

2025-09-22



GBON National Contribution Plan

Haiti

Systematic Observations
Financing Facility

**Weather
and climate
data for
resilience**



GBON National Contribution Plan

Haiti

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Résumé exécutif en français

Ce document a été élaboré par l'Office fédéral de météorologie et de climatologie – MétéoSuisse et l'Unité Hydro-météorologique d'Haïti (UHM) dans le cadre de l'initiative SOFF (Systematic Observations Financing Facility). Ce "plan national de contribution" contient une série de recommandations d'investissements à réaliser pour que Haïti remplisse les exigences GBON (Global Basic Observing Network) de base au niveau national. Haïti s'est engagé à respecter les exigences GBON lors du 18^{ème} Congrès météorologique mondial en 2019, avec des objectifs clairs en matière d'acquisition et de partage international des observations météorologiques de base (c'est-à-dire la pression, la température, l'humidité, le vent et les précipitations).

Ce plan préconise en premier lieu une approche séquentielle des investissements SOFF en Haïti, similaire à celle suggérée dans d'autres pays (par exemple en République démocratique du Congo). Dans le cas présent toutefois, l'approche séquentielle des investissements SOFF n'est pas motivée par l'ampleur¹ du projet en soi, mais plutôt par le niveau élevé d'insécurité et d'instabilité géopolitique dans le pays, qui, ensemble, ajoutent des risques et des défis importants au projet.

Une série de cycles d'investissement, chacun comprenant une période de 24 mois d'investissements "actifs" suivie d'une période de "validation" de 12 mois, devrait permettre aux sites d'observation GBON nouvellement établis de passer rapidement à la phase de conformité SOFF (lors de laquelle des fonds seront disponibles pour maintenir ces sites sur le long terme). Cela signifie que les phases 2 et 3 de SOFF se dérouleront en parallèle en Haïti (les stations de surface étant vouées à être stabilisées en premier, avant que des efforts ne soient déployés pour mettre en place un système de radiosondage).

Ce plan national de contribution comprend six modules (objectifs GBON généraux - modèle d'affaires et développement institutionnel - développement d'infrastructures GBON - développement des capacités humaine - gestion des risques - transition vers la phase d'investissement) et 121 recommandations spécifiques, toutes énumérées dans le tableau 3. Ce document est complété par la définition des objectifs GBON pour Haïti ("National Gap Analysis" en anglais) et par un examen approfondi de l'UHM en juin 2025 ("Country Hydromet Diagnostics" en anglais), deux documents qui sont disponibles sur le site web² de SOFF.

Ce plan national de contribution est destiné à servir de base aux demandes de financement de tous les cycles d'investissement SOFF en Haïti, qui seront assemblées conjointement par l'entité chargée de la mise en œuvre de SOFF ("Implementing Entity" en anglais) et l'UHM, avec le soutien de MétéoSuisse (en tant que conseiller pair SOFF). Les recommandations spécifiques de ce plan national de contribution constituent une série d'objectifs explicites qui, ensemble, devraient servir de guide pour le renforcement du réseau d'observation météorologique (en surface et en atmosphère libre) de l'UHM en Haïti.

Les idées et les objectifs énoncés dans ce plan national de contribution sont ambitieux, mais néanmoins réalisables en principe. Compte tenu de l'évolution rapide et parfois disruptive des technologies et des situations géopolitiques, il est essentiel que tous les partenaires du projet (à savoir le pays bénéficiaire, l'entité chargée de la mise en œuvre, le conseiller pair, le secrétariat et le comité de direction SOFF) fassent preuve de pragmatisme, de flexibilité et d'agilité dans la mise en œuvre de la vision définie dans ce plan. Il faut également reconnaître que les investissements SOFF en Haïti seront probablement menés parallèlement à d'autres initiatives majeures, notamment CREWS et EW4All. Il est primordial que toutes ces initiatives se complètent et se soutiennent mutuellement, tant du point de vue des objectifs que des aspects pratiques. Ces initiatives ne peuvent en aucun cas être menées de manière isolée. Une forte appropriation de ce plan (et de l'initiative SOFF en général) par l'UHM et le gouvernement haïtien est également absolument indispensable pour que ce projet soit couronné de succès.

¹Les objectifs GBON en Haïti sont de trois stations de surface et 1 station de radiosondage.

²<https://un-soff.org/document-library/>

Executive summary

This document has been assembled by the Federal Office of Meteorology and Climatology (MeteoSwiss) and the UHM – the acronym of the “Unité Hydrométéorologique d’Haïti”, Haiti’s National Meteorological and Hydrological Services (NMHS) – within the scope of the Systematic Observations Financing Facility (SOFF). This “National Contribution Plan” contains a series of recommendations for investments to be made in order for Haiti to become Global Basic Observing Network (GBON)-compliant at the national level. Haiti committed to abide by the GBON requirements at the 18th World Meteorological Congress in 2019, with clear goals in terms of the acquisition and international sharing of basic meteorological observations (i.e. pressure, temperature, humidity, wind, precipitation).

First and foremost, this plan advocates for a sequential approach to SOFF investments in Haiti, in a manner similar to what was suggested elsewhere (e.g., in the Democratic Republic of Congo). In the present case, the sequential approach to SOFF investments is not motivated by the scale of project³ in itself, but rather by the severe level of insecurity and geopolitical volatility in the country, that together add significant risks and challenges to the project.

A series of Investment Rounds, each comprised of a 24-month period of “active” investments followed by a 12-month “commissioning” period, ought to enable newly established GBON observing sites to rapidly transition to the SOFF Compliance Phase (at which point funds will be available to maintain these sites in the long term). This implies that the SOFF Phase 2 and 3 will eventually be proceeding in parallel in Haiti (with surface stations being stabilized first, before any efforts are deployed towards an upper-air system).

This National Contribution Plan is comprised of 6 modules (National Target toward GBON Compliance - GBON Business Model and Institutional Development - GBON Infrastructure Development - GBON Human Capacity Development - Risk Management Framework - Transition to SOFF Investment Phase) and 121 specific recommendations, all listed in Table 3. This document is completed by the evaluation of the GBON targets for Haiti (known as the “National Gap Analysis”) and an in-depth review of the state of Haiti’s NMHS as of June 2025 (known as the “Country Hydromet Diagnostics”), both available from the SOFF website⁴.

This National Contribution Plan is meant to serve as a basis for the funding requests of all SOFF Investment Rounds in Haiti, that will be assembled by the SOFF Implementing Entity (IE) and the “Unité Hydrométéorologique d’Haïti”, Haiti’s NMHS (UHM), with the support of MeteoSwiss (as SOFF Peer Advisor). The specific recommendations of this National Contribution Plan constitute a series of explicit goals, that altogether ought to serve as a guide towards the strengthening of the meteorological (surface and upper-air) observing network of the UHM in Haiti.

The ideas and objectives laid out in this National Contribution Plan are ambitious, but nonetheless achievable in principle. Bearing in mind that both technology and geo-political situations are prone to rapid & disruptive evolution, it is crucial that all project partners (namely, the Beneficiary Country, the Implementing Entity, the Peer Advisor, the SOFF Secretariat and Steering Committee (StC)) be pragmatic, flexible and agile when working towards implementing the vision outlined in this plan. It must also be recognized that SOFF investments in Haiti will likely proceed alongside other major initiatives, including CREWS and EW4All. It is paramount that all these initiatives complement and support each other: not only theoretically, but on a practical basis too. They absolutely cannot be allowed to proceed in isolation. A strong ownership of this plan (and of the SOFF initiative in general) by the UHM and the Government of Haiti is also absolutely imperative to see this project succeed.

³The GBON gap in Haiti is of 3 surface stations and 1 upper-air station.

⁴<https://un-soff.org/document-library/>

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Disclaimer

All Uniform Resource Locators (URLs) mentioned in this document are valid as of 2025-09-22, unless specified otherwise. This file was compiled using the 2024/10/22 - v1.0 soffreport L^AT_EX class.

Relevant concepts and terminology

The following core concepts will be used throughout this document.

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A **national GBON network** is comprised of a series of individual **GBON observing sites**, that must each be compliant against the official **GBON requirements**.

A GBON observing site can host **manual stations** (surface and/or upper-air), **Automatic Weather Stations (AWSs)**, and/or an **automatic upper-air station**.

Manual and AWS **surface stations** are deployed/installed on a measurement field.

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Manual upper-air stations are comprised of a sounding preparation hall, a launch pad, and, if warranted, H₂ production and storage facilities. For **automatic upper-air stations**, the sounding preparation hall and launch pad are replaced by a so-called auto-launcher.

GBON observing sites hosting manual stations (surface or upper-air) are also comprised of an office to host the local **observers**.

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All GBON observing sites, in particular those hosting an AWS, must have a designated **site keeper**, responsible for the regular site maintenance and able to easily access the site on a weekly basis (at least).

We refer to the process of preventing further degradation of a given station as **stabilization**. This includes, for example, the implementation of Standard Operating Procedures (SOPs) including basic maintenance and diagnostic procedures, and technical interventions of low complexity (e.g. a battery change). The process of stabilization is not to be confused with that of a station **refurbishment**, which implies a heavy technical intervention, typically to replace faulty sensors or replace an AWS that has reached its end-of-life with a new model. The initial stabilization of existing surface stations in Haiti represents a key step of this National Contribution Plan, to account for and mitigate the risks associated with the volatile security situation on the ground.

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When referring to training activities, we shall differentiate between:

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- **formations**, that are typically covering a broad range of topics over several months/years with one or more formal examinations leading to the award of a degree or diploma, and
- **instructions**, which aim at having participants master a specific Standard Operating Procedure (SOP) over a short period of time (typically a few weeks at most).

This National Contribution Plan proposes that instructions ought to be a key component of SOFF investments in Haiti, at least initially.

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A CI/CC approach for SOFF investments in Haiti

The challenges currently faced by Haiti and the UHM are highlighted in the Country Hydromet Diagnostics (CHD) document assembled as part of the SOFF Readiness Phase for this country. These challenges strongly suggest that the GBON National Contribution Target specified in Module 1 of this document cannot/should not be realized within a single SOFF Investment Round. The National Contribution Target (see Module 1) must be understood as a long-term vision: one that will require multiple, successive rounds of investments, each building upon the outcomes of the preceding ones.

This National Contribution Plan (NCP) describes a comprehensive concept that would allow Haiti to eventually become fully GBON compliant. Given that technologies and geo-political situations are prone to rapid, sometimes disruptive evolution, it remains crucial that all SOFF partners - namely the Beneficiary Country, the Implementing Entity (IE), the Peer Advisor, the SOFF Secretariat, and the SOFF Steering Committee (StC) - approach this NCP with a decisively agile mindset. This document presents a global concept and guiding principles. The individual Investment Requests will be responsible for detailing specific objectives for each round. In particular, each Investment Request will include specific targets that will have to be met in order to proceed with a follow-up SOFF investment round in Haiti.

The stabilization of early investments is paramount to the success of this multi-round NCP. **It is thus crucial that surface stations that become GBON compliant as part of a specific Investment Round be allowed to enter the SOFF Compliance phase immediately.** Doing so will ensure that initial SOFF investments in Haiti form a solid and coherent foundation on which the latter rounds can be built. The CHD for Haiti clearly revealed that the degradation of the security situation in the country in recent years, in particular in and around Port-au-Prince, is putting the post-2010-earthquake NMHS recovery achievements in jeopardy. Provided that the novel concept of a “Compliance Phase” is implemented appropriately, SOFF can be uniquely suited to provide much needed long-term stability to the NMHS. It remains clear that SOFF in itself cannot counteract a generalized loss of security and political stability on a national level. Advancing with sequential SOFF Investments in Haiti will provide all project partners the necessary agility to adapt plans and solutions to the evolving situation on the ground, while also limiting the financial risk associated to the project.

We shall refer to the proposed concept of successive, sequential SOFF Investment Rounds with the continuous entry of suitable stations into SOFF Compliance (on a station-by-station basis) as **“Continuous Implementation / Continuous Compliance (CI/CC)”**. It implies that the SOFF Implementation and Compliance Phases proceed in parallel to one another, as illustrated in Fig. 1. Successive, sequential Investment Rounds (each to be submitted to the SOFF Steering Committee for approval and funding) can feed a number of newly-GBON-compliant stations into the SOFF Compliance Phase. The process continues until such time as the NCP described in this document is realized, or the success criteria of a given Investment Round fail to be met.

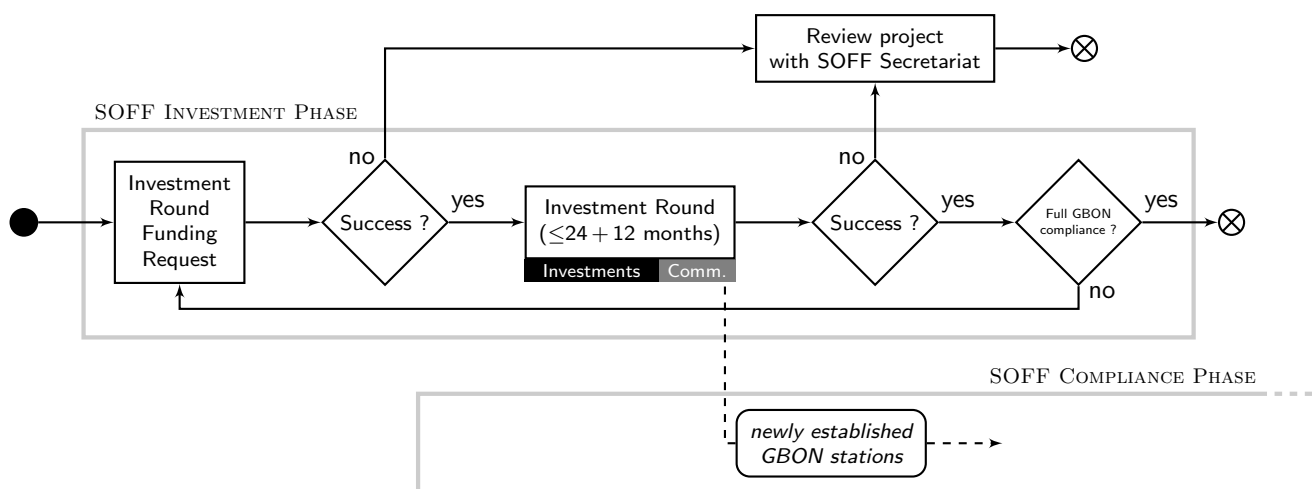


Figure 1: Illustration of the Continuous Implementation / Continuous Compliance (CI/CC) concept put forward in this NCP. A series of sequential Investment Rounds, each one with short term objectives, are used to eventually attain full GBON compliance at the national level. Each Investment Round includes a 12-month Commissioning period to demonstrate the stability of newly-established GBON observing sites. Stations enter the SOFF Compliance Phase immediately after the end of the Commissioning period, to ensure their continued stability. A new Investment Round proceeds only if the success criteria set by the preceding one have been met. With this scheme, the SOFF Investment and Compliance Phase will eventually proceed in parallel.

