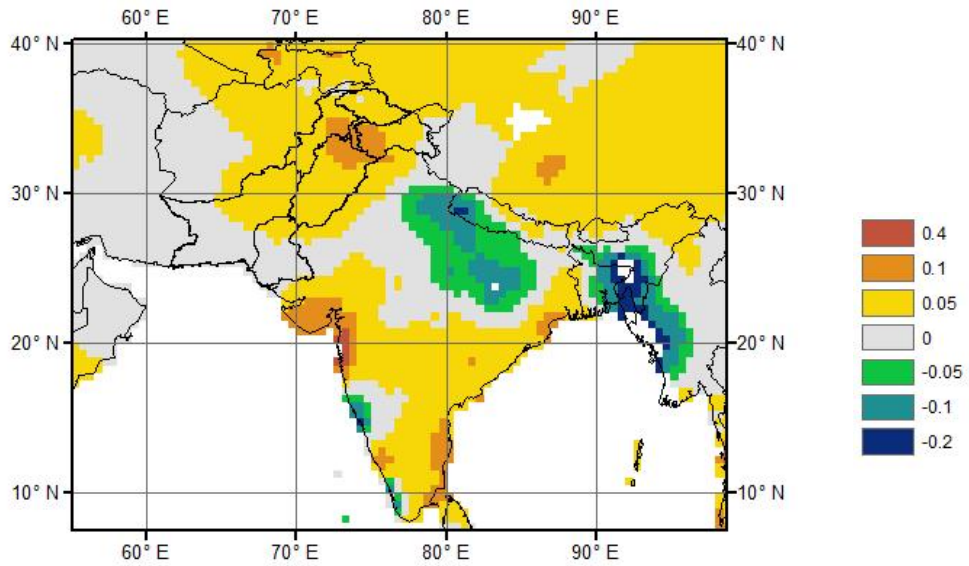
CRU TS - Mean temperature (T) Trend deg C per decade - 1961-2015

Observations - Annual



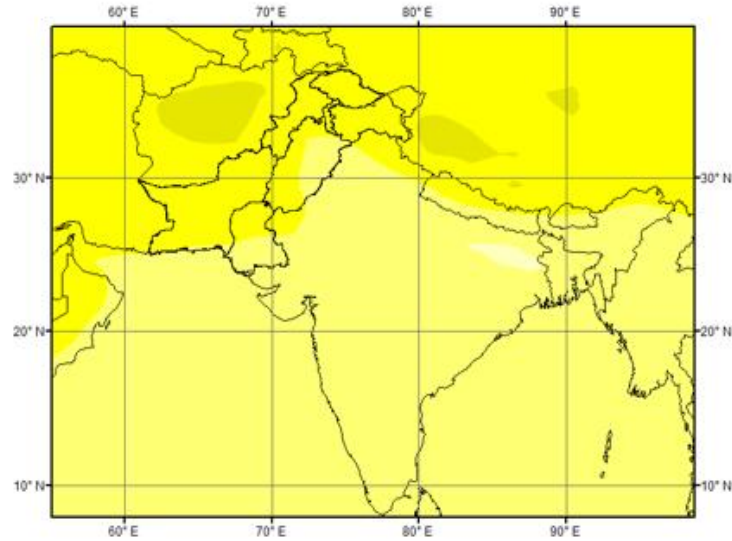
CRU TS - Total precipitation (PR) Trend mm_day per decade - 1961-2015

Observations - Annual

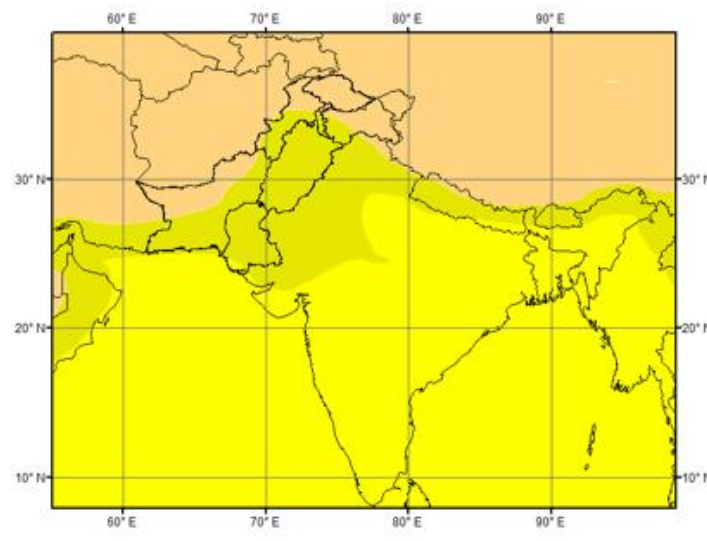


CMIP6 - Mean temperature (T) Change deg C - (rel. to 1981-2010) - Annual (34 models)

