Third session of the Joint WMO-IOC Technical Commission
for Oceanography and Marine Meteorology (JCOMM-III)

Marrakech, Morocco, 4-11 November 2009

Marine Meteorological activities in Morocco

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- Introduction
- Marine Meteorological Organization
- Marine Observation Activity
- Modeling Activity
- Marine Meteorological Support Activity
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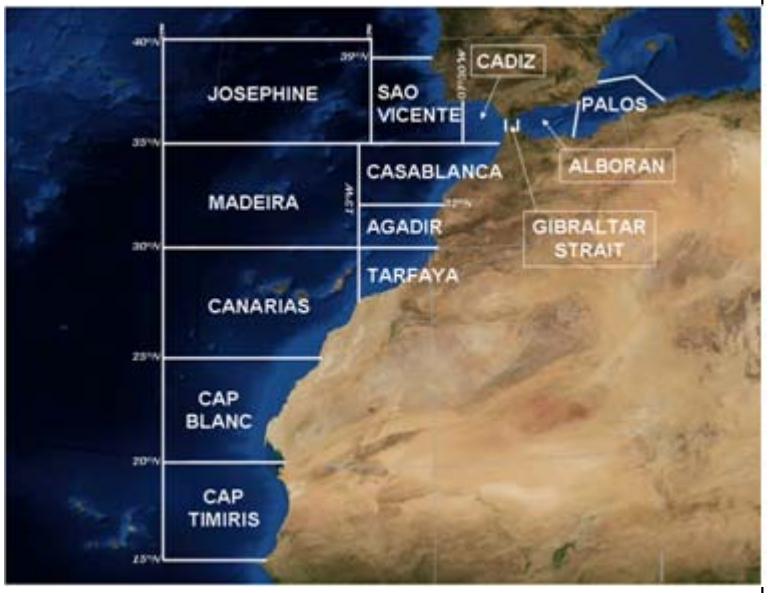
introduction

- 3500 km of coasts
- exclusive economic zone of about 1 million km²
- two coastlines: one on the Mediterranean and the other on the Atlantic,
- location at the crossroads of maritime routes,
- proximity to the Gibraltar Strait (28% of world seaborne traded oil)
- 30 ports:12 multipurpose ports ; 12 fishing ports, 6 marinas
- diversity of hydrological and ecological characteristics of its watershed
- marine fisheries sector employs over 400,000 people
- generates a turnover of about $ 1 billion.
- Tourism projects, oil exploration, etc.



introduction

- Alert users in case of dangerous marine meteorological phenomenon to save or reduce loss of lives and property;
- Provide a tool for decision support in planning operations at sea or in ports to increase efficiency and profitability of various maritime economic activities;
- Participate in search and rescue at sea by the SAR provision of meteorological services to ensure safe operations and optimize search efforts;
- Contribute to the conduct of operations against maritime pollution by forecasting the drift of the spillage of pollutants to organize and guide control operations to areas in imminent danger;
- Accompany the maritime professionals, coastal managers, investors in the seaside tourism, specialists in their aquaculture projects, studies statistical characterization of oceanographic-meteorological sites.

