MODEL OUTPUT STRATEGY FOR CEOP

Gopal Raman Iyengar

National Centre for Medium Range Weather Forecasting

NCMRWF Gridded output for CEOP

- **NCMRWF will provide the model output data for the EOP4 period 2003-2004 from the current operational version of the T80/L18 analysis-forecast system.**

- **Gridded data has been provided for the period Oct 2003-May 2004**

NCMRWF Gridded output for CEOP

- **The analysis fields provided will be valid for 00, 06, 12 and 18UTC. These fields will contain only the 3D atmospheric variables on 15 pressure levels and Surface Pressure.**
- **The forecast fields provided will also be valid for 00, 06, 12 and 18UTC. The forecast fields will have the 2D surface fields in addition to the 3D fields. The details of the forecast fields are given in the table.**

CEOP Code number		Variables requested by CEOP (according to Appendix A)			Center's
					Code number
		Top of Atmosphere Processes	Units		
1		shortwave downward flux (positive)	W/m^2		212
2		shortwave upward flux (positive)	W/m^2		178
3		longwave upward flux (positive)	W/m^2		179
		Atmosphere Variables			
4		temperature	K		130
6		moisture	kg/kg		133
7		zonal wind	m/s		131
8		meridional wind	m/s		132
10		geopotential height	gpm		156
11		pressure velocity	Pa/s		135
		Atmosphere Processes 3D			
		large scale heating	K		217
15		convective latent heating rate	K		216
		diffusive heating	K		215
21		short-wave heating rate	K		153
22		long-wave heating rate	K		154

		Vertically Integrated Atmos. Variables			
42		surface pressure	Pa		152
		Vertically Integrated Processes			
48		precipitation (total)	kg/(m^2s)		228
		convective precipitation	kg/(m^2s)		143
		Surface Variables			
59		2-meter temperature	K		167
60		2-meter specific humidity	kg/kg		168
61		u-component at 10 m	m/s		165
62		v_component at 10 m	m/s		166
65		Soil moisture	m		140
67		snow depth	m		141
69		planetary boundary layer height	m		159
		Surface Processes			
72		longwave downward flux (positive number)	W/m^2		175
73		longwave upward flux (postive number)	W/m^2		177
74		sensible heating (positive upward)	W/m^2		146
75		latent heating(positive upward)	W/m^2		147
		Net Short Wave Flux at surface	W/m^2		149
		Miscellaneous			
95		surface albedo	%		174
98		total cloud cover	%		162

CEOP SUB-PROJECTS

Monsoon Diagnostic Studies

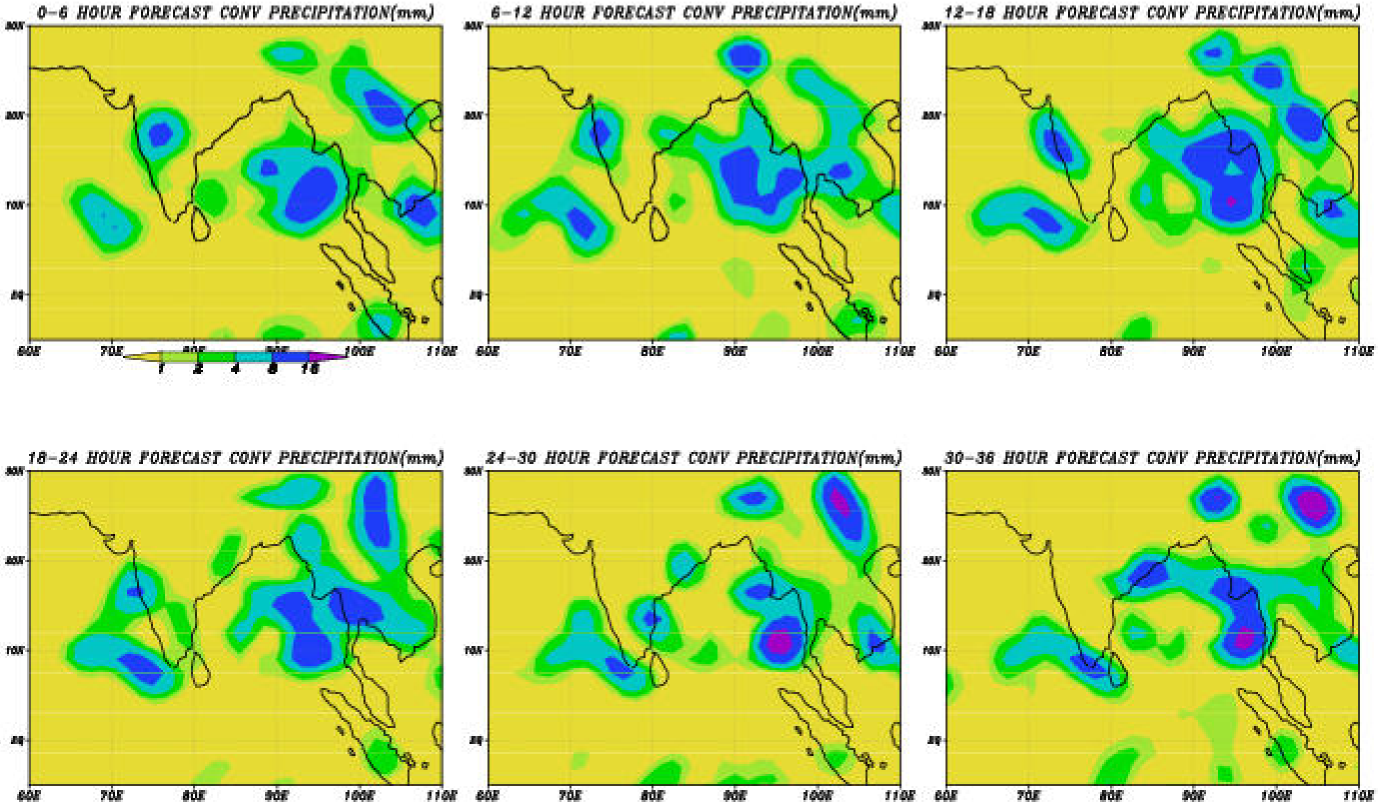
(Onset/Advancement, Synoptic disturbances, Intra-seasonal variability, dry & wet spells)

