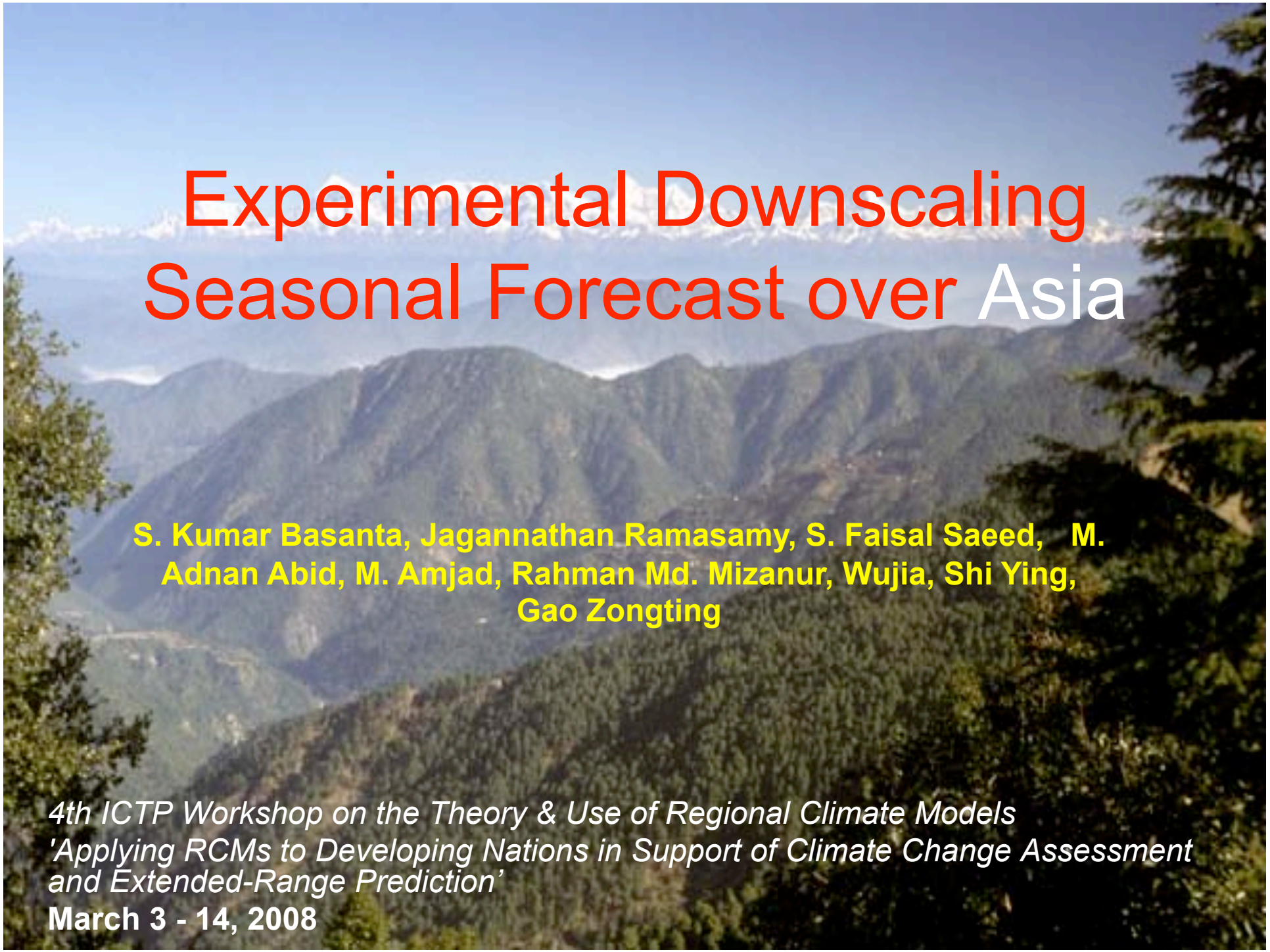


Experimental Downscaling Seasonal Forecast over Asia

S. Kumar Basanta, Jagannathan Ramasamy, S. Faisal Saeed, M. Adnan Abid, M. Amjad, Rahman Md. Mizanur, Wujia, Shi Ying, Gao Zongting

4th ICTP Workshop on the Theory & Use of Regional Climate Models
'Applying RCMs to Developing Nations in Support of Climate Change Assessment and Extended-Range Prediction'
March 3 - 14, 2008

MOTIVATION

The Regional Spectral Model (RSM) was originally developed at the National Center for Environmental Predictions (NCEP) to provide regional details for the Global Spectral Model (GSM).

Experimental Climate Prediction Center (ECPC) of Scripps Institution of Oceanography (SIO) produces 12-member ensemble seasonal forecasts every month by ECPC Global Spectral Model (GSM)

The ***motivation*** of this work is to see the regional details by dynamical downscaling of seasonal forecast by Global Spectral Model GSM.

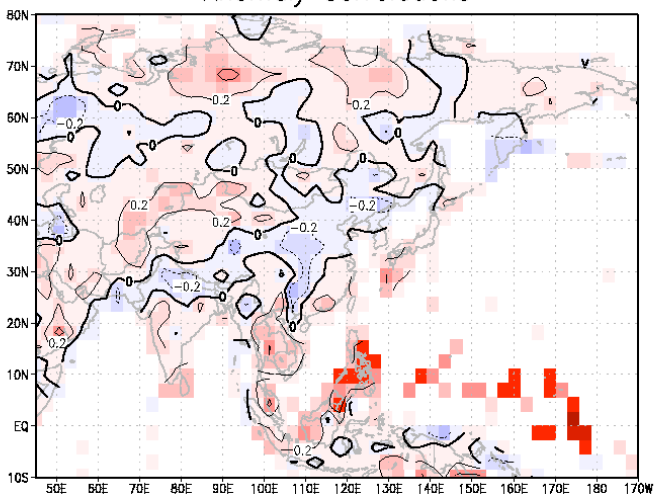
We downscaled GSM
9-member ensembles, created with 3 initial conditions and 3 SST forecasts

	IC 1	**IC 2**	**IC 3**
SST plus	**n01**	**n02**	**n03**
SST mean	**l01**	**l02**	**l03**
SST minus	**v01**	**v02**	**v03**

