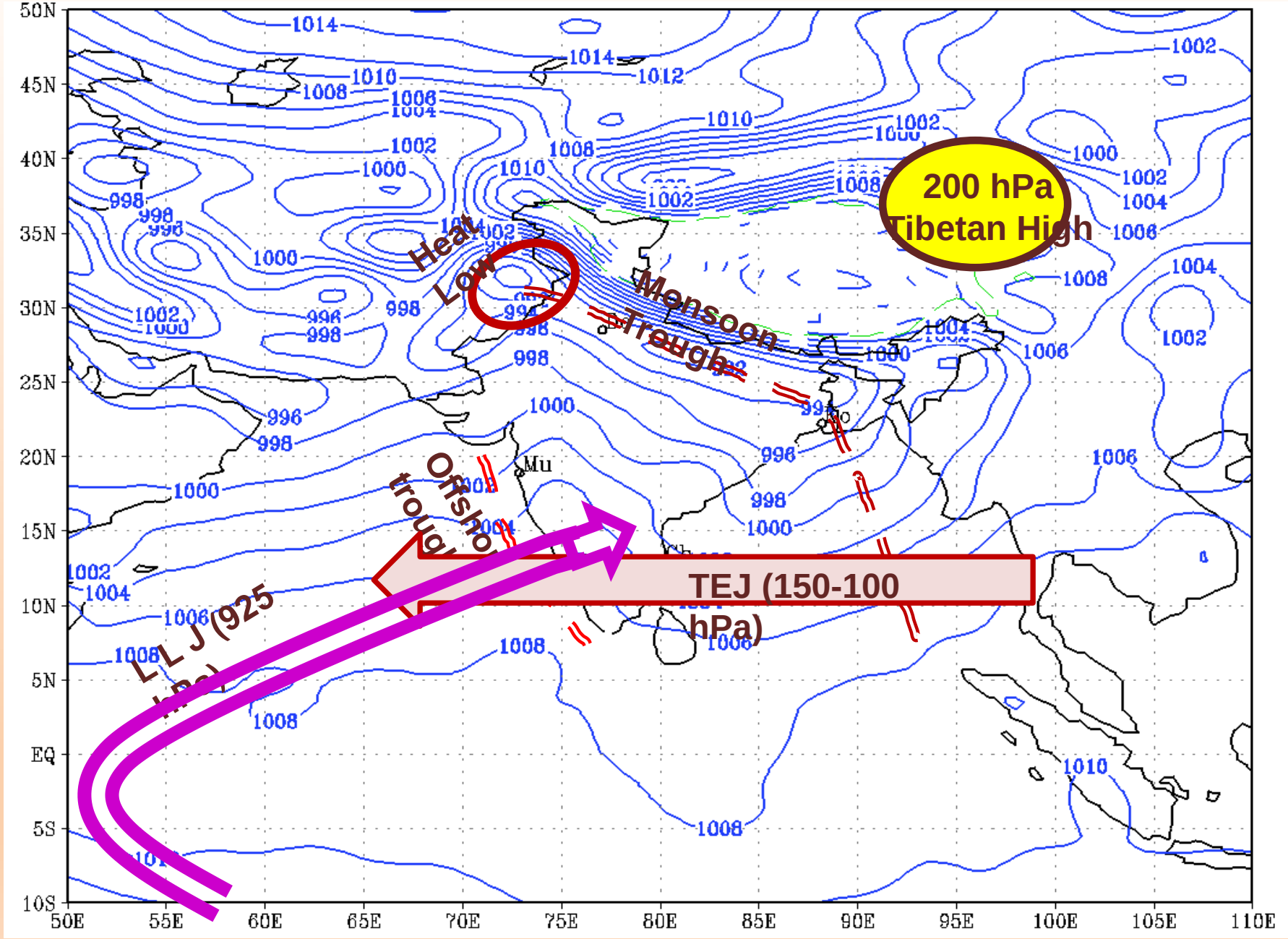
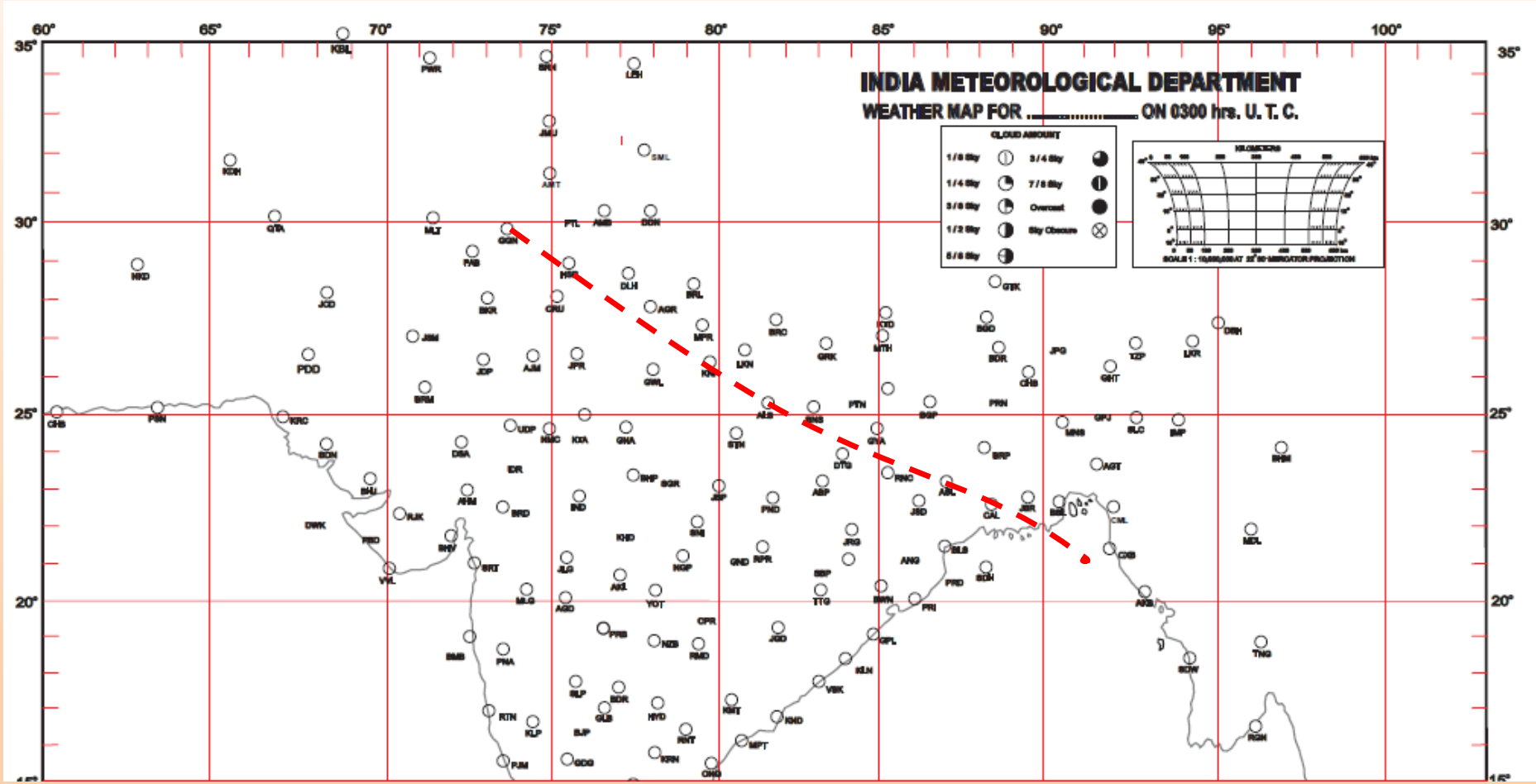
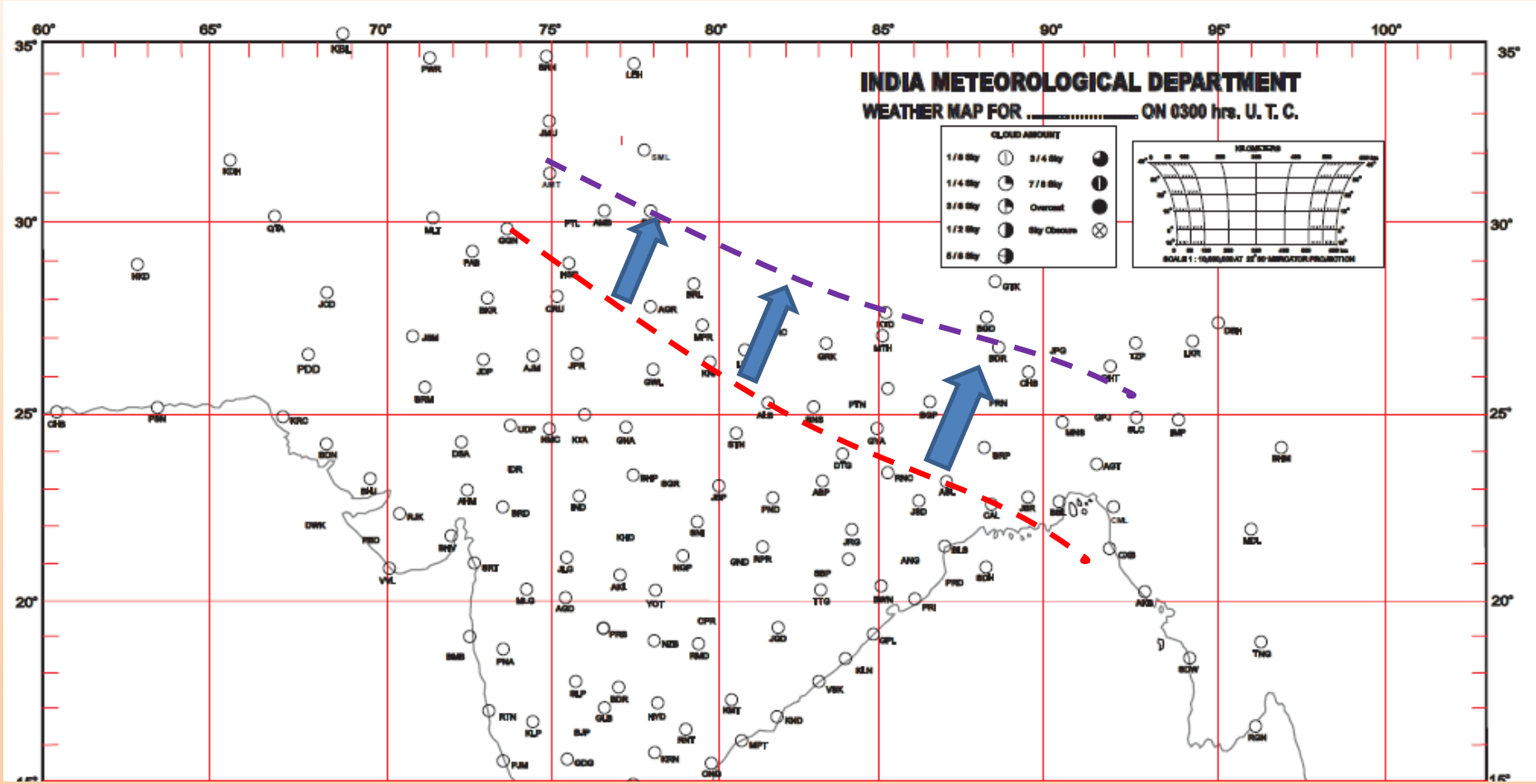
Annual Monsoon Seminar-2023

Northeast Monsoon - 2023

Dr. S. BALACHANDRAN
HEAD
Regional Meteorological Centre, Chennai


200 hPa
Tibetan High
Heat
Low
Monsoon
Trough
Offsho
trough
TEJ (150-100
hPa)
LL J (925
hPa)
Mu
50N
45N
40N
35N
30N
25N
20N
15N
10N
5N
EQ
5S
10S
50E
55E
60E
65E
70E
75E
80E
85E
90E
95E
100E
105E
110E


INDIA METEOROLOGICAL DEPARTMENT
WEATHER MAP FOR ..... ON 0300 hrs. U. T. C.
CLOUD AMOUNT
1/8 Sky
1/4 Sky
3/8 Sky
1/2 Sky
5/8 Sky
3/4 Sky
7/8 Sky
Overcast
Sky Obscure
60°
65°
70°
75°
80°
85°
90°
95°
100°
35°
30°
25°
20°
15°


INDIA METEOROLOGICAL DEPARTMENT
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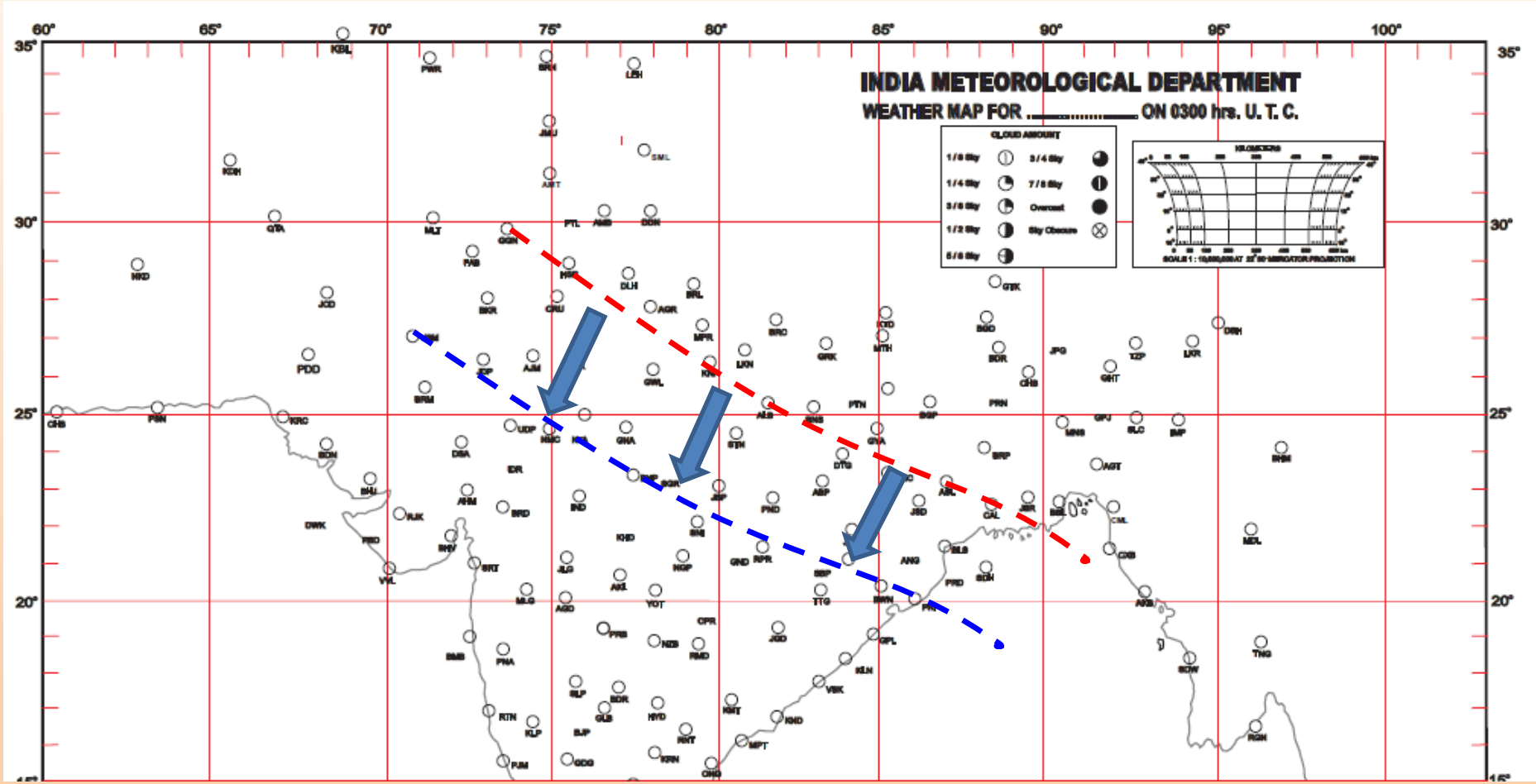
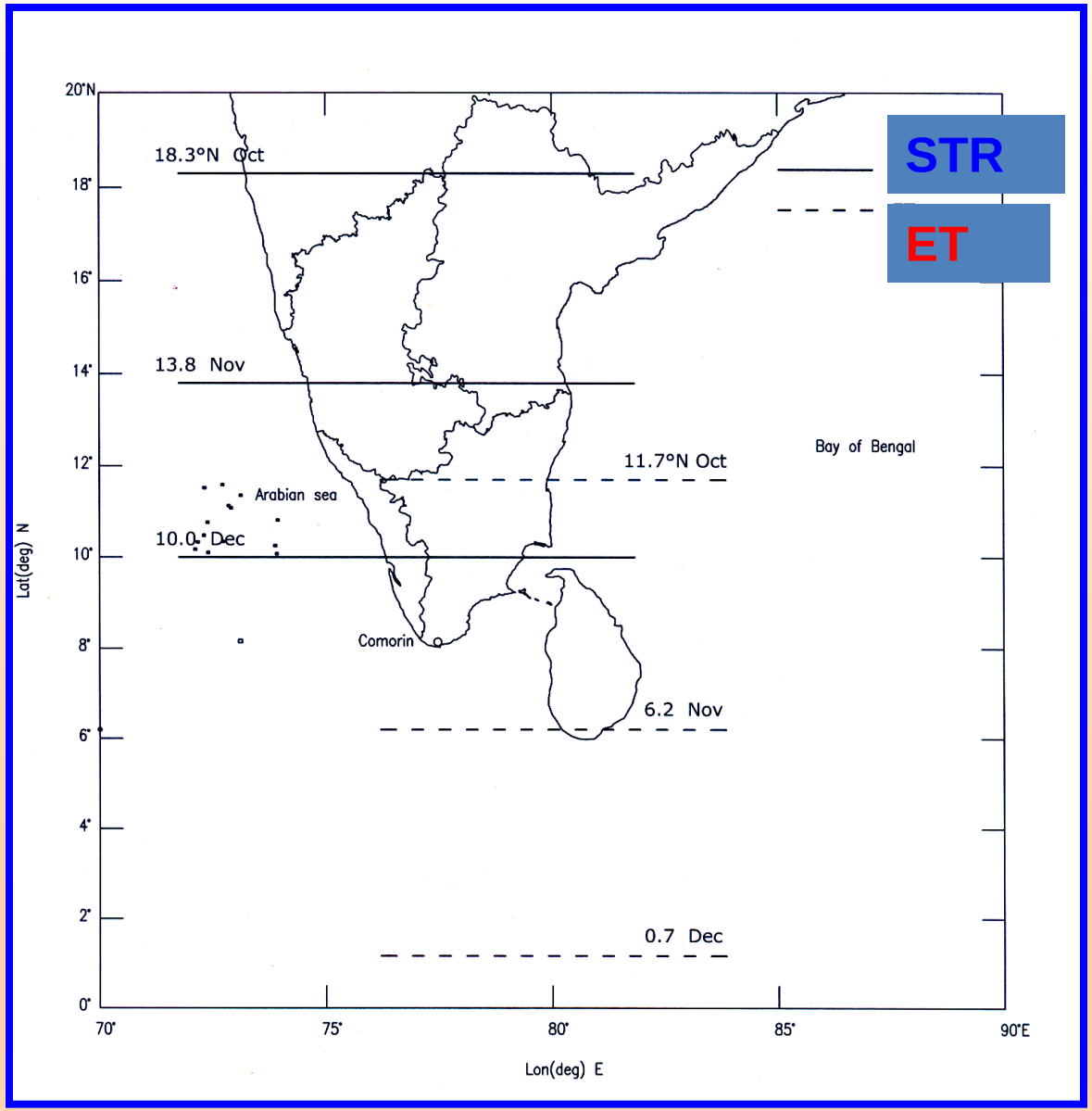
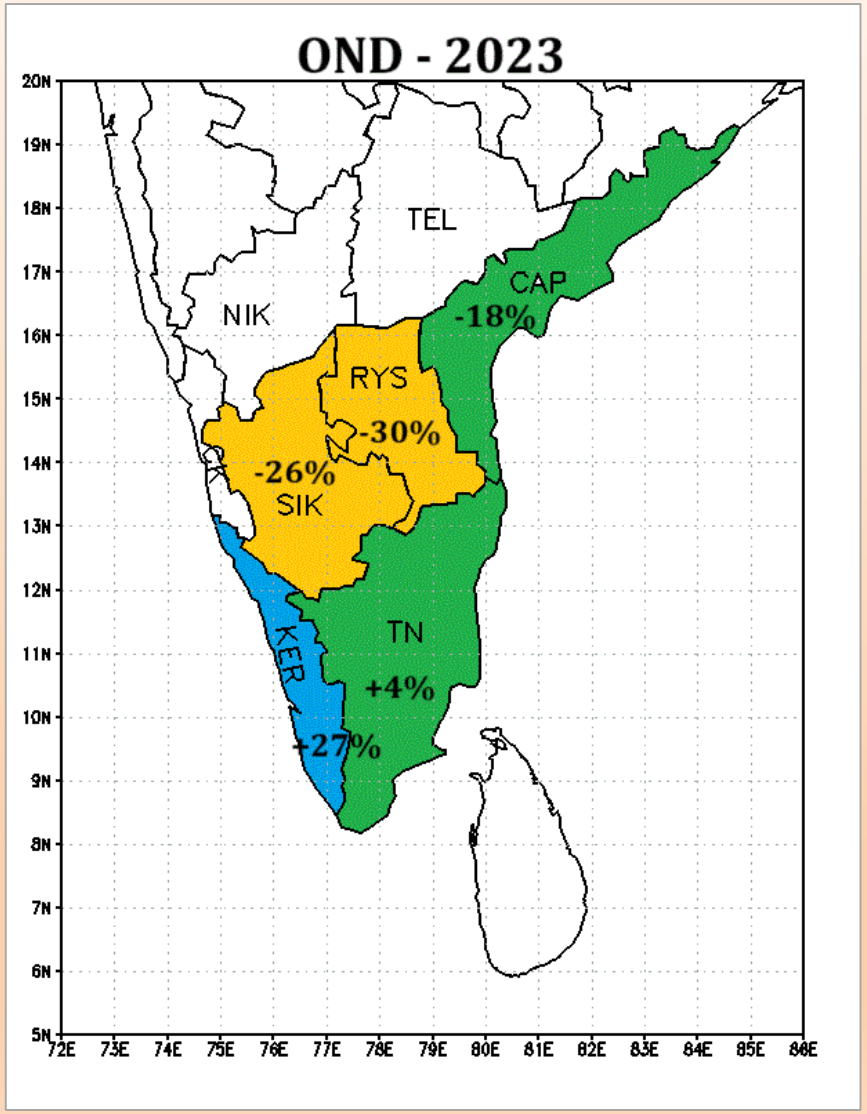
Overcast
1/2 Sky
Sky Obscure
5/8 Sky
60°
65°
70°
75°
80°
85°
90°
95°
100°
35°
30°
25°
20°


INDIA METEOROLOGICAL DEPARTMENT
WEATHER MAP FOR ..... ON 0300 hrs. U. T. C.
CLOUD AMOUNT
60°
65°
70°
75°
80°
85°
90°
95°
100°
35°
30°
25°
20°


STR
ET
18.3°N Oct
13.8 Nov
11.7°N Oct
10.0 Dec
6.2 Nov
0.7 Dec
Arabian sea
Bay of Bengal
Comorin
20°N
18°
16°
14°
12°
10°
8°
6°
4°
2°
0°
70°
75°
80°
85°
90°E
Lat(deg) N
Lon(deg) E

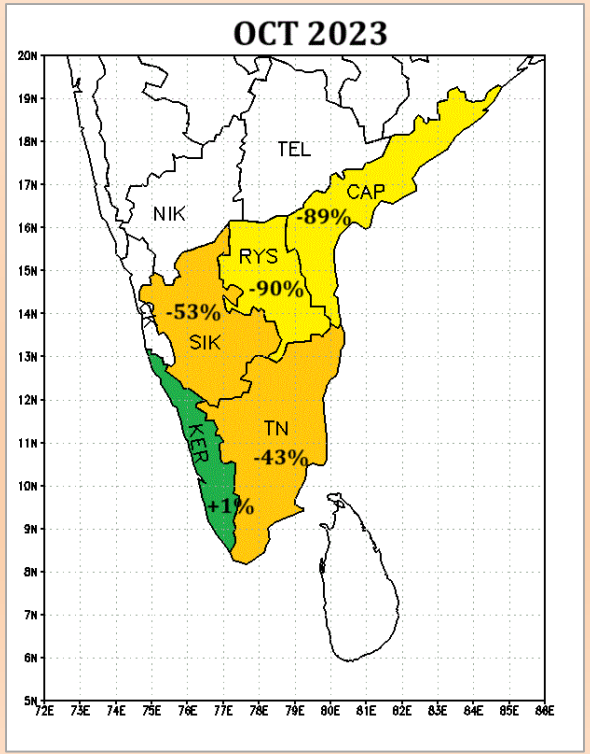
NEM 2023 - Sub divisional Seasonal rainfall

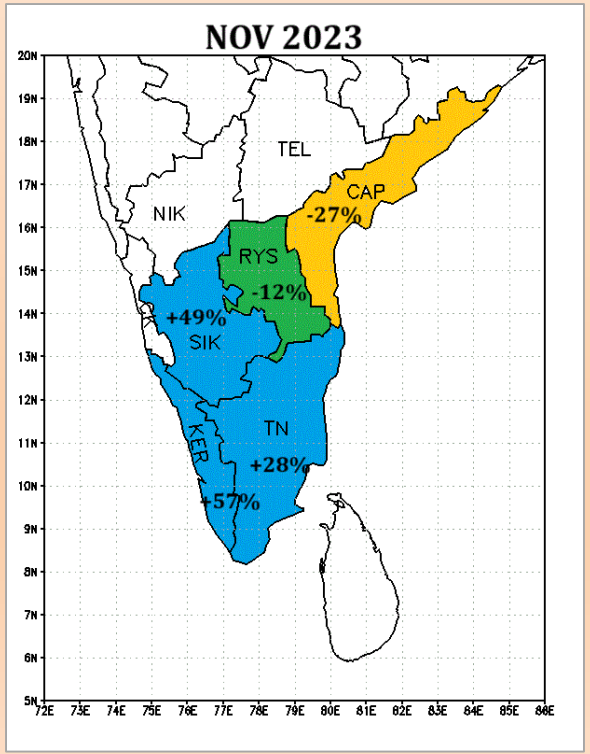


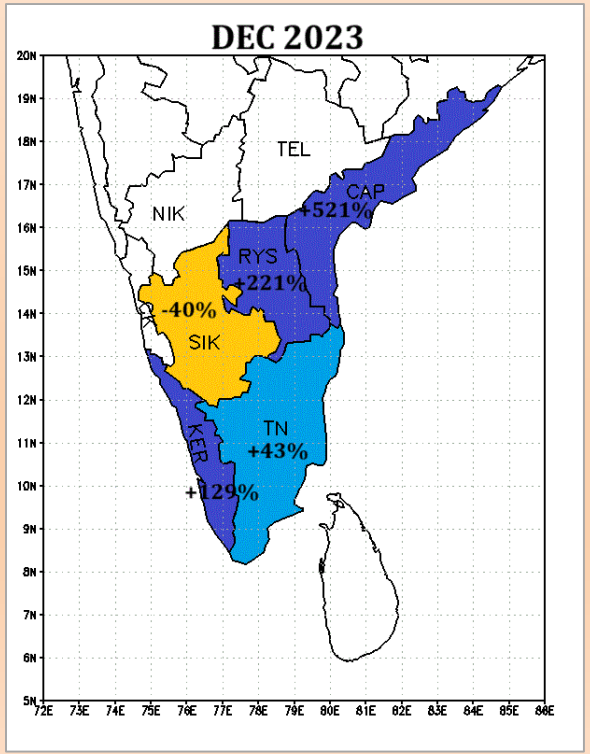
OCT-DEC 2023			
Met sub div	Actual rainfall (mm)	Normal rainfall (mm)	PDN (%)
CAP & Yanam	**265.8**	**322.9**	**-18**
RYS	**164.7**	**236.4**	**-30**
TN, PDC & KKL	**458.9**	**442.8**	**+4**
SIK	**146.8**	**199.0**	**-26**
KER & Mahe	**624.9**	**492.0**	**+27**

Sub divisional monthly rainfall – Oct-Dec 2023

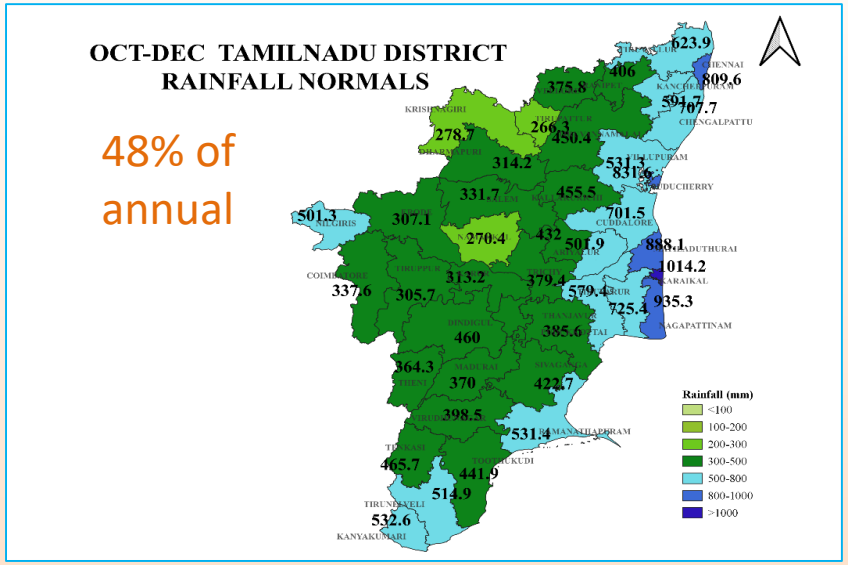
2023	OCT			NOV			DEC		
SUB-DIVISION	Actual rainfall (mm)	Normal rainfall (mm)	PDN (%)	Actual rainfall (mm)	Normal rainfall (mm)	PDN (%)	Actual rainfall (mm)	Normal rainfall (mm)	PDN (%)
CAP & Yanam	19.4	182.2	-89	82.7	113.1	-27	171.4	27.6	+521
RYS	12.7	132.1	-90	68.9	78.4	-12	83.2	25.9	+221
TN, PDC & KKL	98.4	171.9	-43	233	181.7	+28	127.5	89.2	+43
SIK	64	137.2	-53	76.4	51.2	+49	6.4	10.6	-40
KER & Mahe	310.5	306.5	+1	240.1	153.1	+57	74.3	32.4	+129

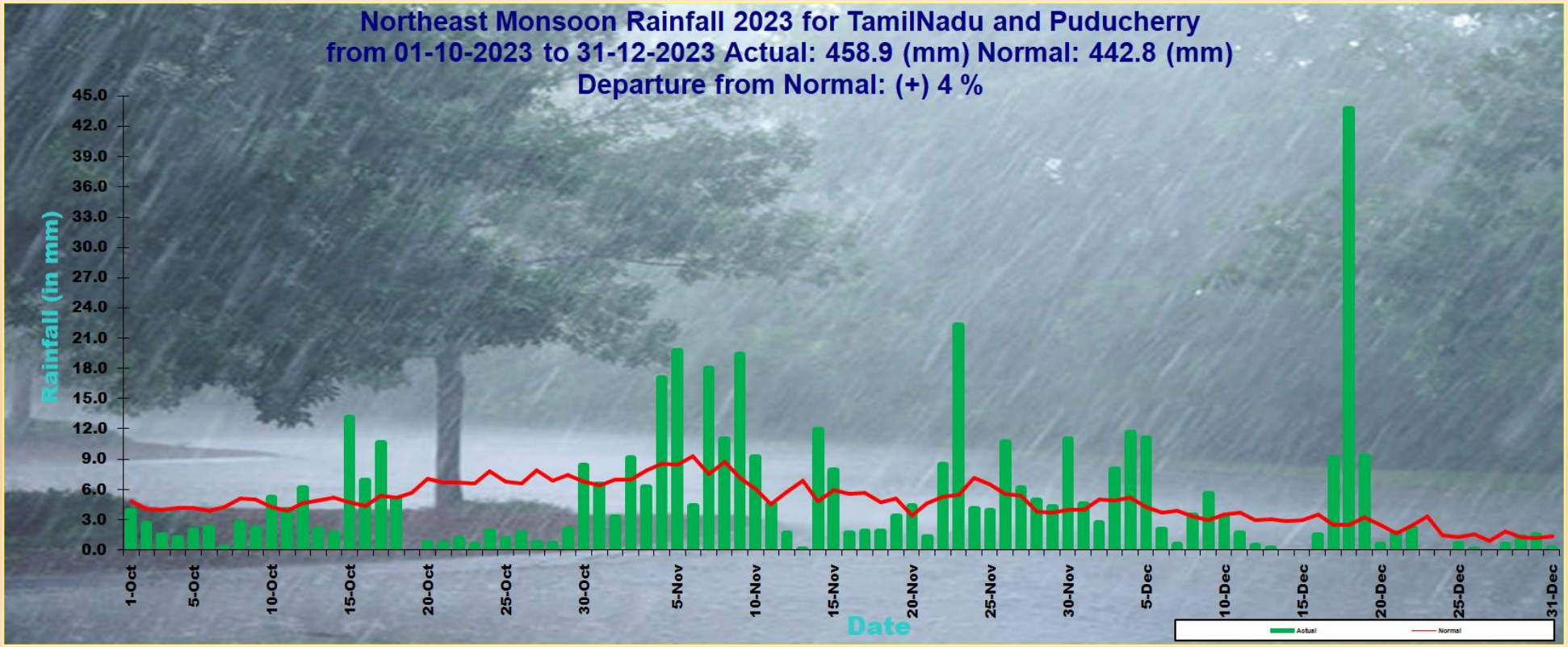




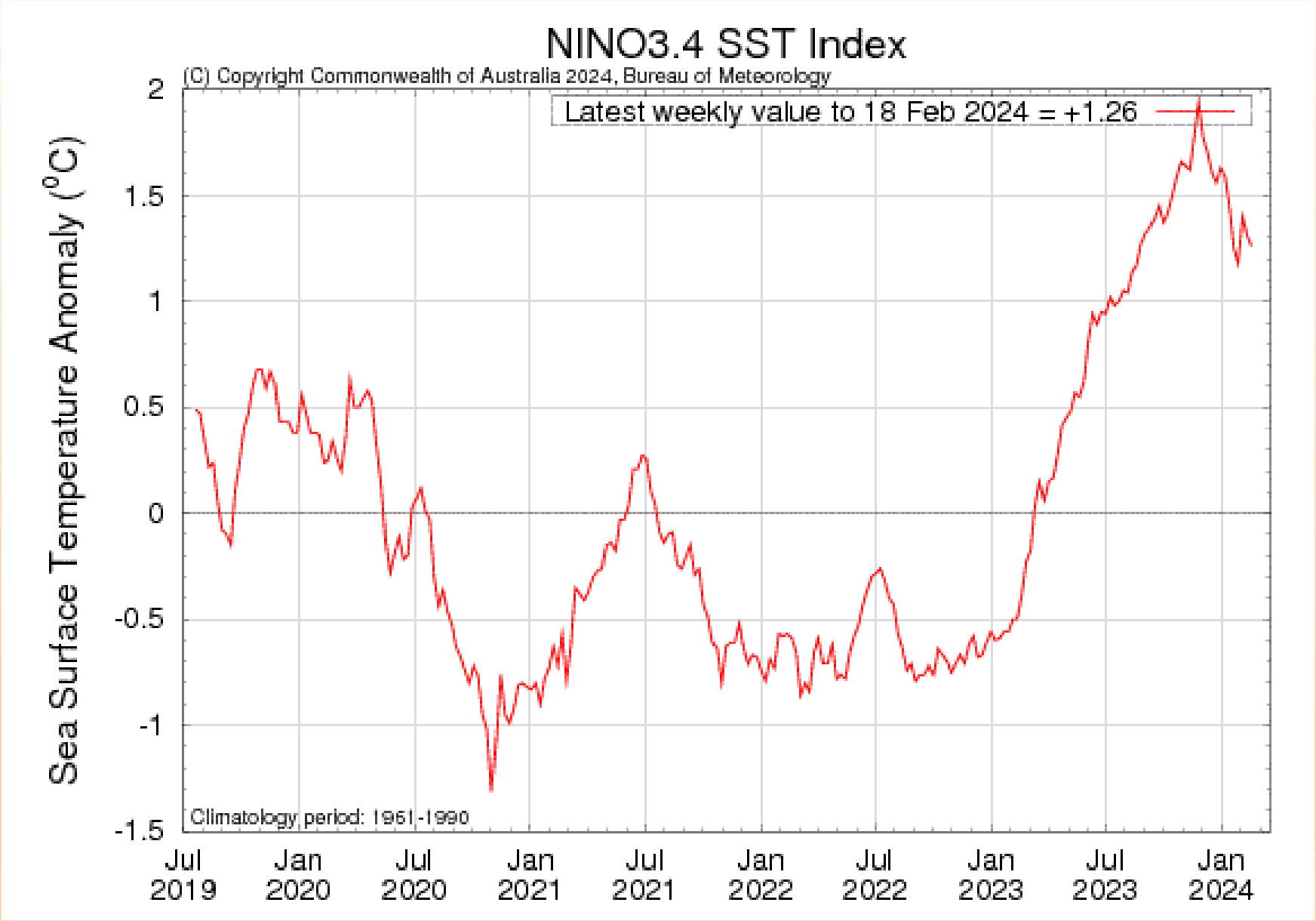


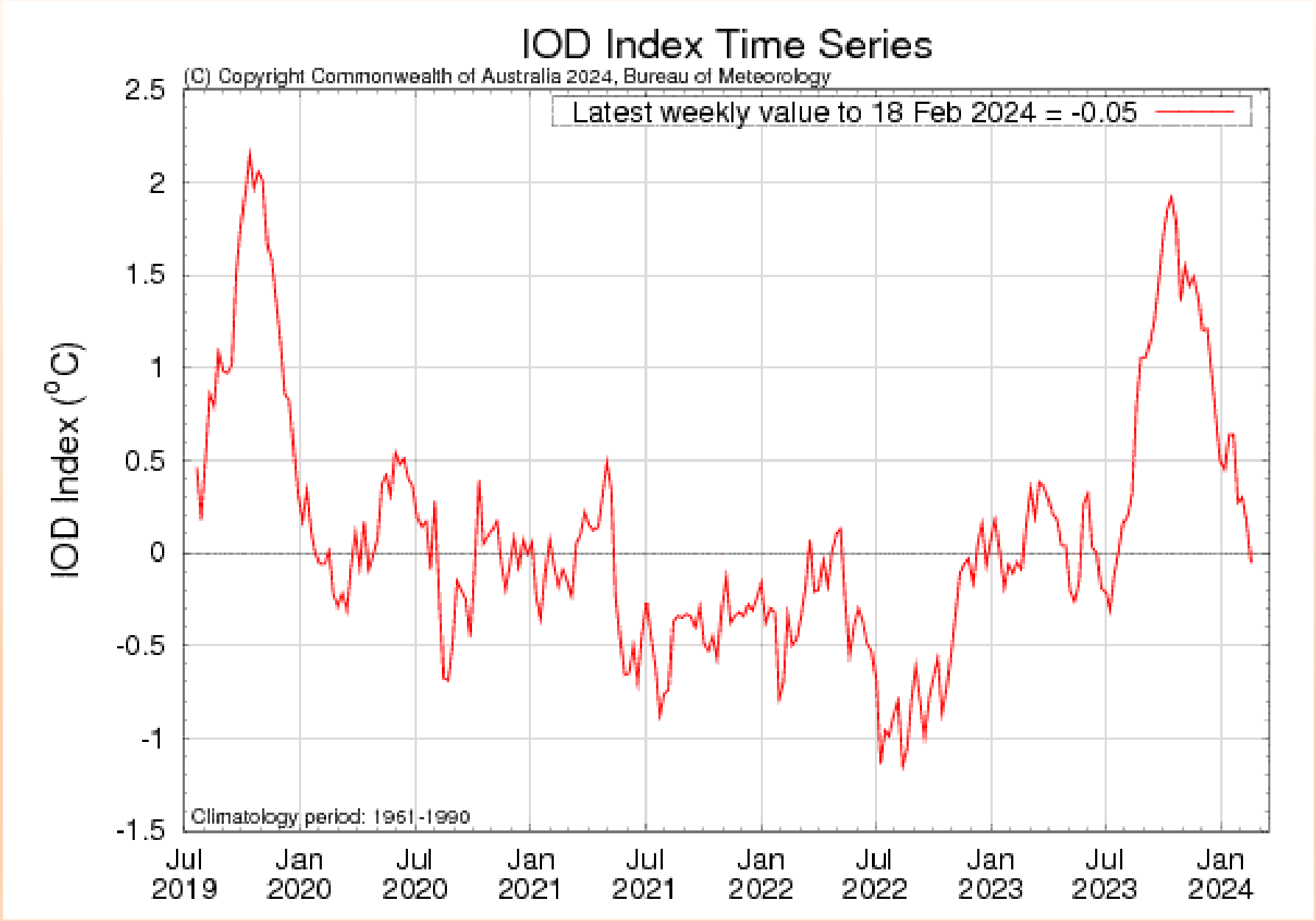
Normal date of commencement of NEM rains over CTN→ 20th OCT

