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REPORT ON AMENDMENTS TO THE TYPHOON COMMITTEE OPERATIONAL MANUAL

(submitted by the Rapporteur)

Summary and Purpose of Document**:**

This document presents draft amendments to the Typhoon Committee Operational Manual - Meteorological Component (TOM) proposed by the RSMC Tokyo – Typhoon Center and the Members.

ACTION REQUIRED:
The Committee is invited to review and approve the proposed amendments to the TOM.

APPENDIXES:
A) DRAFT TEXT FOR INCLUSION AT SESSION REPORT
B) UPDATE OF THE TYPHOON COMMITTEE OPERATIONAL MANUAL

APPENDIX A:

DRAFT TEXT FOR INCLUSION IN THE SESSION REPORT

x.x Review of Typhoon Committee Operational Manual (TOM)

1. The Session noted that the Typhoon Committee Operational Manual (TOM) rapporteur requests WMO to publish and upload the 2018 edition of TOM on the Tropical Cyclone Programme (TCP) Website as submitted by the Rapporteur, with the amendments given in Appendix XX.

2. The Committee expressed its appreciation to the rapporteur for update of TOM.

APPENDIX B:

UPDATE OF THE TYPHOON COMMITTEE OPERATIONAL MANUAL

1. The Typhoon Committee Operational Manual - Meteorological Component (TOM) has been reviewed and updated every year since its first issue in 1987. The 2017 edition was completed and posted on the WMO website in March 2017 in accordance with the approval of amendments to the 2016 edition by the Typhoon Committee 49th session (21 to 24 February 2017 Yokohama, Japan).

2. At the 49th session, the Committee decided that the rapporteur of the RSMC Tokyo – Typhoon Center in Japan Meteorological Agency (JMA) continue arrangements for updating the TOM. In this connection, on 27 September 2017, the rapporteur, Mr. Chiashi Muroi, Head of the RSMC Tokyo - Typhoon Center proposed some revisions based on the description in Section 1.1 in the TOM to the focal points of the meteorological component of the Members and invited them to provide comments for the revision and proposals for updates.

3. Proposed revisions by the RSMC Tokyo – Typhoon Center are attached as Annex 1 and given below are the major points of the revisions to simplify and clarify the roles of the RSMC Tokyo - Typhoon Centre and the Members:

- Transfer of detailed information on the Members from the text to the appendices (Section 2.1 to Appendix 2-C, Section 2.4 to Appendix 2-H, Section 2.5 to Appendix 2-I, Section 5.4 to Appendix 5-A,B)
- Removal of information on analysis and forecasting procedures used in each Member including not up-to-date information (Appendix 3-B,C)
- Removal of information described in WMO official publications such as Manual and change to be only referred to the publications (Section 3.2, 3.3, 4.4, Appendix 3-A,D,E)
- Transfer of detailed information on classification of tropical cyclones from Section 1.2 to Section 4.2 (Section 1.2, Appendix 1-A to Appendix 4-A)
- Update of list of acronyms used in the TOM (Appendix 1-C)

4. As of the end of January 2018, comments for the proposed revisions had not been provided by any focal points.

5. Proposals for updates and amendments to the revised TOM were submitted by the five focal points of China; Hong Kong, China; Japan; Macao, China; and Thailand, which are attached as Annex 2, and given below are the major points of the amendments:

- Addition of the information on Himawari-9 (Section 2.4)
- Revision and update of the information on products provided by the RSMC Tokyo – Typhoon Center (Section 3.1)
- Update of the information on reconnaissance flights (Appendix 2-I)
- Update of the information on the radar stations (Appendix 2-D,E)
- Update of the information on the satellite imagery receiving facilities (Appendix 2-G)
- Update of the information on the meteorological telecommunication network (Appendix

5-A,B)

- Update of the information on contacts (Appendix 5-C)
- Revision of monitoring period for regular monitoring (Appendix 6-B)
- Update of the information on archive data by the RSMC Tokyo – Typhoon Center (Appendix 7-A)

Annex 1

Draft Revisions to
the Typhoon Committee Operational Manual – Meteorological Component (TOM)
proposed by the RSMC Tokyo – Typhoon Center

Page	Line	Proposed Revision	Comments
Section 1.2			
2	Footnote	* Details are shown in 4.2.~~"Tropical cyclone" is a generic term that includes tropical depression, tropical storm, severe tropical storm and typhoon.~~ ** ~~Classifications internally used by Members are shown in Appendix 1-A.~~	Transfer of detailed information on classification of tropical cyclones to Section 4.2
Section 2.3			
9	L21	Marine meteorological observations, such as~~namely~~ air pressure, sea surface temperature, significant wave height and period, are also made by the ~~JMA~~ drifting ocean data buoys by the Members~~every 3 hours in the western North Pacific~~. ~~When waves are higher than thresholds set beforehand, the buoy changes into the hourly observation mode automatically.~~ All reports are coded in the BUOY code (FM18), and immediately put onto the GTS ~~with the header "SSVB01 RJTD"~~. A list of the drifting buoy observations by the Members is shown in Appendix 2-C. ~~Hourly marine meteorological observations, namely air pressure and sea surface temperature are also made during tropical cyclone seasons by the drifting buoys deployed by Hong Kong, China over the South China Sea with support of the Hong Kong Voluntary Observing Ships. All reports are coded in the BUOY code (FM18), and immediately put onto the GTS with the header "IOBC01 VHHH" and "IOBX02 KWBC" respectively for buoys operated solely by Hong Kong, China and for buoys operated under the Barometer Upgrade Scheme of the Global Drifter Programme of Data Buoy Cooperation Panel of JCOMM.~~	Transfer of detailed information on buoy observations by Japan and Hong Kong, China to Appendix 2-C (See Annex 1-1) based on the policy that detailed information on the Members should be described in appendices
Section 2.4			
10	L32	SAREP reports are also issued by other Typhoon Committee Members. A list of SAREP reports issued by the RSMC Tokyo – Typhoon Center and other Typhoon Committee Members is shown in Appendix	Transfer of detailed information on SAREP reports issued by Hong Kong, China to Appendix 2-H (See Annex 1-2) based

		2-H. ~~eight times a day by Hong Kong, China to other meteorological centres through the GTS under the heading of IUCC01 VHHH, IUCC02 VHHH, IUCC03 VHHH and IUCC04 VHHH in the BUFR code (FM 94) when a tropical cyclone is located within 10N to 30N and 105E to 125E.~~	on the policy that detailed information on the Members should be described in appendices
Section 2.5			
11	L1	The Members~~HKO~~ conduct~~s~~ reconnaissance flights for selected tropical cyclones ~~over the northern part of the South China Sea. Data is being shared at a regional level~~. Detailed information of reconnaissance flights conducted by the Members is given in Appendix 2-I.	Transfer of detailed information on reconnaissance flights conducted by Hong Kong, China to Appendix 2-I (See Annex 1-3) based on the policy that information on the Members should be described in appendices
Section 3.1			
After 17	Table 3.4	To be added to Annex 1-4	Addition of the information on products provided by the RSMC Tokyo - Typhoon Center at the Numerical Typhoon Prediction Website
Section 3.2			
18	L4	The RSMC Tokyo - Typhoon Center should prepare the products for numerical weather prediction shown in the WMO Manual on the Global Data-Processing and Forecasting System (GDPFS)~~Appendix 3-A~~.	Change of a reference to outline of the RSMC Tokyo – Typhoon Center's NWP models from Appendix 3-A to the WMO Manual on the GDPFS
18	L25	(i) 24, 48, 72, 96 and 120~~72~~-hour forecast position;	Revision of lead times of the RSMC Tokyo – Typhoon Center's track forecast
Section 3.3			
18	L41	The national meteorological services of Typhoon Committee Members are operating~~using various kinds of operational~~ analysis and forecasting ~~methods for~~ development and movement of tropical cyclones in the region~~typhoon track. The ones currently used are shown in Appendix 3-B~~. The final responsibility for the operational analysis and forecasting ~~development and movement of tropical cyclones in the region~~ will be with the ~~national meteorological services~~NMSs of each of the Members. ~~In order to promote uniformity in the adoption of proven techniques, a sample of such techniques currently used by Members is given in Appendix 3-C.~~	Change of description corresponding to the removal of Appendix 3-B and 3-C related to analysis and forecasting procedures used in each Member
Section 4.3			