Module 1. National Target toward GBON Compliance

The outcomes of the GBON Global and National Gap analyses for Haiti are summarized in Table 1. The GBON vision for Haiti is that of 3 surface and 1 upper-air ⁵ stations, as illustrated in Figs. 2 and 3. With a radius of influence $R_{inf}^* = 141$ km for surface stations ($R_{inf}^* = 354$ km for upper-air stations) ⁶, 100% of Haiti would be located within the resulting surface network area of influence A_{inf}^* (100% for the upper-air network as well).

Table 1: GBON National Contribution Target for Haiti.

Type of station	WMO GBON Global Gap Analysis, June 2023				GBON National Contribution Target	
	Target	Reporting	Gap		To improve	New
			To improve	New		
			[# of stations]			
Surface	1	0	1	0	3	0
Upper-Air	1	0	0	1	0	1

Achieving GBON compliance in Haiti is a significant undertaking that will strongly benefit from being broken up in a series of sequential Investment Rounds.

Recommended activity 1.1. *Each Investment Round ought to last at most 36 months (including a 12-month commissioning period), and have objectives designed accordingly.*

Maintaining small investment timelines implies that risks can be assessed more exhaustively and reliably. Doing so also ensures that the project team can remain agile, with the ability to respond to technological and/or geo-political changes. The 12-month commissioning period is a SOFF requirement. It is intended to demonstrate that the newly established GBON sites are indeed stable and their nominal operation is sustainable, before they are allowed to enter the SOFF Compliance phase.

Recommended activity 1.2. *The UHM ought to have a “SOFF Task Team” in place during every Investment Round.*

Members of the SOFF Task Team should all have clearly defined roles (e.g. Solution Owner, Expert, ...) and responsibilities. In particular, each team member should be contributing actively to the SOFF project: for example by planning/following-up on investments and logistics, by coordinating training and formations, by ensuring prompt and smooth communications with the Implementing Entity, the Peer Advisor and the GBON observing sites, by tracking progress and assembling progress reports, by studying the environmental impacts of specific investments, or by liaising with stakeholders and relevant Civil Society Organizations (CSOs).

Recommended activity 1.3. *Members of the SOFF Task Team ought to meet on a bi-weekly basis. The detailed attendance and succinct meeting notes ought to be shared with the Implementing Entity and the Peer Advisor.*

Recommended activity 1.4. *The UHM ought to organize a kick-off workshop at the start of each Investment Round.*

Using the Investment Request documents as input, the workshop should be used to validate an explicit and exhaustive project plan, specifying (at least) deliverables, deadlines, and responsibilities for the entire duration of the Investment Round.

To have its network become GBON compliant, the UHM faces a series of complex challenges. SOFF was designed to tackle some of these directly: for example, the lack of operational funding and the degraded infrastructure. However, the UHM will also need to tackle a series of obstacles that cannot be (directly) overcome with an isolated financial investment. These obstacles include, for example, the need to secure a suitable operational budget from the Government of Haiti, alongside a change of legal status.

Given this state-of-affairs, the proposed sequential approach to GBON compliance in Haiti is as follows:

1. Detailed assessment and stabilization of the Automated Weather Observing System (AWOS) at the airport of Port-au-Prince,
2. Detailed assessment and stabilization of the AWSs in Port-au-Prince, Cap-Haïtien and Les Cayes,

⁵The target of 1 upper-air station in Haiti is consistent with the regional GBON design for the Caribbean that has been approved in March 2025 at the 19th session of the Regional Association IV.

⁶in accordance with GBON regulations; see Appendix A of Haiti’s National Gap Analysis (NGA) document for details.

3. Establishment of international data sharing,
4. Refurbishment of the AWS in Port-au-Prince, Cap-Haïtien and Les Cayes,
5. Deployment of an upper-air system in Haiti, including the assembly of the necessary division within the UHM.

230 **Recommended activity 1.5.** *In view of the current difficult situation the ground, the first SOFF Investment Round in Haiti should first focus on stabilizing existing infrastructure by 1) implementing necessary SOPs, 2) enabling specific capacity development activities for key technical staff, and 3) (re-)establishing a solid regional network of partners.*

According to this recommendation, it can be expected that the first SOFF Investment Round in Haiti will tackle the first three points of the overall sequence, with the following specific goals:

- 235 A. Stabilize existing observing equipment on the chosen GBON sites, by setting up dedicated, specific SOPs (and instructing relevant UHM staff accordingly) for the basic maintenance and fault diagnostic of existing observing equipment (i.e. AWSs and AWOS).
- B. Deploy a WIS 2.0 Box, and initiate the international sharing of currently-existing, stabilized AWS and AWOS data from Haiti.
- 240 C. Re-establish, formalize, strengthen, and coordinate relevant connections with key regional and international partners, which may include:
 - Instituto de Meteorología de Cuba (INSMET), that contributed to deploy the AWS on Haitian airports,
 - Météo France International (MFI), that contributed to deploy the AWOS at the airport of Port-au-Prince, and the UHM Climate Data Management System (CDMS) where the AWOS and AWS data are being ingested,
 - 245 • the Caribbean Metrological Organization (CMO), through which Haiti and the UHM may gain access to the regional WMO Information System (WIS) 2.0 Box initiative, and
 - Environment and Climate Change Canada (ECCC), that as co-lead for the Regional WIGOS Center (RWC) in RAIV is responsible for interactions with Haiti regarding the monitoring of their GBON stations, along with others in the region.

250 Steps 4 and 5 of the overall sequence proposed above will be targeted in distinct, follow-up Investment Rounds.

It is important to acknowledge the fact that French is the official working language at the UHM. Yet, English remains the dominant language used by SOFF, the World Meteorological Organization (WMO), and several regional partners for most communications, while Spanish is spoken at INSMET. Although modern translation tools can certainly help overcome this language barrier, they can still prove inadequate to fully process complex and/or technical documents and drawings.

Recommended activity 1.6. *The UHM, with the support of the SOFF IE, ought to identify and implement suitable measures to ensure that smooth communication can take place with all relevant non-french-speaking project partners.*

All project stakeholders should keep this language barrier in mind, and contribute to erase/smooth it to the best of their abilities.

260 It is also important to recognize that the SOFF Investments in Haiti will proceed alongside several complementary initiatives also benefiting the UHM, including (but not limited to): Climate Risk and Early Warning Systems (CREWS) and Early Warning For All (EW4All). Given the limited human resources available at the UHM for project management and project work, the existence of multiple projects proceeding in parallel poses a real threat of stretching the UHM human resources beyond capacity.

265 **Recommended activity 1.7.** *The SOFF Implementing Entity, with the support of the SOFF Peer Advisor, should establish a coordination group, composed of one expert from each capacity development project interacting with the UHM.*

270 This group should meet (virtually) on a regular basis (i.e. every 2-month or so), in order to briefly discuss the status of the different projects, detail the plans for the upcoming months (including the expected resources/input required from the UHM) staff), and coordinate efforts to avoid exhausting the available human resources at the UHM. Evidently, the existence of this group will also facilitate the alignment and complementarity of the project objectives with one another.

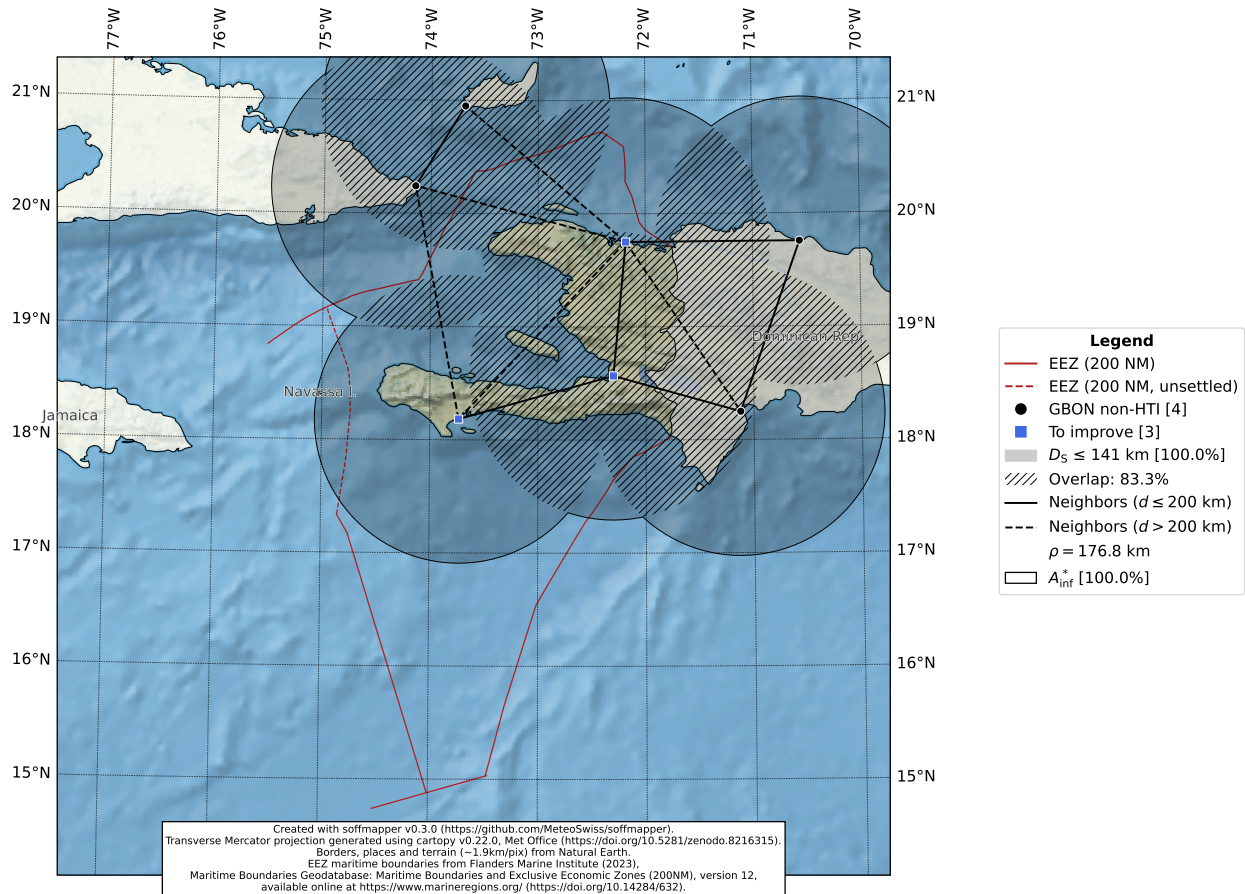


Figure 2: Map of UHM surface stations to improve (blue) in order to achieve GBON compliance at the national level in Haiti. Black diamonds indicate GBON observing sites in neighboring countries, either existing or planned as part of SOFF. Neighboring stations are linked by black lines (dashed if they are separated by more than 200 km). All positions located up to $D_5 = 141$ km from a station are shaded in black, with hashed areas indicating zones where two or more stations are closer than D_5 . The mean horizontal separation (in the GBON sense) of this network, accounting for stations in the neighboring countries, is $\rho = 176.8$ km. A total surface area $A_{inf}^* = 100.0\%$ of Haiti is located within a distance $D_5 = 141$ km from a planned GBON observing site (see Appendix A of the National Gap Analysis - NGA for details).

