



**STANDARD OPERATING PROCEDURE
(SOP)
WEATHER AND CLIMATE SERVICES DIVISION**

**NATIONAL CENTER FOR HYDROLOGY AND METEOROLOGY
ROYAL GOVERNMENT OF BHUTAN**

2020



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1. Standard Operating Procedure for WCSD

1.1 Title

This document is the Standard Operating Procedure 2020 for Weather and Climate Services Division (WCSD), NCHM, hereafter referred as SOP 2020 for WCSD.

1.2 Purpose

The SOP provides the operating procedures for the WCSD to fulfill the vision, mandates and functions of the Center. It provides standardized linkages and approaches amongst the sections within the Division including the management and technical support.

1.3 Effective

This SOP 2020 for WCSD would come into effect from 1st August 2020

2. WCSD mandate, functions and structure

2.1 Mandate of WCSD

The Weather and Climate Services Division is mandated to study and provide public weather services, severe weather warnings, meteorological data management, aviation, agro-meteorological services and climate change information and services.

2.2 Functions of WCSD

Following are the functions of WCSD

- a. Prepare and provide weather and climate services.
- b. Research and development in the field of weather, climate and climate variability and climate change.
- c. Prepare and provide short, medium, extended range and seasonal forecasts.
- d. Numerical weather prediction (NWP) modelling and validation.
- e. Monitor extreme weather events and issue warning/bulletins/advisories.
- f. Climate data processing, analysis, archival and dissemination to end users.
- g. Climate modelling, downscaling and climate change projections.
- h. Develop and provide aviation meteorological forecasts and information.
- i. Provide agro-meteorological services.
- j. Provision of tailor made services related to weather and climate.
- k. Operation, monitoring and maintenance of Global Telecommunication System (GTS) and satellite system.

Standard Operating Procedure for WCSD

- l. Publish climate data and climate reports.
- m. Publish scientific papers on weather and climate related studies.
- n. Coordinate and organize national, regional and international weather and climate forums.
- o. Represent the Center and collaborate with relevant national, regional and international organizations related to weather and climate activities.
- p. Education, advocacy and awareness on weather and climate

2.3 Structure of WCSD

WCSD is organized into four Sections:

- a. Weather Forecasting Section (WFS)
- b. Climate Information Management Section (CIMS)
- c. Climate Research & Analysis Services Section (CRAS)
- d. Aviation Meteorological Section (AMS)

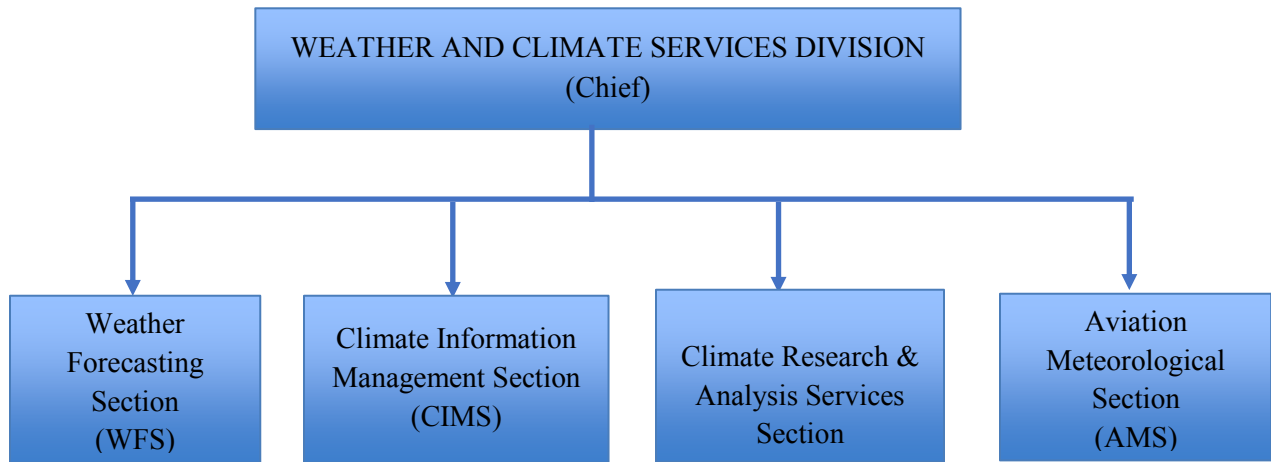


Figure 1: WCSD organization structure

3. SOP for Weather Forecasting Section (WFS)

The following table provides the general SOP for the weather forecasting section. For details refer SOP for weather forecasting.