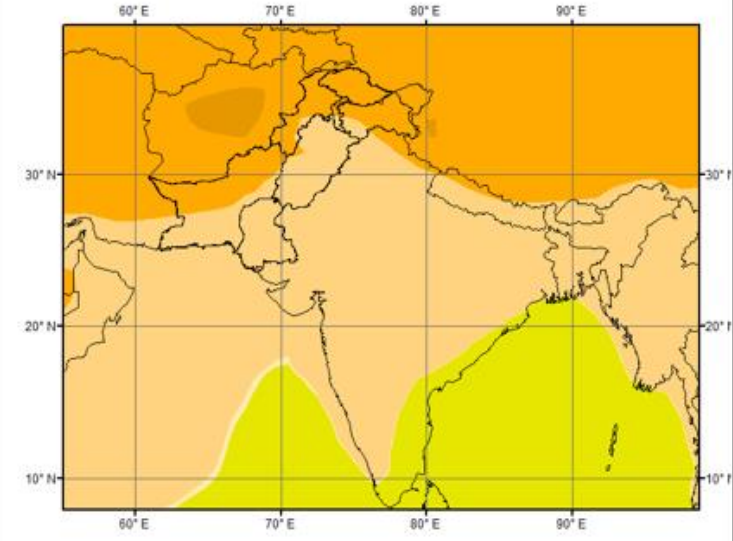
4.5NT



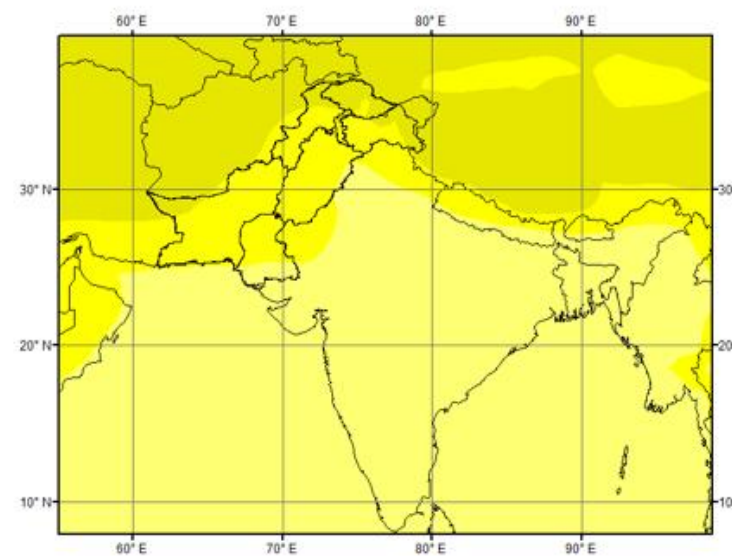
4.5MT



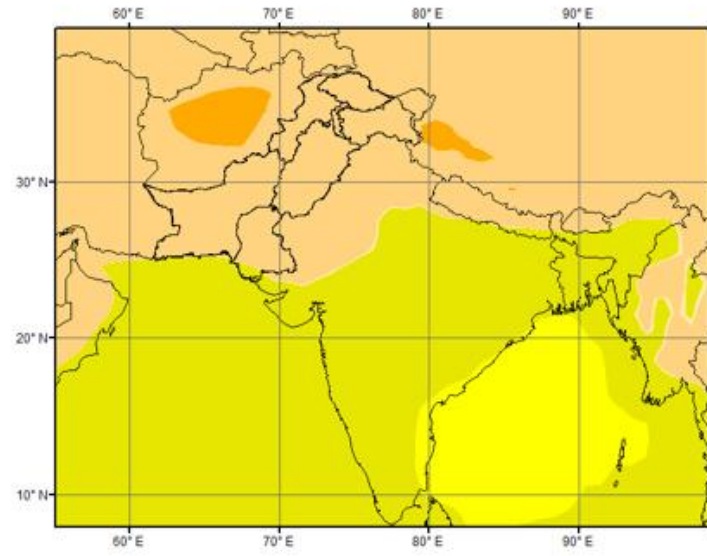
4.5LT



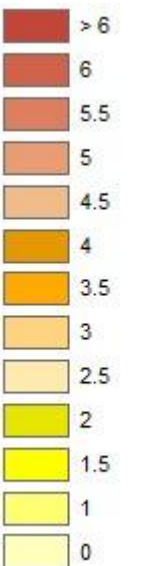
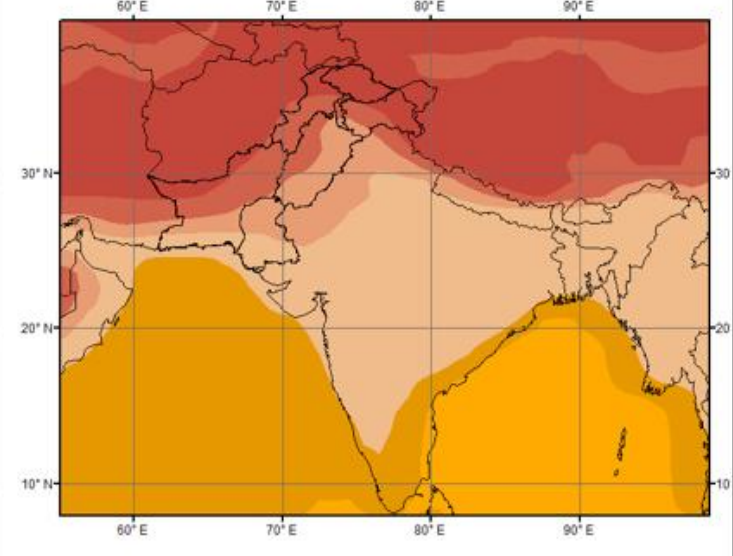
8.5NT