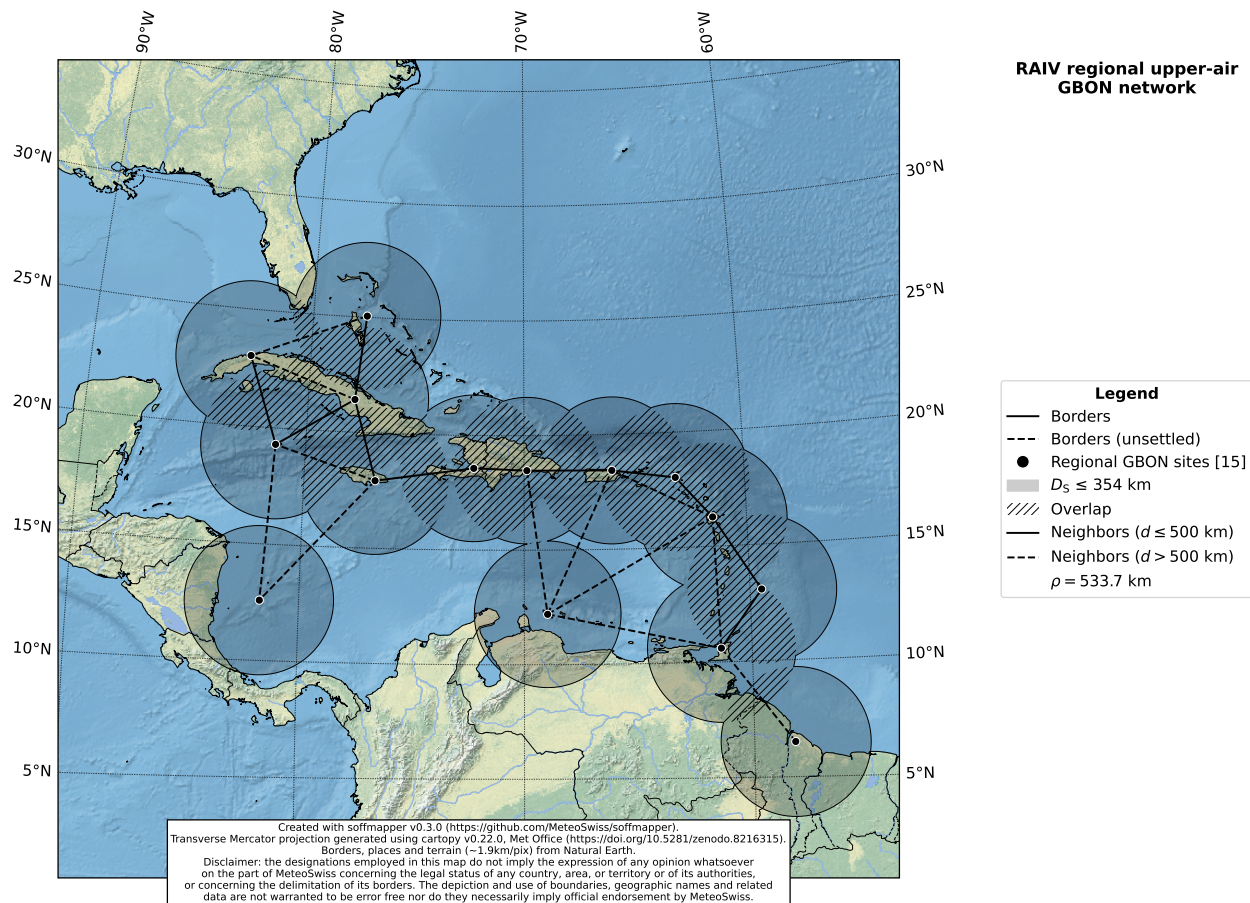


Figure 3: Map of the Caribbean regional GBON upper-air network concept, including the station in Haiti, approved in March 2025 at the 19th session of the Regional Association IV. The lines connecting neighboring stations are dashed if the separation is larger than 500 km. All positions located up to $D_s = 354$ km from a station are shaded in black, with hashed areas indicating zones where two or more stations are closer than D_s .

Module 2. GBON Business Model and Institutional Development

2.1 Assessment of national governmental and private organizations of relevance for the operation and maintenance of GBON

275 The CHD identified at least two key governmental stakeholders of the UHM that could be relevant for GBON compliance: the “Direction Générale de la Protection Civile”, Haiti’s civil protection agency (DGPC), and the “Office National de l’Aviation Civile”, Haiti’s national civil aviation agency (OFNAC). The former relies on forecasts and alerts issued by the UHM, while the latter benefits from UHM observational infrastructures and aeronautical services at several airports throughout the country. The World Food Programme (WFP) also has a vested interest in meteorological observations from (and an existing working relationship with) the UHM, for the purpose of food security and anticipatory action initiatives.

285 All these stakeholders stand to benefit directly from seeing Haiti becoming GBON compliant, in that it would provide them with a steady, reliable stream of quality meteorological observations nation-wide. However, according to the CHD, none appear to have the financial means nor the technological know-how required to actively contribute to the deployment of a GBON network in Haiti, which in itself is not part of their responsibilities either. From that perspective, the UHM is the sole governmental actor in Haiti with a suitable mandate to operate and maintain GBON-compliant stations.

A total of 3 surface observing sites will need to be refurbished to meet the GBON National Target.

Recommended activity 2.1. *The location of GBON observing sites should be decided after a careful and exhaustive site assessment in terms of safety, utilities, long-term access, personnel availability, and meteorological suitability.*

290 A priori, for the surface stations, the sites located at the airports of Port-au-Prince, Cap-Haïtien, and Les Cayes would appear to be highly suitable to become GBON stations, not only because of geographical distribution, but also in terms of access and security. In terms of communication, General Packet Radio Service (GPRS) connectivity is available on all sites.

In addition to the elements listed in Recommendation 2.1:

295 **Recommended activity 2.2.** *The selection of an upper-air site should account for the potential impact on air traffic (also in the long term), and the possible need for dedicated coordination with OFNAC for balloon launches.*

2.2 Assessment of potential GBON sub-regional collaboration

300 As highlighted in the CHD document, Haiti’s NMHS has benefited from the continued support of numerous regional (and less-regional) entities in the wake of the devastating earthquake in 2010. Whereas some of these partnerships have naturally slowed-down with the conclusion of the associated projects, several are today in hiatus as a result of the degrading security conditions on the ground. Nonetheless, many previous partners of Haiti’s NMHS could play key roles within the scope of SOFF.

Recommended activity 2.3. *The UHM should consider re-establishing an active technical collaboration with the Instituto de Meteorología de Cuba (INSMET).*

305 Specifically, a collaboration with INSMET, that will itself be supported by SOFF investments, would be most interesting in the area of instrument calibration, station maintenance, and towards the practical training of technical staff. The AWSs installed in Haiti are of the same brand and model as those currently in use by INSMET, the staff of which was in fact directly involved in the installation of the UHM’s AWSs. INSMET thus appears to be an ideal partner to help the UHM diagnose the current state of its AWSs, and subsequently stabilize them (if warranted/feasible).

310 **Recommended activity 2.4.** *The UHM should consider re-establishing an active technical collaboration with Météo France International (MFI).*

315 MFI was responsible for the deployment of the AWOS at the airport of Port-au-Prince. They would thus appear well suited to support the UHM in stabilizing this system, by providing (e.g.) dedicated instructions to UHM staff towards the operational implementation of crucial SOPs. MFI is also responsible for the data transfer/management software⁷ used at the UHM, and will be key to further implement a transfer of data towards a WIS 2.0 Box (irrespective of the exact form it will take).

⁷known as OBSMET (<https://www.mfi.fr/systems/?id=2>)

It may be that INSMET, possibly through SOFF investments, eventually upgrades its chosen AWS model. The UHM may also be required to upgrade its existing AWS and/or AWOS, depending on the outcome of the fault diagnostics. From that perspective:

Recommended activity 2.5. *The UHM should monitor the progress towards GBON compliance of countries in RA IV, together with the associated solutions implemented as part of SOFF.*

Countries in RA IV exhibit a strong level of regional organization and cooperation, with typically an English-speaking and Spanish-speaking pendant to different initiatives. While being a French-speaking country implies additional communication hurdles for Haiti, it also implies that the UHM does not have any de facto affiliation with English- or Spanish-speaking regional entities: it could in principle decide to participate in any relevant regional initiative. In particular:

Recommended activity 2.6. *The UHM should consider reinforcing its interactions with CMO.*

The UHM should carefully consider the benefits associated with the participation to this important regional initiative. More generally, special consideration should be given to specific solutions and/or systems found to fulfill their objectives in the region. In turn, the UHM and its Peer Advisor should also strive at informing SOFF partners in the region (and beyond) of the SOFF developments and solutions in Haiti.

Recommended activity 2.7. *The UHM should consider exploiting to their full potential all pre-existing regional initiatives to which it already takes part, including (for example) the support available from ECCC as the Metadata lead and as one of the co-leads for the RWC assigned to Haiti.*

Recommended activity 2.8. *The UHM should consider attending every WMO Technical Conference (TECO).*

TECOs are held every two years, with the next one planned for 2026. These venues would provide the ideal means for the UHM to report on the progress of the SOFF project in Haiti. In turn, these venues would also allow the UHM to interact with manufacturers & WMO, and keep track of recent technological developments and best-practices in the field of meteorological measurements.

Recommended activity 2.9. *Participation to TECOs should be contingent upon the submission by UHM of at least one poster describing the SOFF project status in Haiti.*

This poster should cover the following elements: project status, recent successes & challenges, new lessons learned, and the next steps. There is likely to be much interest by the international community to also hear in more details about specific aspects of GBON observations in Haiti. The UHM should therefore systematically consider the possibility, in addition to the general project status update, to submit additional posters on key aspects implemented recently as part of SOFF (for example: maintenance, calibration, SOPs, etc ...).

2.3 Assessment of a business model to operate and maintain the network

The Haiti CHD revealed that the UHM faces a long-stream of insufficient budget allocations from the government. Together with the current lack of sustainable revenue generation from aeronautical services, it implies that the UHM is not able to actively maintain its observing systems. The solution to these financial problems is in principle political, and thus complex. It is paramount that the UHM continues to advocate for a suitable operational budget, possibly via a change of legal status.

Recommended activity 2.10. *The WMO, through its regional office for the Americas, should stand ready to actively support the continued dialogue between the UHM and the government of Haiti.*

The SOFF project ought to provide the UHM with an excellent opportunity to demonstrate its ability to operate a GBON network (with all the resulting benefits for Haiti), if given the proper financial means to do so. However, until such time as the baseline financial situation of the UHM improves, its ability to sustainably operate a GBON network will remain largely compromised (see Sec. 5.1).

Recommended activity 2.11. *UHM staff members (station keepers, maintenance technicians, calibration experts, IT specialists, data analysts) necessary to the operation of GBON observing sites to be established as part of the SOFF project in Haiti should be paid fairly, regularly, and reliably.*

If SOFF can cover the costs associated with new stations, spare parts, communication, power, and external contractors, it should not substitute itself to the Government of Haiti to pay staff base salaries. SOFF should however anticipate to cover supplemental staff-costs necessary to attain GBON compliance, for example related to accessing sites (incl. by air), or to master relevant SOPs with instructions delivered by experts in-country or abroad.

Recommended activity 2.12. *The SOFF Implementing Entity (IE) for Haiti should identify a suitable technical means to cover supplemental staff-costs.*

The Haiti CHD did not identify suitable national private partners to establish a public-private collaboration towards GBON compliance as of June 2025. The recommended model, for now, is thus that of a fully-public setup, in which the UHM is accountable for the delivery of data, as well as network operation and maintenance. This approach, however, should not become dogma, as several regional initiatives (for example related to the management of spare parts) may prove effective down the line. These would however most inevitably require the security situation on the ground to improve first. This is particularly true for international private partners, for which a consolidated & longer-term involvement (beyond the Recommendations 2.3, 2.4, 2.6 and 2.7) would almost inevitably imply having the ability to safely send experts to Haiti at regular intervals.

Recommended activity 2.13. *For each SOFF Investment Round, the UHM should carefully evaluate whether the emergence of new private partners (at the national, regional or international level) could warrant a change towards another business model (e.g. public-private) to maintain and operate the GBON network in Haiti.*

2.4 Assessment of existing national strategies and projects related to observing networks

No formal national strategy for establishing and/or improving observing networks could be identified as part of the CHD of Haiti.

Recommended activity 2.14. *The UHM should consider assembling a detailed WMO Integrated Global Observing System (WIGOS) plan, in direct support of the SOFF project.*

The SOFF project in Haiti builds upon significant investments by the World Bank and the World Meteorological Organization (WMO). Whereas the projects implemented in the wake of the earthquake in 2010 have now ended, CREWS has been active in the country since 2021, albeit with limited reach given the degrading security situation on the ground. A cost extension for CREWS is currently planned, but has not yet been formally approved.

In parallel, significant efforts by multiple national entities (including the UHM) and international partners (including United Nations (UN) Office for Disaster Risk Reduction (UNDRR), WFP, WMO, International Telecommunication Union (ITU), and International Committee of the Red Cross (ICRC), to name a few) were deployed in recent years within the scope of the EW4All initiative to map the requirements and needs for the deployment of a Multi-Hazard Early Warnings System (MHEWS) in Haiti.

Recommended activity 2.15. *The UHM should allocate sufficient personnel to its different capacity development projects, to ensure that their respective implementation timelines can be met.*

Recommended activity 2.16. *The UHM should ensure that a regular exchange of information takes place between the teams assigned to its different capacity development projects.*

These measures represent a UHM-internal pendant to the Recommendation 1.7.

2.5 Review of the national legislation of relevance for GBON

The creation of the UHM is detailed in a circular from the “Ministère de l’Agriculture, des Ressources Naturelles et du Développement Rural”, Haiti’s Agriculture, Natural Resources and Rural Development Ministry (MARNDP) from 2015-08-27. There is currently no other law/act/policy regulating meteorology as a whole in Haiti. The Haiti CHD noted the fact that the Climate Change National Committee, of which the UHM is in principle a member, is not operational. The Haiti CHD also noted that the lack of an operational budget for the UHM may possibly be addressed by change of their legal status from “unit” to “service”.

Recommended activity 2.17. *The UHM should consider continuing advocating for a change of legal status, so as to secure an appropriate operational budget.*

The review of the legislation related to procurement, importation and customs processes has not revealed specific elements liable to significantly affect the smooth implementation of this National Contribution Plan. This is a direct consequence of the fact that the Implementing Entity uses its own procurement processes, on which all its project management units are trained.

The UHM already provides its archival data to researchers and students free of charge. The free sharing of GBON data internationally is therefore not expected to be a problem. Nonetheless:

Recommended activity 2.18. *The UHM ought to clearly mention its commitment to the free and open international sharing of GBON data in relevant documents, such as business & operational plans, 5/10-year strategy, etc . . .*

Module 3. GBON Infrastructure Development

3.1 Design the surface and upper-air observing network and observational practices

The maps of the 3 surface and 1 upper-air stations found via the NGA to be sufficient for Haiti to reach GBON compliance are shown in Figs. 2 and 3. The upper-air station must be established anew. Given its radius of influence, it can in principle be located anywhere in the country, even though from a regional perspective, a northern-placement (e.g. in Cap-Haïtien) would be beneficial to extend GBON coverage towards the Turks and Caicos Islands. Currently, the upper-air station is foreseen to be located in Port-au-Prince, which hosts the UHM headquarters. The 3 surface stations to be upgraded are located at the airport of Port-au-Prince, Cap-Haïtien, and Les Cayes. A Thies Clima AWS is located on each of those sites, while an additional AWOS is also located at the airport of Port-au-Prince. All these sites are listed in Table 2, and we refer the reader to Delphin Léveill   et al. (2020) for further details.

