



**GMES
AND AFRICA**



GMES & AFRICA

MARINE AND COASTAL MANAGEMENT IN THE EAST AFRICA REGION

NEWSLETTER

1ST ISSUE

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FOREWORD

BY MOI DIRECTOR

The Mauritius Oceanography Institute (MOI) and its partners are pleased to present this issue of the newsletter for the East Africa marine consortium. This edition contains different articles on usage of the GMES and Africa - Marine and Coastal Service data and products by students, fishers, local authorities and researchers in the field of marine science.

The featured article describes the work that is being undertaken by our partner in Tanzania to bring technology to the fishermen community so as to reduce fishing efforts in inshore waters and help fishers to venture offshore where there are profitable fishing areas.

By sharing our experiences and stories on how Earth Observation (EO) data related to the Marine and Coastal Management action is used by institutions within our region, we hope to enhance the use of data and information generated from the GMES and Africa programme so as to bring the benefits of space technology and associated products to the countries of the East Africa region.

The different articles illustrate the use and dissemination of GMES and Africa data in Madagascar and also highlight how accurate, timely and useful information products derived from the Copernicus Marine Environment Monitoring Service have contributed to informed decision making.

A key pillar of the GMES and Africa project is Education and Training in Earth Observation (EO). Within this framework, the MOI has organised three online regional training workshops to build capacity amongst its partners and stakeholders in the region to better equip them to use Earth Observation (EO) science and technology for marine and coastal area service development and implementation.

Please read on to find out more about our activities and of the accomplishments and future direction of the GMES and Africa project.

I would like to seize this opportunity to convey our best wishes and Seasons' Greetings to all our readers.

DR. KAMLA RUBY MOOTHIEEN PILLAY

DIRECTOR, MAURITIUS OCEANOGRAPHY INSTITUTE

PREFACE

BY IOC

Despite the ongoing Covid-19 pandemic and challenges, it is encouraging to note that the partners of the GMES & Africa project continue to exchange and implement activities both at national and regional levels contributing to a more sustainable, secure and serene future.

The partnership between the African Union and the European Union on space technology is providing opportunities for countries in Africa to bridge the gap between space science and technology to enhance decision making and to support the development of sound science based public policies for sustainable development.

The Indian Ocean Commission is extremely proud to be part of this African vision to bring space science and technology closer to the coastal population of East African States and more particularly to the small island States of the Western Indian Ocean with the objective to improve governance and management of marine and coastal resources, the precious natural capital which support the economy and livelihood of our Nations.

This pan-African initiative in a context shaken by the Covid-19 pandemic presents an opportunity to think differently about development and to broaden the fundamental movement for a sustainable economic growth, for climate change's adaptation and mitigation.

The consortium led by the Mauritius Oceanography Institute is a testimony to the existence of a regional pool of expertise, human capital and competences required to drive the development of the blue economy in the Western Indian Ocean region. This current newsletter brings out the importance of regional collaboration and the effectiveness of decision-making tools to support the management of coastal and marine resources.

Whether at national or regional level, we must collectively continue our efforts to keep up with the evolution of information and space technologies and to better integrate Earth Observation services into development policies and planning. The Indian Ocean Commission will have to ensure the link between GMES & Africa activities in the region and other programmes in the field of climate and meteorology and all aspects of ocean governance to sustain fisheries and marine ecosystem management, maritime security and marine pollution. Looking forward to a successful implementation of the GMES & Africa programme despite the current challenges.

Best wishes for good health, success and happiness for the year 2021!

MR. VÊLAYOUDOM MARIMOUTOU

SECRETARY GENERAL, INDIAN OCEAN COMMISSION

FEATURED ARTICLE

LOCATING PROFITABLE FISHING GROUNDS IN TANZANIA USING EO TECHNOLOGY - THE UNTOLD STORY



The Tanzanian coastal fishery directly supports over 54 thousand fishers and makes a significant contribution to the National Gross Domestic Product. The recently observed decline in demersal fish catch along the coast is seen as a threat to local communities depending on fish as source of income and food. The decline of this stock is mainly because shallow water stocks are overfished. While the coastal stock are in peril, the offshore stocks and in particular the pelagic fish resources are underexploited because of poor fishing crafts used by local communities as well as inadequate knowledge of locating profitable fishing grounds in offshore waters.

