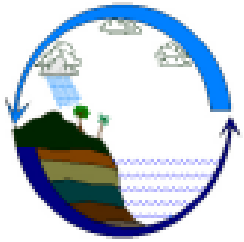


WMO Workshop on Cyclone Forecasting and Analyzing
Muscat, OMAN 18 Dec 2012

Experience of Cyclone Forecasting in Myanmar

Kyaw Lwin Oo

Assistant Director(Meteorology)

Department of Meteorology and Hydrology

Cyclone warning system in Myanmar

- Tropical cyclone warnings in Myanmar are provided by the Department of Meteorology and Hydrology (DMH),Nay Pyi Taw, Myanmar.

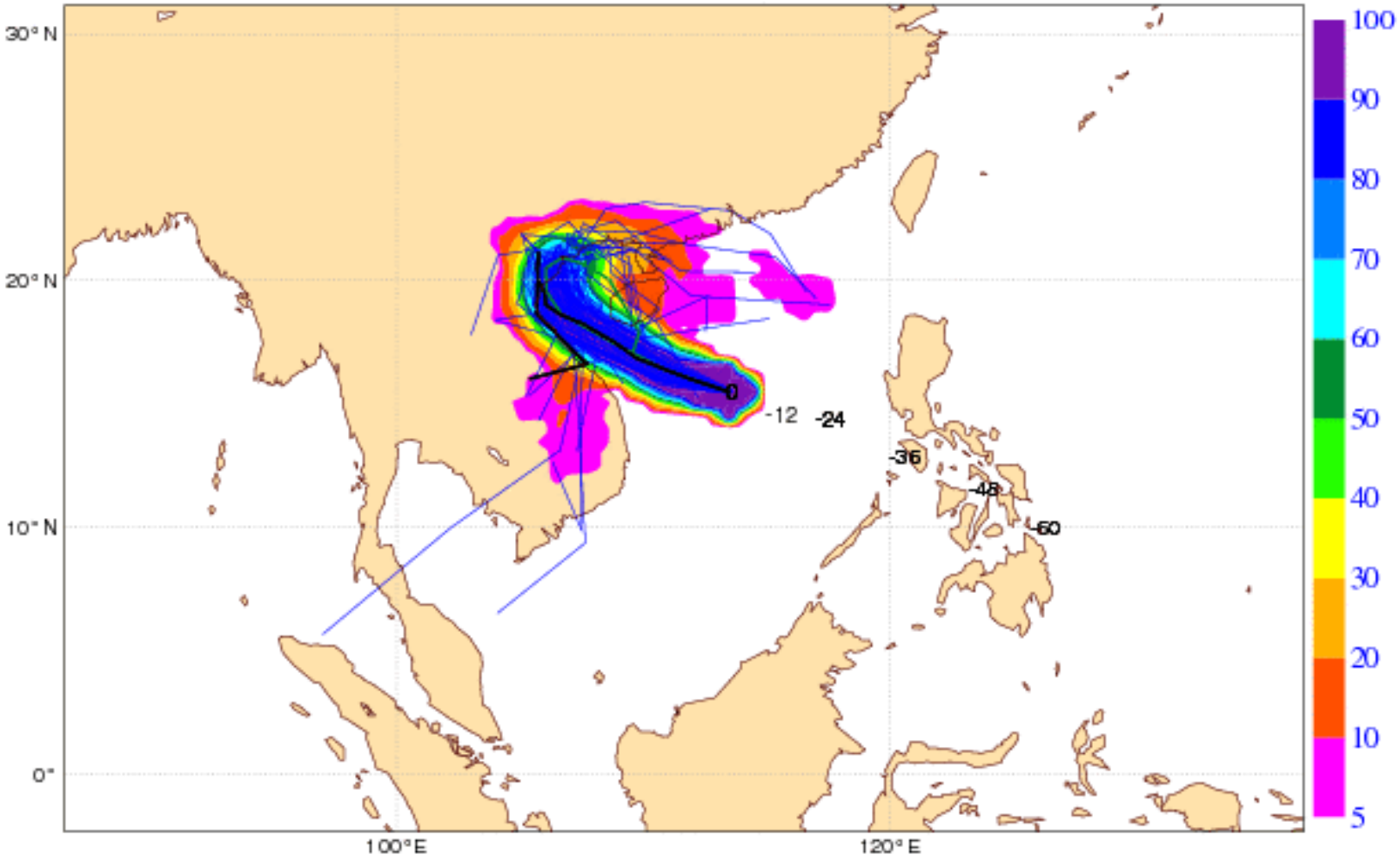
2012 LPA, Depression and Cyclone

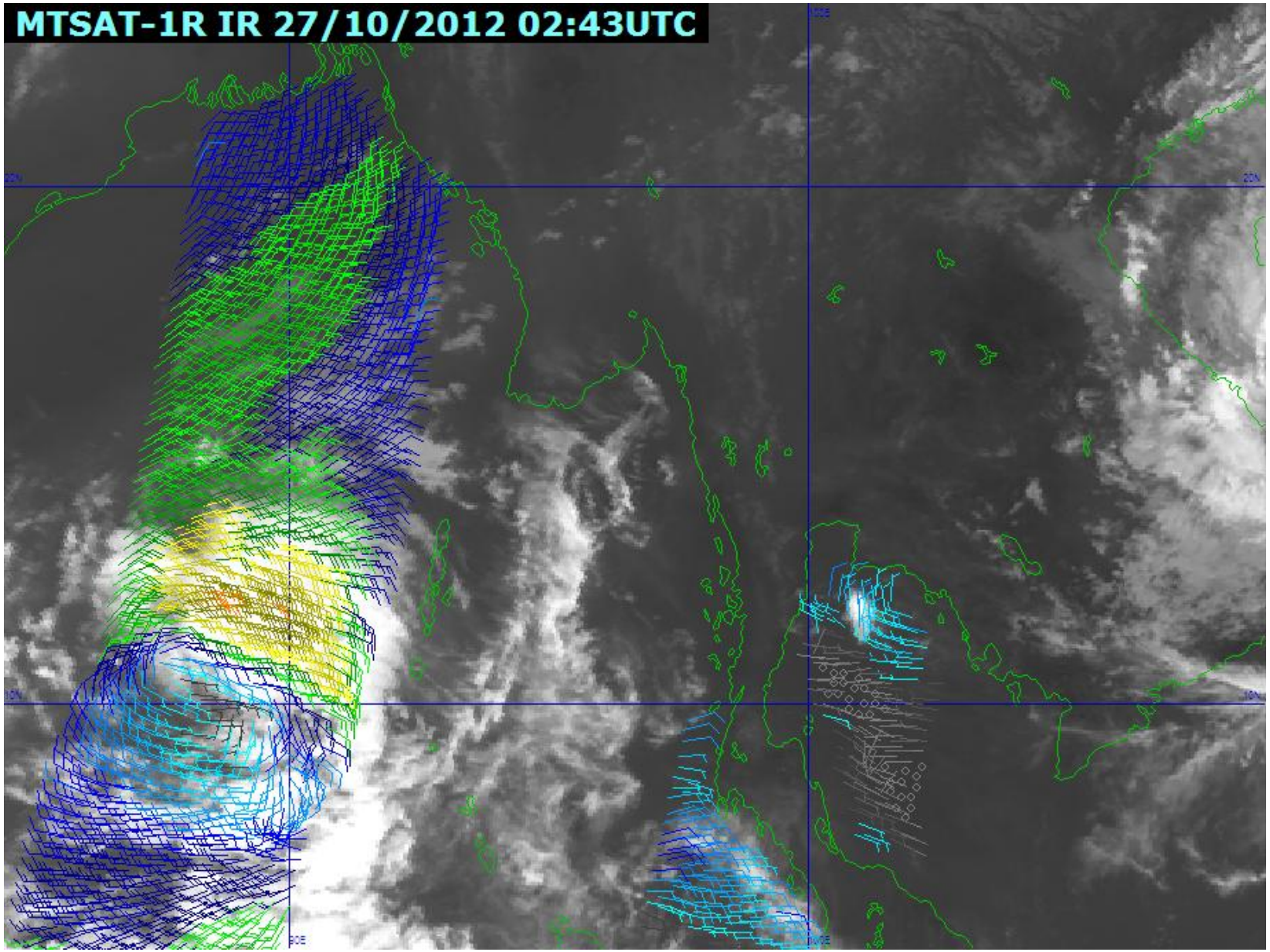
Sr	System	Place	Date	Affect in Myanmar
1	LPA	NW Bay	20-22 July	Monsoon Vigorous, Heavy Rain
2	LPA	NW Bay	3-6 August	Highest Monsoon Intensity
3	LPA	NW Bay	17-19 August	Only strong monsoon
4	LPA	N Bay	25-27 August	Heavy rain in some Coastal areas
5	LPA	WC/NW Bay	3-6 Sept	Monsoon Strong
6	LPA	WC Bay	27 Sep-2 Oct	Moderate Monsoon
7	Depression	NW-NE Bay	7 Oct-12 Oct	Squally Weather in NW areas.
8	CS NILAM	SE Bay	27 Oct-1Nov	
9	Depression	SE Bay	14 Nov-20 Nov	
10	LPA	Andaman Sea	28 Nov-3 Dec	Damaged paddy field due to rain

