Typhoon Committee Technical Conference (TC50 TECO) on
"Embracing new technologies and knowledge to
meet the challenges in the new era of tropical cyclone forecasting"
In conjunction with
the 50th Session of the Typhoon Committee

Development of Radar Composite Map in Typhoon Region

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27 February 2018 Ha Noi, Viet Nam

Topics

Background

Methodology

Application

Conclusion

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Methodology

Application

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Background

The Development of Regional Radar Network:

to establish composite map pilot project in Typhoon Region”

under the Annual Operation Program (AOP)

of the 2011 Strategic Plan of Typhoon Committee in item 6 (AOP-6).

Thai Meteorological Department (TMD)

together with Japan Meteorology Agency (JMA)

has been assigned as the leader to lead the project

Topics

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Methodology

1) Selected weather radar site,

2) To converted the radial native radar format to GRIB-2,

3) To created composite angle table,

4) To applied JMA's software to produce Pseudo CAPPI at 2 kilometers height,

5) To created national Pseudo CAPPI,

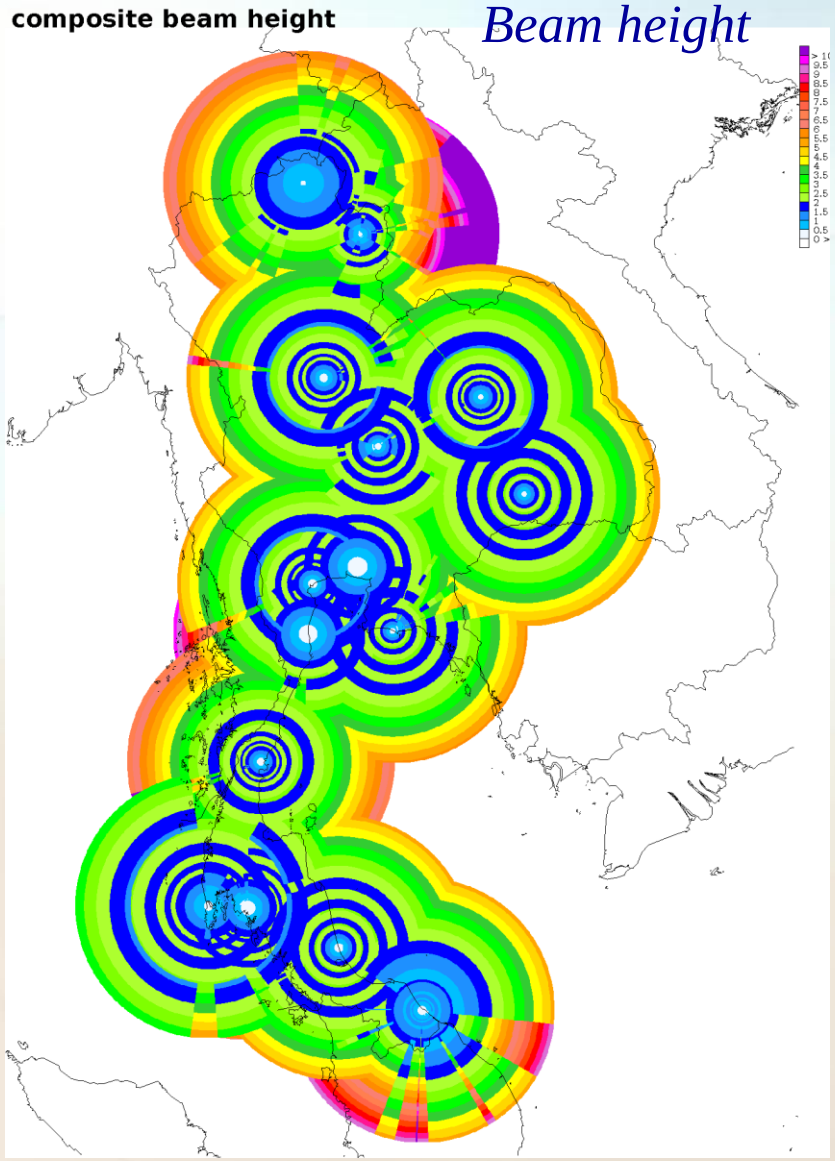
6) To applied Z-R relationship to calculated precipitation,

7) To estimated precipitation with 2nd calibration method and

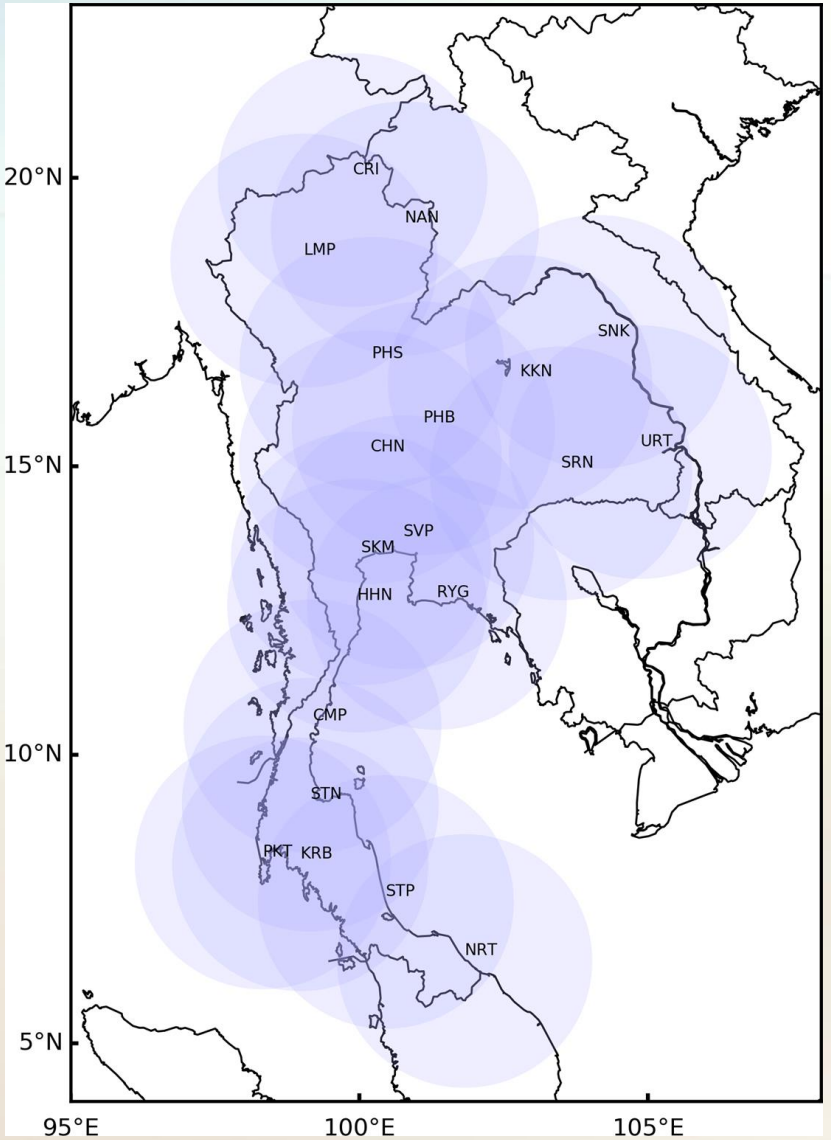
8) To improve the accuracy with statistical and quality checking.