Fluctuations in the activity of the summer monsoon over India are known to dominantly dependent on

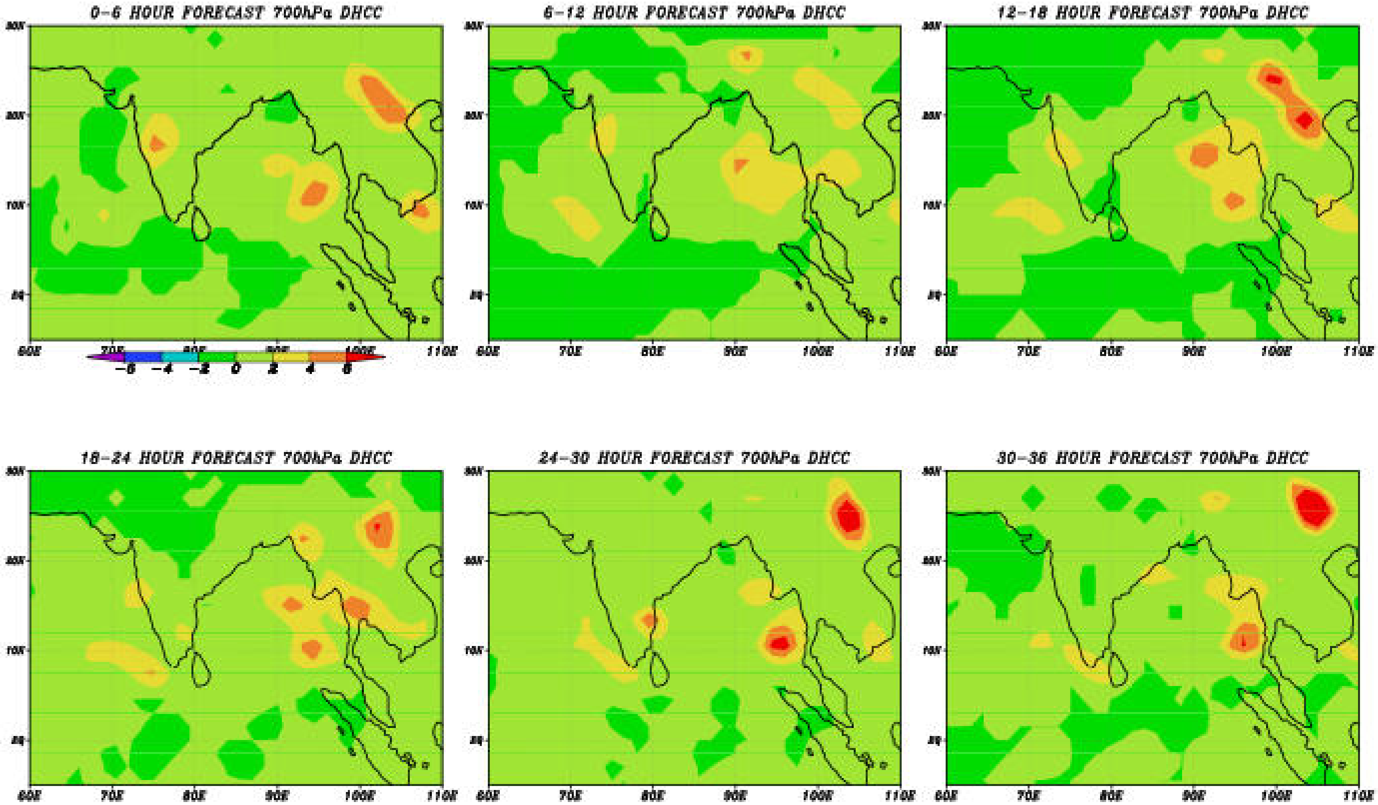
North-south oscillations in the regional monsoon trough
Frequency of formation of the synoptic scale (3-5 day) weather disturbances like the monsoon lows and depressions

The intra-seasonal active-break cyclone of the monsoon and the overlapping formation of the monsoon lows/depressions or prolonged absence of the cyclogenesis for a period of 15-30 days are influenced by the intra-seasonal oscillation of the Monsoon on 30-50 day scale.