Table 2: List of UHM observing sites, that (as of September 22, 2025) appear reasonably well suited to serve as GBON sites.

Department	Station name	Station type	Latitude [�]	Longitude [�]
Ouest	Port-au-Prince	Surface & Upper-air [†]	+18.5806	-72.3036
Nord	Cap-Ha��tien	Surface	+19.7334	-72.1956
Sud	Les Cayes	Surface	+18.2712	-72.7843

[†] To be confirmed in the relevant SOFF Investment Round Funding Proposal

In view of the current security situation in Haiti:

Recommended activity 3.1. *The UHM should first aim at being GBON-compliant for surface observations, before considering the expansion to upper-air observations.*

Recommended activity 3.2. *The UHM should begin by stabilizing existing observing systems, with the deployment of new observing systems contingent upon a clear improvement of the security situation on the ground.*

Recommended activity 3.3. *The UHM should ensure that the deployment of any new system is accompanied by the assembly of clear, explicit, succinct, self-explanatory SOPs for basic maintenance and troubleshooting.*

Rapidly stabilizing the existing AWS and AWOS stations on planned GBON sites would create motivation among the staff and build trust with the stakeholders, while minimizing the need for significant investments in hardware by exploiting synergies with previous capacity development projects at the UHM. This "stabilize first - expand/upgrade second" approach is also compatible with the volatile security situation on the ground.

Whether all existing AWS and AWOS stations can indeed be stabilized remains to be confirmed, given the current lack of expertise at the UHM to conduct the necessary fault diagnostics on the ground.

Recommended activity 3.4. *The UHM should aim to perform, with high priority, detailed fault diagnostics of its existing and SOFF-relevant AWS and AWOS stations.*

Doing so will likely require dedicated support from expert international partners with a working knowledge of the systems employed by the UHM. It is however paramount that the UHM builds and maintains full ownership of its equipment, to ensure that necessary resources and attention can be summoned locally for regular operation and maintenance purposes.

Recommended activity 3.5. *Relevant UHM technical staff should be trained to implement all necessary SOPs applicable to station diagnostics.*

Provided the diagnostics confirm that the stabilization of stations is meaningful from both the metrological and financial perspectives:

Recommended activity 3.6. *The UHM, with the help of relevant experts, should assess and confirm the expected lifetime of its (stabilized) AWS and AWOS.*

Assuming that any further decline of the existing AWS and AWOS (and all associated equipment related to data transfer, incl. loggers) can be realized (and that these systems can provide viable observations in the short term), their age and lack of regular maintenance in recent years nonetheless implies that they will likely need to be replaced in the not-so-distant future.

Recommended activity 3.7. *The UHM should procure sufficient spare parts for its stabilized AWS and AWOS systems, accounting for their expected lifetime and the evolving security situation on the ground.*

An active, long-term (SOFF-financed) maintenance of existing AWSs may be necessary until such time as the security situation on the ground allows for their replacement (to be financed in a specific SOFF Investment Round). Irrespective of when new observing systems may be deployed:

Recommended activity 3.8. *The UHM should establish and implement clear SOPs at its GBON observing sites.*

At the very least, doing so will require to:

- establish a formal procedure for regular inspections and (basic) maintenance of the observing equipment, including the creation of inspection reports,
- ensure that local staff is able to perform necessary maintenance activities once per week at least,
- implement regular ground maintenance activities (incl. grass mowing and ground cleanup),
- secure the sites against equipment theft and vandalism,
- add a dedicated information panel to each site, aimed at passers-by⁸, to explain in layperson's terms the content and importance of the measurement site for the region, Haiti, and the World,
- establish a "GBON Compliance Team" responsible for monitoring the overall performance of the network & follow-up on issues, and
- organize regular open-days at the site, to raise awareness among local authorities and create ownership within the local community.

These activities remain important for sites located on airport grounds, in view of past security and vandalism issues.

If the size of Haiti and the associated network of UHM stations could in principle warrant the establishment of dedicated calibration facilities at the UHM, the number of GBON stations alone does not justify the use of SOFF funds to do so.

Recommended activity 3.9. *The UHM should seek to establish a formal relationship with regional partners to cover the calibration needs of its GBON stations.*

In the region, both INSMET and the Caribbean Institute for Meteorology and Hydrology (CIMH) do host calibration facilities. As discussed Module 2.2, the existence of past, successful interactions between the UHM and INSMET related to the deployment of AWSs on Haitian airports suggests that this institution (that is itself benefiting from SOFF support to modernize its calibration facilities) might be best suited to support the calibration of the current AWSs of the UHM (at least).

Recommended activity 3.10. *When renewing its current AWS and AWOS systems, the UHM should balance the (crucial) need to maintain uniform technology throughout its network with the benefit of using systems compatible with the relevant regional calibration facilities.*

Recommended activity 3.11. *The UHM should carefully review possible calibration approaches available through regional partners, with the calibration of actual sensors from GBON sites to be preferred over the use of field calibration kits.*

This recommendation contradicts somewhat the typical approach of having a Regional Instrument Center (RIC) responsible for the calibration of field calibration kits or national etalon; yet, it does appear meaningful in the context of Haiti given the small number of GBON stations considered here. Whereas the use of calibration kits may prove more practical for a large network, the small number of GBON stations to be supported by SOFF in Haiti suggests that sensors themselves could be directly sent for calibrations. Having a direct calibration of the station sensors would significantly simplify the calibration SOPs, and thus minimize the associated risks (in terms of degraded data quality or availability). Doing so evidently requires to have an additional set of sensors to be swapped in the field, to avoid interrupting measurements. In any case:

Recommended activity 3.12. *The UHM should ensure that the instruments used for acquiring GBON observations are regularly calibrated with a level of accuracy sufficient to meet the GBON quality requirements.*

⁸Even though the new GBON sites are expected to be setup on airport grounds, one cannot exclude foot traffic in the vicinity of the stations, including by airport staff.

Instrument calibrations should occur at least with a frequency specified by the manufacturer, and more often in case of data quality issues.

Recommended activity 3.13. *The UHM should review and (if warranted) adjust its calibration setup with each SOFF Investment Round, to ensure that it is continuously able to meet the necessary GBON quality requirements for the stations to be rehabilitated/re-established.*

Recommended activity 3.14. *The UHM should strive at deploying hardware solutions across its GBON network that, short of being uniform, are highly compatible with one another.*

Doing so is paramount to facilitate maintenance and calibration activities, and maximize resilience in general. From that perspective:

Recommended activity 3.15. *The UHM and the SOFF IE in Haiti should ensure that selected technological solutions are compatible with any recommendation or guidelines issued by the Task Team (TT)-FirstMile assembled under WMO's Standing Committee on Information Management and Technology (SC-IMT).*

The new observing equipment to be selected by the UHM should evidently be able to measure all baseline GBON variables with the necessary quality and frequency.

Recommended activity 3.16. *The UHM and the SOFF IE in Haiti should abide by the official GBON Tender Specifications for AWSs and radiosonde-related procurements, namely Task Team GBON (TT-GBON) documents 6.1⁹ and 6.2¹⁰.*

Recommended activity 3.17. *The SOFF IE in Haiti ought to consult and interact closely with the UHM when preparing call-for-tenders, to ensure that all appropriate needs and requirements can be specified in sufficient details.*

The SOFF Peer Advisor can evidently also be consulted to aid in the drafting of call-for-tenders and other specification documents. For example, at the moment, the existing AWSs are not connected to the grid, and rely on solar power.

Recommended activity 3.18. *When refurbishing/upgrading existing AWSs or deploying new ones, the UHM should explore the possibility of having these systems connected to the grid, instead of solely relying on solar power.*

The transport of human personnel between stations is currently extremely challenging in Haiti. This implies that:

Recommended activity 3.19. *The UHM should ensure that regular maintenance operations can be performed by local staff to the largest extent possible.*

It would for example be beneficial to see the local staff receive dedicated instructions to replace faulty equipment that does not require expert knowledge or highly sophisticated tools. Local staff should also have the means to self-run basic station diagnostics, and perform more advanced tests with remote support from experts. The ability to diagnose empty batteries, in particular, is paramount.

Recommended activity 3.20. *The ownership of all observing instruments should lie with the Instruments & Calibration Team at the UHM headquarters.*

This ought to ensure that operating and maintenance practices are uniform throughout the network. It also implies that any instrument purchase is made by the the Instrument & Calibration Team.

Recommended activity 3.21. *The UHM should ensure that robust, reliable communication channels exist between the headquarters and the GBON observing sites, including the means to communicate in real time with video.*

Recommended activity 3.22. *The UHM should implement a formal procedure to document all station maintenance activities.*

All maintenance reports should be made available to the UHM headquarters upon completion of the activity. Ideally, they ought to describe in details the nature of the intervention, and enable/encourage the inclusion of pictures.

On some of the sites, UHM observers are responsible for the assembly of Meteorological Aerodrome Reports (METARs) for the local airport. In view of the communication challenges Haiti, and to maximize reliability and resilience:

Recommended activity 3.23. *When operating an AWS on a site with human observers, the UHM should ensure that local observers have a direct access to the live meteorological measurements acquired by the automatic system, independent of the station's connectivity to the outside World.*

⁹https://wmoomm.sharepoint.com/:b:/s/wmocpdb/Ecvr45QvsGZAsQA5FZFcnawBiVksBFp36U-t_Z52Isq3A?e=NEfgs8

¹⁰<https://wmoomm.sharepoint.com/:b:/s/wmocpdb/EZeqACbXb01Es-bieNi04wYBB0BmeYjb3gE9Ddvpa3nVhQ?e=xN21Yo>

We present in Fig. 4 a schematic view of the relationships between specific teams that ought to be assembled by the UHM to operate its GBON network.

Recommended activity 3.24. *To support the operation of its GBON network, the UHM ought to consider assembling an Instrument Maintenance & Calibration Team, an Information and Communications Technology (ICT) Team, and a GBON Compliance Team.*

The envisaged, non-exhaustive responsibilities of each team are listed in Fig. 5.

Haiti lies within the Coordinated Universal Time (UTC)-4 (in the summer) or UTC-5 (in the winter) time zones, such that operational radiosounding will need to occur in the early morning and late afternoon (local time). At this point in time, it remains unclear whether a manual system or an auto-launcher would prove more appropriate.

Recommended activity 3.25. *When deploying an upper-air station, the UHM should very carefully consider the implications of using an auto-launcher over manual launches.*

Although manual launches evidently require trained personnel to work on a daily basis, they are significantly cheaper to operate, and are less prone to long periods of downtime related to technical faults (in particular in tropical settings). If implemented correctly, manual launches can also enable the creation of local jobs, together with a stronger ownership of the underlying measurements by the NMHS. For the UHM that does not yet have experience with radiosounding, manual launches may prove to be a meaningful and resilient alternative over auto-launchers. Irrespective of the launch technique:

Recommended activity 3.26. *In view of the growing scarcity of He worldwide, the UHM ought to favor the use of H₂ as lift gas for its upper-air station.*

The preferred solution from a reliance and logistics perspective would be for the UHM to procure H₂ regularly and reliably by means of an external contractor.

Recommended activity 3.27. *When establishing a new upper-air station, the UHM should carefully assess the possibility to procure a sufficient amount of H₂ with the necessary regularity by means of a local manufacturer, and only commit to setting up a local H₂ production at the GBON observing site if no suitable alternative is identified.*

Site access for staff can be particularly challenging, in particular in terms of security associated to overland travels.

Recommended activity 3.28. *The UHM should ensure that its staff members have the means to access the applicable GBON observing site(s) safely and reliably.*

Beside security issues, the purchase and use of land vehicles also involves recurring maintenance and operational costs, together with a significant logistical overhead for the UHM. In view of the fact that the GBON stations are expected to be located at airports, the UHM should favor the use of air transport to access its GBON sites, at least initially. The purchase of specific duty vehicles may be warranted down the line, provided a significative improvement to the security situation on the ground is realized. In any case:

Recommended activity 3.29. *Before investing in any new fleet vehicle, the UHM should carefully consider and balance the associated operational, maintenance, and logistical costs against the possibility of hiring private transport services whenever necessary.*

Recommended activity 3.30. *The UHM should ensure that its personnel can work in a safe and comfortable environment.*

In particular, this implies that technicians and stations keepers should have access to the relevant personal protection equipment applicable to their tasks.

Recommended activity 3.31. *The UHM ought to ensure that its staff actively maintains its GBON observing sites, and provide them with the necessary equipment's and consumables to do so.*

Basic, regular maintenance activities of GBON observing sites hosting an AWS include, for example, the need to cut grass and control weed growth, clean sensors and solar panels, maintain cable connectors and waterproof joints. At some sites, specific equipment (such as protective suits to dislodge bee nests) may also be warranted.

3.2 Design of the ICT infrastructure and services

The data acquired by the THIES Clima AWSs were transferred to the UHM headquarters by means of GPRS technology. At the time of writing however, communication has been lost with all the stations, for unknown reasons. The AWOS

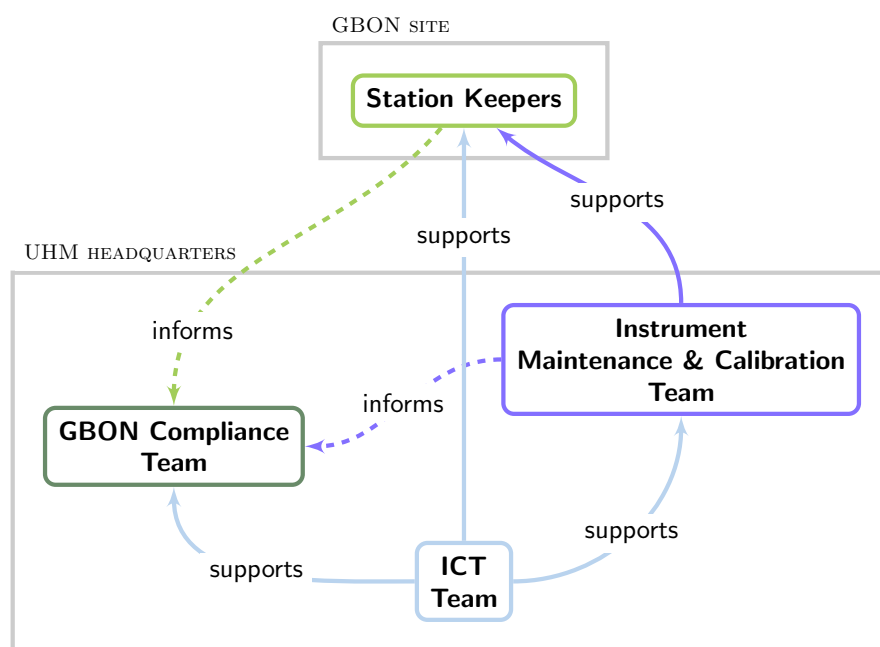


Figure 4: Summary of the teams (and their inter-connectivity) proposed to be formalized within the UHM ecosystem in order to sustainably operate a GBON network. Interactions involving active support are traced using full lines; dashed lines indicated interactions dominated by (regular) transfer of information. In general, support flows upward towards the field, while information flows downward towards the headquarters. See Fig. 5 for the list of each team’s responsibilities.