1) Selected weather radar site

Beam height



Coverage range 240 km



WMO NO	CODE	NAME	LATITUDE	LONGITUDE	HEIGHT (m)	RANGE (Km)	SCAN TILT	Polarization
48308	CRI*	CHIANGRAI	19 57 41.00N	99 52 52.98E	440.0	240	0.9 1.3	Single
48329	LMP	LAMPHUN	18 33 55.44N	99 02 30.12E	320.0	240	0.8 1.6 2.6 3.5	Single
48331	NAN	NAN	19 07 23.5092N	100 48 47.3976E	264.7	240	0.5 1.5 2.4 3.4	Dual
48356	SNK	SAKON NAKHON	17 09 22.91N	104 07 57.33E	196.0	240	0.5 1.5 2.4 3.4	Dual
48378	PHS	PHITSANULOK	16 46 31.30N	100 13 4.39E	72.0	240	0.5 1.5 2.4 3.4	Single
48379	PHB	PHETCHABUN	15 39 24.98N	101 06 18.98E	97.0	240	0.5 1.5 2.4 3.4	Single
48381	KKN	KHONKAEN	16 27 45.00N	102 47 9.17E	217.0	240	0.5 1.5 2.4 3.4	Dual
48402	CHN	CHAINAT	15 9 28.27N	100 11 28.55E	40.0	240	0.5 1.0 1.5 3.4	Dual
48407	URT	UBON RATCHATHANI	15 14 37.00N	104 52 29.02E	155.0	240	0.6 1.0	Dual
48417	KKW**	KHAO KEAW	14 21 44.00N	101 23 35.02E	1261.0	240	0.5 0.9 1.3 2.4 3.4	Single
48429	SVP*	SUVARNABHUMI	13 41 11.00N	100 46 03.00E	28.0	240	0.9 1.5	Single
48432	SRN	SURIN	14 52 33.34N	103 29 45.27E	176.0	240	0.5 1.0 2.0 4.0	Dual
48438	SKM	SAMUTSONGKRAM	13 24 26.00N	100 01 55.00E	31.0	240	0.5 1.5 2.4 3.4	Dual
48475	HHN*	HUAHIN	12 35 10.00N	099 57 45.00E	30.0	240	0.8 1.6	Single
48478	RYG	RAYONG	12 38 01N	101 20 26E	34.0	240	0.7 1.3 2.2 4.0	Single
48517	CMP	CHUMPHON	10 29 35.16N	99 11 17.53E	32.0	240	1.0 2.0 2.9 3.9	Single
48551	STN*	SURAT THANI	09 08 8.00N	99 09 07.02E	33.0	240	0.7 0.7 1.1	Single
48563	KRB	KRABI	08 06 5.00N	98 58 41.02E	52.0	240	1.0 1.3 1.7 2.2	Single
48565	PKT	PHUKET AIRPORT	08 08 1.00N	98 19 46.00E	281.0	240	0.0 0.5 1.0 1.5 2.0 2.5	Single
48568	STP	SATHING PHRA	07 26 59.98N	100 27 35.98E	33.0	240	0.5 1.5 2.4 3.4	Single
48583	NRT	NARATHIWAT	06 25 36N	101 49 30.59E	32.0	240	0.5 1.5 2.4 3.4	Dual

Native data format

???? format

ECC vol format

UF

Gematronik xml format

converter

WMO GRIB2

Network Common Data Form (NetCDF)

Hierarchical Data Format 5 (HDF5)

WMO BUFR

Extensible Markup Language (XML)