GCM Forecast Skill Maps

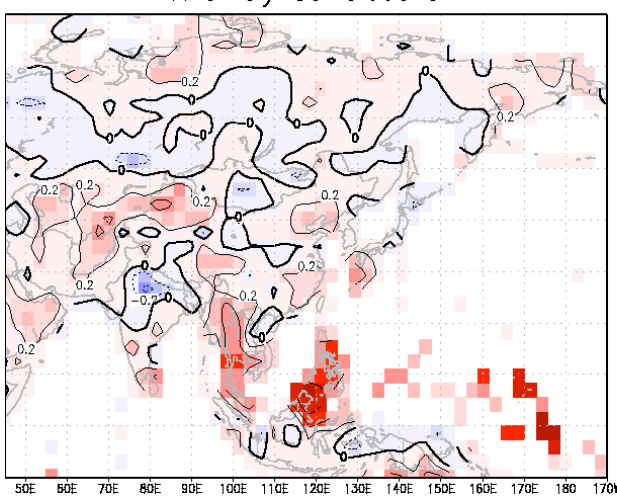
CCM3.6

Precipitation Anomalies : 1950–2000 MAM



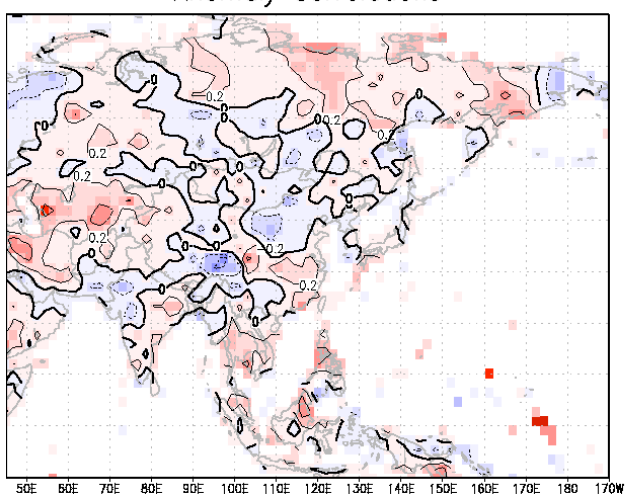
ECHAM4.5

Precipitation Anomalies : 1950–2000 MAM



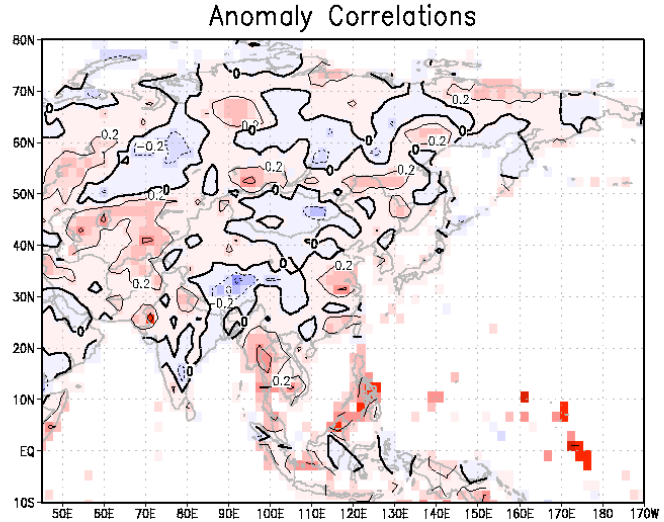
COLA–T63

Precipitation Anomalies : 1950–2000 MAM



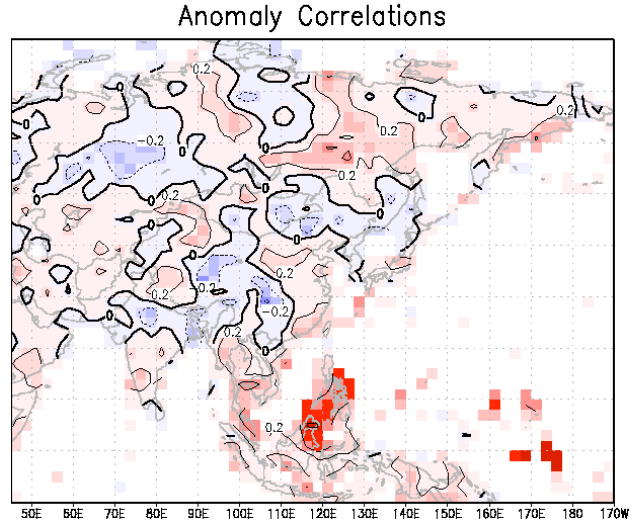
ECPC–NOAH

Precipitation Anomalies : 1950–2000 MAM



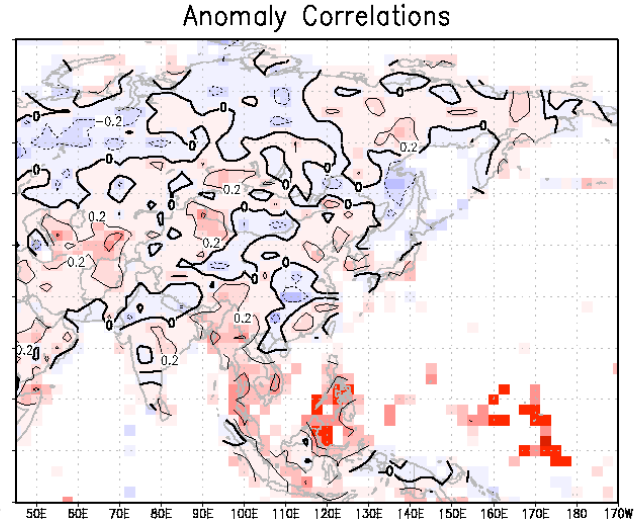
GFDL–AM2p12b

Precipitation Anomalies : 1950–2000 MAM



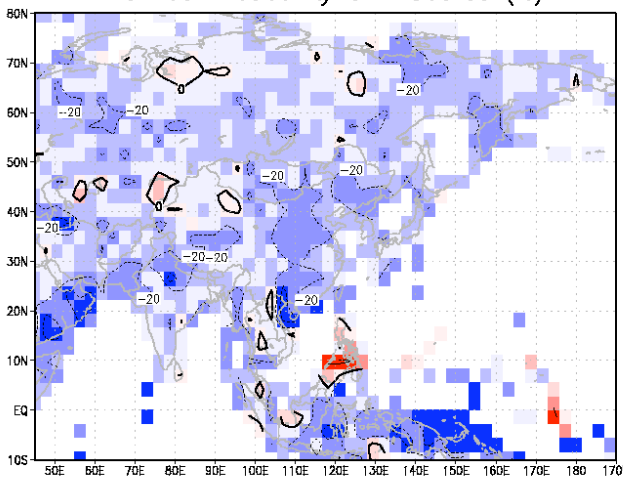
NSIPP1

Precipitation Anomalies : 1950–2000 MAM



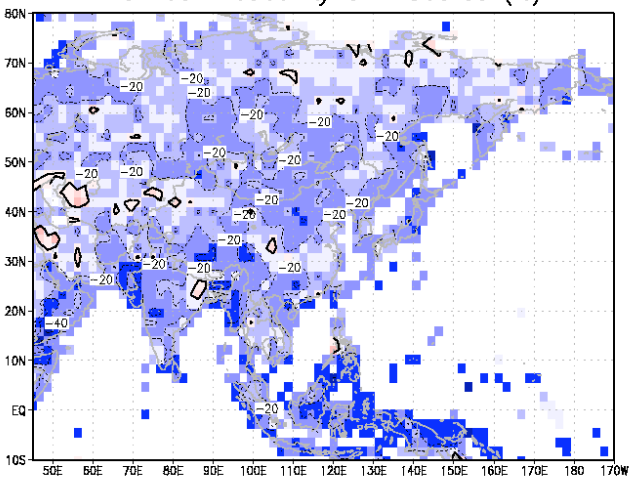
CCM3.6

Precipitation Anomalies : 1950–2000 MAM



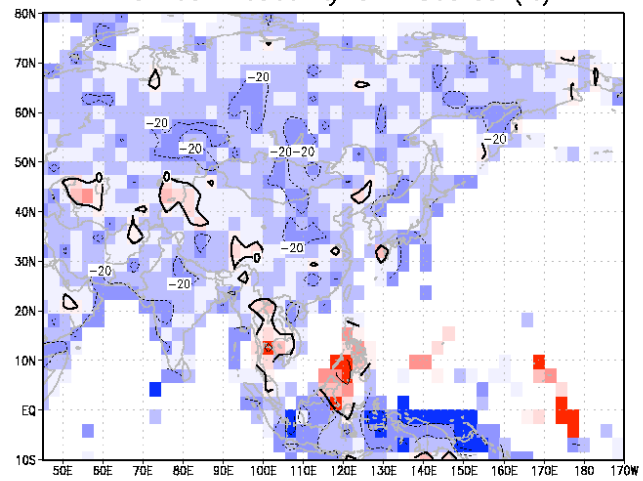
COLA–T63

Precipitation Anomalies : 1950–2000 MAM



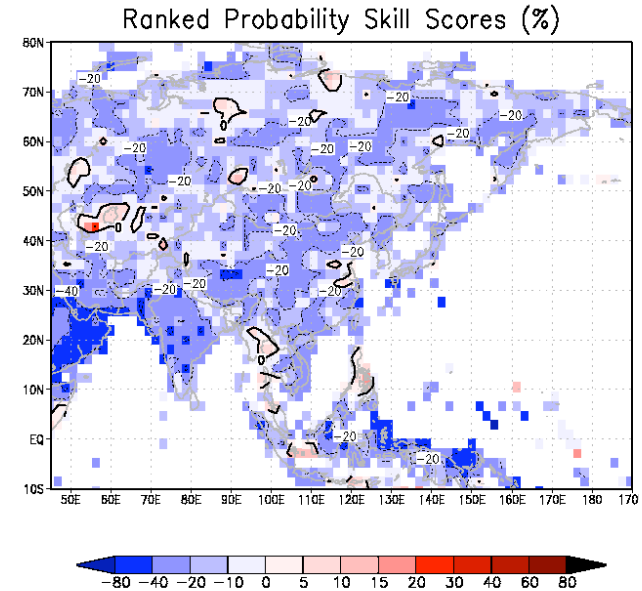
ECHAM4.5

Precipitation Anomalies : 1950–2000 MAM



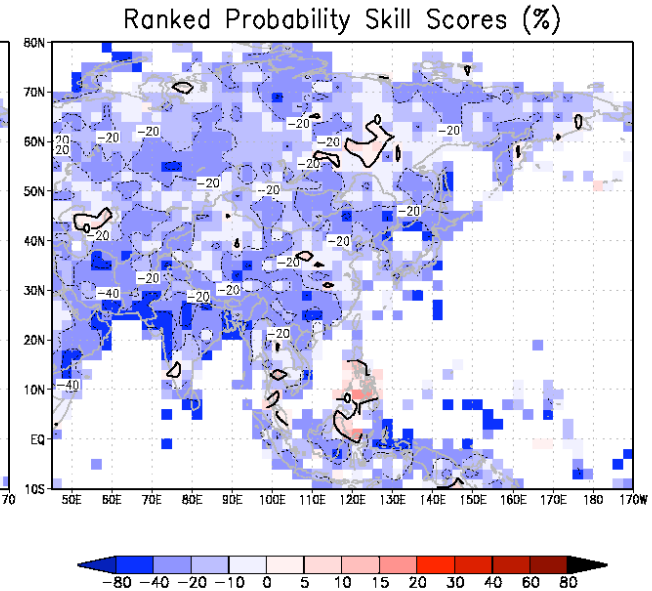
ECPC–NOAH

Precipitation Anomalies : 1950–2000 MAM



