The Case study of the Track Prediction cyclone Nilam over Bay of Bengal in October 2012

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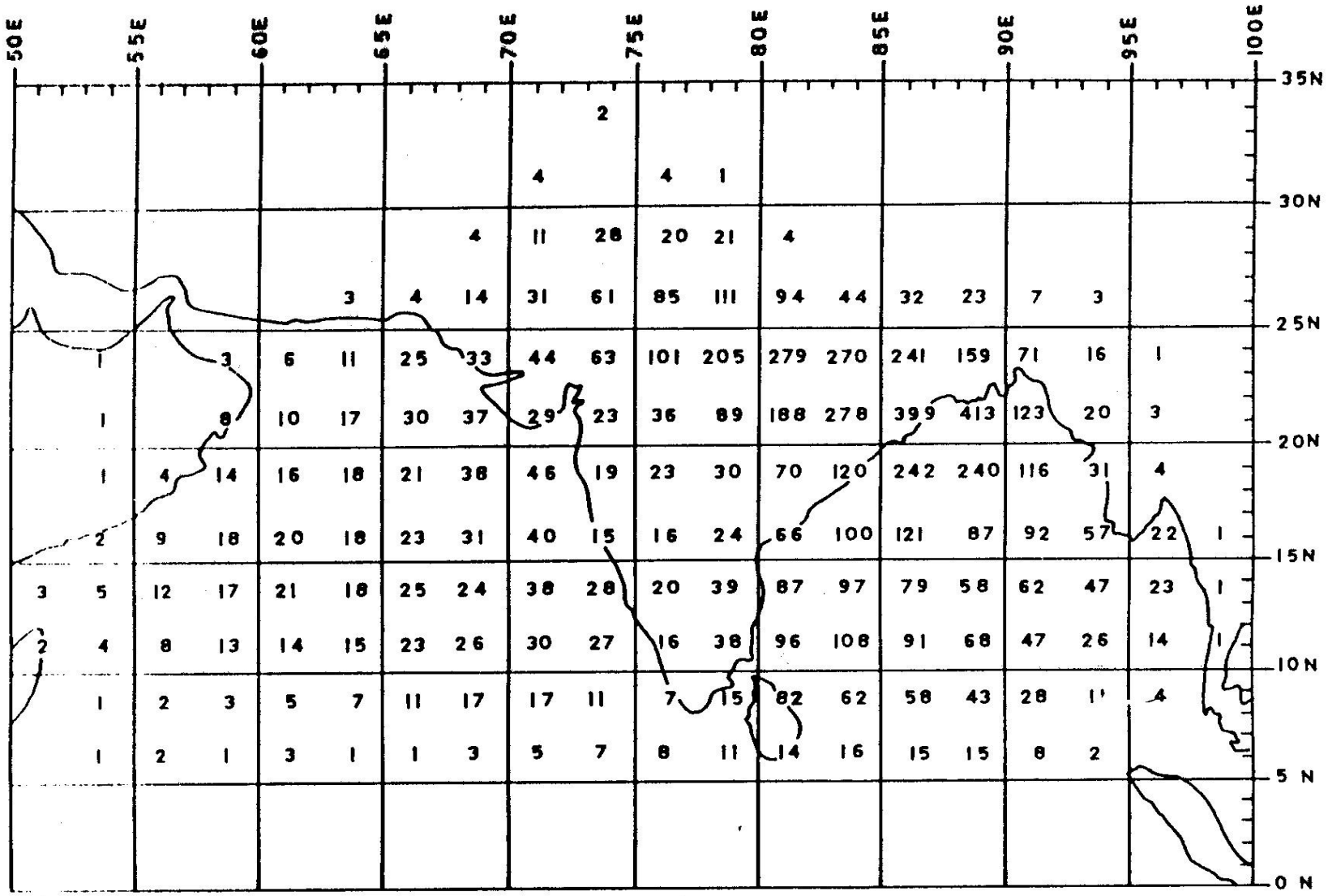
Department of Meteorology
Sri Lanka

Number of tropical cyclones passing through each 2.5 deg. Box during January-December 1877-1974 (McBride, J.L., 1995).



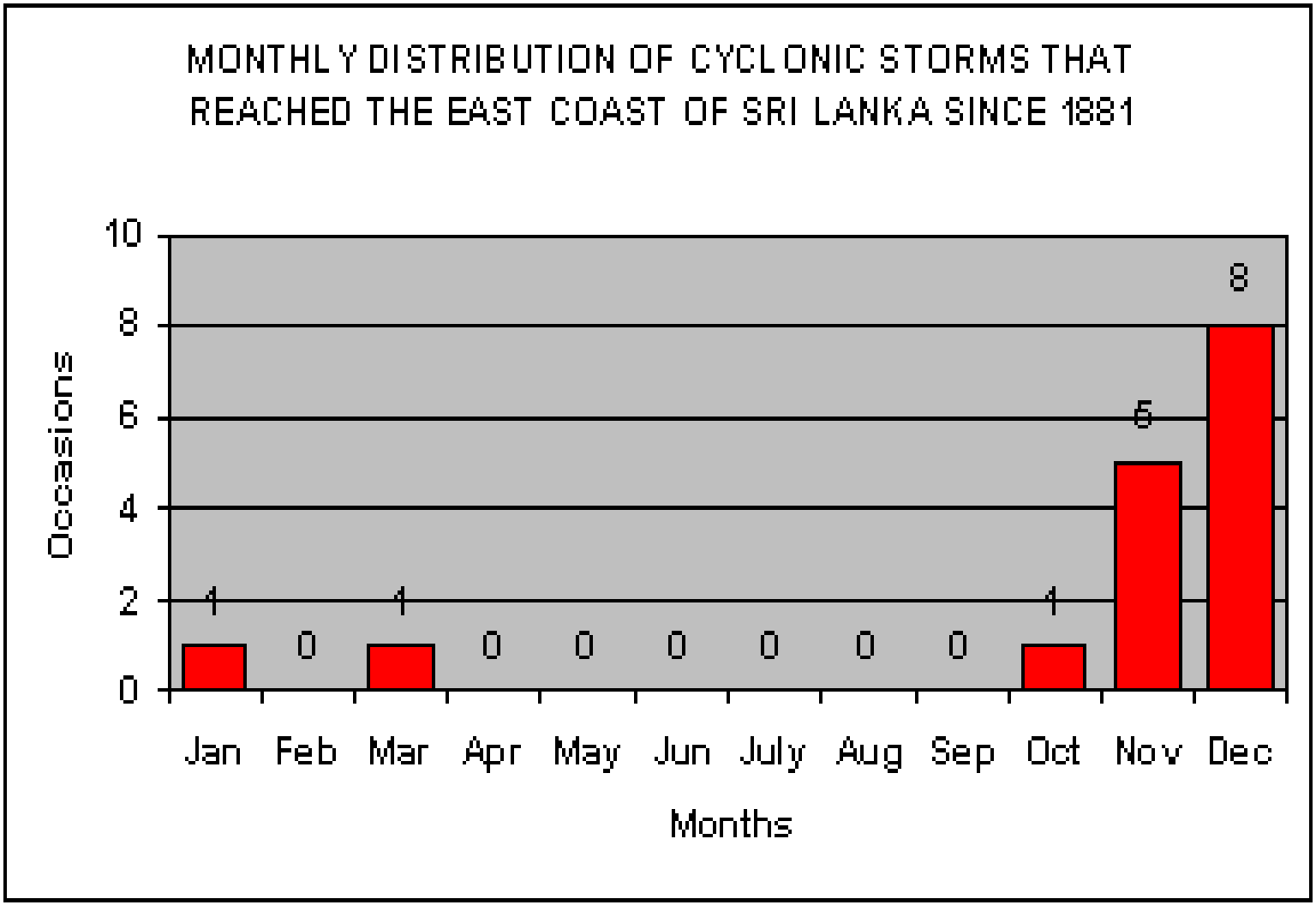
Classifications of cyclonic disturbances for the Bay of Bengal and the Arabian Sea region

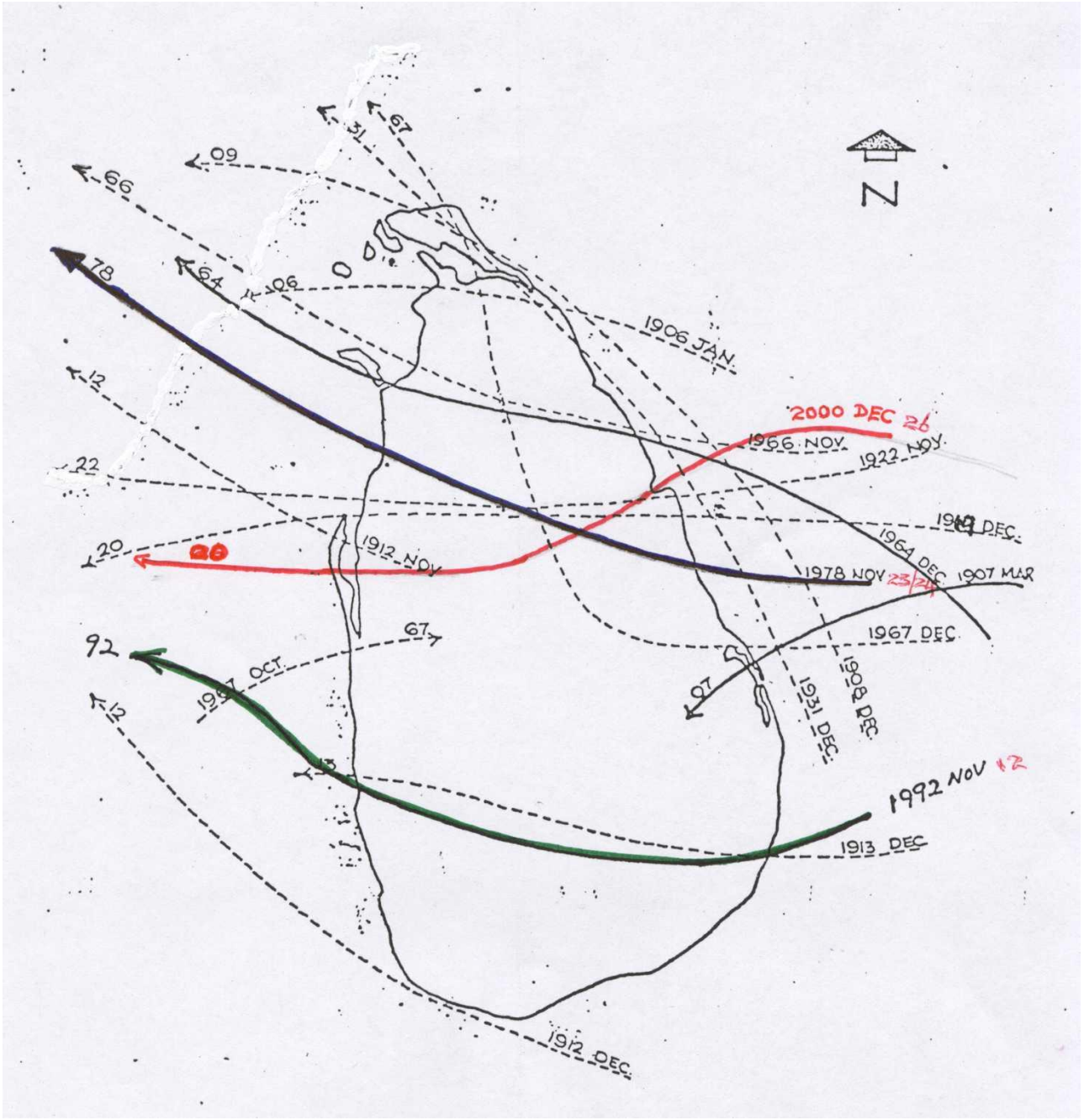
Weather system	Maximum wind speed
1. Low pressure area	Wind speed less than 17 kt (31 km/h)
2. Depression	Wind speed between 17 and 33 kt (31 and 61 km/h)
3. Cyclonic storm	Wind speed between 34 and 47 kt (62 and 88 km/h)
4. Severe cyclonic storm	Wind speed between 48 and 63 kt (89 and 118 km/h)
5. Severe cyclonic storm	Wind speed 64 kt (119 km/h) or more with a core of hurricane winds*
6. Very severe cyclonic storm	Wind speed 64 and 119 kt (119 and 221 km/h)
7. Super cyclonic storm	Wind speed 120 kt and above (222 km/h)

* Term used nationally in Bangladesh

Month	Number	Year
January	01	1906
February	-	-
March	01	1907
April	-	-
May	-	-
June	-	-
July	-	-
August	-	-
September	-	-
October	01	1967
November	05	1912, 1922, 1966, 1978, 1992
December	08	1908, 1912, 1913, 1919, 1931, 1964, 1967, 2000

Number of cyclones/cyclonic storms that reached the coasts of Sri Lanka in different months during the period 1881 – 2005.