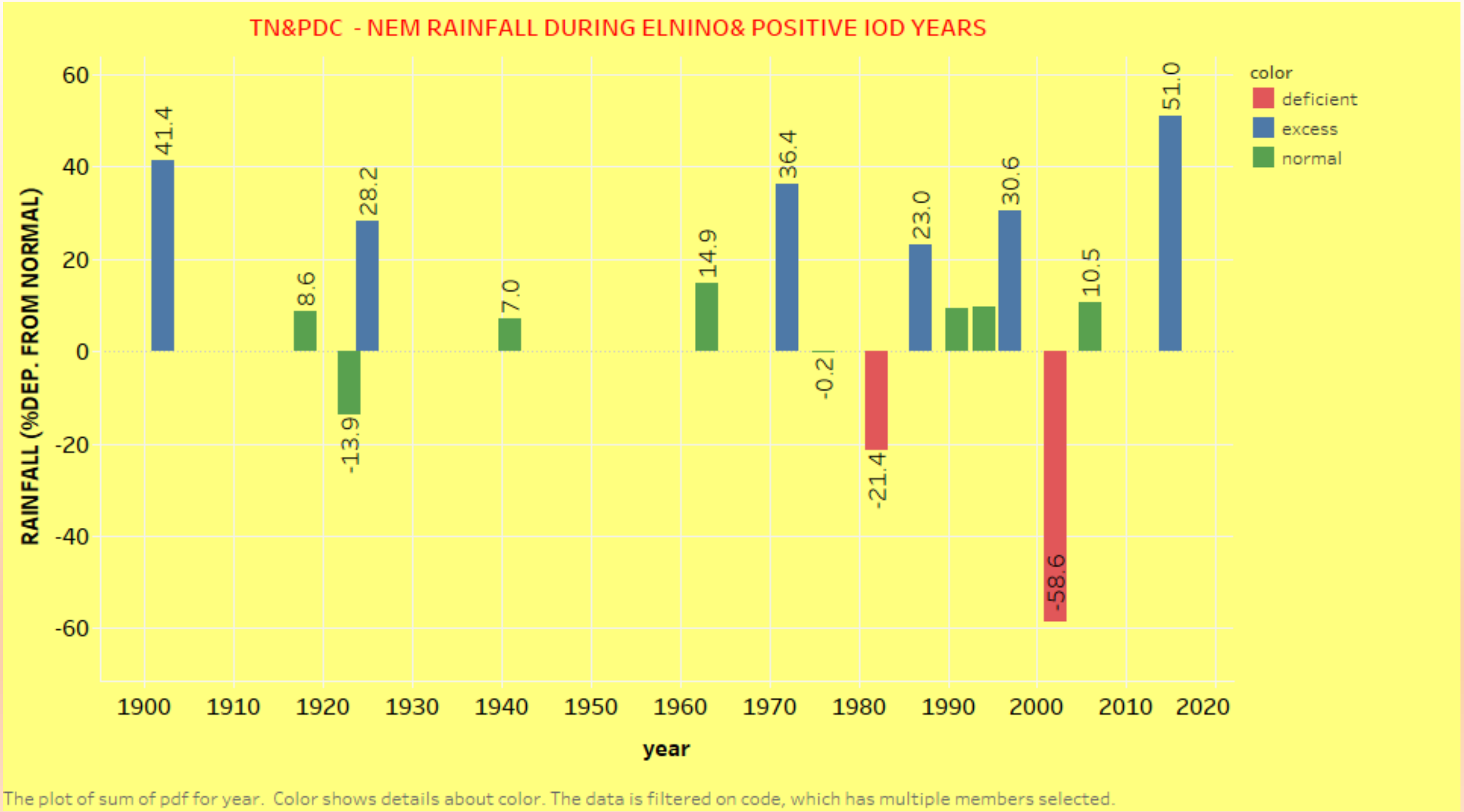




Large scale Drivers

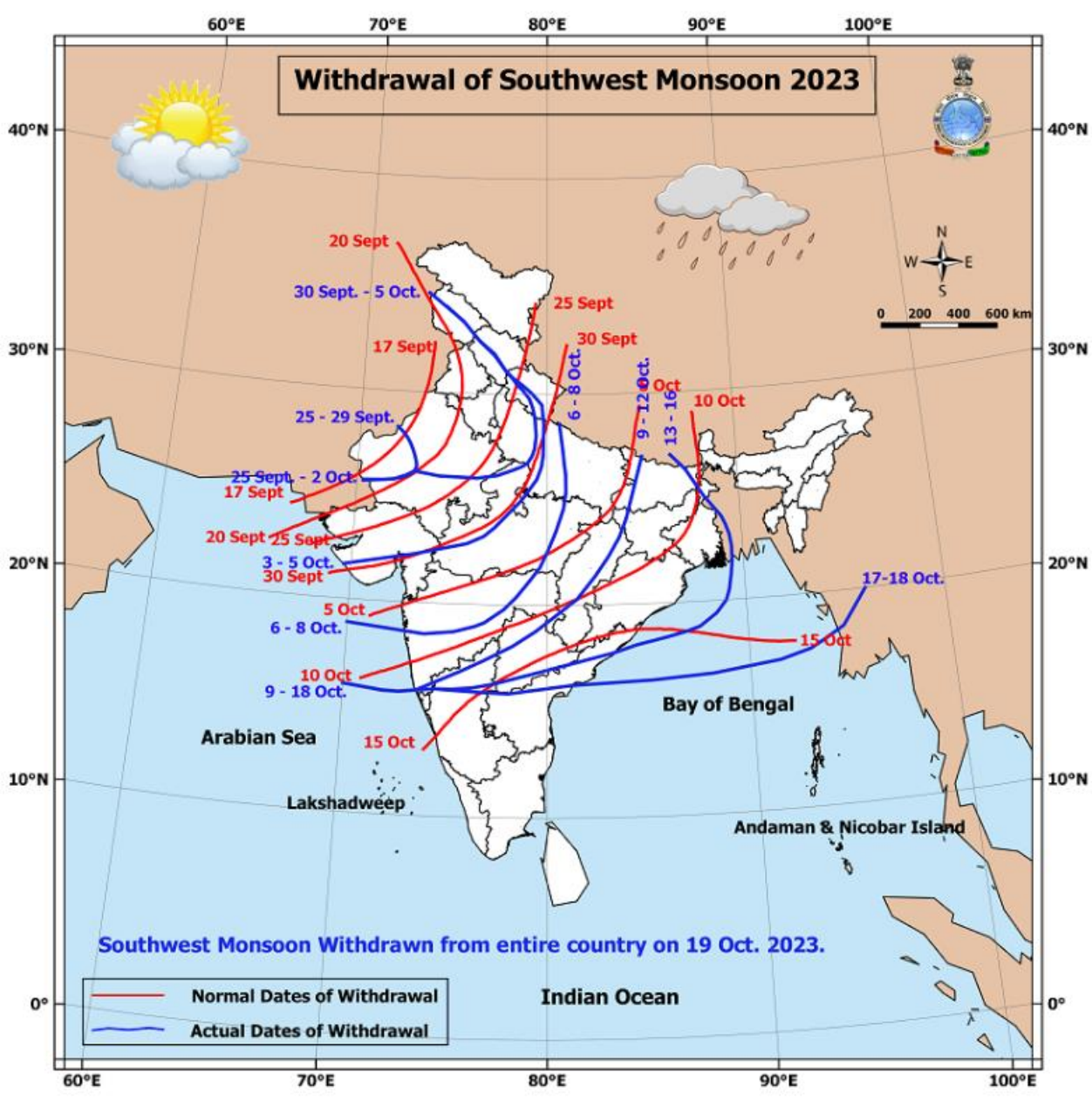

NINO3.4 SST Index
(C) Copyright Commonwealth of Australia 2024, Bureau of Meteorology
Latest weekly value to 18 Feb 2024 = +1.26
Sea Surface Temperature Anomaly (°C)
2
1.5
1
0.5
0
-0.5
-1
-1.5
Climatology period: 1961-1990
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024


IOD Index Time Series
(C) Copyright Commonwealth of Australia 2024, Bureau of Meteorology
Latest weekly value to 18 Feb 2024 = -0.05
IOD Index (°C)
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
Climatology period: 1961-1990
Jul 2019
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024

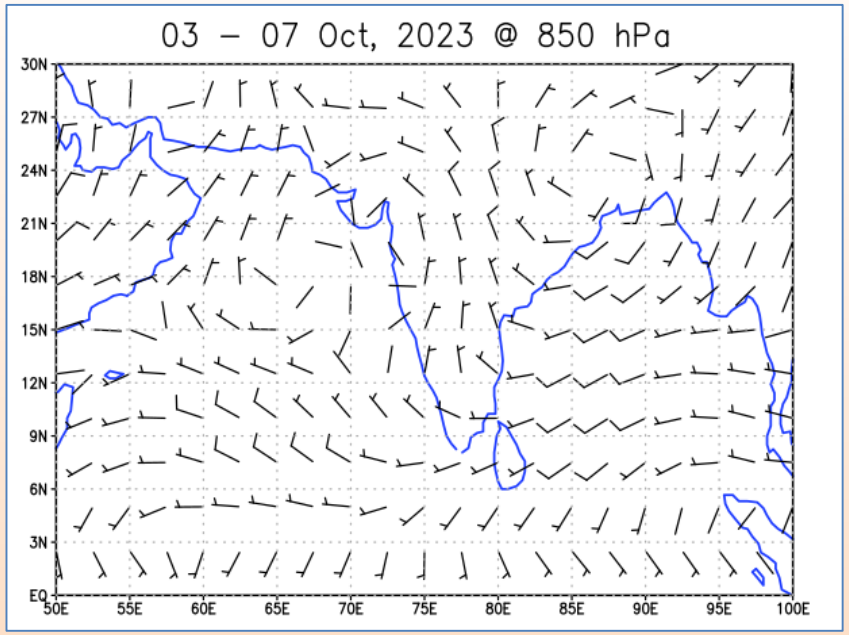


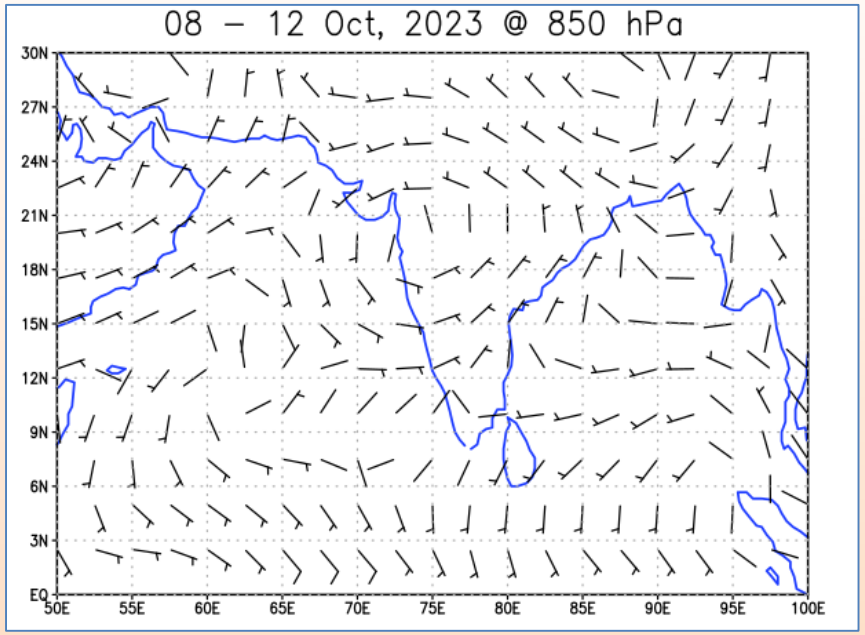
The plot of sum of pdf for year. Color shows details about color. The data is filtered on code, which has multiple members selected.

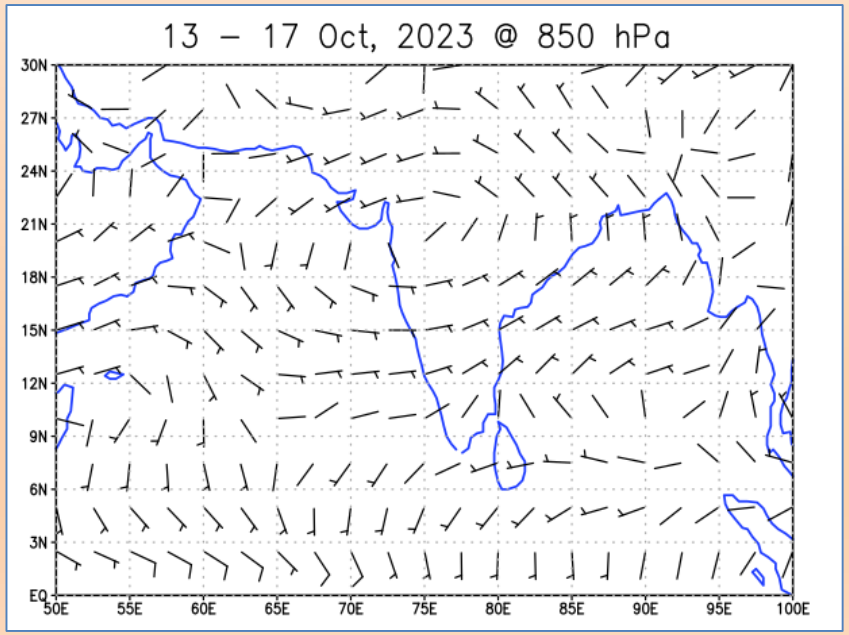
Onset of NEM

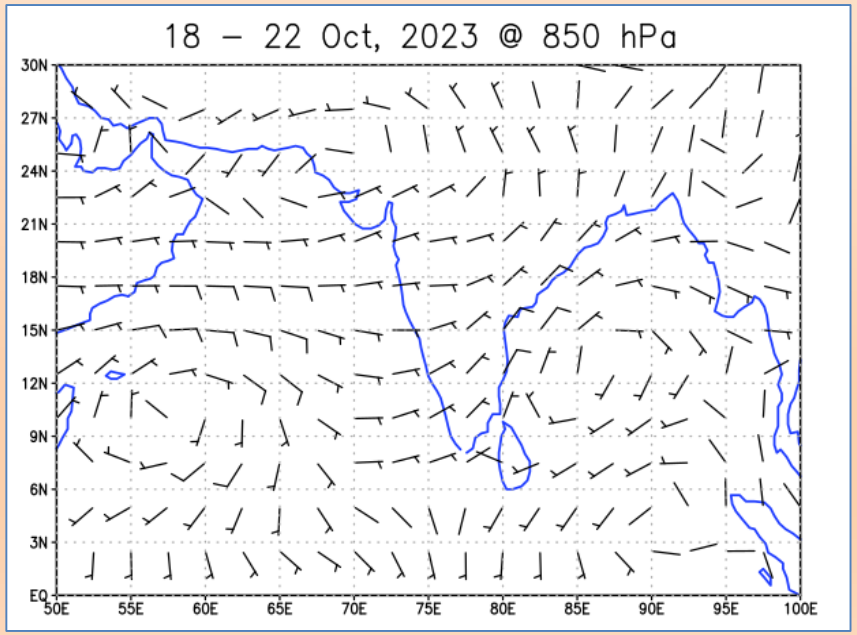


SWM 2023:
W/d→ 19 OCT 2023

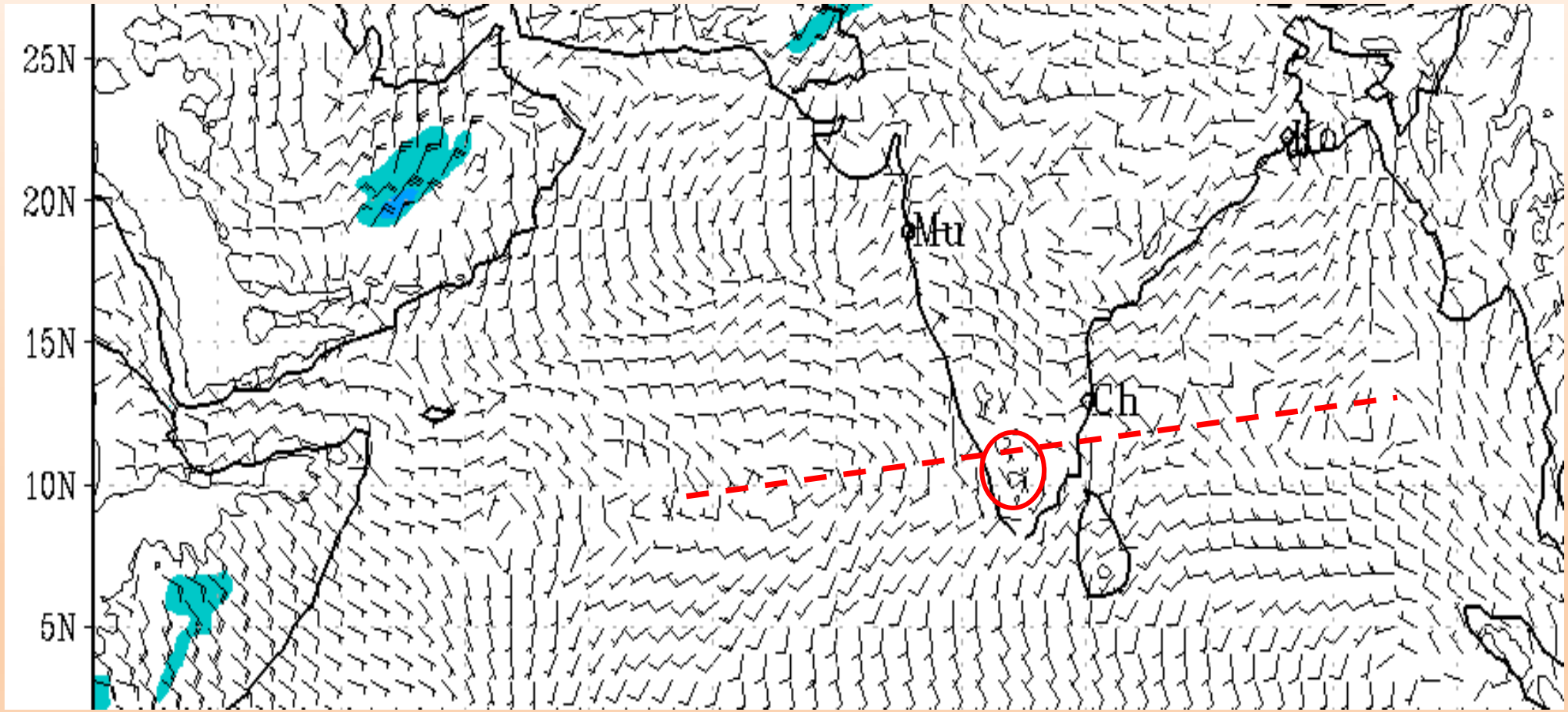

03 – 07 Oct, 2023 @ 850 hPa
30N
27N
24N
21N
18N
15N
12N
9N
6N
3N
EQ
50E
55E
60E
65E
70E
75E
80E
85E
90E
95E
100E


08 – 12 Oct, 2023 @ 850 hPa
30N
27N
24N
21N
18N
15N
12N
9N
6N
3N
EQ
50E
55E
60E
65E
70E
75E
80E
85E
90E
95E
100E

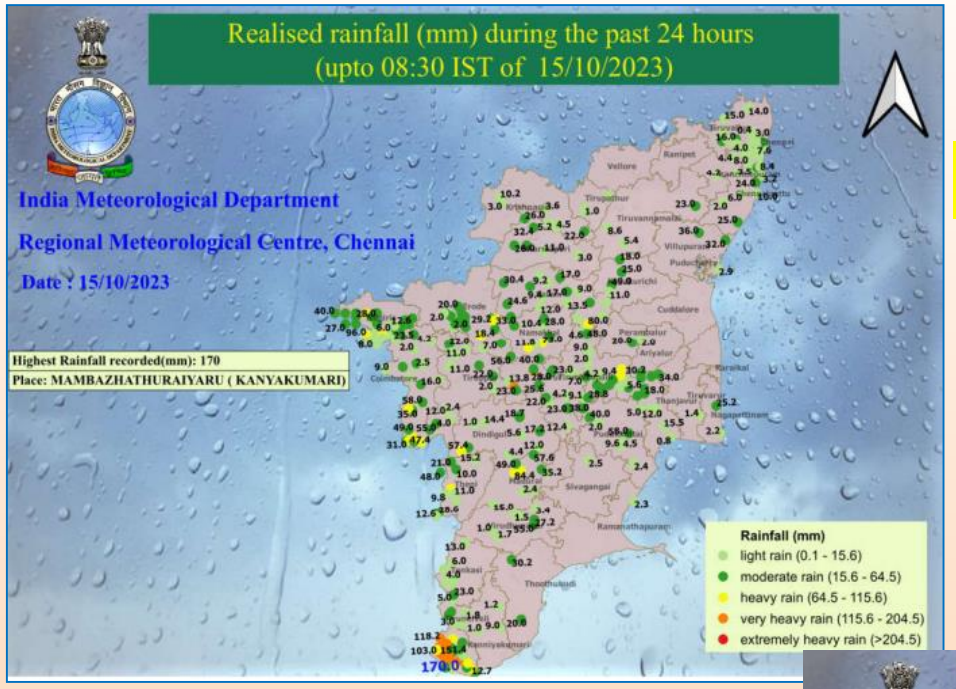

13 – 17 Oct, 2023 @ 850 hPa
30N
27N
24N
21N
18N
15N
12N
9N
6N
3N
EQ
50E
55E
60E
65E
70E
75E
80E
85E
90E
95E
100E

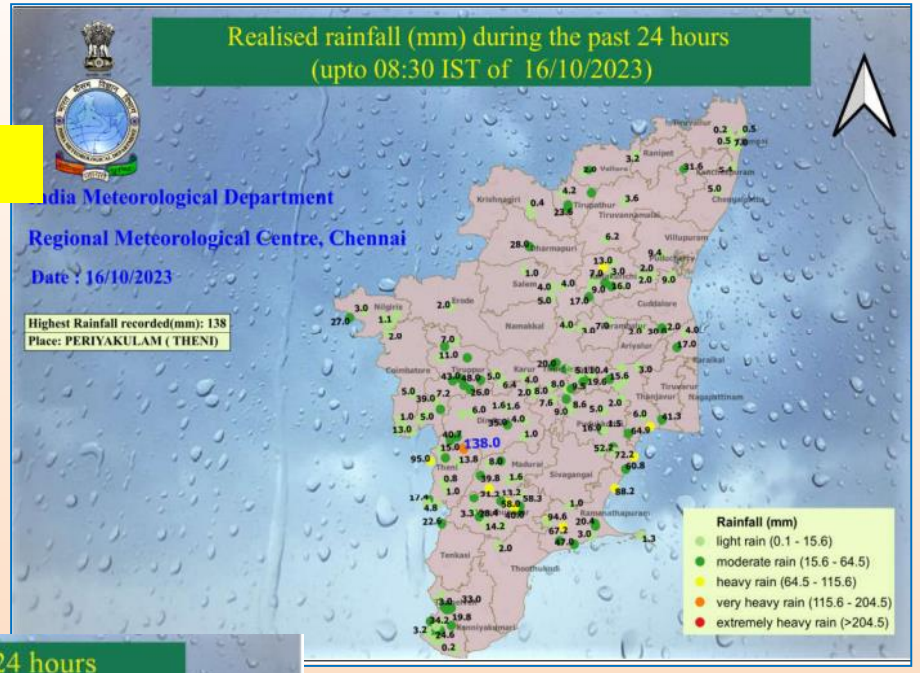

18 – 22 Oct, 2023 @ 850 hPa
30N
27N
24N
21N
18N
15N
12N
9N
6N
3N
EQ
50E
55E
60E
65E
70E
75E
80E
85E
90E
95E
100E

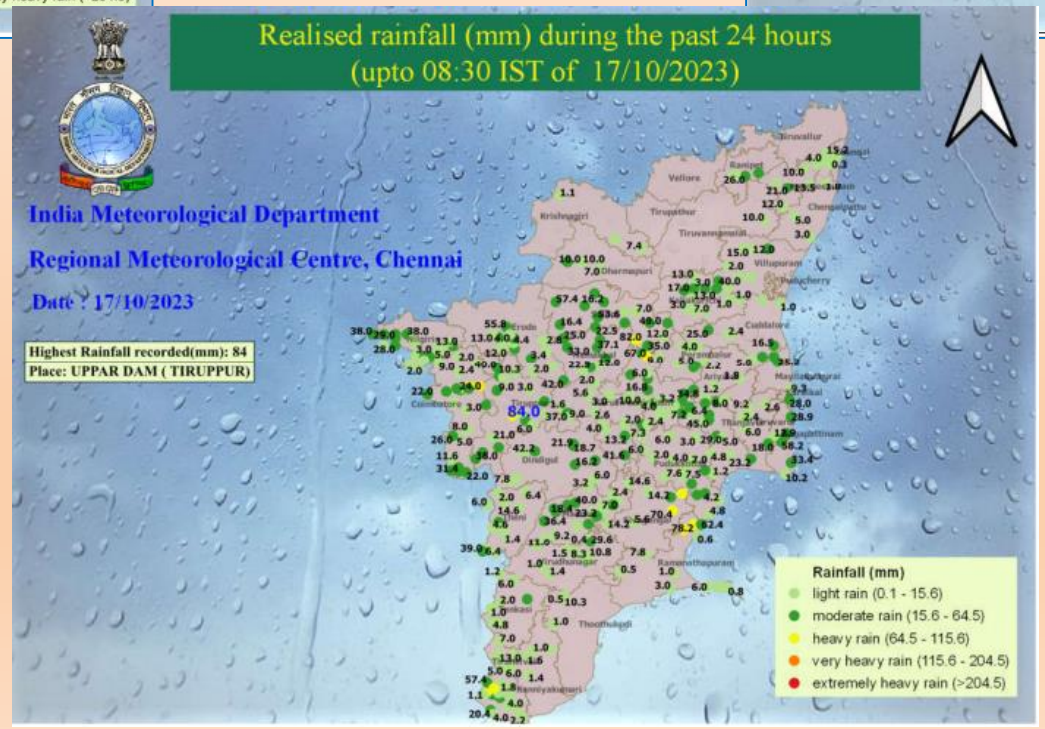
EAST- WEST SHEAR ZONE
14.10.2023



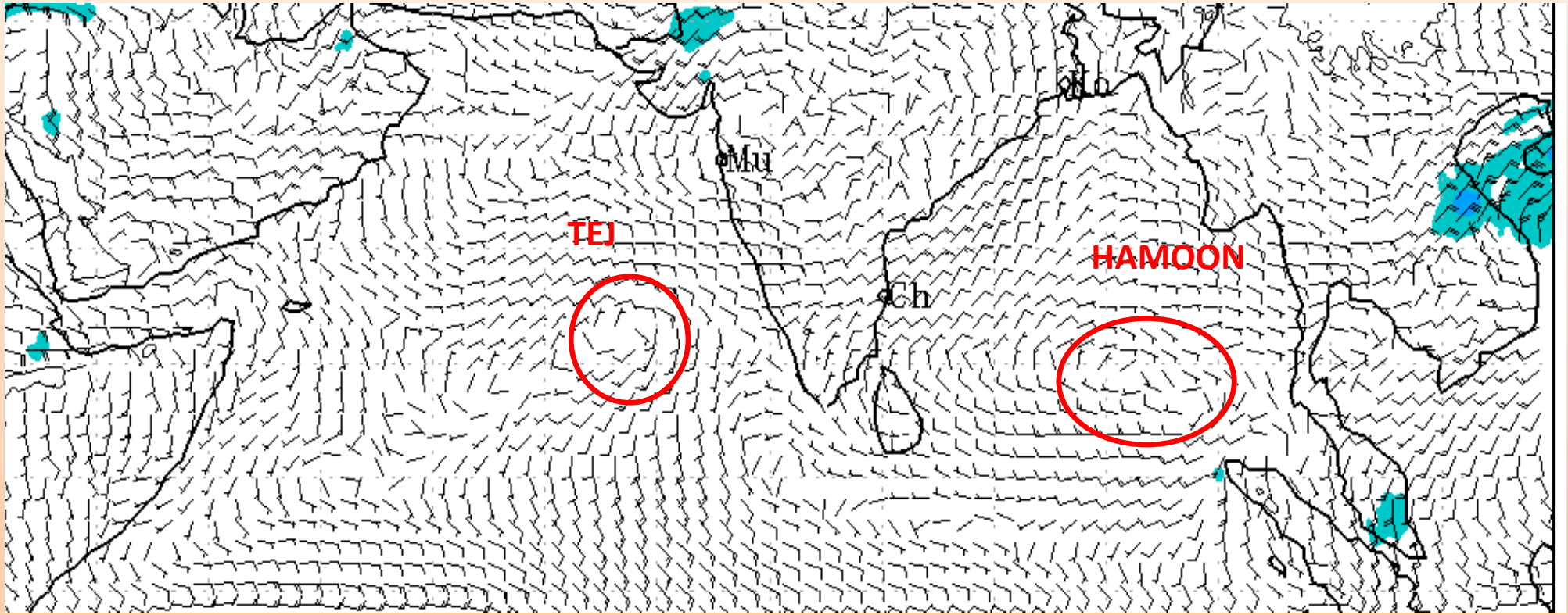
15 TH – 17TH OCT



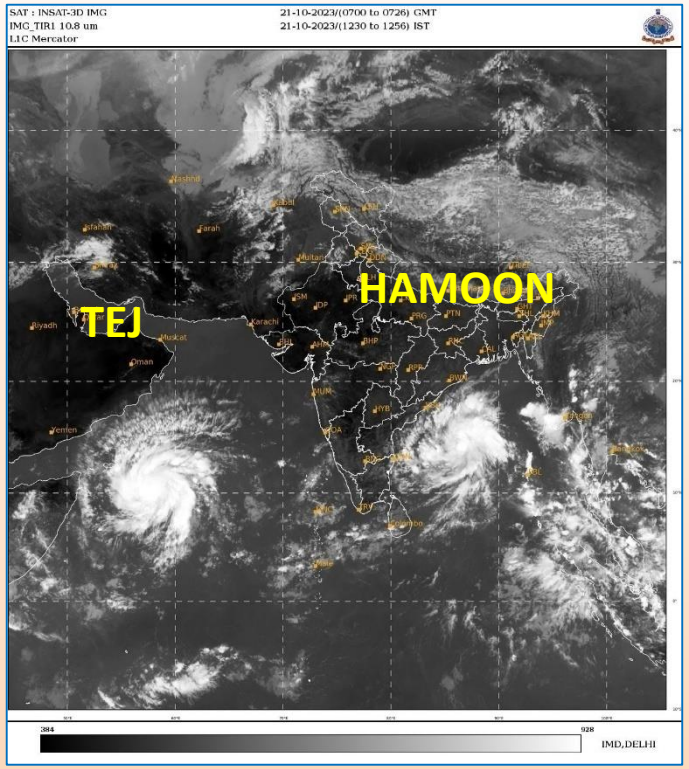


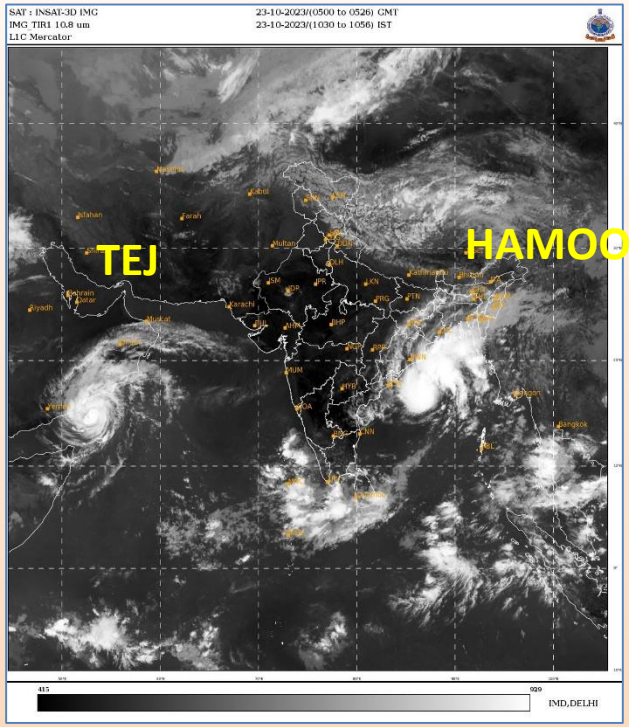


17/10/23



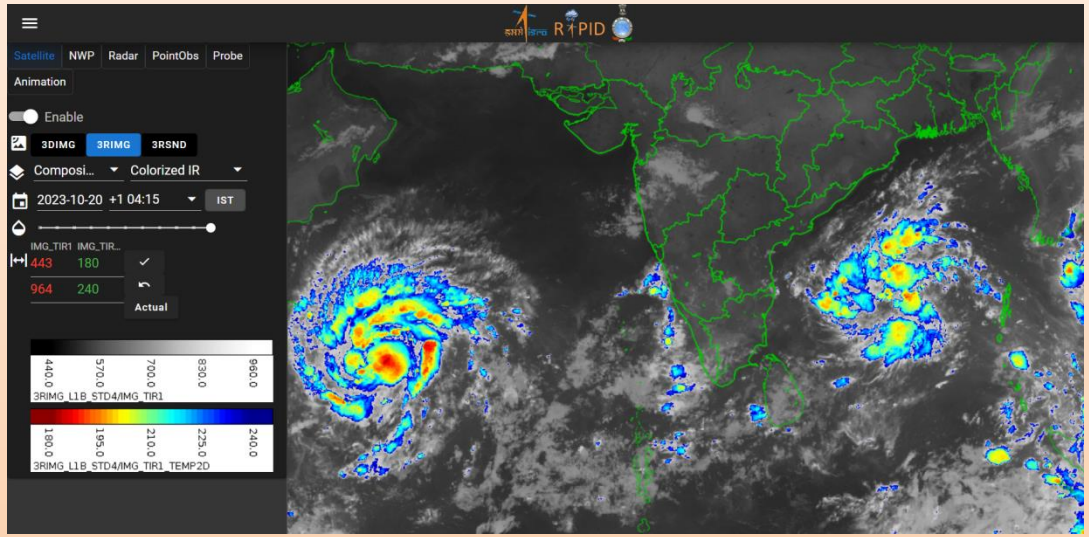
21.10.2023 / 13:00 IST

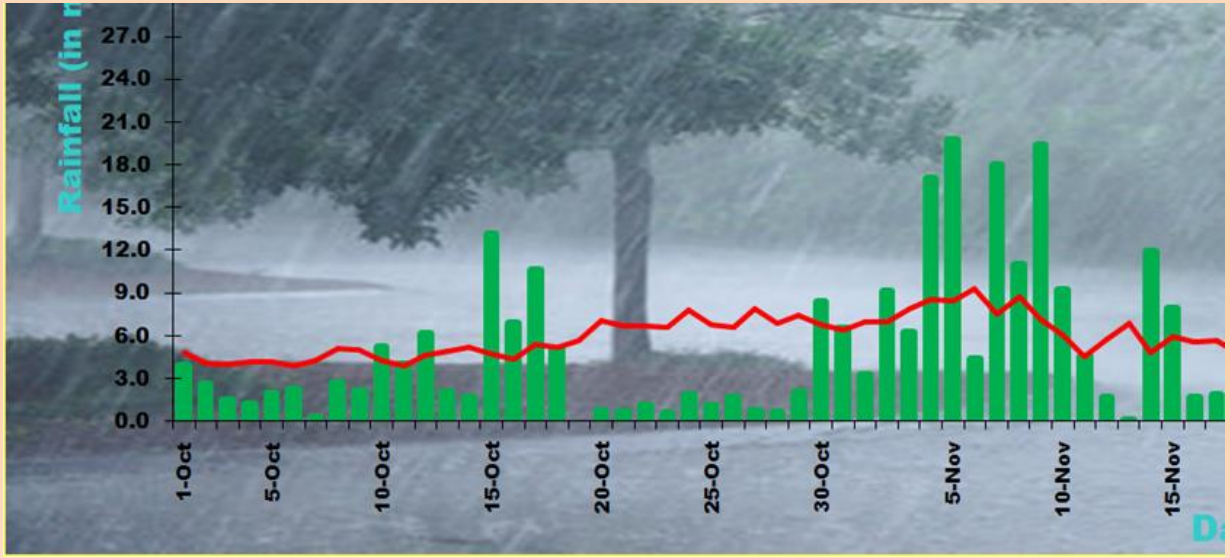




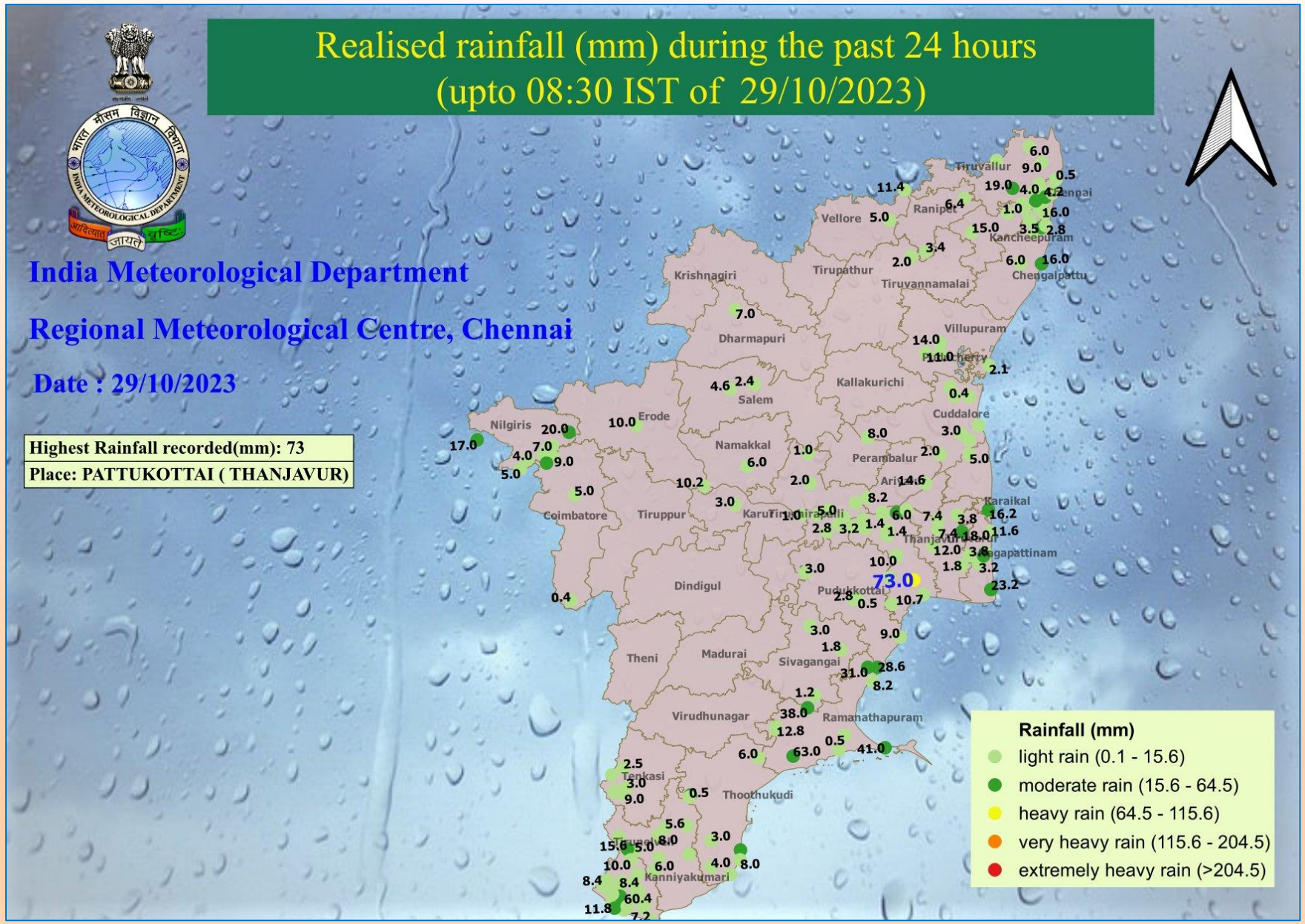
23.10.2023 / 10:00 IST

TEJ over AS during 20th-24th& HAMOON over BOB during 21st-25th Oct 2023





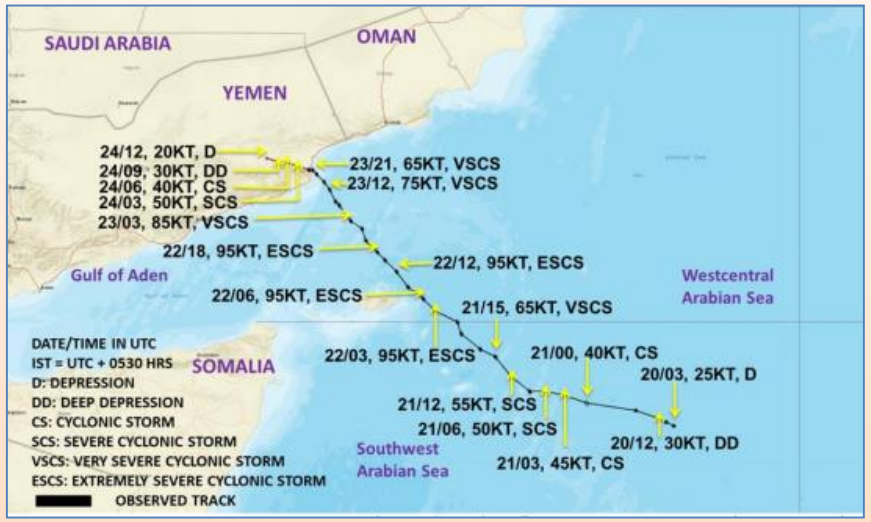
Realised rainfall (mm) during the past 24 hours
(upto 08:30 IST of 29/10/2023)



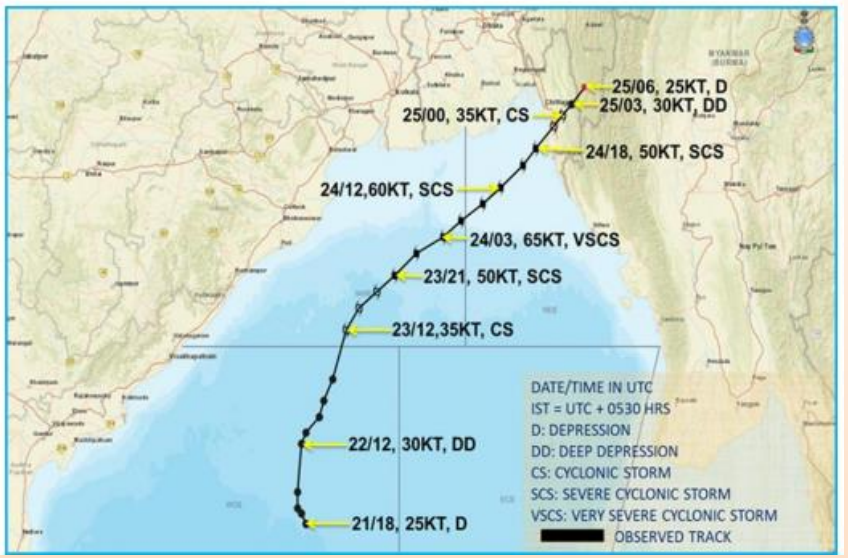
Synoptic Systems during Oct-Dec 2023

Synoptic systems	
ESCS TEJ over the AS	20-24 OCT; crossed Yemen coast
VSCS HAMOON over the BOB	21-25 OCT; crossed B'desh coast
CS MIDHILI over the BOB	15-18 NOV; crossed B'desh coast
SCS MICHAUNG over the BOB	01-06 DEC; crossed south AP coast south of Bapatla

