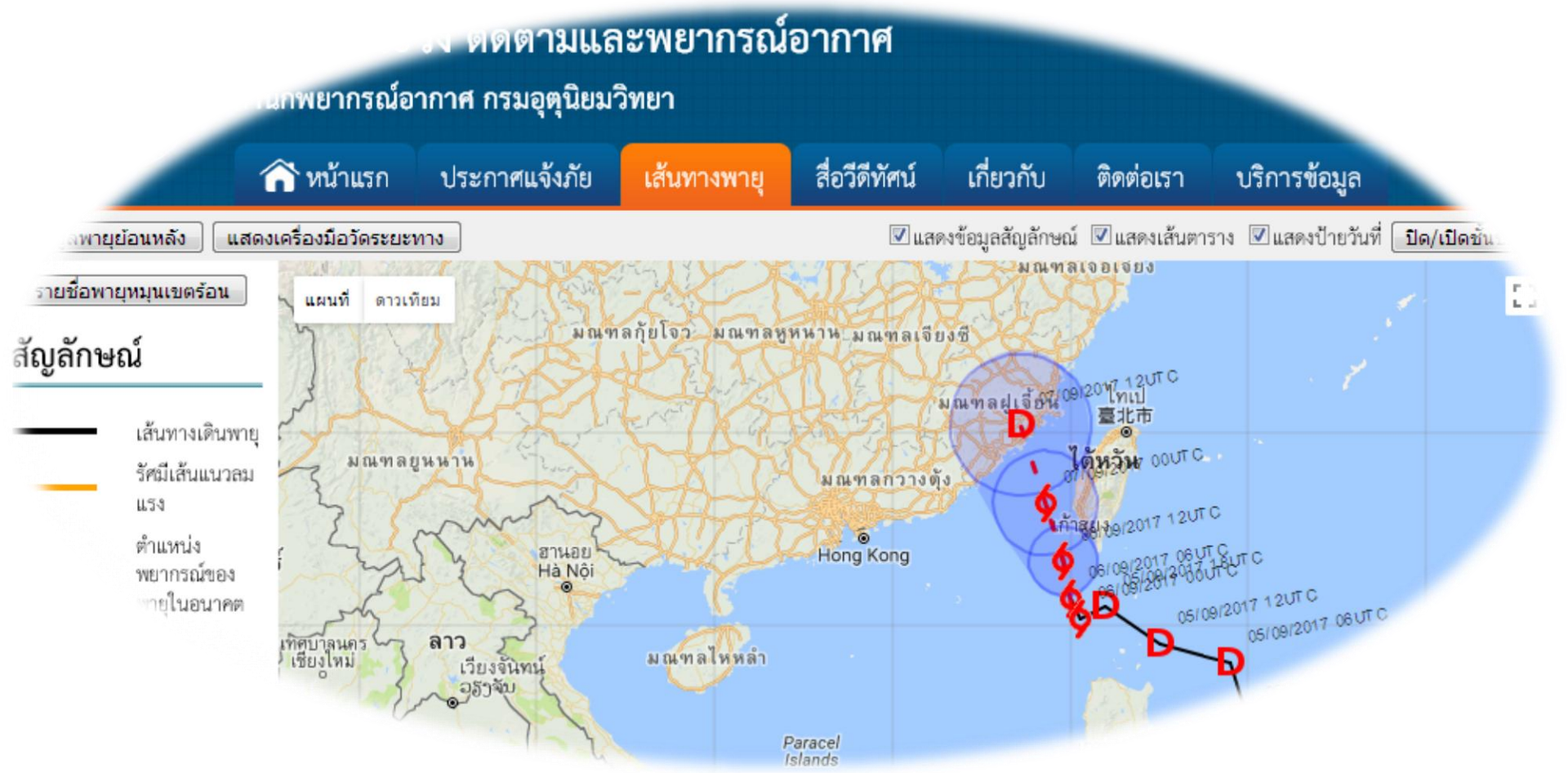
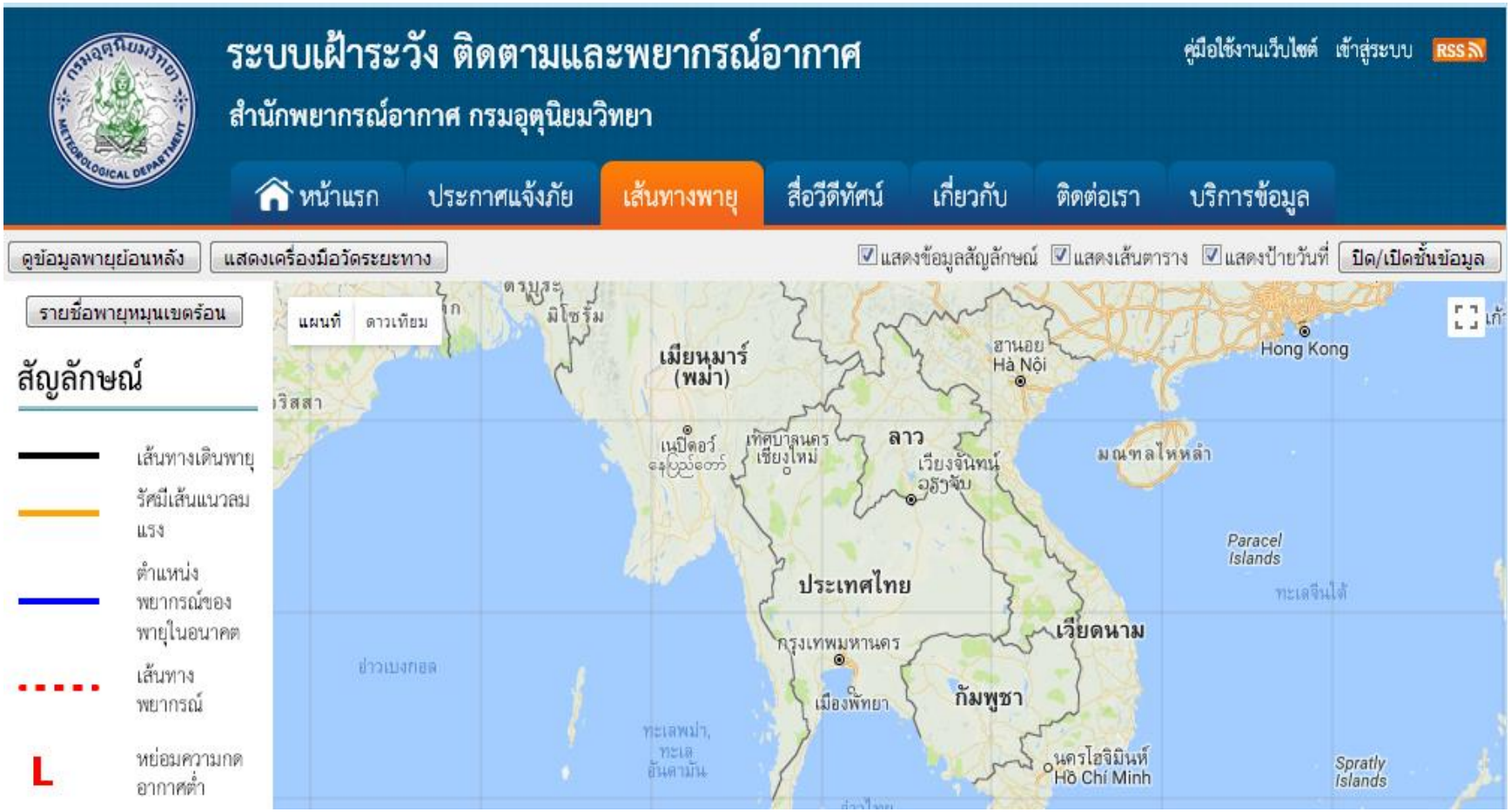
Tropical cyclone track analyzing and monitoring in TMD



1.For analyzing cyclone track



Website meteo alarm

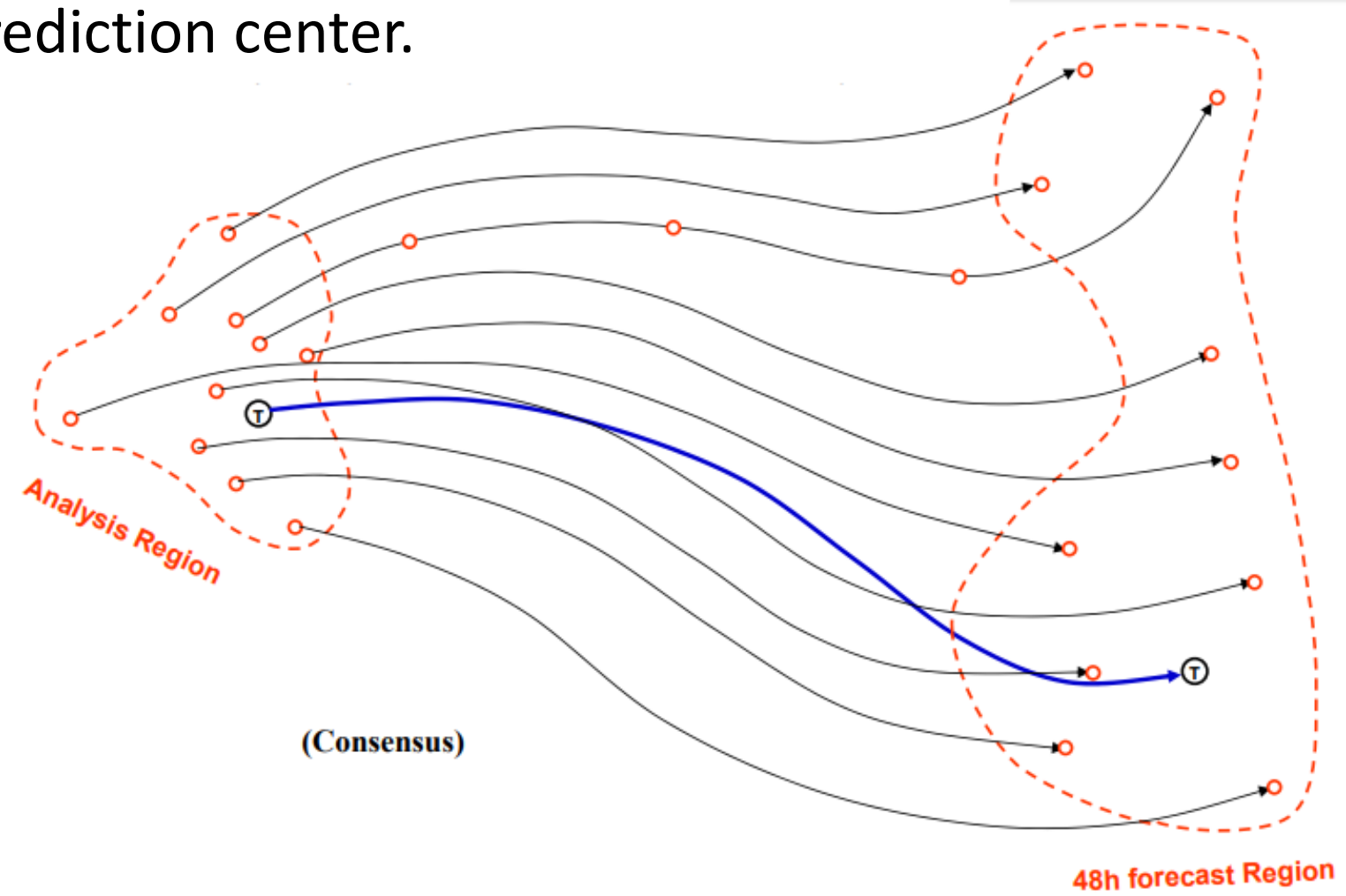
http://www.metalarm.tmd.go.th/monitor/typhooon

Basis for consensus forecasting

- A CONSENSUS POSITION

  track forecast is simply an average of the initial and forecast latitudes and longitudes of a group of deterministic model tropical cyclone tracks at each forecast interval.
- Deterministic model track forecast positions from the consensus (average) track position at each forecast interval.
- No prediction of consensus tropical cyclone track forecast error

DETERMINISTIC MODEL is a single numerical model that is typically the highest horizontal and vertical resolution model from a numerical weather prediction center.



Numerical weather prediction center.

- The Joint Typhoon Warning Center (JTWC)
- RSMC Tropical Cyclone
- hurricane/archive - Unisys Weather
- Tropical Cyclone Information of JMA
- NRL Tropical Cyclone Page - Navy.mil
- Severe Weather Information Centre

JTWC

Joint Typhoon Warning Center (JTWC)

Products and Services Notice

Warning Graphic Legend

Annual Tropical Cyclone Reports

Best Track Archive

Frequently Asked Questions (FAQ)

2009 METSAT and TC Conference

2012 TC Conference

Global Tropical Hazards Outlook *new*

Current Northwest Pacific/North Indian Ocean* Tropical Systems

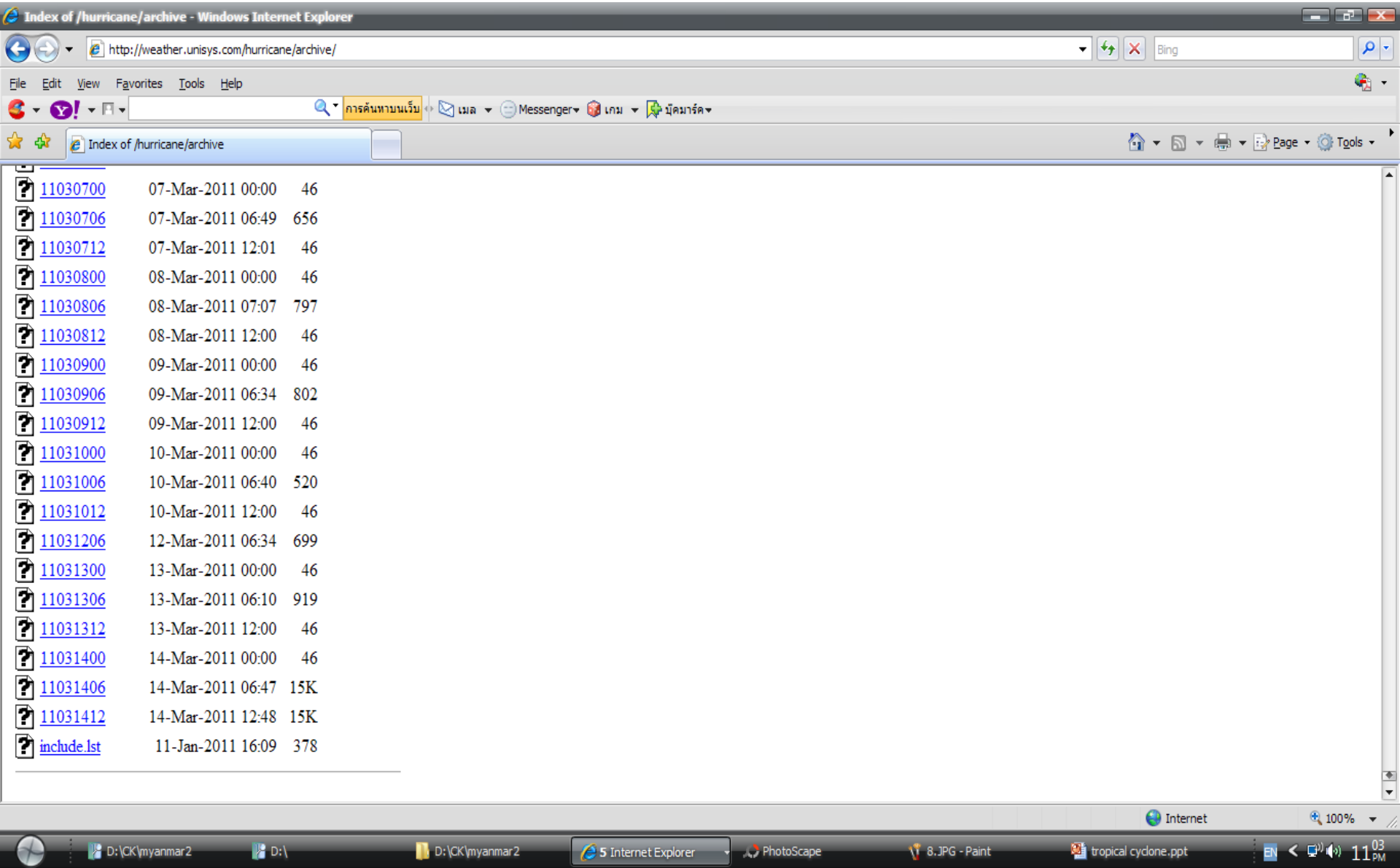
Tropical Depression 19W (Nineteen) Warning #03
Issued at 05/2100Z

- TC Warning Text
- TC Warning Graphic
- Prognostic Reasoning
- JMV 3.0 Data
- Google Earth Overlay KML
- IR Satellite Imagery
- Satellite Fix Bulletin