MONTHLY DISTRIBUTION OF CYCLONIC STORMS THAT REACHED THE EAST COAST OF SRI LANKA SINCE 1881
Occasions
10
8
6
4
2
0
1
0
1
0
0
0
0
0
0
1
5
8
Jan
Feb
Mar
Apr
May
Jun
July
Aug
Sep
Oct
Nov
Dec
Months



Path of cyclonic storms which crossed Sri Lanka.

(1901 - 2000)

Hazards

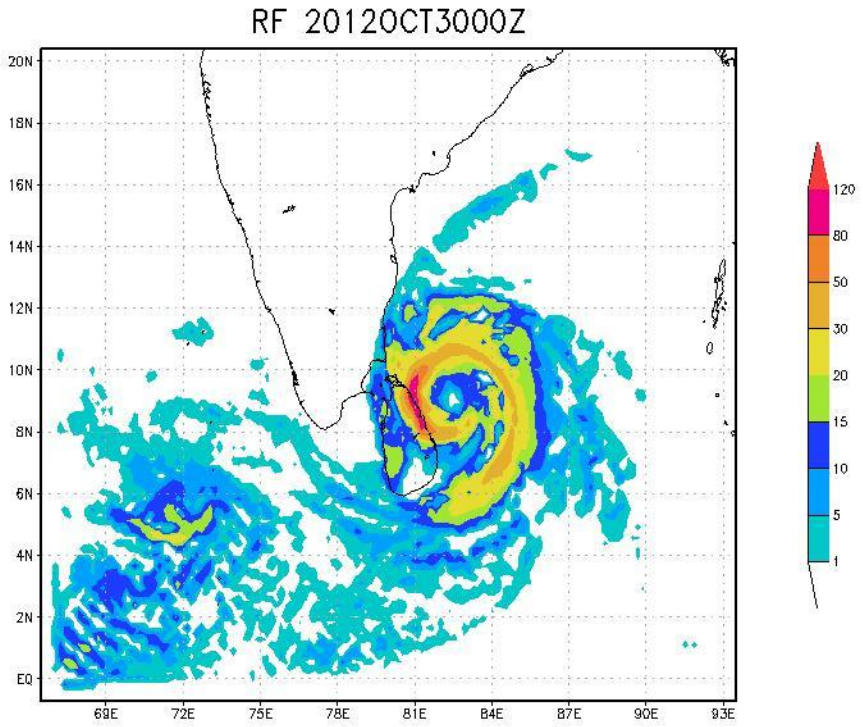
- *Heavy Rain/Floods*
- *Strong winds*
- *Rain induced Landslides*
- *Sea Erosion*
- *Storm surge*

Case Study Using WRF model

Analysis area

latitudes EQ to 20 degrees North

longitudes 67 to 93 degrees East



Model description and initial conditions

WRF is basically non-hydrostatic Mesoscale model NMM).

2.5 degree (low resolution) global data (grib2 data) issued by NCEP which is forecast up to 72 hours are used for this study.

Domain design in this study is 150x120 while resolution is 20 km.

Single run per day is used for this study at 1200Z

Only three dimensional data assimilation normally called 3DVAR was used without Nesting.

