13 Feb 2024

GBON National Gap Analysis

Systematic Observations Financing Facility

GBON Gap Analysis Report

Djibouti

Weather and climate data for resilience

WEATHER CLIMATE WATER

Screening of the National Gap Analysis (NGA) of Djibouti

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: 24 May 2024

Signature:

Albert Fischer

Director, WIGOS Branch, Infrastructure Department, WMO

GBON National Gap Analysis Report
Djibouti

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1. Country information from the GBON Global Gap Analysis

Djibouti, located in the northeast of the horn of Africa, covers 23200 km^2 and has 370 km of coastline and a population of 820,000 inhabitants. Except the urban centre of Djibouti City (about 600.000 inhabitants, the population density is low. The landscape of Djibouti is variable and extreme, ranging from low lying areas along the coast to a series of low desert plains separated by parallel plateaus in the west and south and rugged mountains in the north with highest peak is Mount Moussa at 2,028 m. Djibouti has an INFORM Risk index of 4.9, which is high. Natural hazard exposure is also high, with droughts, earthquakes, tsunamis and coastal flooding being the dominant factors. The coastline of district Tadjourah faces frequent flooding with damages to road infrastructure from rain fall in the northern mountains.

The meteorological services in Djibouti are provided by the "Agence Nationale de Meteorologie" (ANM) while the hydrometeorological services are provided by the "Centre de recherche et de Dévelopement" (CERD). Djibouti is among the first countries selected for a coordinated and targeted support under the UN EW4ALL initiative. Therefore, SOFF, CREWS (Climate Risk & Early Warning Systems) and GCF (Green Climate Funds) projects1 are being developed in synergy.

WMO has conducted a GBON Global Gap Analysis (June 2023) which has resulted in the following results: for the Surface observation network, the requirement is one (1) for low density resolution (200 km) and three (3) for high density resolution (100 km). In terms of an upper air site, the GBON requirement calls for a single upper-air station. It should be added that the closest operational upper air station is in Addis Ababa, more than a 1000 km away and the area around Djibouti is virtually without stations to the south (Somalia), almost no stations to the North (Eritrea) and very few stations to the West (Ethiopia). The result of the assessment is compiled in table 1.

Table 1. GBON Global Gap Analysis

A. GBON horizontal resolution requirements	B. Target	C. Reporting to req.	D. Gap to improve	E. Gap new	F. Gap total
Surface stations Standard density 200 km	1	0	1	0	1

[1] CREWS is proposing to acquire 3 AWS. GCF may also consider additional AWS (Concept note under development)

Upper-air stations over land Standard density 500km	1	0	0	1	1

- Target – the number of GBON low-resolution required stations; Reporting to Req. – The existing stations reporting according to the GBON's standards; Gap to improve – number of existing stations, which might be upgraded to fulfil GBON's requirements; Gap new – the number of required new stations; Gap Total – number of stations requiring an investment (existing/new)

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

Surface stations

A mission was sent to Djibouti to assess the current situation in the country, and it had the opportunity to visit a few existing sites. It was determined that there is a fully functioning AWS at the Djibouti Airport, which is the main station, supposed to share data internationally. However, due to communication issues, the data is not shared via the GTS. In addition, there are three (3) operational AWSs at Dikhil, Arta and Ali Sabieh, which are all located in the south-west of Djibouti city. Hourly observations of surface pressure and temperature are performed manually by a technician.

Previously two more AWSs existed in the North at Tadjourah (vandalised) and Obock (destroyed by strong winds). Both cities of Tadjourah and Obock have an airport. The current status of the GBON observation network can be viewed in the tables 2 and 3 below. All operating stations are in the southeastern area, whereas there is no surface observing station in the central mountains and north of the Gulfs of Aden and of Tadjourah.

It must be added that ANM has no spare parts for the current operational stations, nor they have vehicles to visit the sites. Usually, they rent a 4x4 for the maintenance visit. The number of technicians (2) for the maintenance is limited and they are on the verge of going to retirement. There is no firm plan yet for hiring new personnel.

Upper-air stations

ANM currently does not operate any upper-air stations. However, in the past, there were upper-air launches and the building is still in existence. However, unused for many years.