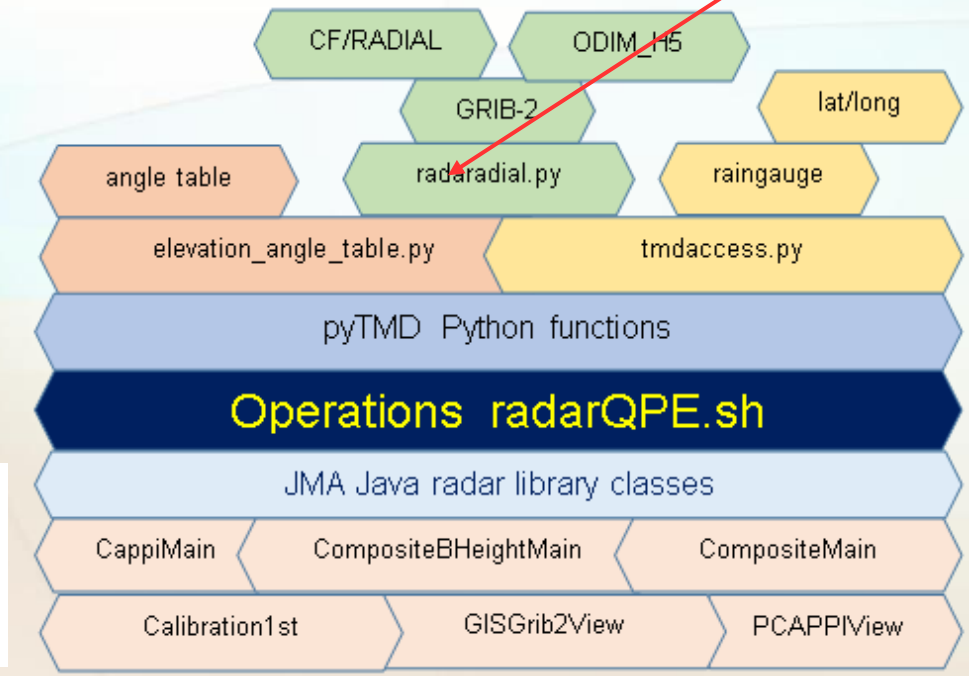
GeoJASON

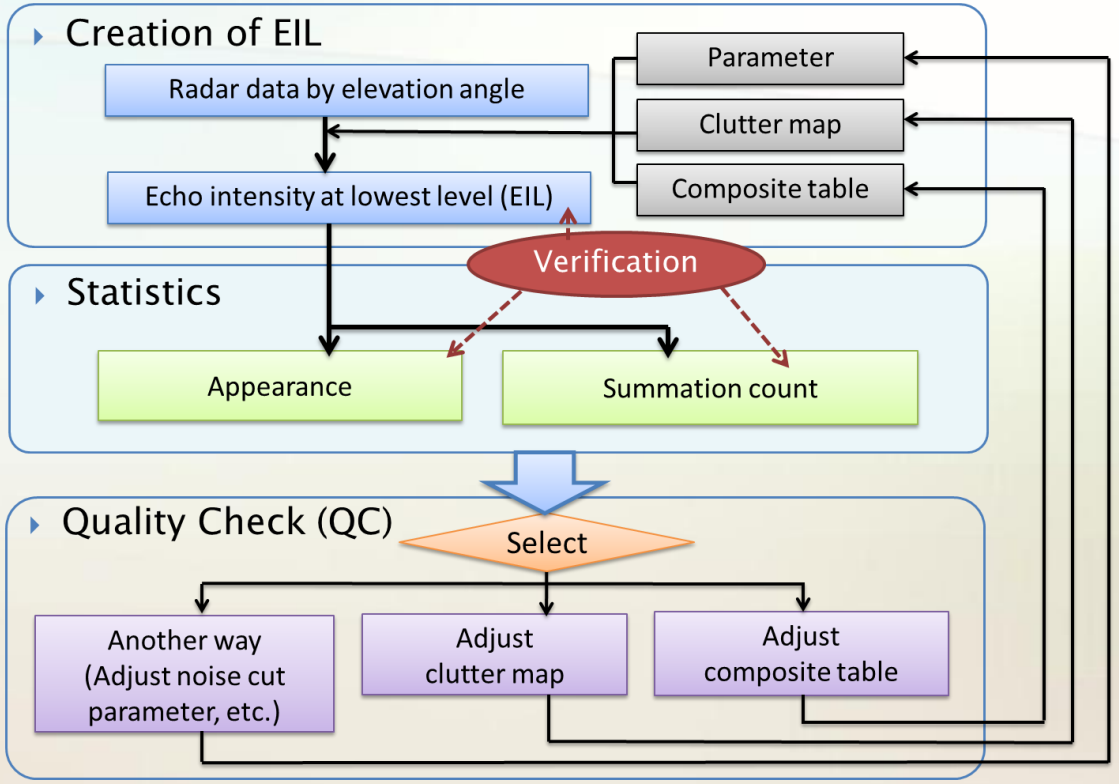
Image

csv

2) To converted the radial native radar format to GRIB-2

Radaradial conveterd UF to GRIB-2





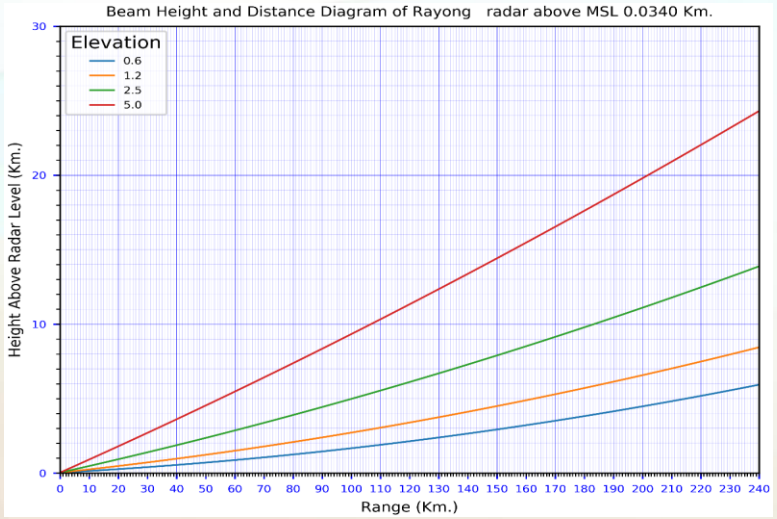
WMO GRIB2

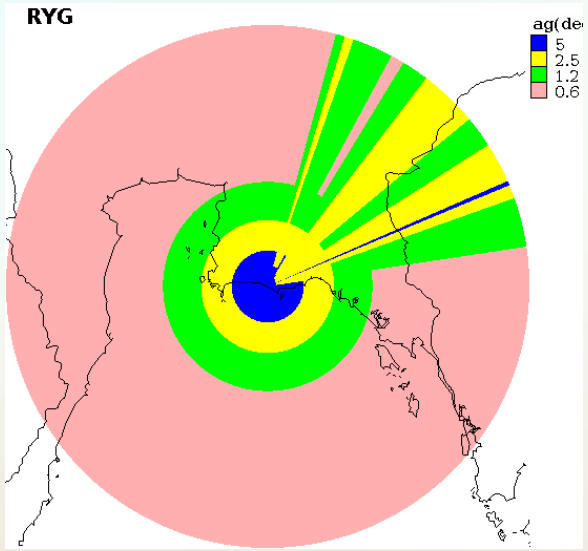
Section Number	Section Name	Section Contents
Section 0:	Indicator Section	"GRIB", Discipline, GRIB Edition number, length of message
Section 1:	Identification Section	Length of section, section number, characteristics that apply to all processed data in the GRIB message
Section 2:	Local Use Section (optional)	Length of section, section number, additional items for local use by originating centres
Section 3:	Grid Definition Section	Length of section, section number, definition of grid surface and geometry of data values within the surface
Section 4:	Product Definition Section	Length of Section, section number, description of the nature of the data
Section 5:	Data Representation Section	Length of section, section number, description of how the data values are represented
Section 6:	Bit-Map Section	Length of section, section number, indication of presence or absence of data at each grid point, as applicable
Section 7:	Data Section	Length of section, section number, data values
Section 8:	End Section	"7777"

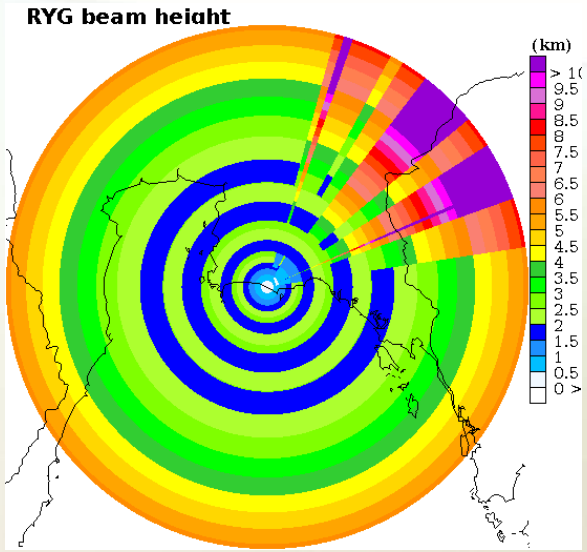
FM 92 GRIB edition 2	Latest version 20.0.0	non-operational
Templates - Grid definition, Product definition, Data representation and Data	doc / pdf	doc / pdf
Code and Flag tables	doc / pdf	doc / pdf
==> Machine readable text and xml files (see Notes 4 and 5)	txt/xml (zip)	txt/xml (zip)
==> [Experimental] Machine readable files with element description column in code/flag tables (see Note 6)	txt/xml (zip)	txt/xml (zip)

http://www.wmo.int/pages/prog/www/WMOCodes/WMO306_vI2/LatestVERSION/LatestVERSION.html