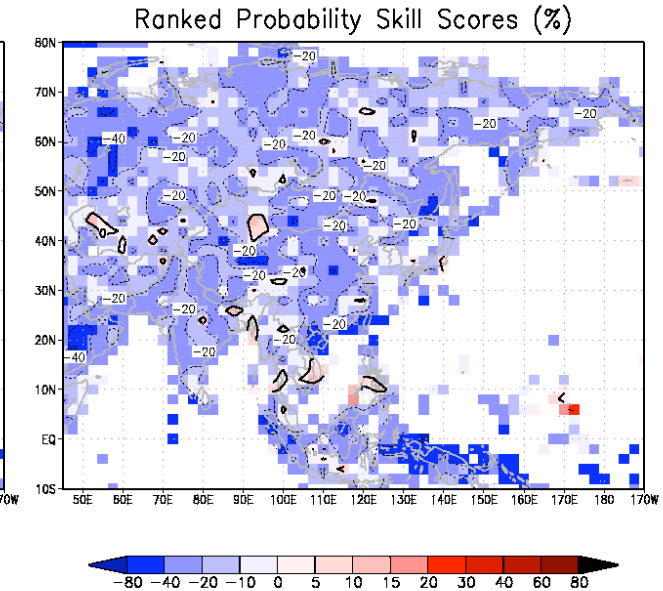
GFDL–AM2p12b

Precipitation Anomalies : 1950–2000 MAM

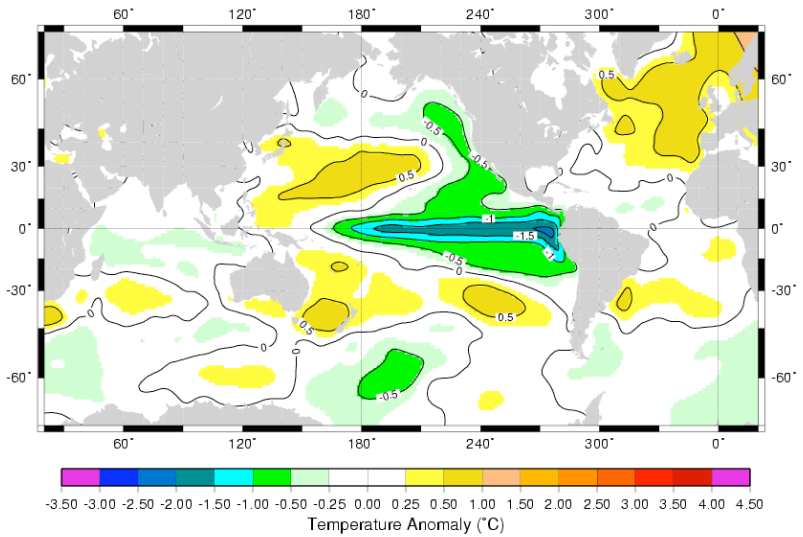


NSIPP1

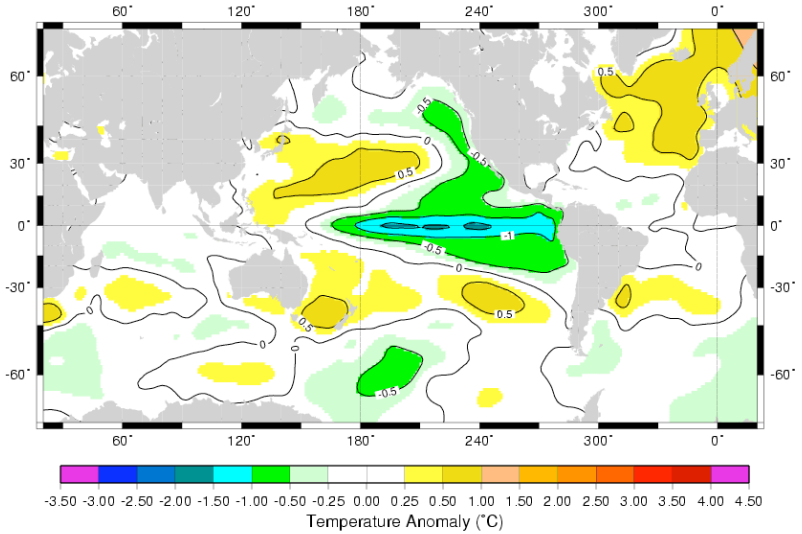
Precipitation Anomalies : 1950–2000 MAM



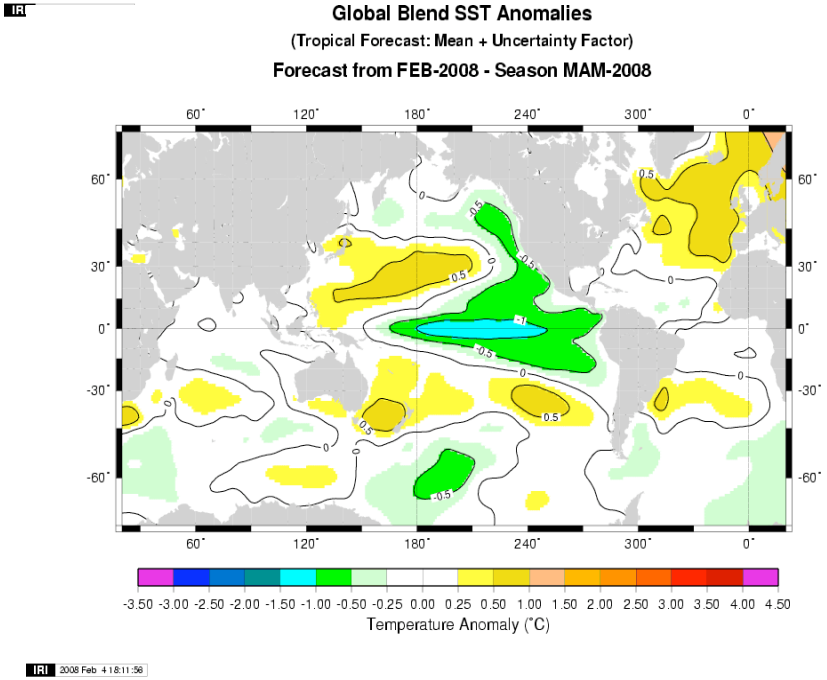
MINUS



MEAN



PLUS



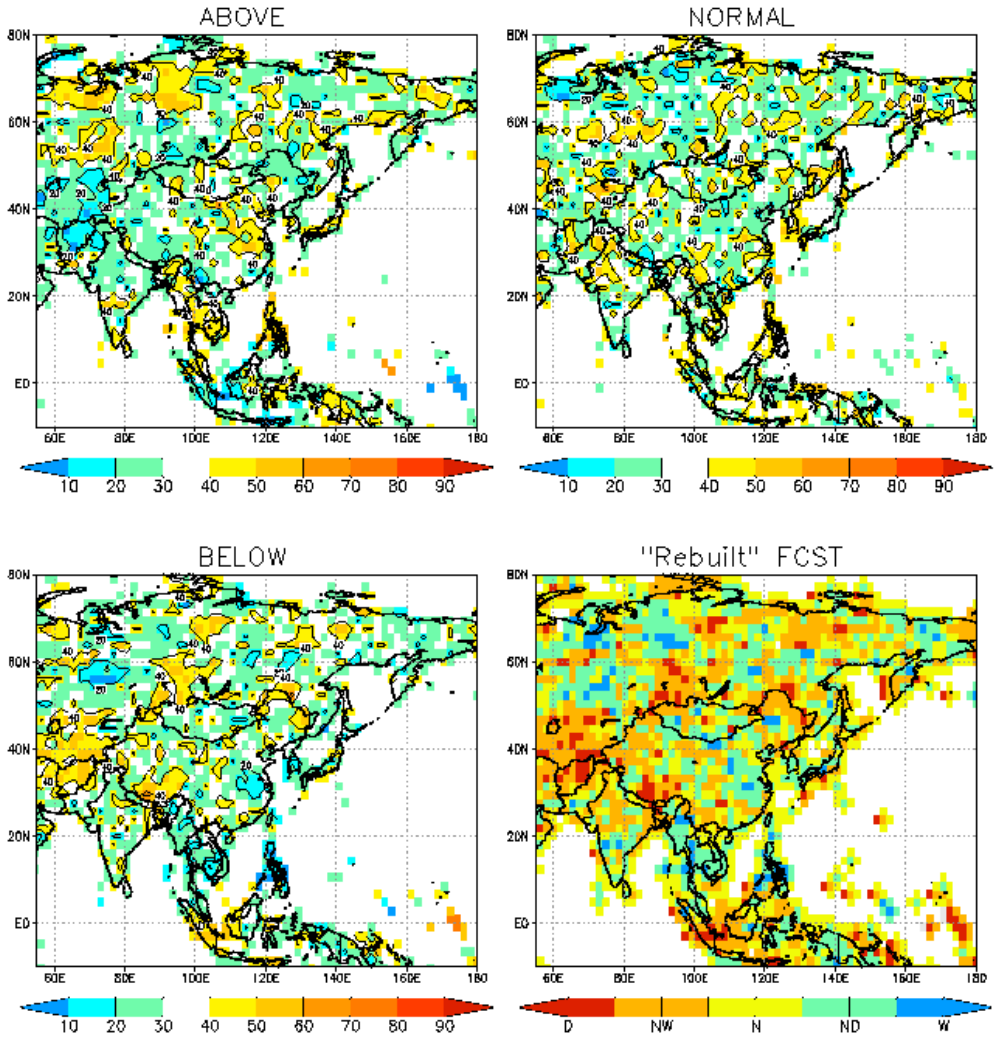
MAM 2008
SST forecast

MAR–APR–MAY 2008

ECPC: Probability(%) of A–N–B PRECIP

Trop. Ocean SSTa forecast (IRI Multi–Model Scenarios) from Jan 2008

Probabilities based on 1950–2001 simulations



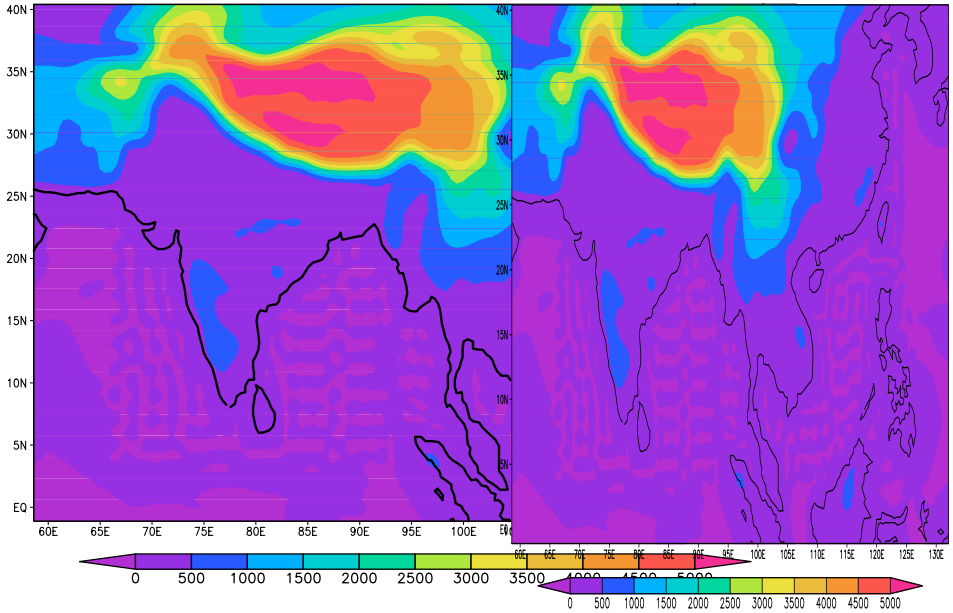
REBUILT SCALE :: D:dry NW:not wet N:normal ND:not dry W:wet
(Grey areas = NO Forecast)

IRI International Research Institute for climate and society

RSM Model Setup

Domain: Asia

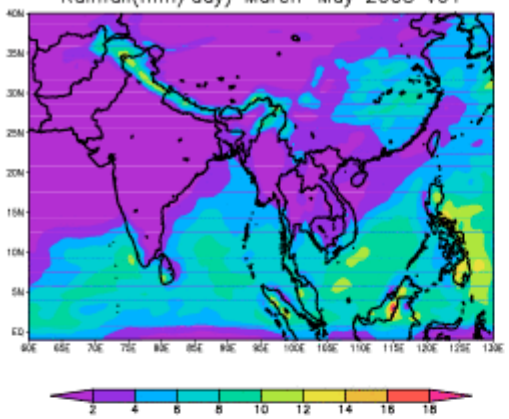
Latitude: 1S to 40N
Longitude: 59E to 132E
Horizontal resolution: 60km
Vertical resolution: 17 levels
Time Step: 300s
Cumulus Scheme:
Relaxed Arakawa Schubert scheme (RAS)