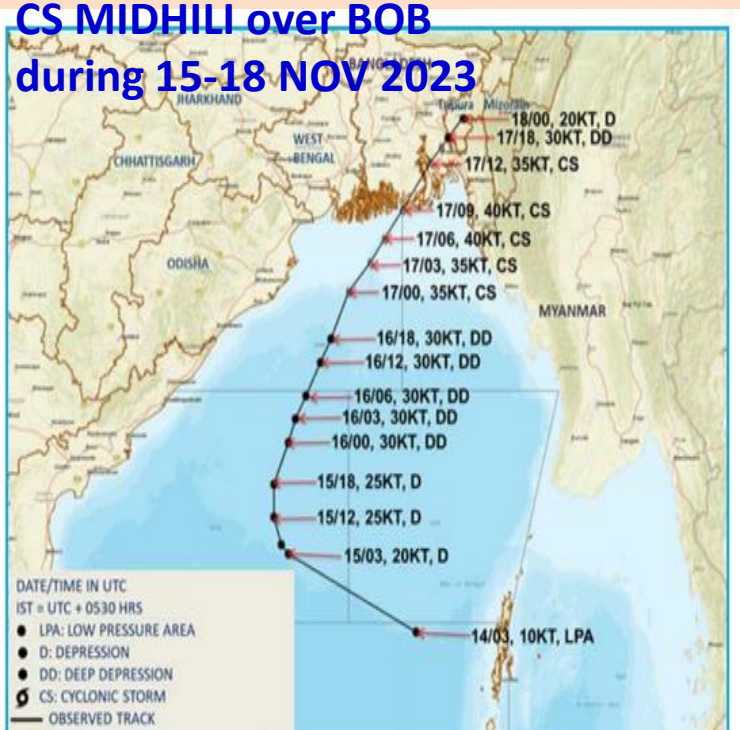
Track of ESCS TEJ over AS during 20-24 OCT 2023



Track of VSCS HAMOON over BOB during 21-25 OCT 2023

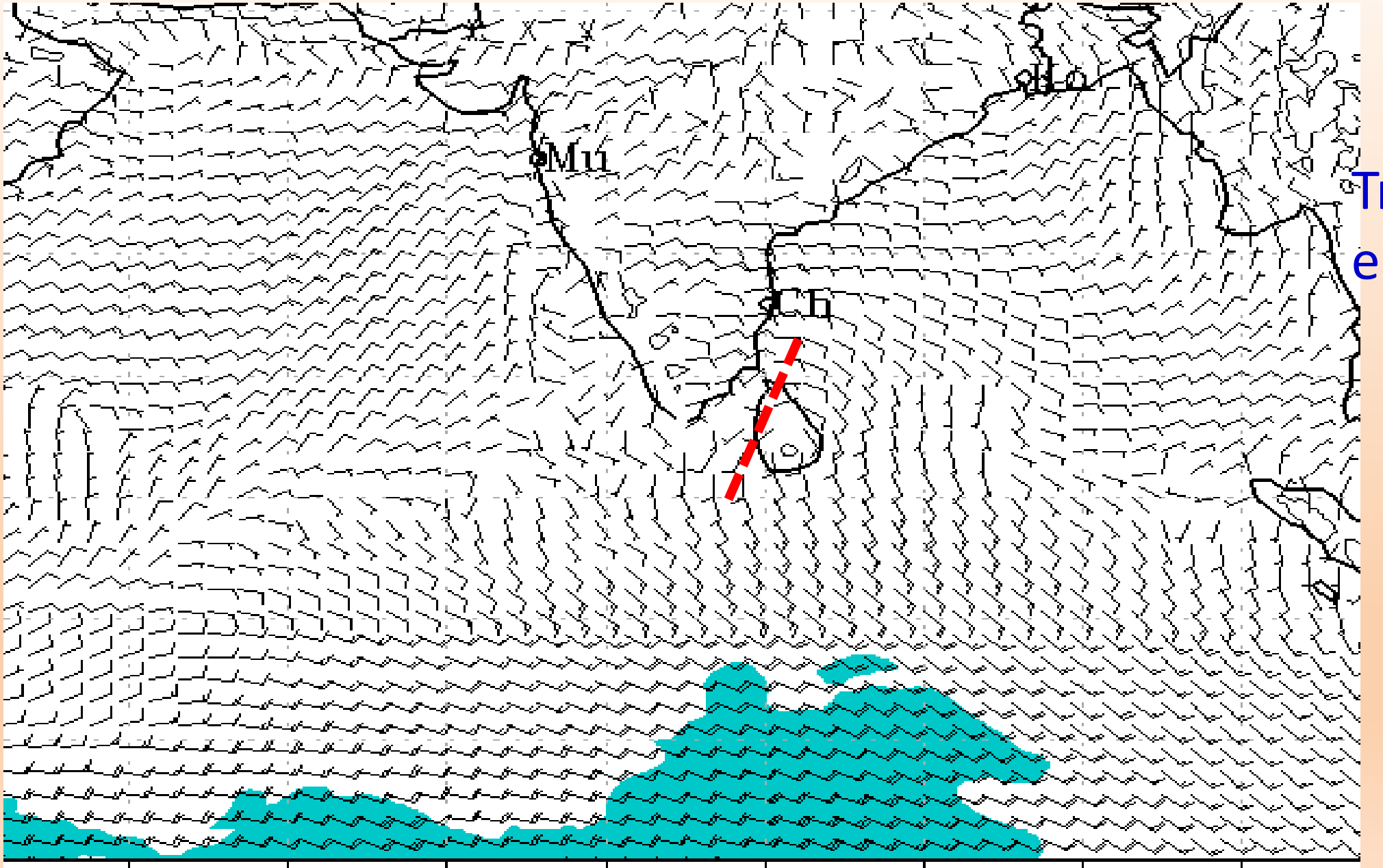


CS MIDHILI over BOB during 15-18 NOV 2023

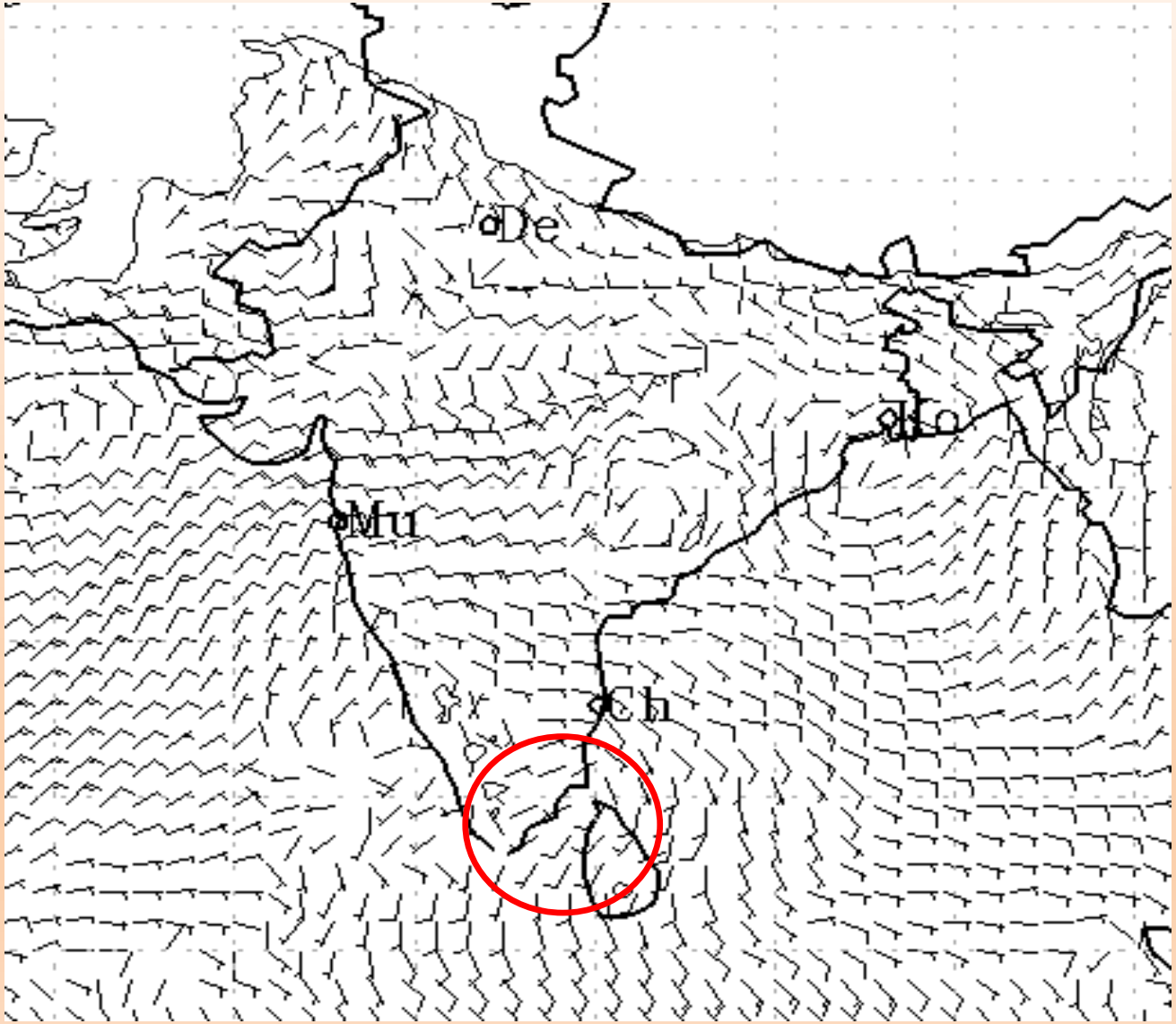


SCS MICHAUNG over BOB during 01-06 DEC 2023

3.11.22023

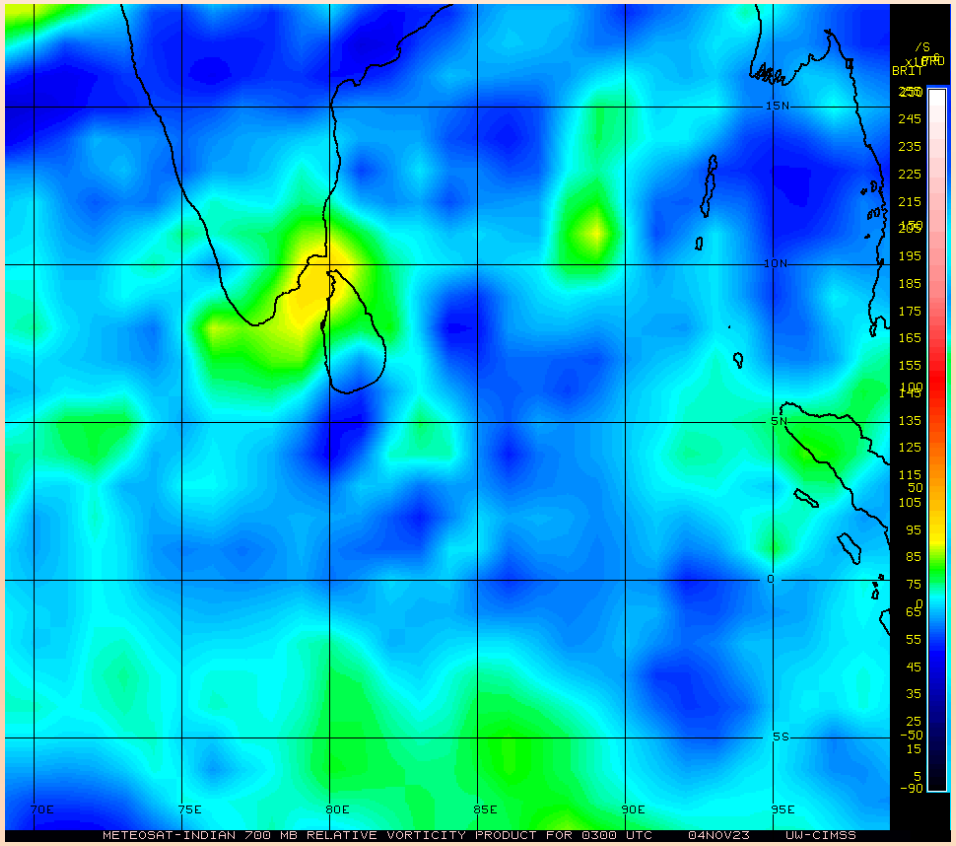


Trough in easterlies

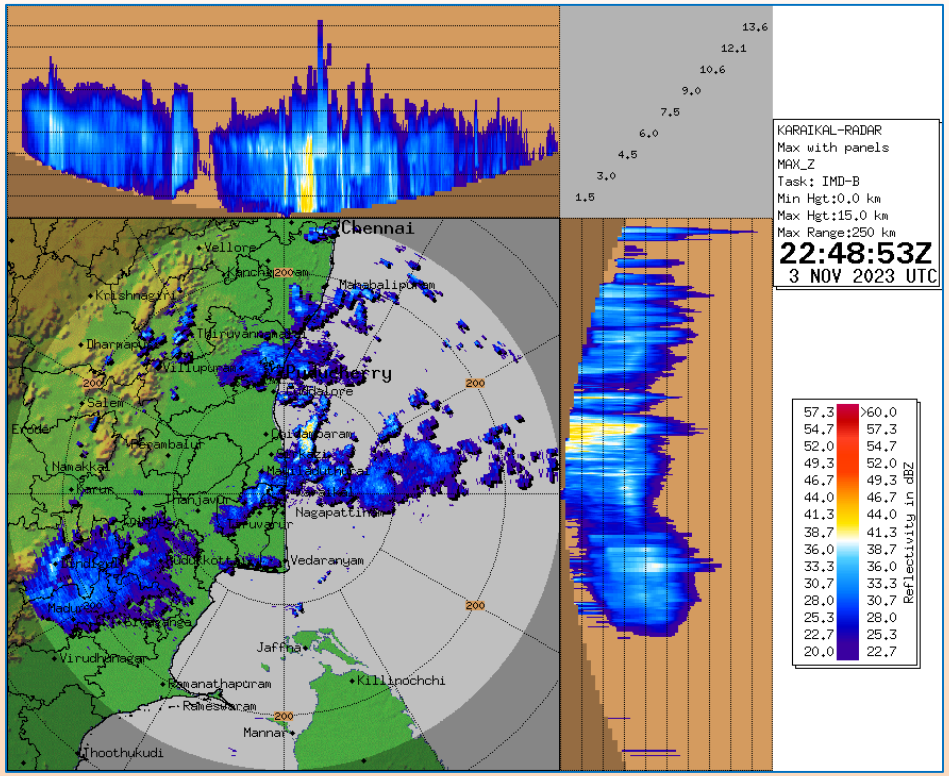


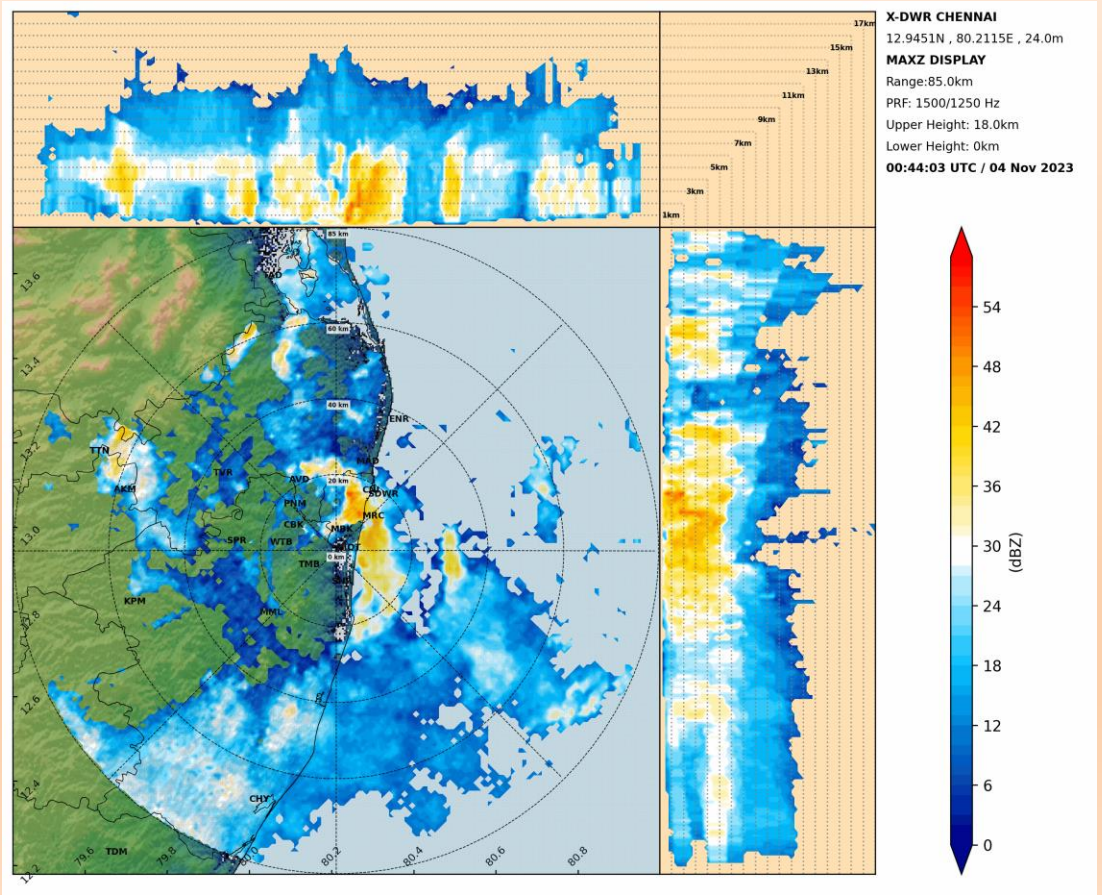
4.11.2023

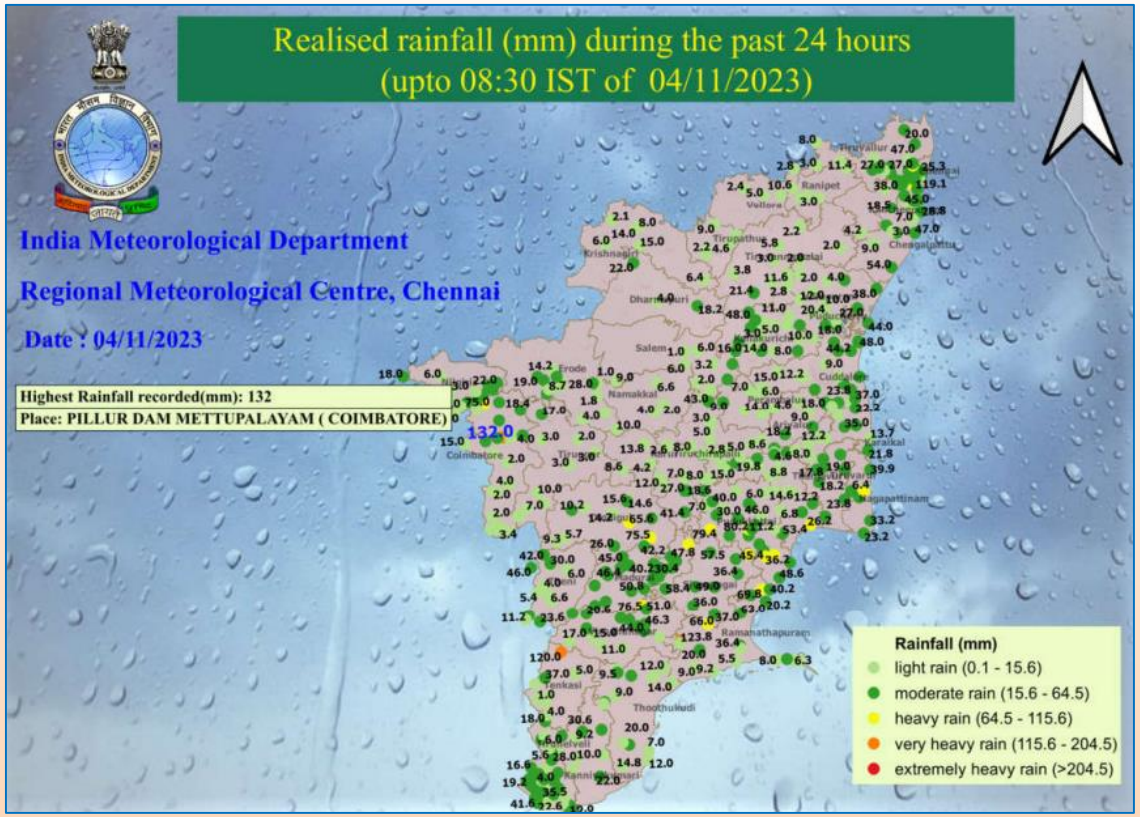
Cycir over STN & n'hood

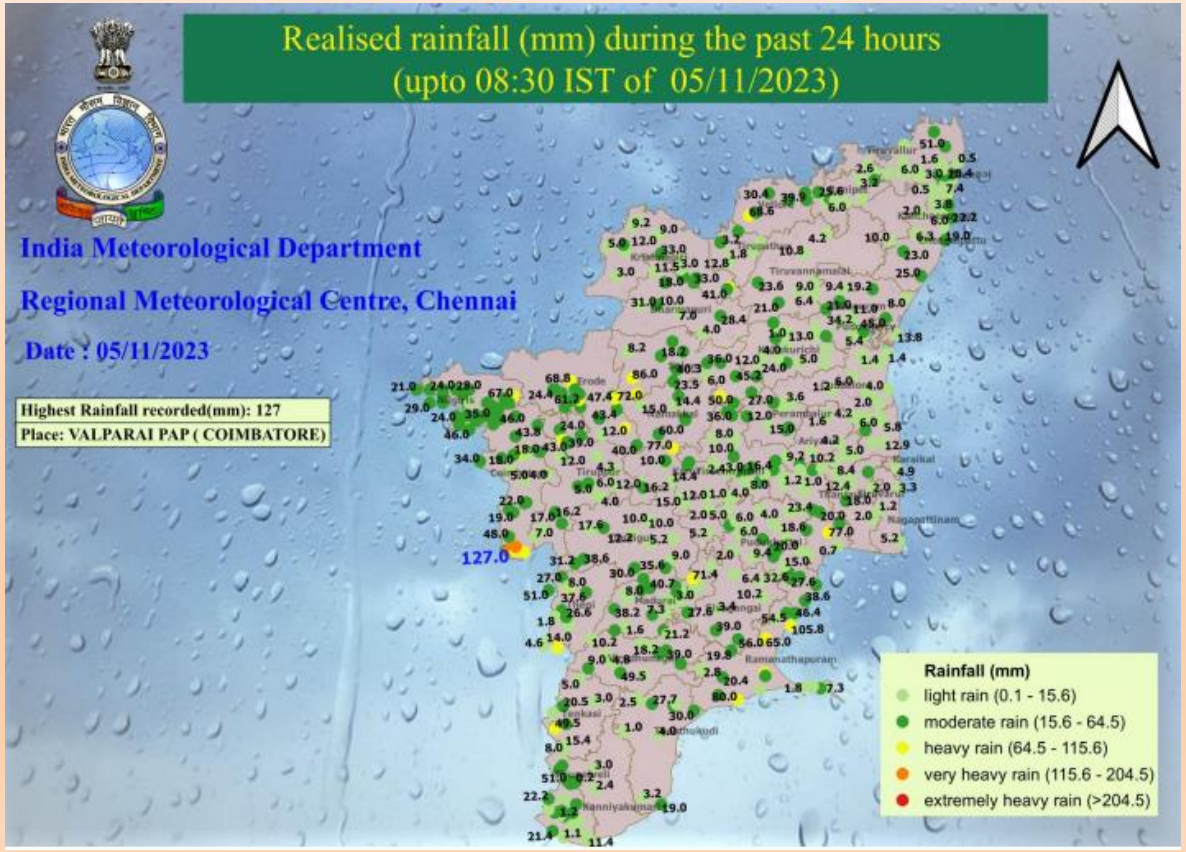


3.11.2023


KARAIKAL-RADAR
Max with panels
MAX_Z
Task: IMD-B
Min Hgt:0.0 km
Max Hgt:15.0 km
Max Range:250 km
22:48:53Z
3 NOV 2023 UTC
Reflectivity in dBZ
Chennai
Vellore
Kanchipuram
Mahabalipuram
Krishnagiri
Tiruvannamalai
Dharmapuri
Villupuram
Puducherry
Cuddalore
Salem
Erode
Perambalur
Kumbakonam
Namakkal
Karur
Thanjavur
Nagapattinam
Tiruvarur
Pudukkottai
Vedaranyam
Madurai
Sivaganga
Jaffna
Virudhunagar
Ramanathapuram
Killinochchi
Rameswaram
Mannar
Thoothukudi

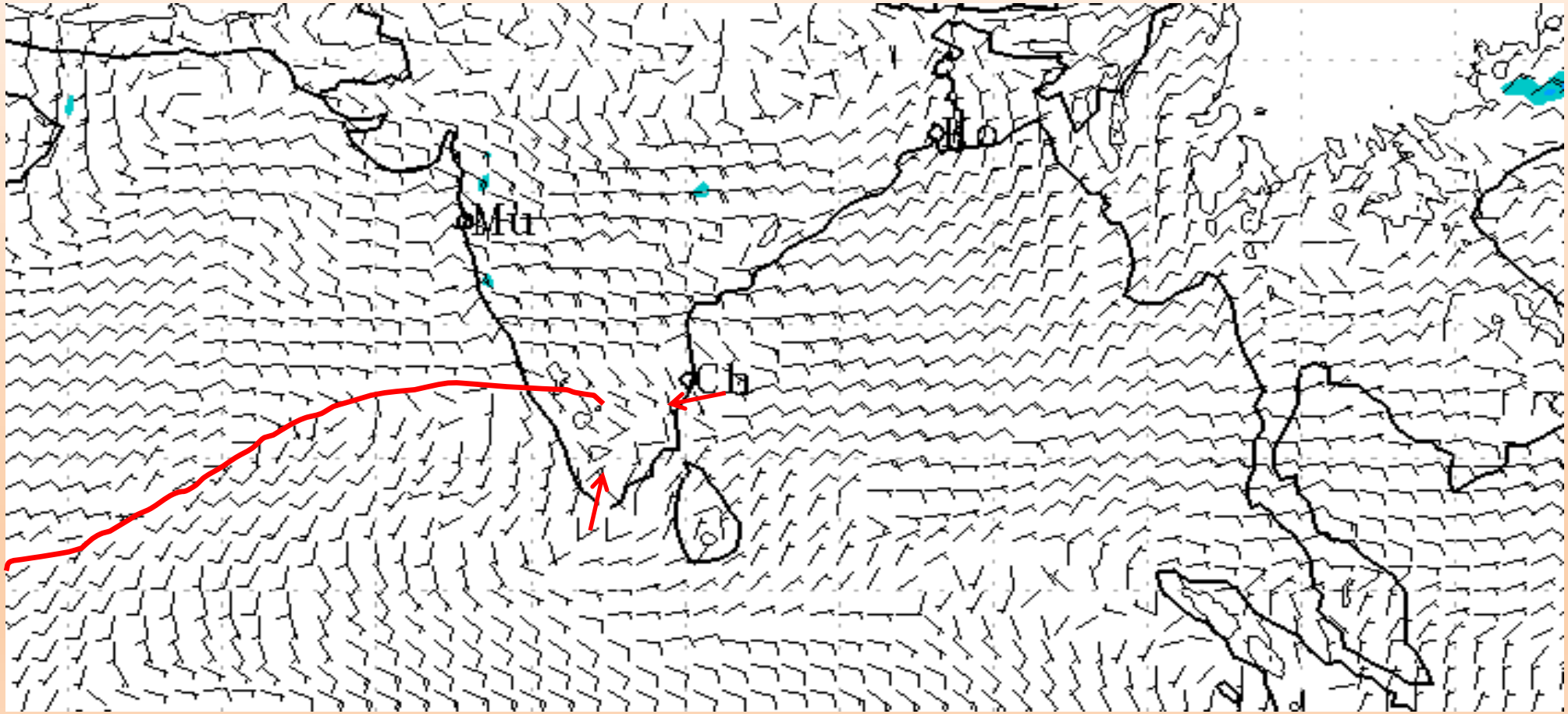

X-DWR CHENNAI
12.9451N , 80.2115E , 24.0m
MAXZ DISPLAY
Range:85.0km
PRF: 1500/1250 Hz
Upper Height: 18.0km
Lower Height: 0km
00:44:03 UTC / 04 Nov 2023
(dBZ)
ENR
TTN
TNR
AKM
AVD
PNM
CBK
SPR
WTB
TMB
KPM
MRC
CDWR
CHY
TDM


Realised rainfall (mm) during the past 24 hours
(upto 08:30 IST of 04/11/2023)
India Meteorological Department
Regional Meteorological Centre, Chennai
Date : 04/11/2023
Highest Rainfall recorded(mm): 132
Place: PILLUR DAM METTUPALAYAM (COIMBATORE)
132.0
Rainfall (mm)
light rain (0.1 - 15.6)
moderate rain (15.6 - 64.5)
heavy rain (64.5 - 115.6)
very heavy rain (115.6 - 204.5)
extremely heavy rain (>204.5)

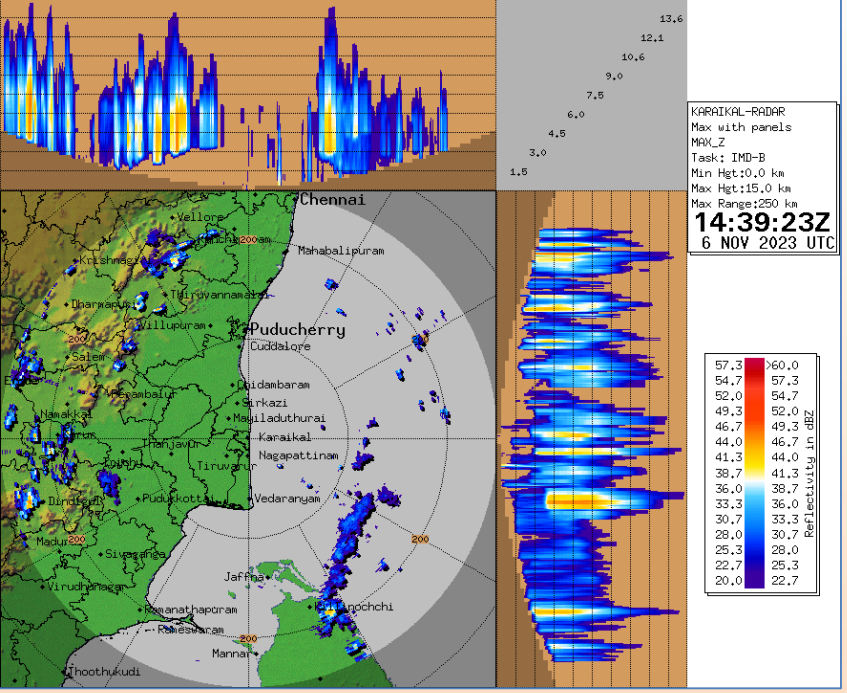

Realised rainfall (mm) during the past 24 hours
(upto 08:30 IST of 05/11/2023)
India Meteorological Department
Regional Meteorological Centre, Chennai
Date : 05/11/2023
Highest Rainfall recorded(mm): 127
Place: VALPARAI PAP (COIMBATORE)
127.0
Rainfall (mm)
light rain (0.1 - 15.6)
moderate rain (15.6 - 64.5)
heavy rain (64.5 - 115.6)
very heavy rain (115.6 - 204.5)
extremely heavy rain (>204.5)

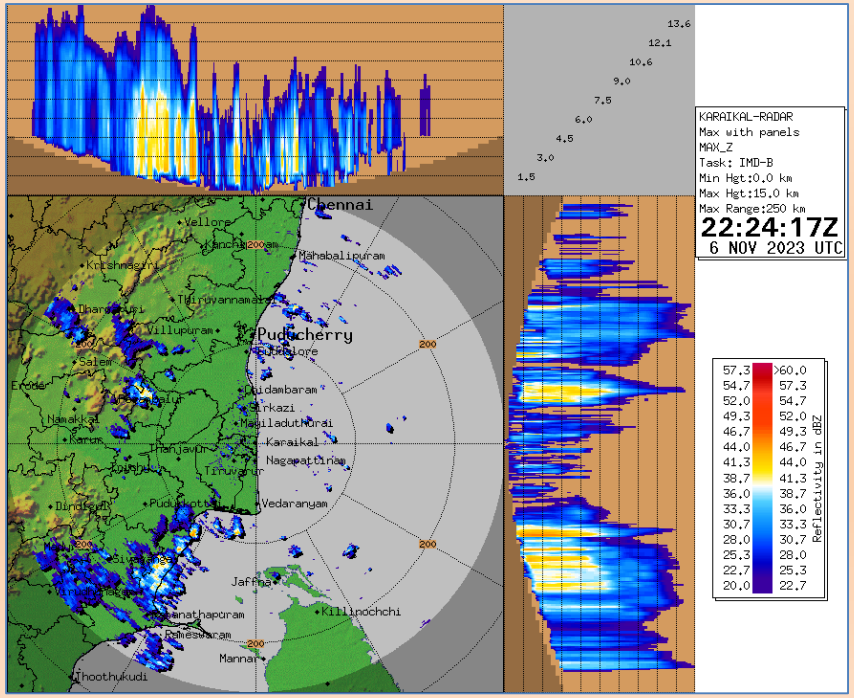
TN→ WS, ACT

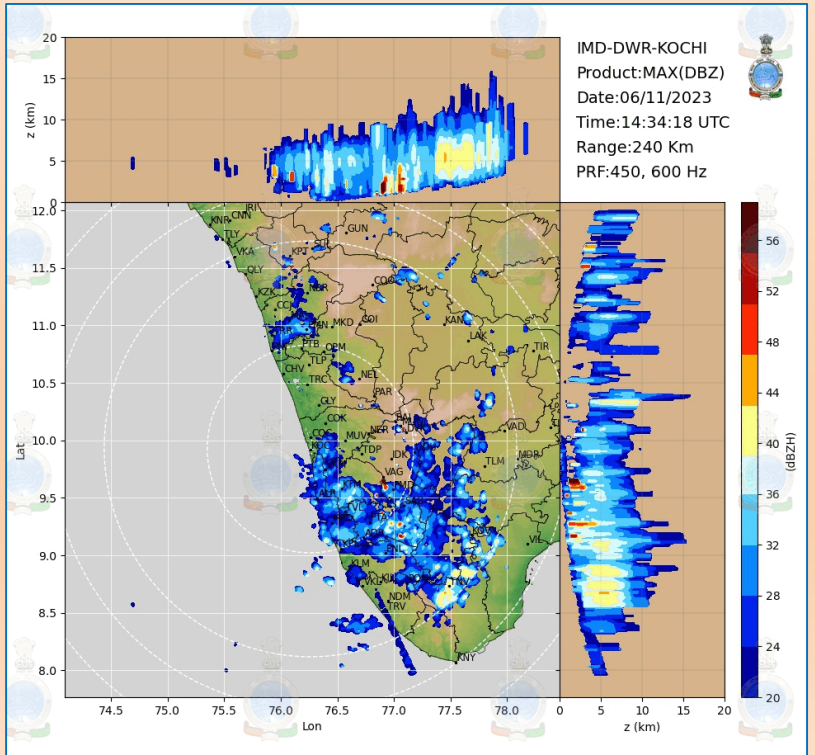
6.11.2023

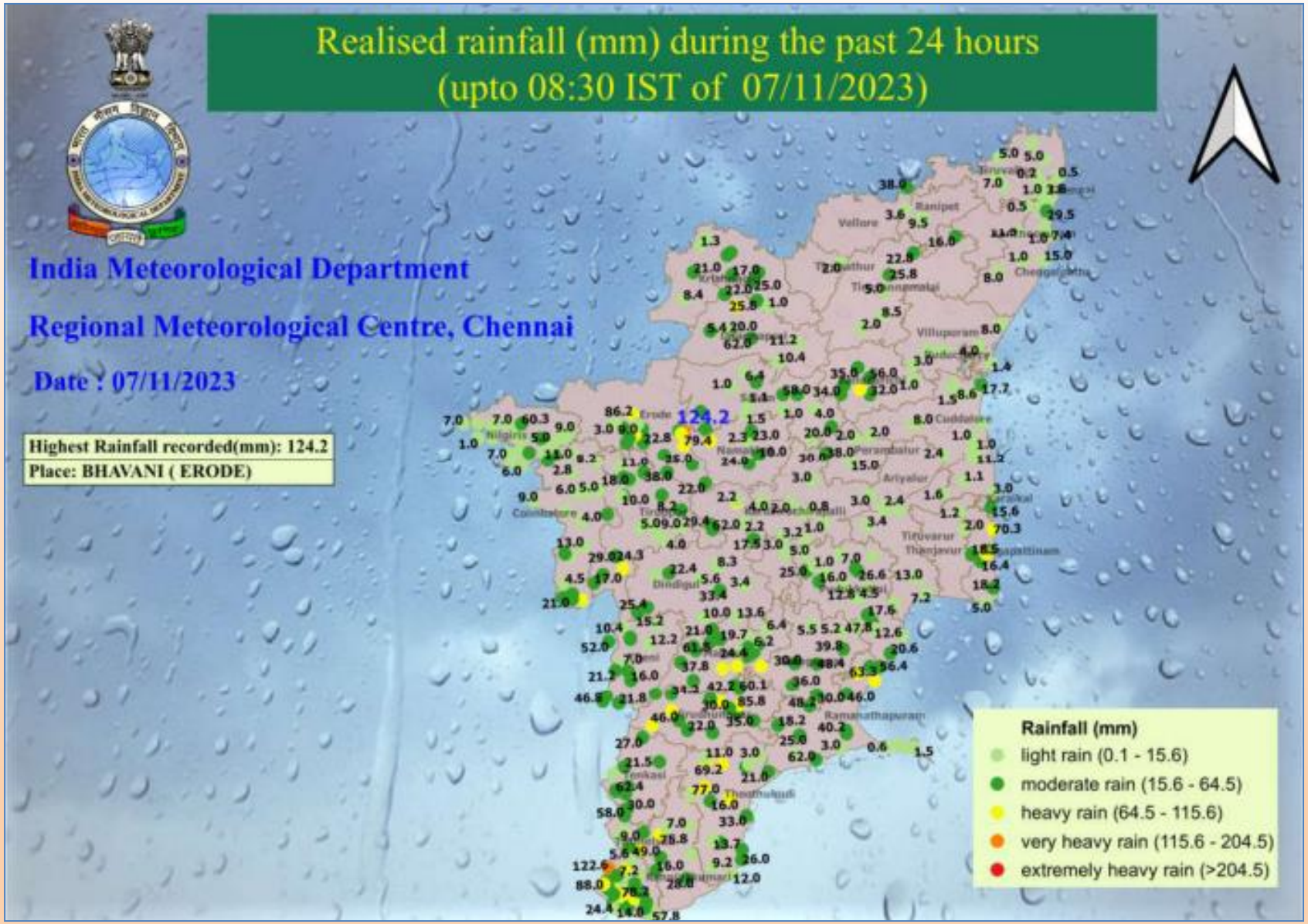


6.11.2023

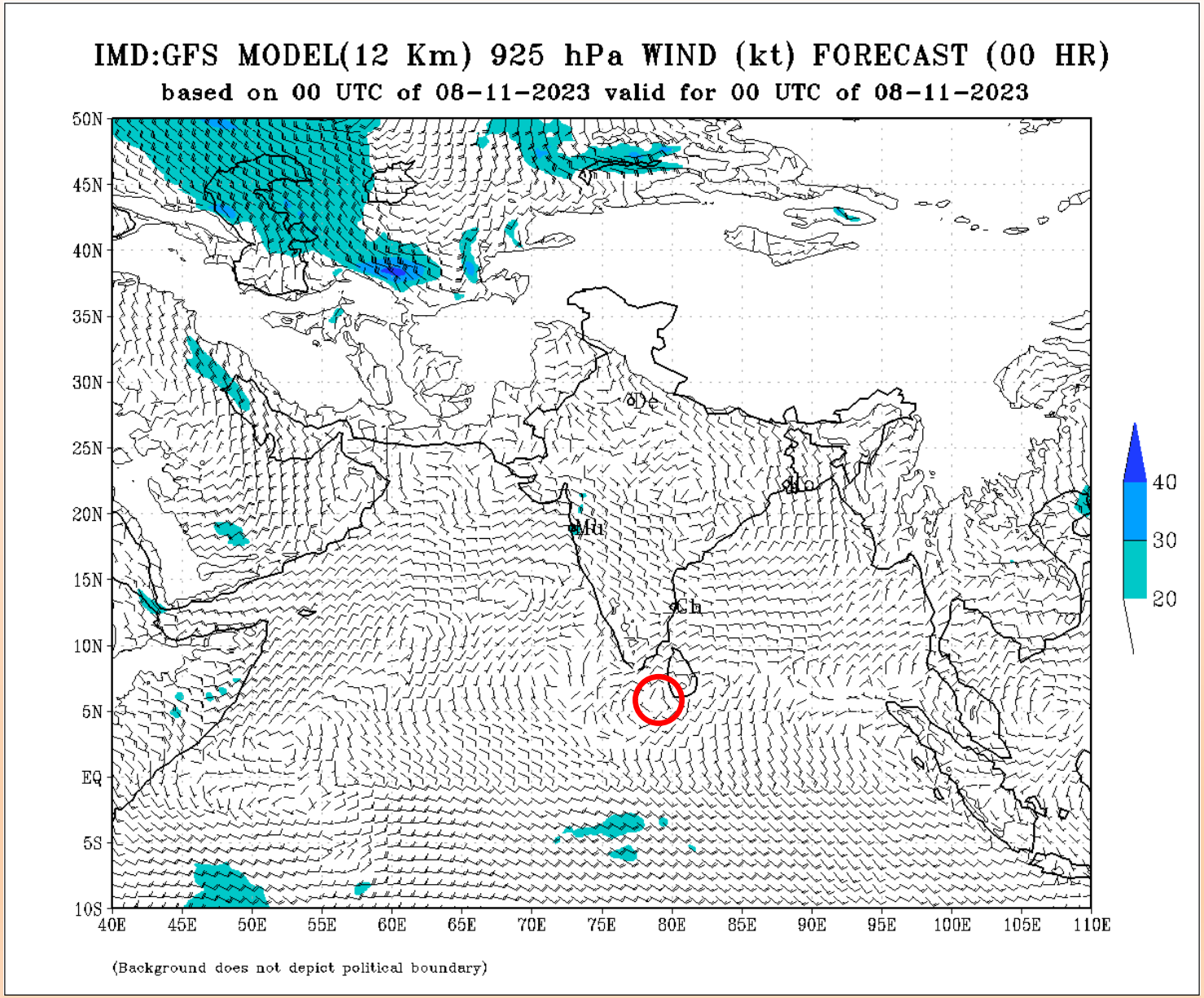

KARAIKAL-RADAR
Max with panels
MAX_Z
Task: IMD-B
Min Hgt:0.0 km
Max Hgt:15.0 km
Max Range:250 km
14:39:23Z
6 NOV 2023 UTC
Reflectivity in dBZ
Chennai
Puducherry
Mahabalipuram
Cuddalore
Chidambaram
Sirkazi
Karaikal
Nagapattinam
Vedaranyam
Jaffna
Killinochchi
Rameswaram
Mannar
Thoothukudi


