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GBON National Contribution Plan of South Sudan

Systematic Observations Financing Facility

Weather and climate data for resilience

GBON National Contribution Plan

South Sudan

SOFF Beneficiary country focal point and institution	**Mr. Mojwok Ogawi Modo AYOKER**, South Sudan Meteorological Service (SSMS) and Hon. Capt. Subek David Dada, South Sudan Civil Aviation Authority
SOFF Peer advisor focal point and institution	**Dr. Delia Arnold Arias**, Dr. Gerhard Wotawa, Mr. Giora Gerhstein and Dr. Andreas Schaffhauser, GeoSphere Austria – Federal Institute for Geology, Geophysics, Climatology and Meteorology

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Executive summary

This document has been generated within the SOFF readiness phase activities for South Sudan. It describes an overview of the status of the South Sudan Meteorological Service (SSMS) and a path towards GBON compliance. While full compliance will not be achieved through the execution of this National Contribution Plan (NCP), it does generate a realistic approach for the needed observational capacity to develop into a fully compliant member state. The NCP presents an overview of the actions that should be pursued to enhance the SSMS capacity with a complete low density GBON network through a phased deployment plan, spanning over a period of 6 years in total, supported by the corresponding human and institutional capacity activities. This plan includes a unique set of synergetic actions to effectively use resources of other ongoing initiatives that cater as well, among others, for deployment of observational stations.

Module 1. National Target toward GBON compliance

Table1. GBON National Contribution Target based on WMO GBON gap analysis.

Type of station	Baseline (Results of the GBON National Gap Analysis)				GBON National Contribution Target	
	Target (# of stations)[1]	GBON-compliant stations (#)	Gap		To improve	New
			New	To improve		
Surface	16	0	11	5	5	11
Upper-air	3	0		3	0	3
Marine	*when applicable					

Table 2 : GBON Gap Analysis within SOFF activities (June 2023)

GBON horizontal resolution requirements	GBON target	Reporting	Gap improve	Gap new	Gap total
Surface stations **Horizontal resolution**: 200km	16	0	2	14	16
Upper-air stations **Horizontal resolution**: 500km	3	0	0	3	3

[1] For SIDS, for the WMO GBON Global Gap Analysis in January 2022, the EEZ area has been added to the total surface area which is the basis for the target number of stations. The standard density requirements for SIDS have been calculated with 500 km for surface stations and 1000 km for upper-air stations.

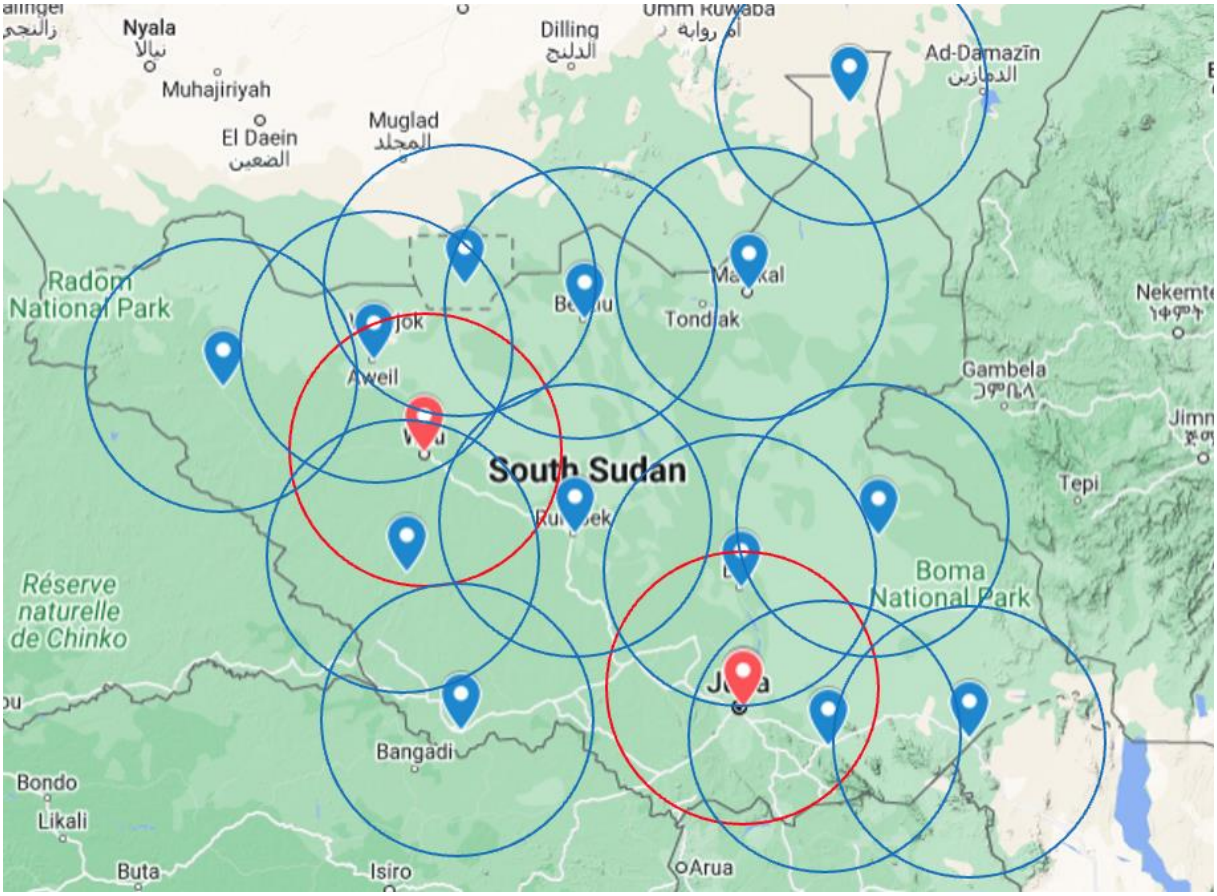


Figure 1. Map of existing surface stations (one at Juba and one at Wau airports marked with a red marker and red 200 km circles) and proposed surface stations (blue markers and circles).

As detailed further down in this document, the main recommendation on going towards GBON compliance is to do a phased approach first to complete the standard density surface stations and then implement upper air stations. The initial NCP will start with the deployment of both manual and automatic stations in those locations where stations and observers exist or existed in the past in addition to a deployment at the university to facilitate the human capacity actions. It is expected that in the first three years, 4 manual stations and 4 automatic stations are deployed, followed then by the remaining sites. It is to be noted that five stations will not be purchased through SOFF but will benefit from an existing project in the country. It is expected that five of these stations can be included in the GBON network also within the first three years of the activities after acceptance of the NCP. Following these deployments, the remaining 6 stations would be deployed in the following 6 years with a feasibility study for upper air deployment and potential deployment.

Finally, the Investment Phase Funding Request, which bases in this document, may take or deviate from this document to accommodate for the practical aspects for the execution of the plan as well as for the evolving nature of the phased approach with particular emphasis in initiating and potentially completing also the upper air stations.

Module 2. GBON Business Model and Institutional Development

This document will describe all the activities considering a **fully public business model**, which is the current recommended approach to enhance the observational capacity of South Sudan to meet GBON compliance.

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

The South Sudan Meteorological Service (SSMS) was established in 2011 right after the country gained its independence. SMSS is operated as a directorate under the Civil Aviation Authority of South Sudan (SSCAA), under the Ministry Transport, and it is therefore embedded within a public governance structure. However, the SSMS has no formal mandate and no national strategic plan for its activities which, in addition to the existing limited resources and capabilities, does not favor a strong and extended stakeholder engagement with the public or the private sectors. It is to be noted, nevertheless, that at ministerial level (Minister of Transport) there is strong interest to formalize the legal framework of the SSMS and build the capacity for a stronger service to provide climate, weather, and early warning services to the country. The development and endorsement **of a legal framework** would on the one hand formalize the mandate and tasks of the SSMS and on the other also streamline the acquisition of resources for the long-term sustainability of a GBON compliant network.

