



ADRICOSM

**Italian Ministry of
Foreign Affairs**



**Italian Ministry for the
Environment and Territory**



UNESCO-IOC

**ADRIatic sea integrated Coastal Areas and river basin
Management system pilot project – EXTension**

ADRICOSM-EXT PROJECT

**(ADRIatic sea integrated COastal areaS and river basin
Management system - EXTension)**

Annex I

TECHNICAL BRIEF

03/04/2006

Contents

WP0: Project Management	8
<i>Task 0.1: Scientific coordination</i>	8
<i>Task 0.2: Project reporting and meetings</i>	8
<i>Task 0.3: Dissemination of Project results</i>	8
WP1: Enhancement of ADRICOSM observational and modeling network	9
<i>Task 1.1: Continuation and improvement of the NRT system for the remotely sensed data</i>	9
<i>Task 1.2 Continuation and improvement of the VOS XBT monitoring system</i>	10
<i>Task 1.3: Implementation of new CTD coastal networks and monitoring stations.</i>	11
<i>Task 1.4 New sea level stations in Southern Adriatic Sea</i>	13
<i>Task 1.5 Introduction of new measurements in existing observational areas for training purposes</i>	13
<i>Task 1.6: Improvement of coastal hydrodynamic modelling and new implementations..</i>	16
<i>Task 1.7 Atmospheric forcing studies</i>	17
<i>Task 1.8 Continuation of ADRICOSM forecasting activities</i>	18
WP2: Integrated Catchment Simulator System - ICSS for a river test site	19
<i>Task 2.1 Definition of pilot area and mobilization</i>	19
<i>Task 2.2 Data Collection and Database Implementation</i>	19
<i>Task 2.3 Models set-up and implementation</i>	19
<i>Task 2.4 Flow, Rainfall and WQ surveys in the sewer system, river and coastal area</i>	19
<i>Task 2.5 Feasibility study for other river basin pilot areas</i>	20
WP3: Data Management system	21
<i>Task 3.1 Organisation of NRT data management system for the whole Adriatic Sea</i>	21
<i>Task 3.2 Organisation of a delayed mode data archiving system for the Adriatic Sea</i>	21
<i>Task 3.3 Development of a portal system (LAS) for satellite, in situ and model data output</i>	22
<i>Task 3.4 Data sharing protocols for meteo-marine measurements</i>	22
<i>Task 3.5 GIS development for coastal areas of the Adriatic Sea</i>	22
WP4: Training and outreach	24
<i>Task 4.1: Workshops and seminars in the field of operational forecasting, ICZM, monitoring, modelling and data assimilation</i>	24
<i>Task 4.2: Mapping techniques for coastal data sets</i>	24
<i>Task 4.3: Training course for data management</i>	24
<i>Task 4.5 Training in ICSS</i>	24

Executive summary

The present document contains the scientific and technical implementation plan for **ADRICOSM-EXT**. A workshop was held in Rome, June 11-12 2003 at INGV headquarters to discuss the research and development work needed to:

- 0- Activate the participation of Bosnia-Herzegovina, Serbia-Montenegro and Albania in the activities of ADRICOSM;
- 1- Continue and further enhance the ADRICOSM observational network with the active participation of the new entering countries;
- 2- Implement the Integrated Catchment Simulator System in one of the new entering countries;
- 3- Expand and implement the data management system for real time data exchange and historical data archiving;
- 4- Activate training courses and workshops on different aspects of real time monitoring and forecasting.

UNESCO-IOC will be the implementing agency for the Ministry of Italian Foreign Affairs and INGV will have the responsibility of the scientific coordination. The participating countries in this project are: Italy, Slovenia, Croatia, Serbia-Montenegro, Bosnia-Herzegovina and Albania.

It is intended that the work to be carried out under the financing of the Ministry of Italian Foreign Affairs is defined by the 'Deliverable within the first 18 months' statement at the end of each Task.

Introduction

Article 29 of the Plan of Implementation of WSSD (*World Summit on Sustainable Development*) of Johannesburg promotes the implementation of Chapter 17 of Agenda 21 (*the Programme of Action for Sustainable Development*), adopted by UNCED (*United Nations Conference on Environment and Development*). The latter provides the program of action for achieving the sustainable development of oceans, coastal areas and seas through the strengthening of international, including regional, cooperation and coordination.

Furthermore, Article 29 promotes integrated, multi-disciplinary and multidisciplinary coastal and ocean management activities at the national level, and encourages coastal States in developing ocean policies and mechanisms on integrated coastal management.

In addition, Chapter 17 of Agenda 21 indicates GOOS (*Global Ocean Observing System*) as a crucial activity to contribute to the preservation and enhancement of the quality of the marine environment and the sustainable use of marine resources. The GOOS coastal module, COOP (*Coastal Ocean Observation Panel*, UNESCO, 2002) is concerned primarily with environmental changes in marine coastal and estuarine ecosystems. In particular it specifies the measurement programs and information required on a continuing basis to meet the needs of user groups on local to regional and global scales, and it coordinates with GCOS (Global Climate Observing System) to insure the full integration of environmental data and information. GOOS and COOP indications are at the basis of the planning in this document.

The Adriatic Sea coastal areas have important political, social, economic and environmental problems that are followed by an active international community. On the political level, the *Adriatic-Ionian Initiative (AII)* has set the stage for the development of the COOP strategy in the Adriatic Sea. **AII** started in year 2000 and involved seven Countries bordering the Adriatic and Ionian Seas (Albania, Bosnia-Herzegovina, Croatia, Greece, Italy, Slovenia, and Serbia-Montenegro) with the aim to coordinate different activities in the areas of tourism, environment, transportations, maritime security, and education. In particular, in the context of the **AII** periodic Round Tables on the protection and sustainable development of the marine environment, the Member Countries of the **AII** have stressed the need to promote and develop a program of Monitoring and Research for the sustainable development of the Adriatic coastal areas.

Furthermore, at the end of year 2000, the *EC New Water Framework Directive (2000/60/EC)*, entered into force. This directive gives the appropriate foundations for achieving the sustainable development of the coastal areas by considering all the factors affecting the quality status of the marine ecosystem. This Directive is also considered in the planning of the *AII* activities.

The research and development program of the **AII** has been initiated with the *ADRICOSM* project (*ADRIatic sea integrated COastal areaS and river basin Management system pilot project*) that started on October 2001 with the financial support of the Italian Ministry for the Environment and Territory and involved Italy, Slovenia and Croatia.

ADRICOSM has the following general aims:

- 1) to demonstrate the feasibility of *Near Real Time (NRT)* coastal currents forecasts;
- 2) to carry out the implementation of a river basin and wastewater management system in an Adriatic test site (the river *Cetina*, *Split*, Croatia);
- 3) to develop the integration of the river system with the coastal current forecasting.