KARAIKAL-RADAR
Max with panels
MAX_Z
Task: IMD-B
Min Hgt:0.0 km
Max Hgt:15.0 km
Max Range:250 km
22:24:17Z
6 NOV 2023 UTC
Reflectivity in dBZ
Chennai
Puducherry
Mahabalipuram
Cuddalore
Chidambaram
Sirkazi
Karaikal
Nagapattinam
Vedaranyam
Jaffna
Killinochchi
Rameswaram
Mannar
Thoothukudi

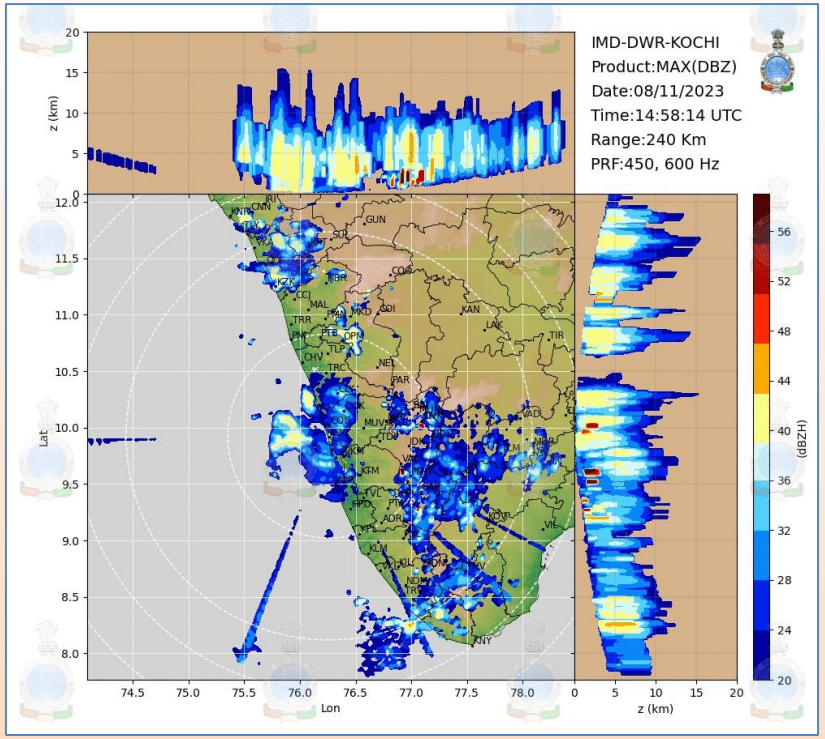

IMD-DWR-KOCHI
Product:MAX(DBZ)
Date:06/11/2023
Time:14:34:18 UTC
Range:240 Km
PRF:450, 600 Hz
z (km)
Lat
Lon
z (km)
(dBZH)

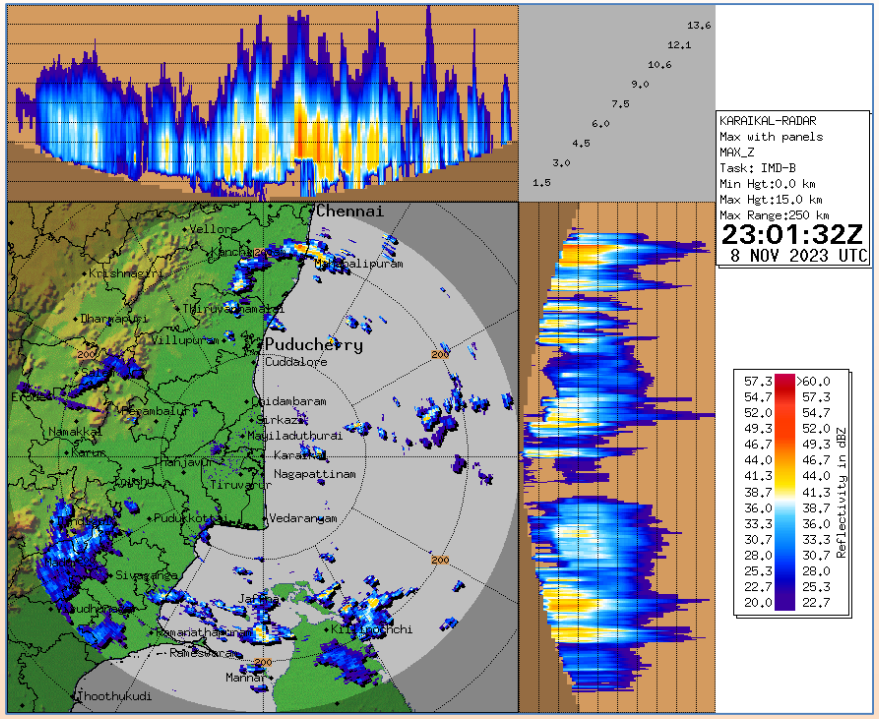

Realised rainfall (mm) during the past 24 hours
(upto 08:30 IST of 07/11/2023)
India Meteorological Department
Regional Meteorological Centre, Chennai
Date : 07/11/2023
Highest Rainfall recorded(mm): 124.2
Place: BHAVANI (ERODE)
124.2
Rainfall (mm)
light rain (0.1 - 15.6)
moderate rain (15.6 - 64.5)
heavy rain (64.5 - 115.6)
very heavy rain (115.6 - 204.5)
extremely heavy rain (>204.5)

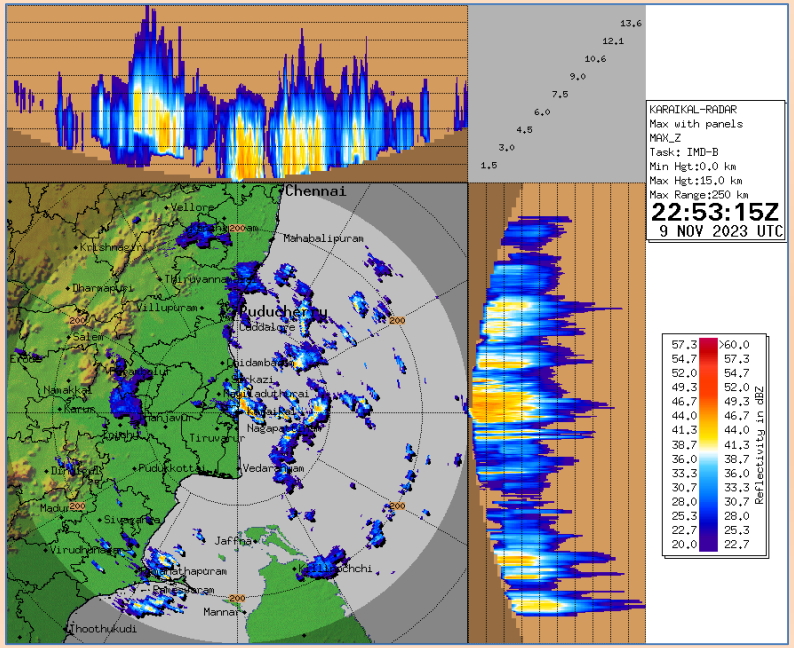
TN→FWS, ACT

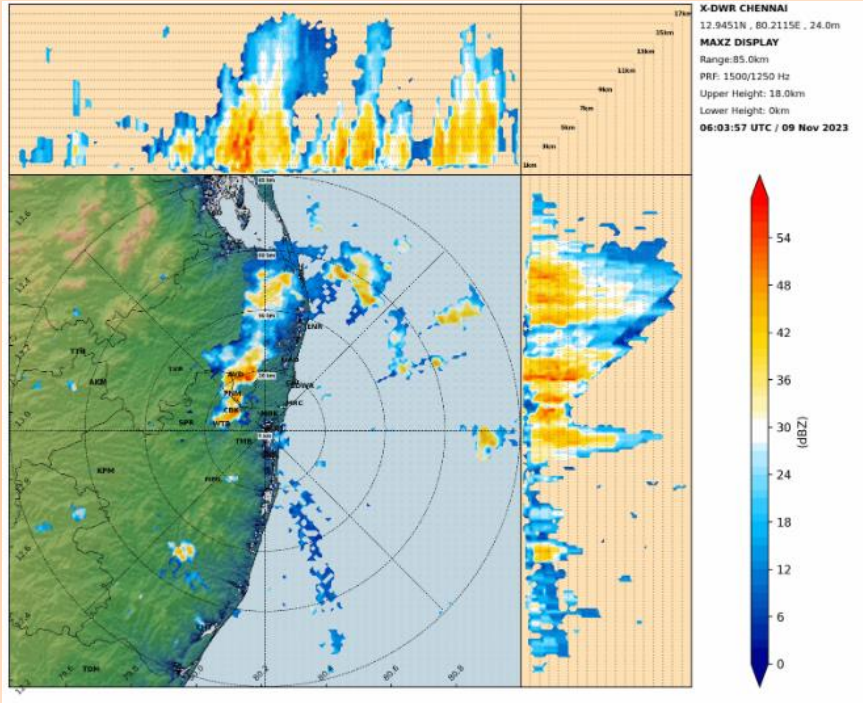


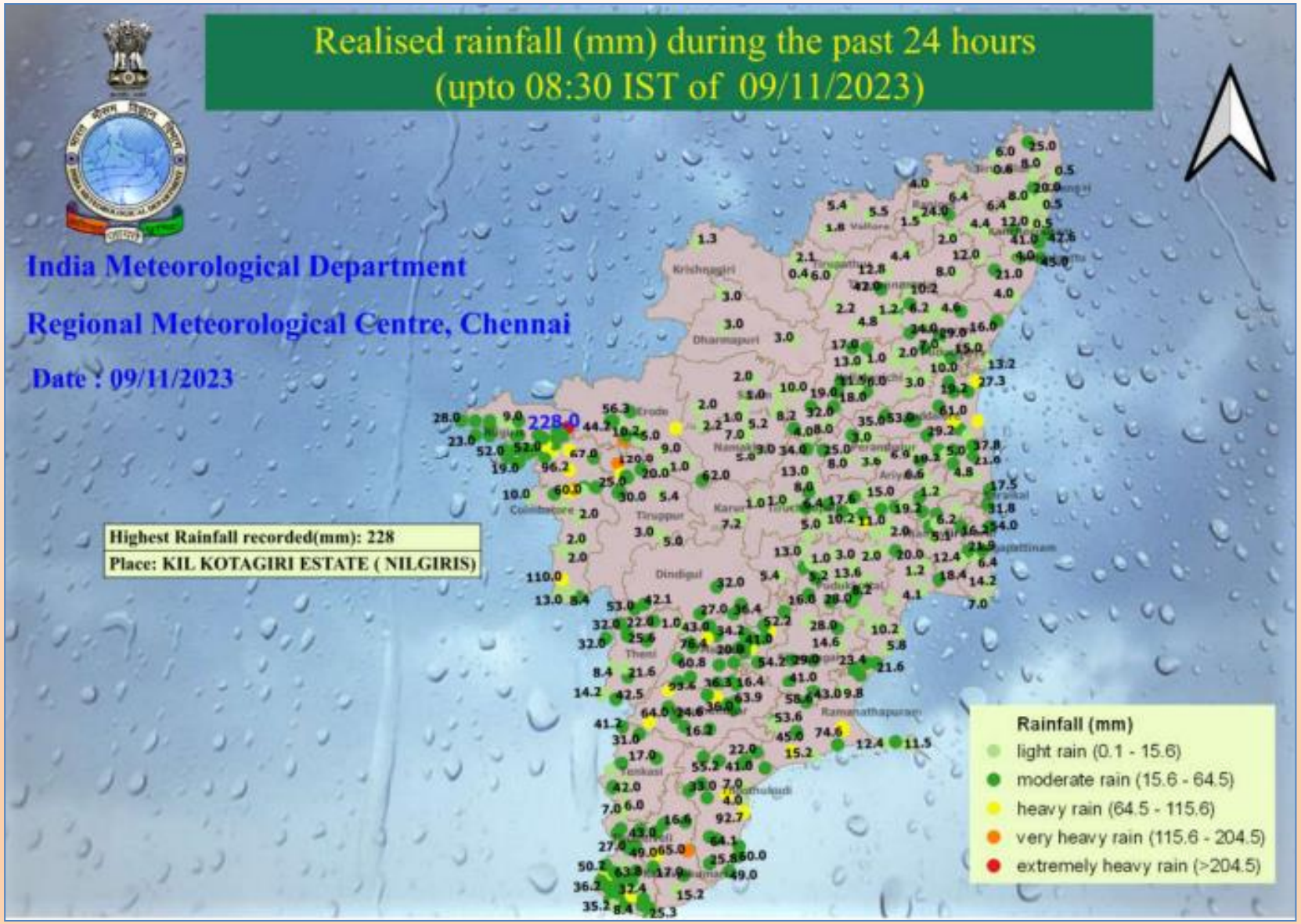
08-09 Nov
Cycir over
Comorin area
& n'hood


IMD-DWR-KOCHI
Product:MAX(DBZ)
Date:08/11/2023
Time:14:58:14 UTC
Range:240 Km
PRF:450, 600 Hz
z (km)
Lat
Lon
z (km)
(dBZH)


KARAIKAL-RADAR
Max with panels
MAX_Z
Task: IMD-B
Min Hgt:0.0 km
Max Hgt:15.0 km
Max Range:250 km
23:01:32Z
8 NOV 2023 UTC
Chennai
Puducherry
Reflectivity in dBZ

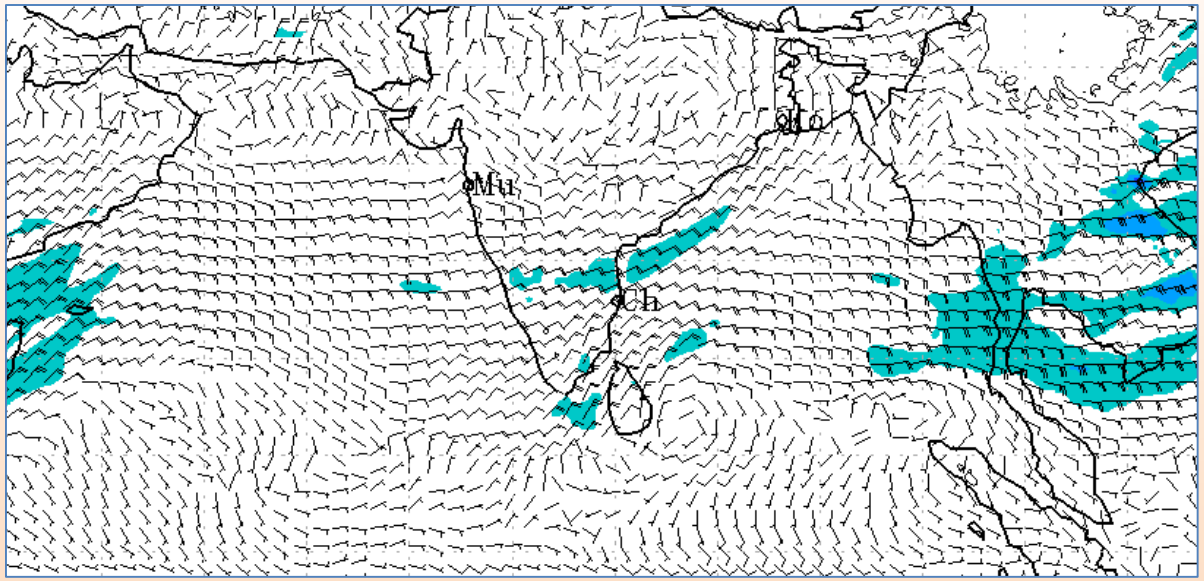

KARAIKAL-RADAR
Max with panels
MAX_Z
Task: IMD-B
Min Hgt:0.0 km
Max Hgt:15.0 km
Max Range:250 km
22:53:15Z
9 NOV 2023 UTC
Chennai
Puducherry
Reflectivity in dBZ


X-DWR CHENNAI
12.9451N , 80.2115E , 24.0m
MAXZ DISPLAY
Range:85.0km
PRF: 1500/1250 Hz
Upper Height: 18.0km
Lower Height: 0km
06:03:57 UTC / 09 Nov 2023
(dBZ)



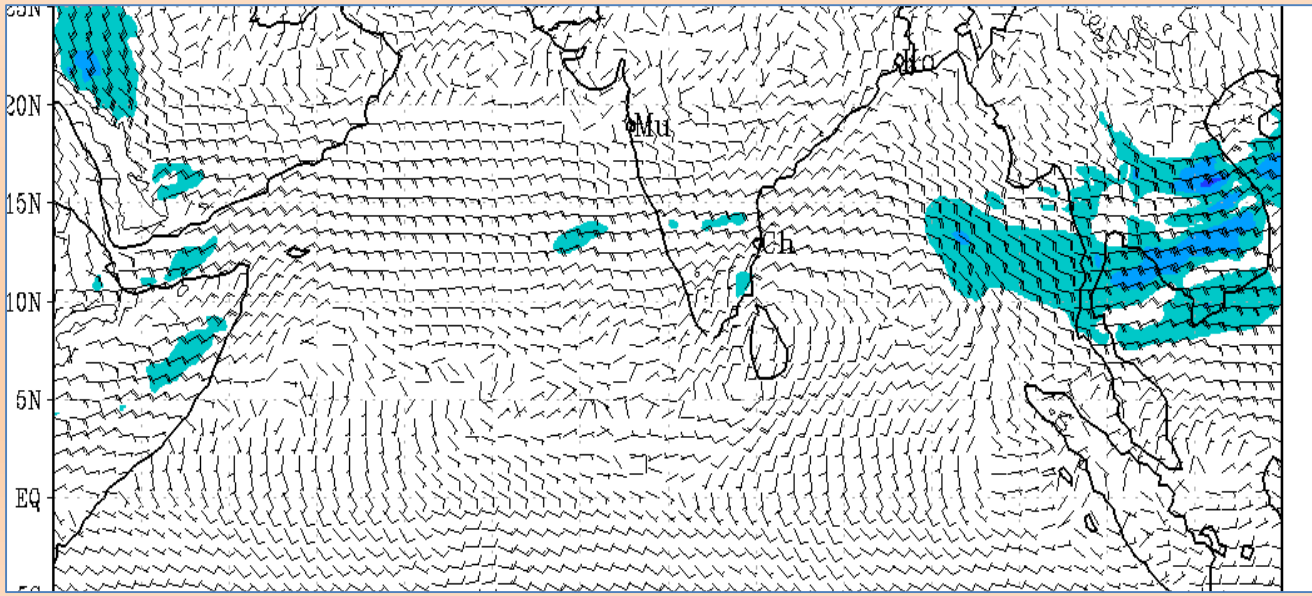
TN→WS, ACT

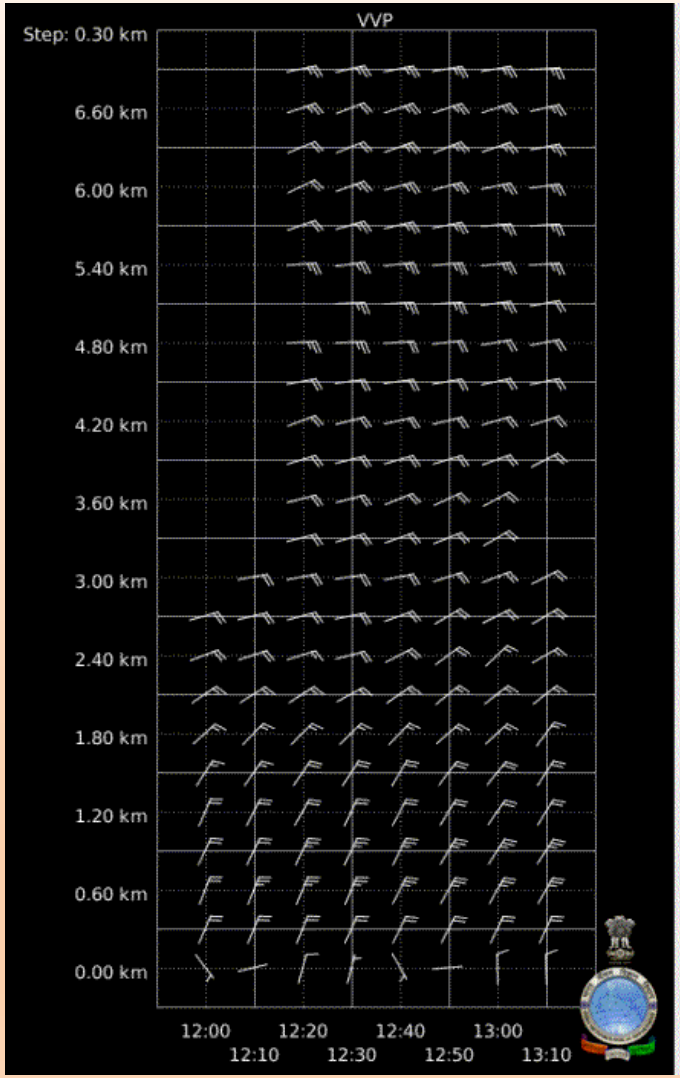
Kil Kotagiri Estate (Nilgris): 23 cm



13-14 NOV

Strengthening of NEly-Ely winds along TN coast in association with formation of a LOPAR over SE BOB

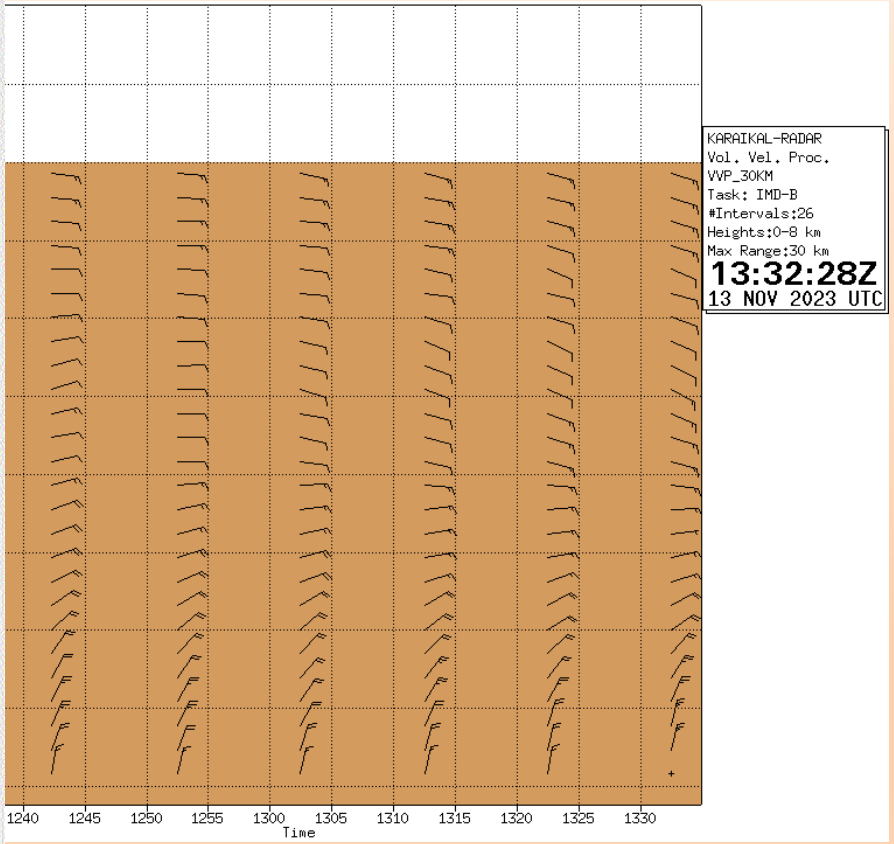


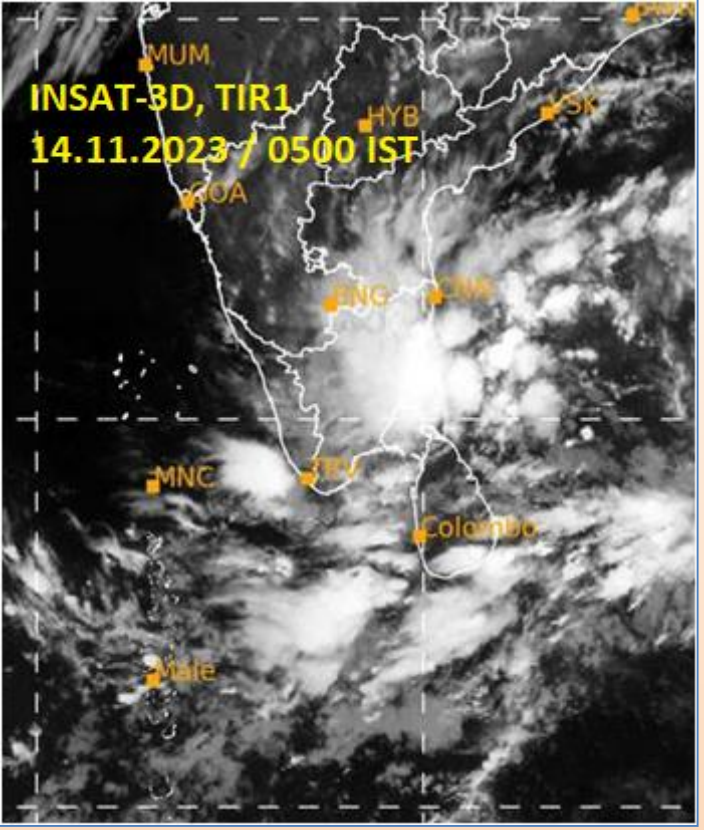


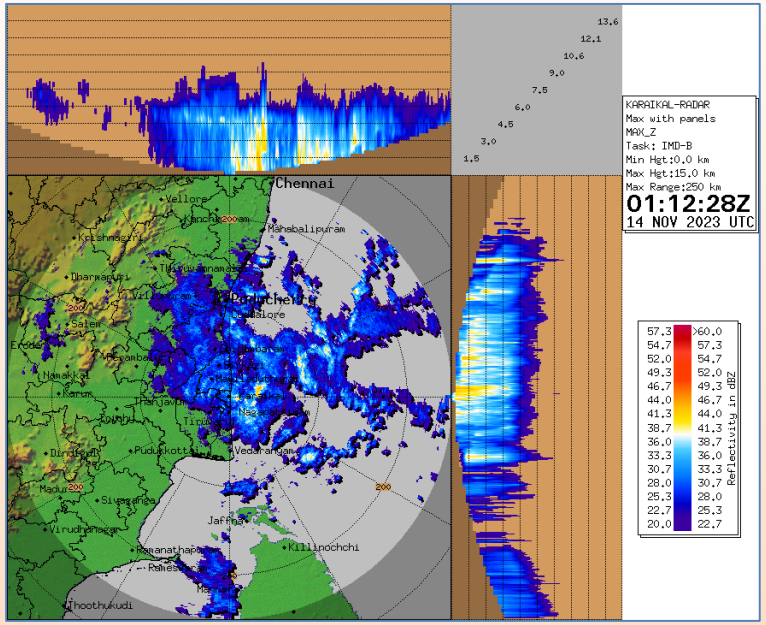
VVP (V)
13:10 / 13-Nov-2023
Chennai

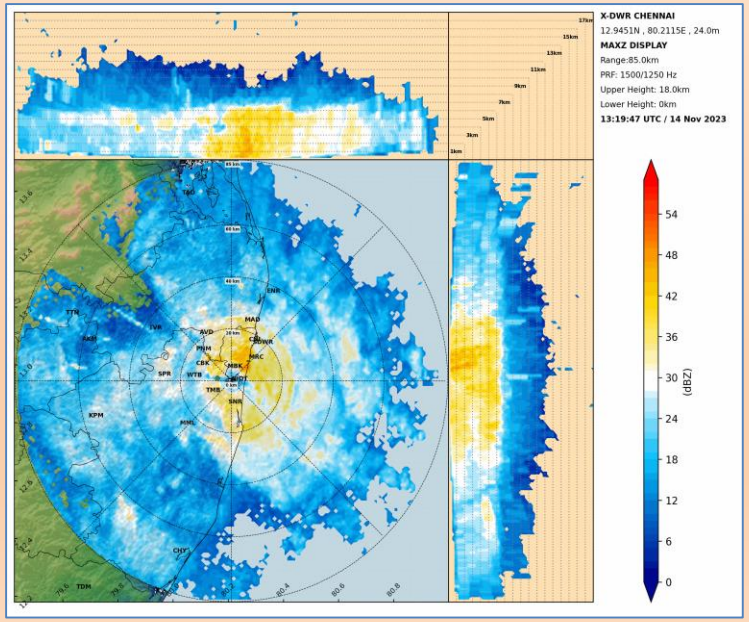
Pdf File:	30.vvp
Range:	0 km to 30 km
Clutter Filter:	IIRDoppler 8
Time sampling:	31
PRF:	600 Hz / 450 Hz
Alg type:	Complete
Elevation:	0.2 deg to 21.0 deg
Second reg:	On

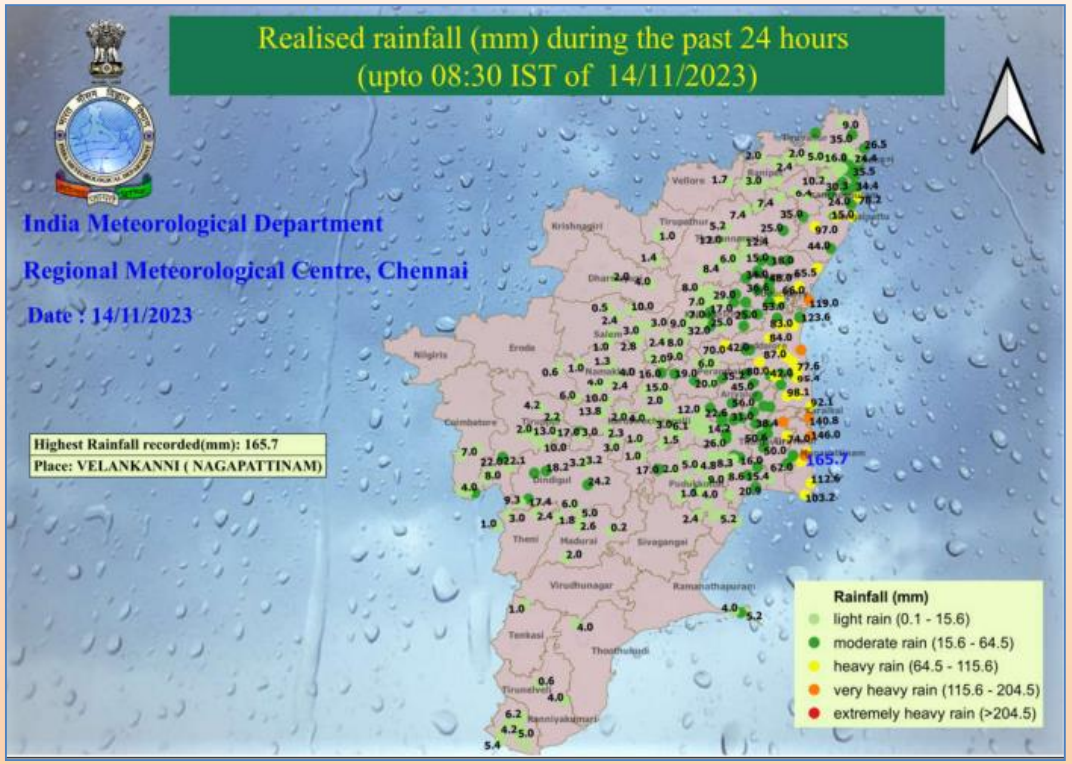
DWR Chennai, IMD
Rainbow® SELEX-SI

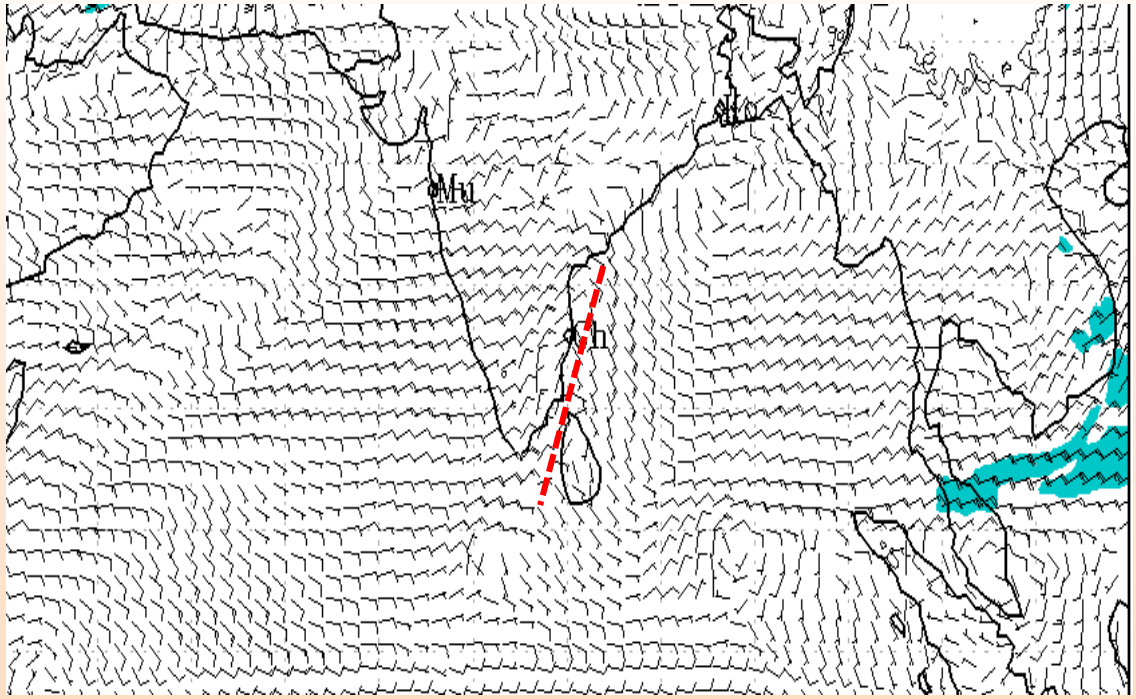



MUM
INSAT-3D, TIR1
14.11.2023 / 0500 IST
HYB
VSK
GOA
BNG
CHN
MNC
TRV
Colombo
Male


KARAIKAL-RADAR
Max with panels
MAX_Z
Task: IMD-B
Min Hgt:0.0 km
Max Hgt:15.0 km
Max Range:250 km
01:12:28Z
14 NOV 2023 UTC
Chennai
Puducherry
Cuddalore
Villupuram
Vellore
Mahabalipuram
Thoothukudi
Killinochchi
Reflectivity in dBZ

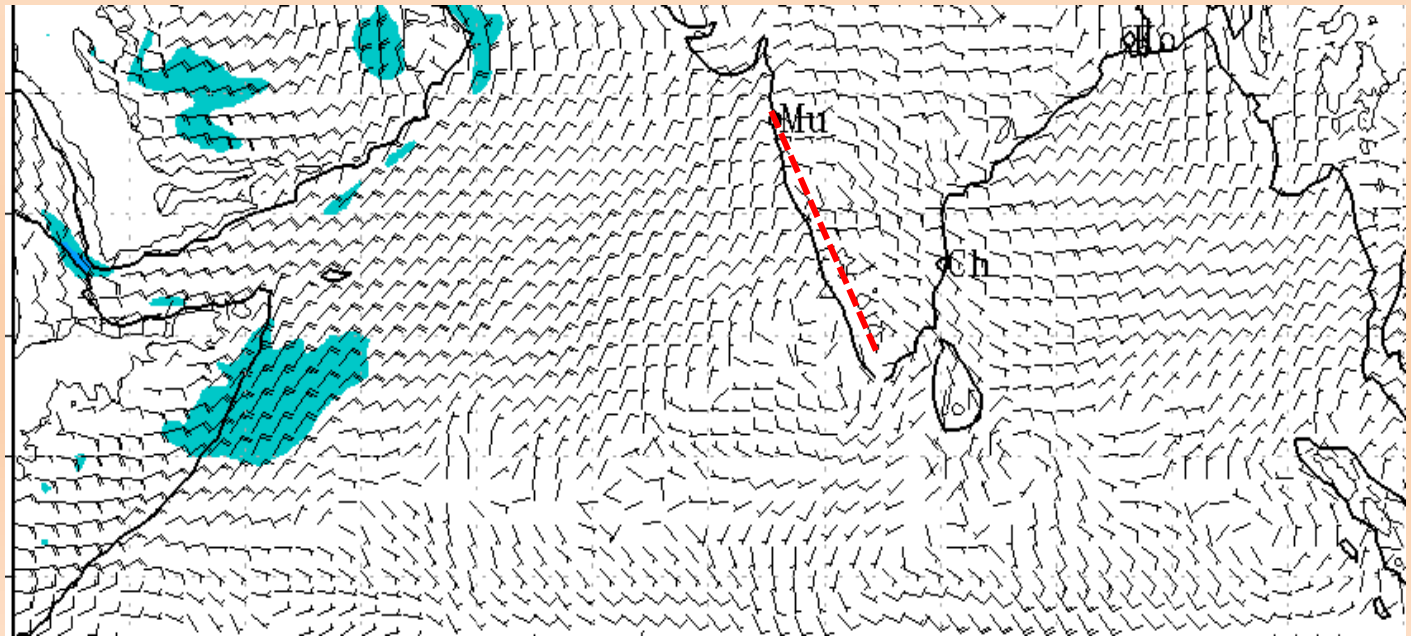

X-DWR CHENNAI
12.9451N , 80.2115E , 24.0m
MAXZ DISPLAY
Range:85.0km
PRF: 1500/1250 Hz
Upper Height: 18.0km
Lower Height: 0km
13:19:47 UTC / 14 Nov 2023
(dBZ)

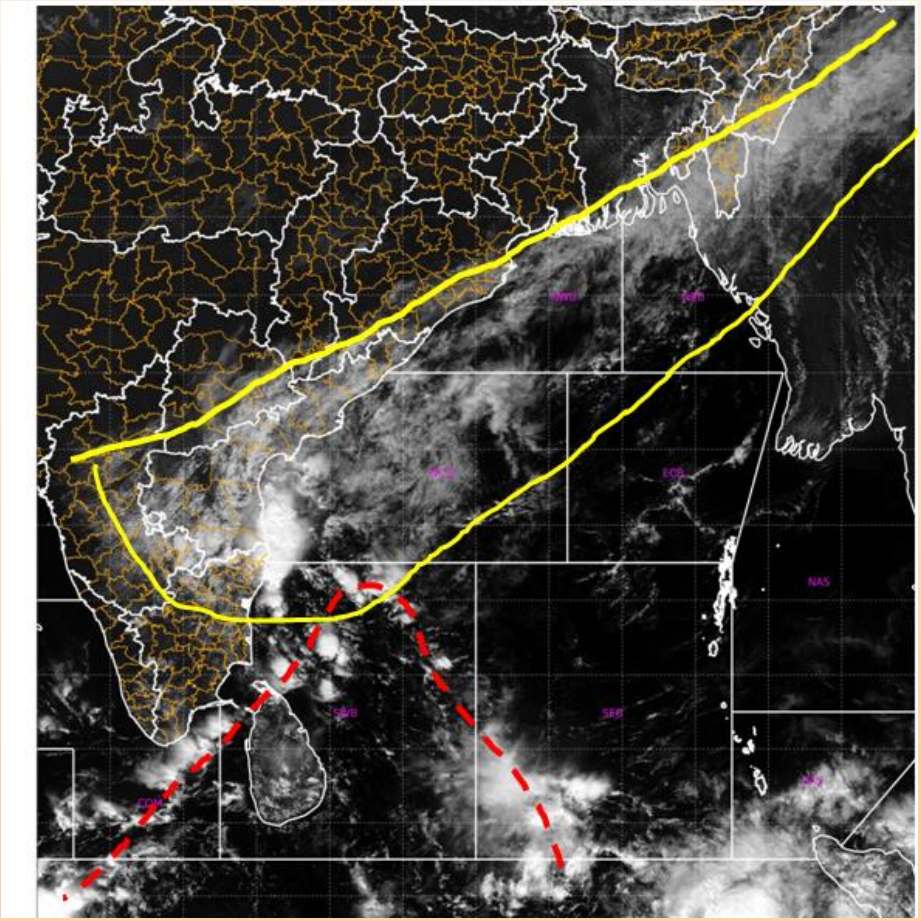

Realised rainfall (mm) during the past 24 hours
(upto 08:30 IST of 14/11/2023)
India Meteorological Department
Regional Meteorological Centre, Chennai
Date : 14/11/2023
Highest Rainfall recorded(mm): 165.7
Place: VELANKANNI (NAGAPATTINAM)
Rainfall (mm)
light rain (0.1 - 15.6)
moderate rain (15.6 - 64.5)
heavy rain (64.5 - 115.6)
very heavy rain (115.6 - 204.5)
extremely heavy rain (>204.5)

