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GBON National Gap Analysis

Systematic Observations
Financing Facility

**Weather
and climate
data for
resilience**





Screening of the National Gap Analysis (NGA) of Dominica

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: 17 September 2024

Signature:

Albert Fischer

Director, WIGOS Branch, Infrastructure Department, WMO

GBON National Gap Analysis Report Dominica

Beneficiary Country Focal Point and Institute	Ithoma James, Dominica Meteorological Service, Mr. Fitzroy Pascal PR of Dominica
Peer Advisor Focal Point and Institute	Dr. Delia Arnold Arias, Dr. Gerhard Wotawa, GeoSphere Austria – Federal Institute for Geology, Geophysics, Climatology and Meteorology

1. Country information from the GBON Global Gap Analysis

Small Island Developing States (SIDS) are a group of 39 States and 18 Associate Members that share common challenges and vulnerabilities, including climate change, biodiversity, limited resources, and natural disasters. They have been recognized by the United Nations since the 1992 U.N. Conference on Environment and Development held in Rio de Janeiro, Brazil. Dominica, as several other of the SIDS, is highly vulnerable to the effects of weather-induced hazards such as hurricanes, storms, and floods but also to geological hazards such as earthquakes and volcanoes.

The Dominica Meteorological Service (DMS) was established back in 1959, with the opening of the Douglas Charles Airport (formerly Melville Hall Airport). The DMS is a government entity, as division of the Ministry of National Security and Legal Affairs. While the original primary aim of the DMS was to serve the airport activities, its scope has grown to a fully operating hydromet service with monitoring activities, climate services, hydrological services and warnings and response information in collaboration with the Office of Disaster Management (ODM), also located under the same Ministry. Dominica became an official member of the World Meteorological Organization (WMO) in 1980. DMS is a member of the Caribbean Meteorological Organization (CMO), with whom it collaborates closely. CMO is a specialized agency of the Caribbean Community (CARICOM) located in Trinidad and Tobago. In 1967, the Caribbean Institute for Meteorology and Hydrology (CIMH) was founded in the framework of CMO. CIMH is a training and research organization located in Barbados.

In June 2023, WMO conducted a global gap analysis of to assess the state of the observational data exchange in Dominica compared to GBON standards. The findings of that evaluation indicate that Dominica remains non-compliant with the target of one surface GBON-compliant station not being met, neither with one upper-air station (Table I).

Table I. WMO GBON Global Gap Analysis (June 2023). Illustration of the information that the WMO Secretariat provides to each country

A. GBON horizontal resolution requirements	B. Target	C. Reporting (GBON compliant) ¹	D. Gap to improve	E. Gap new	F. Gap total
	[# of stations]				
Surface stations Standard density ² 500 km	1	0	1	0	1
Upper-air stations over land Standard density ² 1000km	1	0	0	1	1

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

Surface stations

DMS currently operates 32 stations belonging to the Early Warning Hydro Network, of which 4 are fully equipped AWS. Added to them, DMS operates the 2 stations located at the airports. DMS also operates and maintains a total of 12 water level stations, rainfall stations or a combination of both. The vast majority of the stations are well-located with regard to the CIMO criteria, cover the country well, and are operating fine, and therefore are a good basis for a meteorological monitoring network. Almost all of the stations have the same basic design including data logger and are from the same vendor. While still in demo mode, the near real time data of most of the 32 Early Warning Hydro Network stations is sent to the DMS headquarters and it can be publicly accessed from this web site: <https://monitoring.weather.gov.dm/Dominica/index.php>. However, none of these data is currently transferred into the WIS, and it is a challenge to continuously maintain and to renew the network after third-party projects end. One of the reasons for the missing international data exchange (WMO WIS/WIS2.0) is that there is yet no clear and robust approach to data management, which is due to a lack of staff. Currently, only manual data transfer to WIS is established. Therefore, two Dominican stations appear in the WIGOS Data Quality Monitoring System (WDQMS) webtool, the ones in the Douglas Charles and the Canefield airports. Although they already have a WIGOS identifier, neither of them is GBON compliant.

Upper-air stations

The Meteorological Service currently does not operate any upper-air stations.

¹ The rationale for classifying surface and upper-air stations as reporting is based on the WIGOS Data Quality Monitoring System (WDQMS) for the chosen time period (WMO GBON Global Gap analysis, June 2023). Stations with data availability more than 80% on at least 80% of days, are considered as reporting. Other listed stations are counted as having the possibility to be improved.

² For SIDS, for the WMO GBON Global Gap Analysis in June 2023, the EEZ area has been added to the total surface area which is the basis for the target number of stations. The standard density requirements for SIDS have been calculated with 500 km for surface stations and 1000 km for upper-air stations.