The key step toward integrated coastal areas and river basin management system is to connect the catchment basin runoff and the wastewater management with marine environment

monitoring and forecasting since the coastal areas are strongly forced by the drainage basin inputs and disperse these inputs in a complex hydrodynamic environment. The ADRICOSM project duration is of 3 years, and consists of 3 phases: preparation, forecasting, and assessment. At the present time ADRICOSM is at the end of its second phase with all the monitoring and modelling activities well underway. In its final phase ADRICOSM will provide a dissemination of the results to Italian, Slovenian, and Croatian experts (Coast Guards, Port Authorities, and Coastal Operators). Furthermore ADRICOSM has been adopted in the WSSD in Johannesburg as a “Type II Initiative”, i.e., an initiative addressing the promotion of sustainable development.

As a next step, we consider essential the enlargement of the ADRICOSM experience to other Adriatic Countries and continue the implementation of a state of the art monitoring and forecasting system for the marine coastal areas and the river catchments. For this reason, the **ADRICOSM-EXT** project (*ADRIatic sea integrated COastal areaS and river basin Management system pilot project- EXTension*) has been initiated. It will be supported by the *Italian Ministry of Foreign Affairs* and implemented by *UNESCO-IOC (Intergovernmental Oceanographic Commission)* and coordinated scientifically by *INGV (Italian National Institute of Geophysics and Vulcanology)*.

ADRICOSM-EXT will continue and enlarge the research and development work of ADRICOSM and will coordinate activities between all the Adriatic riparian *AII* Member States, i.e., Italy, Slovenia, Croatia, Albania, Bosnia-Herzegovina and Serbia-Montenegro.

Participating Institutions

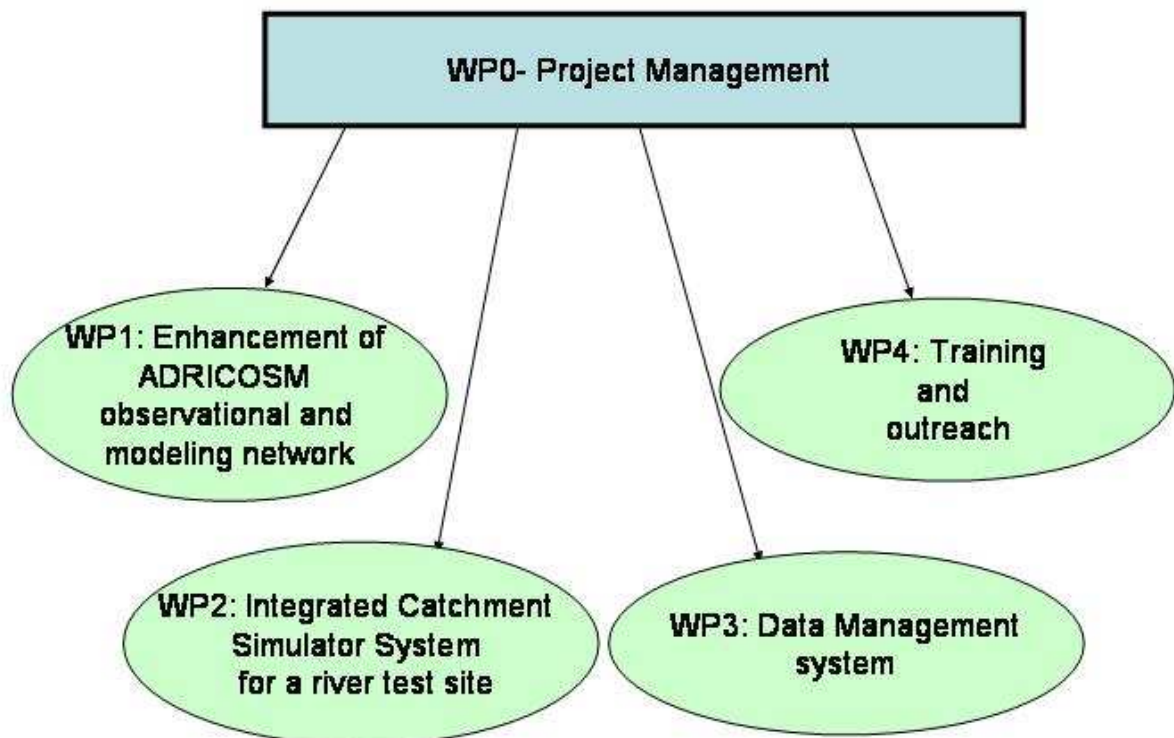
#	ACRONYM	STATUS	INSTITUTION NAME	SCIENTIFIC RESPONSIBLE
1	UNESCO-IOC	Contractor	Intergovernmental Oceanographic Commission, UNESCO, Paris, FRANCE	Julian Barbieri
2	INGV	Scientific/ technical Coordinator	Istituto Nazionale di Geofisica e Vulcanologia (INGV), Roma, ITALY	Nadia Pinardi
3	UNIBO.CIRSA	Partner	Università di Bologna, Centro Interdipartimentale di Ricerca per le Scienze Ambientali (CIRSA), ITALY	Marco Zavatarelli
4	SGI	Partner	SGI-SpA, Sarmeola di Rubano, Padova, ITALY	Augusto Pretner
5	ENEA.CRAM	Partner	Ente per le Nuove Tecnologie, l'Energia e l'Ambiente (ENEA), Centro Ricerche Ambiente Marino (CRAM), ITALY	Giuseppe Manzella
6	ARPA.DAPHNE	Partner	Agenzia Regionale Prevenzione e Ambiente dell'Emilia Romagna (ARPA), Struttura Oceanografica Daphne, Cesenatico, ITALY	Giuseppe Montanari
7	CNR.ISAC	Partner	Consiglio Nazionale delle Ricerche, Istituto di Scienze dell'atmosfera e del Clima, Sezione di Roma, ITALY	Rosalia Santoleri
8	OGS	Partner	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), Dipartimento di Oceanologia, Trieste, ITALY	Renzo Mosetti
9	CNR.ISMAR/ IGM	Partner	Consiglio Nazionale delle Ricerche (CNR), Istituto di Scienze Marine, Sezione di Geologia Marina, Bologna, ITALY	Mariangela Ravaioli
10	CNR.ISMAR/ Ancona	Partner	Consiglio Nazionale delle Ricerche (CNR), Istituto di Scienze Marine, ITALY	Mauro Marini
11	CLU	Partner	Communications, Learning and Understanding, Srl, ITALY	Luisella Bianco
12	APAT	Partner	Environmental and Territory Protection Agency, ITALY	Stefano Corsini
13	NIB.MBS	Partner	National Institute of Biology (NIB), Marine Biological Station (MBS), Piran, SLOVENIA	Vlado Malacic
14	RBI.CMR	Partner	Rudjer Boskovic Institute (RBI), Center for Marine Research (CMR), Rovinj, CROATIA	Nenad Smodlaka
15	IOF	Partner	Institute of Oceanography and Fisheries (IOF), Split, CROATIA	Vlado Dacic
16	UZ.AMGI	Partner	University of Zagreb, Andrija Mohorovicic Geophysical Institute (AMGI), Zagreb, CROATIA	Zoran Pasaric
17	FCE	Partner	Faculty of Civil Engineering, University of Split, Split, CROATIA	Jure Margeta
18	HEIS	Partner	Hydro-engineering Institute, Sarajevo, BOSNIA-HERZEGOVINA	Dragana Selmanagic
19	FCE-Mostar	Partner	Faculty of Civil Engineering, University of Mostar, Mostar, BOSNIA-HERZEGOVINA	Gordan Prskalo
20	UNIBE	Partner	University of Belgrade, Belgrade, SERBIA-MONTENEGRO	Borivoj Rajkovic
21	IBM	Partner	Institute of Marine Biology Dobrota bb, Kotor, SERBIA-MONTENEGRO	Sreten Mandic
22	HI	Partner	Hydrometeorological Institut of Tirana, ALBANIA	Kujtim Bicaku