The SSMS currently provides meteorological data and services for civil aviation (METARs and TAFs) based on in-situ surface weather observations at the main airports and web-available meteorological information. In addition, a 24h country-wide weather forecast is dispatched daily on the radio and a weekly weather forecast (average of selected weather parameters) based on ICPAC information is distributed to selected stakeholders. Other than this, there is no additional observational networks or NWP/Climate model capability in-house.

Through exchange during the mission in South Sudan no additional information was made available to explore in detail the pool of potential governmental stakeholders operating or accessing meteorological observational information in the country. Clearly, considering that a weather service is a national critical infrastructure, the main stakeholder is the immediate governance layer where the SSMS is included, namely the SSCAA the Ministry of Agriculture and Forestry, Health, Humanitarian Affairs, Water Resources and Immigration, Transport, and Livestock and Fisheries. Many of the existing in the current Cabinet are as well potential stakeholders to be considered.

Another relevant stakeholder is Juba university. While the operation of stations and gathering of observations shall be made by the SSMS staff members, **Juba university is an essential stakeholder and critical component in any capacity development activity** in the area. Within the SOFF activities, it is recommended and envisaged that Juba university becomes the

focal point for know-how transfer, training (coordinated with the Nairobi WMO's Designated Training Center) and pool for future staff members.

Additional organizations to establish synergies with and that may act as stakeholders downstream are those UN Agencies/programmes or international organizations (Financial Institutions, Development banks and NGOs) that have considered or already have in their pipeline the deployment of some sort of observational capacity which may of course not necessarily meet GBON compliance criteria. Those activities can be in the field of disaster risk reduction, climate adaptation, agriculture and food security or other relevant sectors. Among them FAO, UNDP, UNEP, and the WFP are relevant actors that have been approached.

Related to the private sector, there is no across-country private meteorological service or firm that operates an observational network and that could provide support to the GBON compliance strategy and that could be approached for a potential partnership relationship. There is however the potential for interaction with the Oil industry in the north, but it would likely comprise a more "services provided to client" approach and not a joint venture or a public private partnership to enhance the national capacities as a whole.

Given the array of governmental and private organizations relevant for maintaining a GBON compliant network, the preceding information yields four primary recommendations:

1. It is capital that additional national effort is invested in **organizing the legislative framework around the activities and mandate of the SSMS.** This action would gear the development of the SSMS and would bring appropriate organizational and governance structure for additional funding acquisition as well as enhancing the terms for future discussions with the private sector. National and international advocacy towards this action should highlight the **importance of the SSMS as a national critical infrastructure** that is essential for the well-being of the nation as well as to facilitate inflow of resources via international organizations.
2. Following from the item above, there should be a sustainable **national budget allocation for the SSMS** activities. While SOFF investment will cater for the initial investment for operations, deployment and staffing, a longer term no-end (beyond a 5-to-10-year time horizon) perspective is required that should build on a potential national strategy for disaster risk management and climate change adaptation.
3. As also depicted in the sections below, **stakeholder** (considering stakeholders those that can benefit from the services, contribute to the services as well as the government structures that should provide the framework for the SSMS operations) **and end-user engagement** coordinated activities should occur. This engagement should include the following specific actions:
    a. Yearly stakeholder workshop, if possible facilitated by a community member that is familiar with institutional whereabouts at national and international levels. This workshop should gather key government institutions, intergovernmental agencies and regional economic commissions and UN Agencies and Programmes as well as the private sector. Not only this workshop

would serve to strengthen the business model taken but would also open the possibility to explore other potential approaches while in turn explore additional sources of revenue that may add to the long-term sustainability of the network. These workshops can also trigger regional capitalization and act as a platform for engagements of CSOs.

   b. Bi-lateral discussions with the other relevant implementing entities in the region, specifically those with projects and/or activities that could be synergized and lead to enhanced optimization of resources.

4. Establishment of a long-term **formal cooperation with Juba University** as the national hub for training and pooling of staff. This relationship needs to be further curated in views also of the regional collaborations with the Nairobi DTC and the Nairobi Designated Calibration center (DCC).

2.2. Assessment of potential GBON sub-regional collaboration

Given the size of the country and the limited existing observational capacity, optimization with neighboring countries is a challenge. There are however several potential collaborations for optimization of the operations of the network deployed. The following have been identified:

1. Through WMO Regional Office for Africa facilitation, establish cooperation with the Regional Training Center (located in **Kenya**), with the SSMS and the Juba University to prepare a **training program** that should include meteorological background on weather observations (manual and automatic) and technical maintenance.
2. Through WMO Regional Office for Africa facilitation, establish an exchange mechanism with the Regional Instrument Center of Nairobi, Kenya[2] to assist in the **calibration actions** across the network and to develop channels for know-how exchange.
3. Establish the procedure to get information already available on GTS from neighboring countries, e.g., Ethiopia, Kenya, and Uganda weather services specifically for upper-air soundings. At the same time, initiate dialogue with Ethiopia, Kenya and Uganda weather services and bordering SOFF countries for SOFF station deployment in bordering areas to optimize network deployment.
4. The Climate Risk and Early Warning Systems (**CREWS**) East Africa (EA)[3] project is targeting all the members of the East Africa Community (EAC) except the Democratic Republic of Congo. The project, which started in early 2023 with a duration of four years, is therefore including South Sudan. CREWS EA project scope in South Sudan is to improve hydrometeorological forecasting and early warning capacity, including the assessment and strengthening of the hydrometeorological network. CREWS will become a critical cooperation with SOFF. In this capacity plan we consider CREWS as the initiator and facilitator of the WIS2in a box deployment with the corresponding training actions. This is an essential step for GBON compliance. This close cooperation with CREWS shall facilitate that the assessment of data distribution through WIS is

[2] https://community.wmo.int/en/activity-areas/imop/Regional_Instrument_Centres/ric-kenya

[3] https://public.wmo.int/en/resources/meteoworld/crews-finance-early-warnings-project-east-africa-and-lake-victoria-region

performed and brings the international exchange capacities needed within the SOFF activities.

One aspect to be considered in terms of resource optimization is the costing of the purchase and maintenance of the stations. While this has not been yet explored in detail with all its potential, dialogue with the neighboring SOFF countries will be initiated to investigate enhanced offers in joint station purchases. Similarly, maintenance and spares could be jointly addressed with adaptations to the established plan. Regional discussions and workshops addressing these items may be organized directly through the SOFF secretariat. Alternatively, bi-lateral discussions shall take place as possible. This aspect is also discussed with the AfDB project described below that aims at the deployment of 20 stations in South Sudan. In essence, while some stations will be merged (*the plan is to have 5 stations of the SOFF planned ones covered and deployed by this project*) all the purchased AWS stations should be of the same time to enhance all maintenance procedures and spare part acquisition. This synergetic action enables the prevention of a usual problem in capacity building projects whereby different institutions deploy stations in slightly different locations with slightly or totally different characteristics without establishing joint approaches.

It is important to highlight that South Sudan is one of the countries targeted within the Early Warnings for All initiative (EW4All). As it is well known, SOFF is contributing to the pillar "Detection, observations, monitoring, analysis and forecasting of hazards" with specific actions towards closing significant Global Basic Observing Network (GBON) gap. In the downscaled for Africa action plan for Early Warnings for All initiative, it is included as an action to provide SOFF long term, open-ended grant financial and technical support to close Africa's GBON gap and to internationally exchange the mandatory GBON data in a sustained manner. It is foreseen to have a specific workshop with the Early Warning for All initiative to capitalize on the activities foreseen therein and to use it as a platform to further engage with those intergovernmental agencies, regional commissions, regional centers, financing institutions and UN agencies and programmes that may facilitate the sustainability of the deployed network that, in turn, should serve as the backbone for a national early warning system.

While it is critical that the stations are located in areas with minimum infrastructure capacity (populated, with electricity, etc…) there has to be also local cooperation to ensure functioning and tracking of the station. This shall be explored through cooperation with CSO or potentially with engaging with the private sector to build more effective mante4nance and security approaches. Similarly, the ICT infrastructure needed to ensure the operations of the deployed network will require the right approach to infrastructure maintenance and operations. At the time of purchasing the systems, an exploration of further cooperation with the vendors in this direction shall be explored.