NCMRWF T80/L18 FORECAST IC: 12Z16MAY2004



NCMRWF T80/L18 FORECAST IC: 12Z16MAY2004



Observed Rainfall distribution June,2004

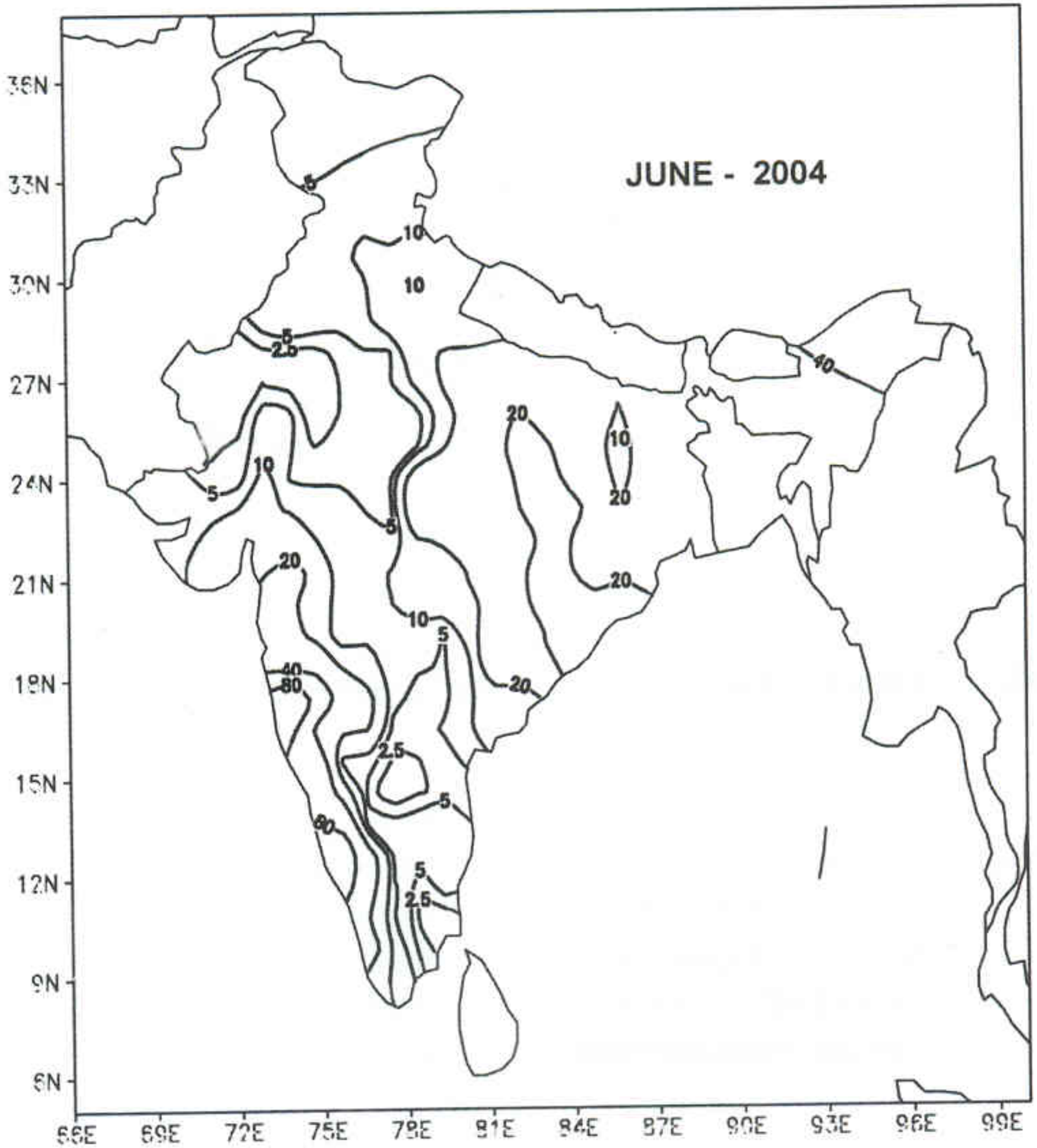
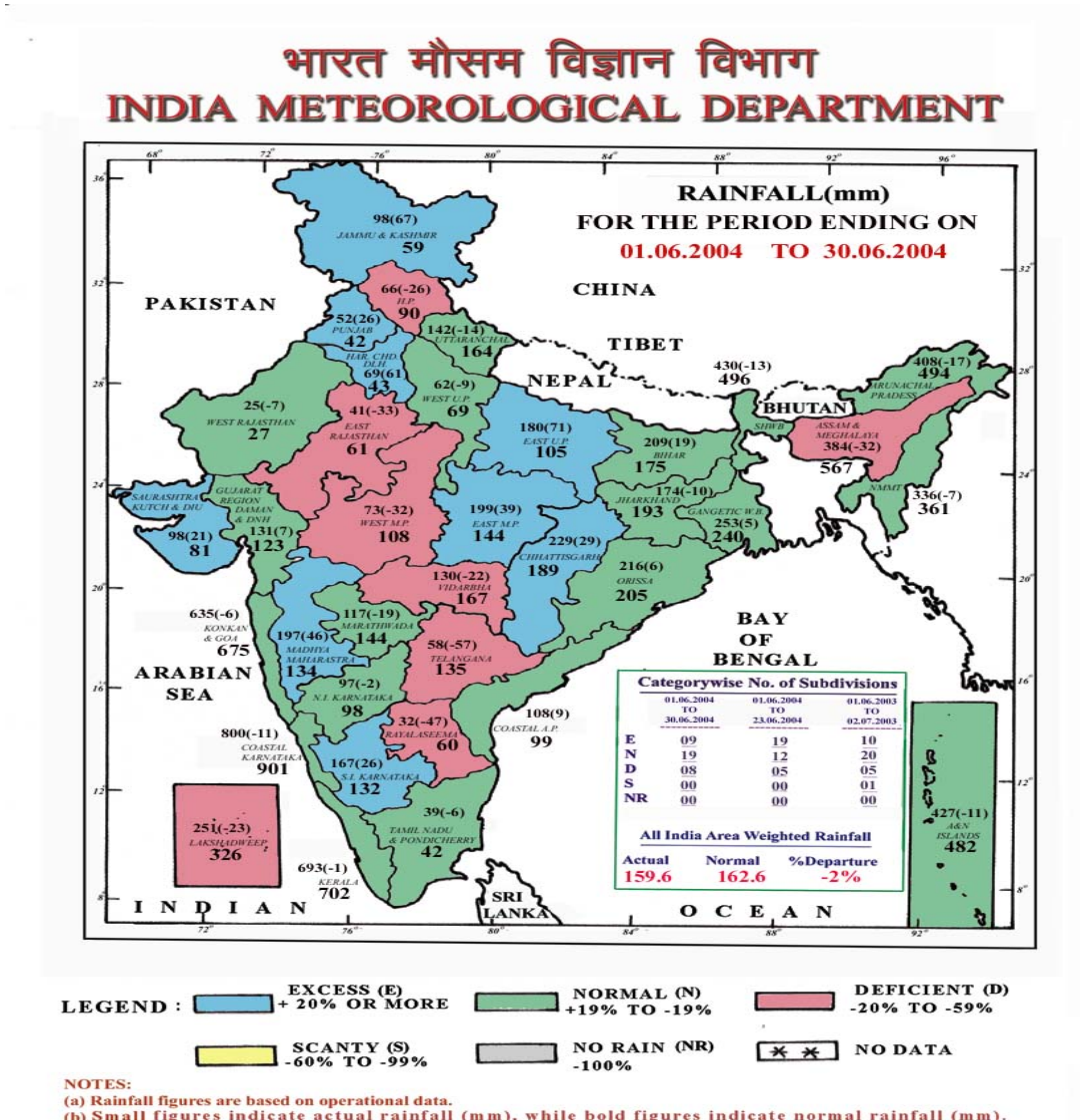
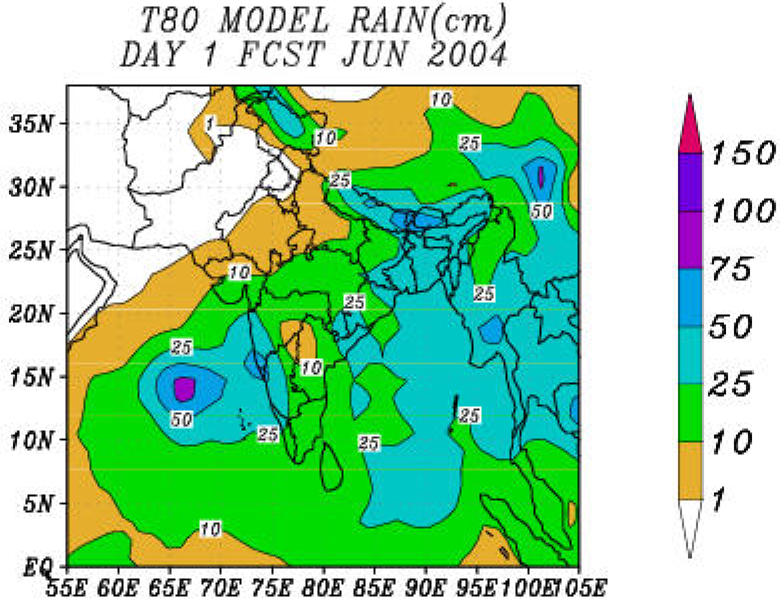