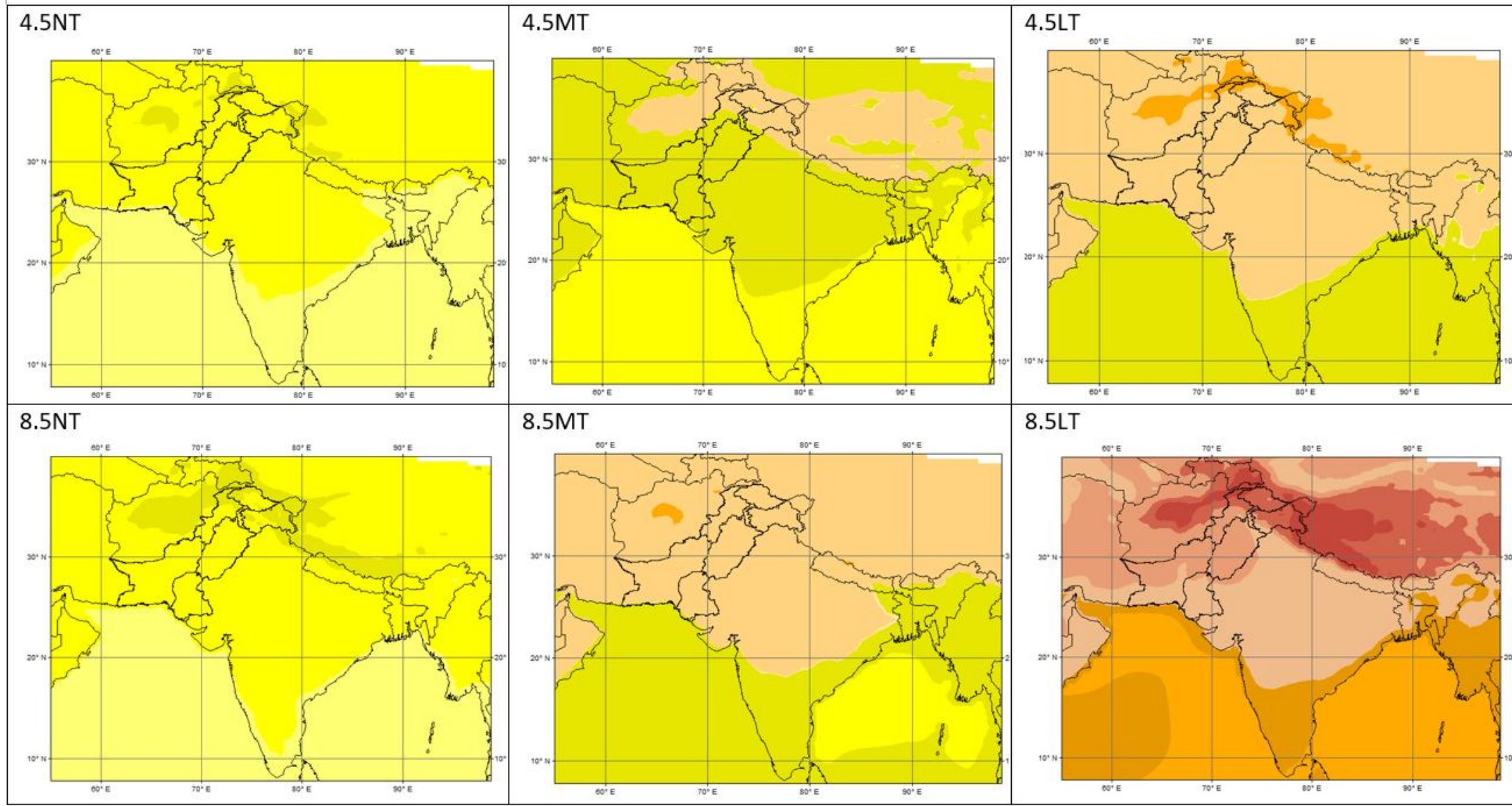
8.5MT



8.5LT

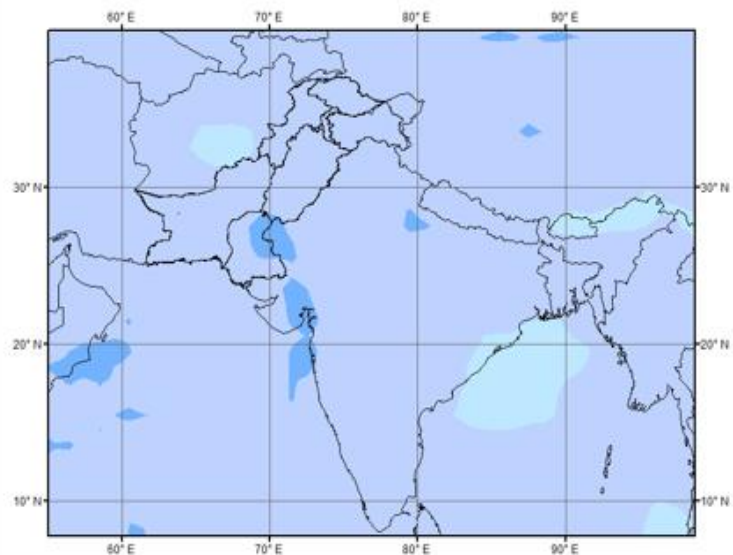


CORDEX South Asia - Mean temperature (T) Change deg C - (rel. to 1981-2010) - Annual (17 models)

