**APPENDIX XIII**

**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](#4.2 Classification of tropical cyclones*, **).~~"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 “SSVB01-19 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 [2-H](#_APPENDIX_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.~~ | Transfer of detailed information on SAREP reports issued by Hong Kong, China to Appendix 2-H (See Annex 1-2) based 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 | 1. When a tropical cyclone of TS intensity or higher is located in the responsible area of the RSMC Tokyo - Typhoon Center; 2. When a tropical depression existing in the responsible area is forecasted to have an intensity of TS or higher within 24 hours; or 3. 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 | 1. 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/) |

### Annex 2-4

APPENDIX 2-D

**DISTRIBUTION OF THE RADAR STATIONS OF TYPHOON COMMITTEE MEMBERS**

radar_map

### Annex 2-5

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 | 22° 21´ N |  |  |  |
|  |  | 114° 07´ E | 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 |  | -117 | -114 |  |  |  |
|  | dBm |
|  | Beam width  (Width of over -3dB  antenna gain of maximum) |  | 0.9(H)  0.9(V) | 0.9 |  |  |  |
|  | deg |
|  |  |
|  | Detection range | km | 500 | 500 |  |  |  |
|  | Scan mode in observation |  | 2 | 2 |  |  |  |
|  | 1.Fixed elevation |  |
|  | 2.CAPPI |  |
|  | 3.Manually controlled |  |
|  | DATA PROCESSING |  |  |  |  |  |  |
|  | MTI processing |  | 2 | 2 |  |  |  |
|  | 1.Yes, 2.No |  |
|  | Doppler processing |  | 1 | 1 |  |  |  |
|  | 1.Yes, 2.No |  |
|  | Display |  | 1 | 1 |  |  |  |
|  | 1.Digital, 2.Analog |  |
|  | OPERATION MODE (When tropical | | 3  (Continuous) | 3  (Continuous) |  |  |  |
|  | cyclone is within range of detection) | |
|  | 1.Hourly |  |
|  | 2.3-hourly |  |
|  | 3.Others |  |
|  | PRESENT STATUS |  | 1 | 1 |  |  |  |
|  | 1.Operational |  |
|  | 2.Not operational (for research etc.) | |

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 | 19° 55´ N | 18° 47´ N | 17° 09´ N | 16° 46´ N |
|  |  | 97° 50´ E | 99° 50´ E | 98° 59´ E | 104° 08´ E | 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 |  | -90~~108~~ | -110~~108~~ | -110~~106~~ | -110~~108~~ | -110~~106~~ |
|  | dBm |
|  | Beam width  (Width of over -3dB  antenna gain of maximum) |  | 2 | 1.0~~1.1~~ | 1.0~~1.1~~ | 1.0~~1.1~~ | 1.0~~1.1~~ |
|  | deg |
|  |  |
|  | Detection range | km | 120 | 240 | 240 | 240 | 240 |
|  | Scan mode in observation |  | 2, 3 | 2, 3 | 2, 3 | 2,3 | 2, 3 |
|  | 1.Fixed elevation |  |
|  | 2.CAPPI |  |
|  | 3.Manually controlled |  |
|  | DATA PROCESSING |  |  |  |  |  |  |
|  | MTI processing |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Yes, 2.No |  |
|  | Doppler processing |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Yes, 2.No |  |
|  | Display |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Digital, 2.Analog |  |
|  | OPERATION MODE (When tropical | | 1, 3 | 1, 3 | 1, 3 | 1, 3 | 1, 3 |
|  | cyclone is within range of detection) | |
|  | 1.Hourly |  |
|  | 2.3-hourly |  |
|  | 3.Others |  |
|  | PRESENT STATUS |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Operational |  |
|  | 2.Not operational(for research etc.) | |