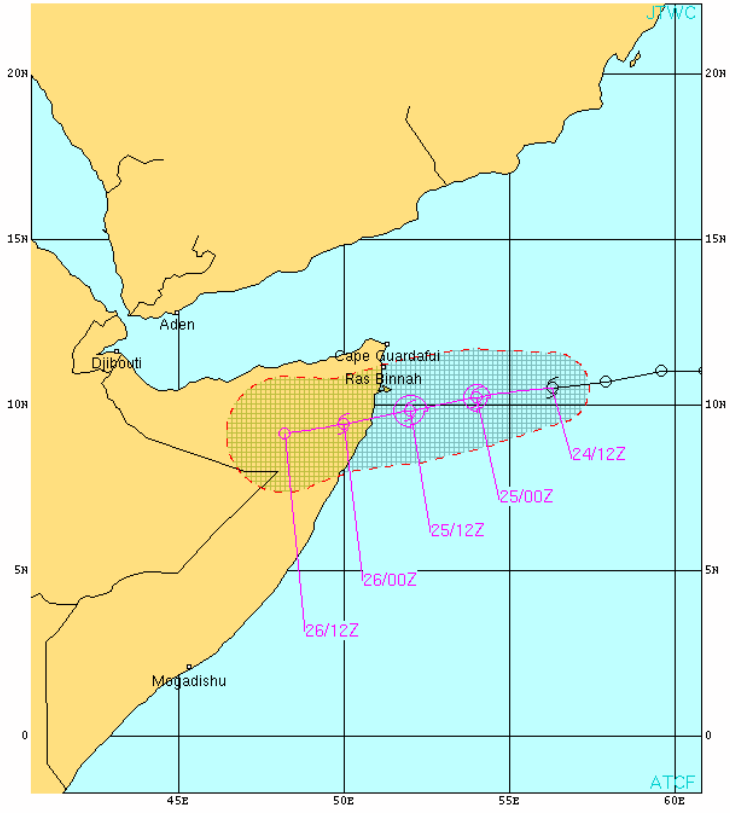
20121026 12 UTC

Probability that SON-TINH will pass within 120km radius during the next 120 hours

tracks: black=OPER, green=CTRL, blue=EPS numbers: observed positions at t+..h

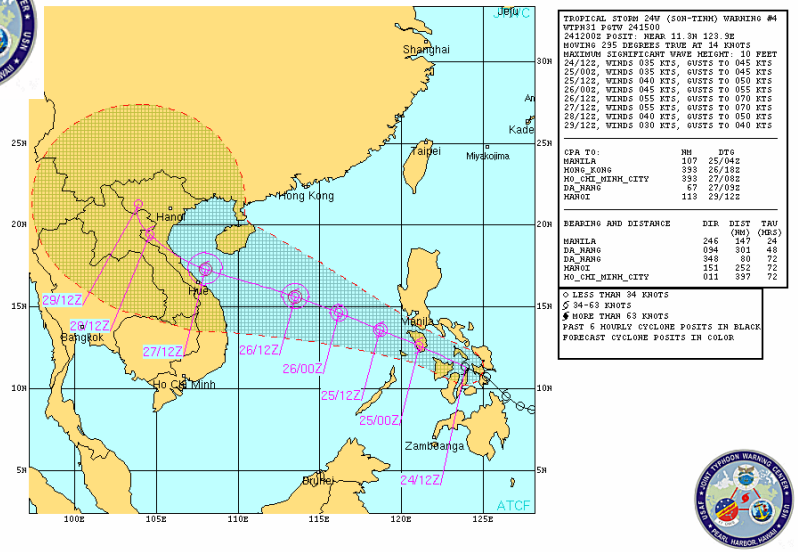



MTSAT-1R IR 27/10/2012 02:43UTC



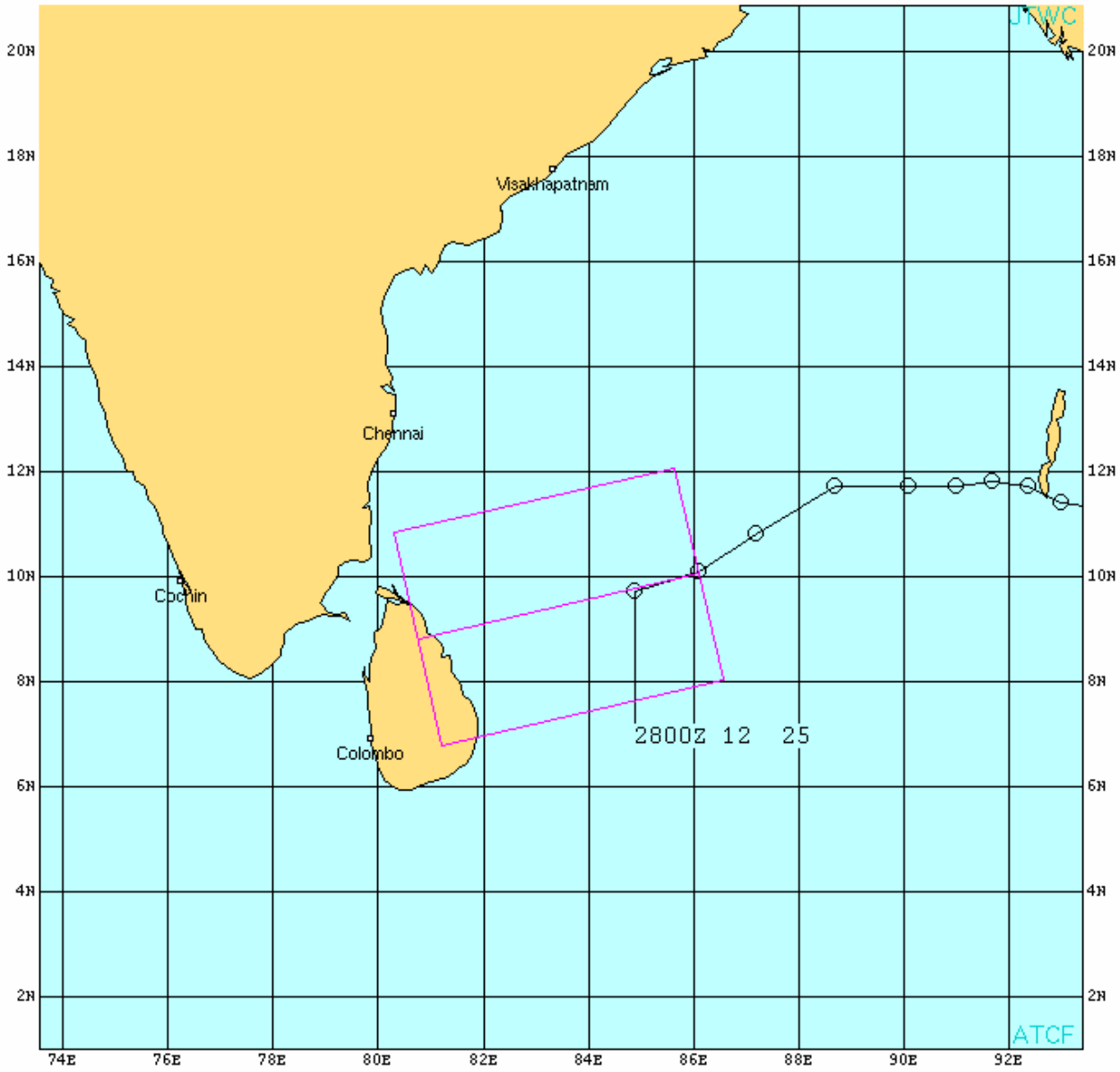

```
TROPICAL CYCLONE 01A (ONE) WARNING #1
WTIO31 PGTW 241500
241200Z POSIT: NEAR 10.5N 56.3E
MOVING 265 DEGREES TRUE AT 16 KNOTS
MAXIMUM SIGNIFICANT WAVE HEIGHT: 11 FEET
24/12Z, WINDS 035 KTS, GUSTS TO 045 KTS
25/00Z, WINDS 040 KTS, GUSTS TO 050 KTS
25/12Z, WINDS 045 KTS, GUSTS TO 055 KTS
26/00Z, WINDS 035 KTS, GUSTS TO 045 KTS
26/12Z, WINDS 025 KTS, GUSTS TO 035 KTS

BEARING AND DISTANCE      DIR  DIST  TAU
                               (NM)  (HRS)
MASIRAH_ISLAND            213   748   24
```

