MarCOSIO: The use of earth observation data towards more efficient sea rescue missions in the Southern African Oceans

BACKGROUND:

Incidents of people drowning, fatalities, property loss and damage occur daily in South Africa and neighbouring countries. These incidents are often a result of people going out to sea without adequate knowledge of the prevailing conditions, or how those conditions may change while they are at sea. Therefore, this raises a need for monitoring of the oceans and provision of information regarding sea state to all that make use of the ocean including artisanal fishermen, coastal communities, tourists and other sea farers. Conversely, there is a need to provide safety to all that make use of the oceans and to assist in cases where lives and property get lost or distressed at sea. The South African Exclusive Economic Zone covers approximately 1.5-million km² across the Atlantic, Southern and Indian Oceans, therefore carrying out a rescue mission is equivalent to looking for a needle in a haystack. The vast area and high levels of activity in the Southern African oceanic territory pose a challenge to effective monitoring of the ocean and performing sea rescue missions.

The MarCOSIO Safety at Sea service, developed in 2019, under the GMES and Africa project, makes use of earth observation data as a wide area monitoring tool to enable safe use of oceanic territories as well as to support rescue missions by authorised personnel. The service provides vital sea state and rescue information for Southern Africa and Indian Ocean region.

MarCOSIO

KMFRI | NATIONAL SEA RESCUE INSTITUTE | UNIVERSIDADE EDUARDO MONDLANE | WIOMSA | reef CONSERVATION | ABALOBI | Benguela CURRENT CONVENTION | CORDIO East Africa

MarCOSIO: The use of earth observation
data towards more efficient sea rescue missions
in the Southern African Oceans

END-USER'S PROFILE (BENEFICIARY ORGANIZATION):

The National Sea Rescue Institute (NSRI) has a mandate to carry out rescue missions in the South African coastal ocean, shelf sea, oceanic territories and neighbouring countries, supporting local authorities.

The NSRI is the first partner and user of the MarCOSIO Sea Rescue application. The NSRI is a volunteer rescue organisation that is on call 24/7. Their mission is to save lives in South African waters. They provide more than a rescue service by also educating communities on water-safety.

The NSRI has 51 rescue stations along the coastline and has core staff as well as over 400 volunteers. The NSRI further supports neighbouring states Namibia and Mozambique who have resource constraints and therefore need assistance with rescue operations. It costs about 200mil a year to operate a sea rescue organisation. The NSRI further works closely with law enforcement agencies because often rescues can turn into law enforcement matters.

END-USER'S NEEDS:

Prior to the development of the tools, the NSRI used spreadsheets and calculators to determine search areas during rescue operations. With the development of the Marcosio tool, user needs were gathered through a service co-design model based on extensive interaction with users in the public and private sectors. These were conducted through one-on-one meetings, specialised Technical Advisory Groups, and narratives around case studies. These main user requirements were identified by the NSRI. The NSRI indicated that, firstly, a web-based search and rescue tool must gather ocean weather information from several global regional and local weather models, to ensure consistent access to this required information. The tool must perform search and rescue calculations, with an output search area and estimated time of rescue, that will be used by rescue personnel to search for objects and persons lost at sea. The tool must also consider the changing weather patterns and allow for refinement of search parameters even after the initial search area is defined. Secondly, the public facing web-based sea state viewer must provide information to ordinary sea farers and users of the ocean in a simplified format, where a user can find their location and request ocean weather conditions.

INFORMATION PROVIDED:

The sea rescue application consists of several components that provide functionality for acquiring required ocean weather information, updating the weather information, performing search and rescue parameter and drift calculations, as well as visualisation of the results on a map interface.

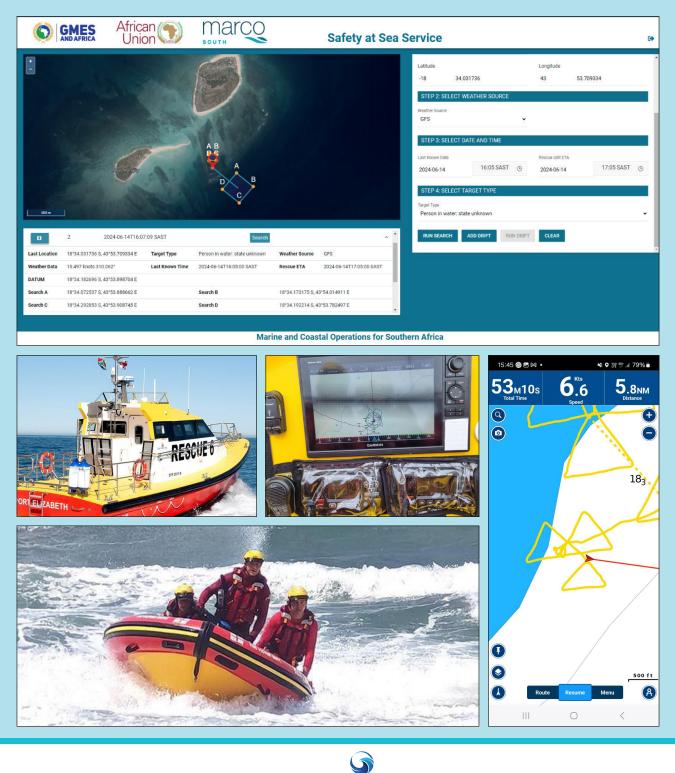The ocean weather data, including ocean waves forecasts and global sea surface winds, are acquired from two global models, The Global Forecasting Service (GFS) and the Copernicus Marine Data Products. More detailed and localised products such as currents are acquired from models developed by regional agencies such as the South African Weather Service. All forecasts' data are available for at least 7 days, updated six hourly with a temporal resolution of one hour.

USAGE:

After being trained, NSRI is equipped to utilize the sea rescue application for several purposes. Firstly, to train new and existing rescue volunteers on how to perform a sea rescue. A dummy object is thrown overboard then two calculations for rescue parameters are made using the tool. The rescue volunteers then go out into the ocean to retrieve the object. Secondly, for planning of rescue missions and deployment of relevant resources. Lastly, for engagement with other regional sea rescue teams on how to undertake rescue missions.

In addition to NSRI, the service is available to other sea rescue institutions and includes a public-facing interface for general use. The service can be accessed via a web interface at: **https://ocims.csir.co.za/coastops/**

IMPACT:

The tool has been very successful in South Africa, particularly with the NSRI. The MarCOSIO Sea Rescue service enables the NSRI to timeously undertake rescue missions allowing for more rescues and less recovery.

As a result, the NSRI has recently been involved in the following notable rescue missions, including recently sunken fishing vessel MFV Lepanto, **https://thefishingdaily.com/international-fishing-news/tragic-sinking-of-trawler-lepanto-claims-eleven-lives-off-south-africa/ and health scare on cruise liner:https://www.nsri.org.za/2024/03/urgent-medical-situation-of-a-local-adult-female-onboard-a-cruise-liner**/ .

OUTREACH:

The service has been introduced to other user groups in the region, including sea rescue authorities in Namibia, Angola and Mozambique. The NSRI is currently engaging with teams in Madagascar on how to start up a sea rescue organisation and is introducing the MarCOSIO sea rescue tool as one of the tools that can be used in this regard.