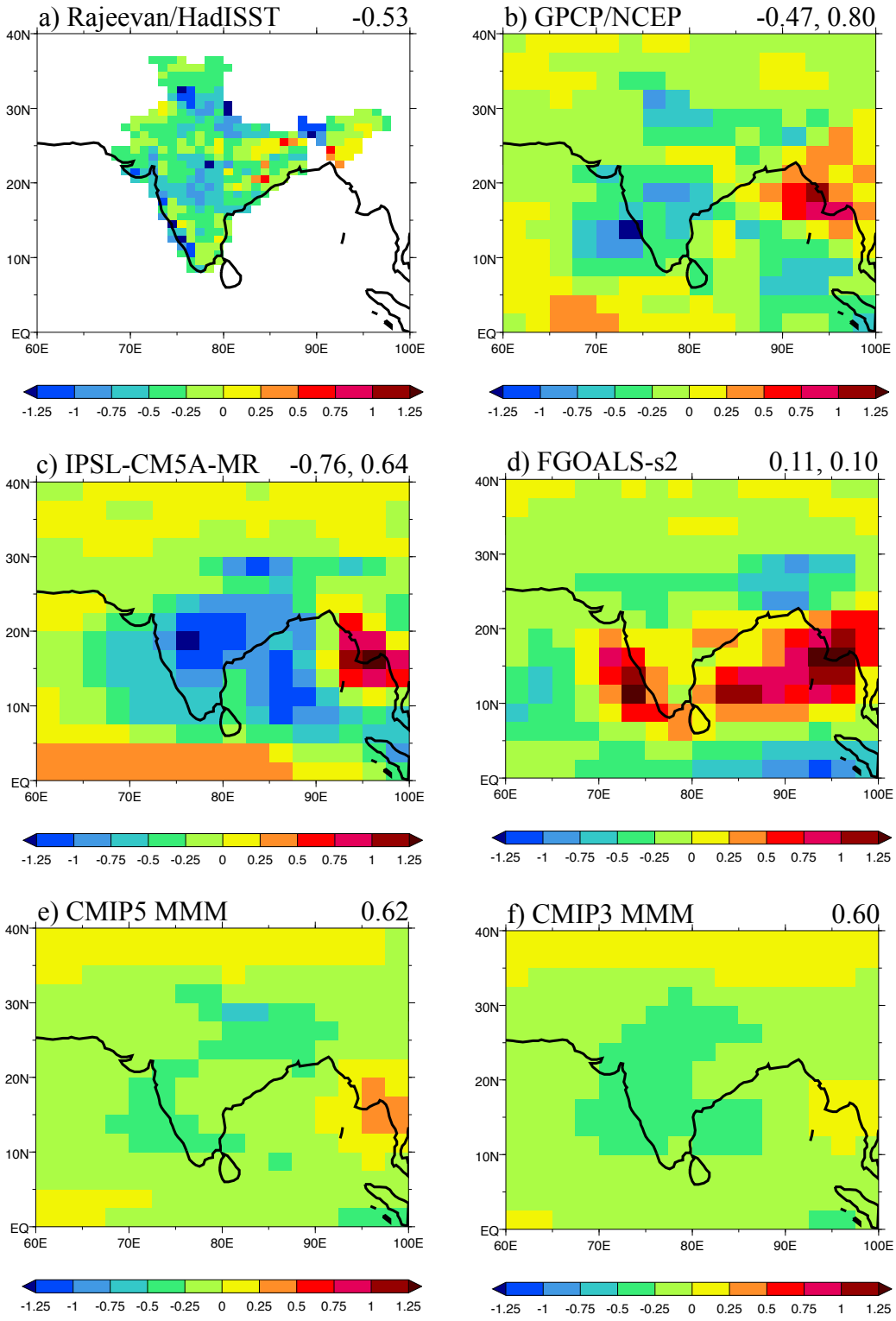
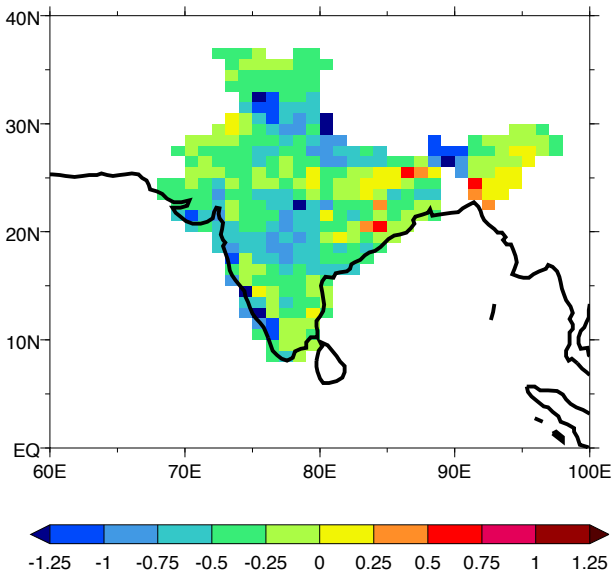



**Fig. 10** Interannual JJAS precipitation anomalies (mm day$^{-1}$) based on linear regression with JJAS NINO3.4 SST anomalies **a** Rajeevan rainfall data vs. HadISST SST (1961-1999), **b** GPCP rainfall vs. SST used in the NCEP-NCAR Reanalysis (1979-2007), **c** IPSL-CM5A-MR, **d** FGOALS-s2, **e** CMIP5 MMM, and **f** CMIP3 MMM. The regressions are scaled by one standard deviation of the NINO3.4 SST anomalies and are thus consistent with anomalies during El Nino. **c** and **d** are the models that span the range of the AIR-NINO3.4 SST correlations from the CMIP5 and CMIP3 models (see Figure 9a). In panels **a-d** the first value is the correlation of AIR-NINO3.4 SST. The last value in **b** is the pattern correlation of GPCP with CMAP for the interannual JJAS precipitation anomalies, and in **c-f** the last (or only) value is the model pattern correlation with GPCP for the interannual JJAS precipitation anomalies. The skill metrics are calculated over the region 60$^{o}$E-100$^{o}$E, 0$^{o}$-30$^{o}$N. The Rajeevan rainfall, the HadISST SST, and the model data is for 1961-1999. The GPCP, CMAP and NCEP-NCAR Reanalysis SST data are for 1979-2007

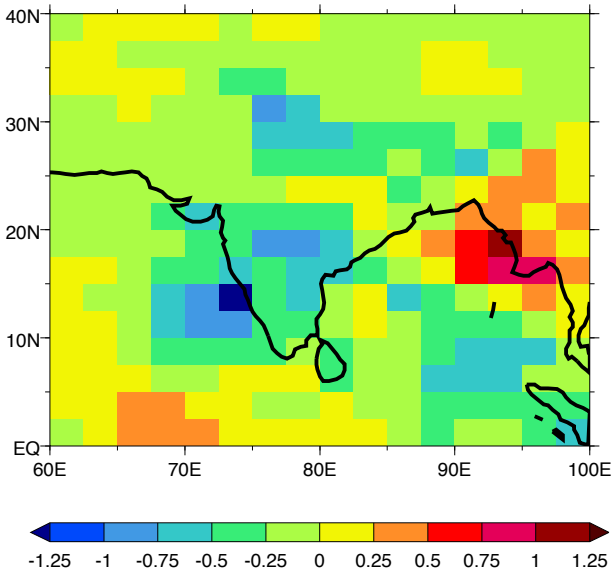
Rajeevan (1961-1999)







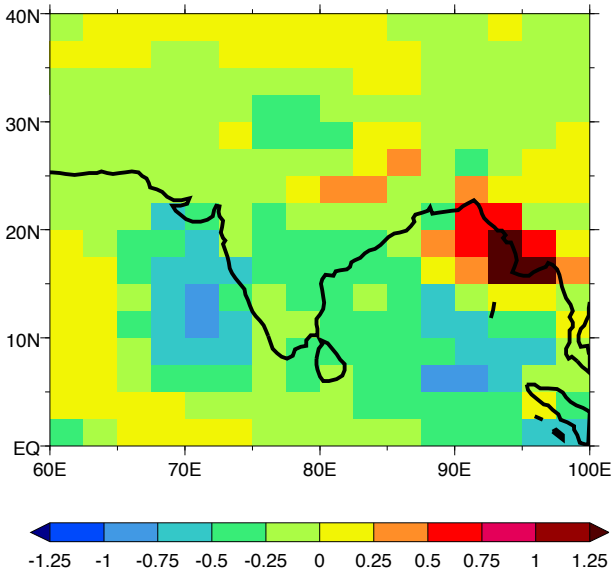
GPCP (1979-2007)