Physics options which we use are as follows:

```
mp_physics             = 6,
ra_lw_physics          = 1,
ra_sw_physics          = 1,
radt                   = 5,
sf_sfclay_physics      = 5,
sf_surface_physics     = 2,
bl_pbl_physics         = 6,
bldt                   = 0,
cu_physics             = 1,
cudt                   = 5,
isfflx                 = 1,
ifsnow                 = 0,
icloud                 = 1,
surface_input_source   = 1,
num_soil_layers        = 4,
sf_urban_physics       = 0,
maxiens                = 1,
maxens                 = 3,
maxens2                = 3,
maxens3                = 16,
ensdim                 = 144,
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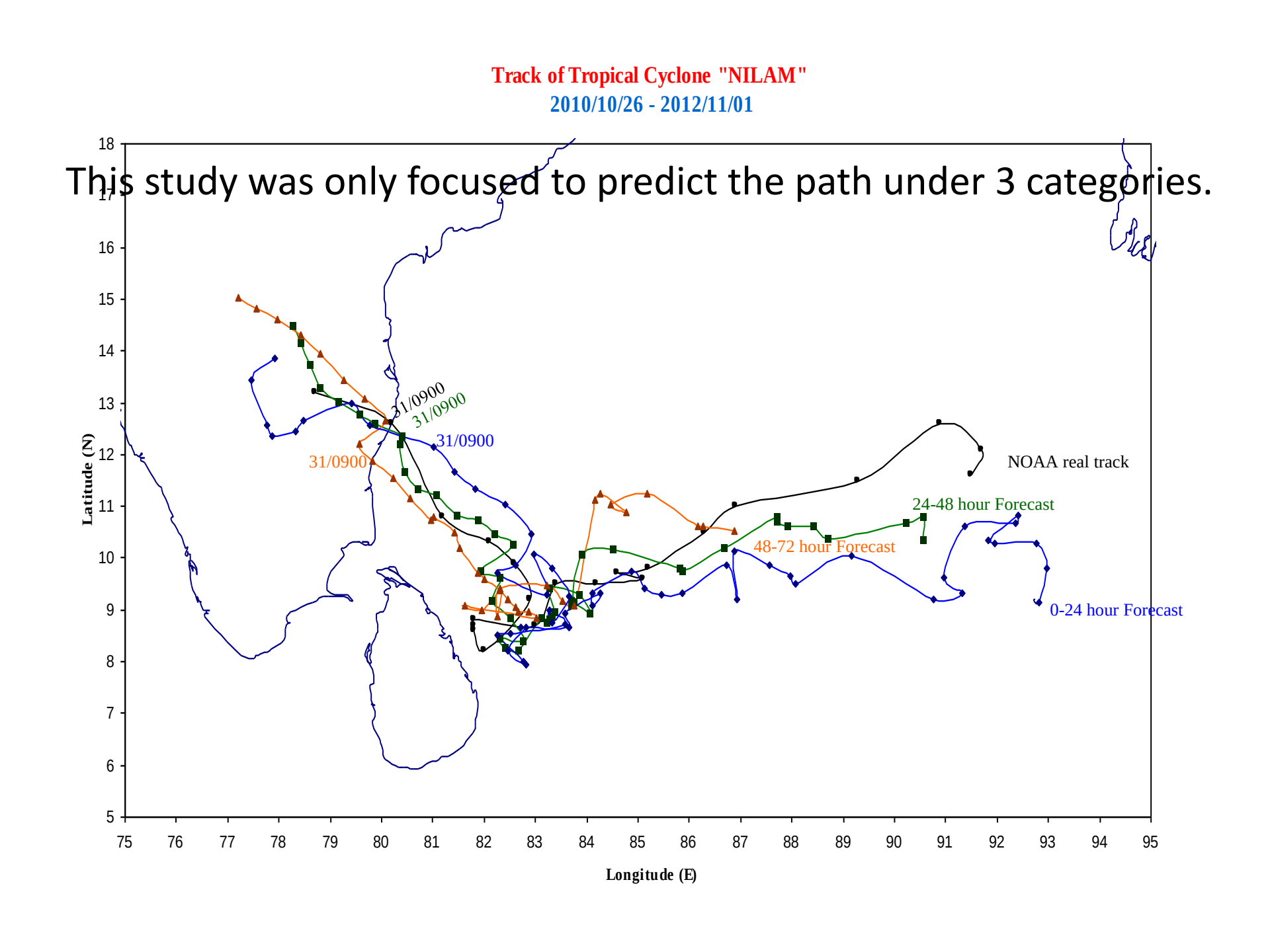
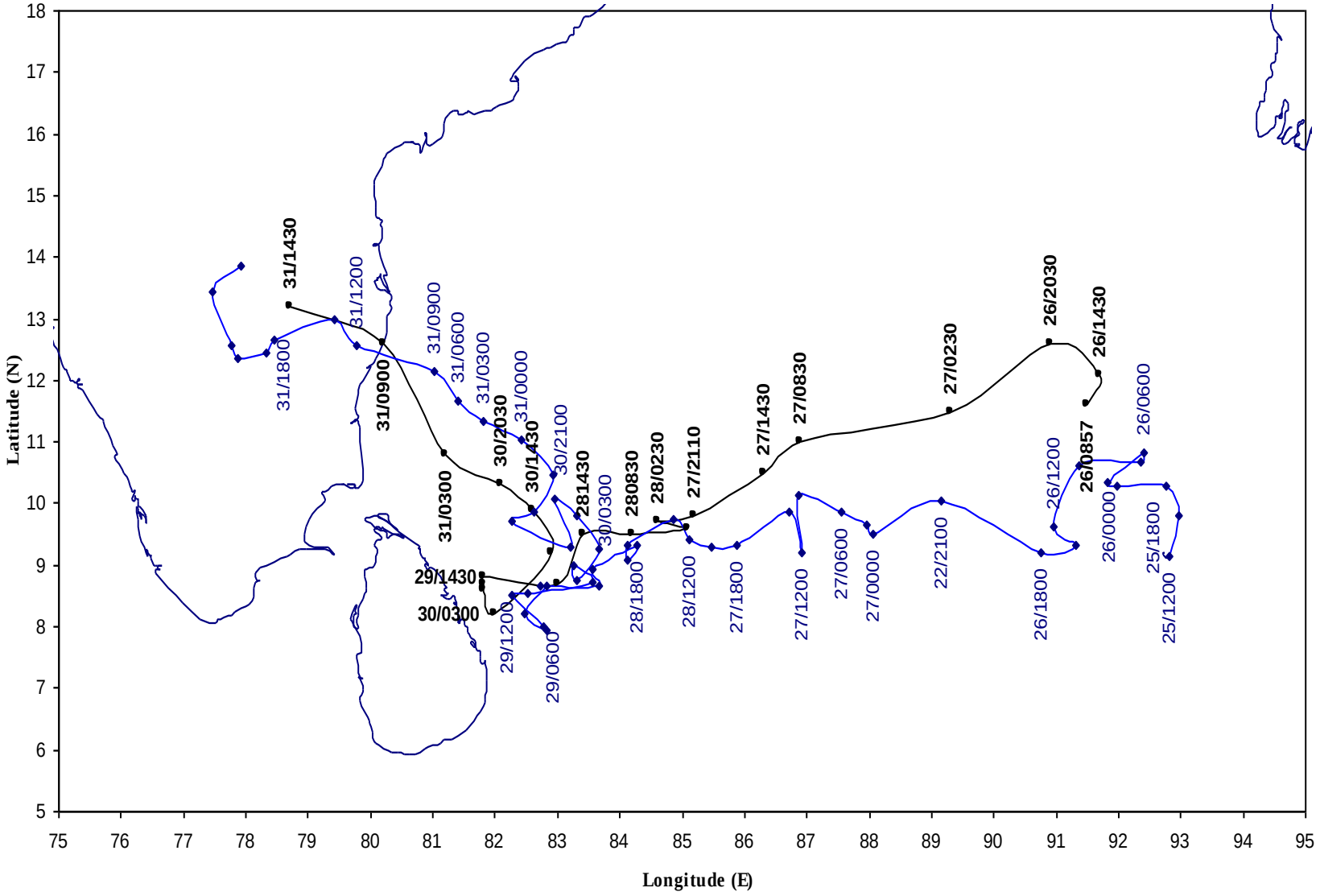
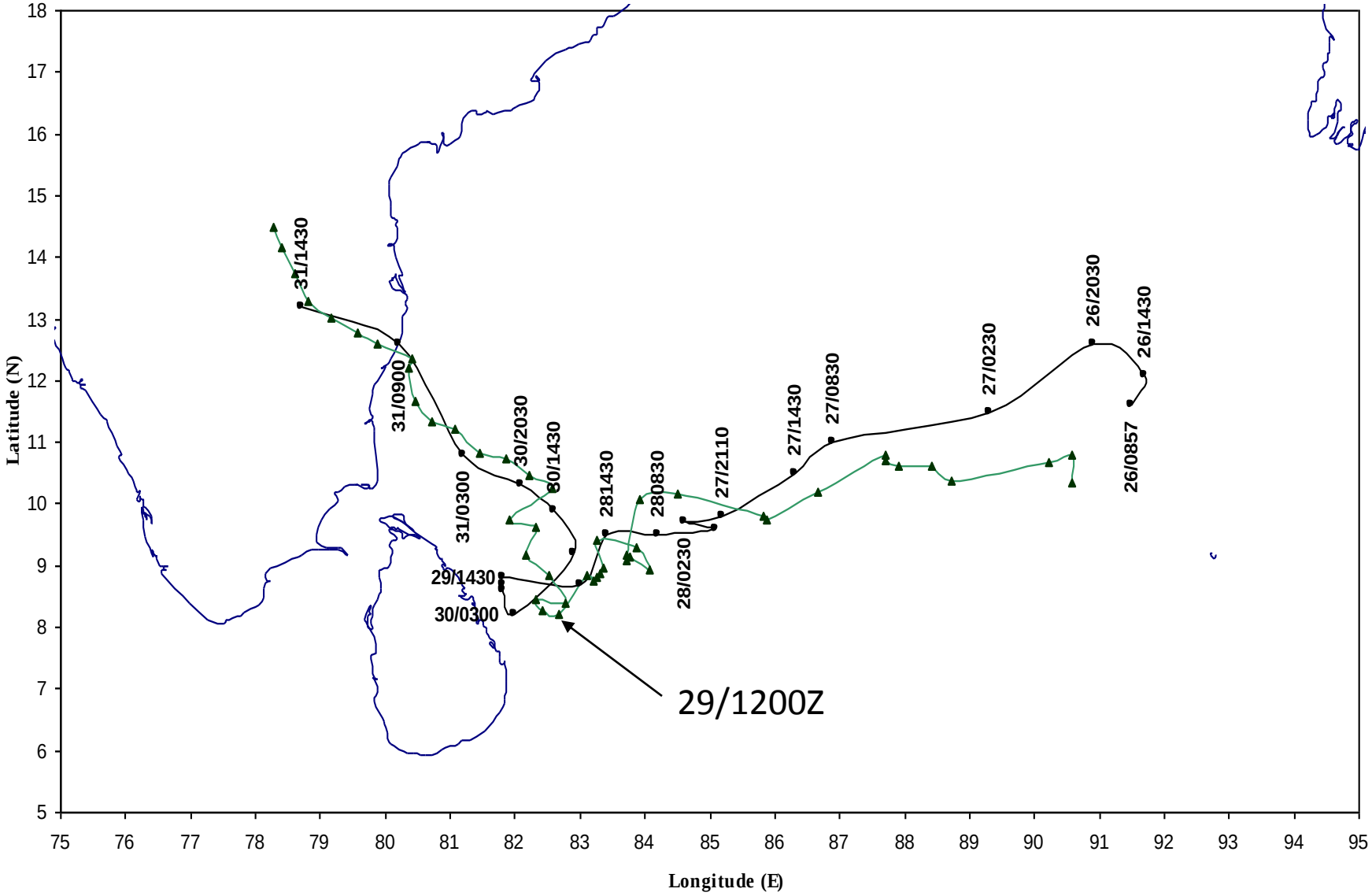
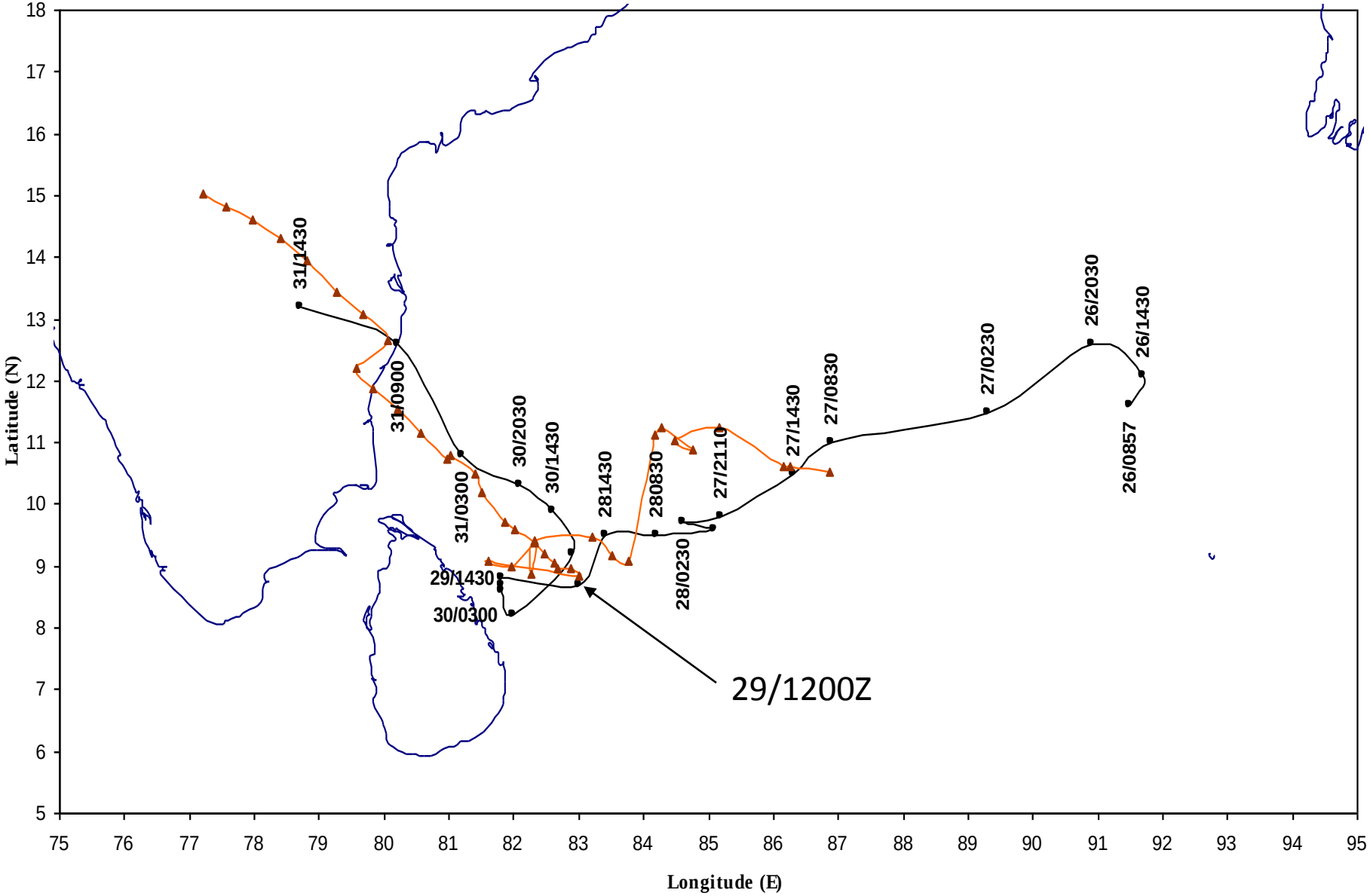

Track of Tropical Cyclone "NILAM"