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

Given the country situation, it is **at this stage advisable to operate under a fully public business model** with the NHMS and therefore the government having full control of the services, observational capacity and operations. While engagement with the private sector is of particular interest, it is considered that a public approach shall guarantee a more sustainable

approach even beyond the SOFF activities. In such an approach the SSMS would be responsible for the operations, maintenance and replacement of the equipment considering the life cycle of the specific equipment and its replacement after the end of the life-cycle. It is to be mentioned, however, that the lack of legal framework or even national strategic plan, adds an extra level of risk to this business model approach that needs careful consideration (Table 3).

Table 3: identified risks for the proposed business model.

Risk	**Impact**	**Likelihood**
Financial risk – changing funding based on political governance changes, leading to limited or discontinued budget and resources	High	Medium – aggravated by the lack of formal mandate or legislative framework around the role and responsibility of the SSMS.
Sustainability challenges – low flexibility on adapting to changing circumstances or if political forces drive into other directions	High	Medium – again aggravated by the lack of mandate.
Market competition – potential competition with the private sector and leading to distorted markets	Low	Low – since there is no private sector operating weather information in the region.
Quality of the services – due to limited resources	High	High – can be mitigated if the planning and coordination with other activities occurs properly and with a sustainable perspective.
Management competence – due to lack of personnel or corresponding training to manage a larger and more complex service	Medium	Low – it is envisaged that training at management level occurs and should bring best practices and know-how into a growing organization.
Limited legal frameworks and data policies in place that limit the exploitation of the new capacities	Medium	Medium – the data availability is still limited for this being a problem. However, to consider in cost-recovery approaches.
Data gaps usually due to "operate to fail" approach triggered by constrained resources	High	High – while a sustainable approach is sought, resources both technical, financial, and human are extremely limited to start with.
Ineffective monitoring and tracking of the network and its related purchases etc	Medium-Low	Low – the peer advisor will act as a supporting entity to these matters.

The detailed financial plan is to be prepared in the Funding Request for the Investment Phase to ensure a pragmatic and actionable approach is taken and in preparation for minor modifications in the plan according to the Implementing Entity guidance. However, the costing of the new infrastructure will be based on the World Bank activities including the estimation of Total Ownership Costs detailed in "Charting a Course for Sustainable Hydrological and Meteorological Observation Networks in Developing Countries" by Grimes et al. 2022,

considering not only purchase costs but all the surrounding costs related to maintenance and operation.

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

Currently there is no national strategy in place for improving observing networks or specific GBON related projects. While UN organizations have attempted to increase the observational capacity or even to initiate early warning systems, they focus on their specific needs without considering GBON standards or requirements. However, it is recommended to establish dialogue with those entities that operate in the country to seek for leveraging and, above all, to prevent duplication of efforts specifically in terms of deployed stations and personnel resources to operate and maintain them. Among the most relevant projects, the following should be approached:

- It bears special significance to establish a coordination mechanism with the project "Program to build resilience for food and nutrition security in the Horn of Africa (BREFONS) through the Africa Disaster Risk Financing Programme (ADRiFi)– South Sudan". (https://projectsportal.afdb.org/dataportal/VProject/show/P-SS-A00-002), where SSMS is included in its critical capacity of provider of weather and climate services. The project, with a planned completion date of December 2027, aims at enhancing the adaptative capacity to prepare and manage climate risks with focus on climate services and infrastructures as well as solutions for climate risk financing and insurance. Through FAO working with ICPAC, this project (BREFONS, under ADRIFFI) will procure and install 20 automatic weather stations (deployed in 10 states) with the corresponding training of 20 meteorologists. The training will be on data collection and processing accompanied by the establishment of a data aggregation and archival system at SSMS. The project also includes the purchase of two vehicles to facilitate the maintenance of observational sites and equipment. Although the scope differs from that of SOFF and the activities have not yet started, a close coordination should be performed to prevent possible duplication of efforts and synergize from the respective activities, by taking an effective approach to resource management. As SOFF will already establish a path towards alignment to WMO standards in the community, and in particular, within SSMS activities, it is advisable that the projects find alignment towards the SOFF deployments and look for joint sustained approaches. Station-wise, any merging of station deployment action is encouraged and also to aim at having same vendor stations to handle more effectively the maintenance costs. While the station location shall be targeting different scopes, any effort that could boost sustainable and synergetic aspects is encouraged even considering a future merging of station networks under the responsibility of SSMS and moving towards high-density SOFF compliance. Specifically important when it relates to human capacity and scaling up the staff and capabilities of the SSMS so that the organization, its governance and its organizational approaches are not overwhelmed by multiple initiatives but is able to absorb the growth in a gradual and coordinated approach. Following up on this

rationale, **an agreement through AfDB has been reached** whereby the next agreements have been reached:

- **Five of the stations envisaged within SOFF** (with minor modifications in locations) **will be covered by the 20 stations expected in this project.** The costs of the stations and their operations within the extension of the project (up to 2027) will be covered and not included in the SOFF funding request. Only the follow-up M&O will be included.
- **The AWS to be purchased both in SOFF and this project will be of the same vendor.** This will optimize purchase options, maintenance and purchasing of spare parts.
- The vehicles purchased through this project can be used to maintain and access SOFF stations.
- **The data management system may be as well covered by this project** (or another potential projects ongoing in the region). At the time of writing the NCP a definitive path for the data management system cannot be done. *Therefore, it will be budgeted into the SOFF investment phase but with an "if" statement since we aim at preventing duplication of activities. Within the first half a year of the investment phase this aspect should be clarified*.
- **Trainings will be coordinated** and exploited jointly for better effectiveness. Those organized within SOFF will be made available to the project.

It is to be noted that the BREFONS project is interested in coordinating with SOFF the complete procurement and installation of the remaining 15 stations of the project (in addition to those 5 that will be included in the SOFF GBON network). This adds up to a sustainable national approach to network deployment.

- The Ministry of Environment and Forestry in collaboration with UNDP and the IGAD Climate Prediction and Applications Centre (ICPAC) will establish 'South Sudan National Climate Early Warning System'. The National Early Warning System is a USD 10 million two-year project and will use geospatial applications to provide climate information services and risk communication for the country. This project was launched in August 2023.ver the next five years, the Adapting to Climate Change Project will establish a multi-hazard early warning system made up of five (5) manual and three (3) automatic synoptic stations. There will also be one national hydro-meteorological station with a nationwide weather and climate database. The government will be supported to sustain these facilities. Additionally, the project will provide for capacity building, installation of meteorological stations in strategic locations, and setting up of resilience projects in drought-prone areas like Terekeka in Central Equatoria and Kapoeta in Eastern Equatoria State. While this activity has not yet been started and has a different focus as that of SOFF, it shall be considered in the upcoming stakeholder engagement to aim at streamlining efforts and capacities in a coordinated manner.
- 'Strengthening the Capacity of the Government and Communities to Adapt to Climate Change' Project, is being implemented by UNDP, in partnership with Ministry of Environment and Forestry. The project is funded by the Global Environment Facility (GEF) through the United Nations Environment Programme (UNEP). The project was launched in April 2023.This five-year project will put in place three components to

address current and future impacts of climate change in South Sudan: (1) a multi-hazard early warning system, (2) a practical ecosystem-based adaptation process for people in flood affected areas, and (3) setting up a Climate Change Centre at the University of Juba.

As stated in the sub-regional collaboration section, CREWS is a critical activity in the region. Facilitated by WMO, CREWS will be approached to establish synergies towards ICT and WIS2 activities, including potential trainings and general support for deployment taking advantage of the fact of having CREWS initiated East Africa actions, where South Sudan is included. Capitalizing on the synergies established with CREWS, not only the corresponding WIS2 implementation shall occur but also lead to a WIGOS implementation plan for the country.

2.5. Review of the national legislation of relevance for GBON

Unfortunately, there is no legislative framework that describes the responsibility of the SSMS in relation to weather data measuring and provision. The SSMS has no formal mandate. In addition to the lacking formal mandate of the SSMS, it is worth mentioning that there is no existing policy or national strategy at government level on data sharing, public data services or public-private engagement. This lack of legal umbrella does not facilitate the generation of such partnerships within the country and the exploration of more versatile and flexible business models.