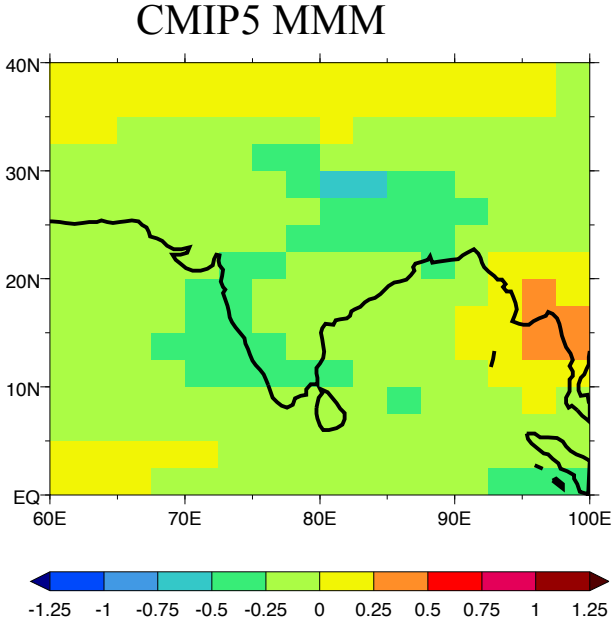






CMAP (1979-2007)

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30N
20N
10N
EQ
60E
70E
80E
90E
100E
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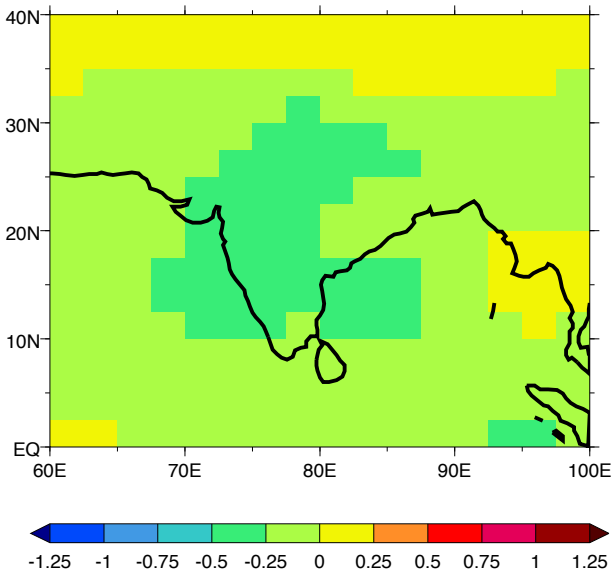
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25


CMIP3 MMM
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10N
EQ
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70E
80E
90E
100E
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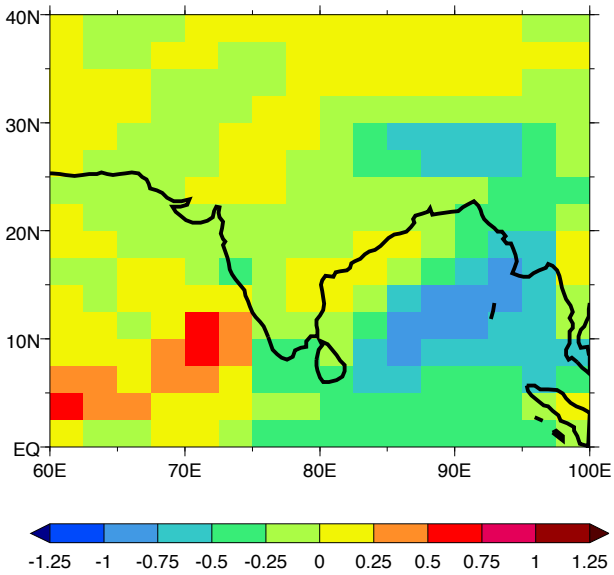
-0.25
0
0.25
0.5
0.75
1
1.25

# BCC-CSM-1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30N
20N
10N
EQ
60E
70E
80E
90E
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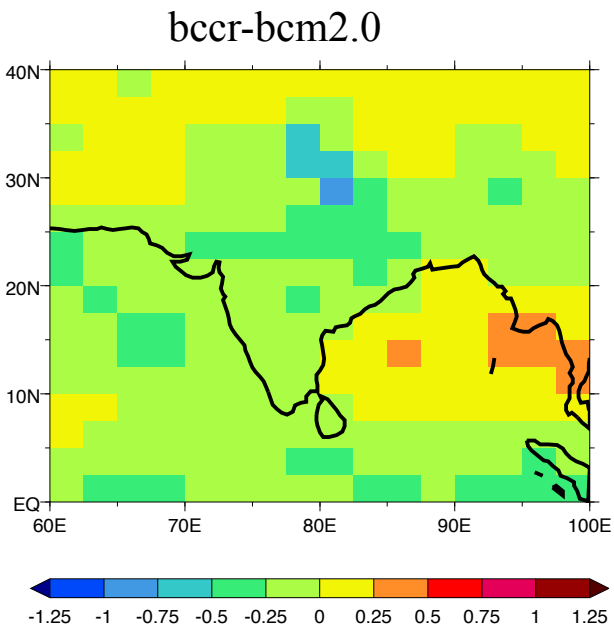
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20N
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EQ
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100E
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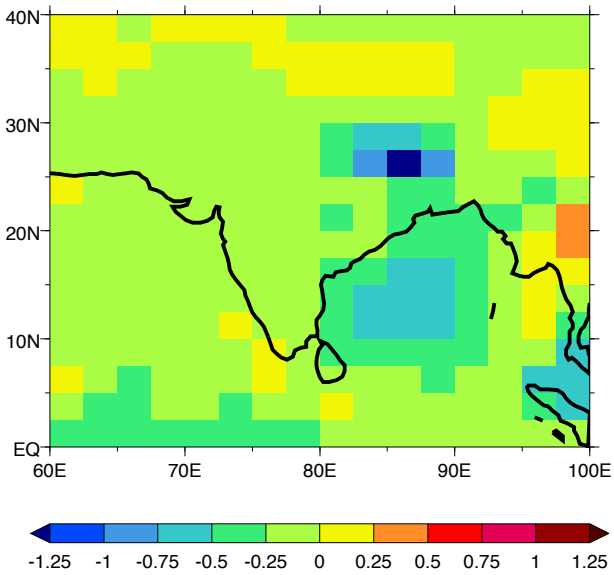
0.5
0.75
1
1.25

# CanESM2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30N
20N
10N
EQ
60E
70E
80E
90E
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-1
-0.75
-0.5
-0.25
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0.25
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0.75
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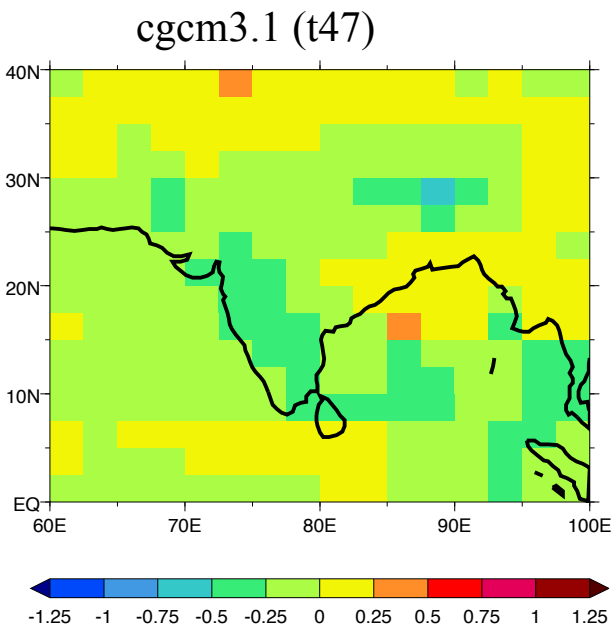
1.25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20N
10N
EQ
60E
70E
80E
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100E
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0.25
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0.75
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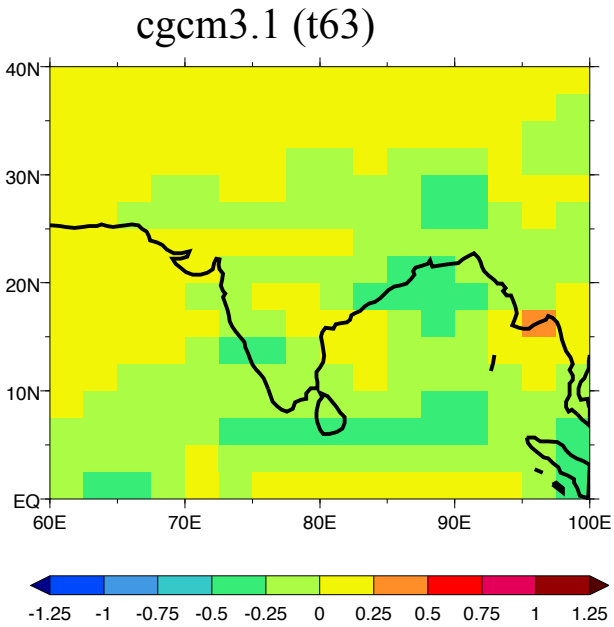
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EQ
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100E
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-0.25
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0.75
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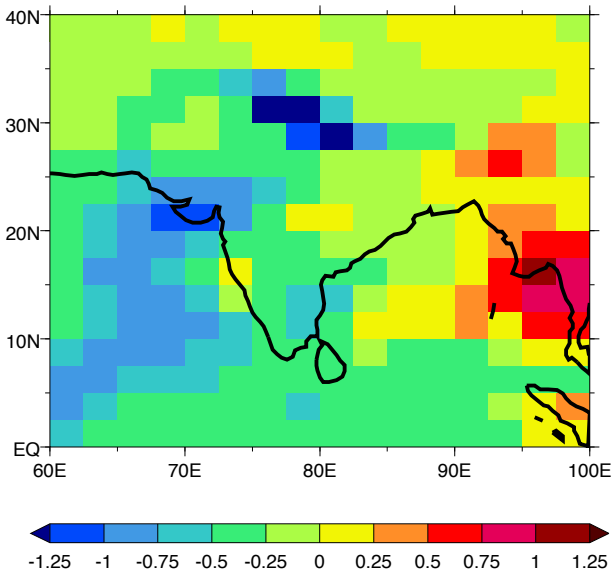
1.25

