Report of

GMES & AFRICA and GOOS-AFRICA JOINT WORKSHOP ON STRATEGIC REFLECTION ON THE ACTIVITIES TO BE CARRIED OUT IMMEDIATELY, AND DRAFT OF ACTION PLAN TO BE CONDUCTED IN THE MEDIUM TERM

ABIDJAN, COTE D'IVOIRE

13TH – 17TH MAY 2024

***Workshop participants visit at the host institution (CURAT) of the GOOS-AFRICA Secretariat, CURAT, University Felix* Houphouët-Boigny**

Abidjan, Côte d'Ivoire, 14th May 2024

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1. Introduction and Background

Strategically, GOOS-AFRICA and GMES & AFRICA agreed to engage in a win-win partnerships to support ocean observations in Africa, thus contributing inter alia to the implementation of specific objectives and tasks of relevant African institutional frameworks and initiatives such as the 2050 Africa's Integrated Maritime Strategy (2050 AIM Strategy), the Africa Blue Economy Strategy, the African Union's NEPAD Coastal and Marine Action Plan, the African Regional Seas Conventions, the Decade of African Seas and Oceans, as well as international frameworks such as the WSSD Implementation Plan, the Millennium Development Goals, the United Nations Sustainable Development Goals, the United Framework Convention on Climate Change, the United Nations Convention on Biological Diversity, the United Nations Decade of Ocean Sciences for Sustainable Development (2021-2025)[1] .

The strategic alliance towards a win-win collaboration between GMES & AFRICA and GOOS-AFRICA on in-situ ocean observation and forecasting systems in Africa was agreed at the first Continental workshop on Coastal and Marine Areas from 4 to 6 July 2022 in Accra, Ghana[1], attended by high-level experts from Africa.

Subsequently, a focussed meeting was organised with the specific theme on collaboration between GOOS AFRICA and GMES & AFRICA in Kigali, Rwanda, 24 - 28 October 2022. At this meeting, several actions of common interest between GMES & AFRICA and GOOS-AFRICA were proposed for joint implementation to promote a qualitative leap in oceanography in Africa and strengthen the Africa components of the ocean observations network as part of the overall development of the Global Ocean Observing System (GOOS).

The aims of the strategic alliance include:

- Strengthen partnerships to improve the delivery of observations to end-users through scientific forecasts, services, and assessments;
- Strengthen knowledge and exchange around the creation of value chains from ocean observations, enabling the dissemination of end-user applications at the local level;
- Maintain, strengthen, and expand the coordination of observations through the GOOS-AFRICA network;
- Promote the implementation of common standards and best practices;
- Ensure that ocean observing systems, data and information in Africa are accessible, interoperable, and reusable with quality assurance;
- Support innovation in observation technologies and networks;
- Develop capacity to ensure that a broader range of stakeholders participate and use the data for their benefits;
- Expand systematic observations to understand human impacts on the ocean; and
- Play a leading role in establishing effective governance for in situ and satellite observations in Africa in collaboration with partners and stakeholders.

[1] *https://1drv.ms/b/s!AivPYogOE-NWh5MaZXiEZOvu5bc_pw?e=2HWxuS*

1.1. Objectives of the Workshop

Based on a budget line allocated to GOOS-AFRICA at the IOC of UNESCO Assembly in June 2023, as well as the support of GMES & Africa to achieve common goals, a strategic reflection was necessary to select the immediate activities to be carried out, and to include in a medium-term action plan for GOOS-AFRICA. Consequently, the objectives of the workshop in Abidjan, as outlined in its concept note (Annex 1), were to:

- Refine the Long-Term Vision of GOOS-AFRICA; and agree on a three-year Strategic Action Plan (2024-2026)
- Identify current and required Infrastructure and Equipment
- Review the Organisation and Coordination of GOOS-AFRICA
- Identify partners towards fruitful collaborations.
- Examine a Strategy for Capacity empowerment
- Agree on priority areas for ocean observations
- Select the Essential Ocean Variables to be measured.
- Investigate Data Quality Standards and Technology Innovation Solutions
- Define a Communication Strategy
- Define an Education and Awareness Strategy
- Define an Evaluation Strategy for Regular Ocean Observations
- Define a Timeline for implementation of agreed activities
- Establish a mechanism for a continuous review and update of the Strategic Plan

1.2. Conduct of the Workshop

The workshop was held at the Scientific and Technological Centre of Felix Houphouet-Boigny University (UFHB) in Abidjan, Côte d'Ivoire. Thirty-three participants attended the workshop in person during all or part of the five days (Annex 2). The last three days were organised in interactive and participatory mode.

Twenty-two oral presentations were made during the first two days of the workshop followed by round table deliberations involving the entire group for the last two and a half days. Prof. Kouadio AFFIAN, the Chairman of GOOS-AFRICA Coordinating Committee, chaired the workshop with Mr. Christo WHITTLE of the Council for Scientific and Industrial Research (CSIR) and MarCOSIO (Marine and Coastal Services for Southern Africa and the Indian Ocean) Consortium acting as facilitator, and Mr. David KIRUGARA, serving as the rapporteurs.

A visit to the Centre Universitaire de Recherche et d'Application en Télédétection (CURAT) of UFHB was organized during the second day to introduce participants to the GOOS-AFRICA Secretariat office. The participants visited CURAT again on the final day of the workshop to participate in the award ceremony for the winners of a Hackathon, arranged by the MarCNoWA (Marine and Coastal Areas Management in North and West Africa) Consortium, which involved designing of innovative Earth Observation (EO) solutions for applications in the marine space.

1.3. Opening addresses

The workshop was officially opened by His Excellency Mr. Jacques ASSAHORE, Côte d'Ivoire's Minister of Environment, Sustainable Development, and Ecological Transition. He was accompanied by other dignitaries, including the Chief of Staff representing His Excellency Prof. Adama DIAWARA, Minister of Higher Education and Scientific Research, Prof Ballo ZIE, Vice Chancellor of the University of Felix Houphouet-Boigny (UFHB), Dr. Tidiane OUATTARA, President of the African Space Council, African Union Commission, Prof. Kouadio AFFIAN, Chair of GOOS-AFRICA, Dr. Bahir SALEY, Coordinator of GMES & Africa, African Union Commission, and Mr. Justin AHANHANZO, founding Coordinator of GOOS-AFRICA, representing UNESCO.

In his opening remarks, Prof. AFFIAN reiterated that GOOS-AFRICA is targeting coordination of Ocean Observations at the continental level and thus the need for a strategic plan. He reminded that as African ocean networks, there is a need to organize ourselves, and actively search and pursue our own home-grown solutions that resonate with African aspirations.

Prof. ZIE confirmed that UFHB was proud to host the GOOS-AFRICA Secretariat. He enumerated the different courses that are offered at the University, ranging from Physics, Physical oceanography, Marine transport, Climate change, and Marine biology amongst others. He informed the participants that CURAT is a specialized semi-autonomous institution from the mainstream university offering post graduate courses in Oceanography and Remote Sensing.

Mr. AHANHANZO informed the meeting that the Head of the UNESCO Office in Abidjan, Mr. Omar DIOP who was committed to the administrative arrangements related to the burial of a UNESCO staff, Mr. Yao Ydo**,** national of Côte d'Ivoire and Director of the UNESCO International Bureau of Education based in Geneva, kindly requested him to represent UNESCO at the meeting. Thus, Mr. AHANHANZO requested the meeting to observe a minute of silence in the memory of Mr. Yao Ydo. He extended the warm welcome of the Head of the UNESCO Office in Abidjan to the participants for successful deliberations. In addition, Mr. AHANHANZO, in his capacity as the founding Coordinator and initiator of the GOOS-AFRICA concept, gave a brief overview of the history of GOOS-AFRICA as a Pan African flagship Framework for Ocean Observations and Forecasting Systems endorsed by the New Partnership for Africa's Development (NEPAD) and The African Union. He stressed that GOOS-AFRICA contributes to the Blue Economy development in Africa. He recalled that due to the lack of permanent Secretariat for GOOS-AFRICA, the initiative slowed down. He however enthusiastically reminded participants that despite all odds, it is worth noting that GOOS-AFRICA made a giant step owing to the support of UNESCO over a decade through a continuous funding to the intersectoral and interdisciplinary Crosscutting project on the Applications of Satellite Remote Sensing for Integrated Management of Ecosystems and Water Resources in Africa, which significantly reinforced the GOOS-AFRICA component on Ocean Satellite Remote Sensing (Space Oceanography). Thus, GOOS-AFRICA is successful in establishing the first integrated Pan African network of water and oceans remote sensing specialists. CURAT was selected as one of the participating and beneficiary institution, which benefited from the continuous UNESCO funding. Based on this past successful experience, it is expected that CURAT could serve as an efficient and reliable host

of the GOOS-AFRICA Secretariat. Institutional mechanism should be put in place to ensure successful operations of the GOOS-AFRICA Secretariat.

