The Forecast Diagnostic of the CWB Seasonal Forecast System

Climate Forecast System Development Team

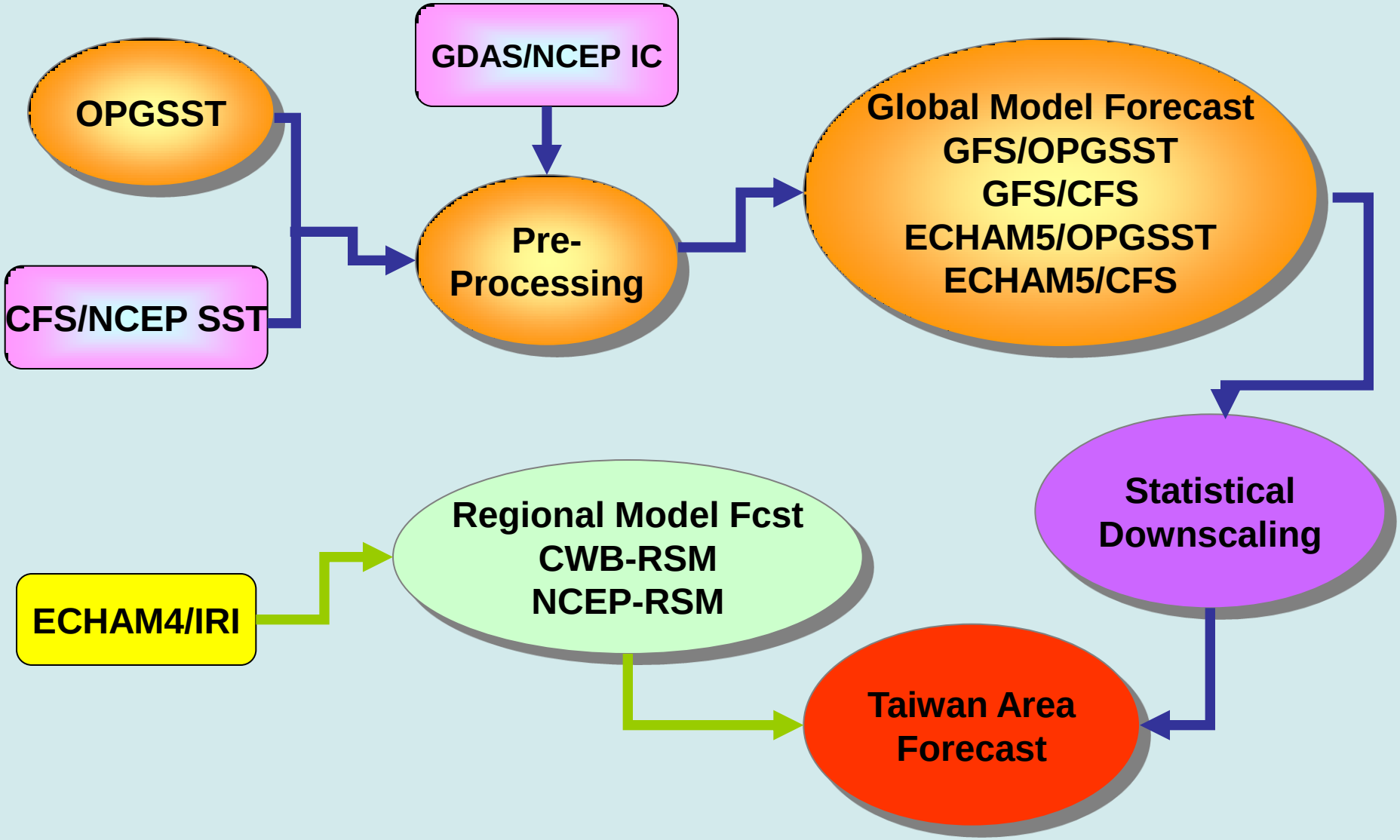
Research and Development Center

Central Weather Bureau

Presented by

Jyh-Wen Hwu

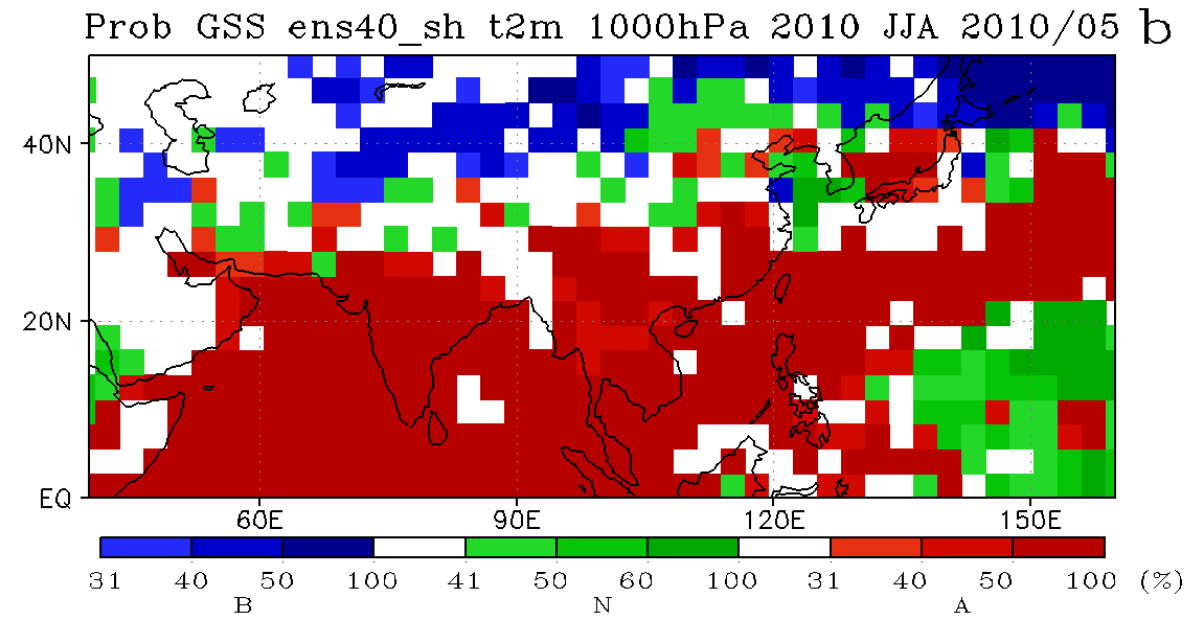
Seasonal Forecast System

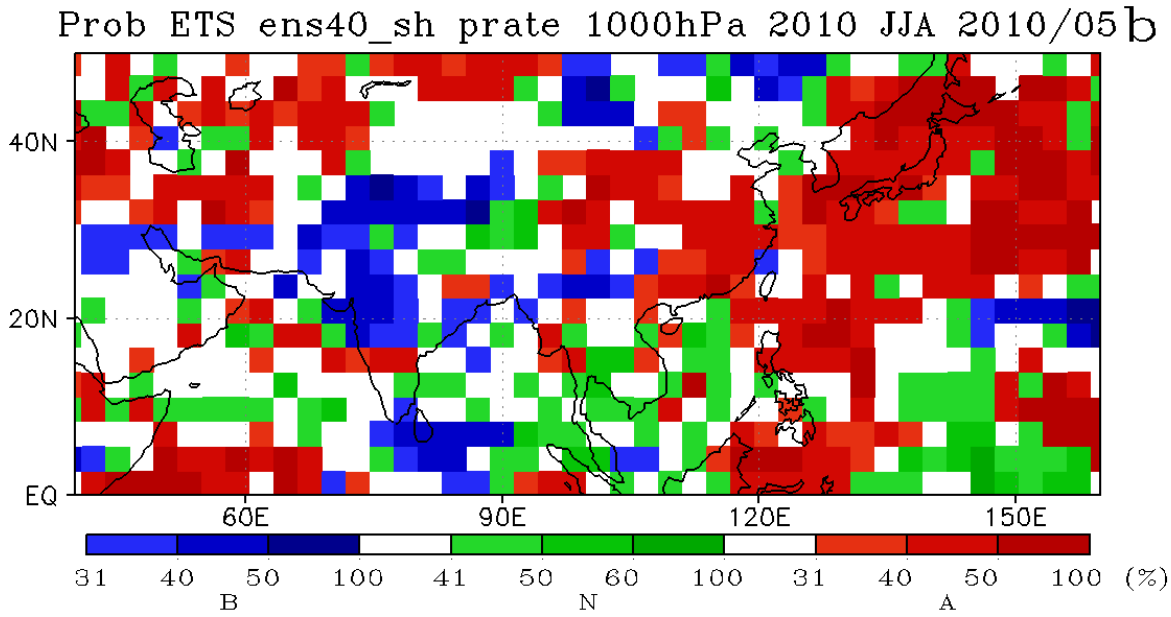


Seasonal Forecast System

- Experimental forecast from January 2006 to December 2009
- Operation in January 2010
- 40 members ensemble global forecast
- Statistical downscaling to Taiwan stations
- Dynamical downscaling to Taiwan area