The main overall recommendation is to make all possible efforts, in coordination with the Ministry of Transport, to effectively define the role and mandate of the SSMS under a legal umbrella. The strengthening of the institutional mandate will become critical for a sustainable approach to network maintenance and operation as well as the well-being of the SSMS itself. If possible, this legal framework should not only describe the mandate, but the underlying aspects that would make the mandate possible. Namely, communication and infrastructure facilities, observation networks, database and data exchange polity etc. While steering the political agenda as a whole is beyond the capacities or intentions of the activities within SOFF, advocacy towards the establishment of this legal framework will be performed in all the instances possible. In order to potentiate and trigger the needed dialogues, it is recommended to make use of the planned stakeholder engagement workshops (Module4) to include an item action at policy level and advocate for a better legal establishment of the SSMSS. This should be as well supported by bi-lateral engagements with decision-making bodies. This engagement should be facilitated by those actors that can interface across institutions. The Peer Advisor shall as well facilitate interaction with the international community to identify best practices and ways to move forwards towards a more formalization of the role of the SSMS nationally and internationally.

It is also to be considered as a recommendation that, at the time of procurement or purchasing of the stations (spare parts and all related infrastructures) regulated taxes and potential custom fees should be properly accounted for. All regulations related to tax, customs or international shipping will be considered at the time of procurement by the Implementing Entity.

Module 3. GBON Infrastructure Development

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

As emphasized in the National Gap Analysis, South Sudan faces significant challenges due to its limited observational and institutional capacity. Given these initial conditions, a substantial effort must be undertaken to achieve GBON compliance. This effort should encompass multiple aspects and address all relevant components to promote long-term sustainability. To commence this endeavor, the following conditions must be taken into account during network design and planning:

- **Security and safety** – due to the political and social state of the country, it is highly difficult to guarantee the safety and integrity of stations. To no lesser degree, guaranteeing the safety of the relevant human resources (observers and technicians) assigned to the stations may also be challenge. Poor roads and transport infrastructure add to these issues.
- **Maintenance and calibration** – There are no facilities and no equipment available. Moreover, the stations outside of the capital are difficult to access, due to both security and poor roads, which might in turn worsen during the rainy seasons. Station maintenance may also be impacted by considering the institution's shortage of transportation resources.
- **Data communication and transmission** – the country is lacking a stable and widespread internet and cellular network across the country. This can hinder station deployment and data transmission, which is essential for GBON compliance. Data transfer by satellite communication may be required.

These three items alone already limit the potential deployment locations to those near or within a populated area that have minimum infrastructure that can enable the operation of a station.

In addition, the design, planning and budgeting of the network should consider all the costs related to purchase, operations including data transfer and communication costs, maintenance and replacement as well as all the related indirect costs to its operability (vehicles, transport for maintenance, ICT, licensing, spare parts and common equipment, training, management and administrative workload among others) for the whole extend of the life cycle of the network (and therefore considering the life cycles of the stations themselves).

Given the multitude of components and items that must be taken into consideration, combined with the initial state of the SSMS capacities and country situation, the only viable option is to adopt a phased approach (Figure 2, Table 4) with a long-term outlook. This approach aims to enhance the country's capacity while accommodating the evolving needs and resources throughout the entire investment phase. The phases are considered to take an overall time of 6 years that should bring the country towards GBON compliance for surface stations and initiate the actions also for upper air stations compliance.

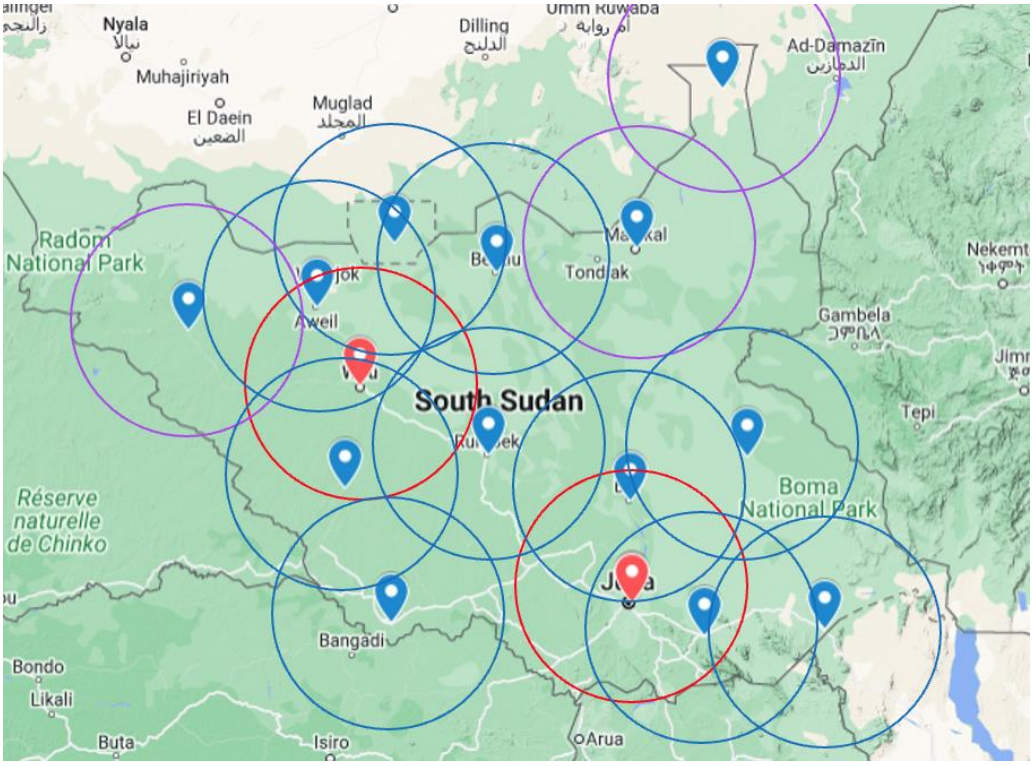


Figure 1 Map with the stations according to the phased approach. Red markers are those Locations that have had recent existing stations and that will be having AWS in the first Phase. Violet circles indicate those stations that will be deployed in Phase 2. Both violet and red will have automatic and manual stations.

Table 4: list of stations, those with "→" indicate the initial estimated SOFF location that will be slightly moved (therefore the "→") to make use of the stations purchased and deployed by BREFONS. The remaining stations are all to be funded by SOFF.

Station identifier	**Location**	**Comment – Deployment phase (subject to Funding Reques)**
1	Juba Airport	Phase 1 – Manual and Automatic
2	Juba University	Phase 1 – Manual and Automatic
3	Malakal Airport	Phase 1 – Manual Phase 2 - Automatic
4	Wau Airport	Phase 1 – Manual Phase 2 - Automatic
5	Renk	Phase 1 – Manual Phase 2 - Automatic
6	Aweil → Gok Machar	Phase 3 – Automatic (BREFONS project)
7	Rumbek	Phase 3 - Automatic
8	Yambio	Phase 3 - Automatic
9	Torit	Phase 3 - Automatic
10	Bor → FAO Campus	Phase 3 – Automatic (BREFONS project)
11	Bentiu → Leer	Phase 3 – Automatic (BREFONS project)
12	Abyei -_> Wunrok	Phase 3 – Automatic (BREFONS project)
13	Pibor Post	Phase 3 - Automatic
14	Raga	Phase 3 - Automatic
15	Narus → Kapoeta	Phase 3 – Automatic (BREFONS project)
16	Nagero	Phase 3 - Automatic

Please **note** that the list may undergo adaptation based on the agreements performed with the BREFONS to capitalize on this activity and make use of 5 of their stations to be part of the GBON compliant network. The stations locations are not expected to change dramatically and would still guarantee coverage of the national extension. Also the phases may change to adapt to the BREFONS project potentially bringing five stations into Phase 2.

