



MEDAR-MEDATLAS II

1999-2001

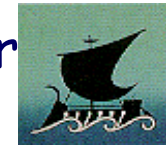
**Mediterranean Data Archaeology and Rescue
of Temperature, Salinity and Bio-chemical Parameters
(MAS3-CT98--0174/ERBIC20-CT98-0103)**

Project Results Overview

**MAMA Kick-Off Meeting
UNESCO/IOC, Paris, 11-12 March 2002**

MEDAR Group

**presented by Catherine MAILLARD, project coordinator
IFREMER/TMSI/IDM/SISMER**



EC-Marine Science & Technology Programme

Questions Asked and Needs

- ◆ *The need for marine database and appropriate data management is particularly crucial in the Mediterranean and Black Sea : for environmental studies, for qualification of new data that requires statistics of expected values, for initialisation and qualification of numerical models*
- ◆ *Managing living and non-living resources, monitoring environmental changes in the sea and protecting the marine environment, require long time series of observations of:*

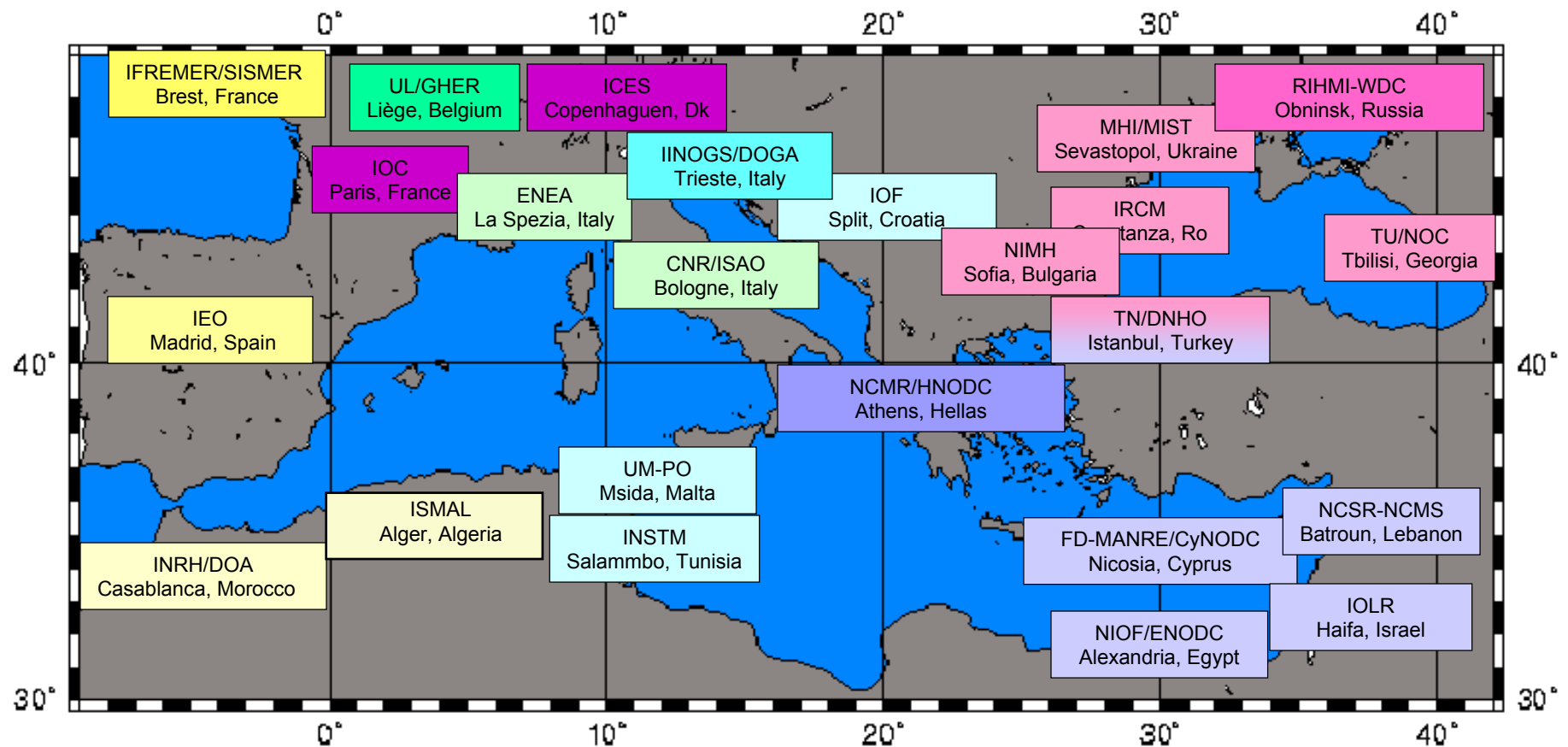
Dissolved Oxygen: *low oxygen levels in the upper layers, can result in reduction of higher life forms, release of toxic forms of metals and pathology in living organisms.*

Nutrients: *changes in nutrient fluxes can alter primary production and bio-diversity, and can directly affect aquaculture and fishing activity.*

Temperature and Salinity: *are the primary indicators of climate change and allow the computation of other derived parameters such as density, sound velocity, and geostrophic current, widely used in scientific and technical studies.*

- ◆ *The data collected by the scientific laboratories are not always available for public use, and frequently not even inventoried and safeguarded. Data never archived in a public data bank are in danger of being lost. Studies show that without appropriate safeguarding, about 30% of them will be lost within 10 years. Data collected in variable environment cannot be remade.*

MEDAR GROUP



Collaborations and Scientific Advisers :

GODAR Project - WDC-A,
EUROGOOS, IODE Network

Project History and International Context

◆ UNESCO/IOC/IODE

- 1988 : Global Sea Surface Temperature Salinity Pilot Project (**GTSP**) launched
- 1993 : Global Oceanographic Data Archaeology and Rescue Project (**GODAR**)
- 1995 : IOC-ICSU-CEC/**GODAR IV - Regional Workshop** Mediterranean, Malta
- 1996 : Mediterranean Data Archaeology and Rescue of temperature, salinity and bio-chemical parameter (**MEDAR**), officially endorsed by IOC
- 1997 : IOC-EC-Turkish DC/ First **MEDAR/MEDATLAS** Meeting, Istanbul

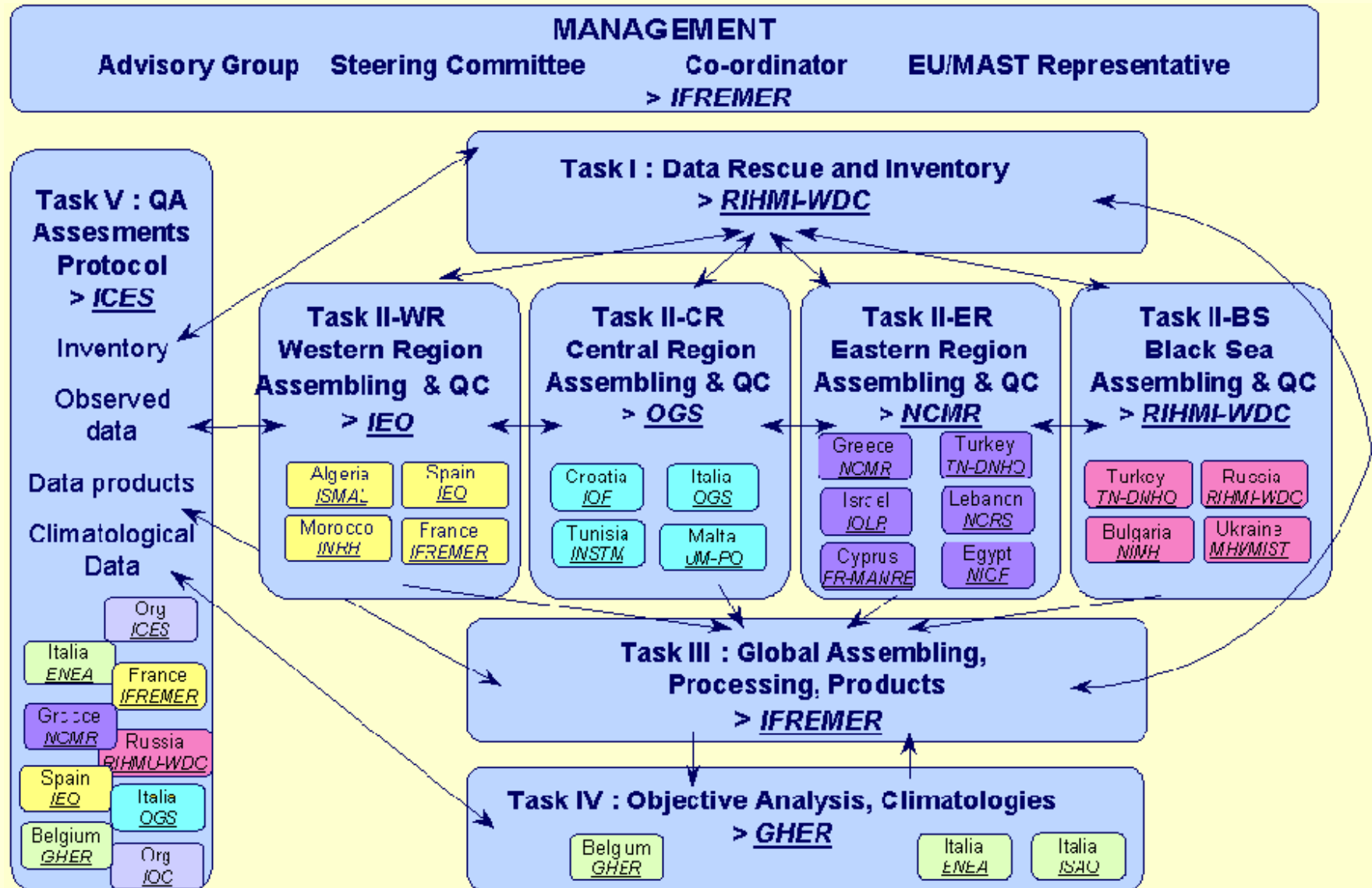
◆ EC/MAST : Marine Science and Technology Programme

- 1995-1996: **MO**DB (MAS2-CT93-0075)
- 1994-1997: **MEDATLAS** Pilot Project (MAS2-CT93-0074)
- 1997: **MEDAR/MEDATLAS II** submitted and accepted
- Dec 1998: **MEDAR/MEDATLAS II** MAST/INCO Concerted action contract for a 3-year support period December 1998 to 2001
- March 1999 : Kick-off Meeting in Paris
- Dec. 1999: QC Workshop in Brest and Athens
- June 2000: Steering Committee Meeting, Varna
- Dec. 2000: IIInd Annual Workshop, Nicosia
- June 2001: Steering Committee Meeting, Madrid
- Dec. 2001: IIIrd Annual Workshop, Trieste