◇ LESS THAN 34 KNOTS
ᔕ 34-63 KNOTS
ᔓ MORE THAN 63 KNOTS
PAST 6 HOURLY CYCLONE POSITS IN BLACK
FORECAST CYCLONE POSITS IN COLOR

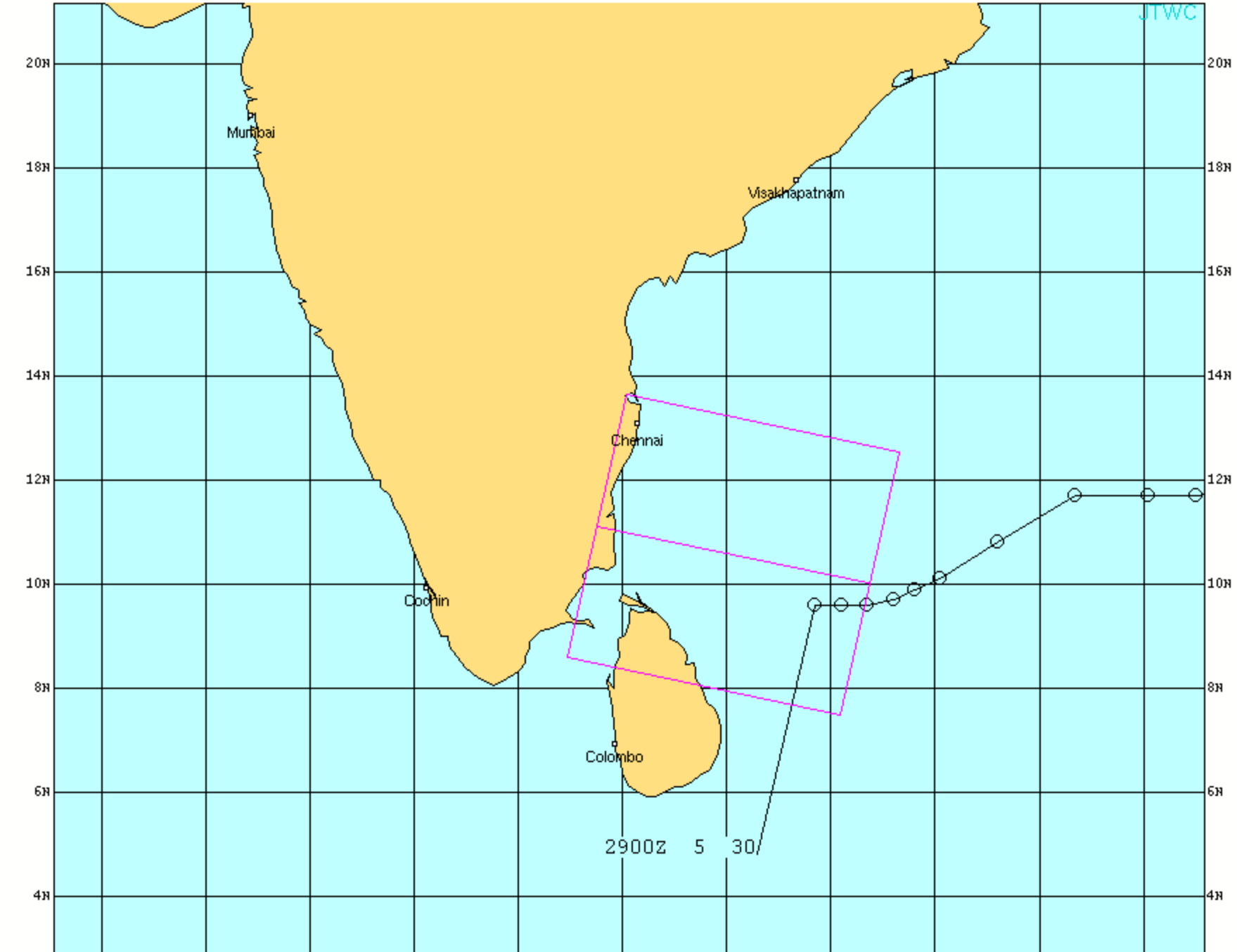



```
TROPICAL STORM 24W (SON-TINH) WARNING #4
WTPN31 PGTW 241500
241200Z POSIT: NEAR 11.3N 123.9E
MOVING 295 DEGREES TRUE AT 14 KNOTS
MAXIMUM SIGNIFICANT WAVE HEIGHT: 10 FEET
24/12Z, WINDS 035 KTS, GUSTS TO 045 KTS
25/00Z, WINDS 035 KTS, GUSTS TO 045 KTS
25/12Z, WINDS 040 KTS, GUSTS TO 050 KTS
26/00Z, WINDS 045 KTS, GUSTS TO 055 KTS
26/12Z, WINDS 055 KTS, GUSTS TO 070 KTS
27/12Z, WINDS 055 KTS, GUSTS TO 070 KTS
28/12Z, WINDS 040 KTS, GUSTS TO 050 KTS
29/12Z, WINDS 030 KTS, GUSTS TO 040 KTS

CPA TO:                   NM     DTG
MANILA                   107  25/04Z
HONG_KONG                393  26/18Z
HO_CHI_MINH_CITY         393  27/08Z
DA_NANG                   67  27/09Z
HANOI                    113  29/12Z

BEARING AND DISTANCE      DIR  DIST  TAU
                               (NM)  (HRS)
MANILA                    246   147   24
DA_NANG                   094   301   48
DA_NANG                   348    80   72
HANOI                     151   252   72
HO_CHI_MINH_CITY          011   397   72
```

◇ LESS THAN 34 KNOTS
ᔕ 34-63 KNOTS
ᔓ MORE THAN 63 KNOTS
PAST 6 HOURLY CYCLONE POSITS IN BLACK
FORECAST CYCLONE POSITS IN COLOR