Dr. SALEY, the new coordinator of GMES & Africa programme, informed the participants that GMES & AFRICA is a continental programme that seeks to address contemporary ocean challenges not only in Côte d'Ivoire and West Africa but throughout the entire continent, noting that 38 of 55 countries in Africa are vulnerable to sea level rise. For West Africa monitoring of sea level rise, biodiversity loss, and coastal erosion using earth observation technologies is of particular importance.

Dr. OUATTARA, the President of the African Space Agency, noted that GOOS-AFRICA is one of the pillars of the African Space Agency. He emphasized that the African Union Commission (AUC) is committed to promote Pan Africanism with Africans taking their rightful position in driving Ocean activities on the continent. He insisted that the GOOS-AFRICA mechanism, supported by African Heads of States, is a unique approach for the entire Africa and should be led by Africans as is the case. He stressed that the AUC is keen to make linkages with other continental programmes and thus the reason for interest and support to GOOS-AFRICA activities. He reminded participants that the Commission has supported two previous workshops, the first one a technical and policy coordinating committee workshop that delved into governance issues was held in Abidjan in 2019 and the other was held in Accra (Ghana), and Kigali, Rwanda in 2022 to create synergies with GMES & Africa for Coastal area projects.

Finally, Dr. OUATTARA noted that the Commission prioritizes stability of governance and prefers to work with the same team members without unnecessary interruption.

Mr M. Jacques ASSAHORE, the chief guest, warmly welcomed all the participants to the Workshop and to Côte d'Ivoire. He specifically acknowledged the invaluable contribution of Prof. AFFIAN in the management of GOOS-AFRICA, expressing deep gratitude for his work. He also assured the support of the Ivorian government to ensure that the GOOS-AFRICA Secretariat is operational. He ended his remarks by informing the participants that Côte d'Ivoire has a new Director of Blue Economy who will follow the workshop and report to the Government on deliberations agreed upon.

2. Keynote addresses

Dr. Joanna POST, Director of the GOOS Programme based at the IOC-UNESCO secretariat in Paris, delivered the overall GOOS 2030 strategy and the GOOS global architecture, demonstrating how all the different actors work together. She then proceeded to inform the participants that at COP28 in January 2024, the Norwegian Agency for Development Cooperation (Norad) committed funding to continue supporting UNESCO to advance the UN 2030 Agenda and its sustainable development goals, and support the implementation of the IOC Capacity Development strategy. UNESCO is the lead sponsor of GOOS and has availed funding to establish and support a GOOS-AFRICA office in Abidjan for the newly launched GOOS-AFRICA Secretariat at UFHB. During discussions it was suggested that the GOOS-AFRICA Secretariat could engage a lead expert as a consultant that

will play a pivotal role in coordinating GOOS-AFRICA project activities, working with the core team and key partners to develop a comprehensive GOOS-AFRICA strategic position paper. The expert will work under the guidance of the GOOS-AFRICA Chair, Prof. AFFIAN and review the requirements in ocean observations and data to enable sustainable ocean management in Africa with a focus on common issues of national concerns.

She also shared that similar funding opportunities are available to three other GOOS Regional Alliances (GRAs), namely IOGOOS, Pi-GOOS, and IOCARIBE-GOOS. She shared the news that additional funding from IOC is available to GOOS-AFRICA for the current biennium of 2024-2025.

Prof Angora Aman, former Coordinator for ODINAFRICA, presented on the status quo of the Global Sea Level Observing System (GLOSS) stations on the continent. On operations, he highlighted that some tide gauges were working while others were non-operational for several reasons. Storm surges swept the Nigerian station, and some countries face technical capacity challenges in equipment maintenance. In effect, he lamented that despite continuous sea level measurements taken at a global scale, a significant data gap has been recorded along the African coasts.

Another challenge Prof. Aman mentioned is that data are fragmented in Africa because they are collected during project life and are time-limited coupled with some countries being unwilling or unable to share their data.

He proposed that a revitalized GOOS-AFRICA Ocean Observation network would address the current challenges by ensuring standardized continental policies that will translate into standardization of equipment, open data access, data analysis, common data formats, calibration and training to ensure the creation of a joint and regionally harmonized platform for sharing information and strengthening GOOS-AFRICA National Focal points. Prof. Angora also emphasized that an evolving GOOS-AFRICA strategy should respond to the goals articulated within the 2050 AIM Strategy (Africa's Integrated Maritime Strategy for 2050) and African Union's Agenda 2063: The Africa We Want.

Dr. Enrique, the Technical Director of Ocean Prediction Decade Coordination Centre (DCC) at Mercator Ocean Institute gave his presentation on Ocean Prediction in Africa. He pointed out that ocean forecasts are disconnected and discontinuous and that there is a need to establish a modelling community with a common framework. The Mercator Ocean Institute (MOi) has extensive experience in ocean forecasting and would like to create a better-linked community with many robust systems worldwide, particularly focusing on ocean forecasts improvement in developing countries, particularly in Africa, through collaborative work.

He further told the workshop that MOi is interested in activating the Ocean Prediction DCC for Africa, particularly Ocean Prediction - African Seas, which is being implemented by CURAT and SAEON as the African regional team. MOi has assets to support priority 6 (Ocean Observations and Forecasting Systems for Africa) that is within the remit of GOOS-AFRICA and priority 7 (Digital twin for Africa - Establishing an African Ocean Knowledge Hub) of the Ocean Decade Roadmap for Africa, as well as to build a community of talents and resources to

improve ocean forecasting capacities and capabilities through shared knowledge, robust service, and operations.

3.Other Continental and Regional Programmes / Initiatives

Dr. Fiedler made a presentation on the FUTURO Programme, noting that FUTURO is an acronym for "Future of Tropical Upwelling Regions in the Atlantic Ocean". The FUTURO programme, which is based in Cabo Verde, is an all-season multiscale research campaign on the future evolution of the coastal upwelling system off West Africa, initiated in 2024 during the Barcelona Ocean Conference and spearheaded by GEOMAR. This international co-designed science project seeks to include the expertise of both Social and Natural Scientists.
The preparatory phase will last until 2026, followed by a core implementation phase from 2027 to 2029 and then a synthesis phase from 2030 to 2032. He emphasized that it is in this preparatory phase that FUTURO seeks to establish working groups to help co-design the experiment and establish it as an Ocean Decade Action for Africa under the SEAWARD Africa Decade programme and work closely with GOOS-AFRICA.

Dr. Kwame Adu Agyekum from the University of Ghana, the Coordinator of MarCNoWA, gave a detailed presentation of the various Earth Observation (EO) services provided by the MarCNoWA and MarCOSIO consortia, the two GMES & Africa Marine and Coastal areas projects. The presented services cater for the needs of African marine stakeholders in support of informed decision making in all sectors of society. More details on the services of the two consortia are available from the Kigali report[1], however he emphasized that GMES & Africa places major emphasis on technological approaches that incorporate Earth Observation data backed by the Copernicus programme.