Marine Meteorological Organization

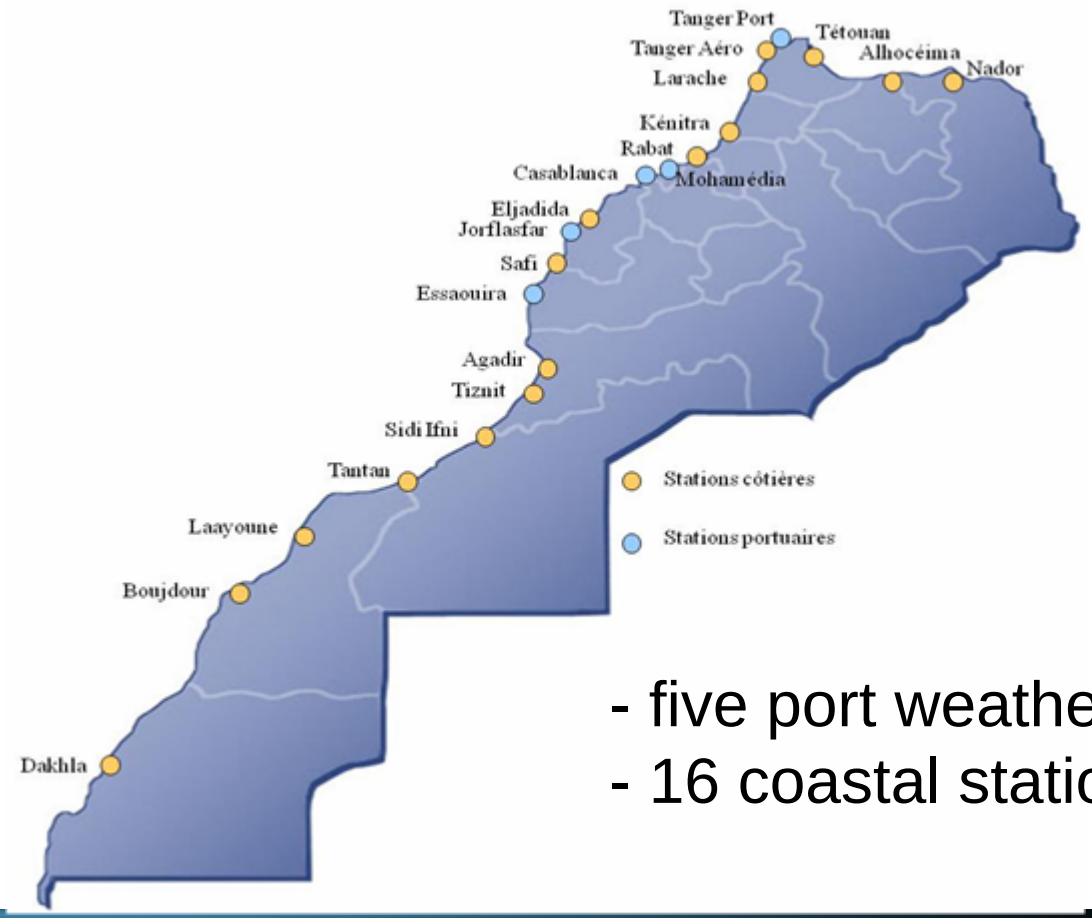
Three forecasting and assistance levels:
1.The Central Marine Meteorology is responsible for:
-security mission in Moroccan marine areas
-Weather Watch and warnings
-Sets and communicates the overall framework of the synoptic forecast
-adaptation and development of marine modeling activity and operational use of numerical models
-Providing marine meteorological information and services to support marine pollution and search and rescue.

Marine Meteorology Organization

2. The Regional services are responsible for:
- monitoring the marine weather warning
- adaptation of the prediction at regional and local context.
- provide assistance to local and regional users.
- participate in assistance activities relating to marine pollution and search and rescue
- focal points of the DMN in their respective regions.
-manage the weather stations on the main ports.

3. Port weather station :
- weather and marine observation
- monitoring the marine weather warning.
- assistance to users of the port (Briefing, forecast maps),

Marine observation Activity

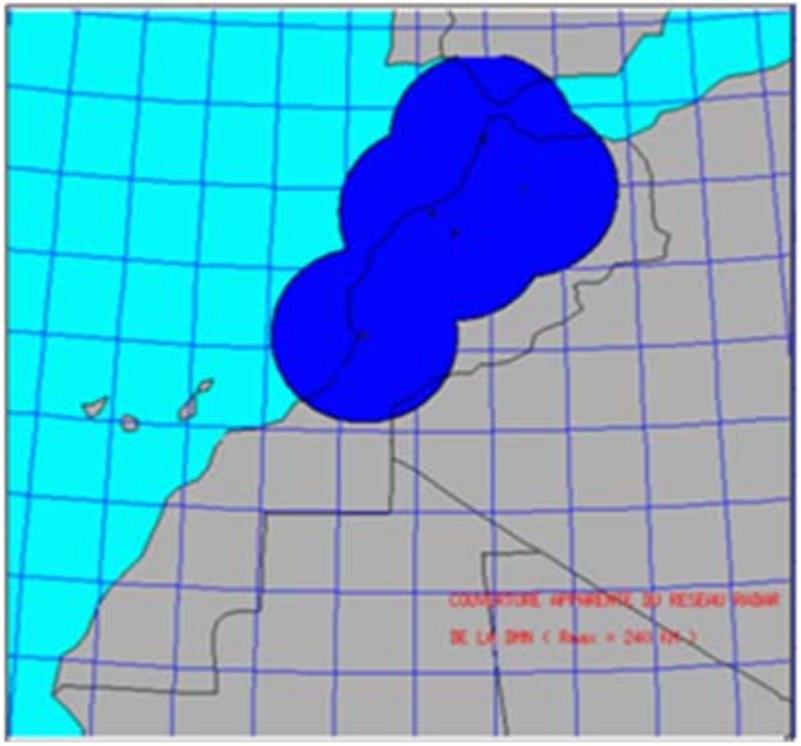


- five port weather stations
- 16 coastal stations

Marine observation Activity

The DMN operates the following remote sensing systems :