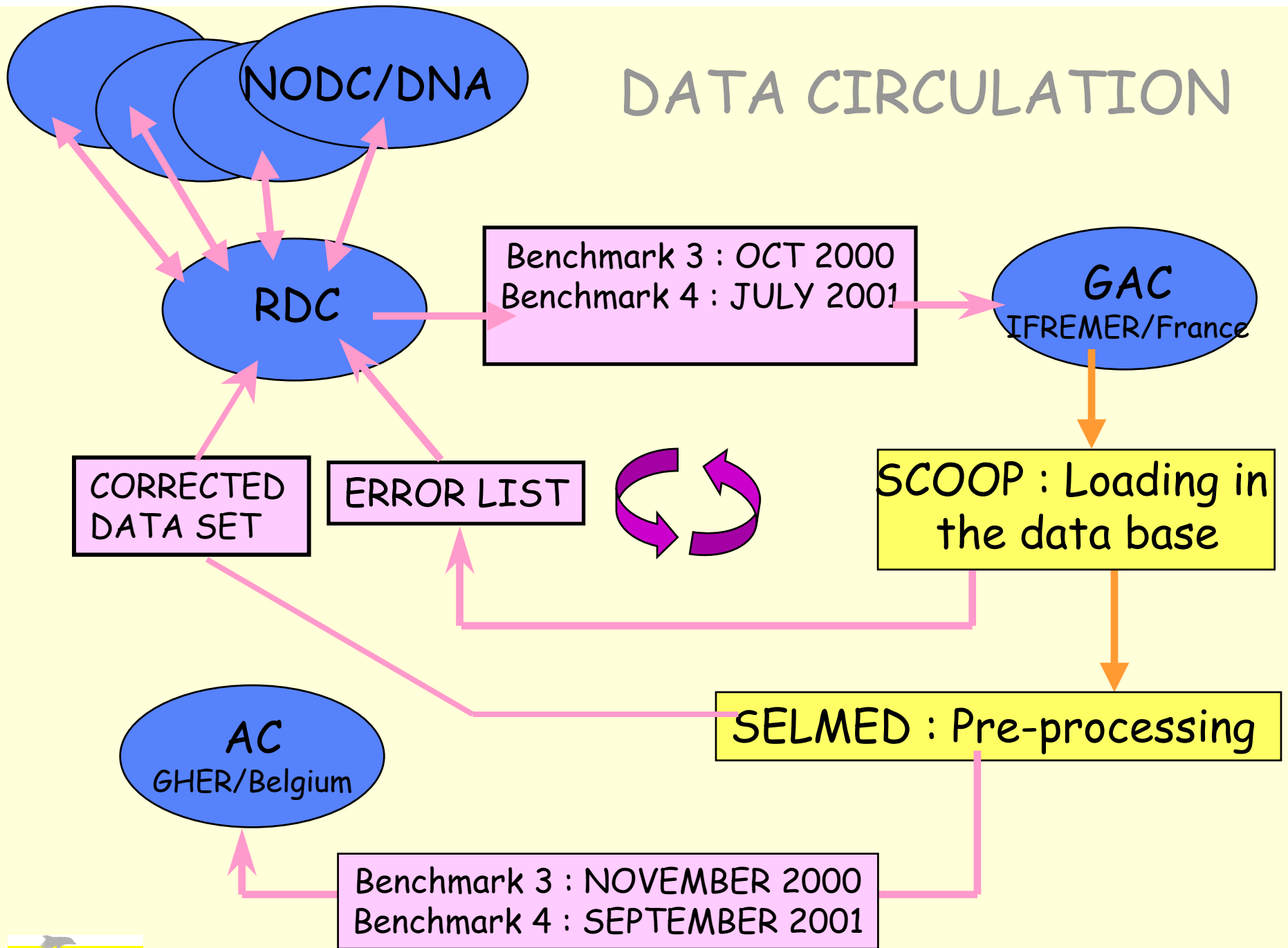
Objectives and Methodology of Medar/Medatlas II

- ◆ **1:** to inventory, safeguard and make available historical data sets of : Temperature, Salinity, Oxygen, Nitrate, Nitrite, Ammonia, Total Nitrogen, Phosphate, Total Phosphorus, Silicate, H₂S, pH, Alkalinity, Chlorophyll-a
- ◆ **2:** to make the archived data sets comparable and compatible by using a common MEDATLAS protocol for formatting and quality checking
- ◆ **3:** to prepare qualified value added products by developing and using efficient gridding, and mapping methodology developed with the Variational Inverse Model of MODB
- ◆ **4:** to publish and disseminate the observed data, gridded analysed data, maps, software and documentation on CDrom for further scientific, educational, industrial, governmental use
- ◆ **5:** to develop and document a common methodology for data and meta-data formatting and qualifying, based on the internationally agreed standards.

PROJECT STRUCTURE



DATA CIRCULATION



Results

MEDAR

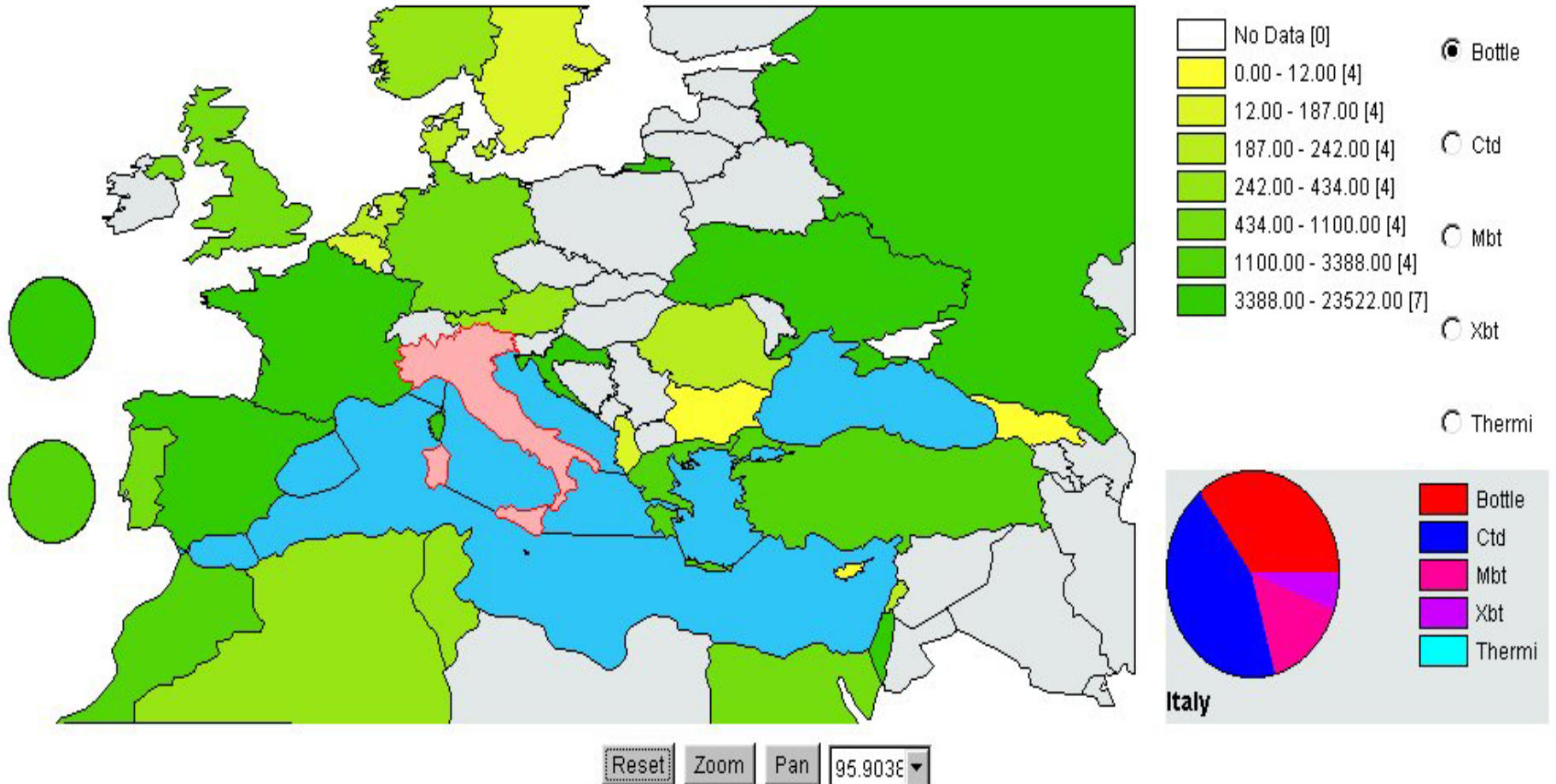
Documentation
Cruise inventory
Data extraction
Climatology (maps and figures)
Climatology (numerical fields)

MEDAR
MEDATLAS II

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LOG

Medatlas Inventory



Content of the database - Data Types

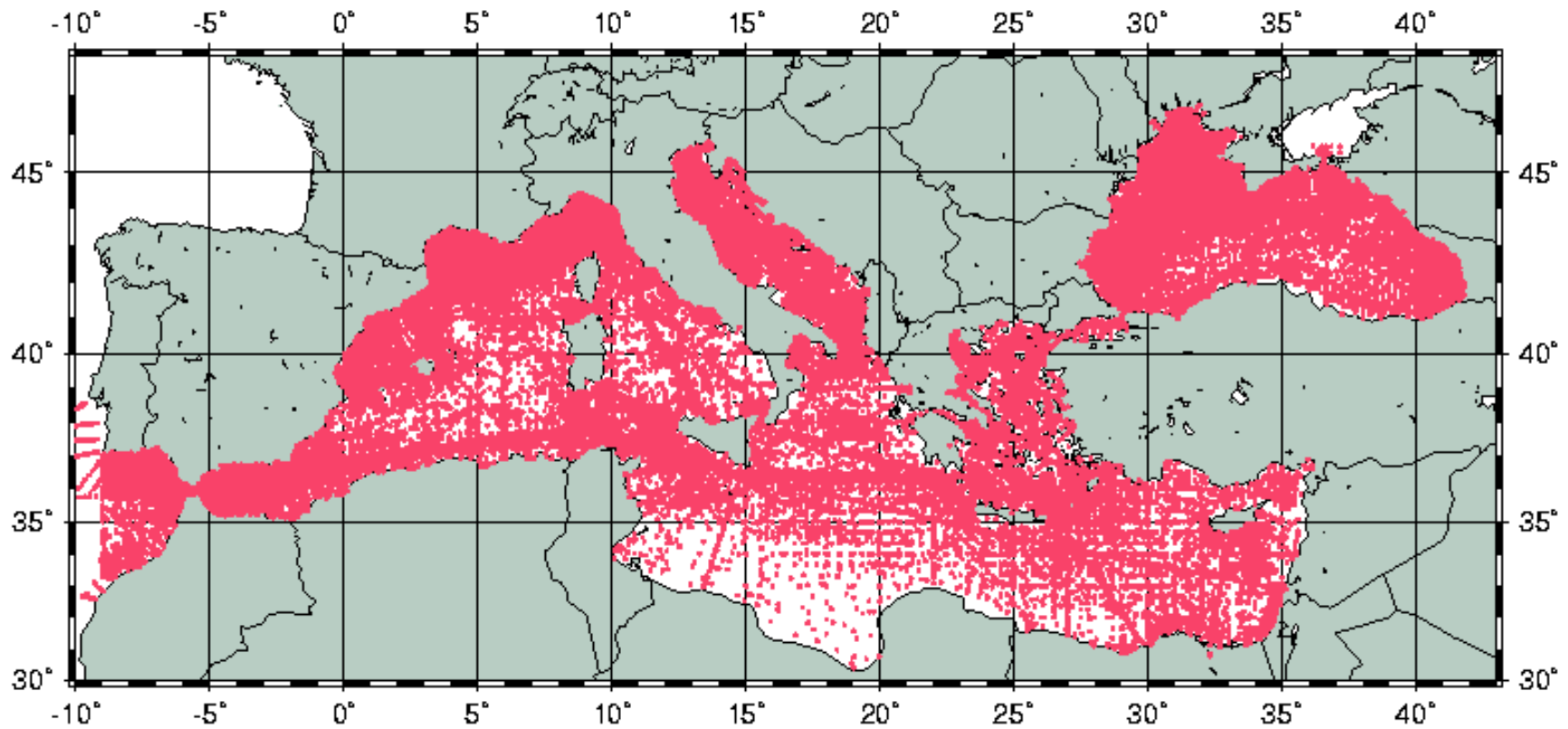
Data type	Nb of Profiles in MEDATLAS 2001 <i>(MEDATLAS 97)</i>
CTD	36 054 <i>(15 533)</i>
Bottle	88 453 <i>(33 916)</i>
MBT and XBT	161 890 <i>(156 471)</i>
Thermistors	29 <i>(29)</i>