He informed the workshop that the University of Ghana (UG), the lead of the MarCNoWA consortium, is testing locally built low-cost prototype sensors for measuring in-situ subsurface SST in selected West and North African nations to validate hydrodynamic model data where satellite derived information was found to be incomplete or inconsistent. The sensors, with location capabilities, are mounted on artisanal fishing boats, and preliminary results show that the retrieved data compares well with Mercator products and may also result in an improved potential fishing zone service. He informed the workshop that the activity is linked to GAIA and citizen science and will contribute to the EOV for GOOS-AFRICA. GAIA (GEO-Africa Incubator/Accelerator) is an initiative of Edenway Foundation based in Ghana which is "*Fostering Digital Literacy and Entrepreneurship among African Youth through GAIA Clubs in universities; technical, secondary, and vocational schools; and rural communities*". The Clubs serve as localized nodes that offer a combination of hands-on digital skills training and collaborative learning among members.

Dr. Kwame concluded his presentation by emphasizing the importance of supporting the GAIA initiative due to its potential as an emerging industry for developing homegrown innovations for Africa and creating jobs for our youth in the Blue Economy space.

Dr Juliet HERMES gave a presentation on Coastal Observations Lab in a Box (COLaB), a commercial, portable, low-cost, and modular suite of instruments that measure physical, biogeochemical, and biological ocean variables and complement moored equipment. She mentioned that COLaB has been tried and tested in Mexico and become global because of its association with an Ocean Best Practices task team and recent endorsement by the UN Ocean Decade under the CoastPredict program.

She informed participants that COLaB was motivated by the need for more reliable and comparable observations across much of the coastal ocean and aims to refute the common misconception that high quality coastal ocean observations could only be obtained using expensive equipment and facilities. Partial funding was made available through the COLaB project with final costs depending upon instrument selection. A modular approach to COLaB component selection allows the user to tailor the package to fulfil their needs and address their research questions. Suitable user training can also be tailored to the selected user package and augmented with online training material from OceanTeacher. Immediate plans are pilot training camps and field studies in Mozambique, later in Ghana in July 2024, and then in Kenya in September 2024. The Ghana study will focus on river monitoring.

Dr Wang from the First Institute of Oceanography (FIO) of China's Ministry of Natural Resources made a presentation on a new generation Global Navigation Satellite System (GNSS) surface drifting buoy. He said that the Smart buoy is highly low-cost, high-precision, open source and intelligent and provides significant opportunities for improved ocean observation and monitoring for ten important variables: geographic position, time, surface wave height, period and direction, surface current velocity and direction, surface sea temperature, surface sea salinity, and atmospheric water vapor content.

While noting that the new buoy is small and easy to operate and designed in four configurations to respond to different needs, he stressed that it costs only about 4 % of the prevailing typical cost of USD 40,000 – 80,000 for commercially new wave buoys.

He noted that the new buoy has been developed through China Ocean Decade Programme "Ocean to Climate Seamless Forecasting System (OSF)" and Chinese Government intends to provide OSF contribution to Africa (OSF-Africa) by planning a massive joint deployment of the smart buoy with some African key partners for testing and validation through collaborative ventures. The donation will be about 10 – 12 buoys to key partners of Côte d'Ivoire, Nigeria for West Africa and Kenya to benefit the East African region.

Dr Kwame Koranteng, a member of the Ocean Decade Africa Taskforce, made a presentation on the SEAWARD Africa (Science and Knowledge for a Resilient and Sustainable Ocean Economy in Africa) programme of the Africa Taskforce. He elaborated that it is an umbrella programme designed from the Ocean Decade Africa Roadmap with four components aligned to the nine priority areas of the roadmap. Ocean Observations including data and information constitute the foundation for SEAWARD AFRICA programme layout supporting all its four components. It intends to strengthen ocean observation networks as part of the overall development of GOOS-AFRICA, particularly in the coordination efforts for

the expansion of the Global Sea Level Observing System (GLOSS) in Africa. He further noted that within SEAWARD AFRICA, the Taskforce also intends to conduct a mapping exercise of existing observation networks to establish a baseline and identify priority for future observation programmes.

The presenter informed the workshop that the programme is undergoing endorsement and registration as an umbrella Ocean Decade Programme for Africa and received recognition in the statement of the IOC Executive Secretary at the closing session of the Barcelona Ocean Decade Conference. He urged that projects from Africa be submitted for endorsement as Decade Actions under the programme through current call for action for Africa that closes on 31st August 2024. He concluded that the partnership with GOOS-AFRICA will be a classic case of co-implementation of SEAWARD AFRICA to address the unequal distribution of ocean observations and forecasting capabilities in Africa.

Prof. Jimmy, Advisor and Senior Consultant, Climate Change and Green Growth, African Development Bank Group (AfDB), informed participants on the US West Africa Coastal Resilience Research Consortium (CRRC), outlining the network's five-year goals. He emphasized the importance of interdisciplinary and multidisciplinary approaches while addressing coastal challenges due to their inherent complexities. He concluded his presentation by mentioning that CRRC will expand into a pan-African organization that will combine both atmospheric and oceanic phenomena. He told participants about the next CRRC conference on the Open Global Approach to be held in Lagos from August 19th to 21st, 2024, and extended an invitation to the workshop participants.

3.1. Current state of Ocean Observations: Country Reports

Seven technical presentations on ocean observations and status of oceanographic infrastructure in different countries within Africa were delivered during the workshop; these covered the Central Africa (2), North Africa (1), West Africa (3) and South Africa (1) regions.

In summary, challenges faced in Ocean observation were highlighted and ranged from data sharing, use of outdated equipment and maintenance issues, lack of skilled personnel to manage technological equipment, and funding to facilitate ocean observations expeditions, amongst others.

3.1.1. Central Africa

Prof. Bope Bope, representing the Marine Pollution Control and Monitoring Center, Kinshasa, Democratic Republic of Congo, informed the workshop that a National Oceanographic Data Centre, established in December 2023 with the support of UNESCO, is addressing the challenges of coastal zone management: pollution, coastal erosion, protection of biodiversity, promotion of oceanographic research, monitoring climate change, etc. He outlined the different oceanographic equipment that are available for use in DRC and his key message was the need of implementation of a regional in situ data collection network including capacity development and data sharing.

Dr Sylvie, representing the Research Center for Marine Ecosystems, Cameroun, urged for the need for a strong regional network for data management building

on from the previous successes of the ODINAFRICA programme. Such a programme should address coastal vulnerability that is a priority in each of the countries in the sub-region.

3.1.2. North Africa

Prof. Zackaria, the President of the National Institute of Oceanography and Fisheries (NIOF), Egypt, gave a brief of all the equipment available at the Institute. He demonstrated the importance of collaborative work as was the case when Egypt experienced abnormal tidal cycles for 2 weeks in February/March this year. He informed the workshop that cooperation and international networks with other countries surrounding the Mediterranean Sea in capabilities in Ocean modelling and forecasting enabled NIOF to decipher that atmospheric anomalies were responsible for the observations.

3.1.3. West Africa

Dr Mobio from CURAT, Côte d'Ivoire, demonstrated different oceanographic applications including dynamical oceanography in Ivorian marine waters including eddies and their spatial and temporal influences on fish catches. He also showed studies of coastline evolution because coastal vulnerability is a priority concern for West African countries.

Dr Rabiu, the Assistant Director at the Nigeria Institute of Oceanography and Marine Research (NIOMR) outlined the existing infrastructure available at NIOMR and conduct of research cruises. He told the workshop that NIOMR is open to collaborative efforts in Remote Sensing, modelling, and forecasting through partnerships. He concluded by highlighting challenges of funding, technological limits and lack of skilled labour, among others.

3.1.4. South Africa

Mr. Christo, from the CSIR representing the MarCOSIO consortium informed the participants of the important linkages between South Africa's National Ocean and Coastal Information Management System (OCIMS) and the MarCOSIO project. During phase 2 of the OCIMS project the CSIR was joined by the South African Weather Services (SAWS) and the South African Environmental Observation Network (SAEON), thereby expanding the Earth Observation expertise in service development to include capacity and capabilities in predictive ocean and atmospheric modelling to provide an improved operational service. He elaborated on the challenge of incorporating services developed by MarCOSIO within the varied institutional frameworks of partner countries within the project, because the development of these vertical and horizontal linkages working cooperation with many different government bureaucracies. Despite these challenges, marine services developed in OCIMS and MarCOSIO are demonstrating a regional impact on improved ecosystem management, EEZ security and the support of economic activities. During Phase II of the MarCOSIO project a primary goal is to establish advisory groups composed of technical experts from relevant African government, academia, community and private sector stake-holders that will identify and collate both national and regional needs to ensure active participation, contribution and maximum benefit from the project. These Policy and Technical Expert Groups will encourage and facilitate knowledge sharing and cross-

fertilization between MarCOSIO partners, communities and governments, and also facilitate science to policy and institutional framework dialogues.

