



# THE IFMS NEWSLETTER

## AfMS Special Volume



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## MESSAGE FROM IFMS PRESIDENT

Dr. Harinder P. S. Ahluwalia/President of IFMS

This edition of the IFMS Newsletter has been designed to celebrate the Inauguration Ceremony of the newly created African Meteorological Society (**AfMS**). AfMS has been created to unite all African countries together for building the capacity to protect themselves from the disasters caused by Global Warming and Climate Change (**GW&CC**).

GW&CC has thrown a big challenge on mankind to tackle. Our response to that challenge is to create capacity in all countries to handle the disasters caused by GW&CC. National Meteorological Services (**NMS**), National Disaster Management Departments, WMO, and the World Bank (**WB**), which are all employee-based organizations, are doing their part as best as they can with limited resources and staff. The challenge in front of us is much bigger than all these organizations can handle. Although the problem has been caused by emissions from developed countries with a big population, widespread sufferings will befall disproportionately on the least developed countries (**LDCs**) and developing countries (**DCs**). We need an organized grass root movement in which professionals from all over the world, whether they are active or retired, African diaspora or philanthropic people from any other country, can participate in this capacity-building exercise.

Many professional groups have created their own National Meteorological Society (**NMSoc**) in their country to get professionals from the Public, Private and Academic sectors to collaborate. In order to create collaboration at the regional level, two regions -the RA6 (Europe) and RA3 (South America) - have created the European Meteorological Society (EMS) and the Latin American and Iberian Federation of Meteorological Societies (FLISMET), respectively. Looking at the utility of these Regional Meteorological Societies (**RMSs**), IFMS decided to assist African nations to create the African Meteorological Society (**AfMS**) which was their dream. We also plan to advise and, if required, help Asian countries to create the Asian Meteorological Society (AsMS).

Since only NMSocs can be members of RMSs, every country should have an NMSoc. With the existence of RMSs and IFMS for providing collaboration opportunities, every country, irrespective of its size, can have an NMSoc. There are 193 members of WMO out of which only approximately 73 have an NMSoc. Therefore, there are a number of NMSocs which need to be created. IFMS is assisting AfMS in creating NMSocs in Africa. It is also assisting countries in other continents to do the same.

Since these volunteer-based organizations can provide great assistance in capacity building in all countries, national governments must support them financially and morally.

A part of the funds from Climate finance which refers to local, national, or transnational financing—drawn from public, private and alternative sources of financing—**that seeks to support mitigation and adaptation actions that will address climate change should be used to support Meteorological Societies**. The immediate goal of these countries is how to protect themselves from disasters caused by other countries. This can be done only with capacity building, installing infrastructure, developing Early Warning Systems, etc. With potential membership from all three sectors (Public, Private and Academic), Meteorological Societies are capable of creating capacity with very small investment by the national governments and the international community.

In this edition of the IFMS Newsletter, we have endeavoured to explain the universe of Meteorological Societies and how they can create capacity in needy countries. Furthermore, how collaboration can help even affluent societies to gain greatly by sharing resources, has been discussed. We have explained what AfMS is all about and how it will create capacity in Africa by using the volunteer services of African experts and those from the African Diaspora and “Friends of Africa”. We greatly appreciate the assistance provided by the America Meteorological Society, Royal Met Society, etc., and the experts Prof. (Dr.) Sushil Dash who leads our Teacher Training Program, Dr. Robert Varley who leads our Professional Training Program and Prof. (Dr.) Charles Ichoku who leads the African Diaspora Group are expected to make a strong contribution to our endeavour. I would also like to thank Dr. Buruhani Nyenzi, Mr. Workneh Degefu, and Mr. Tefesse Gurmu for their untiring assistance in creating the AfMS.

## Message from the Secretary-General of WMO



**Prof. Petteri Taalas**

Today's globalized world presents challenges of a magnitude never seen before that have impacts on the weather, climate, and water sphere, and that have adverse implications for economic and social development worldwide.

Certainly, the solutions must involve the public sector represented by the National Meteorological and Hydrological Services (NMHSs). However, the participation of different stakeholders from other sectors is critical.

The World Meteorological Organization (WMO), as the authoritative voice of the United Nations system in weather, climate, water, and other environmental areas recognizes this need and is committed to building a community among the stakeholders who actively participate in the value chain for meteorological services.

The Geneva Declaration 2019, an outcome of the 18th World Meteorological Congress held in June 2019, not only does encourage effective collaboration between the public and private sectors, but also promotes the engagement of academic, civil society, and investment partners to improve the range, quality, and delivery of critical environmental information and services.

Thereby, WMO will always support inclusive initiatives that welcome the contribution and complementary roles of all stakeholders and express the importance of having quality weather, climate, water, and other environmental information and services for smart decision-making toward the transition to a sustainable future.

I want to thank the International Forum of Meteorological Societies (IFMS) for its assistance in the establishment of the African Meteorological Society (AfMS). I believe that just as WMO brings NMHSs together for better collaboration, IFMS does so by helping to create and unite other meteorological societies.

Furthermore, I would like to acknowledge and support the creation of the AfMS, which, as an organization composed of stakeholders from the professional and scientific societies in Africa, will reinforce the collaboration in the meteorology field to build capacity in Africa.

## Message From Former President of World Meteorological Organization

### Hydrometeorological Societies Making a Difference

#### Welcoming the New African Meteorological Society



**David Grimes**

Hardly a day does not go by without mention of significant weather or climate-related events impacting society. In many cases the damages and losses are significant, and developing societies are often harder hit, lacking the resilience in their economies and built infrastructures to withstand them. However, trends over the last 40 years have shown that loss of life has been less and less - due for the most part as a consequence of early warnings.

This has been no accident. One of the world's major scientific accomplishments over the last century has been weather prediction with forecast skills rivaling two weeks. Improved observational awareness of meteorological phenomena, combined with improved scientific methods and predictions offers incredible and pervasive benefits and opportunities for the protection of life and property, for the growth of national economies, and for environmental integrity and sustainability. These scientific contributions have been made possible by the public, academic and private sectors. The societal benefits from these works also accrue to these same sectors.

Enablers bring these contributions together. While national public institutions often have the responsibility for warning their citizens, this is really made possible by bringing capabilities offered by academic and private sector innovation, building up human resource skills and competencies, transferring relevant research into operational functions, and leveraging communications capacities to reach communities and individuals.

Meteorological societies are one of the few structures that organically bring these communities together; an important function for success. They offer forums for learning and education, sharing research advances and results, engaging with private and public sector contributors, working together on advancing solutions to challenging problems and collaborating on common goals. A meteorological society brings together the know-how, the resources, and the ambitions for the benefit of all civil society.

It is now time for the African Meteorological Society to play its part. We all extend a warm welcome to our newest community, for which the opportunity to engage, cooperate and collaborate has the potential to bring important benefits to all countries within the continent.





## Message From Board Chairman of African Meteorological Society (AfMS)

**Dr. Buruhani Nyenzi**

Since late 2021 effort of establishing an African Meteorological Society (AfMS) was initiated by the President of the International Forum of Meteorological Societies (IFMS) Dr. Harinder P.S. Ahluwalia, African members of IFMS Council (Dr. Buruhani S. Nyenzi, Mr. Workneh Degefu, and Mr. Tafesse Gurmu) and WMO Regional Office for Africa, other colleagues from existing African National Meteorological Societies and National Meteorological and Hydrological Services. The thinking of establishing the society was based on having something that can bring together African meteorologists in addressing issues related to meteorological and other related sciences for the benefit of the continent following existing examples from other parts of the globe such as Europe, South America, and others. These efforts bore some fruits in early 2022 when AfMS was formally established after being registered in Addis Ababa, Ethiopia ensuring that AfMS operates near the WMO RA1 Office which is located there.

Earlier on up to the late 90s there existed the African Meteorological Society which was based on the membership of individual scientists. Looking through the records and experience on what is going on in other parts of the world it was decided that membership to this new AfMS should be based on National Meteorological Societies (NMSocs) and other associate members. Therefore, the main pillars of the AfMS are the NMSocs and associated members which include NMHSs. The constitution stipulates clearly the structure of the society which includes the General Assembly, Board, and others. It also clearly elaborates on the general organization of society. So far there are about twelve members of the society. This is a very small number considering that there are about 52 countries in Africa. An effort is being made to urge countries to establish NMSocs, where they do not exist so that they can join AfMS.

So far AfMS has been recognized and supported by many friends of Africa from the UK, USA, Europe, Canada, India, and from other countries. Other meteorological societies have come up very strongly to support AfMS for example the American Meteorological Society has supported us in developing the AfMS website. The African Diaspora from different countries, especially those from the USA, have also come out very strongly to support AfMS activities and in ensuring that AfMS grows up sustainably. These are also working on ensuring that the African diaspora from other foreign countries joins in supporting this endeavour.

The AfMS board takes this opportunity to thank all those people and societies that have so far helped in supporting our course. The AfMS Board calls for resident African experts to come up strongly in supporting the AfMS aims and objectives. The growth of AfMS can't be realised by just depending on foreign support. It is the duty of the African resident scientists to serve society through volunteering to serve it in different established committees, and other organs of the society.

## Message by EMS President for the inauguration of the AfMS



**Bert Holtslag**

The European Meteorological Society (EMS) welcomes very much the African Meteorological Society (AfMS) with its foundation by the Meteorological Societies in Africa in 2021 and congratulates AfMS with its official inauguration on November 30, 2022. We applaud that cooperation is now established in Africa to enhance capacity building in the very important and related fields of Meteorology, Hydrology, and Climatology. This indeed should benefit accurate weather forecasting which is extremely important for improving the economy of African Nations and safeguarding them from weather-related disasters.

We are ready to help AfMS as much as possible to benefit from our experiences over the last 25-plus years with a history starting in 1996 (<https://www.emetsoc.org/about-ems/history/>). From the start, the mission of EMS is to facilitate, stimulate and outreach Meteorology and the related sciences as much as possible within Europe. This role becomes even more crucial in the near future in a warmer climate with severe weather. The EMS annual meetings focus on the role the meteorological and climatological communities are playing in society. Over the years the EMS has become firmly established as a key part of the European meteorological community and has benefited from the engagement of its Member Societies and Associate Members.

We hope that AFMs will develop in a similarly successful way as EMS with annual Meetings that bring together the public, private and academic sectors, with sessions that recognize the achievements in meteorology, technology, journalism, outreach, and communication; the support and the development of early career scientists; the exchange of experience and expertise between meteorologists working in the media and the communication between members and the sharing of experiences.

## Message From Administrator of The Korea Meteorological Administration

**Dr.Hee-Dong YOO**

On behalf of the Korea Meteorological Administration, I am pleased to convey my sincere congratulations on the inauguration of the African Meteorological Society.

It is truly timely to launch such an important organization to tackle the issues related to the extreme weather events caused by climate change through capacity building in the African region via training and education. Although I cannot attend the Inauguration Ceremony due to previously engaged duties, I will encourage the meteorological community of the Republic of Korea, including the Korea Meteorological Society to participate in the ceremony.

I wish AfMS a great start and success into the future.



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# A Case For Financing Protection Against Global Warming And Climate Change

Dr. Harinder Ahluwalia

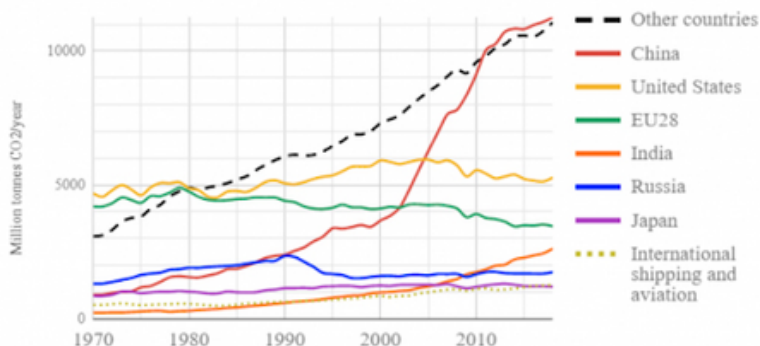
## 1. INTRODUCTION

Due to the industrialization of nations requiring the use of fossil fuels, the atmosphere has been polluted with Green House Gases (GHG) resulting in GW&CC. Since the year 1900, the earth's average temperature has increased by one degree which is causing widespread devastation due to adverse weather conditions. The atmosphere is warming up at an alarming rate and scientists are warning that if the increase in temperature goes beyond 1.5o, as per the following figure, the devastation will be widespread.

## 2. COUNTRIES MOST RESPONSIBLE FOR GHG EMISSIONS

The graph in the following diagram shows the countries, which are most responsible for emitting GHG and causing Global Warming and Climate Change (GW&CC).

World fossil carbon dioxide emission 1970-2018



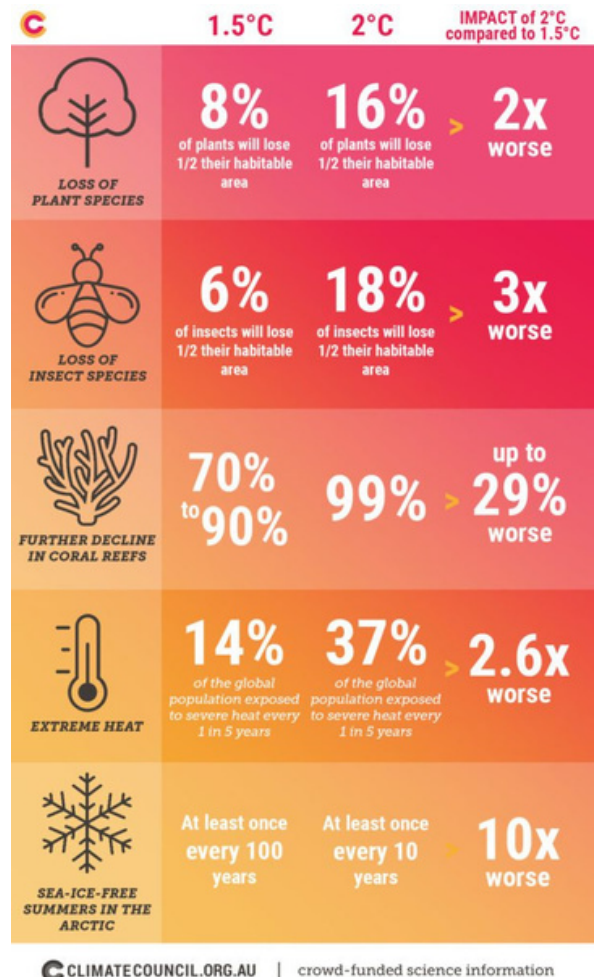
## 3. CLIMATE CHANGE FUND

The Climate Change Fund (CCF) was established in May 2008 to facilitate greater investments in developing member countries (DMCs) to effectively address the causes and consequences of climate change, by strengthening support for low-carbon and climate-resilient development in DMCs. Here are some interesting quotes from world leaders.



“Our collective goal must be to surpass the \$100-billion-dollar-a-year target in 2021 and to scale up international public finance in the period after,” U.N. Secretary-General Guterres said in a speech opening the COP26 summit.