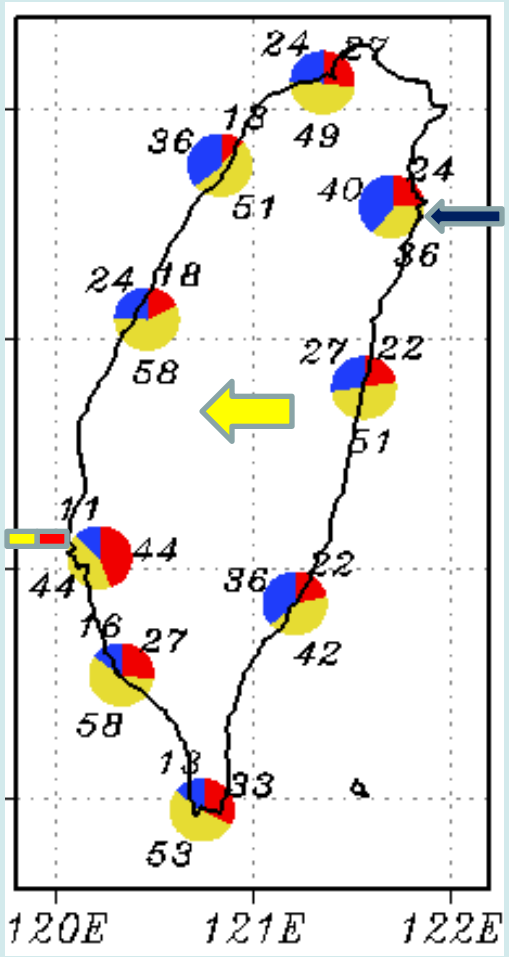
Forecast Products



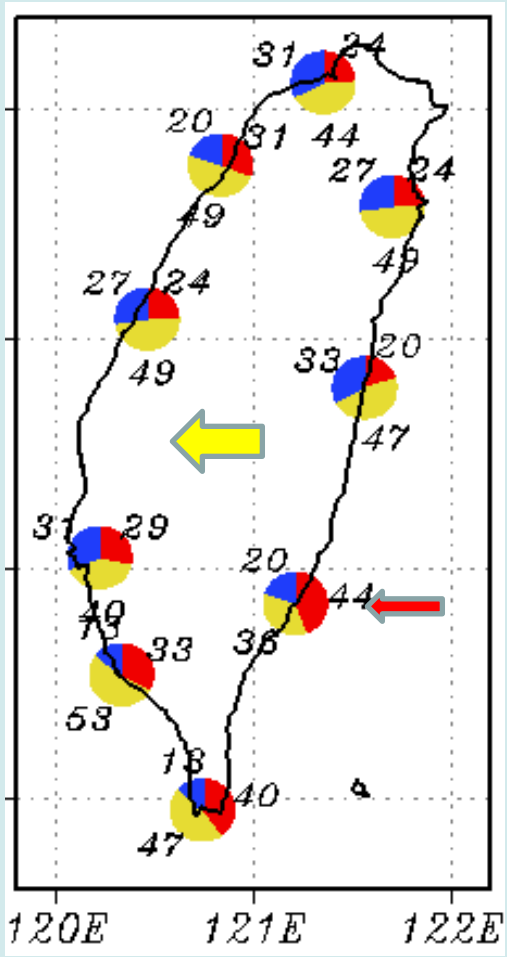


Statistical Downscaling

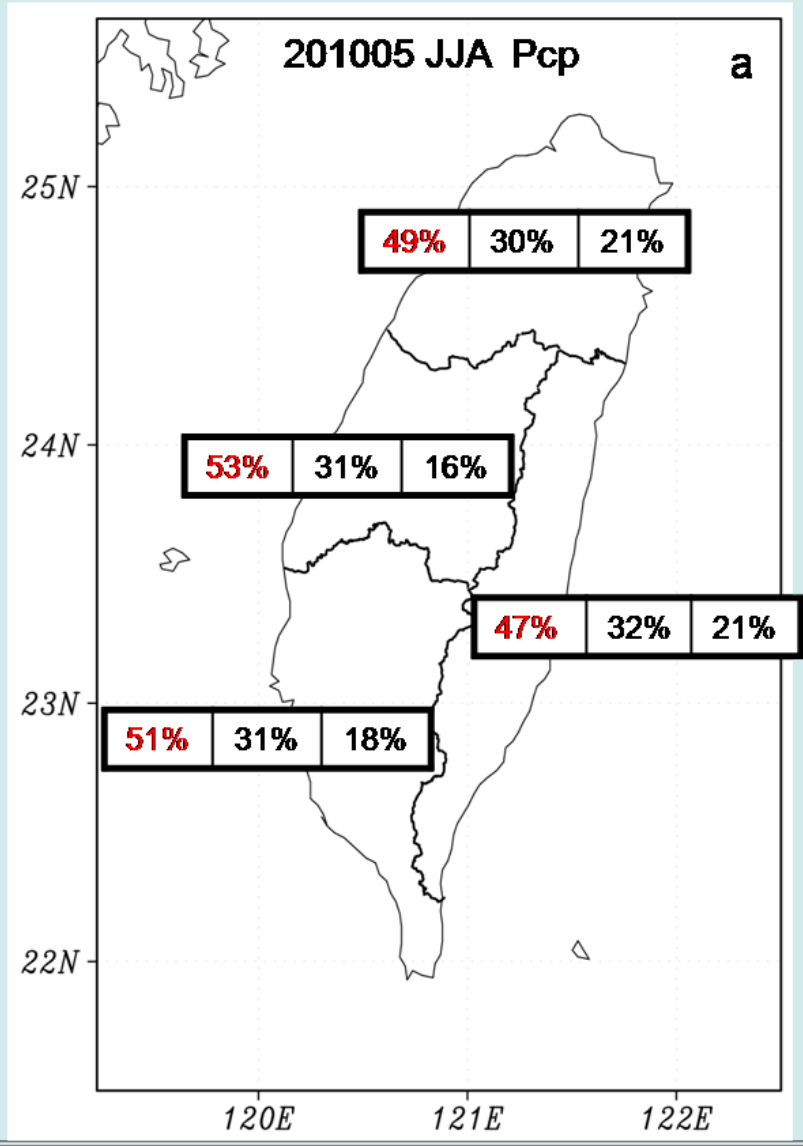
2010JJA Prec

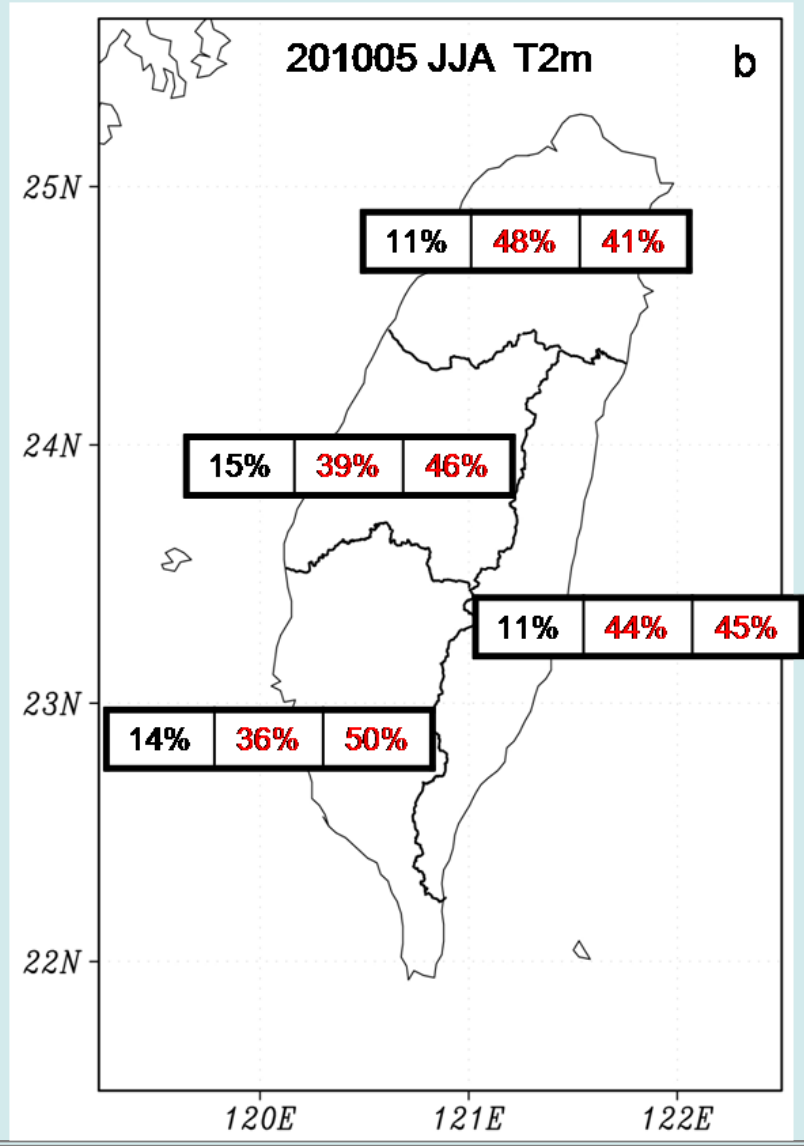


2010JJA T

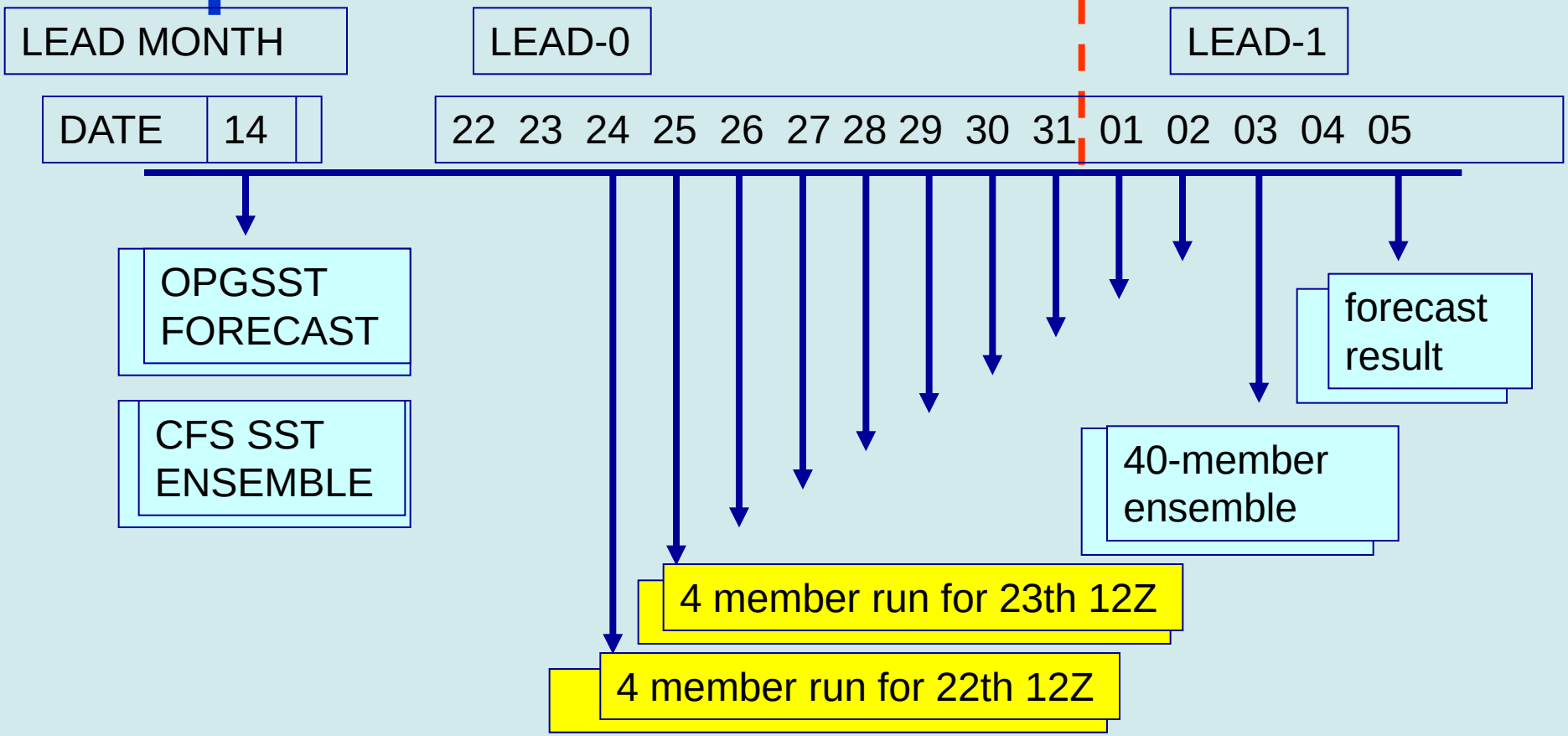


Dynamical Downscaling

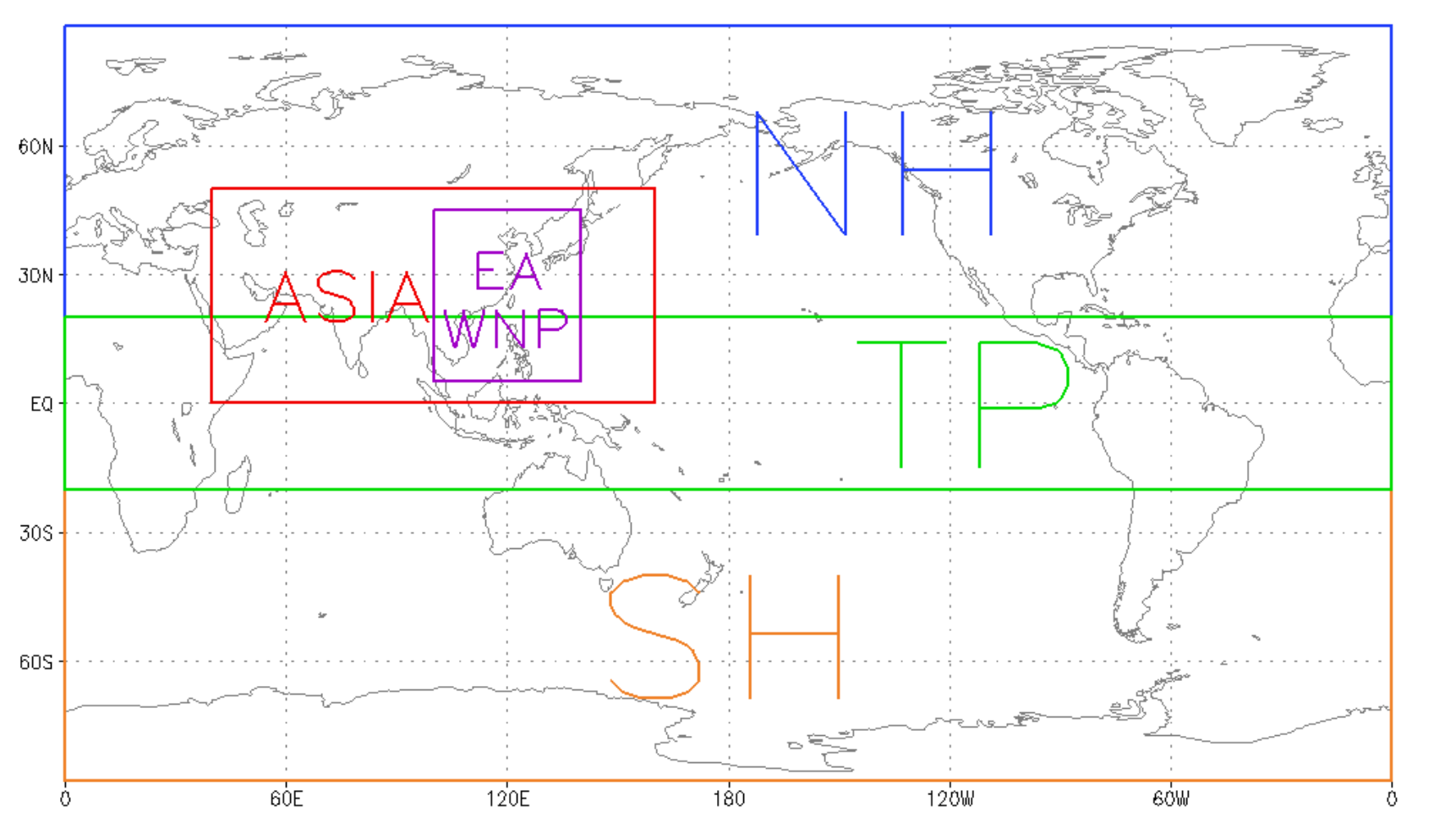




Operational Forecast Schedule



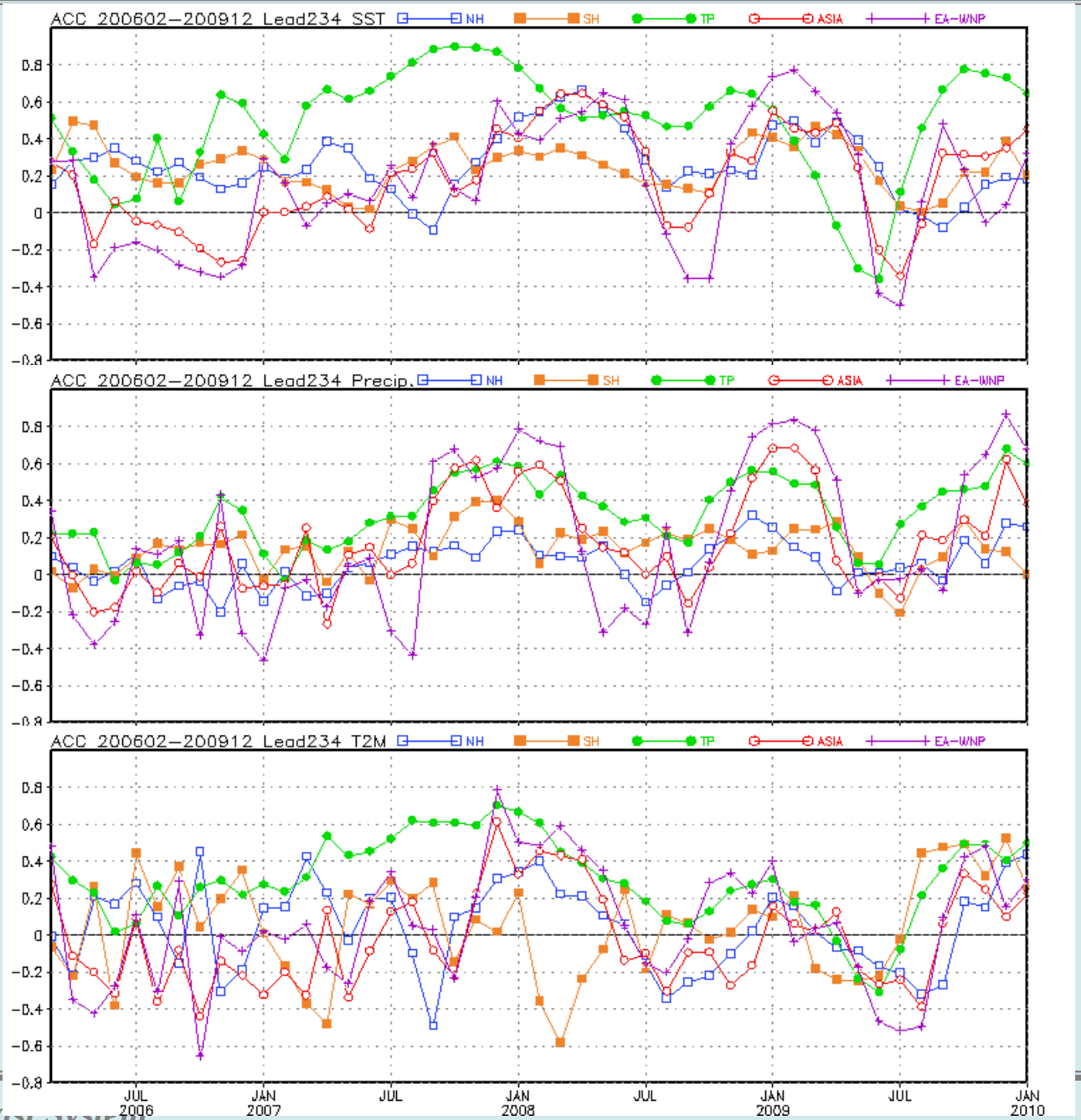
- IC: last 10 days of lead0 from NCEP/GDAS.
- 4 members run in all IC+2 days (GFS/OPGSST, GFS/CFS, ECHAM/OPGSST, ECHAM/CFS) with 7 months forecasting.
- Each member need about 40 minutes for model running and another 30 minutes for post process.

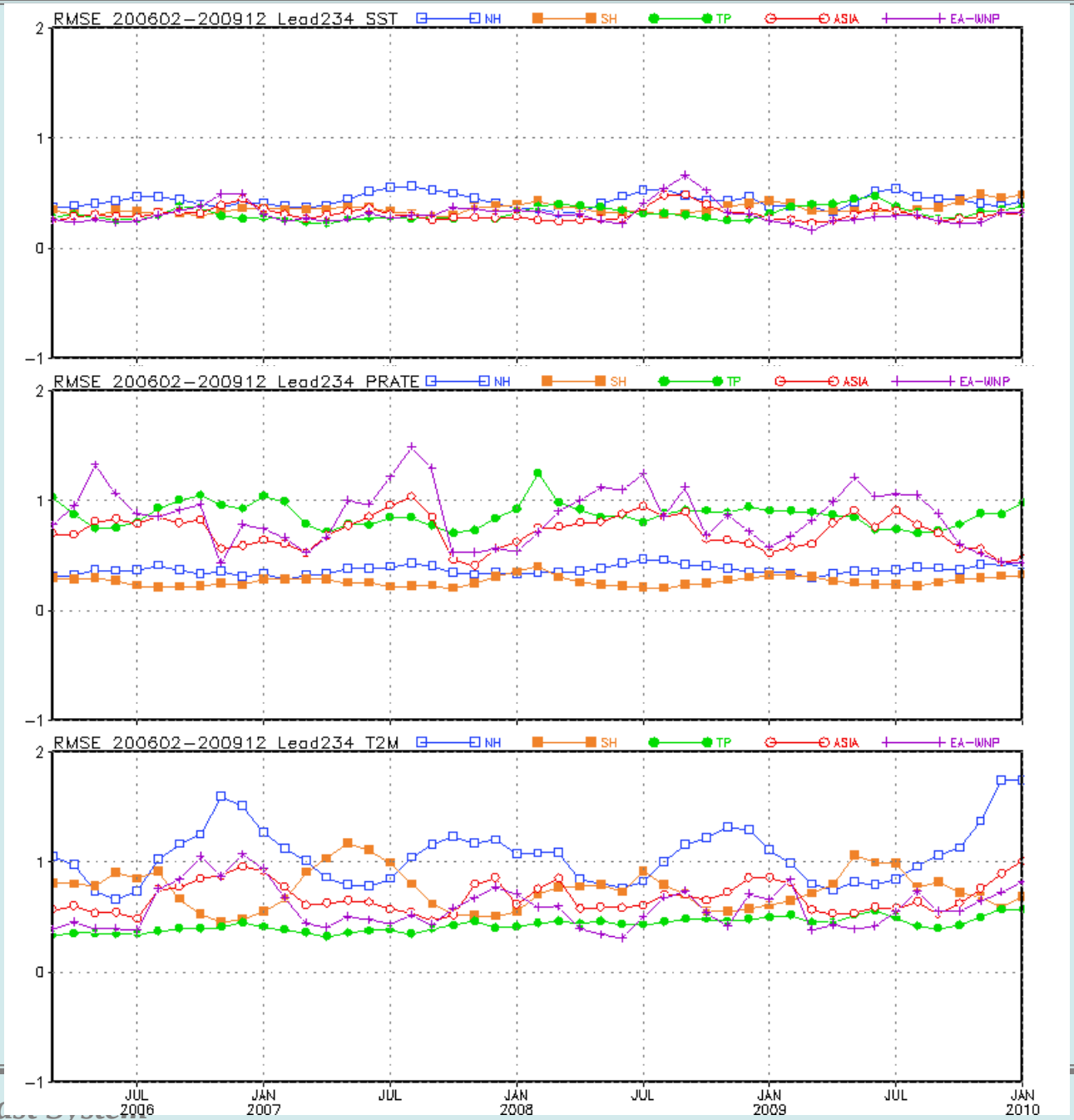


TP (20ºS-20ºN, 0º-360ºE); SH (90ºS-20ºS, 0º-360ºE)

NH (20ºN-90ºN, 0º-360ºE)

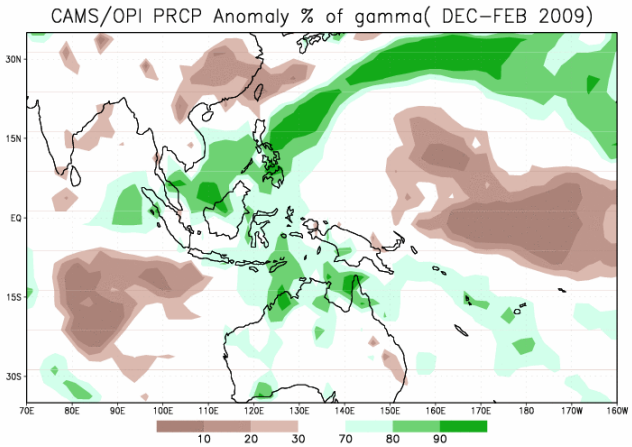