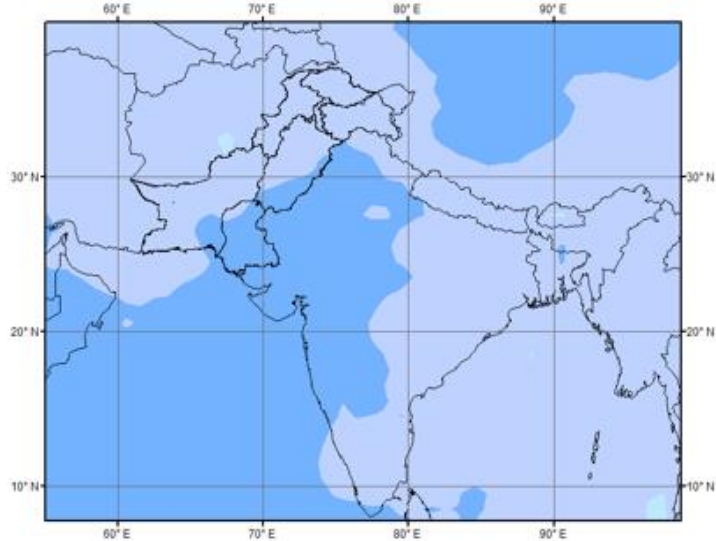


CMIP6 - Total precipitation (PR) Change % - (rel. to 1981-2010) - Annual (32 models)