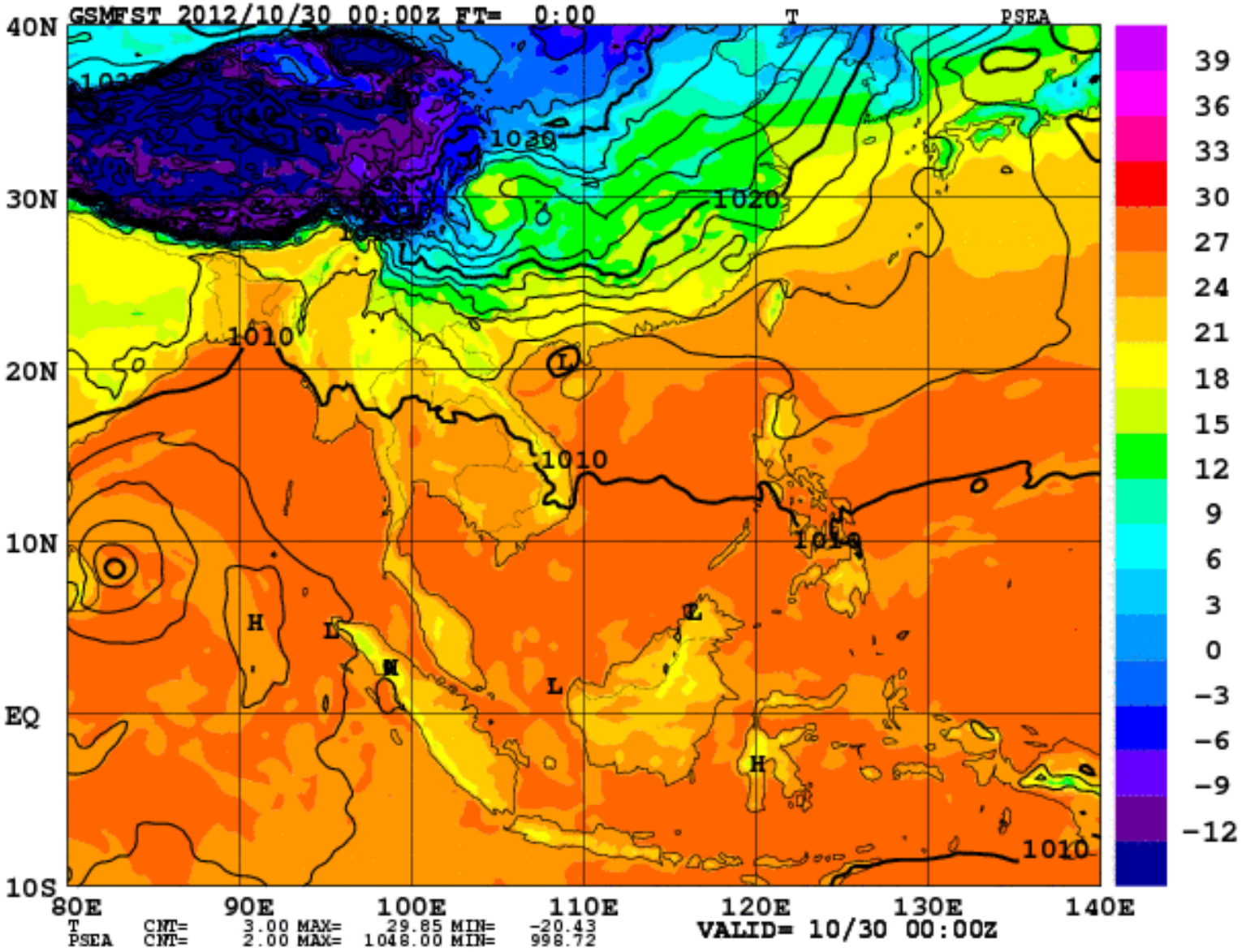
TROPICAL CYCLONE FORMATION ALERT
WTIO21 PGTW 280330
280000Z POSITION: NEAR 9.7N 84.9E
MOVING WEST-SOUTHWESTWARD AT 12 KNOTS
MAXIMUM SUSTAINED WINDS: 30 KNOTS


JTWC
TROPICAL CYC
WTIO21 PGTW
290000Z POSI
MOVING WESTW
MAXIMUM SUST
20N
18N
16N
14N
12N
10N
8N
6N
4N
Mumbai
Visakhapatnam
Chennai
Cochin
Colombo
2900Z 5 30