3) To created composite angle table



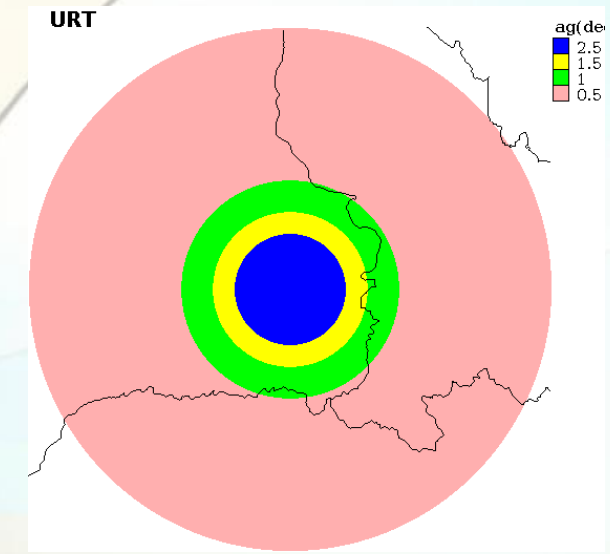


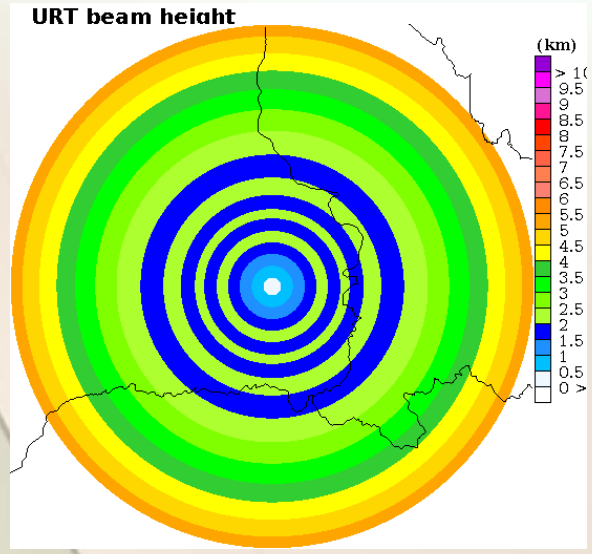


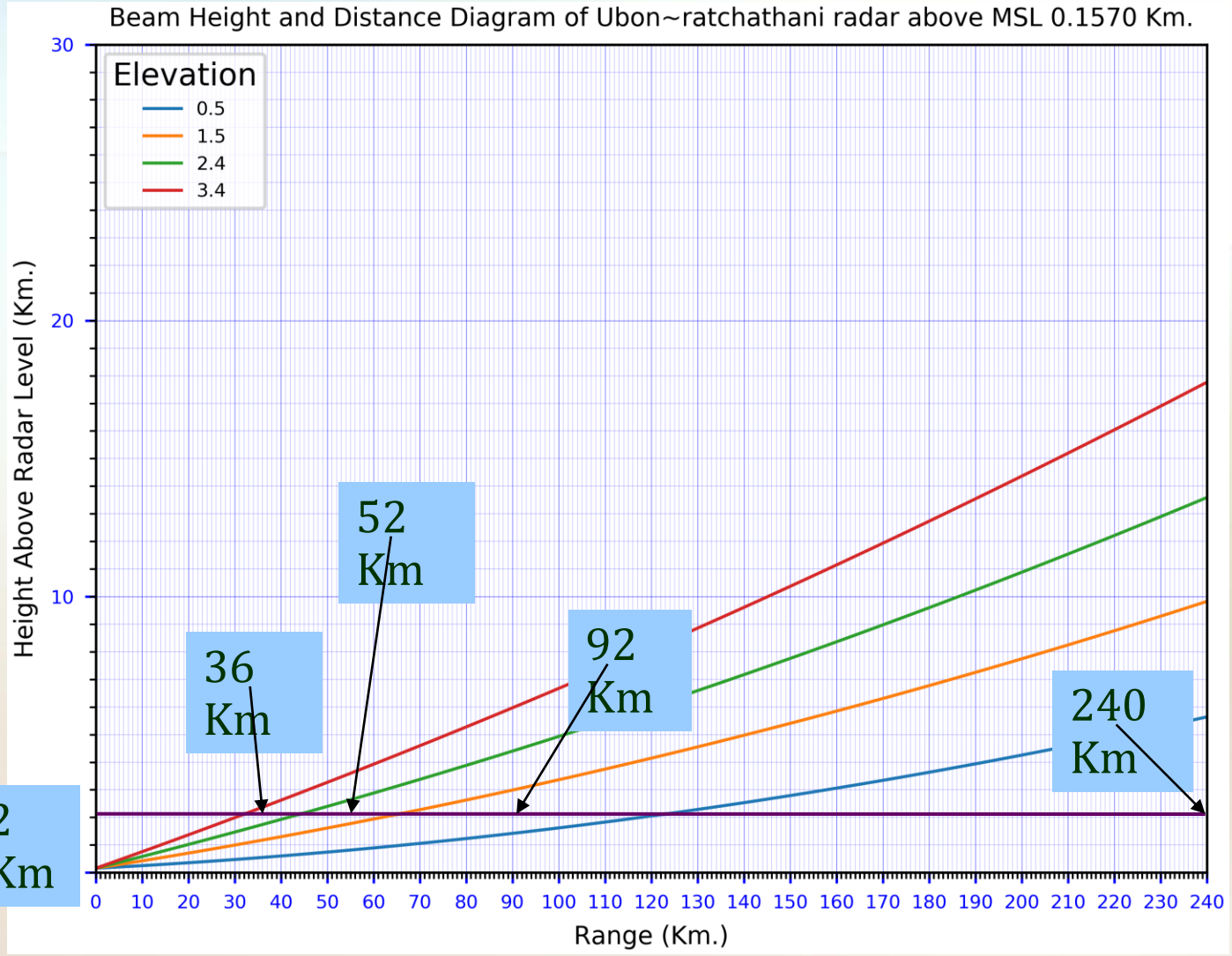
Elevation angles, composite angle table and beam height of Rayong (RYG)

azimuth	range	angle	range	angle	range	angle	range	angle	range
11	0	3.4	44	1.9	71	1.0	106	0.5	240
15	0	3.4	19	1.9	71	1.0	240		
20	0	3.4	19	1.9	240				
35	0	3.4	13	1.9	71	1.0	240		
47	0	3.4	9	1.9	240				
51	0	3.4	8	1.9	71	1.0	240		
55	0	3.4	8	1.9	240				
67	0	3.4	240						
68	0	3.4	8	1.9	240				
79	0	3.4	8	1.9	71	1.0	240		
360	0	3.4	44	1.9	71	1.0	106	0.5	240