19	L39	(ii) 24, 48, 72, 96 and 120~~72~~-hour forecasts of the central position;	Revision of lead times of the RSMC Tokyo – Typhoon Center's track forecast
Section 4.4			
20	L8	Weather forecast areas fixed nationally by individual Typhoon Committee Members are shown in WMO Publication No. 9, Weather Reporting Volume D - Information for Shipping~~Appendix 4-B~~.	Change of a reference to weather forecast area figures from Appendix 4-B to the WMO Publication
Section 5.4			
22	Figure 5.1		Transfer of Figure 5.1 to Appendix 5-A based on the policy that detailed information on the Members should be described in appendices
23	Table 5.1		Transfer of Table 5.1 to Appendix 5-B based on the policy that detailed information on the Members should be described in appendices
Appendix 1-A			
29			Transfer to Appendix 4-A
Appendix 1-D			
35		To be replaced by Annex 1-5	Update of list of acronyms used in the TOM
Appendix 3-A			
70			Removal because of the existence of the same description in the WMO Manual on the GDPFS
Appendix 3-B			
73			Removal because of the inclusion of not up-to-date information
Appendix 3-C			
98			Removal because of the inclusion of not up-to-date information
Appendix 3-D			
118			Removal because of the existence of the same description in the WMO Manual on the GDPFS
Appendix 3-E			
121			Removal because of the existence of the same description in the WMO Manual on the GDPFS

Annex 1-1

APPEXDIX 2-C

LIST OF BUOY OBSERVATIONS BY TYPHOON COMMITTEE MEMBERS

Member	Area	Observation Elements	Frequency	Heading in the BUFR code (FM 94)
Hong Kong, China	South China Sea	Air pressure and sea surface temperature	Every hour during tropical cyclone seasons	IOBC01 VHHH for buoys operated solely by Hong Kong, China IOBX02 KWBC for buoys operated under the Barometer Upgrade Scheme of the Global Drifter Programme of Data Buoy Cooperation Panel of JCOMM.
Japan	Western North Pacific	Air pressure, sea surface temperature, significant wave height and period	Every 3 hours (Every hour when waves are higher than thresholds set beforehand)	SSVB01-19 RJTD

Annex 1-2

APPENDIX 2-H

LIST OF SAREP REPORTS ISSUED BY TYPHOON COMMITTEE MEMBERS

Member	Frequency	Heading in the BUFR code (FM 94)	Issuance Condition
RSMC Tokyo – Typhoon Center	8 times/day	IUCC10 RJTD	(i) When a tropical cyclone of TS intensity or higher is located in the responsible area of the RSMC Tokyo - Typhoon Center; (ii) When a tropical depression existing in the responsible area is forecasted to have an intensity of TS or higher within 24 hours; or (iii) When an area of wind speed of 34 knots or higher caused by a tropical cyclone is forecasted to be in the responsible area within 24 hours.
Hong Kong, China	8 times/day	IUCC01 VHHH IUCC02 VHHH IUCC03 VHHH IUCC04 VHHH	When a tropical cyclone is located within 10N to 30N and 105E to 125E.

Annex 1-3

APPENDIX 2-I

RECONNAISSANCE FLIGHTS CONDUCTED BY TYPHOON COMMITTEE MEMBERS

HKO conducts reconnaissance flights for selected tropical cyclones over the northern part of the South China Sea. Data is being shared at a regional level.

Annex 1-4

Table 3.4 List of other products provided by RSMC Tokyo - Typhoon Center
(Available at the Numerical Typhoon Prediction Website: https://tynwp-web.kishou.go.jp/)

Products	Frequency	Details
Observation/Analysis		
TC Analysis	At least 4 times/day	• Results and historical logs of RSMC Tokyo – Typhoon Center's TC analysis conducted using satellite images (Conventional Dvorak analysis and Early-stage Dvorak analysis)
Satellite Microwave Products		• TC snapshot images • Warm-core-based TC intensity estimates • Weighted consensus TC intensity estimates made using Dvorak analysis and satellite microwave warm-core-based intensity estimates
Radar	Every hour	• Radar composite imagery of the Typhoon Committee Regional Radar Network
Upper-Air Analysis	4 times/day	• Upper-air analysis based on GSM initial field data - Streamlines at 850 and 200 hPa - Vertical wind shear between 200 and 850 hPa - Divergence at 200 hPa - Vorticity at 850 hPa
Ocean Analysis	Once/day	• Sea surface temperature and difference from 24 hours ago • Tropical cyclone heat potential and difference from 24 hours ago
Forecasting/NWP		
TC Track Prediction	4 times/day	• TC track prediction of deterministic NWP models from nine centers (BoM, CMA, CMC, DWD, ECMWF, KMA, NCEP, UKMO and JMA) and a related consensus • TC track prediction of ensemble NWP models from four centers (ECMWF, NCEP, UKMO and JMA)
NWP Weather Maps	Twice/day	• Mean sea level pressure and 500 hPa Geopotential height (up to 72 hours at 00 UTC, up to 168 hours at 12 UTC) of deterministic NWP models from nine centers (BoM, CMA, CMC, DWD, ECMWF, KMA, NCEP, UKMO and JMA)
TC Activity Prediction	Twice/day	• Two- and five-day TC activity prediction maps based on ensemble NWP models from two centers (ECMWF and UKMO) and a related consensus
Storm Surge/Waves		
Storm Surge Forecasts	4 times/day	• Distribution maps of storm surge for RSMC Tokyo – Typhoon Center's TC track forecast and each of five TC track forecasts selected from GEPS ensemble members and maximum storm surge among these six TC track forecasts (up to 72 hours ahead) • Time-series storm surge forecast charts for RSMC Tokyo – Typhoon Center's TC track forecast and each of five TC track forecasts selected from GEPS ensemble members (up to 72 hours ahead)
Wave Height Forecasts	4 times/day	• Distribution maps of ensemble mean wave height, maximum wave height, probability of exceeding various wave heights and ensemble spread based on Wave EPS Model (up to 264 hours ahead) • Time-series charts of ensemble mean wave height with ensemble spread information and probability of exceeding various wave heights based on Wave EPS Model (up to 264 hours ahead)