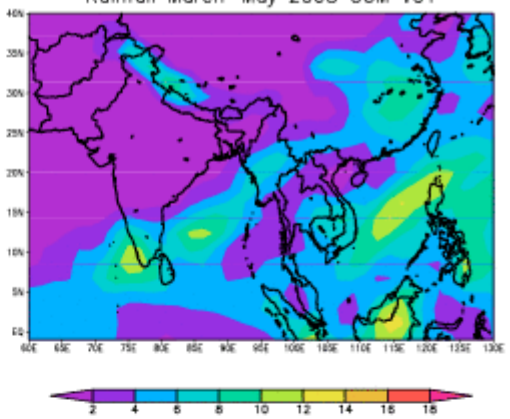
RSM

GSM

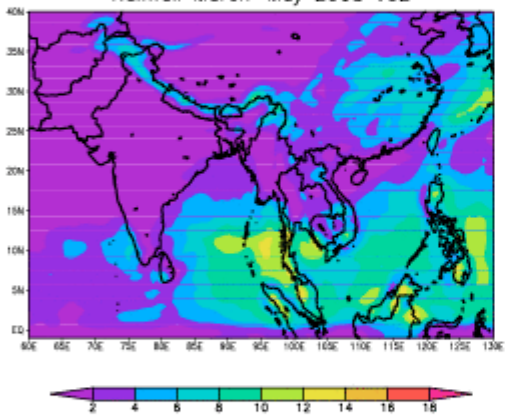
Rainfall(mm/day) March-May 2008 V01



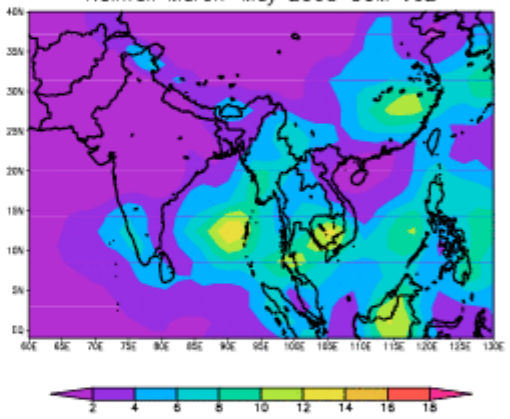
Rainfall March-May 2008 GCM V01



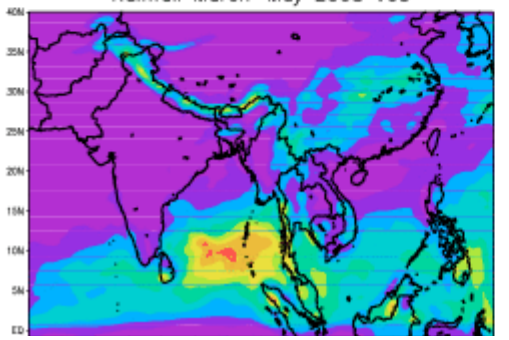
Rainfall March-May 2008 V02



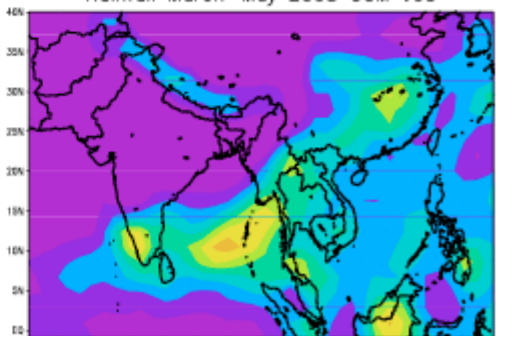
Rainfall March-May 2008 GCM V02



Rainfall March-May 2008 V03

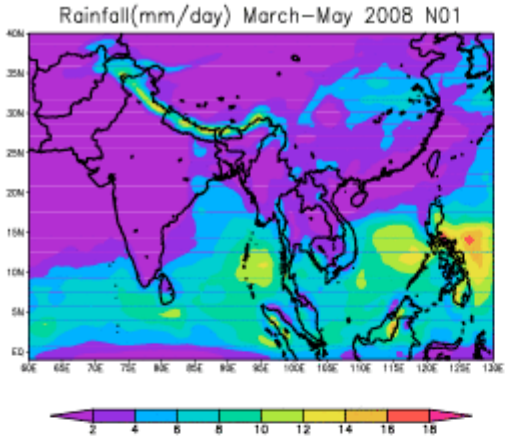


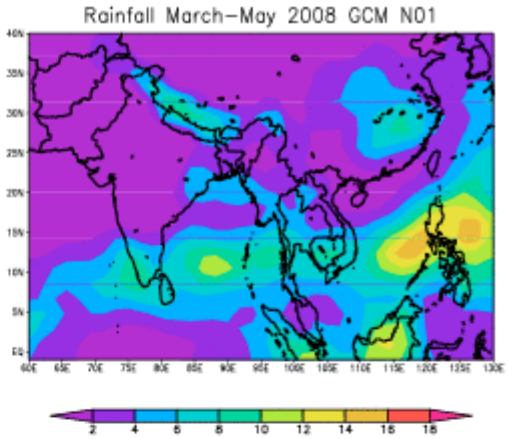
Rainfall March-May 2008 GCM V03



RSM

GSM


Rainfall(mm/day) March-May 2008 N01
2 4 6 8 10 12 14 16 18


Rainfall March-May 2008 GCM N01
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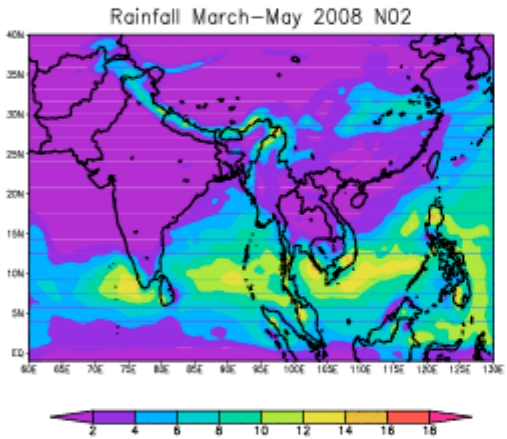
Rainfall March-May 2008 N02
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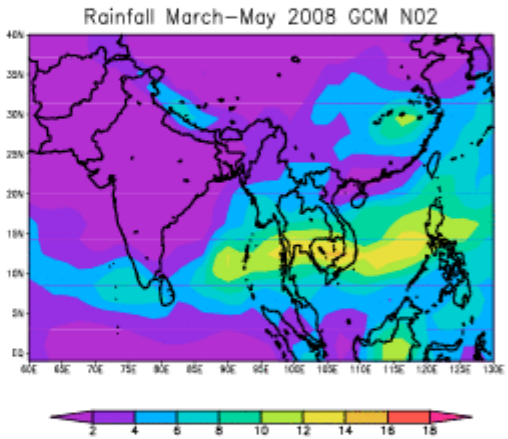
Rainfall March-May 2008 GCM N02
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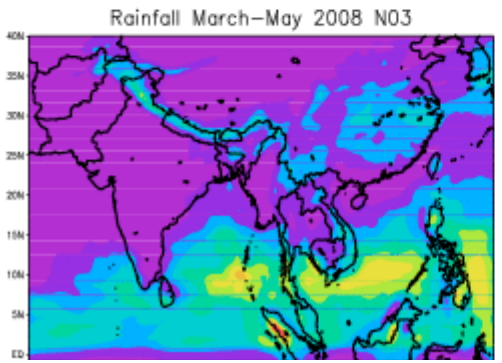
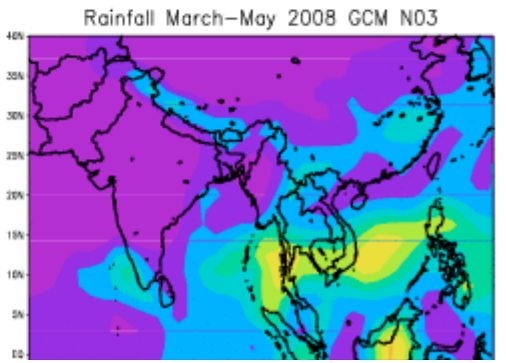
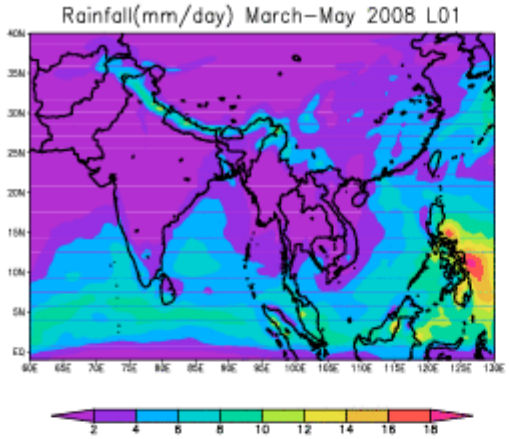

Rainfall March-May 2008 N03


Rainfall March-May 2008 GCM N03

RSM


Rainfall(mm/day) March-May 2008 L01
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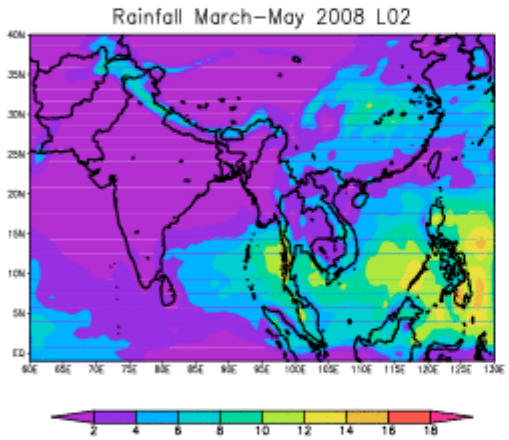
Rainfall March-May 2008 L02
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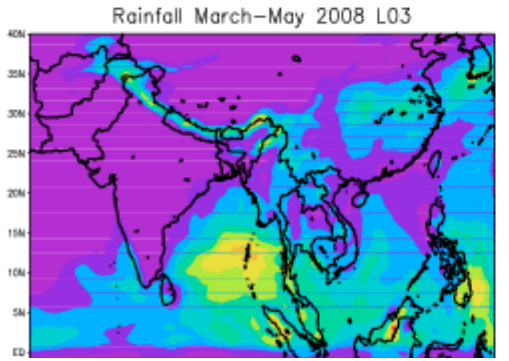
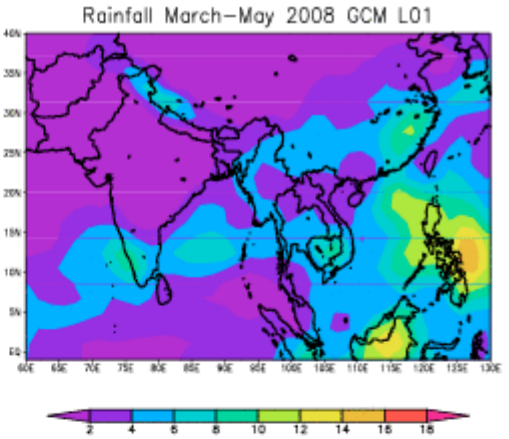

Rainfall March-May 2008 L03

GSM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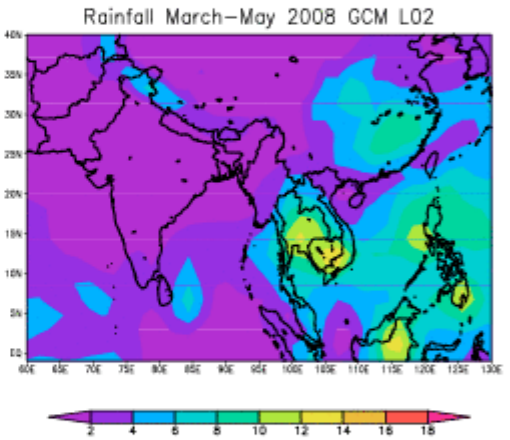
Rainfall March-May 2008 GCM L02
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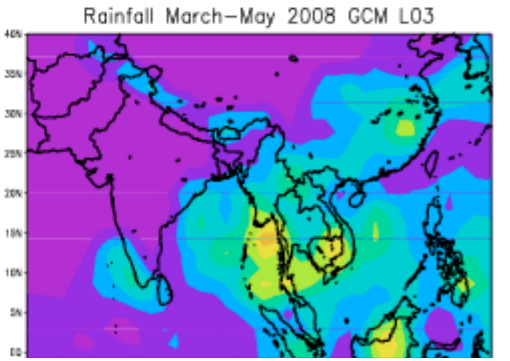
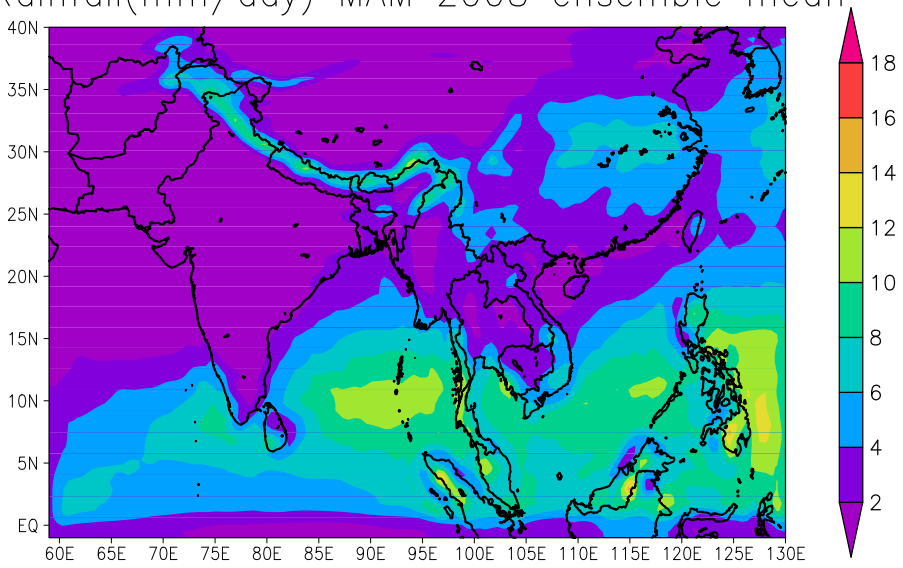
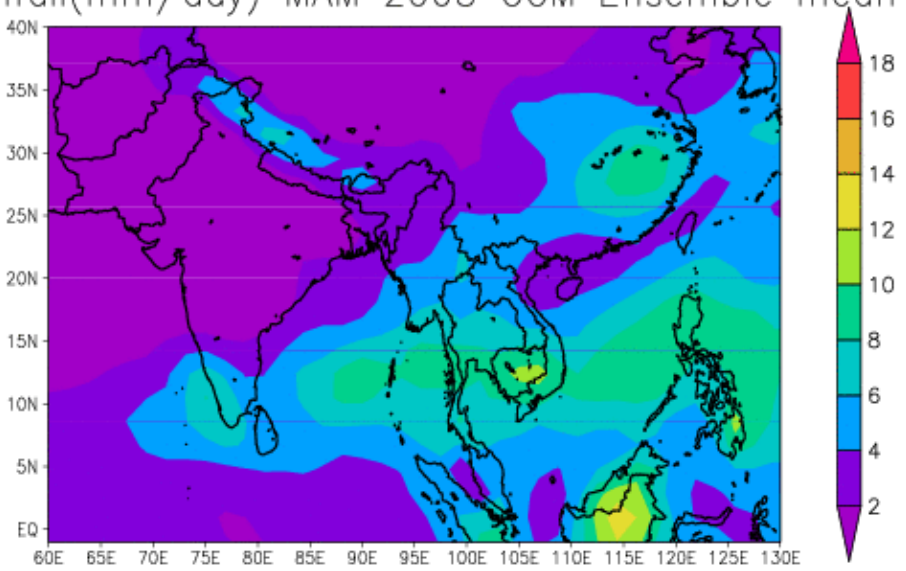