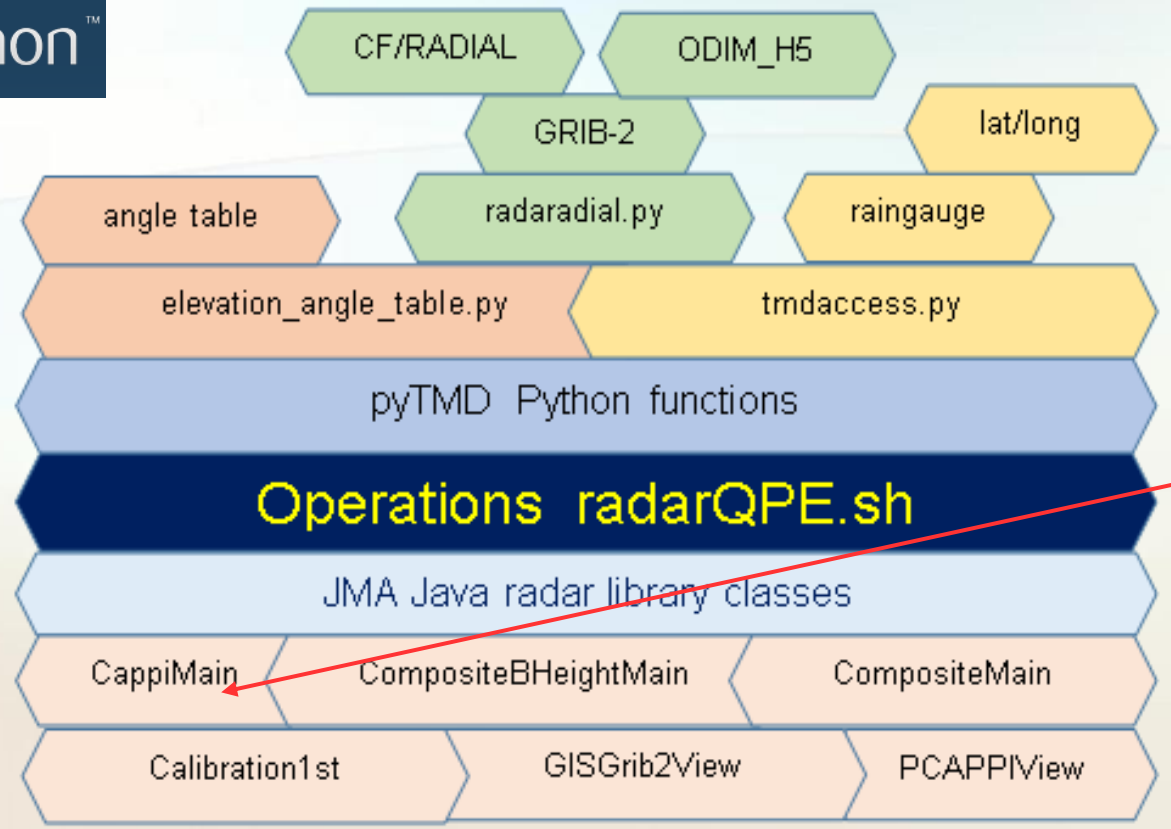
3) To created composite angle table





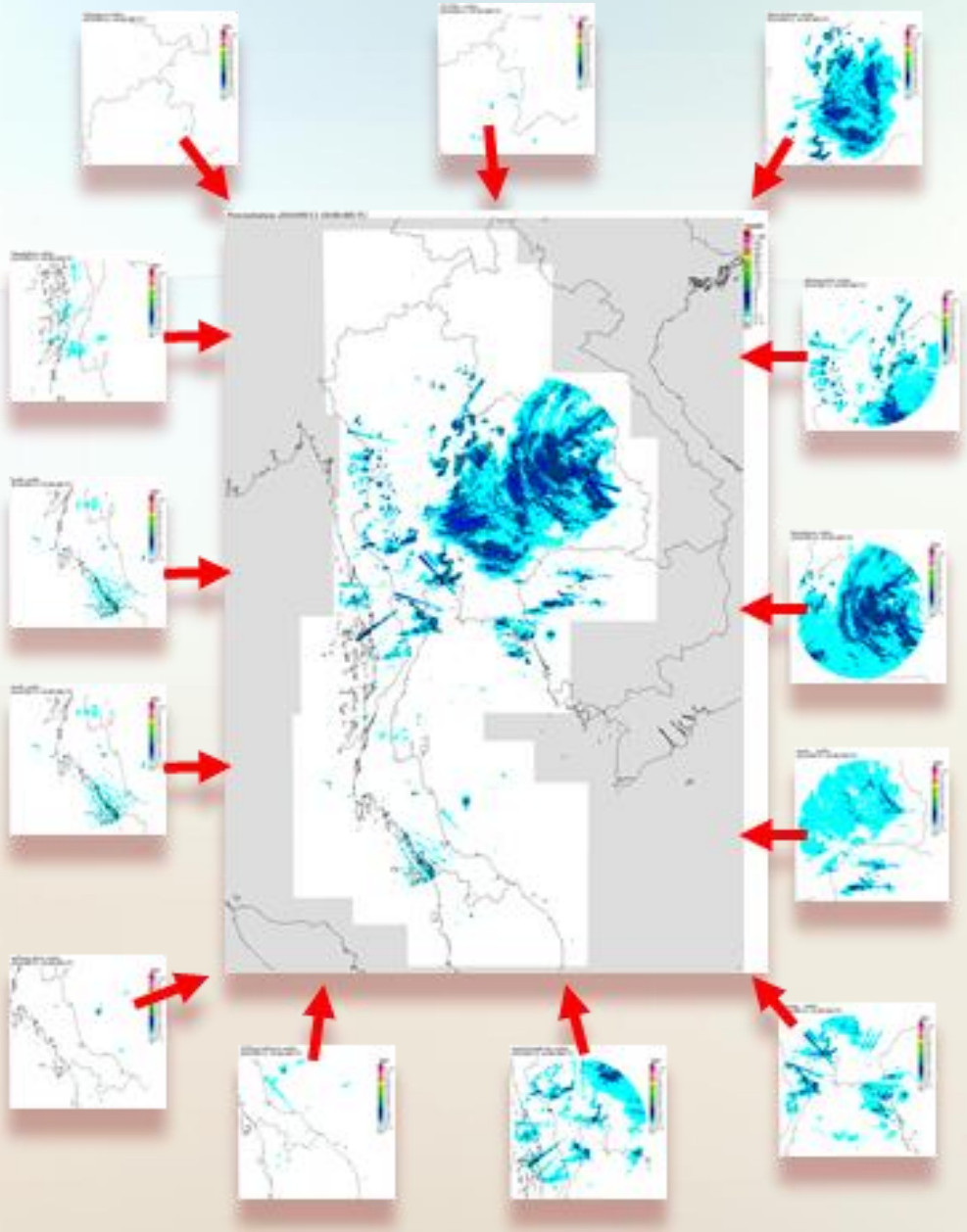


4) Pseudo CAPPI at 2 kilometers height

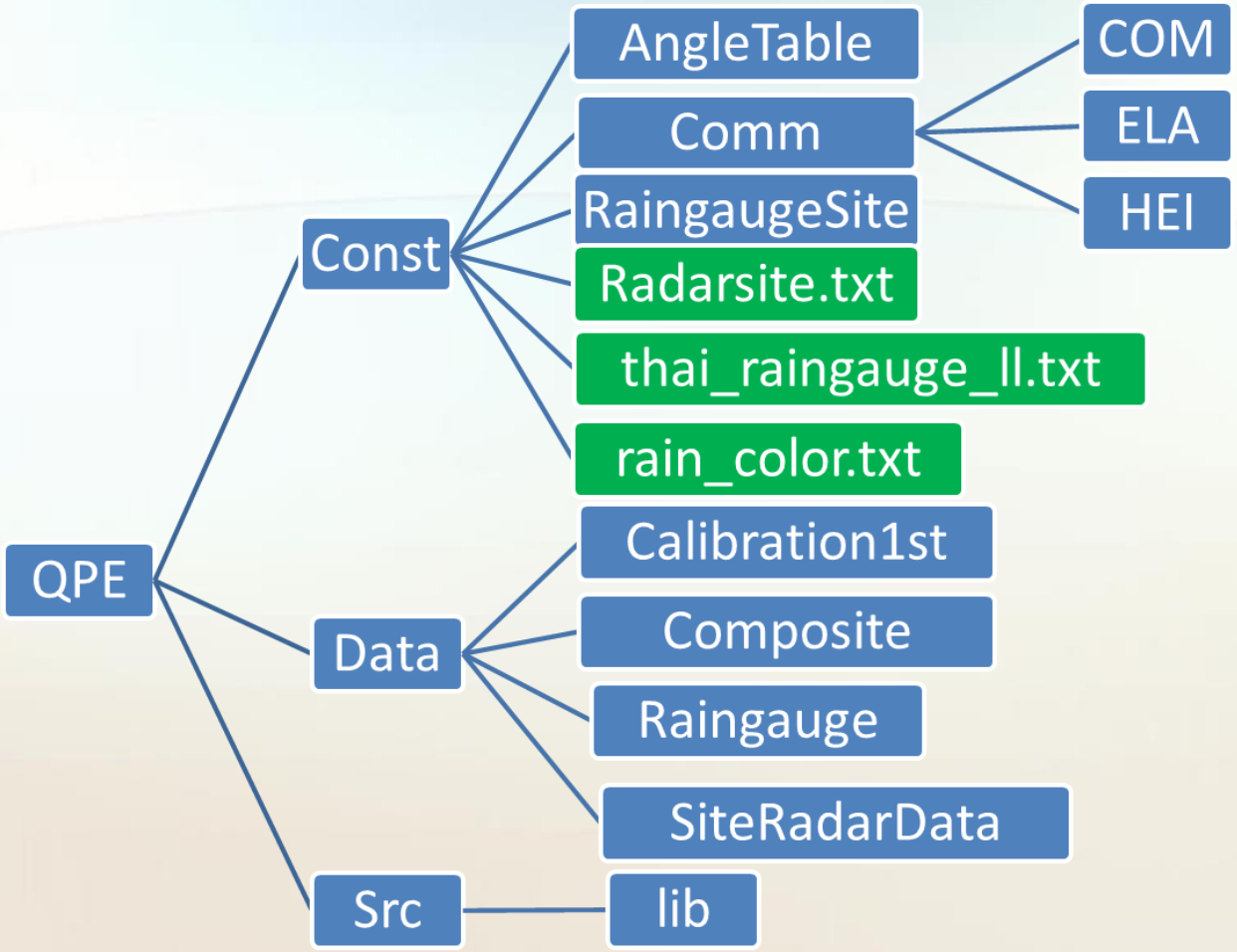


CAPPIMAIN

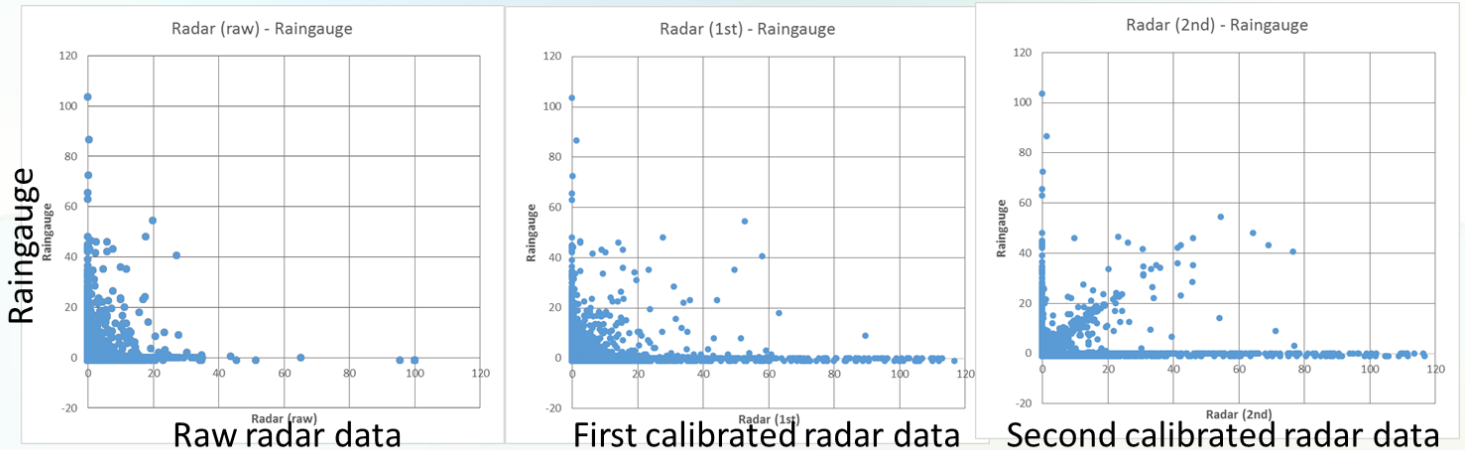
5) To created national Pseudo CAPPI



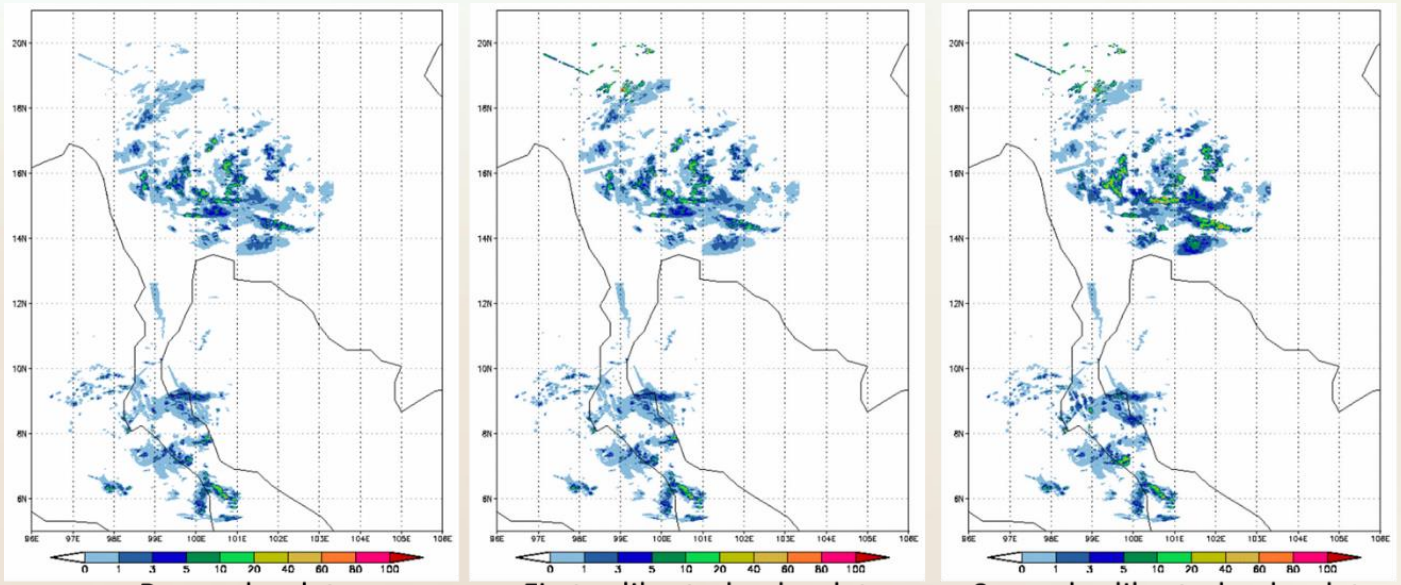
6) To applied Z-R relationship to calculated precipitation