# CCSM4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EQ
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80E
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-1
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0.75
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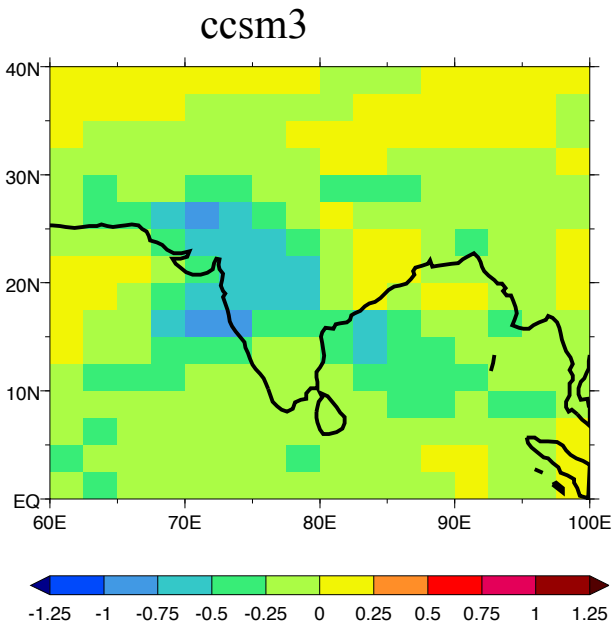
ccsm3
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30N
20N
10N
EQ
60E
70E
80E
90E
100E
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-1
-0.75
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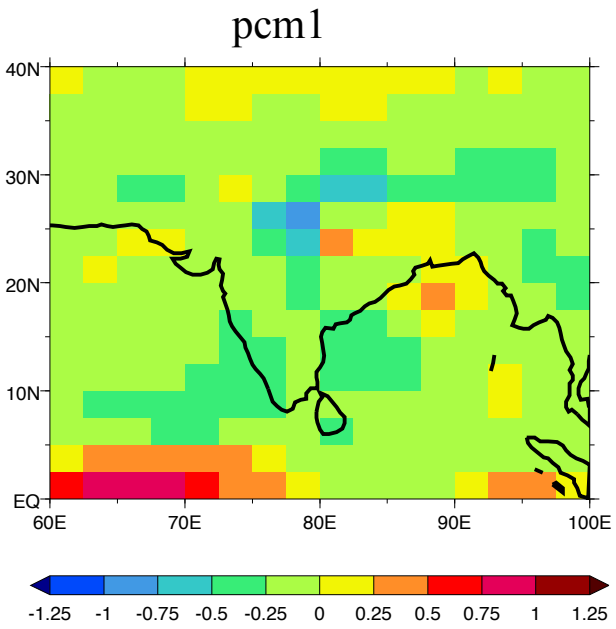
1.25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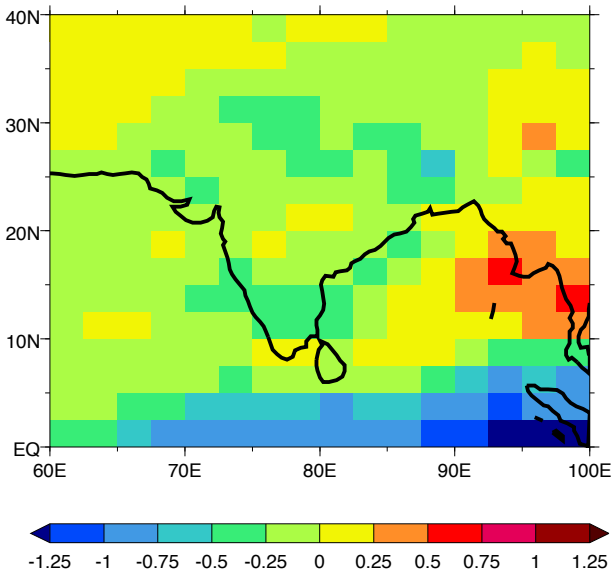
1.25

# CNRM-CM5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10N
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90E
100E
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0.5
0.75
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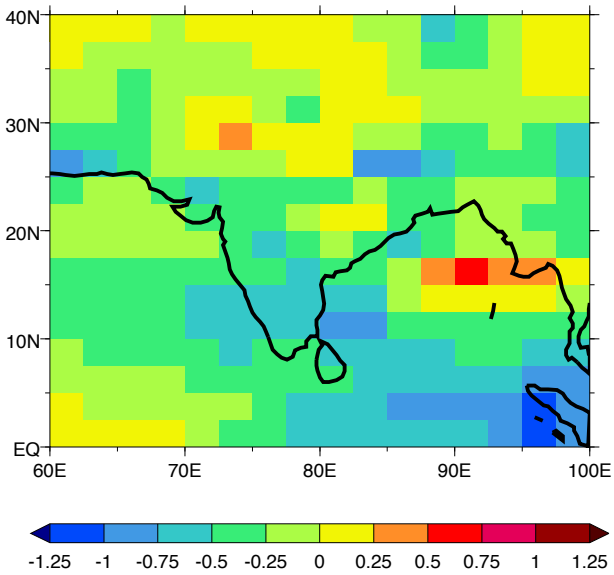
1.25

cnrm-cm3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80E
90E
100E


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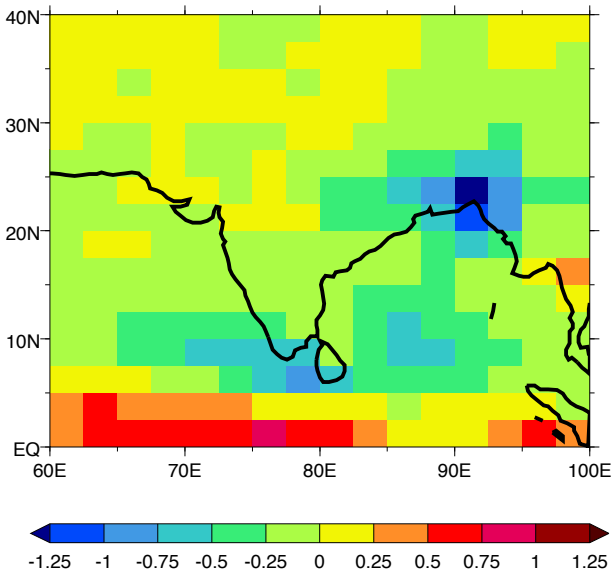
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100E


