Systematic Observations Financing Facility

27 September 2024

GBON National Gap Analysis

Jamaica

Systematic Observations Financing Facility

Weather and climate data for resilience

WEATHER CLIMATE WATER

Screening of the National Gap Analysis (NGA) of Jamaica

WMO Technical Authority screens the GBON National Gap Analysis to ensure consistency with the GBON regulations and provides feedback for revisions as needed. *The screening of the NGA is conducted according to the SOFF Operational Guidance Handbook, version: 04.07.2023 and the provisions in Decision 5.7 of the SOFF Steering Committee.*

Following iterations with the peer advisor and beneficiary country, WMO Technical Authority confirms that the National Gap Analysis is consistent with GBON regulations.

Date: 10/02/2025

Signature:

Albert Fischer

Director, WIGOS Branch, Infrastructure Department, WMO

GBON Gap Analysis Report
Jamaica

Beneficiary Country Focal Point	Evan Thompson, JMS
Peer Advisor Focal Point and Institute	Anni Karttunen, FMI
WMO Technical Authority	

1. WMO Global Gap Analysis (June 2023)

Table I. WMO Global Gap Analysis June 2023

GBON horizontal resolution requirements	GBON target	Reporting	Gap improve	Gap new	Gap total
Surface stations Horizontal resolution: 200km	**2**	**0**	**2**	**0**	**2**
Upper-air stations Horizontal resolution: 500km	**1**	**1**	**0**	**0**	**0**

2. Analysis of existing GBON stations and their status against GBON requirements

Table II. Assessment of existing GBON stations per operational status and network ownership.

GBON Requirements	Existing observation stations (# of stations)			
	NMHS network		Third-party network	
	Reporting	Improve	Reporting	Improve
Surface stations Horizontal resolution: 200km Variables: SLP, T, H, W, P, SD	**2**	**2**	**0**	**0**
Upper-air stations Horizontal resolution: 500km Vertical resolution: 100m, up to 30 hPa Variables: T, H, W	**0**	**0**	**1**	**0**

The Meteorological Service of Jamaica (JMS) operates a network including manual synoptic stations and automatic stations with both WMO grade synoptic stations and stations of subgrade category as well as a network of manual rain gauges. All-in-all there are 118 AWS stations, from which approximately 30 have capability to transmit information in real-time from which approximately half in a reliable fashion. Most of the stations report all GBON parameters excluding

snow-depth, which is not relevant for the Jamaican climate. Many of the stations require manual collection and actual pick-up of data from the station itself. In addition to MSJ-owned stations MSJ operates some weather stations owned by the Civil Aviation Authority for the aviation purposes.

The network includes two manual surface weather stations registered in the GBON WDQMS database. The stations are located in Montego Bay international airport and Kingston international airport with less than 150km space between them. Both stations are reporting every 3 hours instead of the hourly resolution required for GBON. The both stations operate a very old set of sensors (including mercury-based thermometers) that need to be replaced.

Caribbean WIS2.0 platform is being implemented to support the dissemination of messages manually and needs to be developed to support the automatic transmission to ensure hourly target. The regional development of the platform is coordinated by the Caribbean Meteorological Organization.

Table III. Assessment of existing GBON stations per station characteristic.

Station name	Station type (S/UA)	Owner (NMHS/third-party)	Funding source	GBON variable measured						Reporting cycle	GBON Compliance (Y/N)
				SLP	T	H	W	P	SD		
Montego Bay	S	NMHS	NMHS	X	X	X	X	X	-	3 hours	N
Kingston	S	NMHS	NMHS	X	X	X	X	X	-	3 hours	N
Kingston	UA	NWS	NWS/NMHS	-	X	X	X	-	-	Twice a day	Y

***Notes*: Assessment of existing GBON stations per station characteristics.** Station type: S: Surface, US: Upper-Air; Owner of the station: NMHS or name of third-party; GBON variables: SLP: Sea-level pressure; T: Temperature; H: Humidity; W: wind; P: Precipitation; SD: Snow depth; Reporting cycle: Number of observation reports exchanged internationally per day (0-24); GBON compliance: weather the station is GBON compliant or not (see GBON guide on compliance criteria).

The network of complementary AWSs does not fulfil WMO synoptic criteria and is used to cost-efficiently increase the density of observations especially useful for the agricultural needs. The importance of the complementary network and network of rain gauges has been recently highlighted as the weather radar has been out of operation.