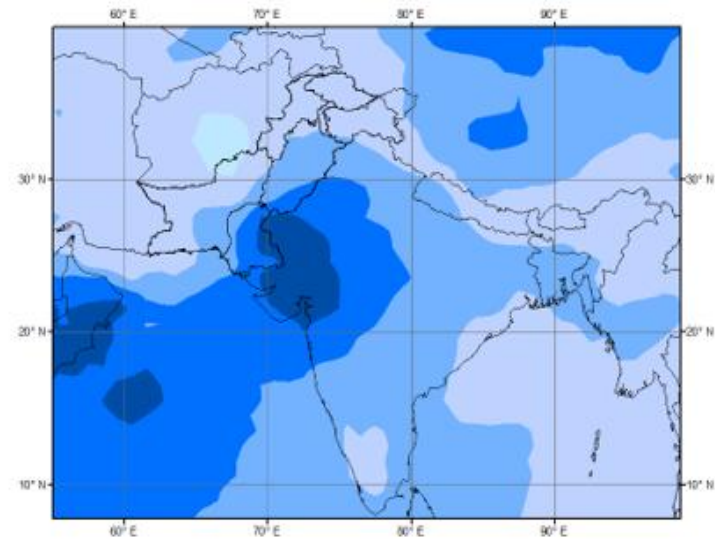
4.5NT



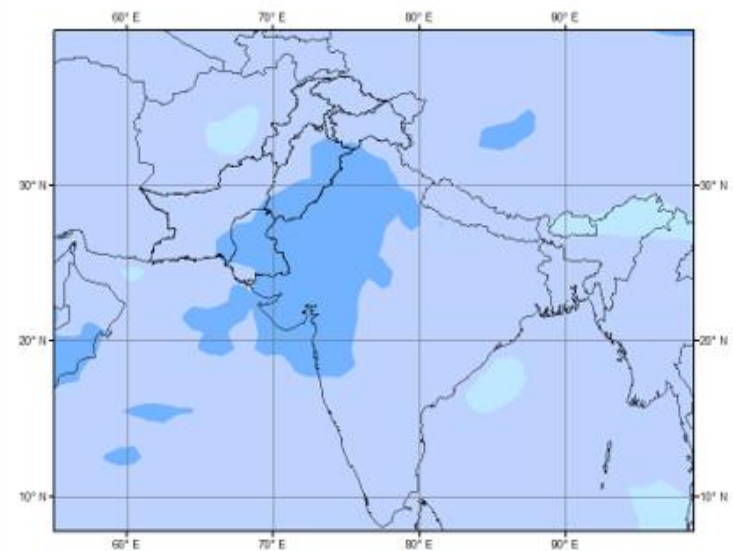
4.5MT



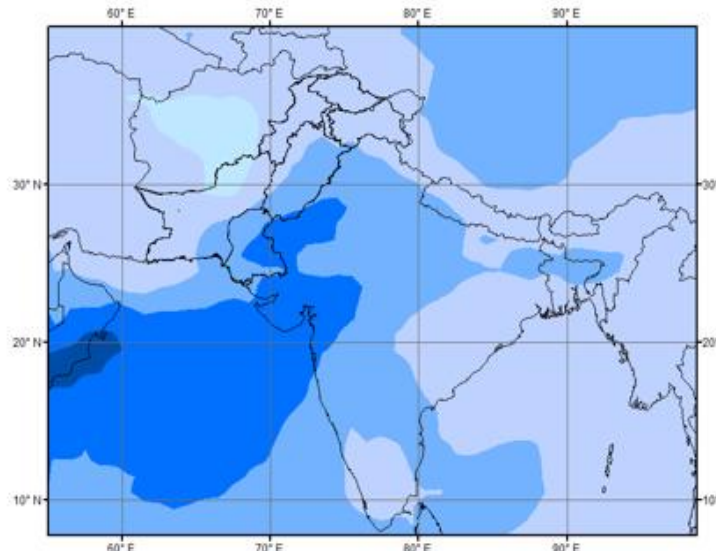
4.5LT



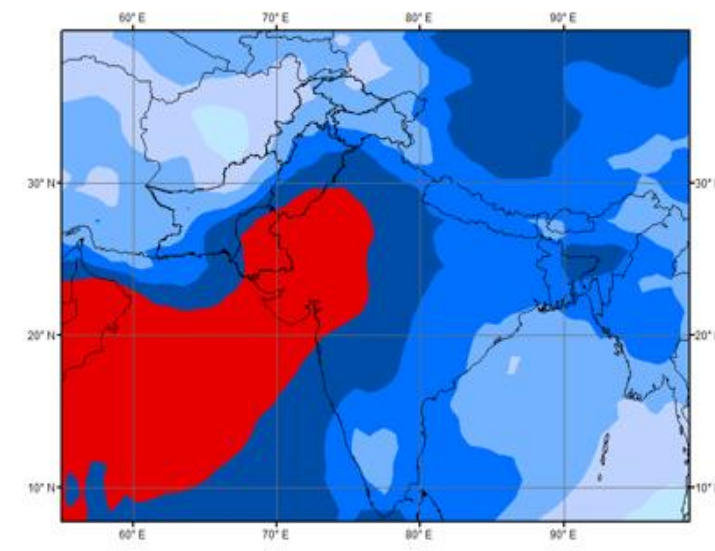
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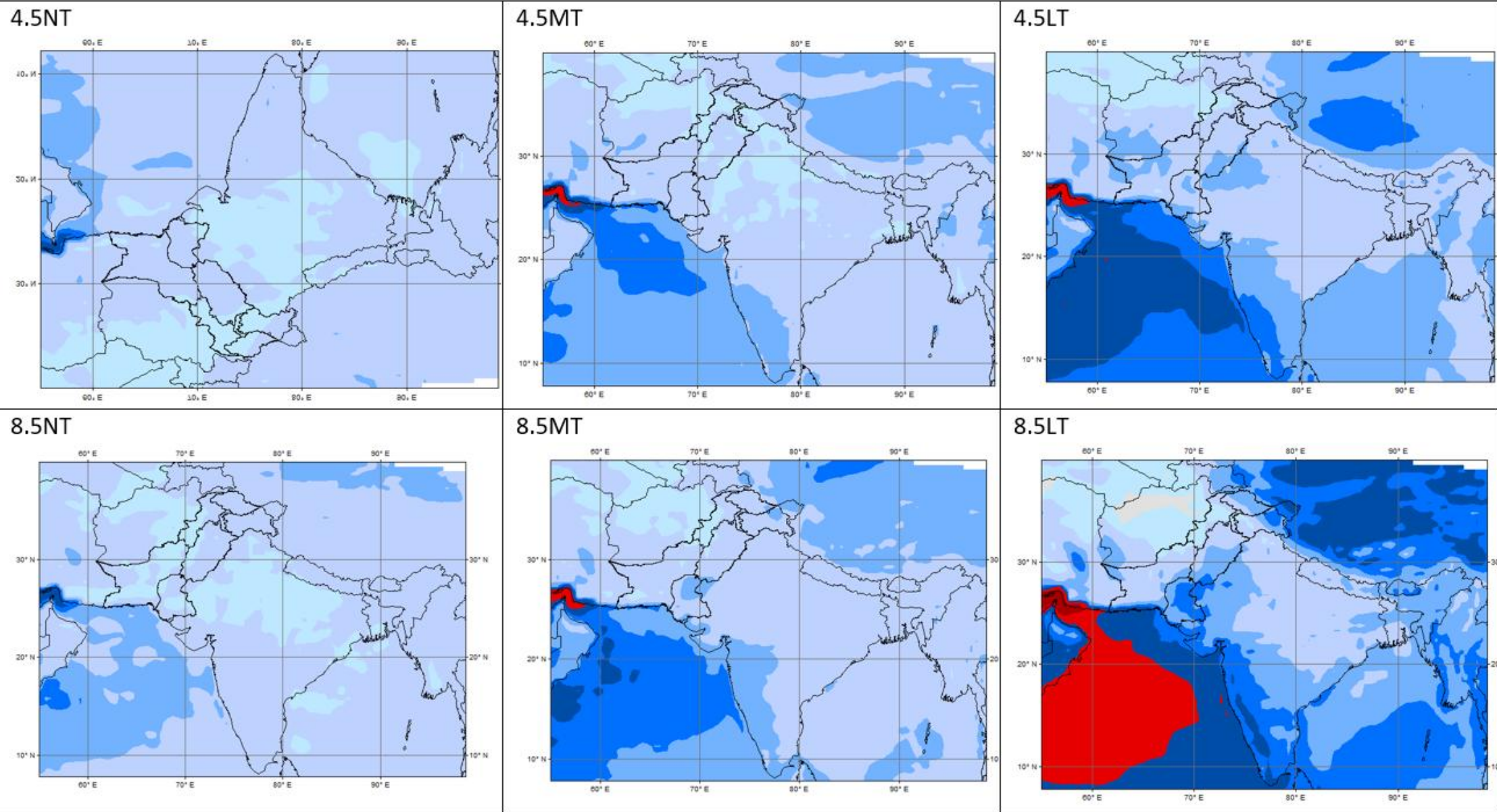
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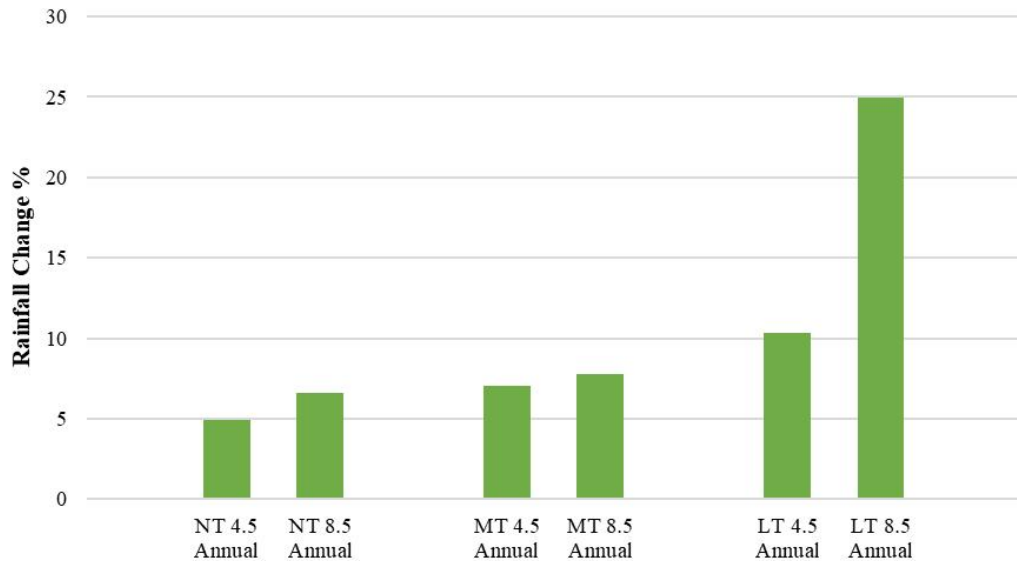
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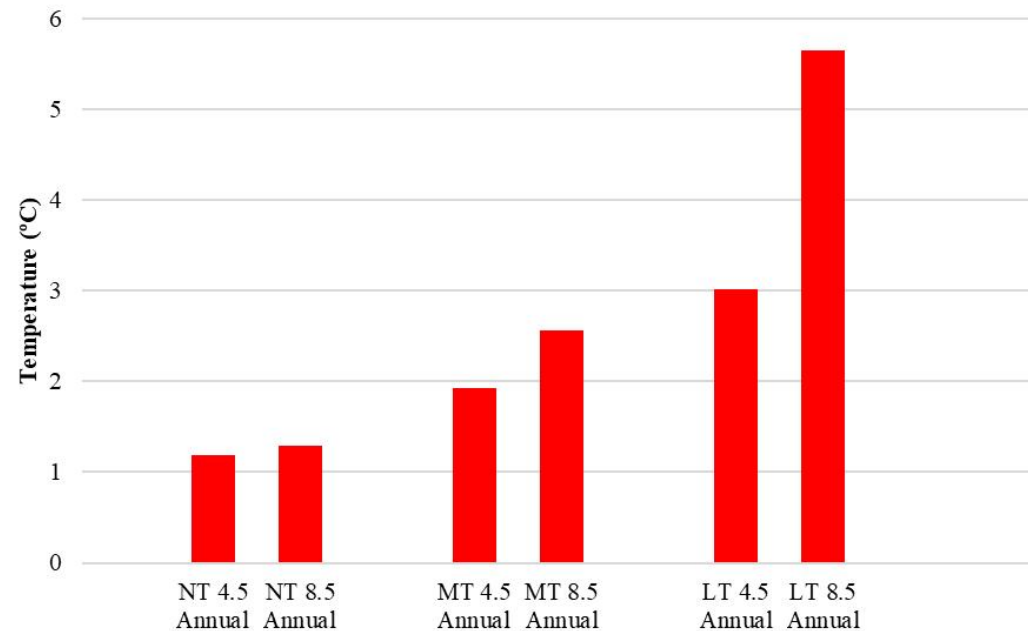
CORDEX South Asia - Total precipitation (PR) Change % - (rel. to 181-2010) - Annual (26 models)