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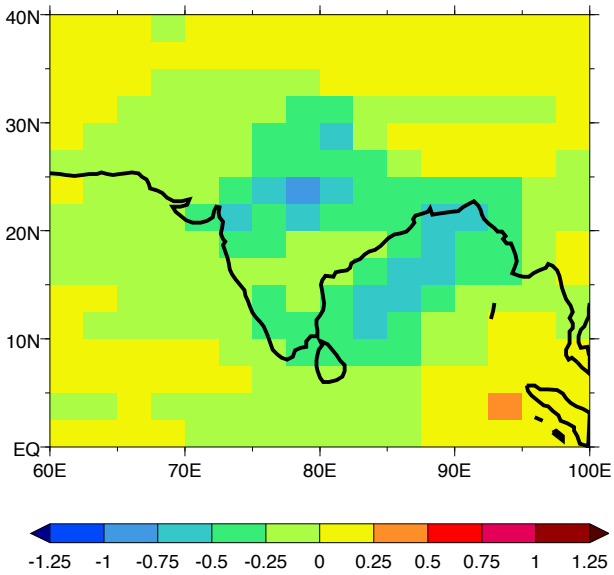
# csiro-mk3.0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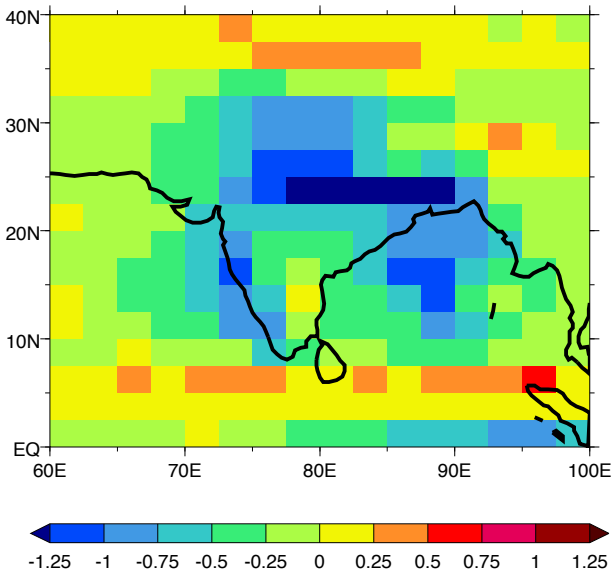
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90E
100E
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0.25
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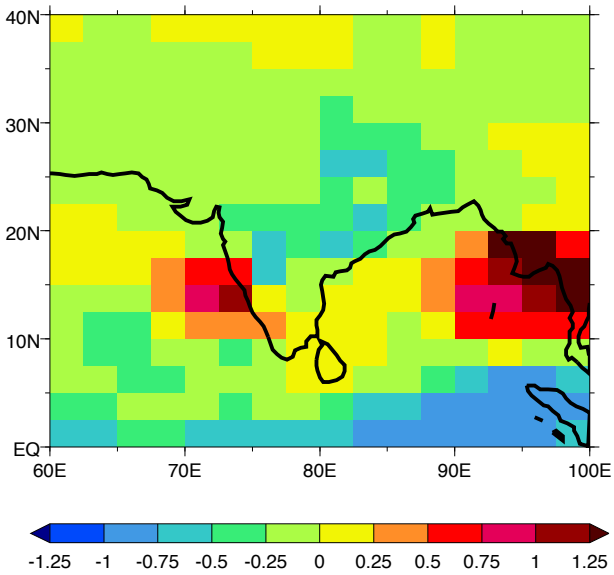
0.75
1
1.25

# FGOALS-g2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10N
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80E
90E
100E
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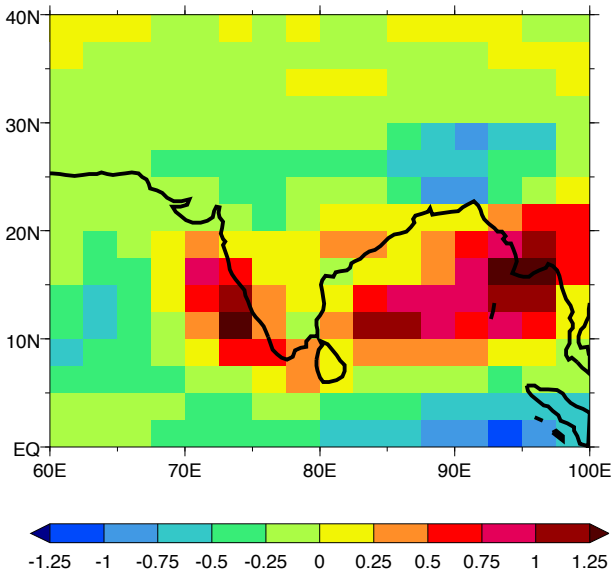
1.25

FGOALS-s2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70E
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90E
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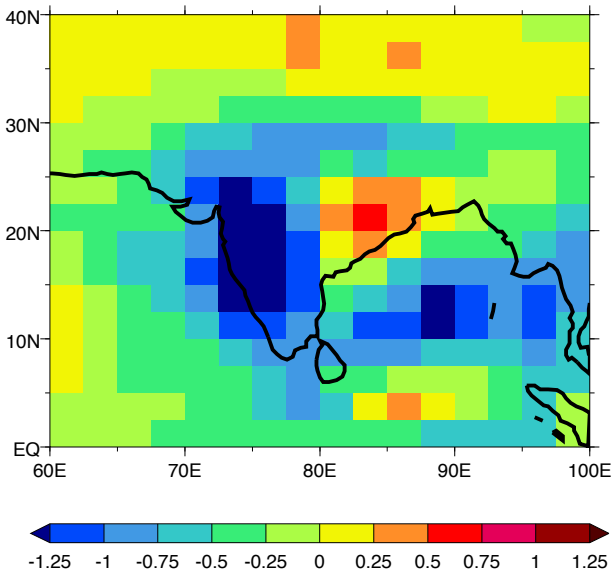
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90E
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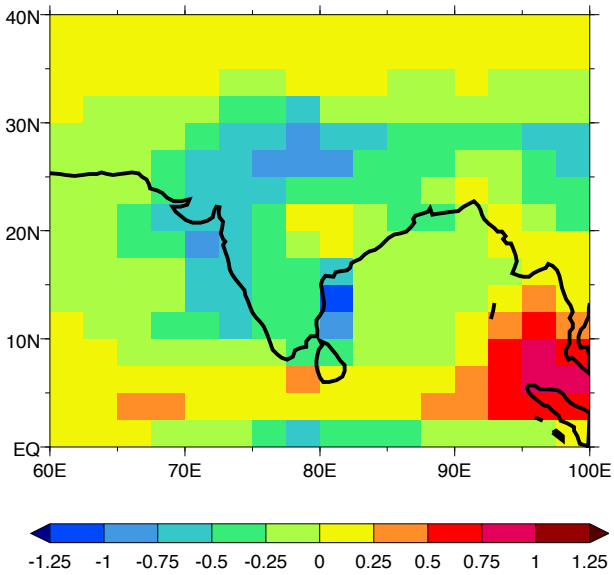
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90E
100E
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0.25
0.5
0.75
1
1.25

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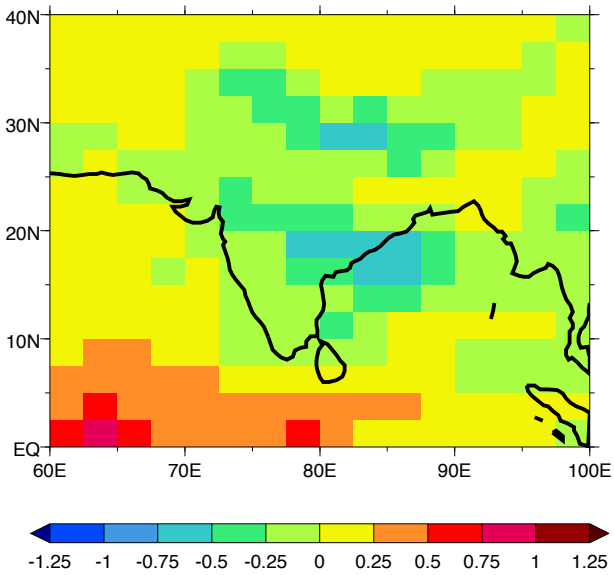
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80E
90E
100E
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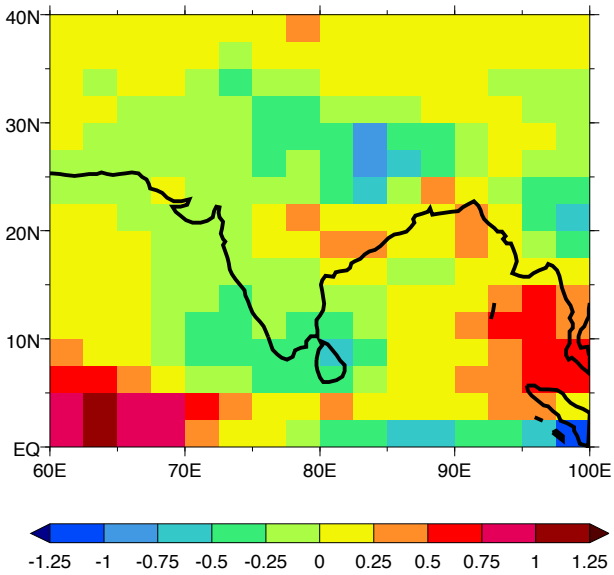
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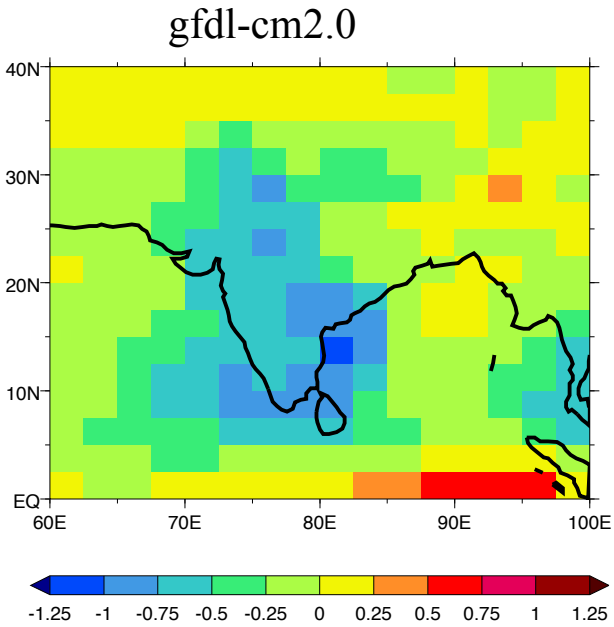
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EQ
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70E
80E
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-0.5
-0.25
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0.25
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0.75
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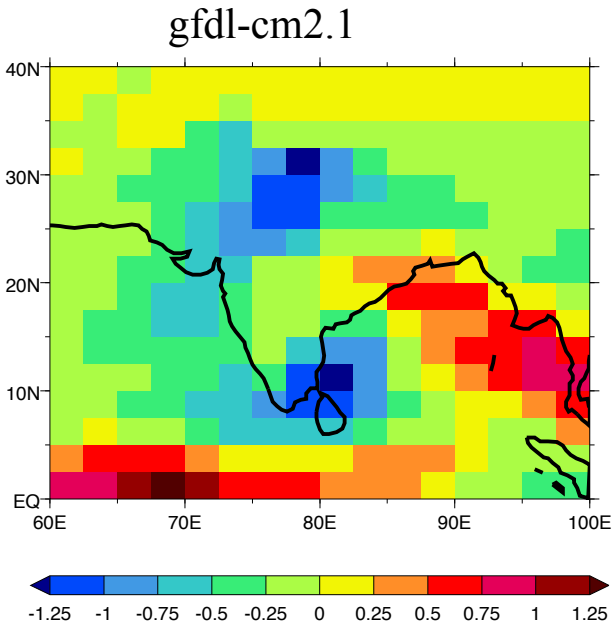
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80E
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100E
-1.25
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-0.25
0
0.25
0.5
0.75
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1.25