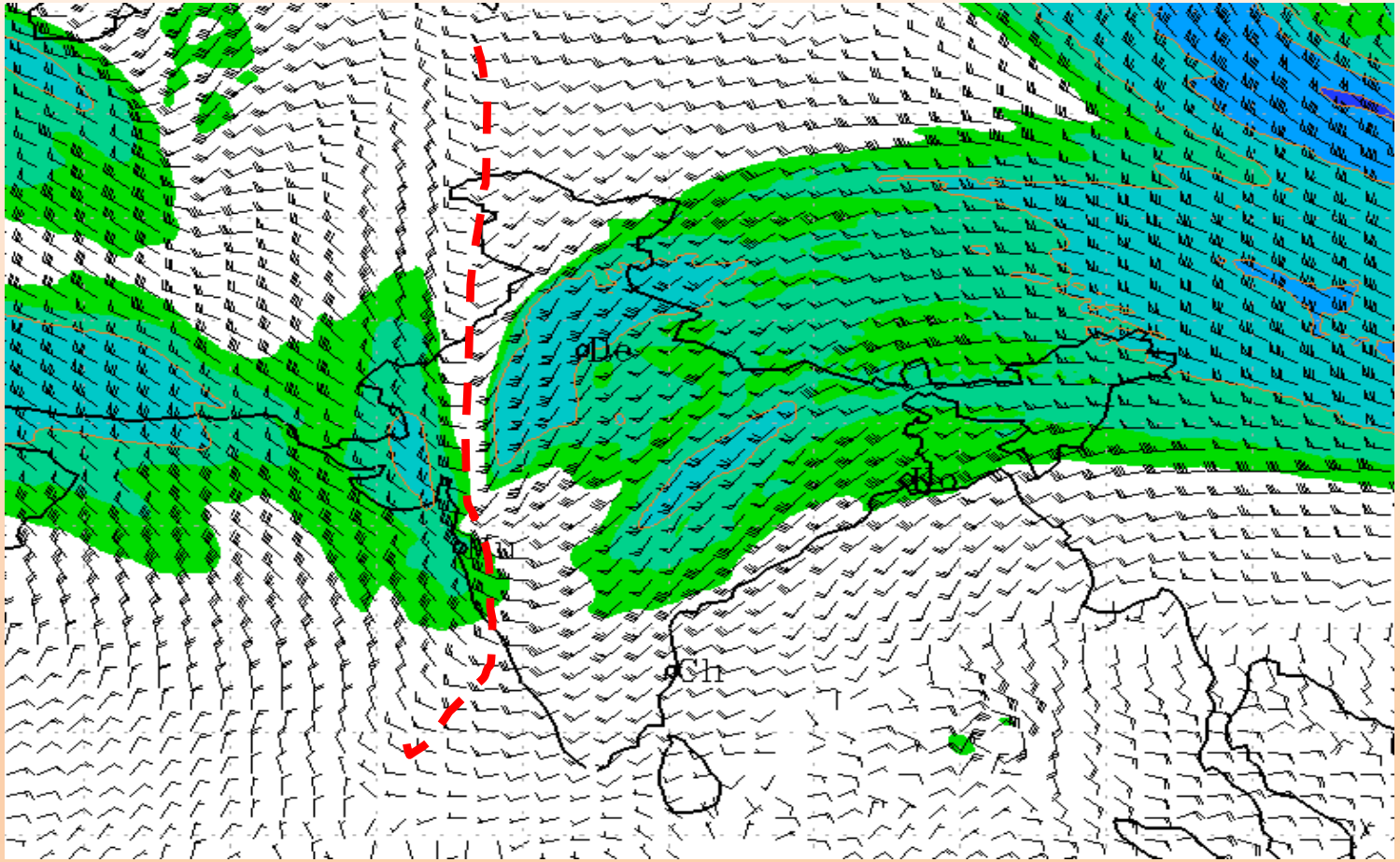


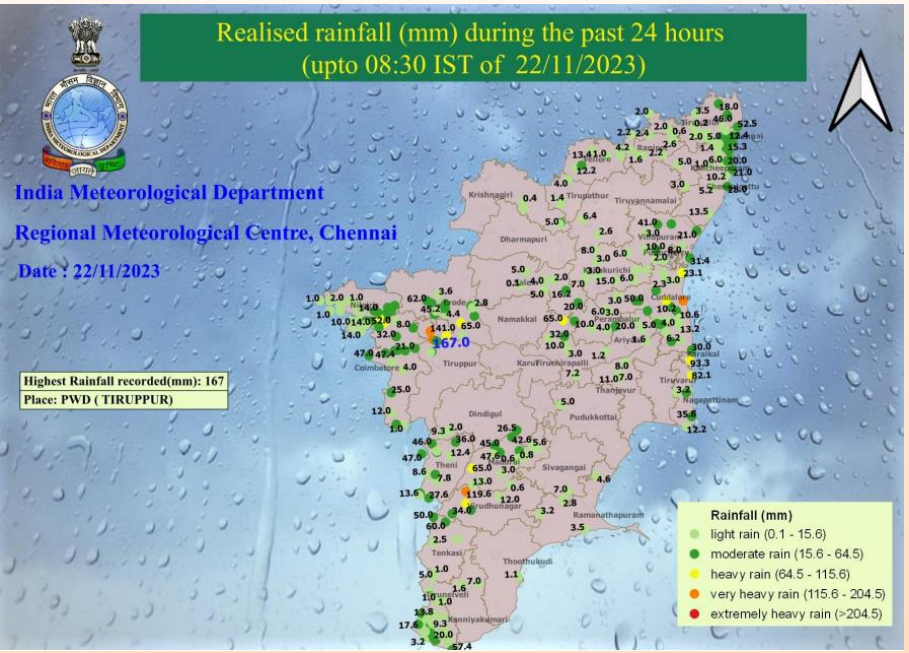
21-23 NOV

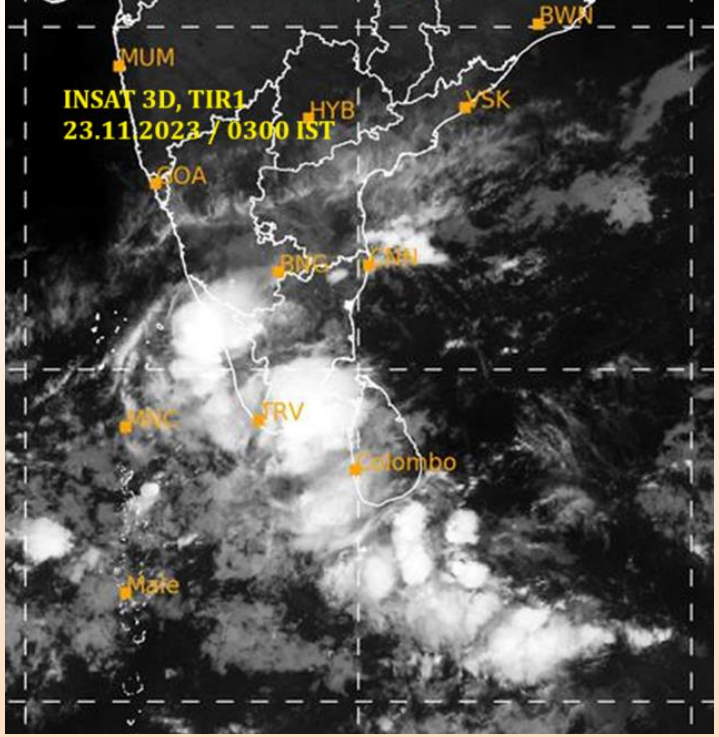
Westward moving trough in LL easterlies across TN-KER with interaction with westerly trough at upper levels

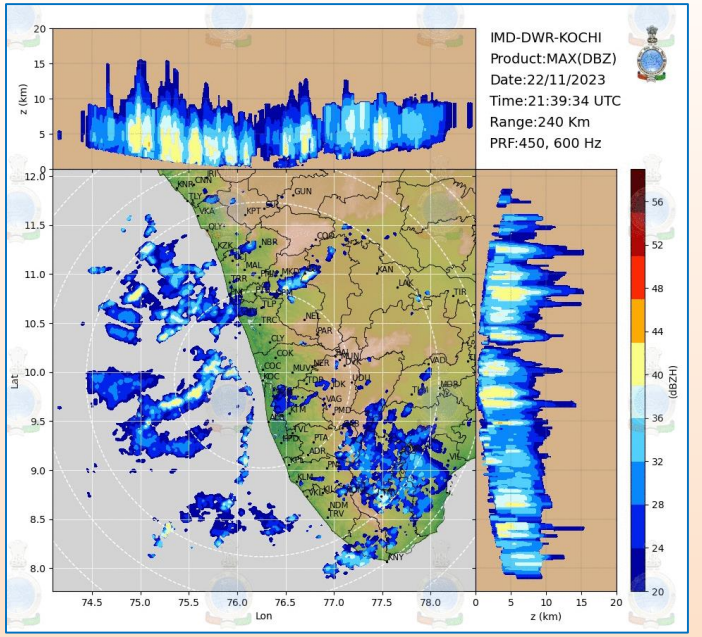


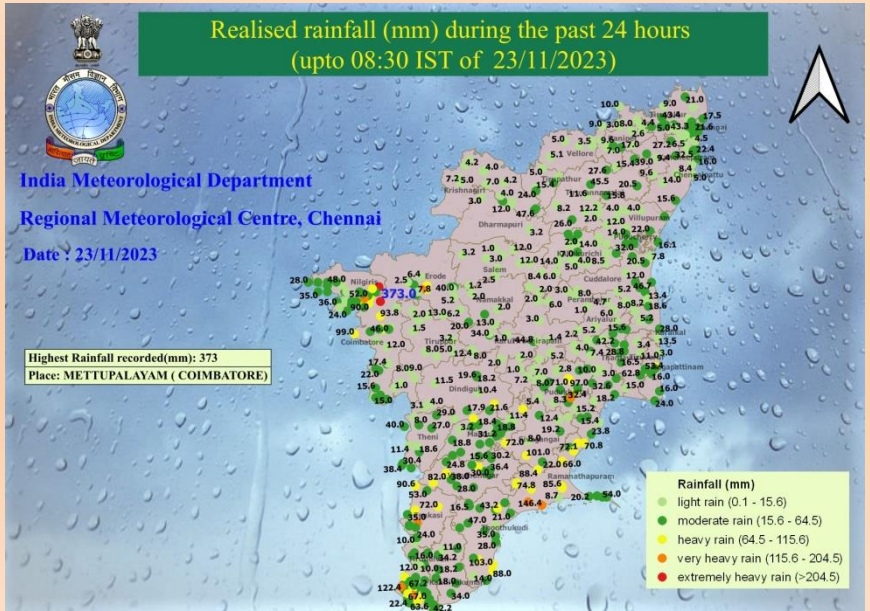


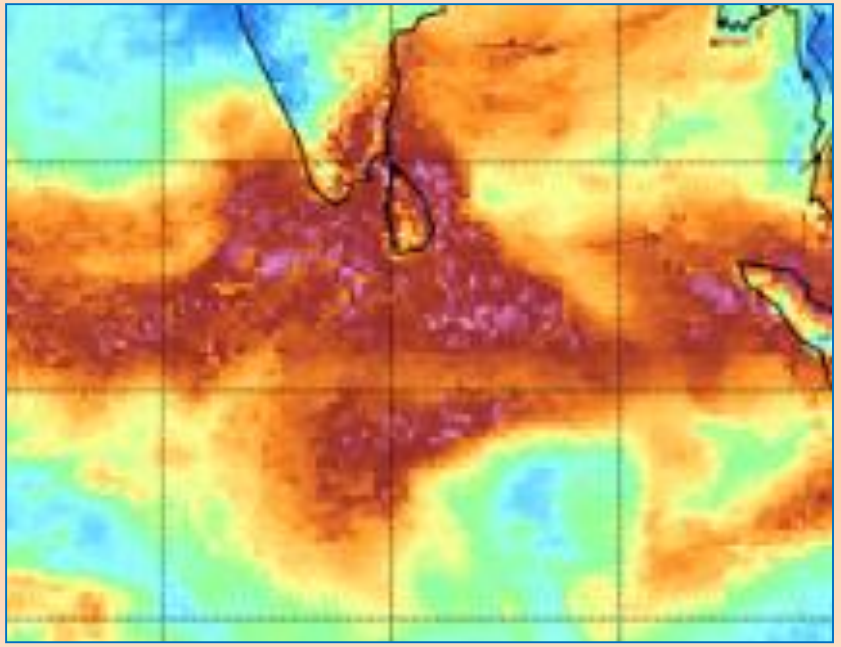








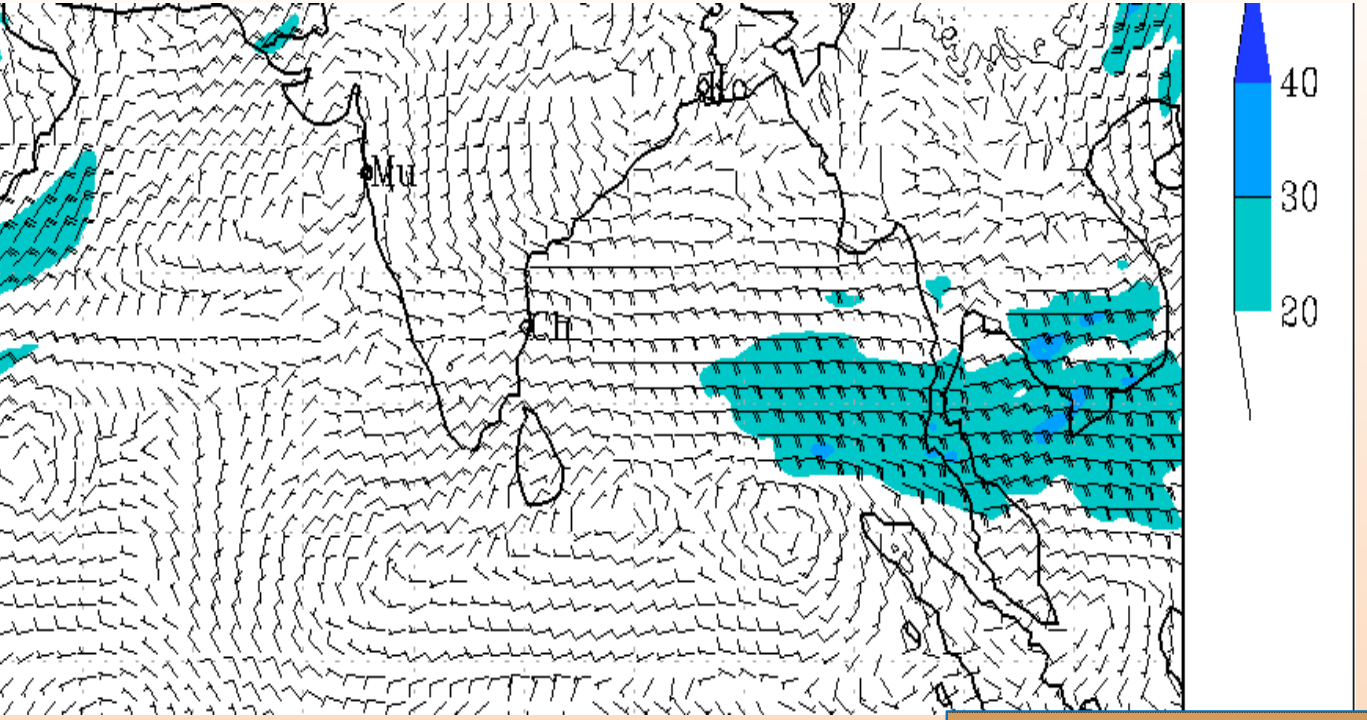


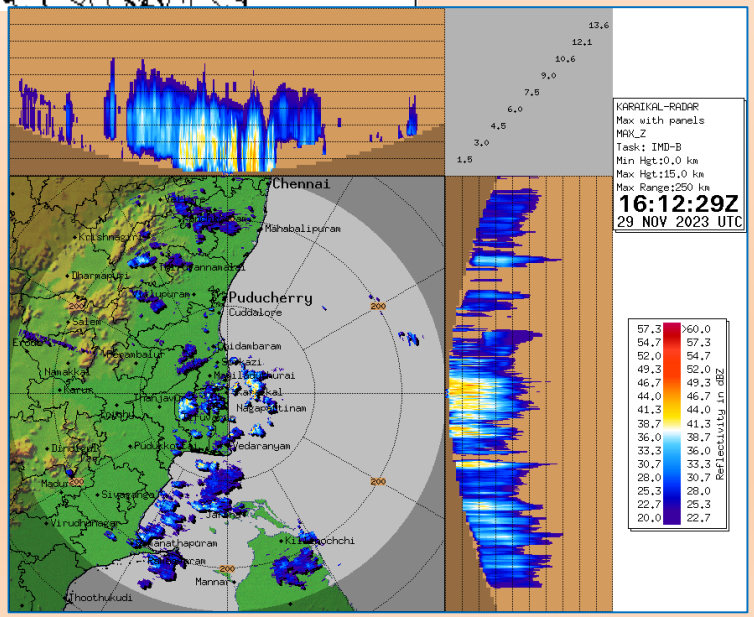


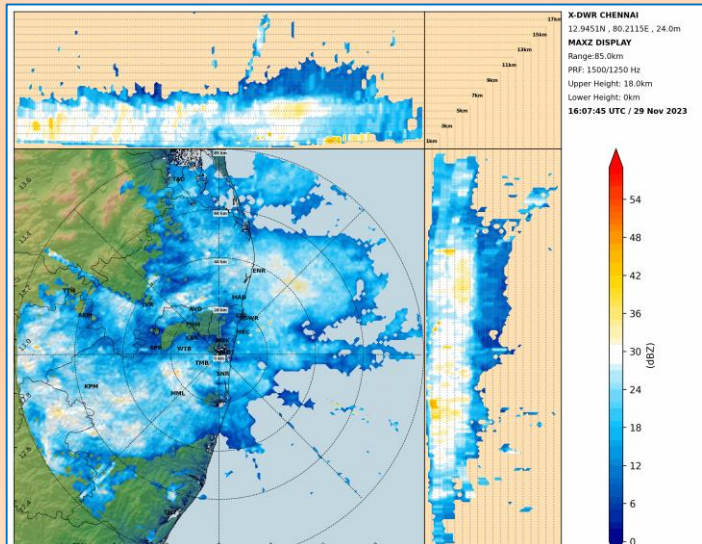
21-23 NOV

Westward moving trough in LL easterlies across TN-KER

29.11.23


40
30
20

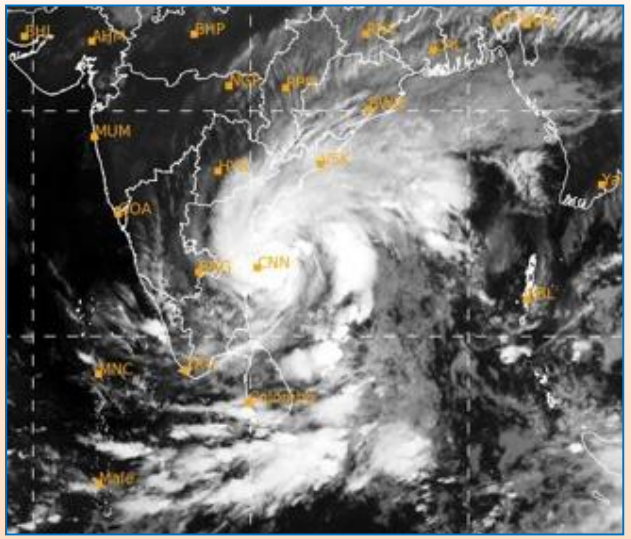

KARAIKAL-RADAR
Max with panels
MAX_Z
Task: IMD-B
Min Hgt:0.0 km
Max Hgt:15.0 km
Max Range:250 km
16:12:29Z
29 NOV 2023 UTC
Chennai
Puducherry
Cuddalore
Mahabalipuram
Nagapattinam
Vedaranyam
Mannar
Thoothukudi
Reflectivity in dBZ

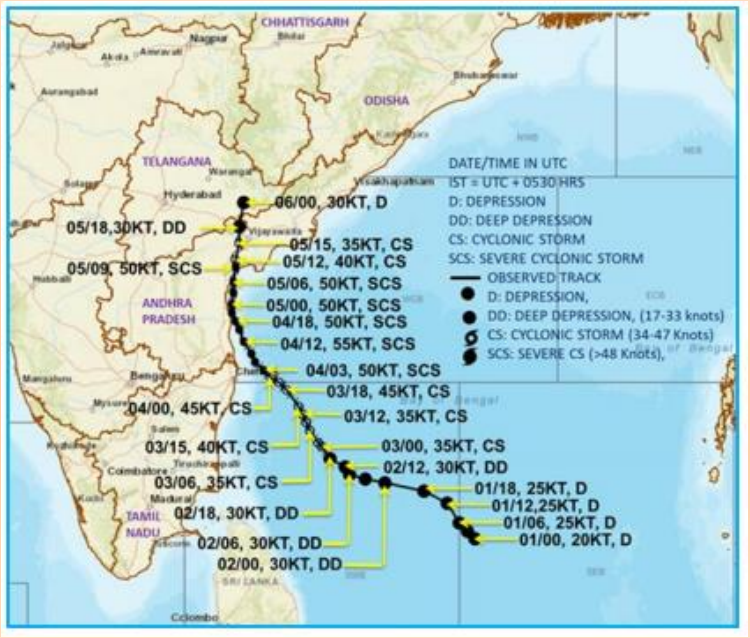

X-DWR CHENNAI
MAXZ DISPLAY
16:07:45 UTC / 29 Nov 2023
(dBZ)

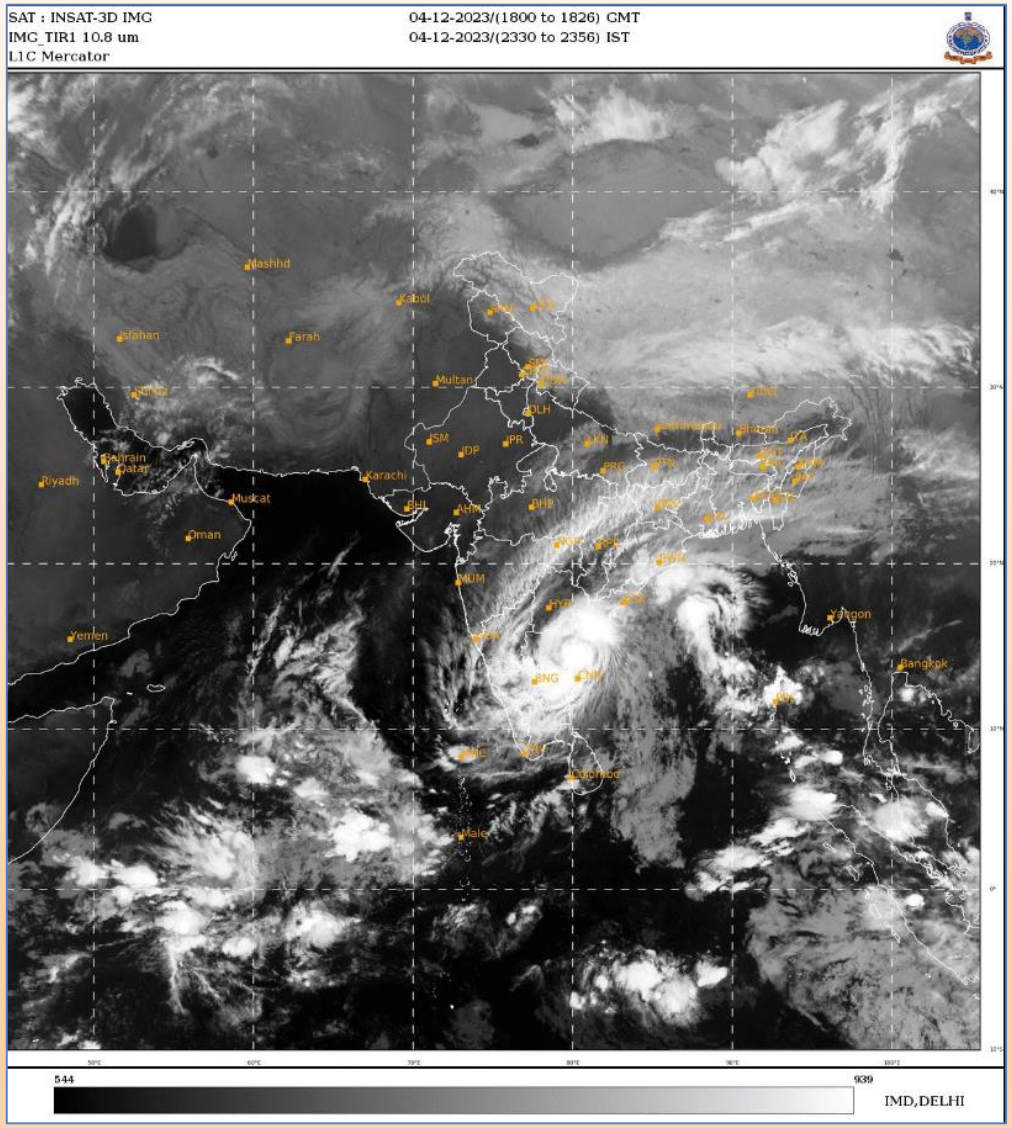
SCS MICHAUNG

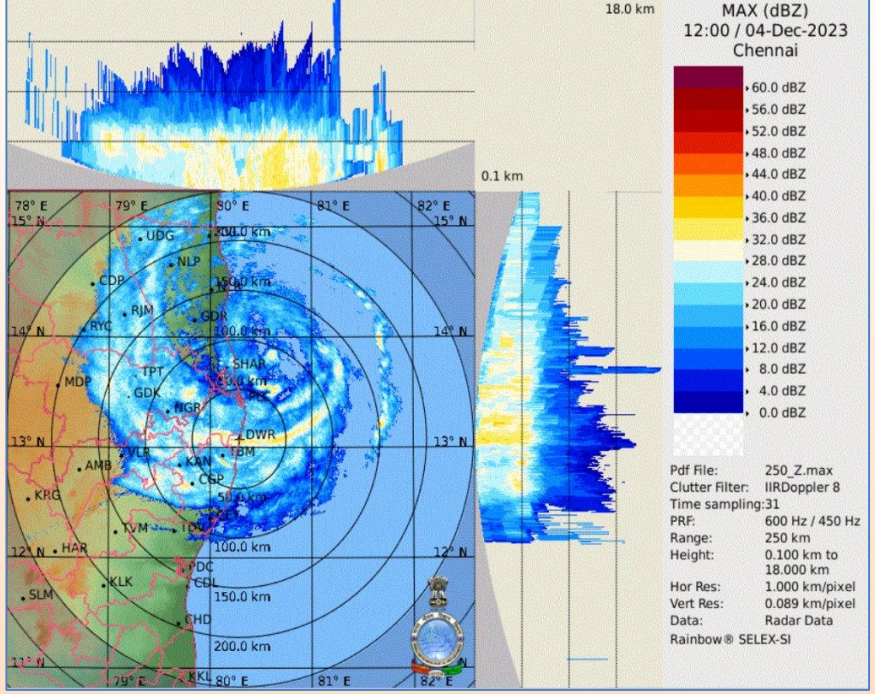
SCS MICHAUNG over BOB during 01-06 DEC 2023

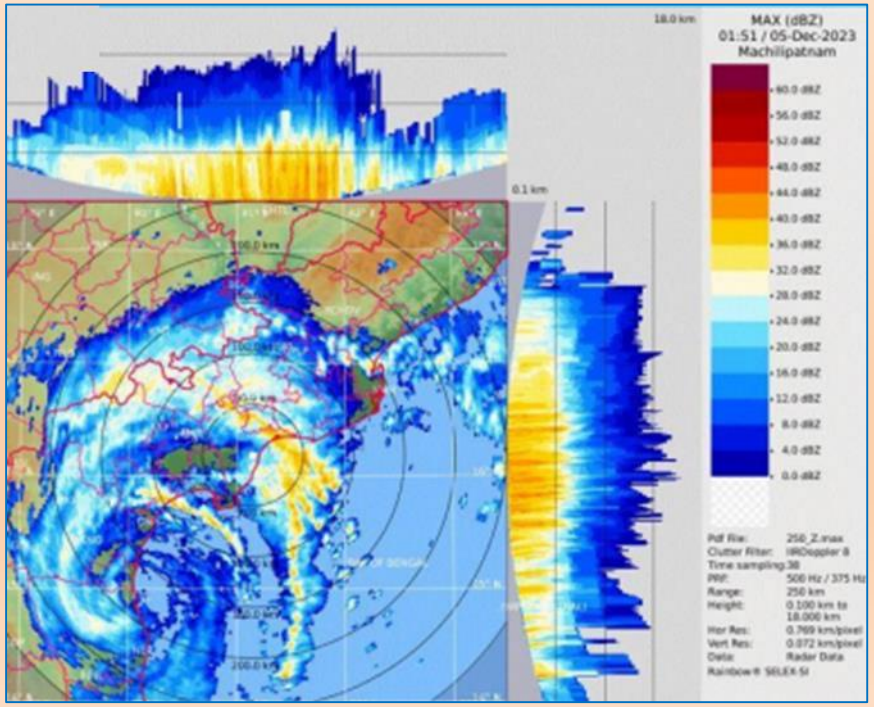
- ✓ Formed as a D on 01st Dec – SE & SW BOB
- ✓ DD→ over SW BOB on 02nd Dec / 0530 IST
- ✓ CS→ over SW BOB on 03rd Dec/0530 IST
- ✓ SCS→ over SW bob on 04th Dec/1130 IST
- ✓ Crossed coast→ 1230-1430 IST of 05th Dec, near south of Bapatla.
- ✓ System centre was within 150 km from Chennai coast during 03rd/2330 IST to 04th/2030 IST
- ✓ When close to Chennai → system was intensifying from CS to SCS stage & was moving slowly NNW-wards.
- ✓ Intense rainfall activity & strong winds prevailed continuously from 03rd night to 04th night over Chennai.

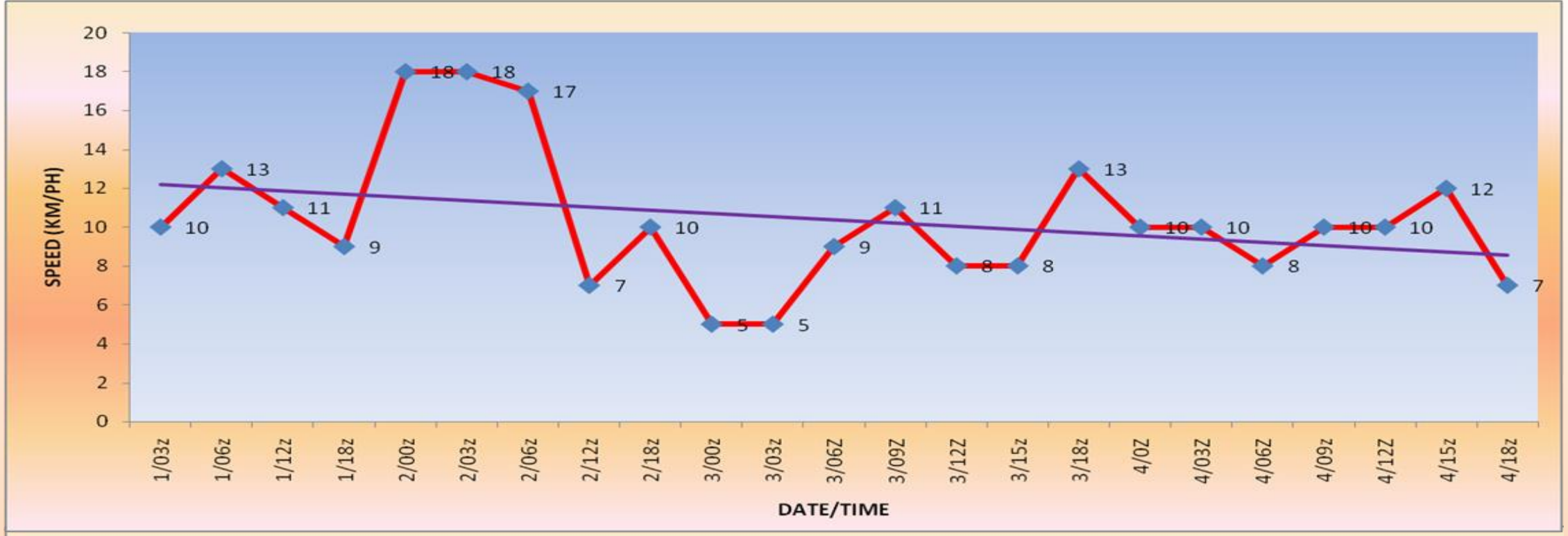


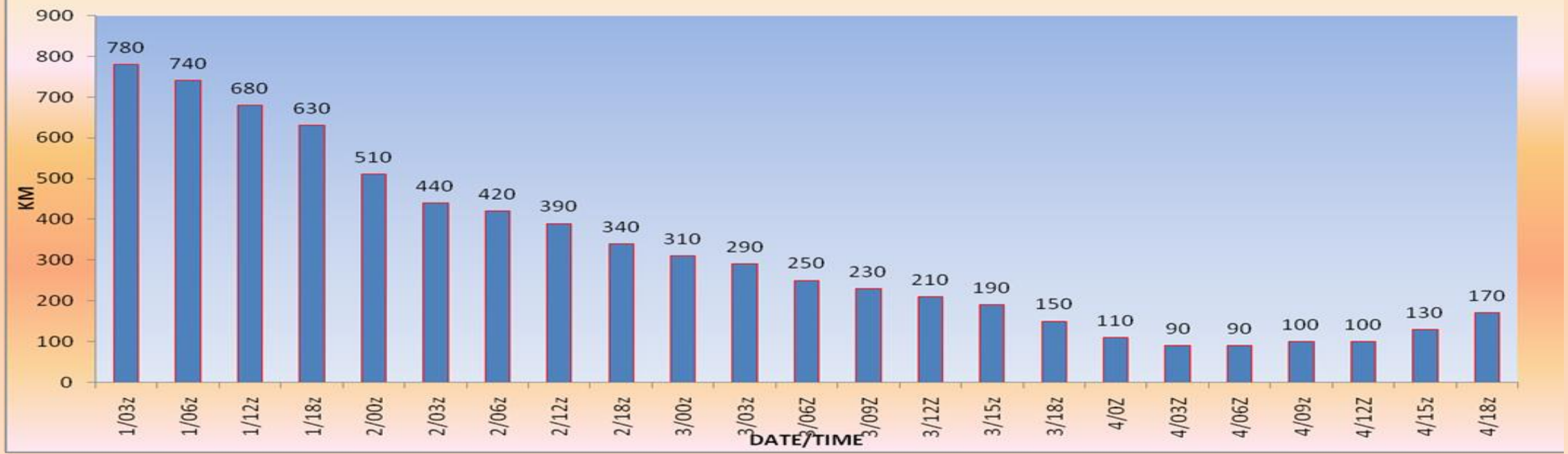



SAT : INSAT-3D IMG
IMG_TIR1 10.8 um
L1C Mercator
04-12-2023/(1800 to 1826) GMT
04-12-2023/(2330 to 2356) IST
544
939
IMD,DELHI

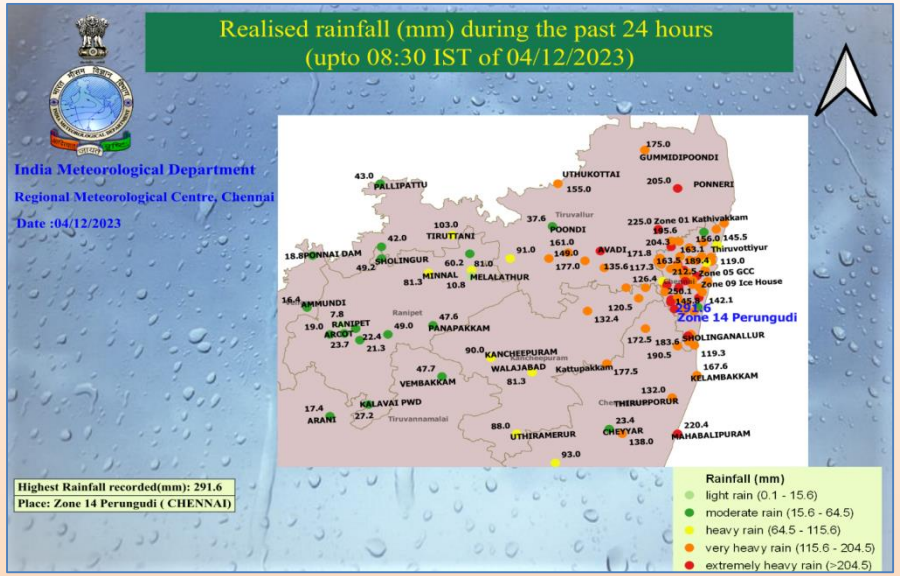

MAX (dBZ)
12:00 / 04-Dec-2023
Chennai
60.0 dBZ
56.0 dBZ
52.0 dBZ
48.0 dBZ
44.0 dBZ
40.0 dBZ
36.0 dBZ
32.0 dBZ
28.0 dBZ
24.0 dBZ
20.0 dBZ
16.0 dBZ
12.0 dBZ
8.0 dBZ
4.0 dBZ
0.0 dBZ
Pdf File: 250_Z.max
Clutter Filter: IIRDoppler 8
Time sampling:31
PRF: 600 Hz / 450 Hz
Range: 250 km
Height: 0.100 km to 18.000 km
Hor Res: 1.000 km/pixel
Vert Res: 0.089 km/pixel
Data: Radar Data
Rainbow® SELEX-SI


MAX (dBZ)
01:51 / 05-Dec-2023
Machilipatnam

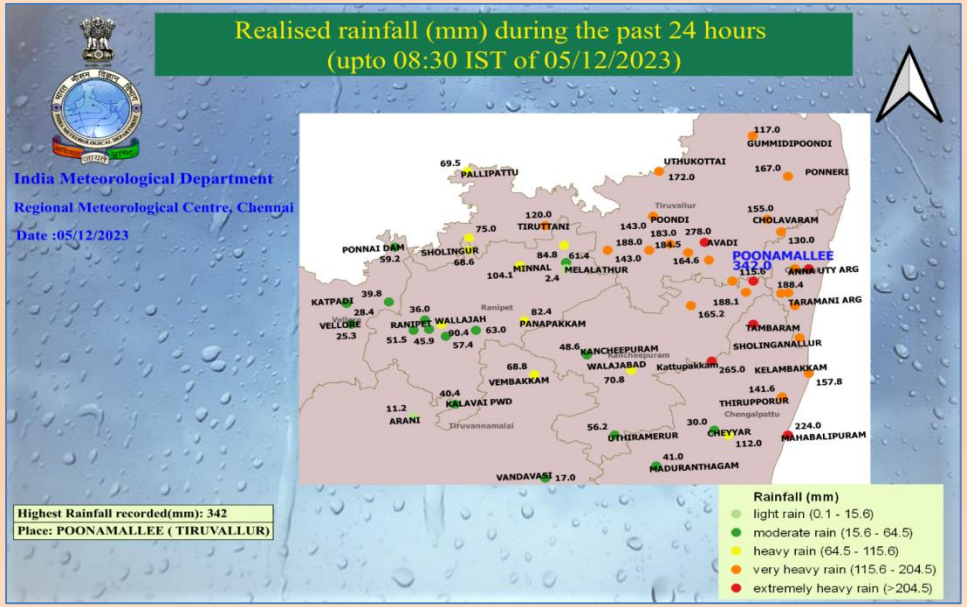

SPEED (KM/PH)
20
18
16
14
12
10
8
6
4
2
0
10
13
11
9
18
18
17
7
10
5
5
9
11
8
8
13
10
10
8
10
10
12
7
1/03z
1/06z
1/12z
1/18z
2/00z
2/03z
2/06z
2/12z
2/18z
3/00z
3/03z
3/06Z
3/09Z
3/12Z
3/15z
3/18z
4/0Z
4/03Z
4/06Z
4/09z
4/12Z
4/15z
4/18z
DATE/TIME


KM
900
800
700
600
500
400
300
200
100
0
780
740
680
630
510
440
420
390
340
310
290
250
230
210
190
150
110
90
90
100
100
130
170
1/03z
1/06z
1/12z
1/18z
2/00z
2/03z
2/06z
2/12z
2/18z
3/00z
3/03z
3/06Z
3/09Z
3/12Z
3/15z
3/18z
4/0Z
4/03Z
4/06Z
4/09z
4/12Z
4/15z
4/18z
DATE/TIME

Adverse weather observed over Chennai and adjoining districts



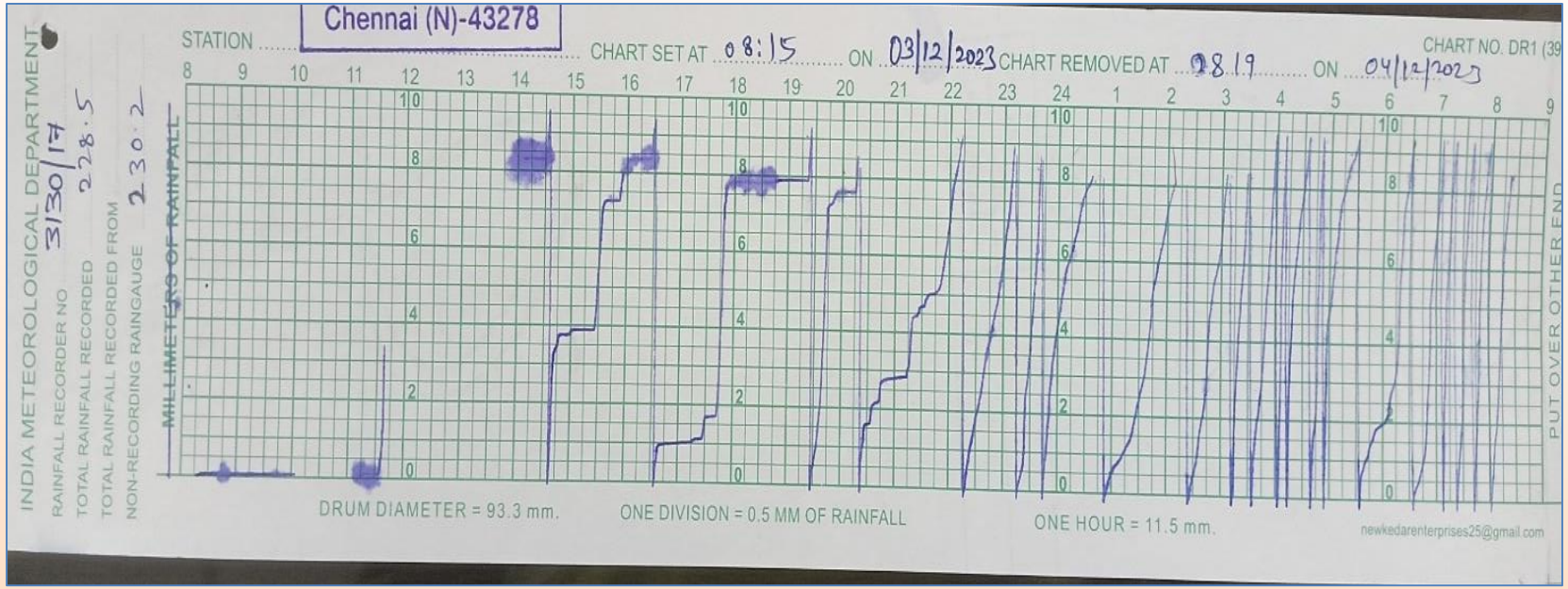
24 hr ending 08:30 IST of	EX.H	VH	H
04.12.23	21	59	12
05.12.23	14	29	11