Table II. Assessment of existent stations per their operational status and network ownership

GBON Requirements	Existing observation stations (# of stations)			
	NMHS network		Third-party network	
	Reporting (GBON compliant) ³	To improve	Reporting (GBON compliant) ³	To improve
Surface land stations Standard density ⁴ 200km Variables: SLP, T, H, W, P, SD	0	1	0	0
Upper-air stations operated from land Horizontal resolution ⁴ : 500km Vertical resolution: 100m, up to 30 hPa Variables: T, H, W	0	1	0	0
Surface marine stations in Exclusive Economic Zones: ⁷ 500 km Variables: SLP, SST	0	1	0	0
Upper-air stations operated in Exclusive Economic Zones: ⁵ 1000 km Vertical resolution: 100m, up to 30 hPa Variables: T, H, W	0	0	0	0

³ The rationale for classifying surface and upper-air stations as reporting is based on the WIGOS Data Quality Monitoring System (WDQMS) for the chosen time period during the development of National Gap Analysis Stations with data availability more than 80% on at least 80% of days, are considered as reporting. Other listed stations are counted as having the possibility to be improved.

⁴ For SIDS, for the WMO GBON Global Gap Analysis in June 2023, the EEZ area has been added to the total surface area which is the basis for the target number of stations. The standard density requirements for SIDS have been calculated with 500 km for surface stations and 1000 km for upper-air stations.

⁵ Although GBON marine stations and stations in EEZ are not part of initial SOFF scope, peer advisors are encouraged to analyze in this step when considered relevant e.g. SIDS, the status of current marine stations for future GBON marine observations investments.

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

Station name	Station type (S/U A/M ⁶)	Owner (NMHS /3rd party)	Funding source	GBON variable measured							Reporting cycle (obs/day)	GBON Compliant (Y/N)
				SLP	T	H	W	P	SD	SST		
Canefield	S	NMHS	Gov	x	x	x	x	x	-	-	Every 8 hours (manually)	N

* Currently no stations designated to GBON. Canefield is recommended to be designated.

3. Results of the GBON National Gap Analysis

Surface stations

According to the GBON standard-resolution criteria Dominica should operate at least one single surface station, providing hourly measurements on a 24/7 basis with the following requirements:

- a. The minimum number of internationally available reports should be not less than 80% of the total number of reports for the period.
- b. delayed reports should not constitute more than 5% of the total number.
- c. rejected reports, due to insufficient quality, should not constitute more than 5% of the total number of reports).

As stated elsewhere in this document, Dominica is not yet reaching this level of compliance (Table II). However, it does have the right level of infrastructure and basic governance to reach the GBON surface target. Among the 36 stations, Canefield (Table III), in the west, is the station selected to undergo the corresponding upgrading. This station is located at the secondary airport of Dominica, which is currently underutilized but has proven to be very relevant for disaster relief due to its proximity to the capital town. In addition, the comparison between Canefield and the Douglas Charles airport station, located at the northeast, on both sides of the mountain range is then also possible, providing background information for storms that are highly impactful and potentially stagnant over a region due to topographical features. The station is located in the area where the population density is highest, being then useful in terms of early warnings and early action. Due to its western location close to the mountain

⁶ Please see guidance on marine stations in Section 2 on Scope.

range, however, the station is situated on the leeward side of the predominant trade wind circulation, which means that the Douglas Charles station retains its importance.

While Canefield is already suited with some equipment, it is highly recommended that the station undergoes a significant upgrade to offer a sustainable solution for data provision and international data exchange.

As in other countries in the regions, and due to the climatological and topographical conditions there are several major challenges that must be considered at the time of installing, maintaining, and operating a station, namely:

- a. Data communication and transmission – the existing station is unable to transmit its data to the headquarters in near real time. In the case of Dominica, however, this is a minor issue as DMS is capable to build up and operate AWS that transmit data.
- b. Spare parts – spare parts are an essential component of the proper maintenance and operation of the station. Sufficient long-term funding to acquire and have ready to use spare parts is missing.
- c. Technical Staff – DMS has very limited staff to fulfil all its responsibilities. There is a lack of technical staff having one single staff member doing all the maintenance and operations of the stations in parallel to other duties at the weather services. Staff training and technical support is provided by CIMH, meaning that a technical coordination with CIMH is needed regarding the procurement of the station funded by SOFF.
- d. Harsh Environmental Conditions – A combination of tropical conditions (high humidity and temperatures), hurricane-prone regions (strong winds and intensive precipitation) and the vicinity of the ocean (high salinity) require a durable, calibrated, and suitable equipment. Additionally, the sulphur gases emitted by the volcanos speed up the corrosion process significantly.
- e. Transportation – currently the means of transport to get to the stations are limited and currently the private vehicles of the staff members are being used. This, coupled with the limitation on personnel may hinder the proper M&O of the stations. However, as the Canefield site is very close to DMS headquarters, this should be a rather minor issue.