* ***Includes Bay of Bengal and Arabian Sea***

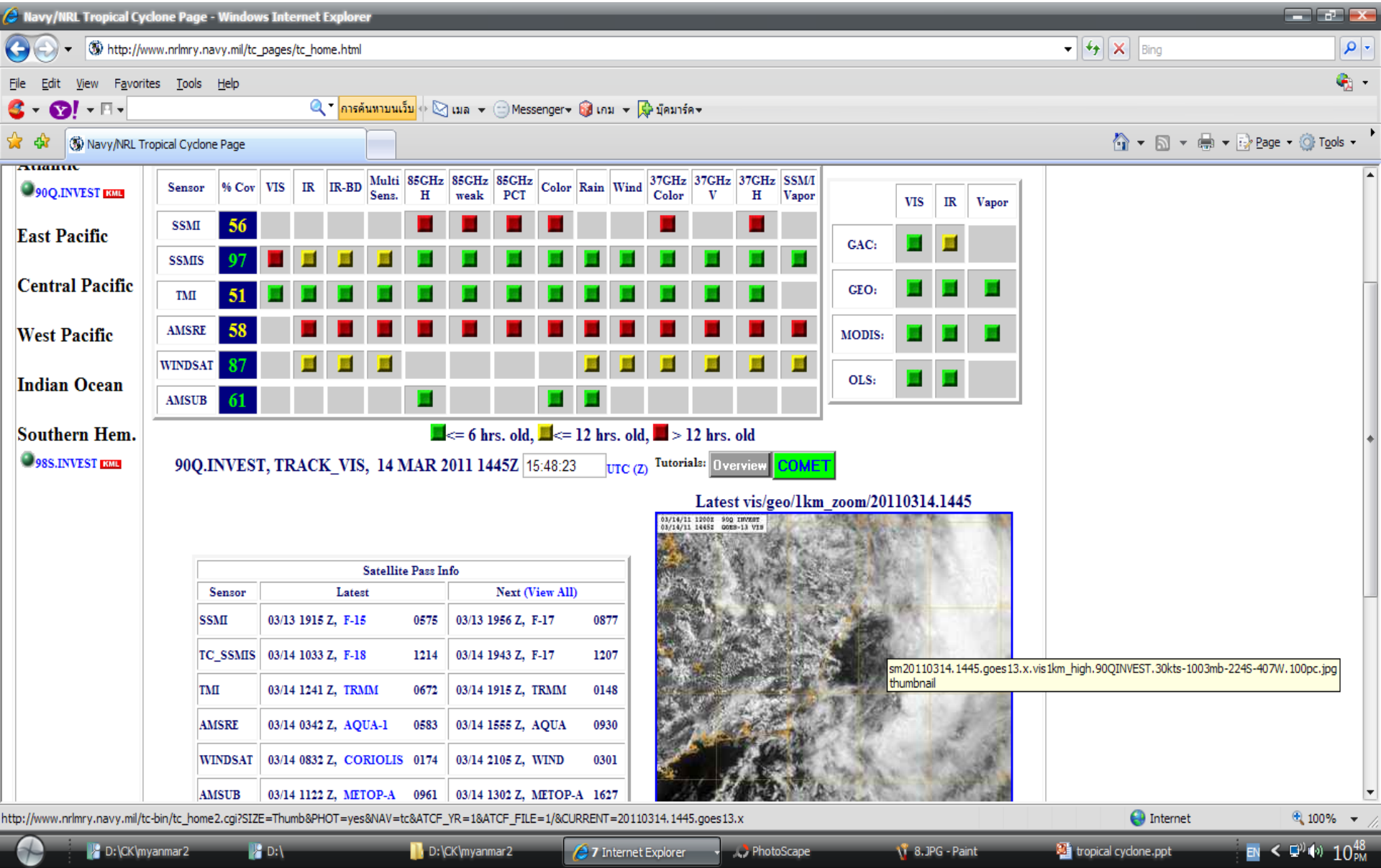
Current Central/Eastern Pacific Tropical Systems

http://weather.unisys.com/hurricane/archive/



```
** WTIO20 FMEE 141221 ***
SECURITE
WARNING FOR METAREA VIII (S)
ISSUED BY METEO-FRANCE/TROPICAL CYCLONE CENTRE/LA REUNION 14/03/2011 AT
1200 UTC.
WARNING NUMBER: 002/07 (SOUTH-WEST INDIAN OCEAN)

10 MINUTES AVERAGE WIND SPEED IN KNOTS (KT)
(WIND GUSTS AT SEA MAY BE ABOUT 40% STRONGER THAN THE AVERAGED WIND).
MINIMUM SEA LEVEL PRESSURE IN HECTOPASCALS (HPA)
(INDICATIVE FIGURE).

WARNING
BEGINNING OF VALIDITY: MONDAY    14/03/2011 AT 1200 UTC.

PHENOMENON:        TROPICAL DISTURBANCE 7 1002 HPA
POSITION:          WITHIN 30 NM RADIUS OF POINT 11.7S / 85.8E
(ELEVEN DECIMAL SEVEN DEGREES SOUTH AND EIGHTY FIVE DECIMAL EIGHT DEGREES
 EAST) AT 1200 UTC
MOVEMENT:          WEST-SOUTH-WEST 10 KT

THREAT AREAS:
SQUALLY WEATHER WITHIN 300 NM RADIUS FROM THE CENTER, IN THE WESTERN SEMI
-CIRCLE AND THE SOUTHEASTERN QUADRANT.

CLOCKWISE CIRCULATION  20/25 KT AND ROUGH SEAS WITHIN 100 NM RADIUS FROM
THE CENTER.
STRONG BREEZE 25 KT AND ROUGH SEAS UP TO 400 NM IN THE SOUTHERN
SEMI-CIRCLE DUE TO GRADIENT EFFECT.
STRONG GUSTS UNDER SQUALLS.

FORECAST POSITION AND INTENSITY:
12H, VALID 2011/03/15 AT 00 UTC:
12.5S / 84.1E, MAX WIND = 25 KT, TROP. DISTURBANCE.
24H, VALID 2011/03/15 AT 12 UTC:
```

http://www.nrlmry.navy.mil/tc_pages/tc_home.html



http://severe.worldweather.wmo.int/

JMA

気象庁
Japan Meteorological Agency

Home | Weather/Earthquakes | Services | Publications/Perio

Home > Weather and Earthquakes > Tropical Cyclone Information

Tropical Cyclone Information

Select track forecast or wind probability: 3-Day Track and Intensity Forecast Print

Tropical Cyclone: TD a

Show tracks covering: 72 hours

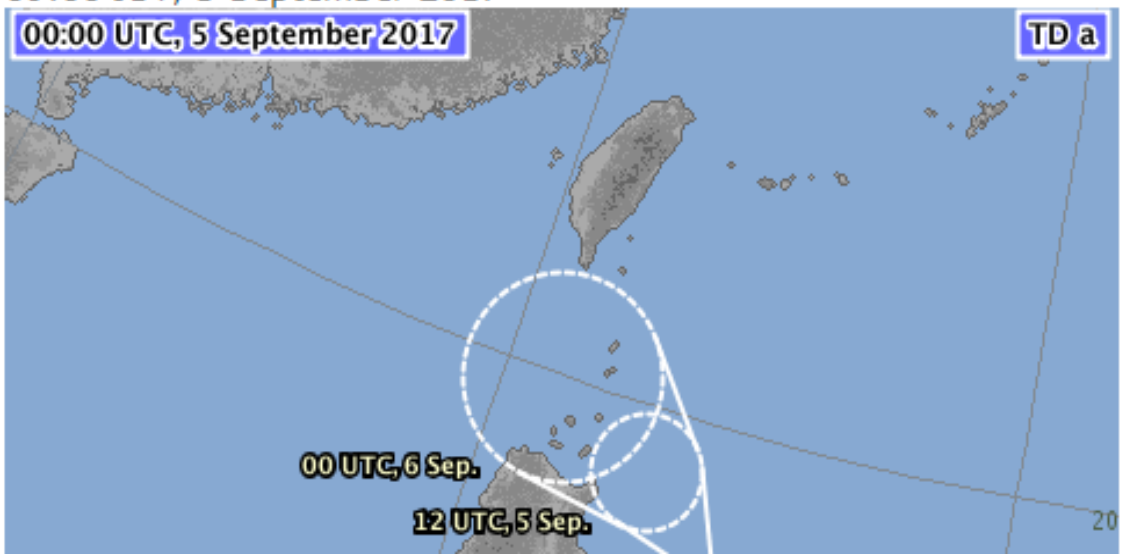
Display Time: < > Show all probability circles Animation: Play Stop

Click on map to zoom in.

Draw lines linking forecast circle centers: Yes No

09:00 JST, 5 September 2017

Notes



Close

TD

Issued at 01:05 UTC, 5 September 2017

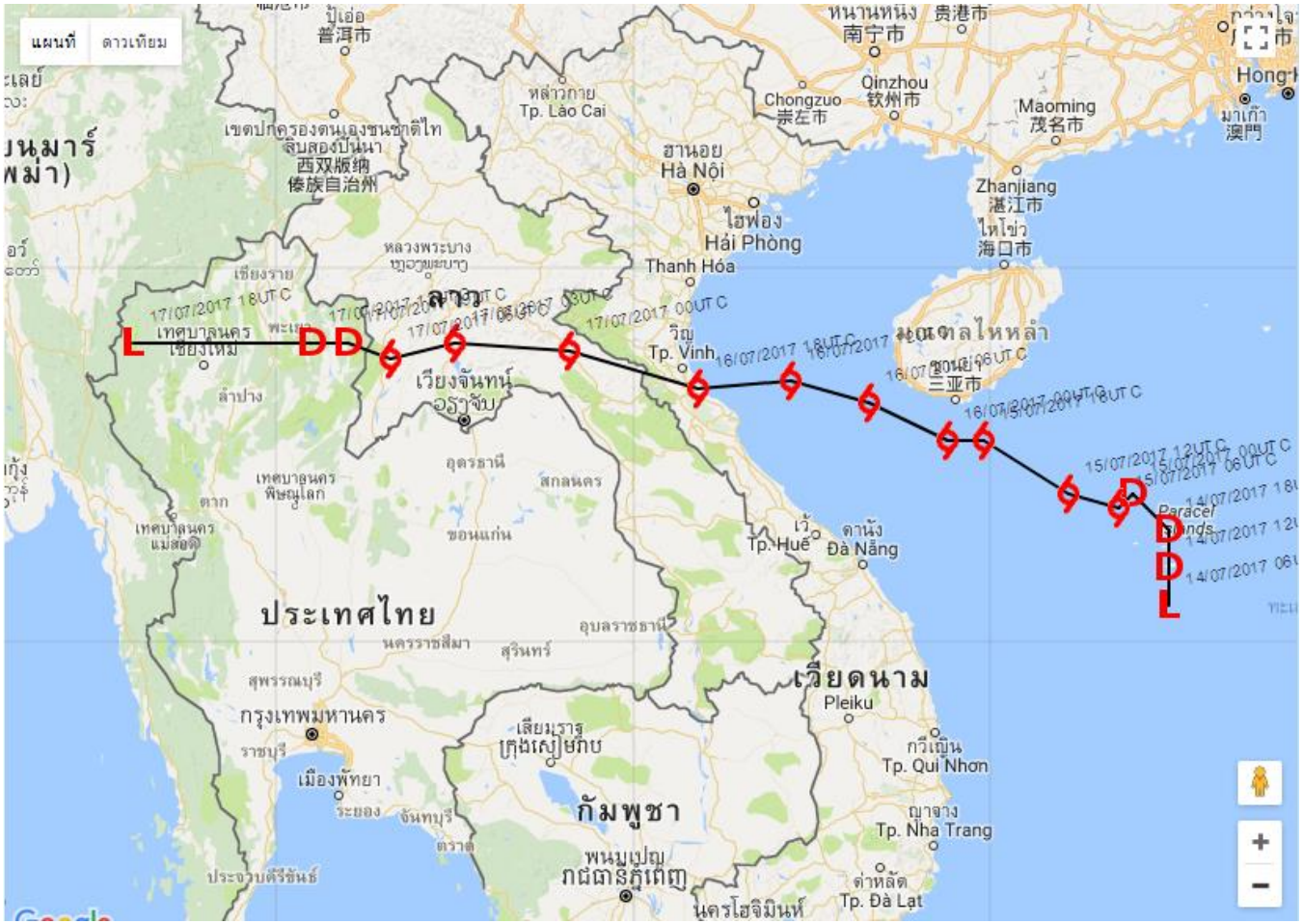
<Analysis at 00 UTC, 5 September>	
Scale	-
Intensity	-
	TD
Center position	N17°25' (17.4°)
	E124°50' (124.8°)
Direction and speed of movement	WNW 15 km/h (8 kt)
Central pressure	1004 hPa

60 แสดงจำนวนแถวกรอกข้อมูล

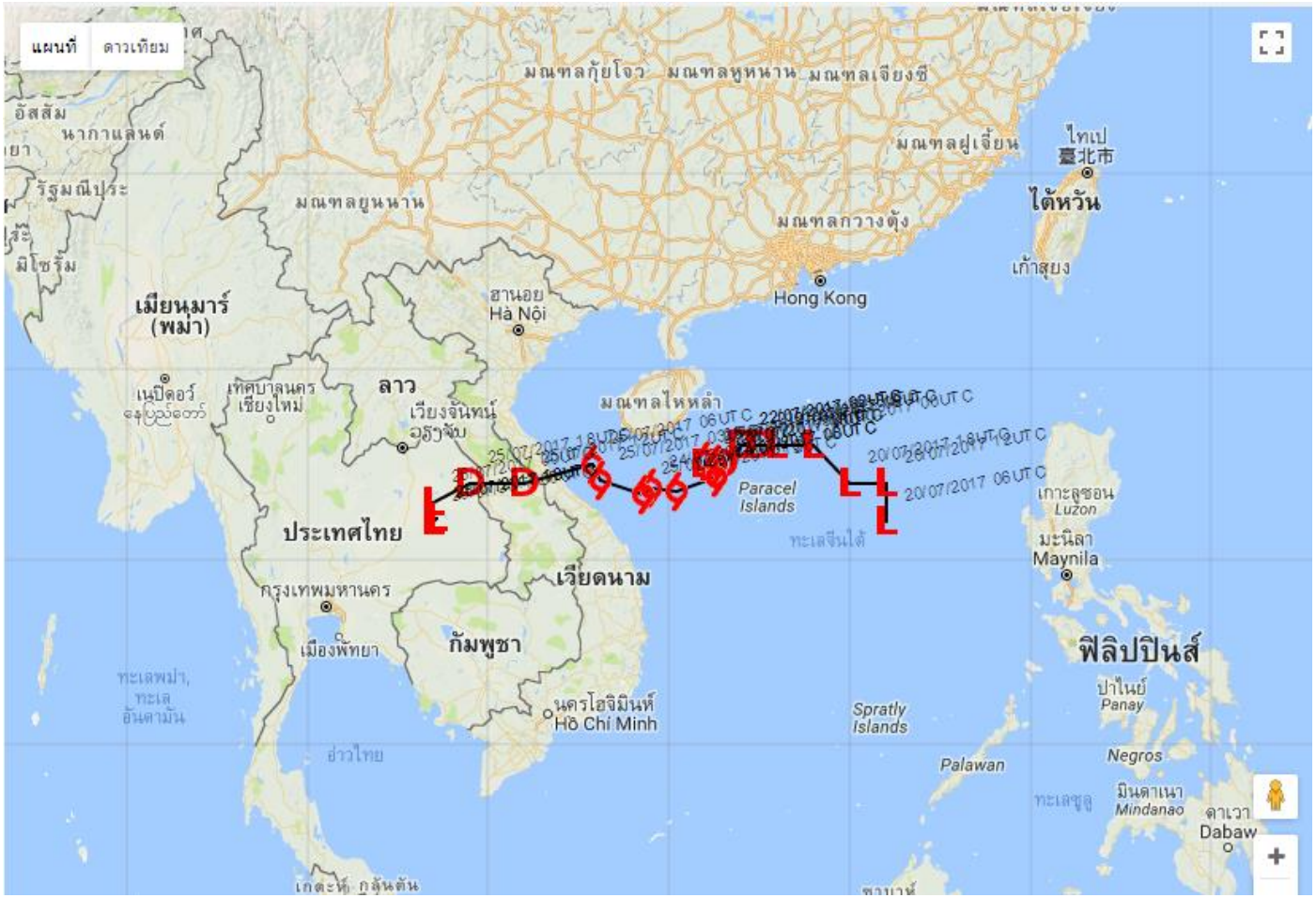
ข้อมูลพายุ

วันที่	เวลา (UTC)	ละติจูด	ลองจิจูด	ความเร็ว (นอต)	ความเร็วพยากรณ์ (นอต)	ป้าย offset x	ป้าย offset y	รัศมีเส้นแนวลมแรง (กม.)	ทิศทางการเคลื่อนตัว	
04/09/2017	00:00	16.3	128	20		0	30		WNW	>
04/09/2017	06:00	16.4	127.4	30		0	30		WNW	>
04/09/2017	12:00	16.5	126.3	30		0	30		W	>
04/09/2017	18:00	17	125.3	30		0	30		W	>
05/09/2017	18:00	19.4	121.9		35	0	30		NW	>
										>
										>
										>
										>

Example Severe Tropical Storm TALAS



Example Tropical Storm SONCA



2.For monitoring a tropical cyclone and active low pressure

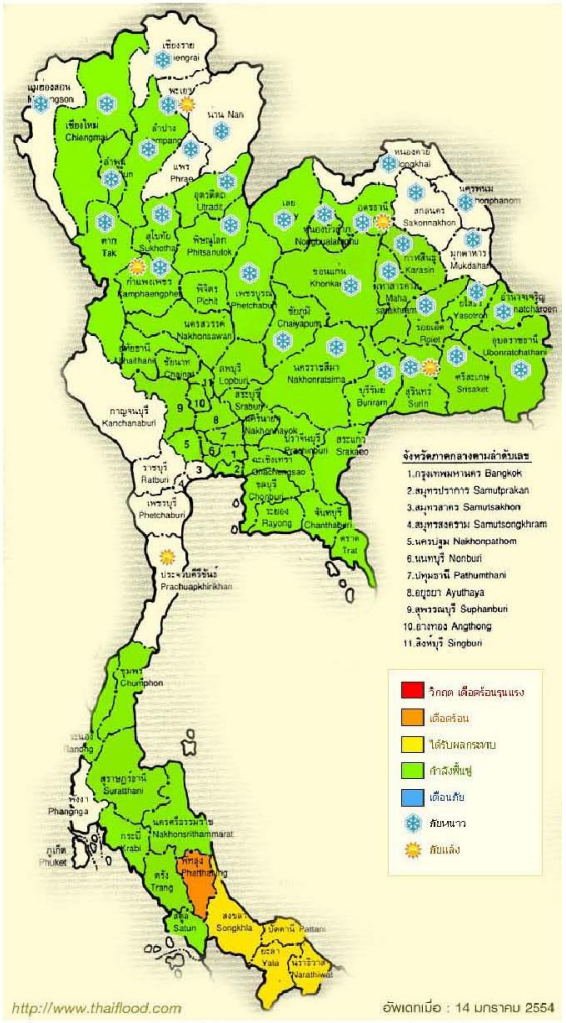
- For the active low pressures are the same things. They usually make damage likely a tropical cyclone disaster. However, Thailand does not have a system for monitory them.
- To mitigate severe impacts, The accuracy of tropical cyclone track and active low pressure forecasting is very important for risk area evaluation that will be affected by the tropical cyclone due to evacuation in time can reduce both human and property losses.

https://en.wikipedia.org/wiki/Cyclone_Jal#/media/File:Jal_2010_track.png

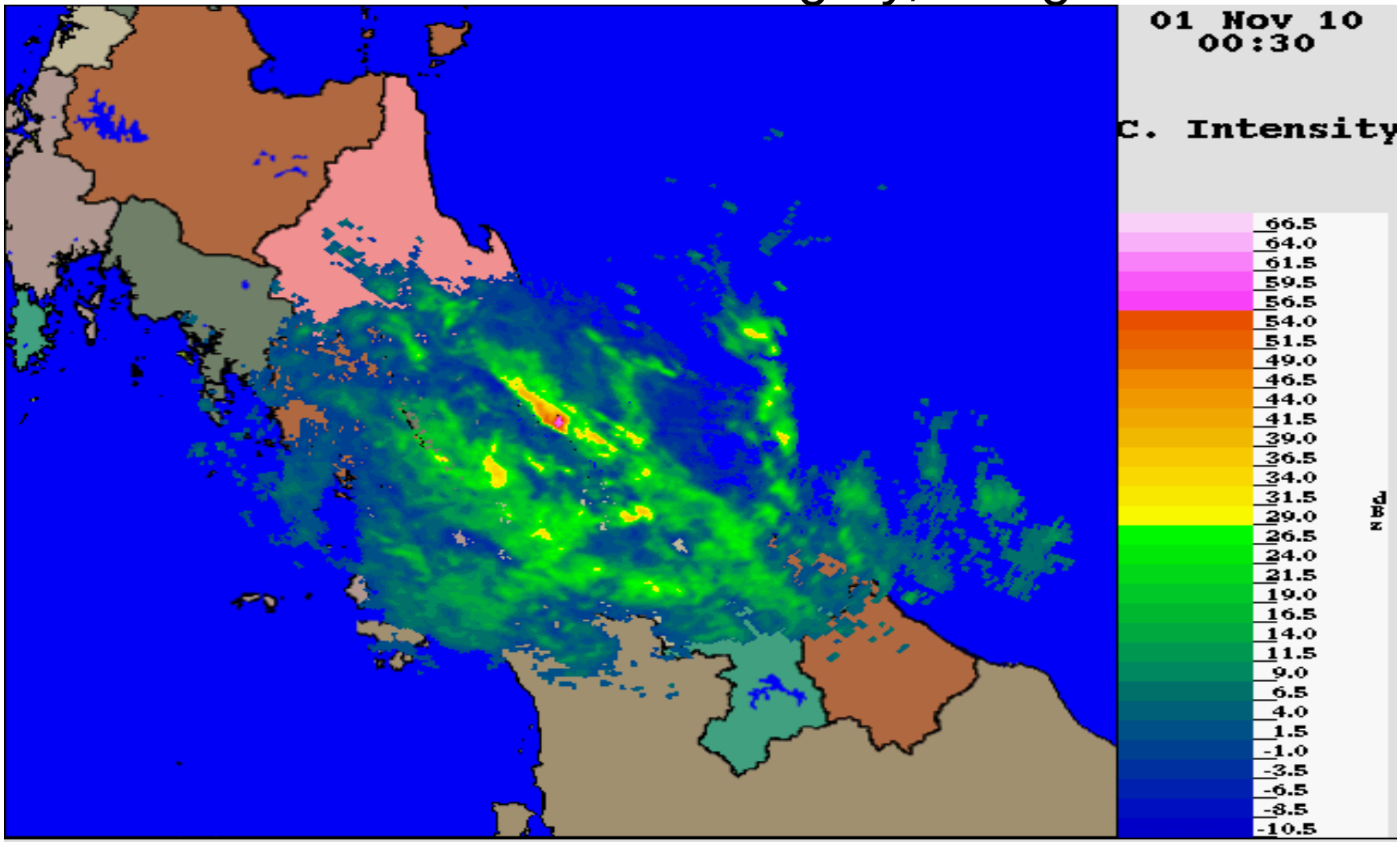
- When Jal was just a low pressure area, it hit Thailand and strengthened into a depression. As a result, heavy to very heavy rains battered the country causing extensive flooding

Overview of the 2010: the impact

- On 31 October 2010, Tropical Depression led to heavy rain and flood affecting 12 southern provinces of Thailand (133 districts, 874 sub-districts, 6,197 villages, 609,511 households and 1,932,405 persons). Hat Yai, one of the most famous cities in Thailand, had been most affected by flooding in 2000.
- Hat Yai was severely flooded, worse than the 2000 flood.