4. Brainstorming on the GOOS-AFRICA Strategic Plan

Prof. Affian opened the brainstorming session of the workshop, which intended to draft an outline of a framework for developing a strategic plan aligned to GOOS 2030 strategic plans but considering the unique African context and a three-year implementation plan (Annex 3). He also reminded the participants that a critical outcome of the workshop was convergence on immediate actions to be actualized by GOOS–AFRICA and GMES & Africa.

Critical issues raised for consideration in the design of the strategic /implementation plan document(s) are:

1. Clarity was sought regarding the governance structure of GOOS-AFRICA and the Coordination Committee membership.
2. Group discussions focused on broad issues of identifying a long-term vision for future growth and impact of GOOS-AFRICA, considering emerging challenges and opportunities in the field of oceanography.
3. The need for critical information on physical, chemical, and biological essential ocean variables to deliver climate operational services and ocean health in African countries and small island states was underlined as the driver for the strategy development.
4. The mission of GOOS-AFRICA, therefore, will be to lead the ocean community and create partnerships to develop an integrated, responsive, and sustained observing system.
5. A gap analysis was undertaken for the development of the Ocean Decade Africa Roadmap, hence, valuable information should be referenced to enumerate the different categories of the SWOT analysis for the Strategic plan. Similarly, the recommendations from the Kigali report need close consideration in the preparation of the strategic goals and objectives aligned to the GOOS 2030 Strategic plan while taking into account the unique African landscape.
6. It was argued that a GOOS-AFRICA Implementation plan may be more pragmatic in the three-year time frame within which initial funding is available. It was proposed that GOOS-AFRICA Implementation plan should focus on Ocean Decade Roadmap Priorities 5 (*Strengthening multi-hazards early warning systems and community resilience*), 6 (*Ocean Observations and forecasting systems for Africa*), 7 (*Digital twin for Africa - Establishing an African Ocean Knowledge Hub*), 8 (*Strengthening capacities and skills of African Early Career Ocean Professionals (ECOPs*) and 9 (*Regional ocean literacy programme*) while referring to the actions of the SEAWARD Africa Programme.
7. GOOS-AFRICA should foster strategic partnerships with other GRA and wider GOOS community, Africa Ocean Decade Taskforce, African Union Commission (AUC), WMO, GMES & Africa (MarCOSIO and MARCNoWA), Regional initiatives and organisations – WIOMSA, Nairobi and Abidjan Conventions, BCC, multilateral efforts, LMEs, etc., as well as research institutions, universities, government agencies, and industry partners
8. The diversification of revenue streams for funding to support GOOS-AFRICA operations was explored to reduce dependency on government and traditional funding sources. Such may include venture capital as an

innovative source of funding for projects, especially those targeting youth and other private-public partnership arrangements and industry (private sector) Corporate Social Responsibility (CSR) activities, especially the oil industry and others involved in Blue Economy activities.

9. There was also a recognition that national governments should be more proactive in investing resources to assist with the maintenance of infrastructure (e.g., tidal gauges) acquired through international collaborative initiatives in order to achieve a higher standard of sustainability. One approach to achieve this is creating a Community of Practice (CoP) with dedicated GOOS-AFRICA technicians responsible for assisting with the prioritised EOV observing systems, maintenance, and training.
10. The need of strengthening continental and international collaboration by participating in joint research initiatives was emphasized, and RCCR used as an example of potential collaboration, including others such as the European Observation and Data Network, European Space Agency (ESA), EUMETSAT, and the First Institute of Oceanography (FIO) of China, among others.
11. It was stated that Ocean Observations must address important management processes (e.g. MSP) so that the collected data supports both scientific research interest and science for management and policy making issues.
12. During the plenary discussions, it appeared that new participants lack information on GOOS-AFRICA history including initial plans and projects, Coordinating Committee mechanism, communication and interactions with stakeholders. The meeting requested the founding Coordinator and initiator of the GOOS-AFRICA Concept, Mr. Justin AHANHANZO to prepare a presentation for the following day. Subsequent, he convened an evening meeting of the GOOS-AFRICA Coordinating Committee member present at the meeting to co-design the content of the targeted presentation including refining of the GOOS-AFRICA Governance Structure for discussions.

4.1.Proposed Governance structure of GOOS AFRICA

For GOOS-AFRICA to effectively act as the platform for coordination of ocean matters on the continent, a refined governance structure that strengthens networking, efficiency, accountability, and cooperation mechanisms working with institutional nodes at regional or national level was proposed (Fig. 1).

Based on the presentation on the history of GOOS-AFRICA and taking into consideration the need to reinforce and equip the Coordinating Committee and Working Groups with institutional memories, transfer of knowledge and best practices to close communication gaps and engage proactive vigorous multilateral and multisource fund raising, enabling regular activities, it was agreed to build on the expertise, experience and wisdom of the past Chairs of the GOOS-AFRICA Coordinating Committee. Consequently, a proposal was made to constitute a GOOS-AFRICA Advisory Board to be made up of past Chairs of GOOS-AFRICA Coordinating Committee, past leaders of LME projects in Africa and heads of major relevant African institutions. The Advisory Board will be an overarching paramount body to oversee and guide the GOOS-AFRICA Coordinating Committee and the upcoming Secretariat.

This architecture was presented at the workshop and is expected to be further discussed and endorsed by the Coordination Committee as soon as possible.

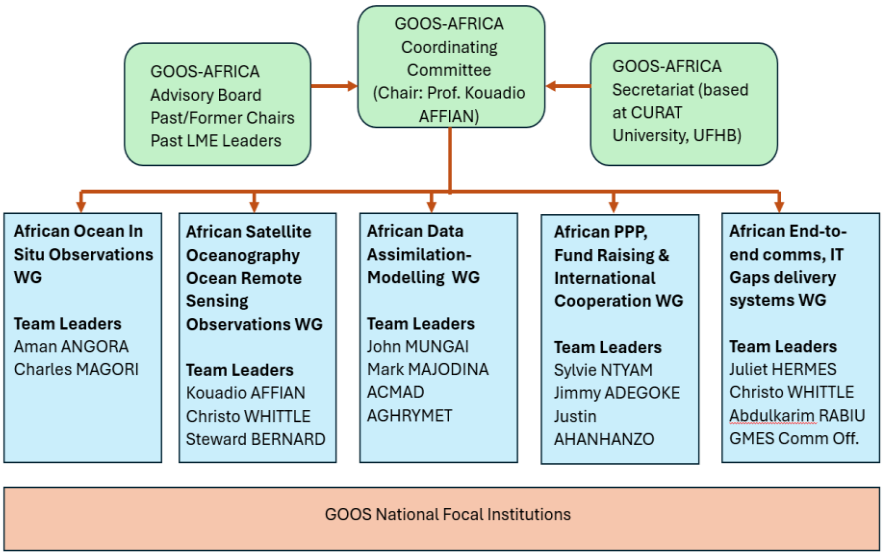

Figure 1:Revised Governance Structure for GOOS AFRICA

Prof. Affian urged the participants that they are at liberty to join any of the five expert technical working groups. He then presented the Coordinating Committee membership as follows: Kouadio AFFIAN (GOOS-AFRICA Chair), Cherif SAMMARI, Karim HILMI, Sylvie Carole Epse ONDO NTYAM, Christo WHITTLE, Justin

AHANHANZO, Veronica DOVE and Jimmy ADEGOKE. It was noted that this membership has remained unchanged since 2019 due to financial constraints with no funding from UNESCO for GOOS-AFRICA activities.

