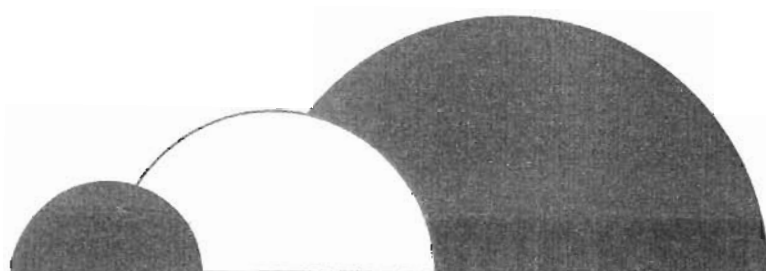


ISSN 1972-1552

Volume 2, 2007

# *Epitome*



## **Geoitalia 2007**

**Sesto Forum Italiano di Scienze della Terra  
Rimini, 12 - 14 settembre 2007**



# **F I S T**

Federazione Italiana di Scienze della Terra

**MODELLING THE CARBON CYCLE IN THE NORTHERN ADRIATIC SEA**COSSARINI Gianpiero<sup>1</sup>, DEL NEGRO Paola<sup>1</sup>, FONDA UMANI Serena<sup>2</sup>, SOLIDORO Cosimo<sup>1</sup>1 - Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (Ogs)  
2 - Università di Trieste

Presenter e-mail: slibralato@ogs.trieste.it

**Key terms:** *Biological model; Northern Adriatic Sea; Carbon cycle; Bacterial Respiration; Primary production*

The interaction between physical and biological processes is a key factor for analysing and understanding the functioning of the Northern Adriatic continental shelf pump. In fact, the downward flux of carbon from the photic zone to the deeper layer of the water column is mainly due to water circulation over the Adriatic Shelf and mixing processes, as well as to carbon uptake by autotrophic plankton, nutrient recycling and respiration of organic carbon by heterotrophic component.

In the frame of this workpackage, the functioning of the continental shelf pump is studied using short-term simulations performed by a coupled transport-carbon cycle model. The transport model is MitGCM, and the biological model has been developed ad hoc for this application.

The biological model represents a synthesis of the current paradigms of the marine ecological modelling and it is in agreement with specific ecological literature on the area of interest.

Some of the processes represented in the model are studied in deep, since their critical role on the process. Different formulations of primary production and exudation, and different parameterisations of light limitation are implemented and compared. Further, bacterial respiration and nutrient recycling are the other processes subjected to a critical review.

The comparison between model results and the results of statistical analysis of data on Northern Adriatic Sea represents a fundamental step for testing and validating the different formulations and parameterisations of the biological model.

**W10-110 Orale Crise, Alessandro**

10.1474/Epitome.02.0110.Geoitalia2007

**DECADAL SIMULATIONS OF THE MEDITERRANEAN SEA ECOSYSTEM WITH A 3D BIOGEOCHEMICAL MODEL**CRISE Alessandro<sup>1</sup>, LAZZARI Paolo<sup>1</sup>, SALON Stefano<sup>1</sup>, TREVISANI Sebastiano<sup>1</sup>, BERANGER Karine<sup>2</sup>, SCHRÖDER Katrin<sup>3</sup>, CERRATI Gabriella<sup>4</sup>

1 - Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), Trieste, Italy

2 - Ecole Nationale Supérieure de Techniques Avancées (ENSTA), Paris, France

3 - CNR ISMAR sezione di La Spezia, Italy

4 - ENEA CRAM sezione di La Spezia, Italy

Presenter e-mail: acrise@ogs.trieste.it

**Key terms:** *Med Sea; eco-hydrodynamical; Decadal Simulation*

CO<sub>2</sub> sequestration by means of the oceanic areas represents one of the most important subjects among the ongoing studies regarding the climate change. The processes that rule the CO<sub>2</sub> absorption into the sea are today not very well understood. In particular, the Mediterranean Sea appears to be a site of wide interest, where the entity of the sequestration potential is characterized by a large uncertainty.

In the framework of the VECTOR project, a series of decadal simulations of the Mediterranean Sea ecosystem have been planned to be implemented in order to assess and estimate the amount of the CO<sub>2</sub> cycle, with a particular interest in the vertical transfer processes that involve the CO<sub>2</sub> within the trophic web.