General Objectives

The overall objectives of **ADRICOSM-EXT** are the following:

1. OBJ-1 Activate the participation of Bosnia-Herzegovina, Serbia-Montenegro and Albania in the activities of ADRICOSM;
2. OBJ-2 Continuation and further enhancement of the ADRICOSM observational network with the active participation of the new entering countries;
3. OBJ-3 Expansion of the Integrated Catchment Simulator System implementation in one of the new entering countries;
4. OBJ-4 Expansion and implementation of a data management system for real time exchange and historical data archiving;
5. OBJ-5 Activate training courses and workshops on different aspects of real time monitoring and forecasting.

The work will be carried out in five workpackages that are schematically represented below.



Description of work by workpackages

WP0: PROJECT MANAGEMENT

Major Workpackage aims :

1. Facilitating contractual agreements at the start of Project;
2. Defining Project reporting mechanisms and scheduling meetings
3. Preparing a plan for the dissemination of project results and implement it

Task 0.1: Scientific coordination

The Project shall last thirty months. UNESCO-IOC will provide the overall coordination of the Project and scientific aspects will be coordinated by INGV.

Responsible: UNESCO-IOC

Participant: INGV

Duration: 0 – 18 months

Deliverable within 18 months: Sub-Contract Agreements for the first year and a half of the Project

Task 0.2: Project reporting and meetings

The Project will produce six month management and scientific reports. A kick-off meeting is foreseen as well as general workshops between all Project participants. The technical meetings needed in several Tasks will be coordinated directly by each partners.

Activities reports will consists of:

- 1) by 28 August 2005 at the latest, a report including the Terms of Reference for the subsidiary contract, a comprehensive definition and technical description of each task, including corresponding deliverables;
- 2) by 15 April 2006 at the latest: Intermediate MANAGEMENT and SCIENTIFIC reports (an intermediate technical and scientific report on the progress achieved);
- 3) by 30 August 2006 at the latest Final MANAGEMENT and SCIENTIFIC reports (a full activity report covering Partner's contribution to the overall project).

The report should cover step-by-step all deliverables described in Annex 1 and assess the impact of obtained results in view of the next phase of the Project.

Responsible: UNESCO-IOC

Participants: All the partner Institutions

Duration: 0 – 18 months

Deliverable within 18 months: Kick-off meeting, six months management reports, final scientific report for the first 18 months, technical meeting reports

Task 0.3: Dissemination of Project results

A dissemination plan will be defined that will consists of Project Web pages, connected to the ADRICOSM central Web page, and brochures to illustrate the Project aims (at the beginning) and Project results (at the end).

Responsible: CLU

Participants: INGV, UNESCO-IOC.

Duration: 0 – 18 months

Deliverable within 18 months: The ADRICOSM-EXT web page and a first Project brochure

WP1: ENHANCEMENT OF ADRICOSM OBSERVATIONAL AND MODELING NETWORK

Major workpackage aims:

4. Insert the entering countries with an active role in ADRICOSM observational and modeling activities;
5. Continue and improve the satellite data analysis system for SST, color and scatterometer winds;
6. Continuation and improvement of the VOS XBT monitoring system;
7. Collect hydrological seasonal data sets in entering countries coastal areas;
8. Add new physical and key biochemical observations in established ADRICOSM coastal areas for training purposes;
9. Atmospheric forcing studies to increase the ocean forecast reliability
10. Continuation of the ADRICOSM forecasting activities

Task 1.1: Continuation and improvement of the NRT system for the remotely sensed data

Main aims are:

- Re-process the ADRICOSM color data to achieve best accuracy and disseminate them,
- reprocess SST data for atmospheric sensitivity studies,
- calculate new derived parameters from color images,
- make available scatterometer data for meteorological sensitivity studies

In the ADRICOSM Pilot Project the NRT satellite data is limited to the TOP phase that ends with the second Project year. The main objective of this task is to continue the SeaWiFS and AVHRR data processing and distribution in order to ensure availability of satellite data to the entering participants and for modeling data assimilation activity planned during the ADRICOSM-EXT. Moreover, improvement of SST and ocean color products is planned to extend the range of application of the NRT system. Novel model oriented satellite products are also planned for feasibility studies of higher resolution assimilation schemes.

Training in NRT use of satellite data will be provided to participants from the entering countries as a stage. The GOS processing and analysis system will be available to the participants of the entering countries to carry out case studies in their areas of interest.

Subtask 1.1.1: SST

Experience during ADRICOSM Pilot Project TOP phase has indicated that especially in winter due to extensive cloud cover the number of valid SST pixels in the Adriatic is reduced. This has negative repercussions on the data assimilation. To address this problem in ADRICOSM-EXT the actual SST products will be improved by increasing the number of useful passes and producing new interpolated SST fields. In particular, the coverage of the Adriatic will be improved using SST generated from NOAA-17 AVHRR data in addition to presently used NOAA-16 AVHRR data.

Furthermore, space and time objective analysis techniques will be used to produce daily optimally interpolated SST fields with a 2-3 day delay over the model grid. The objective analysis scheme will take into account the effect of the daily cycle on data merging. Finally, in order to obtain more accurate SST critical to the modeling component the UM/RSMAS Pathfinder SST algorithm will be used to generate high precision (0.3 C) absolute SST. Full resolution SST data will be made available to interested partners in addition to the gridded product as a feature of the satellite LAS web services.

Entering countries personnel will be involved in the definition and realization of SST data products for their specific application and areas of interest. This activity will constitute part of the training to be performed during their stay at GOS-ISAC. These products will be available

as new features of the LAS for remote operation after the end of the training period to the all ADRICOSM-EXT participants.

Responsible: CNR.ISAC

Participants: HEIS

Duration: 0 – 18 months

Deliverable within 18 months: Description on data procedures on GOS web site, NRT SST data of the first 18 months on the web, description of the new products developed during the training stage

Subtask 1.1.2: Ocean Color

At present real-time daily images of Chlorophyll and Case I/II water are produced with climatological ancillary data and presented and archived. In the ADRICOSM-EXT, daily files will be replaced by their counterpart produced with the ancillary data obtained from NASA as soon as the latter become available (about 4-day delay) to achieve best accuracy.

Moreover, the water quality indices based upon case I/II masks and water clarity coefficient will be made available to project as additional diagnostic tool for monitoring the coastal waters. Experimental use of MODIS (Terra and Aqua) NRT data will be incorporated in the processing chain to improve the data coverage in a way analogous to the introduction of NOAA-17 data in the SST processing chain. Full resolution ocean color data will be made available to interested partners in addition to the gridded product as a feature of the satellite LAS web services.

