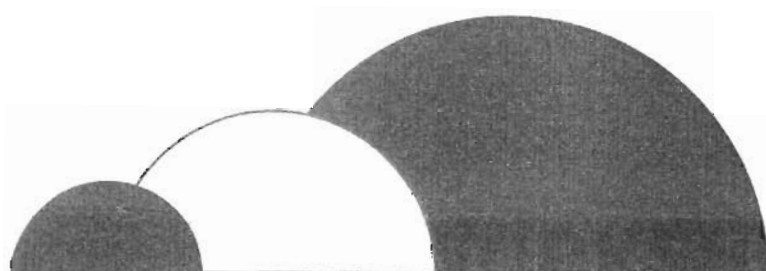


ISSN 1972-1552

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

IN THE NORTHERN ADRIATIC SEA

QUERIN Stefano¹, LAURENT Céla², CRISE Alessandro¹, SOLIDORO Cosimo¹
 1 - ISTITUTO NAZIONALE DI OCEANOGRAFIA E DI GEOFISICA SPERIMENTALE (OGS)

2 - UNIVERSITÉ DE VERSAILLES SAINT-QUENTIN-EN-YVELINES

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

Key terms: Numerical model; Northern Adriatic Sea; Circulation; Dense water

This numerical study presents recent results obtained by running a hydrodynamic model for the Northern Adriatic Sea. The aim of this activity, in the framework of the VECTOR project, is to study the formation and transport of dense water masses, which originate in the Northern Adriatic Sea in winter and spread along the basin. Wintertime seawater temperature usually reaches minimum values in February, because of the strong atmospheric cooling. Concurrently, low riverine discharges due to snow heap on the watershed increase water salinity. These factors cause the formation of the dense water masses (7°C, 38 psu, 1030 kg/m³), especially in the Gulf of Trieste and in the surrounding areas. In order to reproduce and analyze the process, simulations are carried out customizing the MITgcm, a three-dimensional, finite volume, non-hydrostatic, general circulation model. The model domain (0.0225° (~ 2.5 km) horizontal resolution) is limited by the transect along the 100 m isobath (from 80 km south of Ancona -along the Italian coast- to 50 km south of Zadar -along the Croatian coast-). The bathymetry and the initial thermohaline conditions are obtained from interpolation of experimental data, while passive radiation conditions are applied to the southern boundary. Riverine flow rates are derived from in situ measurements and are modeled in such a way as to consider both the thermohaline and momentum contribution. The surface atmospheric forcing is interpolated from a high resolution Limited Area Model (LAM: ETA006). Since winter 2006/2007 has been particularly mild, simulations are run both with realistic conditions (measured ICs, BCs and ETA006 forcing) and idealized conditions (strong and dry winds and intense negative heat fluxes). A comparison of the results obtained in the two forcing conditions is carried out, together with a discussion about the phenomena that trigger the dense water flux.

W10-140 Orale Ravaioli, Mariangela

10.1474/Epitome.02.0140.Geoitalia2007

THE ROLE OF THE SEDIMENTS OF THE ROSS SEA AND PACIFIC SECTOR OF THE SOUTHERN OCEAN (ANTARCTICA) IN THE GLOBAL BUDGET OF THE CARBON CYCLES. BIOSESO AND ABIOLCLEAR PROJECTS HISTORICAL DATA SERIES

RAVAIOLI Mariangela¹, CAPOTONDI Lucilla¹, FRIGNANI Mauro¹, GIGLIO F.¹, LANGONE Leonardo¹

1 - Istituto di Scienze Marine, sede di Bologna, Via Gobetti 101, 40129 Bologna, Italia

Presenter e-mail: mariangela.ravaioli@bo.ismar.cnr.it

Key terms: Marine sediment; organic carbon; particles fluxes; Southern Ocean; historical data series