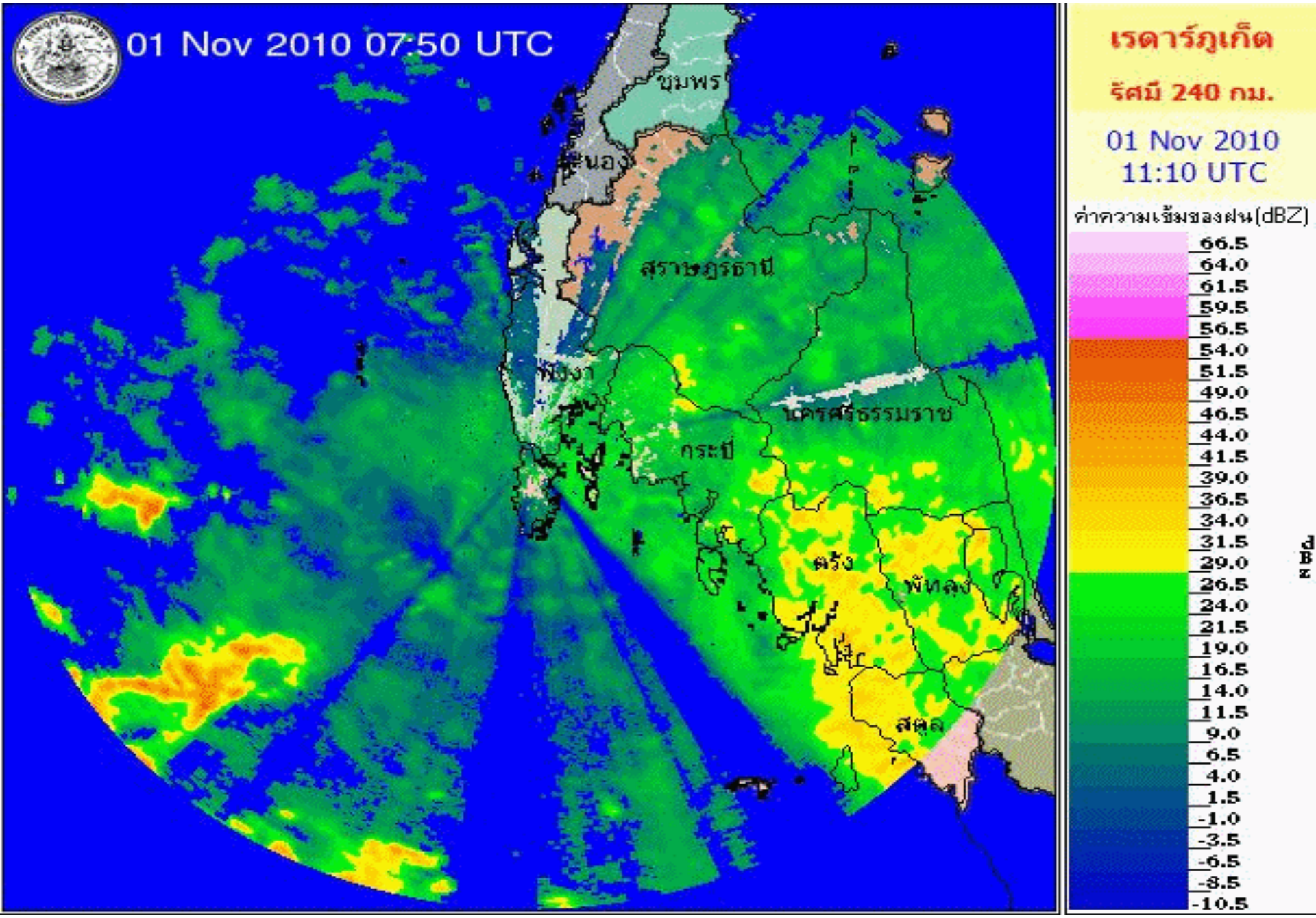
Weather Radar Imagery, Songkhla



Product Type: PPI Corrected Intensity Tilt: 0 Elevation: 0.3 Degs

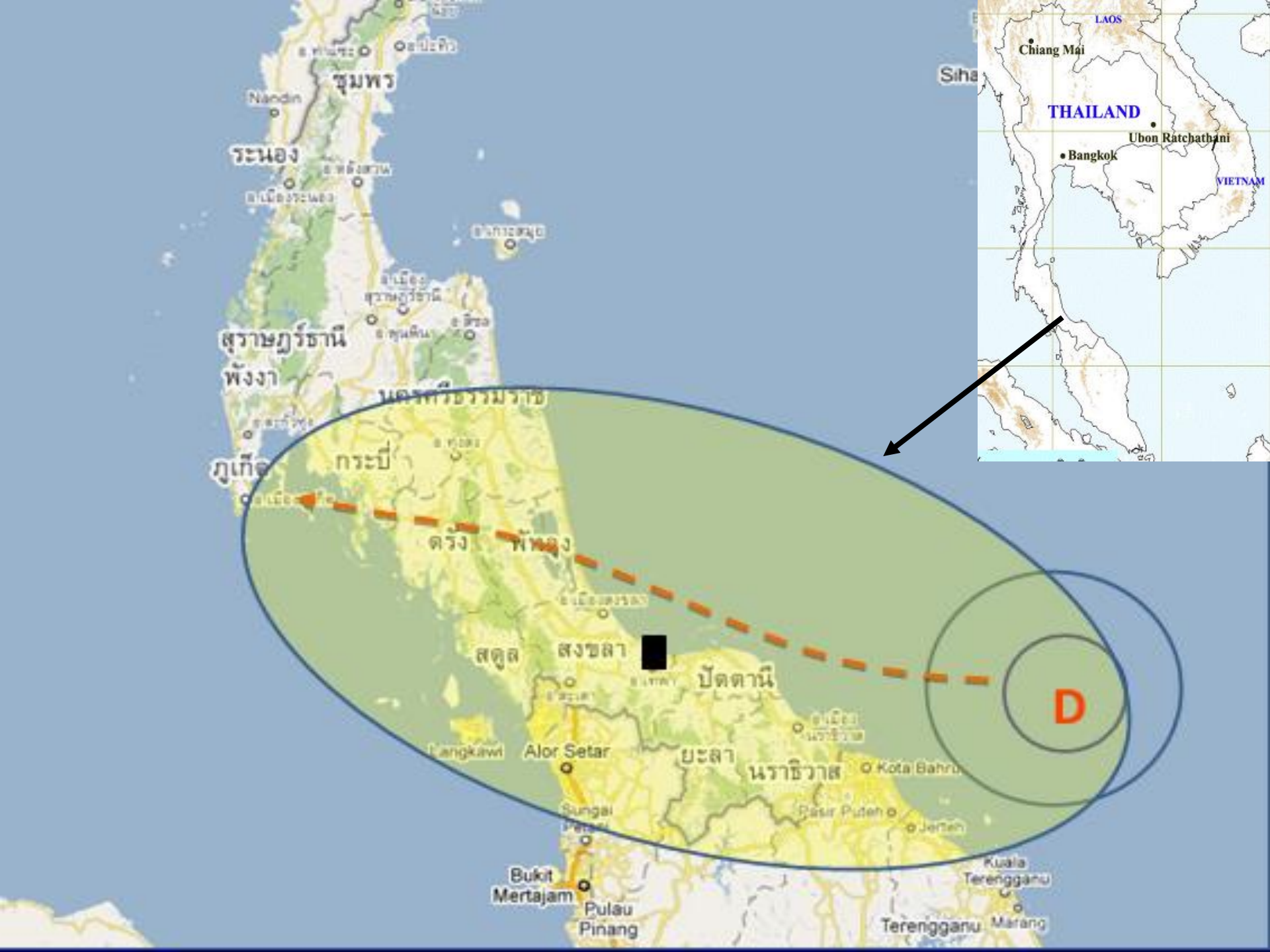
PRF: 250 Hz	Max Range: 240 km	Gates: 240
Gatewidth: 1000 m	Samples: 32	Unfolding: Off
Pulse Width: 2.0 us	Clutter Filter: 3	Range Normalization: On
Site Name: Sathingphra	Radar Type: DWSR-81C	Antenna Height ASL: 30 m

Weather Radar Imagery, Phuket

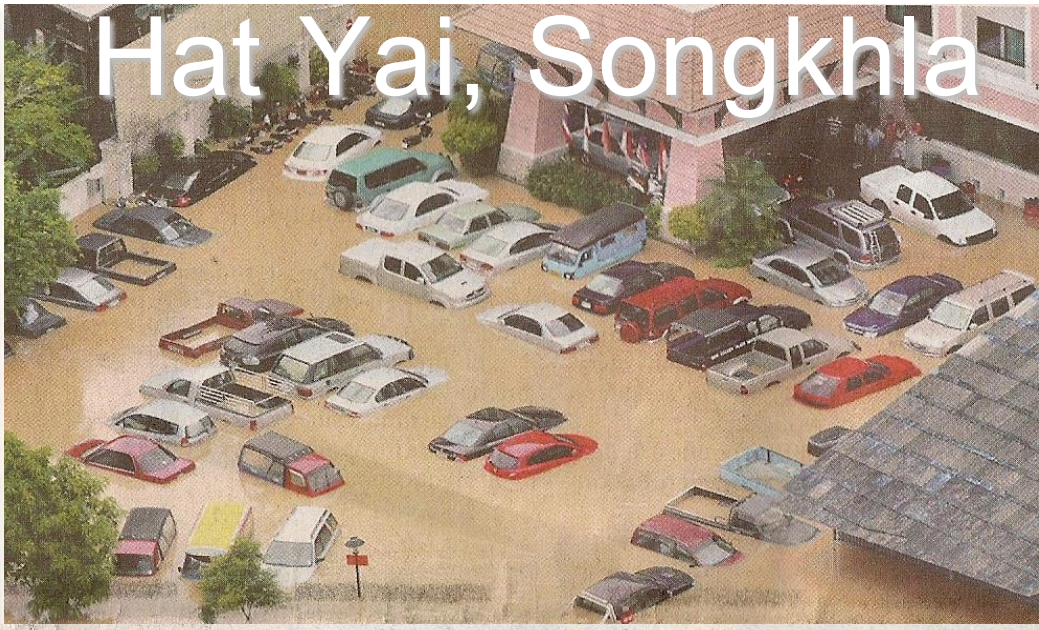


Deep depression

Cyclone JAL


LAOS
Chiang Mai
THAILAND
Ubon Ratchathani
Bangkok
VIETNAM
ชุมพร
ระนอง
สุราษฎร์ธานี
พังงา
นครศรีธรรมราช
ภูเก็ต
กระบี่
ตรัง
พัทลุง
สตูล
สงขลา
ปัตตานี
D
Langkawi
Alor Setar
ยะลา
นราธิวาส
Kota Bahru
Pasir Puteh
Jertih
Bukit Mertajam
Pulau Pinang
Kuala Terengganu
Terengganu
Marang

In 2010



Flood waters in tambon Khlong Hae of Hat Yai almost submerge the Saphan Dam road sign. WEERAWONG WONGPREEDEE


3 13:03

http://thailandwanderer.blogspot.com/2009/12/hatyai-great-flood-in-year-25432000.html

Research

- We set system for determine cyclogenesis
- Set domain
- Set every 3 days forecast and 4 times cycling for update.
- It’s not best track but for warning

System for determine cyclogenesis **Tracker**

- The tropical cyclone and active low pressure tracker system consists of a python group of functions based on the NCEP/EMC method:
  - Forecastools.py
  - Cyclone.py
  - Thaicyclones_op.py

- Different combination of variables and detection criteria were tested
- The parameters used by NCEP/EMC are indicated inside the functions