Entering countries personnel will be involved in the definition and realization of ocean color data products for their specific application and areas of interest. This activity will constitute part of the training to be performed during their stay at GOS-ISAC. These products will be available as new features of the LAS for remote operation after the end of the training period to the all ADRICOSM-EXT participants.

Responsible: CNR.ISAC

Participants: HEIS, CNR.ISMAR-Ancona

Duration: 0 – 18 months

Deliverable within 18 months: Description on data procedures on GOS web site, NRT SeaWiFS ocean color data of the first 18 months on the web, description of the new products developed during the training stage

Subtask 1.1.3: Satellite data products for meteorological sensitivity studies

Satellite data can be used to tune and to validate local area meteorological models. Moreover, satellite data over the ocean can be used as boundary condition. The objective is providing specific satellite data products for meteorological sensitivity studies.

In particular day and night SST data will be produced to address the daily temperature cycle and its spatial structure. Wind fields derived from Quikscat will be produced for the Adriatic to have information on smaller scale pattern undetected by the large scale model output. Feedback from the modeling component is envisioned to optimize the satellite data products.

Responsible: CNR.ISAC

Participants: UNIBE

Duration: 0 – 18 months

Deliverable within 18 months: Maps of day and night SST data for the two-four test periods, maps of surface wind data for the test period.

Task 1.2 Continuation and improvement of the VOS XBT monitoring system

Subtask 1.2.1 Design of the automatic meteorological station for the VOS-XBT system

The meteo measurements on board of VOS will be wind, air temperature, pressure and humidity. Many instruments and systems can be selected. Actually the data are transmitted

through Inmarsat (which is quite expensive). During the first 6 months of the project, ENEA, IOF and OGS will make an analysis of the existing sensors, explore the possibility to use Iridium/Globalstar data transmission, design and realize a compact package of sensors, data storage and transmission system to be installed on the selected ships. The real-time data transmission system, data transmission and quality control protocol will be developed.

Responsible: ENEA.CRAM

Participants: UNESCO-IOC, OGS, IOF

Duration: 0 – 3 months

Deliverable within 18 months: Existing sensors analysis report, design of the new sensors, transmission system design, sensors installed on the ship. Data transmission and quality control protocol for the meteorological ship-borne data. Meteorological data transmission and quality control protocol

Subtask 1.2.2 XBT and continuous ship-borne meteorological measurements along the transects Ploce-Malta and Dubrovnik-Bari

The automatic meteorological station developed in Subtask 1.2.1 for continuous wind, temperature, atmospheric pressure and humidity measurements will be installed on the ship of opportunity. Positioning and installation of sensors on the ship as well as the crew preparation for the use of the meteorological station will be carried out in co-operation with the shipping company.

The meteorological station will be operative all the time while ship will be cruising. The XBT measurements are planned to be carried out on a monthly basis excluding two summer months (July and August) with a spatial resolution of 10 nautical miles as in the previous program which has been operative since 1999. The Deep Blue type of XBT will be used as they can go down to 900 m depth. The data will be collected monthly, transmitted in real time to the ENEA center on the transects Dubrovnik-Bari and Ploce-Malta.

Responsible: OGS

Participants: IOF, ENEA.CRAM

Duration: 0 – 18 months

Deliverable within 18 months: Meteorological and XBT data collected. Estimates of air-sea heat fluxes and comparison with the ECMWF data

Task 1.3: Implementation of new CTD coastal networks and monitoring stations.

Subtask 1.3.1: The Bar-Durres coastal area seasonal data collection

The aim of this task is to start collection of basic hydrological and biochemical data sets in new coastal areas (Serbia-Montenegro and Albania) to build the scientific basis for coastal forecasting in successive phases.

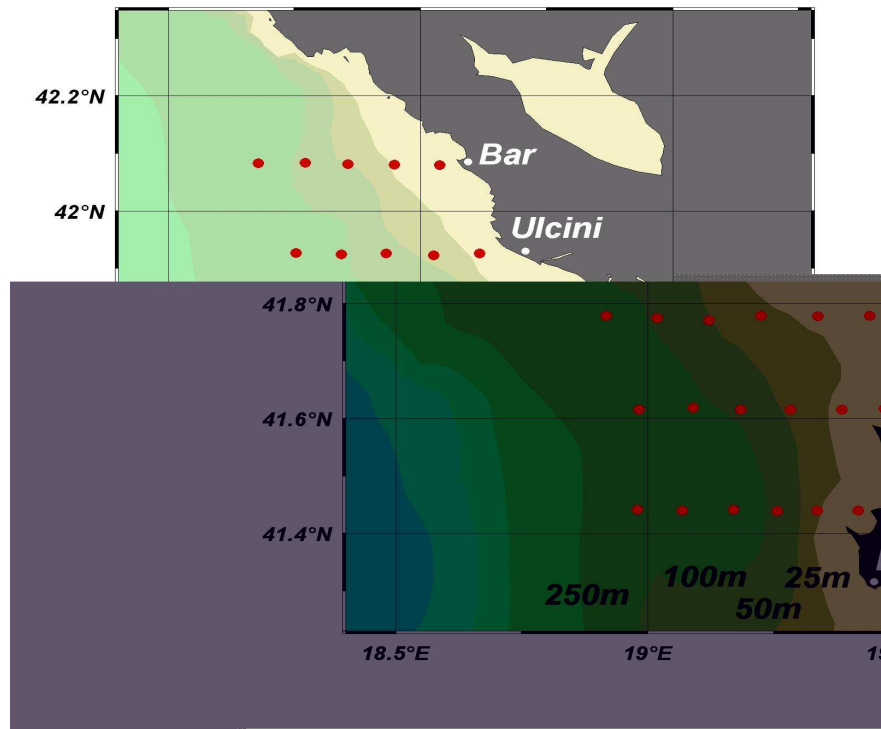
The aim of this subtask is to implement a new CTD network on new transects between Serbia-Montenegro and Albania. The new program of CTD measurements consists of four 6 days seasonal cruises, 5 transects on the Durazzo/Bar coastal area and a Brindisi/Durazzo track (see Figure below). The analyzed parameters are CTD (Temperature, salinity, turbidity, fluorescence, oxygen) on a total number of 45 stations. The data will be transmitted to the ENEA real time data collection center.