The system used to perform the simulations is a three-dimensional coupled eco-hydrodynamical model (BFM and OPA-tracer model) for the whole Mediterranean Sea. The biogeochemical module is characterized by a multi-nutrient carbon-based biogeochemical flux model (BFM). Key aspects of the model are the potential for limitation by macronutrients (nitrogen, phosphate and silicate), adjustable (i.e. non-redfieldian) C:N:P:Si ratio into zooplankton and phytoplankton compartments, chlorophyll to carbon variable dependency. The forcing fields for the Tracer model consisting of temperature, salinity, zonal and meridional currents, vertical eddy diffusivity are obtained subsampling a high resolution OGCM (OPA-MED16 - about 5km horizontal resolution, ENSTA/LOCEAN). The atmospheric forcing fields are obtained from ECMWF analyses (about 50 km for horizontal resolution) and the period considered is 1998-2005.

MED16 simulation was focussed on the investigation of the interannual variability of the convection whose role in the biogeochemical processes is particularly relevant.

The results of simulations are studied, in order to evaluate temporal and vertical evolution of the concentration of the key variables, such as macronutrients, chlorophyll, phytoplankton biomass and productivity.

**W10-111 Poster D'Argenio, Bruno**

10.1474/Epitome.02.0111.Geoitalia2007

**SHORELINE EVOLUTION AT SELE RIVER MOUTH: COMPARISON OF FIELD DATA WITH NUMERICAL MODEL RESULTS**VICINANZA Diego<sup>1</sup>, FERRANTE Vincenzo<sup>2</sup>, D'ARGENIO Bruno<sup>3</sup>, MARSELLA Ennio<sup>1</sup>

1 - Seconda Università di Napoli, Istituto per l'Ambiente Marino Costiero - CNR

2 - Seconda Università di Napoli

3 - Istituto per l'Ambiente Marino Costiero - CNR

Presenter e-mail: b.dargenio@iamc.cnr.it

**Key terms:** *shoreline evolution; numerical model; Sele River mouth*

Near a river mouth several important coastal morphology phenomena can take place. These processes are due to the sediment transport caused by the wave currents.

A numerical approach is presented to evaluate the coastal morphology processes and shoreline evolution near the Sele river mouth.

The hydrodynamic and morphodynamic phenomena are described by using a 2DH numerical model. The model consists of three parts: the first simulates wave propagation, the second simulates hydrodynamic behaviour and the last performs morphodynamic and shoreline evolution. In this study the numerical simulation and field data comparison are carried out to evaluate shoreline and

morphodynamic response to the hydrodynamic processes occurring near Sele river mouth. Numerical modelling is based on four year wave data monitoring and two coastline measurement. Model calculations of shoreline change from 2001 to 2004 were in agreement with the measurements. This study is part of VECTOR Project (VulnErabilità delle Coste e degli ecosistemi marini italiani ai cambiamenti climatici e loro ruolo nei cicli del carbonio mediterraneo) research line 2 VULCOST (coastal area vulnerability due to global climatic changes).

**W10-112 Orale Delfanti, Roberta**

10.1474/Epitome.02.0112.Geoitalia2007

**VARIABILITY OF POC EXPORT FLUX FROM THE EUPHOTIC ZONE AT THE VECTOR TIME SERIES STATIONS.**SCHIRONE Antonio<sup>1</sup>, CONTE Fabio<sup>1</sup>, MALAGUTI Antonella<sup>2</sup>, SALVI Stefano<sup>1</sup>, ABBATE Marinella<sup>1</sup>, GIROSI Laura<sup>1</sup>, DELFANTI Roberta<sup>1</sup>