The Tanzania Fisheries Research Institute (TAFIRI), one of the members of the East Africa Marine consortium, has for the last decade been a pioneer in the region in the use of earth observation data (remote sensing technology) to identify and locate profitable fishing areas, widely known as Potential Fishing Zones (PFZ) for the pelagic fish species. The prime objective of using Earth Observation technology is to reduce fishing pressure in inshore waters by encouraging small scale fishers to venture off shore to fish for Tuna and Tuna like species. This is in alignment with Tanzania's National Development Vision 2025; and the second National Five-Year Development Plan 2016/2017 - 2020/2021; the UN's 2030 Agenda for Sustainable Development and the Blue Economy; which acknowledge the role of Science, Technology and Innovation to attain sustainable socioeconomic development.

Findings from TAFIRI on small pelagic fishery at Fundo in Pemba, Nungwi in Zanzibar, Kipumbwi in Tanga and Kilindoni in Mafia - under the previous Monitoring for Environment and Security in Africa (MESA) project - showed a positive relationship between Potential Fishing Zone and small and medium pelagics catches along confined stretch of Sea Surface Temperature fronts.

With archived satellite data available through the GMES eStation and the skills acquired, TAFIRI has collaborated with local authorities like the Deep Sea Fishing Authority to provide information that help artisanal fishers to access more

profitable fishing areas in the Exclusive Economic Zone. TAFIRI has raised awareness amongst local communities and authorities dealing with fisheries on the potential of PFZ for reducing fishing effort. District Fisheries Officers from all coastal districts of the United State of Tanzania were introduced to this initiative and recognized its benefit for sustainable resource utilization. Field visits were organised and TAFIRI trained more than 100 ring-net fishers on proper use of GPS for tracking and marking daily fishing locations and using smartphones for data entry.

Over the past months, TAFIRI has developed a public-private partnership with the fisherman community. Fishers have benefited from GPS, mobile phones and training for locating fishing ground and collection of fish catch data. On the other hand the Government side is benefiting from geo-tagged fisheries information provided by the fishers for validation of the information captured through satellite technology. The information captured in part will be used by the government for improving the fisheries management plans for small and medium (sardines and bonitos) as well as large pelagic fish (Tuna and tuna like) in coastal waters of Tanzania.

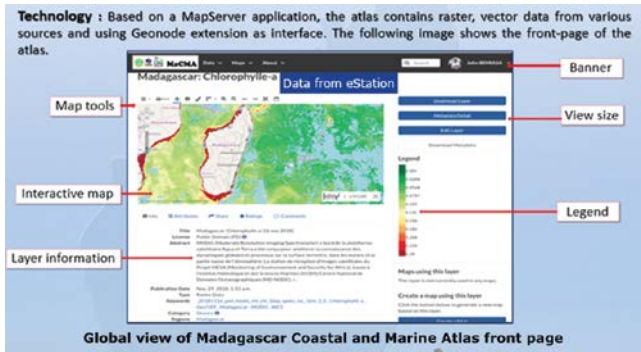
Artisanal fishers are dependent on local knowledge in accessing fishing grounds which are located primarily inshore. It is therefore important to help these fishermen access alternative profitable fishing areas offshore. The use of this innovative fishing technique not only allows an increase in fish catches, but also reduces time and fuel spent looking for fishing grounds using traditional methods therefore reducing fishing costs.

While Earth Observation technology can be used to empower the Tanzanian fishers community and reduce fishing pressure in inshore waters, there is a need for Government intervention particularly in developing appropriate strategies regarding fishing along the coast of Tanzania to ensure the sustainable utilisation of fisheries resources.