2010/10/26 - 2012/11/01
This study was only focused to predict the path under 3 categories.
Latitude (N)
Longitude (E)
31/0900
31/0900
31/0900
31/0900
NOAA real track
24-48 hour Forecast
48-72 hour Forecast
0-24 hour Forecast

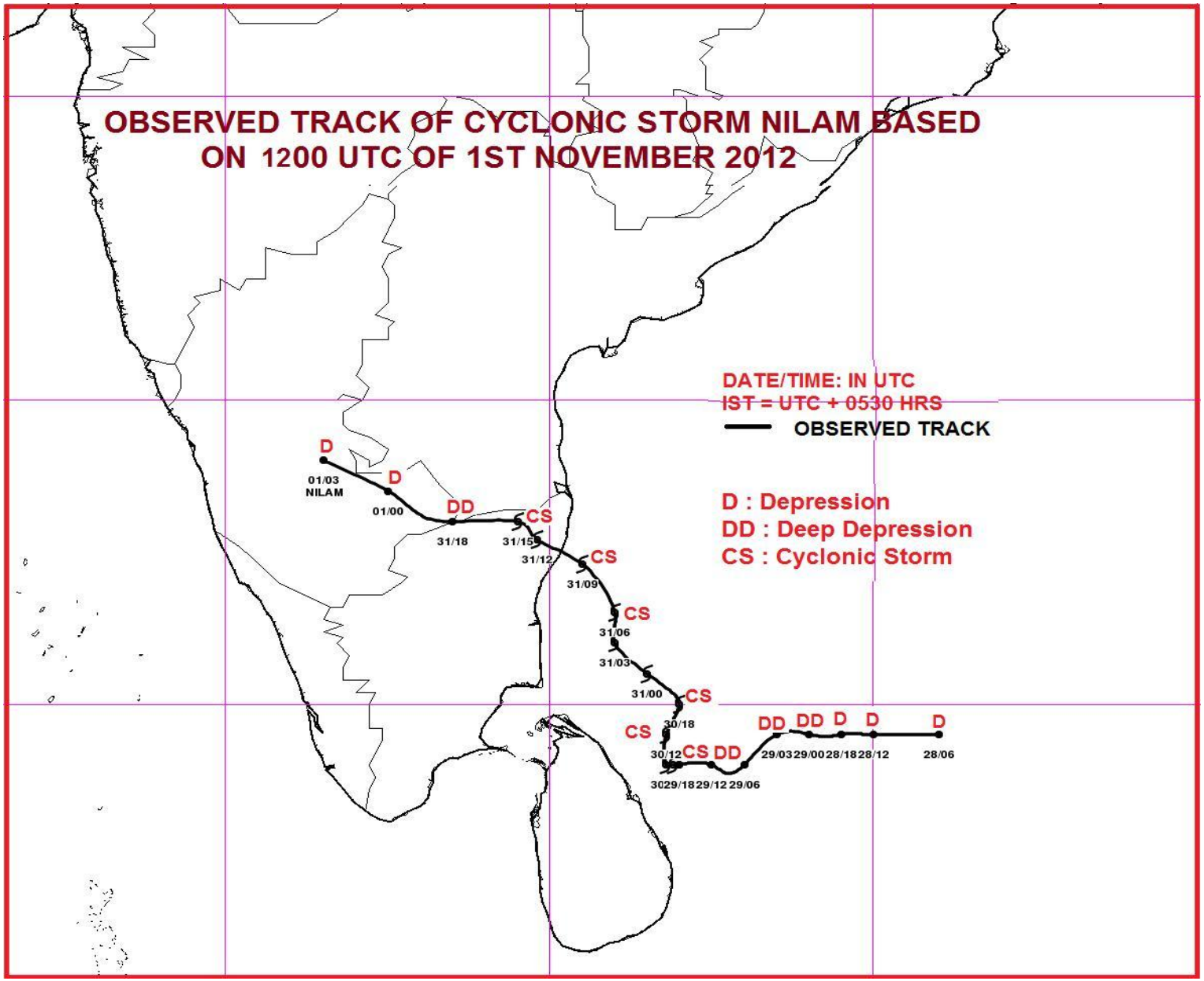

Track of Tropical Cyclone "NILAM"
2010/10/26 - 2012/11/01
Latitude (N)
Longitude (E)
31/1430
31/1200
31/0900
31/0600
31/0300
31/0000
30/2100
30/2030
30/1430
30/0300
281430
280830
28/0230
27/2110
27/1430
27/0830
27/0230
26/2030
26/1430
26/0857
26/0600
26/1200
26/0000
25/1800
25/1200
31/1800
31/0900
31/0300
30/2030
30/0300
29/1430
29/1200
29/0600
30/0300
28/1800
28/1200
27/1800
27/1200
27/0600
27/0000
22/2100
26/1800


Track of Tropical Cyclone "NILAM"
2010/10/26 - 2012/11/01
Latitude (N)
Longitude (E)
31/1430
31/0900
31/0300
30/2030
30/1430
281430
280830
28/0230
27/2110
27/1430
27/0830