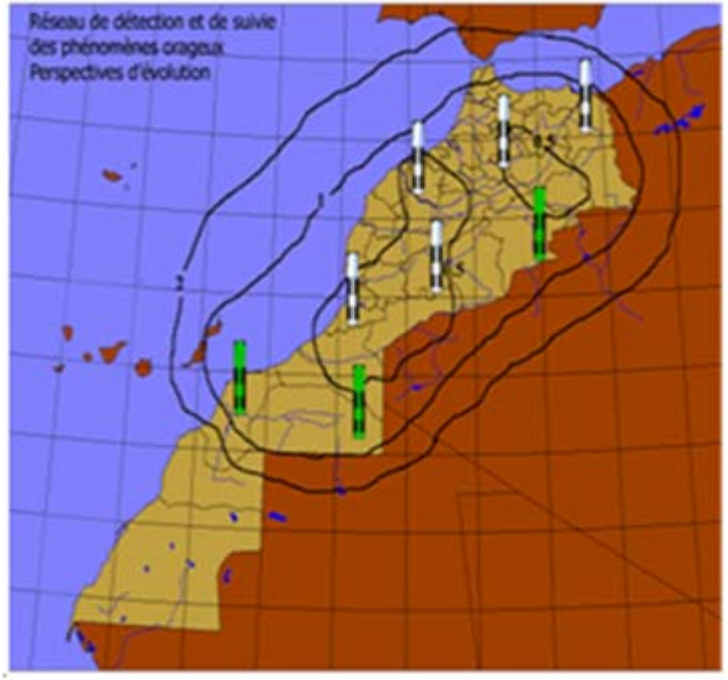
- Receiving stations images Meteosat Second Generation MSG.
- A network of six weather radar with a range exceeding 240Km situated in Larache, Casa, Fez, Khouribga, Bengrir and Agadir.



Couverture du réseau radar

Marine observation Activity

- A network consisting of five lightning sensors covering not only most of the territory, but also a large part of our maritime areas. This system allows monitoring of thunderstorm activity with detection efficiency greater than 90% and a positional accuracy of less than 1Km.



Couverture du réseau foudre

Marine observation Activity

the DMN use all data circulating on the GTS, in particular the comments made by vessels volunteers, drifting and moored buoys deployed in the framework of international programs, etc..

With cooperation between the DMN and Météo-France, the ship Aknoul of COMANAV, was recruited in January 2008 and equipped with an automatic station type BATOS. The first observations began circulating on February 28, 2008.