APPENDIX 2-E, p.20

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 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 | 15° 14´ N | 14° 53´ N | ~~13° 23´ N~~ | ~~13° 55´ N~~ |
|  |  | 102° 47´ E | 105° 01´ E | 103° 29´ E | ~~100° 36´ E~~ | ~~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 |  | -106 | -108 | -106 | ~~-108~~ | ~~-106~~ |
|  | dBm |
|  | Beam width  (Width of over -3dB  antenna gain of maximum) |  | 1.0~~2.2~~ | 1.0~~1.1~~ | 1.0~~2.1~~ | ~~2.5~~ | ~~1.2~~ |
|  | deg |
|  |  |
|  | Detection range | km | 240 | 240 | 240 | ~~60~~ | ~~240~~ |
|  | Scan mode in observation |  | 2, 3 | 2, 3 | 2, 3 | ~~2, 3~~ | ~~2, 3~~ |
|  | 1.Fixed elevation |  |
|  | 2.CAPPI |  |
|  | 3.Manually controlled |  |
|  | DATA PROCESSING |  |  |  |  |  |  |
|  | MTI processing |  | 1 | 1 | 1 | ~~1~~ | ~~1~~ |
|  | 1.Yes, 2.No |  |
|  | Doppler processing |  | 1 | 1 | 1 | ~~1~~ | ~~1~~ |
|  | 1.Yes, 2.No |  |
|  | Display |  | 1 | 1 | 1 | ~~1~~ | ~~1~~ |
|  | 1.Digital, 2.Analog |  |
|  | OPERATION MODE (When tropical | | 1, 3 | 1, 3 | 1, 3 | ~~1, 3~~ | ~~1, 3~~ |
|  | cyclone is within range of detection) | |
|  | 1.Hourly |  |
|  | 2.3-hourly |  |
|  | 3.Others |  |
|  | PRESENT STATUS |  | 1 | 1 | 1 | ~~1~~ | ~~1~~ |
|  | 1.Operational |  |
|  | 2.Not operational(for research etc.) | |

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 | 12° 38´ N | 10° 29´ N | 9° 47´ N | 9° 08´ N |
|  |  | 99° 57´ E | 101° 21´ E | 99° 11´ E | 98° 36´ E | 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 |  | -106 | -115~~106~~ | -110~~108~~ | -90~~108~~ | -110~~106~~ |
|  | dBm |
|  | Beam width  (Width of over -3dB  antenna gain of maximum) |  | 2.1 | 1.0~~1.1~~ | 1.0~~1.1~~ | 2 | 1.0~~2.2~~ |
|  | deg |
|  |  |
|  | Detection range | km | 240 | 240 | 240 | 120 | 240 |
|  | Scan mode in observation |  | 2, 3 | 2, 3 | 2, 3 | 2, 3 | 2, 3 |
|  | 1.Fixed elevation |  |
|  | 2.CAPPI |  |
|  | 3.Manually controlled |  |
|  | DATA PROCESSING |  |  |  |  |  |  |
|  | MTI processing |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Yes, 2.No |  |
|  | Doppler processing |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Yes, 2.No |  |
|  | Display |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Digital, 2.Analog |  |
|  | OPERATION MODE (When tropical | | 1, 3 | 1, 3 | 1, 3 | 1, 3 | 1, 3 |
|  | cyclone is within range of detection) | |
|  | 1.Hourly |  |
|  | 2.3-hourly |  |
|  | 3.Others |  |
|  | PRESENT STATUS |  | 1 | 1 | 1 | 2 | 1 |
|  | 1.Operational |  |
|  | 2.Not operational(for research etc.) | |