ASIA (0º-50ºN, 40ºE-160ºE) ;EA-WNP (5ºN-45ºN, 100ºE-140ºE)

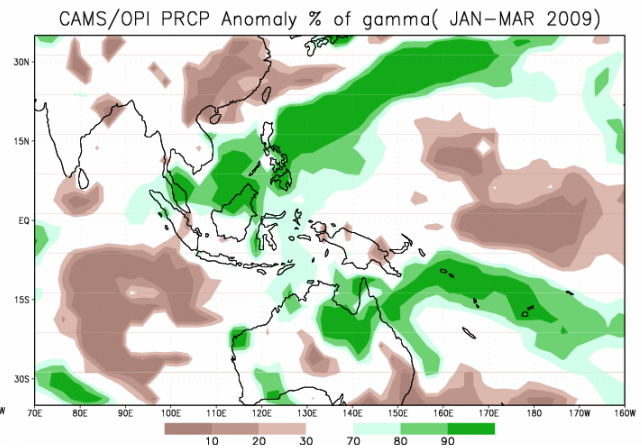

ACC 200602–200912 Lead234 SST
NH
SH
TP
ASIA
EA-WNP
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
ACC 200602–200912 Lead234 Precip.
NH
SH
TP
ASIA
EA-WNP
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
ACC 200602–200912 Lead234 T2M
NH
SH
TP
ASIA
EA-WNP
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
JUL 2006
JAN 2007
JUL
JAN 2008
JUL
JAN 2009
JUL
JAN 2010

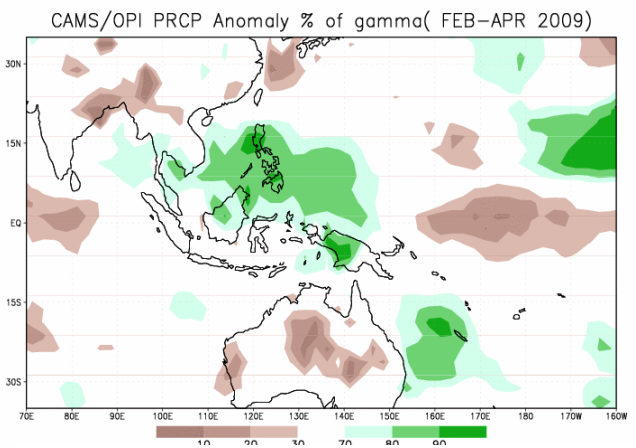

RMSE 200602-200912 Lead234 SST
NH
SH
TP
ASIA
EA-WNP
2
1
0
-1
RMSE 200602-200912 Lead234 PRATE
NH
SH
TP
ASIA
EA-WNP
2
1
0
-1
RMSE 200602-200912 Lead234 T2M
NH
SH
TP
ASIA
EA-WNP
2
1
0
-1
JUL 2006
JAN 2007
JUL
JAN 2008
JUL
JAN 2009
JUL
JAN 2010

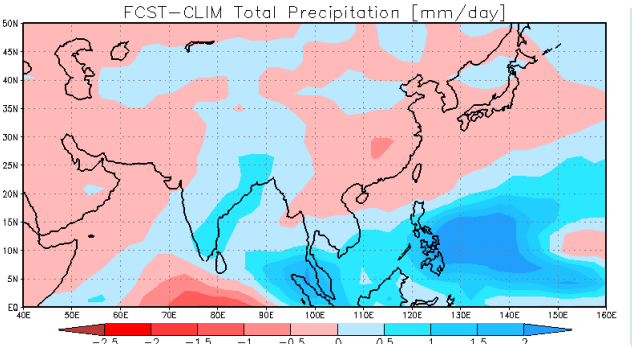
Verification (Prec.)