Upper-air stations

To fulfill GBON criteria, Dominica should operate at least one upper air station. However, it is to be noted that in the Caribbean region there is already existing upper air infrastructure with upper air stations in Barbados, Guadalupe and Trinidad and Tobago each of them with varying operational capacity. In addition, some of the aforementioned countries in the region, and new ones, are also target of the SOFF activities potentially further enhancing the upper air capacity of the overall Caribbean area. A final consideration would be that the spatial resolution required for SIDCs is 1000 km, whereas the distance between the countries is less than 200 km meaning that Barbados upper air station would be sufficient to cover Dominica (Figure 2). This situation leads to the need to leverage and rationalize the regional capacity in a sensible way considering the countries as a whole to maximize capacity and minimize maintenance and operations leading to better regional sustainability. This being said, Dominica could act as a northern back-up upper air site in case either Barbados or Guadalupe had discontinuation

in data provision. In this respect, it is important to note that upper air information is essential for weather prediction, not only but in particular during the hurricane season.

Marine surface and upper-air stations

Dominica possesses a rather large marine Exclusive Economic Zone of about 29,000 km² (Figure 3). With this size it may be relevant for the region to install a minimum set of marine surface stations. Given the size and shape of Dominica’s EEZ, with an elongated EEZ with a maximum distance of 563 km, at least one station would be recommended to initiate this observational capacity.

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	1	1	0	1	0
Upper-air stations operated from land	1	1 (Barbados)	0	0	0
Surface marine stations in Exclusive Economic Zones:⁷ Density 500 km Variables: SLP, SST Observing cycle: 1h	1	0	0	1	1
Upper-air stations operated in Exclusive Economic Zones:⁸ Density 1000 km Vertical resolution: 100 m, up to 30 hPa Variables: T, H, W Observing cycle: twice a day	0	0	0	0	0

⁷ 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.

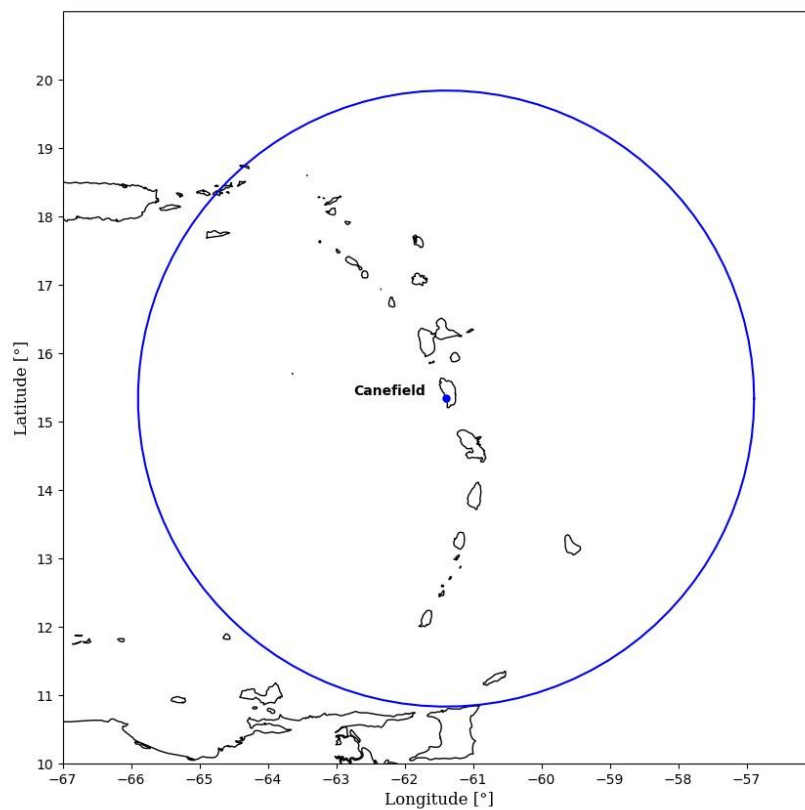
⁸ Although GBON marine stations are not part of initial SOFF scope, peer advisors are encouraged to analyze in this step when considered relevant e.g. SIDS, the need for future GBON marine observations investments according to the GBON requirements.