Station type	Amount
AWS station with 2m wind measurement	35
Complementary AWS - Davis	49
Rain gauges	85

MSJ operates one upper-air sounding station at the Kingston international airport. The station is part of the Cooperative Hurricane Upper Air Station network and therefore supported by US National Weather Service (NWS). NWS has provided the sounding equipment including hydrogen generator and continues to provide the consumables for twice daily soundings and maintenance of the system. MSJ provides the housing and human resources for operation. The station is operational and delivers soundings reliably twice a day, or more during the hurricane season depending on NWS wishes.

3. Results of the GBON National Gap Analysis

To reach the required reporting interval of one hour and to replace obsolete technology it is recommended to automate all GBON sensors (SLP, T, H, W, P) for the selected two GBON stations. To ensure data availability, good calibration practices and sustainability of the stations spare part stock needs to be included. At the moment MSJ lacks technical staff to support the maintenance and operation of the network and it is recommended to recruit one additional technician to the team.

MSJ lacks calibration facilities and has had challenges in securing funding for overseas calibration services. It is recommended to support the regional calibration center at CIMH to provide calibration in most needed parameters (SLP, T, H) and to enhance the calibration procedures and cycle between the services.

The upper air sounding system is operating well with the support of NWS. To ensure twice daily soundings operations one additional operator needs to be recruited to the staff. Investing in a power line conditioner has been recommended by NWS to avoid power spikes that can damage the hydrogen generator thus interrupting operations.

Table IV. Results of the GBON national gap analysis. SLP: Atmospheric pressure; T: Temperature; H: Humidity; W: wind; P: Precipitation; SD: Snow depth; SST: Sea surface temperature**.**

GBON requirements	Global GBON target	Approved national target	Reporting	Gap	
				To improve	New
	[# of stations]				
Surface land stations	2	2	0	**2**	**0**
Upper-air stations operated from land	1	1	1	**0**	0

Surface marine stations in Exclusive Economic Zones:[1] Density 500 km Variables: SLP, SST Observing cycle: 1h	-	-	-	-	-
Upper-air stations operated in Exclusive Economic Zones:[2] Density 1000 km Vertical resolution: 100 m, up to 30 hPa Variables: T, H, W Observing cycle: twice a day	-	-	-	-	-