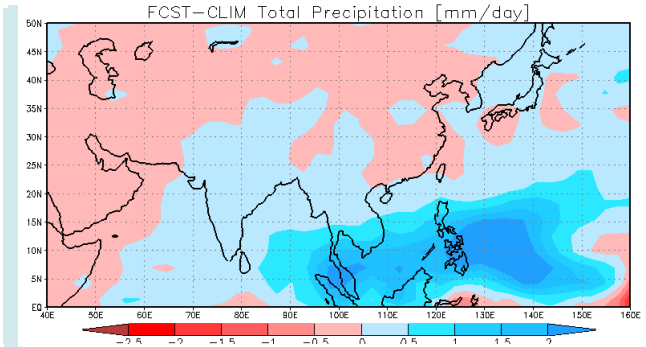
OBS

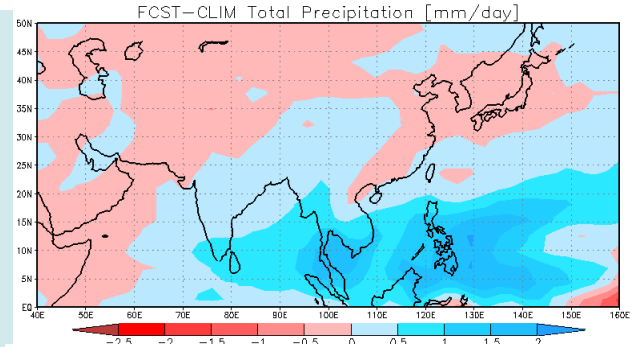


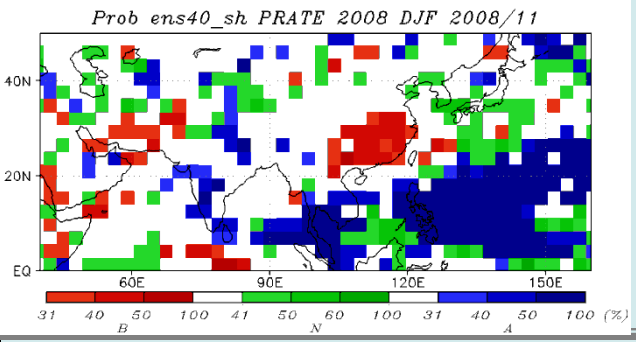


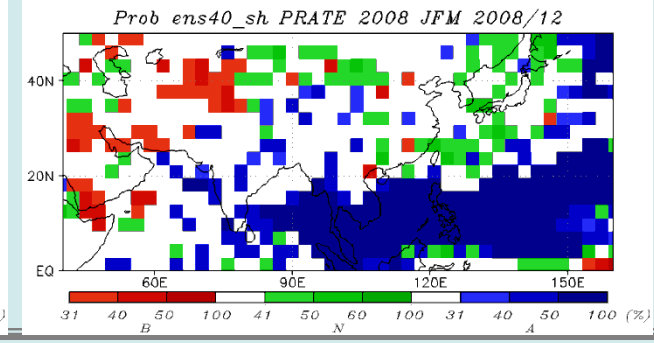


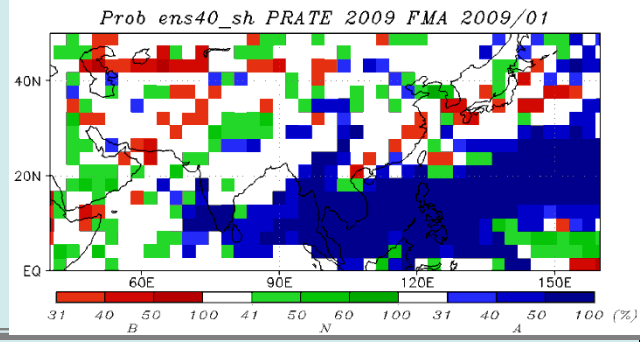




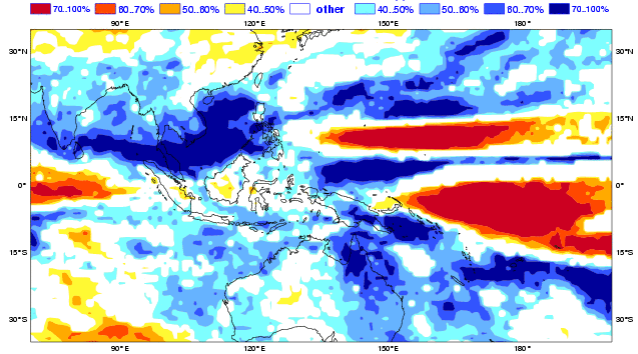






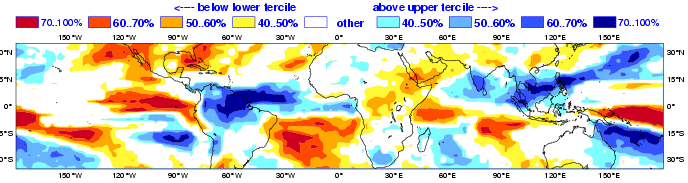


ECMWF Seasonal Forecast
Prob(most likely category of precipitation)
Forecast start reference is 01/11/08
Ensemble size = 41, climate size = 275
System 3
DJF 2008/09
No significance test applied



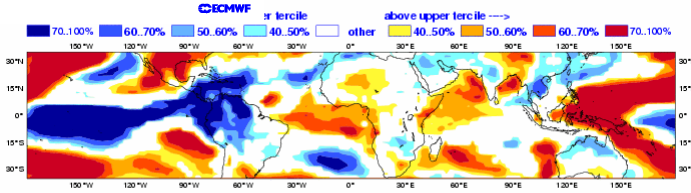
Forecast issue date: 15/11/2008

EUROSIP multi-model seasonal forecast
Prob(most likely category of precipitation)
Forecast start reference is 01/12/08
Unweighted mean
ECMWF/Met Office/Météo-France
JFM 2009
No significance test applied



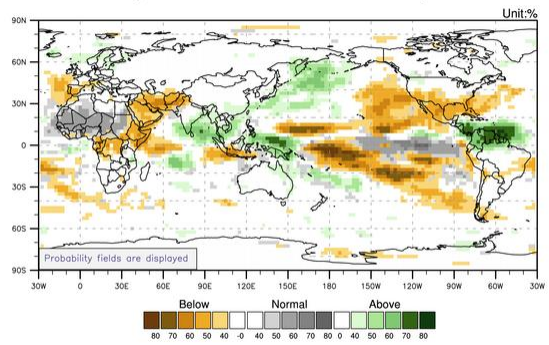
Forecast issue date: 15/12/2008

forecast
temperature)
ECMWF/Met Office/Météo-France
FMA 2009
No significance test applied

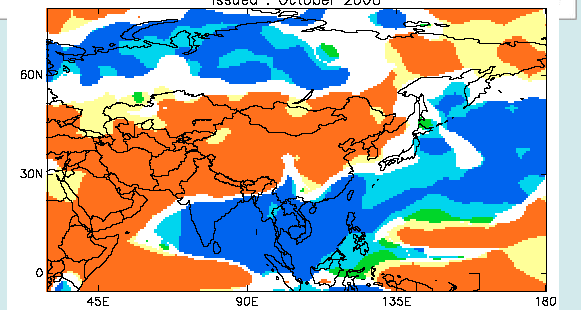


Forecast issue date: 15/01/2009

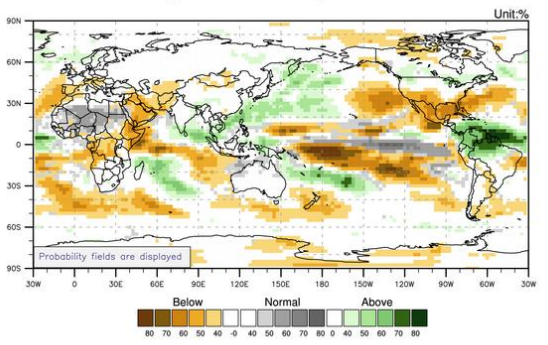
Precipitation for December 2008-February 2009



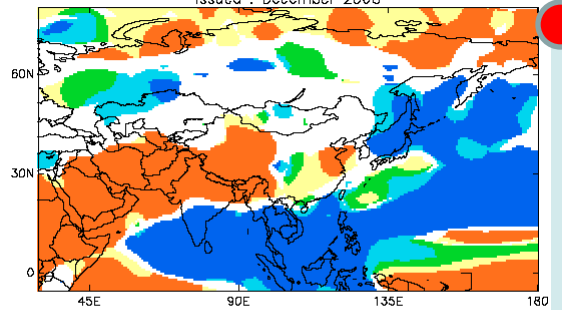
Met Office : More likely precipitation tercile categories Dec/Jan/Feb
Issued : October 2008



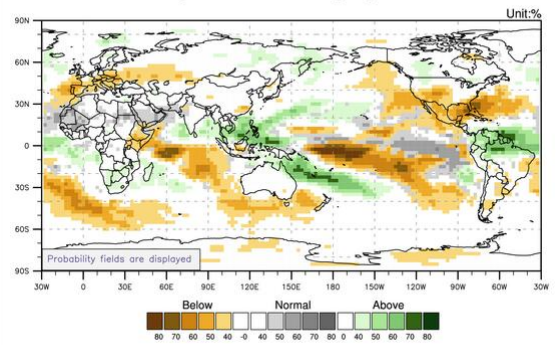
Precipitation for January-March 2009



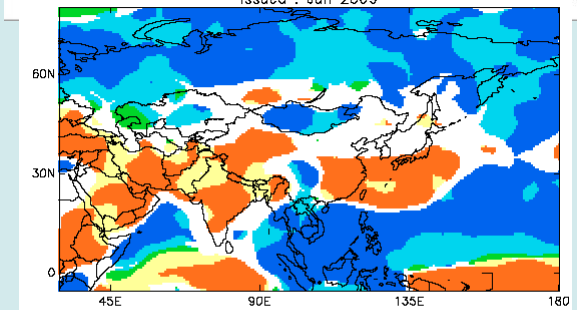
Met Office : More likely precipitation tercile categories Jan/Feb/Mar
Issued : December 2008



Precipitation for February-April 2009

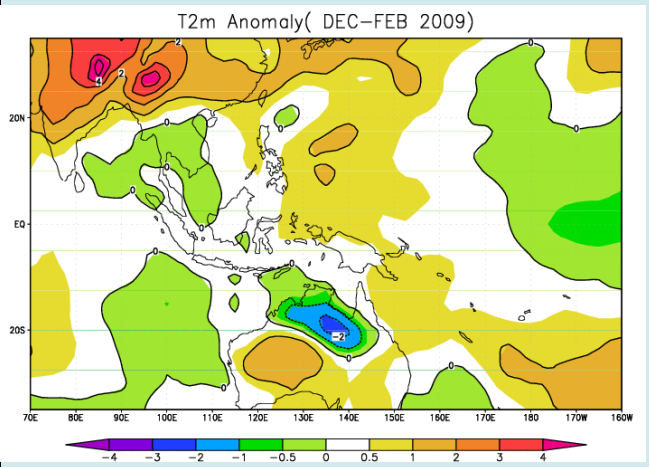


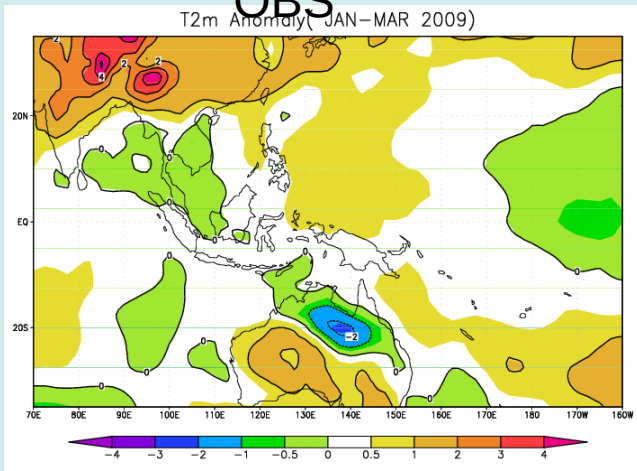
Met Office : More likely precipitation tercile categories Feb/Mar/Apr
Issued : Jan 2009