Responsible: CNR.ISMAR (Ancona)

Participants: IBM, IE

Duration: 0-18 months

Deliverable within 18 months: Two coastal cruises CTD data set, data available in the ENEA real time data collection center

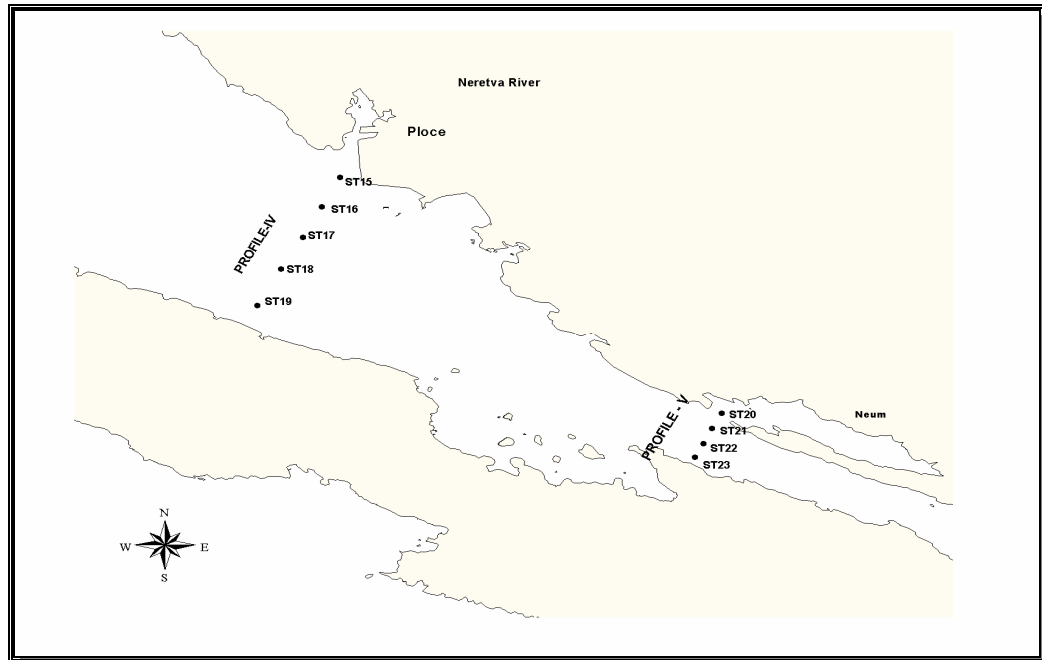


Subtask 1.3.2: Extending the measurements area for CTD and inclusion of optical parameters

Aiming to improve ASHELF-2 model and COAST model we propose to add 9 CTD stations in Vis-Peljesac-Drvenik area (Figure below). Preliminary analysis of ADRICOSM CTD results and ASHELF-2 model in Vis-Peljesac-Drvenik area have shown that measurements on existing CTD stations could not give a precise indication about the influence of Neretva River discharge on the complex currents in this test area.

To partially solve the problem, it is necessary to set-up CTD measurements on 9 additional stations along two transects (called Profiles V and IV in the figure below) and re-arrange position of stations at the transect III (old transects). Measurements on the IV and V transects, as well as validation and analysis of data from the CTD stations, will be done in cooperation with Bosnia-Herzegovina.

Measurements of optical parameters (with Biospherical Profiling Radiometer) in Vis-Peljesac-Drvenik area will be done at representative CTD stations across the gradient of optical properties. Measurements will be done under specific weather situations (after sirocco and bora) in different part of the year (during the period with mixed and stratified water column).



Proposed new coastal stations

Responsible: IOF

Participants: HEIS

Duration: 0 – 18 months

Deliverable within 18 months: Set up of two new coastal CTD transects in the Vis-Peljesac-Drvenik coastal area, CTD data collection and near-real time data dissemination, QC of data,

Task 1.4 New sea level stations in Southern Adriatic Sea

The objectives are:

- Implementation of a meteo-marine station on the Albania coast across the Otranto Strait, in collaboration with Albanian partners;
- Acquisition and collection of meteo-marine data in an electronic data archive located in Albania, in collaboration with Albanian partners;
- Definition of the administrative programs for ordinary and extraordinary maintenance of the meteo-marine station, in collaboration with Albanian partners;
- Integration of the new station in the APAT meteo-marine network and dissemination of the data within the Project.

Responsible: APAT

Participants: UNESCO-IOC, IE

Duration: 0 – 18 months

Deliverables within 18 months: instrumentations, hardware, software, administrative and technical procedures.

Task 1.5 Introduction of new measurements in existing observational areas for training purposes

Subtask 1.5.1: Add new ADCP on board of two of the four major ADRICOSM CTD network vessels.

A new VM-ADCP system for a 10-25 m long ship to be used in shallow waters (10-50 m) will be implemented in two of the four ADRICOSM coastal areas networks and new entry partners will be participating to enforce training for future implementations in other coastal areas. Small ships roll is large, compromising therefore ADCP data quality. The problems related to the installation of such device on each of the five ADRICOSM ships involved in the coastal areas networks will be assessed and the necessary developments carried out.

After the initial problem assessment phase the combined collection of CTD and ADCP data will be carried out at monthly or seasonally time scales in the four traditional CTD coastal monitoring networks of ADRICOSM.

Responsible: OGS

Participants: UNESCO-IOC, ARPA.Daphne, NIB.MBS, RBI.CMR, IOF, HEIS, UNIBE, IBM, IE

Duration: 0-18 months

Deliverable within 18 months: installation and test of the system; training courses on ADCP monitoring. CTD and ADCP data collection

Subtask 1.5.2 Installation of new sensors in the Gulf of Trieste monitoring station

Innovative technology will be added on the mooring in the Gulf of Trieste and participants from the entering countries will be invited to participate in the data collection and analysis exercise. A new controller to collect the data from different sensors and transmit the measurements in real time to the off-shore station will be installed together with an ADCP hull mounted and a profiling CTD. The mooring and the campaigns done in collaboration with LBM (now part of OGS) will provide valuable time series on physical and bio-optical parameters. Training courses will be organized in collaboration with LBM on the new implementation of the mooring and the measurement performed.

Responsible: OGS

Participants: IBM

Duration: 0-18 months

Deliverable within 18 months: Installation and test of the new sensors

Subtask 1.5.3: Po river Buoy station

Actually, the Po river Buoy station (figure 1) measures meteorological (wind speed, wind gust and wind direction, air temperature, air pressure, relative humidity and net solar radiation), oceanographic (current speed and 2D current direction) and physico-chemical parameters (water conductivity, temperature, pH, redox, dissolved oxygen, chlorophyll α and turbidity) at one hour intervals of data acquisition within the first meter water depth.

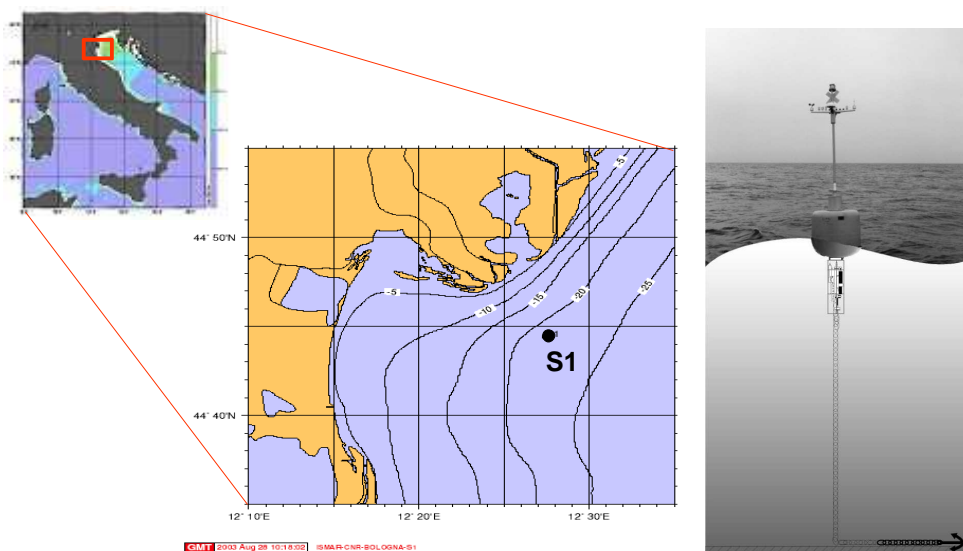


Figure 1: Location of the Po river Buoy station and present configuration of the system.