Annex 1-5

APPENDIX 1-D

LIST OF ACRONYMS USED IN THE OPERATIONAL MANUAL - METEOROLOGICAL COMPONENT –

AFTN	Aeronautical Fixed Telecommunication Network
AIREP	Aircraft En-route Report
AMeDAS	Automated Meteorological Data Acquisition System
AMV	Atmospheric Motion Vector
APT	Automatic Picture Transmission
ASCAT	Advanced SCATterometer
ASDAR	Aircraft to Satellite Data Relay
BOM	Bureau of Meteorology
BUFR	Binary Universal Form for the Representation of meteorological data
BUOY	Report of a buoy operation
CAPPI	Constant Altitude Plan Position Indicator
CMA	China Meteorological Administration
CMC	Canadian Meteorological Centre
CSR	Clear Sky Radiance
~~DPSK~~	~~Differential Phase-Shift Keying~~
DDN	DataDirect Networks
DWD	Deutscher Wetterdienst
~~EIR~~	~~Enhanced Infrared~~
ECMWF	European Centre for Medium-Range Weather Forecasts
EPS	Ensemble Prediction System
ESCAP	Economic and Social Commission for Asia and the Pacific
FAX	Facsimile
FTP	File Transfer Protocol
GEPS	Global EPS
GMS	Geostationary Meteorological Satellite
GNSS	Global Navigation Satellite System
~~GOES~~	~~Geostationary Operational Environmental Satellite~~
GRIB	General regularly distributed information in binary form
GSM	Global Spectral Model
GTS	Global Telecommunication System
HKO	Hong Kong Observatory
HRPT	High Resolution Picture Transmission
ICAO	International Civil Aviation Organization
IR	Infrared
JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology
JCSAT	Japan Communications Satellite
JMA	Japan Meteorological Agency
JTWC	Joint Typhoon Warning Centre
KMA	Korea Meteorological Administration
~~LTP~~	~~Long Term Plan~~
~~MANAM~~	~~Manual Amendment~~
~~MDUS~~	~~Medium Scale Data Utilization Station~~
METER	Aerodrome routine meteorological report
~~MOS~~	~~Model Output Statistics~~
MPLS	Multi-Protocol Label Switching
MSTP	Multiple Spanning Tree Protocol
~~MSL~~	~~Mean Sea Level~~
MTI	Moving Target Indicator
MTSAT	Multi-functional Transport Satellite

NCEP	National Centers for Environmental Prediction
NESDIS	National Environmental Satellite, Data and Information Service
NMC	National Meteorological Centre
NMHS	National Meteorological and Hydrological Service
NMS	National Meteorological Service
NOAA	National Oceanic and Atmospheric Administration
NWP	Numerical Weather Prediction
OPMET	Operational Meteorological Data
PILOT	Upper-wind report from a fixed land station
PNG	Portable Network Graphics
PWV	Precipitable Water Vapour
R/A	Radar/raingauge-Analyzed precipitation
RADOB	Report of ground radar weather observation
~~RMC~~	~~Regional Meteorological Centre~~
RO	Radio Occultation
ROBEX	Regional OPMET Bulletin Exchange
RSMC	Regional/Specialized Meteorological Centre
RTH	Regional Telecommunication Hub
~~SDUS~~	~~Small Scale Data Utilization Station~~
S.VISSR	Stretched VISSR
SAREP	Report of synoptic interpretation of cloud data obtained by a meteorological satellite
SATAID	SATellite Animation and Interactive Diagnosis
SATEM	Report of satellite remote upper-air soundings of pressure, temperature and humidity
SATOB	Report of satellite observations of wind, surface temperature, cloud, humidity and radiation
SHIP	Report of surface observation from a sea station
SST	Sea Surface Temperature
SYNOP	Report of surface observation from a fixed land station
TAC	Traditional Alphanumeric Code Form
TBB	Temperature Black Body
TC	Typhoon Committee
TCP	Tropical Cyclone Programme
TCP/IP	Transmission Control Protocol / Internet Protocol
TCS	Typhoon Committee Secretariat
TDCF	Table-Driven Code Form
TEMP	Upper-level pressure, temperature, humidity and wind report from a fixed land station
TOPEX	Typhoon Operational Experiment
TS	Tropical Storm
UKMO	United Kingdom Met Office
UNDP	United Nations Development Programme
UTC	Universal Time Coordinated
VIS	Visible
VISSR	Visible and Infrared Spin Scan Radiometer
VPN	Virtual Private Network
~~WMC~~	~~World Meteorological Centre~~
WMO	World Meteorological Organization
WV	Water Vapor
~~WWW~~	~~World Weather Watch~~

Annex 2

Draft Amendments to
the Typhoon Committee Operational Manual – Meteorological Component (TOM)
proposed by the Members

Page	Line	Proposed Amendment	Comments
Section 2.4			
8	L49	JMA started the operation of its new geostationary meteorological satellite, Himawari-8, at 02:00 UTC on 7 July 2015, replacing the previous satellite MTSAT-2. The agency also launched Himawari-9, which is identical to the Himawari-8 unit, on 2 November 2016. After a period of in-orbit testing, Himawari-9 began serving as back-up to Himawari-8 on 10 March 2017 and will continue in this role until the planned switchover in or around 2022. This dual combination of new-generation satellites will support JMA's stable provision of continuous satellite observation data for the Asia-Oceania region until 2029. The meteorological satellite information obtained by Himawari-8/9 and related products are operated as follows:	Addition of the information on Himawari-9 operated by Japan
Section 3.1			
12	Table 3.1	To be replaced by Annex 2-1	Revision and update of the information on chart-form ocean wave products provided by the RSMC Tokyo - Typhoon Center
14	Table 3.2	To be replaced by Annex 2-2	Update of the information on EPS products provided by the RSMC Tokyo - Typhoon Center
16	Table 3.3	To be replaced by Annex 2-3	Revision of the information on storm surge products provided by the RSMC Tokyo - Typhoon Center at the Global Information System Center Tokyo server
Appendix 2-D			
38		To be replaced by Annex 2-4	Update of the distribution of the radar stations in Thailand
Appendix 2-E			
39		To be replaced by Annex 2-5	Update of the information of radar stations in Hong Kong, China; and Thailand
Appendix 2-G			
65		To be replaced by Annex 2-6	Update of the information

			on satellite imagery receiving facilities at Macao, China
Appendix 2-I			
68	L6	HKO conducts dropsonde reconnaissance flights for selected tropical cyclones over the northern part of the South China Sea. Data is disseminated in BUFR format through GTS circuit~~being shared at a regional level~~.	Update of the information on reconnaissance flights conducted by Hong Kong, China
Appendix 4-A			
70		To be replaced by Annex 2-7	Revision of the table on classifications of tropical cyclones
Appendix 5-A			
74		To be replaced by Annex 2-8	Revision of circuits between Bangkok and Offenbach from regional to inter-regional circuits
Appendix 5-B			
75		To be replaced by Annex 2-9	Update of present operational status of the meteorological telecommunication network related to Thailand
Appendix 5-C			
77		To be replaced by Annex 2-10	Update of the contact detail of Hong Kong, China; Japan; Macao, China; Republic of Korea; TCS; and Thailand
Appendix 6-B			
88	L10	The two appropriate periods are selected from the one year starting on 1st January~~November~~ and ending on 31st December~~October of the subsequent year~~.	Revision of monitoring period for regular monitoring
Appendix 7-A			
96		To be replaced by Annex 2-11	Update of the information on archive data by the RSMC Tokyo – Typhoon Center

Annex 2-1

Table 3.1 Chart-form products provided by RSMC Tokyo - Typhoon Center for regional purposes