27/0230
26/2030
26/1430
26/0857
29/1430
30/0300
29/1200Z

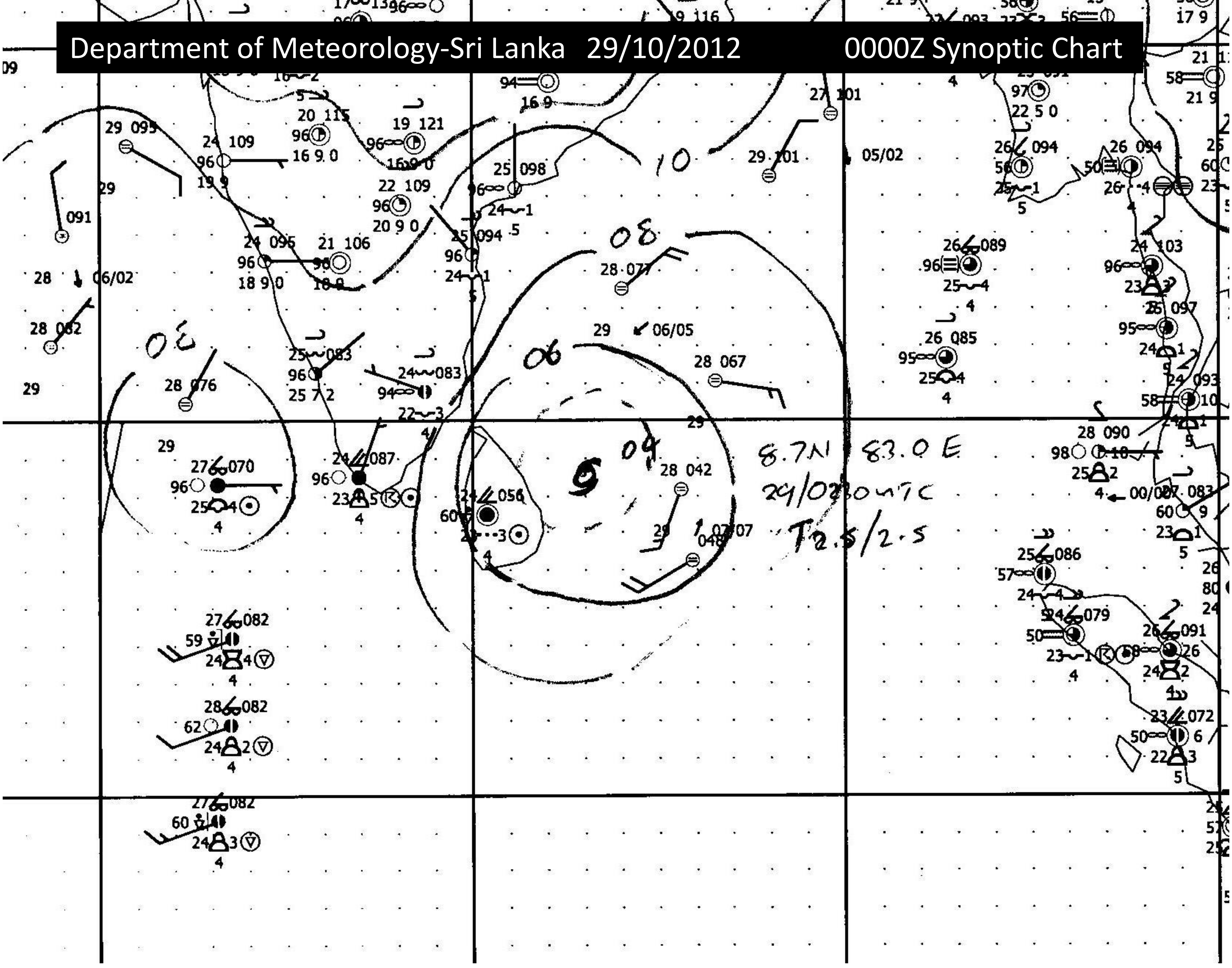
Track of Tropical Cyclone "NILAM"

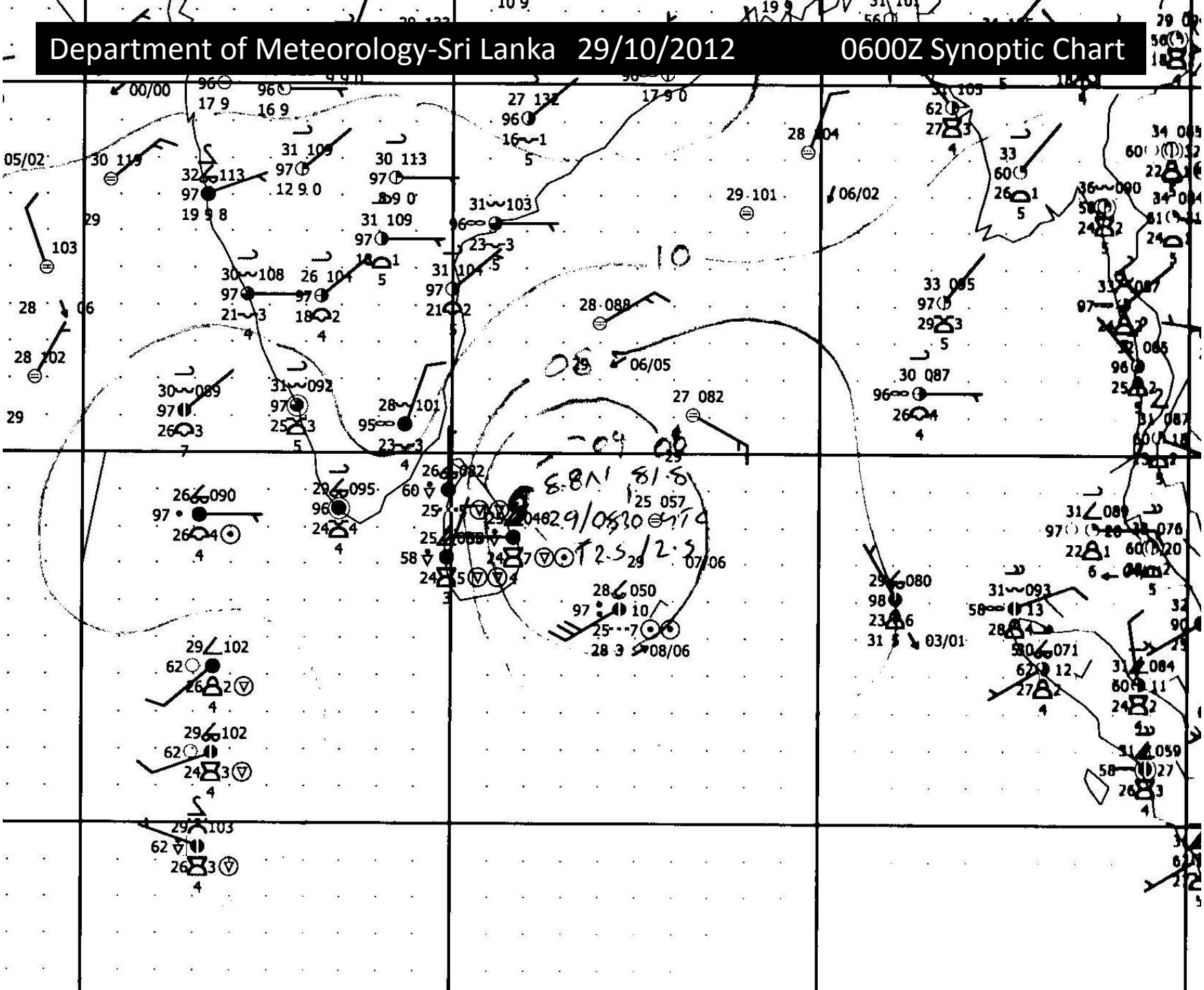
2010/10/26 - 2012/11/01

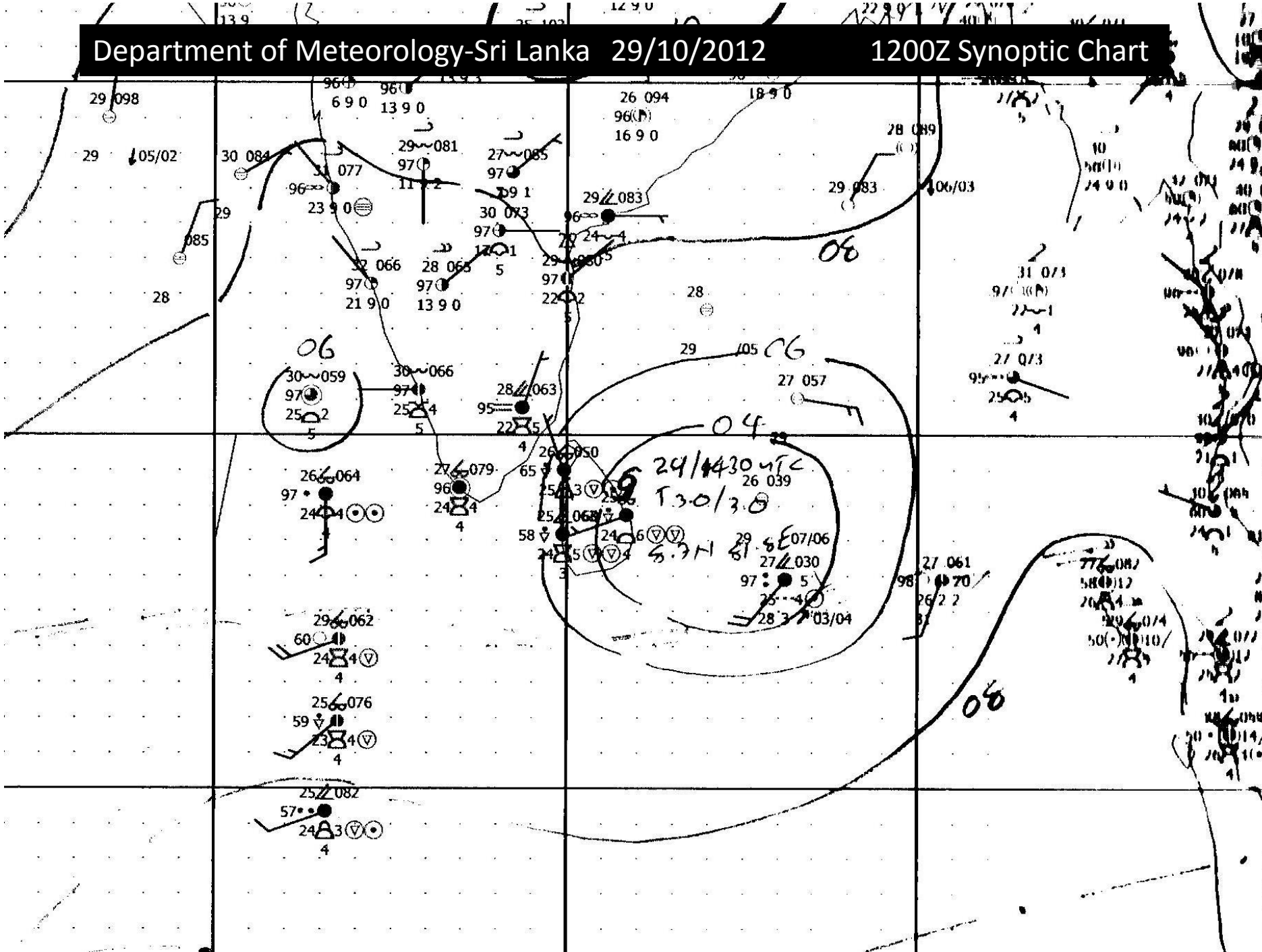


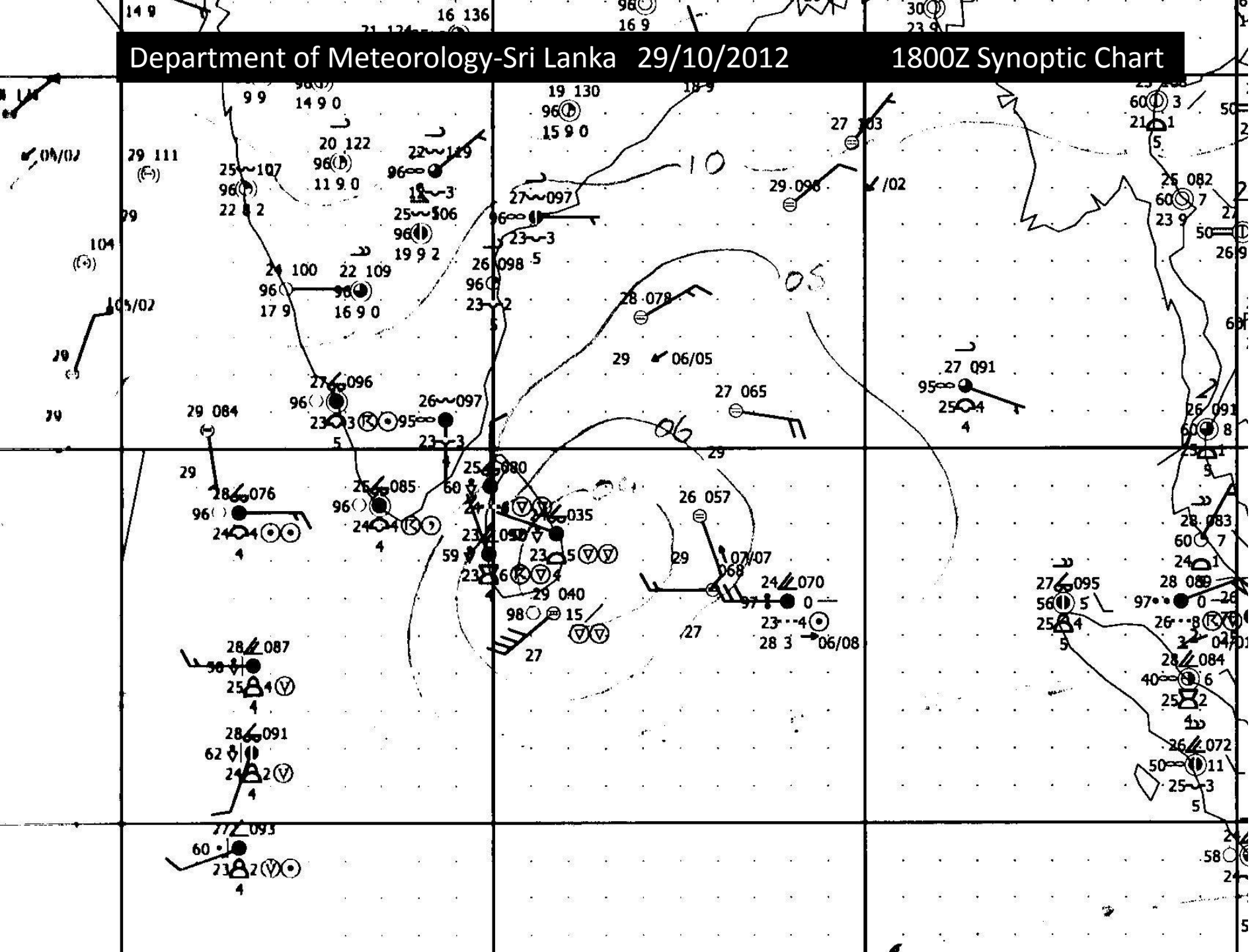

OBSERVED TRACK OF CYCLONIC STORM NILAM BASED ON 1200 UTC OF 1ST NOVEMBER 2012
DATE/TIME: IN UTC
IST = UTC + 0530 HRS
OBSERVED TRACK
D : Depression
DD : Deep Depression
CS : Cyclonic Storm
D
01/03
NILAM
D
01/00
DD
31/18
CS
31/15
31/12
CS
31/09
CS
31/06
31/03
31/00
CS
30/18
CS
30/12
CS
DD
3029/18
29/12
29/06
DD
DD
D
D
D
29/03
29/00
28/18
28/12
28/06

Department of Meteorology-Sri Lanka 29/10/2012 0000Z Synoptic Chart

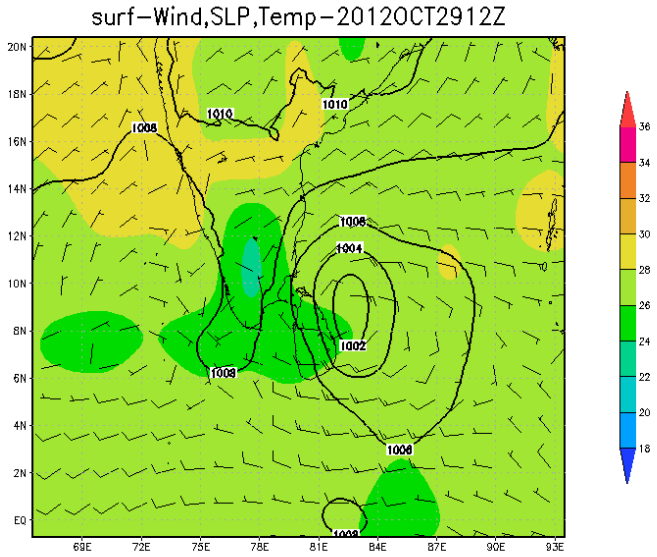


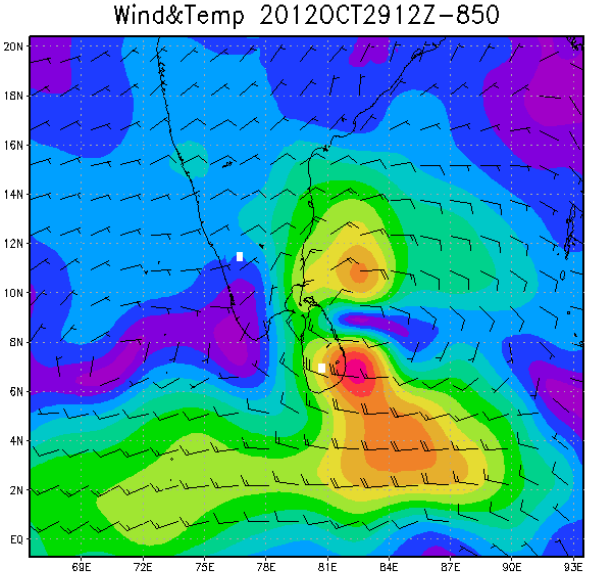

Department of Meteorology-Sri Lanka 29/10/2012 0600Z Synoptic Chart

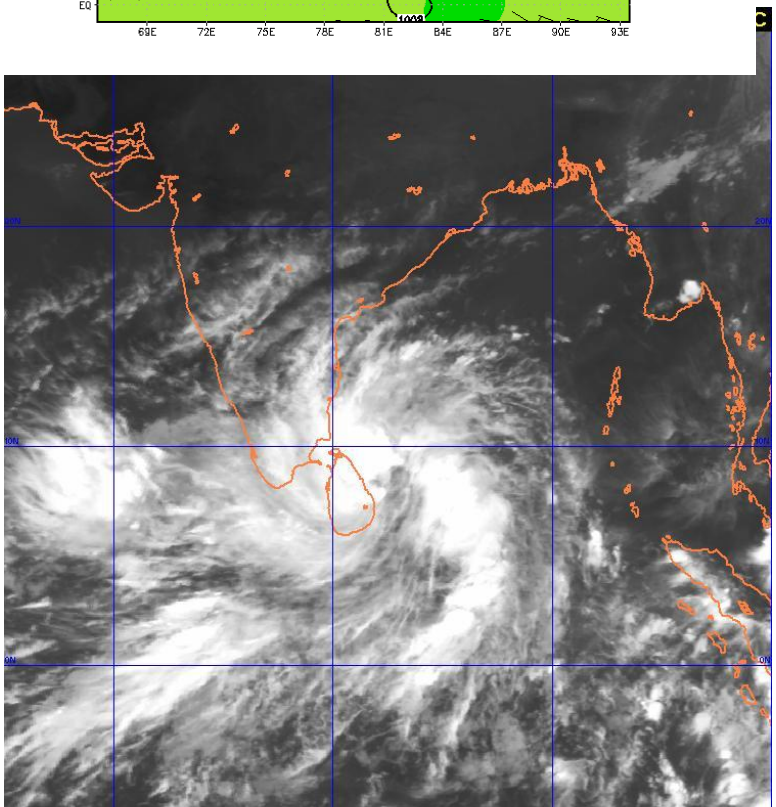