PHASE 1 (2 years)

Aim: laying the foundation for capacity development and initiation of the network. This phase should ensure that a minimal capacity is deployed while setting the ground and plan for its growth. It is to be noted that, although the aim is to deploy a fully-fledged AWS surface stations network, a small set of manual stations are planned for deployment in this phase. The rationale behind this approach is that these 4 manual stations would be multi-purpose and serve to A) perform trainings and develop in-house knowhow, B) gather the observational baseline needed for calibration of the AWSs and, C) very importantly, act as a back-up system in case of failure or network problems of the AWSs. During this phase, the following actions will be necessary:

Technical components:

1. Initiate AWS and manual station procurement procedures - The procurement, led by the IE and supervised by the peer advisor, should explore potential maintenance plans and spare parts acquisition. Following the regional gains, a dialogue will be established with the neighboring SOFF countries to try to achieve best value for money in the procurement actions and / or follow-up maintenance plans. Similarly, it will be explored what are the potential AWS to be deployed in other projects (for example that led by FAO) to as well try to find an optimization of resources (clearly acquisition of the same type of AWS will facilitate maintenance, training and usage of spare parts).
2. Once procurement is achieved for 4 manual stations and an initial number of 4 automatic stations to:
    a. Deploy **5 manual** stations at Malakal, Wau, Renk, Juba airport and Juba university. This activity will have to be accompanied by training existing observers and if needed recruiting a set of observers (minimum one per station) to operate them. The observers are aimed at being further trained and becoming full staff members. It is also expected to capacitate one staff member to become technical staff for station maintenance.
    b. Deployment of **1 new AWS** and upgrade of **1 AWS** station at the Juba University and Juba airport respectively. While Juba airport and Juba university are certainly close, the aim is to build the baseline capacity for training and building of the personnel. Understanding the tandem Juba University + Nairobi WMO's DTC as a unique opportunity for a sustainable approach, it is essential that the university is equipped accordingly and appropriately to perform the corresponding technical trainings.

c. Prepare the deployment plan for the upcoming phases. This plan needs to be fine-tuned with the evolving interaction and exchange with other UN organisations and related projects.

3. Initiate the ICT and metadata/data management acquisition process with the corresponding vendor offers and quality control and assurance mechanisms. As for the AWS procurement, the IE will have a leading role supported by the peer advisor. In this activity it is particularly important to take a realistic approach towards the national situation in terms of communications.
4. Initiate discussions on a calibration plan with the Nairobi WMO's Designated Calibration Center.

Human capacity development:

5. Initiate a training collaboration between the University of Juba, which was already agreed within the Readiness Phase on-site visit, and the Nairobi WMO Regional Training Center. This activity should evolve into a training action for a set of observers/new staff (minimum 5). The training should cover technical and scientific aspects related to both manual and automatic stations. The training should address A) conducting weather observations, B) maintenance of the stations and C) management (best management practices). The management aspect should be aimed at generating the organisational and managerial knowhow to prepare for the growth of the weather service. This specific management topic may be coordinated with WMO ETR and will be also supported by the Peer Advisor, which may host a specific meeting at the Peer Advisor's facilities to share best practices and know-how.
6. Initiate the recruitment of observers to handle the manual stations and to be trained as meteorologists to become staff members of the SSMS.

Governance and stakeholder engagement:

7. Establish advocacy to paraministry. This advocacy action will take advantage of the planned stakeholder engagement workshops, which will offer a unique set-up to discuss the criticality for the nation of a well-functioning weather service, particularly with the coming climate change effects. The advocacy will be triggered by bi-lateral discussions and be supported by the peer advisors, representatives of the WMO regional office and relevant national actors as possible.
8. Establish dialogues with stakeholders including other IEs that may have specific actions or interests in the country that can be synergised aiming at a better usage of respective resources and boosting cooperation.

PHASE 2 (1 year)

Aim: The primary objective of this phase is to implement the two additional AWS units and thoroughly verify operations, maintenance, and other pertinent considerations before transitioning to a comprehensive deployment approach while, at the same time, continuing with the human capacity development that is required for the expected evolution of the SSMS's activities. During this phase, the following actions are envisaged:

Technical components:

1. Deployment of the 3 automatic surface stations at Wau and Malakal airports as well as in Renk. This of course includes all the logistical aspects for the deployment.
2. Revision of operations of the operating AWS so far and their calibration – *Milestone – stations operating for one year. This milestone is needed and critical to ensure that there is a healthy evolution and robust approach towards station deployment. Should none of the deployed stations operate, a delay of 6 months should occur to address those delays previous to further deployments.*
3. Deployment of ICT and data management infrastructure required for station operations for all the deployed AWSs.
4. Identification of bottle necks to consider the following deployment of AWS in other locations – adaptation of deployment and maintenance plans as needed.
5. Preparation of the locations remaining for station deployment (fencing, cleaning of area, etc.)
6. Acquisition of remaining 11 AWS for the upcoming deployment phases (note 5 of them are to be acquired via BREFONS). Depending on the speed of the BREFONS, 5 of the stations may already be deployed in PHASE 2.

Human capacity development:

7. Continue the training plan between the University of Juba and the Nairobi WMO designated training centre with potential cooperation of WMO ETR. Addition of trainees.
8. Continue with recruitment actions – expand the tasks of the observers towards full staff members and one as a technician. *Milestone – one technician and 2 additional staff members. It is critical at this point to have a technician that can already maintain the manual and AWS stations of the network.*

Governance and stakeholder engagement:

9. Continue with advocacy as possible and assist, if possible, in the concept note for a legislation and (data) policy framework. This is to be shared and potentially endorsed in a stakeholder engagement workshop.
10. Continue with stakeholder engagement as possible. Aim at strengthening the regional approaches and establish cooperation mechanisms and MoUs as possible.

PHASE 3 (3 years)

Aim: this phase has as its primary objective to deploy the remaining AWS units in two consecutive sets, ensuring the functionality of those already installed, and to commence and strengthen international data transmission. *It is important to highlight those further deployments are only advised or possible when the stations deployed in the former phases are operating and transmitting. Should this not be the case, the Peer Advisory suggests focusing on guaranteeing minimum capacity even if this leads to a later meeting of GBON compliance for surface observations.* In addition, a feasibility study for implementation of upper air stations will be performed. This last phase of the Investment Phase envisages the following activities:

Technical components:

1. Revision of operations of AWS so far with the inclusion of a calibration approach with the manual data and through cooperation with the Nairobi Calibration Center – *Milestone – min 5 stations operating without big data gaps and transmitting internationally. Should this not be the case, efforts should be focused on ensuring minimum capacity of those 5 operating AWSs.*
2. Deployment of ICT and data management infrastructure. Initiate international data delivery on a routine basis.
3. Maintenance as appropriate.
4. Acquisition of spare parts required for a full capacity network with a life cycle of 10 years.
5. Preparation and deployment of 5 (1.5 years) + 6 (1.5 years) AWS in the pre-selected location and traceability of their functioning and data transmission.
6. Feasibility study for the implementation of upper air stations, initiating it with one at the Juba airport.

Human capacity development:

7. Continue with training and building of operators, staff members and technicians
8. Recruiting full staff members and technicians – *Milestone – 3 additional staff members*

Governance and stakeholder engagement:

9. Try to establish a long-term cooperation plan with IEs, UN actors and other stakeholders to maintain sustained third-party funding for operations or further development.
10. Engage internationally and seek interest from the private sector to aim at initiating PPE approaches.