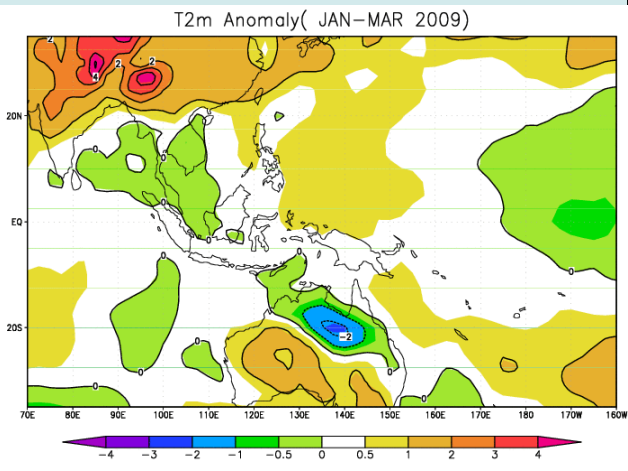


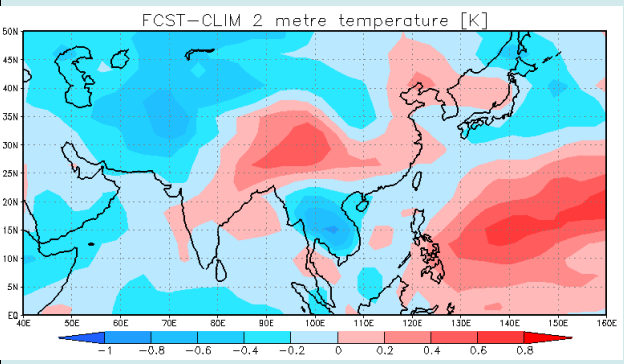
Verification (T2M)

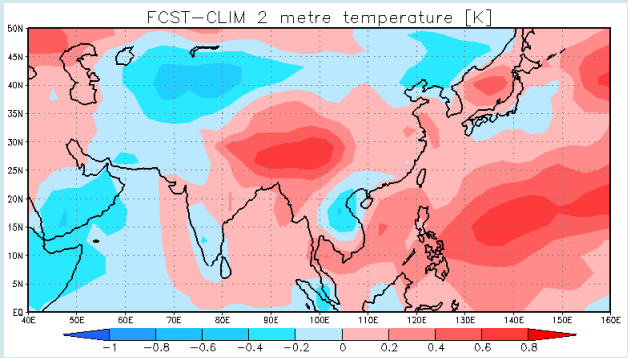
OBS

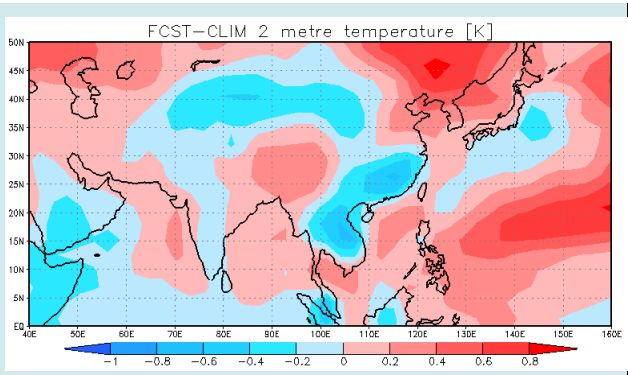


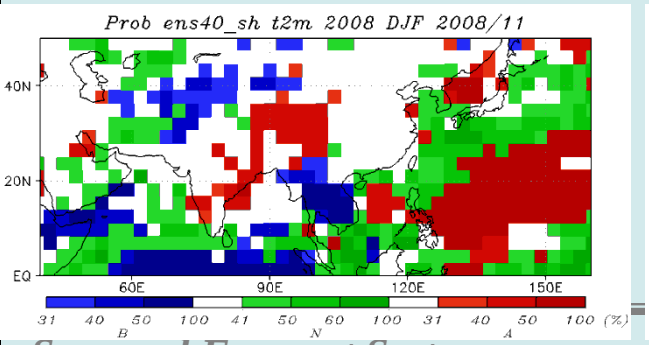


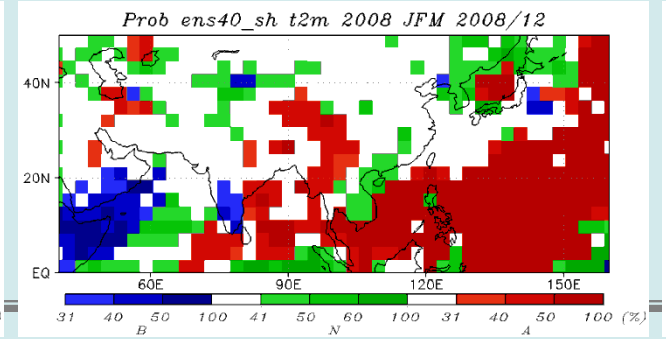


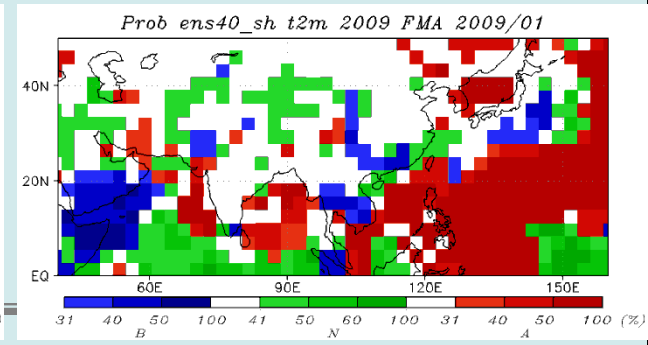




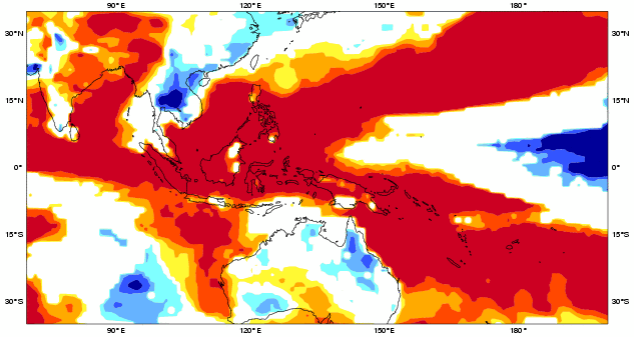




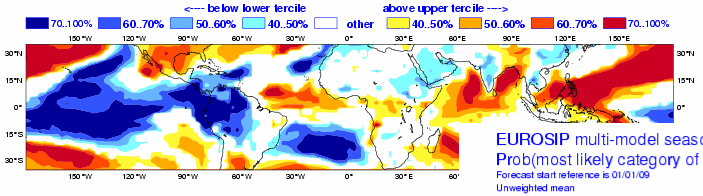




ECMWF Seasonal Forecast
Prob(most likely category of 2m temperature)
Forecast start reference is 01/11/08
Ensemble size = 41, climate size = 275
System 3
DJF 2008/09
No significance test applied

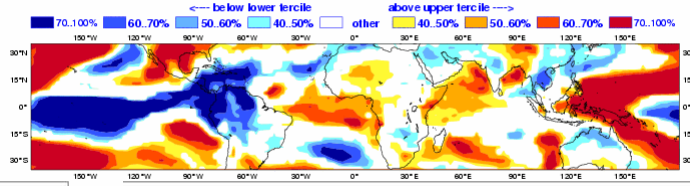


EUROSIP multi-model seasonal forecast
Prob(most likely category of 2m temperature)
Forecast start reference is 01/12/08
Unweighted mean
ECMWF/Met Office/Météo-France
JFM 2009
No significance test applied



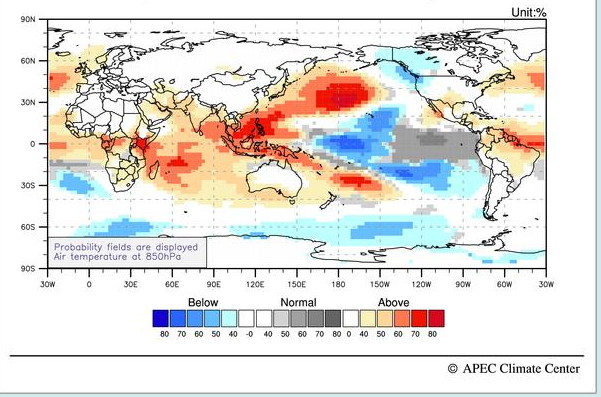
Forecast issue date: 15/12/2008

EUROSIP multi-model seasonal forecast
Prob(most likely category of 2m temperature)
Forecast start reference is 01/01/09
Unweighted mean
ECMWF/Met Office/Météo-France
FMA 2009
No significance test applied



Forecast issue date: 15

Temperature for December 2008-February 2009



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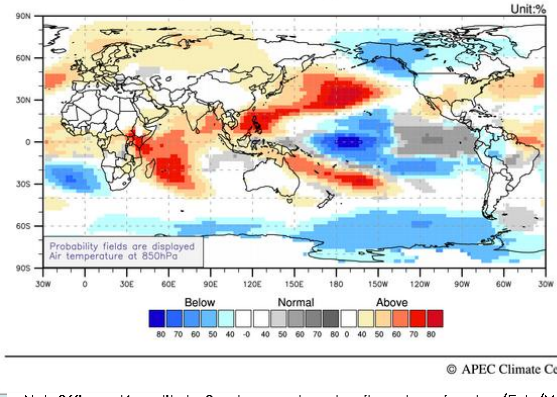
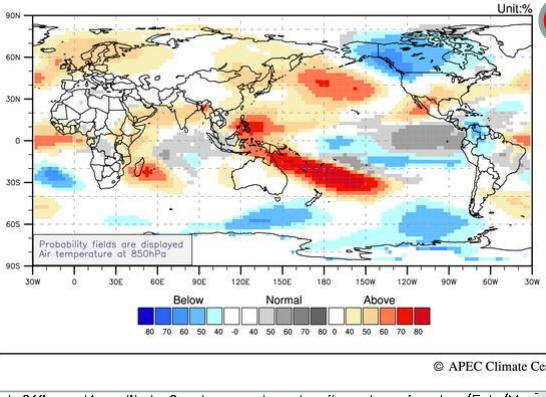
Temperature for January-March 2009



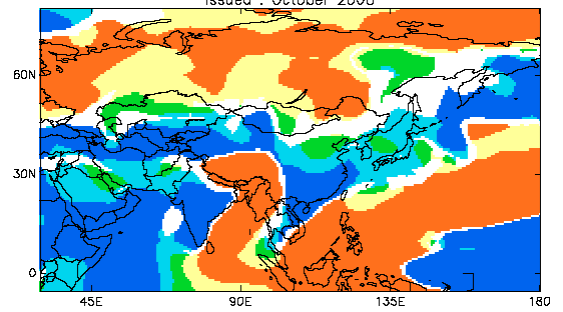
© APEC Climate Center

Temperature for February-April 2009

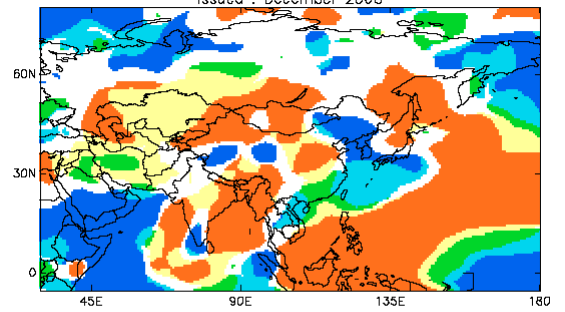


© APEC Climate Center

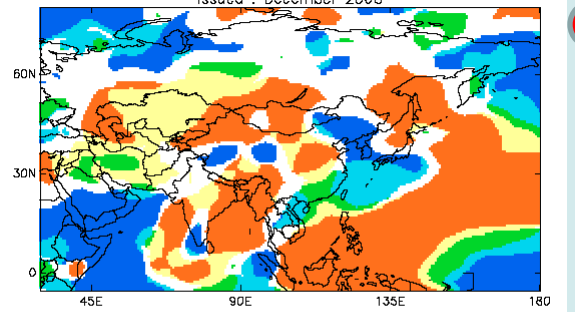
Met Office : More likely 2m temperature tercile categories Dec/Jan/Feb
Issued : October 2008