Content of the new database - by Parameters

Parameter	Nb of Profiles	Parameter	Nb of Profiles
Temperature	284 946	Nitrite	10 561
Salinity	118 509	Ammonium	5 301
Oxygen	44 989	Chlorophyll	4 716
Phosphate	20 808	Alkalinity	2 548
Silicate	15 936	Total Phosporus	2381
PH	14 458	H2S	1 843
Nitrate	10 588	Total Nitrogen	153

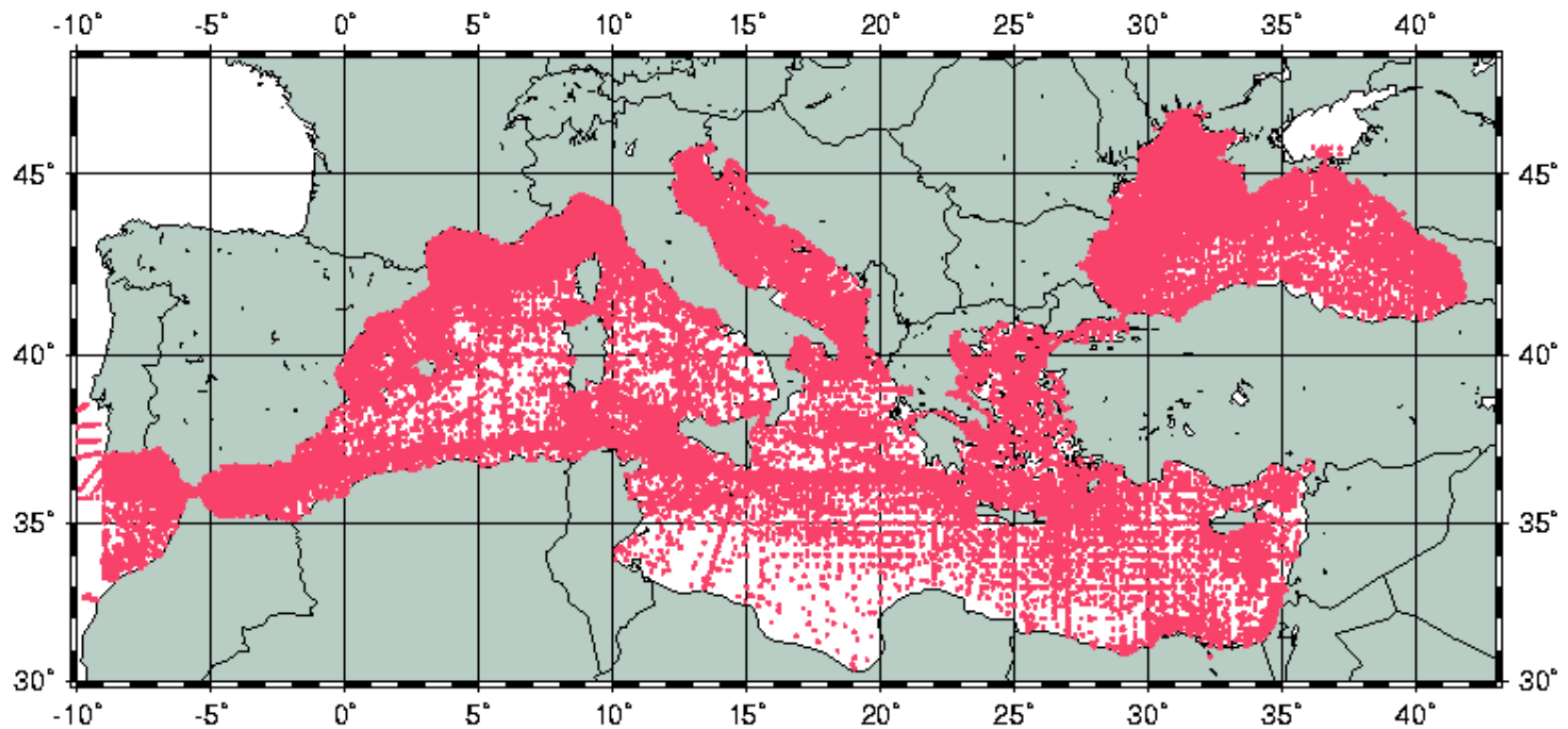
TEMPERATURE

128525 TEMPERATURE profiles (XBT-MBT not plotted)



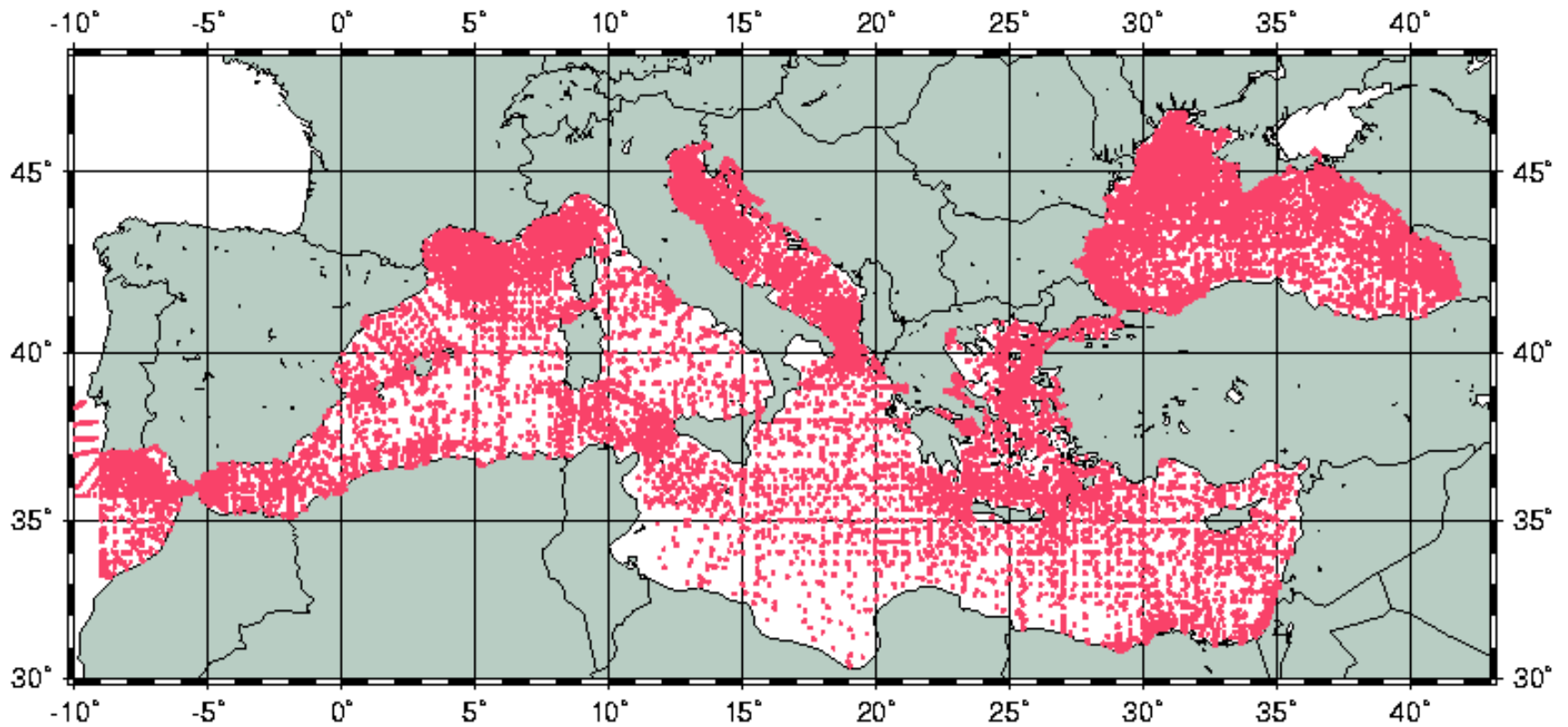
SALINITY

118509 SALINITY profiles



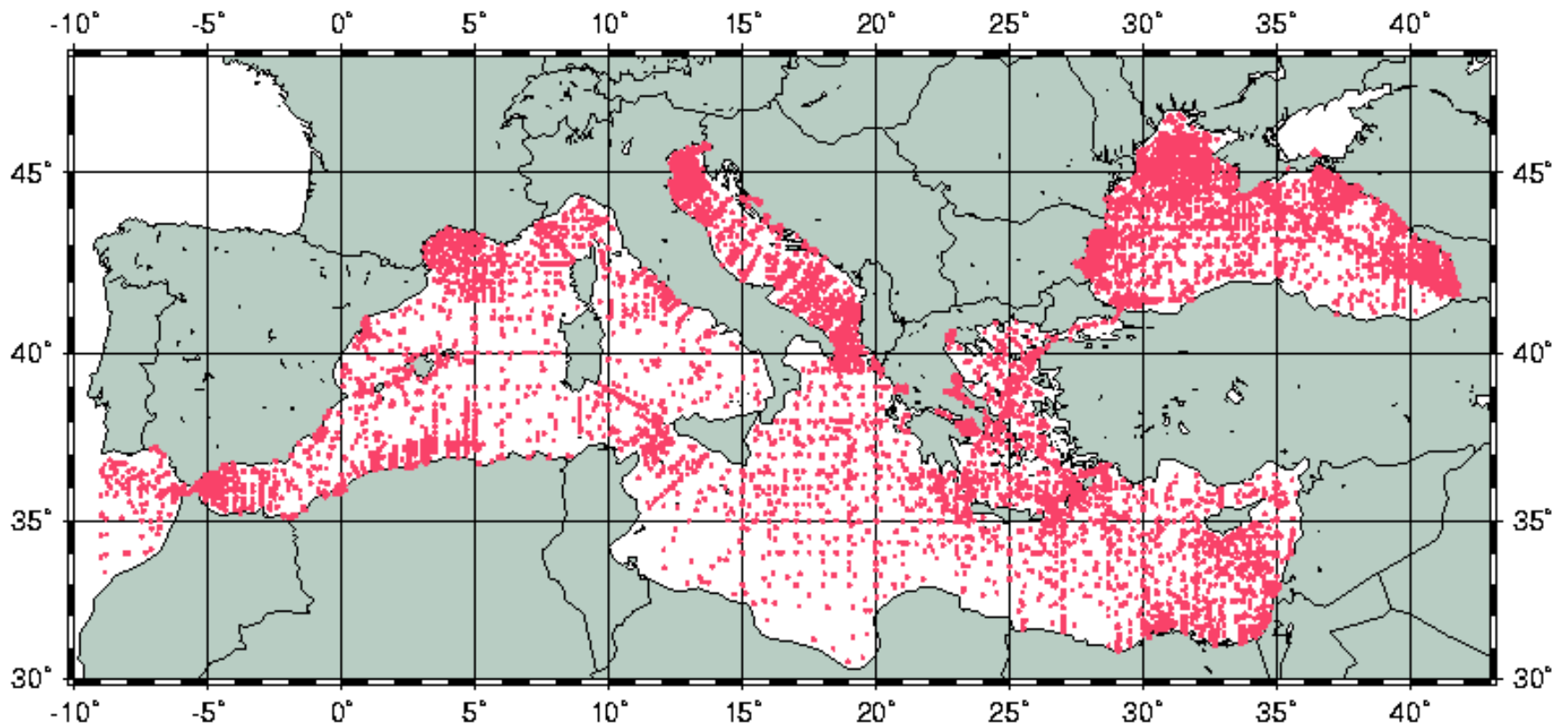
OXYGEN

44989 OXYGEN profiles



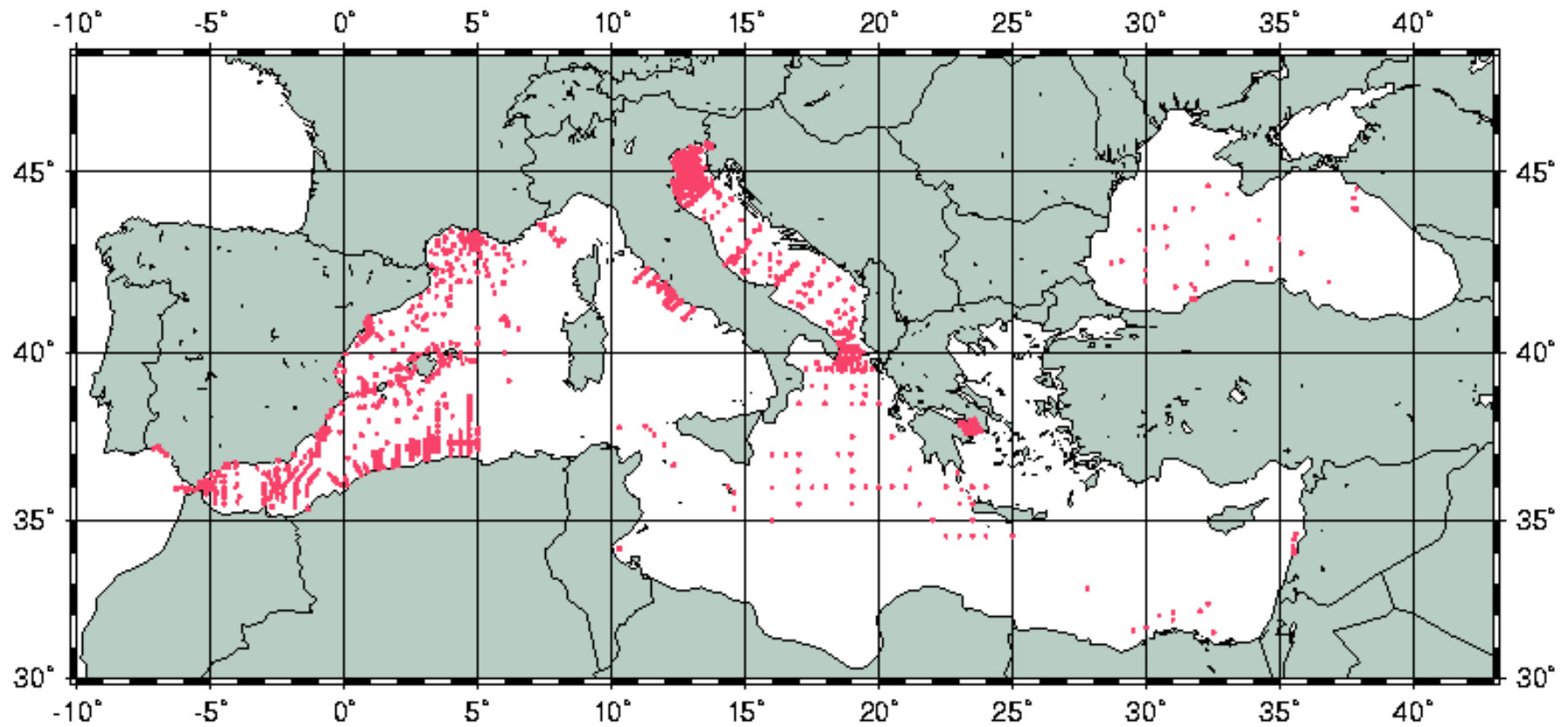
PHOSPHATE

20808 PHOSPHATE profiles

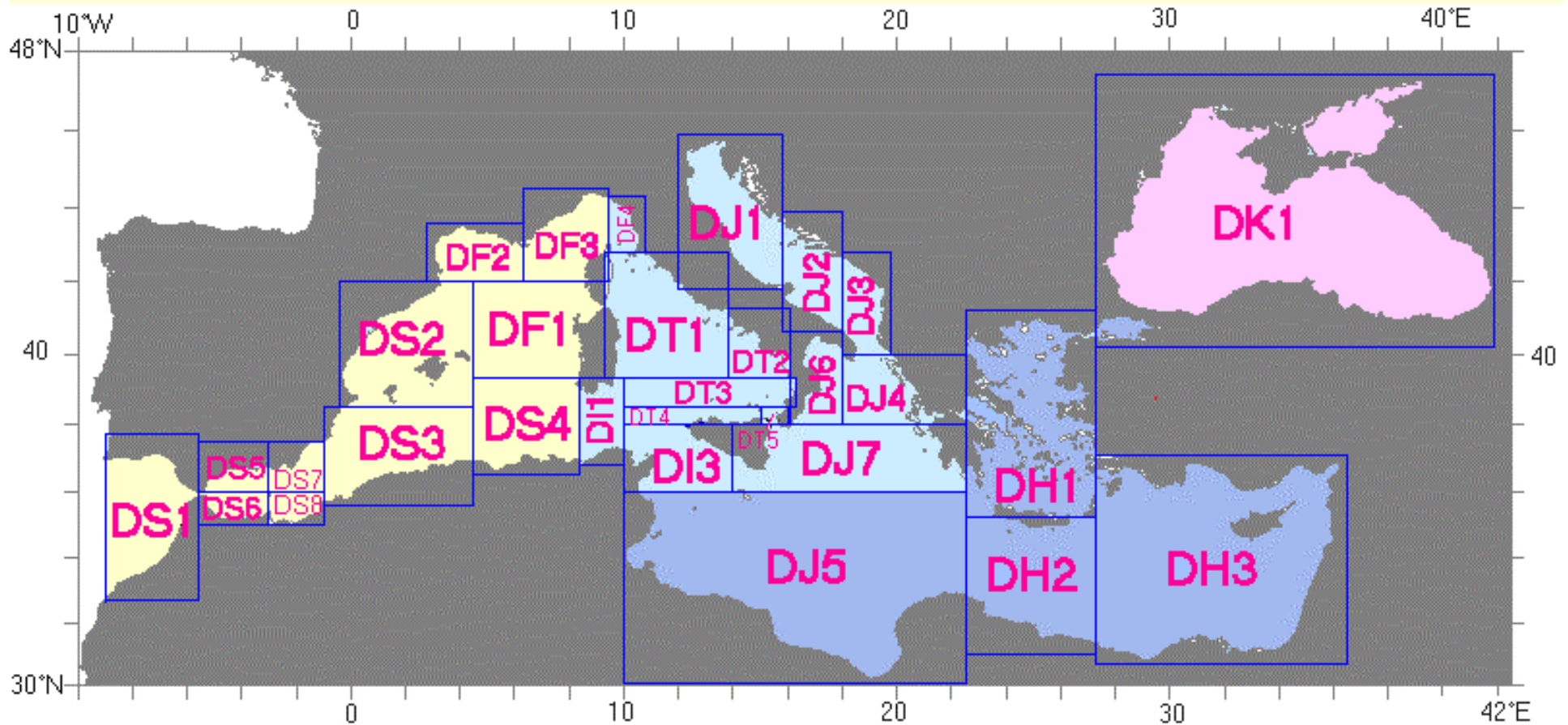


CHLOROPHYLL

4716 CHLOROPHYLL profiles



Regional Assembling and Quality Checks



Quality Assurance Medatlas Common Protocol for Observations

- ◆ Objective : to insure coherence and compatibility between data sets from various sources
- ◆ Methodology :
 - ➔ development of existing international standards
 - ➔ workshop and job training in regional inter-calibrated data centres
- ◆ Content
 1. common MEDATLAS exchange format, which according to ICES/IOC GETADE recommendations should:
 - be auto-descriptive
 - be independent of the computer
 - be flexible and accept (almost) any number of parameters
 - keep track of the source and history of the data
 - allow the processing of each profile independently
 2. quality checks procedure with automatic and visual checks, and quality flags as a result (extended IOC/GTSP protocol)

This protocol is used in several Mediterranean projects and taken into account in international projects

Medatlas Format

```

*FI29199662004 MTP11-MATER/CNL JUL96                29DB ODON DE BUEN
31/07/1996 03/08/1996 BALEARIC SEA
29 UIB, IEO, Institut de Ciències del Mar, Barcelona, Font Jordi
PINOT Jean-Michel                                Project=MTP 11-MATER
Regional Archiving= FI                            Availability=L
Data Type=B02 n= 2 QC=Y
Data Type=H09 n= 2 QC=Y
Data Type=H21 n= 2 QC=Y
Data Type=H22 n= 2 QC=Y