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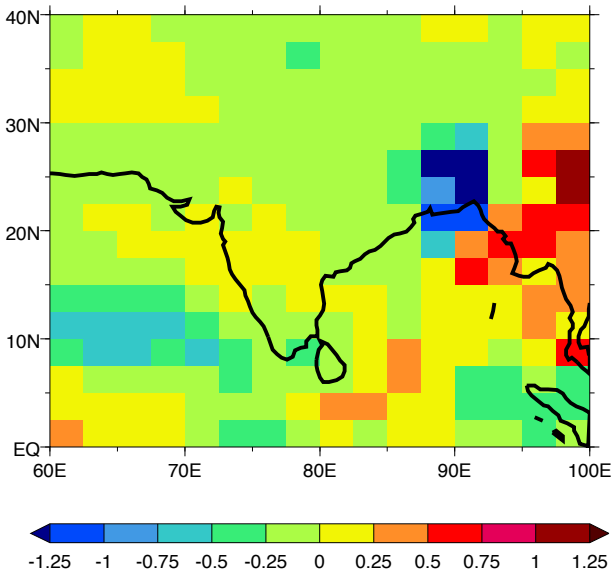
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30N
20N
10N
EQ
60E
70E
80E
90E
100E
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0.75
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1.25

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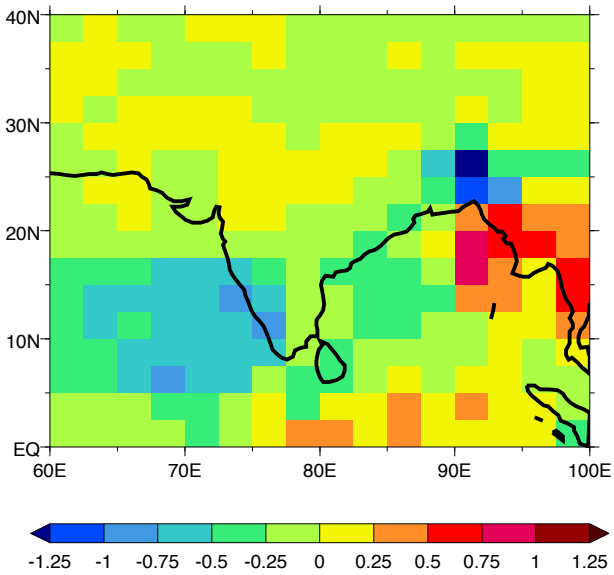
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30N
20N
10N
EQ
60E
70E
80E
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-1
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-0.5
-0.25
0
0.25
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0.75
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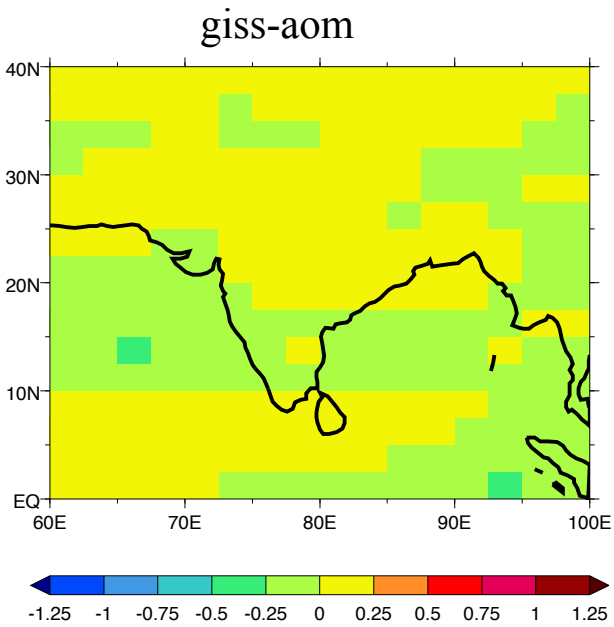
1.25


giss-aom
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80E
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0.5
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1
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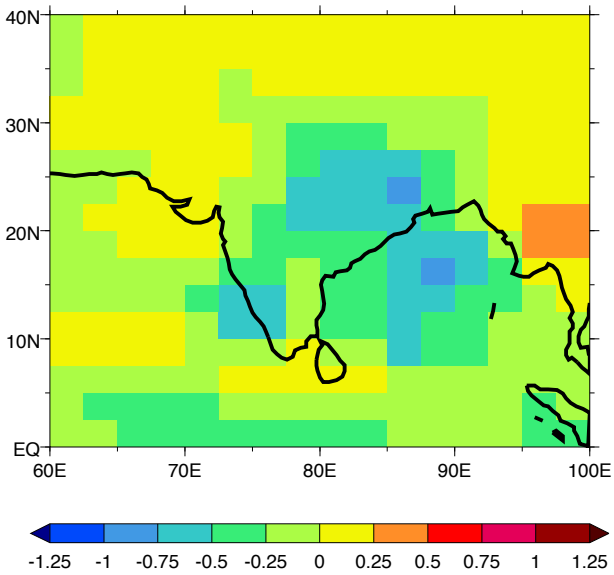
HadCM3


40N
30N
20N
10N
EQ
60E
70E
80E
90E
100E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0.25
0.5
0.75
1
1.25

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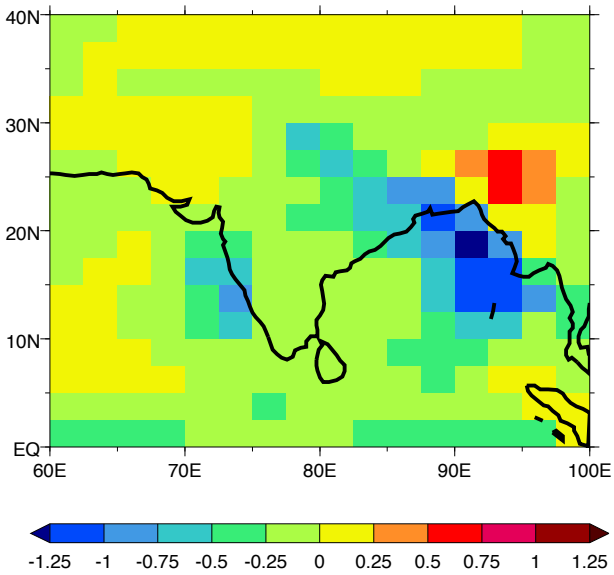
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20N
10N
EQ
60E
70E
80E
90E
100E
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-1
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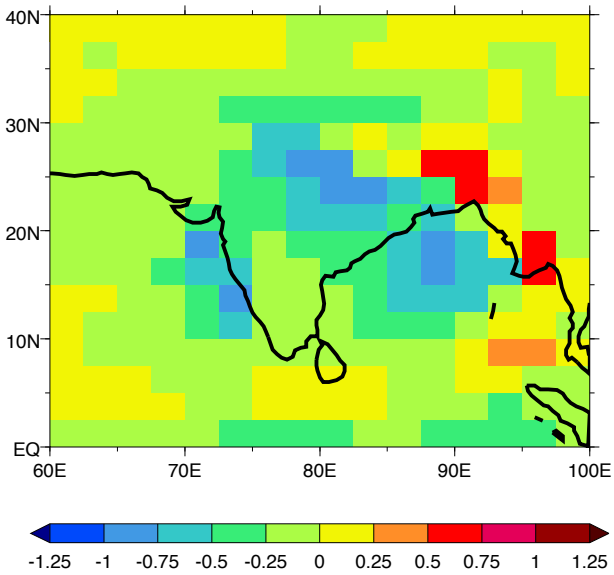
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25