Met Office : More likely 2m temperature tercile categories Jan/Feb/Mar
Issued : December 2008



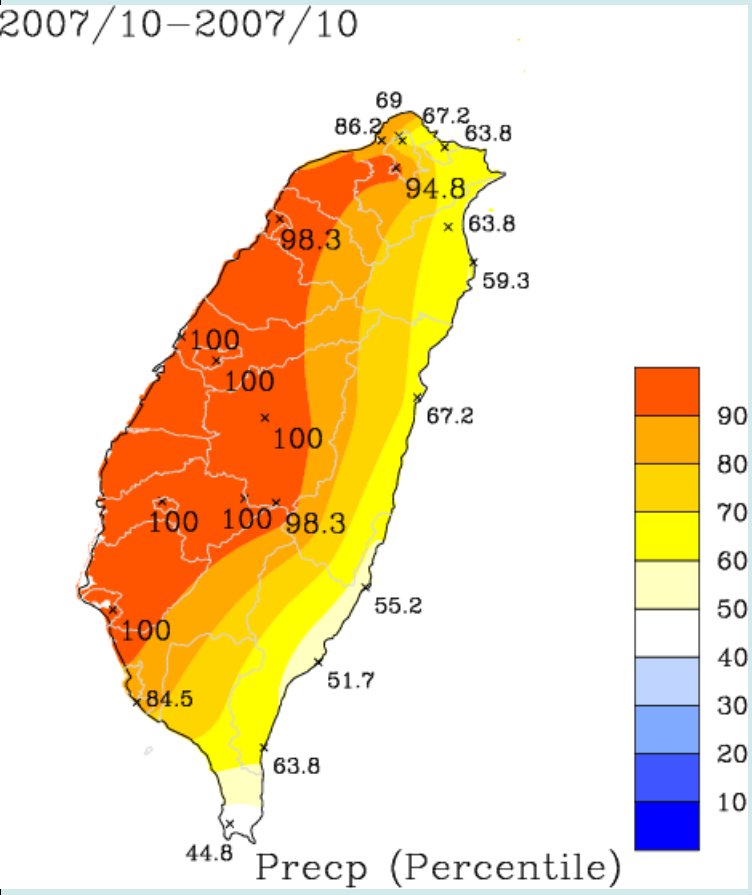
Met Office : More likely 2m temperature tercile categories Jan/Feb/Mar
Issued : December 2008



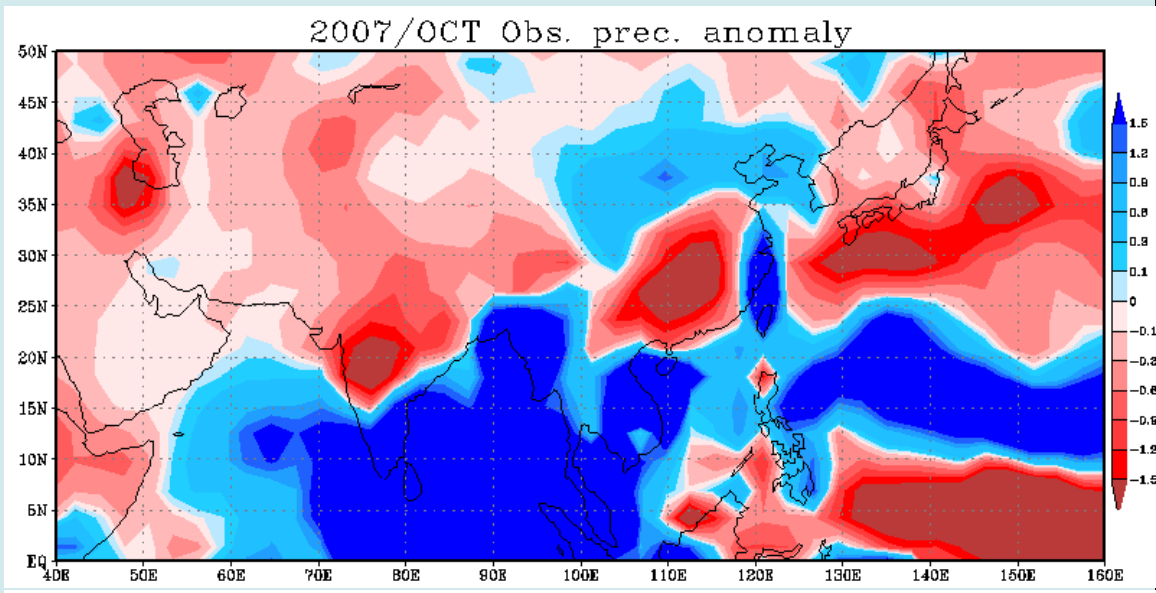
Extreme Events over Taiwan

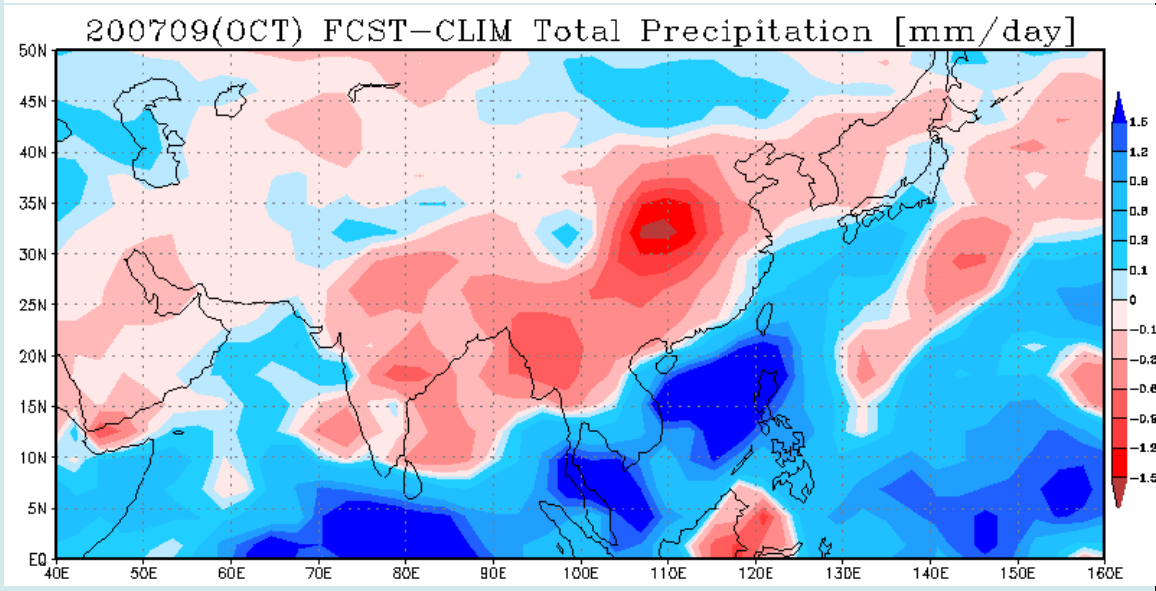
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2006						M 1-12						
2007		CO 1-4				M 5-8	HW 21-27	SW 10-14 **T** 17-24		**T** **6-8**		
2008		CO 9-15							**T** **16-18**			
2009								**T** **7-9**				

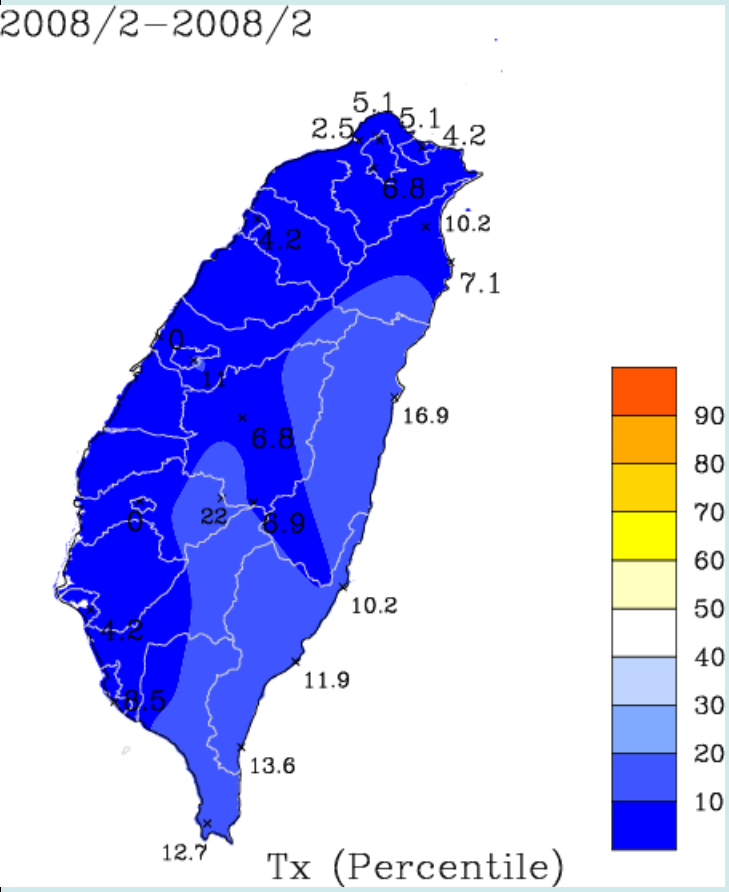
M: Meiyu
SW: southwesterly
T: typhoon
HW: heat wave
CO: cold outbreak


2007/10–2007/10
69
86.2
67.2
63.8
94.8
63.8
98.3
59.3
100
100
100
67.2
100
100
98.3
55.2
100
51.7
84.5
63.8
44.8
90
80
70
60
50
40
30
20
10
Precp (Percentile)