7) To estimated precipitation with 2nd calibration method and



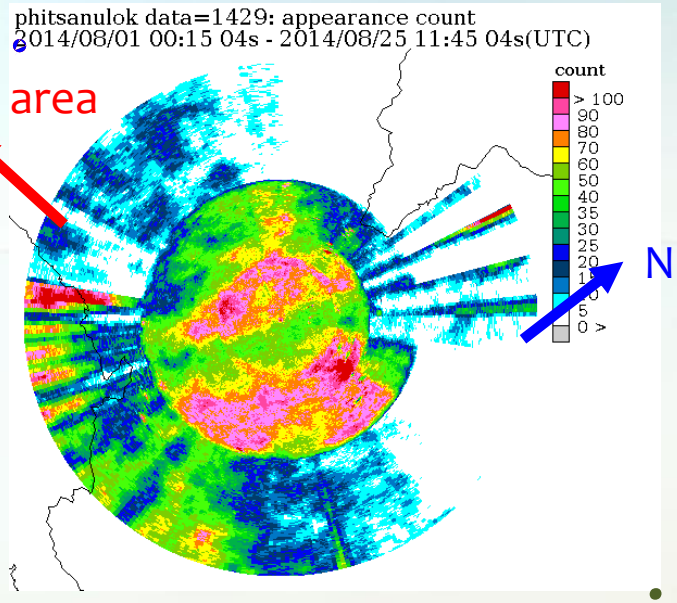
Raw radar data | First calibrated radar data | Second calibrated radar data

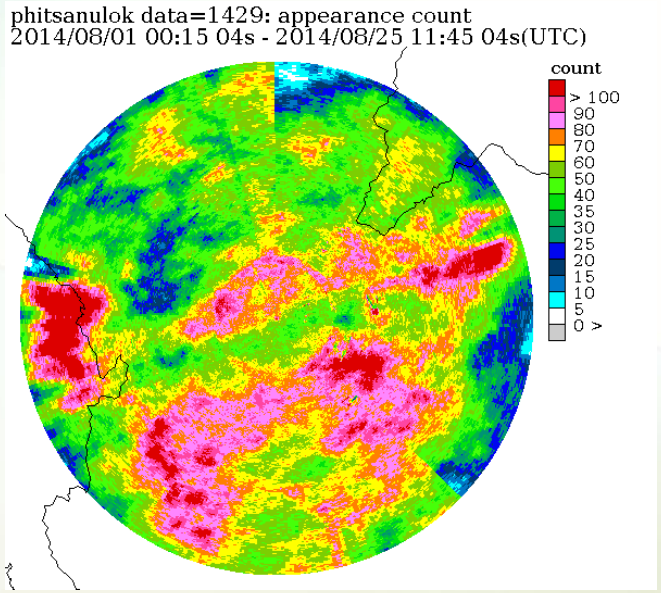


Raw radar data | First calibrated radar data | Second calibrated radar data

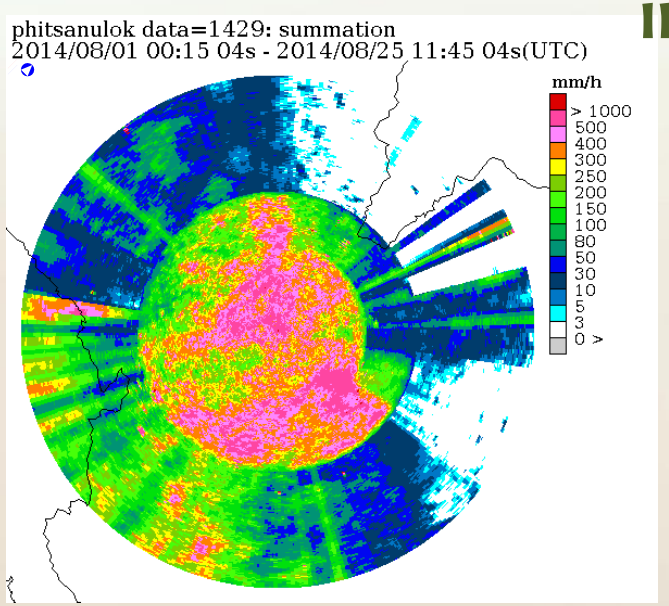
8) To improve the accuracy with statistical and quality checking