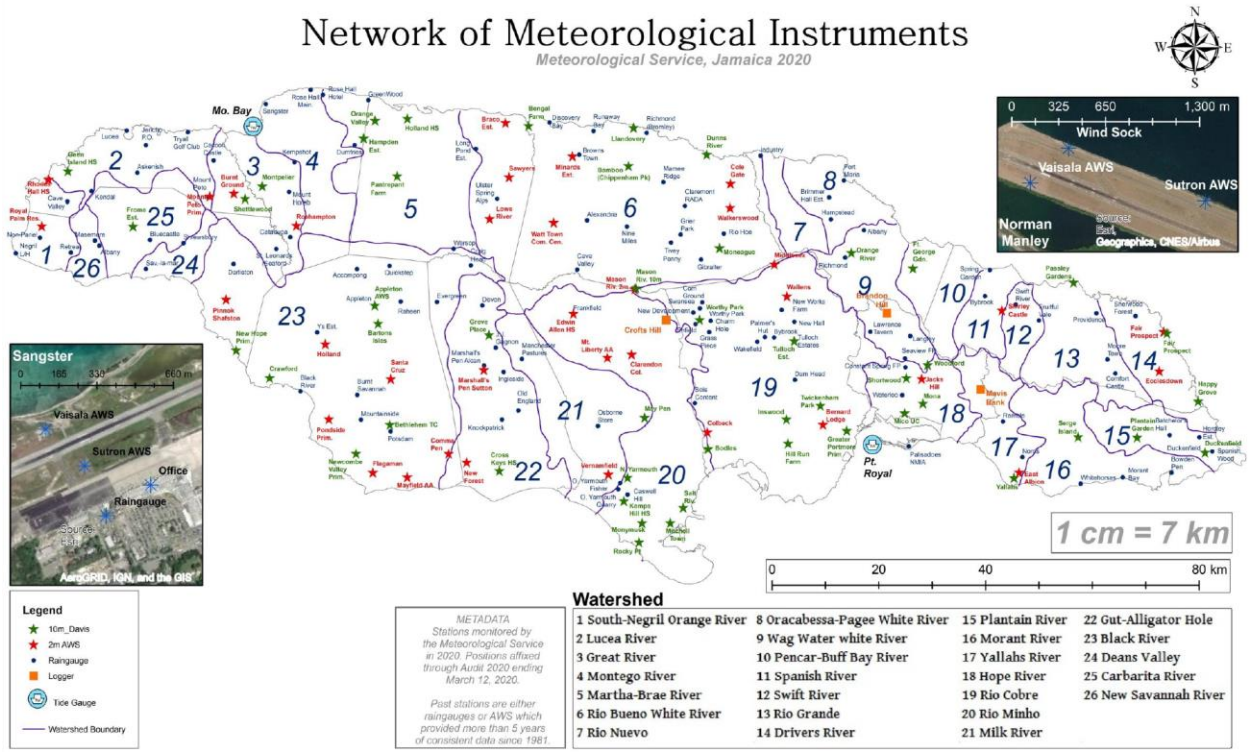


Figure 1. Network on JMS meteorological stations 2020. Green stars mark low cost stations, red traditional automatic stations, dots rain gauges and both airports have additional airstrip figures with the stations dedicated to aviation use.

[1] Although GBON marine stations are not part of initial SOFF scope, peer advisors are encouraged to analyze in this step when considered relevant e.g. SIDS, the need for future GBON marine observations investments according to the GBON requirements.

[2] Although GBON marine stations are not part of initial SOFF scope, peer advisors are encouraged to analyze in this step when considered relevant e.g. SIDS, the need for future GBON marine observations investments according to the GBON requirements.

3.1 Recommended existing surface and upper-air stations to be designated to GBON

Table V. Recommended existing surface and upper-air stations to be designated to GBON.

Station name	Station type (S/UA)
Montego Bay	S
Kingston	S
Kingston	UA

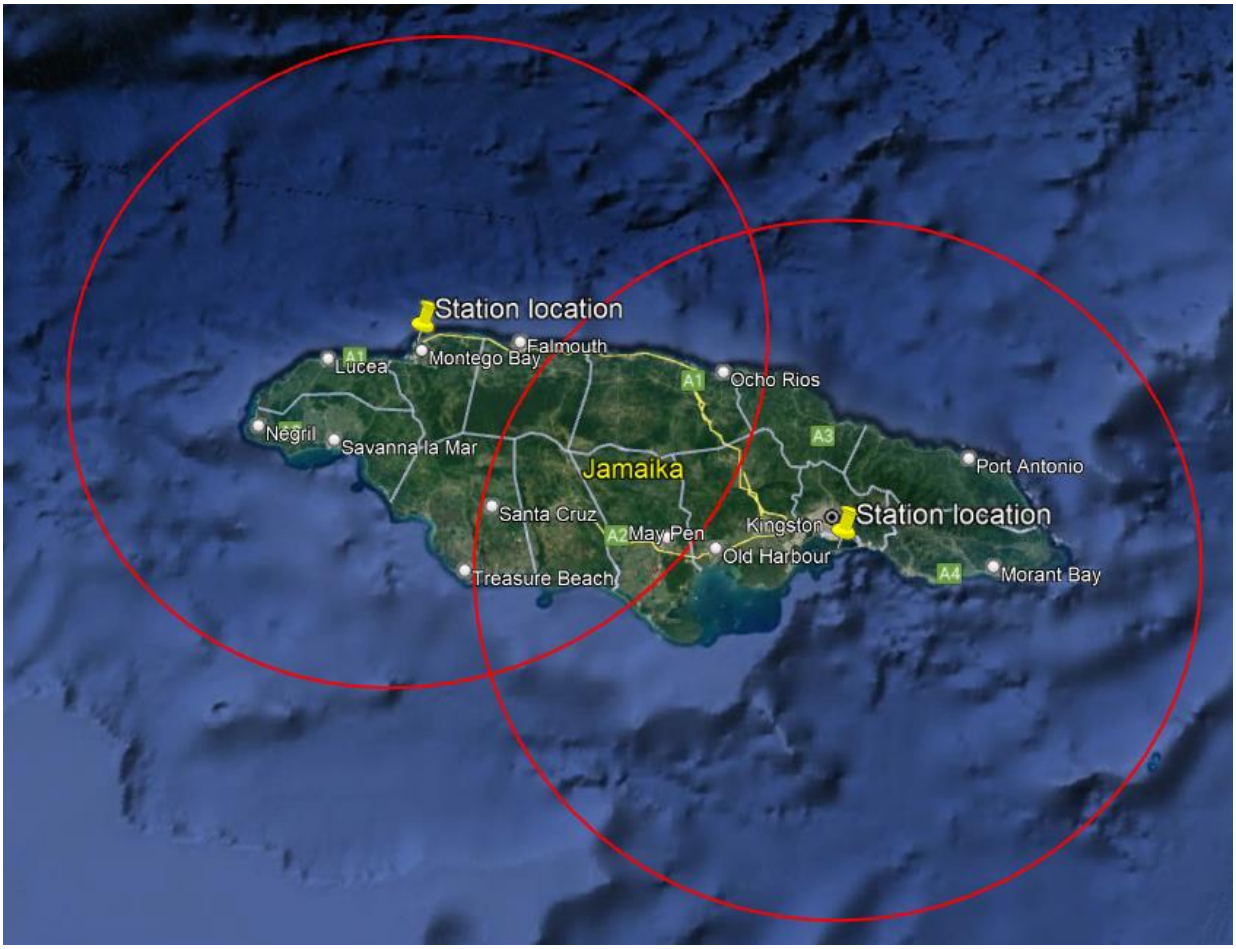
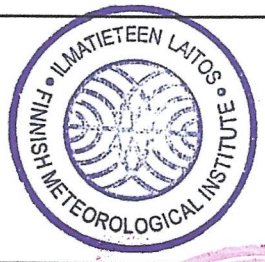