ISMAR will improve the Po river buoy system with an ADCP and a firmware waves at the sea bottom. The bottom sensors will be mounted on an AISI 316 stainless steel tripod and will include an 600 kHz acoustic doppler current profiler (ADCP) with 3D current speed and

direction profiling capabilities, temperature and pressure sensors for water level measures and a waves firmware for multi-directional wave gauge measures (figure 2).

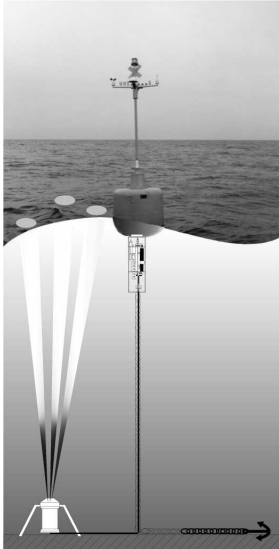


Figure 2: The future configuration of the Po river Buoy station.

Responsible: CNR.ISMAR-IGM

Participants: NIB.MBS, IE

Duration: 0 – 18 months

Deliverable within 18 months: set up of the new sensors, excursions for platform maintenance training

Subtask 1.5.4: Assessment of primary production in the Gulf of Trieste coastal waters

Estimation of the primary production using ^{14}C method in a coastal station. Calibration of optical remote sensors using “in situ” ^{14}C method will be carried out with the aim to evaluate the primary production in the whole Gulf of Trieste. Photosynthetic rate vs Irradiance curves and photosynthetic parameters for the most important phytoplankton assemblages of the Gulf will be studied using a light incubator.

The OGS will provide training to Adriatic partners on optical data collection and estimation of the primary production using ^{14}C method in a coastal station. The training would span over 10 months and would include:

- course (20 hours) on data management and statistical treatment of bio-optical data.
- a field course (10 excursions) to acquire hand-on experience on optical probe management and experimental design on primary production ^{14}C method.

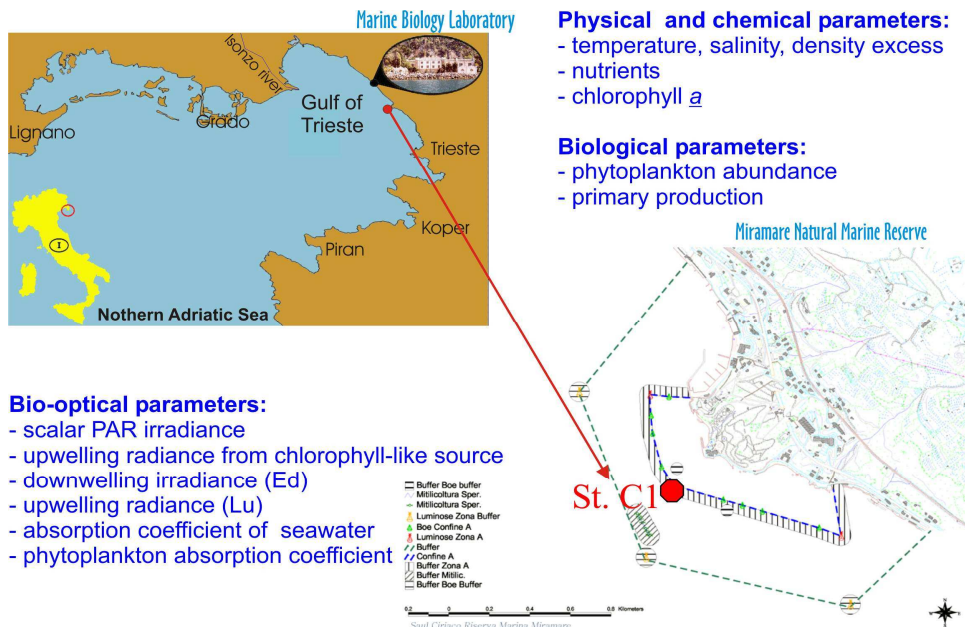


Fig. 1 – Gulf of Trieste and location of the sampling station C1

Responsible: OGS

Participants: IBM

Duration: 0-18 months

Deliverable within 18 months: implementation of the primary production dataset and comparison with the primary production data estimated by optical probe.

Task 1.6: Improvement of coastal hydrodynamic modelling and new implementations

The main aims of this task are:

- Improve the coastal forecasting activities in several coastal areas
- Add new coastal modeling sites and introduce innovative modeling activities.

Subtask 1.6.1: Improve the coastal forecasting activities in the Split area

High-resolution meteorological fields will be used to rerun the ASHELF-2 model for the TFP and TOP ADRICOSM period (April, 1 - September, 30, 2003). The fields will be provided by a mesoscale meteorological model (ALADIN/ZAGREB) having spatial resolution of 8 km. Initial and boundary conditions will be taken from the corresponding AREG runs. Comparison between high-resolution (ALADIN) and low-resolution (ECMWF) meteorological fields will be done, having in mind AREG and ASHELF-2 models. Subsequently, the ASHELF-2 results obtained with the high-resolution forcing will be compared with results obtained during the TFP and TOP periods.

Responsible: UZ.AMGI

Participants: INGV

Duration: 0-18 months

Deliverable within 18 months: Acquisition and preparation of ALADIN meteorological fields. Comparison of high-resolution (ALADIN) and low (ECMWF) meteorological fields for the TFP and TOP period. Preparation of AREG for high-resolution forcing runs.

Subtask 1.6.2: Improvement of coastal forecasting activities in marine area influenced by discharge of Neretva River (Croatia and Bosnia-Herzegovina territories)-High resolution coastal model (COAST) and coastal modeling tools

Aiming to improve knowledge of oceanographic processes in the marine coastal areas influenced by the discharge of the Neretva River it is proposed to set-up a high-resolution model (200 meters grid) for the coastal area influenced by Neretva River (Pelješac -Neretva River delta – Hvar).

A coastal model will be implemented and nested within ASHELF-2 model. Atmospheric forcing will be obtained from high-resolution mesoscale models. Oceanographic model results will be compared with temperature and salinity data obtained in the corresponding periods. Comparison of the modeled and measured data will be used to define suitable parameterization of the heat and water fluxes for the studied area.