Determine Cyclogenesis Process

Thaicyclones_op.py

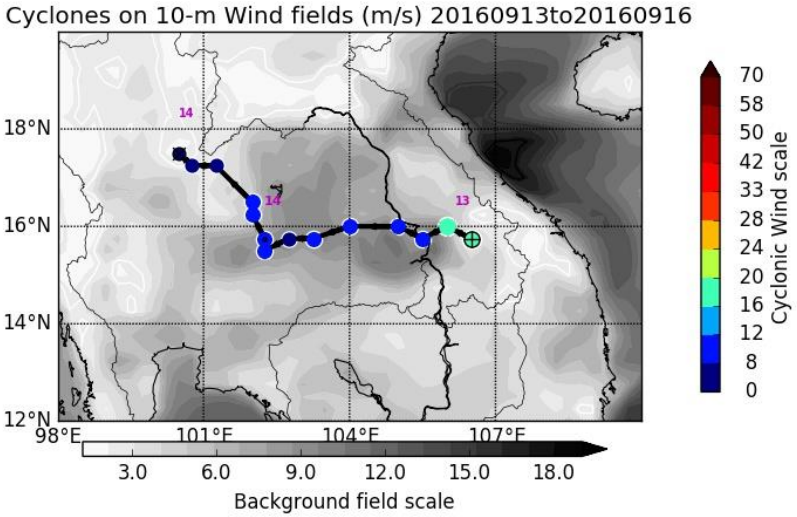
Python script

Program cyclone track

cyclone.py forecastools.py thaicyclones_op.py

Cyclone.py

-prmslmsl
-ugrdprs
-vgrdprs
-ugrd10m
-vgrd10m



Forecastools.py

- fetch NOAA forecast fields

WAVE

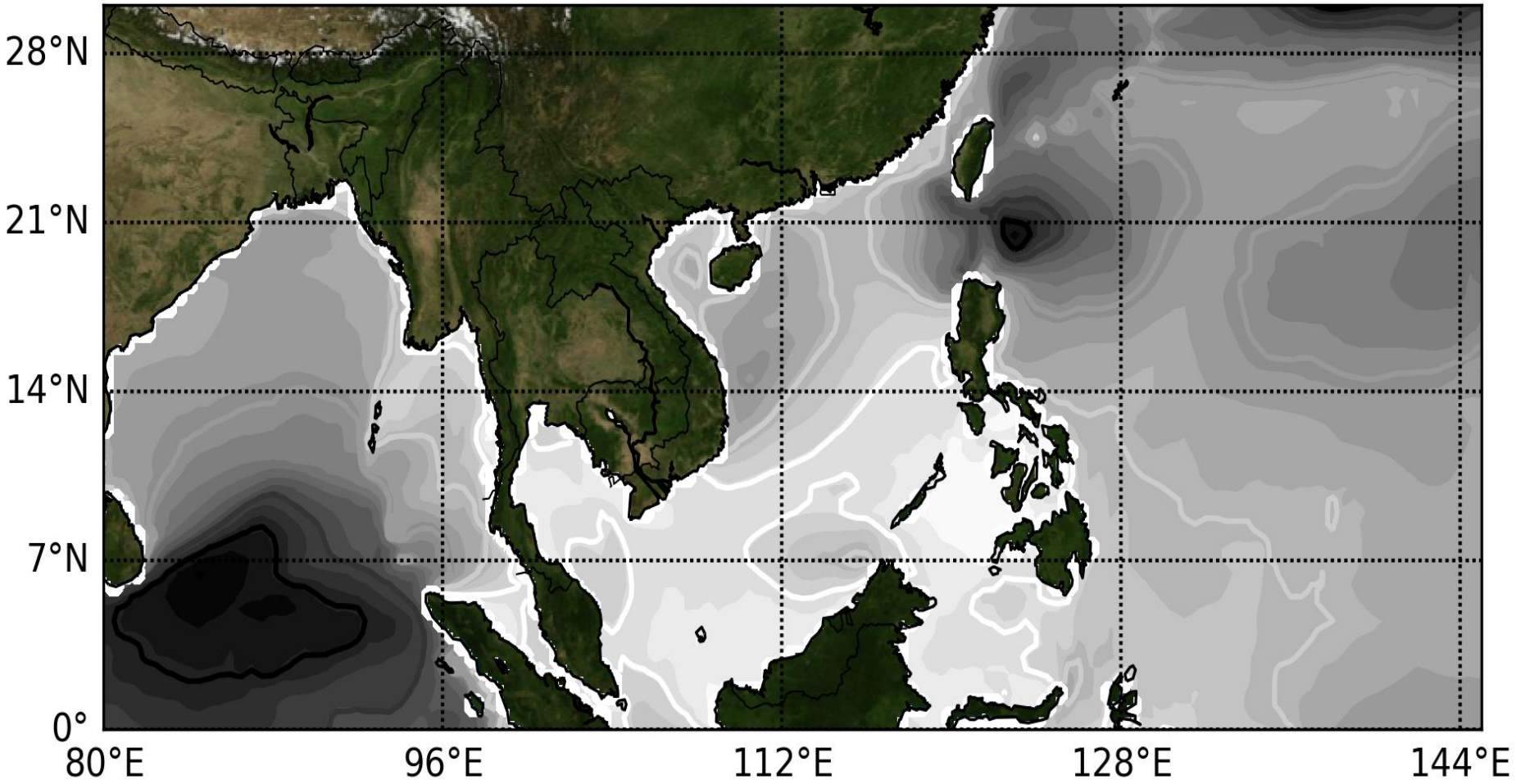
FNL

Wave and FNL 0.25 degree from GFS OpenDAP-alt data

3 days track forecasting

Update every 6 hours

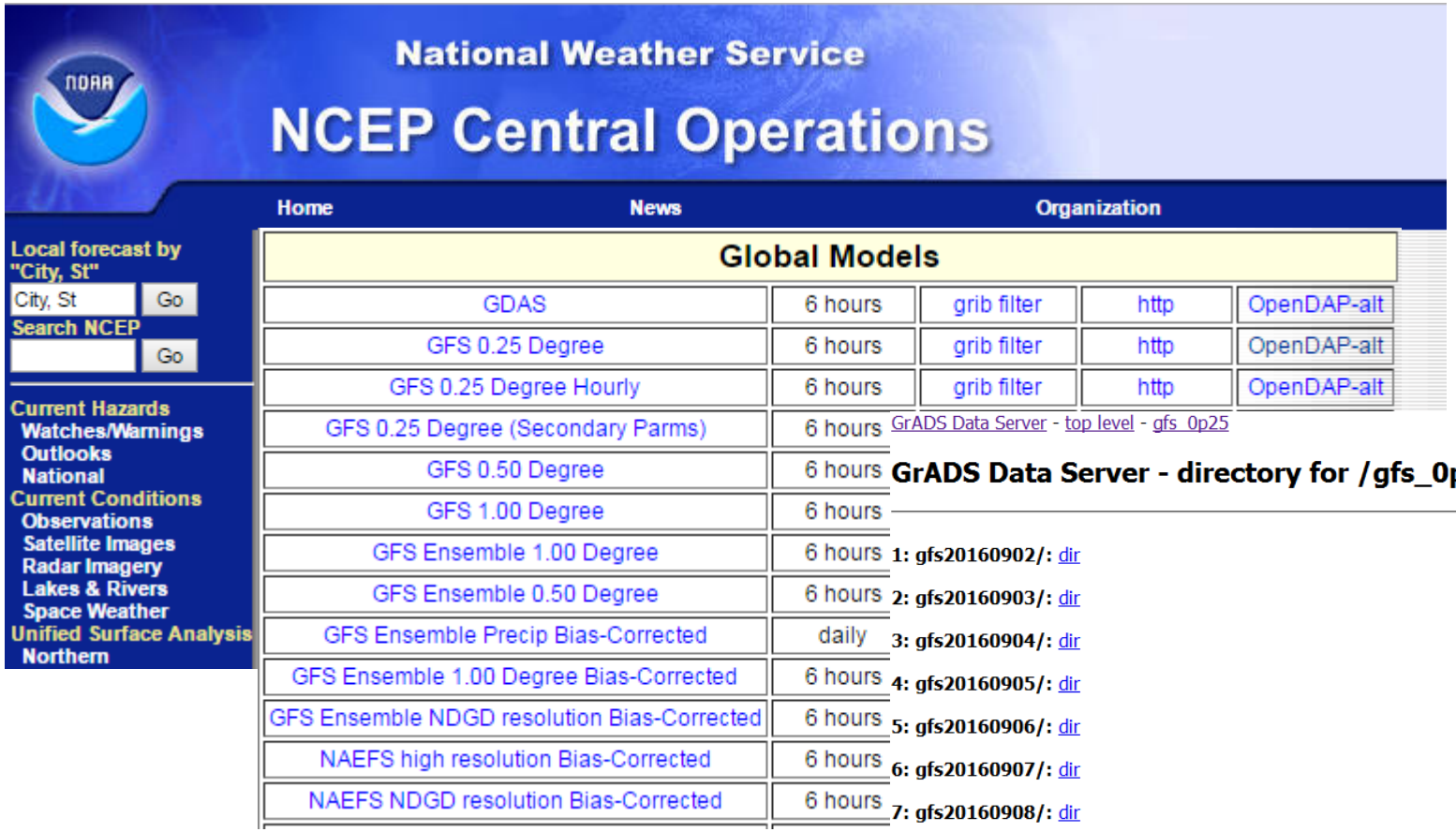
Domain setup



0 -30 N, 80-150 E

Input Data

Global Forecast System (GFS)



National Weather Service

NCEP Central Operations

Home | News | Organization

Local forecast by "City, St"
City, St Go
Search NCEP
Go

Current Hazards
Watches/Warnings
Outlooks
National
Current Conditions
Observations
Satellite Images
Radar Imagery
Lakes & Rivers
Space Weather
Unified Surface Analysis
Northern

Global Models				
GDAS	6 hours	grib filter	http	OpenDAP-alt
GFS 0.25 Degree	6 hours	grib filter	http	OpenDAP-alt
GFS 0.25 Degree Hourly	6 hours	grib filter	http	OpenDAP-alt
GFS 0.25 Degree (Secondary Parms)	6 hours			
GFS 0.50 Degree	6 hours			
GFS 1.00 Degree	6 hours			
GFS Ensemble 1.00 Degree	6 hours			
GFS Ensemble 0.50 Degree	6 hours			
GFS Ensemble Precip Bias-Corrected	daily			
GFS Ensemble 1.00 Degree Bias-Corrected	6 hours			
GFS Ensemble NDGD resolution Bias-Corrected	6 hours			
NAEFS high resolution Bias-Corrected	6 hours			
NAEFS NDGD resolution Bias-Corrected	6 hours			

GrADS Data Server - top level - gfs_0p25

GrADS Data Server - directory for /gfs_0p25 : 14 entries

1: gfs20160902/: dir
2: gfs20160903/: dir
3: gfs20160904/: dir
4: gfs20160905/: dir
5: gfs20160906/: dir
6: gfs20160907/: dir
7: gfs20160908/: dir
8: gfs20160909/: dir
9: gfs20160910/: dir
10: gfs20160911/: dir
11: gfs20160912/: dir
12: gfs20160913/: dir

http://nomads.ncep.noaa.gov:9090/dods/gfs_0p25/

http://nomads.ncep.noaa.gov:9090/dods/wave/

NCEP/EMC Cyclogenesis Tracking Page

2017082012
2017082006
2017082000
2017081918
2017081912
2017081906
2017081900
2017081818
2017081812
2017081806
2017081800
2017081718
2017081712
2017081706
2017081700
2017081618
2017081612
2017081606
2017081600
2017081518
2017081512
2017081506
2017081500
2017081418
2017081412
2017081406
2017081400
2017081318

NCEP/EMC Tracking of Cyclogenesis in Models

1. Purpose

The purpose of this site is to monitor the ability of various numerical weather prediction models to develop both extratropical and tropical cyclones. Initially, the site will contain track plots from various models, including the NCEP GFS, NCEP Eta, NCEP global ensemble, NCEP short range ensemble (SREF), UKMET and NOGAPS models. The plan is to eventually include performance and verification statistics as well.

2. Determination of tracks

All tracks included on this site are derived from GRIB files operationally available within NCEP and are determined using the operational NCEP cyclone tracking software.

Briefly, for tropical cyclones, 7 parameters are tracked, including the relative vorticity maximum, geopotential height minimum and wind speed minimum at both 850 and 700 hPa, as well as the minimum in sea level pressure. These 7 parameters are averaged together to provide an average position fix at each forecast hour.

Since extratropical cyclones are generally not nearly as vertically coherent as their tropical counterparts, using parameters from 3 different levels of the atmosphere would muddy the tracking picture. Therefore, when tracking is done specifically for extratropical cyclones, only mslp is tracked. In order to avoid tracking weak, transient disturbances (either real or artifacts of model noise), 2 constraints have been added to the tracking criteria in order for a found disturbance to be reported as being a tracked storm: (1) the storm must live for at least 24 hours within a forecast, and (2) the storm must maintain a closed mslp contour, using a 2 mb contour interval.

http://www.emc.ncep.noaa.gov/gmb/tpm/emchurr/tcgen/

“HOW THE NCEP TROPICAL CYCLONE TRACKER WORKS”

P1.13

HOW THE NCEP TROPICAL CYCLONE TRACKER WORKS

Timothy P. Marchok
SAIC at NCEP/GFDL
Geophysical Fluid Dynamics Laboratory, Princeton, New Jersey

1. INTRODUCTION

The Environmental Modeling Center (EMC) at the National Centers for Environmental Prediction (NCEP) runs a daily suite of global and regional models and has the responsibility of providing tropical cyclone guidance based on these model forecasts to the Tropical Prediction Center (TPC) on an operational basis. In 1998, a new tropical cyclone tracking system for extracting track and intensity forecast information from these forecasts was implemented at NCEP. The purpose of this paper is to describe this new tracking system, including its core algorithm and other related features.

2. DATA REQUIREMENTS

The tracker processes data that are in GRIB format

restricted area smaller than that of the original analysis and centered on the position obtained from each previous analysis, with each successive analysis done on a grid with half the grid-spacing of the previous iteration. In this way, for example, the position for a storm from a model dataset with 1-degree resolution can be refined to within 1/16 of a degree.

This method is used for the 5 primary parameters, but for the minima in wind speed at 700 and 850 mb, a smaller area within 120 km of the center guess position is first interpolated to a fine mesh and then a Barnes analysis is done on that smaller grid. The reason the larger area is not searched in this case is to avoid the mistake of identifying a calm area well outside the storm as the calm area near the center of the storm. The cen-

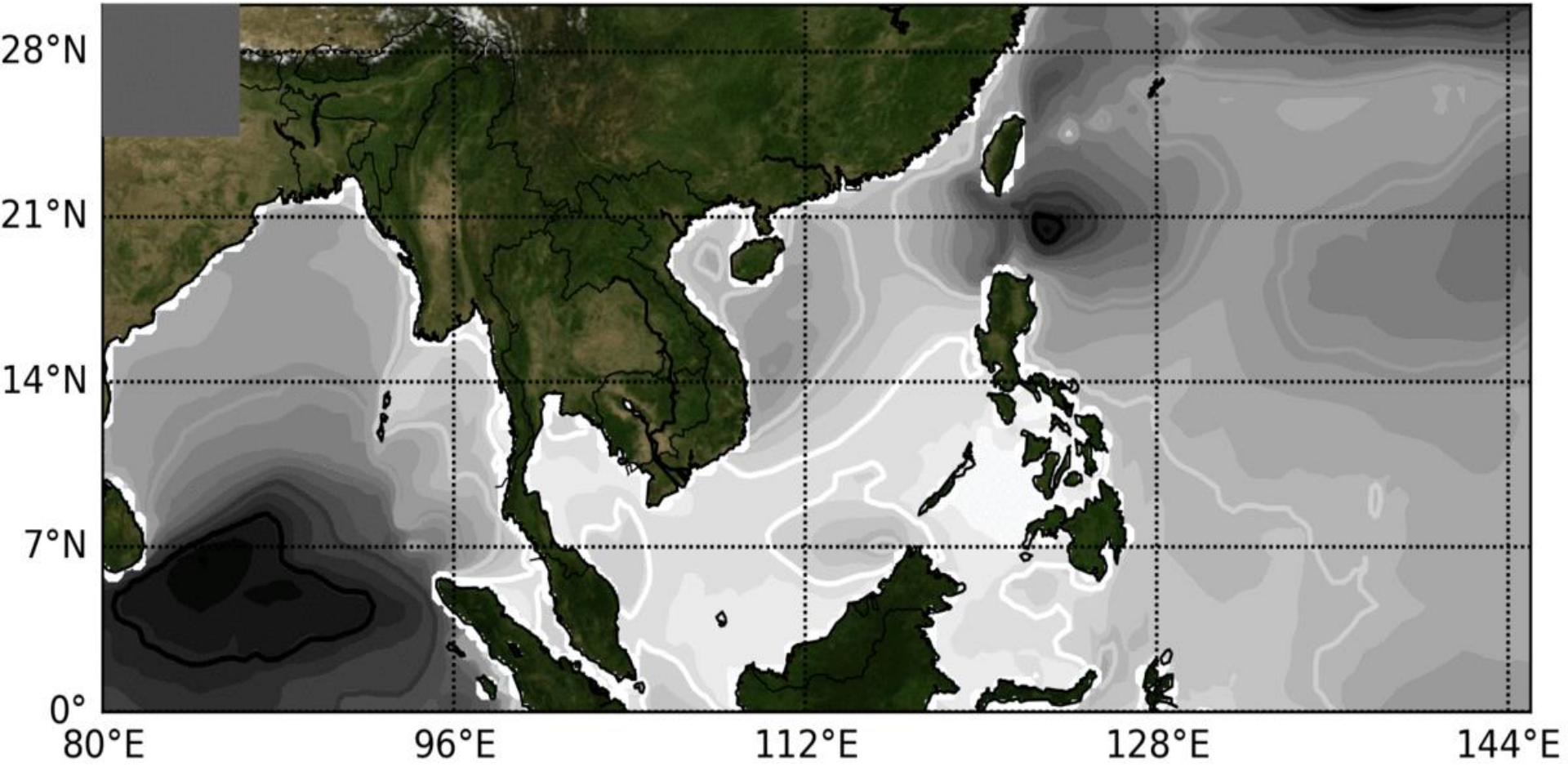
Tracker Design: Multiple Variables

- A weighted average of the positions of several low-level variables is used.
- 6 Primary parameters:
  - 850 mb vorticity
  - 700 mb vorticity
  - Surface (10 m) vorticity
  - 850 mb gp height
  - 700 mb gp height
  - Mean Sea-Level Pressure
- 3 Secondary parameters:
  - 850 mb minimum in wind speed
  - 700 mb minimum in wind speed
  - Surface (10 m) minimum in wind speed

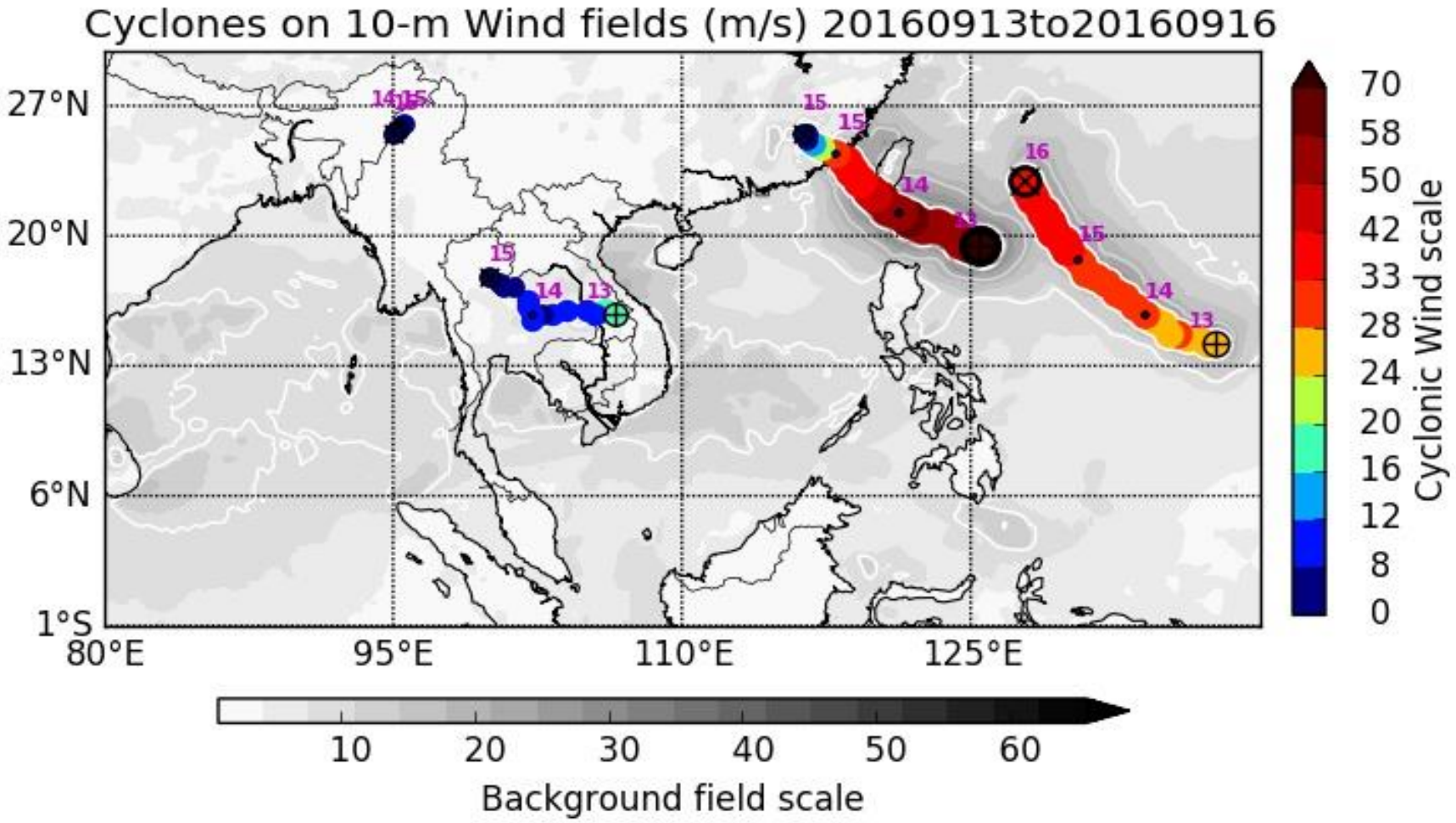
-prmslmsl
-ugrdprs
-vgrdprs
-ugrd10m
-vgrd10m

A python program was built to operationally download NOAA forecast and find and track cyclones

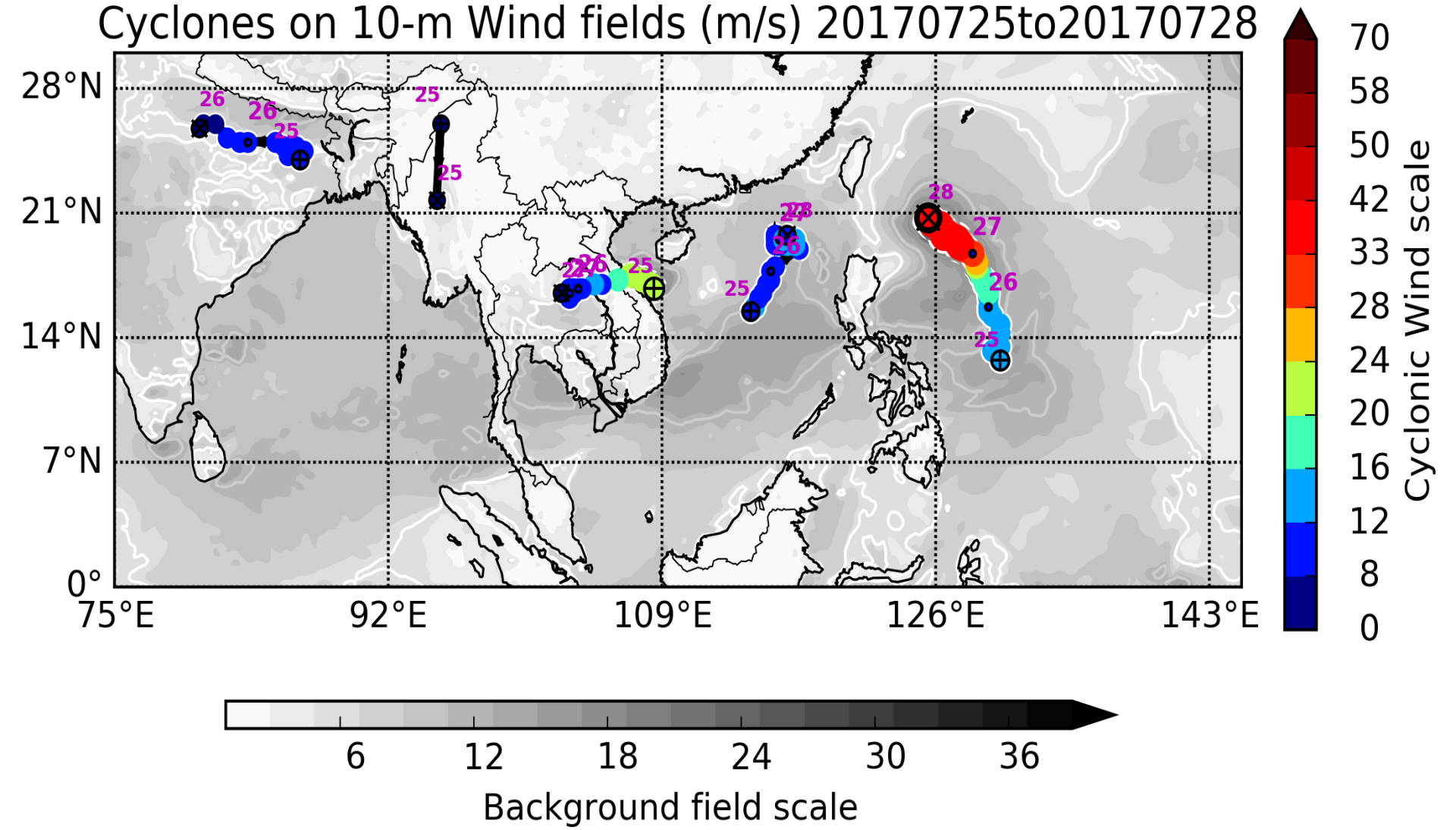
sw is defined as the size (km) of the sub-grid that runs the entire grid/fields searching for cyclones.