Area	Contents and Level	Forecast hours	Initial time	Availability
A' (Far East)	500hPa (Z, ζ)	Analysis	00, 12UTC	GTS
		24, 36	00, 12UTC	GTS, JMH
	500hPa (T), 700hPa (D)	24, 36	00, 12UTC	GTS, JMH
	700hPa (ω), 850hPa (T, A)	Analysis	00, 12UTC	GTS
		24, 36	00, 12UTC	GTS, JMH
	Surface (P, R, A)	24, 36	00, 12UTC	GTS, JMH
C (East Asia)	300hPa (Z, T, W, A)	Analysis	00UTC	GTS
	500hPa (Z, T, A)	Analysis	00, 12UTC	GTS, JMH
	500hPa (Z, ζ)	48, 72	00, 12UTC	GTS
	700hPa (Z, T, D, A)	Analysis	00, 12UTC	GTS
	700hPa (ω), 850hPa (T, A)	48, 72	12UTC	GTS
	850hPa (Z, T, D, A)	Analysis	00, 12UTC	GTS, JMH
	Surface (P, R)	24, 48, 72	00, 12UTC	GTS, JMH
		96, 120	12UTC	JMH
O (Asia)	500hPa (Z, ζ)	96, 120, 144, 168, 192	12UTC	GTS
	850hPa (T), Surface (P)			
Q (Asia Pacific)	200hPa (Z, T, W), Tropopause (Z)	Analysis	00, 12UTC	GTS
	250hPa (Z, T, W)	Analysis, 24	00, 12UTC	
	500hPa (Z, T, W)	24	00, 12UTC	
D (N.H.)	500hPa (Z, T)	Analysis	12UTC	GTS
W (NW Pacific)	200hPa (streamline)	Analysis, 24, 48	00, 12UTC	GTS
	850hPa (streamline)		00, 12UTC	
C'' (NW Pacific)	Ocean Wave (height, period and direction)	Analysis	00, 12UTC	GTS, JMH
	Ocean Wave (height, period and direction)	12, 24, 48, 72		
	Ocean Wave (height, period, direction and rough sea area)	24		
C	Sea Surface Temperature	Daily analysis	-	JMH
C'2 (Asia Pacific)	Surface (P)	Analysis	00,06,12, 18UTC	GTS, JMH
		24	00, 12UTC	
		48		
	Surface (Typhoon Forecast)	12,24,48,72	00,06,12, 18UTC	
		24,48,72,96, 120		JMH

Notes:

(a) Area

A', C, O, Q, D, W,C'' and C'2 are illustrated in Figure 3.1.

(b) Contents

Z: geopotential height ζ: vorticity T: temperature
D: dewpoint depression ω: vertical velocity W: wind speed by isotach
A: wind arrows P: sea level pressure R: rainfall

Annex 2-2

Table 3.2 NWP products (GSM and EPS) provided by RSMC Tokyo - Typhoon Center
(Available at http://www.wis-jma.go.jp/cms/)

Model	GSM	GSM	GSM
Area and resolution	Whole globe, 1.25°×1.25°	20°S–60°N, 60°E–160°W 1.25°×1.25°	Whole globe, 2.5°×2.5°
Levels and elements	10 hPa: Z, U, V, T 20 hPa: Z, U, V, T 30 hPa: Z, U, V, T 50 hPa: Z, U, V, T 70 hPa: Z, U, V, T 100 hPa: Z, U, V, T 150 hPa: Z, U, V, T 200 hPa: Z, U, V, T, ψ, χ 250 hPa: Z, U, V, T 300 hPa: Z, U, V, T, H, ω 400 hPa: Z, U, V, T, H, ω 500 hPa: Z, U, V, T, H, ω, ζ 600 hPa: Z, U, V, T, H, ω 700 hPa: Z, U, V, T, H, ω 850 hPa: Z, U, V, T, H, ω, ψ, χ 925 hPa: Z, U, V, T, H, ω 1000 hPa: Z, U, V, T, H, ω Surface: P, U, V, T, H, R†	10 hPa: Z, U, V, T 20 hPa: Z, U, V, T 30 hPa: Z, U, V, T 50 hPa: Z, U, V, T 70 hPa: Z, U, V, T 100 hPa: Z, U, V, T 150 hPa: Z, U, V, T 200 hPa: Z[§], U[§], V[§], T[§], ψ, χ 250 hPa: Z, U, V, T 300 hPa: Z, U, V, T, D 400 hPa: Z, U, V, T, D 500 hPa: Z[§], U[§], V[§], T[§], D[§], ζ 700 hPa: Z[§], U[§], V[§], T[§], D[§], ω 850 hPa: Z[§], U[§], V[§], T[§], D[§], ω, ψ, χ 925 hPa: Z, U, V, T, D, ω 1000 hPa: Z, U, V, T, D Surface: P[¶], U[¶], V[¶], T[¶], D[¶], R[¶]	10 hPa: Z*, U*, V*, T* 20 hPa: Z*, U*, V*, T* 30 hPa: Z°, U°, V°, T° 50 hPa: Z°, U°, V°, T° 70 hPa: Z°, U°, V°, T° 100 hPa: Z°, U°, V°, T° 150 hPa: Z*, U*, V*, T* 200 hPa: Z, U, V, T 250 hPa: Z°, U°, V°, T° 300 hPa: Z, U, V, T, D*‡ 400 hPa: Z*, U*, V*, T*, D*‡ 500 hPa: Z, U, V, T, D*‡ 700 hPa: Z, U, V, T, D 850 hPa: Z, U, V, T, D 1000 hPa: Z, U*, V*, T*, D*‡ Surface: P, U, V, T, D*‡, R†
Forecast hours	0–84 every 6 hours and 96–192 every 12 hours for 12UTC initial † Except analysis	0–84 (every 6 hours) § 96–192 (every 24 hours) for 12UTC initial ¶ 90–192 (every 6 hours) for 12UTC initial	0–72 every 24 hours and 96–192 every 24 hours for 12UTC ° 0–120 for 12UTC † Except analysis * Analysis only
Initial times	00, 06, 12, 18UTC	00, 06, 12, 18UTC	00UTC and 12UTC ‡ 00UTC only

Model	Global~~One-week~~ EPS
Area and resolution	Whole globe, 2.5°×2.5°
Levels and elements	250 hPa: μU, σU, μV, σV 500 hPa: μZ, σZ 850 hPa: μU, σU, μV, σV, μT, σT 1000 hPa: μZ, σZ Surface: μP, σP
Forecast hours	0–192 every 12 hours
Initial times	00, 12UTC

Annex 2-3

Table 3.3 List of other products provided by RSMC Tokyo - Typhoon Center
(Available at the Global Information System Center Tokyo server:
http://www.wis-jma.go.jp/cms/)

Data	Contents / frequency (initial time)
Satellite products	High density atmospheric motion vectors (BUFR) Himawari-8 (VIS, IR, WVx3: every hour), 60S-60N, 90E-170W Clear Sky Radiance (CSR) data (BUFR) Himawari-8 radiances and brightness temperatures averaged over cloud-free pixels: every hour
Tropical cyclone Information	Tropical cyclone related information (BUFR) • tropical cyclone analysis data (00, 06, 12 and 18 UTC)
Wave data	Global Wave Model (GRIB2) • significant wave height • prevailing wave period • wave direction Forecast hours: 0–84 every 6 hours (00, 06 and 18UTC) 0–84 every 6 hours and 96-192 every 12 hours (12 UTC)
Observational data	(a) Surface data (TAC/TDCF) SYNOP, SHIP, BUOY: Mostly 4 times a day (b) Upper-air data (TAC/TDCF) TEMP (parts A-D), PILOT (parts A-D): Mostly twice a day
~~Storm surge~~	~~Storm surge model for Asian area~~ ~~· storm surge distribution (map image)~~ ~~· time series charts (at requested locations)~~ ~~The plotted values are storm surges, predicted water levels, astronomical tides, surface winds, and sea level pressures.~~ ~~Forecast hours:~~ ~~0–72 every 3 hours (00, 06 12, and 18UTC)~~ ~~Only in the case of a tropical cyclone being in the forecast time~~ ~~(Available at https://tynwp-web.kishou.go.jp/)~~
SATAID service	(a) Satellite imagery (SATAID) Himawari-8 (b) Observation data (SATAID) SYNOP, SHIP, METAR, TEMP (A, B) and ASCAT sea-surface wind (c) NWP products (SATAID) GSM (Available at http://www.wis-jma.go.jp/cms/sataid/)