Ligne de navigation Casa-Marseille effectuée par le bateau Aknoul

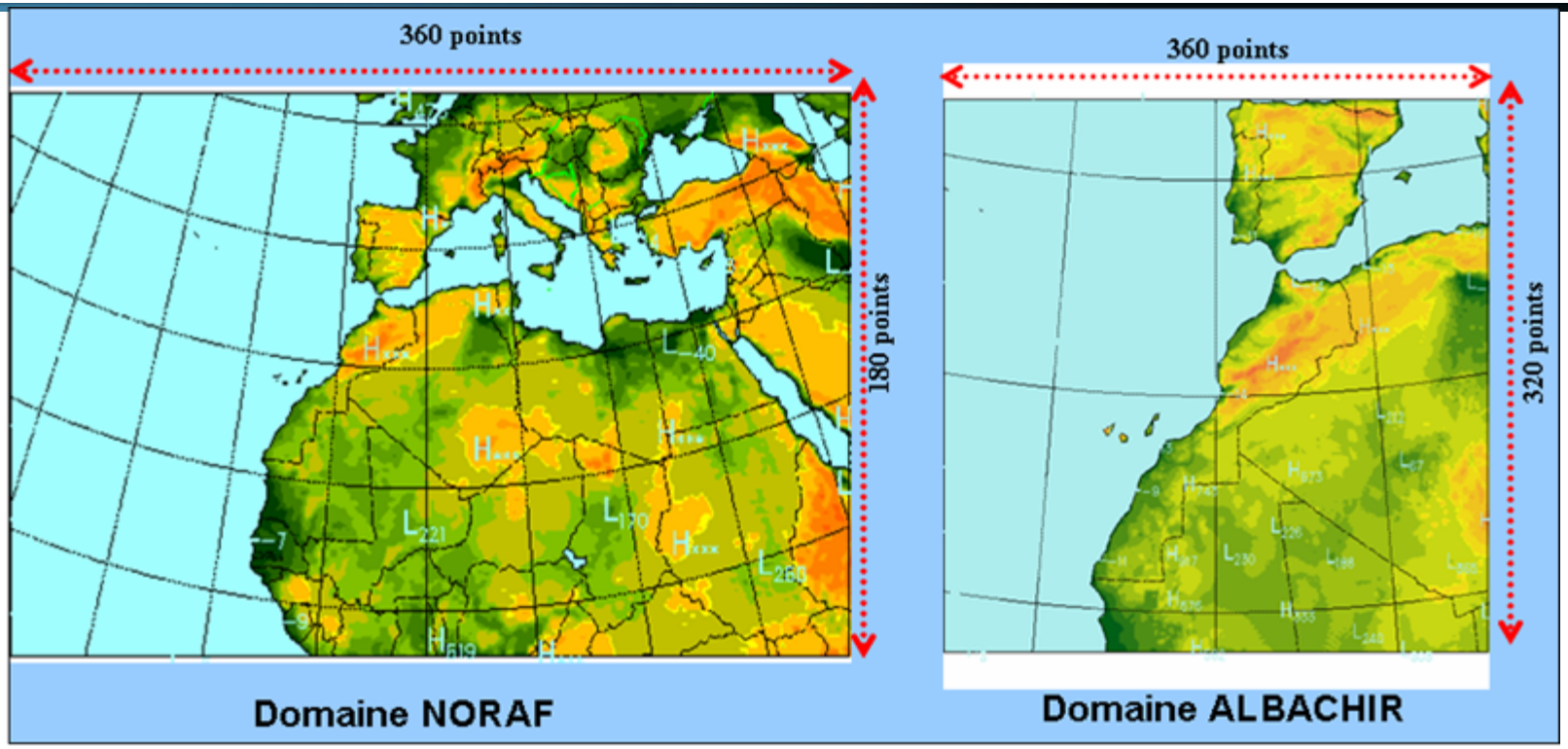
Marine observation Activity

In addition, the DMN has signed a partnership agreement with the Royal Navy, covering, among other aspects the observation. To this end, the Convention provides the establishment of observation station at the semaphores and equipment of vessels with automatic stations.
The first station will open at the semaphore port of Agadir

Modeling Activity

Atmospheric models:
Since 1996, the DMN operates a system of operational numerical weather prediction model based on the ALADIN Community. The application built around ALADIN named ALBACHIR in DMN. The NWP system of DMN can run the model in two versions ALBACHIR limited area on two different geographical areas: North Africa ALBACHIR to 28 km resolution and ALBACHIR Maroc to 9 km resolution with outputs up to 72H

Modeling Activity



DMN operating model outputs of Météo-France (ARPEGE for atmosphere and VAG to predict the sea state), the (ECMWF) and UKMET Office.

Modeling Activity

Wave models:
- the WAM model implemented in the DMN since 2001 for deep waters.

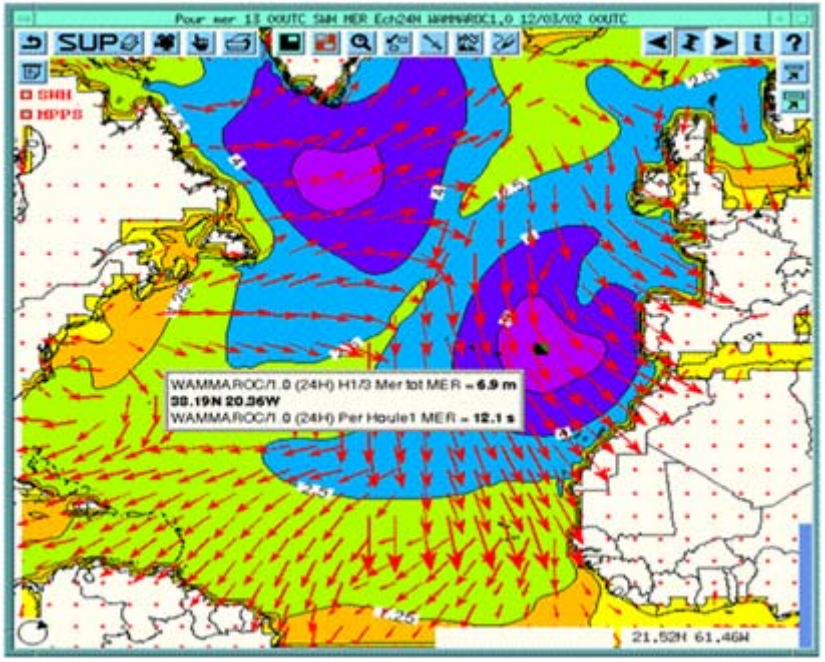
- the SWAN for the shallow waters.