Many leaders of developing nations, including from the Maldives and Kenya, told the event they would need more financial support to achieve new, stronger climate plans to cut emissions and protect their people from wilder weather and rising seas. Kenya's president said, “losses caused by the impacts of climate change in the East African nation from droughts and torrential rains to ecosystem destruction - could add up to as much as 3% of gross domestic product per year”.



#### 4. CONTRIBUTION OF AFRICA TO GLOBAL WARMING AND CLIMATE CHANGE (GW&CC)

It is believed that all of Africa produces between 3% to 5% of GHG Emissions. Therefore, the proposed assistance is to ensure that when these countries make progress, they do so on a sustainable basis. However, they are suffering today because of the effects of global warming and climate change caused by others. Therefore, our first duty is to protect them from these disasters. This can be done only by building capacity in countries where such capacity is lacking.

#### 5. AREAS OF CAPACITY BUILDING

In order to build capacity in Africa and other least developed and developing countries, the following areas need urgent attention:

1. Capacity building in terms of knowledge and competence in weather forecasting which requires the introduction of climate-related education at the following levels:
  - a. School, College, and University level – IFMS/AfMS are currently running a Pilot Project on this aspect in the 9 countries in the horn of Africa and East Africa,
  - b. Professional Training - IFMS/AfMS is also currently working on this aspect.

We have presented articles in this Newsletter on both these aspects.

1. Installing infrastructure (AWSs, DWRs, etc.) to measure weather parameters.
2. Building Institutional and Societal Capacity – in terms of actions to be taken in case of various kinds of emergencies.
3. Provision of Forecasting infrastructure for the local area. There are various global models run by bigger meteorological services the output from which is available openly.
4. Early Warning Systems to protect society at large.

#### 6. ROLE OF NMHS, WMO, and WBG

The National Meteorological and Hydrological Services (**NMHS**), the World Meteorological Organization (**WMO**), and the World Bank Group (**WBG**) have a very important role to play. An NMHS has its country as a focal point to provide all kinds of systems and services to do accurate weather forecasting to enhance its economy and to protect its population against weather and water-related hazards. WMO creates collaboration between the NMHS and prescribes standards. The World Bank lends money to the least developed and developing countries for the creation of infrastructure and knowledge-base. These are all employee-based organizations with limited resources. They themselves cannot meet all the needs for creating capacity around the world, hence the need for volunteer-based organizations.

#### 7. COST-EFFECTIVE WAYS FOR FUNDING PROTECTION FROM DISASTERS CAUSED BY GW&CC

As discussed in other sections of this Newsletter, the three levels of volunteer-based Meteorological Societies (NMSocs, RMS, and IFMS) can make a strong contribution to building capacity all around the world including in the Least Developed Countries (**LDCs**) and Developing Countries (**DCs**). Therefore, we would like to recommend the following most cost-effective way to implement the above-mentioned capacity needs.

The National Meteorological Societies in developed nations (AMS, RMetS, CMOS, AMOS, MSJ, etc.) and some developing nations (CMS, IMS, etc.) have done a great job in creating a knowledge base and collaboration between scientists. Society at large has gained a lot from this important part of the Global Weather Enterprise (**GWE**). They can do an even better job with additional financing and having an NMSoc in all countries.

Given the existence of Regional Meteorological Societies (**RMSs**) and the International Forum of Meteorological Societies (**IFMS**) and the benefits provided by them for their member societies, professionals from many DCs and LDCs would like to have an NMSoc in their country to become part of the fraternity of Meteorological Societies; but they find it hard to sustain it because even the small amount of funding required by them is not available. As volunteer-based organizations, they can assist in capacity building very strongly with very reasonable funding.

Manpower for NMSocs mostly comes from volunteers with a feeling for doing good for society at large. Therefore, every dollar spent by an NMSoc can produce a disproportionately higher level of benefit – especially in conjunction with their RMS and IFMS. Due to the lack of funding available to these NMSocs, a big opportunity to build capacity in these countries is lost. National Governments must assist their NMSoc financially for executing well-defined Projects planned to create capacity.

We believe that a fair part of the \$100 Billion Climate Fund must be spent for Capacity Building against GW&CC through IFMS. IFMS should be funded sufficiently to be able to conduct its own affairs and fund RMSs and NMSocs for well-defined projects approved by the high-level Funding Committee in IFMS. RMSs and NMSocs can define their projects for capacity building and submit them to IFMS. IFMS will evaluate the capacity-building value of the project and fund it accordingly. IFMS could also use some funds for conducting World Weather Open Science Conferences (WWOSC) in close collaboration with WMO and RMSs.

Thus, the magic of volunteer-based organizations will work at three levels (national, regional, and international) assisting NMHSs, WMO, and WBG in creating capacity all around the world in a systematic manner and collaborating with all active and retired professionals who are yearning to be of value to the mankind. We hope that this Proposal is supported by all International Aid Agencies of affluent nations to benefit all mankind.

## 8. CONCLUSIONS

Global Warming and Climate Change (GW&CC) has thrown a big challenge on mankind to tackle. Our response is to protect our society at large by creating a family of National Meteorological Societies (NMSocs), Regional Meteorological Societies (RMSs - on the continental level), and the International Forum of Meteorological (IFMS - on the entire world level) to work with NMHSs, WMO and WBG to create capacity in all nations. These Societies exist to cooperate with each other and create capacity around the world.

The least developed and developing countries which were on their own to create capacity can now depend on their RMS and IFMS to help their NMSoc in creating capacity through various programs (see the Value proposition of AfMS). If you do not have an NMSoc, you should have one. Depending upon the size of your country and professional community in the field of meteorology/hydrology.

Our proposal to fund IFMS, which in turn will fund RMSs and NMSocs on the basis of project merit, if accepted will assist NMHSs, WMO, and WBG very strongly in building capacity all around the world. Let's defeat GW&CC with full cooperation between the various components of the Global Weather Enterprise (GWE) consisting of Public, Private and Academic sectors and the power of volunteer-based organizations.

# Building Capacity around the world through Meteorological Societies

Dr. Harinder Ahluwalia

## 1. INTRODUCTION

In order to improve economic growth and safeguard against the disasters caused by Global Warming, it is necessary to have accurate weather forecasting. ***That requires quality infrastructure and a strong knowledge base in your country.*** In addition, it is important to have Early Warning Systems (EWS) and build Institutional and Societal Capacity.



National Meteorological and Hydrological Services (**NMHS**) and National Governments are primarily responsible for fulfilling the above requirements. In addition, World Meteorological Organization (**WMO**) coordinates the efforts of NMHSs, prescribes standards, and helps in creating capacity in developing countries. The World Bank finances infrastructure and capacity-building projects in the least developed countries (**LDCs**) and developing countries (**DCs**).



However, due to limitations on funding and available manpower, they could use the assistance of additional resources. Who better than National Meteorological Societies (NMSocs) and Regional Meteorological Societies (**RMSs**) to play that role to assist the NMHSs and the national Governments provided that both of them support them strongly? In this article, we describe the role of the three levels of Meteorological Societies: NMSocs, RMSs, and IFMS and how they endeavor to create capacity around the world to handle the adverse effects of Global Warming and Climate Change (GW&CC) and to assist in improving the economies with quality weather forecasting.

The purpose of this article is to illustrate the value of the three types of organizations (NMSocs, RMSs, and IFMS) and their role in the Global Weather Enterprise (GWE).

## 2. National Meteorological Societies (NMSocs)

From the article on AfMS Value Proposition in this Newsletter which also applies to the NMSocs, you can appreciate what an important role NMSocs play in building capacity in their countries. NMSocs in advanced countries have proven to be great builders of capacity in their countries.

NMSocs not only share knowledge through publications, webinars, and Education and Training (**E&T**) courses but also provide a forum for networking, conferences, discussions, and creating S&T Collaborations. ***They can use the services of active professionals and retired professionals. Their selling point to professionals is “do good to your society at large” by doing philanthropic work.***

These societies provide a Forum for Professionals from the Public, Academic, and Private Sectors to network and learn from each other's experiences to increase the local Capacity.

No matter what the size of your country or your professional community, you can have an NMSoc because of the following reasons:

1. Activities of International (IFMS) and Regional and/or Subregional Society (e.g., EMS, AfMS, FLISMET, SAMA, etc.) and other friendly NMSocs including those from developed countries.
2. Availability of new means of information communication – Zoom, WebEx, Google Meet, etc. which makes participation in events of other societies much easier.
3. Availability of a variety of activities from various organizations including Webinars, conferences, online Training Programs, etc.
4. Implementation of New Ideas such as PPA (Public, Private and Academic) Collaboration, Global Campus Initiative (GCI), IFMS Training Programs, S&T Collaboration, etc.
5. Realization on the part of NMHSs about the utility of NMSocs. Some already appreciate that and others are being convinced by IFMS and RMSs.

Some interesting examples of even countries with the small population having an NMSoc are: Andorra which has a population of approximately 77,000 and has an NMSoc with 15 members and Iceland with a population of approximately 350,000 has an NMSoc with 25 members; both are taking advantage of networking & local events and in addition – a variety of activities of the European Met Society (**EMS**). The additional activities of IFMS and other strong NMSocs are also available to them. This aspect is illustrated in the first figure below. Those countries which do not have an NMSoc yet are strongly encouraged to create one for the betterment of their countries. The list of activities that society can do with ease can be tailored according to the size of the professional community in your country.





### 3. Regional Meteorological Societies

As shown by the European Meteorological Societies (**EMS**: [www.emetsoc.org](http://www.emetsoc.org)), the power of collaboration at the continental level can be enhanced by creating a Regional Meteorological Society.

The EMS is the association of [Meteorological Societies](#) in Europe. The network consists of 39 Member Societies and 28 [Associate Members](#). The EMS is a non-profit-making organization. The [EMS Annual Meetings](#) attract some 600 people each year from all sectors of the field. With a number of [Awards](#) outstanding contributions to science, its applications, and communication are honored; young scientists are supported through [conference grants](#).

In 1986 the Argentinian Centre of Meteorologists ([CAM](#)), the Sociedade Brasileira de Meteorologia ([SBMET](#)), and the Mexican Meteorological Organization ([OMMAC](#)) founded the Latin American Federation of Meteorological Societies. Spain joined in 1992, and since then it became known as the Federation of Latin American and Iberian Meteorological Societies ([FLISMET](#): Federación Latino-Americana e Ibérica de Sociedades de Meteorología).

In 2021, IFMS assisted the NMSocs from African nations to create the African Meteorological Society (**AfMS**) with the aim of creating capacity in Africa through collaboration between African NMSocs. Because Africa is in dire need of creating capacity – both knowledge and infrastructure - and due to the scarcity of available financial and expert manpower resources, the NMHSs could use assistance from other sources than WMO which is already assisting them. The AfMS is meant to create capacity in all of Africa with the help of NMSocs of various countries and through collaboration with IFMS and other RMSs, e.g., EMS. In addition, the African Diaspora and “Friends of Africa” are also strongly participating in this effort. AfMS provides an organization that all those interested in developing capacity in Africa can use.

We also would like to see another RMS be created in Asia called the Asian Meteorological Society (AsMS) with members from WMO-RA2 as well as ASEAN countries (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam). In addition, an RMS could also be created in the South Pacific Region which will be considered at an appropriate time after AsMS has been created.

Currently, we have some collaboration between Japan, China, and South Korea. In addition, there is the South Asian Meteorological Association (**SAMA**) which is also a non-profit scientific association of nine south Asian countries including Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan, and Sri Lanka engaged in promoting regional cooperation in the field of meteorology and allied sciences. In order to ensure that in addition to India, other advanced and advancing countries like Japan, South Korea, and China also can contribute to the development of Asian LDCs and DCs. This is our goal for 2023.

In addition to the organizations described above, we also have the Caribbean Meteorological Organization (**CMO**) which is a specialized agency of the Caribbean Community that coordinates the joint scientific and technical activities in weather, climate, and water-related sciences in sixteen (16) English-speaking Caribbean countries. It originated from the British Caribbean Meteorological Service, which was founded in 1951. Federalization of the Anglo-Caribbean Countries produced the West Indies Meteorological Service (**WIMS**), which was founded in 1958. The supreme body of the Organization, the Caribbean Meteorological Council, which was established in 1962, meets once per year to define policy for the Organization.

In 1963, the Caribbean Meteorological Service (**CMS**) replaced the WIMS. The CMS established the Caribbean Meteorological Institute (**CMI**) in 1967 as a part of a project in cooperation with the United Nations Development Programme.

As weather and climate know no national boundaries, cooperation at a regional and international scale is essential for the development of meteorology and operational hydrology as well as to reap the benefits from their applications. CMO provides the framework for such regional and international cooperation.

We also have to explore whether FLISMET can also include Spanish-speaking countries of Central America.

#### 4. International Forum of Meteorological Societies (IFMS)

The International Forum of Meteorological Societies (**IFMS**) was created in 2010 to foster and encourage communication and exchange of knowledge, ideas, and resources among the world's meteorological societies. The following figure shows the role of the four important parts of the Global Weather Enterprise dealing with meteorology.



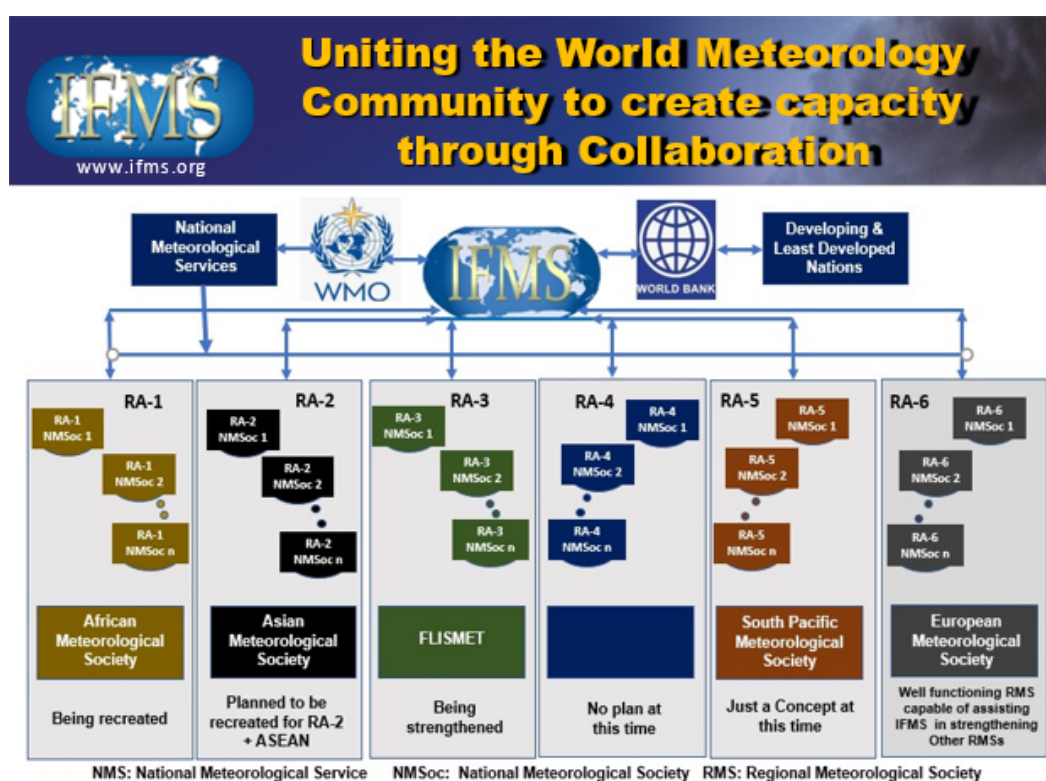
IFMS is organized exclusively for scientific, educational and charitable purposes, including, but not limited to:

- 1) Foster, promote, and encourage cooperation, communication, collaboration, and exchange of knowledge, ideas, and resources among the Meteorological Societies of the world.
- 2) Advance the science and profession of meteorology and related sciences worldwide and assist the development of applications of these subjects for the public welfare and benefit of the peoples of the world.
- 3) Assist in developing and promoting capacity-building efforts that produce effective and sustainable service capabilities in developing countries.
- 4) Assist all meteorological societies in developing best practices.
- 5) Assist developing meteorological societies to strengthen themselves.
- 6) Help start new meteorological societies in countries where none exists.