# HadGEM2-ES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30N
20N
10N
EQ
60E
70E
80E
90E
100E
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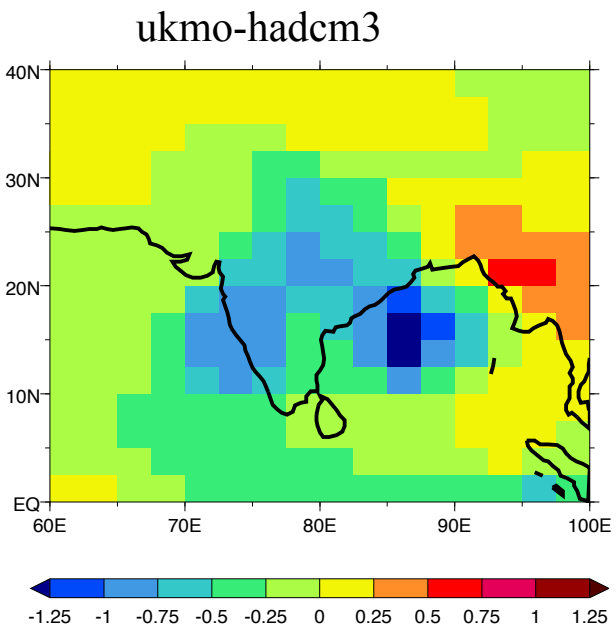
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25


ukmo-hadcm3
40N
30N
20N
10N
EQ
60E
70E
80E
90E
100E
-1.25
-1
-0.75
-0.5
-0.25
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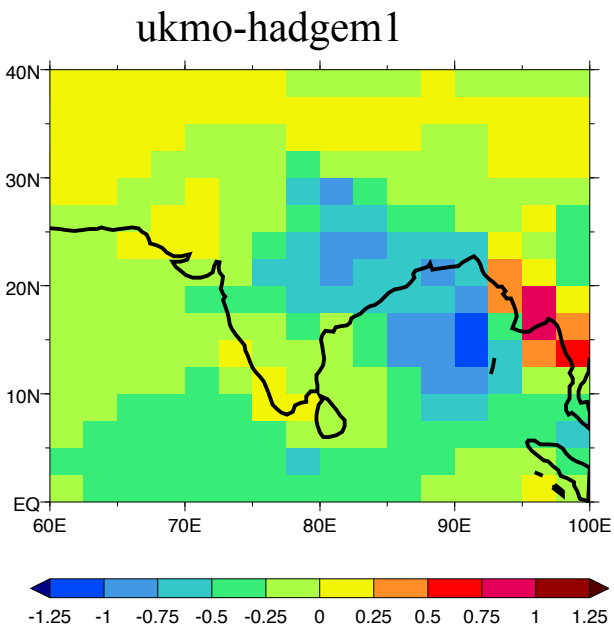
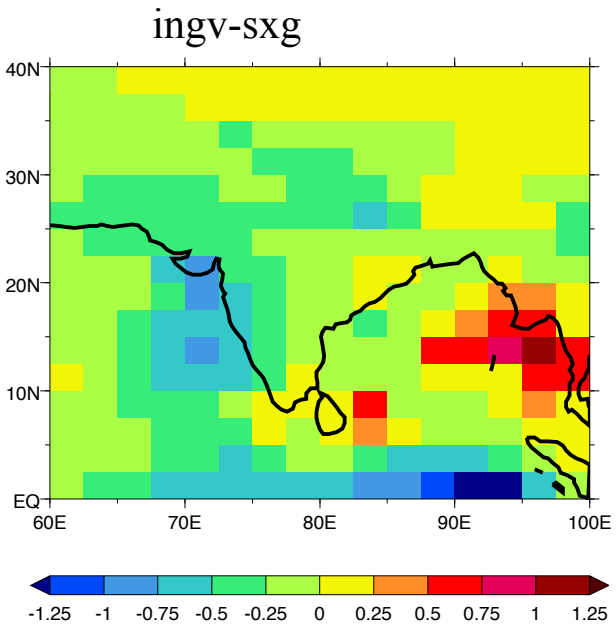
0.75
1
1.25


ukmo-hadgem1
40N
30N
20N
10N
EQ
60E
70E
80E
90E
100E
-1.25
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25


ingv-sxg
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EQ
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70E
80E
90E
100E
-1.25
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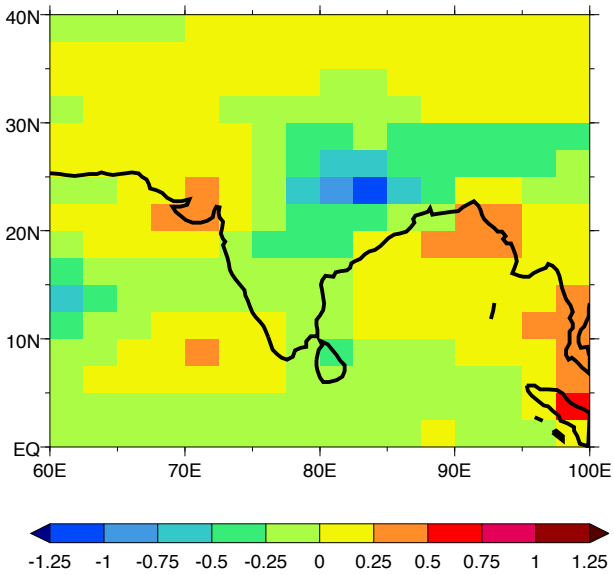
-0.25
0
0.25
0.5
0.75
1
1.25

# INM-CM4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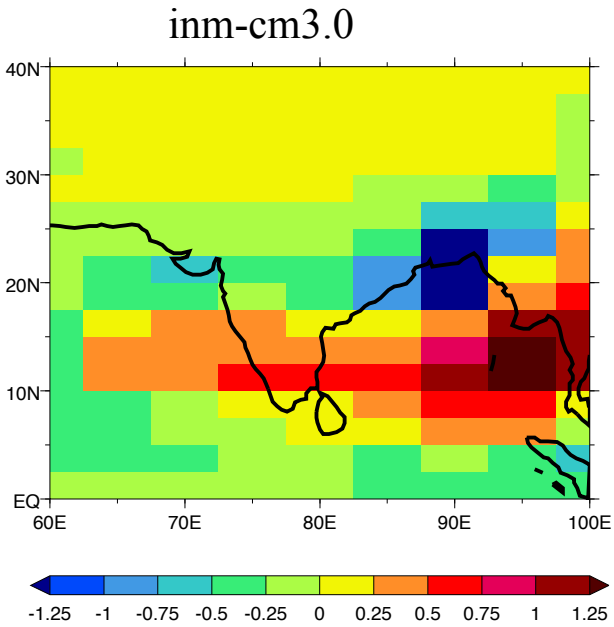
30N
20N
10N
EQ
60E
70E
80E
90E
100E
-1.25
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25


inm-cm3.0
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10N
EQ
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70E
80E
90E
100E
-1.25
-1
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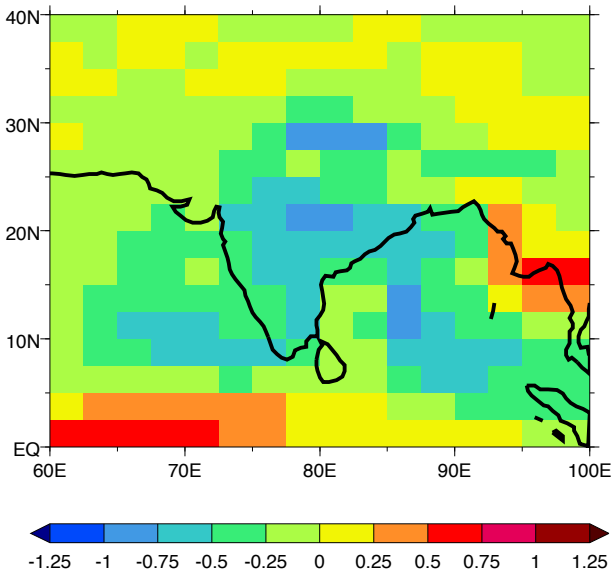
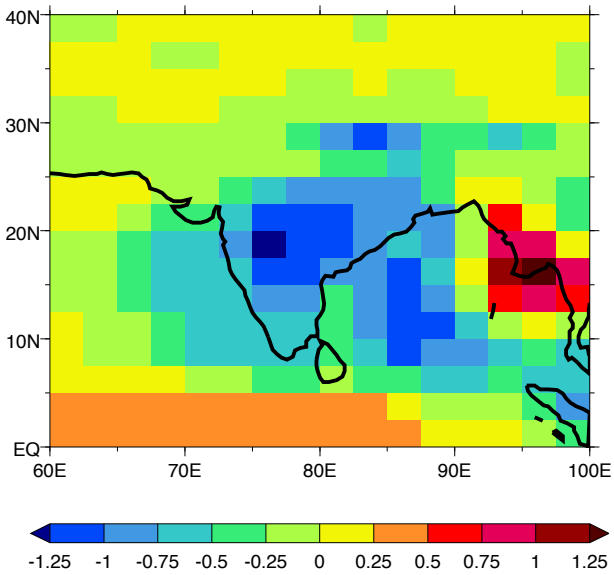
-0.25
0
0.25
0.5
0.75
1
1.25

