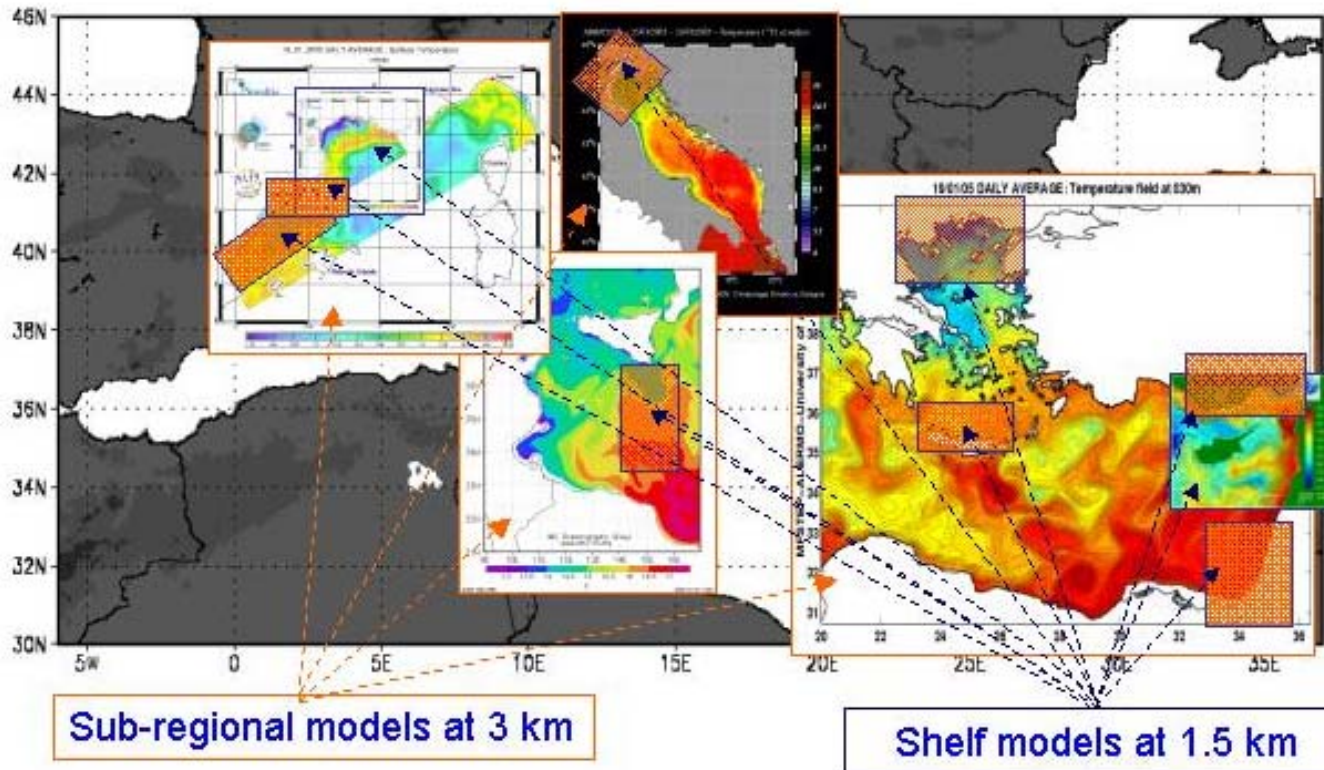


## Regional and Shelf Models

One of the goals of MFSTEP is to evaluate and demonstrate the feasibility of near real time 5-day forecast at regional and shelf scale in the Mediterranean Sea. Four regional and ten shelf models are involved in the MFSTEP ocean modelling and forecasting activities. Model configuration and forecast bulletins can be found at the web site: <http://www.oc.phys.uoa.gr/mfstep>.



# Regional and Shelf Models

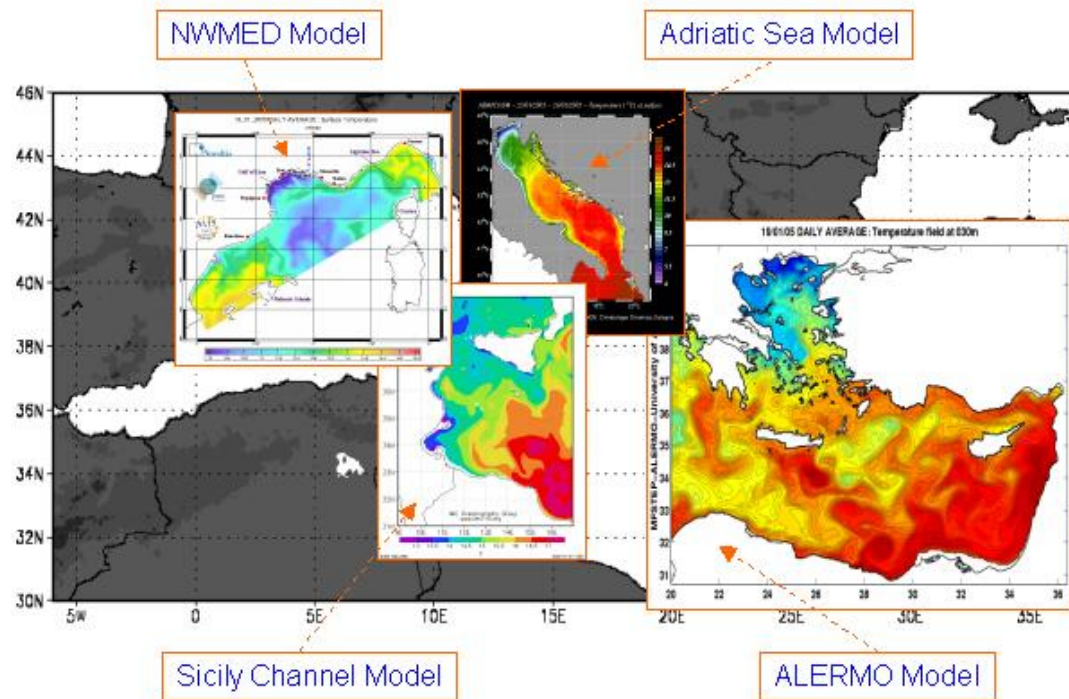
Four regional models (Table 1) have been implemented in the first phase of the project at a resolution of about 3 km (double horizontal resolution as compared to the MFSP project) and are running in operational mode delivering weekly forecasting bulletins.