Chennai –NBK

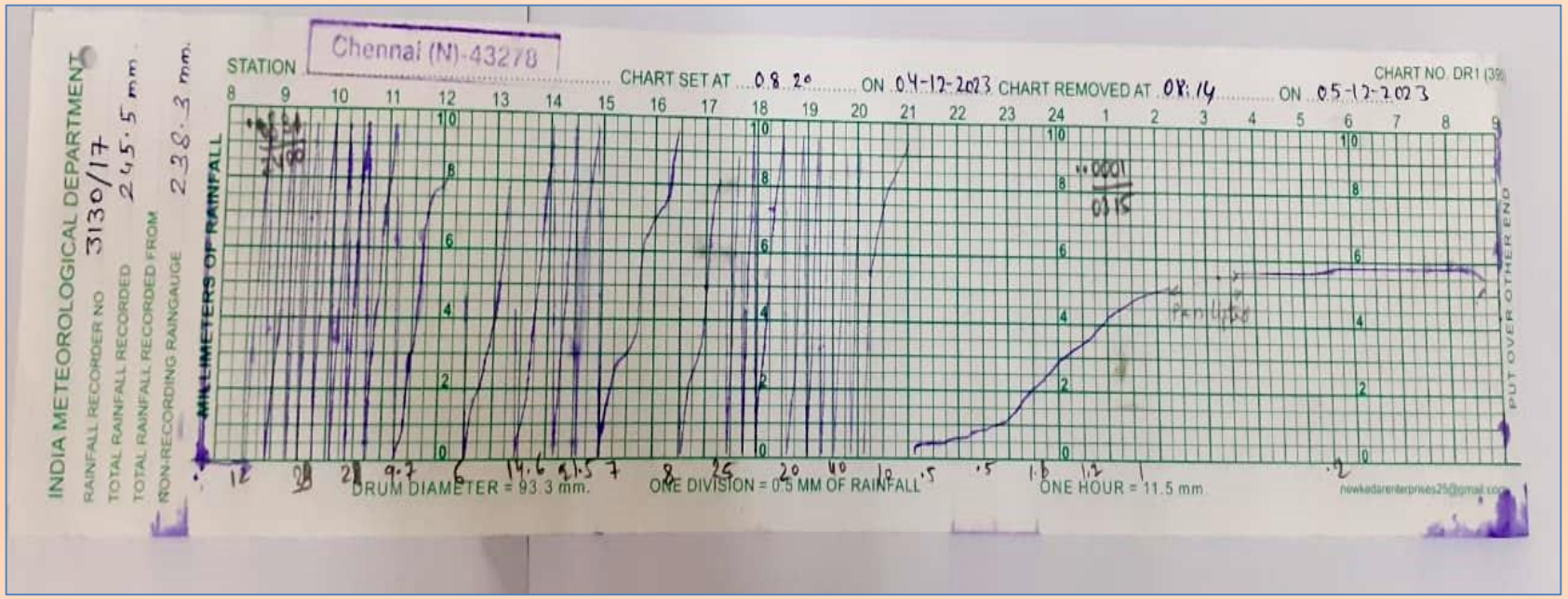
Self Recording RainGauge

23cm



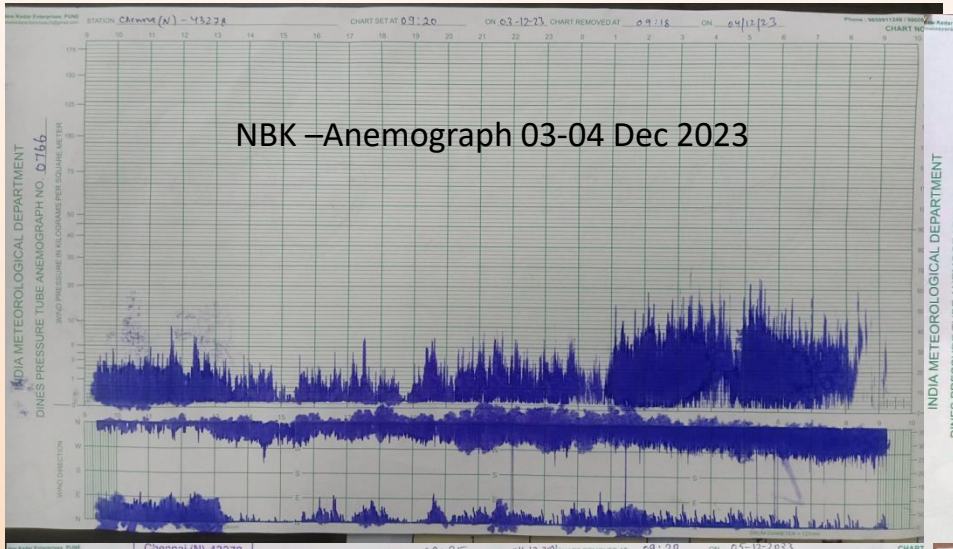
03 / 0830 IST - 04 / 0830 IST Dec 2023

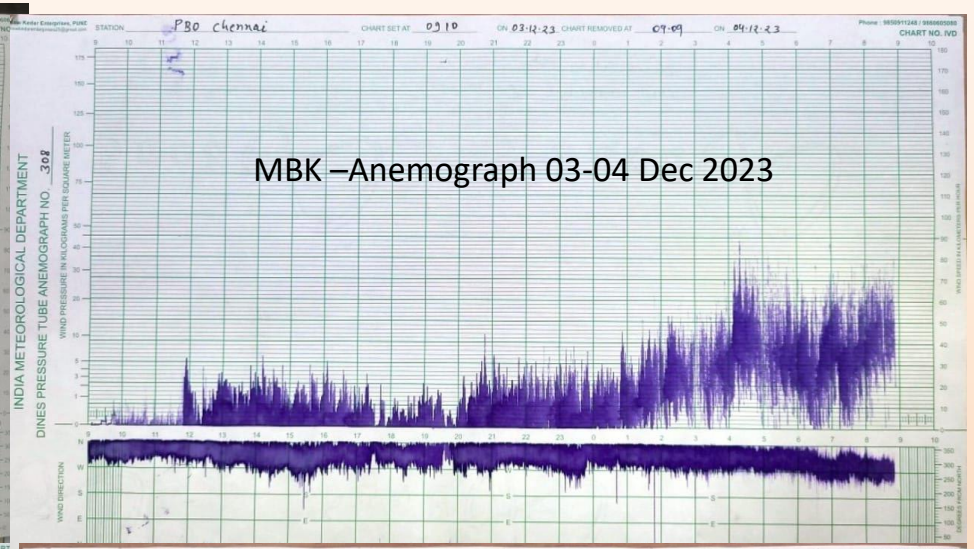
24cm

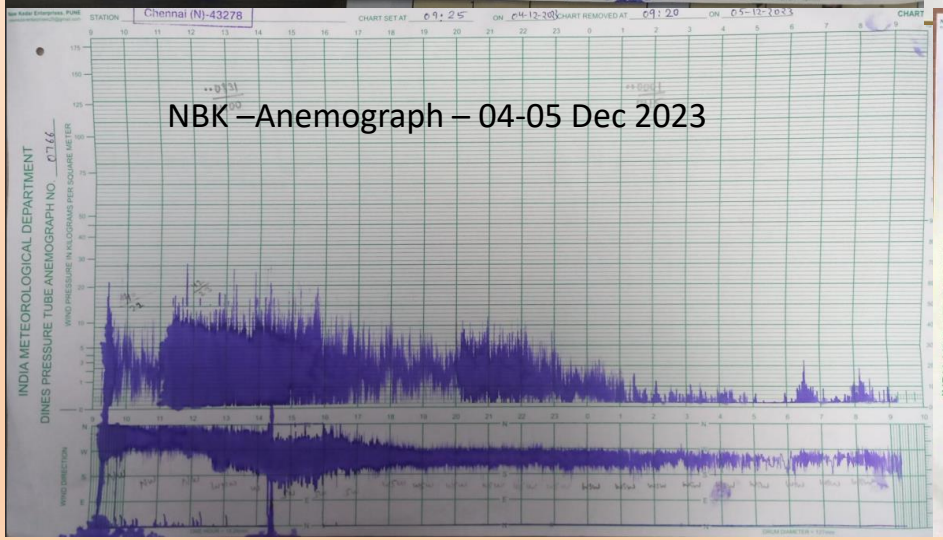


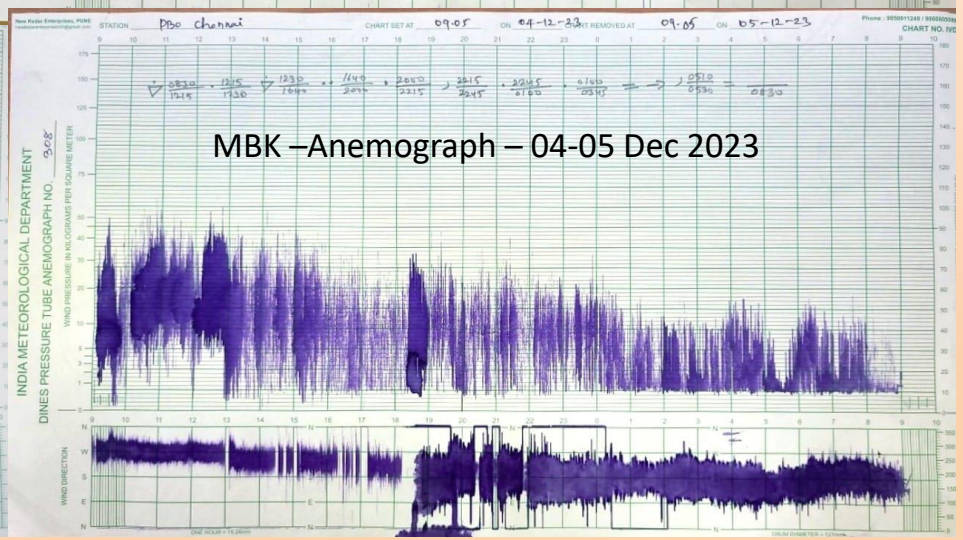
04 / 0830 IST - 05 / 0830 IST Dec 2023

Station	Lowest Mean Sea Level Pressure (hPa)	24-hr pressure change
Bapatla	997.4 (05/1630 IST)	-8.0
Ongole	992.3 (05/1330 IST)	-14.7
Kavali	989.6 (05/0630 IST)	-16.6
Nellore	987.9 (05/0230 IST)	-17.2
Chennai NBK	**997.0 (04/1530 IST)**	-8.6
Chennai MBK	**998.3 (04/1530 IST)**	-6.9



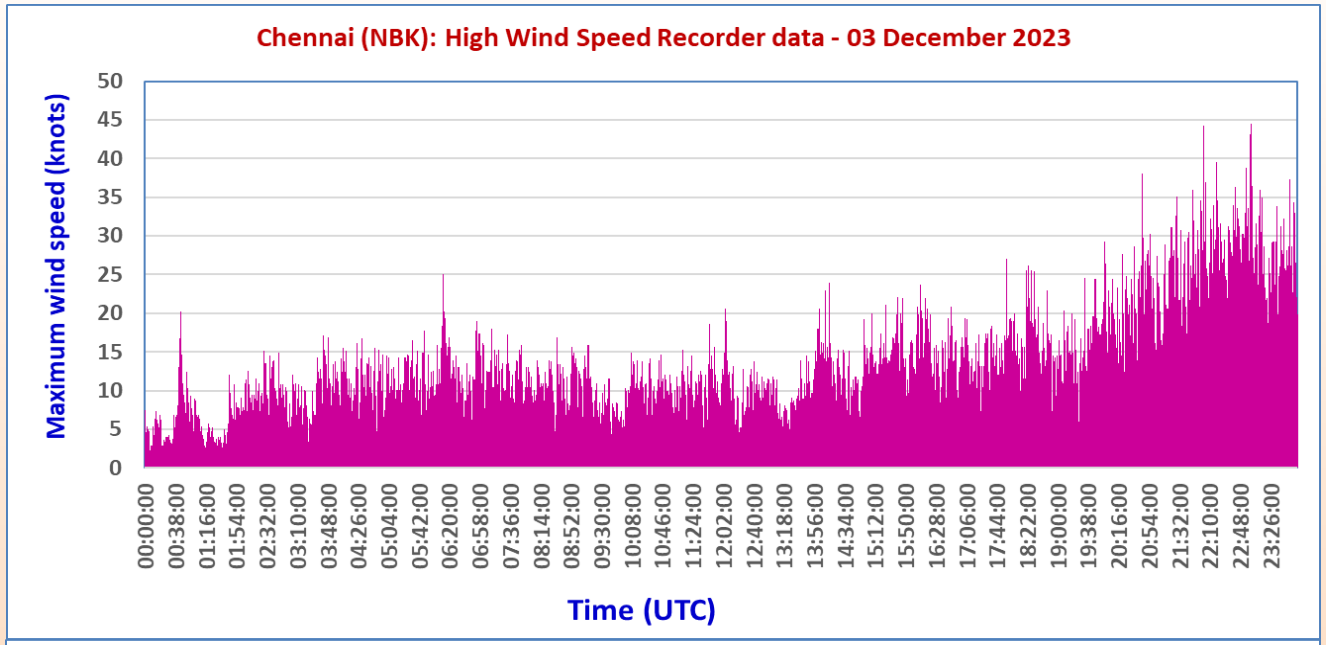


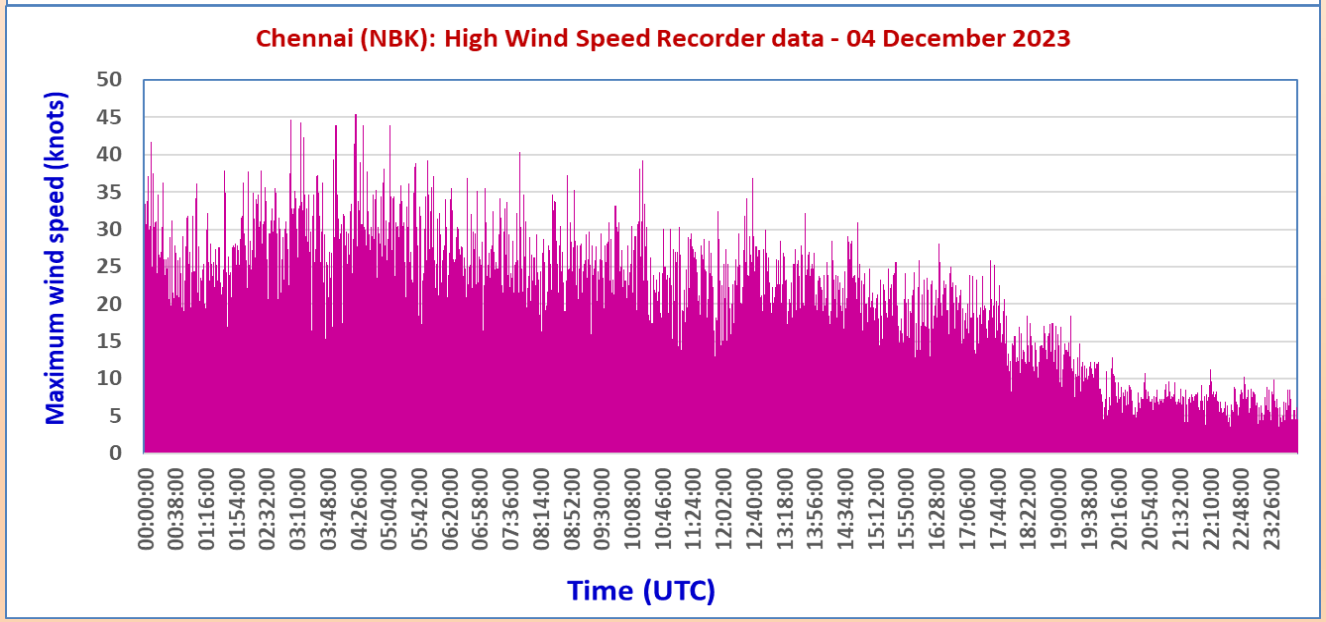




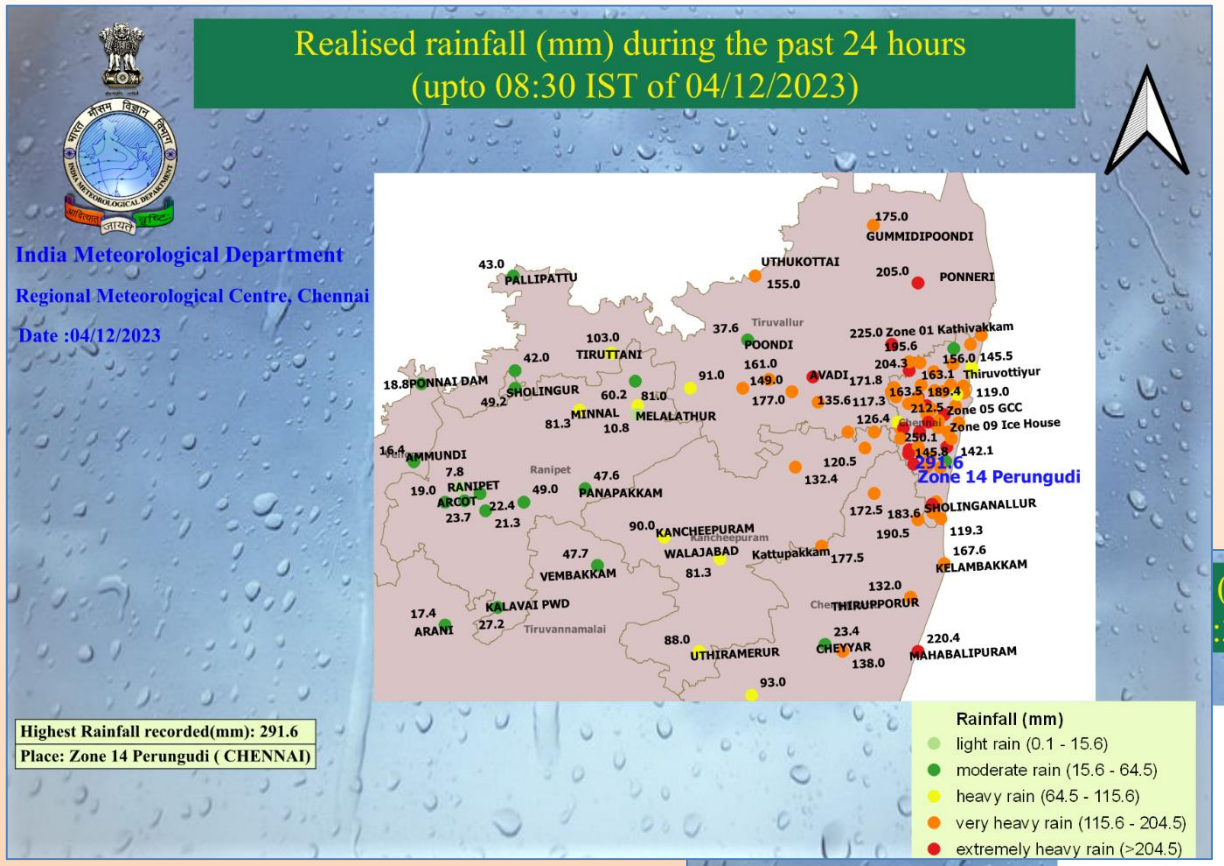
NBK: 60-70 kmph

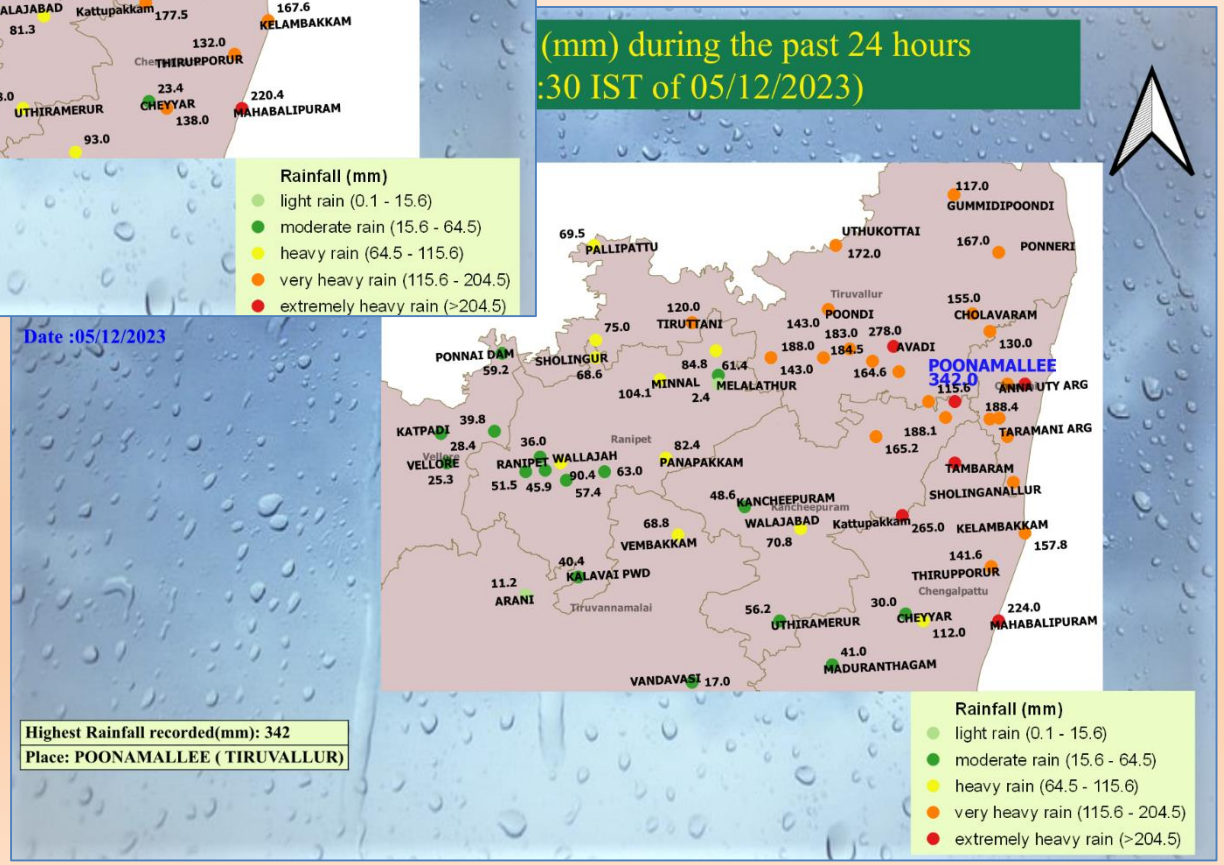
MBK: 80-90 kmph





✓ **75 kmph (40-45 knots) in gusts during early hours to noon of 04th December 2023.**



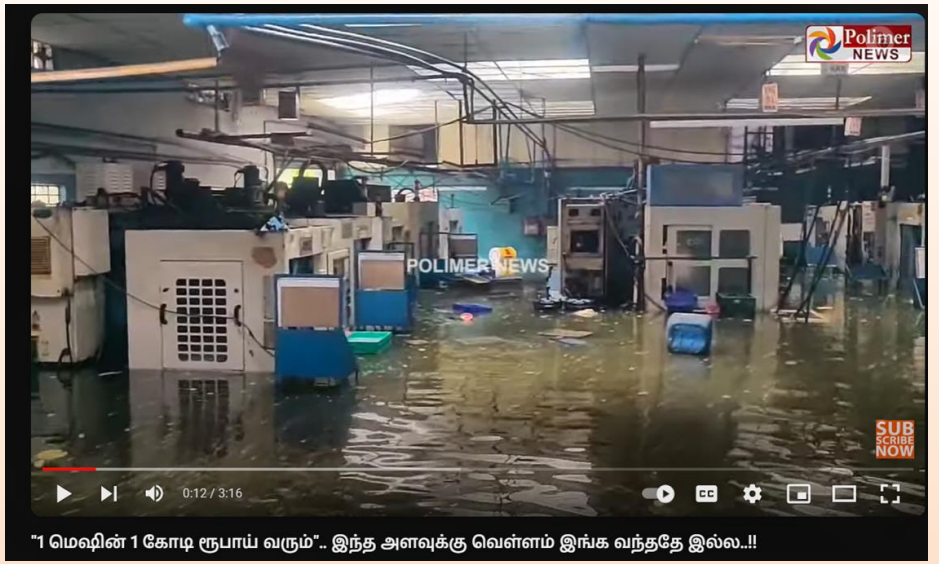


2 days of VH-XH rainfall activity over Chennai & n'hood

04 Dec: Perungudi: 29 cm

05 Dec: Poonamallee: 34 cm


Picture in picture
Polimer NEWS
POLIMER NEWS
SUB SCRIBE NOW
0:26 / 3:16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POLIMER NEWS
SUB SCRIBE NOW
0:12 / 3:16
"1 மெஷின் 1 கோடி ரூபாய் வரும்".. இந்த அளவுக்கு வெள்ளம் இங்க வந்ததே இல்ல..!!


முடிச்சூர்
DINAMALAR


மேற்கு தாம்பரம்


பள்ளிக்கரணை, சென்னை
அடுக்குமாடி குடியிருப்பு ஒன்றில், நிறுத்தி
வைக்கப்பட்டிருந்த கார்களை சூழ்ந்த வெள்ளம்
தந்தி
THANTHI TV
0:38 / 3:22

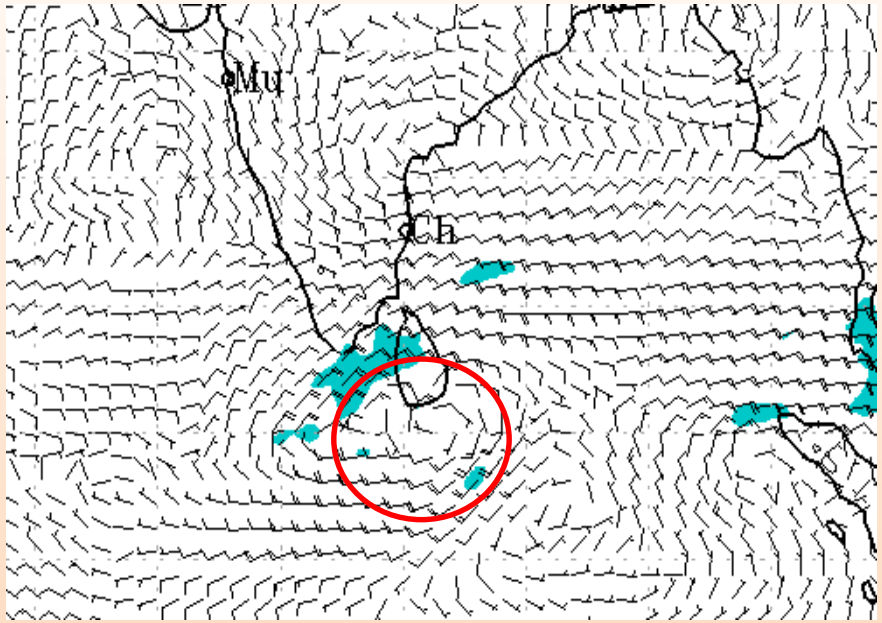
Dec 2015 & Dec 2023 events

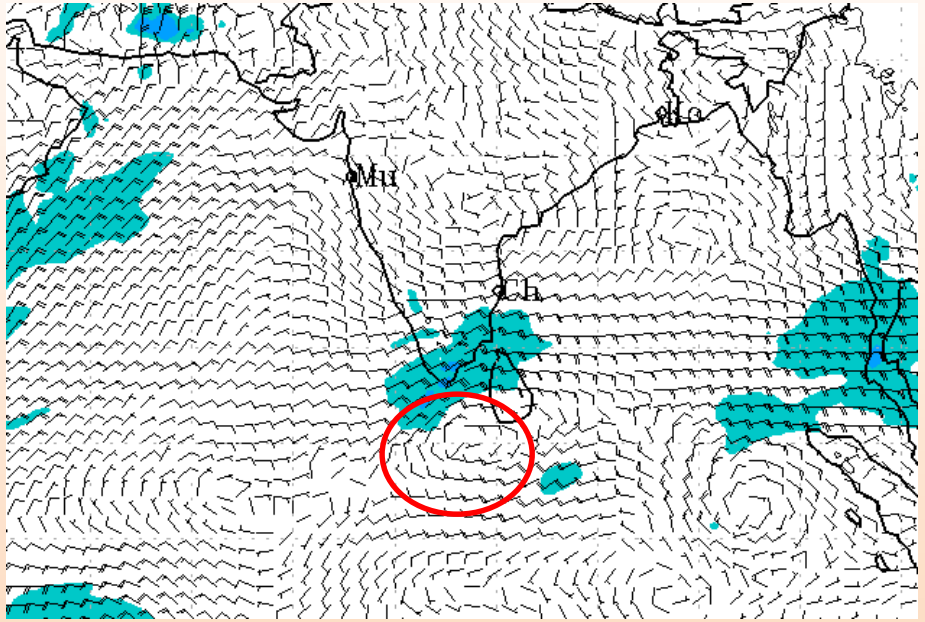
Dec 2015	Dec 2023
Single day event – 01 Dec 2015	Two days event – 03& 04Dec 2023
No cyclone	Cyclone
02nd Dec 2015 district rainfall: Chennai district: 276.2 mm; Kancheepuram district (including Chengalpattu): 336.7 mm; Thiruvallur district: 258.0 mm	**04th& 05th Dec 2023 district rainfall**: Chennai district:209.6, 185.6 mm Kancheepuram district:115.0, 132.3 mm Chengalpattu district: 146.5, 132.2 mm Thiruvallur district: 145.5, 141.6
Highest 24-hr rainfall: **02nd: TAMBARAM-49 cm**	Highest 24 hr rainfall: **04th: PERUNGUDI 29 cm;** **05th: POONAMALLEE 34 cm.**
Less rainfall reporting stations	More rainfall reporting stations
NBK & MBK 24-hr rainfall: 02nd: NBK: 29 cm; MBK: 35 cm	NBK: 04th: 23 cm; 05th: 24 cm MBK: 04th: 25 cm; 05th: 19 cm
NBK & MBK: **5 days cum rainfall**- 01-05 Dec 2015 **NBK: 40 cm** (398.0 mm) **MBK: 49 cm** (489.0 mm)	NBK &MBK:- 5 days cumrainfall 01-05 Dec 2015: **NBK: 58 cm** (576.7 mm) **MBK: 55 cm** (549.3 mm)
Cumulative seasonal rainfall: 01 Oct to 10 Dec 2015: **NBK: 166 cm** (1664 mm) **MBK: 188 cm** (1879 mm)	**Cumulative seasonal rainfall**: 01 Oct to 10 Dec 2023: **NBK: 125 cm** (1255.4 mm) **MBK: 108 cm** (1084.3 mm)
Cumulative annual rainfall till 10 Dec 2015: **NBK: 209 cm** / 140 cm (normal) **MBK: 245cm** / 138 cm (normal)	**Cumulative annual rainfall till 10 Dec 2023**: **NBK: 210 cm** **MBK: 217 cm**
Water levels in reservoirs -	
Civic conditions -	

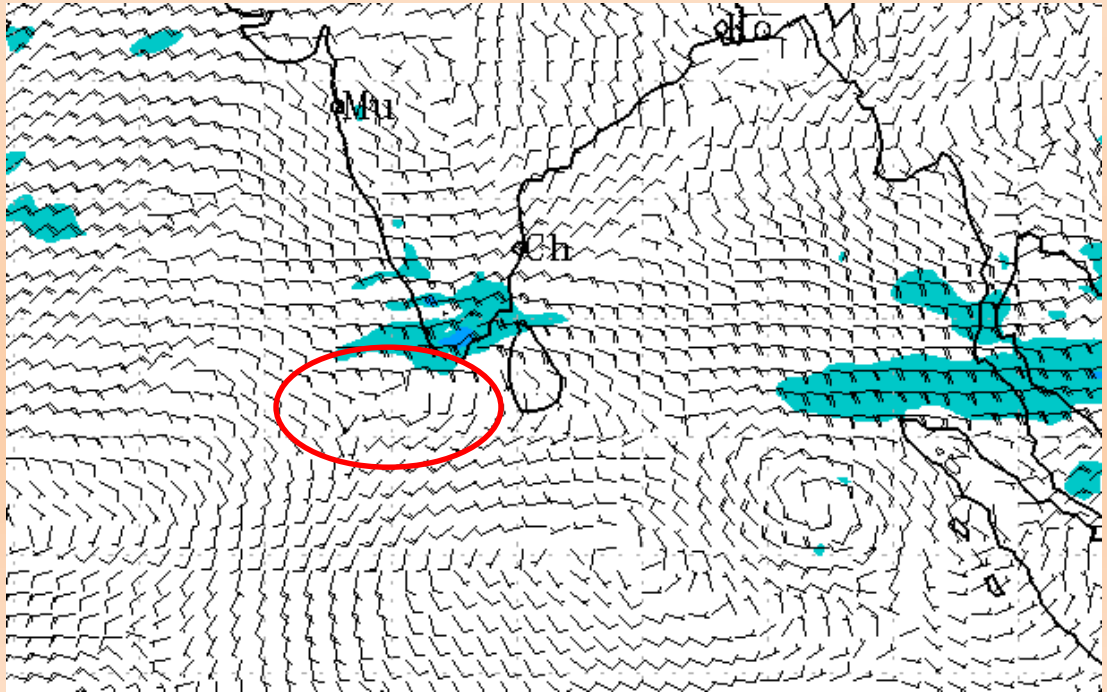
Extremely Heavy Rainfall event over South Tamilnadu
17 & 18 December 2023

Synoptic situation

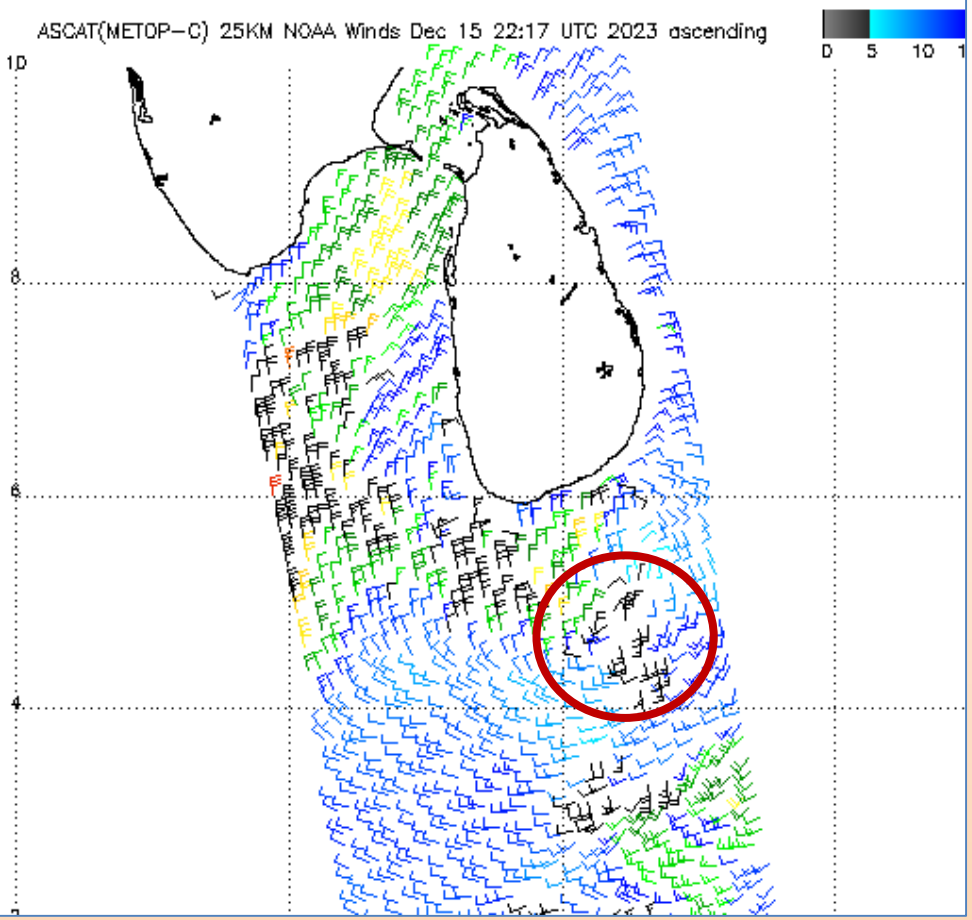
Date	Synoptic situation
15.12.2023	An upper cyclonic circulation over southwest Bay of Bengal and adjoining equatorial Indian ocean in the lower tropospheric levels
16.12.2023	It was observed over equatorial Indian Ocean and adjoining southwest Bay of Bengal off south Sri Lanka coast
17.12.2023	It was over Comorin area & neighbourhood and extended up to mid tropospheric levels
18.12.2023	It persisted over the same area

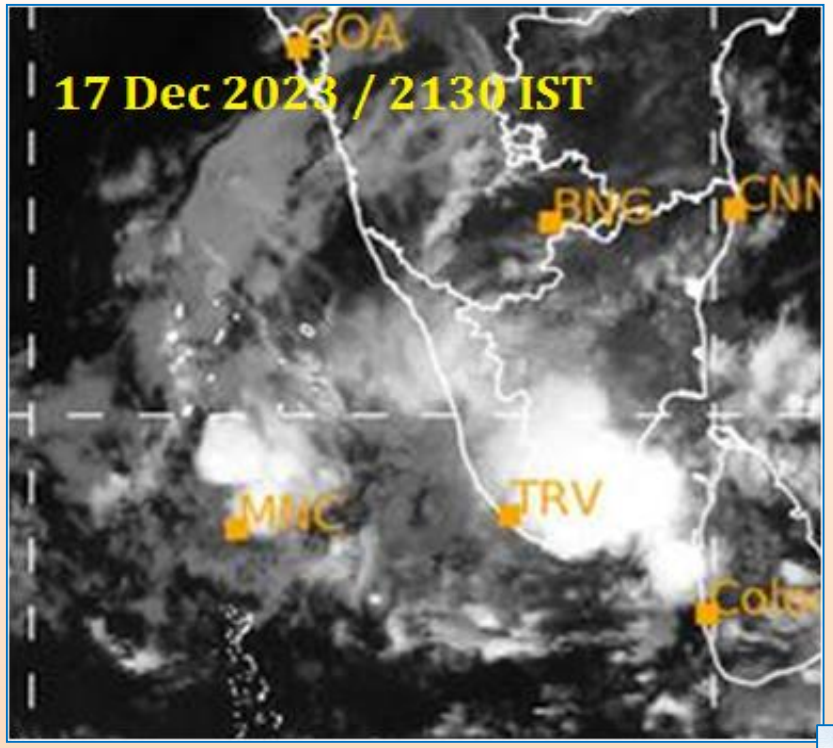


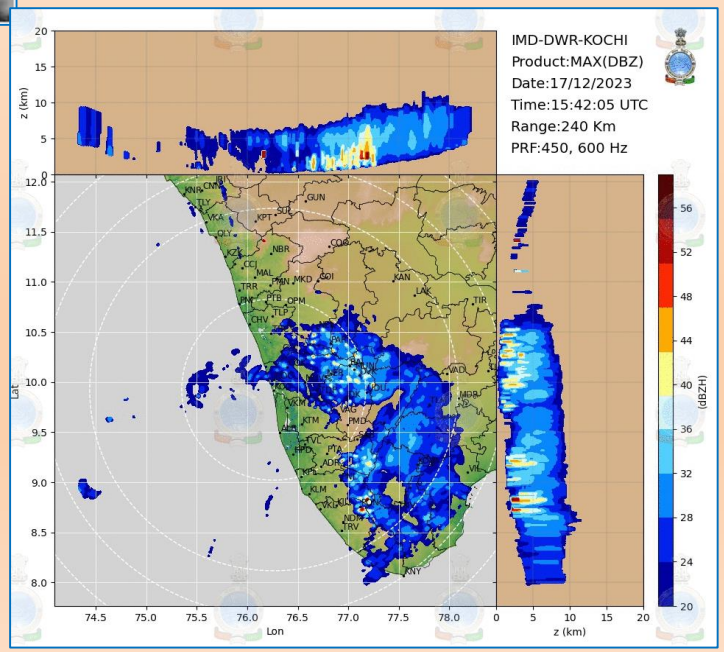




16TH TO 18TH DEC



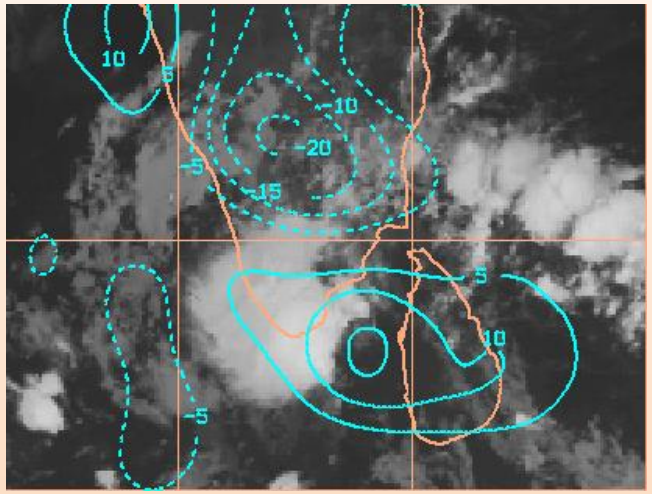




Scatterometer winds indicating cycir off south Sri Lanka coast on 15th night

Low level convergence

00Z



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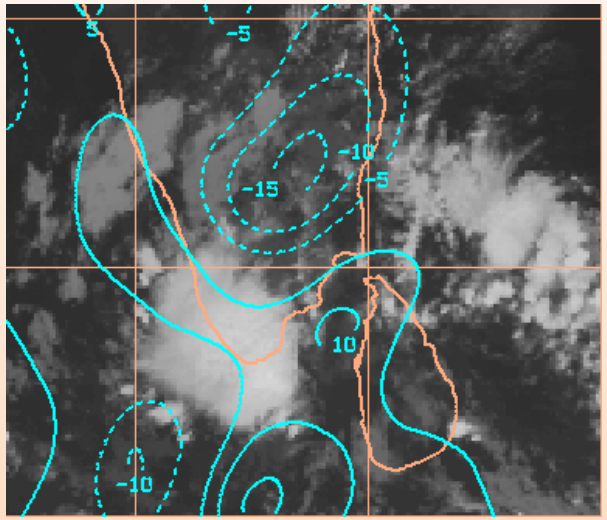
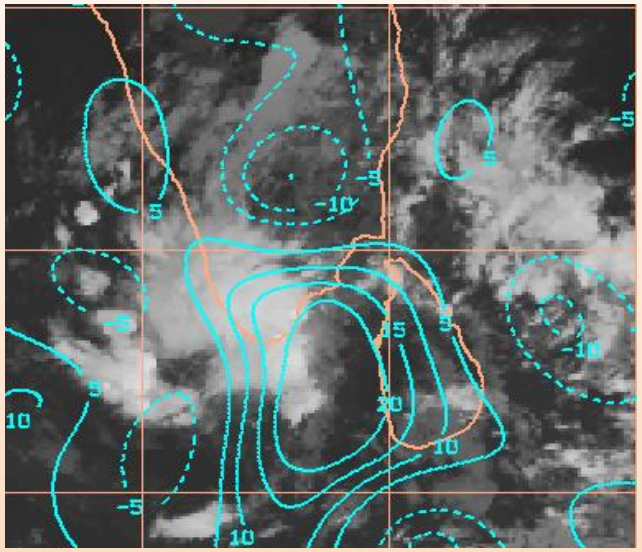