These models have been adapted and validated on the area of Morocco.

Several versions are available:

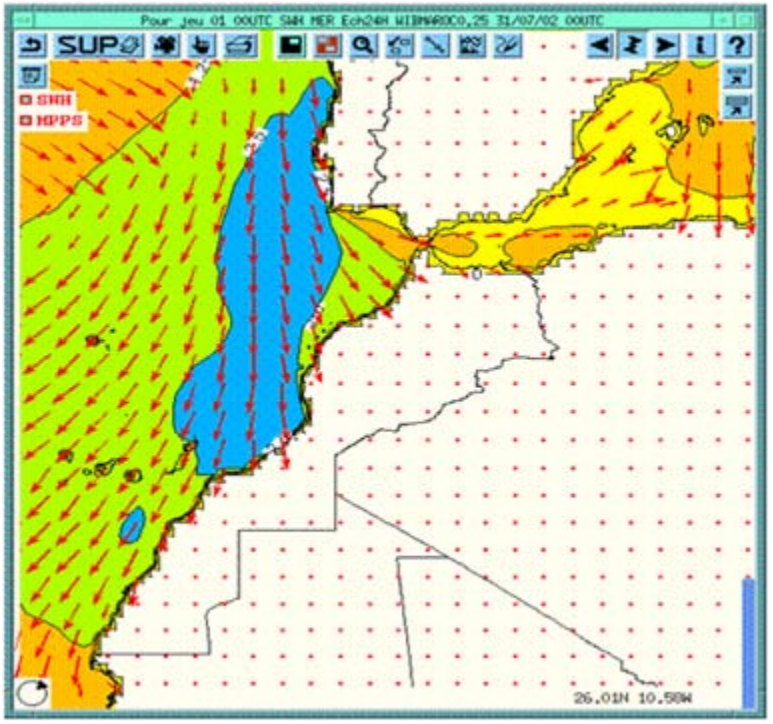
Modeling Activity

- WAM-NA, covers the North Atlantic with a resolution of 1 ° x1 °. It provides a global view of the evolution of wave fields associated with depression of the North Atlantic. The forcing is done by the wind field at 10m provided by the ARPEGE atmospheric model with a spatial resolution of 1°x1°, and a time step of six hours. These fields come regularly via the GTS. The WAM model outputs are available twice daily at 00h and 12h UTC.



Modeling Activity

- WAM-Maroc, with a resolution of about 9km. It offers a relatively detailed description of wave fields in our area of maritime responsibility. The forcing of this model is carried out every three hours by the wind field at 10m from the atmospheric model with a NORAF (resolution of 0.25 ° x0.25 °). boundary conditions are provided by the WAM-NA. The WAM-MAROC uses the files of the bathymetric database ETOPO5.