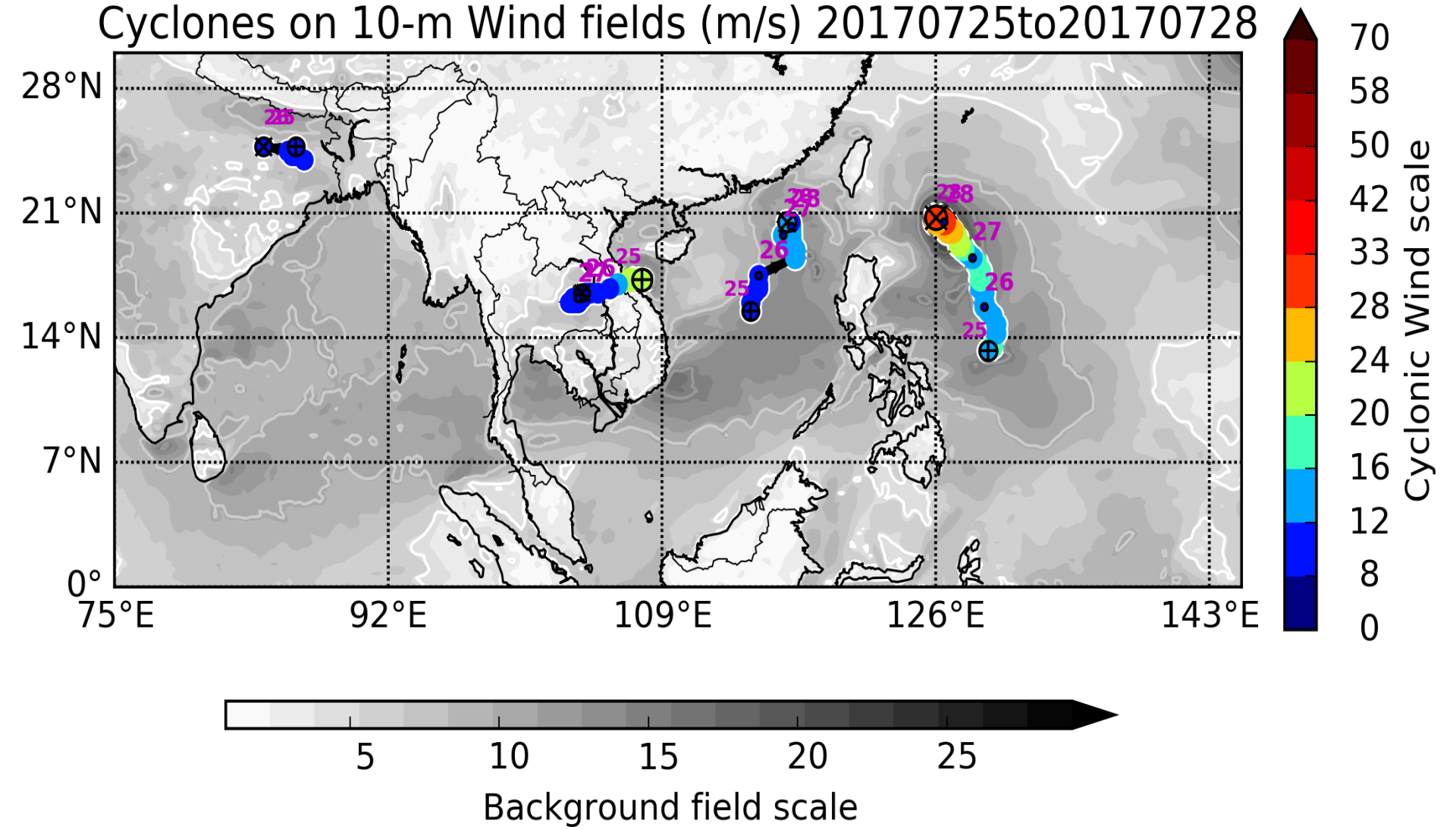
Monitor tropical cyclone and active low pressure tracker in 3 days forecast



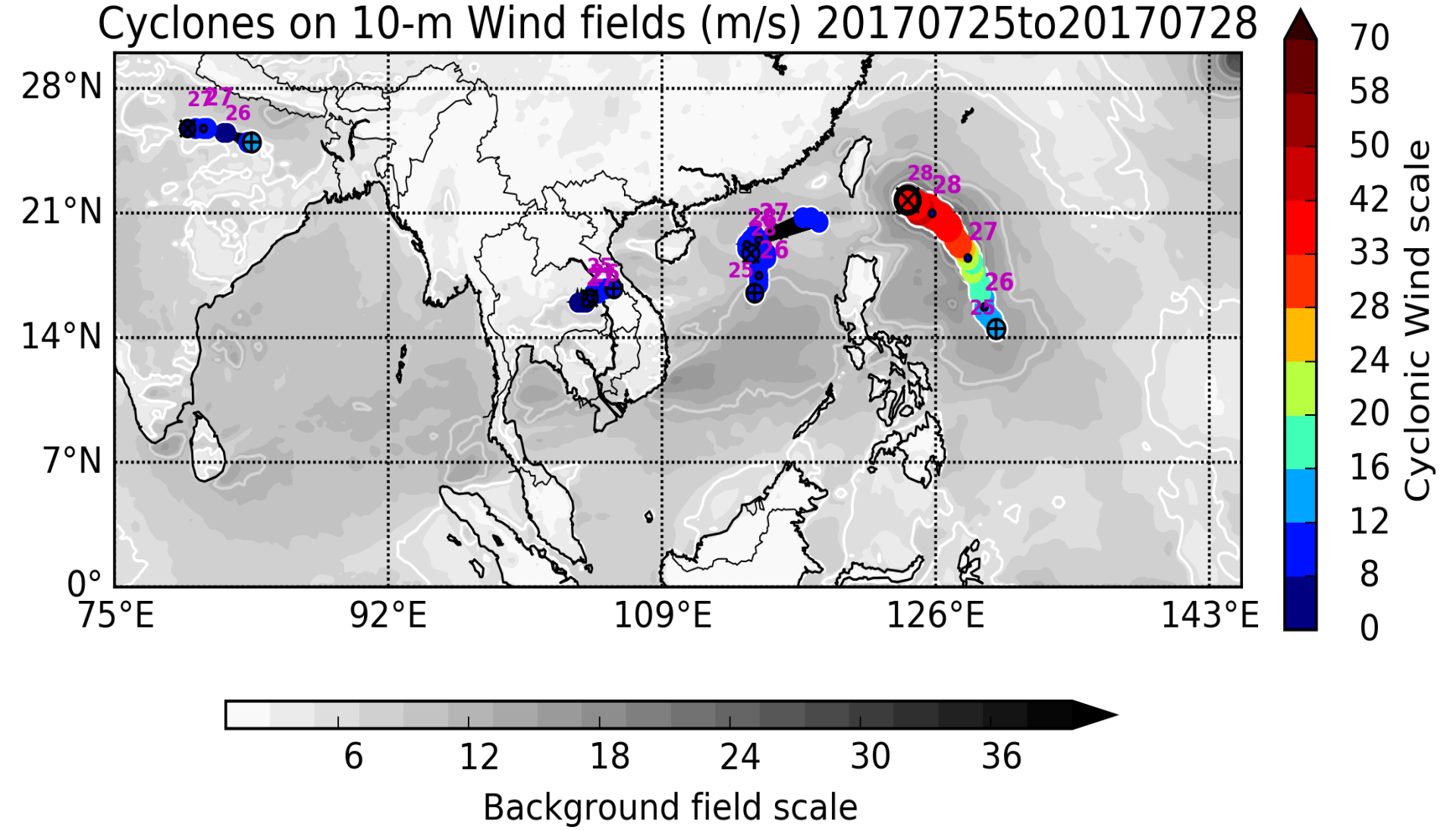
SONCA 25-07-2017 initial 00 UTC



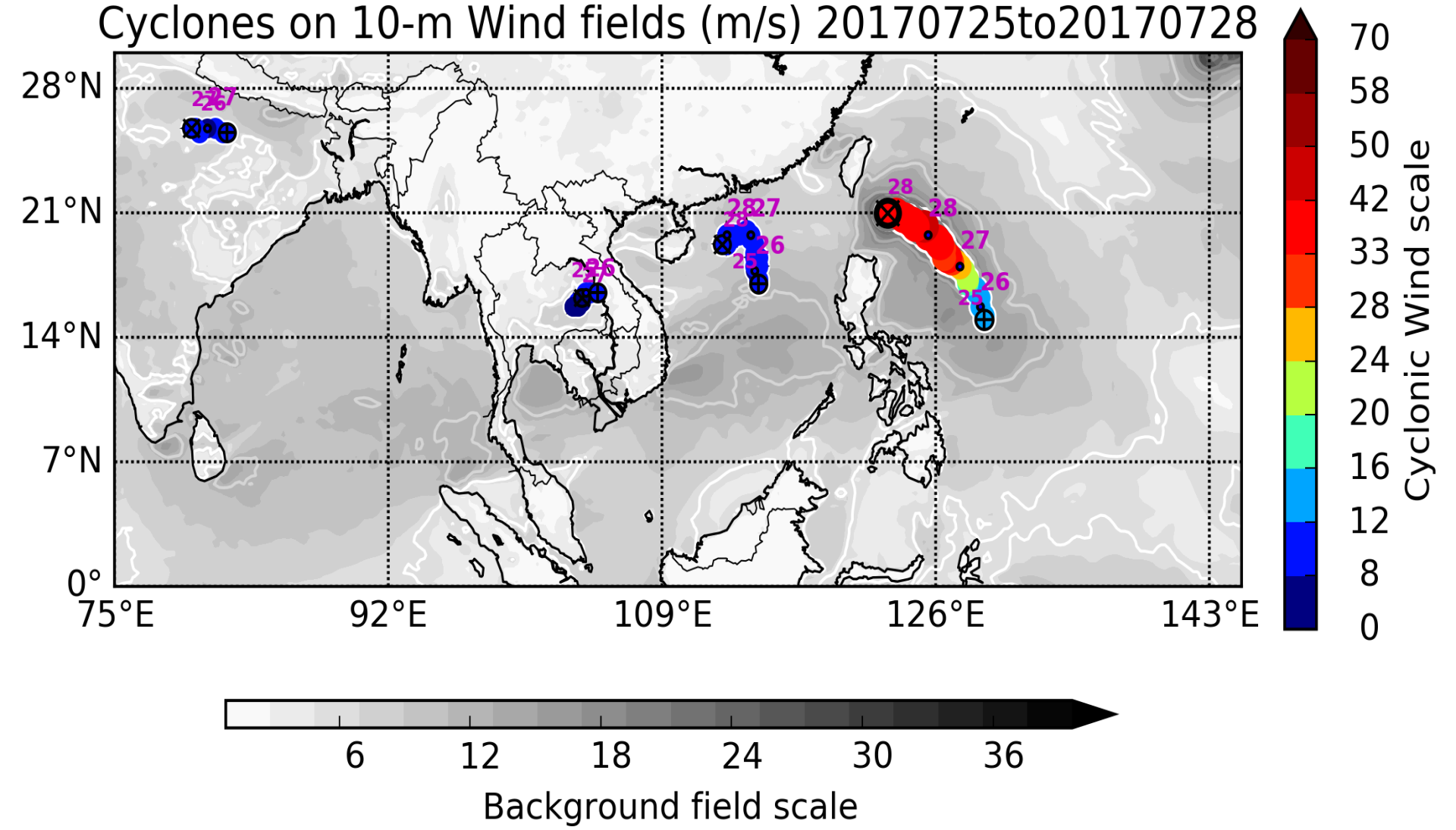
SONCA 25-07-2017 initial 06 UTC



SONCA 25-07-2017 initial 12 UTC

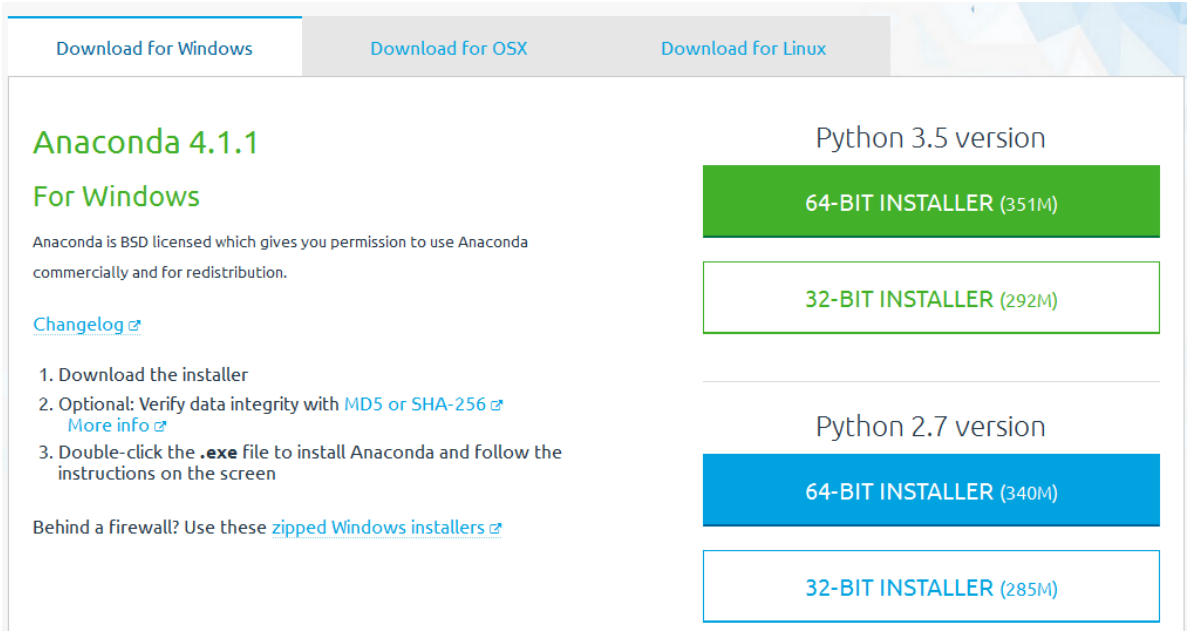


SONCA 25-07-2017 initial 18 UTC



Python script files

Example Python script




```
import pylab
from pylab import *
from netCDF4 import Dataset
import time
import forecastools
import cyclone
# forecastools.list()
# NetCDF with variables
fnameinput='AtmNOAA_2016060300.nc'

# Reading Old NetCDF File ---------------------------
ncfile = Dataset(fnameinput)

lat = ncfile.variables['latitude'][:]
lon = ncfile.variables['longitude'][:]
ntime = ncfile.variables['time'][:]
# import time; time.gmtime(ntime[0])

ugrd10m = ncfile.variables['nugrd10m'][:,:,:]
vgrd10m = ncfile.variables['nvgrd10m'][:,:,:]
prmslmsl = ncfile.variables['nprmslmsl'][:,:,:]

ugrdprs = np.zeros((ncfile.variables['nugrdprs850'].shape[0],2,ncfile.
```