Rainfall March-May 2008 GCM L03

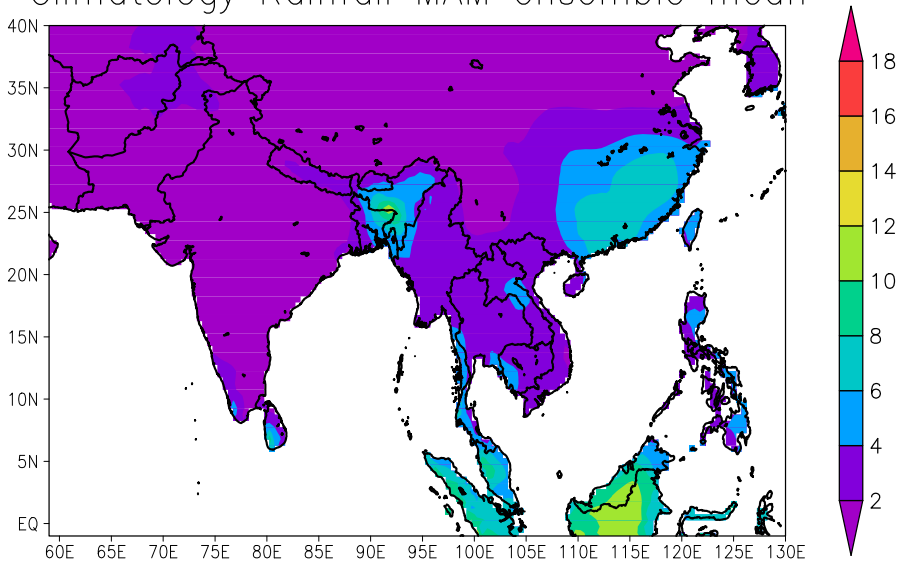
Rainfall(mm/day) MAM 2008 ensemble mean



Rainfall(mm/day) MAM 2008 GCM Ensemble mean



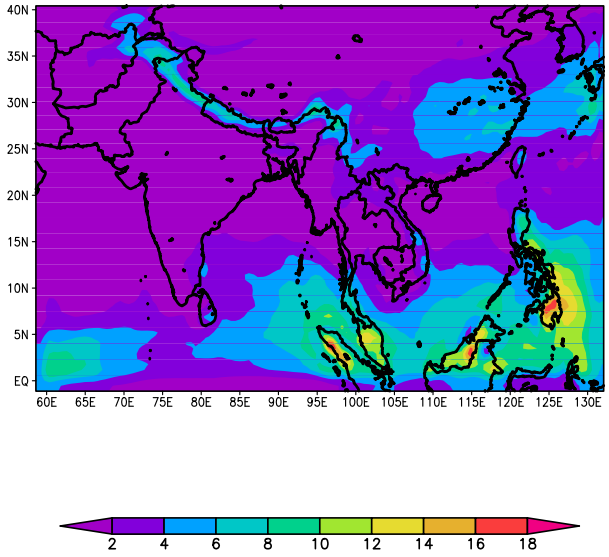
Climatology Rainfall MAM ensemble mean



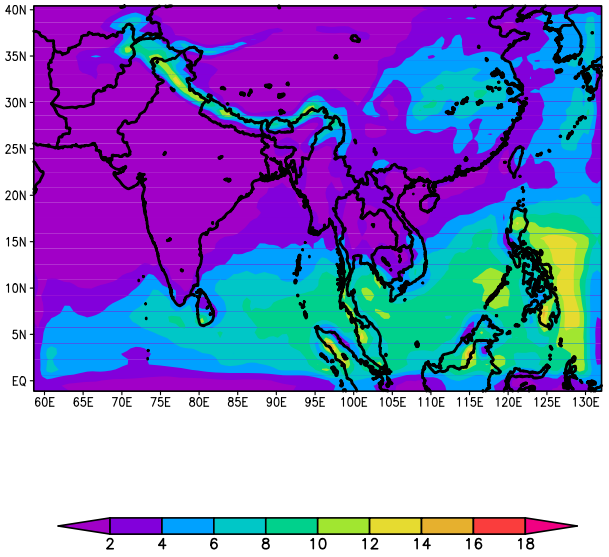
Mean Ensemble

Precipitation (mm/day) for March, April, May and Seasonal (MAM)

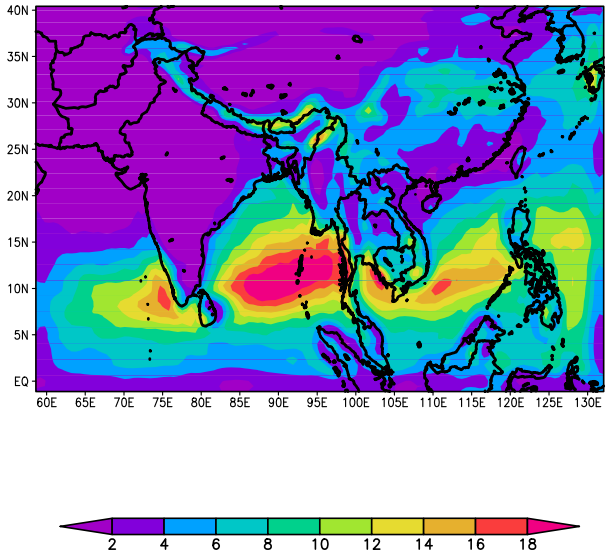
Rainfall(mm/day) March 2008 ensemble mean