- 7) Facilitate cooperation between meteorological societies worldwide.
- 8) Facilitate the sharing of relevant accreditation information, procedures, guidelines and standards and, to do any and all things permitted for a not-for-profit corporation organized under prevailing laws in the jurisdiction where IFMS is incorporated.
- 9) Assist National Meteorological Societies to promote collaboration among the Private/Public/University/NGO sector social civil organizations
- 10) Develop international bridges to encourage collaboration among public, private, and academic sectors as well as users. Assist Private Sector companies to facilitate international outreach, especially to build infrastructure in developing countries.
- 11) Assist WMO in organizing Open Science Conferences at least every 3 years.

## 5. Relationship between various parts of the Global Weather Enterprise

The relationship between various parts of the Global Weather Enterprise is shown in the following figure.



There is an MOU of cooperation between IFMS (which unites NMSocs and RMSs) and WMO (which unites NMHSs). In addition, there is relationship between the NMHS and NMSoc of each country.

Since World Bank Group (WBG) is assisting in financing of infrastructure and capacity building, IFMS could help them in this endeavour. We are looking forward to an MOU between the WBG and IFMS for this cooperation.

In each of the grey shaded areas we show the NMSocs in each of the 6 Regions of IFMS (which match those of WMO). Under the NMSocs we show the RMS for that region which unites the NMSocs in that region. This completes the complete depiction of the Global Weather Enterprise and collaborations between its various constituents.

## History of African Meteorological Society (AfMS)

Mr. Workneh Degefu and Dr. Harinder Ahluwalia



The original African Meteorological Society (AfMS) was established in 1987, in Bujumbura, Burundi, and was registered in Burundi. Founding Members were some of the Directors of NMHSs in Africa. The office of AfMS was collocated with WMO's Regional Office for Africa in Bujumbura, Burundi. Membership was based on individuals rather than institutions like National Meteorological Societies (NMSocs) hence it was difficult to manage from such a distance and also collect dues. In addition, communication was difficult because of the non-existence of modern facilities (Zoom, WebEx, Google Meet, etc.) for conducting meetings and activities (e.g., Webinars) remotely.

Membership recruitment was also difficult because, at that time, there were few functioning National Societies that could help in recruiting members. Transfer of Membership fees (currency restrictions) also caused difficulties. Office bearers were neither full-time nor fully committed. In addition, the lack of finances for office needs and activities made it impossible to operate and AfMS became non-functional.

The idea of re-establishing the African Meteorological Society (**AfMS**) began in the last quarter of 2020 when the President of IFMS ([www.ifms.org](http://www.ifms.org)) Dr. Harinder Ahluwalia proposed to the two African Members of the IFMS Council - Dr. Buruhani Nyenzi (Vice-President Administration of IFMS) and Mr. Workneh Degefu (Region 1 Representative) that in order to develop capacity in Africa, we need to create AfMS. Both of them supported the idea very strongly and so did the IFMS Council.

A meeting of African professionals including PRs of African countries in WMO was organized on December 10, 2020, to gauge the interest of a large number of attendees. It was the dream of various African professionals to have an AfMS, the meeting strongly endorsed the idea. It also decided to initiate the process of preparing the constitution and planning the other requirements.

The Constitution was prepared and distributed for comments, the name and the logo were selected and all this material was reviewed in a meeting held on 10 February 2021. The constitution was approved and the Society was formally established with the endorsement of five potential founding members: (Ethiopia, Kenya, Sudan, Tanzania, and Uganda). It was decided to have the headquarters of AfMS in Addis Ababa because WMO Region 1 Office was there.

Due to administrative conditions imposed by the Ethiopian Registration Authority and the high fee to be paid by each Founding Member, only Ethiopia and Tanzania were kept as Founding Members with other NMSoc joining after the Registration of AfMS. The registration process was completed on March 1, 2022, after which other members joined AfMS.

Currently, the NMSocs of the following countries have become members of AfMS: Cameroon, Ethiopia, Kenya, Madagascar, Nigeria, Sudan, Tanzania, and Uganda. In addition, four NMHSs have become associate Members: Algeria, Comoros, Djibouti, and Madagascar. We urge the remaining existing NMSocs in Africa to become members and NMHSs to become Associate Members. The following link provides the form to be filled out to become a member/associate member of AfMS and IFMS:

<https://forms.gle/7199YAFmZdcWVTzu6>

IFMS believes that because of the existence of IFMS and Regional Meteorological Societies like AfMS, EMS, etc., every country, no matter how big or small, can have an NMSoc.

If your country does not have an NMSoc and you are interested in starting one, AfMS/IFMS will help you. This website has material under the Resources Tab, the documents related to creating your NMSoc. In order to seek the help of AfMS/IFMS, please make your request using the following link:

<https://forms.gle/trsTPVNqKvKwRW7T9>

## VALUE PROPOSITION OF AfMS

Building Capacity to withstand the effects of GW&CC



Unified & Collaborative Approach to Capacity Building in Africa

The objective of establishing AfMS is to unite the NMSocs of Africa to create capacity in Africa through the following activities:

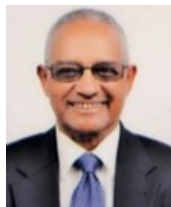
1. **Organizing scientific Meetings and Lecture series;**
2. **Supporting scientific publications and research for the public welfare;**
3. **Publishing its own Scientific Journal, when feasible; this will generate pride of publishing in their own Journal of high quality;**
4. **When circumstances allow, holding Africa-wide Conference in one of the member countries or through on-line means or a combination of both to maximize participation;**
5. **Looking into the feasibility of Certification of professionals. If found important and feasible, it will be implemented; it will ensure high standard of professionals.**
6. **Assisting in Educational Programs by holding Webinars and online Training Programs and also, if feasible, by developing its own training programs specific to Africa's climatic conditions. This will be to supplement the existing Programs by various organizations and coordinate all of them;**
7. **Cooperating with the National Meteorological Services of Africa and with IFMS and other Regional Meteorological Societies (e.g., EMS and FLISMET) for the benefit of strengthening Global Weather Enterprise (GWE);**
8. **Instituting Recognition and Awards Program for Professionals both young and matured to encourage S&T development as well as recognizing the assistance of NMSocs to the AfMS development;**
9. **Promoting cooperation between Public, Private and Academic Sectors; and**
10. **Strengthening existing Meteorological Societies and creating new ones in those countries where no such society exists.**



## AfMS BOARD MEMBERS



Dr. Buruhani Nyenzi  
Chair



Mr. Workneh Degefu  
Vice Chair



Dr. Godwin Ayesiga  
General Secretary



Ms Hidaya Senga  
Treasurer



Mr. Kidanu Woldemedhin  
Member At large



Vacant  
Rep Northern Region



Dr. Hassan Addoma  
Rep Eastern Region



Prof. Debo Adeyewa  
Rep West Region



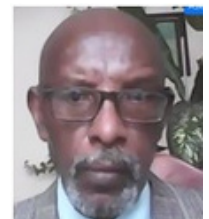
MOLOU Emmanuel  
Rep Central Region



Vacant  
Rep. Southern Region



Dr. Richard Damoah  
Rep. Diaspora



Tafesse Gurmu  
Executive Director

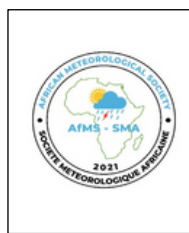
## AfMS COMMITTEES CHAIRS



Rebecca Manzou  
C1: Financing



Stephen Magezi  
C2: Creating Societies



Vacant  
C3: Recruiting Volunteers



Prof. Debo Adeyewa  
C4: Education/Training



Freedom Mukanga  
C5: Communications



MOLOU Emmanuel  
C6 : S&T Collaboration



Dr. Bob Ogwang  
C7: Organizing Conferences



Prof. G.C. Ufoegbune  
C8: Publication Committee



Prof. Jimmy Adegoke  
C9: Awards



Prof. Charles Ichoku  
C10: Diaspora & FOA



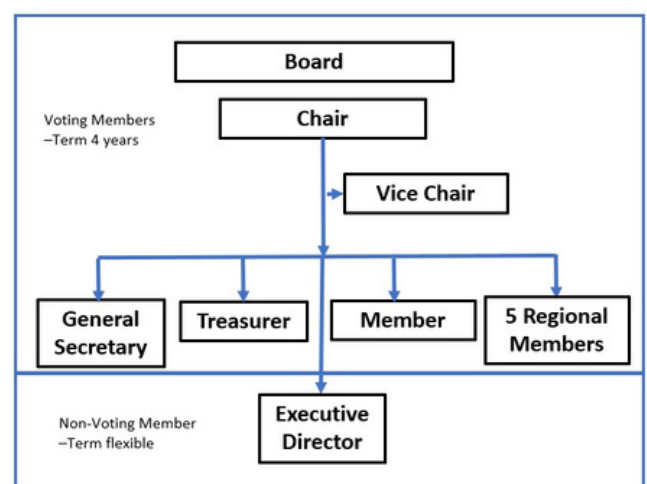
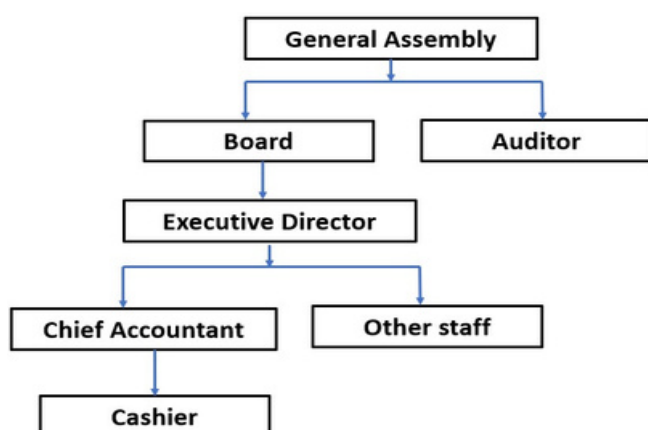
## COMMITTEES TO IMPLEMENT VALUE PROPOSITION OF AfMS

### AfMS creating capacity in Africa through its Committees

<b>Committee #1:</b>	<b>Financing Committee</b>
<b>Committee #2:</b>	<b>Committee to Create NMSocs and liaison with existing NMSocs and RMSs and IFMS.</b>
<b>Committee #3:</b>	<b>Committee for attracting Volunteers and assigning them to other Committees.</b>
<b>Committee #4:</b>	<b>Committee for Education and Training and conducting Webinars.</b>
<b>Committee #5:</b>	<b>Communications Committee – takes care of Website, Social-Media, Newsletter, etc.</b>
<b>Committee #6:</b>	<b>Committee for S&amp;T Collaboration.</b>
<b>Committee #7:</b>	<b>Committee to organize Conference</b>
<b>Committee #8:</b>	<b>Publication Committee.</b>
<b>Committee #9:</b>	<b>Awards Committee.</b>
<b>Committee #10:</b>	<b>African Diaspora and Friends of Africa</b>

## ORGANIZATIONAL STRUCTURE OF AFMS

### 1 AfMS Overall Structure



General Assembly consists of all Member societies – full members and associate members with ONLY full members having voting rights. Auditor reports to the General Assembly.

### 2 Board Members as per AfMS Constitution

As per the Constitution, there are 10 Board Members which are as follows:

(1) Chair (2) Vice Chair, (3) Secretary, and (4) Treasurer (5) Member at large (5) Five Regional Members.

### 3 Current Assignments Based on the above

All these positions in the above section, except Executive Director, are elected positions. However, in order to formulate the organization and kick-start it, we have appointed an interim Board which will be in effect till we elect the first Board in November/June 2023 for which the procedure will be defined and agreed upon in a General Assembly Meeting.

In the Interim Board, the following are the current assignments:

**Chair of the Board:** Dr. Buruhani Nyenzi,

**Vice Chair of the Board:** Mr. Workneh Degefu,

**General Secretary:** Dr. Godwin Ayesiga,

**Treasurer:** Ms. Hidaya Senga.

**Member at Large:** Mr. Kidanu Woldemedhin,

**Northern Region Rep:** Vacant - Eligible NMSoc Egyptian Met Society not a member of AfMS yet

**Eastern Region Rep:** Dr. Hassan Mohamed Hassan Addoma, from the Sudanese Met Society

**Western Region Rep:** Prof. Debo Adeyewa from the Nigerian Meteorological Society

**Central Region Rep:** Molou Emmanuel from Cameroon Meteorological Society

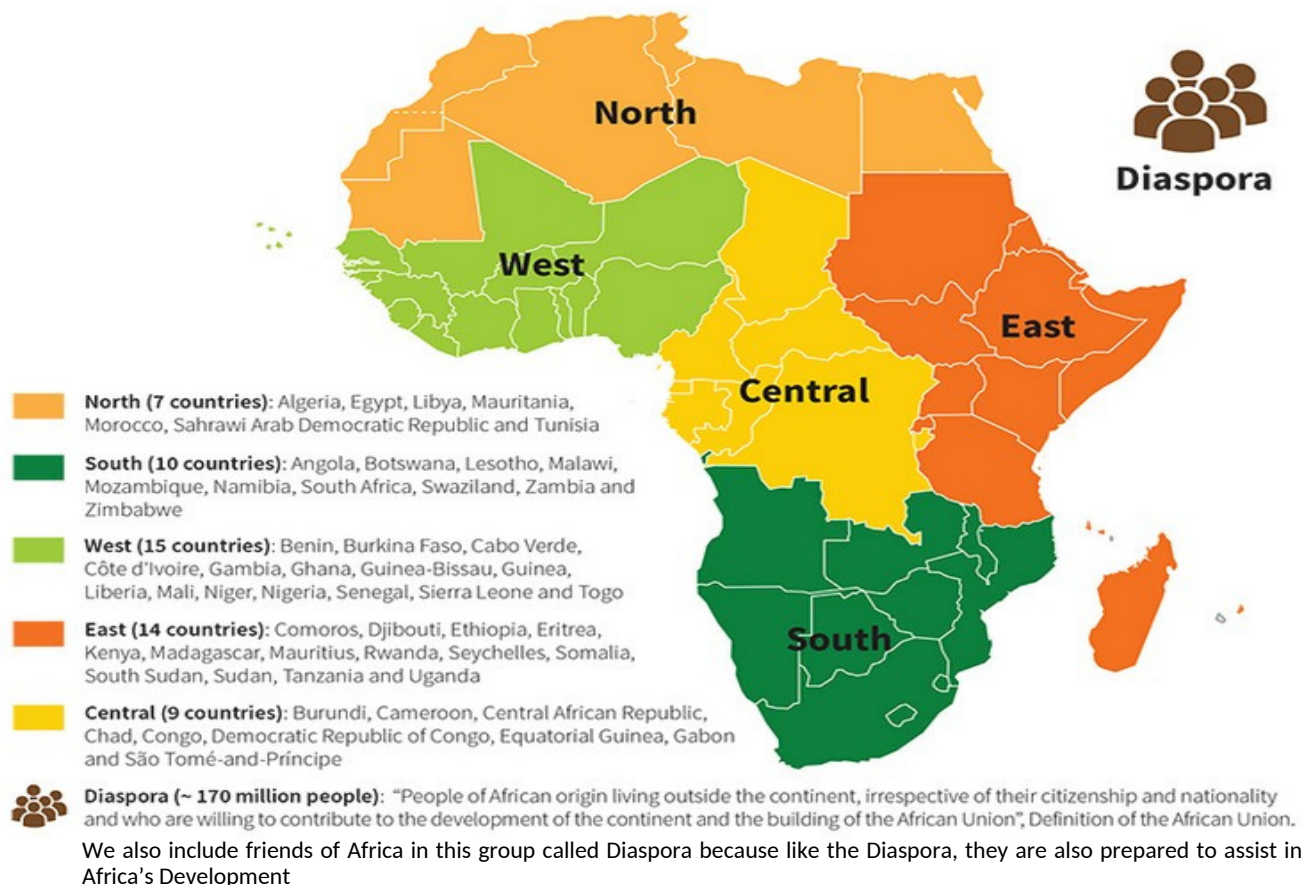
**Southern Region Rep:** Vacant - Eligible NMSoc from South African SASAS, not a member of AfMS yet