4.2. Setting up of the GOOS Secretariat Office in CURAT

On the second day of the workshop, participants visited CURAT to inspect the GOOS-AFRICA secretariat Office and to interact with the staff. A presentation was made by the Director, Dr KOUAME Kan Jean, on the activities of the Centre. It was noted that the Centre was created in 1995 and has 31 full time staff, 5 part time staff, 5 international staff from Canada, France, and Benin and 5 administrative staff. The centre offers a two year post graduate (Master degree) to a restricted number of students from the West African region.

4.3. Engagement of a Lead Expert

As was previously reported from the presentation of Dr. Joanna POST, funding is available through Norad to engage a consultant (lead expert) to support the GOOS-AFRICA Secretariat at UFHB. The Terms of Reference for hiring the consultant needs to be expeditiously addressed by the Coordination Committee so that administrative formalities for the recruitment can commence. Among others, the consultant will lead the development of the three year strategic / implementation plan for 2024 – 2026.

5. Immediate Actions for GOOS – AFRICA with time lines

The immediate actions agreed upon, by consensus, by the participants are found in Table 1 below. Many of these also constitute the necessary actions to be included in the Strategic Plan

Table 1. Matrix filled at the Workshop on Necessary Actions for the Strategic Plan

Activity	Task description	Start date	End date	Year of implementation	Requirements	Responsible	Deliverable	Budget
Strategic / Implementation plan	Recruitment of Consultant	May-24	Jun-24	Year 1 (2024-25)	Drafting of ToR by GOOS Coordination Committee; Administrative formalities for recruitment	GOOS-AFRICA Chair	ToR	
	GOOS AFRICA Secretariat Office set up	May-24	Jun-24	Year 1 (2024-25)	Space at CURAT identified and administrative formalities	GOOS-AFRICA Chair	Operational Office	
	Drafting of the Strategic and Implementation plan, prioritization of actions based on low hanging fruits	Jul-24	May-25	Year 1 (2024-25)	Consultant recruited and consultation with GOOS Coordinating Committee	GOOS-AFRICA Chair	Document	
	Co-implementation of GOOS AFRICA actions with those of SEAWARD AFRICA Umbrella Programme	Jun-24		Year 1 (2024-25)		IOC AFRICA Secretariat / GOOS-AFRICA working group		Regular budget
Infrastructure and Human Resource mapping	Mapping exercise by 1 expert per LME for data collection, (i.e., platforms, equipment, data centres, personnel, training opportunities) in consultation with the GOOS Coordinating Committee through the GOOS National Focal points, IOC focal point and	Jul-24	Jan-25	Year 1 (2024-25)		Prof. AMAN as Team leader to coordinate and synthesize the information into a final report	Final Report	Regular budget

Commenté [AJ1]: Needs additional refinement with a small technical group.

Commenté [AJ2]: There are too many old folks as responsables: We should identify young and mid-career professionals to lead the technical work and give them space to grow. To ensure inclusiveness, one person should not lead more than 1 task because experiences have shown that those who took too many responsibilities do not perform due to time constraints. Young people are needed for technical tasks..

	GMES & Africa relevant survey							
	Targetted upgrade of existing facilities and infrastructure (in-situ) to address research gaps identified from EO and modelling concerns, and to replace outdated infrastructure.	May-25	Dec-26	Years 2 and 3	Prof. AMANs report for information			Norad funding
Role of GOOS Africa in Capacity development	Coordination of training needs with those of GMES & Africa for synergies Coordination of GOOS Africa activities with Regional Centres of Excellence in RS (eg CURAT, Zanzibar, Nansen-Tutu etc) Support the utilisation of capacity development tools provided by Ocean Prediction DCC and ETOOFS for Modelling / Prediction Take advantage of CD activities of Copernicus (hackathons)	Nov-24	Dec-24	Year 1 for low hanging fruits and continuous to Year 3	Activity is captured in the submission made by GOOS AFRICA to IOC Assembly that clearly identified three institutions for Capacity Development; CURAT for Remote Sensing; Alexandria for in-situ monitoring and Morocco for Modelling Concept notes available and can be extended to Southern and Eastern Africa through submission of concept note	Prof. AFFIAN for CURAT Prof. HAMOUNDA for Alexandria Prof. KARIM for Morocco		Regular budget

	Training workshop on remote sensing marine applications	09 Dec 24	14 Dec	Year 1 (2024-25)	Drafting of ToR by CURAT	Director of CURAT	ToR	Regular budget
	Training workshop on Modelling, Observations and forecasting	First quarter	First quarter	Year 2 (2024-25)	Drafting of ToR by INRH	Director of INRH	ToR	Regular budget
	Training workshop on data acquisition, data processing, interpretation and data archiving	Second quarter	Second quarter	Year 2	Drafting of ToR by NIOF	President of NIOF	TOR	Regular budget
Data Quality and Technology Integration	In partnership with GAIA, perform validation exercise of low cost sensors using recognized oceanographic instrumentation as an investment in homegrown affordable new in situ ocean observation technology and systems.			Year 1	Purchase of Wave Buoy for West Africa Deployment of wave Buoy in Kenya purchased through GMES & Africa Phase I to strengthen the network of observing buoys in Eastern Africa region	Dr. AGYEKUM of UG Dr. MBARU of KMFRI	Deployed Wave Buoys	GMES & Africa MarCOSIO and MARCONoWA
	Identify and acquire advanced technology and equipment to support data collection (e.g. COLaB, Smart Buoy from China, shelf scale sampling in SA taking advantage of existing partner	Dec 24	End of second quarter	Years 1 and 2	Donation of 10 Smart Buoy from China	GOOS-AFRICA Chair	First Institute of Oceanography of China	Regular budget

	technologies and 'fit for purposeness' in African conditions Recommend instruments for EOV measurements – provide best practices for EOVs in an African context							
	Installing more tide gauges and maintenance the old ones	Dec 24	End of second quarter	Years 1 and 2	Drafting TOR	GOOS-AFRICA chair and expert committed for the implementation	TOR	Regular Budget
Ocean literacy, Outreach and Community Engagement	Develop a GOOS Africa website and brand identity and social media platform utilize GRA and GOOS communication staff. Explore a GOOS Africa newsletter into the future, utilizing partners eg through WIOMSA, with media, GMES and Africa to increase GOOS Africa awareness – eg engage with GOOS national focal points. Strengthen community engagement efforts through citizen science projects, public lectures, Civil Society Organizations, NGO's and Faith based			Years 1, 2 and 3	Leverage existing Ocean Literacy Programmes of UNESCO and outreach programmes and IOC AFRICA to assist to put together an Ocean Observation Expert group based on the African Group of Negotiation Experts		Newsletters	GMES & Africa MarCOSIO and MARCONoWA

	organizations and outreach events to foster a sense of ownership and support for the institute's mission.							

6. Conclusions and key messages

The workshop's significant results were summarized as follows:

1) Preparation of the outline of a three-year action plan for GOOS-AFRICA that will be funded from IOC regular budget as well as from extrabudgetary sources.
2) Confirmation of the physical presence of the GOOS-AFRICA secretariat at CURAT.
3) The expansion of GOOS-AFRICA organization structure to include technical expert working groups that will ensure the successful implementation of the program for the next three years.

Immediate actions for GMES & AFRICA to support GOOS-AFRICA include:

4) Purchase and deployment of wave buoy in Western Africa and the deployment of a wave buoy in Kenya purchased during GMES & AFRICA Phase I. This will be a win-win for both GOOS-AFRICA and GMES & AFRICA. For the former it will strengthen the Ocean Obervation network for EOV on the Continent while for the later the in-situ data obtained will be used to improve data validation and enhance the EO service development. A final rider for this activity is that another benefit will be that commercial wave buoys will be used to validate data from low-cost home-grown sensors deployed through GAIA.