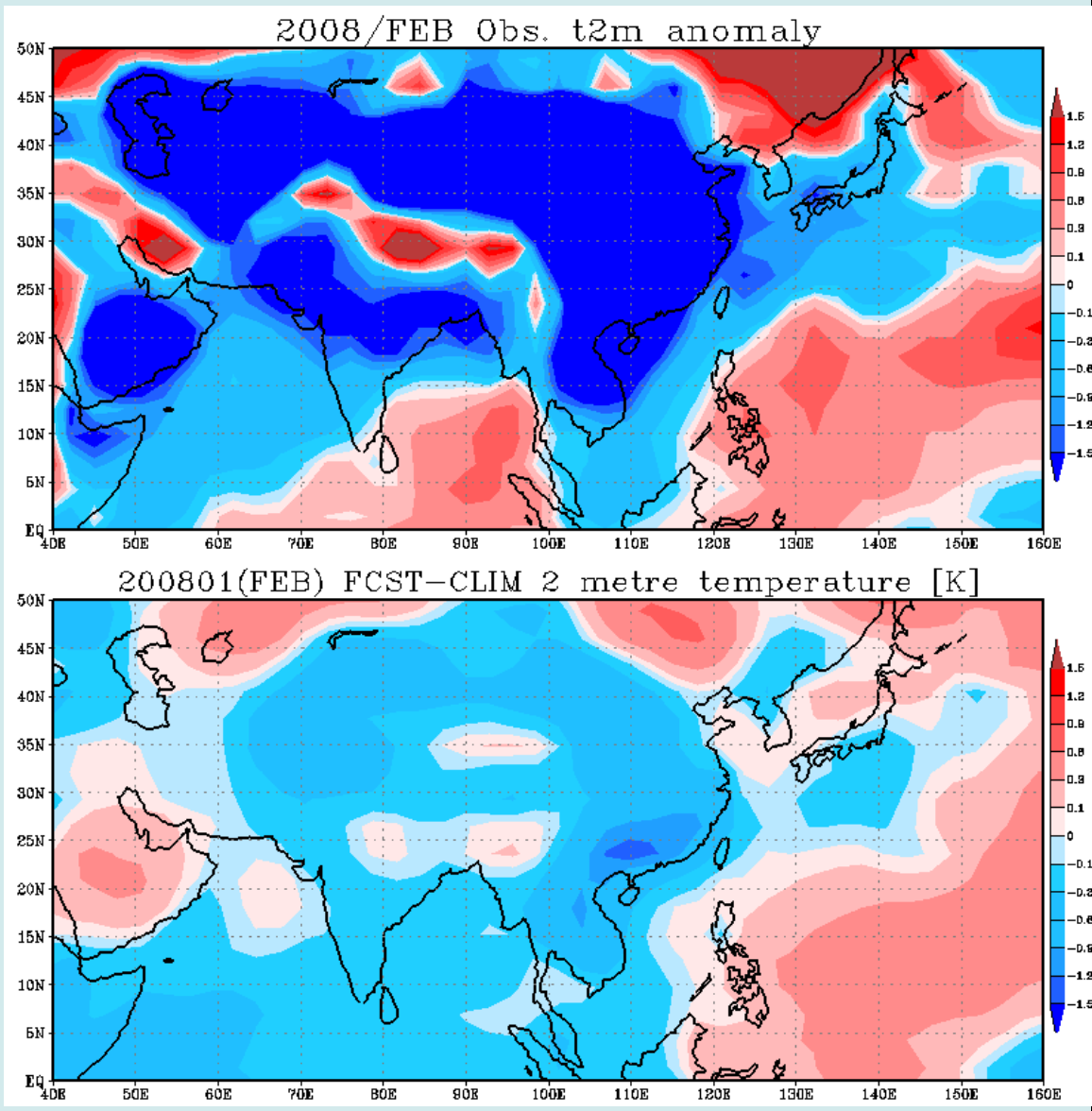
Typhoon (6-8)

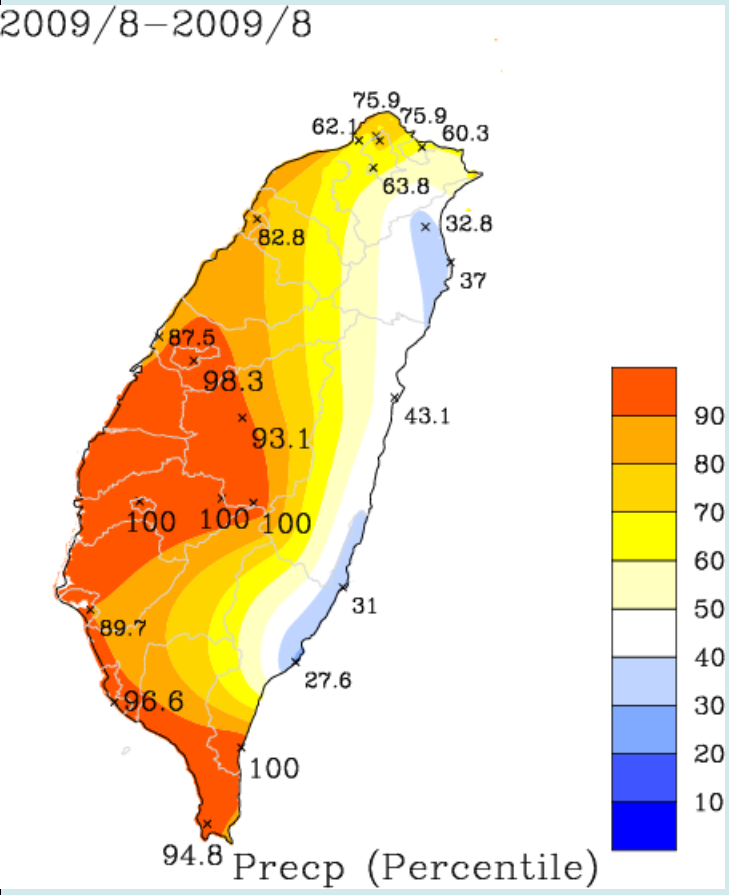

2007/OCT Obs. prec. anomaly
50N
45N
40N
35N
30N
25N
20N
15N
10N
5N
EQ
40E
50E
60E
70E
80E
90E
100E
110E
120E
130E
140E
150E
160E


200709(OCT) FCST–CLIM Total Precipitation [mm/day]
50N
45N
40N
35N
30N
25N
20N
15N
10N
5N
EQ
40E
50E
60E
70E
80E
90E
100E
110E
120E
130E
140E
150E
160E

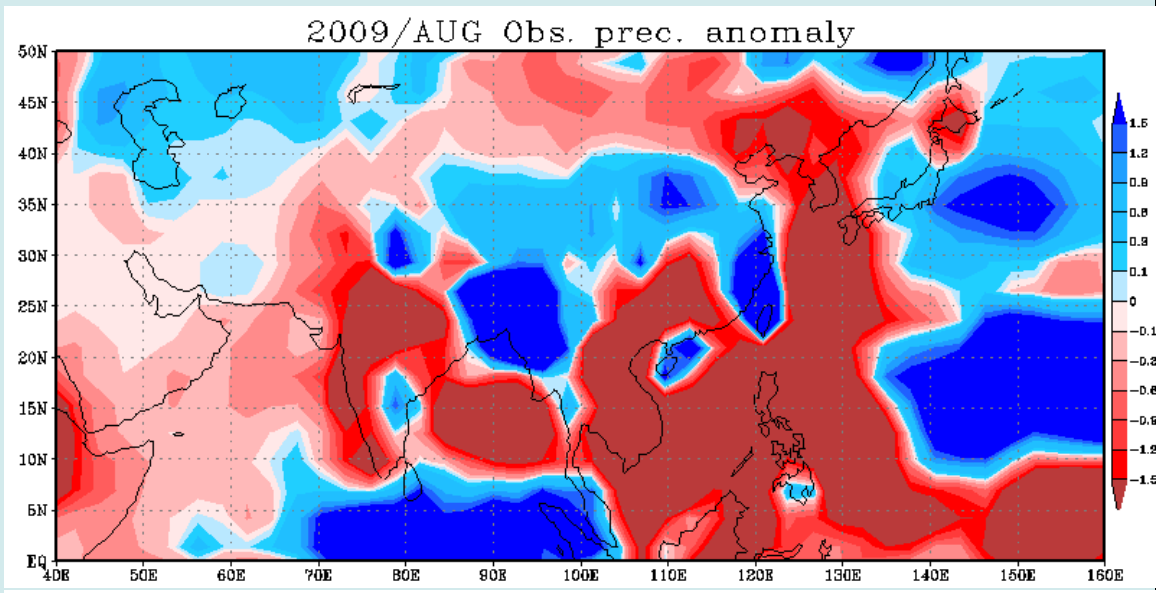


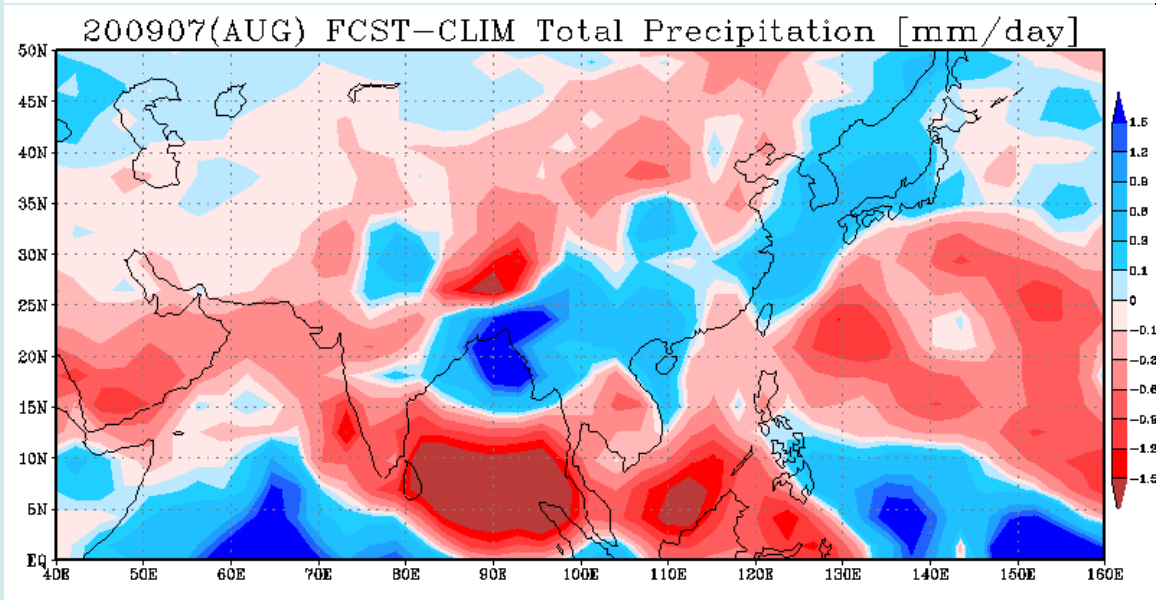
cold outbreak (9-15)



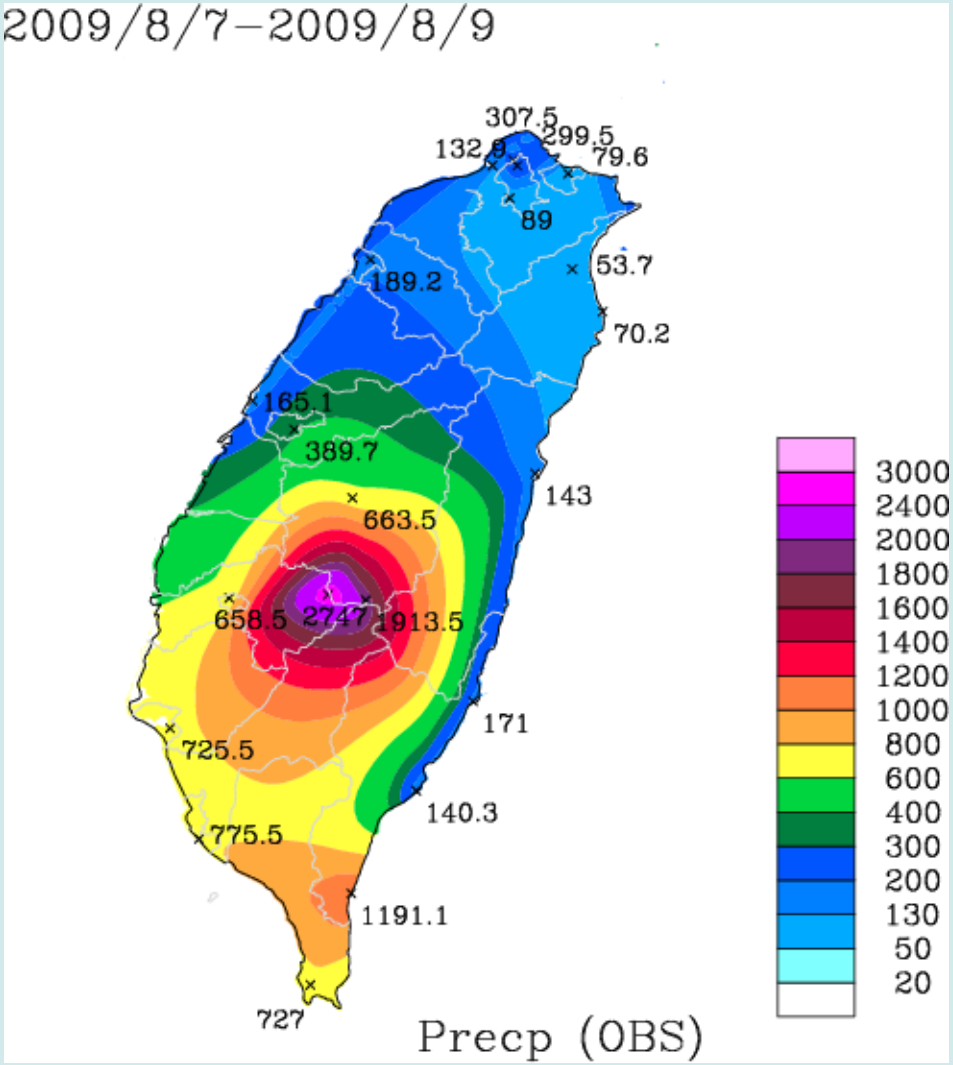

2009/8–2009/8
75.9
62.1
75.9
60.3
63.8
32.8
82.8
37
87.5
98.3
43.1
93.1
100
100
100
31
89.7
27.6
96.6
100
94.8
Precp (Percentile)
90
80
70
60
50
40
30
20
10