Table 2. Assessment of existent stations per their operational status and network ownership

GBON Requirements	Existing observation stations (# of stations)			
	NMHS network		Third-party network	
	Reporting to req.	To improve	Reporting to req.	To improve
Surface land stations Standard density 200km Variables: SLP (Surface Level Pressure), T, H, W, P, SD (Snow Depth)	0	1	0	0

Upper-air stations operated from land Horizontal resolution: 500km Vertical resolution: 100m, up to 30 hPa Variables: T, H, W	0	1	0	0
Surface marine stations in Exclusive Economic Zones: 500 km Variables: SLP, SST (Sea Surface Temperature)	**0**	**0**	**0**	**0**
Upper-air stations operated in Exclusive Economic Zones: 1000 km Vertical resolution: 100m, up to 30 hPa Variables: T, H, W	**0**	**0**	**0**	**0**

Table 3. Assessment of a designated GBON station 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/UA/M)	Owner (NMHS/3rd party)	Funding source	GBON variable measured							Reporting cycle (obs/day)	GBON Compliant (Y/N)
				SLP	T	H		P	SD	SST		
Djibouti Airport	S	NMHS	Gov	X	X	X	X	X	-	-	24	N
Ali Sabieh	S	NMHS	Gov	X	X	X	X	X	-	-	24	N
Dikhil	S	NMHS	Gov	X	X	X	X	X	-	-	24	N
Arta	S	NMHS	Gov	X	X	X	X	X	-	-	24	N

3. Results of the GBON National Gap Analysis

Surface stations

To fulfil the low-resolution GBON criterion, the already existing station at the Djibouti Airport would suffice (as can be seen in Fig. 1 and tables 4&5a), finding a solution to the data transmission issue

(including the future WIS 2.0). Obtaining enough spare parts is mandatory to assure the sustainability of this station.

However, in case a sufficient funding possibility will become available, the same procedure could be taken with at least one additional existing AWS (preferably the one in the second largest city – Ali Sabieh).

The major current and future challenges to be taken into consideration when preparing the national contribution plan with sustainability as one of its principles include:

a. Ensuring coordination with the GCF project (in preparation) and CREWS Djibouti projects Acquiring consumables for the upper air site and spare parts for Surface Stations to ensure continuity of services

b. Ensuring a transportation mean (and fuel) to observing sites is available for the maintenance of the stations
c. Recruit and train a new generation of technicians.

Upper-air stations

Upper-air observations were made at the ANM Head Office during the period 1970 - 1994 using French Meteomodem radiosondes equipment. Currently no upper air station is operational in Djibouti. The airport of Djibouti city or ANM Head Office (near the airport) is recommended for the installation of the required upper air station, in case that external funds will be available (Fig. 2). The map reveals also that an upper air station could cover large parts of Eritrea, Northern Somalia and Eastern Africa.

Marine surface and upper-air stations

Djibouti possess quite a large marine Exclusive Economic Zone, which has a high importance for the international marine transportation (the meeting point between the Red Sea and the Indian Ocean). Therefore, it might be of a great benefit of a future project to install at least one marine surface station in the sea east to Djibouti, preferably closer to the main Sea Port of Djibouti (the City).

Table 4. 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	GBON target (# of stations)	GBON Compliant stations (#)	Stations gap	
			To improve	New
Surface land stations Standard density 200km Variables: SLP, T, H, W, SD Observing cycle: 1h	1	0	**1**	**0**
Upper-air stations operated from land Standard density 500km Vertical resolution: 100m, up to 30 hpa Variables: T, H, W Observing cycle: twice a day	1	0	**0**	1

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

Table 5. Recommended existing and proposed surface and upper-air stations to be designated to low-resolution GBON.

Station name	Station type (S/UA/M)
Djibouti Airport	S
Djibouti Airport	U

Figure 1. A map with the existing surface station for a low-resolution GBON (200 km). The blue circle is surrounding the entirety of St. Lucia.