Department of Meteorology-Sri Lanka 29/10/2012 1200Z Synoptic Chart

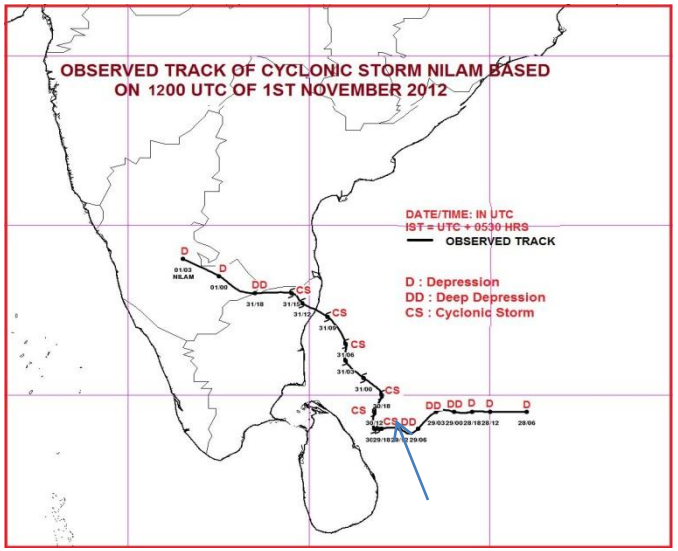

Department of Meteorology-Sri Lanka 29/10/2012 1800Z Synoptic Chart

29/1200Z FY2 image, 0-24 hour WRF forecast maps, RSMC best track

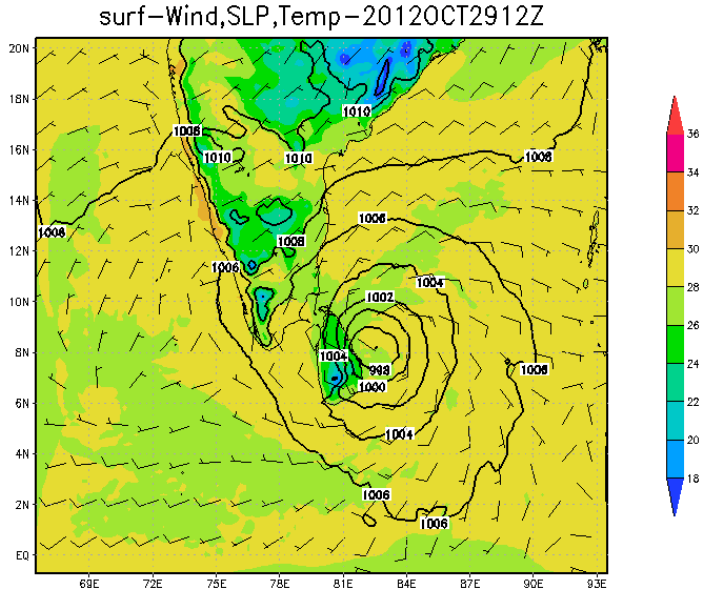


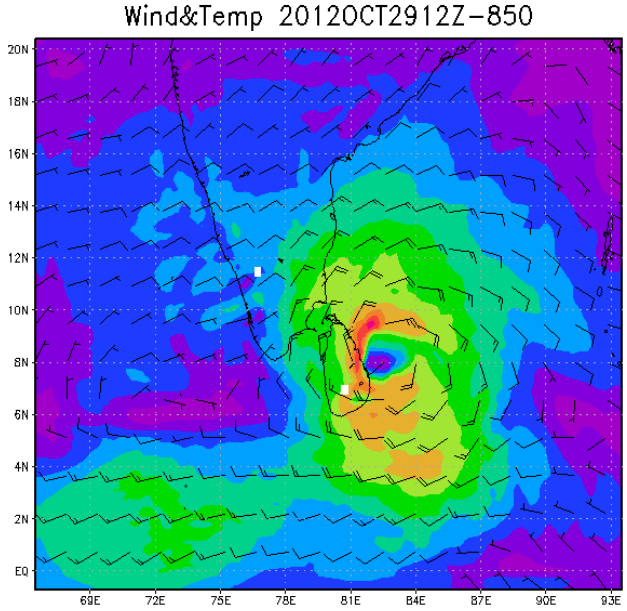


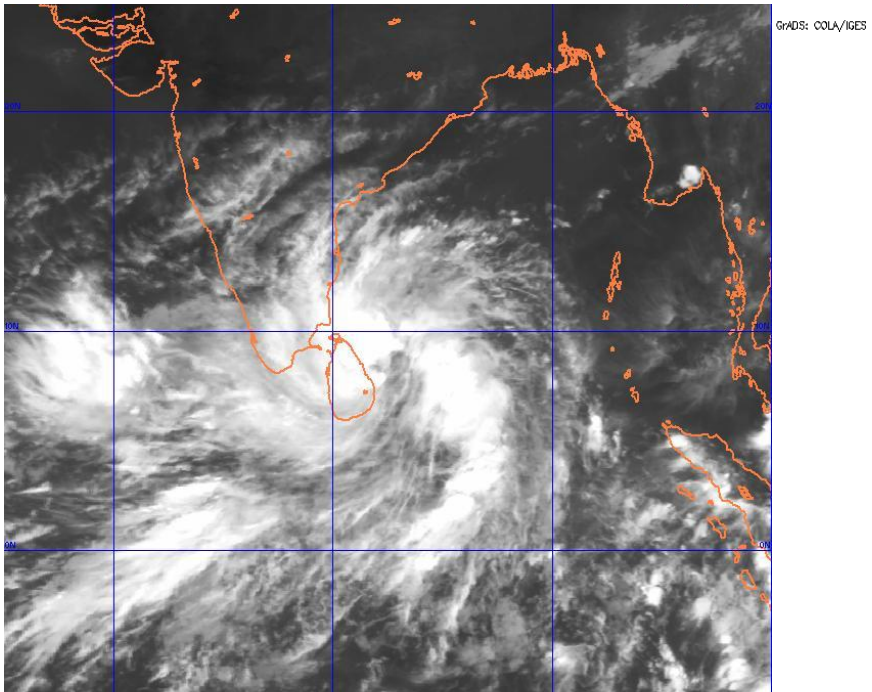


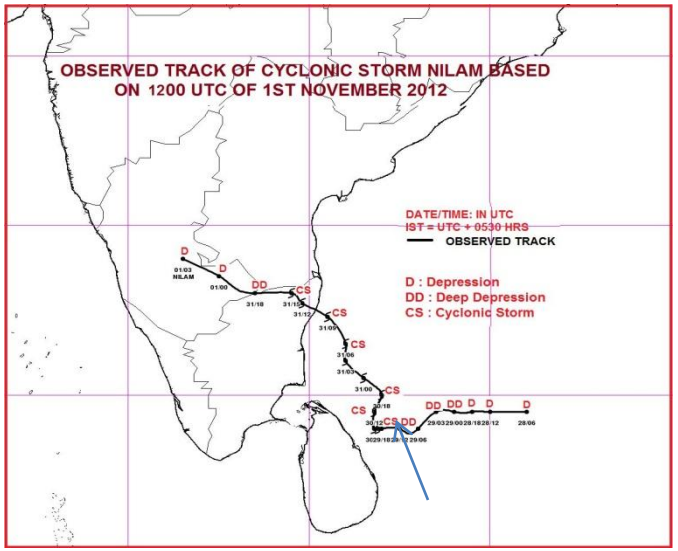


29/1200Z FY2 image, 24-48 hour WRF forecast maps, RSMC best track

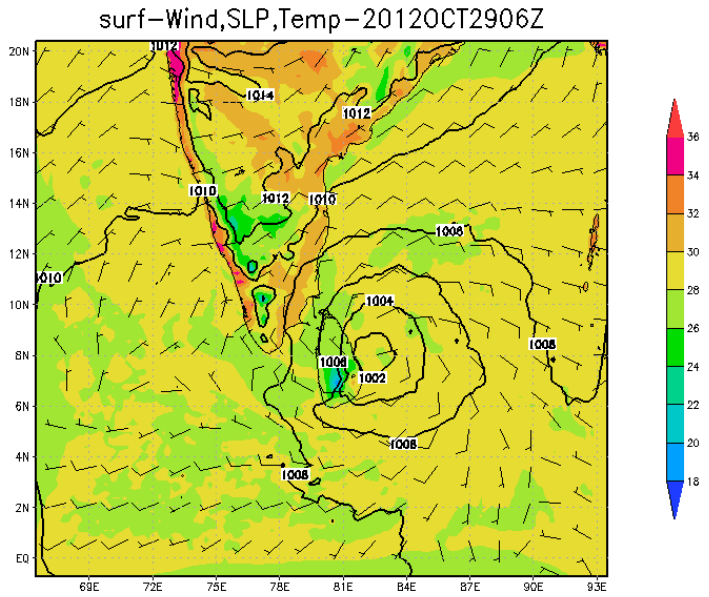


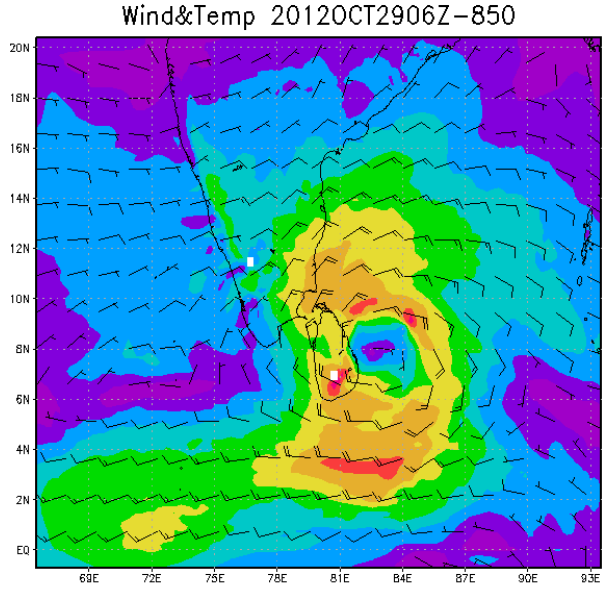


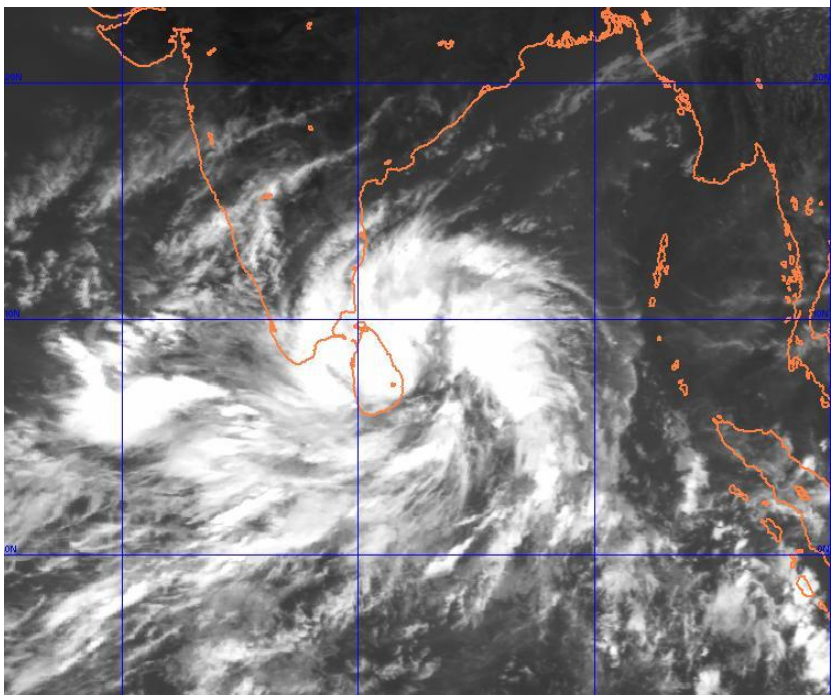


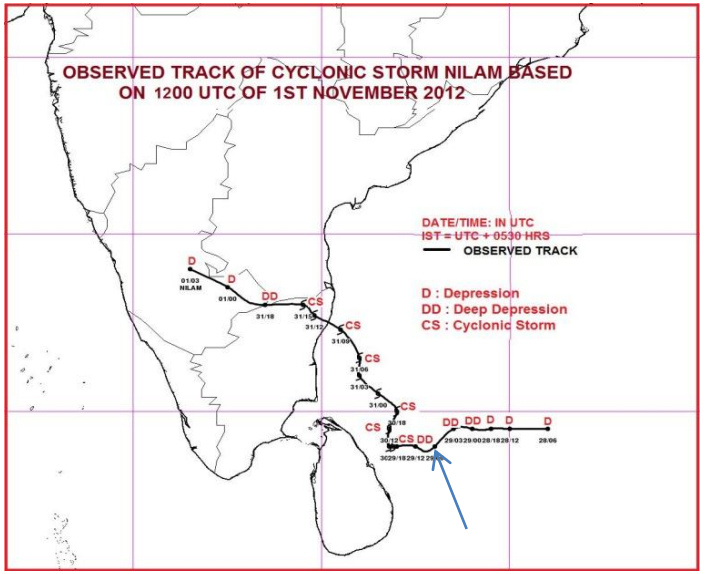


29/0600Z FY2 image, 0-24 hour WRF forecast maps, RSMC best track

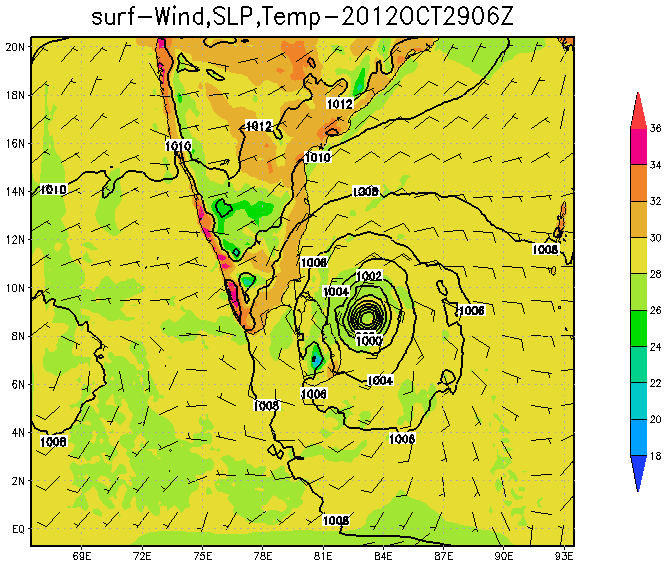


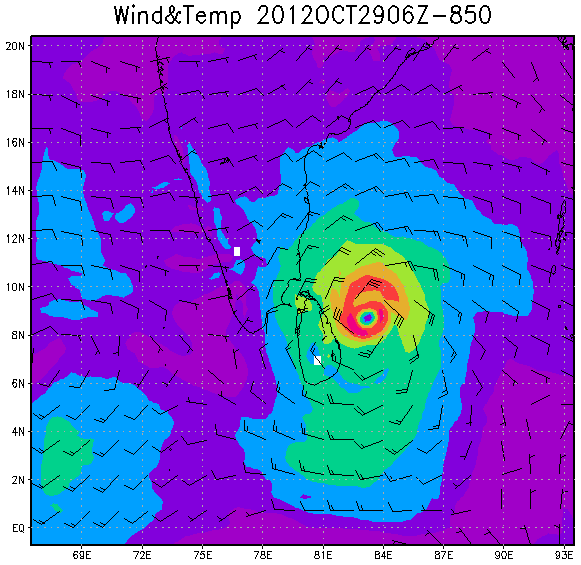


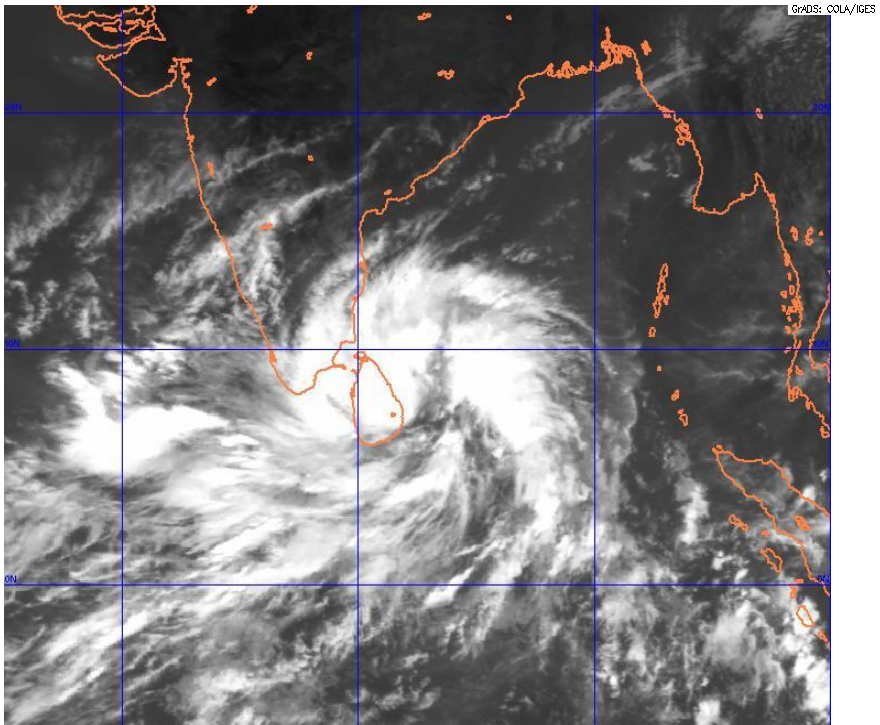