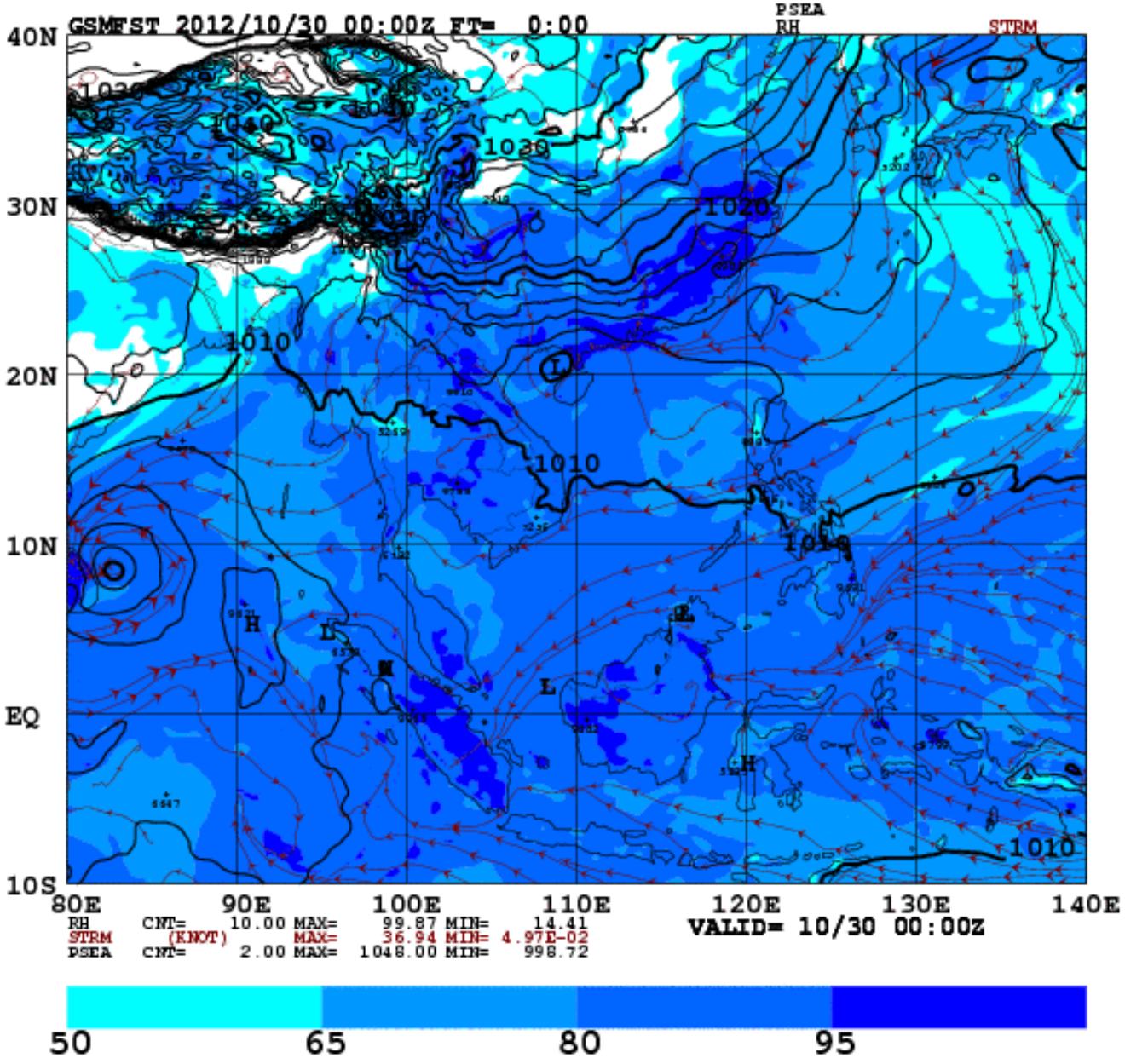
Cyclone Color Coding Scheme in Myanmar

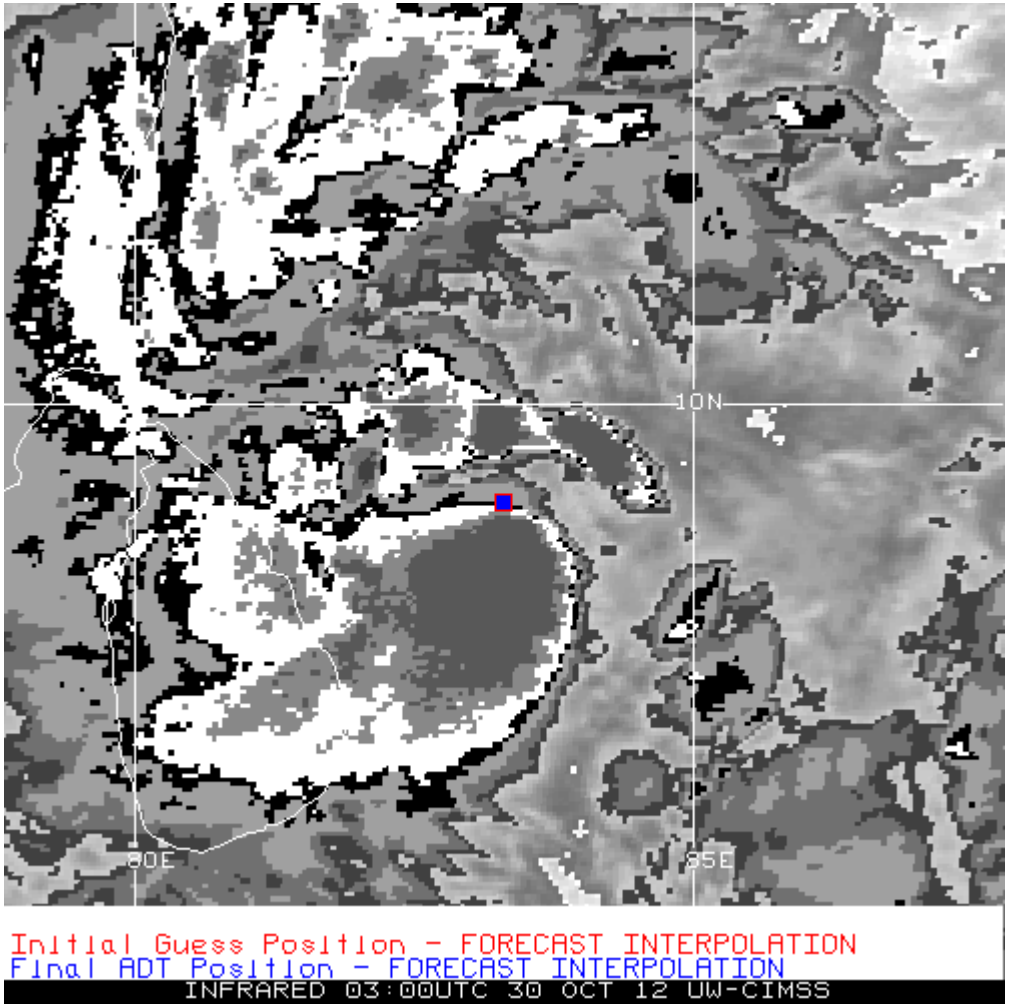
Yellow Stage	The formation of a tropical storm in the Bay of Bengal and the Andaman Sea.
Orange Stage	When a tropical storm has formed in the Bay of Bengal and the Andaman Sea and begins moving toward the Myanmar coast.
Red Stage	When a storm moving towards Myanmar coast is expected to make landfall in 12 hours
Brown Stage	When a storm makes landfall on the Myanmar coast
Green Stage	When a storm has weakened and the storm hazard has passed.

Temparature at surface, PSEA



Relative Humidity[%] at surface, wind(stream line), PSEA





We also use CIMSS ADT HALF HOURLY

UKMO 261200UTC

- **MET OFFICE TROPICAL CYCLONE GUIDANCE FOR NORTH INDIAN OCEAN**
- **GLOBAL MODEL DATA TIME 12UTC 26.10.2012**
- **NEW TROPICAL STORM FORECAST TO DEVELOP AFTER 24 HOURS**
- **FORECAST POSITION AT T+ 24 : 11.5N 85.4E**

VERIFYING TIME	POSITION	STRENGTH	TENDENCY
12UTC 27.10.2012	11.5N 85.4E	WEAK	
00UTC 28.10.2012	11.3N 85.4E	WEAK	LITTLE CHANGE
12UTC 28.10.2012	10.7N 84.1E	WEAK	LITTLE CHANGE
00UTC 29.10.2012	10.6N 81.8E	WEAK	LITTLE CHANGE
12UTC 29.10.2012	9.7N 81.9E	WEAK	LITTLE CHANGE
00UTC 30.10.2012	10.1N 81.1E	MODERATE	INTENSIFYING SLIGHTLY
12UTC 30.10.2012	10.7N 79.7E	STRONG	INTENSIFYING SLIGHTLY
00UTC 31.10.2012	12.1N 78.5E	MODERATE	WEAKENING SLIGHTLY
12UTC 31.10.2012	13.8N 74.5E	WEAK	WEAKENING RAPIDLY
00UTC 01.11.2012	15.0N 71.1E	WEAK	INTENSIFYING SLIGHTLY
12UTC 01.11.2012	12.6N 68.5E	STRONG	INTENSIFYING RAPIDLY

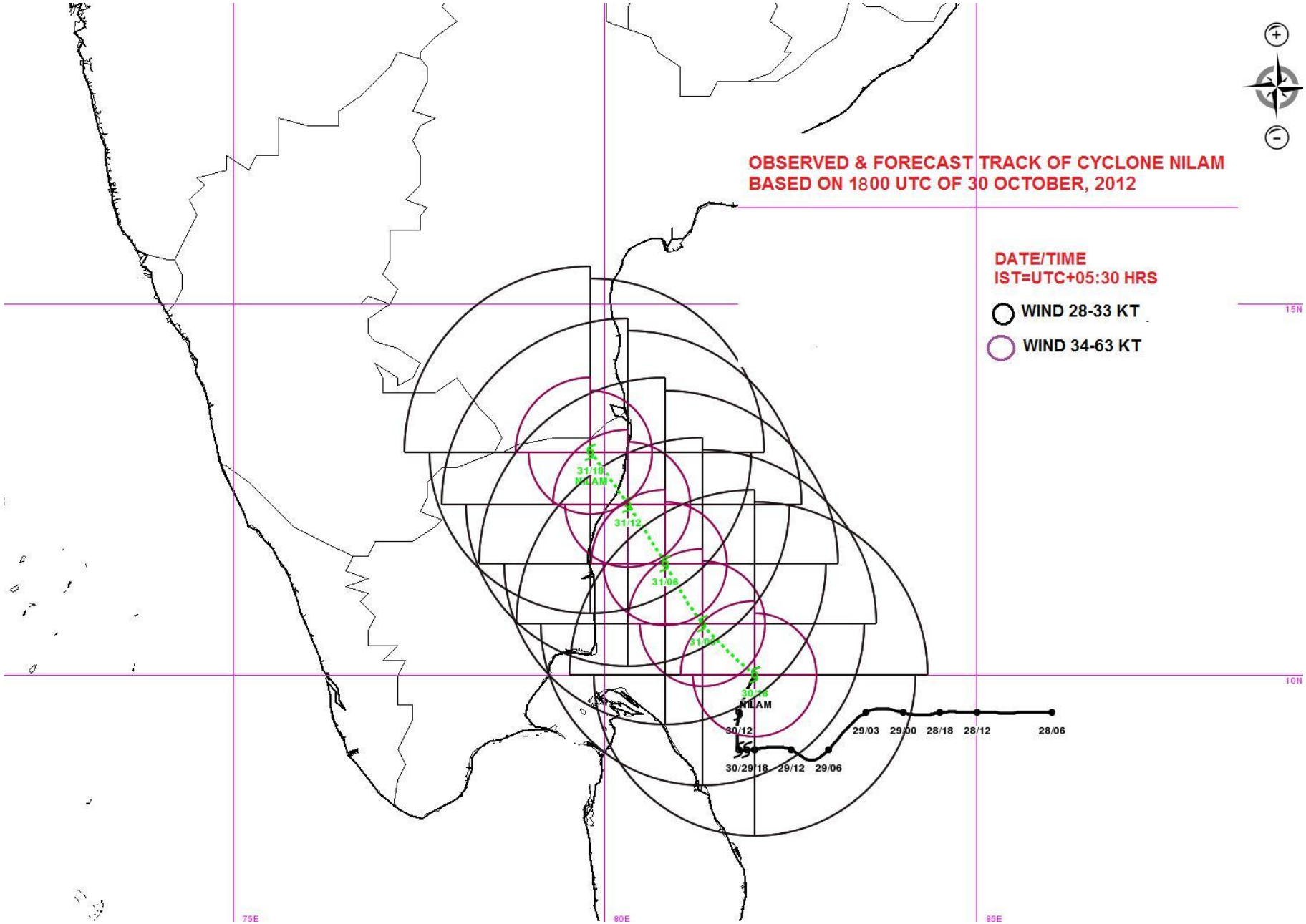
- **THIS INFORMATION IS PROVIDED AS GUIDANCE FOR TROPICAL CYCLONE**
- **RSMCS. IT REQUIRES INTERPRETATION BY TROPICAL CYCLONE SPECIALISTS**
- **AND SHOULD NOT BE CONSIDERED AS A FINAL PRODUCT**
- **MET OFFICE, EXETER, UK**
- **TOO 261634**