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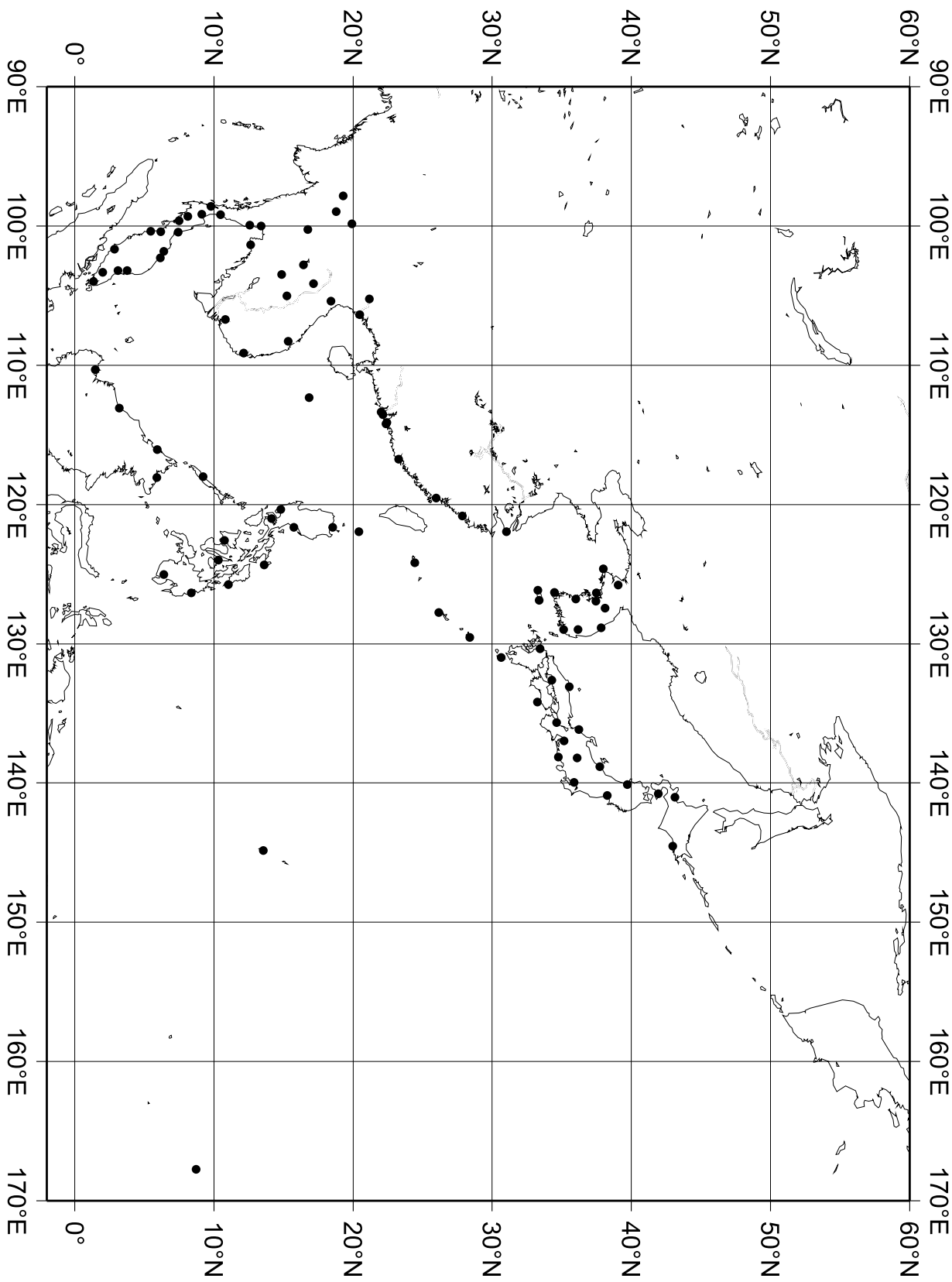
APPENDIX 2-D

DISTRIBUTION OF THE RADAR STATIONS OF TYPHOON COMMITTEE MEMBERS



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APPENDIX 2-D, p.3

Name of the Member **Hong Kong, China**

NAME OF STATION		Tai Mo Shan	Tate's Cairn			
SPECIFICATIONS	Unit					
Index number		45009	45010			
Location of station		22° 25′ N 114° 07′ E	22° 21′ N 114° 13′ E			
Antenna elevation	m	968	582			
Wave length	cm	10.6	10.3			
Peak power of transmitter	kW	650	650			
Pulse length	μ s	1.0/2.0~~1.8~~	1.0/2.0			
Sensitivity minimum of receiver	dBm	-117	-114			
Beam width (Width of over -3dB antenna gain of maximum)	deg	0.9(H) 0.9(V)	0.9			
Detection range	km	500	500			
Scan mode in observation 1.Fixed elevation 2.CAPPI 3.Manually controlled		2	2			
DATA PROCESSING						
MTI processing 1.Yes, 2.No		2	2			
Doppler processing 1.Yes, 2.No		1	1			
Display 1.Digital, 2.Analog		1	1			
OPERATION MODE (When tropical cyclone is within range of detection) 1.Hourly 2.3-hourly 3.Others		3 (Continuous)	3 (Continuous)			
PRESENT STATUS 1.Operational 2.Not operational (for research etc.)		1	1			

APPENDIX 2-E, p.19

Name of the Member **Thailand - 1**

NAME OF STATION		Mahong Son	Chiang Rai	Chiang Mai	Sakol Nakon	Phitsanulok
SPECIFICATIONS	Unit					
Index number		48300	48303	48327	48356	48378
Location of station		19° 18´ N 97° 50´ E	19° 55´ N 99° 50´ E	18° 47´ N 98° 59´ E	17° 09´ N 104° 08´ E	16° 46´ N 100° 16´ E
Antenna elevation	m	292	440	337	198	56
Wave length	cm	3	5	5	5	5
Peak power of transmitter	kW	200	300~~250~~	300~~250~~	300~~250~~	300~~25~~
Pulse length	μ s	0.5&1	0.8&2	0.8&2	0.8&2	0.8&2
Sensitivity minimum of receiver	dBm	-90~~108~~	-110~~108~~	-110~~106~~	-110~~108~~	-110~~106~~
Beam width (Width of over -3dB antenna gain of maximum)	deg	2	1.0~~1.1~~	1.0~~1.1~~	1.0~~1.1~~	1.0~~1.1~~
Detection range	km	120	240	240	240	240
Scan mode in observation 1.Fixed elevation 2.CAPPI 3.Manually controlled		2, 3	2, 3	2, 3	2,3	2, 3
DATA PROCESSING						
MTI processing 1.Yes, 2.No		1	1	1	1	1
Doppler processing 1.Yes, 2.No		1	1	1	1	1
Display 1.Digital, 2.Analog		1	1	1	1	1
OPERATION MODE (When tropical cyclone is within range of detection) 1.Hourly 2.3-hourly 3.Others		1, 3	1, 3	1, 3	1, 3	1, 3
PRESENT STATUS 1.Operational 2.Not operational(for research etc.)		1	1	1	1	1