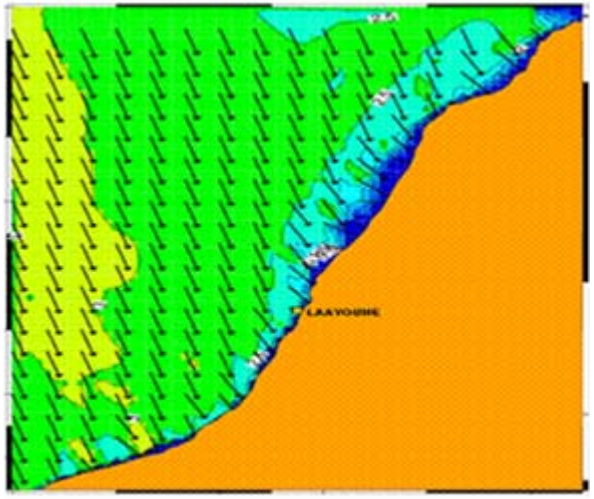


Modeling Activity

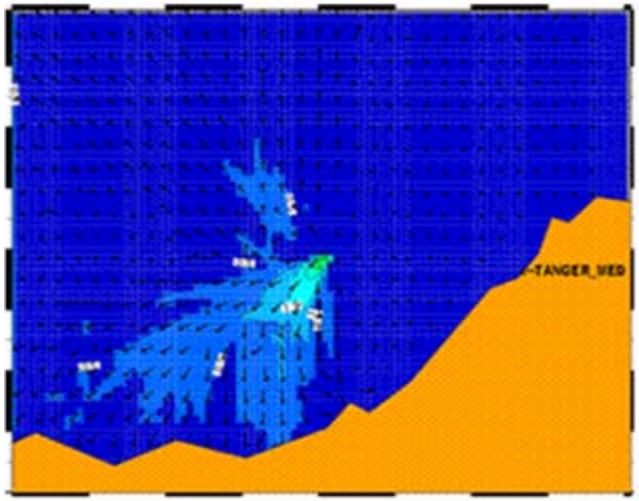
- SWAN can cover an area of interest with a resolution of 2km. To improve the prediction on a particularly sensitive area, we can use techniques appropriate for modeling the state of the sea in coastal areas. These techniques take into account the specific phenomena and shallow waters such as bathymetry, refraction, diffraction, and the currents and tides. The forcing is carried by winds ALBACHIR model and boundary conditions are provided by the WAM-MAROC.
SWAN uses bathymetric database files GEBCO.

Modeling Activity

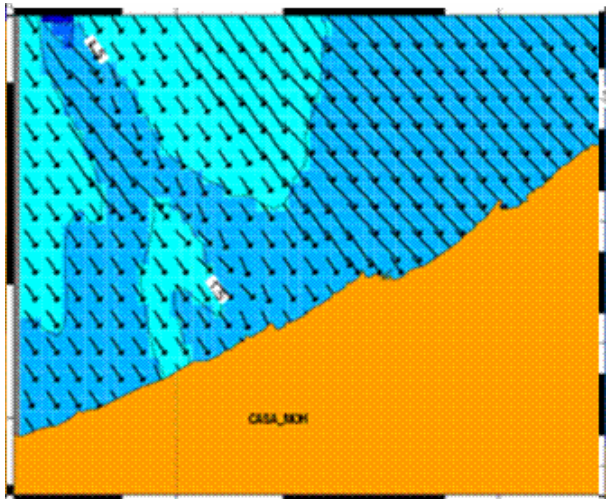
Three versions are currently operational to meet the needs of customers in the marine meteorological following areas:
Wharf Phosboucraa in Laayoune
Tanger-Med Zone in Gibraltar strait
Casa Mohamedia Zone on the Atlantic coast.