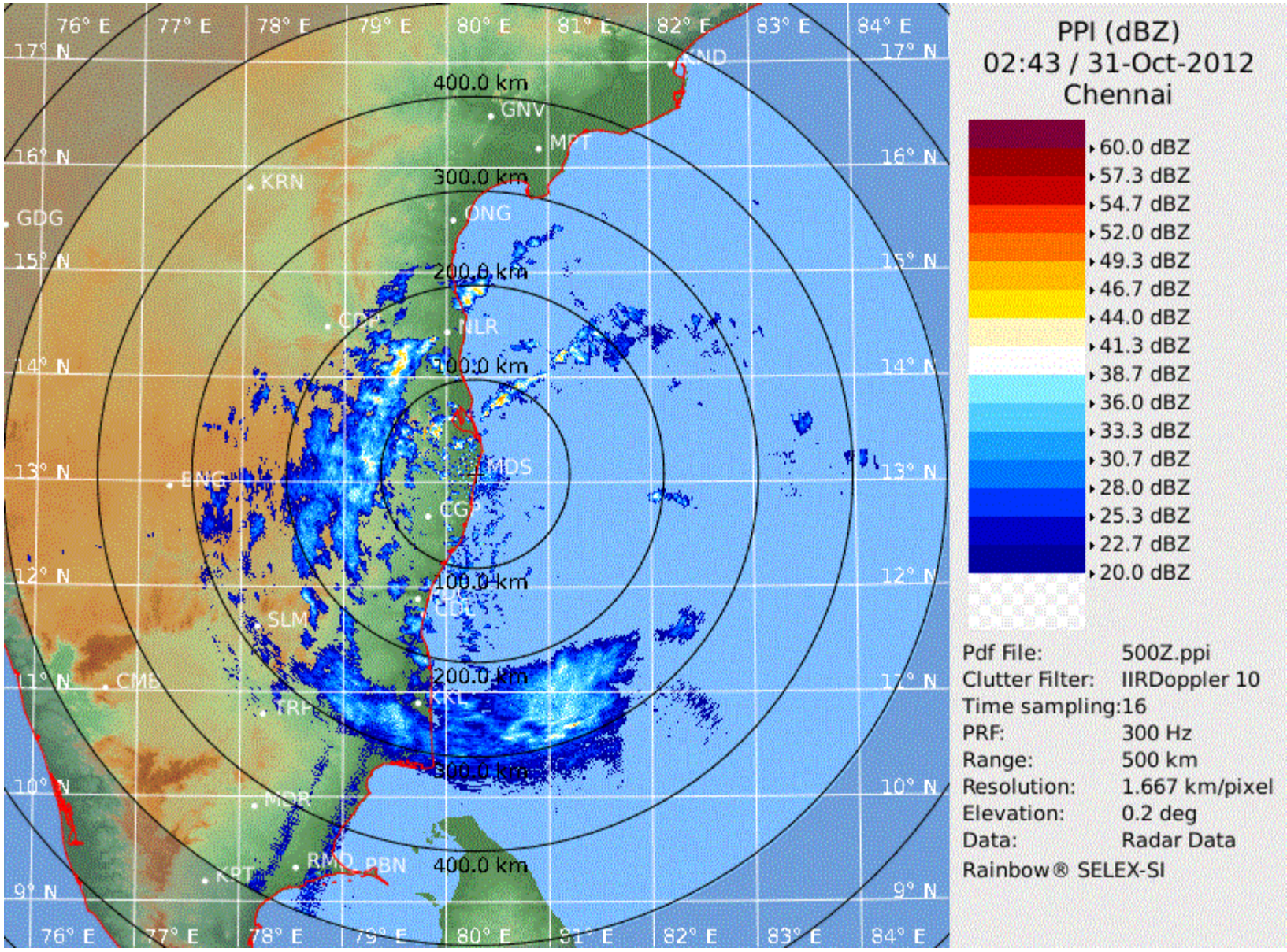
UKMO 301800UTC TC Guidance

- **MET OFFICE TROPICAL CYCLONE GUIDANCE FOR NORTH INDIAN OCEAN**
- **GLOBAL MODEL DATA TIME 12UTC 30.10.2012**
- **CYCLONIC STORM NILAM ANALYSED POSITION : 9.1N 84.2E**

VERIFYING TIME	POSITION	STRENGTH	TENDENCY
12UTC 30.10.2012	9.1N 84.2E	MODERATE	
00UTC 31.10.2012	10.5N 82.8E	MODERATE	LITTLE CHANGE
12UTC 31.10.2012	12.2N 81.4E	MODERATE	INTENSIFYING SLIGHTLY
00UTC 01.11.2012	14.4N 80.3E	STRONG	INTENSIFYING SLIGHTLY
12UTC 01.11.2012	15.4N 78.3E	MODERATE	WEAKENING SLIGHTLY
00UTC 02.11.2012	15.9N 77.8E	WEAK	WEAKENING RAPIDLY
12UTC 02.11.2012	16.3N 78.6E	WEAK	WEAKENING SLIGHTLY
00UTC 03.11.2012	BELOW TROPICAL STORM STRENGTH		

- **THIS INFORMATION IS PROVIDED AS GUIDANCE FOR TROPICAL CYCLONE**
- **RSMCS. IT REQUIRES INTERPRETATION BY TROPICAL CYCLONE SPECIALISTS**
- **AND SHOULD NOT BE CONSIDERED AS A FINAL PRODUCT**
- **MET OFFICE, EXETER, UK**
- **TOO 301735**


OBSERVED & FORECAST TRACK OF CYCLONE NILAM
BASED ON 1800 UTC OF 30 OCTOBER, 2012
DATE/TIME
IST=UTC+05:30 HRS
WIND 28-33 KT
WIND 34-63 KT
31/18
NILAM
31/12
31/06
31/00
30/18
NILAM
30/12
30/29/18
29/12
29/06
29/03
29/00
28/18
28/12
28/06
15N
10N
75E
80E
85E


PPI (dBZ)
02:43 / 31-Oct-2012
Chennai
60.0 dBZ
57.3 dBZ
54.7 dBZ
52.0 dBZ
49.3 dBZ
46.7 dBZ
44.0 dBZ
41.3 dBZ
38.7 dBZ
36.0 dBZ
33.3 dBZ
30.7 dBZ
28.0 dBZ
25.3 dBZ
22.7 dBZ
20.0 dBZ
Pdf File: 500Z.ppi
Clutter Filter: IIRDoppler 10
Time sampling: 16
PRF: 300 Hz
Range: 500 km
Resolution: 1.667 km/pixel
Elevation: 0.2 deg
Data: Radar Data
Rainbow® SELEX-SI
400.0 km
300.0 km
200.0 km
100.0 km
GNV
MPT
KRN
GDG
ONG
NLR
MDS
SLM
CME
TRH
MDR
RMD
PBN
KPT
76° E
77° E
78° E
79° E
80° E
81° E
82° E
83° E
84° E
17° N
16° N
15° N
14° N
13° N
12° N
11° N
10° N
9° N