**Diaspora Region Rep:** Currently, Richard Damoah

**Executive Director:** Mr. Tafesse Gurmu

### 4 AfMS – Regional Board Members

#### THE SIX REGIONS OF THE AFRICAN UNION



# Education and Training Program of IFMS for Africa

Dr. Harinder Ahluwalia

“Education is the most powerful weapon which you can use to change the world”

...Nelson Mandela

Education is simply the soul of a society as it passes from one generation to another.

Education is a commitment to excellence in Teaching and Learning.

## 1. INTRODUCTION

This article describes IFMS' plan for building capacity in Africa through the recently created African Meteorological Society (**AfMS**) for which the value Proposition is available on its website. As a part of our capacity-building efforts, we are currently working on two important aspects:

1. Education and Training (**E&T**), and
2. Science and Technology (**S&T**) Collaboration.

Under E&T we are working on two important Programs which are:

Program 1: Teacher/Student Training Program

Program 2: Review and potential Upgrade of available Educational Programs.

Under S&T Collaboration we provide means of requesting S&T Collaboration with high-quality Expert Volunteers. This program has cooperation with the AMS International Academic Volunteer Program.

## 2. Background

Under its Education and Training (**E&T**) Program, IFMS had created a committee led by Prof. Sushil Dash, the Chair of IFMS' E&T Committee which had members from India, Nepal, the UK, etc. We decided to develop two types of training, one for Teachers/Students which is the best way of promoting meteorology at the grassroots, and another one for professionals in the field of meteorology. We created a list of various online sites for training.



After we created the African Meteorological Society (**AfMS**) and registered it in Addis Ababa (Ethiopia) in 2022, Dr. Robert Varley (Retd. CEO of the UK Met Office) who had been assisting Africa in various ways was impressed by this event and offered to help us in our Professional Training Program. We then created two teams, one led by Prof. Dash for Teacher/Student Training and the other led by Dr. Varley for developing Professional Training.

After we created the African Meteorological Society (**AfMS**) and registered it in Addis Ababa (Ethiopia) in 2022, Dr. Robert Varley (Retd. CEO of the UK Met Office) who had been assisting Africa in various ways was impressed by this event and offered to help us in our Professional Training Program. We then created two teams, one led by Prof. Dash for Teacher/Student Training and the other led by Dr. Varley for developing Professional Training.

The team members of our previous E&T Committee had collected a list of a number of sites which was passed on to Dr. Varley's group which added its own collection to the list and conducted this very important project with a very strong dedicated team. Although currently both these E&T Programs are targeted towards Africa, the resulting information will be applicable to the whole world.

## 3. E&T EFFORT OF IFMS/AfMS

Africa needs assistance in building capacity to protect itself against the adverse effects of Global Warming and Climate Change (GW&CC). This can be best achieved by two types discussed in the background.

Since training youngsters is the most effective way of building knowledge at the grassroots level, we are working on Teacher/Student Training Program 1 at all levels: Universities, Colleges, and Schools.

Program 2 is for training

### 3.1 Program 1: Teacher Training Course

We are starting a Pilot Project in East Africa and the Horn of Africa involving the following 9 countries: Kenya, Tanzania, Uganda; Somalia, Djibouti, Eritrea, Ethiopia, Sudan, and South Sudan. This Initiative **is led by Dr. Sushil Dash**: Chair of the IFMS Committee on Education and Training (E&T).

#### 3.1.1 Planned Steps

The following steps are being executed for the Pilot Project:

1. Formation of an E&T Committee for the above Countries with at least one, preferably many more, members from each country to execute the following steps.
2. Couple of interactive meetings to finalize the most important climate theme common to these countries such as water availability, disaster handling, etc.
3. Identification of schools/colleges to be part of this program for establishing weather observatories for educational purposes, conducting seminars, etc.
4. Identification of teachers from each of these institutions suitable for undergoing training; mostly with science, mathematics, and geographic backgrounds.
5. Preparation of documents for teachers' training.
6. Establishing small observatories.
7. Monitoring of weather observations with the help of students.
8. Involvement of Students in executing small scientific projects using the collected data.
9. Periodic workshops to evaluate the progress and make course corrections.

We have had a couple of meetings and this project is on its way.

#### 3.1.2 How the courses will be given?

The volunteer teachers will give these courses and also some of us like Dr. Dash will be involved. We will use Zoom or equivalent to give these courses.

#### 3.1.3 How the courses will be evaluated?

After one year of implementation, we will prepare a questionnaire and conduct a survey to evaluate the result, etc.

### 3.2 Program 2: Learning Portal for Africa

The second Program, **led by Robert Varley (Retd. CEO of the UK Met Office)**, supports weather and climate learning across the African nations.

He collected a team of meteorologists and trainers who together bring a wealth of experience in scientific research, operational meteorology, professional training, and capacity development in Africa. The team comprised:

1. Liz Bentley, Chief Executive, Royal Meteorological Society
2. Liz Carlton, former trainer, Met Office College
3. Brian Golding, Met Office Research Fellow
4. Phil Merrett, former trainer, Met Office College
5. Bob Riddaway, former Principal, Met Office College
6. Robert Varley, Vice President, Royal Meteorological Society
7. John Ward, former trainer, Met Office College

Mr. Varley's team collated, reviewed and grouped over 70 learning resources for different audiences. The learning portal offers a suite of materials and learning resources and provides a clear, single point of reference for people across Africa to access recommended courses and resources that have been subject to expert scrutiny. Altogether, there are seven lists of learning resources, each one developed with a specific audience in mind e.g. school children and teachers. In every list, there is some detail about each resource, such as who created it. There is also a brief description of what it contains, the languages it is available in, a website link, and the connectivity requirements for accessing the resource. Each list can be used online or downloaded from the following website <https://ifms.org/index.cfm/ifms/afms-learning-portal/>.

## 4. S&T EFFORT OF IFMS/AfMS

### 4.1 IFMS S&T COLLABORATION

Under this Program we are providing opportunities for collaboration between the National Meteorology/Hydrology Societies (NMSocs) on joint activities, where appropriate, to advance the science and profession of meteorology. In addition to collaboration between Societies, this collaboration can also be between professionals from different societies arranged through IFMS.

In terms of collaboration, IFMS has provided the Collaboration Tab on its website for interested National and Regional Societies and individuals to request collaboration through the Website link or by filling the form and sending it to: [ifms.collaboration@gmail.com](mailto:ifms.collaboration@gmail.com)

Depending upon the type of request, we will announce it on our Website and try to find the right collaborator (Volunteer).

We are also partnering with AMS on their Global Partners, the AMS International Academic Volunteer Program which is described in the next section. This program will be one of the sources of locating the right collaborator (Volunteer) for the International Scholars.

### 4.2 Global Partners, the AMS International Academic Volunteer Program

Global Partners - the AMS International Academic Volunteer - Program, enables AMS members to volunteer their expertise and experience to professionals in academic and nonprofit NGO organizations worldwide and to promote equity, goodwill, and service to the extended atmospheric science community for the benefit of society internationally.

It seeks to connect AMS members who are interested in providing specialized expertise and services to international professionals in academia and nonprofit, non-governmental organizations (NGOs). Services proffered to these international scholars/institutions ("International Scholars") may include but are not limited to assistance in the course and curriculum development, research planning and collaboration, public engagement, mentoring, and other not-for-profit activities. Such services will typically be provided on a pro bono basis except for travel, per diem, communication, and other support costs, which could be provided by the International Scholars, their institutions, and/or other non-AMS parties. The role of the AMS is limited to functioning as an exchange mechanism that facilitates the matching of those International Scholars seeking relevant services with those AMS member-volunteers desiring to provide them.

## 5. CONCLUSIONS

The opportunities provided by both E&T as well as S&T Programs of IFMS/AfMS are invaluable. They help both volunteers and beneficiaries of the program. Volunteers get the feeling of being a part of the Capacity Building paradigm and the beneficiaries get the full benefit of these Programs.

The success of these programs is dependent upon the participation of both Volunteers and Beneficiaries. We urge Professionals from all nations whether "local", "diaspora" or "friends of Africa" and other Least Developed and Developing countries, to participate and create capacity in Africa and the rest of the world. Finally, we also urge all National Meteorological Services, WMO, and World Bank to support our efforts as strongly as possible because after all, we are assisting them in their effort to create capacity around the world!

## 6. ACKNOWLEDGEMENT

We profusely thank Prof. Sushil Das, Dr. Robert Varley, and Dr. Walter Dabberdt for their generosity in leading these programs. We also sincerely thank all the volunteers who have agreed to assist us in making these programs a great success.

## Pilot Project on E&T in the Horn of Africa and East Africa

**Dr. Sushil Kumar Dash**

Chair, IFMS Committee on Webinars & Training; Visiting Scientist, DST CoE on Climate Modelling; President, Foundation on Education and Research in Climate Change; Past President, Indian Meteorological Society; Formerly Professor & Head, CAS, IIT Delhi.

### 1. Introduction



Capacity development based on existing knowledge and skills in Weather and Climate is one of the objectives of the International Forum of Meteorological Societies (IFMS). In order to undertake various types of Educational and Training (E&T) programmes in climate science, IFMS has formed one special E&T Committee consisting of some Council Members and Volunteers in addition to the IFMS regular Committee on Webinars and Training. In the past, IFMS had undertaken a survey of the current E&T activities of its member National Meteorological Societies (NMSocs) and also some non-member NMSocs. A series of Webinars were also arranged with

key speakers such as COMET Director Dr. Elizabeth Page, WMO Global Campus Initiative (GCI) expert Dr. Patrick Parrish, AMS Executive Director Dr. Keith L. Seitter, RMetS CEO Prof. Elizabeth Bentley, IFMS President Dr. Harinder Ahluwalia and Prof. Sushil Kumar Dash, Chair, IFMS Committee on Webinars & Training.

The question arises as to why IFMS is interested in the furtherance of E&T programmes in Weather and Climate science. There are several important reasons for such an effort by IFMS. First of all, IFMS consists of several Met Societies as its members which are very active and have close collaborations with National Meteorological Services (NMHSs), Educational institutions, Stakeholders, Associations and NGOs involved with the people at large. Members of Met Societies include not only several existing employees of NMHSs but also senior members who have long experience in the field and have the potential to train others. Thus, Met Societies can undertake the job of training the Trainers which will eventually lead to a sort of Chain Reaction. This will have multiplying effects. Secondly, IFMS can contribute significantly to the centrality of COMET and WMO-GCI i.e., Collaboration and IFMS will certainly widen the scope of WMO-GCI by encompassing Outreach Programmes based on the Citizens Science concept. Thirdly, IFMS can eventually contribute to the quality of training by modifying the existing course materials specific to the climate issues of different regions. It may be noted that focus will be given to the regional languages and gender issues at the local level.

Weather and Climate Science are interdisciplinary in nature and include almost all important branches of science such as Physics, Mathematics, Chemistry, Bi-sciences, Geosciences, Computer science and engineering etc. In addition, social science is very important since climate changes, extreme weather events etc. affect the socioeconomic conditions of the people. Climate changes have far more consequences in the fields of agriculture, human health, transport, tourism etc. Hence when one thinks of E&T in Weather and Climate, it is not that easy to identify a few themes. Nevertheless, one can be very specific to start with and plan for a handful of important themes such as,

(i) Teachers & Students Training, (ii) Public Awareness of Weather & Climate Disasters, (iii) Exposure to Numerical Weather Prediction, (iv) Satellite Data Collection Instruments, (v) Satellite Data Use and (vi) Processing and Display System.

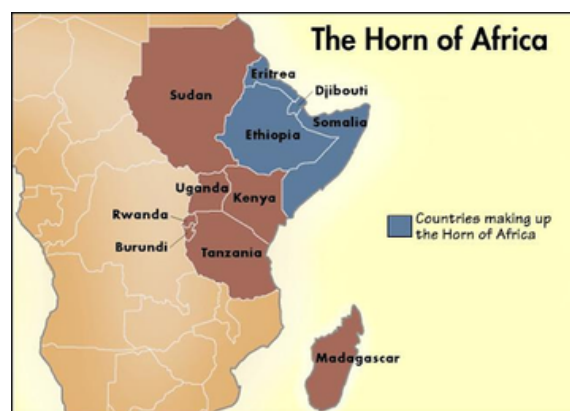


E&T in Meteorology is not new. Several educational institutions, NMHSs, R&D institutions, Met Societies and similar organisations are on the job for years. Different types of course materials are available either on free platforms or on a payment basis. Under the present circumstances, investing time (also funds) on the use of scientific knowledge for the Public Good is paramount. Therefore, to start with, IFMS needs to be selective in its approach. Based on the current survey conducted among IFMS member societies, it is inferred that several societies are already engaged in Teachers & Students Training and Awareness Programmes on Climate Change. These societies have clearly expressed their views on IFMS support to extend their existing programmes. Hence, the first two themes, (i) Teachers & Students Training, (ii) Public Awareness of Weather & Climate Disasters, are a priority for IFMS. It may be noted here that emphasis will be given to regional climate extremes and disaster-related awareness.