The polar areas, and the southern one in particular, play a key role in the cycles of greenhouse gases, and hence the global climate. However, it has long been debated if the Southern Ocean is a CO₂ sink due to summer productivity or an annual source due to the upwelling of deep water. From 1999 onwards, several research projects (BIOSESO I/II - Biogenic sedimentation in the Southern Ocean, 1999-2005 and Abiolclear - Antarctic BIOgeochemical cycles-CLimatic and palEoclimAtic Reconstructions, 2006-2008) have been carried out to better understand the role that the Ross Sea and the Pacific Sector of the Southern Ocean play in the global carbon cycling. Within the framework of these projects, the researcher team of the Marine Science Institute of Bologna (CNR) collect data on sinking particle compositions and fluxes and sediment records in these areas to estimate organic carbon primary production, export from the photic layer, remineralisation in the water column and in surficial sediments, and burial. The data set obtained from the projects include particle samples collected during ca. 8 years by moored automatic sediment traps at 2 different levels (one just below the photic levels and the other about 50 m above the sea bottom). More than 100 sediment cores and box-cores were also collected. We believe that this extensive data set could be used to quantify the actual role of the area in the global carbon cycle.

W10-141 Poster Ravaioli, Mariangela

10.1474/Epitome.02.0141.Geoitalia2007

AUTOMATIC DATA GATHERING AND PERIODIC SAMPLINGS IN THE NORTHERN ADRIATIC SEA

RAVAIOLI Mariangela¹, CARDIN Vanessa², CRISCIANI Fulvio¹, CATALETTO Bruno², SPAGNOLI Federico¹, BASTIANINI Mauro¹, FONDA UMANI Serena³, MARINI Mauro¹, SOCAL Giorgio¹, BOLDRINI Alfredo¹, et al.

1 - Istituto di Scienze Marine, CNR-ISMAR

2 - Istituto Nazionale di Oceanografia e Geofisica Sperimentale, OGS Trieste

3 - Dipartimento di Biologia, Università di Trieste

Presenter e-mail: mariangela.ravaioli@bo.ismar.cnr.it

Key terms: Adriatic; carbon cycle; automatic data; meteorological data; oceanographic buoy

In the framework of the national research program VECTOR (Vulnerabilità delle Coste e degli ecosistemi marini italiani ai cambiamenti climatici e loro ruolo nei cicli del carbonio mediterraneo), a wide array of data-sets have been merged in the effort to a better understanding of ecosystems functions and of their feedback to environmental changes. VECTOR focuses at different sites, in particular the research line CARADRI will study the carbon cycle in the Adriatic given the reactivity of this ecosystem, considered the Mediterranean area with the highest mean primary production. Both research and ecological monitoring of a wide range of variables cover key areas of the basin (Gulf of Trieste, Gulf of Venice, Po Delta, Ancona). One of the key feature of CARADRI is its long-term approach and the presence of automatic data gathering systems which ensures continuity to the collection of data. The ability of buoyed observatories to make long-term measurements of ongoing processes also gives the study the potential to play an important role in oceanographic and climatic studies. They could track the flow of major currents along the adriatic

boundaries.

The network of marine scientists involved in VECTOR CARADRI has recently (August 2006) been included in the international (I-LTER) and European (E-LTER) long-term ecological networks.

Different institutions are cooperating in the management of the different stations and in the gathering and sharing of data in this site. At all the station of the NAS automatic acquiring devices ensure a continuous gathering the meteorological and hydrological parameters.

Process oriented measures such as: vertical fluxes, primary production rates regarding both bacterial and plankton systems, isotopic tracers (U/Th), Dissolved, Particulate of inorganic and organic carbon concentration, allow a better comprehension of the origin and path of the main fractions of carbon flowing through the ecosystem. During the meeting will be presented some results.

