

## A MONITORING AND FORECASTING SYSTEM FOR THE BLACK SEA

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### Abstract

A near-operational system has been developed in the framework of the EU FP5 ARENA project to continuously monitor and forecast the state of the Black Sea. The results of an experiment on the operational functioning of the Nowcasting/Forecasting System, carried out for the first time in the Black Sea region, are described.

*Keywords* : Black Sea, Remote Sensing, Circulation Models, Sea Level, Coastal Models.

A monitoring and forecasting system for the Black Sea was developed as part of the European FP5 project ARENA (A REgional capacity building and Networking programme to upgrade monitoring and forecasting Activity in the Black Sea basin), which was aimed at designing a pilot nowcasting/forecasting system [1] in collaboration with the Black Sea GOOS, as well as with other ongoing international projects interested in the development of operational oceanographic services in the basin [2].

The elaborated strategy for the Black Sea nowcasting/forecasting system is based on the evaluation of the available resources in the region. An extended initial near-real time observing system exists in the basin. It comprises remote sensing data of AVISO altimetry, IR AVHRR data, JPL/QUIKSCAT scatterometry, and NASA SeaWiFS/MODIS sea color data together with international surface drifting buoys and NICOP/ONR profiling floats programs and NCEP atmospheric model data. The Black Sea basin-scale circulation model of the Marine Hydrophysical Institute (Ukraine) assimilates remote sensing data for the near-real time nowcasting of three-dimensional temperature, salinity and current fields [3]. The development of a nowcasting/forecasting system assumes the extension of the regional atmospheric models supported by the Hydro-Meteorological Institutes of Bulgaria and Romania in the framework of a Météo-France ALADIN project for the entire Black Sea area, plus an improvement of the ecosystem model of the Institute of Marine Sciences (Turkey) to a three-dimensional, near-real time operating one. The use of high-resolution regional atmospheric model makes possible a medium-range forecasting of the Black Sea circulation.

Special attention is paid to the accurate prediction of circulation in the coastal zone. As part of the Black Sea nowcasting/forecasting system a set of high-resolution models is implemented for the six nearshore regions of the Black Sea [4]. The models are nested in a basin-scale model. Two regional models - for the Burgas Bay and for the Georgian nearshore zone - are domestic models (Bulgarian and Georgian respectively) in z-coordinates. The other regional models represent the version of the Princeton Ocean Model for the Kalamita Bay near the western Crimea, for the Romanian nearshore zone, for the North-Western Shelf zone and for the Russian nearshore zone of the Black Sea. With the nesting technique, velocity, temperature, and salinity along the boundaries are interpolated from the relevant basin scale model variables. An integral constraint is applied so that the net mass flux across the open boundaries is identical to the net flux in the basin scale model. The main improvement is in the simulation over the narrow shelf region, which is not adequately resolved by the basin-scale model.

An experiment on operational functioning of the Black Sea Nowcasting/Forecasting System has been carried out for the first time in the Black Sea region and showed that the developed system can operate in near-real time regime.

### References

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