SWAN Laayoune



SWAN Tanger-Med



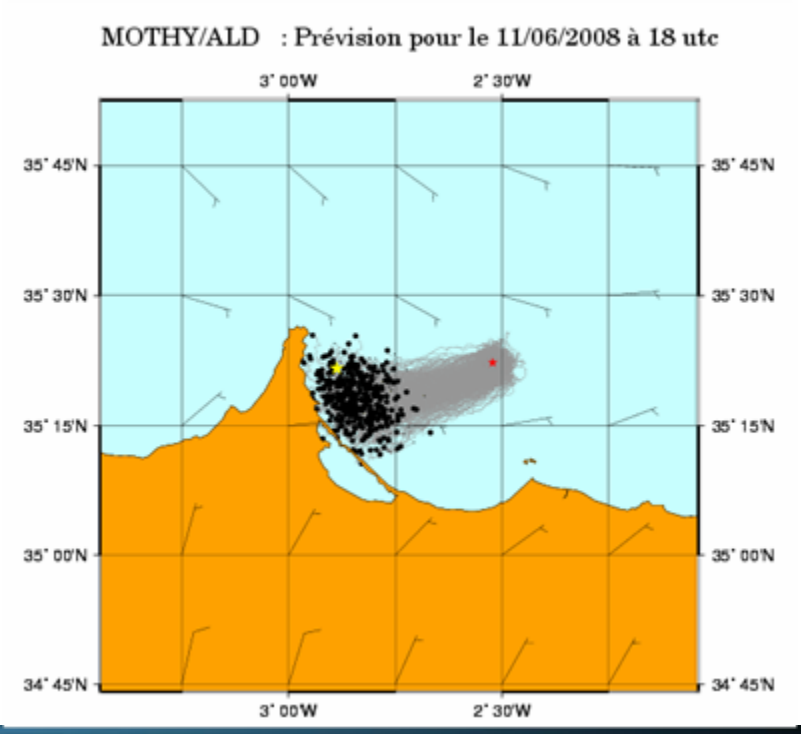
SWAN Casa-Mohamedia

Modeling Activity

Model monitoring of marine pollution:
Through cooperation with Météo-France, the DMN has completed the adaptation of French MOTHY model with the specificities of Moroccan coasts. It is introduced in the model parameters on tide, bathymetry and currents related to our area, it forced using the wind fields and sea level pressure of Moroccan atmospheric model ALBACHIR.
The graphics outputs can give a forecast of the most probable trajectories of the drift sheets of pollutants over several days.

Modeling Activity

Model MOTHY has been operational for the first time in June 2008 on the occasion of the participation of DMN to exercise simulex2008 off Nador city.



Marine meteorological support Activity

The Meteorological and Marine Forecasting for the Assistance of Navigation and Shipping Operations is provided continuously, on the maritime areas of responsibility and the wide coastal strip of 20 nautical miles. These forecasts bulletins are distributed at fixed frequencies by the Coastal radio stations.

However, a great need for specific assistance is requested by customers.

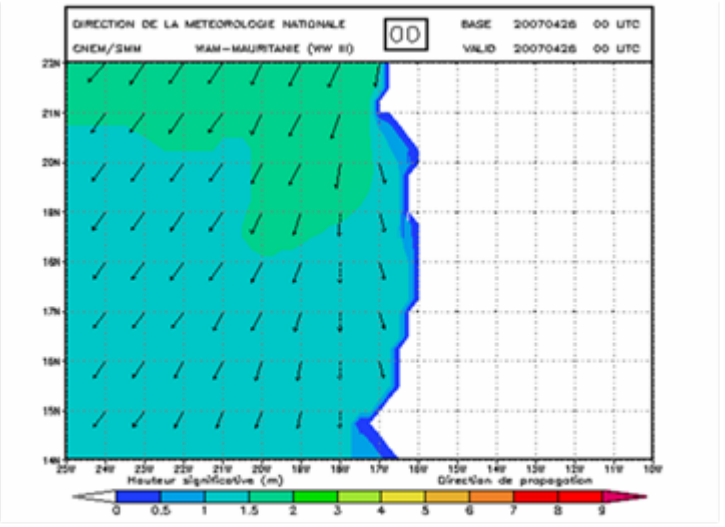
In this sense, the DMN has set up two initiatives:

- The board of assessment and guidance (CEO) which is a part of listening and discussing the needs of partners with the goal of continuously improving quality service and provide valuable weather and climate information to the maritime sector.
- Quality approach that puts the customer at the center of the DMN concerns.

International cooperation

The DMN provides technical assistance in the field of Maritime Meteorology to Senegal. Every day, digital and graphics products are dissiminated to Meteorological service.

Training was organized in Dakar in 2006. Several workshops were also organized in Casablanca with the aim of supporting the country in the establishment of a marine meteorological service for the benefit of the sea users



Champ de vague prévu par le modèle WAM sur le large de la Mauritanie

International cooperation

Similarly, digital products and graphics on the marine forecast is provided daily to the meteorological service in Mauritania.

The DMN has also participated in the project of capacity building in marine meteorology in West Africa sponsored by WMO and Spain.

Furthermore, contacts are being made with the organisation of Spanish ports (puertos del estados) in the field of modeling waves at very fine mesh.

Actions in Development

Recognizing the importance of meteorological services for marine users, the DMN has scheduled several activities for development in all aspects:

For observation:

- Continue efforts to automate port stations.
- Installation of automatic stations at sites of semaphores of the Royal Navy.
- acquisition of marine radars to measure the characteristics of waves and currents.
- Continuation of effort recruiting voluntary ships.

In terms of wave modeling:

- The assimilation of Envisat and Jason1 data in the wave model.
- Increasing the range of waves forecasts from 3 to 5 days.
- Generalization of the SWAN model on the port sites.
- The implementation of systems for forecasting waves in very fine mesh.

THANK YOU FOR YOUR ATTENTION