Case Study

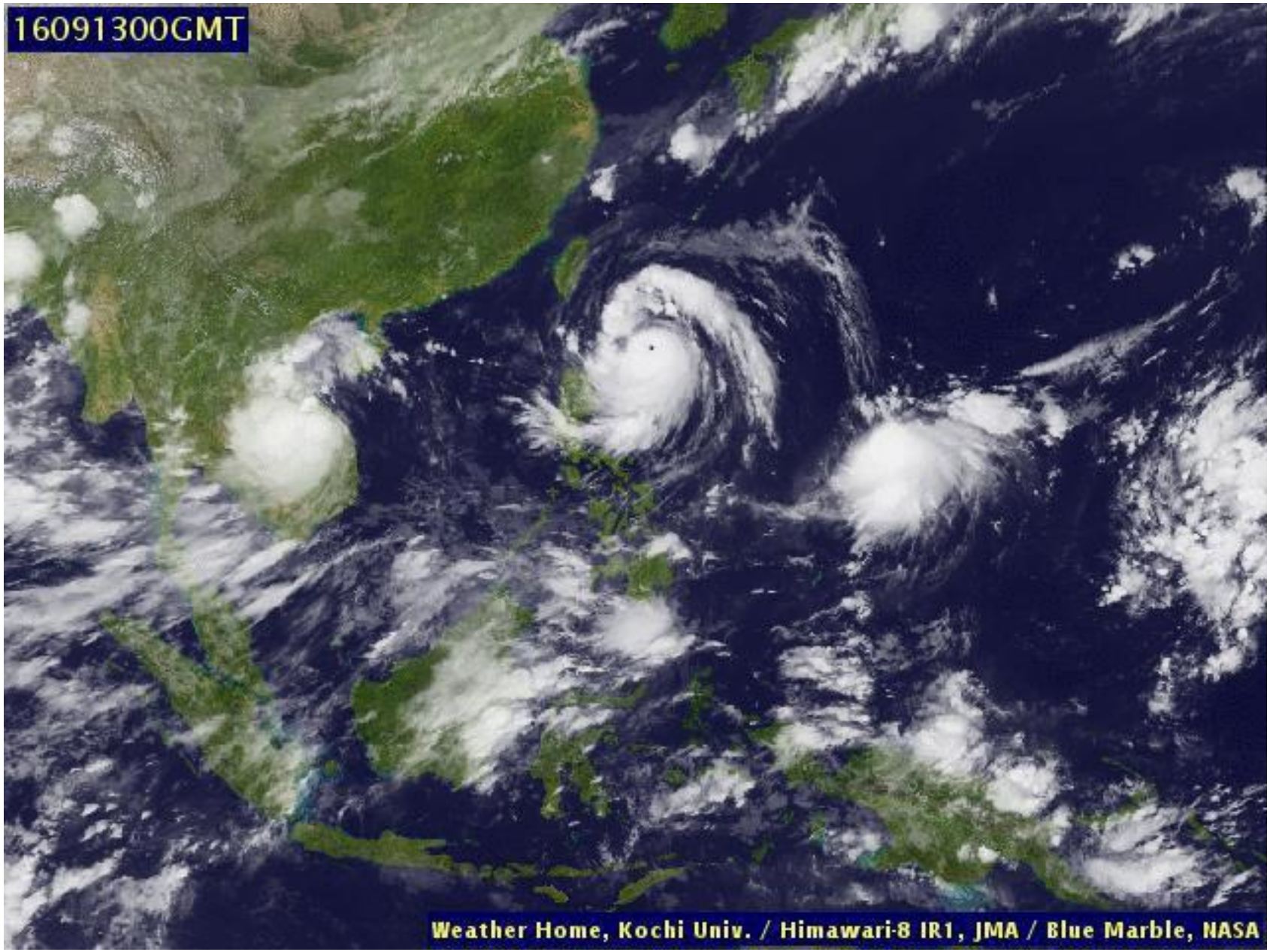
- 2016-2017 affect to Thailand
  - Mirinae (25 -28 July 1026)
  - DIANMU (22 -23 August 2016)
  - RAI (09 -14 September 2016)
  - Active Low (25-30 October2016)
  - Active Low (05-10 January 2017)
  - talus(14-17 July 2017)
  - sonca (20-29 July 2017)