Figure 2. The existing manual GBON station locations in Montego Bay International Airport and Kingston International Airport. Circles have 100 km radius.

Figure 3. Location of upper-air sounding station. Circle radius in 250km.

Report completion signatures

Peer Advisor signature  
Beneficiary Country signature  
WMO Technical Authority signature 

Annex 1.

Review of GAPs in capacity

In addition to number of GBON compliant observation stations, the discussions of Gap Analysis included a short review of Quality Management System (QMS), the status and capacity gaps in data transfer, database management, sensor maintenance and calibration, metadata, and quality control.

QMS

Quality management is currently only applied for provided aviation services. MSJ has planned to expand QMS to cover also other services and to obtain ISO9001:2015 certification.

Identified gaps:

- no sub-process for surface weather stations excluding aviation stations.

Central database

Currently there is no functioning database. Manufacturer or system-specific databases are in use for some of the systems, but these offer only short-term data storage or data viewing options. Observation data is collected manually on a monthly basis to the climate repository. The current configuration of the database will require upgrading to adequately handle real-time data from automatic stations and from different data sources. Data management, improvements in quality control mechanisms, capability to communicate with APIs for importing and exporting open data are needed. It will be important to store data from different sources in one place to simplify the system of data pipeline. Upgrades in data management and storage are needed to support the national early warning initiatives.

Identified gaps:

- IT support in observation data, transmission, quality control, processing and archiving. Hardware and robust software for database management.
- Gaps in human capacity in IT and programming skills.
- Benchmarking other organizations.

Data transfer

The data reading and transfer processes are largely manual. This includes the data retrieval from synoptic stations (less than half of AWS stations transmit data in real-time) and data uploading to archiving and dissemination. Support is needed in automatization of data transfer processes including dissemination to international data sharing platforms.

Identified gaps:

- Gaps in human capacity in automatization and programming skills and processes.

- Data transfer software
- Benchmarking other organizations.

Data quality control and assurance

Data quality control is done manually on the spot when observations are made, and manual quality control is done periodically including reporting on the findings. No real-time quality control exists.

Identified gaps:

- Insufficient staff capacity, including programming skills.
- Automated QC/QA methods and algorithms
- Benchmarking other organizations.

Sensor maintenance and calibration

Maintenance is done only monthly basis, and the largest shortcomings are the lack of budget for spare parts or difficulty in procuring spares for the variety of different manufacturers' stations.

Two of the staff members have been trained for calibration activities with certification from CIMH but routine activities in this sector have not yet been started. At the moment sensors can be calibrated case-by-case by using external calibration services or calibration kits for some of the sensors. Once the regional calibration centre CIMH has the capabilities to calibrate (SLP, T, H) it is recommended to use the services, at the moment CIMH only calibrates pressure.

MSJ has a need to recruit one additional member to the technical staff for the surface weather maintenance and calibration purposes.

Maintenance of upper-air sounding system is done based on maintenance manual recommendations from the system supplier.

Identified gaps:

- Insufficient staff capacity to calibrate and maintain sensors.
- Need to recruit additional member for technical staff.
- Maintenance procedures needs to be updated.
- Maintenance toolkit needs upgrading.
- Regional calibration services need strengthening to cover all needed basic parameters.