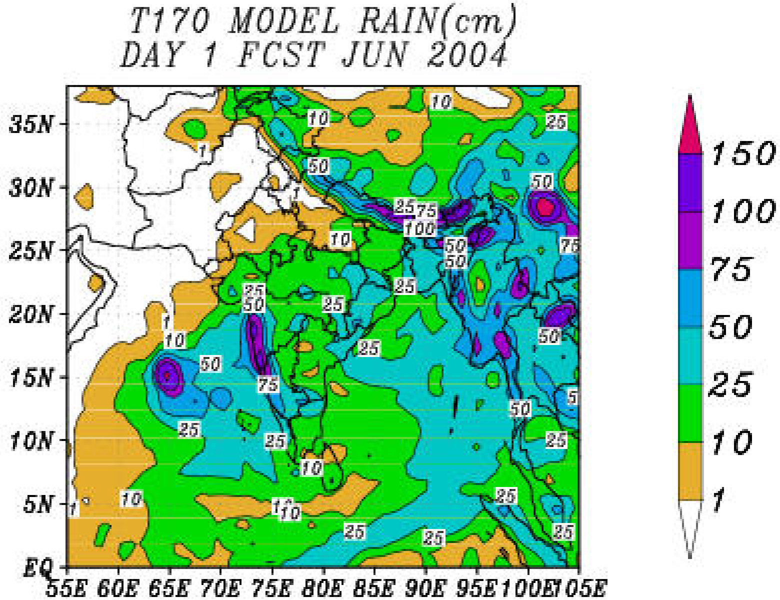
FIG. 3 : MONTHLY RAINFALL (cm)

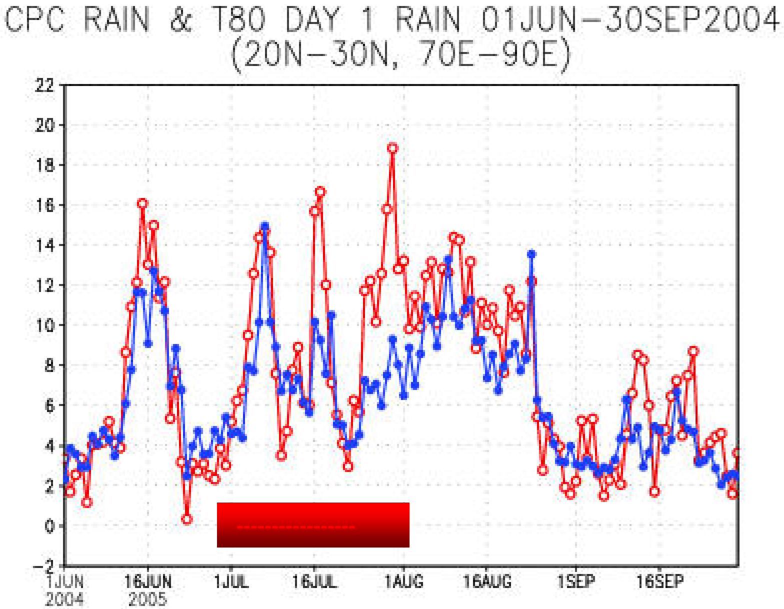
Observed Rainfall distribution

June,2004



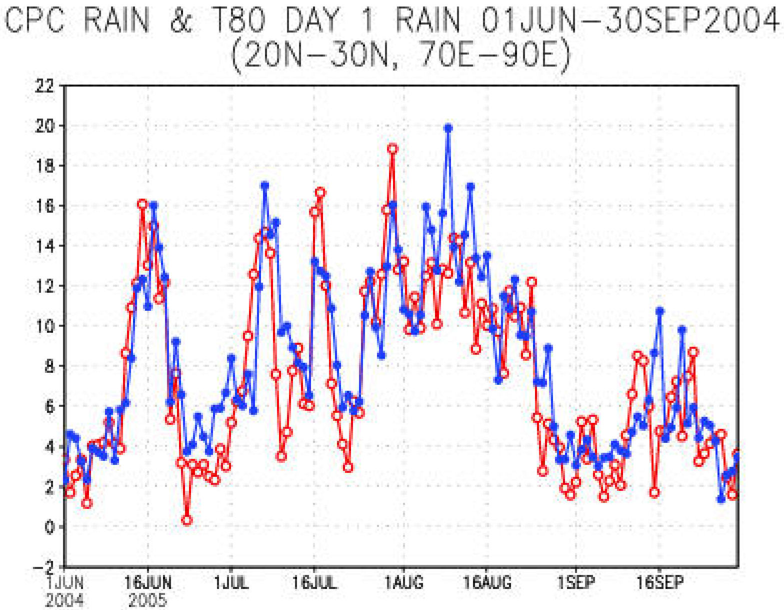

T80 MODEL RAIN(cm)
DAY 1 FCST JUN 2004
35N
30N
25N
20N
15N
10N
5N
EQ
55E 60E 65E 70E 75E 80E 85E 90E 95E 100E 105E
150
100
75
50
25
10
1


T170 MODEL RAIN(cm)
DAY 1 FCST JUN 2004
35N
30N
25N
20N
15N
10N
5N
EQ
55E 60E 65E 70E 75E 80E 85E 90E 95E 100E 105E
150
100
75
50
25
10
1