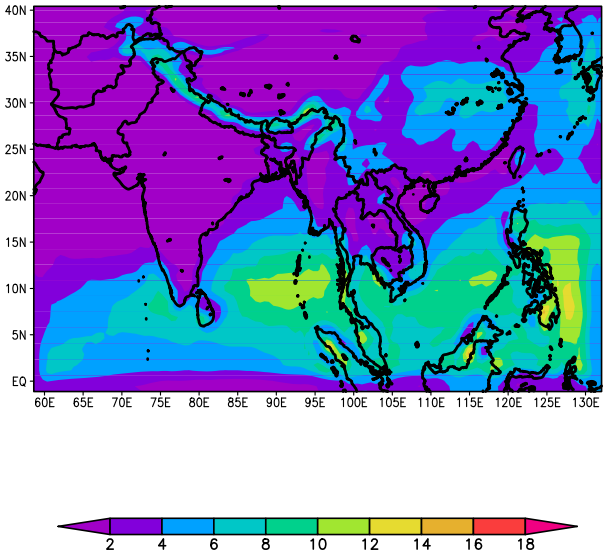
Rainfall April 2008 ensemble mean



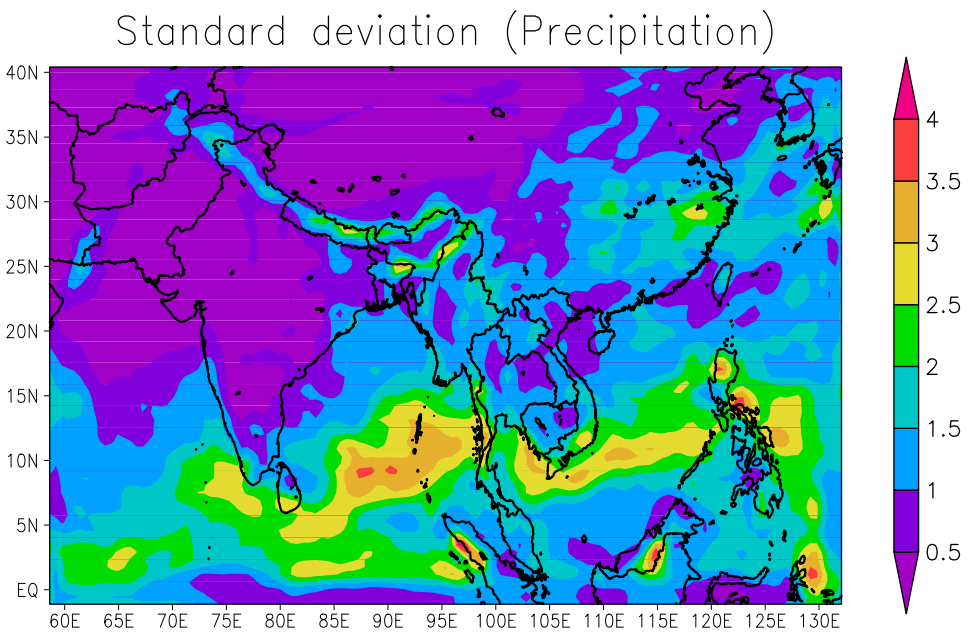
Rainfall May 2008 ensemble mean

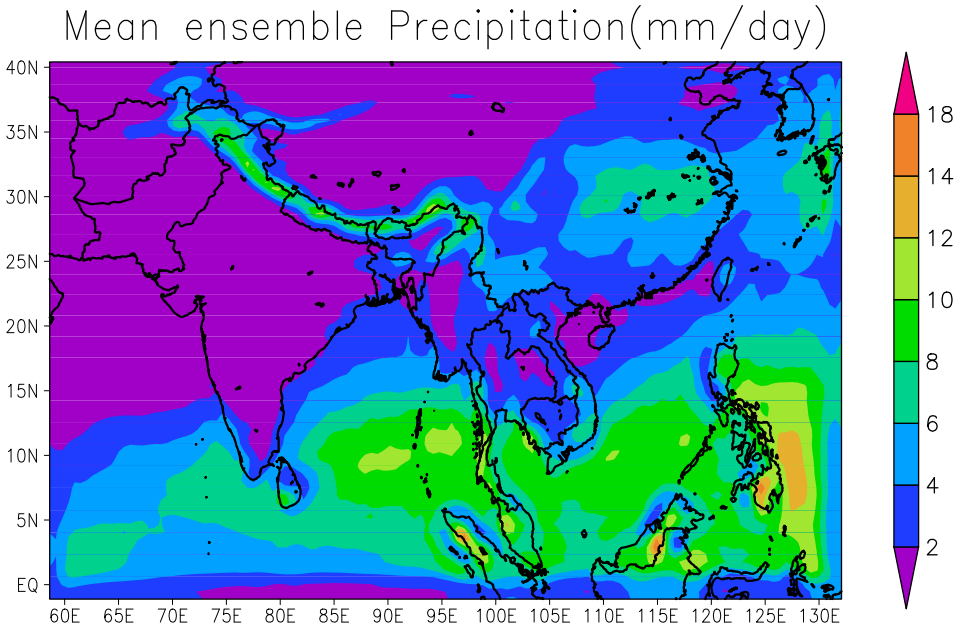


Rainfall March–May 2008 ensemble mean

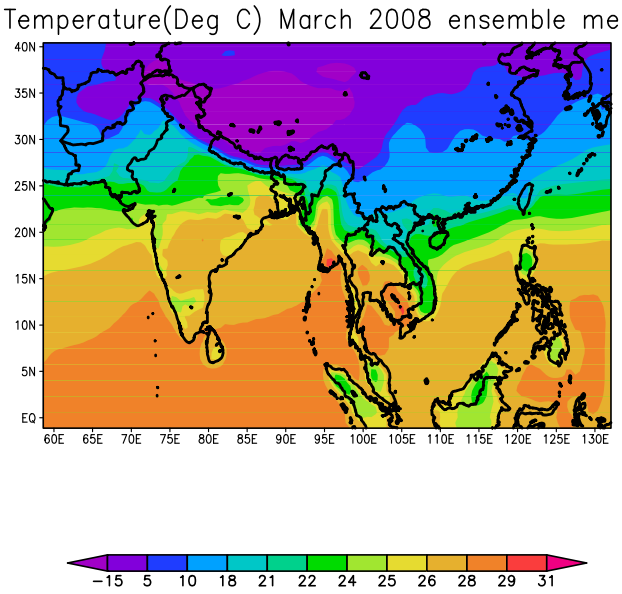


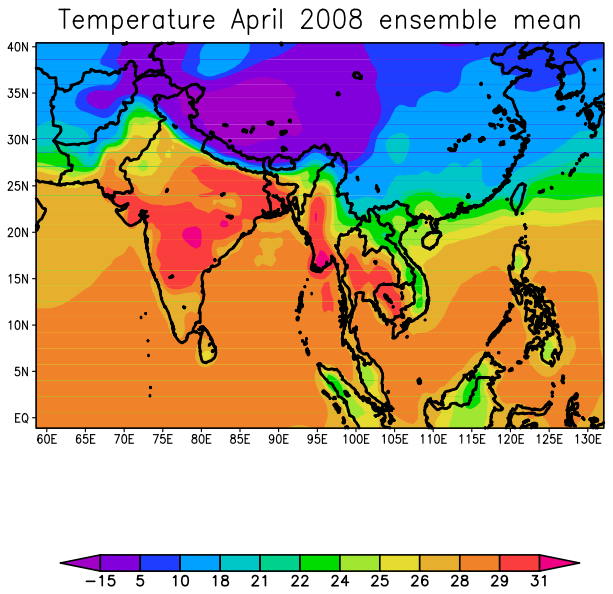
Precipitation (mm/day)