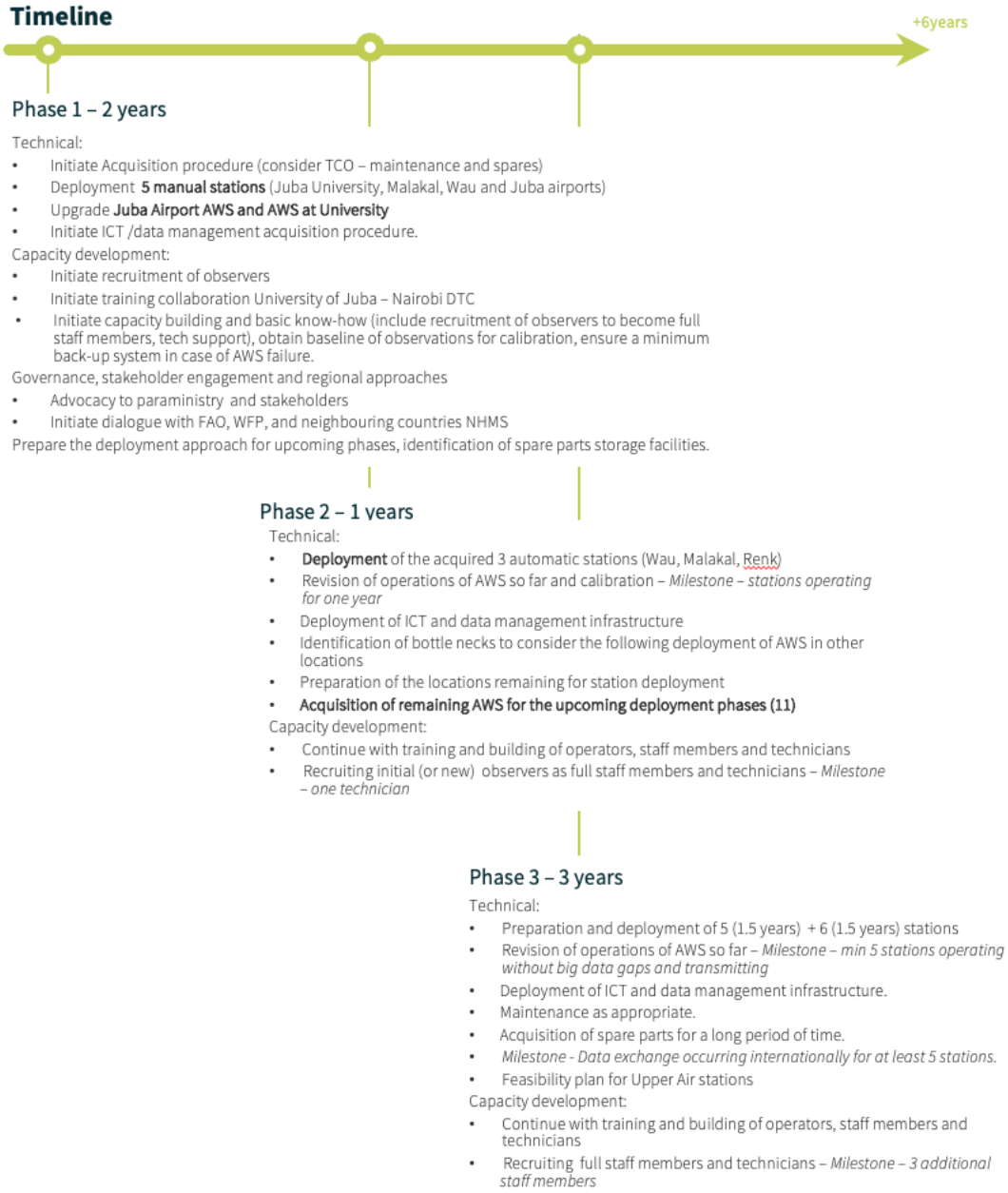


Figure 2 **Summarized time plan for the investment phase.**

The investments should include:

- 16 (5 of which will be budgeted through a collaboration with another existing project) fully automatic AWS with the corresponding temperature sensor, humidity sensor (hygrometer), atmospheric pressure sensor (barometer), rain gauge and wind speed and direction sensors; and 4 manual stations. All including the Total Cost of Ownership approximation.
- Generation of the SOPs for the station operations.

The maintenance plan will be drafted in agreement with the manufacturer and after the first deployment phase when in-situ experience is gathered about the response of the equipment in South Sudan environment. The Implementing Entity, supported by the Peer Advisor, will be in charge of the tendering processes based on the WMO guidance.

The technical specifications of the stations to be deployed will follow those as specified in the GBON Tender Specifications for AWS (TT_GBON Deliverable 6.1, V1.1.9.VI.2022, TT_GBON Operating Plan) while at the same time coordinated with those purchases done through BREFONS. In this way, maintenance and operations are to be done in a more consistent and cost-efficient manner.

3.2. Design of the ICT infrastructure and services

The Information and Communication technology (ICT) infrastructure for a meteorological network is crucial for its operation and, more importantly within the SOFF scope, for the data transmission and dissemination in real-time. The infrastructure must consider very critical aspects that can largely modify the costs and should be carefully considered at the time of preparing the funding proposal:

- Data loggers, able to store data for at least 30 days and able to transmit the data automatically at least every 60 minutes, able to run in a low power mode and able to perform data compression before sending (especially If the network is below 3 G)
- Transmission: mobile network, even 2G, is OK, of course sat network is ok or better (in case of extreme weather events), but still expensive.
- Power supply: Wired supply is preferable but also solar power is OK (1 m^2 Solar Panel = 100W Peak), Akku to bridge breakdowns in power supply or to store solar power for the night: 50-100 Ah
- Sensors: Temperature, Humidity, Precipitation, Wind speed and direction, pressure are the basic sensors. If possible, mechanical sensors, then reparations are better. For example, a mechanic wind cup sensor is easy to repair and maintain
- AWS should be located in a protected area, someone has to have a look at the sensors at least once a week for cleaning and should be able to do small repairs (change a fuse, restart the logger, etc.) or should help to identify problems when someone guides him by phone.

It is to be noted that sustainability requires that budget is allocated to the ICT for the lifespan of the network and the ITC itself and with proper back-up and data storage and data services systems.

Data exchange will be WIS2 compliant thanks for the engagement and cooperation with CREWS, who will cater for the deployment of WIS2 in a box for the deployed stations.

3.3. Design the data management system

There are some critical aspects that need to be addressed throughout the evolution of the investment phase and that will largely affect the potential budget. Among them, especially considering the WIS2in a box tool (https://community.wmo.int/en/wis2box) the following:

- Should SMSS operate secure highly redundant IT infrastructure on their own or rely on cloud computing services?

- How to scale a cloud computing services?
- Is the network connectivity and bandwidth in South Sudan enough to perform all services and data management via cloud?

The transmission of data from an observing station to the national data management system should be performed trough reliable communications infrastructure. Currently GPRS/UMTS/LTE transmissions appear to be the most feasible and cost-efficient approach for the current setting. However, at the procurement point, additional options may be explored.

The receiving units may be hosted by cloud computing services with a direct connection to a temporary file storage where the original data protocols may be kept for data buffering, technical monitoring, and maintenance purposes. Received data may be decoded and rendered instantaneously and sent to the central PostgreSQL database holding the full raw data archive.

This database shall be located on secure, highly redundant storage service and shall be the data backbone of the whole data management system. Since the WMO Information System 2.0 (WIS 2.0) will enter a pre-operational stage in 2024 it is highly recommended to base all national and international data transmission processes of the SMSS network on the wis2box toolset operating close to the central database. Some new weather station concepts offer direct upload of data to WIS 2.0 (https://www.campbellsci.eu/gbon-and-soff)

- The SMSS data management system shall benefit from various features of the wis2box (https://docs.wis2box.wis.wmo.int/en/1.0b4).
- WIS2 compliant: easily register your wis2box to WIS2 infrastructure, conformant to WMO data and metadata standards.
- WIS2 compliance: enables sharing of data to WIS2 using standards in compliance with WIS2 technical regulations.
- event driven or interactive data ingest/process/publishing pipelines.
- visualization of stations/data on interactive maps.
- discovery metadata management and publishing.
- download/access of data from WIS 2 network to your local environment.
- standards-based data services and access mechanisms.
- robust and extensible plugin framework. Write your own data processing engines and integrate seamlessly into wis2box.
- Free and Open Source (FOSS).
- containerized: use of Docker, enabling easy deployment to cloud or on-premises infrastructure.

All downstream applications as data monitoring, internal and external data transmission, quality control and data processing will depend on the reliability of the central database for raw data.

Following the Guidelines on Surface Station Data Quality Control and Quality Assurance for Climate Applications (WMO-No. 1269) mandatory data quality control (QC) and assurance (QA) tests will be established. Ready-made Software for QC and QA often needs elaborate and costly adaptations to fit to the local technical and meteorological environment and to meet local needs. Offering a long-term perspective for local and self-determined development with

PYTHON and PostgreSQL, it is recommended that SMSS builds its own low level QC software involving local IT staff.