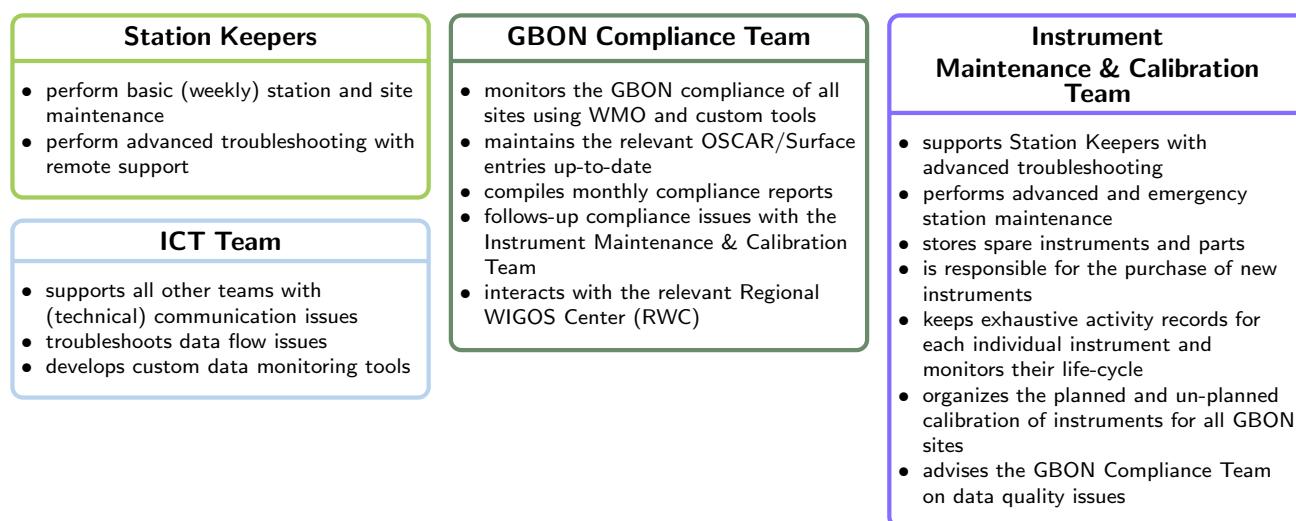


Figure 5: Responsibilities of the teams proposed to be assembled within the UHM ecosystem, to enable the sustainable operation of its GBON network.

at the airport of Port-au-Prince, on the other hand, relies on direct radio communication with the headquarter building. Both data flows were setup to have the data fed into the OBSMET software, run on a server at the UHM headquarters.

Recommended activity 3.32. *The UHM should confirm that all relevant GBON stations can continue seeing their data ingested in the relevant database at the headquarters, and review the need for possible software update (incl. relevant security patch).*

At the moment, the UHM does not share its data on the Global Telecommunication System (GTS), and does not have any plans to setup a WIS 2.0 Box. To do so, the UHM faces essentially three options: it could collaborate with CMO to benefit from the regional WIS 2.0 Box initiative in the Caribbean region, it could rely on a commercial solution, or it could upgrade its own software/hardware solution on-site.

Recommended activity 3.33. *The UHM should carefully assess the advantages and implications of a self-hosted versus a regionally-hosted WIS 2.0 Box.*

Although a regional WIS 2.0 Box may imply (initially) more complexity in terms of the necessary contractual links to be established, it could provide enhanced stability and reliability down the line. This may prove beneficial, at least initially, until the security situation in Haiti improves. The participation to a regional initiative may also have specific advantages in terms of regional support and integration for the UHM, by comparison with a private/commercial hosting solution. Either way, a cloud-based instance WIS 2.0 Box would appear most favorable, in that it would not require the UHM to operate and maintain additional ICT equipment on-premises.

3.3 Design the data management system

Real-time data from surface & upper-air stations should be available at the observing site itself to ensure that the UHM can continue its operations at airports without disruption in case of connectivity loss (see Recommendation 3.23).

Recommended activity 3.34. *The UHM should ensure that data from its GBON observing sites are easily visible by its stakeholders.*

This could be achieved, for example, by means of a web-interface granting public access to the latest measurements of a given station, as illustrated in Fig. 6. Such an interface could be deployed in the cloud alongside a medium-term archive of stations measurements to also enable direct queries by users. One should note that such an interface may be available through WIS 2.0 box directly, depending on the chosen implementation.

Recommended activity 3.35. *When designing new ICT solutions for data management purposes, the UHM should always carefully consider the potential of cloud-based solutions.*

Cloud-based solutions not only allow to minimize the need to operate and maintain physical ICT equipment, they also provide for a straightforward means to scale-up infrastructure: a clear advantage given the CI/CC approach of this NCP. However, cloud-based solutions also require a robust financial structure to be in place, so as to cover the necessary bills at regular intervals. Failure to issue the necessary payments on time would pose the risk of a total system shutdown on very short notice, which would be highly problematic from a GBON perspective.

Recommended activity 3.36. *The UHM should implement a formal Quality Management System (QMS) to assess and monitor the performance of its GBON network.*

This QMS should incorporate official WMO tools (in addition to in-house tools and indicators), including the WIGOS Data Quality Management System (WDQMS)¹¹ and the GBON compliance app¹².

Recommended activity 3.37. *The UHM should assemble a GBON Compliance Team, that ought to be formally responsible for assessing the performance of its GBON observing sites on a weekly basis (at least).*

Recommended activity 3.38. *The UHM should ensure that the metadata of its GBON observing sites is kept up-to-date on Observing Systems Capability Analysis and Review Tool (OSCAR)/Surface¹³.*

This, in turn, implies that:

Recommended activity 3.39. *The UHM ought to actively maintain detailed records of each of its GBON observing sites, that would include (at least) an exhaustive list of relevant stakeholders; site details (including pictures), floor plans,*

¹¹<https://wdqms.wmo.int/>

¹²<https://gbon-compliance.wmo.int/>

¹³<https://oscar.wmo.int/surface/#/>

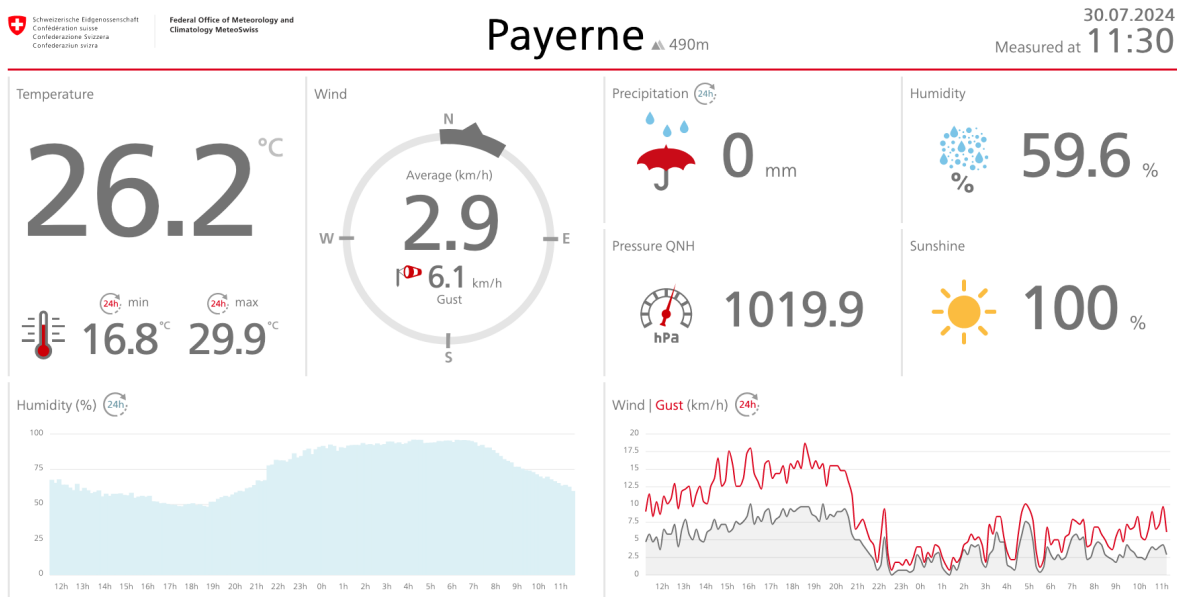


Figure 6: Screenshot of the so-called SMN-Display webpage, providing public access to the real-time measurements from the GBON station of the Federal Office of Meteorology and Climatology (MeteoSwiss) in Payerne. The page is accessible under: <https://swissmetnet-display.ch/pay/en>

and access information; local personnel details (including responsibilities and expertise); deployed instruments (including serial numbers) and hardware.

Recommended activity 3.40. The UHM, by means of the Instrument Maintenance & Calibration Team, ought to keep exhaustive activity records (e.g. dates, location and outcome of any installation, calibration, or service event) for each individual observing equipment.

Recommended activity 3.41. The UHM management should be kept informed of the GBON compliance level of its network, which also ought to be included in the institution's yearly objectives.

3.4 Environmental and sustainability considerations

Haiti faces important challenges in terms of environmental sustainability, and so does the UHM. Implementing environmentally-sustainable solutions requires tackling significant obstacles, for example the generalized lack of waste management and/or recycling infrastructures.

Recommended activity 3.42. The UHM should systematically consider and assess the environmental impact and sustainability of any financial investment made to achieve GBON compliance in Haiti.

Doing so constitutes an important first step towards being able to minimize one's environmental impact. It is also important to consider the full life-cycle of equipment to be installed, and plan for adequate funds to allow for the appropriate dismantlement of equipment at its end-of-life. For the case of radiosondes, for example, the UHM should pay close attention to the biodegradability of the different models.

Recommended activity 3.43. The UHM should plan for the removal and appropriate disposal of antiquated, broken, and/or non-functional equipment from the measurement field(s) of its GBON observing sites.

It would also be beneficial, from a sustainability and social perspective, to favor short supply chains within the scope of the SOFF project in Haiti.

Recommended activity 3.44. Whenever possible and appropriate, the UHM should favor the use of local/regional/national contractors.

The repair of fences, for example, is one activity that could possibly be organized using local entities; so is the site maintenance.

Recommended activity 3.45. *The UHM should carefully assess and plan for the necessary consumables to be delivered to each of its GBON observing sites, and for the resulting waste to be appropriately disposed of.*

Module 4. GBON Human Capacity Development

4.1 Assessment of human capacity gaps

The Haiti CHD identified that if senior UHM staff have received training in accordance with their duties, the same is not the case for recent hires. In general, few UHM staff have received recent training on modern scientific, technical and ICT technologies. Of particular concern for its GBON operations is the fact that there is currently only one technician at the UHM, which has not been trained to maintain nor troubleshoot existing observing systems. Overall, women represent ~40% of UHM employees. As of June 2025, the UHM reported a total of 53 staff members spread on the sites of Port-au-Prince and Cap-Haïtien.

Achieving GBON compliance for surface observations may not necessarily require the UHM to hire new staff members. Several new tasks, for example within the GBON Compliance Team (see Fig. 4), can most certainly be integrated in existing, relevant units. The identification of reliable Station Keepers in Cap-Haïtien could be achieved through the pool of local observers; in Les Cayes, this task may possibly be delegated to a local contractor. At the UHM headquarters, having (currently) one technician in the Instrument Maintenance & Calibration Team ought to be sufficient for three GBON sites, even though it remains clear that additional staff would be required to handle a network growth beyond the scope of SOFF. For the upper-air station, it being a new activity for the UHM, it is certain that its establishment would at the very least require an internal re-assignment of duties, let alone the recruitment of new staff members.

The Compendium of WMO Competency Frameworks (WMO no.1209)¹⁴ ought to provide the UHM with an ideal reference list of competencies, performance criteria, knowledge and skills required for its different staff members.

Recommended activity 4.1. *The UHM should use WMO no. 1209 to regularly evaluate and address the detailed training needs of its personnel.*

Recommended activity 4.2. *The UHM should ensure that each SOFF Investment Round Funding Request includes the necessary training components (following WMO no. 1209) warranted by the technical elements planned for deployment in the Request.*

4.2 Design capacity development activities for technical staff

Recommended activity 4.3. *All existing (and future) UHM personnel responsible for the maintenance of GBON observing sites (that are to become GBON compliant) should be provided with dedicated training on: GBON and SOFF principles and requirements; GBON compliance monitoring (via WDQMS).*

There is no expertise regarding upper-air observations within the UHM, such that the deployment of an upper-air station will also require exhaustive, extensive, dedicated training.

Moving around in Haiti remains very challenging and dangerous. It is therefore paramount for GBON sites to require as little on-site visits from outside personnel as possible. To that end:

Recommended activity 4.4. *The UHM should ensure that the local staff (namely, observers and/or station keepers) is trained to perform the basic regular maintenance of the observing equipment, together with simple troubleshooting tasks.*

Regular maintenance should include, for example, the thorough dusting of instruments and covers (incl. Stevenson screens), and the cleaning of pluviometer buckets (if applicable).