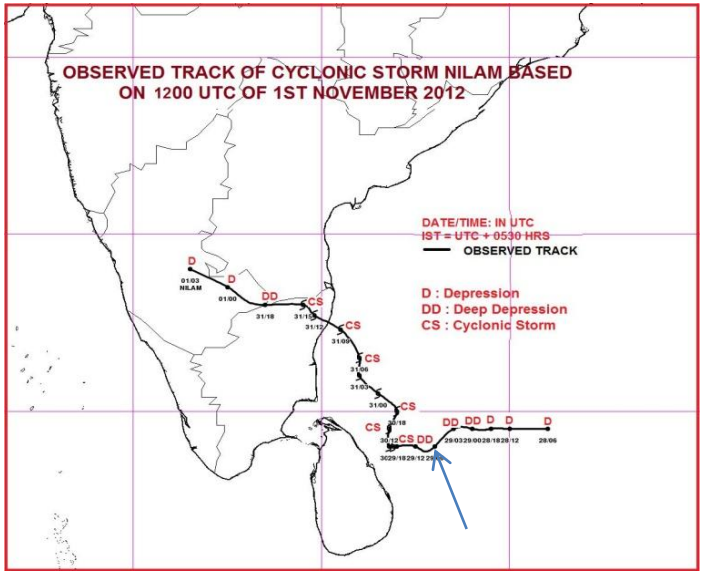


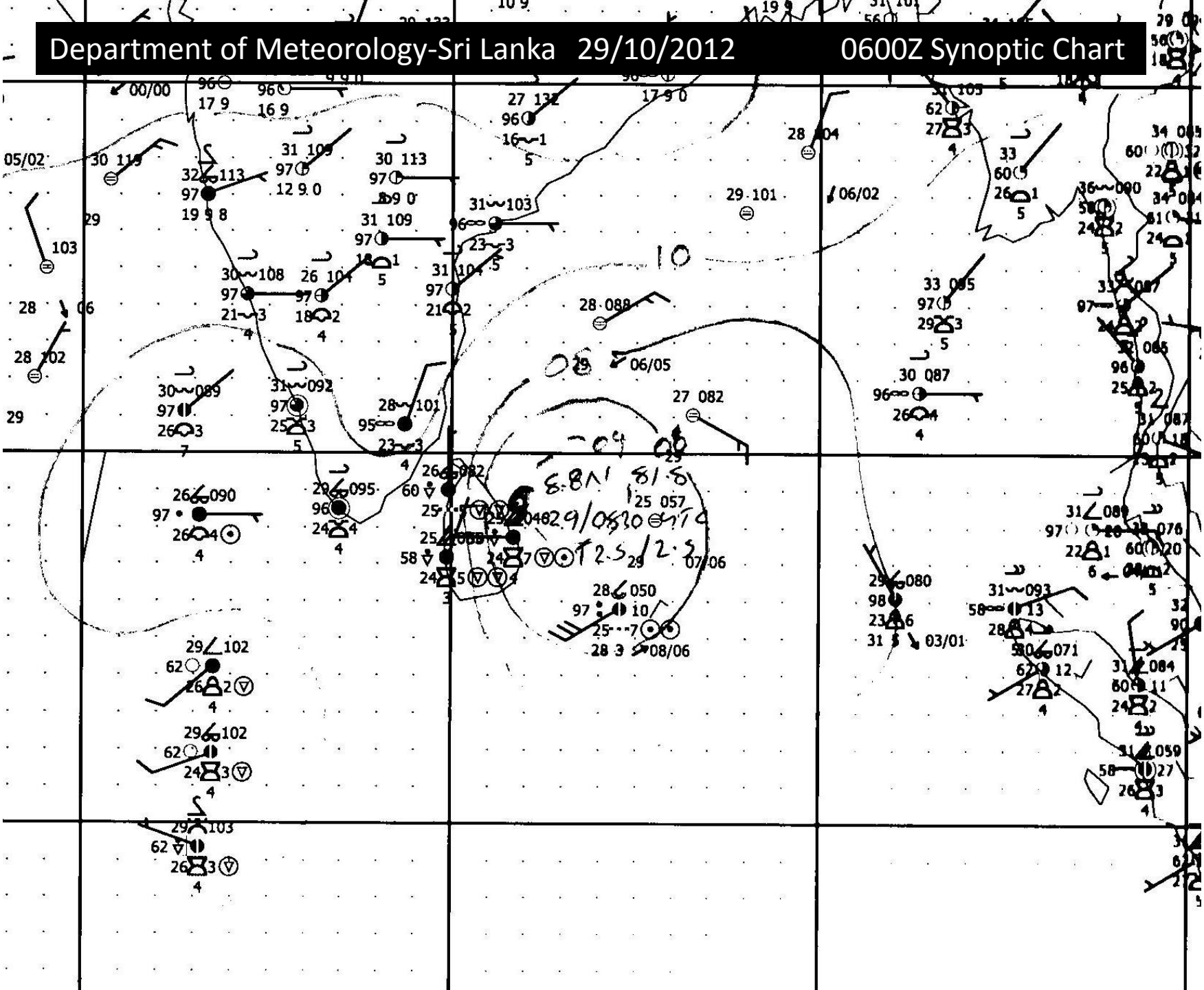
29/0600Z FY2 image, 24-48 hour WRF forecast maps, RSMC best track

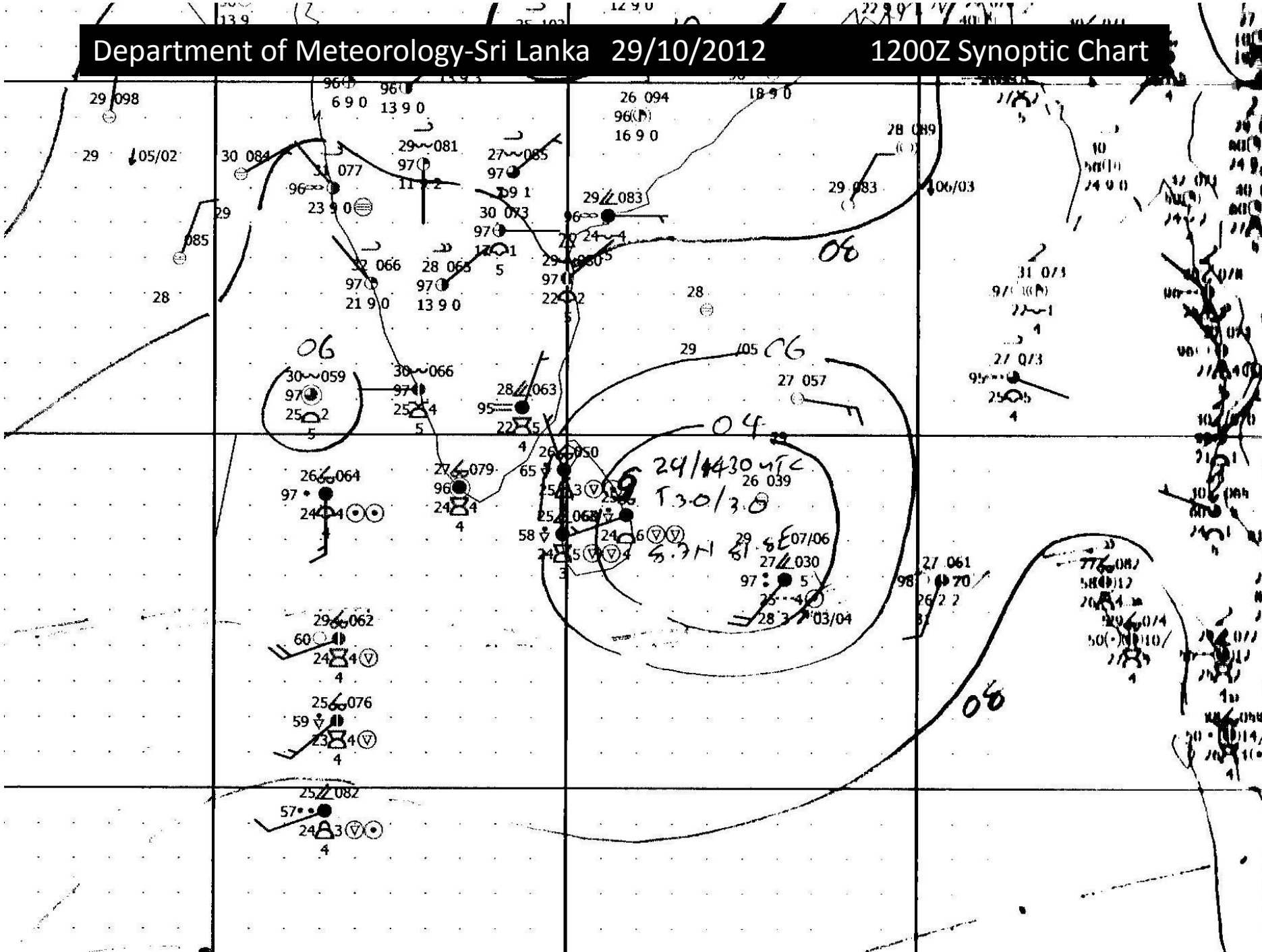









Department of Meteorology-Sri Lanka 29/10/2012 0600Z Synoptic Chart


Department of Meteorology-Sri Lanka 29/10/2012 1200Z Synoptic Chart

Results

In here, main attention is focus to determine the location and time of most southern and more close to East coast of Sri Lanka and Information of landfall. Model derived TC path was approximately agreed with the observations Of Department of Meteorology.

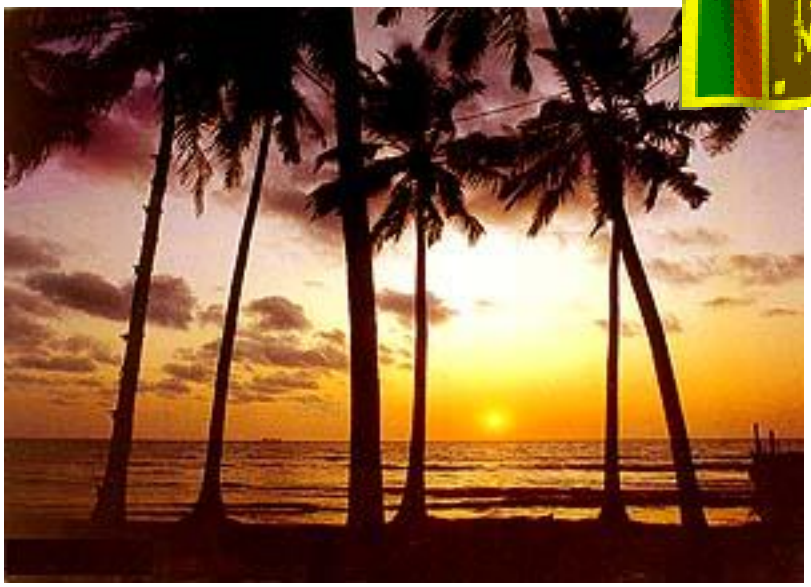
Conclusion

WRF 0-24 and 24-48 forecast are shown the better results for TC formed in Bay of Bengal. WRF path guidance should be further studied to operationally use to predict TC path in the Bay of Bengal.

Natural Beauty