FOCUS

UTILISATION ET DISSÉMINATION DE DONNÉES GMES & AFRICA À MADAGASCAR

Auteur: John Bemiasa [Institut Halieutique et des Sciences Marines (IHSM)/ Centre national de Données Océanographiques (CNDO, Madagascar)]



Les données d'observation de la terre sont stockées et gérées par l'Institut Halieutique et des Sciences Marines (IH.SM) à travers le Centre National de Données et d'Information Océanographiques de Madagascar (MD CNDO). Il s'agit de données de couleur de l'eau et de sa température, reçues au niveau de la station GMES & Africa (MODIS Chl-a, SST et produits dérivés comme les fronts SST). Les principaux utilisateurs de données sont les chercheurs dans le domaine de la science marine, les étudiants, les autorités et les opérateurs en mariculture. Les moyens de dissémination de données et d'information sont divers : sous forme d'atlas, bulletins, cartes et des supports numériques.

Une station de réception de données satellitaires a été installée à l'IH.SM en 2010, sous le sigle AMESD¹.

Le consortium sous le thème « Management of the Marine and Coastal Resources of Eastern Africa and Indian Ocean » auquel fait partie l'IH.SM regroupe les institutions des pays de l'Afrique de l'Est et les îles adjacentes.

La station GMES & Africa (e-Station) reçoit de données satellitaires via EUMETCAST. Les données sur la couleur de l'eau (MODIS-Aqua Chlorophylle-a, 4 Km et 1 Km de résolution spatiale) et de la température de surface de la mer (TSM ou SST en anglais) sont les principales informations que le 'e-Station' enregistre par le biais de l'antenne de réception.

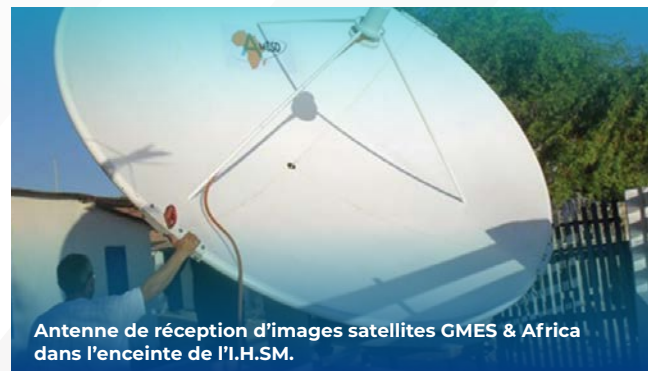
Par ailleurs, des produits dérivés sont générés par la station, à l'instar des fronts SST, et disponibles pour les usagers concernés. Sous divers formats (.tiff, shp), les données sont produites chaque jour sous forme de composite de 3 jours, de moyenne mensuelle et climatologique.

Comme tous les pays/institutions membres du consortium, les besoins en données et informations satellitaires fournies par le 'e-Station' sont importants pour Madagascar, et en particulier pour l'IH.SM. Les utilisateurs sont les chercheurs scientifiques qui travaillent dans les domaines marin et côtier, les étudiants, les opérateurs en mariculture, les autorités de la pêche.

Dans le domaine de la recherche, les données de la station ont été utilisées par des chercheurs pour la production des articles scientifiques. Pour illustration, Soambola et al. (2018), dans leurs études sur les épisodes d'intoxications causées par la consommation des animaux marins (ICAM) dans la baie d'Antsiranana, ont exploité les données de la station dans leurs investigations.

Par ailleurs, le centre reçoit régulièrement des étudiants universitaires en stage pour leurs diplômes (Licence et Master en Océanographie). A ce titre, en 2018, deux stagiaires de l'Université d'Antsiranana étaient venues effectuer leurs stages en exploitant les données de la station. Enfin, les autorités de pêche bénéficient du service de la station par l'intermédiaire de l'observatoire d'Intoxication par Consommation d'animaux Marins - ICAM (hébergé par l'IH.SM) qui fournit régulièrement des informations sur l'évolution des blooms algaux toxiques en mer.