Recommended activity 4.5. *The UHM should ensure that the local station staff is both able and equipped to perform more advanced troubleshooting with remote support from experts.*

This would require the UHM to establish clear SOPs for station maintenance, with an exhaustive supporting manual. Coherent instruction courses and material should be assembled and dispensed accordingly.

Recommended activity 4.6. *The UHM should train and certify its personnel to follow all applicable procedures.*

Refresher courses must be made available upon request from the staff, or when compliance/quality issues are identified.

Recommended activity 4.7. *The UHM should gradually raise the digital awareness and aptitude of its staff, both at its headquarters and in the provinces, by means of dedicated, specialized training as warranted by new/evolving tasks and responsibilities.*

¹⁴<https://library.wmo.int/idurl/4/56877>

Recommended activity 4.8. Existing and new members of the Instrument Maintenance & Calibration Team should receive dedicated, in-depth training on the use, maintenance and calibration of any existing or new AWS to be deployed within the UHM GBON network.

This training could take the form (at least in part) of an in-depth visit to INSMET facilities, or another relevant WMO RIC. Such a visit would also be the perfect means to establish a working relationship between experts, and clarify the logistics of interactions between the UHM and INSMET calibration facilities. This recommendation may also require specific, complementary trainings, for example in electronics and core ICT concepts.

Recommended activity 4.9. Existing and new members of the GBON Compliance Team should be trained in the use of WQMS and the GBON compliance app, OSCAR/Surface, as well as in QMS principles.

Recommended activity 4.10. Existing and new members of the ICT Team supporting GBON observations should receive dedicated training on the assembly, deployment, use, maintenance, and upgrade of a WIS 2.0 Box, and any ICT technology warranted by new observational systems.

The WIS 2.0 Box training should evidently be adjusted to the chosen technical solution (self- or regionally-hosted).

4.3 Design capacity development activities for senior management

The CI/CC approach outlined in this NCP implies that a series of SOFF Investment Round Funding Requests will need to be assembled by the UHM and the SOFF IE over the course of the project. To that end:

Recommended activity 4.11. The UHM should have its senior management refresh its knowledge in both strategic and financial project planning.

It appears particularly important for the UHM senior management to use the time of the Investment Phase to anticipate and carefully plan for the transition to the Compliance Phase.

Recommended activity 4.12. The UHM, with the help of the SOFF IE in Haiti, should carefully review all its financial mechanisms (incl. reporting & planning) and associated procedures.

It would be paramount for this recommendation to be implemented well before the UHM enters the SOFF Compliance Phase, to ensure that sound, safe, clear financial mechanisms for the Compliance Phase can be put in place and validated in time.

Recommended activity 4.13. The UHM should have its senior management, together with all the members of the SOFF Task Team, refresh their knowledge or undertake formal training in project management techniques and principles.

Achieving GBON compliance in Haiti is a challenging objective, that could strongly benefit from an agile mindset.

Recommended activity 4.14. The UHM should have members of the SOFF Task Team, alongside its senior management, trained in the Agile methodology.

UHM project leaders ought to subsequently promote this methodology within the institution, and in particular within the scope of SOFF. The use of comprehensive QMSs is also key to the stabilization of a GBON network.

Recommended activity 4.15. The UHM should have the members of the SOFF Task Team trained to design, assemble, and champion the use of QMSs within the institution.

Human resources form a key component to the success of the SOFF project. To that end:

Recommended activity 4.16. The UHM senior management should perform regular evaluations of the current need for human resources to support its GBON network.

Recommended activity 4.17. The UHM should implement formal, coherent, transparent recruitment mechanisms (incl. exhaustive job descriptions, candidate screening, interviews, and selection).

Recommended activity 4.18. The UHM should seek to establish clear salary grids for all positions throughout the institution.

Recommended activity 4.19. The UHM should keep track of the presence and absence rate of all its staff members.

4.4 Gender and CSOs considerations

Bearing in mind that SOFF funds can only be used to support activities related to the GBON compliance of Haiti:

Recommended activity 4.20. *The UHM should strive at providing a safe, inclusive, and dignified work environment to its employees.*

750 **Recommended activity 4.21.** *The UHM should assemble a detailed professional code-of-conduct, to be formally signed by all its employees.*

Recommended activity 4.22. *All UHM employees should receive a dedicated, mandatory formation on the institution's code-of-conduct, including the prevention of corruption.*

755 **Recommended activity 4.23.** *The UHM ought to establish solid, transparent processes to receive and act upon reports of incidents and/or misconduct within the institution.*

According to the SOFF Gender Action Plan adopted by the SOFF StC on 2022-11-02 (Decision 3.3), SOFF Beneficiary Countries are expected to demonstrate 50% of women participating in the capacity building activities, and 50% of women participating in consultations with civil society organizations. The first step towards eventually meeting these objectives is to closely assess and monitor the gender balance throughout the institution and its activities.

760 **Recommended activity 4.24.** *The UHM ought to maintain clear personnel statistics, including age and gender distributions, for all SOFF-related teams, and for all SOFF-related activities (e.g. workshops, trainings).*

This information should be used by the upper management to assess the gender and age balance within the institution at regular intervals. They should also be provided to the SOFF IE and Peer Advisor as part of a regular project progress reports.

765 It is also paramount to raise awareness regarding the importance and numerous benefits of achieving gender balance within a given institution like the UHM.

Recommended activity 4.25. *The UHM ought to organize for all its employee mandatory formations on gender sensitive topics (including gender balance), diversity and inclusion, sexual harassment, and intercultural communication.*

770 **Recommended activity 4.26.** *The UHM, by means of its senior management, ought to clearly position itself and the whole institution in favor of gender balance and diversity.*

This could be achieved by means of a charter and/or the assembly of a working group, for example.

Recommended activity 4.27. *The UHM and the SOFF IE should ensure that all applicable SOFF investments are designed and implemented in such a way so as to promote gender balance and diversity.*

775 This recommendation implies that, in accordance with the SOFF Gender Action Plan, the UHM should strive at having woman represent at least:

- 50% of all participants in SOFF-related and supported trainings,
- 50% of all participants in SOFF consultations, planning workshops, etc ...
- 50% of staff for operating and maintaining GBON observing sites, and
- 50% of staff in decision-making and project management positions.

780 It is clear that these are ambitious objective that will require time and efforts to be met, albeit the current gender distribution within the UHM is not overly asymmetric (we refer the interested reader to the CHD for details). Nonetheless, it is paramount that the UHM as an institution keeps gender and inclusivity issues close at heart, with constant, sustained, genuine efforts deployed towards improving the existing state-of-affairs.

785 Finally, Civil Society Organizations (CSOs) ought to provide the UHM with an efficient means to reach and interact with additional/new stakeholders and the general public (for example via local CSOs focused on woman's empowerment, but not only).

Recommended activity 4.28. *The UHM ought to identify, keep track, and setup an active liaison program with key CSOs at all its GBON observing sites, with a focus on local CSOs that stand to benefit most from meteorological and climate information.*

⁷⁹⁰ GBON observing sites, through their staff, ought to provide the UHM with the ideal means to build meaningful, sustained, local connections, for example by means of dedicated school visits and workshops. Doing so, in turn, ought to also contribute to boost the visibility, safety and local ownership of upper-air and surface stations.

Module 5. Risk Management Framework

5.1 Assess the risks of the observing network and propose mitigation measures

795 SOFF in Haiti faces several of the contextual and programmatic risks outlined in the SOFF Risk Management Framework, as well as risks specific to the implementation plan outlined in this NCP. They are all reviewed here (including the respective risk levels) in view of the situation on the ground as revealed by the CHD.

5.1.1 Insufficient institutional capacity and/or political commitment to ensure successful implementation of SOFF

Risk level	Likelihood	Impact	Significance of residual risk
Very High	Very Likely	Major	Very High

800 **Description** The Haiti CHD identified that the UHM has been faced with a long-standing stream of insufficient budget allocations, and challenges in terms of the redistribution of revenues from aeronautical services. This situation is evidently compounded by the significant political instability in the country in recent years.

Risk Mitigation Measures The CI/CC approach outlined in Fig. 1 is (also) designed to gradually strengthen the position of the UHM vis-à-vis its stakeholders.

805 **Recommended activity 5.1.** *Until the financial situation of the UHM improves, SOFF should stand ready to support all the operational costs of newly established GBON observing sites, and proceed with Investment Round Funding Requests accordingly.*

Close coordination between the international development project partners of the UHM (CREWS, EW4All, SOFF, etc ...) is also crucial; see Recommendation 1.7.

810 The UHM also faces significant staff shortage, which could affect its ability to successfully act as a solution owner within the scope of SOFF.

Recommended activity 5.2. *The SOFF Implementing Entity should consider embedding a Project Management Unit within the UHM to facilitate the institutional ownership of the SOFF investments.*

815 It should be noted that the WMO project deployed at the UHM in the wake of the earthquake in 2010 has already demonstrated the efficiency of this approach. Members of the Project Management Unit may be recruited both internally to the UHM and externally to the institution.

Residual risk after mitigation measures The political and security situation Haiti remains inherently unstable, and is beyond the control of both the UHM and SOFF.

820 5.1.2 Programmatic targets cannot be reached because of conflict and/or political insecurity negatively affecting SOFF implementation

Risk level	Likelihood	Impact	Significance of residual risk
Very High	Very Likely	Major	High

Description Several regions of Haiti, in particular Port-au-Prince, are subject to severe and long-lasting security threats.

Risk Mitigation Measures

825 **Recommended activity 5.3.** *In view of the security risks for the staff of the UHM, the SOFF IE, the Peer Advisor, and contractors, as well as the risk of damage to UHM infrastructures, significant SOFF hardware investments should not be made in regions where an advice against all travel is in place, as emitted (for example) by the United Kingdom Foreign, Commonwealth and Development Office.*

Residual risk after mitigation measures Implementation of SOFF activities might need to be halted (or simply not started) in specific regions if the security situation does not improve (or even further deteriorates), despite the risk mitigation measures and proactive engagement.

830 5.1.3 Non-compliance with fiduciary and procurement standards in some SOFF activities

Risk level	Likelihood	Impact	Significance of residual risk
High	Possible	Major	Medium

Risk Mitigation Measures SOFF relies on the Implementing Entity's fiduciary and procurement standards during the Investment Phase. In particular, the Implementing Entity will have signed an agreement before receiving funds that includes explicit fiduciary and procurement standards. Both the Peer Advisor and the Implementing Entity will also be provided with extensive WMO guidance on standards and good practices for implementing GBON.

835 **Recommended activity 5.4.** *The SOFF IE should issue (at least) annual reports to ensure that the SOFF Secretariat remains informed of the emergence of possible risks of non-compliance situations and the corrective actions that the IE is planning to take.*

Residual risk after mitigation measures Even with strong fiduciary and procurement standards, procedures, and oversight in place, there is a residual risk of non-compliance in Haiti.

840 5.1.4 UHM staff depart after being trained

Risk level	Likelihood	Impact	Significance of residual risk
High	Possible	Major	Medium

Risk Mitigation Measures The SOFF Compliance phase provides financial support for operations and maintenance, which includes staff-costs. This can be expected to help hire/retain UHM staff, in particular in the provinces.

Recommended activity 5.5. *Each Investment Round Funding Request should carefully assess the UHM staffing situation associated with the specific sites to be (re-)rehabilitated.*

845 In particular, it should outline the anticipated need for direct staff-cost support when the station enters the SOFF Compliance phase.

Recommended activity 5.6. *The SOFF Steering Committee should approve a specific Investment Round Funding Request only if it can reasonably foresee that (re-)habilitated stations will be allowed to enter the SOFF Compliance phase once they have become GBON compliant.*

850 **Recommended activity 5.7.** *The UHM should strive at becoming an attractive employer that can retain highly-skilled personnel.*

Doing so requires an evolution of the current salary scales by the government, which lies outside of the control of the UHM (that should nonetheless continue advocating for it). The UHM should also strive at increasing its attractiveness as an employer, by offering stimulating positions with clear opportunities for skill growth and career evolution.

855 **Recommended activity 5.8.** *The UHM should ensure that there is sufficient redundancy in terms of the distribution of specific, expert knowledge among its staff, to build resilience in case of unforeseen departures.*

Recommended activity 5.9. *The UHM should assemble clear, comprehensive training material to facilitate and speed-up the on-boarding of new personnel, and ensure a uniform training quality throughout the institution.*

860 **Recommended activity 5.10.** *To train its staff, the UHM should initially favor the delivery of short, targeted "instructions" (aimed at mastering specific SOPs) over extended, extensive, comprehensive "formations" (see p.5 for details).*

Each instruction session ought to be tied to the subsequent assembly and use of specific SOPs, the existence of which could subsequently facilitate the on-boarding of new personnel.

Recommended activity 5.11. *The UHM should consider having its staff undertake comprehensive "formations" only after it could stabilize its network and associated GBON operations by means of targeted "instructions".*

865 Targeted instructions will give UHM staff the means to react to immediate & pressing issues. Formations, on the other
hand, would give them the means adequately plan and anticipate the full network life-cycle.

Residual risk after mitigation measures Even with SOFF support, trained staff might decide to leave for other reasons, leaving a capacity gap. The UHM is unlikely to meet the same salary standards as the private sector. It should instead rely on its ability to provide stimulating positions, highlighting its contribution to improving the quality of life of
870 local populations.