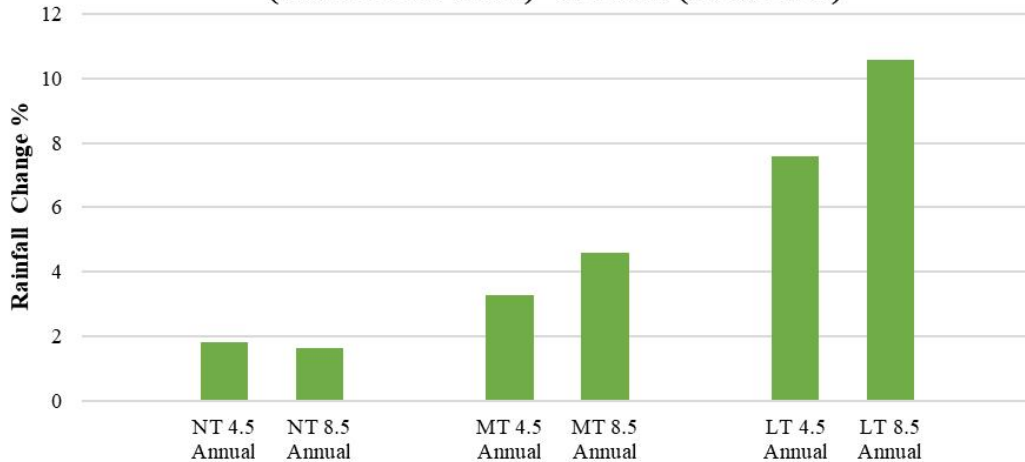
**CMIP6 - Total precipitation (PR) Change %
(rel. to 1981-2010) - Annual (32 models)**