Data Type=H24 n= 2 QC=Y
Data Type=H25 n= 2 QC=Y
Data Type=H26 n= 2 QC=Y
COMMENT
DOXY is calculated from DOX1 following this equation :
DOXY = 44.66 DOX1
DM=CPHL controlled with no climatology
DM=DOXY controlled with Levitus 94
DM=PRES TEMP DOX1 NTRA NTRI PHOS SLCA controlled with Levitus 94
*FI2919966200400030 Data Type=H09
*DATE=03081996 TIME=1446 LAT=N39 24.80 LON=E002 14.00 DEPTH=114      QC=1111
*NB PARAMETERS=09 RECORD LINES=00005
*PRES SEA PRESSURE sea surface=0                (decibar=10000 pascals)      def. = -999.9
*TEMP SEA TEMPERATURE                          (Celsius degree)         def. = 99.999
*DOXY DISSOLVED OXYGEN                         (millimole/m3)          def. = 999.99
*DOX1 DISSOLVED OXYGEN                         (ml/l)                  def. = 99.99
*NTRA NITRATE (NO3-N) CONTENT                  (millimole/m3)          def. = 99.99
*NTRI NITRITE (NO2-N) CONTENT                  (millimole/m3)          def. = 9.99
*PHOS PHOSPHATE (PO4-P) CONTENT                (millimole/m3)          def. = 99.999
*SLCA SILICATE (SIO4-SI) CONTENT               (millimole/m3)          def. = 9.99
*CPHL CHLOROPHYLL-A CONTENT                   (milligram/m3)          def. = 9.99
*GLOBAL PROFILE QUALITY FLAG=1 GLOBAL PARAMETERS QC FLAGS=11111111
*DC HISTORY=BOTTLES
*
*DM HISTORY
*
*COMMENT
*
*SURFACE SAMPLES=
*
*PRES TEMP    DOXY    DOX1  NTRA    NTRI  PHOS    SLCA    CPHL
  25.0  24.270  228.21  5.11  0.08  0.01  0.070  0.92  0.05  111111111
  50.0  15.804  273.77  6.13  0.03  0.01  0.060  0.97  0.14  111111111
  70.0  14.198  247.86  5.55  0.02  0.04  0.070  0.49  0.55  111111111
  80.0  13.983  240.27  5.38  0.42  0.13  0.050  0.26  1.13  111111111
  100.0 13.442  219.73  4.92  3.24  0.16  0.090  2.02  0.23  111111111
-999.9 99.999 999.99 99.99 99.99 9.99 99.999 9.99 9.99 999999999

```

Cruise Header

Station 1 Header

Station 1
Data
Points

Quality Checks

CHECKS

QC-0 : check the format : coherence of station date, time, latitude, longitude, cruise header, conformity of the codes for ship, data type, parameters names & units ..