WFS Actions	Time Frame	Operator	Result/Action Required
1. Monitor, prepare and provide daily weather forecasts	Monitor weather on 24/7 and issue forecast everyday before 5 pm	Weather forecasters and forecasting officials	Weather forecast issued
2. Monitor and issue extreme weather advisories/press release	Monitor weather on 24/7 and issue warnings/advisories for 72 hrs, 48 hrs and 12 hrs.	Weather forecasters and forecasting officials	- Inform any extreme/severe weather occurrence to the Division Chief /Center - Prepare and issue advisories/press release to stakeholders and general public for safety
3. Maintain records of extreme meteorological events	Every day	Designated officials	- Events archived and reports generated annually
4. Operate and maintain GTS data transmission and reception	Every day (24/7)	Weather forecasters and officers on duty	Continuous operation of GTS system - GTS data submitted for weather forecast and warnings
5. Operate and maintain the Himawari Satellite System, and archival of images	Every day (24/7)	Weather forecasters and officers on duty	- Ensured continuous reception of satellite images. - Images submitted for weather forecast and warnings
6. NWP modelling and validation	Every day	Designated Officials	Ensured smooth functioning of WRF - Output of WRF validated
7. Undertakes research in NWP, understanding weather pattern and extreme events	Yearly	Designated Official	- Reports published and shared - Planned strategy to improve modelling for weather forecasts

Table 1: SOP for Weather Forecasting Section

4. SOP for Climate Information Management Section (CIMS)

CIMS actions	Time Frame	Operator	Result/ Action Required
1. Processing and archival of data from manual meteorological stations (Class A and Class C)	Everyday	Data assistants and designated officials	- Data processed and archived in the system - Inform the HOID for any missing and spurious data through the Chief of Division
2. Retrieval and quality control of climate data	Everyday	Data management team	- Quality controlled data - Missing historical data retrieved
3. Retrieval of AWS data from the database.	Everyday	Data management team	- AWS data retrieved for further processing and analysis - Inconsistencies in AWS data, missing of data report to HOID and ICT Service Section of NCHM through the Chief of Division
4. Managing, quality control and dissemination of data for users and research/studies	1-5 days	Designated Officials	- Quality controlled data for analysis - Maintained the log of data issued
5. Generate standard statistical products and annual climate data book	Annually	Designated Officials	- Data statistics produced and printed - Climate data book developed/printed (soft/hard copy)
6. Undertakes researches on the quality of climate data, extremes and other climatological statistics	Annually	Data Management Team	- Reports printed/published

Table 2: SOP for Climate Information Management Section

5. SOP for Climate Research & Analysis Services Section (CRAS)

CRAS Actions	Time Frame	Operator	Result/Action Required
1. Develop, verify and issue seasonal forecasts	Seasons (summer & winter)	Designated Officials	- Seasonal forecast prepared - Seasonal Outlook disseminated to the users
2. Monitor seasonal and monthly climate		Designated Officials	- Reports printed/published - Extremes in climate reported and discussed within the Division
3. Climate modelling, downscaling, analysis and interpretation of climate change data		Designated Officials	Reports printed/published
4. Develop and provide extended range forecast information	Weekly	Designated Officials	Forecast issued
5. Develop agro-met services and provide awareness workshops/meetings		Designated Officials	- Agro-met information and services developed - Collaborated with Department of Agriculture
6. Coordinate National Climate Forums (NCFs)/Seminars	Annually	Designated Officials	- NCFS/ seminars conducted for stakeholders and user
7. Conduct research/collaborative studies on climate/climate change with other sectors and user agencies		Designated Officials	- Report printed/published - Collaborated with others sectors and user agencies

Table 3: SOP for Climate Research & Analysis Services Section

6. SOP for Aviation Meteorological Section (AMS)

The following table provides the general SOP for the aviation meteorological section. For details refer SOP for aviation met section.

AMS Actions	Time Frame	Operator	Result/Action Required
1. Operate and maintain Aviation met station network (AWOS, Manual & RWP)	Everyday	Aviation MET Technician	- Ensured seamless operation of AWOS - Maintenance of system as and when required
2. Installation of new AWOS and other equipment	As and when required	Aviation MET Technician	- Procurement (PPR 2019) processed completed - New system installed and commissioned.
3. Collect and record observational data of aerodromes in all airports	Everyday	Aviation MET Observers	- Data collected and recorded - Any fault in AWOS data collection reported to AMS head/ Division Chief
4. Prepare and provide METAR/SPECI to the aerodromes	30 minutes	Aviation MET Observers	- METAR/SPECI issued via AMHS
5. Prepare and provide MET briefing	1 and half hour prior to departing flight	Aviation MET Forecasters	- MET Briefing issued via email and whatsApp group
5. Coordination with Air Traffic Controllers, Air Traffic Services and ICAO	On regular basis/ as and when required	Head	- Coordinated with the relevant agencies - Kept update of the events to the chief of Division - Head of the Center informed

Table 4: SOP for Aviation Meteorological Section



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