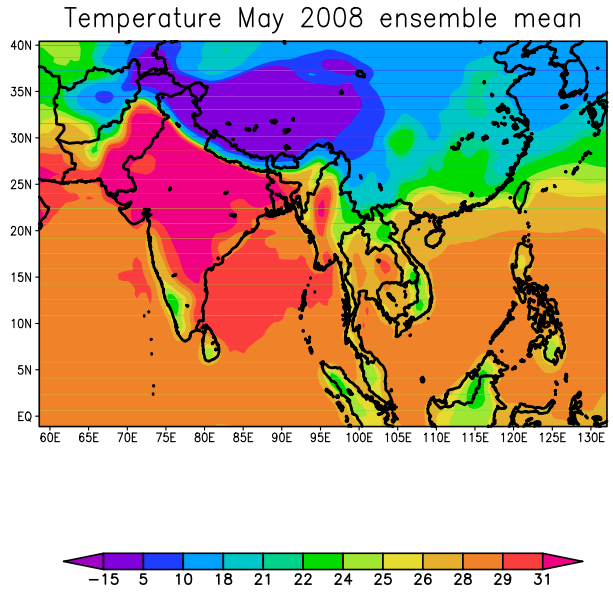


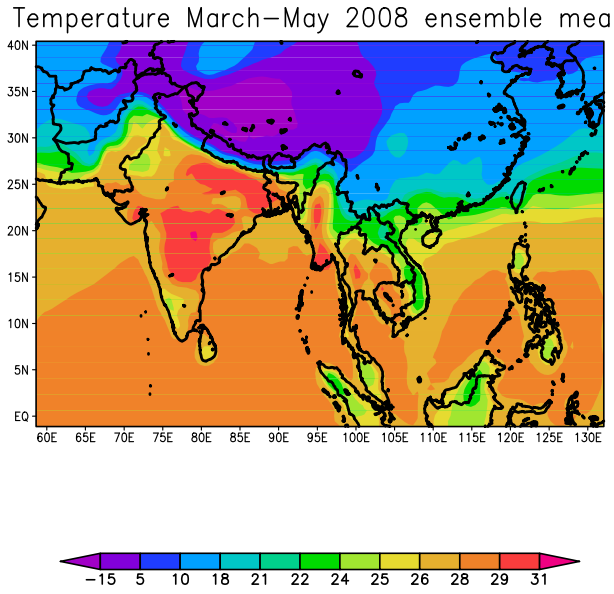


Temperature C

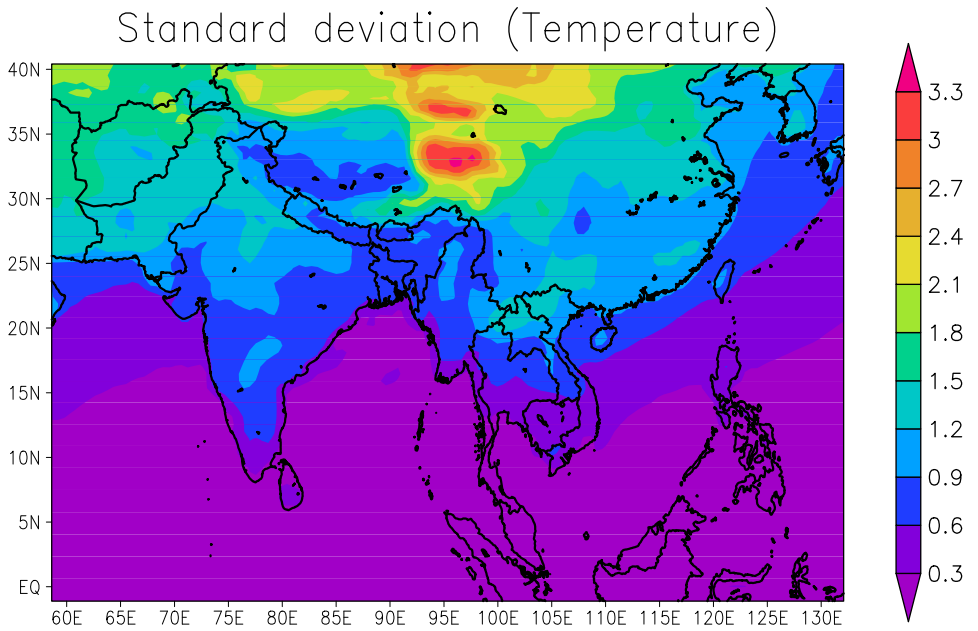


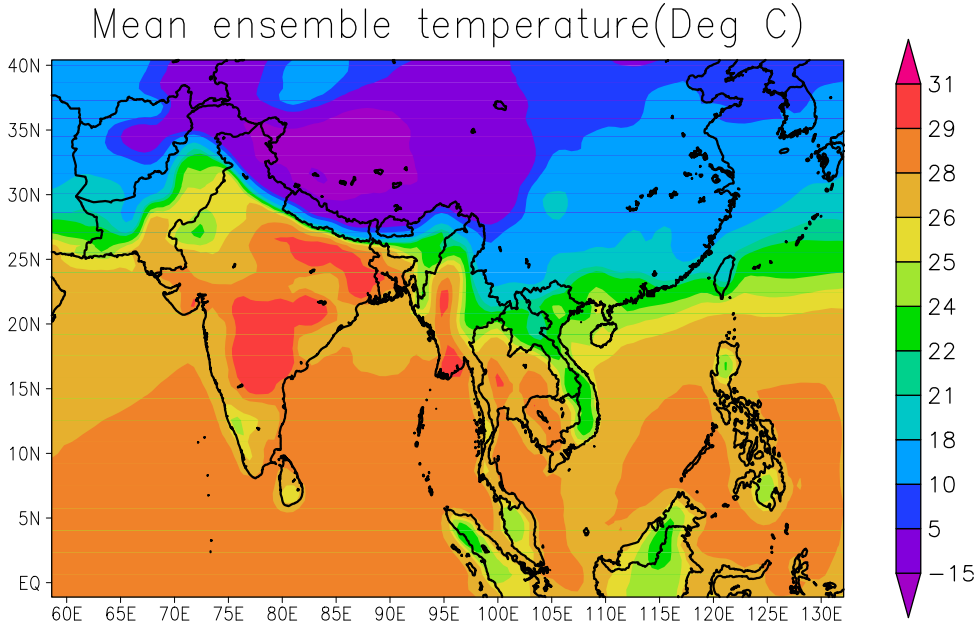






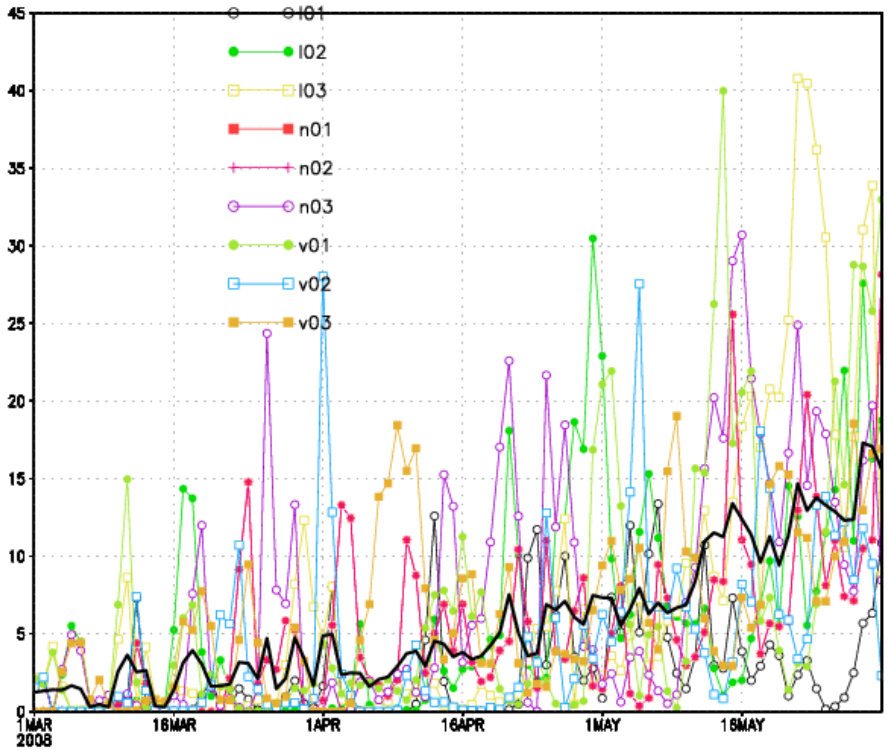
Temperature C



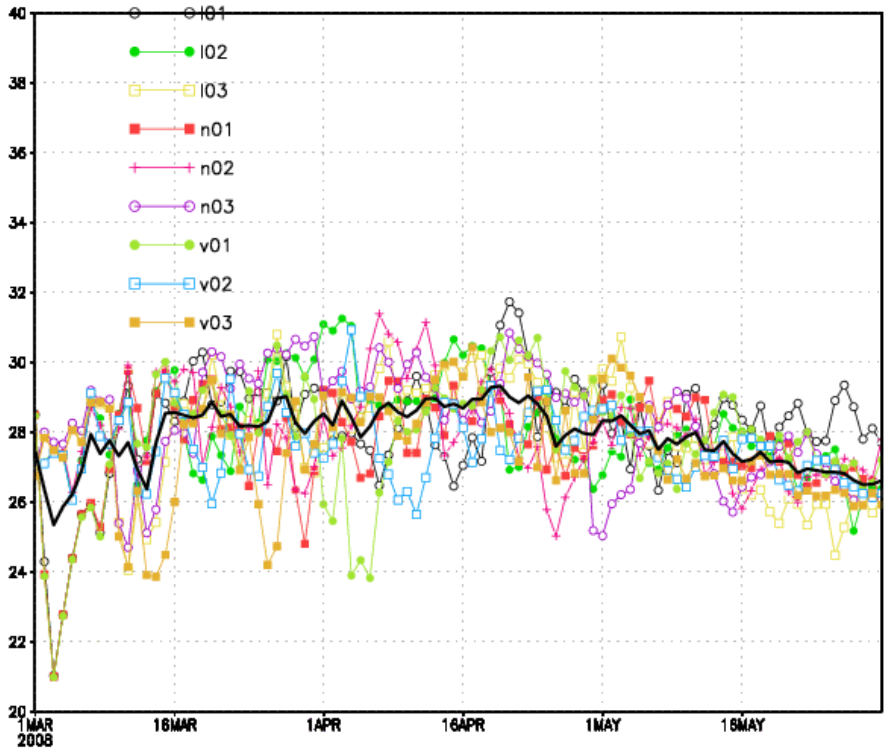


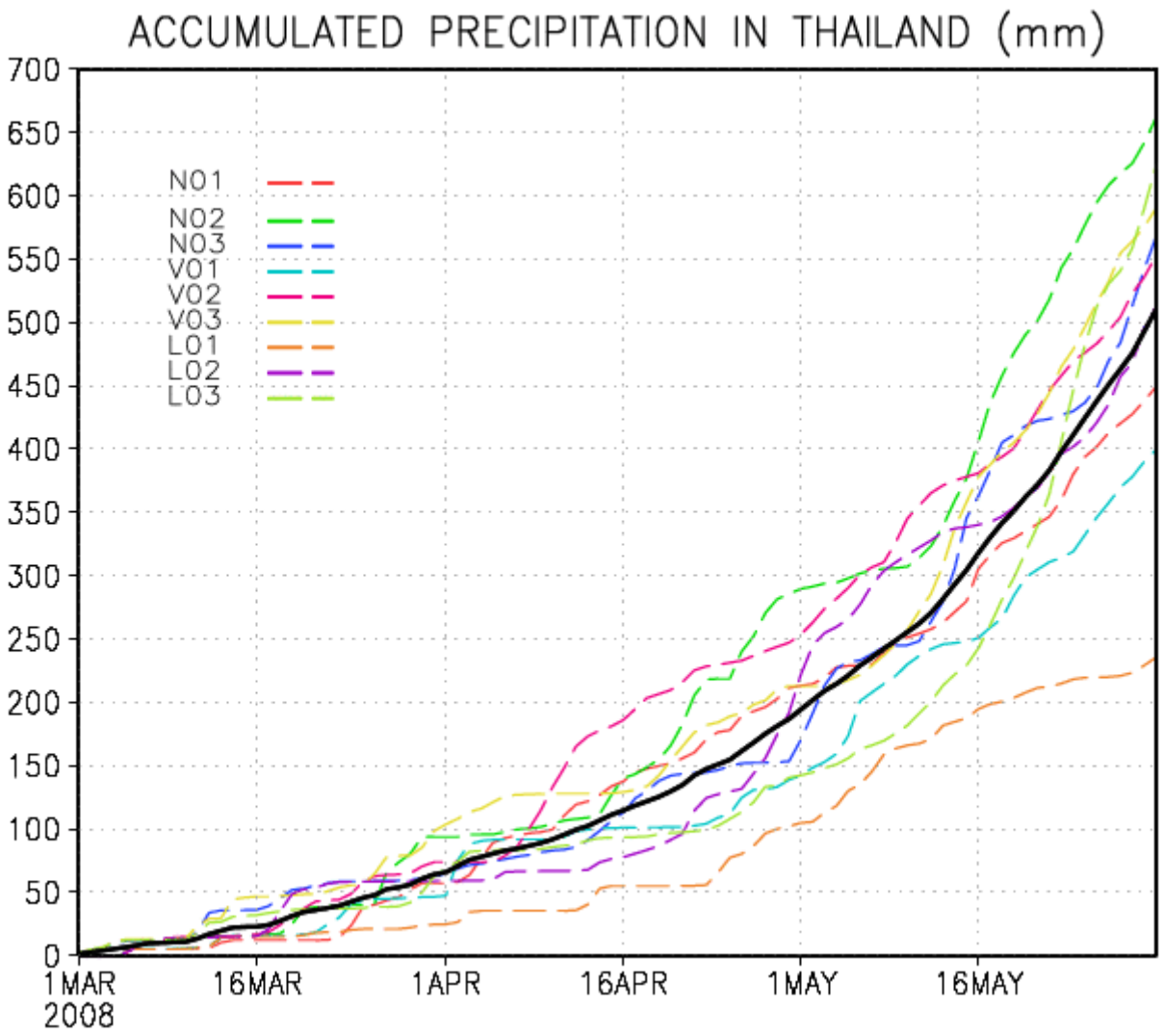
Ensemble Spread over Thailand

Daily Precipitation



Daily Temperature

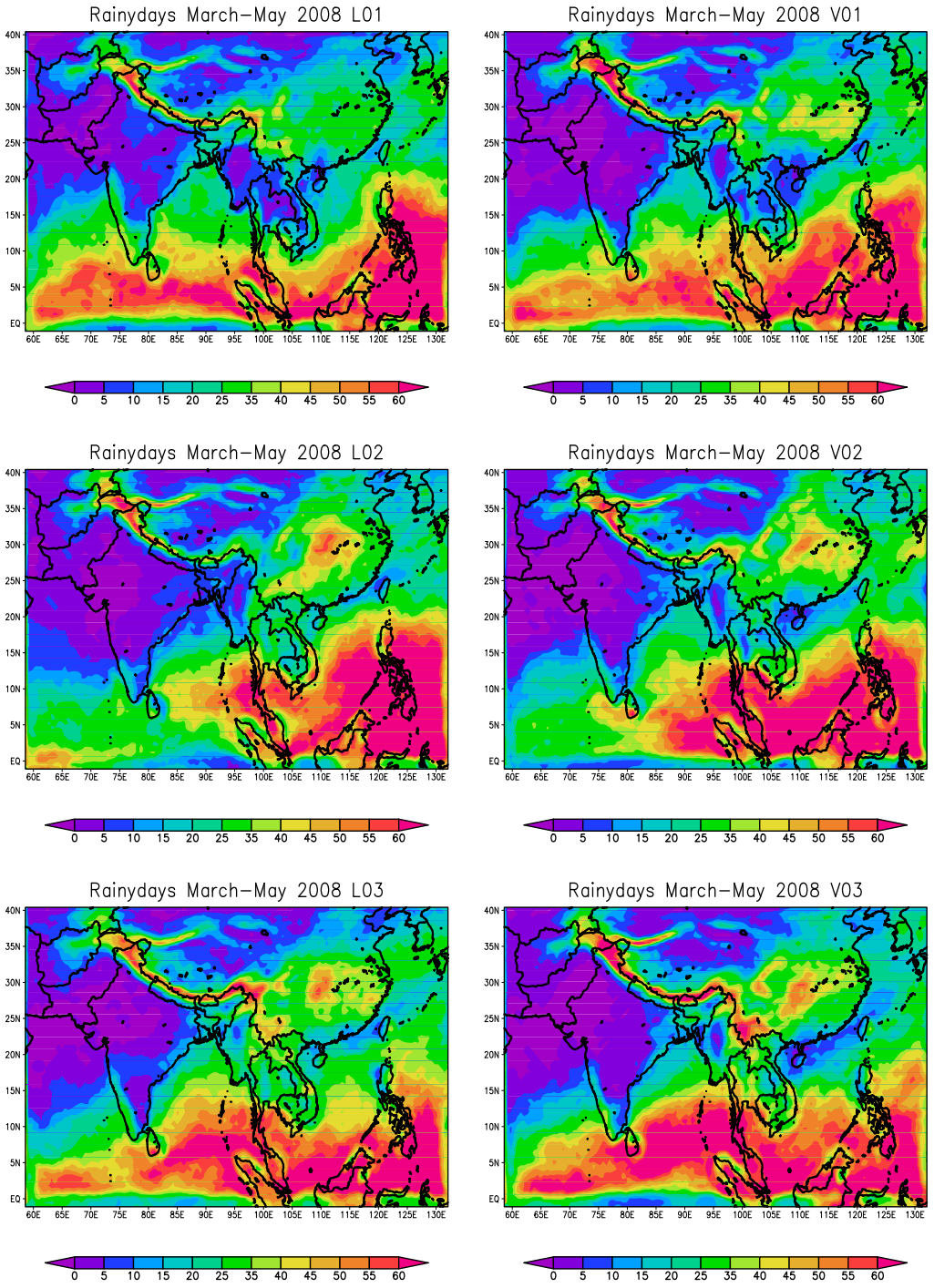



ACCUMULATED PRECIPITATION IN THAILAND (mm)
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
N01
N02
N03
V01
V02
V03
L01
L02
L03
1MAR
2008
16MAR
1APR
16APR
1MAY
16MAY