3.1 Recommended existing surface, upper-air and marine¹⁰ stations to be designated to GBON

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

Station name	Station type (S/UA/M ¹¹)
Canefield	S
(Barbados)	UA

Figure 1. A map with the existing surface station for a low-resolution GBON (500 km). The Green Circle is surrounding the entirety of Dominica, the blue circle has a 500 km radius.



⁹ 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.

¹⁰ 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.

¹¹ Please see guidance on marine stations in Section 2 on Scope.

Figure 2. A map with the existing upper-air station for a low-resolution GBON (1000km). The Green Circle is surrounding the entirety of Dominica.

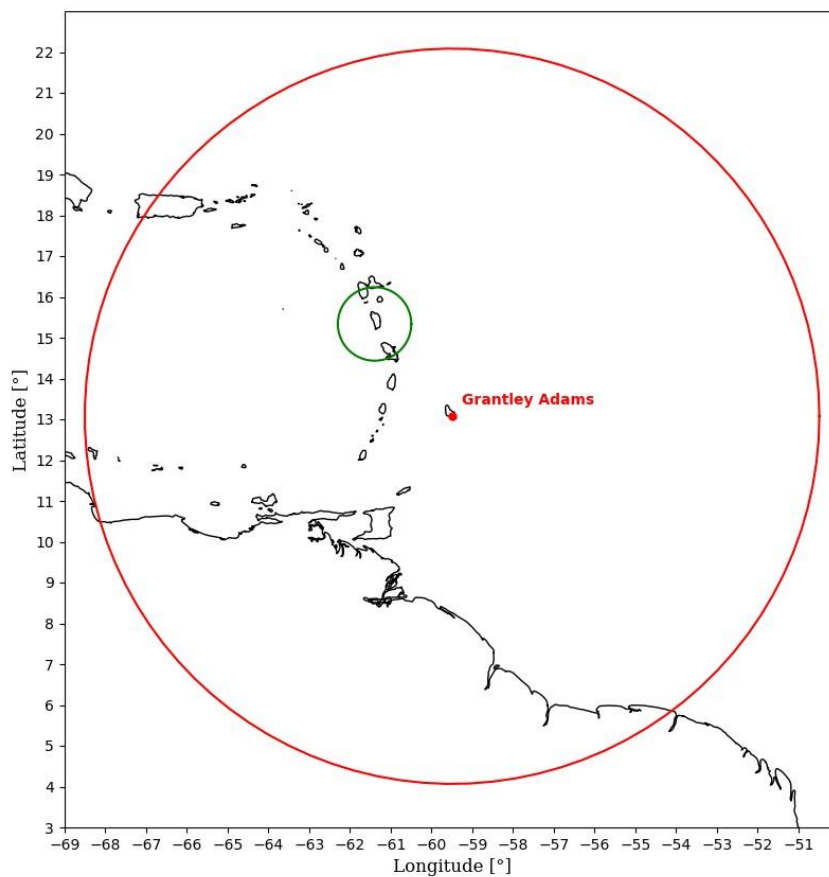
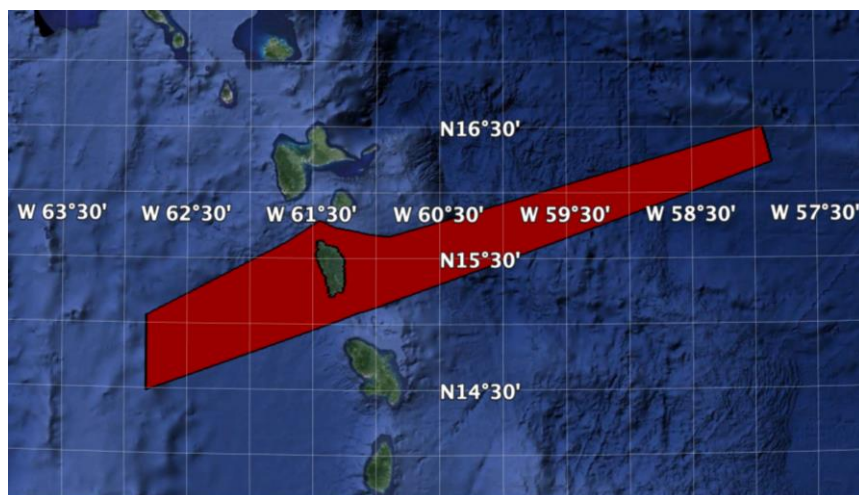


Figure 3. A map with the Dominica EEz in red.



4. Report completion signatures

Peer Advisor signature

Andreas Schöffhauer

Beneficiary Country signature

Holger Jochim
Iz

WMO Technical Authority screening signature

Aluffiel