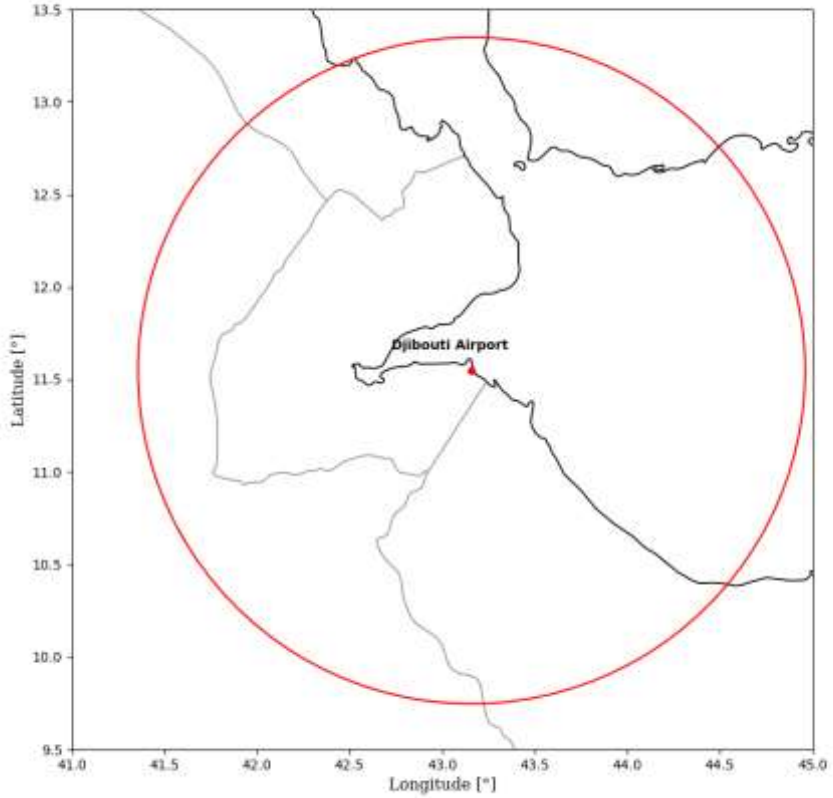
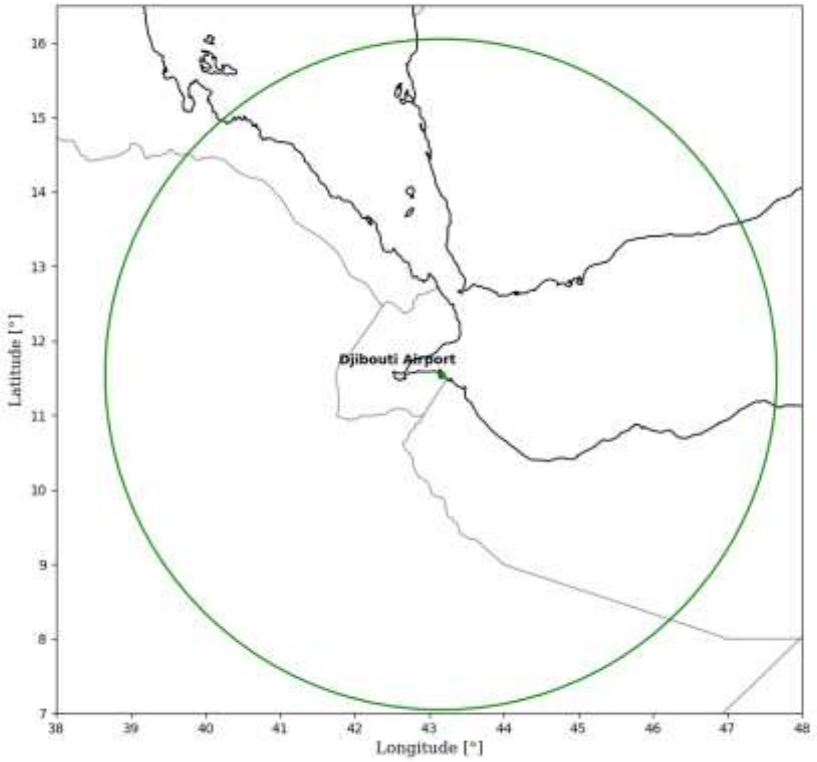


Figure 2. A map with the existing upper-air station for a low-resolution GBON.

Red circle indicates 500km radius. The Green Circle is surrounding the entirety of St. Lucia.



4. Report completion signatures

Peer Advisor signature Andreas Schofthauser
WMO Technical Authority screening signature
Beneficiary Country signature Mr. Mohamed Ismail Nour MOHAMED ISMAEL NOUR Représentant Permanent de Djibouti Auprès de l'Organisation Météorologique Mondiale (OMM)

4. **Report completion signatures**

Peer Advisor signature

Andreas Schofthauser

WMO Technical Authority screening remarks and signature

Beneficiary Country remarks and signature

MOHAMED ISMAEL NOUR

MOHAMED ISMAEL NOUR
Représentant Permanent de
Djibouti Auprès de l'Organisation
Météorologique Mondiale (OMM)

Lu et approuvé.

Mais nous suggérons de tenir compte de la mise en place prochaine d'un service

Météorologique maritime à l'un des ports de Djibouti.

Par ailleurs la République de Djibouti doit retrouver ses 13 stations climatologiques abandonnées après son accession à l'indépendance.