- SMBM01 VBRR 180300 AAXX 18034
- 48001 32907 90000 10140 20100 40184 74344 89/// 333 56999 59006=
- 48004 31902 90000 10130 20130 74644 89/// 333 56990=
- 48008 31557 43601 10165 20117 40180 70244 81430 333 56960 58009=
- 48010 31940 20000 10145 20134 40174 74144 80001 333 56006 59007=
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- 48025 31010 70000 10178 20165 40175 74244 87600 333 56800 58002=
- 48035 31560 20000 10120 20102 40175 70544 80001 333 56009 59014=
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- 48042 32958 01801 10190 20159 40166 333 58004=
- 48045 32560 22302 10120 20102 82800 333 56500=
- 48048 32558 10401 10183 20165 40170 81500 333 56900 58010=
- 48053 32950 03602 10190 20139 40165 333 58010=
- 48057 32958 01401 10194 20118 333 56000=
- 48060 32940 00000 10148 20111 40214 333 58016=
- 48062 32956 03202 10180 20160 40151 70044 333 58011=
- 48071 /2958 00502 10238 20209 40153 333 58007=
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- 48103 32458 30402 10259 20203 40136 82702 333 56109 58012=

Myanmar SYNOP station Disseminate (3)hourly via GTS and can access following Link.

http://weather.noaa.gov/pub/data/raw/sm/smbm01.vbrr..txt

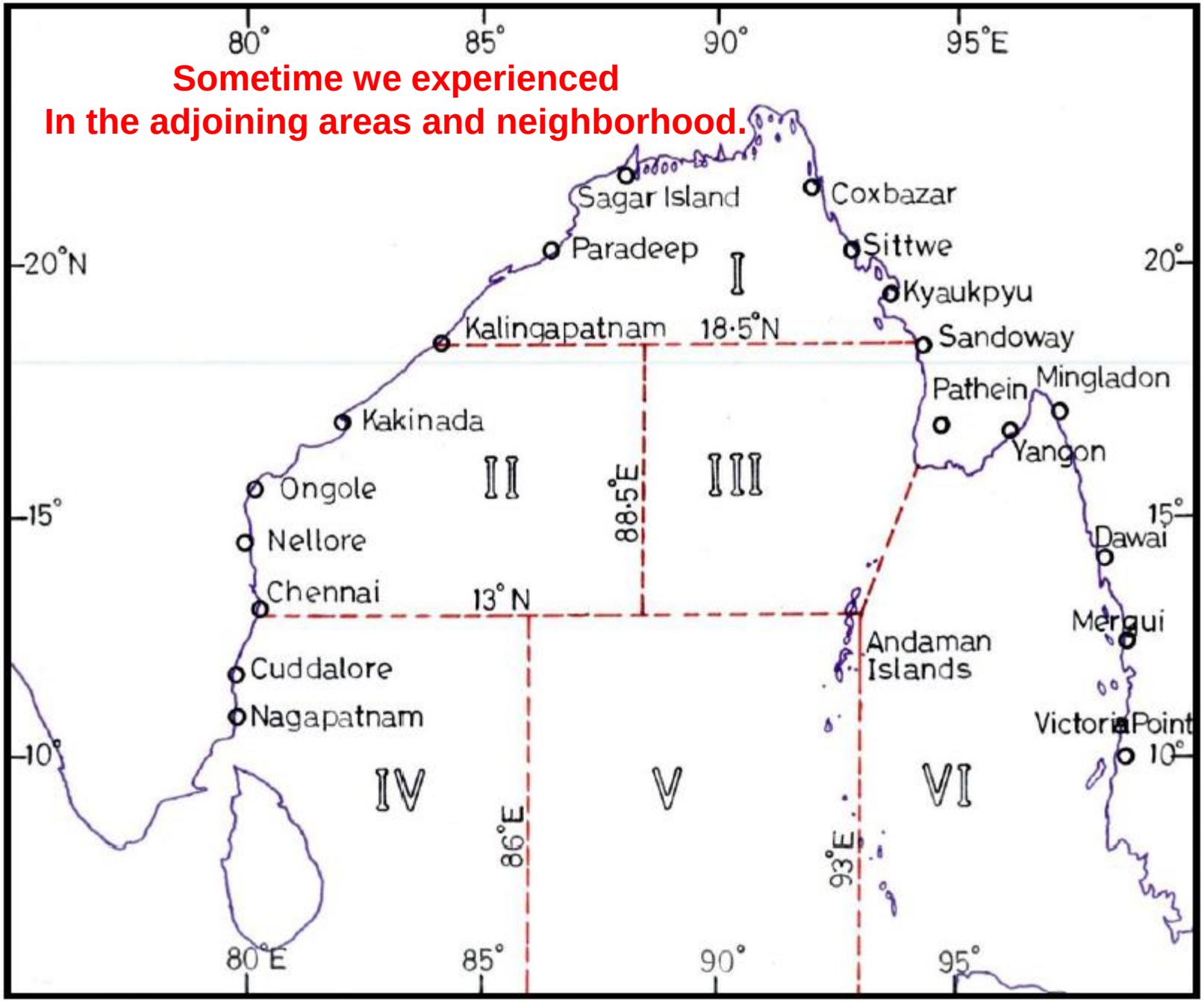
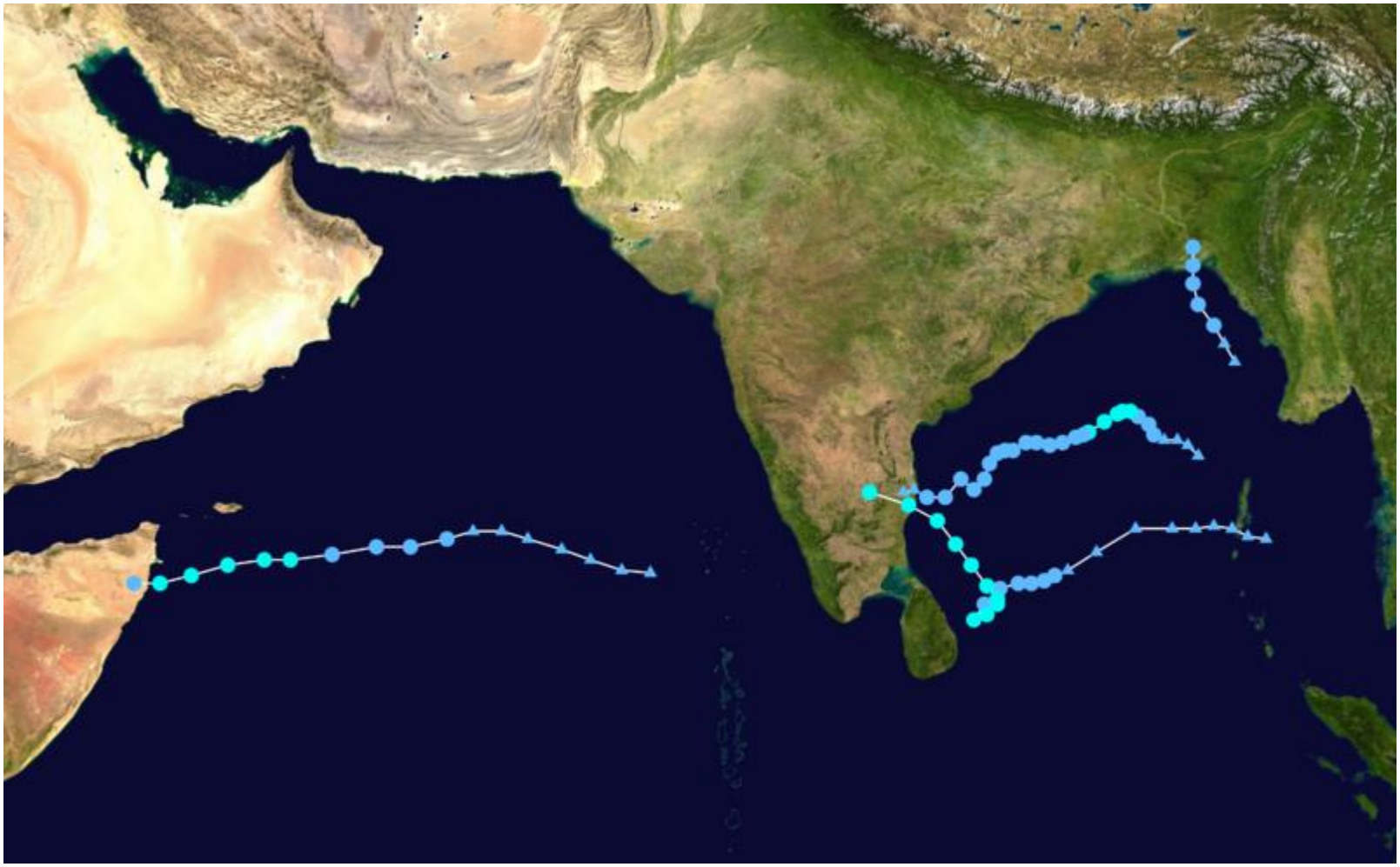
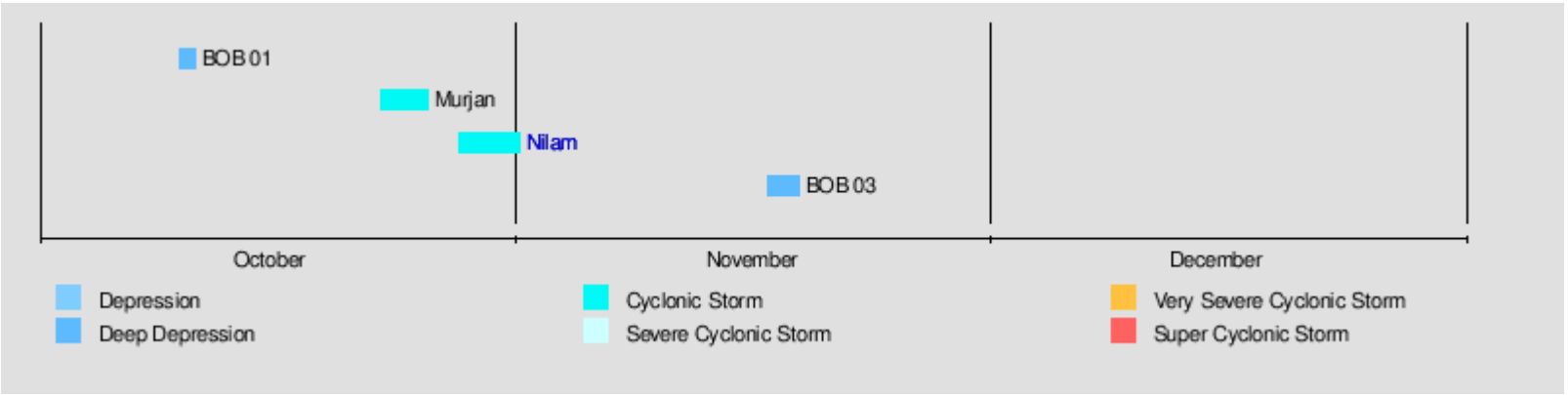
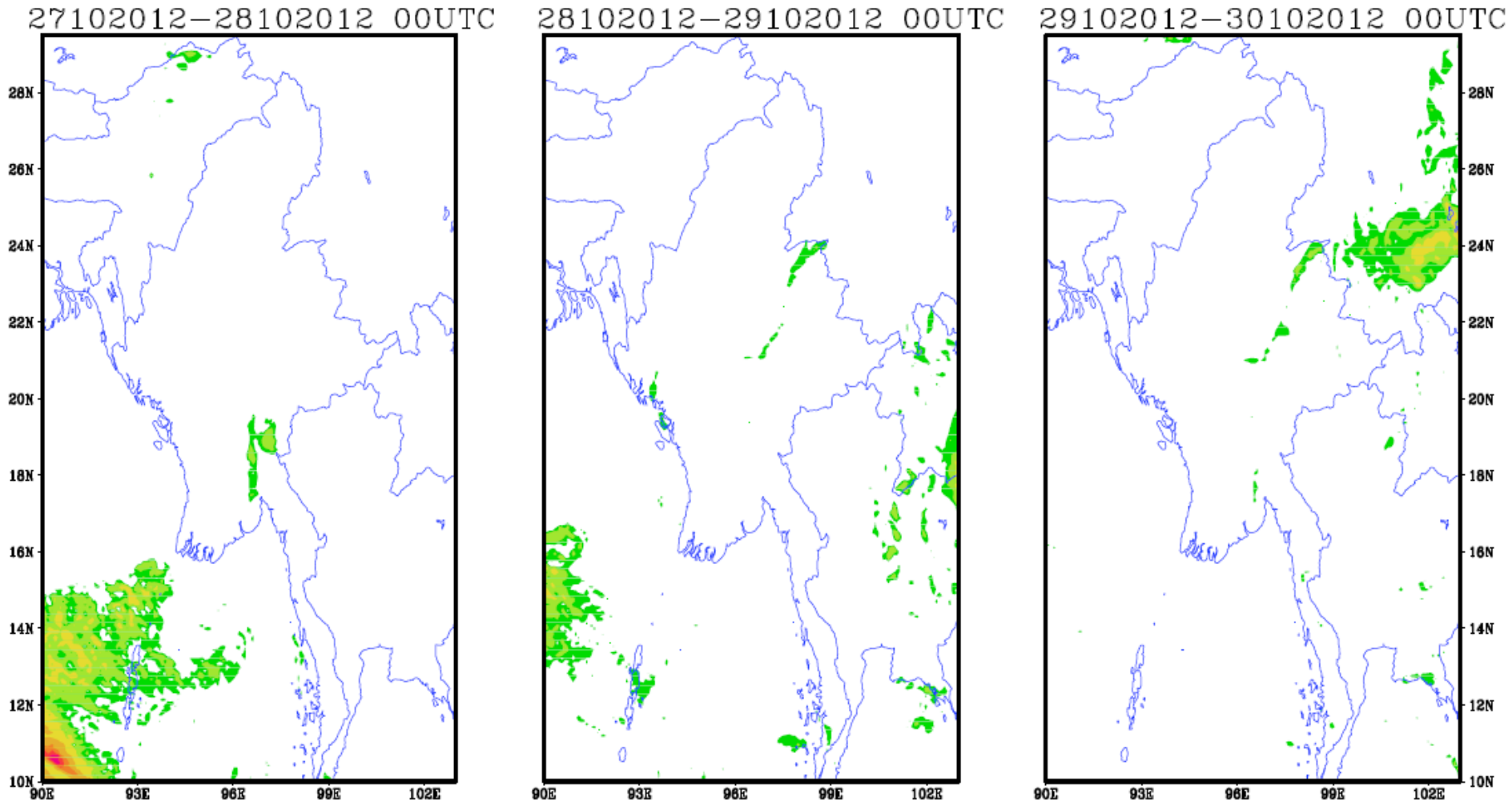