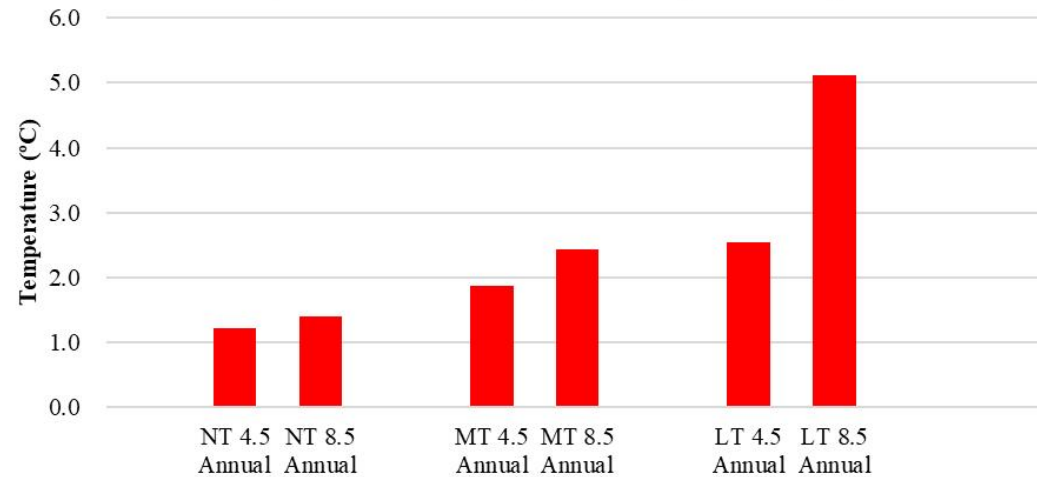
**CMIP6 - Mean temperature (T) Change deg C
(rel. to 1981-2010) - Annual (34 models)**



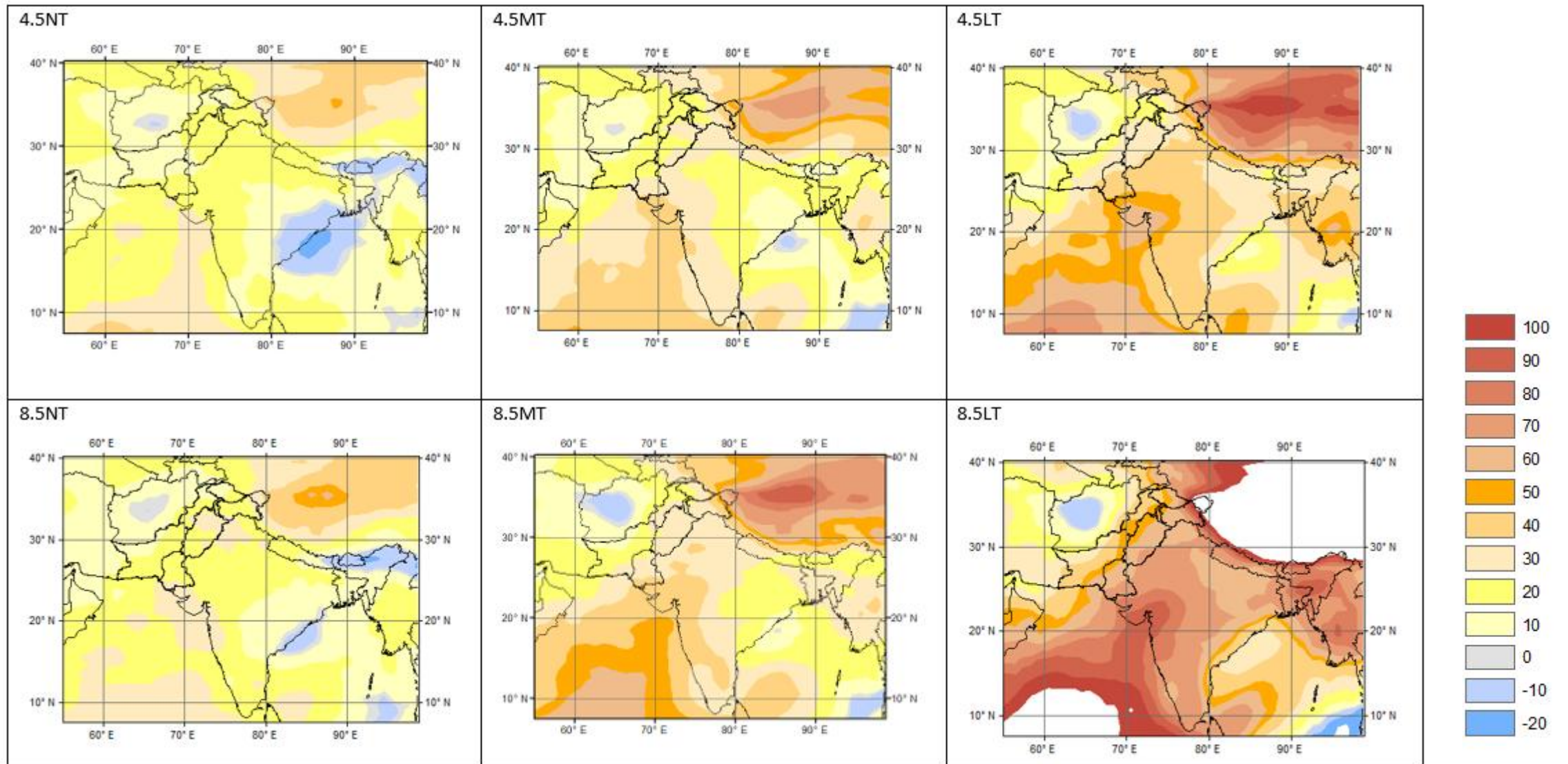
**CORDEX South Asia - Total precipitation (PR) Change %
- (rel. to 1981-2010) - Annual (26 models)**