Name of the Member **Thailand - 2**

NAME OF STATION		Khon Khaen	Ubol	Surin	~~Bangkok~~	~~Donmuang~~
SPECIFICATIONS	Unit					
Index number		48381	48407	48432	~~48455~~	~~48456~~
Location of station		16° 27´ N 102° 47´ E	15° 14´ N 105° 01´ E	14° 53´ N 103° 29´ E	~~13° 23´ N~~ ~~100° 36´ E~~	~~13° 55´ N~~ ~~100° 36´ E~~
Antenna elevation	m	215	155	175	~~60~~	~~45~~
Wave length	cm	5~~10~~	5	5~~10~~	~~3~~	~~10~~
Peak power of transmitter	kW	300~~500~~	300~~250~~	300~~500~~	~~25~~	~~500~~
Pulse length	μ s	0.8&2	0.8&2	0.8&2	~~0.5&1~~	~~0.8&2~~
Sensitivity minimum of receiver	dBm	-106	-108	-106	~~-108~~	~~-106~~
Beam width (Width of over -3dB antenna gain of maximum)	deg	1.0~~2.2~~	1.0~~1.1~~	1.0~~2.1~~	~~2.5~~	~~1.2~~
Detection range	km	240	240	240	~~60~~	~~240~~
Scan mode in observation 1.Fixed elevation 2.CAPPI 3.Manually controlled		2, 3	2, 3	2, 3	~~2, 3~~	~~2, 3~~
DATA PROCESSING						
MTI processing 1.Yes, 2.No		1	1	1	~~1~~	~~1~~
Doppler processing 1.Yes, 2.No		1	1	1	~~1~~	~~1~~
Display 1.Digital, 2.Analog		1	1	1	~~1~~	~~1~~
OPERATION MODE (When tropical cyclone is within range of detection) 1.Hourly 2.3-hourly 3.Others		1, 3	1, 3	1, 3	~~1, 3~~	~~1, 3~~
PRESENT STATUS 1.Operational 2.Not operational(for research etc.)		1	1	1	~~1~~	~~1~~

APPENDIX 2-E, p.21

Name of the Member **Thailand - 3**

NAME OF STATION		Hua Hin	Rayong	Chumporn	Ranong	Surat Thani
SPECIFICATIONS	Unit					
Index number		48475	48478	48517	48532	48551
Location of station		12° 35´ N 99° 57´ E	12° 38´ N 101° 21´ E	10° 29´ N 99° 11´ E	9° 47´ N 98° 36´ E	9° 08´ N 99° 09´ E
Antenna elevation	m	30	32	28	45	33
Wave length	cm	10	5	5	3	5~~10~~
Peak power of transmitter	kW	500	300~~500~~	300~~250~~	200	300~~500~~
Pulse length	μ s	0.8&2	0.882	0.8&2	0.5&1	0.8&2
Sensitivity minimum of receiver	dBm	-106	-115~~106~~	-110~~108~~	-90~~108~~	-110~~106~~
Beam width (Width of over -3dB antenna gain of maximum)	deg	2.1	1.0~~1.1~~	1.0~~1.1~~	2	1.0~~2.2~~
Detection range	km	240	240	240	120	240
Scan mode in observation 1.Fixed elevation 2.CAPPI 3.Manually controlled		2, 3	2, 3	2, 3	2, 3	2, 3
DATA PROCESSING						
MTI processing 1.Yes, 2.No		1	1	1	1	1
Doppler processing 1.Yes, 2.No		1	1	1	1	1
Display 1.Digital, 2.Analog		1	1	1	1	1
OPERATION MODE (When tropical cyclone is within range of detection) 1.Hourly 2.3-hourly 3.Others		1, 3	1, 3	1, 3	1, 3	1, 3
PRESENT STATUS 1.Operational 2.Not operational(for research etc.)		1	1	1	2	1

APPENDIX 2-E, p.22

Name of the Member **Thailand - 4**

NAME OF STATION		Phuket	Trang	Sathing Pra (Songkla)	Narathiwat	Samut Songkram
SPECIFICATIONS	Unit					
Index number		48565	48567	48568	48583	48402
Location of station		8° 08´ N 99° 19´ E	7° 31´ N 99° 37´ E	7° 26´ N 100° 27´ E	6° 25´ N 101° 49´ E	13° 24´ N 100° 01´ E
Antenna elevation	m	281	40	30	29	29
Wave length	cm	5	3	5	53	5
Peak power of transmitter	kW	300250	200	300250	300200	300
Pulse length	μ s	0.852	0.5&1	0.8&2	0.5&1	0.812
Sensitivity minimum of receiver	dBm	-106	-90108	-115106	-110108	-110
Beam width (Width of over -3dB antenna gain of maximum)	deg	1.01.1	2	1.01.1	1.02	1.0
Detection range	km	240	120	240	120	240
Scan mode in observation 1.Fixed elevation 2.CAPPI 3.Manually controlled		2, 3	2, 3	2, 3	2, 3	2, 3
DATA PROCESSING						
MTI processing 1.Yes, 2.No		1	1	1	1	1
Doppler processing 1.Yes, 2.No		1	1	1	1	1
Display 1.Digital, 2.Analog		1	1	1	1	1
OPERATION MODE (When tropical cyclone is within range of detection) 1.Hourly 2.3-hourly 3.Others		1, 3	1, 3	1, 3	1, 3	1, 3
PRESENT STATUS 1.Operational 2.Not operational(for research etc.)		1	1	1	1	1

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APPENDIX 2-G, p.1

SATELLITE IMAGERY RECEIVING FACILITIES AT TYPHOON COMMITTEE MEMBERS

Member	Station		Himawari 1. Himawari Cloud 2. Himawari Cast	NOAA 1. HRPT 2. APT	Meteosat 1. P-DUS
Cambodia			1, 2		
China	Beijing Shanghai Shenyan Guangzhou Cheng-chou Cheng-tu Lan-chou Kunming Changsha Nanjing Harbin	(39.9°N, 116.4°E) (31.1°N, 121.4°E) (41.8°N, 123.6°E) (23.1°N, 113.3°E) (34.7°N, 113.7°E) (31.2°N, 114.0°E) (36.1°N, 103.9°E) (25.0°N, 102.7°E) (28.2°N, 113.1°E) (32.0°N, 118.8°E) (45.8°N, 126.8°E)	1	1, 2 2	
Democratic People's Republic of Korea	Pyongyang	(39.0°N, 125.8°E)		1	
Hong Kong, China*	Kowloon	(22.3°N, 114.2°E)	1, 2	1	
Japan	Minamitorishima	(24.3°N, 154.0°E)	2		
Lao People's Democratic Republic			2		
Macao, China*	Macao	(22.2°N, 113.5°E)	1, 2	1	
Malaysia	Petaling Jaya	(3.1°N, 101.7°E)	1, 2	1	
Philippines	Quezon City Cagayan de Oro City Pasay City Cebu	(14.7°N, 121.0°E) (8.5°N, 124.6°E) (14.5°N, 121.0°E) (10.3°N, 124.0°E)	1, 2	1	

*Hong Kong, China receives AQUA (MODIS), NPP(CrIs, VIIRS, ATMS), FY-2 (S-VISSR), and TERRA (MODIS).

* Macao, China receives FY-2D, FY-2E (S-VISSR) Stretched VISSR.