QC-1 : check of the time and location, search for duplicates

QC-2 : check the data points

RESULT = ELIMINATION or Addition of a QUALITY FLAG to each numerical value (GTSP Flag scale)



QC-1 : check of the time, location & duplicates

Automatic Checks Result

Duplicate data sets: E

Date E or →

Ship velocity E or →

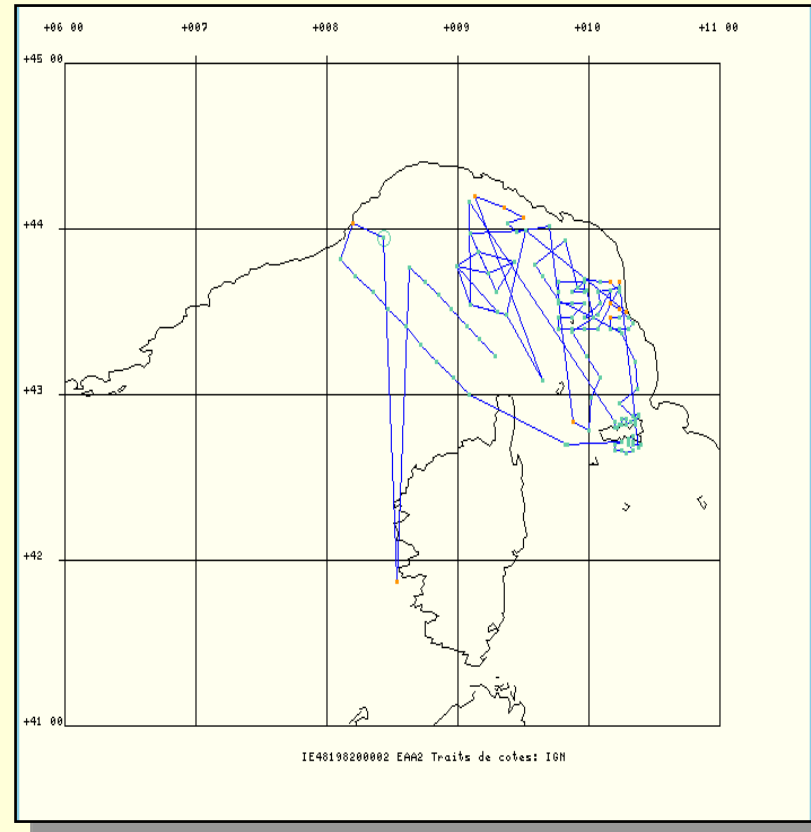
Location/shoreline E or →

Bottom sounding (ETOPO5) →

E = Elimination

→ Correction/Interpolation

→ = Flag «Inconsistent with statistics» - no correction



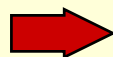
QC-2 : check of the data points

Automatic Checks Result

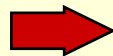
Pressure + one more observation (E)

Out of the regional scale

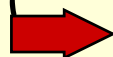
(min & max values)



Increasing pressure

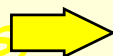


Data below the bottom depth

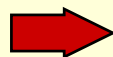


Coherence with pre-existing statistics

(LEVITUS, MODB, MEDATLAS)



No constant profiles



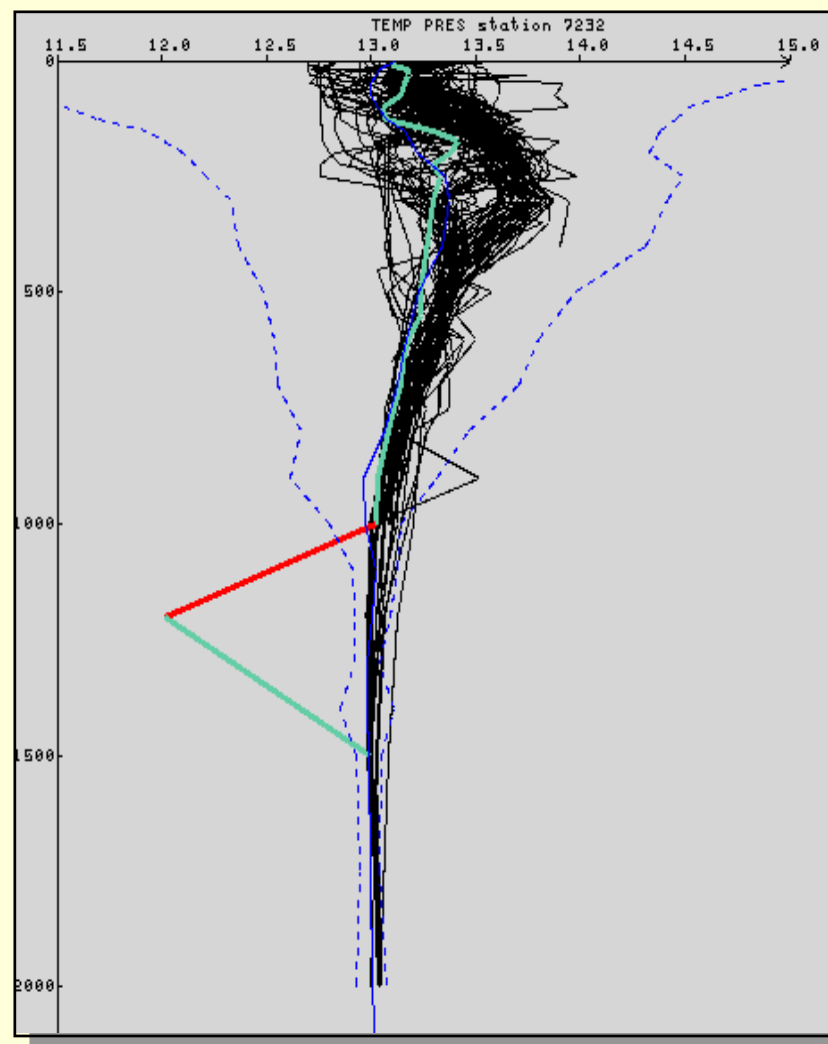
Spikes



Vertical stability

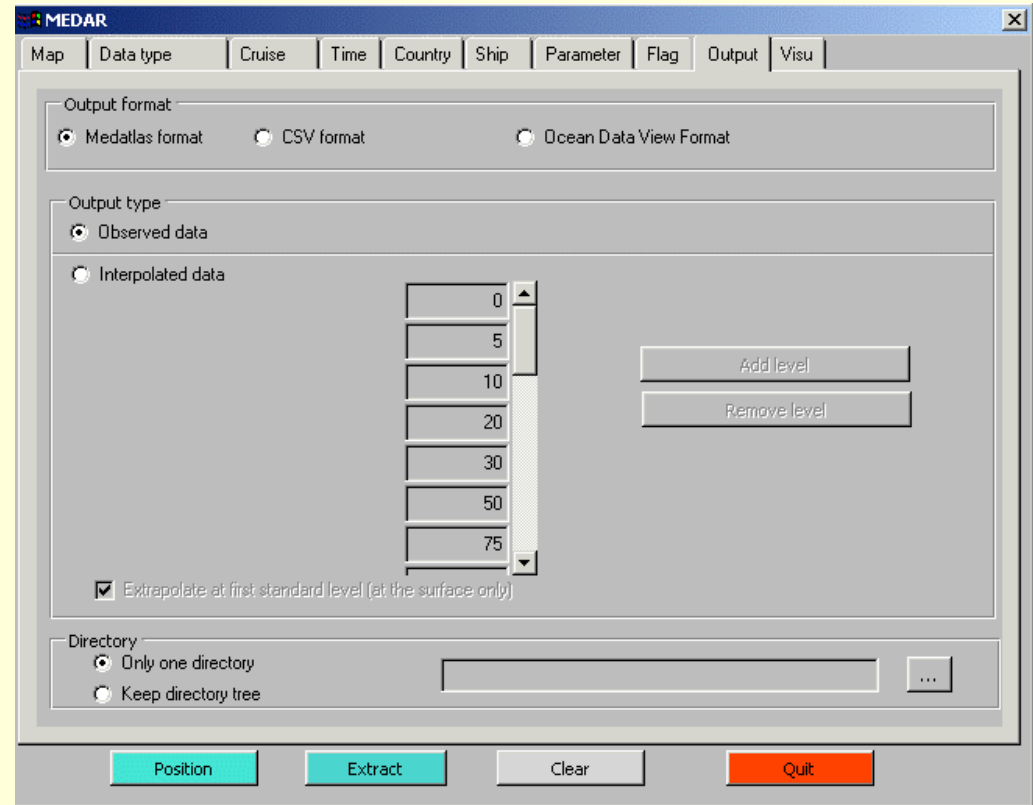


E= Elimination



Global Assembling, Processing & Products

- ◆ with SCOOP (RDBS QC software):
 - Final QC : format, duplicates
- ◆ With SELMEDAR (software on CDrom 2):
 - Extraction of data flagged to 1 or 2
 - Interpolation at standard levels
 - Annual, seasonal and monthly data position distribution
 - Interface to WOCE/ODV import format
- ◆ More data processing software has been developed by partners