## 2. Focus on the Eastern African Countries

Eastern African countries comprise two traditionally recognized regions: East Africa, made up of Kenya, Tanzania, and Uganda; and the Horn of Africa made up of Somalia, Djibouti, Eritrea, Ethiopia, Sudan and South Sudan (Map 1). Thus, we are planning to launch this pilot programme in the above-mentioned nine African countries. The purpose of selecting these countries is the common climatic issue of droughts and water scarcity faced by these Eastern African countries. When one relates the E&T programme based on a common climate event close to the people, it becomes more effective. The reason is, the day-to-day experience instils a thinking process in the human mind. It is difficult to comprehend any event which happens in a faraway place.

After the formation of AfMS, several virtual meetings and webinars were held where the planned proposal of IFMS on a pilot project on E&T in Eastern African Countries was presented and discussed. Subsequently, volunteers from the above-mentioned nine countries were identified and a committee was formed. This committee met on 17 September 2022 and details of the proposal were presented and comments/suggestions were discussed. In that meeting, we identified Chairmen from 4 countries who will coordinate the activities of the group within his own country.



**Map 1: Nine Eastern African Countries identified for the pilot programme on E&T.**

Chairmen of other countries are in the process of being included in the committee. Further, each participating country will have 4 Expert Volunteers. Some have already volunteered and others are in the process of being identified.

This pilot programme needs continuous interaction with the regional experts and teachers and hence the respective chairmen and volunteers will have very important roles to play. Based on the knowledge gathered from the existing school and college level courses in each country, it is intended to develop a couple of courses for the teachers and students on drought and water-related issues which are the key climate issues in the region. Prepared courses will be executed and tested in virtual mode.

### 3. Some Important Studies on African E&T related to Climate

Several interesting studies have been undertaken related to Weather and Climate E&T. Five of these studies relevant to the current pilot project are worth discussing here before undertaking IFMS efforts on E&T in the nine African countries.

**3.1** UNESCO (2021) under its Global Education 2030 programme prepared a document entitled “Getting every school climate-ready: How countries are integrating climate change issues in education”. The key findings state that:

Nearly 47% of national curriculum frameworks of 100 countries reviewed had no reference to climate change. In the rest of the schools, the climate was weakly referred to. In a review of the profiles of 20 countries on climate change communication and education, it was found that efforts are mainly focused on the primary and secondary education levels (90%). Fewer countries have frameworks to support climate change education in technical and vocational education and training (70%), higher education (70 %) and teacher training education (55%).

Finally, UNESCO (2021) recommended that;

Climate change education should be a core curriculum component in every country. Climate change education should not be sidelined as a feel-good topic but should be actively placed at the centre of what we teach and learn, especially in those countries that are more heavily responsible for this crisis. Teachers and school leaders need to be prepared to teach climate change. Many good practice examples from across the world that are shown in this document indicate that a bigger impact is created when Ministries responsible for education, environment and sustainable development collaborate to promote climate change education.

**3.2** Another study, entitled “Challenges and Opportunities for Climate Change Education (CCE) in East Africa: A Critical Review” (*Climate 2021* <https://doi.org/10.3390/cli9060093>), was conducted by Abigael Apollo and Marcellus Forh Mbah. The review is based on literature published in English and from Google Scholar and Web of Science database, with specific search terms. The following facts have emerged:

The education sector provides an untapped opportunity for successful climate change adaptation and mitigation through knowledge and skill acquisitions, and consequently, positive behavioural change. Specifically, education can capacitate individuals and communities to make informed decisions and take practical actions for climate-resilient sustainable development. This study is focused on East Africa, a region whose economy heavily relies on climate-dependent activities. At present, East African governments are already embedding climate change in their school curriculum. However, they lack coherent approaches to leverage climate change education as a tool in their adaptation and mitigation strategies.

This review identified the need to train teachers with accurate climate change information to make such knowledge meaningful to learners and incorporate indigenous knowledge in the learning process. Best approaches elsewhere may not be suitable in a different regional context as decisions about the most adequate practices should take into consideration local realities, available expertise, and resources.

**3.3** Some interesting results based on the implementation of the CCDARE Programme in Sub-Saharan Africa from 2008 to 2012 are also worth considering. (Results-based Activities on C Jeanette Larue, Dept. of Environment, Seychelles, Kouazounde B. Jacques and Bubu Pateh Jallow)

The education component of this programme consisted of the development of climate change-integrated Education Curricula in two schools in Benin (Secondary School level) and Seychelles (Secondary Schools curriculum). This programme included the Production of the Draft Modules of Training for students, teachers, lecturers and Classroom type testing and iterative review and revision of the Modules

**3.4** At this stage, it is also necessary to discuss “Introduction to SANDWATCH: An educational tool for sustainable development [UNESCO 2005 (SC-2005/WS/41), *By Gillian Cambers and Fathimath Ghina*]

The concept of Sandwatch was developed during the First UNESCO Associated Schools Project Network (ASPnet) Caribbean Sea Regional Environmental Education Workshop, held in Tobago, 21–26 July 1998. This programme began with the teachers seeing firsthand many of the problems facing the coastal zone – problems related to erosion, pollution and development – and resolved to do something about these issues themselves. Essentially, this programme was a framework for school students. With the help of their teachers and local communities, they had the opportunity to work together to critically evaluate the problems and conflicts facing their beach environments and to develop sustainable approaches to address these issues. With a strong field monitoring component, Sandwatch tried to ‘make science live’, yet remains inter-disciplinary with applications ranging from biology to woodwork and from poetry to mathematics.

**3.5** In India, a pilot project entitled “Participation of youth in Real-time Observations to Benefit the Education (PROBE)” was initiated and funded by the Department of Science and Technology, Government of India in 2003. This programme was initially executed in some Government Inter Colleges (GICs) in the Himalayan state of Uttarakhand. The main objective of this programme was to educate the school children about the weather and climate through their active participation in terms of regular measurements of the weather parameters and examination of their day-to-day variations. For that purpose, meteorological laboratories were set up in several schools in Uttarakhand. Seeing its success, PROBE projects were later on implemented in other states such as Delhi, Odisha, Tamil Nādu and West Bengal. Subsequently, Masters Training Workshops were also held to train Science, Mathematics and Geography Teachers from selected schools where observatories were set up. This programme generated meteorological data across the whole country which was used in R&D specific to Data Assimilation in the Numerical Weather Prediction model.

#### **4. Proposed Courses for Teachers Training and Way Forward**

Based on the earlier studies in Africa and the experience gathered through E&T programmes implemented by some Meteorological Societies and National Governments, IFMS for this particular pilot project in Eastern African countries may focus on (i) Fundamentals of Weather and Climate, (ii) Details of Regional Weather and Climate, (iii) Monitoring of Weather Data, (iv) Radiation and Greenhouse Gases, (v) Global Warming and Extreme Weather Events, (vi) Early Warning and Disaster Management to start with. Today, several free sites are available with interesting online courses prepared by eminent scientists across the globe. These courses can be studied in detail and tailor-made for East African weather and climate. Based on the existing curricula in the schools and undergraduate colleges in the nine countries, gap analysis can be made with the help of reputed teachers and scientists and suitable courses can be developed to train selected teachers from selected institutions. E&T Committee for East African Countries needs to meet and interact with each other to implement the whole programme. To start with, a couple of interactive meetings may be held to finalise the most important climate theme common to these countries such as water. The most challenging tasks for the AfMS E&T committee include, (i) Identification of schools/colleges to be part of this programme e.g. establishing weather observatories for educational purposes, conducting seminars etc. (ii) Identification of teachers from each of these institutions suitable for undergoing training; mostly with science, mathematics and geography backgrounds, (iii) Preparation of documents for teachers training, (iv) Monitoring of weather observations in selected schools with the help of students, (v) Students involvement in executing small scientific projects using the collected data, (vi) Periodic workshops to evaluate the progress and make course corrections and (vi) Involvement of the People in Science.

# Role of the African Diaspora and Friends of Africa in the development of Capacity in Africa through AfMS

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Members of the African diaspora and Friends of Africa engaged in the weather and climate enterprise around the world understand the critical importance of having a strong continental meteorological society in anchoring Africa's preparedness to mitigate the threat of extreme weather and related environmental events that have become increasingly unpredictable due to climate change. We know that this field of knowledge has been crucial in advancing the economic and technological development of the different countries where most of us live and work. Thus, we congratulate our African colleagues and are delighted to support the ongoing effort to inaugurate the African Meteorological Society (AfMS). The role of AfMS in accelerating and sustaining African

development is critical and is becoming even more so as Africa navigates toward an uncertain future threatened by the rapidly changing climate manifested in a variety of extremes, including drought, flooding, heat waves, wildfires, air pollution, and other such large-scale environmental anomalies. Therefore, so many members of the African diaspora and friends of Africa involved in the weather and climate enterprise from academia, government, and the private sector in various technologically and economically advanced countries of the world have expressed their enthusiasm to participate in this noble effort of bringing the AfMS to life and full activity.

The enthusiasm from the African diaspora and Friends of Africa will go beyond cheering our colleagues in Africa on the AfMS inauguration to actions aimed at helping them in concrete ways to ensure its sustenance, growth, and the full attainment of its goals and objectives. Therefore, we have identified several potential avenues for our members' participation in AfMS activities over the long term, including:

1. Assisting the teams that create AfMS education and training (E&T) courses
2. Presenting Webinars on topics of interest to AfMS
3. Teaching courses when invited to do so at AfMS E&T events
4. Participating in international Science and Technology (S&T) collaborations
5. Mentoring African students and early-career scientists
6. Offering Postdoctoral and Graduate student opportunities to qualified African students
7. Participating in AfMS Conferences
8. Assisting the AfMS in organizing its Conferences
9. Assisting the AfMS in other miscellaneous ways

Most members of the African diaspora and Friends of Africa have indicated their intention to volunteer for several of these activities whenever their expertise is needed. The roles such volunteers will play can come in a variety of forms, as briefly detailed below:

1. **Assisting the teams that create AfMS education and training (E&T) courses:** AfMS will be starting a Teacher Training Pilot Project in East Africa and in the Horn of Africa involving nine countries: Kenya, Tanzania, Uganda; Somalia, Djibouti, Eritrea, Ethiopia, Sudan and South Sudan. A team of Friends of Africa volunteered to lead the development of the E&T materials to be used for the training pilot project. They solicited suggestions of available high-quality training materials from around the world and many of us have provided information about such training materials and will continue to do so as we come across more of them. We will also participate in adapting such materials to the African environment so that they will serve the intended purpose optimally.
2. **Presenting Webinars on topics of interest to AfMS:** It is anticipated that there would be situations when Webinars presented through any of the well-established virtual media platforms are needed to reach participants in different parts of a country or the world simultaneously. Many members of the African diaspora and Friends of Africa are experienced Earth and Atmospheric scientists that have presented such Webinars to different audiences nationally and internationally. We would be delighted to present such Webinars to audiences convened by AfMS.

3. **Teaching courses when invited to do so at AfMS E&T events:** Many of our members are professors at reputable tertiary institutions around the world and teach academic courses at undergraduate and graduate levels. Many of us are experienced in teaching courses during summer school involving participants from multiple institutions around the world [e.g., Ichoku, 2017]. We would be happy to teach courses at summer schools coordinated by AfMS or under its auspices. Some of us may be willing to spend our sabbatical leave or serve as visiting professors at African Universities, where we can teach courses that are relevant to the attainment of AfMS goals.
4. **Participating in international Science and Technology (S&T) collaborations:** Many of our members have collaborated extensively with colleagues in African institutions and organizations and continue to do so. We are happy to expand these collaborations in a variety of ways, including jointly seeking and pursuing research and fellowship opportunities. Such international S&T collaborations are vital for effectively addressing issues of importance that transcend national or even continental borders.
5. **Mentoring African students and early-career scientists:** Our members engage with African students and early-career scientists whom we meet at summer schools and various international conferences that we participate in or through international collaborations. We are always happy to provide mentorship to such acquaintances, as we know how mutually beneficial such relationships can be for the advancement of society where some of us have professional interests and/or even family relationships. AfMS can provide a forum that will promote such engagements for the benefit of all.
6. **Offering Postdoctoral and Graduate student opportunities to qualified African students:** Many of our members have recruited and trained students and postdoctoral associates from Africa. Many of those we have trained have gone on to hold responsible positions in various organizations and institutions around the world. We also host early-career to senior scientists from Africa on short-term visits. We continue to seek out such opportunities, which will probably be even more fruitful within the context of AfMS for mutual benefit.
7. **Participating in AfMS Conferences:** Atmospheric and climate science professionals understand the value of interactions at international conferences in advancing our field of knowledge. Furthermore, we understand that weather and climate phenomena do not obey human-delineated territorial boundaries. Therefore, an improved understanding of large-scale phenomena such as tropical cyclones and long-range transport of pollutants can only be achieved by interacting and sharing knowledge at a global scale through international conferences in Africa and elsewhere. It goes without saying that members of the African diaspora and Friends of Africa in our field of knowledge will be highly interested in participating in AfMS conferences by presenting papers and posters and supporting other conference activities.
8. **Assisting the AfMS in organizing its Conferences:** Members of the African diaspora and Friends of Africa can assist the AfMS with various tasks during conference planning and organization. Some of our members can participate in technical organizing committees and serve as reviewers of abstracts submitted to the conference. We can help to recommend keynote/invited speakers on specific topics of interest and several of us can perform such functions if invited to do so by the conference/session organizers. Since many of us are engaged in collaborative educational and research activities in Africa, we can propose and/or chair relevant sessions at AfMS conferences. We can also help to identify and recommend appropriate exhibitors of relevant instruments and other technology and help in advertising the conferences amongst our colleagues and professional networks across the world. We can collaboratively organize relevant training classes or other side events that typically take place at such large conferences.
9. **Assisting the AfMS in other miscellaneous ways:** Members of the African diaspora and Friends of Africa can assist the AfMS in various other ways. Interaction between our members and those of AfMS will likely open so many new opportunities, some of which we are not able to predict at this time. Examples include: (a) serving on AfMS advisory committees; (b) partnering to develop research proposals and conduct research that can lead to new discoveries and the generation of important results that will be mutually beneficial to Africa and other regions of the world; (c) engaging in long-term scientific collaborations that can open new opportunities for some present and future members of AfMS; (d) submitting and/or reviewing manuscripts for AfMS-affiliated journal(s) when such a journal is established.

#### References:

Ichoku, C., (2017) COSPAR Capacity Building Workshop on Interdisciplinary Remote Sensing, Modeling, and Validation of Environmental Processes, Kumasi, Ghana, 12-23 June 2017, <https://cosparhq.cnes.fr/events/cospar-capacity-building-workshops/>



## The AMS Global Partners Program

Walter Dabberdt and Darrel Baumgardner  
Members, AMS International Academic Volunteer Program

### 1. Overview

The twenty-first century has seen a rapid increase in the number of scientists engaging in atmospheric research, weather forecasting, and climate modeling as academic institutions expand their undergraduate and graduate programs in the environmental sciences and as National Meteorological and Hydrological Services (NMHS') address the challenges of forecasting in a changing climate. There are many opportunities for scientists to network, share knowledge, and expand their interests, such as conferences, symposia, and workshops. Now, another opportunity is available to interest international Scholars to leverage their skills and gain additional expertise in their area of study and research.