Authors indicated as *et al.*:

Michele Giani¹, Aniello Russo², Fabio Raichich¹

4: Istituto centrale per la ricerca scientifica e tecnologica applicata al mare, ICRAM, Chioggia

5: Dipartimento di Scienze del Mare, Università Politecnica delle Marche, Ancona

W10-142 Orale Rinaldi, Alice

10.1474/Epitome.02.0142.Geoitalia2007

ATMOSPHERIC FORCING ESTIMATION FOR THE ASSESSMENT OF HEAT FLUXES CALCULATION AT THE AIR-SEA INTERFACE IN THE GULF OF TRIESTE

RINALDI Alice¹, CARDIN Vanessa¹, GACIC Miroslav¹

1 - Istituto Nazionale di Oceanografia e di Geofisica Sperimentale-OGS

Presenter e-mail: alyrina@yahoo.it

Key terms: Gulf of Trieste; Adriatic Sea; Air-Sea Interaction; atmospheric forcing

Heat flux estimation is very important due to the role that they play in the distribution of water masses and circulation. They are directly connected with buoyancy and therefore to the mixing of the water column, dense water formation process and to the transport of nutrients. In order to assess fluxes estimation using meteorological data from the model ECMWF, fluxes were calculated and compared using data coming from fixed station in the Gulf of Trieste. Meteorological data measured continuously in each of the buoys (Mambo, Paloma and Pirano) were analysed and compared with those coming from the ECMWF model for the period between April 2005 and March 2006.

The comparison of meteorological data between fixed stations reveals that the Mambo buoy shows higher variations in temperature and relative humidity, reaching the highest discrepancy during the winter period and the lowest one during the summer. This fact may be due to the relative vicinity of the buoy to the coast of Trieste. The analysis of the ECMWF time series shows generally a very good correlation with the time series of the two buoys (Pirano and Paloma) following the same trend. On the contrary, a poor correlation with the Mambo buoy was observed.

The wind speed coming from the model seems to be underestimated by a percentage varying from 10 to 60% with respect to the wind measured at the fixed stations. This may be due to the coarse grid of the model (0.5° latitude/longitude grid) that does not resolve in an adequate way the orography of the Northern Adriatic Sea. This underestimation is already been pointed out in literature by several authors.

Heat fluxes have been calculated only in two of the three stations (Paloma and Pirano) due to the data gaps in the Mambo station time series during the studied period. Generally, total heat fluxes show similar behaviour in time between the fixed stations and the model, only differing in the minimum value because of the turbulent components. Monthly heat fluxes are positive in the three case studies between April and July 2005, and not until September/October as it has been reported in literature. This feature may be due to the meteorological conditions experienced during August/September 2005, cold, rainy and cloudy. For the rest of the year heat fluxes are negative indicating a loss of heat. Finally, a comparison with previous years (2003-2004) indicates a good agreement either as far as meteorological time series are concerned as well as those relative to heat fluxes.

W10-143 Poster Rivaro, Paola

10.1474/Epitome.02.0143.Geoitalia2007

DISTRIBUTION OF CARBON DIOXIDE SYSTEM PARAMETERS IN THE SOUTHERN TYRRHENIAN SEA

RIVARO Paola¹, MESSA Roberta¹, FRACHE Roberto¹

1 - Department of Chemistry and Industrial Chemistry, University of Genoa, Genoa, Italy

Presenter e-mail: rivaro@chimica.unige.it

Key terms: Southern Tyrrhenian Sea; inorganic carbonate system; parameter variation

Since the Mediterranean Sea is considered as a vulnerable sea due to the high population density surrounding it, it is essential to have a better knowledge of the present state of the carbonate system, to predict his behaviour in the carbon cycling and climate change.

In this context, the Southern Tyrrhenian Sea is an area of particular interest due to the physical and chemical properties and the circulation of the water masses. In the framework of the VECTOR Project activities - research line CARPEL 8.2 "Serie temporali nel Tirreno Meridionale"-, sea water samples were collected for chemical analyses.

The sampling was carried out in the Southern Tyrrhenian Sea along a section from the Gulf of Naples to the Vector station (39°30'N, 13°30'E) in November 2006, February and April 2007 cruises. In order to characterize the carbonate system in the studied area, Total Alkalinity (TA) and pH in total scale (pHT) were determined. TA and pH measurements were performed using a modification of the potentiometric methods described in the DOE Handbook of methods for CO₂ analysis. The accuracy of TA measurement was evaluated using Certified Reference Material (CRM, Batch 76 and Batch 79, provided by Dr. A.G. Dickson, Scripps Institution of Oceanography, USA). The precision of TA measurement was evaluated by duplicate analyses of the CRM.