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APPENDIX 4-A

CLASSIFICATIONS OF TROPICAL CYCLONES IN THE WESTERN NORTH PACIFIC INTERNALLY USED BY MEMBERS

Maximum sustained winds (knots)	≤ 33 ~~Maximum sustained winds (knots)~~	34 - 47	48 - 63	≥ 64 ~~-~~		
Typhoon Committee (10 min)	Tropical Depression (TD)~~10 min~~	Tropical Storm (TS)	Severe Tropical Storm (STS)	Typhoon (TY)		
China (2 min)	TD~~2 min~~	TS	STS	64 - 80 TY	81 - 99 Severe Typhoon (STY)	≥ 100 ~~-~~ Super Typhoon (Super TY)
Hong Kong, China (10 min)	TD~~10 min~~	TS	STS	64 - 80 TY	81 - 99 Severe Typhoon (ST)	≥ 100 ~~-~~ Super Typhoon (Super T)
Japan (10 min)	TD~~10 min~~	TS	STS	64 - 84 TY	85 - 104 Very Strong TY	≥ 105 ~~-~~ Violent TY
U.S. (1 min)	TD~~1 min~~	TS		64 - 129 TY		≥ 130 ~~-~~ Super TY

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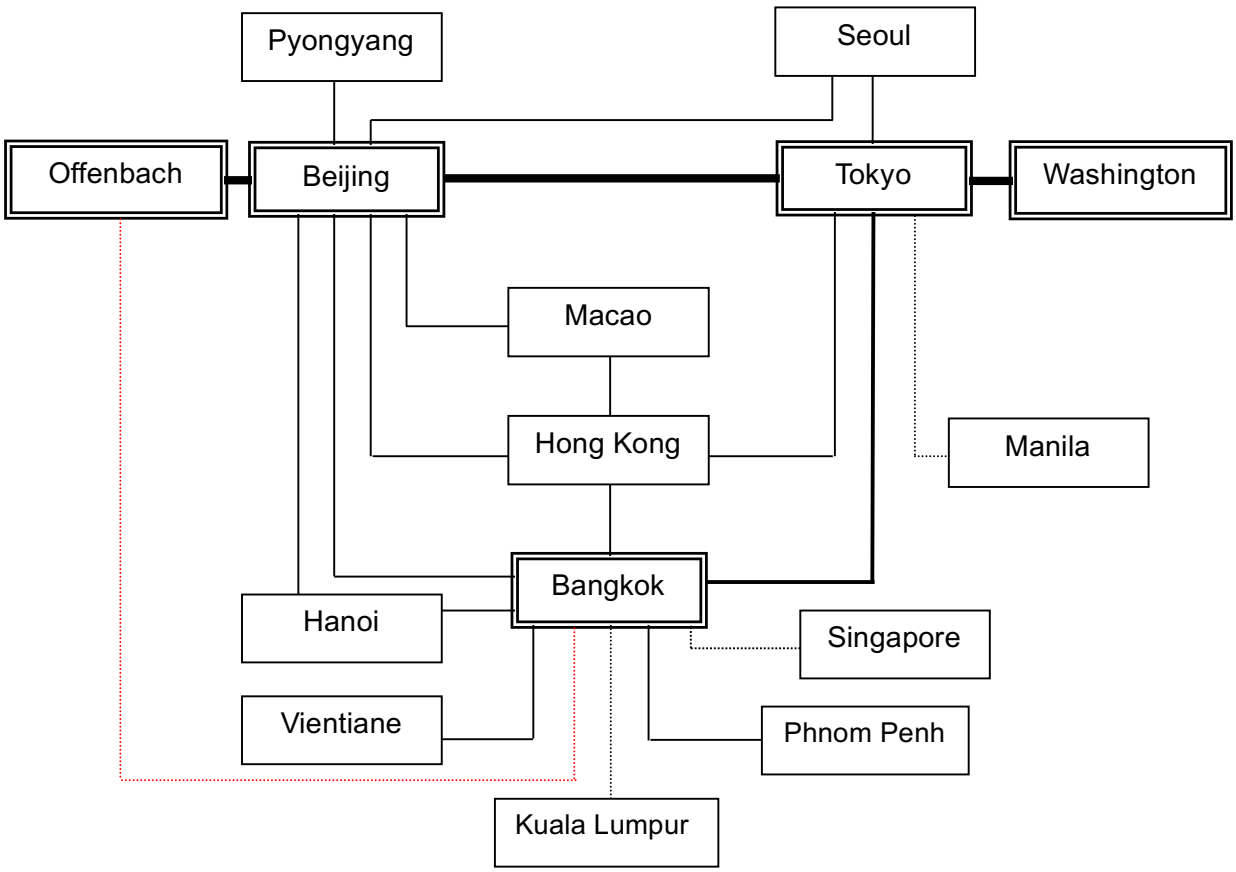
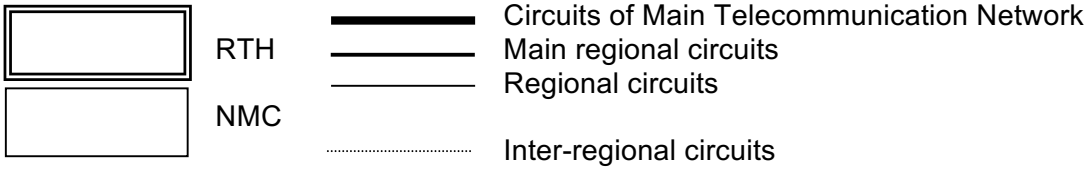
APPENDIX 5-A

METEOROLOGICAL TELECOMMUNICATION NETWORK FOR THE TYPHOON COMMITTEE





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APPENDIX 5-B, p.1

PRESENT OPERATIONAL STATUS OF THE METEOROLOGICAL TELECOMMUNICATION NETWORK FOR THE TYPHOON COMMITTEE REGION

	Main Telecommunication Network	Present Operational Status
1.		
	Beijing - Tokyo	Cable (MPLS), TCP/IP Beijing 16 Mbps/Tokyo 10 Mbps
	Beijing - Offenbach	Cable (MPLS), TCP/IP Beijing 16 Mbps/Offenbach 50 Mbps
	Washington - Tokyo	Cable (MPLS), TCP/IP Washington 50 Mbps/Tokyo 10 Mbps
2.	Main regional circuit	
	Tokyo - Bangkok	Cable (MPLS), TCP/IP Tokyo 2 Mbps/Bangkok 128 kbps
3.	Regional circuits	
	Bangkok - Beijing	64 kbps leased line CMACast (Satellite broadcast)
	Bangkok - Hanoi	64 kbps leased line, FTP protocol
	Bangkok – Hong Kong	Internet, FTP protocol
	Bangkok - Phnom Penh	Internet (VPN), TCP/IP
	Bangkok - Vientiane	Cable (DDN), 64 kbps, FTP protocol and Internet, FTP protocol
	Beijing - Hanoi	64 kbps leased line, CMACast (Satellite broadcast)
	Beijing - Hong Kong	Cable (MSTP), 4 Mbps TCP/IP CMACast (Satellite broadcast)
	Beijing - Macao	2Mbps leased line CMACast (Satellite broadcast)
	Beijing - Pyongyang	64 kbps leased line,; CMACast (Satellite broadcast)
	Beijing - Seoul	Cable (MPLS), TCP/IP Beijing 16 Mbps/Seoul 4 Mbps