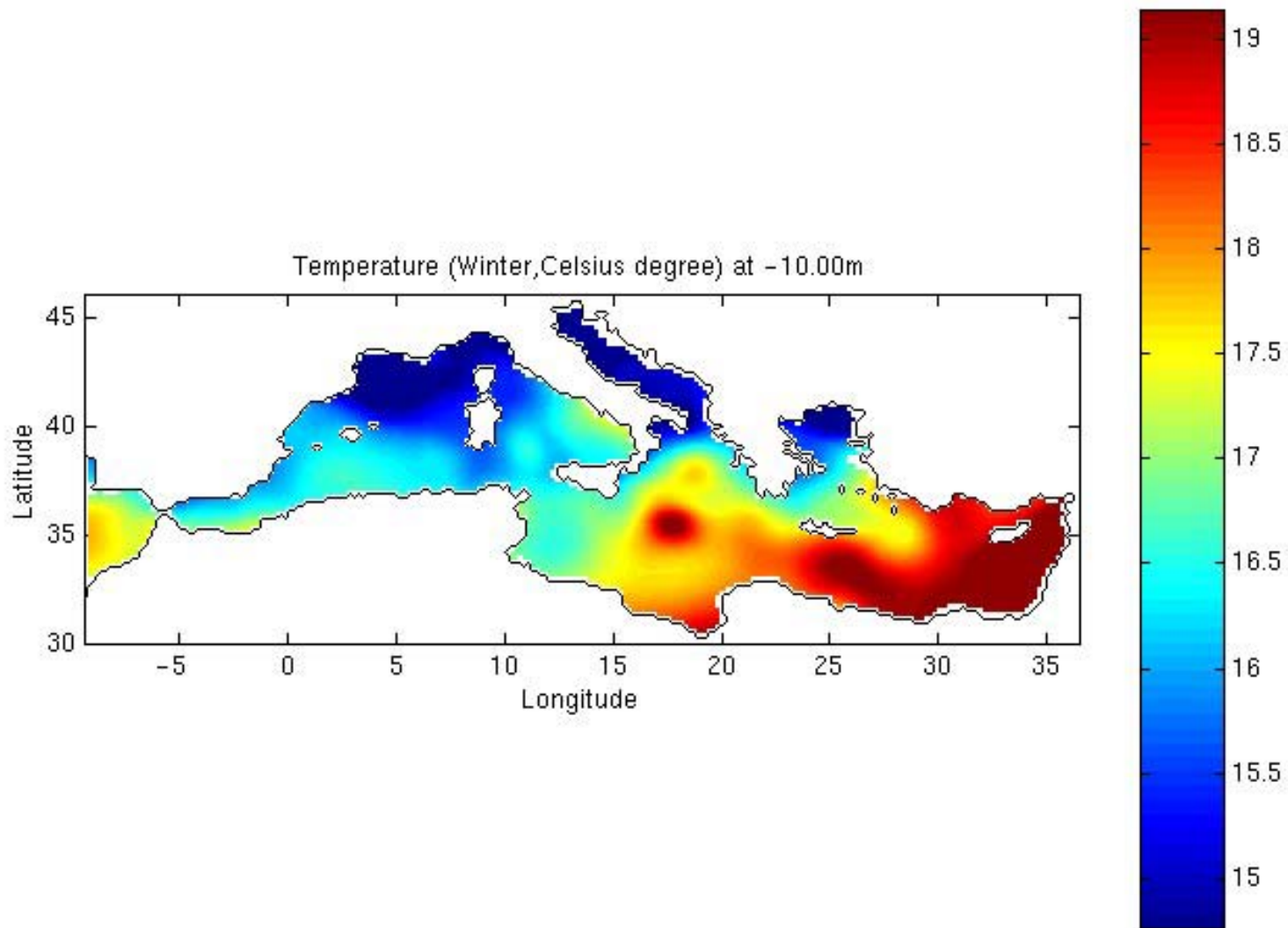
Objective Analysis - Climatologies

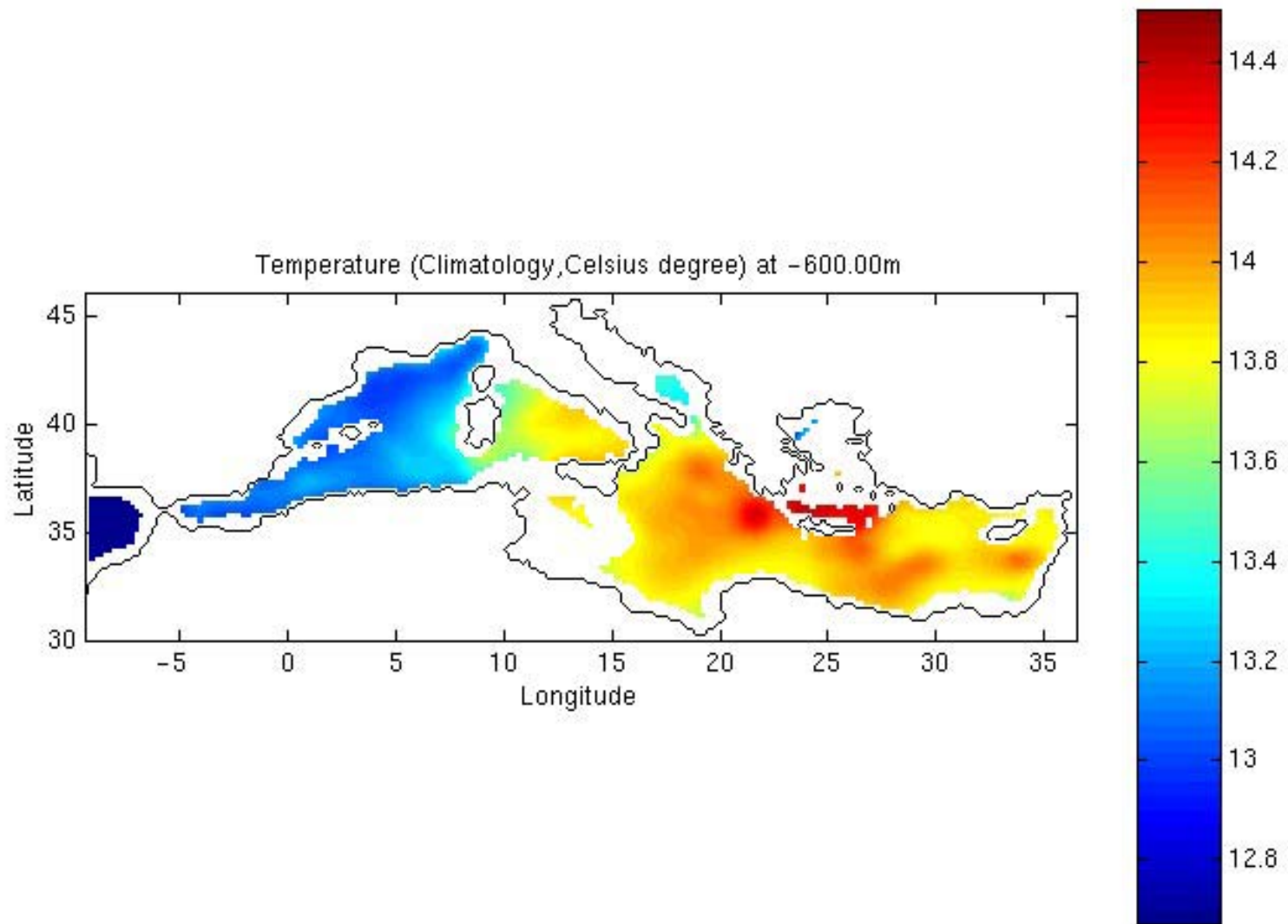
◆ Methodology

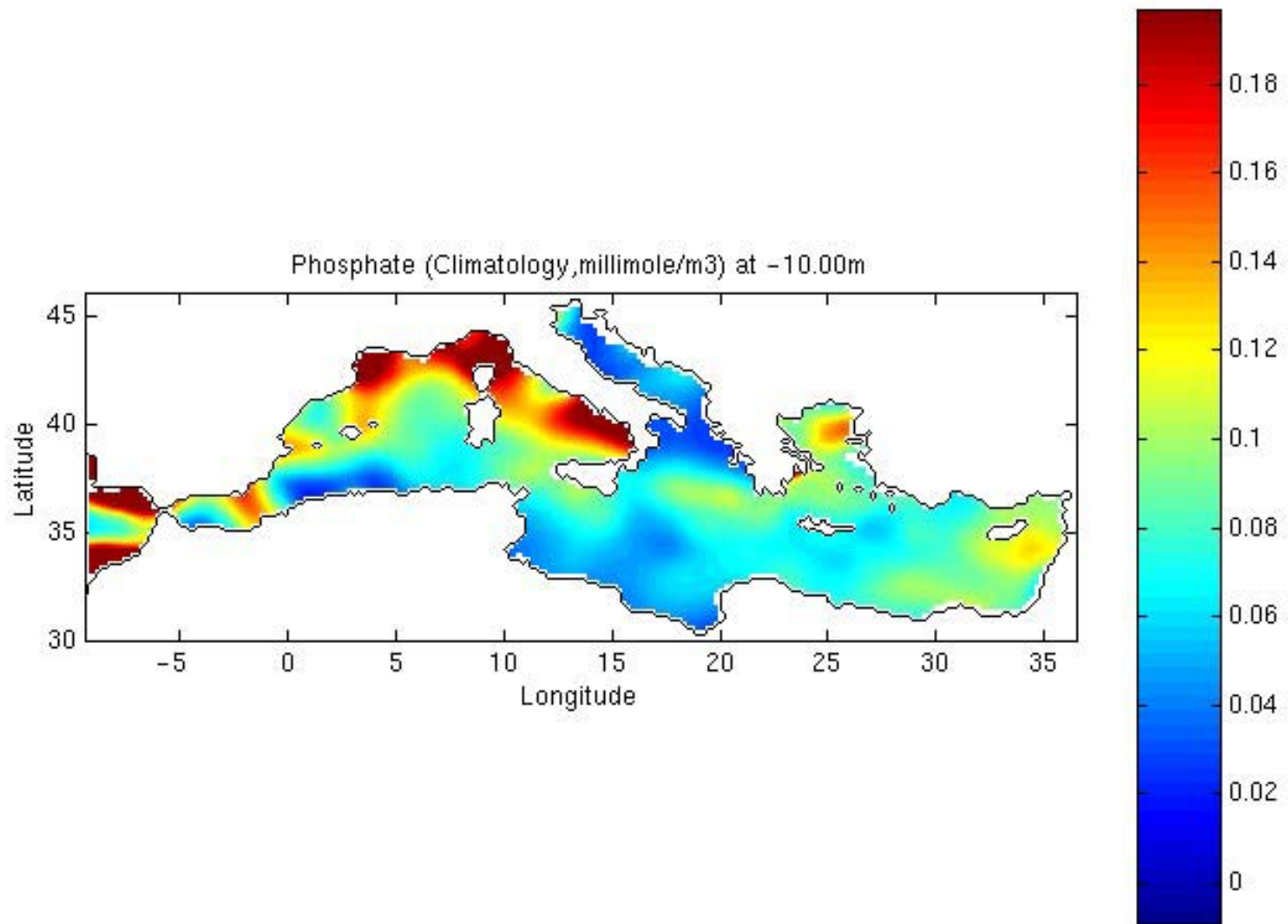
- Computation of Climatological Analysis by Variational Inverse Model (VIM) algorithms
- Computation and Mapping of gridded fields with DIVA Software
- QC of T/S and bio-chemical climatological gridded analysed data by regional experts and modellers