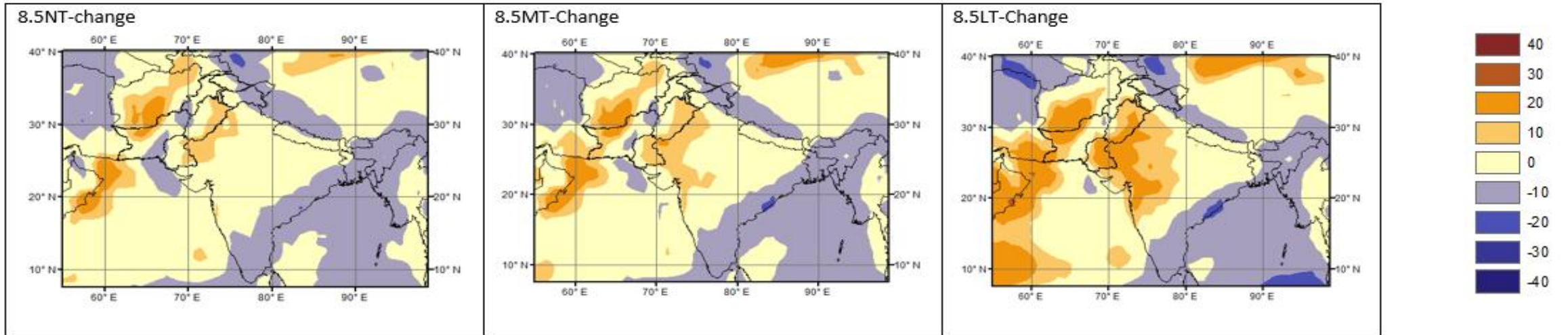
**CORDEX South Asia - Mean temperature (T) Change deg C -
(rel. to 1981-2010) - Annual (17 models)**



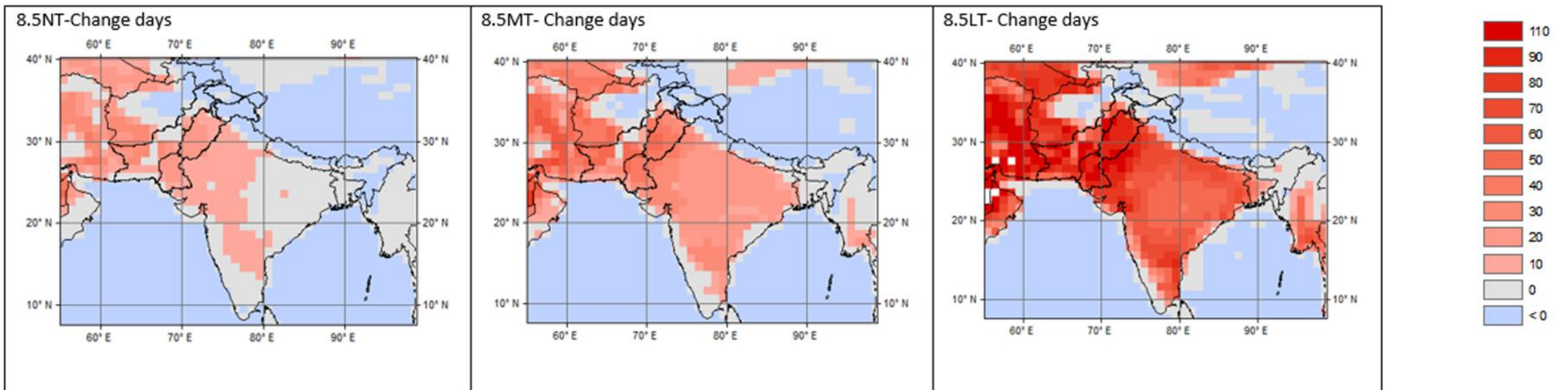
CMIP6 - Standardized Precip Index (SPI-6) Change % - (rel. to 1981-2010) - Annual (32 models)



CMIP6 - Consecutive Dry Days (CDD) days - Annual (32 models)



CMIP6 - Bias Adjusted TX40 Change days - (rel. to 1981-2010) - Annual (25 models)



Thanks for your attention !