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APPENDIX 5-C, p.1

LIST OF ADDRESSES, TELEX/CABLE AND TELEPHONE NUMBERS OF THE TROPICAL CYCLONE WARNING CENTERS IN THE REGION

Centre numbers	Mailing address	Telex/cable, Telephone, fax
Cambodia		
Attn. Mr Ly Chana Deputy Director Department of Agricultural Hydraulics and Hydrometeorology	Norodom Boulevard	Tel.: (+855) 15 913081 Fax: (+855) 23 26345
Attn. Mr Hun Kim Hak Chief of Cambodian National Airport	Pochentong	Tel/Fax:(+855) 23 66193 66192 NMC 66191
China		
National Meteorological Center China Meteorological Adm. (Director: Bi Baogui)	No. 46 Zhongguancun Nandajie, Beijing 100081	Tel.: (+86) (10) 5899 5809 Cable: 2894 Fax: (+86) (10) 6217 2956 E-mail: bibg@cma.gov.cn
Democratic People's Republic of Korea		
Mr Ko Sang Bok Director Central Forecast Research Insitute State Hydrometeorological Adm.	Oesong-dong Central District	Telex: 38022 TCT KP Tel.: (+850) (2) 321 4539 Fax: (+850) (2) 381 4410
Hong Kong, China		
Central Forecasting Office Hong Kong Observatory (Attn. Mr. L.S. Lee) 94482~~2721 5034~~	134A Nathan Road Tsim Sha Tsui Kowloon Hong Kong, China	Tel.: (+852) 2926 8371 (Office hours) (+852) 2368 1944 (24 hours) Fax: (+852) 2311 (24 hours) E-mail: lslee@hko.gov.hk
Japan		
Forecast Division Forecast Department Japan Meteorological Agency (Director: Y. Kajihara~~H. Yokoyama~~) weekdays)	1-3-4 Otemachi Chiyoda-ku Tokyo 100-8122	Telex: 2228080 METTOKJ (24 hours) Tel.: (+81) (3)3211 8303 (00 - 09 UTC on

(+81) (3) 3211 7617
(24 hours)
Fax: (+81) (3) 3211 8303

Lao People's Democratic Republic

Ministry of Agriculture and Forestry, Department of VIENTIANE Meteorology and Hydrology	P.O. Box 811 Vientiane	Telex: 4306 ONU VTELS Cable: UNDEVPRO

Macao, China

Meteorological and Geophysical Bureau (Director: Tam Vai Man~~Fong Soi Kun~~)	P.O. Box 93 Macao, China meteo@smg.gov.mo	Tel.: (+853) 88986173 Fax: (+853) 28850773 E-mail:

Malaysia

Malaysian Meteorological Dep. (Central Forecast Office, Director: Mr. Saw Bun Liong)	Jalan Sultan 46667 Petaling Jaya Selangor Malaysia	Tel.: (+60) (3) 7967 8116 (+60) (3) 7967 8119 Fax: (+60) (3) 7955 0964 E-mail: cfo@met.gov.my

Philippines

Esperanza O. Cayanan Ph.D. Weather Services Chief Weather Division, PAGASA	WFFC Bldg., BIR Road, Diliman, Quezon City 1100	Telex: 66682 WXMLA PN Tel.: (+63) (2) 922 1996 Cable: 66682 WX MLA Fax: (+63) (2) 922 5287 (24 hours)

T C S

Secretary: Yu Jixin~~Olavo Rasquinho~~	Tel: (853) 8 8010531 Coloane, Macau yujx~~olavo~~@typhooncommittee.org	Avenida de 5 de Outubro Fax: (853) 8 8010530 E-mail:

Republic of Korea

National Typhoon Center Korea Meteorological Administration (Director: Deok Hwan JEONG~~Youngsin CHUN~~) 2 Seoseongro 810-gil, Namwon-eup, Seogwipo, Jeju, 63614, Republic of Korea		Tel.: (+82) (70) 7850-6351 Fax: (+82) (64) 805-0368

Thailand

Thai Meteorological Department (Director-General: Mr. Wanchai Sakudomchai)	4353 Sukhumvit Road Bangkok 10260 tmd_inter@tmd.go.th	Tel.: (+66) (2) 366 6325 Fax.: (+66) (2) 399 4020 E-mail:
Weather Forecast Bureau Thai Meteorological Department (Director: Dr. Sugunyanee Yavinchan)	4353 Sukhumvit Road Bangkok 10260	Tel&Fax: (+66) (2) 399 4001 E-mail: sugunyanee@hotmail.com
Telecommunications and Information Technology Bureau Thai Meteorological Department (Acting Director : Mr. Wirat Woranut~~Somwhang Lodchanaangsu~~)	4353 Sukhumvit Road Bangkok 10260	Tel.: (+66) (2) 399 4555 Fax: (+66) (2) 398 9861 E-mail: tmd_inter@tmd.go.th

USA

National Weather Service (Genevieve Miller, Meteorologist in charge)	3232 Hueneme Road Barrigada Guam 96913	Tel.: (+1-671) 472 0944 Fax: (+1-671) 472 7405
RSMC Honolulu (Director: Raymond Tanabe)	2525 Correa Road Suite 250 Honolulu, HI 96822	Tel.: (+1-808) 973-5272 Fax: (+1-808) 973-5271

Viet Nam

Forecast Division Forecast Department Hydro-Meteorological Service (Director: Nguyan Cong Thanh)	4 Dan Thai Than Hanoi	Tel.: (+84) (4) 264020 Fax: (+84) (4) 254278

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APPENDIX 7-A, p.1

LIST OF DATA ARCHIVED BY RSMC TOKYO - TYPHOON CENTER

(a) Observation data (except for Himawari imagery data)~~Level II-b~~

Kinds of data: SYNOP, AMeDAS, SHIP, BUOY, TEMP, PILOT, Aircraft, Wind Profiler, AMV, Scatterometer, MW Sounder, MW Imager, CSR, GNSS-RO, GNSS-PWV, Radar Reflectivity, Radial Velocity, R/A, Typhoon Bogus
~~Surface, ship, buoy, upper-air, RADOB, aircraft, ASDAR, advisory warning, SAREP, SATEM, SATOB, TBB grid value and cloud amount (GMS);~~

~~**Area coverage:** SATEM : 90°E ~ 180°E and 0° ~ 45°N~~

~~SATOB, TBB grid value and cloud amount : area covered by Himawari series~~

~~Other data : within the area of 80°E ~ 160°W and 20°S ~ 60°N~~

(b) Himawari imagery data

Himawari Standard Data (HSD):

Kind of data: Himawari full-spec imagery data

Data format: Himawari Standard Format
(http://www.data.jma.go.jp/mscweb/en/himawari89/space_segment/hsd_sample/HS_D_users_guide_en_v132~~2~~.pdf)

Meteorological Satellite Center Monthly Report (DVD):

Kinds of data: Himawari images in SATAID and PNG formats.

(http://www.data.jma.go.jp/mscweb/en/product/library/report/)

Area coverage:
SATAID: 115°E ~ 150°E and 15°N ~ 50°N
PNG: Full earth disk as seen from 140°E

(c) Objective Analysis data~~Level III-a~~

Kinds of data: Grid point data of the objective surface/atmospheric analysis ~~obtained by the global objective analysis system in RSMC.~~

Area coverage: Global area covered by 1.25 X 1.25 latitude-longitude grid system.

Time of analysis: 00, 06, 12 and 18 UTC

Element and layer:

Surface: Sea surface pressure (Ps), temperature (Ts),
Dd~~d~~ew point depression (Ts - Tds), wind (Us, Vs);

Specific pressure levels (1000 – 0.4~~10~~ hPa):

Geopotential height (Z), temperature (T), wind (U, V)~~,~~;
Dew point depression (T-Td)

~~Specific pressure levels (1000 - 300 hPa):~~
~~Dew point depression (T-Td).~~

Western North Pacific Sea Surface Temperature Analysis data

Kinds of data: Grid point data of the objective sea surface temperature analysis

Area coverage: Western North Pacific area (100°E ~ 180°E and 0° ~ 60°N)
covered by 0.1 X 0.1 latitude-longitude grid system.

Time of analysis: 18 UTC

Element: SST, SST anomalies from the JMA climatology