The American Meteorological Society's (AMS) Global Partners program matches International Scholars seeking collaborations with AMS Member-Volunteers who have the expertise, experience, and availability, compatible with those of the international Scholar. The program is available to International Scholars from academia and non-profit institutions and organizations. The Program focuses on opportunities for AMS members to assist international Scholars in meeting their needs and achieving their academic and civic-engagement goals in the areas of weather, climate, water, and related sciences and technologies. There are many types of collaborations that could be undertaken (remotely or in-person) by the International Scholar and the Volunteer; here are a few examples:

### 2. Creation of new academic programs

As an example of the type of program that could be developed as a Global Partners activity, given the growing need to promote interdisciplinary collaborations between environmental scientists and other areas of research in the social or health sciences, the international Scholar would work with the AMS volunteer to design a curriculum that attracts students and professors from multiple disciplines.

### 3. New syllabus development

There are many new areas of study in the environmental sciences that don't easily fit within the classic courses, especially topics like the impact of air quality on health, climate change and future weather, and many other diverse topics that require the development of course content that is relevant to our society today. Developing these syllabi would be a valuable collaboration between Scholars and AMS volunteers.

### 4. Visiting Scholar in residence (long term)

High-speed internet access has made long-distance, virtual interactions much simpler and has enabled frequent and effective communications between and among researchers; however, having a physical presence in the classroom or laboratory provides the Scholar an opportunity to develop a more personal relationship with the AMS volunteer and their students and associates. Likewise, the visit of the Scholar in person will enrich the lives of their host, colleagues, and students, especially if the Scholar is from a cultural background that differs from the host volunteer.



## 5. Guest lecturers (short term)

Short courses are very specialized, and not all university environmental science programs offer them; hence lecturing at the Scholar's or volunteer's home institute by the volunteer or Scholar, respectively, can significantly broaden the students' academic experience while preparing them for career opportunities that they might not otherwise have known about.

## 6. Research collaboration

Collaborative research can encompass participation in field projects, laboratory studies, model development, or any combination of these, carried out at either the volunteer's or Scholar's home institutes. They could also be carried out where observations are being conducted at some other location other than the research institutes.

## 7. Engineering support

Many of the AMS volunteers are engineers (e.g., computer, electrical, mechanical, etc.) or scientists with engineering backgrounds. This expertise can be useful to Scholars who may be considering the acquisition of instruments and need an expert's opinion on applicability. Designing field programs, setting up laboratories or troubleshooting sensors can also be a useful collaboration that employs the AMS volunteer's expertise.

## 8. Editorial support

International Scholars are generally located in regions where English is not the native language, and yet a large majority of venues where these Scholars present their research use English as the common idiom for oral presentations, peer-reviewed publications, or proposals for funding from international agencies. The AMS volunteers can be helpful in refining the use of the language, particularly with technical descriptions that may not easily translate from the Scholar's native language to English.

## 9. Student mentoring/guidance

Perhaps one of the most important roles that both the AMS volunteer and Scholar can play is that of mentoring students and operational meteorologists alike, not only by sharing their respective experiences and expertise, but also exposing them to a broader, international culture.

## 10. Summary

The AMS Global Partners program provides a conduit and unique opportunity for International Scholars in the atmospheric and related sciences to engage and establish working relationships and friendships with AMS Member-Volunteers. It can be especially beneficial to early- and mid-career international Scholars who may have limited connections with experts in an appropriate field. Volunteer services are offered on a pro bono basis except for travel and per diem (if needed), communication, and other support costs, which can be provided by the volunteers or the international Scholar's institution or a non-AMS party. The role of the Program is limited to functioning as an exchange mechanism that facilitates the matching of those international Scholars in need of relevant expertise with AMS member-Volunteers offering to provide them. The matching process is initiated when the international Scholar or their institution initiates contact with the Global Partners Program with a specific request, and the Program then identifies those Volunteers who have the requisite expertise and availability. Once the international Scholar and the AMS Member-Volunteer mutually agree that collaboration is feasible, an agreement is negotiated between the Volunteer and the international Scholar.

## 11. Signing Up

International Scholars can get more information about the Global Partners program and can apply by clicking on the following link:

<https://community.ametsoc.org/volunteer-with-ams/international-volunteering>

## Open Consultative Platform – Partnership and Innovation for the Next Generation of Weather and Climate Intelligence

**Mr. Tatsuya KIMURA, Director, Public-Private Engagement (PPE) Office, WMO Secretariat**



The increasing impacts of extreme weather and climate change demand accurate and reliable weather, climate, and water information to overcome its adverse effects on society worldwide. No single stakeholder will be able to meet this demand alone. Therefore, engagement among stakeholders from different sectors is highly critical to mitigating these impacts.

The World Meteorological Organization (WMO), as the authoritative voice on weather, climate, and water of the United Nations system, has contributed to the engagement of the public-private-academic community actively participating in the value chain for meteorological services.

WMO coordinates more than 200,000 national experts from National Meteorological and Hydrological Services (NMHSs), academia, and the private sector worldwide. One example is the annual report on the State of the Global Climate, which publishes climate indicators that may represent weather-, climate- and water-related hazards that can adversely affect sectors of global trade in services, such as energy, health, tourism, communications, environment, and transportation.

In addition, WMO plays a key role in meeting the needs of society by sustaining a global structure of systems that provide a critical set of information and services for public safety and government decisions. WMO is working on improving the Early Warning Systems that are critically required for climate adaptation in all sectors, as one-third of the world's people are still not covered by early warning systems. The action plan will be presented at the upcoming United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP 27) in Egypt, building on existing WMO projects such as the Systematic Observation Financing Facility (SOFF), the Climate Risk and Early Warning System (CREWS), Global Multi-Hazard Alert System (GMAS) Framework, the Water and Climate Coalition to build capacity for prediction and warning of extreme weather events in collaboration with national and global stakeholders.

WMO's PPE activities have been guided by the directions given by the 18th World Meteorological Congress (Cg-18) held in 2019 through its Resolution 79, "*Partnership and Innovation for the Next Generation of Weather and Climate Intelligence*," and Resolution 80, "*Geneva Declaration – 2019: Building Community for Weather, Climate and Water Actions*" as well as the "*Guidelines for Public-private Engagement*" approved by the WMO Executive Council in 2020. WMO's engagement activities with a broader range of stakeholders are currently supported by the Public-Private Engagement (PPE) Office of the WMO Secretariat, established in January 2020, with the aim of developing new approaches for greater collaboration among these actors.

The Open Consultative Platform (OCP) of WMO is a consultative mechanism for global stakeholder engagement from all sectors, public, private, academic, user communities, and civil society, to share the view that clarifying the roles of these stakeholders is a crucial challenge for the future of the weather, climate, and water enterprise. The High-Level Sessions of the OCP are conducted in the format of annual thematic sessions as part of the program of the Executive Council and the Congress.

The outputs from the High-Level Sessions of the OCP have led to the creation of two White Papers (WP). The first one (*WP#1 on the Future of Weather and Climate Forecasting*) is a compilation of 30 leading experts from the research, operations, and education fields to analyse the challenges and opportunities and set directions and recommendations for the future. The second WP (*WP#2 on the Future of National Meteorological or Hydrological Services: Evolving Roles and Responsibilities*) is a production of a collective endeavour of world-leading experts focused on evolving roles, responsibilities, operational scenarios, and partnership mechanisms for the future work of NMHSs at the global level.

In addition to high-level communication at the global level, it is also essential to analyse and build an understanding of regional and sub-regional circumstances. Thereby, the Congress, in Resolution 79 (Cg-18), requests the presidents of Regional Associations of WMO to stimulate their regions' informal consultations with stakeholders from all sectors. As a result, the PPE Office has been working on the High-Level Regional Forums of the OCP in each region of WMO. The purpose of the regional forums is to discuss region-specific issues, opportunities, and initiatives for leveraging cooperation and collaboration between sectors and enhancing socioeconomic benefits.

The High-Level Regional Forum in WMO's Regional Association (RA) III (South America) successfully took place in Cartagena de Indias, Colombia, in July 2022. The High-Level Regional Forum in RA VI (Europe) is planned to be held in November 2022 in Geneva, Switzerland.

Also, at the regional level, the first regional pilot project on PPE was adopted by the WMO RA II (Asia) in August 2021 for its implementation in February 2022. The pilot project on Public-Private Engagement for Smart Meteorological Services in Mega-cities (PP-SMSC) is expected to provide experience, good practices, and lessons on downscaling high-level policy and guidance into concrete initiatives tailored to the needs of a region or sub-region and its members.

Alternative activities have been developed to engage and obtain inputs on good practices from the stakeholders. OCP Innovation Seminar is an activity that seeks to establish closer contact with private sector entities, NGOs, and other stakeholders in the sphere of weather, climate, and water. These seminars aim to provide opportunities for the stakeholders to share innovative practices and ideas which help build and understand current developments in the weather enterprise.

Moreover, WMO is closely working with the Association of Hydro-Meteorological Equipment Industry (HMEI) to improve cooperation between the public and private sectors. In March 2021, the WMO & HMEI Information Day was organized to enhance the industry stakeholders' awareness. WMO and HMEI are also working on a Code of Ethics to establish ethical principles for successful and sustainable partnerships.

Finally, it is essential to strengthen capacity development actions to ensure the production of and access to high-quality weather, hydrological, and climate information and services for sustainable development. In this regard, the PPE Office is developing a PPE Training Package, in collaboration with the Education and Training Office of the Member Services and Development Department of the WMO Secretariat, to help NMHSs management/executive staff understand the most up-to-date WMO's policy and guidelines on PPE.

Furthermore, a collection of Good Practices is available on the [PPE Resources](#) section of the [WMO website](#). The WMO Secretariat will continue to provide relevant support to WMO's Members to shape the future development of the weather, climate, and water enterprise in the coming decade and beyond.

# Education and Training Program of IFMS for Africa

Dr. Harinder Ahluwalia

If you do not have one yet - Create your own NMSoc - Join the family

## 1. Introduction

We believe that the National Meteorological Society (**NMSoc**) is a strong capacity builder in its country. Frequently such societies grow out of a recognized need for a forum that allows members of different occupationally based institutions such as National Meteorological and Hydrological Services (**NMHSs**), academia, and private sector organizations to exchange ideas and cooperate on a wide range of research and operational activities. Additionally, occupational institutions can draw many advantages from the activities of such societies e.g., through the promotion of meteorology and its related professions, and the capacity for societies to tap into the broader community affected frequently and in a multitude of ways by the variations of weather and climate.



This article outlines the advantages of an NMSoc and the simple steps for establishing it. More detailed information is available on IFMS and AfMS Websites. To support the development of nascent National Meteorological Societies, the International Forum of Meteorological Societies (**IFMS**) can provide a wealth of knowledge and experience by drawing from its member societies.

## 2. Case for a National Meteorological Society (NMSoc)

The following are the advantages of having an NMSoc in your country:

1. Enhancement of cooperative networks because networking is critical for the nurturing and ongoing advancement of ideas.
2. Creating and developing cross-institutional relationships are integral components of their personal development and the effectiveness of the institutions to which they belong.
3. Many NMSocs, in addition to the staging of conferences and symposiums, offer professional development opportunities through courses, workshops, and publications on research results and operational activities as well as general information on weather, climate, and water for the broader community.
4. As a National Meteorological Society develops, it can offer courses, seminars, and/or lectures to keep its members up to date on the latest industry innovations, research, and trends. Through a range of outreach activities, it can also assist in raising the awareness of the wider community in matters relating to weather, water, and climate.
5. Accreditation/Certification provides recognition and confidence to an employer that an individual has attained the necessary knowledge, skills, and competence to carry out certain tasks. However, establishing such programs and maintaining them can be quite onerous. Therefore, your RMS e.g., EMS or AfMS, etc. can do it and you can use it as long as your NMSoc is a member.
6. Mentoring is the cornerstone of many professional societies when it comes to working with its younger members through the pairing of a lesser experienced person with someone much more experienced.
7. Participating in forums, chat groups or discussion boards sponsored by an association is also a great way to grow your network. This allows you to use your peers as sounding boards and often make some great friends with the same interests as you.
8. For the youngest of a Society's members (high school and college), the availability of a scholarship may be the primary avenue for entering a profession.
9. National Meteorological Societies can help their members find employment through the provision of job listings that other members or their organizations may be offering.

### 3. Steps to start your NMSoc

Each NMSoc will have different capabilities based on available manpower and finances. There is significant diversity amongst the meteorological societies and other related organizations comprising IFMS membership. Therefore, the requirements of each country will be somewhat different. However, the basic steps are quite similar which are:

1. You need to form a Founding Committee. All new institutions initiated from the ground-up, start small. There will be a need for a few key people with the passion (and hopefully the endurance) to see the new entity emerge and become a fully recognized society with the potential to serve both its membership and the wider community. Identifying these people and establishing an initial management structure, which will likely go on to form the founding committee, is clearly a key step,
2. Determine the scope of the new society. Meteorology in itself involves several basic scientific disciplines. Furthermore, meteorology is allied to several other disciplines that also draw on a similar range of basic sciences, such as oceanography and hydrology,
3. In establishing a new society, it will be helpful to reflect in its name the scope of the society's intended interests. For example, in addition to "Meteorological Societies", if your scope is bigger than just meteorology e.g., hydrology, and oceanography, name it appropriately.
4. As far as membership is concerned, potential members of any new society will have working affiliations with in-country organizations having direct or indirect interests in meteorology and its related disciplines. An inventory of such organizations will be an important first step in gauging the future scope of the society's membership. Such organizations may be based within government, academia, or the private sector. Indeed, much of the value of a Meteorological Society will lie in its capacity to draw on all three sectors and act as an effective mechanism for cooperation across a wide range of matters of national interest relating to weather, water, and climate. It will be critically important to obtain the backing of these organizations in establishing society. Such support may include some seed funding, the realization of which may require the submission of a formal proposal.
5. You have to decide While there will be differences in governing regulations from country to country, an incorporated association is generally regarded as a registered legal entity, established for professional or cultural, or charitable purposes, and not as a profit-making enterprise. It will have a minimum number of members and all surpluses (income minus expenditure) will be used to provide further support for the association's future activities. Such a structure offers many benefits to suitable organizations. Incorporation makes an association a legal entity that is independent of its individual members, thus making it easier for the organization to enter into contracts. The benefits and any issues with incorporated societies are discussed in detailed documents.
6. However, surpluses cannot be distributed to members – they must be applied to the objectives of the association. There will typically be an annual financial reporting requirement to both the members and to the relevant local authority which may attract a fee.
7. Incorporating an association may not be compulsory in a given jurisdiction. However, if you do incorporate, there will be rules to follow.



#### 4. Any country irrespective of its size can have an NMSoc

Previously, many smaller countries felt that they did not have the resources to create and sustain an NMSoc. Today countries like Andorra (population of 77,000 society with 15 members, established in 2006), Estonia (population of 1.33 million with 34 members, established in 2018), and Iceland (population of 380,000 with 25 members, established in 1950s), have NMSoc and they are all taking advantage of the existence of the European Meteorological Society (**EMS**). The EMS holds many events in which larger and smaller NMSocs participate and they take advantage of this collaboration. The same will be the case with the African Meteorological Society (AfMS) which will provide many services and hold many events. With the above examples and the following advantages, establishing an NMSoc is very viable.