Further coordination with BREFONS will be sought to capitalize on the purchase and implementation of a (Climate) Data Management System in SSMS. Should this action be finally achieved at the initiation of the Investment Phase, SOFF activities would make use of this capacity deployed.

Last, it will be the role of the Implementing Entity, supported by the Peer Advisor, to ensure that not only the purchasing of the equipment is performed but installed, operated and managed within the Investment Phase and for its sustainable future. Details on the execution and working plan shall be provided in the corresponding Funding Request.

3.4. Environmental and sustainability considerations

AWS and manual stations deployed will undergo maintenance as per funding request to make use of the lifecycle and extend it as possible. They will also be GBON compliant in terms of requirements and characteristics. Sustainability shall be also boosted by synergizing maintenance, calibration and training with other initiatives and ongoing programmes. It is also important to highlight that the stations' locations are to be optimized so that maintenance is facilitated by being deployed in or near a urban area.

It is to be noted that over the years international institutions have executed donor-funded projects and successfully sustaining them upon the elapse of the funding period. Currently, there are several donor-supported projects that are ongoing or under preparation to strengthen the capacities of the meteorological and hydrological services because of decades of low investment in public sector institutions, coupled with many years of civil war.

Strong government commitment is expected since the request emanated from the head of the SSMD and Government. Awareness creation at the policy and political levels of government about the importance of improving the availability of the most essential surface-based data, which have a direct positive impact on the quality of weather forecasts, thus helping in ex-ante climate risk management and improving the safety and well-being of the population will create buy-in and ensure sustainability of the initiatives. Moreover, the need to enhance climate preparedness by enhancing the capacity for climate data collection, analysis and dissemination is an explicit request from the government. The support provided to SSMD is expected to be well received and the investments safeguarded since improvement of climate services is a critical need for the country. The linkage to ICPAC for capacity building will ensure sustained support from the regional centre of which South Sudan is a member.

Module 4. GBON Human Capacity Development Module

4.1. Assessment of human capacity gaps

At the time of writing the NCP, the SSMS is facing a substantial shortage of personnel across all domains relevant for a weather service. For the successful implementation of the SOFF activities in the country, there is an emerging need for substantial growth in terms of staffing and its associated capabilities. It is important to note that other organizations are also pursuing capacity development initiatives in collaboration with SSMS. Therefore, growth should be carefully planned and managed to ensure it is both achievable and sustainable.

Currently SSMS has the following human capacity:

- management positions, one director general, a deputy and one assistant.
- 1 senior forecaster and 5 forecasters in Juba (2 forecasters act also as technicians).
- 5 senior observers (3 in Juba, 2 in Wau, two of them acting as well as a technicians) and 7 observers (3 in Juba, 1 in Malakal and 1 in Wau).

There is no specific IT or ICT profile and the staff members had diverse and no focused tasks. There is also not clerk or any administrative support staff.

Undoubtedly, any project that aims at establishing an observational network requires a strong and well-crafted plan for human capacity. This plan should encompass augmenting the workforce of the institution along with enhancing the background and technical expertise to perform the required duties.

4.2. Design capacity development activities for technical staff

South Sudan SSMS is expected to grow within the SOFF activities and so will its staff members. A training and capacity development plan is required with clear objectives that have measurable milestones and that are aligned with the SSMS strategic goals in the short and long terms. The plan should be tailored to the initial levels of expertise of the staff members and the levels that are expected to be achieved. In order to do so, a structured curriculum has to be designed that covers the technical skills and basic knowledge with a mixture of practical and theoretical components. The trainings should be focused and tailored to specific individuals (or groups of individuals) trying to develop focal points of expertise rather than making general trainings to all staff members.

As stated above in this document, the training will build on cooperation that will be established under the SOFF umbrella, the following are envisaged:

- Cooperation with Juba university in collaboration with the Nairobi Designated Training Center.
- Cooperation with the Nairobi Designated Calibration center.

- Enhance of usage of WMO specific trainings through specific contacts with Education and Training Programme of WMO.

The training plan should include the following specific components:

- **Weather observations and weather parameters:** this training should offer the fundamentals to move forward station operations. It should give basic understanding of the parameters that are critical, their interrelations and basic meteorological background information with a focus on observations and guidelines, functionality and fundamental principles, maintenance of mechanic and electronic components (rules and procedures), data collection, storage (data logger) and transfer general concepts.
- **Station components and maintenance:** conducting weather observations, maintenance, and operations of stations both manual and automatic. These trainings should also be offered to those individuals located at or near the station location for easier maintenance and operations. Specific technicians should result of this training, with a minimum of 2 to cover the 16 stations targeted in GBON. The operations and maintenance should as well include a managerial aspect on generation of SOPs and checklists. Very important to highlight and focus on in-situ maintenance, maintenance of mechanic and electronic components
- **Calibration:** this training should be performed in cooperation with the Calibration Center in Nairobi and should include a visit to the center. The calibration plan and training should exploit the capacities deployed in SOFF through the small set of manual stations and also the AWSs. It is particularly relevant that the role of calibration is explained and embedded into procedures downstream and all maintenance aspects that will require this knowledge.
- **IT, ICT and potentially HPC or cloud services**: the lack of IT personnel will need to be addressed with at least two IT experts to handle all that relates to communication etc. They may as well facilitate the in-house programming of simplified but effective data quality and management procedures. This training should include Ubuntu, Linux, docker and python at a minimum. The training should work on configuration and administration of hardware (server, networks, clients) and software (operative systems, data bases, communication)
- **Data transfer and WIS2** specific training: this will be coordinated with CREWS which will address the deployment of WIS2 in a box system for the international transmission as well as for the additional capacities the tool has to offer that can assist in other activities of the SSMS.
- **Best practices in data quality and quality management:** this should support the IT trainings to enable that there is a quality management system in house that can evolve according to the SSMS needs. This training should offer knowledge on the value chain and its components where QM is needed as well as usability of benchmarking.

It is to be noted that other international training courses can complement the program. Those courses could comprise the freely available courses from EUMETSAT (European Organization for the Exploitation of Meteorological Satellites) or EUMETCAL (European Meteorological Computer Assisted Learning) which offer the opportunity to enhance personal and institutional knowledge easily and remotely in many instances.

4.3. Design capacity development activities for senior management

A weather service is a complex institution that requires effective capacity development activities that empower senior and junior management to lead with excellence and drive the organization toward success and, in this case, the very needed growth. The design of the development activities for management is crucial to ensure the right skills and knowledge to lead effectively. This design should consider the organization's main strategic goals and competences that want to be achieved and be aligned with the mission of the SSMS. It is also very important to customize the activities to the reality of the organization in a gradual approach and with a pragmatic and realistic perspective adapting to the specific needs and evolving capacity. The capacity development activities at this initial stage should focus on:

- Developing leadership skills, including strategic thinking, decision-making and communication.
- Change management, especially in the evolving nature of SOFF, it is important to gather the skills to lead and manage change within the organization and its staff members.
- Financial training and financial management and budgeting. Managers need to familiarize themselves with financial statements, resource allocation and the financial implications of the decisions taken.
- Project management training and Measurement and evaluation through the definition of key performance indicators to assess effectiveness of the activities.
- Strategic planning and regional networking, especially within the UN arena to develop action plans thar have cross-sectorial approaches and optimize networks to achieve strategic national objectives.
- Enhancement of communication skills to become the spokesperson of the organization and establish the high-level dialogues required and drive decisions towards the organization's strategies.
- Technology and digital literacy, to leverage technologies as required.

The training plan should include the following specific components:

- **An exchange to benchmark with another well-established weather service: taking** advantage of the collaboration with the Peer Advisor institution a visit to WMO and GeoSphere Austria facilities to exchange best practices.
- **Exchange with WMO ETR** to identify training activities on management. Potentially participate in Senior Management Capacity Building courses.
- **Training on project management**: identify a course (remote) to establish basic knowledge of administrative skills for project management and KPIs.
- **Financing training:** to gather the expertise and tools to handle costing of projects, budgets, and basic day to day operations of a weather service.