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 | 7° 31´ N | 7° 26´ N | 6° 25´ N | 13° 24´ N |
|  |  | 99° 19´ E | 99° 37´ E | 100° 27´ E | 101° 49´ E | 100° 01´ E |
|  | Antenna elevation | m | 281 | 40 | 30 | 29 | 29 |
|  | Wave length | cm | 5 | 3 | 5 | 5~~3~~ | 5 |
|  | Peak power of transmitter | kW | 300~~250~~ | 200 | 300~~250~~ | 300~~200~~ | 300 |
|  | Pulse length | µ s | 0.852 | 0.5&1 | 0.8&2 | 0.5&1 | 0.812 |
|  | Sensitivity minimum of  receiver |  | -106 | -90~~108~~ | -115~~106~~ | -110~~108~~ | -110 |
|  | dBm |
|  | Beam width  (Width of over -3dB  antenna gain of maximum) |  | 1.0~~1.1~~ | 2 | 1.0~~1.1~~ | 1.0~~2~~ | 1.0 |
|  | deg |
|  |  |
|  | Detection range | km | 240 | 120 | 240 | 120 | 240 |
|  | Scan mode in observation |  | 2, 3 | 2, 3 | 2, 3 | 2, 3 | 2, 3 |
|  | 1.Fixed elevation |  |
|  | 2.CAPPI |  |
|  | 3.Manually controlled |  |
|  | DATA PROCESSING |  |  |  |  |  |  |
|  | MTI processing |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Yes, 2.No |  |
|  | Doppler processing |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Yes, 2.No |  |
|  | Display |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Digital, 2.Analog |  |
|  | OPERATION MODE (When tropical | | 1, 3 | 1, 3 | 1, 3 | 1, 3 | 1, 3 |
|  | cyclone is within range of detection) | |
|  | 1.Hourly |  |
|  | 2.3-hourly |  |
|  | 3.Others |  |
|  | PRESENT STATUS |  | 1 | 1 | 1 | 1 | 1 |
|  | 1.Operational |  |
|  | 2.Not operational(for research etc.) | |

### Annex 2-6

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.

### Annex 2-7

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 |

### Annex 2-8

APPENDIX 5-A

**METEOROLOGICAL TELECOMMUNICATION NETWORK**

**FOR THE TYPHOON COMMITTEE**

Seoul

Beijing

Tokyo

Washington

Bangkok

Offenbach

Singapore

Pyongyang

Macao

Manila

Hong Kong

Hanoi

Phnom Penh

Vientiane

Kuala Lumpur

Circuits of Main Telecommunication Network

RTH Main regional circuits

Regional circuits

NMC

Inter-regional circuits

### Annex 2-9

APPENDIX 5-B, p.1

**PRESENT OPERATIONAL STATUS**

**OF THE METEOROLOGICAL TELECOMMUNICATION NETWORK**

**FOR THE TYPHOON COMMITTEE REGION**

1. Main Telecommunication Present Operational Status

Network

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

### Annex 2-10

APPENDIX 5-C, p.1

**LIST OF ADDRESSES, TELEX/CABLE AND TELEPHONE NUMBERS**

**OF THE TROPICAL CYCLONE WARNING CENTERS IN THE REGION**

**Centre Mailing address Telex/cable, Telephone, fax numbers**

**Cambodia**

Attn. Mr Ly Chana

Deputy Director Norodom Boulevard Tel.: (+855) 15 913081

Department of Agricultural Fax: (+855) 23 26345

Hydraulics and Hydrometeorology

Attn. Mr Hun Kim Hak Pochentong Tel/Fax:(+855) 23 66193

Chief of Cambodian National 66192 NMC

66191 Airport

**China**

National Meteorological Center No. 46 Zhongguancun Tel.: (+86) (10) 5899 5809

China Meteorological Adm. Nandajie, Beijing 100081 Cable: 2894

(Director: Bi Baogui) Fax: (+86) (10) 6217 2956

E-mail: bibg@cma.gov.cn

**Democratic People's Republic of Korea**

Mr Ko Sang Bok Oesong-dong Telex: 38022 TCT KP

Director Central District Tel.: (+850) (2) 321 4539

Central Forecast Research Insitute Fax: (+850) (2) 381 4410

State Hydrometeorological Adm.