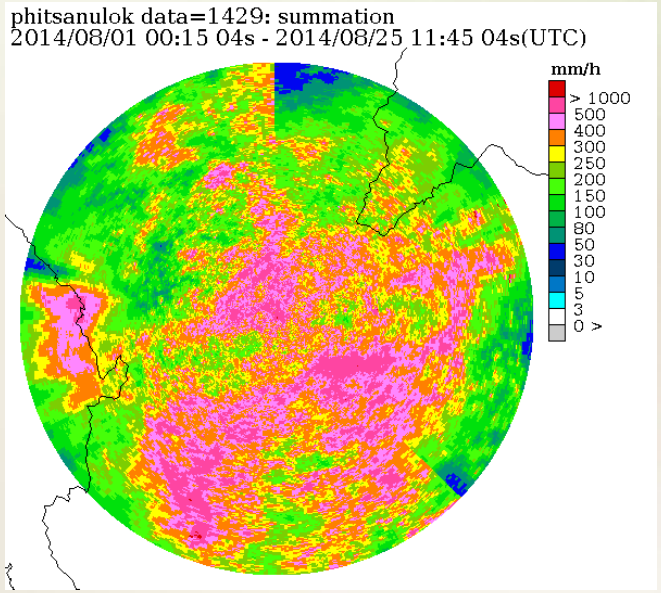
Adjustment table
(2014 Aug) PHS





improved





Weather Radar Quality Control

Singele Polarization

Standardize Operation Parameter

Radial Radar

CAPPI Radar data

Composite Radar Data

Dual Polarization

Topics

Background

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Nowcasting

Flash flood alert and early warning,

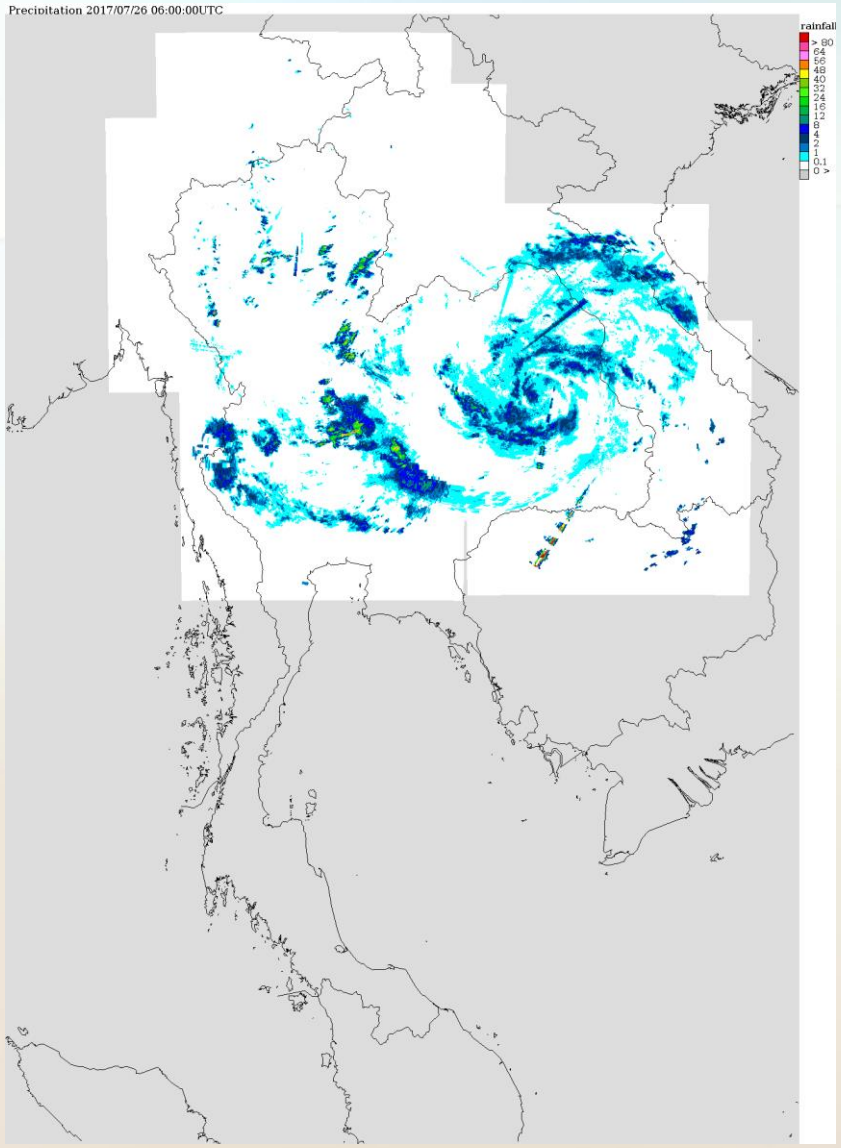
Water management for agriculture and industry,

Tropical storm “SONCA”,

Conclusion

Expereiment test for (WIGOS) project

Tropical Typhoon ‘SONCA’ during 23 to 28 July 2017

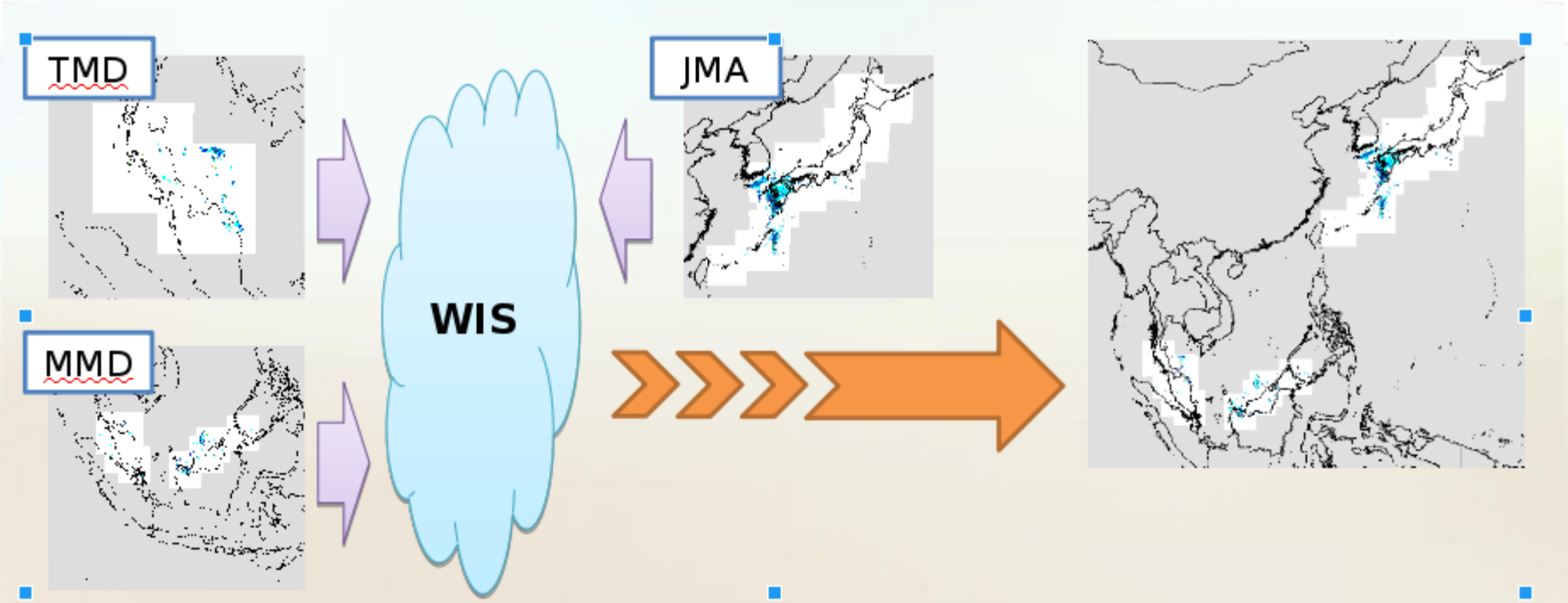


The heaviest daily rainfall in upper Thailand was 250.8 mm at Phang Khon in Sakon Nakhon province on July 28

Tropical Cyclone ‘SONCA’