In addition a numerical model successfully developed at APAT can be used for the investigation of river mouth flow and marine structures interactions. It may be implemented for Neretva and Mala Neretva river mouths and related marine structures at that region in order to investigate small-scale problems (at $L = O(1 \text{ km})$), in which the accuracy of the numerical solution for the description of coastal morphology and marine structures can be appreciated. This code can give reliable and accurate results insofar as 3D effects can be neglected, that is, in the presence of typical 2D forcing (e.g in the absence of baroclinic features), mild bottom slope, and, of course, if $h/L < O(10^{-2})$. The model has been validated in several cases, with analytical and numerical solutions as well as experimental data. More precisely, this model will be use for the understanding of:

1. Interaction with large scale flow;
2. Wind forcing effects;
3. River run-off forcing (in the hypothesis of fully mixed estuarine flow);
4. Tidal forcing.

Responsible: IOF

Participants: APAT, FCE, FCE-Mostar

Duration: 0-18 months

Deliverable within 18 months: Set-up of high-resolution model nested into the ASHELF-2 area. Set up of the hydrodynamic code for $O(1 \text{ km})$ simulations

Subtask 1.6.3: New coastal model for Rovinj Area

This subtask is focused on the implementation of a coastal model in the Rovinj Area nested within the ASHELF-1 model of ADRICOSM. The model will be validated with the ADRICOSM data.

Responsible: RBI.CMS

Participants: INGV

Duration: 0-18 months

Deliverable within 18 months: Set up of the coastal model

Task 1.7 Atmospheric forcing studies

This task is focused on the study of air-sea interaction parameterizations for coastal ocean forecasting. Ocean forcing fields will be produced by using high-resolution atmospheric model runs. Impact of these forcing fields will be accessed through comparison with satellite SST, scatterometer and VOS meteo data. For the ocean runs POM will be the marine model with boundary conditions provided by the Adriatic model available to the Project. Since the atmospheric model is a limited area model (LAM) test of different GCM as sources of the boundary conditions will be performed.

Part of the analysis of the atmospheric model fluxes will be separate analysis of the difference in the PBL parameterizations that are currently proposed by the NCEP model and Mellor-Yamada-Galperin model. If meteo data allow viscous sub-layer parameterization will be re-examined.

Responsible: UNIBE

Participants: INGV

Duration: 0 – 18 month

Deliverable within 18 months: model outputs exchanges

Task 1.8 Continuation of ADRICOSM forecasting activities

The ADRICOSM forecasting activities will be continued with particular attention to the new model implementation sites and the exchange of model data for new applications. Forecasts will be carried out once a week and for seven days.

Responsible: INGV

Participants: IOF

Duration: 0 – 18 month

Deliverable within 18 months: model outputs, data assimilation and forecasts

WP2: INTEGRATED CATCHMENT SIMULATOR SYSTEM - ICSS FOR A RIVER TEST SITE

Overall objectives of the WP are:

1. integrate know-how, innovative tools and state-of-the-art technologies available;
2. implementing in a river test site in *Albania* (River Ishem) the procedures and methodologies, which already have been applied in a river catchment test site in the *Split* area (*Croatia*).

Task 2.1 Definition of pilot area and mobilization

- Identify the pilot site (which should correspond to a “hot spot”) by the relevant Italian and Albanian authorities.
- Identify and contact the local stakeholders in order to define in depth the project contents and responsibilities.

Responsible: IE

Participant: SGI

Duration: 0-6 months

Deliverable within 18 months: Hot spot area defined, network of stakeholders established

Task 2.2 Data Collection and Database Implementation

The logistics, i.e. local staff and office structure will be defined and organized. All existing data on the hydrographic basin will be collated and organised into a relational database and GIS. The existing cartography and previous studies will be reviewed in order to extract the relevant information for input into the database, Historical data series on climatic conditions (rainfall, temperature, potential evaporation, etc.), river (levels and flows, rating curves) and coastal environments (tides and wind) will also be used in the set up of the models. The analysis of the water quality in the river and sea will also be included in the database. Moreover static data regarding sewer system and daily operation will be collected.

Responsible: IE

Participants: SGI

Duration: 0-4 months

Deliverable within 18 months: List of pollution sources, database of acquired information

Task 2.3 Models set-up and implementation

In order to analyse the system performance, models of the River Ischem and Tirana sewer system will be constructed using data acquired in task 2.2. In particular the following model will be implemented.

- MIKE 11 for modelling river, channels and estuaries,
- MOUSE for the main combined and storm sewer collectors and overflows into the receiving waters.

Responsible: SGI

Participants: IE

Duration: 2-8 months

Deliverable within 18 months: MOUSE model of Tirana Sewer System – MIKE11 model of River Ischem.

Task 2.4 Flow, Rainfall and WQ surveys in the sewer system, river and coastal area

Flow, rainfall and water quality surveys will be performed in the sewer system and in the river mouth in order to find out data for the models calibration. Moreover fields measurements will contribute to characterized water quality conditions in critical locations of the system.

In this phase initial set-up of the survey will be carried out and first measurements executed. Design of measurements needed to complete the integrated analysis will be defined. Flow rainfall and WQ survey will be initiated using following equipment: 2 portable automatic samplers, 1 flow meter for sewer system and 1 rain-gauge. These instruments will be installed in suitable locations of the system and samples sent to laboratory for determination of COD, Suspended Solid and Total Nitrogen.

Responsible: IE

Participants: SGI

Duration: 19-30 months

Deliverable within 19-30 months: Short term monitoring data from initial measurements (Tirana sewer system and river Ishem) – Guidelines for completion of Rainfall, Flow and WQ surveys in the sewer system, river and coastal area.

Task 2.5 Feasibility study for other river basin pilot areas

In order to apply ADRICOSM methodology to other relevant Adriatic catchments of Bosnia Herzegovina and Albania, a targeted feasibility study for the river Drini and River Neretva catchments will be carried out.

For both catchments the feasibility study will be characterized by the following activities:

- Overall data acquisition regarding WQ and socio-economical condition of the pilot areas
- Identification of possible “hot spots”
- Analysis of resources (labor, equipment, software, detailed survey and others) and cost breakdown for the implementation of ADRICOSM methodology
- Evaluation of the expected results

Responsible: SGI

Participants: RBI.CMR, IOF, UZ.AMGI, HEIS, FCE, FCE-Mostar

Duration: 18-30 months

Deliverable 19-30 months: Feasibility study for river Drini and river Neretva

WP3: DATA MANAGEMENT SYSTEM

Major aims:

1. Implement and develop an efficient data management system for Real Time and historical data sets in the Adriatic;
2. Organize an Adriatic data management network with expert coastal data centres;
3. Data rescue for physical and biochemical parameters in new coastal areas of interest;
4. Develop quality control procedures for coastal and open ocean historical data sets of the region;
5. Development of GIS for coastal areas;

Task 3.1 Organisation of NRT data management system for the whole Adriatic Sea

- Establishment of data quality control procedures for NRT CTD and VOS data
- Add RT time buoy station data management and dissemination

During ADRICOSM-EXT the analysis of all the data collected in ADRICOSM will be carried out, and also new additional products will be developed:

- protocols and software for data collection, re-sampling at higher vertical resolution, de-spiking, filtering.
- Analysis of the consistency of data collected in ADRICOSM, construction of local climatologies (monthly mean and STD profiles)
- Develop a Q.C. software for coastal data

This activity will foresee the collaboration of all the Institutions involved in data collection in coastal areas (Daphne, LBM, NIB, IOF) and the institutions involved in data management (ENEA and OGS).