Annex 1: Concept Note and Programme

Introduction

The United Nations Decade of Ocean Science for Sustainable Development (2021-2030) was proclaimed "to support efforts to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide behind a common framework that will ensure ocean science can fully support countries in creating improved conditions for sustainable development of the Ocean" (UNESCO-IOC, 2022). The Ocean Decade is especially opportune for Africa as its coastal and ocean waters are increasingly gaining importance as a potential source of economic growth and employment. Several African countries are highly dependent on the ocean and its rich resources. The Ocean Decade Africa Roadmap provides a vision and plan for diverse stakeholders to convene around a common set of priorities for the implementation of the Ocean Decade in Africa.

The Global Monitoring for Environment and Security and Africa (GMES & Africa) initiative is the crystallization of the longstanding cooperation between Africa and Europe in the area of space science & technology and earth observation. The contribution of space observation to satellite communication, television, radio, positioning on the earth, as well as to fields such as agriculture, transport, health, natural resource management, the environment and risk forecasting is well established. Space observations are privileged tools for better understanding of the earth as well as the entire solar system. Although very powerful, space observation which leads to the creation of models, relies on in situ data and mainly data from the oceans, which are the driving force behind global changes and which make up about 70% of the surface of the earth. The marine environment is the largest component of the Earth's system that stabilizes climate and support life on Earth and human well-being. GMES & Africa activities are designed to enable Africa to solve and address some global environmental challenges and to promote sustainable development.

A policy on collection of in situ ocean data is therefore essential, but unfortunately, to date, a common oceanographic data collection policy has not been adopted in Africa. The data collected at the level of each country for its own needs are often not only fragmentary but discontinuous. The GOOS-AFRICA alliance was established by the Intergovernmental Oceanographic Commission (IOC) of UNESCO with an objective of coordinating ocean observing systems and operational oceanography across African nations. Thus, GOOS – AFRICA could play an essential role in supporting GMES & AFRICA.

Strategically, GOOS–AFRICA and GMES & AFRICA concurred to work together in a partnership in support of Ocean Decade implementation in Africa.
The strategic alliance towards a win-win collaboration between GMES & AFRICA and GOOS – AFRICA on in-situ ocean observation in Africa was set in Kigali (24 - 28 October 2022). This strategic alliance aimed to:

Strengthen partnerships to improve the delivery of observations to end-users through scientific forecasts, services and assessments;
Strengthen knowledge and exchange around the creation of value from ocean observations, enabling the dissemination of end-user applications at the local level;
Maintain, strengthen and expand the coordination of observations through the GOOS–AFRICA network;
Promote standards and best practices;

Ensure that ocean observing data and information in Africa are accessible, interoperable and reusable with quality assurance;
Support innovation in observation technologies and networks;
Develop capacity to ensure that a wider range of stakeholders participate and use the data for their benefit;
Expand systematic observations to understand human impacts on the ocean; and
Play a leading role in establishing effective governance for in situ and satellite observations in Africa, in collaboration with partners and stakeholders.

To achieve the above objectives, the high-level experts from Africa, at the Kigali meeting, listed a number of activities of common interest between GMES & AFRICA and GOOS-AFRICA, the implementation of which should promote a qualitative leap in oceanography in Africa.

Based on budget line which is being allocated to GOOS-AFRICA at the COI Assembly held in June 2023 in Paris and the the support of GMES & Africa to achieve common goals, it is important that a strategic reflection be conducted to firstly select the activities to be carried out immediately, and to project in the medium term an action plan to be submitted to give visibility to the actions of GOOS-AFRICA and GMES&AFRICA. This strategic plan is even more urgent because ocean observation has become more crucial than ever, as our understanding of this complex ecosystem plays a fundamental role in preserving life on Earth. The current issues related to ocean observation are numerous and require a strategic response to ensure the sustainability of this environment.

Overall Objective
The objective of this workshop is to select actions to be implemented immediately and draft the three-year strategic plan for ocean observation in Africa and to complement the activities of the GMES & Africa coastal observation component. This three-year strategic plan aims to strengthen the capacity of GOOS-AFRICA to provide crucial data and useful information to end-users.

Specific Objectives
During the workshop, the following specific objectives will be examined:
Define the Long-Term Vision of GOOS-AFRICA
develop a Strategic plan for 2023-2025 that will include proposal for development of an Ocean Development Fund for GOOS-Africa Strategy for 3 Years
Identify necessary Infrastructure and Equipment
Review the Organization and Coordination of GOOS-AFRICA
Identify Partners for establishing fruitful Collaborations.
Examine the Capacity Strengthening Strategy Priority Observation Areas
Select the essentials variables to be measured.
Propose Data Quality and Technological Innovation
Define a Communication Strategy
Review the Education and Awareness Strategy
Establish a Regular Observation Evaluation Strategy
Define the Activity Timeline
Establish a Continuous Adjustment Procedure for the Strategic Plan

Expected Results

Long-Term Vision of GOOS is defined.
Strategic plan for 2024-2028 is proposed for development of an Ocean Development Fund for GOOS-Africa Strategy for 3 Years
Specific and measurable strategic objectives are defined.
State of the current Ocean Observation in Africa is assessed.
Global Strategy for 3 Years is defined.
Necessary infrastructure and equipment are identified.
Organization and Coordination of GOOS-AFRICA are reviewed.
Partners for establishing fruitful Collaborations are identified.
Capacity Strengthening Strategy is examined.
Priority Observation Areas are Determined.
Essential variables to be measured are selected.
Data Quality and Technological Innovation are proposed.
Communication Strategy is defined.
Education and Awareness Strategy is reviewed.
Regular Observation Evaluation Strategy is established.
Activity timeline is defined.
Continuous Adjustment Procedure for the Strategic plan is established.

Programme

Commenté [JA3]: Please use the updated agenda as some participants including Karim, Cherif and Tammy did not attend and there was no presentation from them.

Day 1: Monday, 13th May 2024	
09: 00 – 09:30	Registration
09:30 – 10:00	Opening Ceremony
	Prof. AFFIAN; GOOS-AFRICA Chair and President of the Organizing Committee
	Prof. ZIE; Vice chancellor of Felix HOUPHOUET-BOIGNY University
	Mr. Justin AHANHANZO, Representative of UNESCO
	Dr. SALEY; GMES & AFRICA Coordinator
	Dr. OUATTARA; President of the African Space Council and Head of Science, Technology and Space Division, AUC
	M. Jacques ASSAHORE, Minister of Environment, Sustainable Development, and ecological transition
10 :00 -10:30	Coffee break and Group Photo
10:30 - 10:50	Keynote speaker: Dr. POST Director of GOOS Programme: GOOS Strategic plan.
10:50 - 13:10	Keynote speaker 1: Prof. ANGORA: Overview on Ocean Observation in Africa
13:30 - 13:30	Keynote speaker 2: Dr. ALVAREZ: Ocean Prediction in Africa
13 :10 -14 :30	Lunch break
14:30 – 14:45	Dr. BJORN: FUTURO Ptogramme. The contribution to a concept for a potential West African Ocean Observatory and Capacity Development
14:45 – 15:00	Dr. KWAME: From the ocean observations towards services to end users in Africa:
	Report on ocean observation in countries and African sub region (10 min)
15:00 -16:30	MORROCO (Dr. KARIM)
	Tunisia (Dr. CHERIF)
	Côte d'Ivoire (Dr. MOBIO)
	Benin (Dr. SOHOU)
	Nigeria (Dr. Rabiu Abdulkarim)
	Kenya (Dr. Charles MAGORI)
	Democratic Republic of Congo (Dr. BOPE)
	Egypt (Dr. SUZANE)
	South Africa (Dr. CHRISTO)
	Cameroun (Dr. NTYAM)
	Mozambique (Dr. CANDIDA)