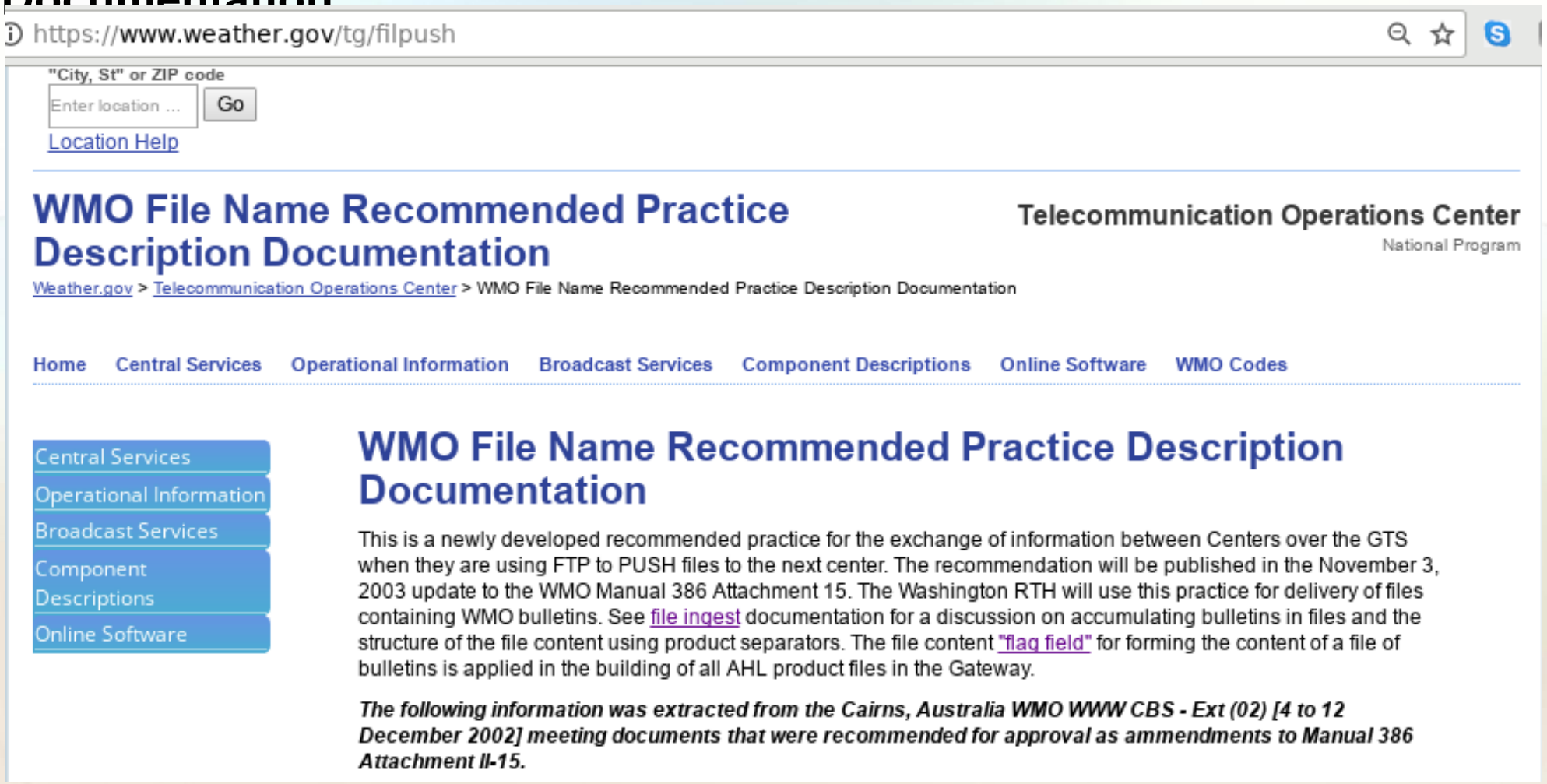
during 23 to 28 July 2017

JMA, MMD and TMD started the experimental radar data exchange in November 2016. Radar composite map in Japan, Malaysia, and Thailand is available at the RSMC Tokyo NTP website.



https://www.weather.gov/tg/filpush

WMO File Name Recommended Practice Description Documentation



Topics

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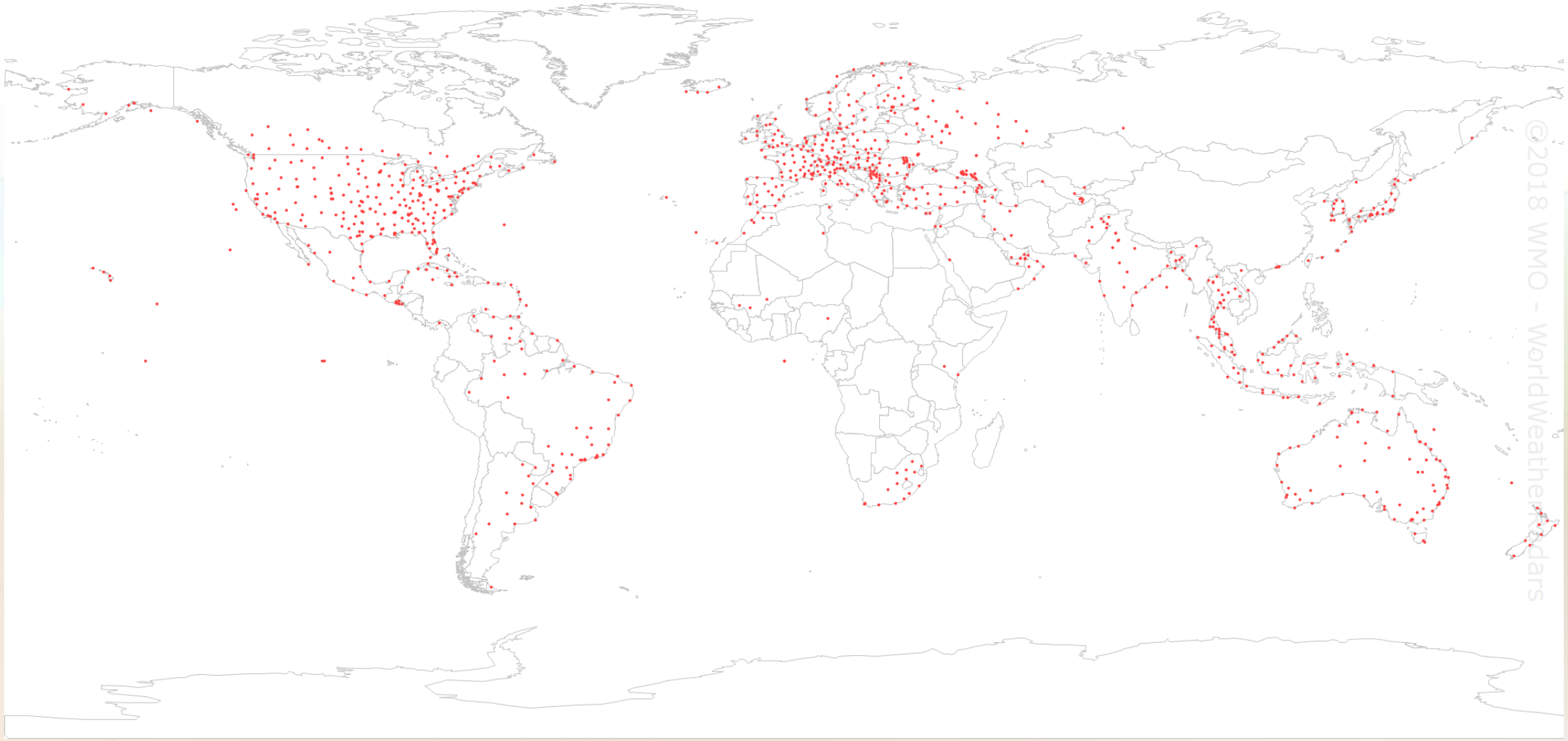
Recommendation and Suggestion

- The creation EIL composite depended on the radar parameters table, more stable and standardize of operation are required.
- The QPE of second calibration is more accuracy than other.
- The developing of regional radar network very helpful the National - - Meteorological Services (NWS) to provide more and effective information in \ spatial and temporal for server weather in specific area.
- The weather radar quality to ensure the accuracy to improved.
- The more strengthen collaboration in TC members in developing regional radar network, more able and usable of weather radar data to protected the property and life of the society in advanced.

WMO Radar Database



Radar Details

WMO Radar Database

Details	
Status	Active
Owner	
Wmo Id	
WMO WIGOS Station Identifier	0.20010.0.2491
Latitude	13° 55' 0" N | 13.916667
Longitude	100° 36' 0" E | 100.6
Station Type	
Ground Height	*m*
Tower Height	*m*
Band	C
Beam Width	1.2°
Frequency	*MHz*
Pulse Width	- - - *µSec*
Prf Min	250 *Hz*

Prf Max	1180 *Hz*
Signal Processor	RVP
TX Type	Magnetron
Power	500 *kW*
RX Type	Analog
Polarization	Single
Manufacturer	Enterprise Electronics Corporation
Lowest Angle	0.5°
Highest Angle	60°
Task Cycle Time Min	60 *min*
Task Cycle Time Max	*min*
MDS	,
ZR Summer	Z=R
ZR Winter	Z=R
ZR Other	
Installation Year	

Notes
Radar Data Exchange (Organization)
Organization
Data Format
Products
Composite Software
Radar Data Exchange (Bilateral)
Data Format
Products
Radar Data Dissemination
Data Format
Products

Acknowledgements

- Typhoon Committee,
- TC members,
- JMA
- Others

Thank you for your Attention