CPC RAIN & T80 DAY 1 RAIN 01JUN-30SEP2004
(20N-30N, 70E-90E)
1JUN 2004
16JUN 2005
1JUL
16JUL
1AUG
16AUG
1SEP
16SEP

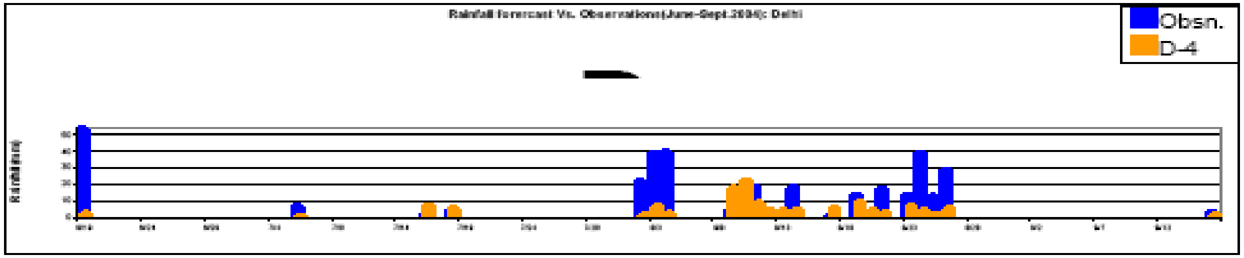
OBS

T80

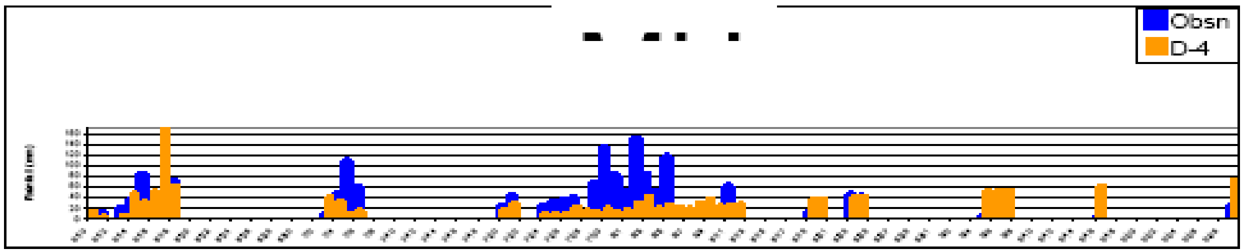

CPC RAIN & T80 DAY 1 RAIN 01JUN-30SEP2004
(20N-30N, 70E-90E)
1JUN 2004
16JUN 2005
1JUL
16JUL
1AUG
16AUG
1SEP
16SEP

T170

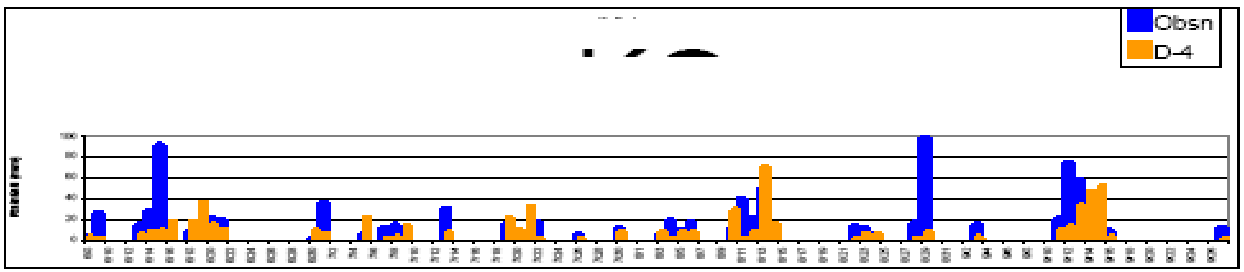
SAMPLE VERIFICATION OF DMO FOR 4 METROPOLITAN CITIES DURING JUNE-SEPTEMBER 2004



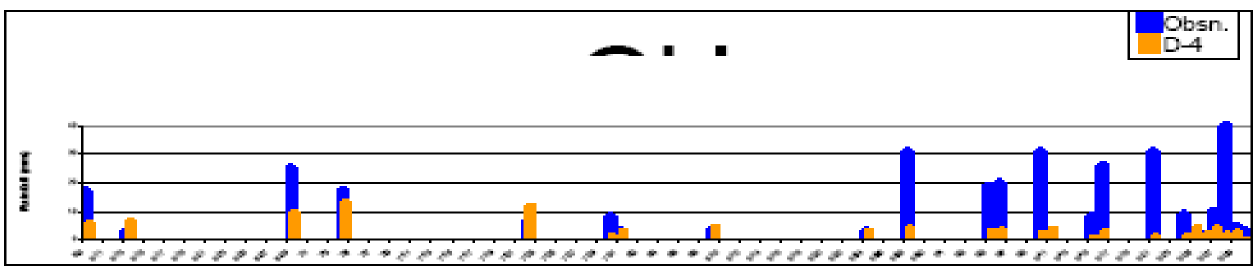
Delhi



Mumbai



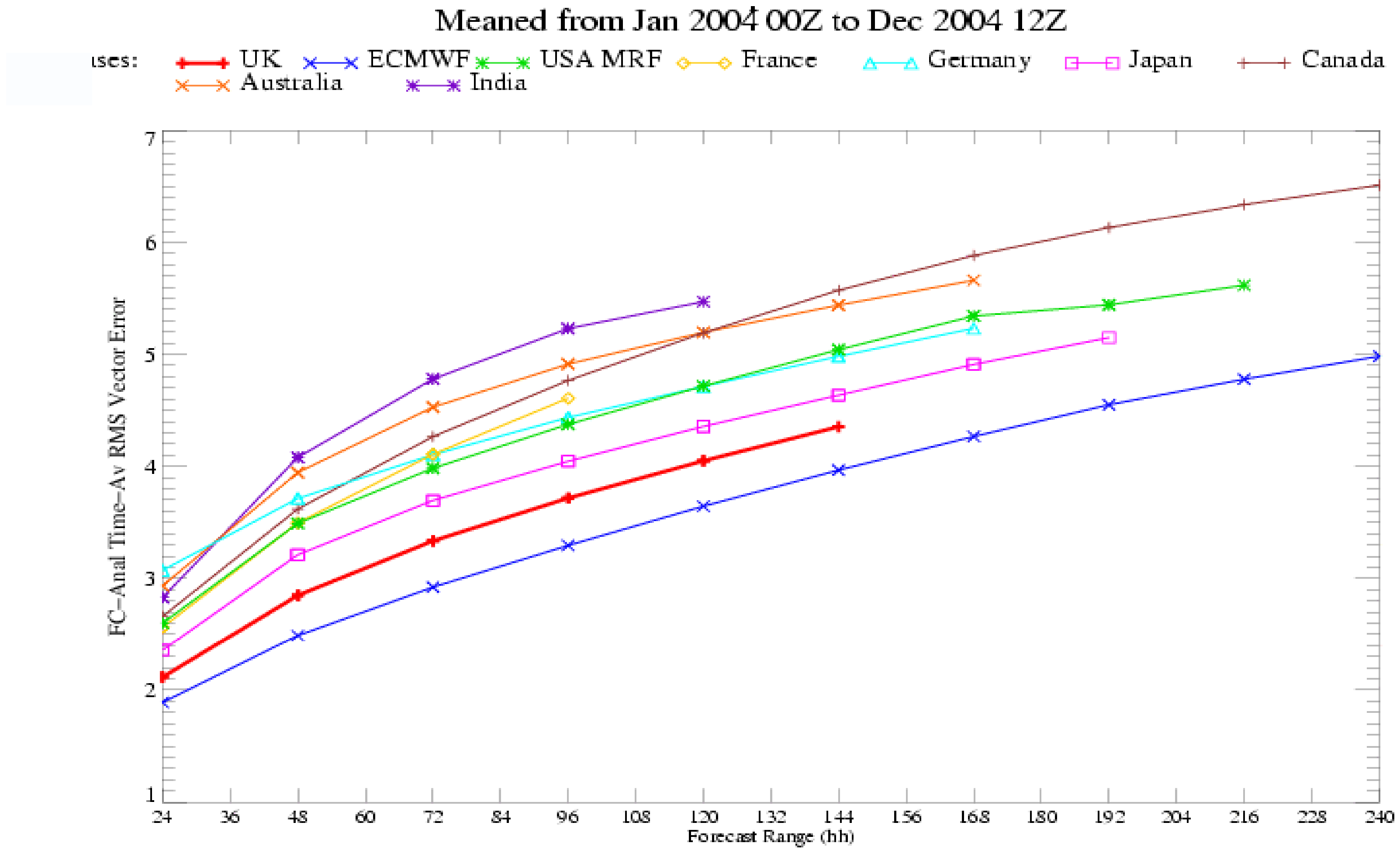
Kolkata



Chennai

Verification: Comparisons of Global Modelling Centres

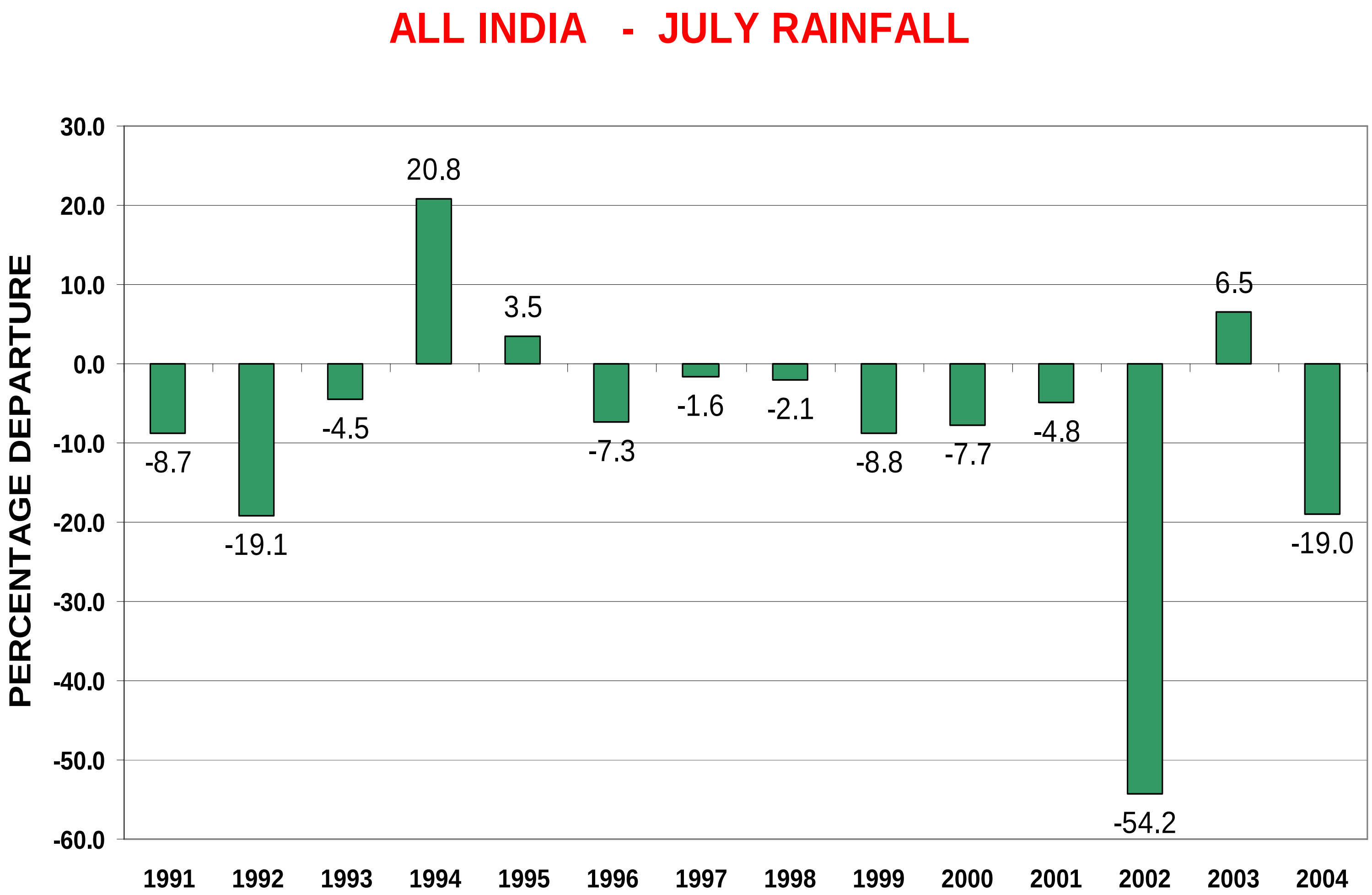
Tropics:850hPa Wind



Rainfall Percentage departure for the country as a whole in recent major drought years

Year	June	July	August	Sep.	Jun-Sep.
1972	-27	-31	-14	-24	-24
1979	-15	-16	-19	-28	-19
1987	-22	-29	-4	-25	-19