16:30 – 16:50	Coffee break
16:50 - 17:50	Synthesis of the day
18:00	End of Day
Day 2: Tuesday 14th May 2024	
08:00 – 09:00	Visit to CURAT / GOOS Secretariat / Felix Houphouet-Boigny University
10:15 – 10:30	Dr. HERMES: Ocean prediction DCC Africa
10:30 - 10:40	Dr. TAMMY: Presentation on coastal observations lab in a box focusing on low-cost sensors for under resourced
10:40 -11:00	Coffee break
11:00 - 11:20	Dr. WANG: Presentation on Smart buoy
11:20 - 11:30	Dr. KORANTENG: UN Decade: What Ocean Observation in Africa
11:30 - 12:30	Round table: selection of short-term actions to be implemented.
12:30 - 13:30	Brainstorming on the definition of specific and measurable strategic objectives for GOOS-AFRICA
13:30 - 14:30	Lunch
14:30 - 16:00	Definition of Global strategy for 3 years
16:00 – 16:20	Coffee break
16:20 -18:00	Definition of Global strategy for 3 years
18:00	End of Day
Day 3: Wednesday 15th May 2024	
09:00 - 10:30	Determination of priority areas
10:30 - 11:00	Coffee break
11:00 – 13:00	Inventory of infrastructures (available equipment and facilities: Cote d'Ivoire / Cabo Verde/ South Africa / Egypt / Nigeria / Kenya / Mozambique / Tunisia / Morocco)
13:00 - 14:00	Lunch
14:00 - 15:30	Select of the essential to variables be measured and define selected zone to be implemented
15:30 - 16:00	Coffee break
16:00 – 18:00	Propose Data quality and Technological Innovation
18:00	End of Day

Day 4: Thursday 16th May 2024	
09:00 - 10:30	Establishment of a regular Observation Evaluation strategy
10:30 - 11:00	Coffee break
11:00 – 13:00	Adoption of the capacity strengthening Strategy
13:00 - 14:00	Lunch
14:00 - 15:30	Define specific and measurable strategic objectives
15:30 - 16:00	Coffee break
16:00 – 17:00	Identify partners for establishing fruitful collaborations.
17:00 – 18:00	Define a communication strategy.
18:00	End of Day
Day 5: Friday 17th May 2024	
09:00 - 10:00	Establishment of a continuous adjustment procedure for the strategic plan
10:00 - 10:45	The Award Ceremony for the Winners of the Hackathon
10:45 - 11:00	Coffee break
11:00 - 11:45	Review of the organization and coordination committee of GOOS-AFRICA
11:45 - 12:45	Closing ceremony
13:00 - 14:00	Lunch

Annex 2: List of Participants

Title	NAME	INSTITUTION	EMAIL
Prof.	ADEGOKE Jimmy	Advisor and Senior Consultant, Climate Change and Green Growth, African Development Bank group (AfDB) University of Missouri – Kansas City, USA	jimmyadegoke2015@gmail.com
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Annex 3: GOOS-AFRICA Draft strategic plan (to be improved)

Year1:

1. **Mission Review and Alignment: (Year 1)**
   - Provide African countries and small islands with
     i. critical information on physical, chemical, biological essential ocean variables
     ii. in order to delivery for climate operational services and ocean health
   - mission is to:
     i. lead ocean community and
     ii. create partnership to grow an integrated, responsive and sustained observing system
2. **Stakeholders: (Year 1)**
   - Scientists, policymakers, industry partners, NGOs, National and regional and sub-regional Institutions and projects, and the local community to understand their needs, expectations, and potential collaborations.
   - International organizations such as MERCATOR, ECMWF, ESA, EUMETSAT, NASA, NOAA, FAO, OMM, IMO, WMU, IOC etc.
   - DCO on ocean observation, on data sharing and DCC ocean predictions and Coastal resilience DCC, Ocean Decade Taskforce
   - Ongoing and planned Regional projects

3. **SWOT Analysis: (Year 1)**
   - **Strengths:**
     i. Regional representation
     ii. Collaborative platform
     iii. Policy influence
     iv. Existing infrastructure including NODC's
     v. Existence of secretariat, expertise
     vi. Multilingual advantage and diversity
     vii. Regional and global recognition of GOOS Africa
     viii. Strong foundations of coordinating OO activities within Africa
     ix. ECOP
     x. Local and traditional knowledge (Indigenous) participation in OO activities

   - **Weaknesses**:
     i. Donor funding dependency
     ii. Human Capacity constraints
     iii. Inadequate and unequal technical resources distribution
     iv. Poor infrastructure maintenance due to funding and lack of technical expertise
     v. Coordination challenges
     vi. Data accessability
     vii. Transboundary challenges with LME's
     viii. Outreach challenges of OO benefits
     ix. Lack of concrete roadmap and action plans
     x. Regional and economic social economic dynamics
     xi. Lack of succession planning and updated ToR
     xii. Inadequate Ocean data management tools

   - **Opportunities**:
     i. Low cost technical innovation options
     ii. Artificial intelligence (e.g. data analytics etc)
     iii. Digital twin for Africa under development
     iv. Partnership expansion, e.g AfSA and GMES and Africa

v. Ocean Decade
vi. Request from AU for a roadmap/ action plan
vii. Potential cooperation with IOGOOS and MedGOOS
viii. PPP opportunities
ix. Synergies with other continental programmes, projects

- **Threats**
  i. Political continuity (instability)
  ii. Lack of co-design of tools
  iii. Financial unsustainability
  iv. Change in global agenda, eg. SDG etc (can be also opportunities)
  v. Helicopter / Parachute science, bridging intellectual property

4. **Evaluation of Infrastructure and Human Resource relate to OO*):*** **(Year 1)**

a. Assess (mapping) infrastructure, human resources, training opportunities, financial flow into Africa (eg national, private sector etc) and funding opportunities (include data centres), with regards to in situ observations, remote sensing activities/applications, modelling efforts *build from Aman's report NB in final report possibly seperate this into infrastructure and HR and combine with (d)*
b. Work with Oceanops and IOC to ensure it is updated and how we can work with global observing systems (eg Argo, GLOSS Etc)
c. Compile information on the needs of institutes and Universities doing related observations, research and postgraduate courses (eg marine science etc), *check with GMES & Africa*
d. Quality of graduates (eg relevent certification) of workforce for the future to contribute to GOOS Africa activities, as well as job opportunities
e. Brain gain – tapping into the African diaspora through for example virtual activities
f. Gather successful case studies relevent to GOOS Africa
g. Investigate how we can understand the dollar value– ocean accounting - of OO (eg as was done by IMOS)

5. Prioritization: (Year 1)

- Which of the ocean decade priorities should be prioritised by GOOS-AFRICA – 5,6,8,9 *details to be added, but also look at what has been done by the task force Africa road map and seaward program*
- Who should GOOS-AFRICA foster strategic partnerships with:
  i. other GRA and wider GOOS community
  ii. GMES & Africa (MarCOSIO and MARCNoWA)
  iii. Africa Ocean Decade Task force
  iv. African Union Commission (AUC) and WMO
  v. Regional initiatives and organisations – WIOMSA, Nairobi and Abidjan Conventions, BCC, multilateral efforts, LMEs etc
  vi. institutions,
  vii. universities,
  viii. government agencies,
  ix. and industry partners

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1. **Rôle of GOOS Africa in Capacity Development: (Year 2 and 3 with Year 1 identifying low hanging fruits)**
   - In situ data collection and processing
     a). Prioritise analytical and maintenance capacity retention and development
   - Remote sensing – *to be run in collaboration with GMES Africa,*
     a). Coordinate activities and training needs with AFSA (GMES & Africa)

b). Coordinate GOOS Africa activities with regional centres of excellence (eg CURAT, Zanzibar, Nansen-Tutu etc)

- Modelling / prediction
  a). Support the utilisation of capacity development tools provided by Ocean Prediction DCC and ETOOFS
  b). Take advantage of CD activities of Copernicus (hackathons)
  c). Efficient utilisation of existing capacity for internal development
- Training in AI *(cross cutter)*

2. **Technology Integration: (Year 2, 3)**
   - Identify the technology needed and deployment for GOOS Africa implementation using OSSEs (Observing system Simulation Experiments *NB Africa does not have experience or capacity to perform OSSEs so would rely on partners or a specific consultant*)
   - Identify and acquire advanced technology and equipment to support data collection
   - Look at succesful case studies and how we can rôle them out further (eg COLaB, Chinese buoy, shelf scale sampling in SA
   - Recommend instruments for EOV measurements – provide best practices for EOVs in an African context
   - Take advantage of existing partner technologies and check 'fit for purposeness' in African conditions
   - *US west Africa coastal resilience research consortium (CRRC) – Jimmy will send an email around this*