4.4. Gender and CSOs considerations

It is well known that disasters affect those most vulnerable, and gender, age and illness are critical factors that may exacerbate the impacts. The integration of gender perspectives with the involvement of civil society is to be included in all aspects, especially when it comes to a government-based institution. This integration should be covered at governance, policy

making, development and dissemination and response levels and should have participative approaches to facilitate the engagement and give the voice to those usually unrepresented.

It is therefore important to bring in CSOs in a participative approach to embed the considerations related to gender and specific vulnerabilities right from the start. CSOs will be particularly important at the time of identifying both potential staff, supporting staff and to be included in the training programmes and any related activities. Within the investment phase it is recommended to initiate a complete gender assessment that should be repeated at the end of the phase to monitor the progression and success of the implemented actions. This assessment will not only comprise an evaluation of the current staff, but, through exchange with the University of Juba, an overview of the future gender proportions existing at student level and that will be the pool of potential staff in the future. Gender balance will be encouraged at every procurement and training action with a growing quota with the years.

It will be particularly important to make use of the stakeholder engagement workshops to include specific a specific dialogue platform for the CSOs addressing gender opportunities while at the same time advocating for the rights of marginalised groups and more vulnerable individuals. The outcomes of the workshops are to be included as formal recommendations for the SOFF activities and be used as guidelines to promote equity and equality. To this aim, an initial dialogue with the International Federation of the Red Cross and its Anticipatory Action will be established so that to act as a community liaison for these activities as well as with UN Women.

Last, but not least, an internal quota for the SOFF activities will be sought to ensure as possible that at least 50% of the staff related to SOFF are female and that in the stakeholder's engagement workshops the female contributions are visible. Both at Implementing Entity and Peer Advisor level this equity will be reinforced at all steps of SOFF related activities. Targets for each year will be included in the Funding Request.

Module 5. Risk Management Framework

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

SSMS has no quality management or risk management framework in place. While ideally the organization should follow the ISO standards, the current state of the institution is still in its incipient states and a more gradual approach is to be taken. However, a proper management of risks is required during and after the SOFF investment phase to prevent potential setbacks and adapt as agile as possible to an emerging risk. In addition, understanding the role of the Implementing Entity, the risk management should follow the internal approaches existing at IE and that will facilitate the execution of the investment phase.

The security situation in South Sudan has always been fluid since its independence. The signing of the Revitalized Peace Agreement (RPA) in 2018 and formation of the Transitional Government of National Unity in 2020, eased the political disagreements in the country. However, any deterioration in the security situation may render project sites inaccessible, hence adversely affecting the implementation of the project. The situation may also lead to loss of equipment and infrastructure established for climate data collection. The macro-economic outlook is positive with real GDP growth projected to recover at 0.3% and 4.6% in 2022/23 and 2023/24 respectively. This will guarantee a stable environment for project implementation with lessened risk of price variations due to macro-economic disruptions. South Sudan is a transition state with limited institutional capacity for programme implementation. The Bank will mitigate this risk by including reputable institutions resident in South Sudan to support in the implementation of the project, through an agreement with the government of South Sudan to ensure adherence to fiduciary standards. Examples of such institutions include FAO. The IGAD Climate Predictions and Applications Centre (ICPAC) will also support the implementation of the project. The GOSS has endorsed this arrangement.

The table (Table 5) below describes the most critical risks that may eb encountered to be added to those presented in the business model selection.

Table 5: summary of risks for a fully public business model.

Risk	Risk level	Likelihood	Impact	Risk Mitigation Measures
Non-compliance with fiduciary and procurement standards in some SOFF activities	Medium	Possible	Major	Support by IE.
SOFF-funded investments cause environmental or social impacts	Low	Unlikely	Minor	No major impact expected here.

NMHS staff depart after being trained	High	Likely	Major	Adequate payment, equipment and working space needed.
Slow implementation and delays in procurement, installation and capacity building activities	High	Likely	Major	Strong support by IE, realistic planning needed.
After the conclusion of the Investment phase, GBON data are not collected or shared or are shared of insufficient quality	Medium	Possible	Major	Before start of investment, legal framework and national strategy for SSMS is needed.
Destruction or theft of SOFF-financed equipment and infrastructure	High	Likely	Major	Station deployment close to populated areas and existing infrastructure.
Countries cannot make optimal use of data, including accessing or using improved forecasts products from the Global Producing Centers throughout the hydromet value chain	High	Possible	Moderate	Management training and training plan.
Meteorological conditions that affect the deployment activities by limiting accessibility to sites and constructions as needed.	Medium	High	Major	Adaptation of the timings and flexibility in the phased approach fulfilling the milestones consecutively.
Limited availability of potential staff members to be trained to ensure full operations of the network.	High	Moderate	Major	Through the IE coordinating activities with other projects are ongoing to rationalize the availability of meteorologists and technicians.

The monitoring of the risks and implementation of mitigation strategies are coordinated by the Implementing Entity, as per description in the Funding Request, but supervised and guided as needed by the Peer Advisor.

Module 6. Transition to SOFF investment phase

The transition to the SOFF investment phase is to be based on the Readiness Phase deliverables and, in particular, this National Contribution Plan which has been drafted in coordination with the beneficiary country and the implementing entity.

Summary of GBON National Contribution Plan

Components	Recommended activities
Module 2. GBON business model and institutional development	1. Initiate advocacy actions to promote the generation of the corresponding legislative framework around the SSMS mandate.
	2. Establish cooperation with the Juba University, Nairobi designated training center and Nairobi designated calibration center.
	3. Foster regional approaches through CREWS and Early Warnings for all and through bi-lateral discussions of other SOFF countries.
	4. Establish a cooperation between the SOFF activities in South Sudan and the project "Program to build resilience for food and nutrition security in the Horn of Africa (BREFONS) the Africa Disaster Risk Financing Programme (ADRiFi)– South Sudan" to rationalize station deployment, trainings and logistical aspects.
Module 3. GBON infrastructure development	1. Initiate the phased approach for surface station deployment. This includes all the acquisition, preparation, ICT and data management actions.
	2. Follow a milestone approach to ensure the capacity is deployed in a robust and sustainable manner to ensure the longevity of the network and its operations.
	3. Initiate the plan for a future upper air station network deployment.
	4. Initiate stakeholder engagement activities to promote engagement, seek for business opportunities and generate an advocacy platform for SSMS activities and role as a national critical infrastructure.
Module 4. GBON human capacity development	1. Establish a tailored technical training plan for the current and expected staff
	2. Establish cooperation and training plan with the University of Juba and the Nairobi Designated Training Center
	3. Establish cooperation with the Nairobi Calibration Training Center
	4. Initiate trainings on higher management aspects including an exchange visit at the Peer Advisor facilities and WMO in Geneva.
Module 5. Risk Management	1. Through the Implementing Entity and supported by the Peer Advisory and Beneficiary Country, monitor the evolution of the investment phase through the identified risks and initiate mitigation actions as required.
	2. Inclusion of reputable institutions through coordination of the Implementing Entity to assist in the execution of the investment phase.
Module 6. Transition to SOFF investment phase	Transition performed in a coordinated manner with the beneficiary country, the implementing entity and the peer advisor following the agreed National Contribution Plan. The funding request will be also based on the activities agreed in this National Contribution Plan.

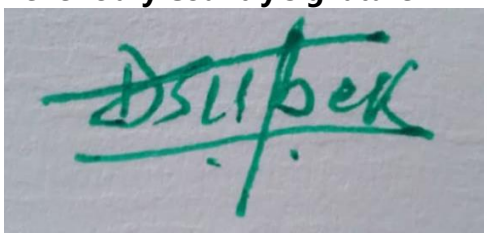
Report completion signatures

Peer Advisor signature

Andreas Schaffhauser

Directorate General GeoSphere Austria

Beneficiary Country signature



Mojwok Ogawi Modo AYOKER
Director General & Permanent
Representative of South Sudan with WMO

Capt. Subek David Dada
South Sudan Civil Aviation Authority

In Juba, South Sudan 26 October 2023

WMO Technical Authority signature