1 - ENEA Centro Ricerche Ambiente Marino, La Spezia, Italy

2 - ENEA Centro Ricerche "E. Clementi", Bologna, Italy

3 - ENEA Centro Ricerche Brasimone, Camugnano (BO), Italy

Presenter e-mail: delfanti@santateresa.enea.it

**Key terms:** *carbon cycle; Thorium; Mediterranean Sea; Particulate organic carbon*

As part of the VECTOR Project, two areas, in the Southern Adriatic and the Southern Tyrrhenian Sea, have been selected for the study of the main processes controlling the seasonal and interannual variability of the carbon exchange between the atmosphere and the open sea environment. The two areas are characterised by different trophic regimes: the Southern Adriatic Sea shows large spring blooms while the S. Tyrrhenian Sea is one of the most oligotrophic areas of the Mediterranean. Time series of the main physical and biogeochemical parameters are being collected at the two stations. POC export fluxes are estimated by two complementary methods: the <sup>234</sup>Th/<sup>238</sup>U disequilibrium method and sediment traps. The <sup>234</sup>Th/<sup>238</sup>U disequilibrium method has been increasingly used over the past decade, because it has the advantage of providing a temporally integrated record (weeks to months) of particle export operating from ships and without the apparent biases that characterise sediment traps.

In this work we first briefly discuss the Thorium method and its accuracy for POC flux estimates at the VECTOR time series stations. We then present the data obtained during the first year of activity at both stations and discuss POC export fluxes in relation to total, new and regenerated primary production and to microphytoplankton population.

**W10-113 Poster Falco, Pierpaolo**

10.1474/Epitome.02.0113.Geoitalia2007

**PRELIMINARY RESULTS OF VECTOR OCEANOGRAPHIC CRUISES - HYDROLOGY OF THE SOUTHERN TYRRHENIAN**FALCO Pierpaolo<sup>1</sup>, ZAMBIANCHI E.<sup>1</sup>

1 - CoNISMa, ULR Parthenope, Dipartimento di Scienze per l'Ambiente - Università Parthenope, Via de Gasperi 5 - 80133, Napoli

Presenter e-mail: pierpaolo.falco@uniparthenope.it

**Key terms:** *Southern Tyrrhenian; Vector Program; processes developing*

In the framework of research line 8, task 2, of the VECTOR program, whose focus is on time series in the Southern Tyrrhenian collected by moored instruments, since november 2006 we have carried out three oceanographic cruises in that area. The ultimate goal of this data collection activity consists in understanding processes developing in the water column affecting and/or ruling the carbon cycle in that pelagic area.

To this aim, we identified the position of one station where a mooring was deployed, with sediment traps, conventional and acoustic current meters, temperature and conductivity sensors, and where hydrological and biogeochemical investigations are being carried out on a regular (seasonal) basis.

In addition to this focal point (39°30' N, 13°30' E, bottom depth 3450 m, 90 nm off the Italian continental coastline), we have collected hydrological data over a transect connecting it to the Gulf of Naples, in SW-NE direction.

In this poster we show the first results of the analysis of the hydrological data collected during the first three cruises. In particular, we present vertical sections of the main physical parameters (temperature, salinity, density) focussing the attention on the geostrophic velocity field associated with the vertical structure of the water column, and to the double diffusion processes, easily identified in the salinity profiles.

**W10-114 Poster Ferraro, Luciana**

10.1474/Epitome.02.0114.Geoitalia2007

**MARINE COASTAL ENVIRONMENT OFF SELE RIVER PLAIN, PRELIMINARY RESULTS OF VULCOST ACTIVITY (VECTOR PROJECT).**ALBERICO Ines<sup>1</sup>, BUDILLON Francesca<sup>2</sup>, FERRARO Luciana<sup>2</sup>, LIRER Fabrizio<sup>1</sup>, PELOSI Nicola<sup>2</sup>, D'ARGENIO Bruno<sup>2</sup>

1 - CIAM, Centro Interdipartimentale Ricerche Ambiente, Università Federico II, Napoli

2 - IAMC, Istituto per l'Ambiente Marino Costiero (CNR), Napoli

Presenter e-mail: luciana.ferraro@iamc.cnr.it

**Key terms:** *Marine coastal environment; coastline evolution; Sele river plain offshore*

Vulcost is the research line of the Vector Project that aims at evaluating the vulnerability of the Sele and Bussento (Campania, Italy) coastal systems, respect to possible future sea level changes.

The first step has been to assess the recent evolution of the coastline and the present day littoral morphology as well as that of depositional systems and ecosystems down to 50 m below the sea level. To this aim several proxies have been integrated:

- comparative analysis of georeferenced technical maps, evidencing the changes in the coastline in the time interval spanning from 1984 to 1998;