1 African Monitoring of Environment for Sustainable Development.



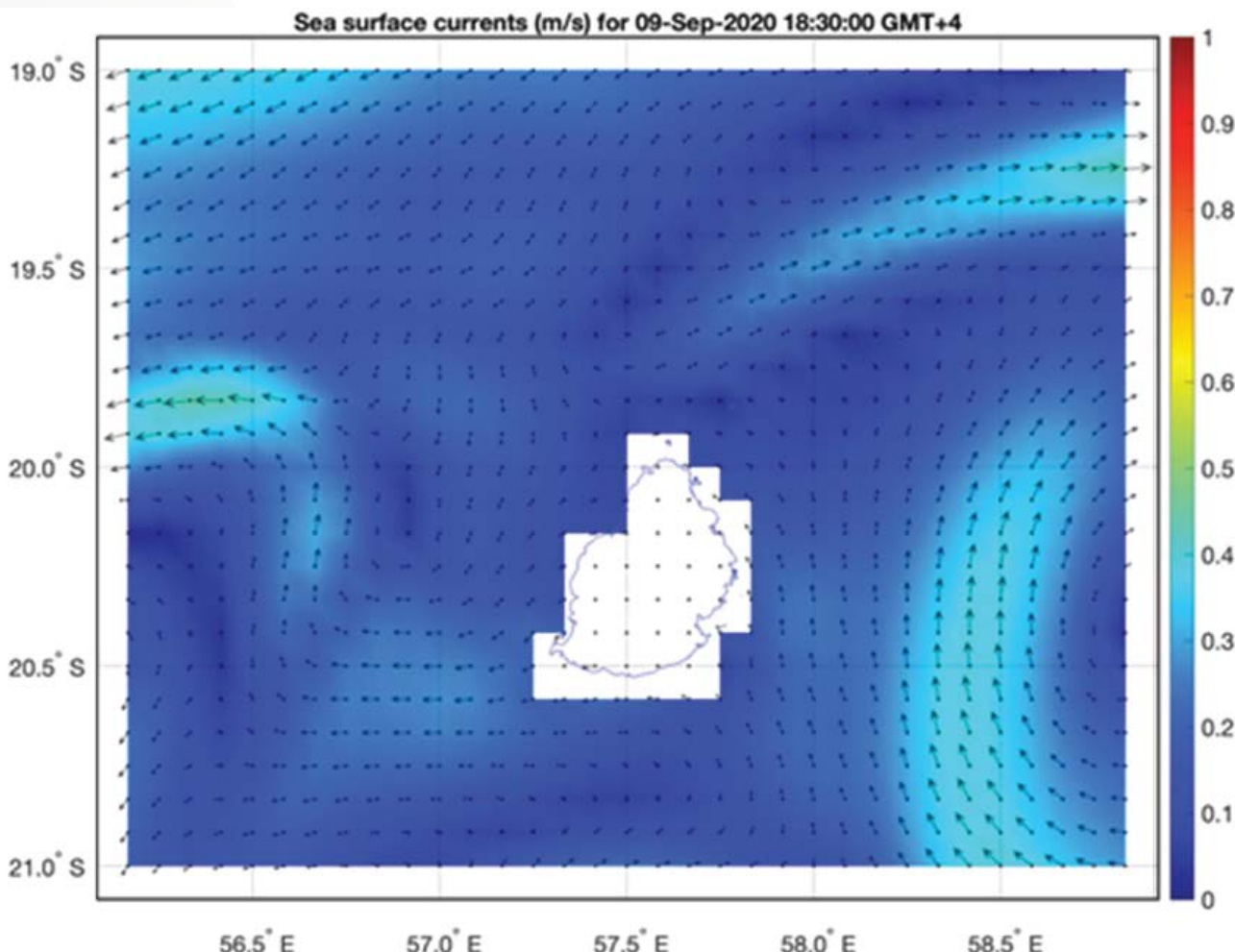
Antenne de réception d'images satellites GMES & Africa dans l'enceinte de l'IH.SM.

Le suivi permanent de ce phénomène est assuré par le centre (e-Station) en utilisant les données de MODIS Chl-a et SST comme indicatrices de la présence de ces micro-organismes responsables d'ICAM.

Les données et informations fournies par le 'e-Station' sont disponibles aux utilisateurs sous diverses formes. Si les formats TIFF et SHP (cartes) sont les plus fréquents, leur dissémination se fait par différents moyens: supports numériques, rapports, publications, bulletins et atlas.