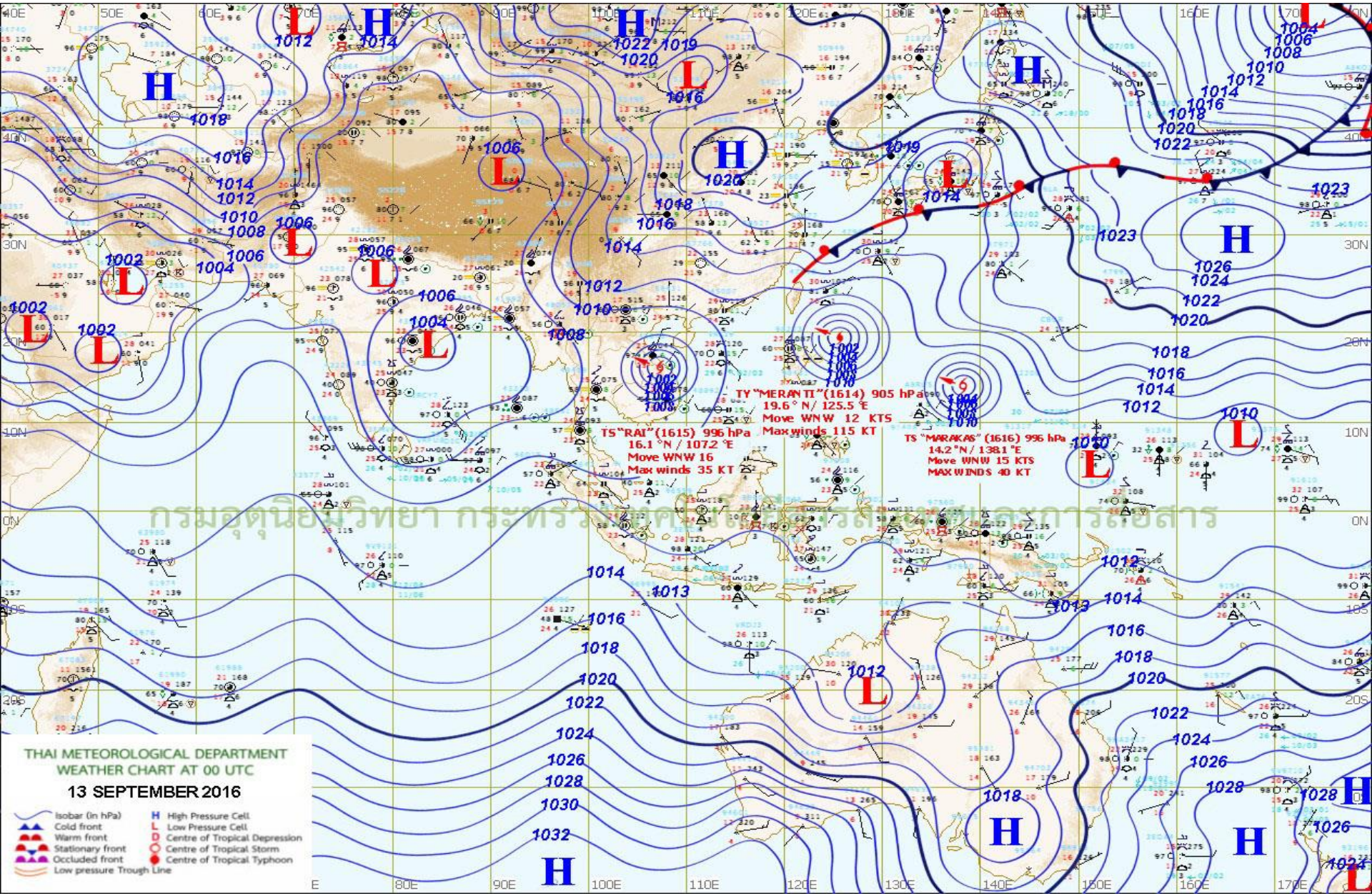
1. Tropical storm Mirinae

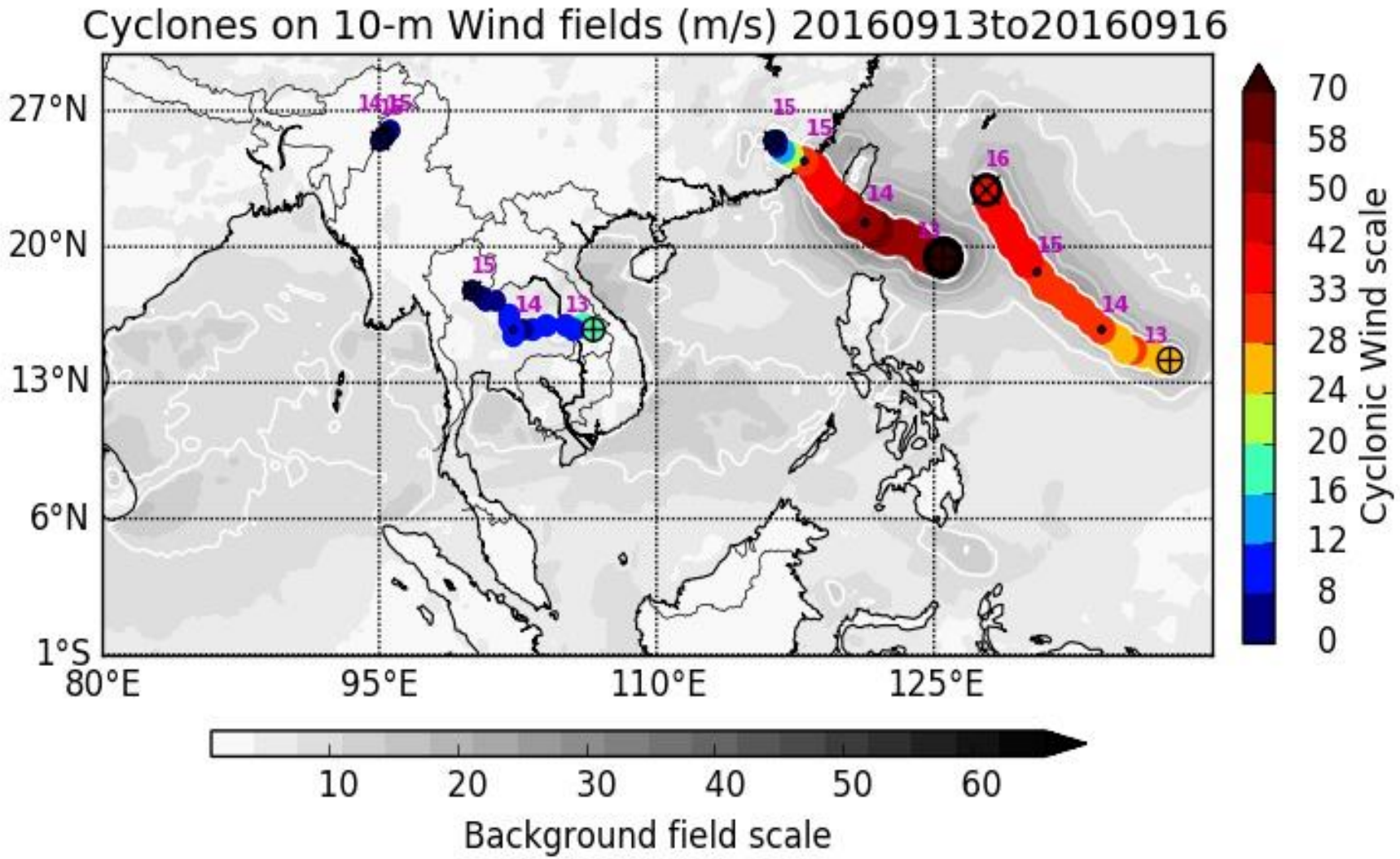
- 25-28 July 2016

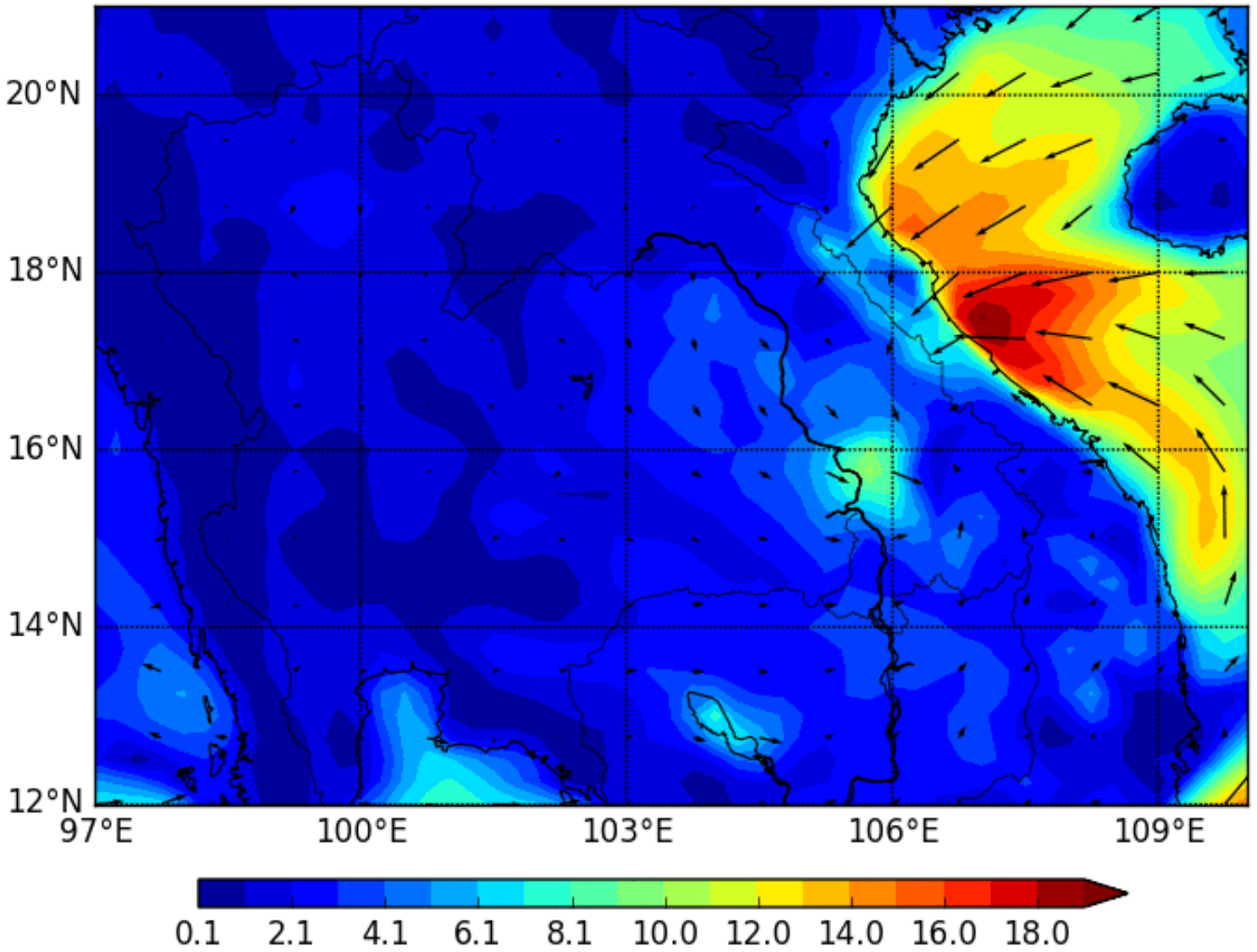
3. **Tropical storm RAI**

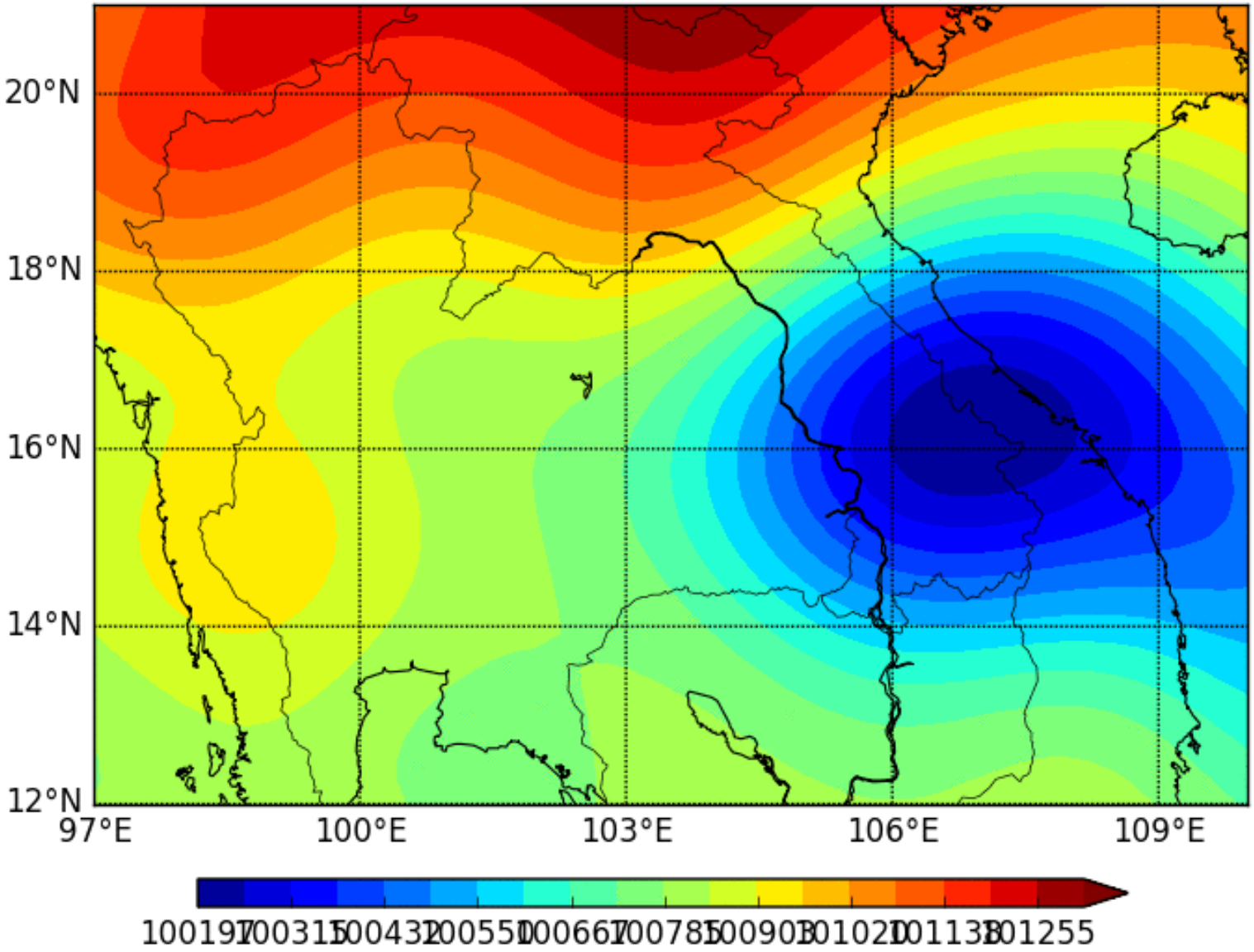
09 -14 September 2016


16091300GMT
Weather Home, Kochi Univ. / Himawari-8 IR1, JMA / Blue Marble, NASA

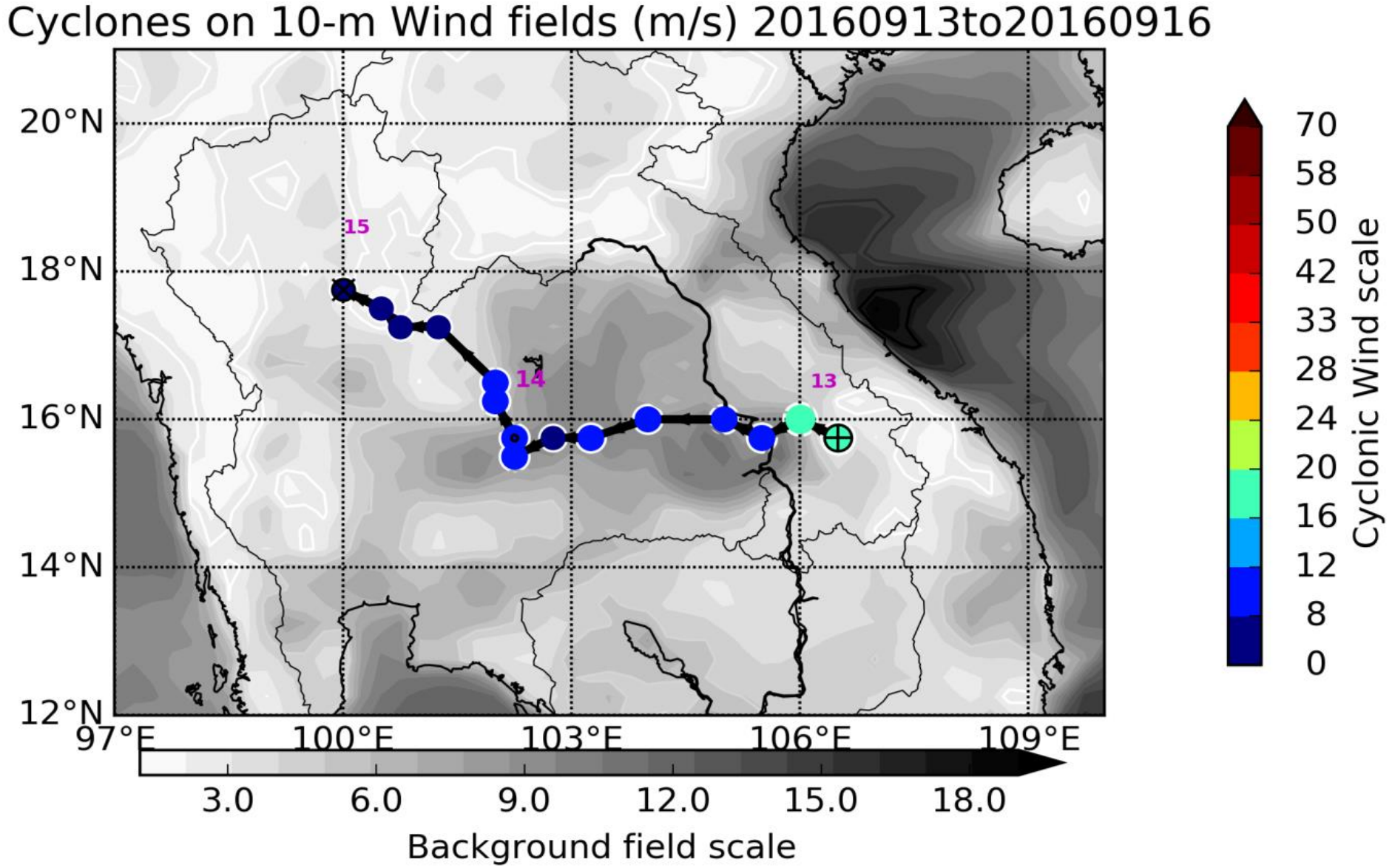



Cyclones on 10-m Wind fields (m/s) 20160913to20160916
27°N
20°N
13°N
6°N
1°S
80°E
95°E
110°E
125°E
Cyclonic Wind scale
70
58
50
42
33
28
24
20
16
12
8
0
10
20
30
40
50
60
Background field scale

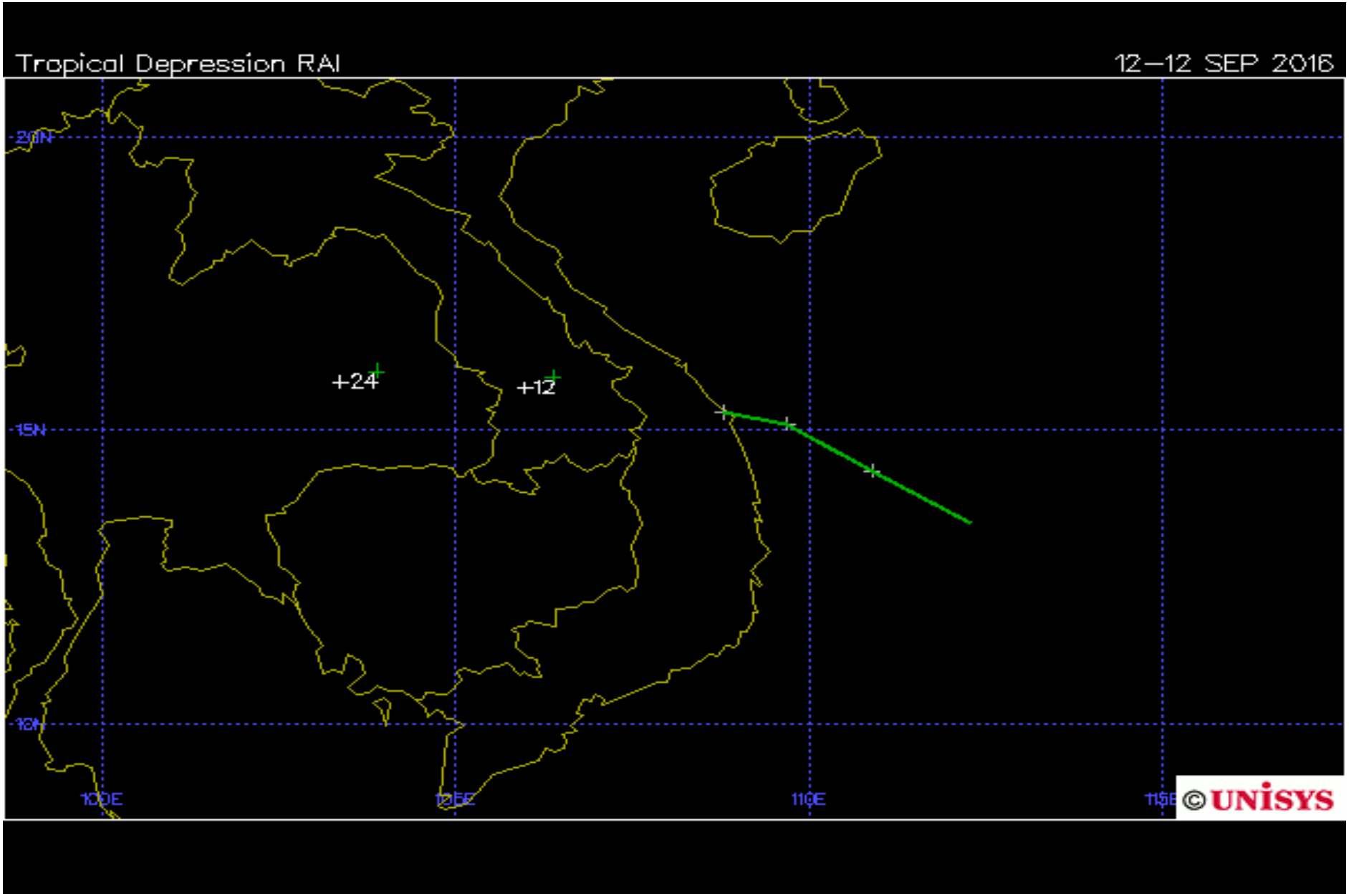

20°N
18°N
16°N
14°N
12°N
97°E
100°E
103°E
106°E
109°E
0.1
2.1
4.1
6.1
8.1
10.0
12.0
14.0
16.0
18.0


20°N
18°N
16°N
14°N
12°N
97°E
100°E
103°E
106°E
109°E
100197
700315
500432
200551
100667
700785
500903
301021
101138
301255


20°N
18°N
16°N
14°N
12°N
97°E
100°E
103°E
106°E
109°E

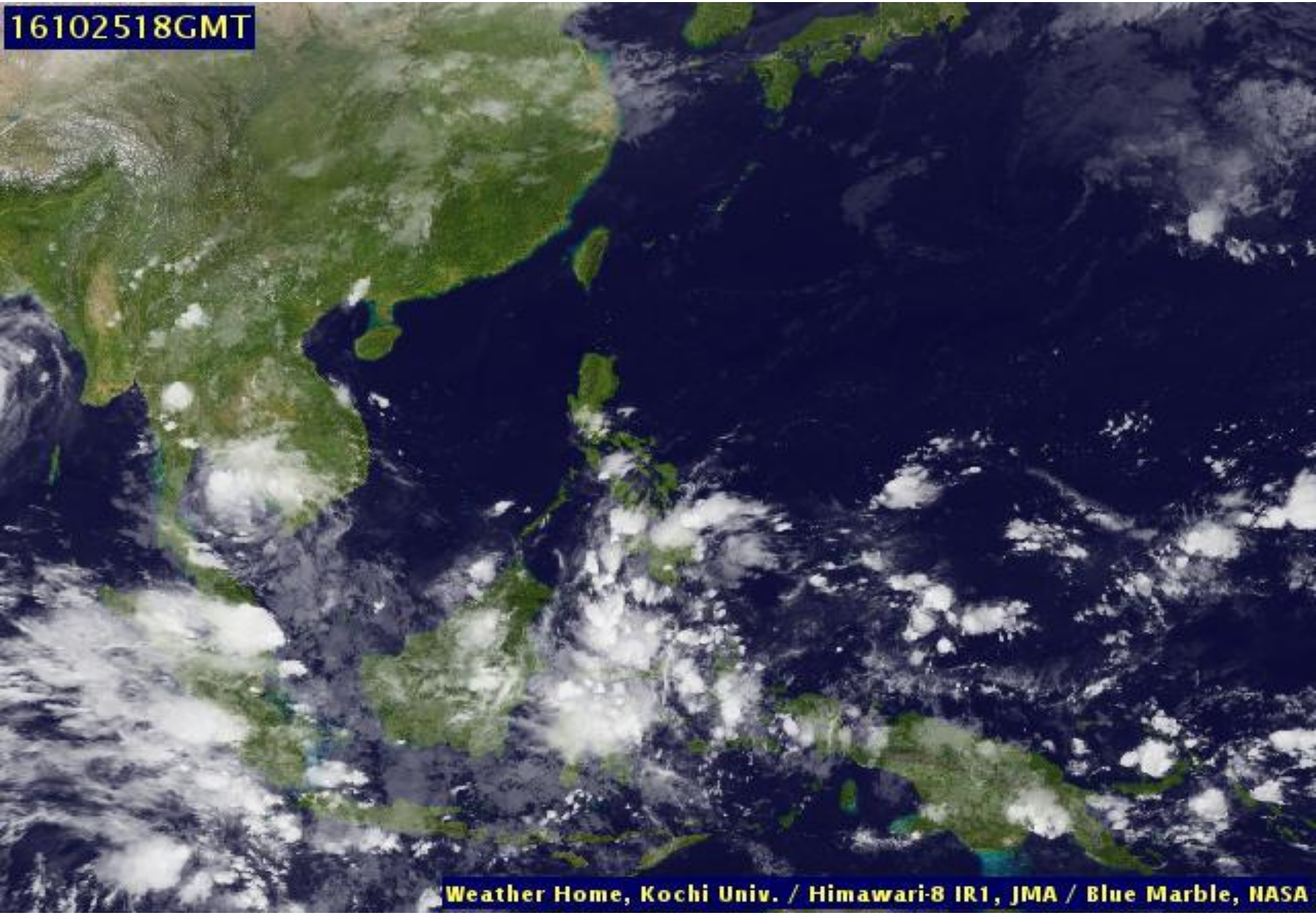

Cyclones on 10-m Wind fields (m/s) 20160913to20160916
20°N
18°N
16°N
14°N
12°N
97°E
100°E
103°E
106°E
109°E
15
14
13
3.0
6.0
9.0
12.0
15.0
18.0
Background field scale
70
58
50
42
33
28
24
20
16
12
8
0
Cyclonic Wind scale

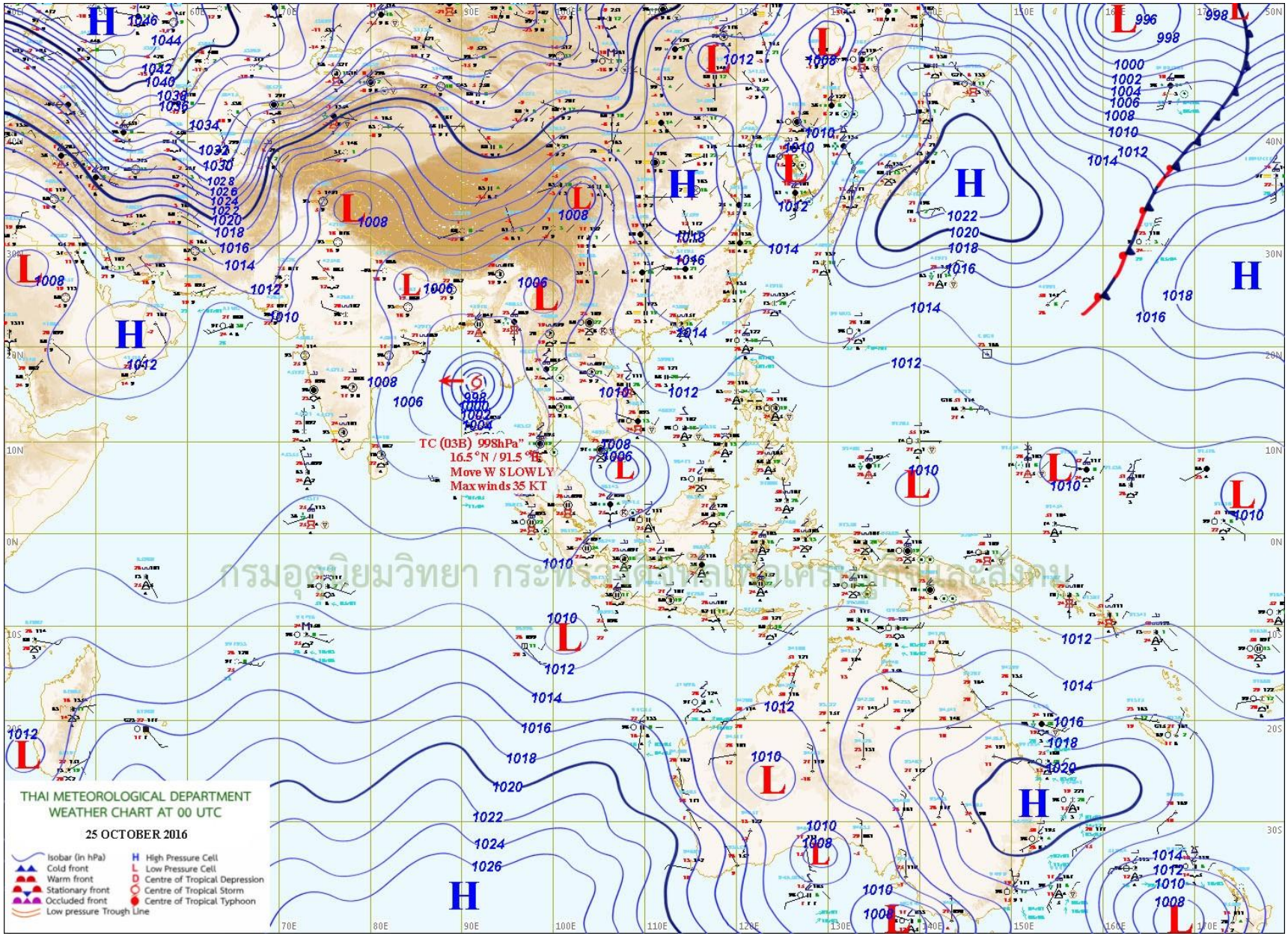
DAY,	HOUR,	MINUTE,	Lat,	Lon,	minWind(m/s),	maxWind(m/s),	meanWind(m/s),	minPressure(mb)
13.00	0.00	0.00	15.75	106.50	0.64	17.88	4.47	1001.97
13.00	3.00	0.00	16.00	106.00	1.28	16.02	5.02	1003.06
13.00	6.00	0.00	15.75	105.50	1.04	11.35	5.21	1002.43
13.00	9.00	0.00	16.00	105.00	1.40	9.75	5.47	1001.63
13.00	12.00	0.00	16.00	104.00	0.83	8.90	6.21	1002.78
13.00	15.00	0.00	15.75	103.25	1.32	9.37	5.61	1004.86
13.00	18.00	0.00	15.75	102.75	1.61	7.89	5.34	1004.65
13.00	21.00	0.00	15.50	102.25	1.73	8.34	4.90	1003.44
14.00	0.00	0.00	15.75	102.25	1.74	9.65	5.15	1004.72
14.00	3.00	0.00	16.25	102.00	1.42	9.29	5.46	1006.74
14.00	6.00	0.00	16.50	102.00	0.53	8.17	4.91	1006.32
14.00	12.00	0.00	17.25	101.25	0.23	4.86	2.12	1005.72
14.00	15.00	0.00	17.25	100.75	0.10	2.83	1.47	1008.15
14.00	18.00	0.00	17.50	100.50	0.10	2.72	1.27	1007.68
15.00	0.00	0.00	17.75	100.00	0.07	2.28	0.99	1007.67

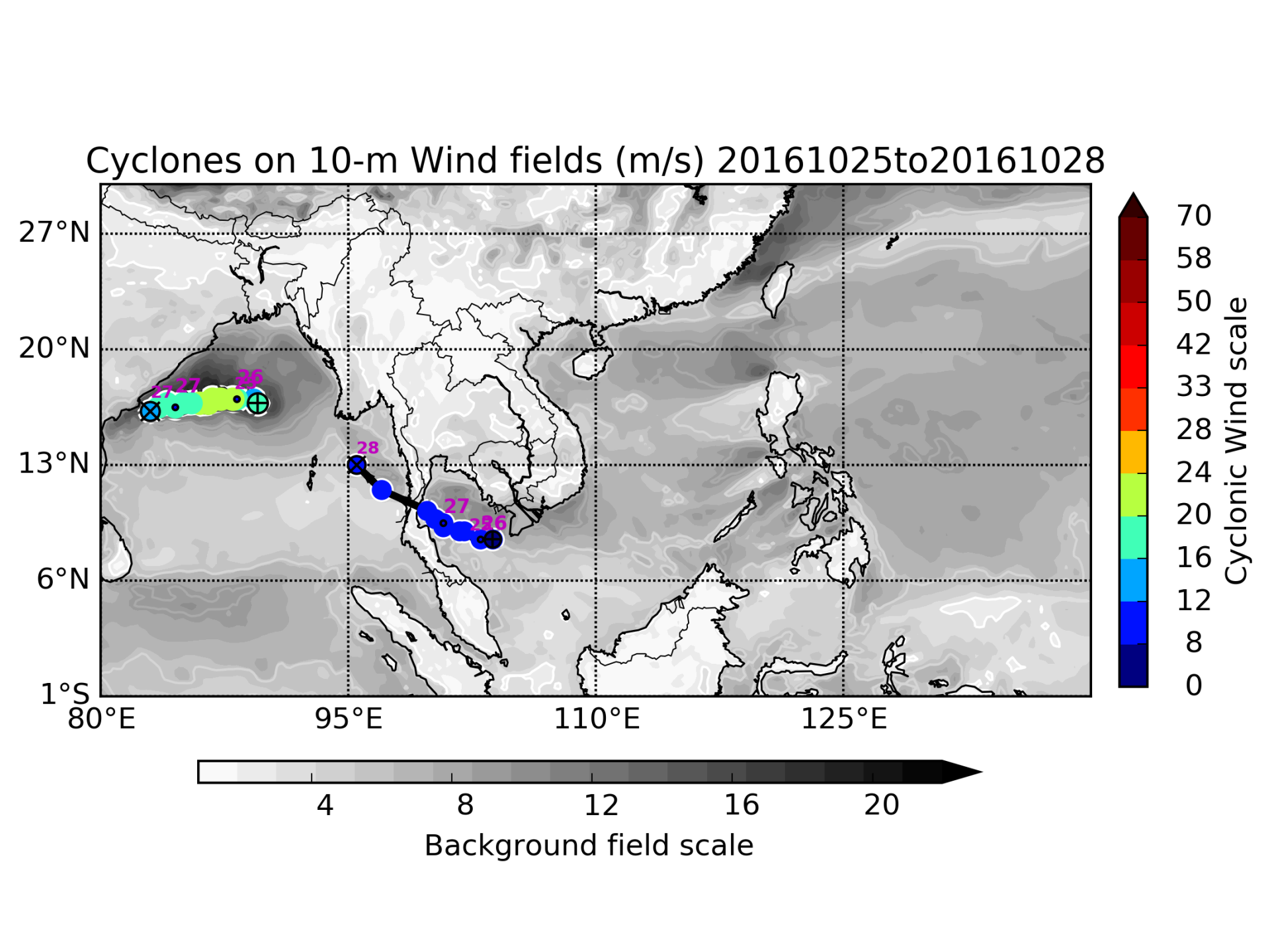

Tropical Depression RAI
12-12 SEP 2016
20N
15N
12N
+24
+12
100E
105E
110E
115E
©UNISYS