1. With so many common activities from the IFMS and your RMS which can be shared, you can already have a Value Proposition. Just keeping track of activities available through IFMS and your RMS, is a sufficient incentive to create an NMSoc in your country.
2. To take advantage of all the services provided by IFMS and RMSs, you must have an NMSoc which must become a member of these societies.
3. Availability of new tools such as Zoom, WebEx, Microsoft Teams, etc. which make holding events (Webinars, Meetings, Conferences, Discussion Groups, etc.), much easier and inexpensive.
4. Networking is critical for nurturing and ongoing advancement of ideas. An occasional get-together for local presentations, lunches or dinners, recognitions, etc. is a big incentive to have an NMSoc.
5. For most professionals, creating and developing cross-institutional relationships are integral components of their personal development and the effectiveness of the institutions to which they belong.
6. One of the most effective mechanisms employed by professional societies for promoting cross-institutional collaboration is through the staging of annual conferences, which typically cover a broad range of topics and sponsor symposiums on specific topics of broad interest.
7. Your conference itself can be in a university or college; even a one-day affair to give your members an opportunity to mingle is a sufficient incentive.
8. Mentoring and eventually job finding can be facilitated by an NMSoc
9. Your **NMHS** should encourage you to have one.

If your society consists of only a few members, your activities can be limited to say first few items above. Instead of holding your own conference, you can participate in the events of AfMS.

#### 5. Conclusions

1. In this critical time of Global Warming and Climate Change (GW&CC) which is causing uncertain weather conditions and many disasters, it is very important to create capacity in all countries. By capacity we mean, knowledge base, infrastructure, awareness among masses and politicians, and Institutional and Societal capacity to handle disasters.
2. No single sector, Public, Private, or Academic (**PPA**) can create the required capacity. We need all sectors to work together which requires a forum for creating this collaboration.
3. NMSocs are best suited to provide that forum because they can have membership from all three sectors.
4. One issue which concerns almost all NMSoc is financing. Since NMSocs are run by volunteers, they provide the best return on any dollar spent on them. IFMS is working hard on convincing donors to fund IFMS so that it can support the financing of the capacity-building projects of NMSocs and RMSs.
5. We have tried to prove in this article the fact that today you can have an NMSoc even if you have a small population in your country.
6. Therefore, we urge all countries to create an NMSoc in their country, if one does not already exist.
7. Finally, we strongly advise NHMSs, WMO, and WB to fully support NMSocs, RMSs and IFMS because they are their best allies for creating capacity around the world.

## The COMET Program's Training For African Forecasters

By Elizabeth Page, Ph.D. and Wendy Gram, Ph.D.

COMET was formed in 1989 as a cooperative program to bring new scientific applications to weather forecasters around the world, with an initial focus on mesoscale meteorology and Doppler radar interpretation. COMET training activities have expanded significantly over the past 30+ years and now address topics such as hydrology, remote sensing, geospatial applications, space weather, fire behavior, oceanography, numerical modeling, and hazard communication among others.



Internationally known for the training portal, MetEd ([www.meted.ucar.edu](http://www.meted.ucar.edu)), COMET set the standard for online distance learning in meteorology by bringing together instructional design concepts, scientific experts, and multimedia designers and web developers to create engaging, scientifically sound training with real-world applications. These highly interactive lessons have evolved over time with technological advances in e-learning. To date, COMET has created over 1000 e-learning lessons. A registration system allows learners to access the site, and take quizzes to document their completion. Learners can subscribe to have booster questions sent to them following their training to help them retain what they learned through the lesson.

COMET offers synchronous, instructor-led courses and workshops, both in person and online, developed for sponsor agencies, including Environment and Climate Change Canada, Korea Meteorological Administration, China Meteorological Administration, the National Weather Service (NWS) in the United States, and the World Meteorological Organization to name a few. Sponsors identify the themes of these courses and COMET facilitators bring together experts on the topics related to those themes to expand the forecasting skills of the participants.

COMET began working with trainers and forecasters in Africa as part of the African Satellite Meteorology Education and Training (ASMET) project in partnership with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) over 25 years ago. Through this project, COMET instructional designers and scientists have worked with trainers from the South African Weather Service, the Institute for Meteorological Training and Research in Kenya, the African School of Meteorology and Civil Aviation (EAMAC) in Niger, the Morocco National Meteorology Department, and EUMETSAT to develop e-learning lessons on applications of satellite data to forecasting. The topics of these lessons include basics of satellite imagery interpretation, heavy rains and flooding, fog, turbulence, dust storms, drought, tropical cyclones, and marine meteorology. These lessons use case study examples and exercises from different locations in Africa.



With funding from the US Department of Transportation's Safe Skies for Africa project, COMET created aviation training lessons and adapted existing training to provide professional development opportunities to help forecasters meet WMO aviation competencies. These lessons focused on aviation hazard forecasting. Part of these efforts included the development of an e-learning course, entitled Review of Aeronautical Meteorology - Africa ([https://www.meted.ucar.edu/education\\_training/course/36](https://www.meted.ucar.edu/education_training/course/36)), consisting of a collection of online lessons that make up more than 65 hours of training. Included is an African regional study guide for the COMET online textbook, Introduction to Tropical Meteorology (2nd edition) which helps focus the information on the needs of forecasters in African nations.

More recently, COMET is developing training related to effective communication of forecasts through WMO workshops and e-learning activities. COMET staff have contributed to WMO workshops on impact-based forecasting and warning services and have supported similar NWS International Activities Office and USAID sponsored Weather Ready Nations workshops in partnership with the Hydrologic Resource Center. Based on these workshops and supporting WMO publications, COMET has developed a series of e-learning lessons that teach forecasters how to work with partners to assess risk from hazards and potential impact on communities. With this information and in collaboration with emergency managers, forecasters can communicate forecast and warning information effectively to help protect lives and property.

While the target audiences for COMET e-learning lessons remain environmental forecasters around the world, university faculty have found them helpful in teaching. Lessons developed by COMET contain case study examples and conceptual descriptions of the application of scientific concepts to real-world scenarios, which bring to life concepts covered during lectures in university classrooms. Faculty found these e-learning opportunities critical to supporting their teaching during COVID pandemic when many faculty found themselves moving their courses online.

Other international efforts to support developing nations have included training courses and e-learning lessons focused on the needs of Caribbean and Pacific Island nations. With a tropical focus on achieving WMO competencies, COMET partnered with the Caribbean Institute of Meteorology and Hydrology and the NWS Pacific Desk on these training activities.

To broaden the reach of the training available from COMET, nine different languages are represented on the MetEd learning site, in addition to a full Spanish version of MetEd. COMET's Spanish translator facilitates the translation of selected lessons into seven other languages including French, Portuguese, German, Russian, Traditional Chinese, Greek, and Indonesian. Classroom courses have also been taught with interpreters to facilitate the training of students.

Please visit the MetEd website and register today (<https://www.meted.ucar.edu/registration.php>) to access hours of free e-learning lessons.

## Building Capacity for Manufacturing Low-Cost Weather Stations

**Paul Kucera, Ph.D., Kathryn Payne, and Elizabeth Page, PhD**



The COMET Program has expanded capacity development activities to include low-cost, innovative environmental sensors through support from the US National Weather Service International Activities Office (NWS IA) and the US Agency for International Development (USAID). This weather station utilizes 3D-printed components along with low-cost environmental microsensors and low-power microprocessors which are integrated with locally sourced resources. The 3D-printed automatic weather station (3D-PAWS) measures surface temperature, pressure, relative humidity, rainfall, wind speed and direction, and solar radiation, and more recent sensors have been added to monitor stream height, storm surge, and snow depth.

Increasing the density of atmospheric and hydrological observation sites increases the accuracy of forecasting and monitoring hydrologic and weather hazards. Accurate and reliable real-time monitoring and dissemination of atmospheric and hydrologic observations are critical for short-term and long-term applications. Short-term applications include flood warnings, agriculture operations, water resource management, and food security monitoring. Long-term applications include expanding long-term historical climate databases in data-sparse regions. These long-term records are critical for monitoring climate change and associated impacts, which are critical in building climate adaptation strategies to create climate-resilient communities.



The goal of the program is to build local capacity to fabricate, assemble, install, maintain, and utilize observations that can support local weather and climate applications. The open-source solution enables local partners to take ownership of the building and maintain sustainable observation networks. The technology and knowledge are transferred through comprehensive training with local partners, who can include national meteorological and hydrological services (NMHSs), international research institutes, non-governmental organizations, and local universities and schools.

Over the past eight years, 3D-PAWS and other low-cost sensors have been fabricated and deployed in fourteen countries, which has resulted in over 215 sites being established. These sites have collected over 700 million environmental observations. The observations have been used in a variety of applications including impact-based forecast and warning services (IBFWS), data assimilation into regional numerical weather prediction forecast models, and seasonal climate monitoring.

The success of 3D-PAWS in building global weather and climate observation capacity is highlighted through two success stories. In 2015, COMET partnered with the Global Learning and Observations to Benefit the Environment (GLOBE: <https://www.globe.gov/>) program to implement 3D-PAWS at primary and secondary schools in Kenya and Uganda. The goal of the partnership with GLOBE focuses on providing the science, technology, engineering, and mathematics (STEM) professionals of tomorrow with access to observations to better understand environmental processes to tackle some of the biggest challenges of the future including climate change. Over 35 3D-PAWS observation sites have been installed at schools providing students and teachers with access to local atmospheric observations to help improve the understanding of the local climate. This collaboration will be expanded to other schools around the globe.

The second success story is focused on the island of Barbados. In 2018, COMET partnered with the Barbados Meteorological Service (BMS: <https://www.barbadosweather.org/>) to establish a 3D-PAWS fabrication facility. BMS has a vision of establishing a dense automated weather station (AWS) network to provide observations to support localized IBFWS products and to establish a long-term historical database to better understand and monitor climate change impacts. The region is sensitive to climate change which can have significant impacts due to sea-level rise and the increase in the frequency of intense tropical weather such as hurricanes. The goal of this initiative is to establish 100 AWS across the island. As with many NMHSs, BMS has limited resources to purchase, implement, and maintain a network of this size using commercial sensors. A 3D-PAWS network was designed as a possible solution. As of September 2022, BMS has successfully installed 68 3D-PAWS stations with plans to install the remaining stations within the next year. Because of the initial success of BMS, the establishment of the complete network has become a national priority with independent financial support provided by the government of Barbados. The observations from the network have been successfully implemented into the BMS IBFWS system. Further expansion of this initiative to other Caribbean islands to provide a regional weather and climate monitoring network is envisioned.

To learn more about 3D PAWS and capacity development activities at COMET, please visit <https://www.icdp.ucar.edu/>.



## New Weather and Climate Learning Portal for Africa Released Ahead of COP27

### [Learning Portal](#)

Ahead of the 27th UN Climate Change Conference of Parties (COP27), which was held in Egypt from 7 to 18 November 2022, the newly founded **African Meteorological Society (AfMS)** worked in collaboration with the UK's Royal Meteorological Society to produce a suite of learning resources for their website [africanmetociety.org](http://africanmetociety.org).

"Education is the most powerful weapon which you can use to change the world" ...Nelson Mandela

In 2021, with assistance from the [International Forum of Meteorological Societies](#), the Meteorological Societies in Africa established a permanent organisation – the African Meteorological Society (AfMS). The AfMS aims to bring local knowledge from all the individual societies to cooperate, build capacity, and share best practices in the field of weather and climate across Africa.

The AfMS aspires to organise education and training events, share resources, host conferences, and encourage science and technology collaborations. It will pay particular attention to those aspects of meteorology which can be solved only on an Africa-wide basis or are best approached on that scale.

As a member of the International Forum, the Royal Meteorological Society (RMetS) is one of the partners supporting the African Meteorological Society with its vision for strengthening its meteorological capacity in Africa. RMetS recognised that training is of central importance and was an area in which they could help.

There is a lot of useful learning material already available online, and a small RMetS team of experts has collated, reviewed and grouped over 70 learning resources for different audiences. The new [learning portal](#) offers a suite of materials and learning resources and provides a clear, single point of reference for people across Africa to access recommended courses and resources that have been subject to expert scrutiny.

Altogether, there are seven lists of learning resources, each one developed with a specific audience in mind e.g. school children and teachers. In every list, there is some detail about each resource, such as who created it. There is also a brief description of what it contains, the languages it is available in, a website link, and the connectivity requirements for accessing the resource. Each list can be used online or downloaded from the website. More detail about the project and links to resources can be found [here](#).