L'exploitation de la station de réception d'images satellitaires GMES & Africa a permis aux utilisateurs nationaux de satisfaire leurs besoins en matière de recherche/utilisation de données et informations sur l'observation de la terre. La période 2018-2020 marque la phase pendant laquelle l'usage et la dissémination des données fournies par la Station atteignent une certaine diversification, à l'instar de la production des articles scientifiques par les universitaires et l'Atlas marines. L'insuffisance de personnels qualifiés qui travaillent au centre, en temps plein, constitue un défi à relever pour assurer l'efficacité de services fournis. On souhaite que l'après GMES & Africa serait la continuation/capitalisation des acquis pour le bénéfice des usagers de données et informations fournies par la station (e-Station).

TRACKING OIL SPILL USING COPERNICUS MARINE DATA



Sea surface current forecast map on an hourly basis around Mauritius, highlighting the direction and magnitude of the surface current.

During an oil spill, responders need to know its location, extent, direction and magnitude in order to protect shorelines and ecologically sensitive areas with containment booms, stage clean-up equipment, or close areas for fishing and boating.

In order to answer these questions, oceanographers use specialised computer models to predict the movement of spilled oil on the water surface. They predict where the oil is most likely to go and how soon it may arrive there. During a major spill response, trajectory maps are created to show predictions for the path of spilled oil. However, to predict the oil movement, oceanographers model how weather, wind, tides and currents affect oil movement.

In the framework of the GMES and Africa programme, the Mauritius Oceanography Institute (MOI) is using forecast data from the Copernicus Marine Environment Monitoring Service. The Copernicus marine project targets the provision of a Marine Core Service based on the provision of ocean state variables, derived from in-situ and satellite remote sensing observations and numerical models, to meet the needs of the response agencies. Particularly, the GMES project aims to provide products to assist downscaled and downstream services within key areas such as 3 days marine weather forecast.

Under the marine weather forecast application, the sea surface current has been a crucial tool to predict the movement of oil slick, where and when it will drift, which resources will be threatened after a given time interval. As a result, the hourly sea surface current forecast, a product derived under the GMES and Africa project has been critical in monitoring the oil slick movement off the South East coast of Mauritius. On a daily basis, these images were presented to the National Crisis Committee, whereby decisions were taken on the placement of booms to contain floating oil and also for prediction of any new oil spill. MOI through GMES is continually providing these informations to the technical committee for the monitoring of the ecosystem in the South East coast of Mauritius.

EVENTS



THE USE OF EARTH OBSERVATION DATA TO SUPPORT MARINE AND COASTAL APPLICATIONS

A training course entitled "The use of Earth Observation data to support Marine and Coastal applications" was organised by the Mauritius Oceanography Institute in collaboration with the Council for Scientific and Industrial Research, South Africa and the support of EUMETSAT. This training which builds on the "GMES & Africa and Copernicus Marine Earth Observation Training" focused on the use of Sentinel and Copernicus marine data in marine and coastal applications.

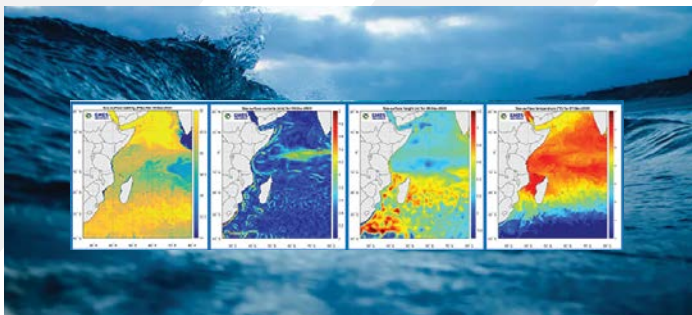
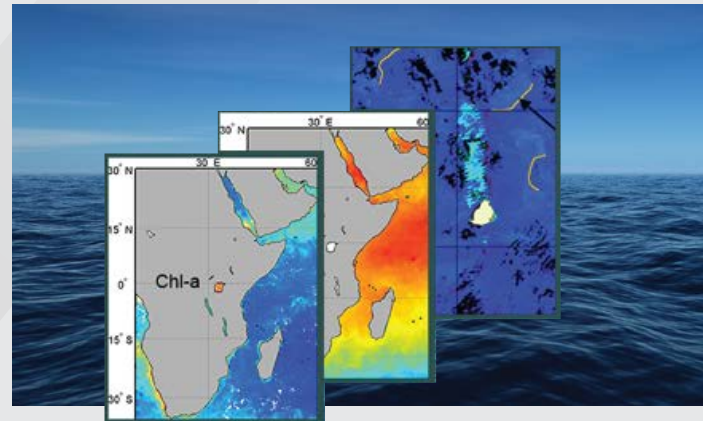
The classroom phase for the Mauritian participants took place from the 24th to 28th of August 2020 at Le Labourdonnais Hotel, Caudan Waterfront, Port Louis, Mauritius. Participants from Kenya, Madagascar, Seychelles and Tanzania attended the course via Zoom. The resource persons for this training included Dr. Marie Smith, Mr. Christo Whittle, Dr. Hayley Evers-King and Mr. Oliver Clements.