# IPSL-CM5A-LR


40N
30N
20N
10N
EQ
60E
70E
80E
90E
100E


-1.25
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25

# IPSL-CM5A-MR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30N
20N
10N
EQ
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70E
80E
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100E
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-1
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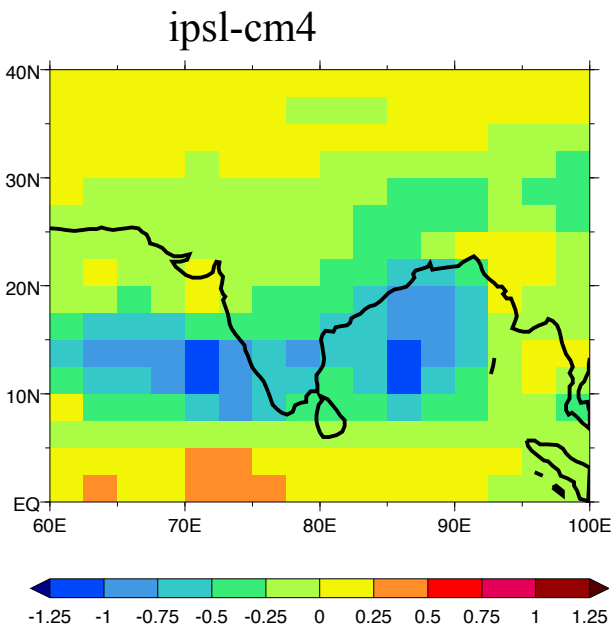
-0.25
0
0.25
0.5
0.75
1
1.25


ipsl-cm4
40N
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EQ
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70E
80E
90E
100E
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-1
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-0.5
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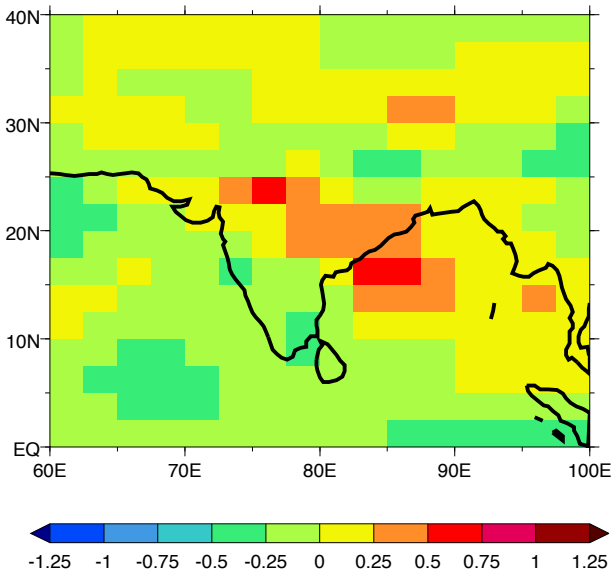
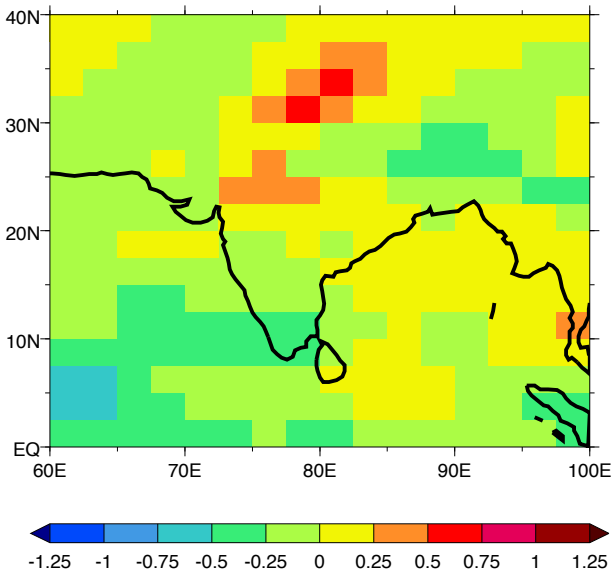
0
0.25
0.5
0.75
1
1.25

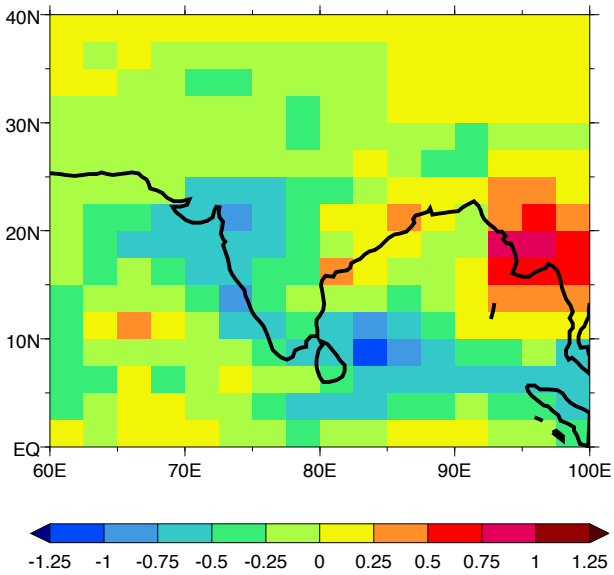
# MIROC-ESM


40N
30N
20N
10N
EQ
60E
70E
80E
90E
100E
-1.25
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25

# MIROC-ESM-CHEM



# MIROC4h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30N
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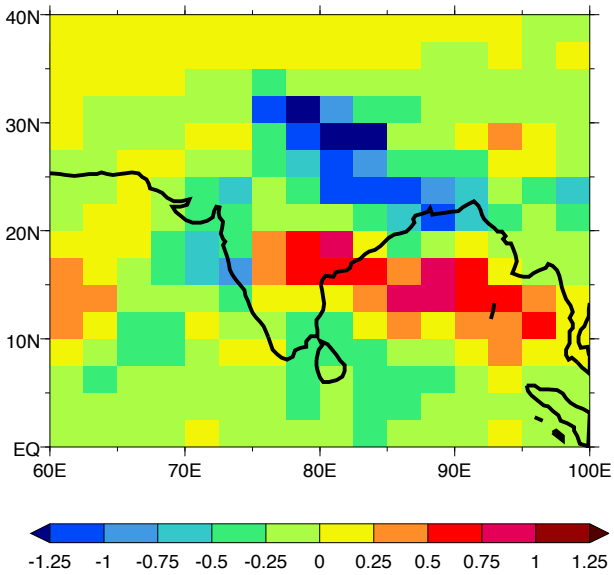
10N
EQ
60E
70E
80E
90E
100E
-1.25
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25

# MIROC5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30N
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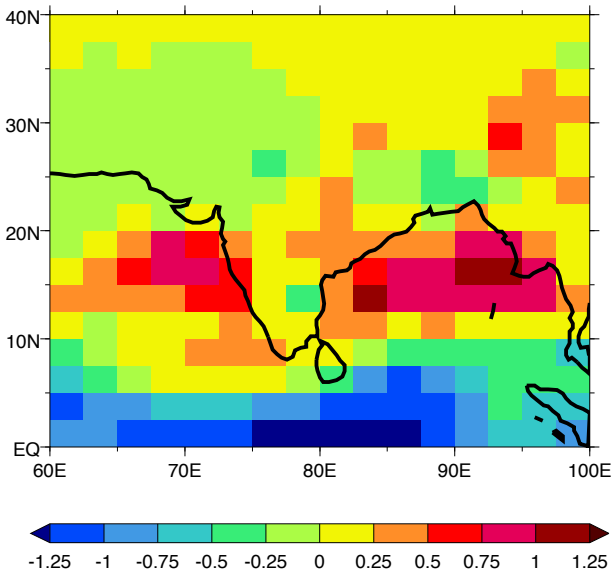
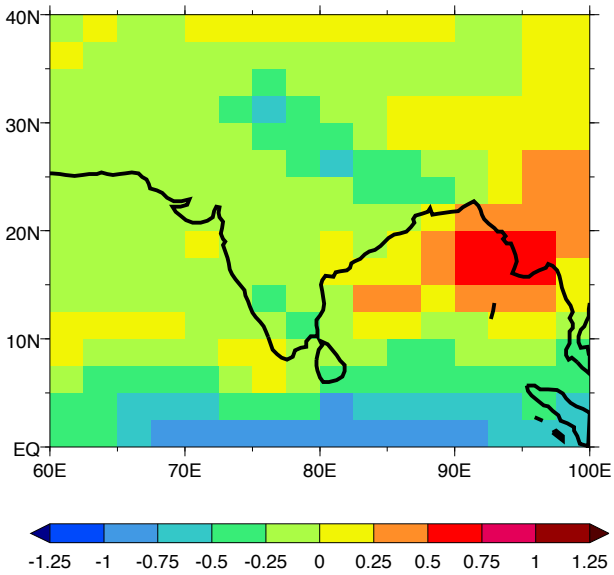
10N
EQ
60E
70E
80E
90E
100E
-1.25
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25