06Z



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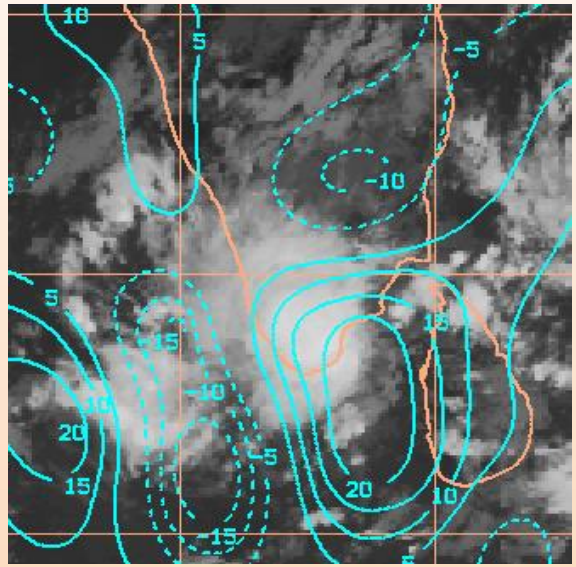

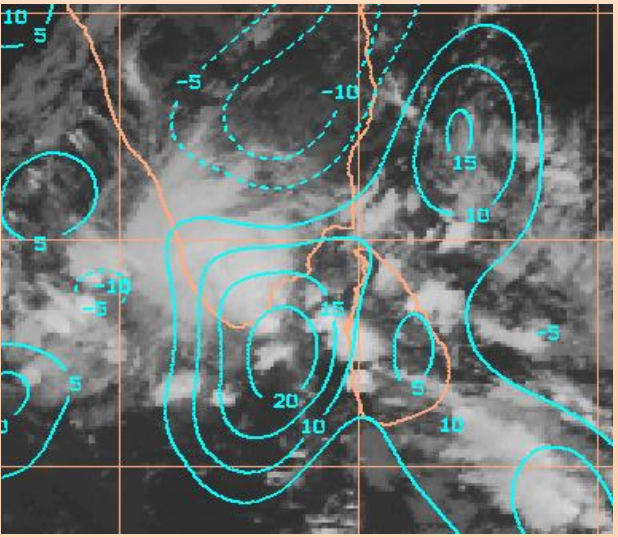

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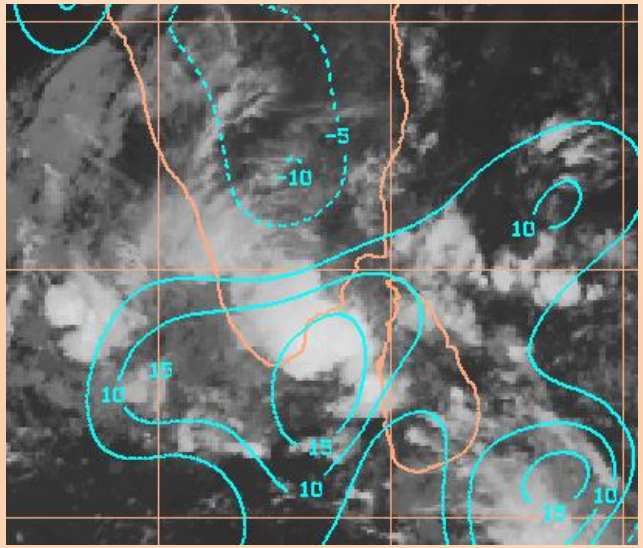

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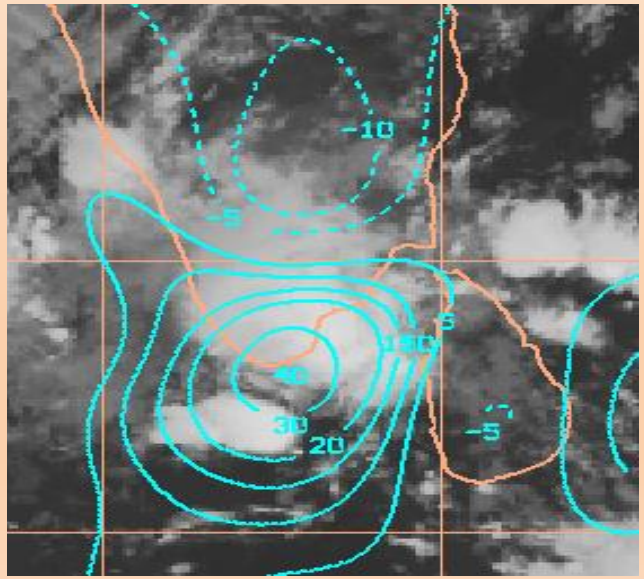

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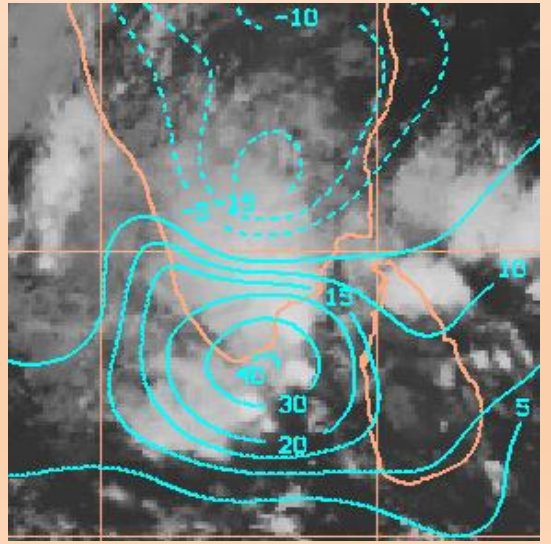
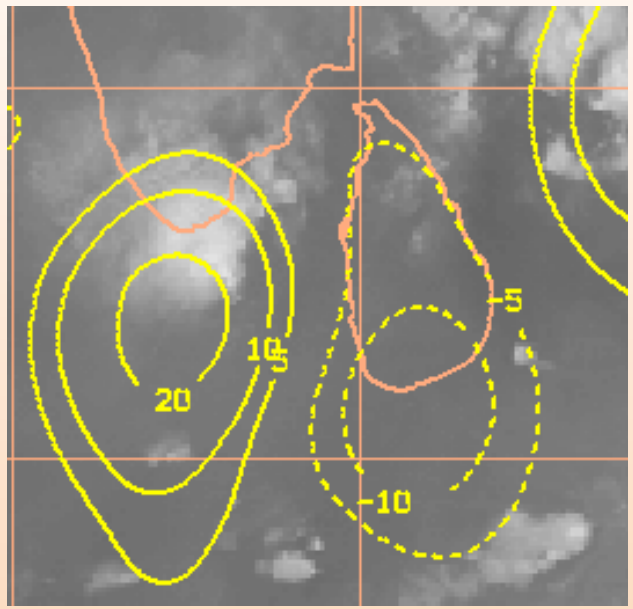
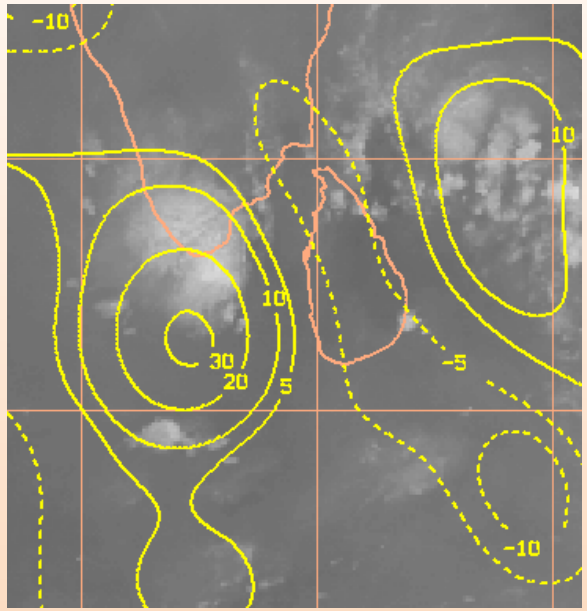
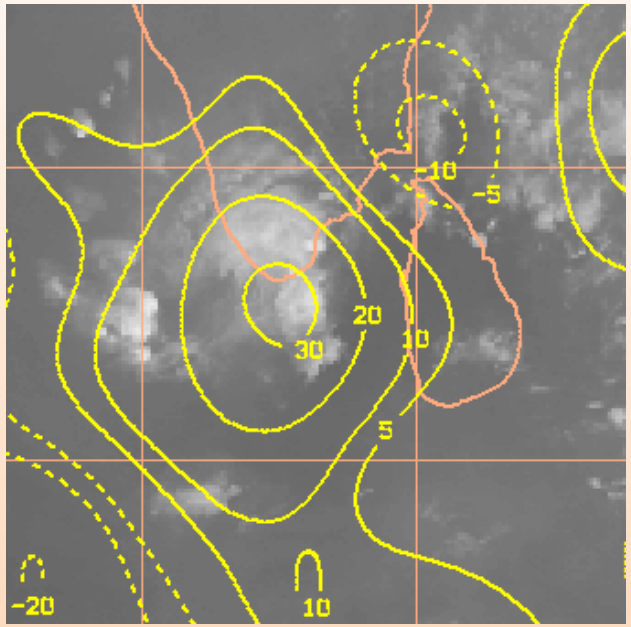


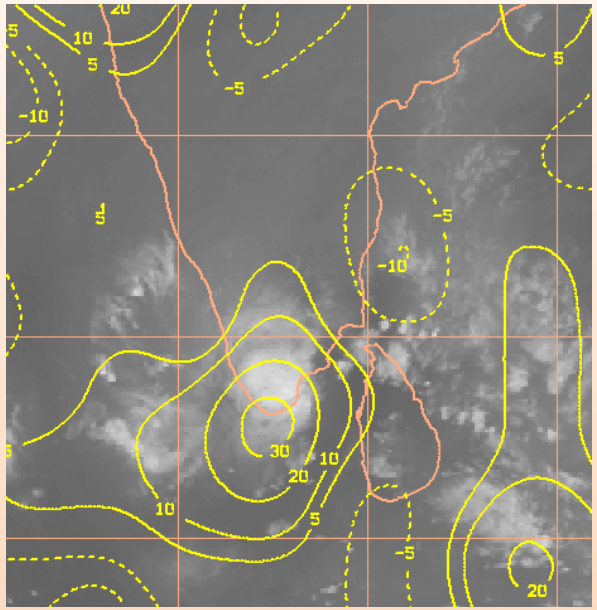
21Z

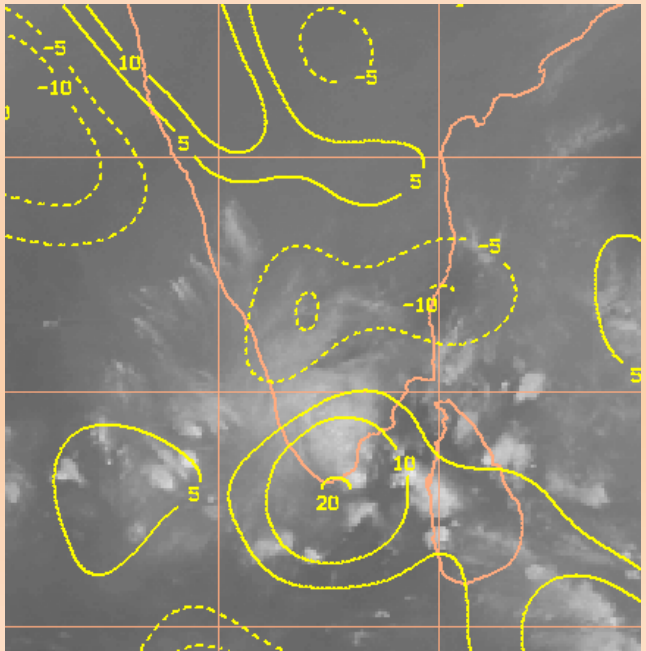
Upper level Divergence

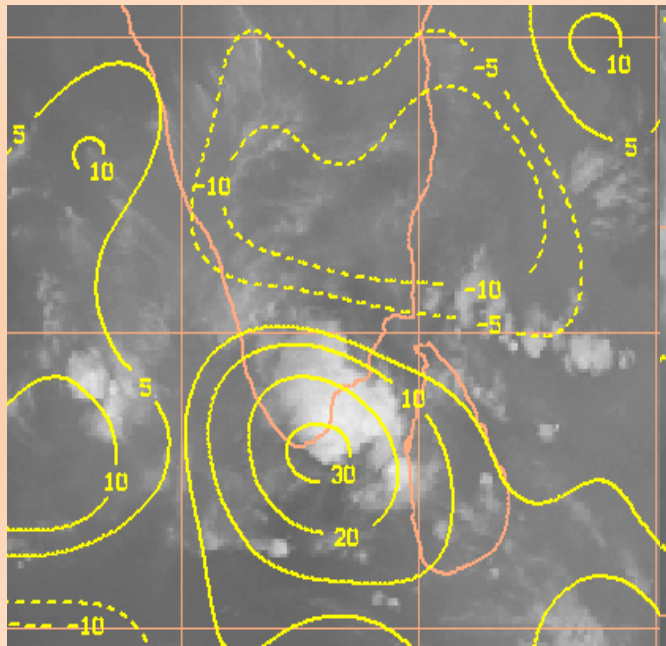


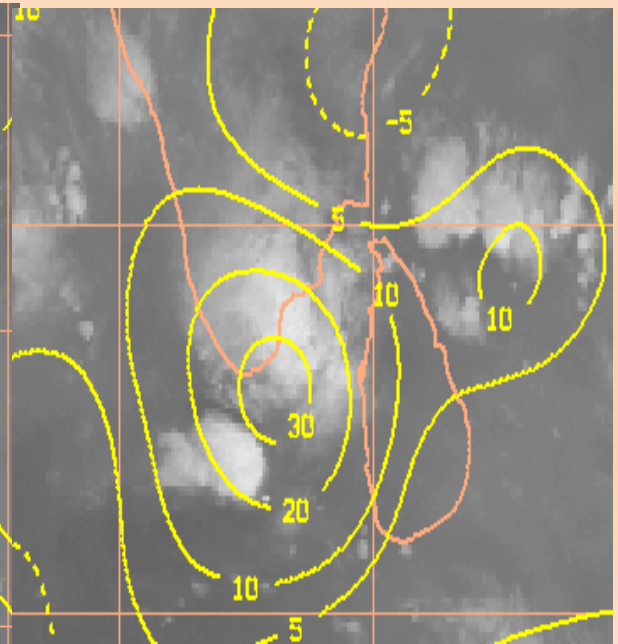


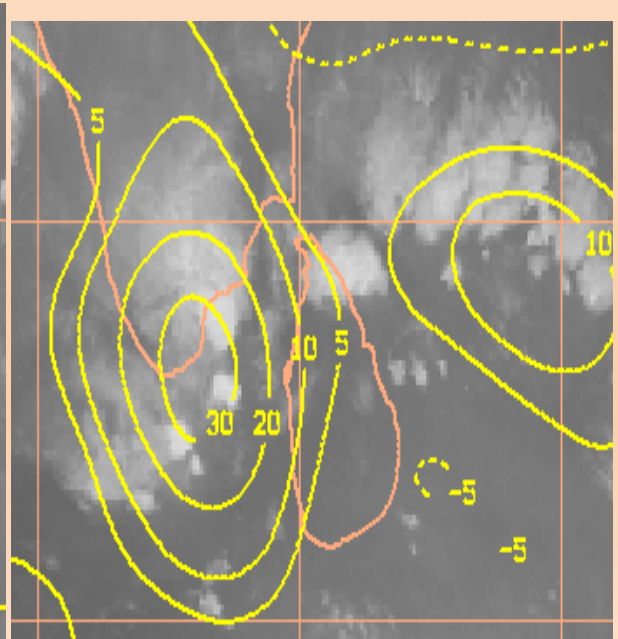




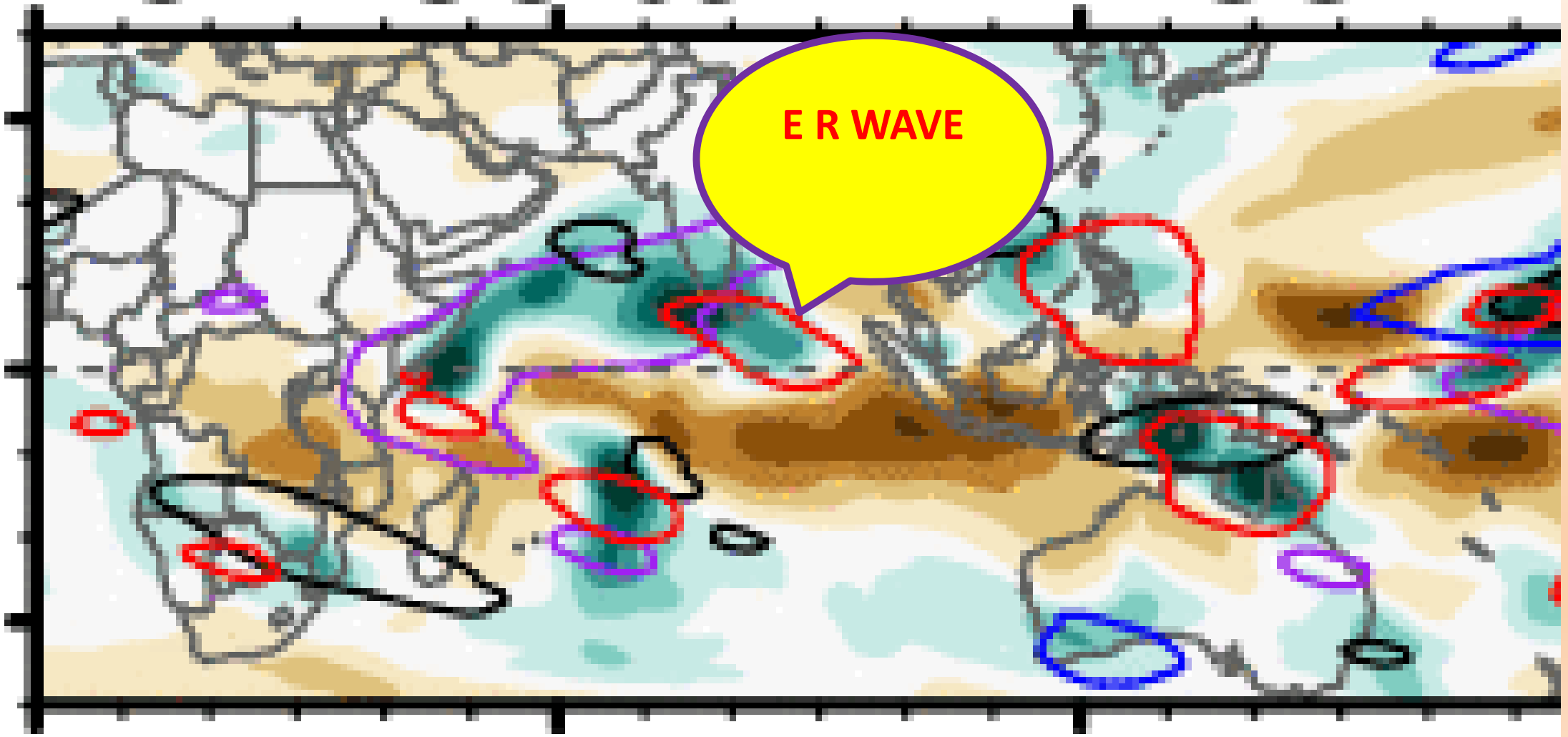


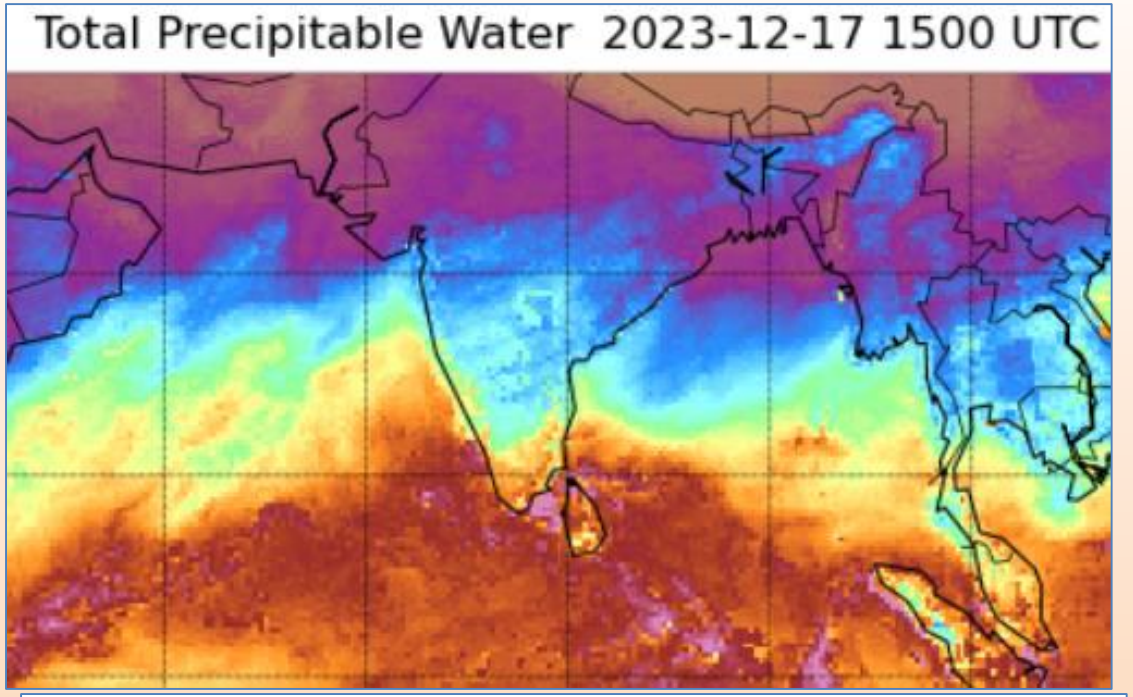


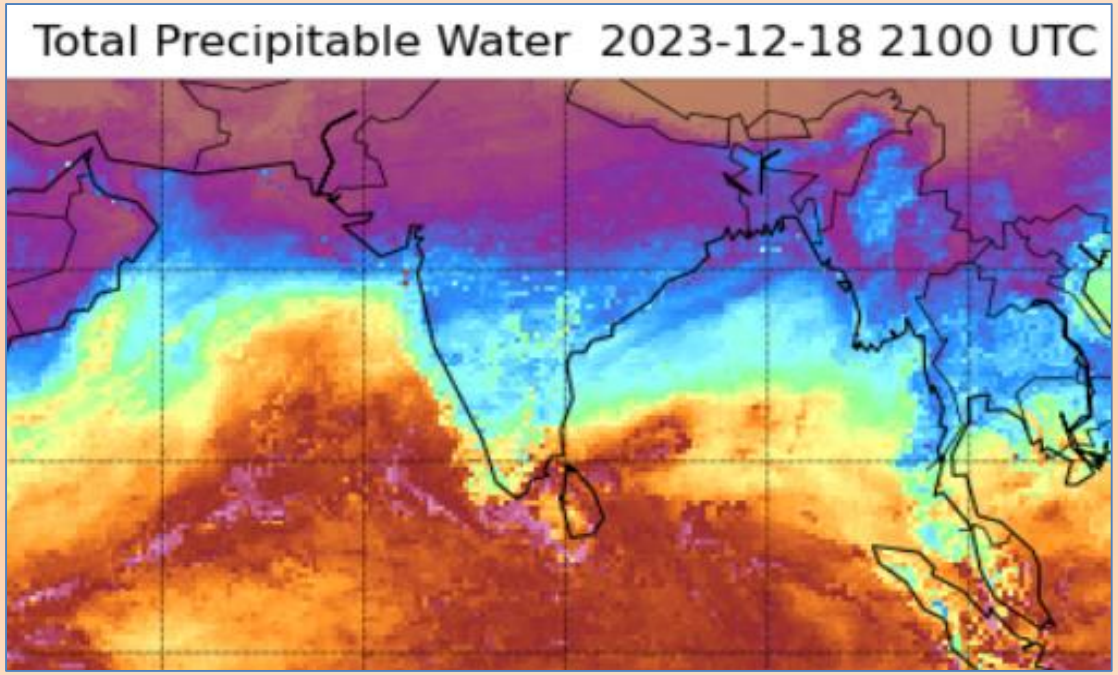


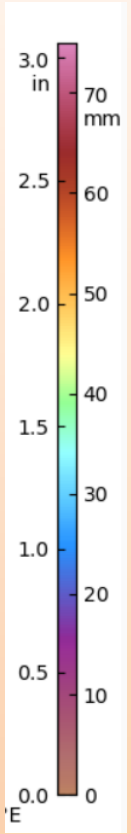


16-Dec to 22-Dec




Total Precipitable Water 2023-12-17 1500 UTC


Total Precipitable Water 2023-12-18 2100 UTC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1.5
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Date	24-hr accumulated rainfall
17.12.2023	Isol H-VH rainfall → Tirunelveli district (highest: 19 cm at Nalumukku) Isol H rainfall → Kanyakumari, Ramanathapuram, Pudukottai, Thanjavur, Tiruvarur & Nagapattinam districts
18.12.2023	H-EXH rainfall → Thoothukudi, Tirunelveli, Kanyakumari & Thenkasi districts Isol H-VH→ Virudunagar, Sivagangai, Ramanathapuram & Theni districts Isol H→ Madurai & Dindigul districts 39-EXH, 23-VH, 36-H; Highest: 95 cm at Kayalpattinam in Thoothukudi district; 7 stations (Tirunelveli & Thoothukudi districts) → 50-70 cm; 23 stns → 30-50 cm
19.12.2023	H-EXH→ Thootukudi district; H-VH→ Tirunelveli district 2-EXH, 7-VH; Highest: 23 cm at Thiruchendur in Thoothukudi dist


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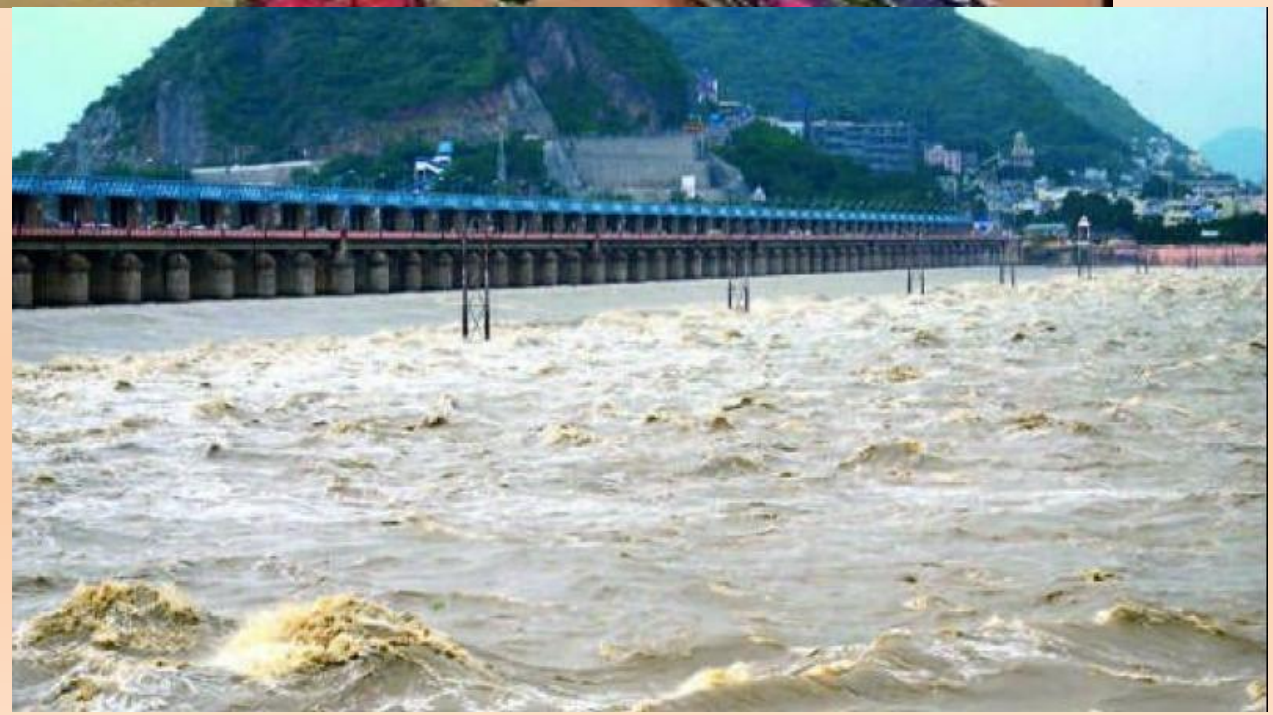
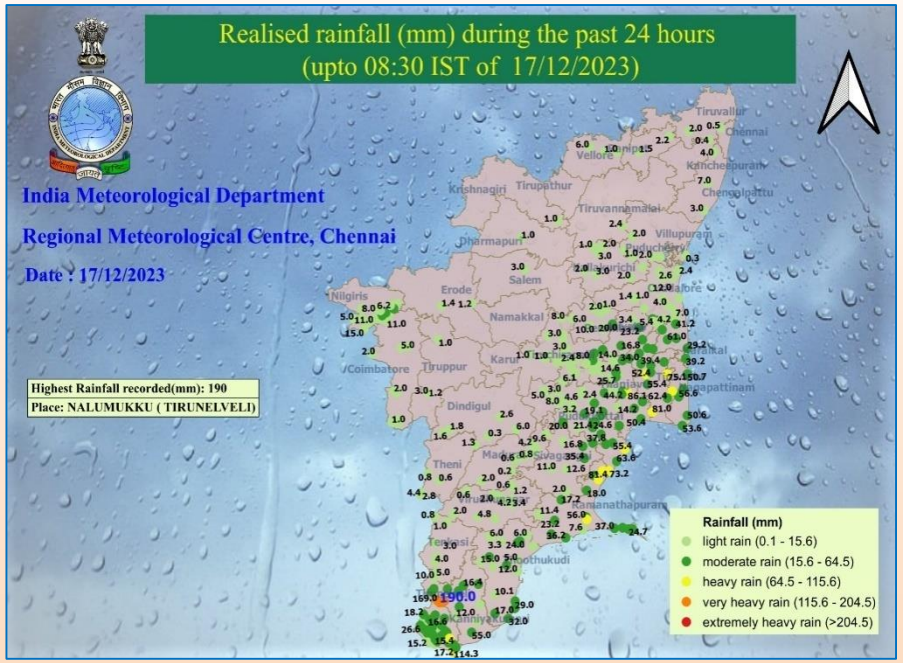
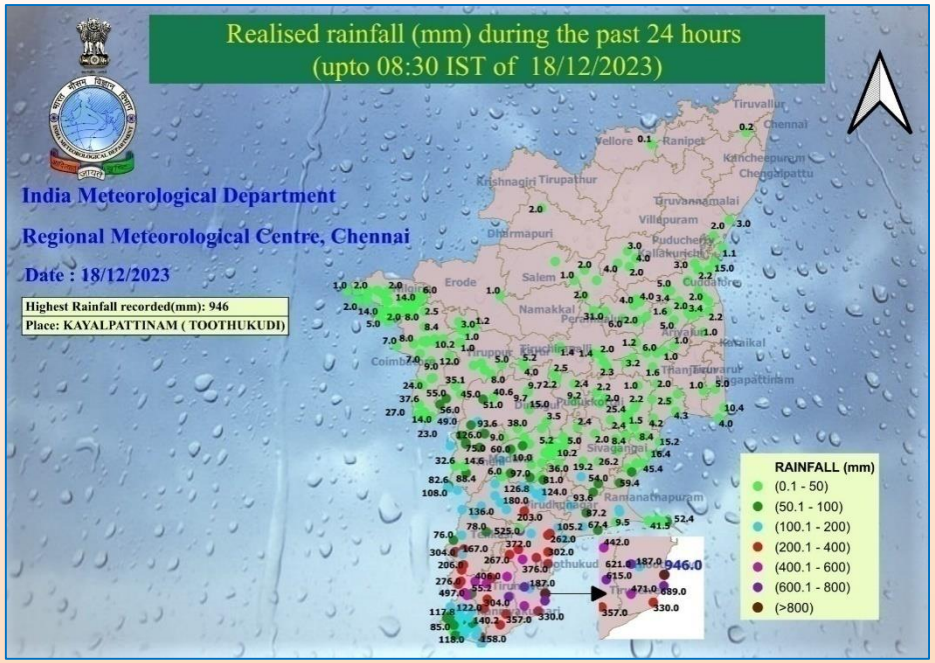
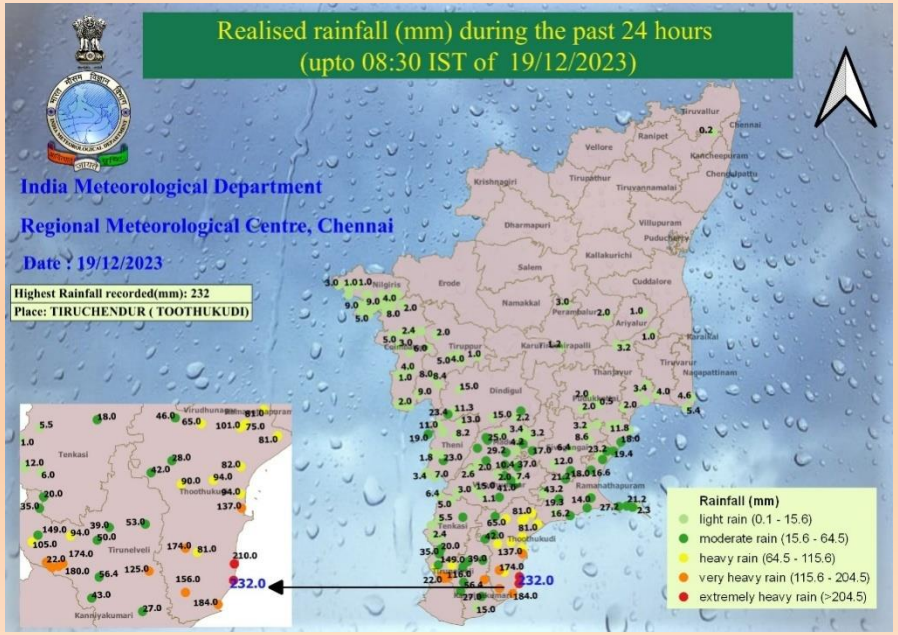
SRIVIKUNTAM
SRIVIKUNTAM

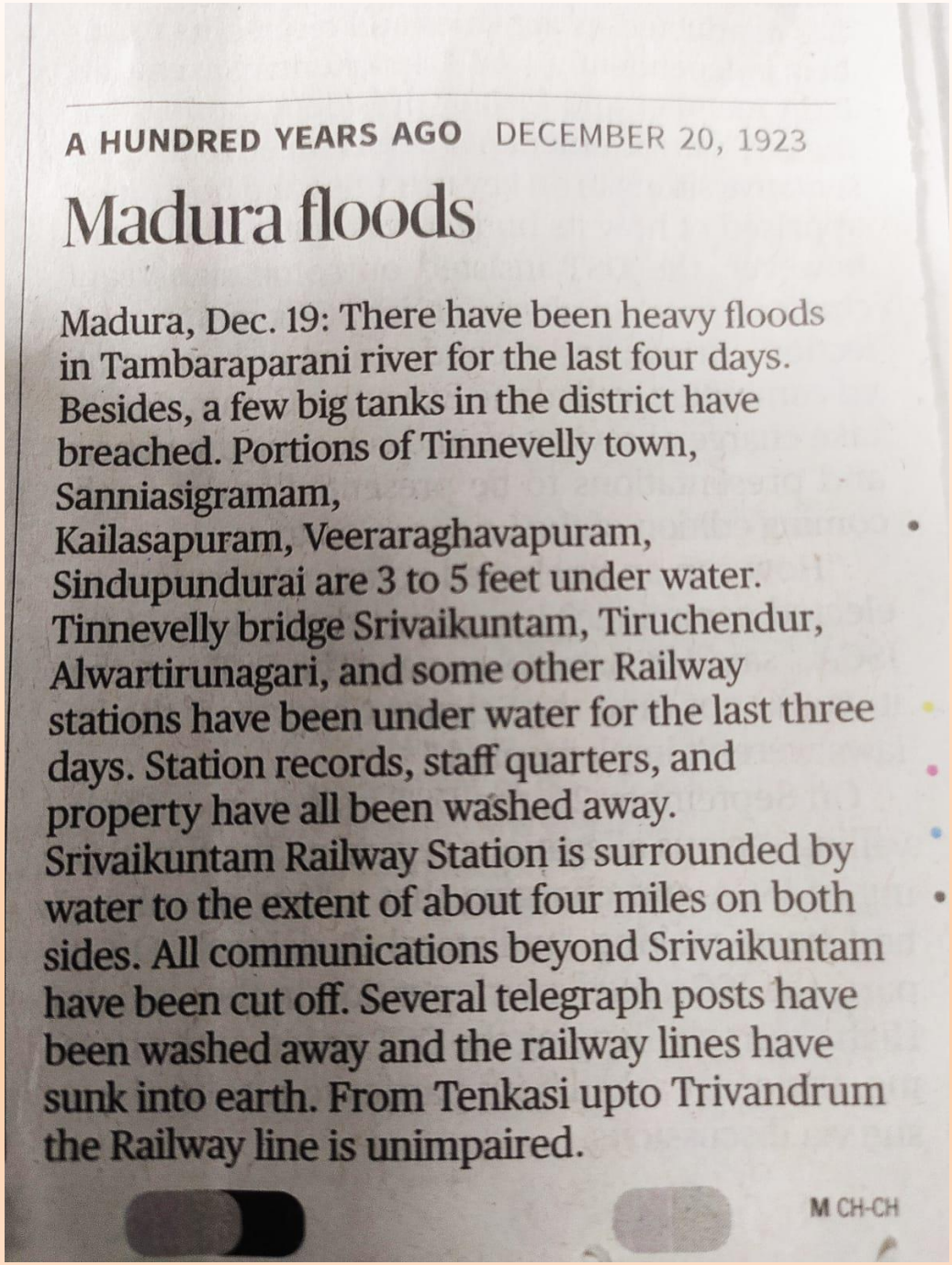

INDIAN AIR FORCE
RPF




Realised rainfall (mm) during the past 24 hours
(upto 08:30 IST of 17/12/2023)
India Meteorological Department
Regional Meteorological Centre, Chennai
Date : 17/12/2023
Highest Rainfall recorded(mm): 190
Place: NALUMUKKU (TIRUNELVELI)
Rainfall (mm)
light rain (0.1 - 15.6)
moderate rain (15.6 - 64.5)
heavy rain (64.5 - 115.6)
very heavy rain (115.6 - 204.5)
extremely heavy rain (>204.5)


Realised rainfall (mm) during the past 24 hours
(upto 08:30 IST of 18/12/2023)
India Meteorological Department
Regional Meteorological Centre, Chennai
Date : 18/12/2023
Highest Rainfall recorded(mm): 946
Place: KAYALPATTINAM (TOOTHUKUDI)
RAINFALL (mm)
(0.1 - 50)
(50.1 - 100)
(100.1 - 200)
(200.1 - 400)
(400.1 - 600)
(600.1 - 800)
(>800)


Realised rainfall (mm) during the past 24 hours
(upto 08:30 IST of 19/12/2023)
India Meteorological Department
Regional Meteorological Centre, Chennai
Date : 19/12/2023
Highest Rainfall recorded(mm): 232
Place: TIRUCHENDUR (TOOTHUKUDI)
Rainfall (mm)
light rain (0.1 - 15.6)
moderate rain (15.6 - 64.5)
heavy rain (64.5 - 115.6)
very heavy rain (115.6 - 204.5)
extremely heavy rain (>204.5)



A HUNDRED YEARS AGO DECEMBER 20, 1923

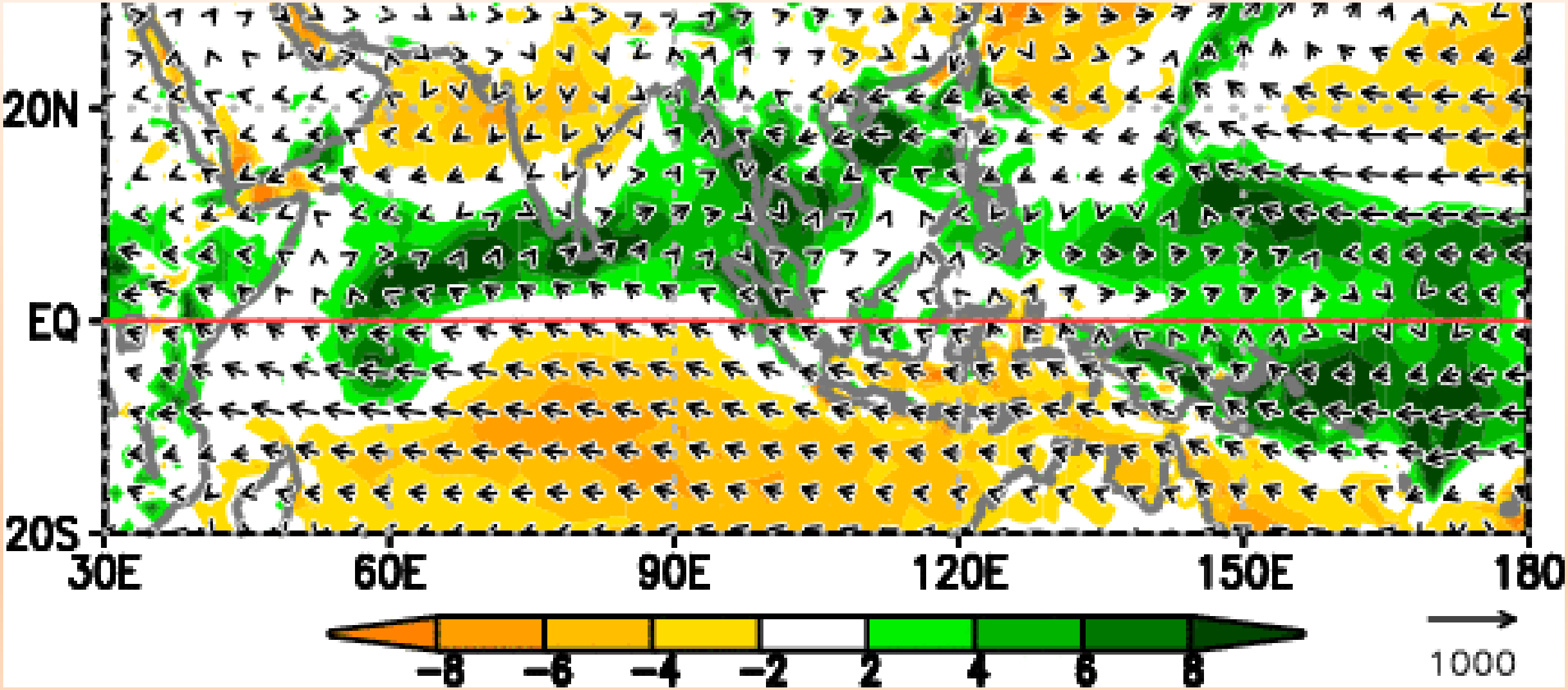
Madura floods

Madura, Dec. 19: There have been heavy floods in Tambaraparani river for the last four days. Besides, a few big tanks in the district have breached. Portions of Tinnevelly town, Sanniasigramam, Kailasapuram, Veeraraghavapuram, Sindupundurai are 3 to 5 feet under water. Tinnevelly bridge Srivaikuntam, Tiruchendur, Alwartirunagari, and some other Railway stations have been under water for the last three days. Station records, staff quarters, and property have all been washed away. Srivaikuntam Railway Station is surrounded by water to the extent of about four miles on both sides. All communications beyond Srivaikuntam have been cut off. Several telegraph posts have been washed away and the railway lines have sunk into earth. From Tenkasi upto Trivandrum the Railway line is unimpaired.