5.1.5 SOFF investments cause environmental or social impacts

Risk level	Likelihood	Impact	Significance of residual risk
High	Possible	Major	Low

Risk Mitigation Measures SOFF will rely on the environmental and social standards guidelines, and procedures of the IE in Haiti, including its grievance and control mechanisms. SOFF financial investments are expected to have modest environmental and social impacts. The main risk lies in a degradation of the image of the UHM vis-à-vis its stakeholders, the government and the general population, should the project fail to result in tangible outcomes.
875

Recommended activity 5.12. *Individual SOFF Investment Rounds should target easy fixes, and do so within a time frame of no more than 24 months of active investments.*

Recommended activity 5.13. *The UHM should make clear, explicit allocation of sufficient personnel to follow-up and execute the actions outlined in the Investment Round Funding Requests.*

880 **Recommended activity 5.14.** *The UHM should maintain close ties with the SOFF IE and the Peer Advisor throughout the duration of the SOFF project, and keep them apprised of any developments, expected or not.*

Recommended activity 5.15. *The UHM, by means of a dedicated formation, ought to raise awareness regarding the environmental impact of meteorological observations (including the disposal & recycling of electronic waste) among its staff (including managers).*

885 **Recommended activity 5.16.** *The UHM should systematically assess the expected environmental and social impact associated with a given SOFF financial investment, to be included in the relevant Investment Request.*

Residual risk after mitigation measures Even with strong environmental and social standards, procedures, and oversight in place, there is some residual risk of non-compliance.

5.1.6 Slow implementation and delays in procurement, installation and capacity building activities

Risk level	Likelihood	Impact	Significance of residual risk
High	Likely	Moderate	Medium

890 **Risk Mitigation Measures** MeteoSwiss, as SOFF peer advisor, will stand ready to provide technical advice to the SOFF IE when facing technical difficulties with procurements. Funding requests for each Investment Rounds will be the result of multiple consultations between the UHM, MeteoSwiss and the IE where foreseeable issues related to procurement and installation are discussed and potential solutions identified. The SOFF Secretariat will also closely monitors implementation and facilitate troubleshooting among SOFF partners to find solutions or corrective measures.
895 The WMO Technical Authority will also provides additional ad hoc technical guidance on GBON implementation to MeteoSwiss and the IE.

In terms of equipment installation, the UHM GBON network will be assembled gradually: starting with the stabilization of existing equipment will allow for tangible progress without the need for significant hardware investment on the ground (initially). Such investments would occur only once the security situation allows it.

900 The cumulation of projects proceeding simultaneously at the UHM is also one driver of this risk, which will be mitigated by maintaining a close coordination between the different activities (see Recommendation 1.7).

Residual risk after mitigation measures Even with strong risk mitigation measures, situations where factors outside SOFF control delay the implementation may arise (from economic crises to further degradation of the security situation to environmental disaster).

905 **5.1.7 After the conclusion of the Investment Phase, GBON data are not collected or shared or are shared of insufficient quality or do not improve forecast skills/climate services**

Risk level	Likelihood	Impact	Significance of residual risk
High	Possible	Major	Medium

Risk Mitigation Measures SOFF will contribute to operations and maintenance expenses through result-based finance provided upon sharing of data by the UHM. The SOFF Investment Phase includes upfront operations and maintenance funding for the first year after a GBON infrastructure has been installed. This will ensure that the UHM demonstrates that it can share the data before the first annual results-based payments kick in.

Site security will be given priority (see Recommendation 5.17). In terms of power, the aim will be to enable the energy intake via both solar power and the grid, to add an additional layer of redundancy (see Recommendation 3.18).

Risk will be mitigated further by proceeding with a series of sequential Investment Rounds in Haiti (see Module 1). The WMO Technical Authority will provide extensive guidance to MeteoSwiss and the IE on standards and good practices for implementing GBON in Haiti. Together with the SOFF Secretariat, they will monitor progress toward GBON compliance, as part of the SOFF Compliance Framework, including data quality and provide quarterly feedback.

Residual risk after mitigation measures Even with the innovative SOFF payment mechanism, the UHM may not be able to summon the required minimum contribution to operations and maintenance activities (to be complemented by SOFF result-based finance). Security and political conditions in Haiti may also interfere with the operation of observation facilities, and/or with the sharing of data.

5.1.8 Destruction or theft of SOFF-financed equipment and infrastructure

Risk level	Likelihood	Impact	Significance of residual risk
High	Likely	Major	High

Description Previous deployment of AWSs by the World Bank and other partners have revealed that technical equipment is prone to theft or vandalism at specific locations, at times triggered by a general misinformation regarding the nature and purpose of the equipment.

925 **Risk Mitigation Measures** In addition to site protective measures, engagement with the local community is crucial to enhance the security of the sites.

Recommended activity 5.17. *When selecting GBON observing sites, the UHM should give priority to the safety of its equipment over the quality of the measurements.*

930 **Recommended activity 5.18.** *SOFF-funded equipment and material should be deployed on GBON observing sites that have measurement fields that are clearly delineated and identified as such, by means of an explanatory panel written in the languages spoken within the local community.*

Recommended activity 5.19. *The UHM should design and implement an outreach program targeting local communities (e.g. schools), in order to raise awareness regarding the nature, role and importance (for the local community) of material and equipment on its GBON observing sites.*

935 **Residual risk after mitigation measures** Even with strong security measures and engagement of the local community, this risk may materialize in specific locations.

Module 6. Transition to SOFF Investment Phase

MeteoSwiss will support and accompany the UHM and the SOFF IE in preparing the first Investment Round Funding Request, based on recommendations made in this NCP.

940 **Recommended activity 6.1.** *The first Investment Round Funding Request to be prepared by the SOFF IE in Haiti and the UHM should target easy fixes achievable within a maximum of 2 years of active investments (followed by 1 year of commissioning), with the goal to see newly-GBON-compliant stations enter the SOFF Compliance Phase immediately upon completion of the Investment Round.*

945 **Recommended activity 6.2.** *The first Investment Round should focus on stabilizing existing AWSs on a few key sites, to be selected via a detailed fault diagnostics (requiring dedicated and prior training of UHM technicians).*

The subset of key sites to be targeted for the first Investment Round should take into account the continued availability of UHM personnel in the vicinity, the geo-political stability of the region, and its accessibility.

Recommended activity 6.3. *All Investment Round Funding Requests should include clear objectives and specific targets that will have to be met before a subsequent Investment Round Funding Request is submitted.*

950 **Recommended activity 6.4.** *All Investment Round Funding Requests should refer to this NCP, and include a list of all the Recommendations specified in Table 3 (noting whether they are met fully, partially or not at all).*

Summary of the GBON National Contribution Plan

The specific recommendations made throughout this NCP are listed in Table 3. The reader is referred to the specific Modules for further information regarding each recommended activity.

Table 3: Summary of the GBON National Contribution Plan for Haiti.

Module Id.	Page	Recommended activities
Module 1. National Target toward GBON Compliance		
1.1	7	Each Investment Round ought to last at most 36 months (including a 12-month commissioning period), and have objectives designed accordingly.
1.2	7	The UHM ought to have a “SOFF Task Team” in place during every Investment Round.
1.3	7	Members of the SOFF Task Team ought to meet on a bi-weekly basis. The detailed attendance and succinct meeting notes ought to be shared with the Implementing Entity and the Peer Advisor.
1.4	7	The UHM ought to organize a kick-off workshop at the start of each Investment Round.
1.5	8	In view of the current difficult situation the ground, the first SOFF Investment Round in Haiti should first focus on stabilizing existing infrastructure by 1) implementing necessary SOPs, 2) enabling specific capacity development activities for key technical staff, and 3) (re-)establishing a solid regional network of partners.
1.6	8	The UHM, with the support of the SOFF IE, ought to identify and implement suitable measures to ensure that smooth communication can take place with all relevant non-french-speaking project partners.
1.7	8	The SOFF Implementing Entity, with the support of the SOFF Peer Advisor, should establish a coordination group, composed of one expert from each capacity development project interacting with the UHM.
Module 2. GBON business model and institutional development		
2.1	11	The location of GBON observing sites should be decided after a careful and exhaustive site assessment in terms of safety, utilities, long-term access, personnel availability, and meteorological suitability.
2.2	11	The selection of an upper-air site should account for the potential impact on air traffic (also in the long term), and the possible need for dedicated coordination with OFNAC for balloon launches.
2.3	11	The UHM should consider re-establishing an active technical collaboration with the Instituto de Meteorología de Cuba (INSMET).
2.4	11	The UHM should consider re-establishing an active technical collaboration with Météo France International (MFI).
2.5	12	The UHM should monitor the progress towards GBON compliance of countries in RA IV, together with the associated solutions implemented as part of SOFF.
2.6	12	The UHM should consider reinforcing its interactions with CMO.
2.7	12	The UHM should consider exploiting to their full potential all pre-existing regional initiatives to which it already takes part, including (for example) the support available from ECCC as the Metadata lead and as one of the co-leads for the RWC assigned to Haiti.
2.8	12	The UHM should consider attending every WMO TECO.
2.9	12	Participation to TECOs should be contingent upon the submission by UHM of at least one poster describing the SOFF project status in Haiti.
2.10	12	The WMO, through its regional office for the Americas, should stand ready to actively support the continued dialogue between the UHM and the government of Haiti.
2.11	12	UHM staff members (station keepers, maintenance technicians, calibration experts, IT specialists, data analysts) necessary to the operation of GBON observing sites to be established as part of the SOFF project in Haiti should be paid fairly, regularly, and reliably.
2.12	13	The SOFF Implementing Entity (IE) for Haiti should identify a suitable technical means to cover supplemental staff-costs.
2.13	13	For each SOFF Investment Round, the UHM should carefully evaluate whether the emergence of new private partners (at the national, regional or international level) could warrant a change towards another business model (e.g. public-private) to maintain and operate the GBON network in Haiti.
2.14	13	The UHM should consider assembling a detailed WIGOS plan, in direct support of the SOFF project.
2.15	13	The UHM should allocate sufficient personnel to its different capacity development projects, to ensure that their respective implementation timelines can be met.

Table 3: continued.

Module Id.	Page	Recommended activities
2.16	13	The UHM should ensure that a regular exchange of information takes place between the teams assigned to its different capacity development projects.
2.17	13	The UHM should consider continuing advocating for a change of legal status, so as to secure an appropriate operational budget.
2.18	14	The UHM ought to clearly mention its commitment to the free and open international sharing of GBON data in relevant documents, such as business & operational plans, 5/10-year strategy, etc . . .
Module 3. GBON infrastructure development		
3.1	15	The UHM should first aim at being GBON-compliant for surface observations, before considering the expansion to upper-air observations.
3.2	15	The UHM should begin by stabilizing existing observing systems, with the deployment of new observing systems contingent upon a clear improvement of the security situation on the ground.
3.3	15	The UHM should ensure that the deployment of any new system is accompanied by the assembly of clear, explicit, succinct, self-explanatory SOPs for basic maintenance and troubleshooting.
3.4	15	The UHM should aim to perform, with high priority, detailed fault diagnostics of its existing and SOFF-relevant AWS and AWOS stations.
3.5	15	Relevant UHM technical staff should be trained to implement all necessary SOPs applicable to station diagnostics.
3.6	15	The UHM, with the help of relevant experts, should assess and confirm the expected lifetime of its (stabilized) AWS and AWOS.
3.7	16	The UHM should procure sufficient spare parts for its stabilized AWS and AWOS systems, accounting for their expected lifetime and the evolving security situation on the ground.
3.8	16	The UHM should establish and implement clear SOPs at its GBON observing sites.
3.9	16	The UHM should seek to establish a formal relationship with regional partners to cover the calibration needs of its GBON stations.
3.10	16	When renewing its current AWS and AWOS systems, the UHM should balance the (crucial) need to maintain uniform technology throughout its network with the benefit of using systems compatible with the relevant regional calibration facilities.
3.11	16	The UHM should carefully review possible calibration approaches available through regional partners, with the calibration of actual sensors from GBON sites to be preferred over the use of field calibration kits.
3.12	16	The UHM should ensure that the instruments used for acquiring GBON observations are regularly calibrated with a level of accuracy sufficient to meet the GBON quality requirements.
3.13	17	The UHM should review and (if warranted) adjust its calibration setup with each SOFF Investment Round, to ensure that it is continuously able to meet the necessary GBON quality requirements for the stations to be rehabilitated/re-established.
3.14	17	The UHM should strive at deploying hardware solutions across its GBON network that, short of being uniform, are highly compatible with one another.
3.15	17	The UHM and the SOFF IE in Haiti should ensure that selected technological solutions are compatible with any recommendation or guidelines issued by the TT-FirstMile assembled under WMO's SC-IMT.
3.16	17	The UHM and the SOFF IE in Haiti should abide by the official GBON Tender Specifications for AWSs and radiosonde-related procurements, namely TT-GBON documents 6.1 ¹⁵ and 6.2 ¹⁶ .
3.17	17	The SOFF IE in Haiti ought to consult and interact closely with the UHM when preparing call-for-tenders, to ensure that all appropriate needs and requirements can be specified in sufficient details.
3.18	17	When refurbishing/upgrading existing AWSs or deploying new ones, the UHM should explore the possibility of having these systems connected to the grid, instead of solely relying on solar power.
3.19	17	The UHM should ensure that regular maintenance operations can be performed by local staff to the largest extent possible.
3.20	17	The ownership of all observing instruments should lie with the Instruments & Calibration Team at the UHM headquarters.
3.21	17	The UHM should ensure that robust, reliable communication channels exist between the headquarters and the GBON observing sites, including the means to communicate in real time with video.
3.22	17	The UHM should implement a formal procedure to document all station maintenance activities.

¹⁵https://wmoomm.sharepoint.com/:b:/s/wmocpdb/Ecivr45QvsGZAsQA5FZFcnawBiVksAsBFp36U-t_Z52Isq3A?e=NEfgs8

¹⁶<https://wmoomm.sharepoint.com/:b:/s/wmocpdb/EZeqACbXb01Es-bieNi04wYBB0BmeYjb3gE9Ddvp3nVhQ?e=xN21Yo>

Table 3: continued.

