MOON IN SUPPORT OF THE STATE OF MARINE ENVIRONMENT ASSESSMENT

Giovanni Coppini *, Nadia Pinardi and MOON Members

Istituto Nazionale di Geofisica e Vulcanologia, Via D. Creti n°12, 40128 Bologna Italy - coppini@bo.ingv.it

Abstract

The main elements of the Mediterranean Operational Oceanography Network-MOON forecasting system were implemented as part of several EU projects and national funding. MOON was established in 2005 for the further development of ocean forecast products in the basin, and represents the EuroGOOS system in the Mediterranean Sea. The MOON observations, forecasts, and analyses are available in real time on the MOON web site: (www.moon-oceanforecasting.eu). MOON is producing a monthly bulletin that contains the observation collected in previous month, the air-sea fluxes, the anomalies and the climatic indices computed by the modelling system. On the basis of this product MOON community is developing a customized monthly bulletin of the ocean state together with UNEP/MAP in support of state of marine environment assesment.

Keywords : Circulation, Temperature, Salinity, Eutrophication, Ocean Colours.

MOON is based upon the demonstration of the real time functioning of an integrated system composed of: a) the Near Real Time Observing system; b) a numerical forecasting system at basin scale and for sub-regional and shelf areas; c) a product dissemination/exploitation system. The latest updates of the system considers a model at 6.5 km horizontal resolution, daily 10 days forecasts, weekly analyses with assimilation of all available data, both from 2 satellites (SST, SLA) and in situ (XBT, ARGO). Sub-regional (ADRICOSM-Adriatic Sea, ALERMO-Levantine and Aegean, ESEOO-West Mediterranean, NW-MED-West Mediterranean, POSEIDON-Aegean Sea, Sicily Channel) and coastal forecasts (CYCOFOS-East Levantine, Gulf of Lyon, Israel coasts, ROSARIO_Malta Shelf) up to 2-1 km resolution, in several open ocean and shelf areas are produced as part of MOON.

The MOON observations and the forecast and analysis data are available in real time on the MOON web site: (www.moon-oceanforecasting.eu). The user community is composed of governmental and military agencies, environmental protection agencies, research institutes, and private companies. MOON has developed and is implementing biogeochemical models coupled to the forecasting system for future predictions of algal blooms in different shelf areas. End-users applications involve oil spill forecasting, real time observing and modelling system for commercial species fish management.

The MOON Marine Core Services derived by the observing system components and running operationally progressively since summer 2004 are: 1) a SOOP-VOS system composed of 9 tracks with 12 nautical miles' resolution and full profile transmission [2]; 2) an altimeter RT data analysis system using four available altimeter sensors for sea surface elevation anomalies, RT analysis of AVHRR with the production of daily SST fields and RT Scatterometer wind analyses blended with NWP products; 3) 23 MedARGO floats deployed at 350 m parking depth, 700 m profiles and 5 days cycle (every 5 cycles a 2000 m profile is collected); 5) a moored buoy network (M3A) (E1-M3A and POSEIDON network in the south Aegean Sea, W1-M3A in the Ligurian Sea, Cyprus Buoy in the Levantine, W2-M3A in the Catalan Shelf and ESEOO buoys network in the Spanish coast). The RT data dissemination network works properly on a daily time scale.

The MOON MCS derived by the forecasting system component are composed of:
1) 10-day basin scale forecasts done with an OGCM at 6.5 km resolution and 71 levels. The forecasts is produced in real time on daily basis [1]
3) 5-days regional forecasts at 3 km resolution in 6 sub-regions nested in the basin scale model: Western Mediterranean (ESEOO), North-Western Mediterranean, Sicilian Strait, Adriatic Sea (ADRICOSM), Aegean Sea (POSEIDON) and Levantine-Aegean Sea (ALERMO). 5-days shelf (1,5 km resolution) forecasts nested in the sub-regional models (Gulf of Lion, Malta Shelf (ROSARIO), Cyprus Coastal Ocean Model (CYCOFOS), Southern Eastern Levantine Shelf). In additino the ESEOO Sea level forecasting system (Nivmar) is available
4) operational weather LAM forecast at 10 km resolution used to force the sub-regional nested models (SKIRON);
5) three-dimensional ecosystem model composed of a general Biochemical Flux Model-BFM coupled to the Adriatic Sea, Eastern Levantine and Aegean Sea , and Mediterranean Sea models. The BFM is a new code for open ocean and coastal biochemistry based upon a biomass and functional group representation of the marine food web;

The MOON Marine Downstream Services consist of end-user applications such as the oil spill drift model CYCOFOS, the Fishery Observing System - FOS for fish catches observation in support of sustainable fishery management and the User Visualization Tools for MCS model output visualization and for particles drifting to be used for Search and Rescue operation and for oil spill drift forecasting.

In addition MOON, on the basis of the above mentioned Marine Core Services, is producing a monthly bulletin that contains the observation collected in previous month, the air-sea fluxes, the anomalies and the climatic indices computed by the modelling system. On the basis of this product MOON community is developing a customized monthly bulletin of the ocean state together with UNEP/MAP in support of state of marine environment assesment. This customized bulletin is actually under development for UNEP/MAP and will contain the observing system data for the previous month, including chlorophyll data from MODIS satellite, True color data for dust event detection and CASE I/CASE II waters evaluation), maps of the mean ocean circulation, dedicated, high resolution, data for pilot areas where Eutrophication is under evaluation, and ocean state indicators such as: Sea Level fluctuation in different sub-portions of the basin; Upwelling indexes for relevant sites in the Mediterranean Sea; Eutrophication and Anoxia indexes; Anomaly fields correlated with NAO; Flushing rates/residence time Ocean heat storage.

References

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