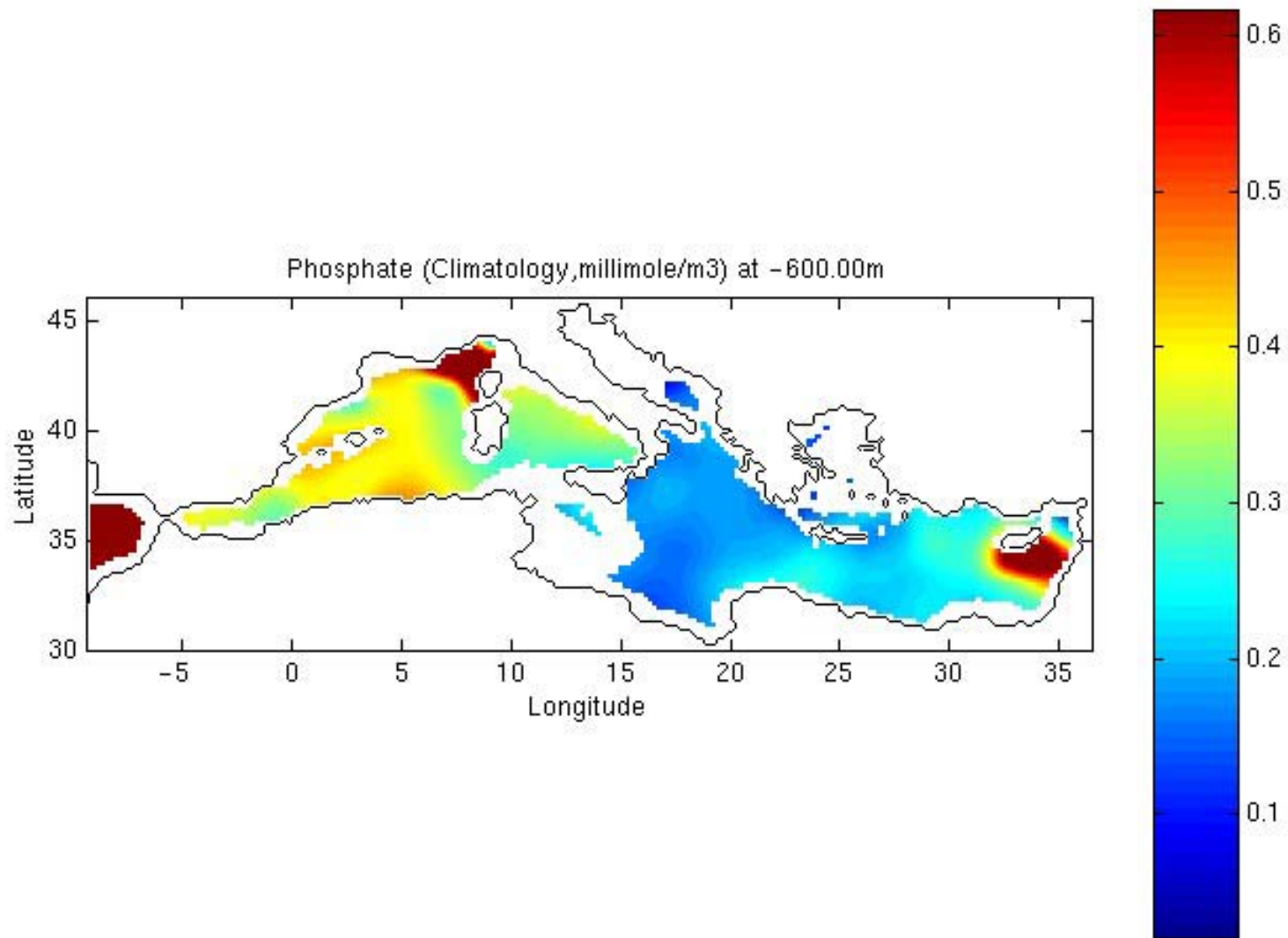
◆ Products

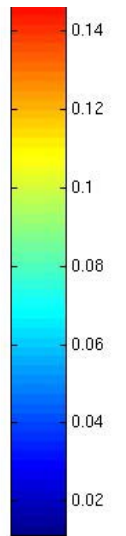
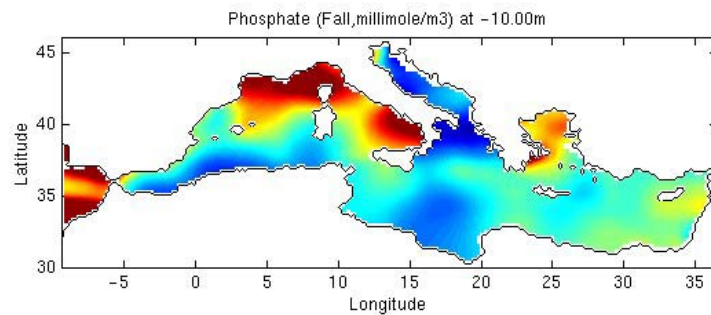
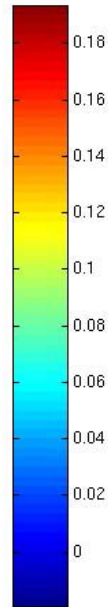
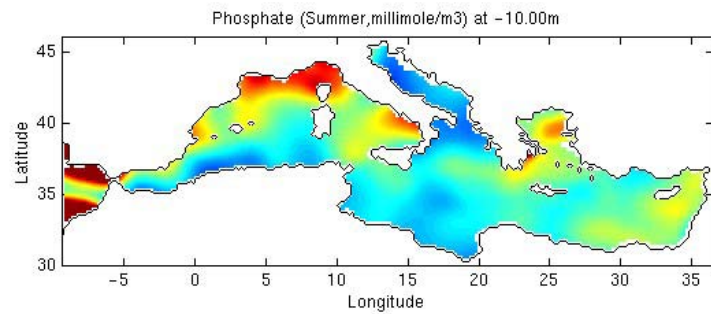
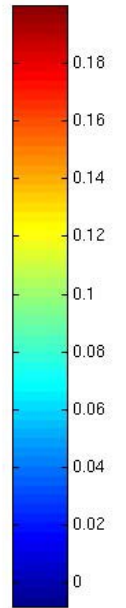
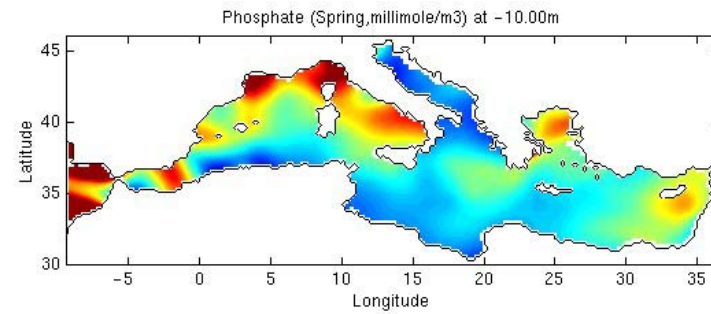
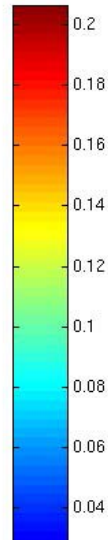
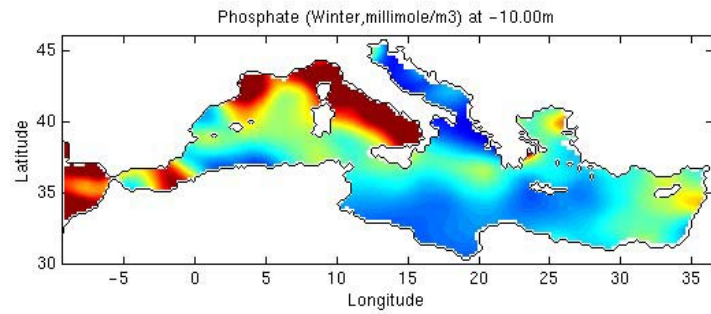
- CDrom 3: Atlas Maps
- CDrom 4: Numerical Fields (NetCdf)
- Web site: Numerical Atlas + DIVA Software & documentation