Setting up a near real time forecast system for the Mediterranean region requires:

- 1) initialization procedures in order to downscale model solutions in a dynamical consistent way,
- 2) modelling techniques to treat the open boundary conditions problem (nested numerical models) and
- 3) asynchronous air-sea coupling methods in order to provide realistic surface boundary conditions for the hydrodynamics.

A proper initialization procedure produces balanced initial conditions that do not excite inertia-gravity oscillations in model integration, as these contaminate the forecasting result. Among different approaches to treat the initialization problem (damping time integration procedures, adjoint model) regional models use the variational initialization technique VIFOP (Variational Initialization Forcing Optimization Platform) developed and disseminated in the framework of MFSTEP. The VIFOP package including the tangent linear of the POM and SYMPHONIE models was configured for the all regional models, using only the external mode of the 'background' field which is dynamically optimized to reduce the amplitude of the spurious external gravity wave generations during the initialization process.

Asynchronous coupling of the regional models with the MFSTEP-OGCM at the lateral boundaries and the limited area atmospheric models ALADIN and SKIRON (with resolution of 1°/10) at the air-sea interface is used in the forecasting demonstration. In order to optimize the coupling procedures, all modelling groups performed series of sensitivity experiments. Additional experiments are performed to investigate the effects of downscaled atmospheric forcing (very high resolution winds) and evaluate the performance of sea level prediction in particular Mediterranean regions by including atmospheric pressure and tidal forcing.

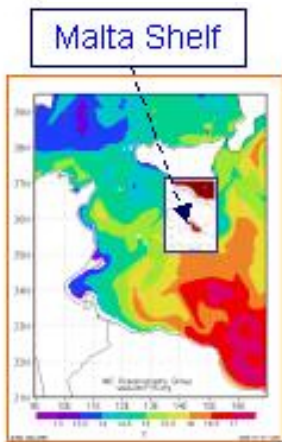
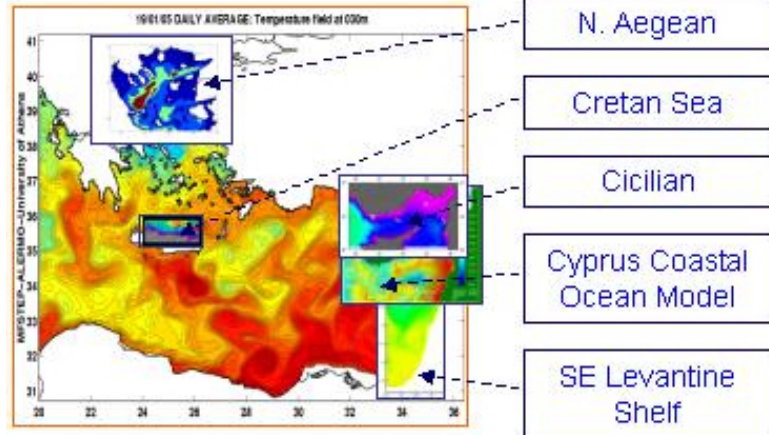
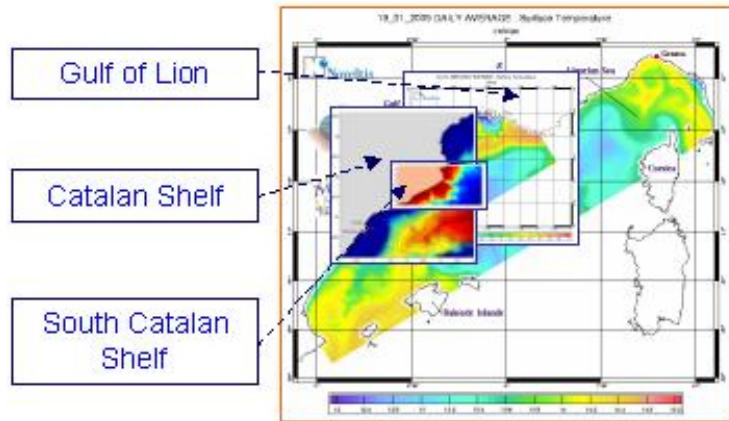