A total of 16 participants attended the training which focused on the concepts around EO across the value chain, the underlying principles of marine remote sensing, accessing and downloading data and products, and how to work with different open source tools.

The training started with a two weeks self-taught phase on the EUMETSAT moodle platform on the 10th August 2020.

THE USE OF E-STATION FOR GENERATING PFZ MAPS AND BULLETIN CHARTS

The online training course on the use of eStation for generating Potential Fishing Zone (PFZ) maps and bulletin charts was held from the 28th to 30th September 2020. Topics covered were related to the "Monitoring and Forecasting of Physical and Biological Oceanography variables" and "Fishing Zones Monitoring and Protection" applications of the Marine and Coastal Management Service. It targeted stakeholders who are involved in the production of Potential Fishing Zone maps and Monthly Oceanographic Bulletins.



3 DAYS MARINE FORECAST

An online training course on "3 Day Marine Forecast" was carried out from the 14th to 16th December 2020 which included the participation of 16 representatives from Meteorological Services in the Eastern Africa region. This online training covered topics related to the generation of sea state advisories using data available from Copernicus Marine Environment Monitoring Service. It provided an overview of the tools developed for the processing and analysis of sea state forecast data under the GMES & Africa 3-Day Marine Weather Forecast application.

ABOUT



GMES AND AFRICA

The Global Monitoring for Environment and Security and Africa (GMES and Africa) is a flagship programme of the African Union Commission (AUC) under the African Space Policy and Strategy. It sets a pathway for the continent to be globally competitive in space activities, including Earth Observation (EO), and to develop a viable continental space programme. With continent-wide coverage, the programme is implemented through grants to African institutions under the banners of regional consortia. 12 consortia have been awarded grants through open competitive bidding to implement projects in water, natural resources, marine and coastal areas management. They represent 114 institutions, established in 45 African countries and 6 European Countries.

Jointly co-financed by the European Commission and the African Union Commission with a total budget of 30 Million EURO, the AUC is the 'delegated authority' responsible for the management of the programme. Copernicus Programme data and services are used and adapted to the African context with a view to specifically respond to African needs with respect to services related to water, natural resources, marine and coastal areas and to address the global needs to manage the environment, mitigate climate change and ensure civil security. The programme enables the implementation of the African Space Policy and Strategy, and harnesses the continent's capabilities in utilising space science and technology for economic growth and sustainable development. The aim of the GMES and Africa Programme is to improve African policy-makers', planners', scientists', business and private sector and citizens' capacities to design, implement, and monitor national, regional and continental policies and to promote sustainable management of natural resources through the use of EO data and derived information.

THE MOI CONSORTIUM

Consortium Members



Mauritius Oceanography Institute



Tanzania Fisheries and Research Institute



Institut Halieutique et des Sciences Marines



Western Indian Ocean Marine Science Association



Kenya Marine Fisheries Research Institute

Associates



Plymouth Marine Laboratory



Seychelles Meteorological Authority



Council for Scientific and Industrial Research - South Africa



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