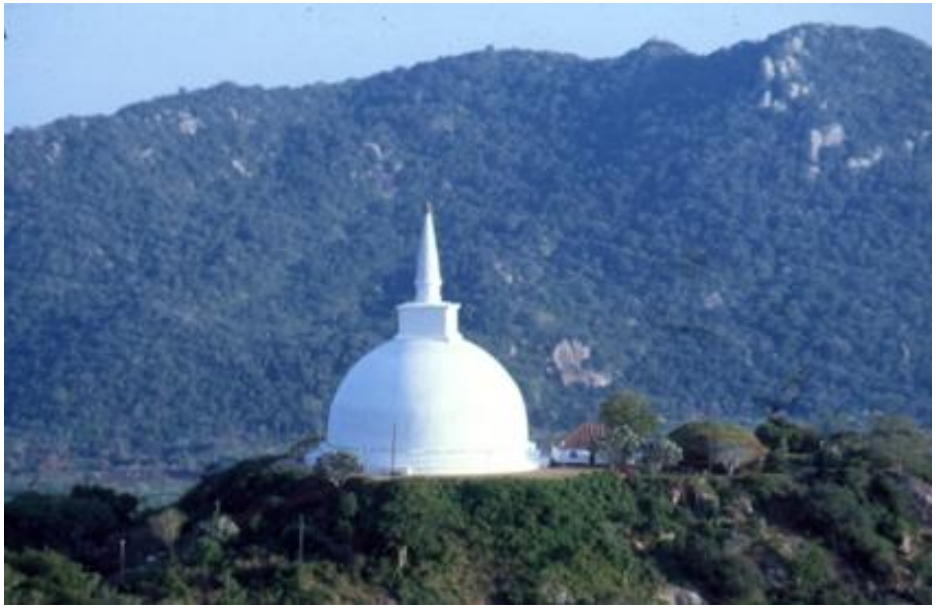
Highlands of Sri Lanka

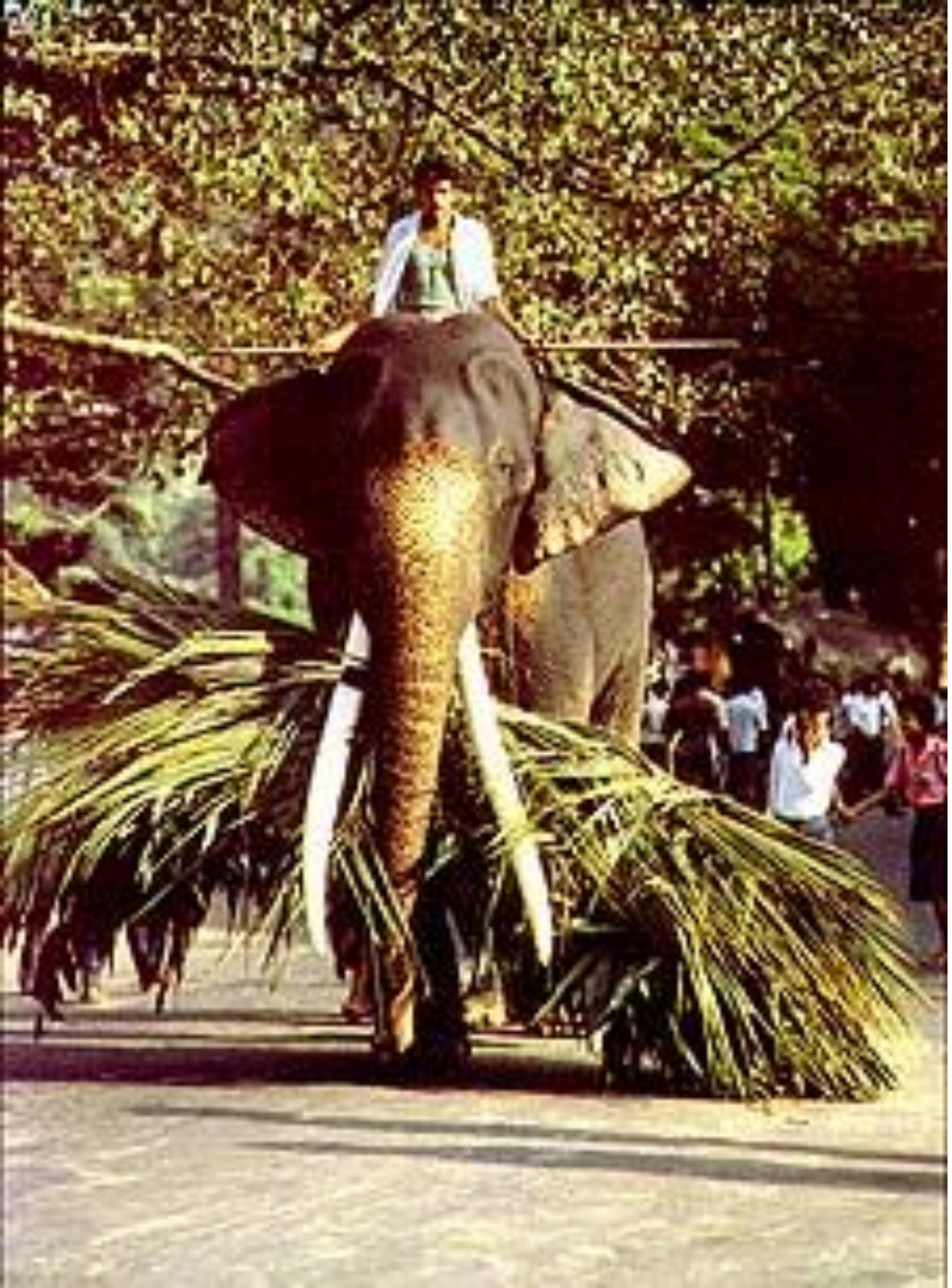
Golden Beaches…….



Scenic Beauty

Buddhism is the religion of most Sri Lankans





Elephants

In

Sri Lanka

Elephant Orphanage Pinnawela, Sri Lanka

The original objective of establishing the orphanage inclined more towards tourism, but is soon became a conservation and educational centre. With the help of local and foreign elephant experts, Pinnawela started a scientific captive-breeding programme for elephants.

Sri Lanka's hill capital **KANDY (488 m from the msl)** is, perhaps, its most beautiful town.

The focal point of the town is the golden-roofed Dalada Maligawa, where the sacred tooth relic of the Buddha is enshrined.

Kandy Esala Perahara or the Annual Pageant of the Temple of Tooth Relic

Dancers at the Kandy Esala Perahera

Sri Lanka is famous for its ....TEA ....