Model Name	Institute	Country	Model	Resolution
<b>NW Mediterranean</b>	POCT	France	SYMPHONIE	3 km
<b>ALERMO (Aegean-Levantine)</b>	UAT	Greece	POM	1°/30
<b>Sicily</b>	IMC	Italy	POM	1°/32
<b>Adriatic Sea</b>	INGV	Italy	POM	5 km

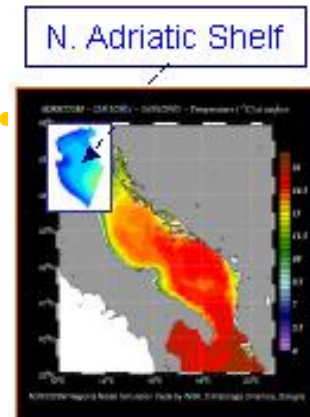
# Regional and Shelf Models

Aiming at a better description of the dynamics and processes of the different areas of the Mediterranean Sea, MFSTEP includes a modelling system resolving different domains and scales, ranging from the basin scale to the shelf scale. Nested in the MFSTEP regional models, the very high-resolution shelf models (about 1.5 km horizontal resolution) were implemented in the framework of the project. Three of them (Cyprus, Malta and Gulf of Lion shelf models) are already running in operational mode forced by the limited area atmospheric models ALADIN and SKIRON.

Model configurations and forecast bulletins of the shelf models can be found at the web site: <http://www.oc.phys.uoa.gr/mfstep>. Advanced shelf model implementation and sensitivity studies (using different boundary conditions, very high resolution winds, tidal and atmospheric pressure forcing) are performed at various shelf models. The results of the scientific and technical developments (improved modelling techniques and data distribution protocols) could be used in future applications.



Model Name	Institute	Country	Model	Resolution
<b>Gulf of Lions</b>	POCT	France	SYMPHONIE	1.5 km
<b>Catalan Shelf</b>	CSIC	Spain	DieCAST	1°/80
<b>South Catalan Shelf</b>	UPC	Spain	SYMPHONIE	1°/80
<b>Malta Shelf</b>	IOI-MOC	Malta	POM	1°/64
<b>N. Adriatic Shelf</b>	INGV	Italy	POM	1.5 km
<b>N. Aegean</b>	HCMR	Greece	POM	1°/64
<b>Cretan Sea</b>	HCMR	Greece	POM	1°/60
<b>CYprus Coastal Ocean Model</b>	DFMR	Cyprus	POM	1°/60
<b>Cilician Basin</b>	IMS	Turkey	POM	1.35 km
<b>SE Levantine Shelf</b>	IOLR	Israel	POM	0.01°-0.012°



# Regional and Shelf Models



Forecasting bulletins are produced and data can be accessed at the local web sites:

1. ADRICOSM forecasting system for the Adriatic Sea:  
<http://www.bo.ingv.it/adricosm/forecast.html>
2. ALERMO forecasting system for the Levantine and Aegean Sea:  
<http://pelagos.oc.phys.uoa.gr/mfstep/bulletin>
3. North Western Mediterranean Sea forecasting system:  
[http://www.noveltis.net/mfstep-wp9/interface/english/NWMED\\_bulletin.php](http://www.noveltis.net/mfstep-wp9/interface/english/NWMED_bulletin.php)
4. SICILY CHANNEL forecasting system:  
<http://www.imc-it.org/progetti/mfstep/Forecast/bulletin.htm>
5. CYCOFOS Cyprus forecasting system:  
<http://www.ucy.ac.cy/cyocan/cycofos/bulletin.php>
6. GULF OF LION forecasting system:  
[http://www.noveltis.net/mfstep-wp9/interface/english/GL\\_bulletin.php](http://www.noveltis.net/mfstep-wp9/interface/english/GL_bulletin.php)
7. MALTA forecasting system:  
<http://www.capemalta.net/MFSTEP/results.html>

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-  UPC - Universitat Politècnica de Catalunya, Spain
-  POCT - Centre national de la recherche Scientifique,  
Pole d'Océanographie Cotiere de Toulouse, France
-  IASA - Institute of Accelerating Systems and Applications, Greece
-  DFMR - Department of Fisheries and Marine Research, Cyprus
-  MF - Meteo-France, France
-  NIB - National Institute of Biology, Slovenia
-  IMC - Centro Marino Internazionale, Italy
-  CLU - Communications, Learning and Understanding, Italy
-  NOVELTIS, France
-  CSIC - Consejo Superior de Investigaciones Científicas, Spain
-  IOLR - Israel Oceanographic & Limnological Research, Israel
-  IOI-MOC - International Ocean Institute - Malta Operational Centre,  
University of Malta, Malta
-  IMS - Institute of Marine Sciences,  
Middle East Technical University, Turkey
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*Mediterranean ocean Forecasting System Toward Environmental Prediction*