2002	+4	-54	-4	-10	-19
2004	-2	-19	-3	-27	-13

July Rainfall in Recent Years



Since 1991, number of years (11 out of 14 years) with less than LPA of July rainfall was more as compared to previous decades. 2002 was the worst year with All India rainfall 54% below normal.

Diurnal behaviour of the Asian Summer Monsoon

Krishnamurti and Kishtwal(2000)

Infrared cloud images and Cloud motion winds form meteosat-5

Evidence of continental-scale diurnal cycle of the monsoon
Circulation from mapping of the divergent circulations

Motion of cloud clusters form Bay of Bengal inland in daytime hours
And a reverse motion in the early morning hours

Diurnal amplification and weakening in the Tibetan High circulation.

The tropical easterly jet on the southern flank of this anti-cyclone
Exhibits a strong diurnal fluctuation in its intensity.

Diurnal response to surface heating, convection and the buildup
And weakening of thermal winds

Ananthkrishnan(1977) has examined the diurnal variation of surface and tropospheric winds for selected sites over India

Pronounced surface wind speed variations were evident at coastal and inland stations.

Amplitude of the surface wind speed oscillations as large as 7m/s at coastal sites and 3m/s at inland sites on diurnal time scale.

Murakami(1983) showed convection over Tibetan plateau is enhanced during the afternoon and is suppressed during early morning hours

Diurnal variation of rainfall and convection over the different tropical land areas, including the monsoon domain.

WORK PLAN

- Verification and intercomparison of precipitation forecasts
- Skill in predicting the occurrence and amount of daily precipitation
- Evolution and predictability of high impact weather in the short range forecasting
- Diurnal behaviour of Indian summer monsoon