Fig. II-C-I. The exact area of coverage




BOB 01
Murjan
Nilam
BOB 03
October
November
December
Depression
Deep Depression
Cyclonic Storm
Severe Cyclonic Storm
Very Severe Cyclonic Storm
Super Cyclonic Storm

Product from RIMES.



- No significant cyclonic storm formed in April and/or May.
- Most of the system developed over NW Bay.
- Only 1 Cyclonic storm formed.
- No directly affect to Myanmar.
- (1) TD and (1) LPA weakened over water. Possibility in association with same system, same longitude in Southern Hemisphere.
- Some system associated with Arabian Sea, Bay of Bengal and China Sea and Pacific in same time.

Governmental office high aware and taking care

13-12-2012 Ministry of Commerce, Disaster Risk Reduction Special Talks

Challenges and gaps

- Intensity upgrading stage. LPA to TD.
- Delayed Weather Outlook and special Outlook.
- Public weather experts declared Cyclone while only in T1.0.
- some time higher authority want specific location Lat/Lon/distance.

Request

- RSMC New Delhi to issue more timely outlook warning.
- Continue multilateral approach.
- More regular training program TC/surge/ satellite technique.
- RSMC to issue medium range TC genesis for panel member.

Acknowledgement

- WMO
- ESCAP
- PTC
- Oman
- RSMC New Delhi
- My DG of DMH(Chair of PTC 2012)
- All the participants. Many Thanks!!!!!