Responsible: ENEA.CRAM

Participants: UNIBO.CIRSA, ARPA-Daphne, LBM.TS, OGS, NIB.MBS

Duration: 0 – 18 months

Deliverable within 18 months: data quality control procedures, data dissemination protocols

Task 3.2 Organisation of a delayed mode data archiving system for the Adriatic Sea

- Evaluate MEDAR/MEDATLAS data set for the area
- Develop feasibility study for the enlargement of MEDAR/MEDATLAS data set in crucial coastal areas and to biochemical state variables
- Add historical data available from all participating countries
- Creation of a biological meta data base of the Adriatic Sea

The Data archiving system aims to obtain a comprehensive and scientifically validated hydro-bio-geo-chemical data set for the Adriatic Sea coastal areas. A large amount of physical and biochemical data were merged into MEDAR/MEDATLAS data sets (ABCD and ATOS, ASCOP, DINAS, EUROMARGE-AS, OTRANTO, POEM and PRISMA1). Recent multidisciplinary data set (ELNA, PRISMA1, PRISMA2, etc.) as well as oceanographic and meteorological measurements from buoy stations still remain in the hosting laboratories in danger to be lost.

Detailed procedure for data validation, including checking for quality control values (statistical values) adjusted to coastal and open sea conditions and analyses of the coherence of incoming data sets, will be developed. Primary data processing and quality control shall be performed by individual institutions responsible for data acquisition; nevertheless common procedures for data archival, inter-calibration and global quality checking shall be carried out before merging new data from different sources. The technical specifications (i.e. parameters name, dimensional units, ranges for quality check, etc.) will be defined in close collaboration with the work-package teams. Catalogues to organize the information (i.e. with ROSCOP forms for data collected during recent cruises and EDMED descriptions for all the data sets) will be implemented, disseminated and regularly updated on WWW pages.

The major objective is therefore to recovery all available physical, bio-geo-chemical and meteorological data to be merged with existing data base (MEDAR/MEDATLAS) in order to evaluate MEDAR/MEDATLAS data set for ADRICOSM coastal areas, to develop/adapt existing methodologies for quality checking to coastal and open sea characteristics, to provide a permanent visibility on the data archiving activity and to release in the public domain (via ftp, WWW and CD-ROM) all available information and data inventories.

Concerning the creation of a biological meta data base of the Adriatic Sea the goal will be the preparation and merge in a biological meta data base of all historical plankton data set that have been collected over the Northern Adriatic during joined research/monitoring projects over the last decades, including the available eastern countries' data sets.

Responsible: OGS

Participants: ENEA.CRAM, LBM.TS, NIB.MBS, RBI.CMR, IOF

Duration: 0-18 months

Deliverable within 18 months: General inventory of available data in selected Adriatic Sea coastal areas; preliminary procedure for data formatting and validation.

Task 3.3 Development of a portal system (LAS) for satellite, in situ and model data output

The system should be developed to make easily accessible the integrated data sets to the new entering countries. As a natural evolution of the satellite website, a LAS portal will be developed. Interactive sub-setting capabilities and data extraction will allow the users to explore the complete the archive and obtain data from specific areas and periods in both digital and gif forms. Movie loop generation will also be provided for case studies for the entire Adriatic and for selected sub-region.

Responsible: CNR.ISAC

Participants: ENEA.CRAM, OGS, UZ.AMGI

Duration: 0 - 4 months

Deliverable within 18 months: Satellite LAS Portal

Task 3.4 Data sharing protocols for meteo-marine measurements

- Integration of meteo-marine networks already operating in Adriatic sea within the Project;
- Definition of technical requirements for the free dissemination of the Adriatic meteo-marine data;
- Set-up of the Adriatic meteo-marine data sharing network and protocols.

Responsible: APAT

Participants: ENEA.CRAM, IE

Duration: 0 – 18 months

Deliverable within 18 months: meteo-marine data sharing protocols

Task 3.5 GIS development for coastal areas of the Adriatic Sea

The aim of this task is to build an electronic atlas of oceanographic data for the Adriatic Sea to aid in scientific research, coastal zone management and education. The atlas will be build using the data base compiled within EU/MAST funded supported initiatives (MEDAR/MEDATLAS II), reinforced with additional historical/ongoing data available/collected from all participating countries.

Future implementation will consider other rescued marine environment data (e.g. long time-series of marine current, sea level, moored meteo-oceanographic buoy platforms; satellite images of Sea Surface Temperature and SeaWiFS chlorophyll concentrations, etc.), as well as riverine, urban and industrial discharges of nutrients into the coastal waters.

Responsible: OGS

Participants: FCE

Duration: 0 - 18

Deliverable within 18 months: Prototype GIS-based (Geographical Information System) electronic atlas of oceanographic data for a comprehensive and multidisciplinary oceanographic data management;

WP4: TRAINING AND OUTREACH

It is intended that all Partners in the Project will be Participants to these Tasks.

Task 4.1: Workshops and seminars in the field of operational forecasting, ICZM, monitoring, modelling and data assimilation

On the basis of UNESCO-IOC activities ICM and GOOS two workshops will be organized with external expertise to discuss state of the art projects and studies on the subjects.

Responsible: UNESCO-IOC

Duration: 0-18 months

Deliverable within 18 months: First Workshop organized

Task 4.2: Mapping techniques for coastal data sets

Mapping of climatology in the Adriatic and ADRIACOSM coastal areas techniques will be described and these techniques will be the arguments of training period for new entry partners.

Responsible: UNIBO-CIRSA

Duration: 0-18 months

Deliverable within 18 months: training course on mapping techniques

Task 4.3: Training course for data management

Training courses for historical and real time data management will be organized.

Responsible: UNESCO-IOC

Duration: 0-18 months

Deliverable within 18 months: training course organized

Task 4.4: Meteo-marine station data management

The work will be organized in the following way:

- Training programs concerning the management of the meteo-marine station;
- Training programs concerning the data collection, management and networking;
- Visiting programs concerning technical visits to meteo-marine stations, informatics and telematic centers
- Stages to be activated at Italian technical organizations.

Responsible: APAT

Duration: 0-18 months

Deliverable within 18 months: training course organized, visits, stages, learning documentation

Task 4.5 Training in ICSS

The scientific and technical training courses and workshops will deal with the following topics:

- Modelling of sewer system with MOUSE
- Modelling of river basin with MIKE11
- Flow, WQ and rain survey in the integrated system
- Performance analysis – evaluation of results

Responsible: SGI

Duration: 10-18 months

Deliverable within 18 months: Training courses and workshop.