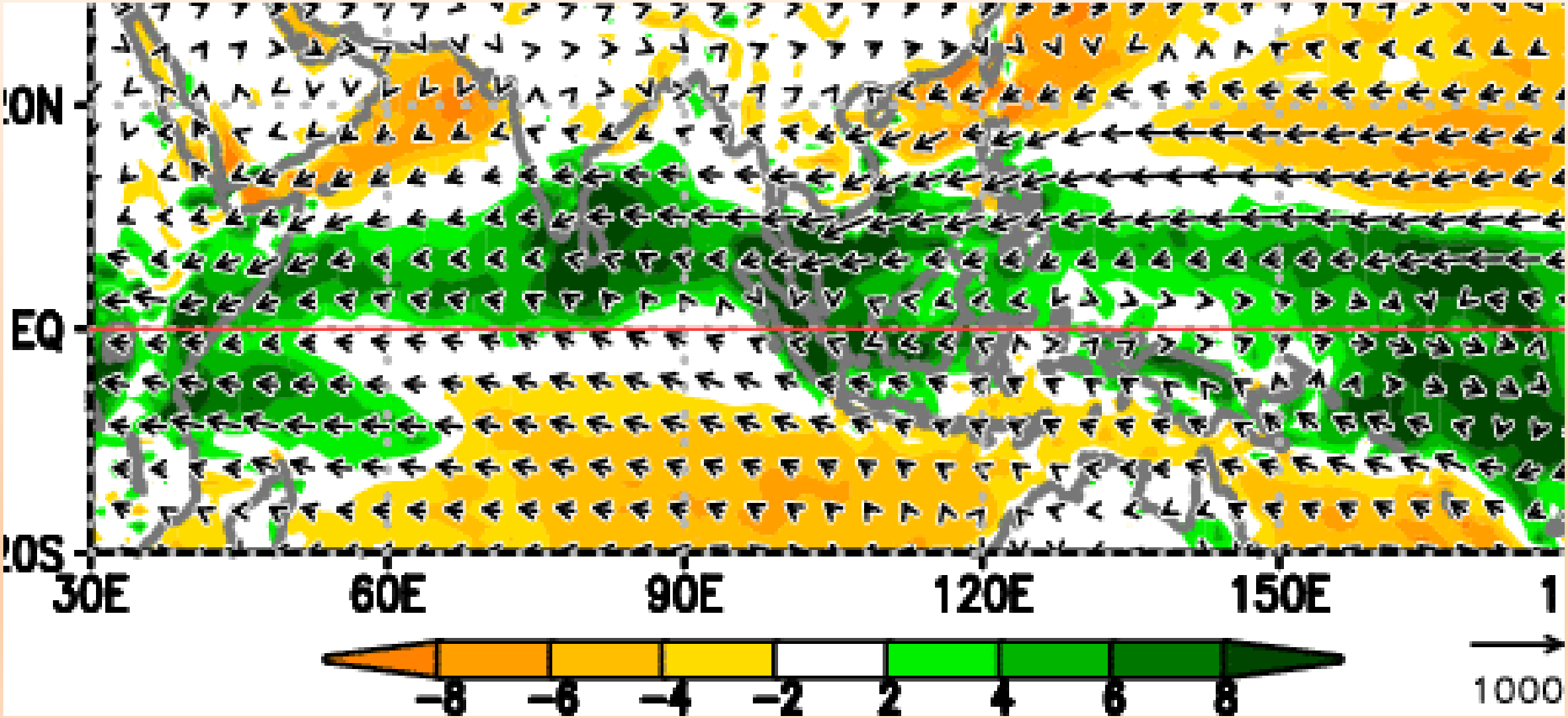
M CH-CH

4.12.1923

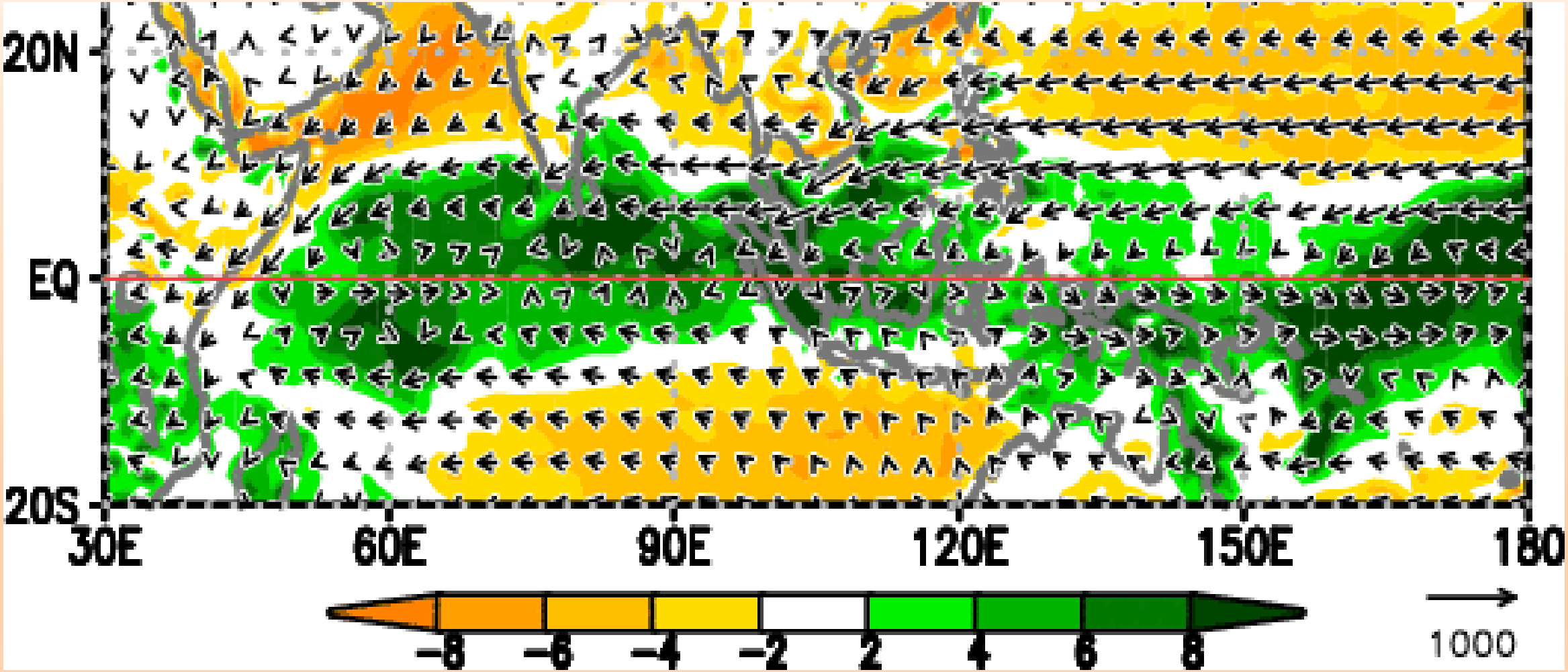
WATER VAPOUR FLUX & CONVERGENCE- OCT



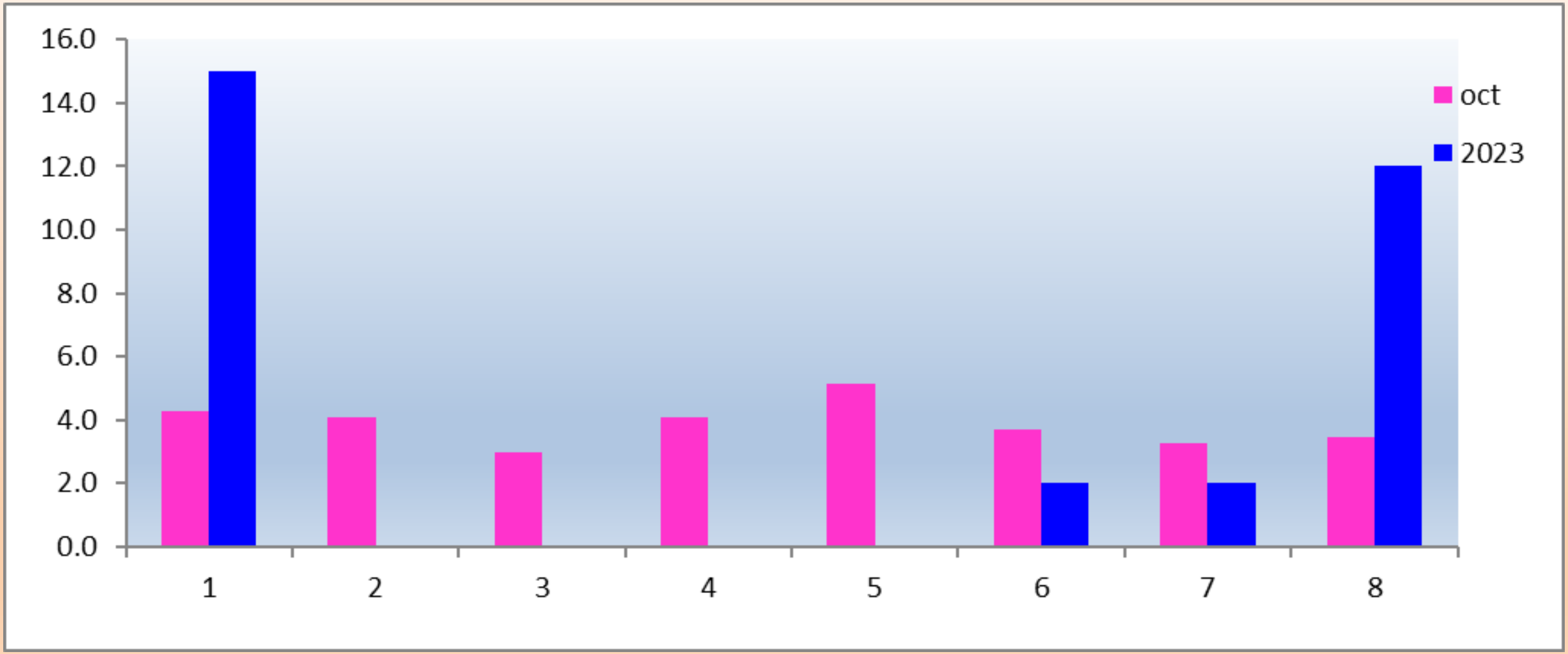
WATER VAPOUR FLUX & CONVERGENCE- NOV



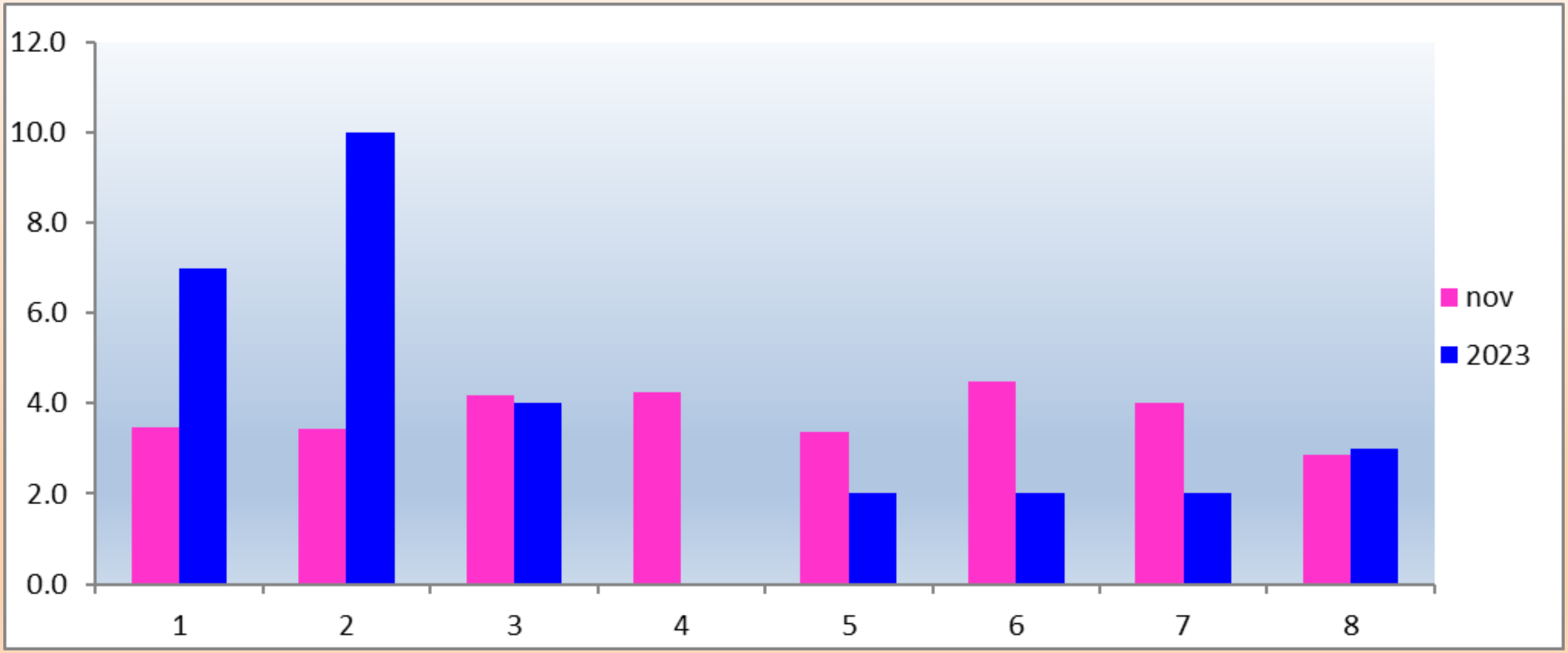
WATER VAPOUR FLUX & CONVERGENCE- DEC



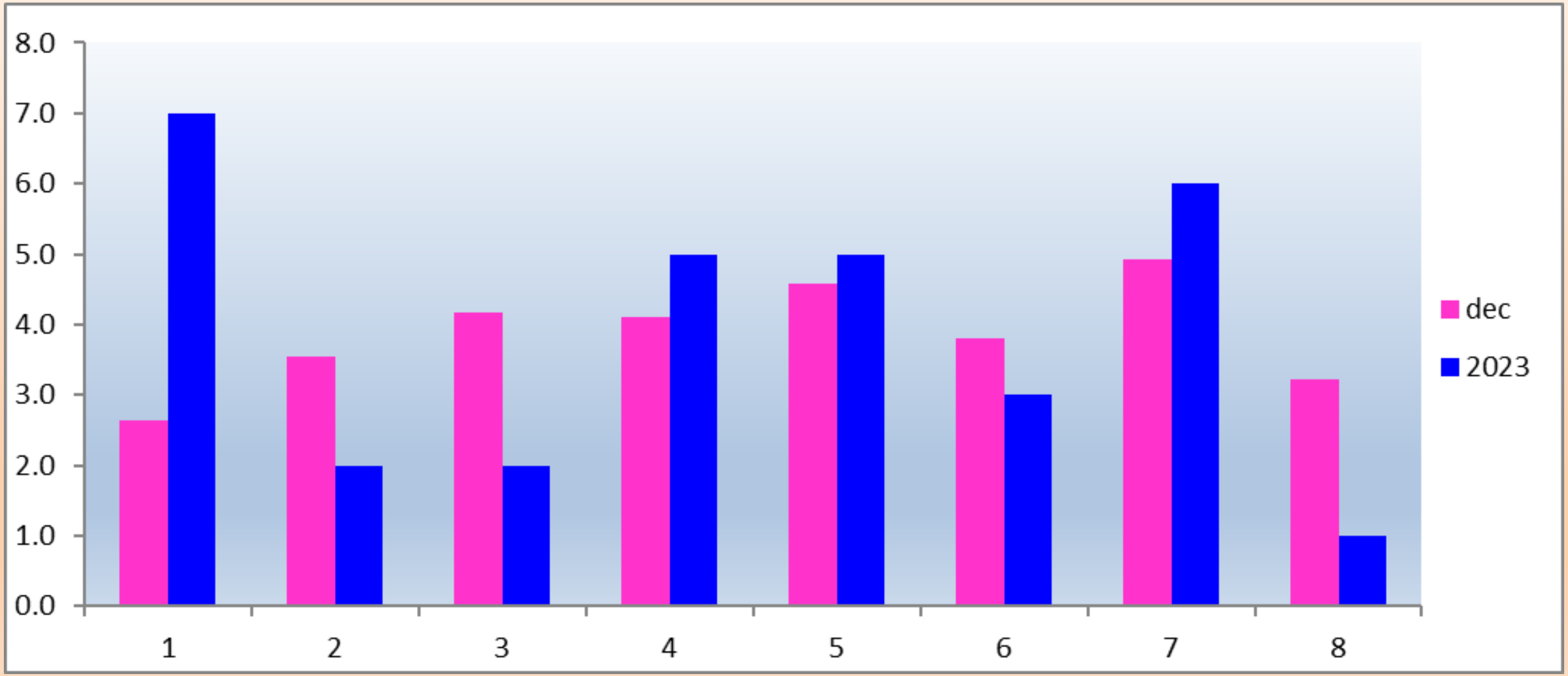
MJO -2023- OCT



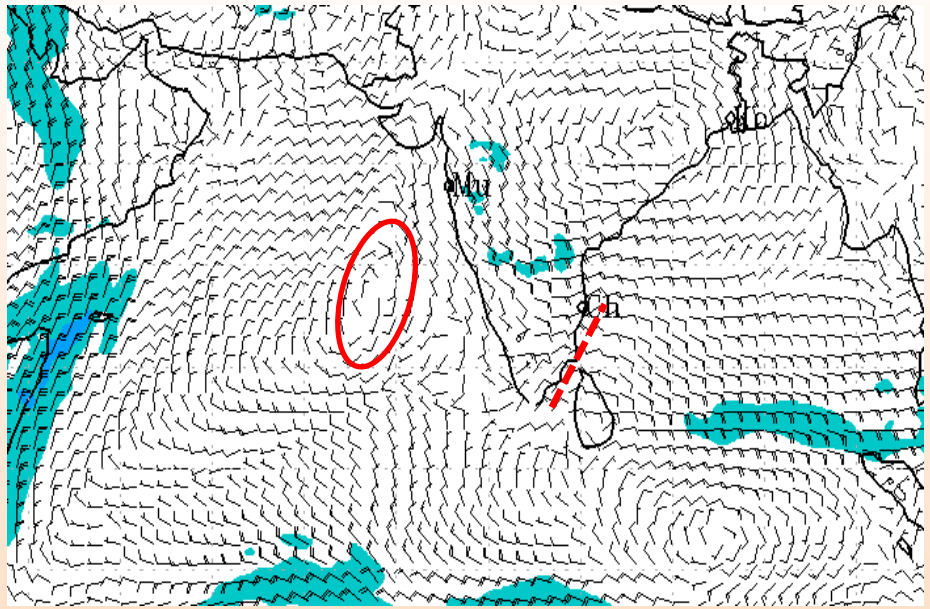
MJO -2023- NOV



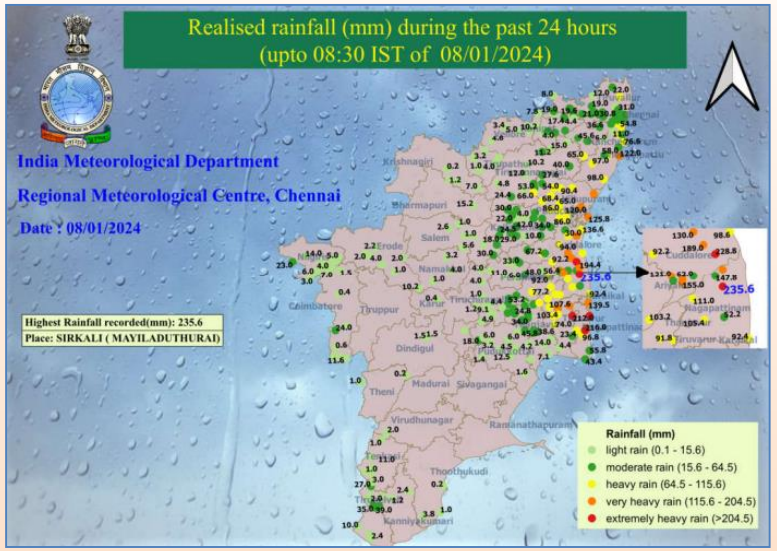
MJO -2023- DEC



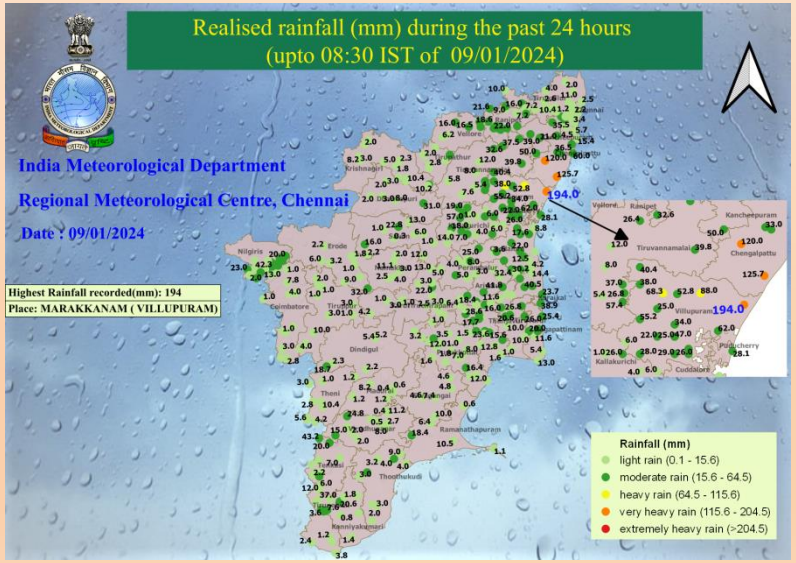
- **NEM Extending into January -2024**

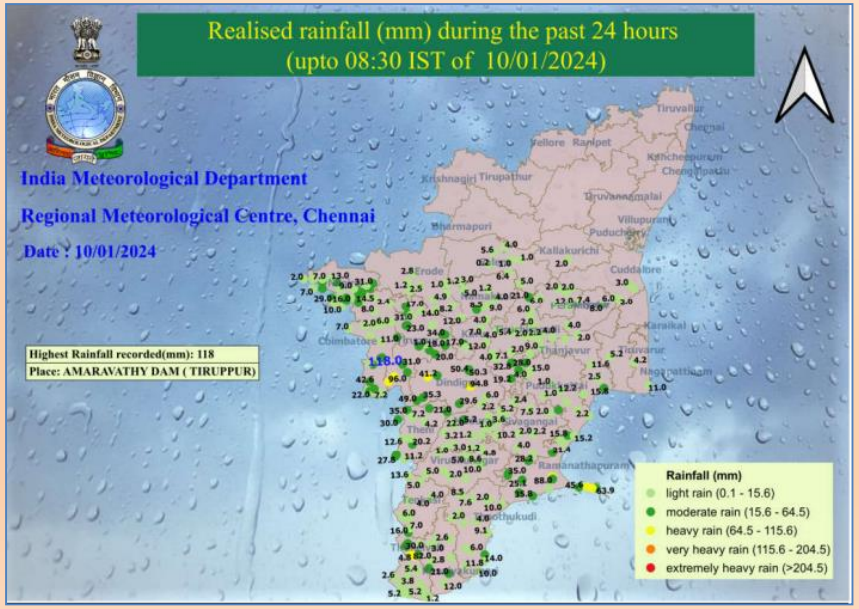


5-10 Jan 2024



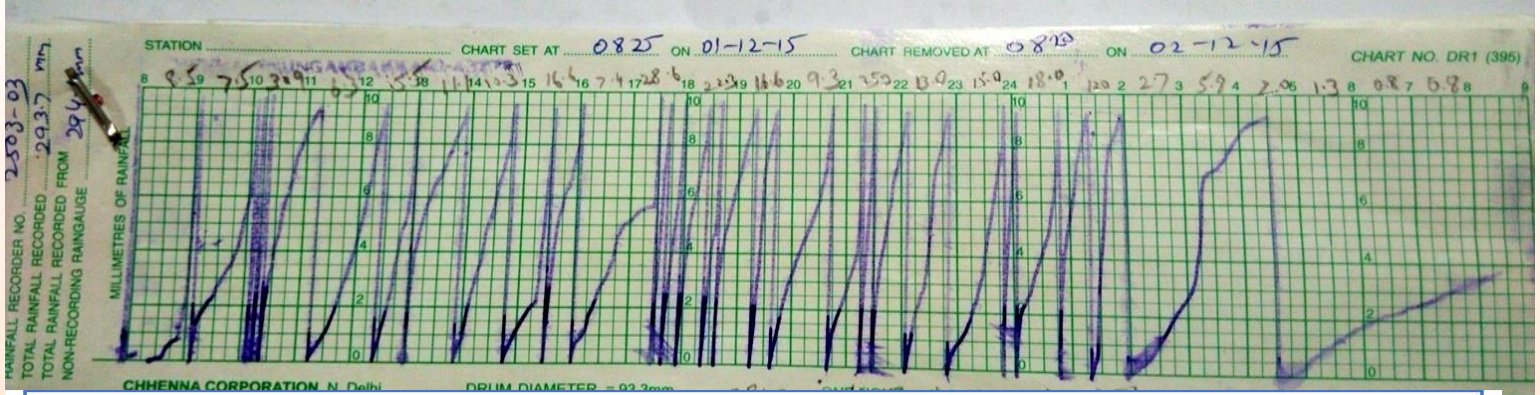
- ✓NEM extended into Jan 2024
- ✓Cycir over Lakshadweep area and neighbourhood
- ✓Trough in easterlies over southwest Bay of Bengal



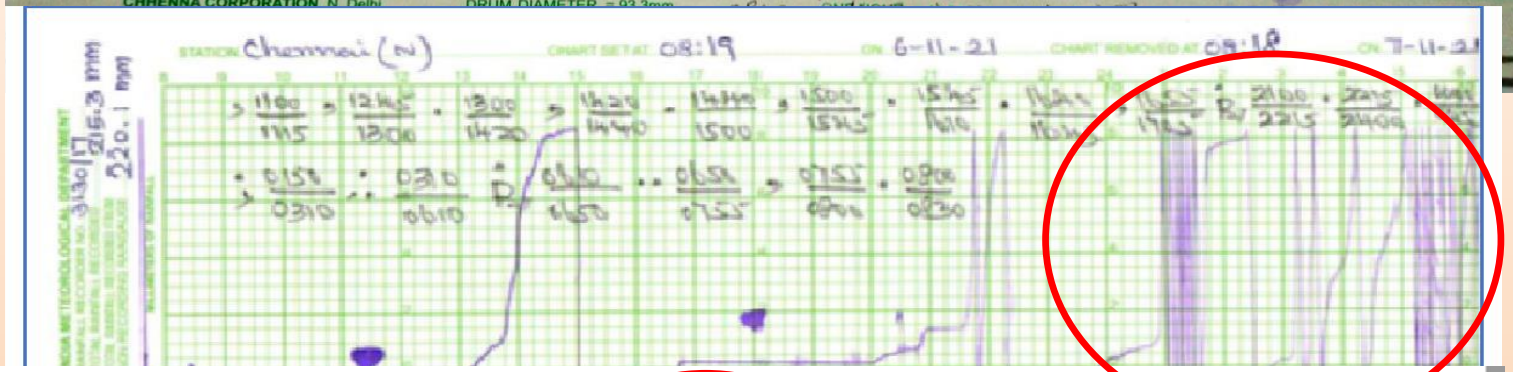


Withdrawal

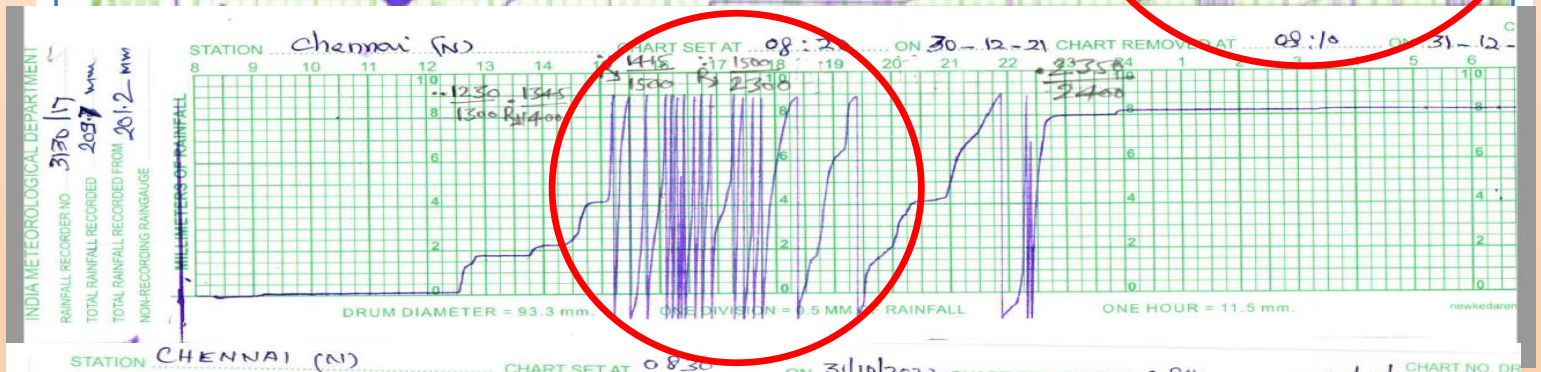
- ✓ **Cessation of northeast monsoon rains over the southern peninsular India was declared on 14th Jan 2024.**



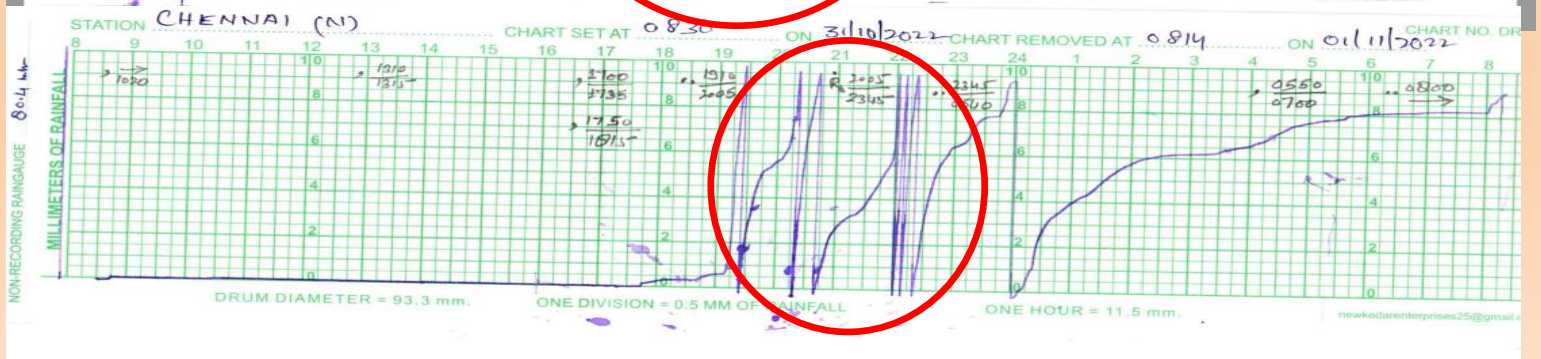
1/12/15
30cm in 24hrs



6/11/21
22cm in 6 hrs



30/12/21
20 cm in 3 hrs

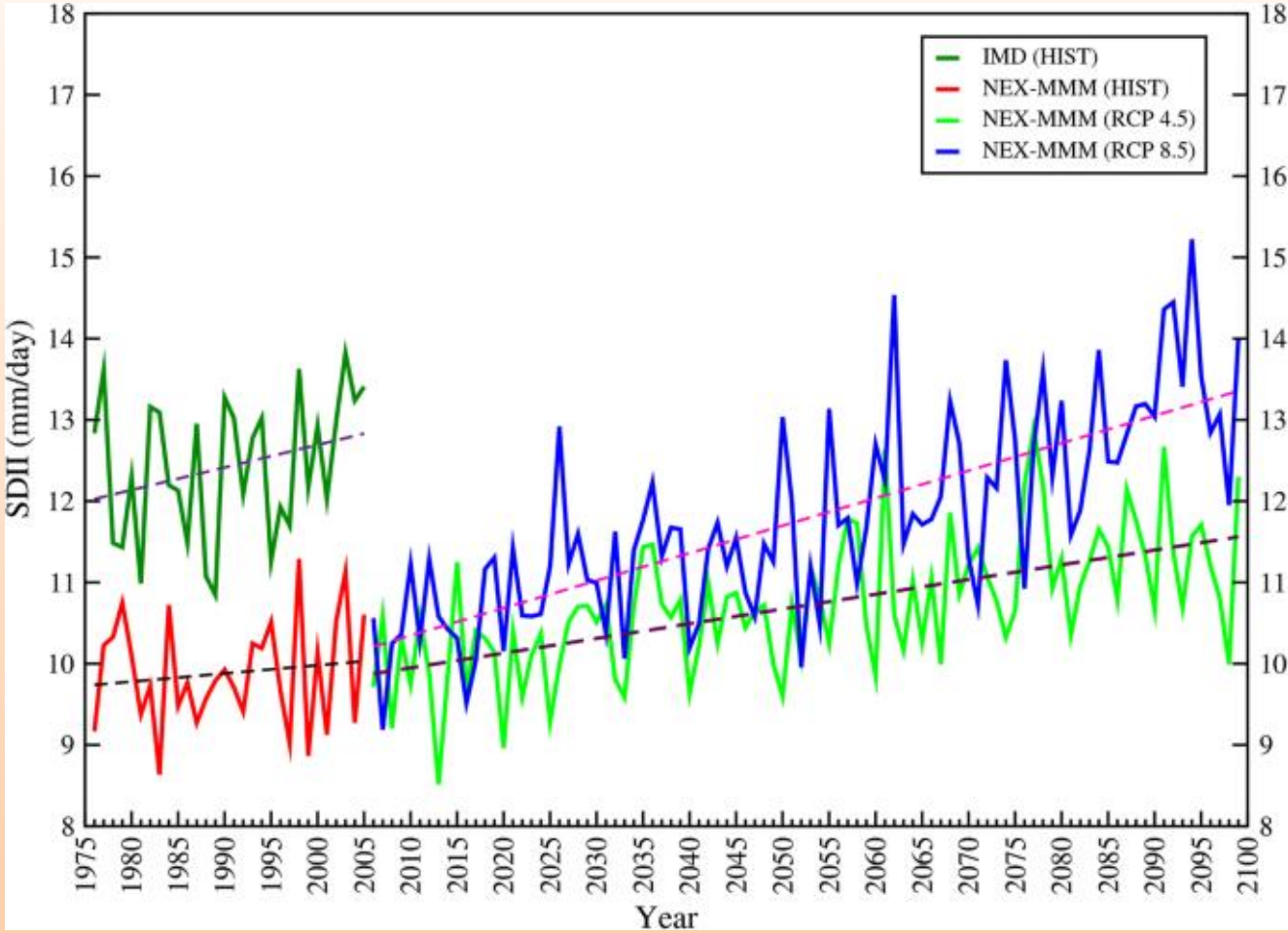


31/10/22
8 cm in 2 hrs

➢future changes in precipitation extremes in northeast monsoon season (October–November–December) over south peninsular India based on statistically downscaled high-resolution NASA Earth Exchange Global Daily Downscaled Projections (NEX-GDDP) datasets.

➢. There may be an increase in precipitation in near (5% under RCP 4.5 and 11% under RCP 8.5) and far future (21% and 38% under RCP4.5 and RCP 8.5 respectively).

➢ **Future climate projections indicate that both the intensity and frequency of precipitation extremes in most parts of the south peninsular India may increase under both the warming scenarios during northeast monsoon season.**



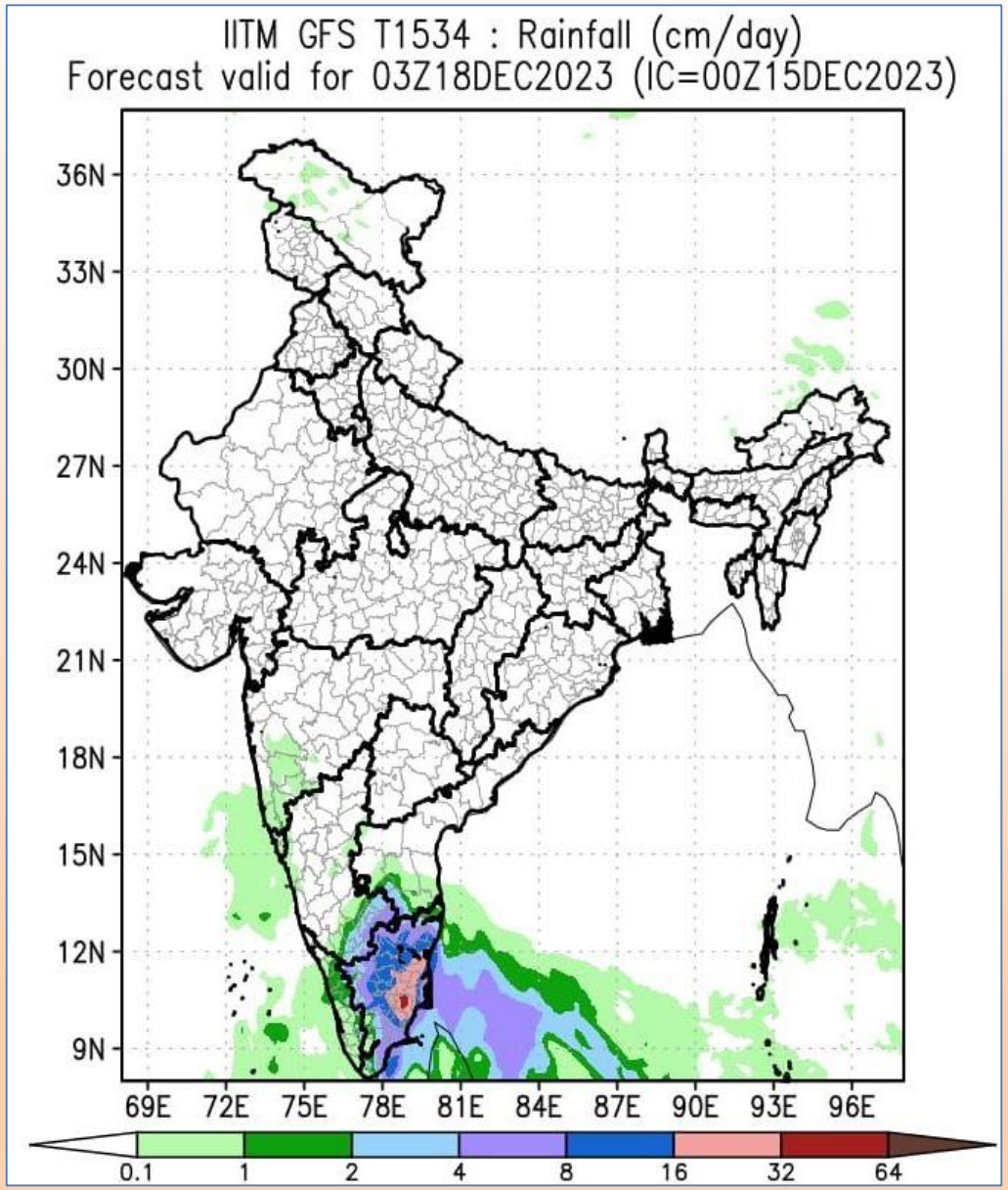
Future changes in precipitation extremes during northeast monsoon over south peninsular India

Theoretical and Applied Climatology, Volume 142, pages 205–217, (2020)

Summary

- ✓ SWM → 19.10.2023.
- ✓ NEM rains commenced →21st OCT
- ✓ 4 TCs (1- AS (ESCS TEJ); 3-BOB (VSCS HAMOON, CS MIDHILI, SCS MICHAUNG))
- ✓ SCS MICHAUNG --> crossed coast S of BPT, AP; caused extensive damages over Chennai
- ✓ UA Cycir, trough in easterlies, strengthening of easterlies & vel conv were other features
- ✓ At the end of the season → KER: Excess category, TN & CAP: Normal category, SIK & RYS → Deficient category.
- ✓ TN → +4% (Def in OCT, Excess in NOV & DEC)
- ✓ 57 days of Hvy rainfall reports including 24 days of VH rain (7 days→ XH rain)
- ✓ Historical heavy rainfall event over STN.

Thank you



- ✓ State level maps are needed for all NWP guidance products.
- ✓ All India maps, even with district outlines, are not very much useful
- ✓ 15 Dec 2023 – GFS guidance, though indicated more than 32 cm of rain, spatially, it is a wrong forecast.
- ✓ Extreme STN→ only moderate rain predicted.