Number of Rainy Days in Different Ensemble Members

Rainy Day if

Precip > 2.5 mm/day

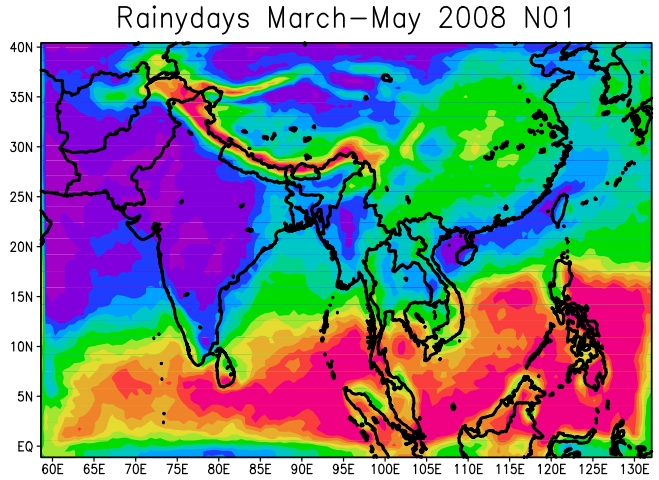


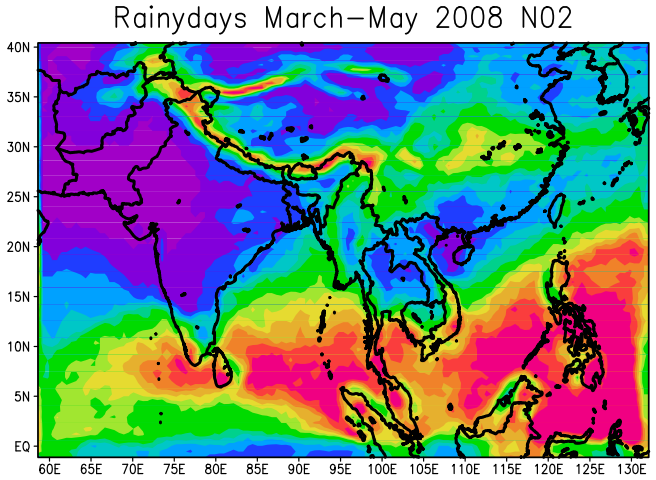
Number of Rainy Days in Different Ensemble Members

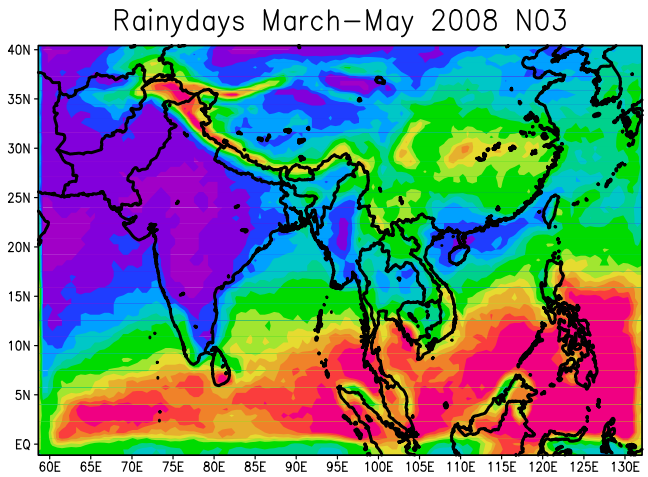
NO1, NO2, NO3 and Ensemble

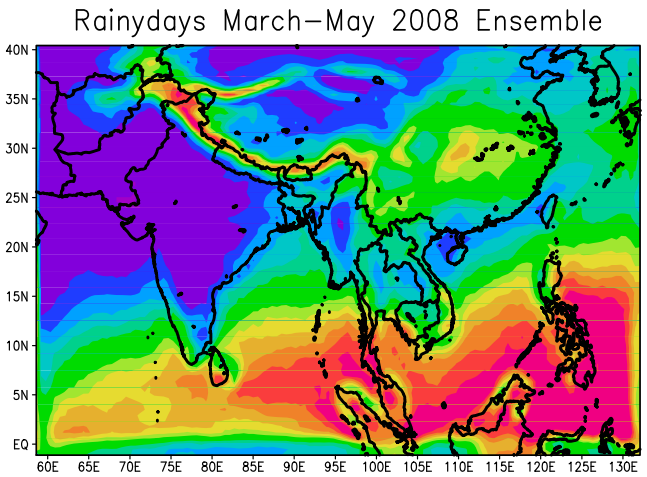
Rainy Day if

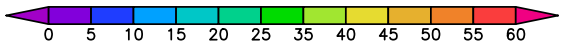
Precip > 2.5mm/day

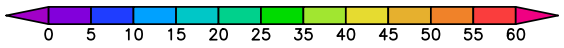




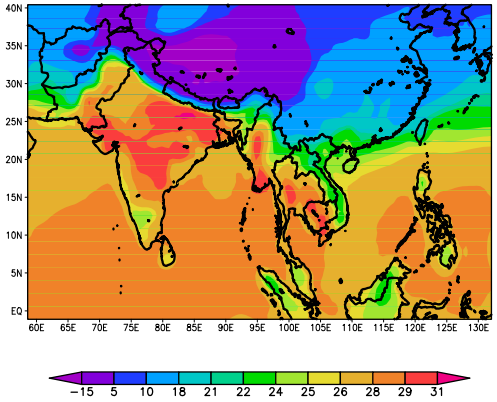




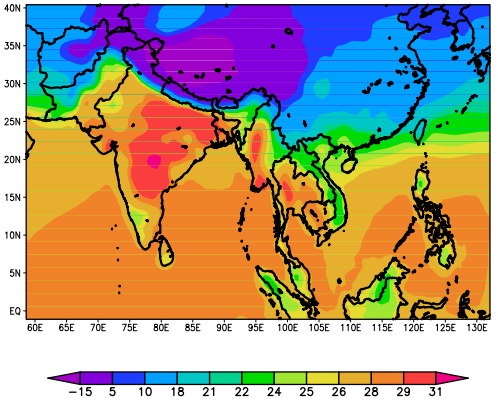




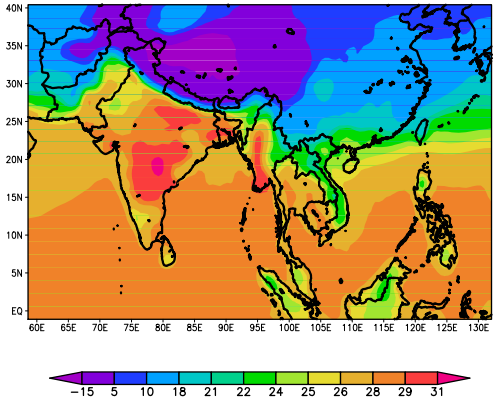
Temperature(Deg C) March–May 2008 L01



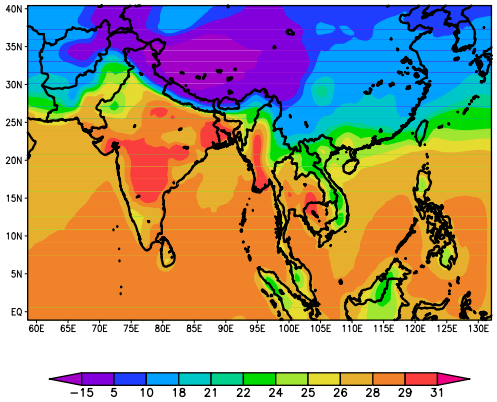
Temperature March–May 2008 V01



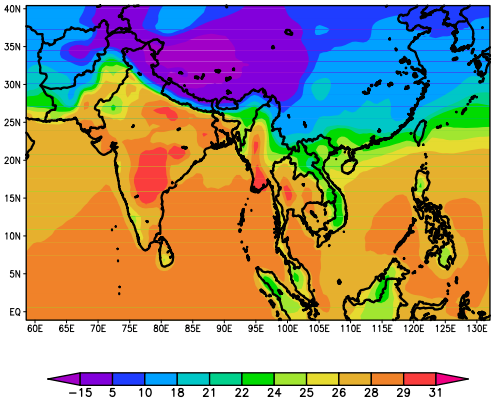
Temperature(Deg C) 2008 March–May N01



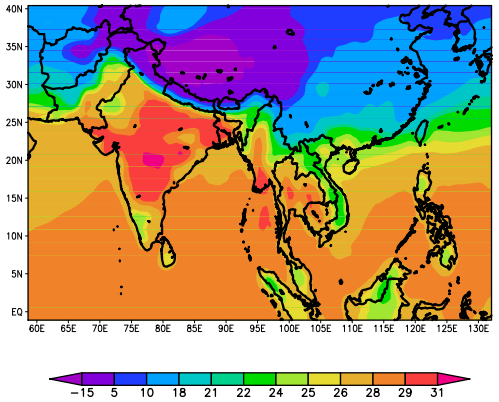
Temperature March–May 2008 L02



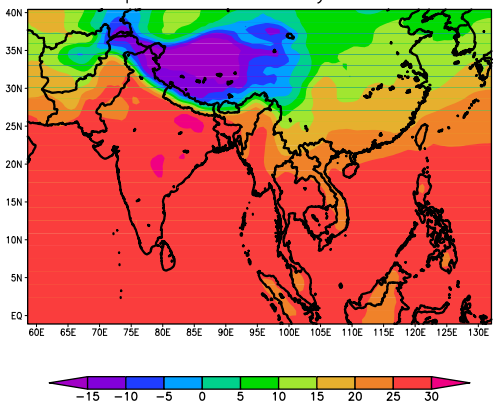
Temperature March–May 2008 V02



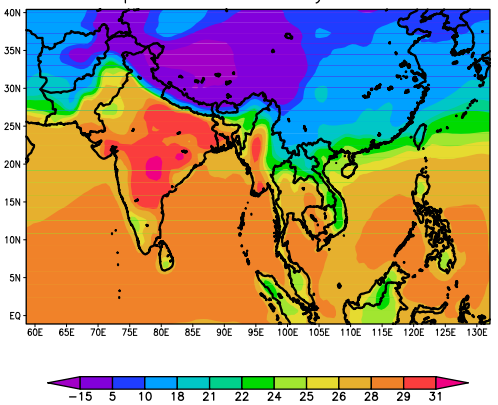
Temperature 2008 March–May N02



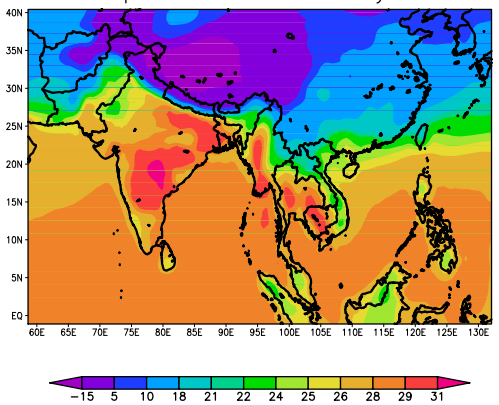
Temperature March–May 2008 L03



Temperature March–May 2008 V03



Temperature 2008 March–May N03



Conclusions

- **The Regional Spectral Model RSM is capturing the large scale precipitation and temperature patterns but there is further need to investigate the model performance with reanalysis data over Asia region.**
- **Different ensemble members are giving fairly large spread both in case of precipitation and temperature and hence capturing the associated uncertainties**
- **There is a need to do hind cast experiments to see the predictability over Asia.**