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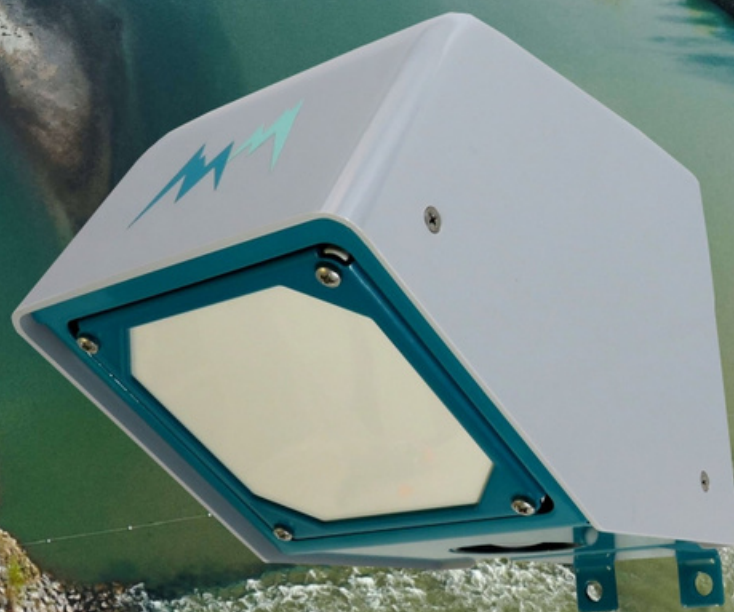
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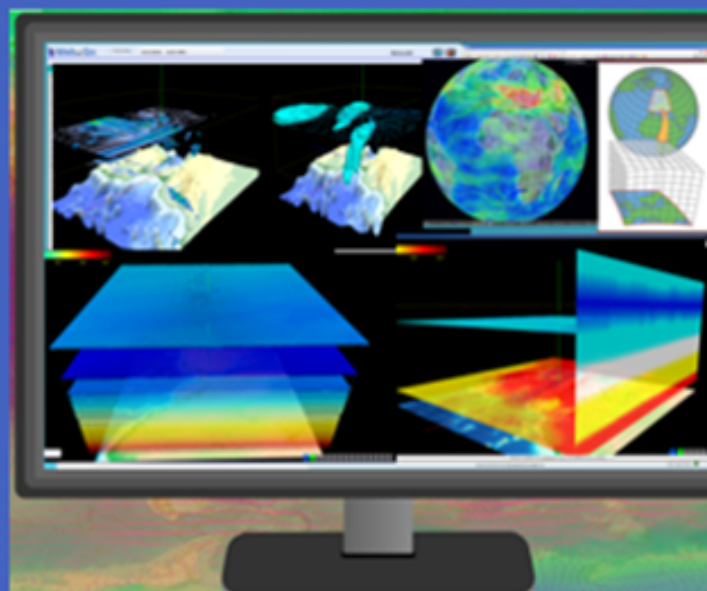
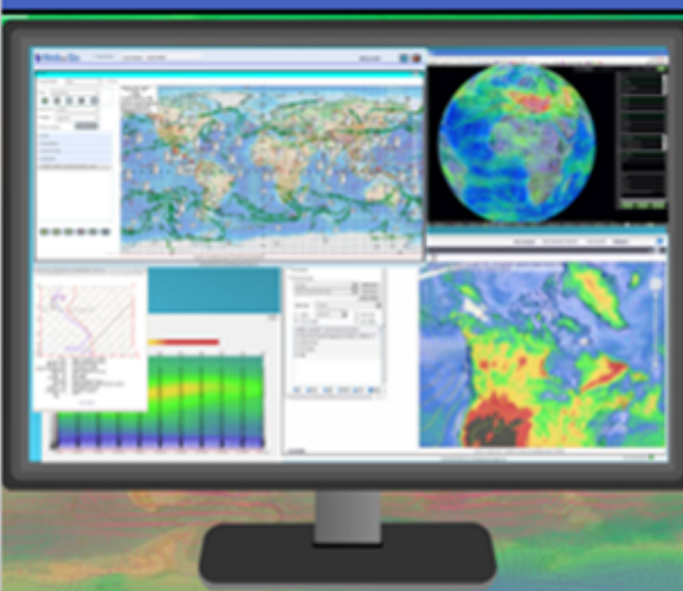
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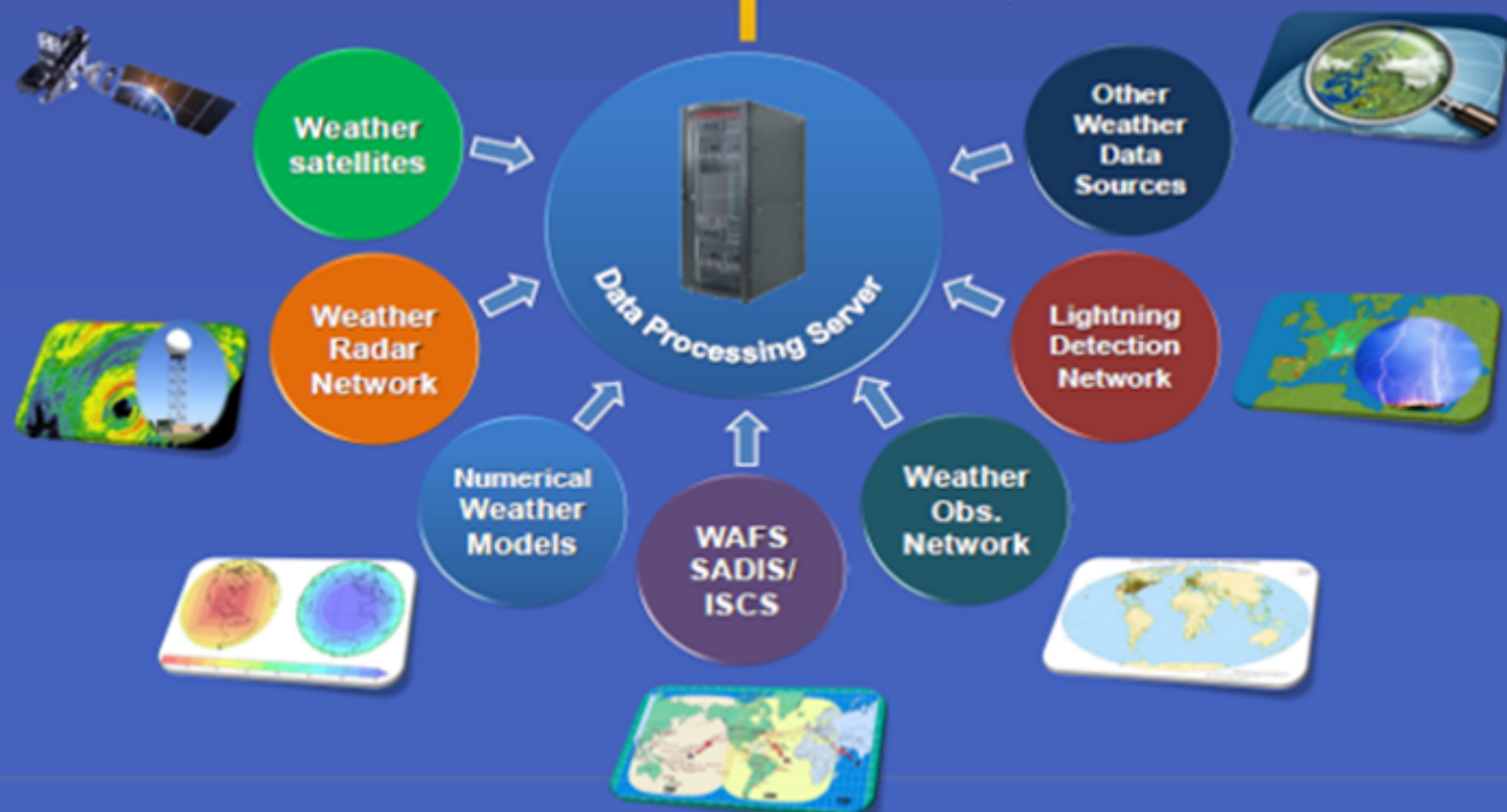
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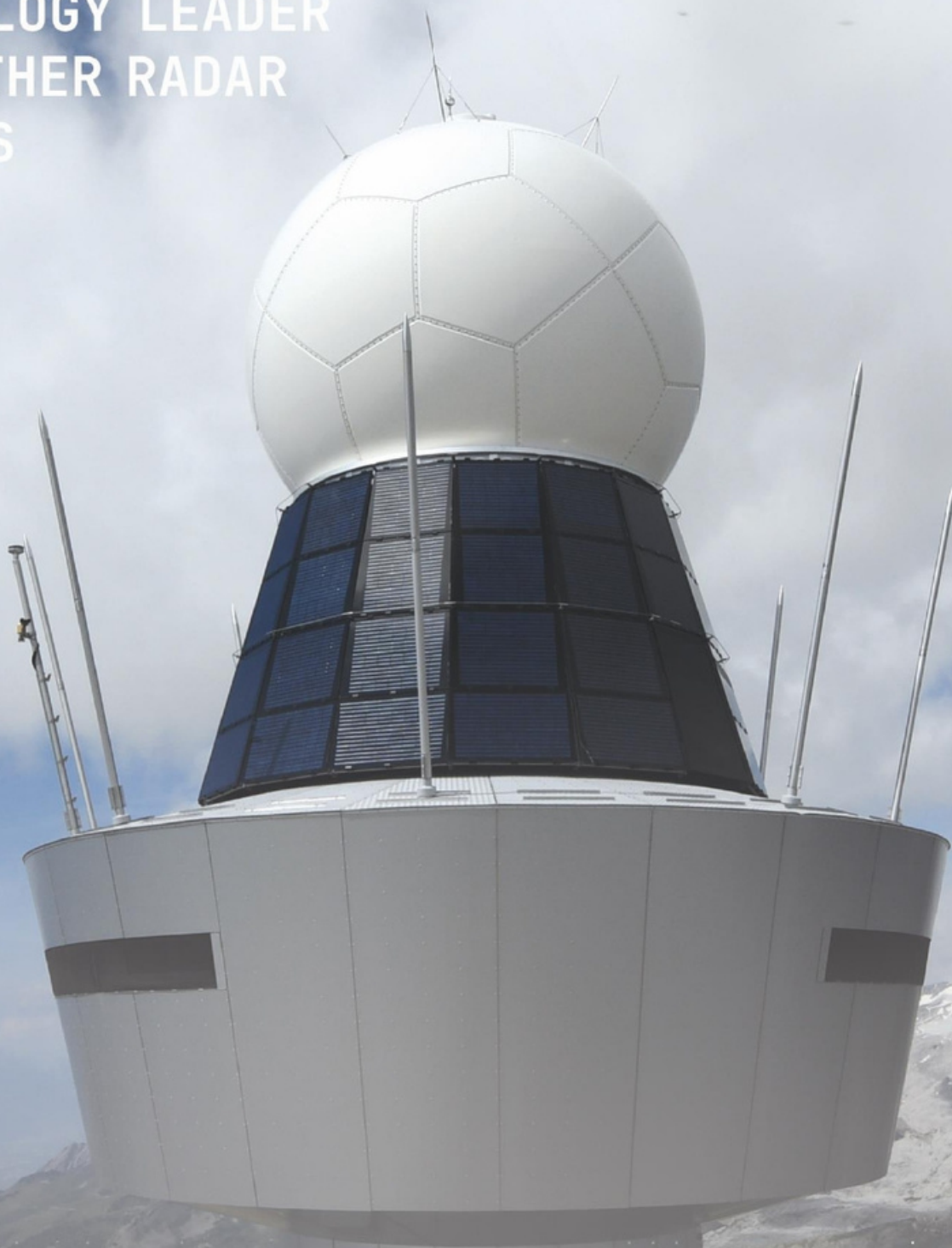
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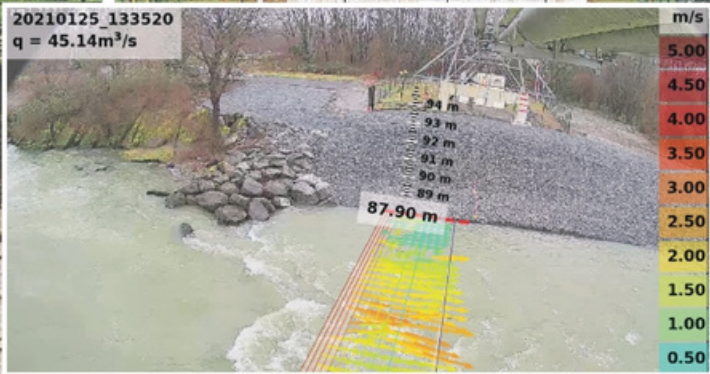
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AMS is a vibrant community of more than 12,000 scientists, researchers, students, educators, broadcasters, and professionals working together to make a difference in the fields of weather, water, and climate science. We share knowledge, improve technology, promote understanding, and disseminate research to ensure that our planet—and the people on it—can thrive.



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The AMS Policy Program promotes greater understanding and use of science and services related to weather, water, and climate through research, analysis, and engagement with the goal of reducing society's vulnerability to weather and climate impacts by sharing our resources and information with policy makers and the public.

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For over 100 years, AMS has published world premier Earth system science research in our high-impact journals, award-winning books, and the long-standing meteorological monographs series. With outstanding author support and post-publication marketing efforts, AMS remains the publisher of choice for the weather, water, and climate community.



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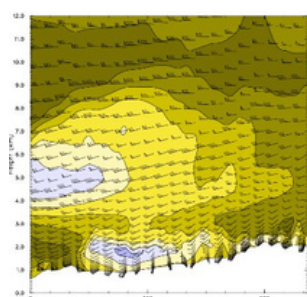
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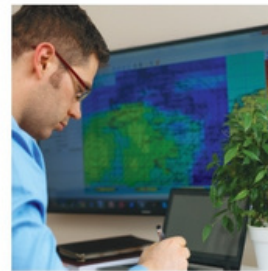


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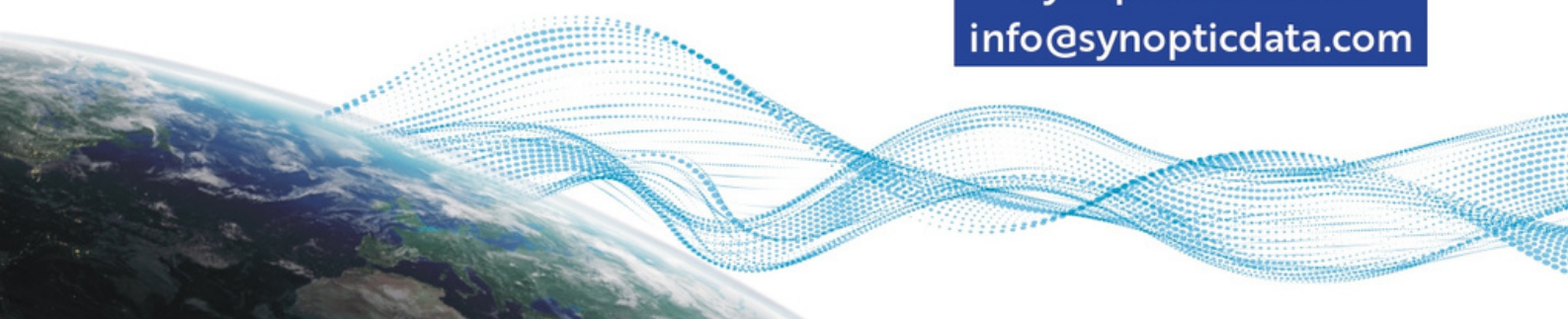


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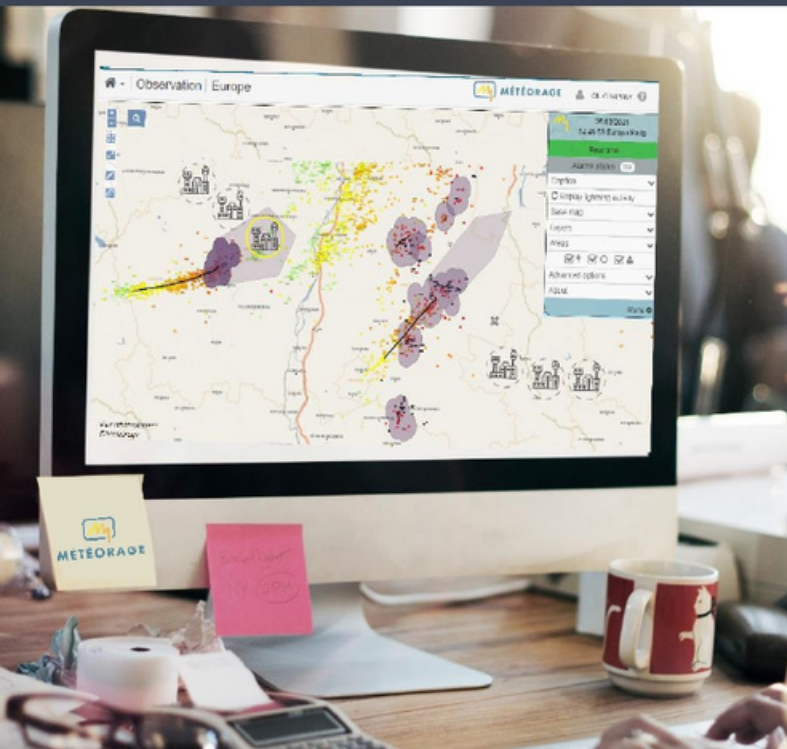
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**PUBLISHER: HARINDER P. S. AHLUWALIA**

**CHIEF EDITOR: KUNG-YUEH CAMYALE CHAO**

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Published on November, 2022