4.Active Low

25-30 October2016


16102518GMT
Weather Home, Kochi Univ. / Himawari-8 IR1, JMA / Blue Marble, NASA

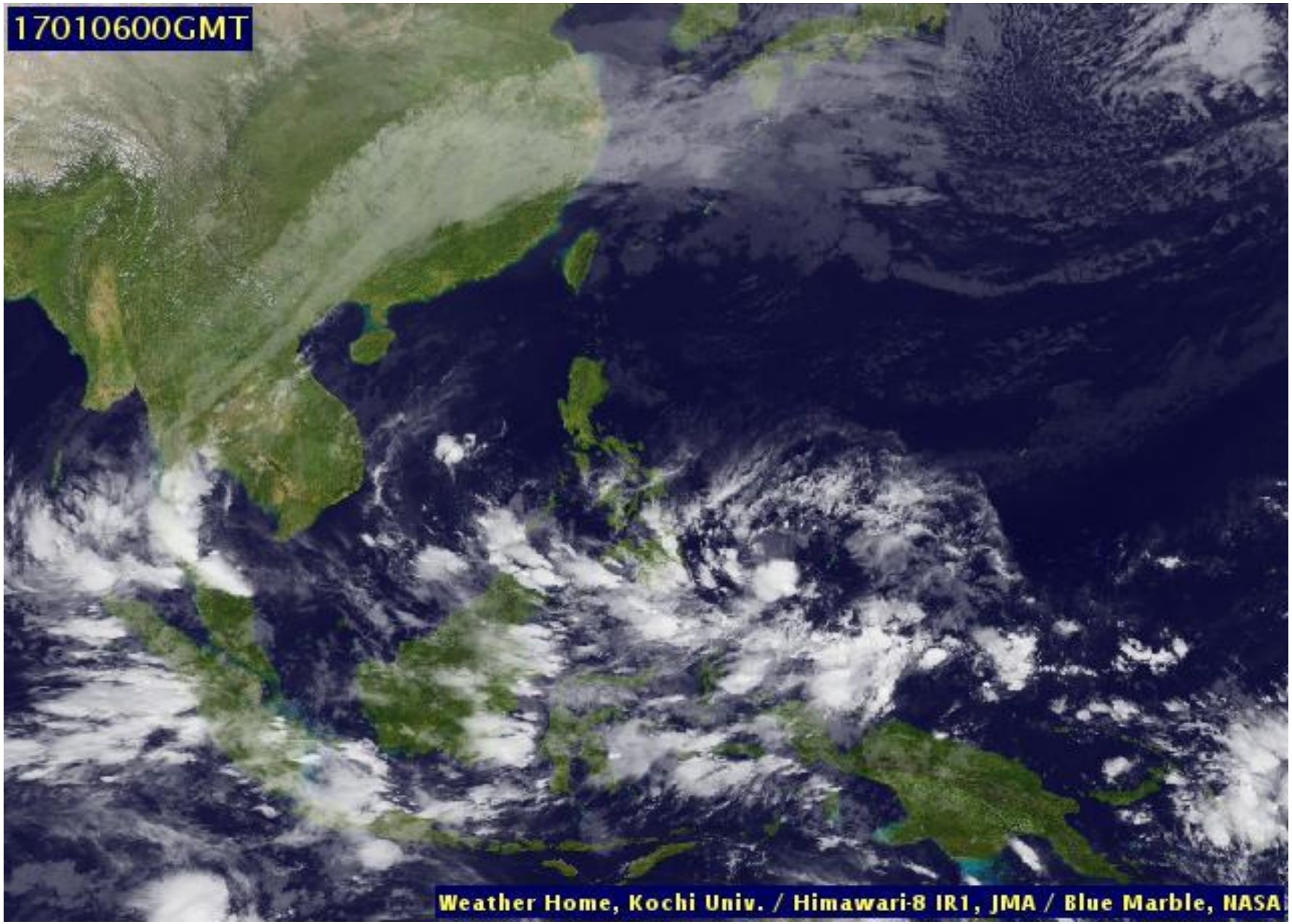


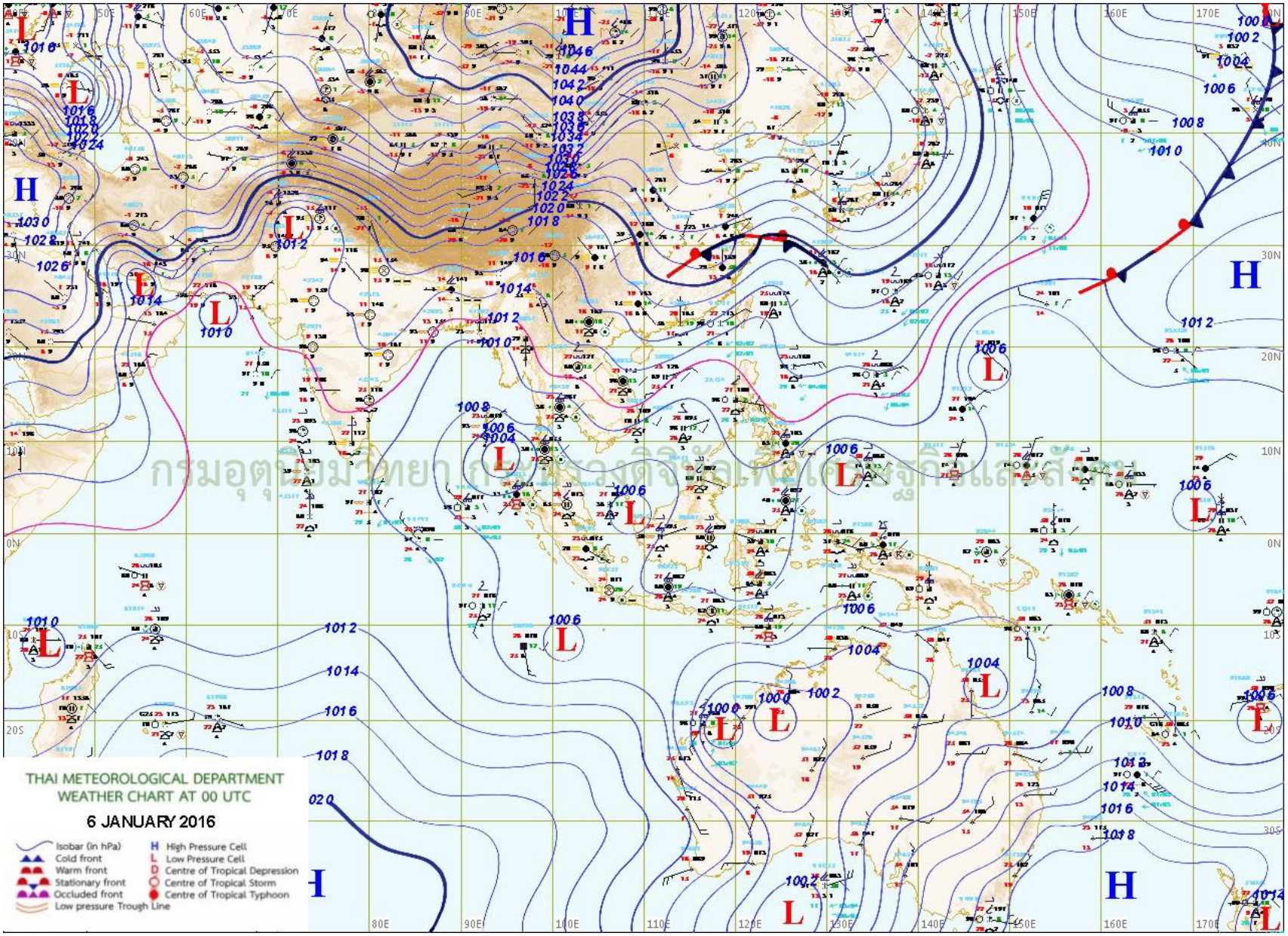

Cyclones on 10-m Wind fields (m/s) 20161025to20161028
27°N
20°N
13°N
6°N
1°S
80°E
95°E
110°E
125°E
27
27
26
28
27
26
70
58
50
42
33
28
24
20
16
12
8
0
Cyclonic Wind scale
4
8
12
16
20
Background field scale

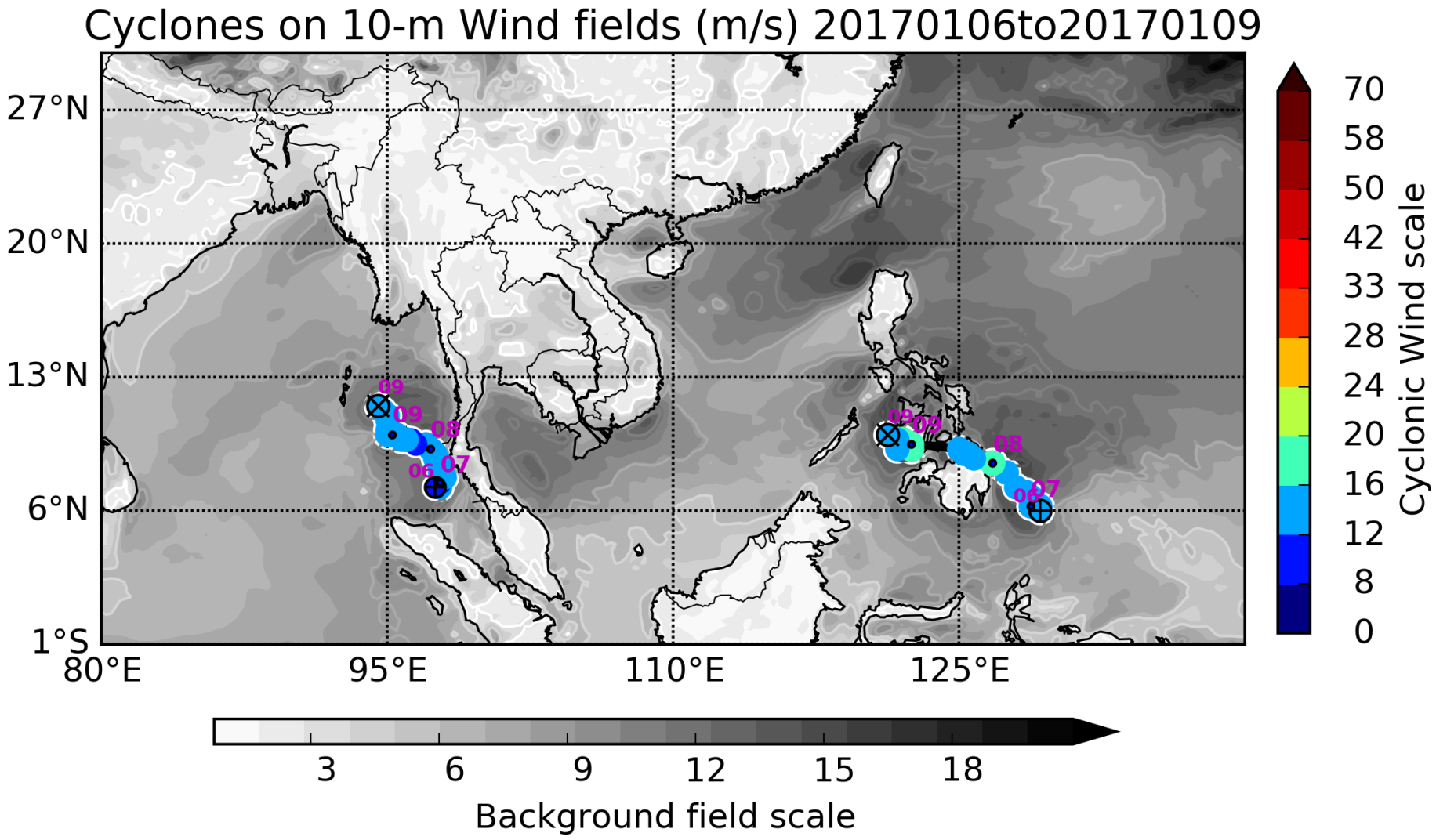
# CycloneID,	YEAR,	MONTH,	DAY,	HOUR,	MINUTE,	Lat,	Lon,	minWind(m/s),
1.00	2016.00	10.00	25.00	18.00	0.00	8.50	103.75	0.26
1.00	2016.00	10.00	25.00	21.00	0.00	8.50	103.75	0.54
1.00	2016.00	10.00	26.00	0.00	0.00	8.50	103.00	0.12
1.00	2016.00	10.00	26.00	9.00	0.00	9.00	101.75	0.44
1.00	2016.00	10.00	26.00	12.00	0.00	9.00	102.00	0.33
1.00	2016.00	10.00	26.00	21.00	0.00	9.25	100.75	0.30
1.00	2016.00	10.00	27.00	0.00	0.00	9.50	100.75	0.23
1.00	2016.00	10.00	27.00	3.00	0.00	9.75	100.25	0.30
1.00	2016.00	10.00	27.00	6.00	0.00	10.25	99.75	0.32
1.00	2016.00	10.00	27.00	18.00	0.00	11.50	97.00	0.28
1.00	2016.00	10.00	28.00	6.00	0.00	13.00	95.50	0.46
2.00	2016.00	10.00	25.00	18.00	0.00	16.75	89.50	3.36
2.00	2016.00	10.00	25.00	21.00	0.00	17.00	89.25	3.62
2.00	2016.00	10.00	26.00	0.00	0.00	17.00	88.25	4.06
2.00	2016.00	10.00	26.00	3.00	0.00	17.00	88.00	3.42
2.00	2016.00	10.00	26.00	6.00	0.00	17.00	87.25	4.26
2.00	2016.00	10.00	26.00	9.00	0.00	17.00	86.75	4.84
2.00	2016.00	10.00	26.00	12.00	0.00	16.75	86.50	2.73
2.00	2016.00	10.00	26.00	15.00	0.00	16.75	86.00	1.70
2.00	2016.00	10.00	26.00	18.00	0.00	16.75	85.50	1.58
2.00	2016.00	10.00	26.00	21.00	0.00	16.75	85.00	1.20
2.00	2016.00	10.00	27.00	0.00	0.00	16.50	84.50	1.05
2.00	2016.00	10.00	27.00	3.00	0.00	16.75	84.00	0.81
2.00	2016.00	10.00	27.00	6.00	0.00	16.50	83.50	0.68
2.00	2016.00	10.00	27.00	9.00	0.00	16.25	83.00	0.60

5.Active Low

05-10 January 2017


17010600GMT
Weather Home, Kochi Univ. / Himawari-8 IR1, JMA / Blue Marble, NASA


THAI METEOROLOGICAL DEPARTMENT
WEATHER CHART AT 00 UTC
6 JANUARY 2016
Isobar (in hPa)
Cold front
Warm front
Stationary front
Occluded front
Low pressure Trough Line
H High Pressure Cell
L Low Pressure Cell
D Centre of Tropical Depression
Centre of Tropical Storm
Centre of Tropical Typhoon


Cyclones on 10-m Wind fields (m/s) 20170106to20170109
27°N
20°N
13°N
6°N
1°S
80°E
95°E
110°E
125°E
09
09
08
07
06
09
09
08
07
06
70
58
50
42
33
28
24
20
16
12
8
0
Cyclonic Wind scale
3
6
9
12
15
18
Background field scale

2.00	2017.00	1.00	6.00	18.00	0.00	7.25	97.50	0.04
2.00	2017.00	1.00	6.00	21.00	0.00	7.25	97.75	0.71
2.00	2017.00	1.00	7.00	0.00	0.00	7.50	97.75	0.49
2.00	2017.00	1.00	7.00	3.00	0.00	7.50	97.75	0.57
2.00	2017.00	1.00	7.00	6.00	0.00	7.75	98.00	0.31
2.00	2017.00	1.00	7.00	9.00	0.00	8.00	97.75	0.57
2.00	2017.00	1.00	7.00	12.00	0.00	8.25	97.75	0.22
2.00	2017.00	1.00	7.00	15.00	0.00	8.50	97.75	0.30
2.00	2017.00	1.00	7.00	18.00	0.00	8.75	97.50	0.14
2.00	2017.00	1.00	7.00	21.00	0.00	9.00	97.50	0.28
2.00	2017.00	1.00	8.00	0.00	0.00	9.25	97.25	0.23
2.00	2017.00	1.00	8.00	3.00	0.00	9.50	97.00	0.90
2.00	2017.00	1.00	8.00	6.00	0.00	9.50	96.50	0.59
2.00	2017.00	1.00	8.00	9.00	0.00	9.75	96.25	0.79
2.00	2017.00	1.00	8.00	12.00	0.00	9.75	96.00	1.57
2.00	2017.00	1.00	8.00	15.00	0.00	9.75	96.00	2.05
2.00	2017.00	1.00	8.00	18.00	0.00	9.75	95.75	1.80
2.00	2017.00	1.00	8.00	21.00	0.00	10.00	95.50	1.76
2.00	2017.00	1.00	9.00	0.00	0.00	10.00	95.25	1.53
2.00	2017.00	1.00	9.00	3.00	0.00	10.00	95.00	2.00
2.00	2017.00	1.00	9.00	6.00	0.00	10.25	95.00	1.05
2.00	2017.00	1.00	9.00	9.00	0.00	10.75	95.00	0.88
2.00	2017.00	1.00	9.00	12.00	0.00	11.00	95.00	0.47
2.00	2017.00	1.00	9.00	15.00	0.00	11.25	94.75	0.60
2.00	2017.00	1.00	9.00	18.00	0.00	11.50	94.50	0.97