**Hong Kong, China**

Central Forecasting Office 134A Nathan Road

Hong Kong Observatory Tsim Sha Tsui Tel.: (+852) 2926 8371

(Attn. Mr. L.S. Lee) Kowloon (Office hours)

Hong Kong, China (+852) 2368 1944

(24 hours)

Fax: (+852) 2311 9448~~2721 5034~~

(24 hours)

E-mail: lslee@hko.gov.hk

**Japan**

Forecast Division 1-3-4 Otemachi Telex: 2228080 METTOKJ

Forecast Department Chiyoda-ku (24 hours)

Japan Meteorological Agency Tokyo 100-8122 Tel.: (+81) (3)3211 8303

(Director: Y. Kajihara~~H. Yokoyama~~) (00 - 09 UTC on weekdays)

(+81) (3) 3211 7617

(24 hours)

Fax: (+81) (3) 3211 8303

APPENDIX 5-C, p.2

**Lao People's Democratic Republic**

Ministry of Agriculture P.O. Box 811 Telex: 4306 ONU VTELS

and Forestry, Department of Vientiane Cable: UNDEVPRO VIENTIANE

Meteorology and Hydrology

**Macao, China**

Meteorological and P.O. Box 93 Tel.: (+853) 88986173

Geophysical Bureau Macao, China Fax: (+853) 28850773

(Director: Tam Vai Man~~Fong Soi Kun~~) E-mail: meteo@smg.gov.mo

**Malaysia**

Malaysian Meteorological Dep. Jalan Sultan Tel.: (+60) (3) 7967 8116

(Central Forecast Office, 46667 Petaling Jaya (+60) (3) 7967 8119

Director: Mr. Saw Bun Liong) Selangor Fax: (+60) (3) 7955 0964

Malaysia E-mail: cfo@met.gov.my

**Philippines**

Esperanza O. Cayanan Ph.D. WFFC Bldg., Telex: 66682 WXMLA PN

Weather Services Chief BIR Road, Diliman, Tel.: (+63) (2) 922 1996

Weather Division, PAGASA Quezon City 1100 Cable: 66682 WX MLA

Fax: (+63) (2) 922 5287

(24 hours)

**T C S**

Secretary: Yu Jixin~~Olavo Rasquinho~~ Avenida de 5 de Outubro Tel: (853) 8 8010531

Coloane, Macau Fax: (853) 8 8010530

E-mail: yujx~~olavo~~@typhooncommittee.org

**Republic of Korea**

National Typhoon Center

Korea Meteorological Administration

(Director: Deok Hwan JEONG~~Youngsin CHUN~~)

2 Seoseongro 810-gil, Namwon-eup, Seogwipo, Tel.: (+82) (70) 7850-6351

Jeju, 63614, Republic of Korea Fax: (+82) (64) 805-0368

APPENDIX 5-C, p.3

**Thailand**

Thai Meteorological Department 4353 Sukhumvit Road Tel.: (+66) (2) 366 6325

Bangkok 10260 Fax.: (+66) (2) 399 4020

(Director-General: Mr. Wanchai Sakudomchai) E-mail: tmd\_inter@tmd.go.th

Weather Forecast Bureau 4353 Sukhumvit Road

Thai Meteorological Department Bangkok 10260

Tel&Fax: (+66) (2) 399 4001

(Director: Dr. Sugunyanee Yavinchan) E-mail: sugunyanee@hotmail.com

Telecommunications and Information 4353 Sukhumvit Road Tel.: (+66) (2) 399 4555

Technology Bureau Bangkok 10260 Fax: (+66) (2) 398 9861

Thai Meteorological Department

(Acting Director : Mr. Wirat Woranut~~Somwhang Lodchanaangsu~~) E-mail: tmd\_inter@tmd.go.th

**USA**

National Weather Service 3232 Hueneme Road Tel.: (+1-671) 472 0944

(Genevieve Miller, Meteorologist Barrigada Fax: (+1-671) 472 7405

in charge) Guam 96913

RSMC Honolulu 2525 Correa Road Suite Tel.: (+1-808) 973-5272

(Director: Raymond Tanabe) 250 Honolulu, HI 96822 Fax: (+1-808) 973-5271

**Viet Nam**

Forecast Division 4 Dan Thai Than Tel.: (+84) (4) 264020

Forecast Department Hanoi Fax: (+84) (4) 254278

Hydro-Meteorological Service

(Director: Nguyan Cong Thanh)

### Annex 2-11

APPENDIX 7-A, p.1

**LIST OF DATA ARCHIVED BY RSMC TOKYO - TYPHOON CENTER**

1. **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\_v13~~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),

D~~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).~~

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**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