Typhoon (7-9)


2009/AUG Obs. prec. anomaly
50N
45N
40N
35N
30N
25N
20N
15N
10N
5N
EQ
40E
50E
60E
70E
80E
90E
100E
110E
120E
130E
140E
150E
160E


200907(AUG) FCST–CLIM Total Precipitation [mm/day]
50N
45N
40N
35N
30N
25N
20N
15N
10N
5N
EQ
40E
50E
60E
70E
80E
90E
100E
110E
120E
130E
140E
150E
160E

Morakot

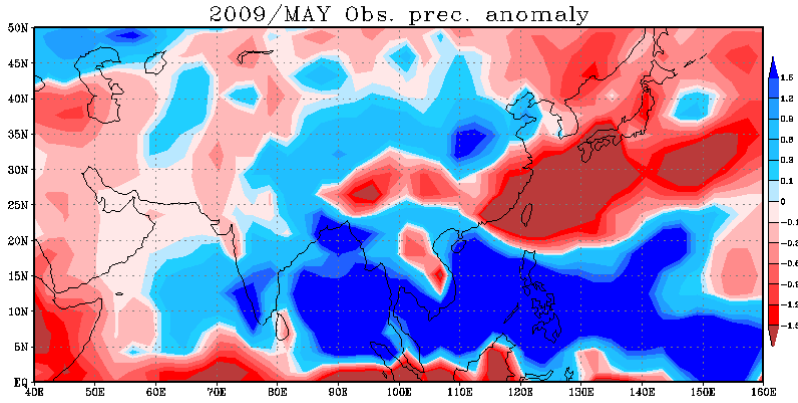


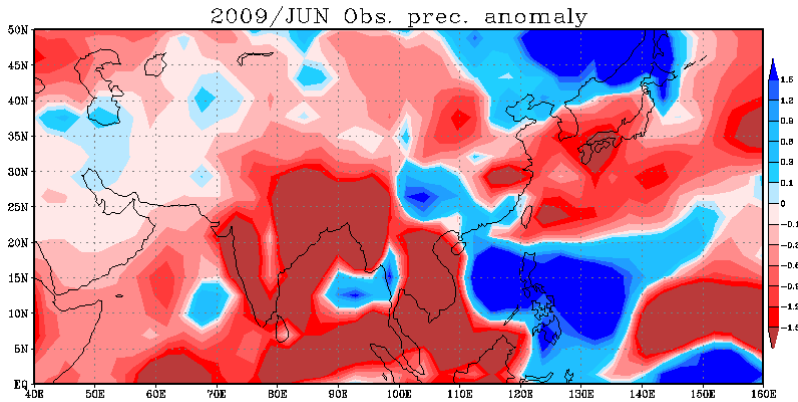
Human
D: 643
M: 60
I: 1555

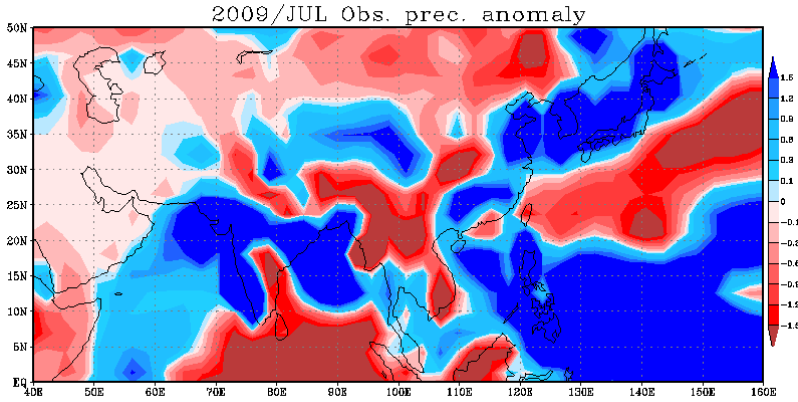
Agriculture & Fishery & Forest & Farm: 16,468,632,000 NT

Property
T: 722
H: 441

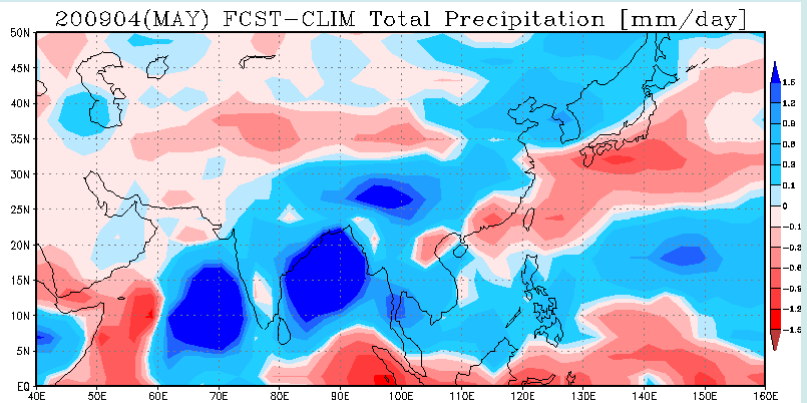
Observation

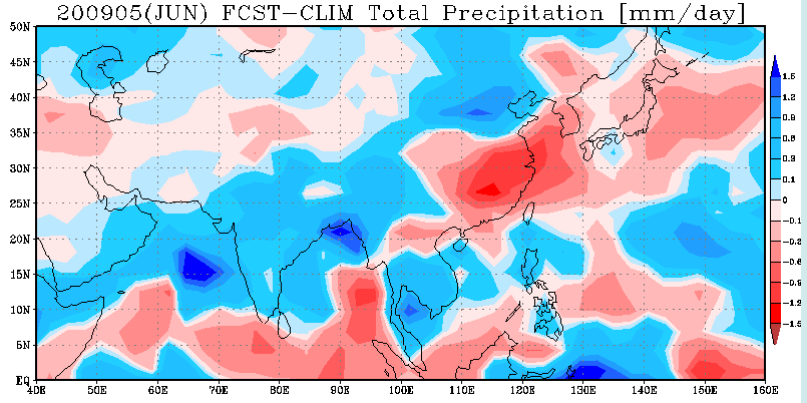


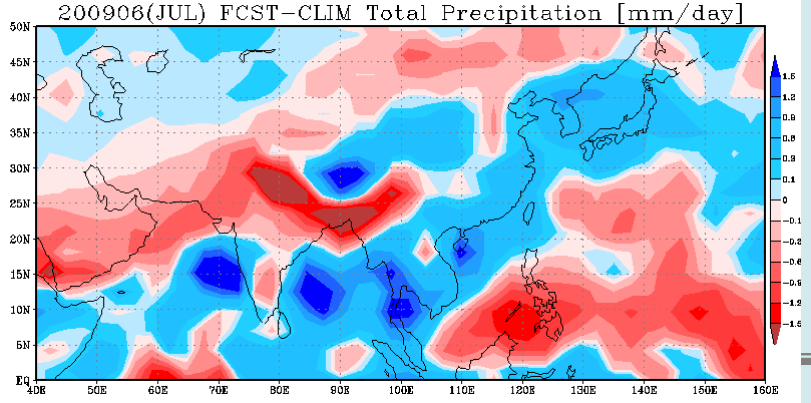




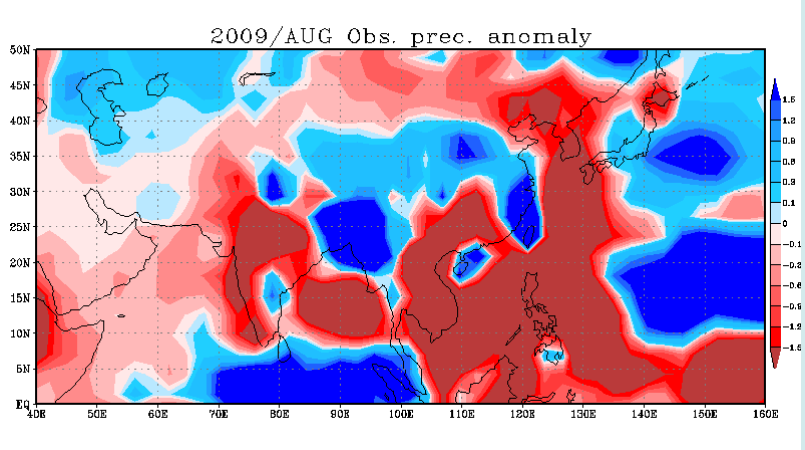
Forecast

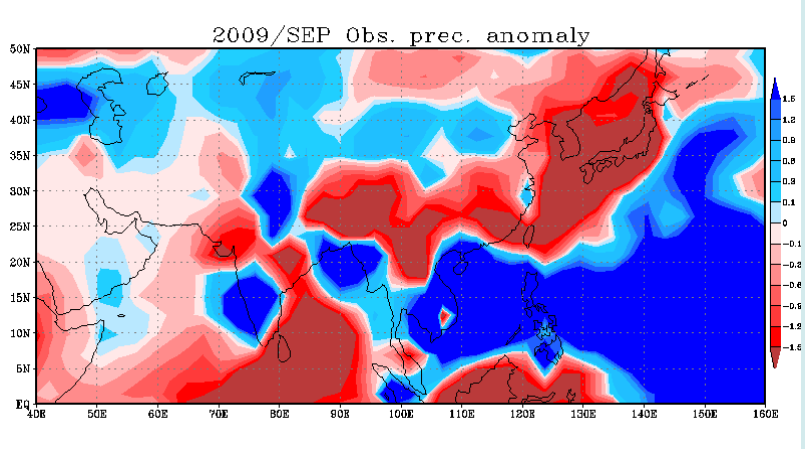




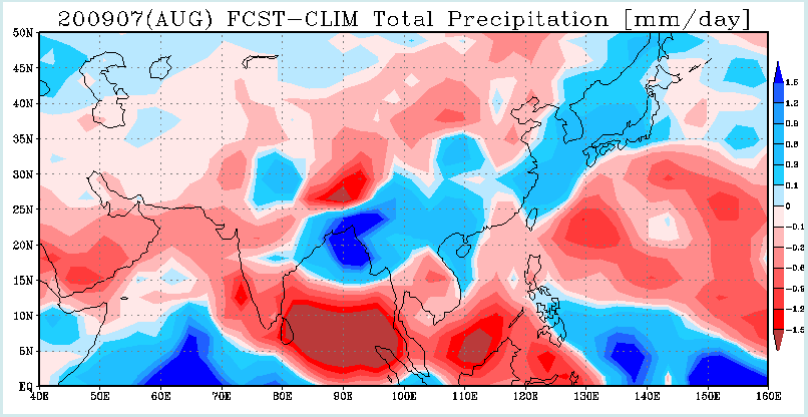


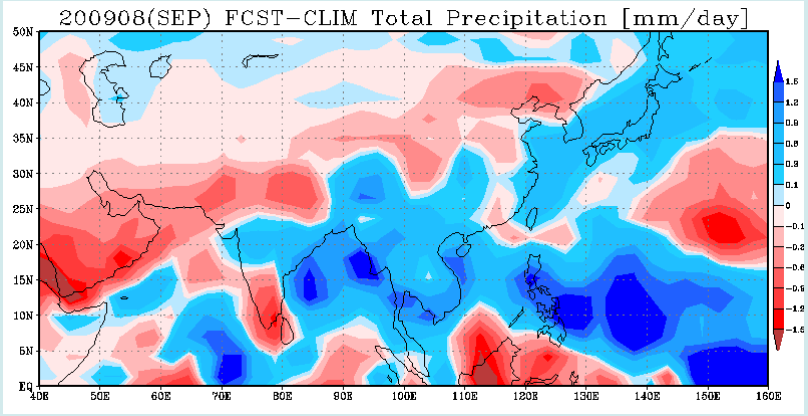
Observation





Forecast





Summary

- The first generation of Seasonal Forecast System of Central Weather Bureau is in operation.
- Seasonal Forecast System provides seasonal and monthly outlook to forecaster.
- Preliminary diagnostic shows that system has reasonable ability in seasonal forecast compared with major centers.
- The forecast skill is better from Winter to Spring.

THANK **YOU** !