3. **Research Initiatives: (Year 2, 3)**
   - Launch new programmes initiatives and interdisciplinary projects to address the selected priorities areas – *one of these maybe functioning tide gauges, but an issue might be how we maintain these. A problem might be that the tide gauges are being 'gifted' from international stakeholders and not maintained, whereas if national governments invest they are more likely to be maintained.*
   - Look to existing initiatives
   - Create a list of events that are happening and share.
   - Establishing a community of practice around eg tide gauges
   - *How do we get community buy in with eg tide gauges – look at example from Pacific, monetize and communicate the value. How can we utilise national partnerships such as the navy/hydrogaphic office and the national met office*
   - *There is a need for best practices*
   - *Potential to have dedicated GOOS AFrica technicians that can be responsible for assisinting with the prioritised EOV observing systems, assist with maintenance and training*
   - Create a process for officially endorsing activities

4. **Public Outreach and Education: (Year 1, 2, 3)**
   - Develop a communication strategy and implementation plan with support from GOOS at UNESCO and other GOOS RA's. NB ensure there are links to the Ocean Decade
   - Outreach in terms of GOOS Africa awareness – eg engage with GOOS national focal points,
   - create champions who consistently acknowledge GOOS Africa eg tweets, presentations etc.
   - Explore a GOOS Africa newsletter into the future, utilizing partners eg through WIOMSA,
   - GOOS Africa website and brand identity and social media platform.
   - Utilize GOOS RA and GOOS communication staff.

- Assign roles to the GOOS Africa steering committee members (eg communications)
- Develop outreach programs in partnership with media, GMES and Africa (Brice contact person)
- workshops, and educational materials to raise public awareness about oceanographic research and its importance for environmental conservation and sustainable development.
- Support ocean literacy

5. **Continental and International Collaboration: (Year 1, 2, 3)**
   - Strengthen international collaboration by participating in joint research projects, RCCR as an example with Jimmy potential collaboration including possible presence in the upcoming Workshop in Lagos in August 2024
   - exchange programs, and scientific conferences to foster knowledge sharing and cross-cultural learning. AARSE and any others like ClimSA, Mercator Ocean Institute etc.
   - European Observation and Data Network, ESA Frascati, First Institute of Oceanography (FIO) from China represented at the workshop

6. **Infrastructure Upgrades: (Year 2, 3)**
   - Targetted upgrade of existing facilities and infrastructure (in-situ) to address research gaps identified from EO and modelling concerns, and to replace outdated infrastructure.
   - Partner with GMES &Africa for advice on the maintenance options based on the EUMETCast software infrastructure in Africa of 200 Stations
   - Partner with relevant institutions to ensure the security of equipment while at sea with appropriaite training
   - TransAfrican Hydrometeorological Observatory

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1. **Diversification of Funding Sources: (Year 1, 2, 3)**
   - Explore alternative funding sources such as grants, philanthropic donations, and corporate sponsorships to diversify revenue streams and reduce dependency on government funding.
   - *Justin spoke about funding opportunities in the Indian Ocean NB Ibukun/Justin can fill in this information later*
   - Explore Venture capital as an innovative source of funding for projects and programmes, especially targeting Youth
   - Partner with industry (private sector) as part of their Corporate Social Responsibility (CSR) activities especially the oil Industry and others involved in Blue Economy activities
   - Philantropic organizations

2. **Community Engagement: (Year 1, 2, 3)**
   - Leverage existing stakeholder networks identified within the activities of both MarCOSIO and MARCONOWA to introduce additional decision making mechanisms.
   - Strengthen community engagement efforts through citizen science projects, public lectures, Civil Society Organizations, NGO’s and Faith based organizations and outreach events to foster a sense of ownership and support for the institute's mission.
   - Seek to partner with existing initiatives within GMES & Africa consortia with the aim of extension of their success stories; e.g for example GAIA activities
   - Leverage existing Ocean Literacy programmes of UNESCO

3. **Policy Advocacy: (Year 1, 2, 3)**

- Engage with policymakers and advocacy groups to provide scientific expertise and evidence-based recommendations for informed decision-making on marine management issues.
- Advocacy enhancement on Marine management issues and identification of National champion makers
- Identify skilled facilitators and lobbyists to address communication challenges within Science - Policy interface

4. **Evaluation and Continuous Improvement: (Year 2, 3)**
   - Conduct regular appraisal of the strategic plan's implementation, soliciting feedback from stakeholders, and making adjustments as needed to ensure alignment with evolving priorities and objectives.
   - Prepare financial and activity reports
   - Solicit feedback from National Focal points, stakeholders and partners; press releases and from online surveys

5. **Long-Term Visioning: (Year 1, 2, 3)**
   - Develop a long-term vision and roadmap for the GOOS AFRICA future growth and impact, taking into account emerging challenges and opportunities in the field of oceanography.

Annex 4: Abbreviations & Acronyms

AfDB	African Development Bank Group
AI	Artificial Intelligence
ARGO	Profiling float
AUC	African Union Commission
BCC	Benguela Current Commission
CD	Capacity Development
CoP	Community of Practice
COLaB	Coastal Observations Lab in a Box
CRRC	US West Africa Coastal Resilience Research Consortium
CSIR	Council for Scientific and Industrial Research
CURAT	Centre Universitaire de Recherche et d'Application en Télédétection
CSR	Corporate Social Responsibility (CSR)
DCC	Decade Coordination Centre
ECOPs	Early Career Ocean Professionals
EEZ	Exclusive Economic Zone
EO	Earth Observation
EOV	Essential Ocean Variables, according to GOOS
ESA	European Space Agency
ETOOFS	Expert Team on Operational Ocean Forecast Systems
EUMETSAT	European METeorological SATellites exploitation organisation
FIO	First Institute of Oceanography, China
FUTURO	Future of Tropical Upwelling Regions in the Atlantic Ocean
GAIA	GEO-Africa Incubator/Accelerator
GEOMAR	Centre for Ocean Research in Kiel, Germany
GLOSS	Global Sea Level Observing System
GMES & AFRICA	Global Monitoring for Environment and Security and Africa
GNSS	Global Navigation Satellite System
GOOS AFRICA	Global Ocean Observing System Regional alliance for AFRICA
GOOS	Global Ocean Observing System
GRA	GOOS Regional Alliances
HF	High Frequency
INRH	Institut National de Recherche Halieutique
IOC of UNESCO	Intergovernmental Oceanographic Commission of UNESCO
IODE	International Oceanographic Data and Information Exchange of IOC of UNESCO
IOCARIBE GOOS	IOC Sub-Commission for the Caribbean and Adjacent Regions
IOGOOS	Indian Ocean GOOS
LME	Large Marine Ecosystem
MaRCOSIO	Marine and Coastal Operations for Southern Africa and the Indian Ocean
MarCNoWA	Marine and Coastal Areas Management in North and West Africa
MOi	Mercator Ocean Institute
MSP	Marine Spatial Planning

NGO	Non-Governmental Organizations
NIOF	National Institute of Oceanogrpahy and Fisheries, Egypt
NIOMR	Nigeria Institute of Oceanography and Marine Research
NoDC	National Oceanographic Data Centres
Norad	Norwegian Agency for Development Cooperation
ODINAFRICA	Ocean Data and Information Network for Africa
OSF	Ocean to Climate Seamless Forecasting System
Pi-GOOS	Pacific Islands GOOS
SAEON	South African Environmental Observation Network
SAWS	South African Weather Services
SEAWARD	Science and Knowledge for a Resilient and Sustainable Ocean Economy in Africa
SST	Sea Surface Temperatures
SWOT	Strengths, Weaknesses, Opportunities and Threats
ToR	Terms of Reference
UFHB	University of Felix Houphouet-Boigny, Cote d'Ivoire
UG	University of Ghana
UNESCO	United Nations Educational, Scientific and Cultural Organization
WG	Working Group
WIOMSA	Western Indian Ocean Marine Science Association
WMO	World Meteorological Organization