Module Id.	Page	Recommended activities
3.23	17	When operating an AWS on a site with human observers, the UHM should ensure that local observers have a direct access to the live meteorological measurements acquired by the automatic system, independent of the station's connectivity to the outside World.
3.24	18	To support the operation of its GBON network, the UHM ought to consider assembling an Instrument Maintenance & Calibration Team, an ICT Team, and a GBON Compliance Team.
3.25	18	When deploying an upper-air station, the UHM should very carefully consider the implications of using an auto-launcher over manual launches.
3.26	18	In view of the growing scarcity of He worldwide, the UHM ought to favor the use of H ₂ as lift gas for its upper-air station.
3.27	18	When establishing a new upper-air station, the UHM should carefully assess the possibility to procure a sufficient amount of H ₂ with the necessary regularity by means of a local manufacturer, and only commit to setting up a local H ₂ production at the GBON observing site if no suitable alternative is identified.
3.28	18	The UHM should ensure that its staff members have the means to access the applicable GBON observing site(s) safely and reliably.
3.29	18	Before investing in any new fleet vehicle, the UHM should carefully consider and balance the associated operational, maintenance, and logistical costs against the possibility of hiring private transport services whenever necessary.
3.30	18	The UHM should ensure that its personnel can work in a safe and comfortable environment.
3.31	18	The UHM ought to ensure that its staff actively maintains its GBON observing sites, and provide them with the necessary equipment's and consumables to do so.
3.32	20	The UHM should confirm that all relevant GBON stations can continue seeing their data ingested in the relevant database at the headquarters, and review the need for possible software update (incl. relevant security patch).
3.33	20	The UHM should carefully assess the advantages and implications of a self-hosted versus a regionally-hosted WIS 2.0 Box.
3.34	20	The UHM should ensure that data from its GBON observing sites are easily visible by its stakeholders.
3.35	20	When designing new ICT solutions for data management purposes, the UHM should always carefully consider the potential of cloud-based solutions.
3.36	20	The UHM should implement a formal QMS to assess and monitor the performance of its GBON network.
3.37	20	The UHM should assemble a GBON Compliance Team, that ought to be formally responsible for assessing the performance of its GBON observing sites on a weekly basis (at least).
3.38	20	The UHM should ensure that the metadata of its GBON observing sites is kept up-to-date on OSCAR/Surface ¹⁷ .
3.39	20	The UHM ought to actively maintain detailed records of each of its GBON observing sites, that would include (at least) an exhaustive list of relevant stakeholders; site details (including pictures), floor plans, and access information; local personnel details (including responsibilities and expertise); deployed instruments (including serial numbers) and hardware.
3.40	21	The UHM, by means of the Instrument Maintenance & Calibration Team, ought to keep exhaustive activity records (e.g. dates, location and outcome of any installation, calibration, or service event) for each individual observing equipment.
3.41	21	The UHM management should be kept informed of the GBON compliance level of its network, which also ought to be included in the institution's yearly objectives.
3.42	21	The UHM should systematically consider and assess the environmental impact and sustainability of any financial investment made to achieve GBON compliance in Haiti.
3.43	21	The UHM should plan for the removal and appropriate disposal of antiquated, broken, and/or non-functional equipment from the measurement field(s) of its GBON observing sites.
3.44	21	Whenever possible and appropriate, the UHM should favor the use of local/regional/national contractors.
3.45	22	The UHM should carefully assess and plan for the necessary consumables to be delivered to each of its GBON observing sites, and for the resulting waste to be appropriately disposed of.
Module 4. GBON human capacity development		
4.1	23	The UHM should use WMO no. 1209 to regularly evaluate and address the detailed training needs of its personnel.

¹⁷<https://oscar.wmo.int/surface/#/>

Table 3: continued.

Module Id.	Page	Recommended activities
4.2	23	The UHM should ensure that each SOFF Investment Round Funding Request includes the necessary training components (following WMO no. 1209) warranted by the technical elements planned for deployment in the Request.
4.3	23	All existing (and future) UHM personnel responsible for the maintenance of GBON observing sites (that are to become GBON compliant) should be provided with dedicated training on: GBON and SOFF principles and requirements; GBON compliance monitoring (via WDQMS).
4.4	23	The UHM should ensure that the local staff (namely, observers and/or station keepers) is trained to perform the basic regular maintenance of the observing equipment, together with simple troubleshooting tasks.
4.5	23	The UHM should ensure that the local station staff is both able and equipped to perform more advanced troubleshooting with remote support from experts.
4.6	23	The UHM should train and certify its personnel to follow all applicable procedures.
4.7	23	The UHM should gradually raise the digital awareness and aptitude of its staff, both at its headquarters and in the provinces, by means of dedicated, specialized training as warranted by new/evolving tasks and responsibilities.
4.8	24	Existing and new members of the Instrument Maintenance & Calibration Team should receive dedicated, in-depth training on the use, maintenance and calibration of any existing or new AWS to be deployed within the UHM GBON network.
4.9	24	Existing and new members of the GBON Compliance Team should be trained in the use of WDQMS and the GBON compliance app, OSCAR/Surface, as well as in QMS principles.
4.10	24	Existing and new members of the ICT Team supporting GBON observations should receive dedicated training on the assembly, deployment, use, maintenance, and upgrade of a WIS 2.0 Box, and any ICT technology warranted by new observational systems.
4.11	24	The UHM should have its senior management refresh its knowledge in both strategic and financial project planning.
4.12	24	The UHM, with the help of the SOFF IE in Haiti, should carefully review all its financial mechanisms (incl. reporting & planning) and associated procedures.
4.13	24	The UHM should have its senior management, together with all the members of the SOFF Task Team, refresh their knowledge or undertake formal training in project management techniques and principles.
4.14	24	The UHM should have members of the SOFF Task Team, alongside its senior management, trained in the Agile methodology.
4.15	24	The UHM should have the members of the SOFF Task Team trained to design, assemble, and champion the use of QMSs within the institution.
4.16	24	The UHM senior management should perform regular evaluations of the current need for human resources to support its GBON network.
4.17	24	The UHM should implement formal, coherent, transparent recruitment mechanisms (incl. exhaustive job descriptions, candidate screening, interviews, and selection).
4.18	24	The UHM should seek to establish clear salary grids for all positions throughout the institution.
4.19	24	The UHM should keep track of the presence and absence rate of all its staff members.
4.20	25	The UHM should strive at providing a safe, inclusive, and dignified work environment to its employees.
4.21	25	The UHM should assemble a detailed professional code-of-conduct, to be formally signed by all its employees.
4.22	25	All UHM employees should receive a dedicated, mandatory formation on the institution's code-of-conduct, including the prevention of corruption.
4.23	25	The UHM ought to establish solid, transparent processes to receive and act upon reports of incidents and/or misconduct within the institution.
4.24	25	The UHM ought to maintain clear personnel statistics, including age and gender distributions, for all SOFF-related teams, and for all SOFF-related activities (e.g. workshops, trainings).
4.25	25	The UHM ought to organize for all its employee mandatory formations on gender sensitive topics (including gender balance), diversity and inclusion, sexual harassment, and intercultural communication.
4.26	25	The UHM, by means of its senior management, ought to clearly position itself and the whole institution in favor of gender balance and diversity.
4.27	25	The UHM and the SOFF IE should ensure that all applicable SOFF investments are designed and implemented in such a way so as to promote gender balance and diversity.

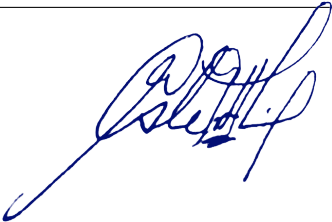
Table 3: continued.

Module Id.	Page	Recommended activities
4.28	25	The UHM ought to identify, keep track, and setup an active liaison program with key CSOs at all its GBON observing sites, with a focus on local CSOs that stand to benefit most from meteorological and climate information.
Module 5. Risk management		
5.1	27	Until the financial situation of the UHM improves, SOFF should stand ready to support all the operational costs of newly established GBON observing sites, and proceed with Investment Round Funding Requests accordingly.
5.2	27	The SOFF Implementing Entity should consider embedding a Project Management Unit within the UHM to facilitate the institutional ownership of the SOFF investments.
5.3	27	In view of the security risks for the staff of the UHM, the SOFF IE, the Peer Advisor, and contractors, as well as the risk of damage to UHM infrastructures, significant SOFF hardware investments should not be made in regions where an advice against all travel is in place, as emitted (for example) by the United Kingdom Foreign, Commonwealth and Development Office.
5.4	28	The SOFF IE should issue (at least) annual reports to ensure that the SOFF Secretariat remains informed of the emergence of possible risks of non-compliance situations and the corrective actions that the IE is planning to take.
5.5	28	Each Investment Round Funding Request should carefully assess the UHM staffing situation associated with the specific sites to be (re-)rehabilitated.
5.6	28	The SOFF Steering Committee should approve a specific Investment Round Funding Request only if it can reasonably foresee that (re-)habilitated stations will be allowed to enter the SOFF Compliance phase once they have become GBON compliant.
5.7	28	The UHM should strive at becoming an attractive employer that can retain highly-skilled personnel.
5.8	28	The UHM should ensure that there is sufficient redundancy in terms of the distribution of specific, expert knowledge among its staff, to build resilience in case of unforeseen departures.
5.9	28	The UHM should assemble clear, comprehensive training material to facilitate and speed-up the on-boarding of new personnel, and ensure a uniform training quality throughout the institution.
5.10	28	To train its staff, the UHM should initially favor the delivery of short, targeted "instructions" (aimed at mastering specific SOPs) over extended, extensive, comprehensive "formations" (see p.5 for details).
5.11	28	The UHM should consider having its staff undertake comprehensive "formations" only after it could stabilize its network and associated GBON operations by means of targeted "instructions".
5.12	29	Individual SOFF Investment Rounds should target easy fixes, and do so within a time frame of no more than 24 months of active investments.
5.13	29	The UHM should make clear, explicit allocation of sufficient personnel to follow-up and execute the actions outlined in the Investment Round Funding Requests.
5.14	29	The UHM should maintain close ties with the SOFF IE and the Peer Advisor throughout the duration of the SOFF project, and keep them apprised of any developments, expected or not.
5.15	29	The UHM, by means of a dedicated formation, ought to raise awareness regarding the environmental impact of meteorological observations (including the disposal & recycling of electronic waste) among its staff (including managers).
5.16	29	The UHM should systematically assess the expected environmental and social impact associated with a given SOFF financial investment, to be included in the relevant Investment Request.
5.17	30	When selecting GBON observing sites, the UHM should give priority to the safety of its equipment over the quality of the measurements.
5.18	30	SOFF-funded equipment and material should be deployed on GBON observing sites that have measurement fields that are clearly delineated and identified as such, by means of an explanatory panel written in the languages spoken within the local community.
5.19	30	The UHM should design and implement an outreach program targeting local communities (e.g. schools), in order to raise awareness regarding the nature, role and importance (for the local community) of material and equipment on its GBON observing sites.
Module 6. Transition to SOFF investment phase		
6.1	31	The first Investment Round Funding Request to be prepared by the SOFF IE in Haiti and the UHM should target easy fixes achievable within a maximum of 2 years of active investments (followed by 1 year of commissioning), with the goal to see newly-GBON-compliant stations enter the SOFF Compliance Phase immediately upon completion of the Investment Round.

Table 3: continued.

Module Id.	Page	Recommended activities
6.2	31	The first Investment Round should focus on stabilizing existing AWSs on a few key sites, to be selected via a detailed fault diagnostics (requiring dedicated and prior training of UHM technicians).
6.3	31	All Investment Round Funding Requests should include clear objectives and specific targets that will have to be met before a subsequent Investment Round Funding Request is submitted.
6.4	31	All Investment Round Funding Requests should refer to this NCP, and include a list of all the Recommendations specified in Table 3 (noting whether they are met fully, partially or not at all).

Report completion signatures

Peer Advisor signature	
Beneficiary Country signature Marcelin ESTERLIN, Ing Coordonnateur UHM R.P d'Haïti auprès de l'OMM	 Date: 2025/09/23
WMO Technical Authority signature	
	

References

Delphin Léveillée, G., Pierre, M., and Staub, C. (2020). Study of climatological stations and networks in Haiti. Technical report, Feed the Future.

List of acronyms

960	AWS	Automatic Weather Station
	AWOS	Automated Weather Observing System
	CDMS	Climate Data Management System
	CI/CC	Continuous Implementation / Continuous Compliance
	CHD	Country Hydromet Diagnostics
965	CIMH	Caribbean Institute for Meteorology and Hydrology
	CMO	Caribbean Metrological Organization
	CREWS	Climate Risk and Early Warning Systems
	CSO	Civil Society Organization
	DGPC	“Direction Générale de la Protection Civile”, Haiti’s civil protection agency
970	ECCC	Environment and Climate Change Canada
	EW4All	Early Warning For All
	GBON	Global Basic Observing Network
	GPRS	General Packet Radio Service
	GTS	Global Telecommunication System
975	ICRC	International Committee of the Red Cross
	ICT	Information and Communications Technology
	IE	Implementing Entity
	INSMET	Instituto de Meteorología de Cuba
	ITU	International Telecommunication Union
980	MARNDR	“Ministère de l’Agriculture, des Ressources Naturelles et du Développement Rural”, Haiti’s Agriculture, Natural Resources and Rural Development Ministry
	METAR	Meteorological Aerodrome Report
	MeteoSwiss	Federal Office of Meteorology and Climatology
	MFI	Météo France International
985	MHEWS	Multi-Hazard Early Warnings System
	NCP	National Contribution Plan
	NGA	National Gap Analysis
	NMHS	National Meteorological and Hydrological Services
	OFNAC	“Office National de l’Aviation Civile”, Haiti’s national civil aviation agency
990	OSCAR	Observing Systems Capability Analysis and Review Tool
	QMS	Quality Management System
	RIC	Regional Instrument Center
	RWC	Regional WIGOS Center
	SC-IMT	Standing Committee on Information Management and Technology
995	SOFF	Systematic Observations Financing Facility
	SOP	Standard Operating Procedure
	StC	Steering Committee
	TECO	Technical Conference
	TT	Task Team
1000	TT-GBON	Task Team GBON
	UHM	“Unité Hydrométéorologique d’Haïti”, Haiti’s NMHS
	UN	United Nations
	UNDRR	UN Office for Disaster Risk Reduction
	URL	Uniform Resource Locator
1005	UTC	Coordinated Universal Time
	WDQMS	WIGOS Data Quality Management System
	WFP	World Food Programme
	WIGOS	WMO Integrated Global Observing System
	WIS	WMO Information System
1010	WMO	World Meteorological Organization