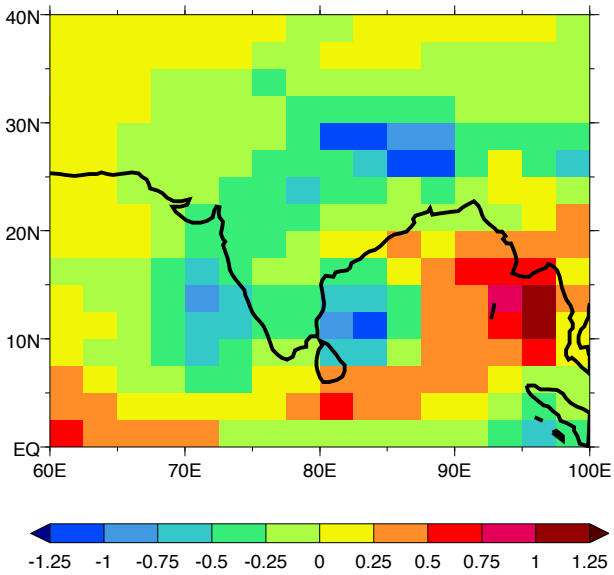
# miroc3.2 (hires)



# miroc3.2 (medres)



# MPI-ESM-LR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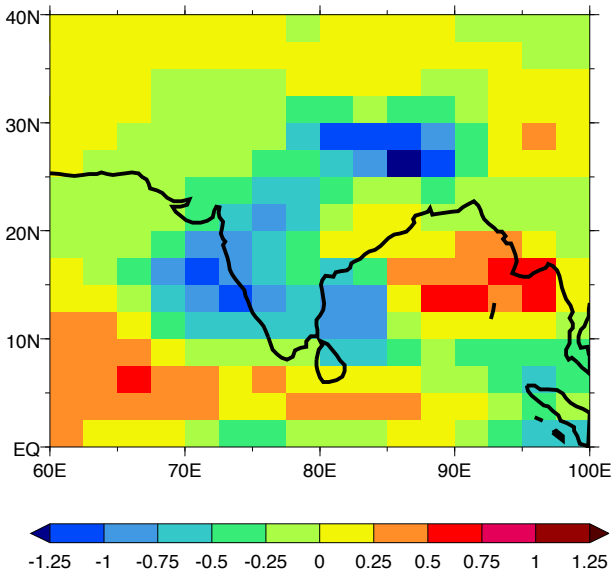
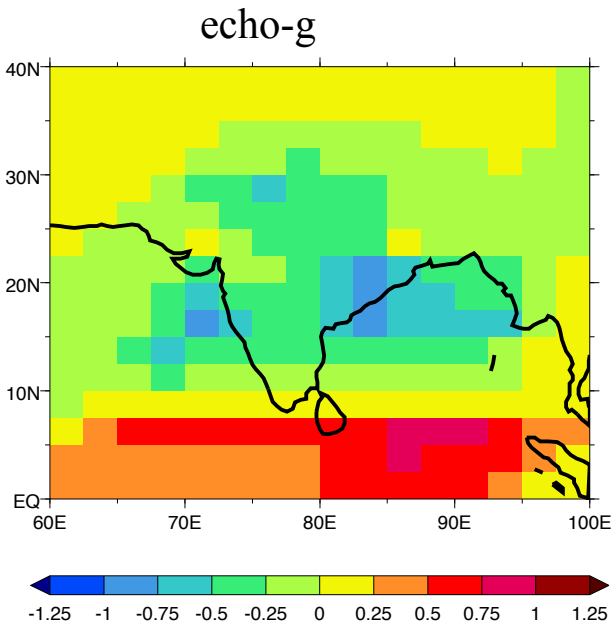
30N
20N
10N
EQ
60E
70E
80E
90E
100E
-1.25
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25

# echam5/mpi-om




echo-g
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20N
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EQ
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70E
80E
90E
100E
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-1
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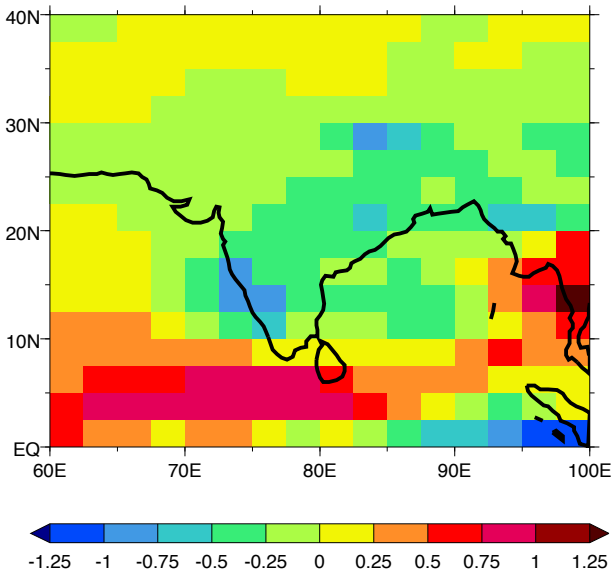
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25

# MRI-CGCM3


40N
30N
20N
10N
EQ
60E
70E
80E
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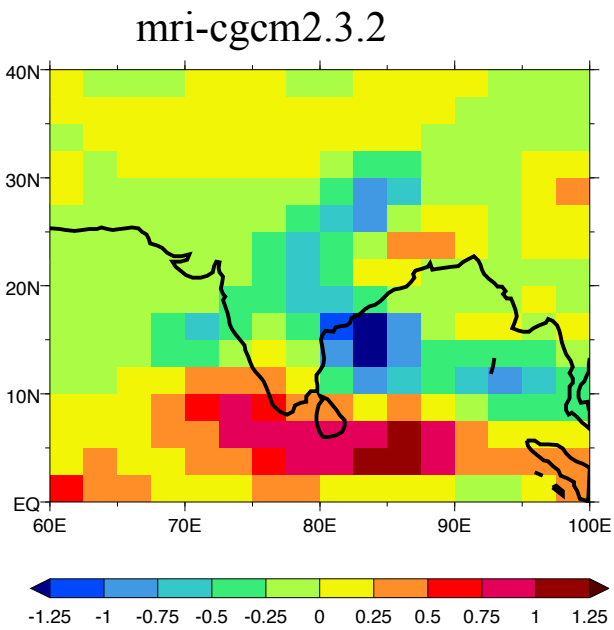
100E
-1.25
-1
-0.75
-0.5
-0.25
0
0.25
0.5
0.75
1
1.25


mri-cgcm2.3.2
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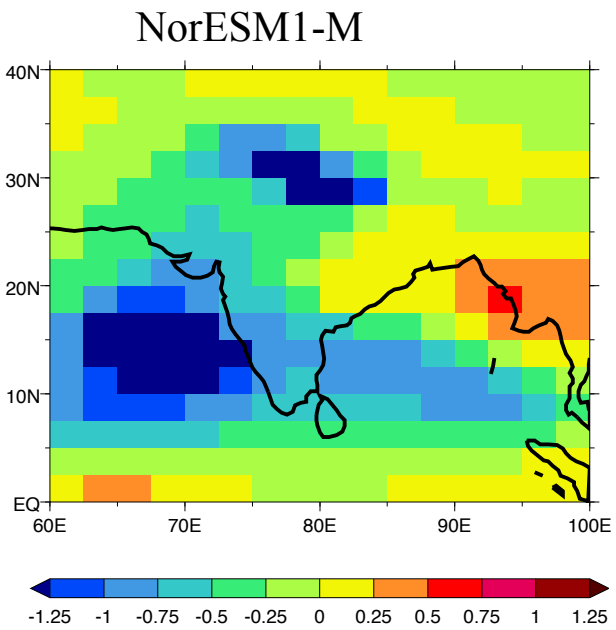
0.25
0.5
0.75
1
1.25


NorESM1-M
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EQ
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0.5
0.75
1
1.25