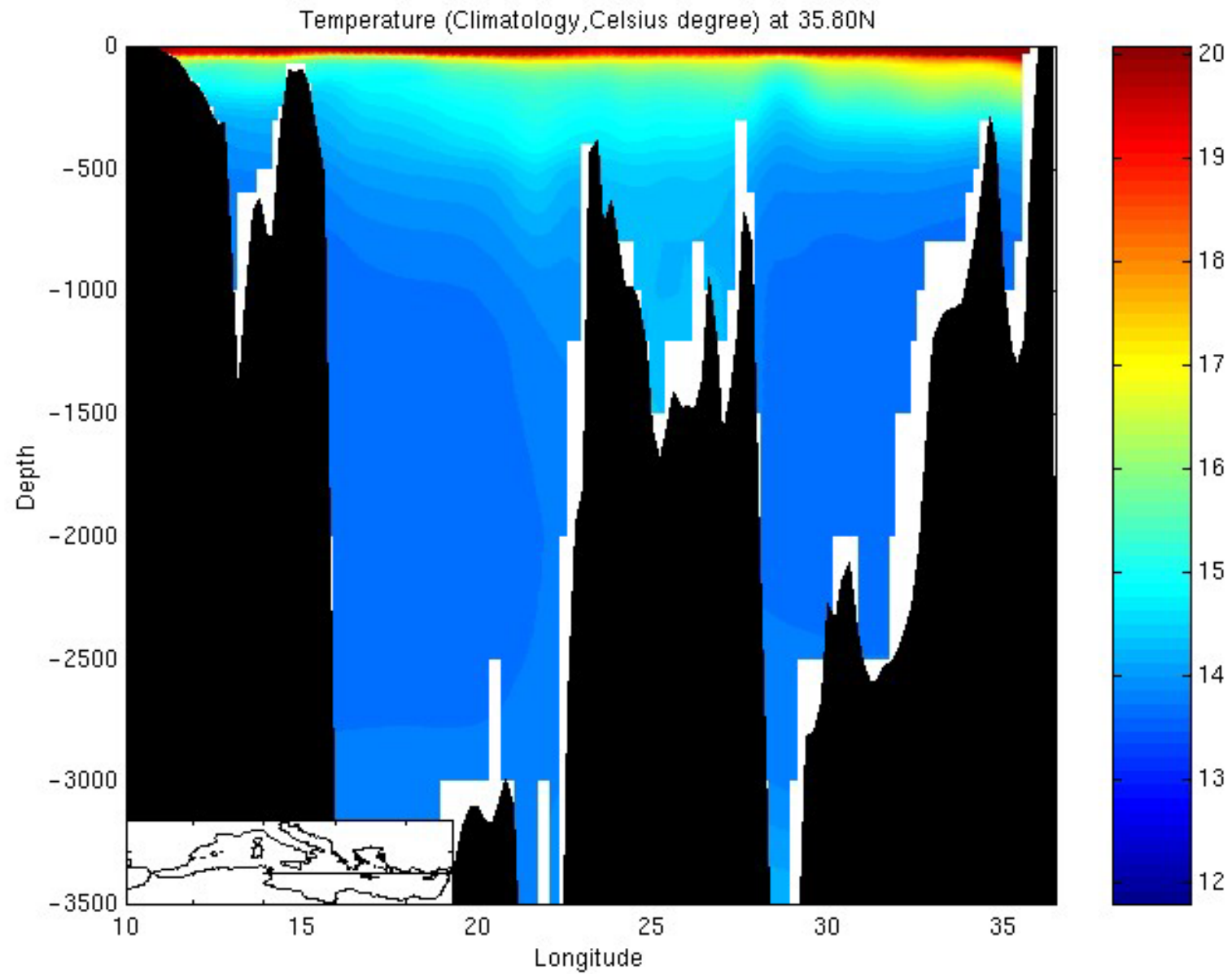


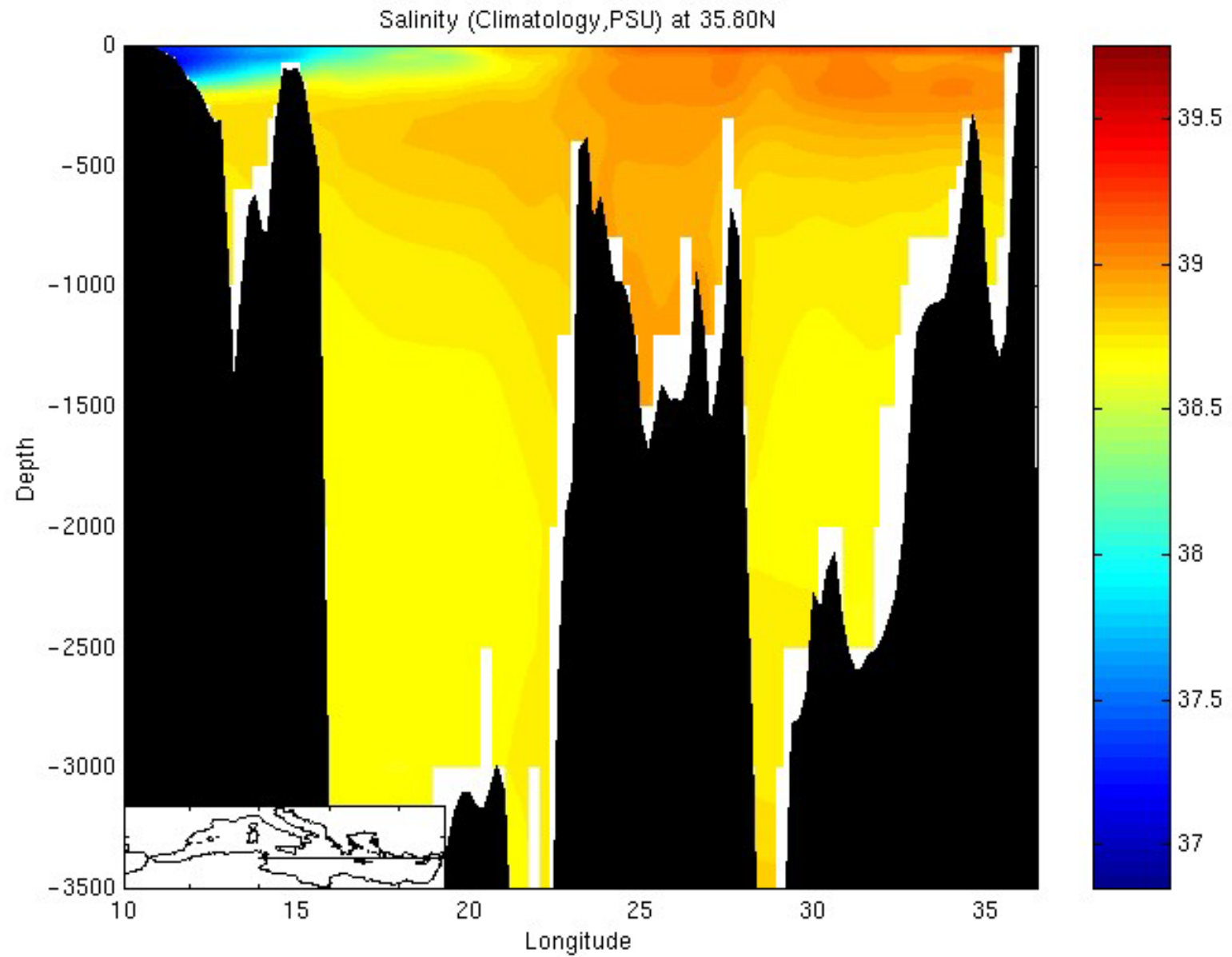


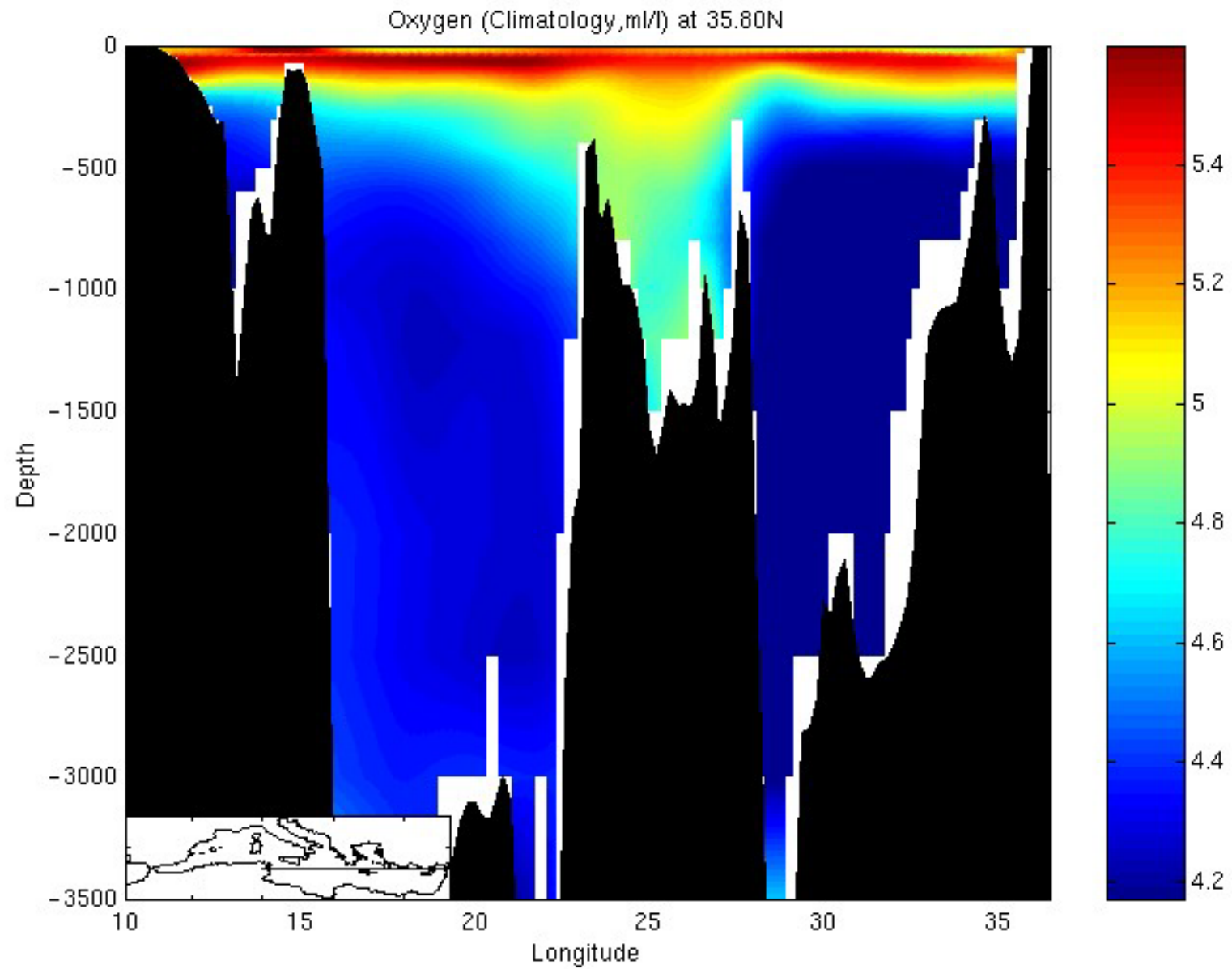


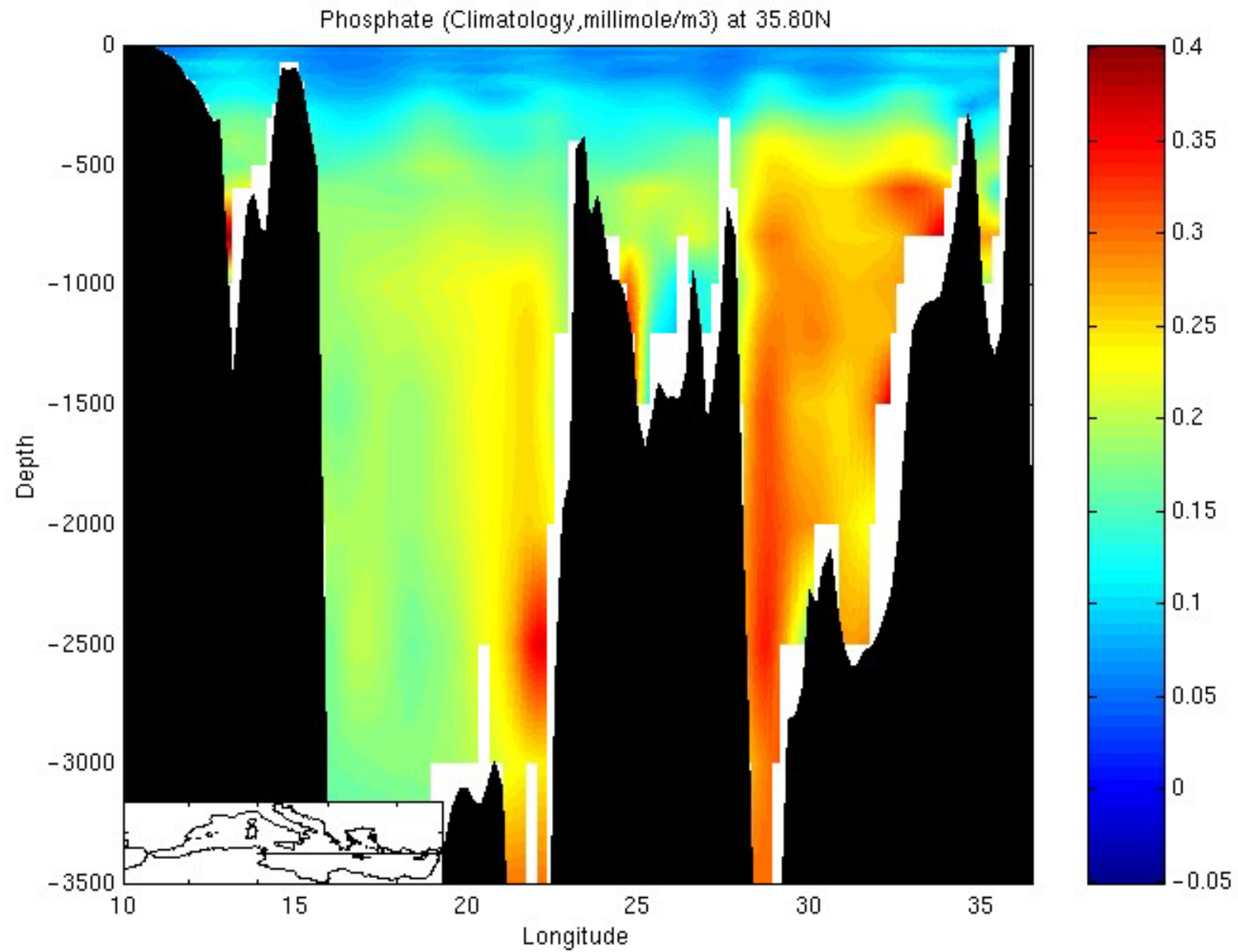


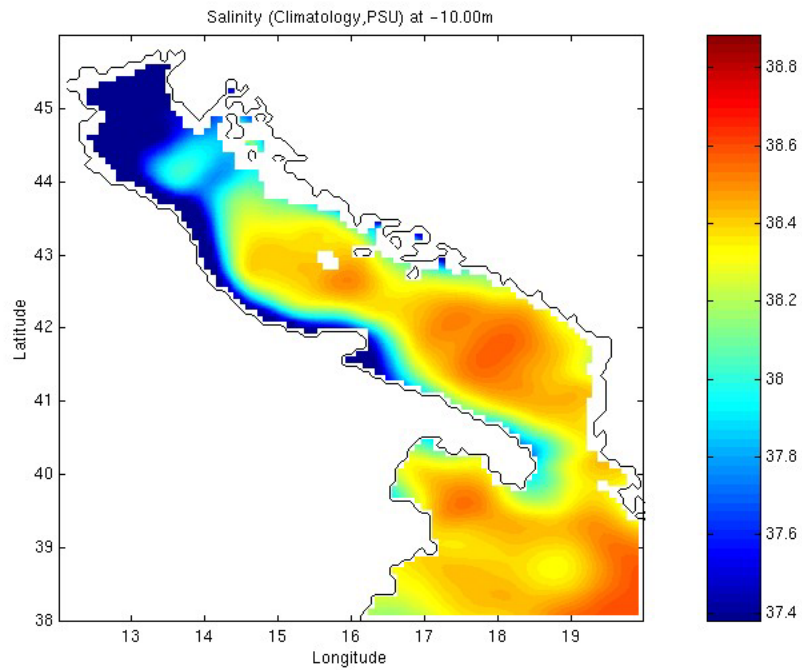
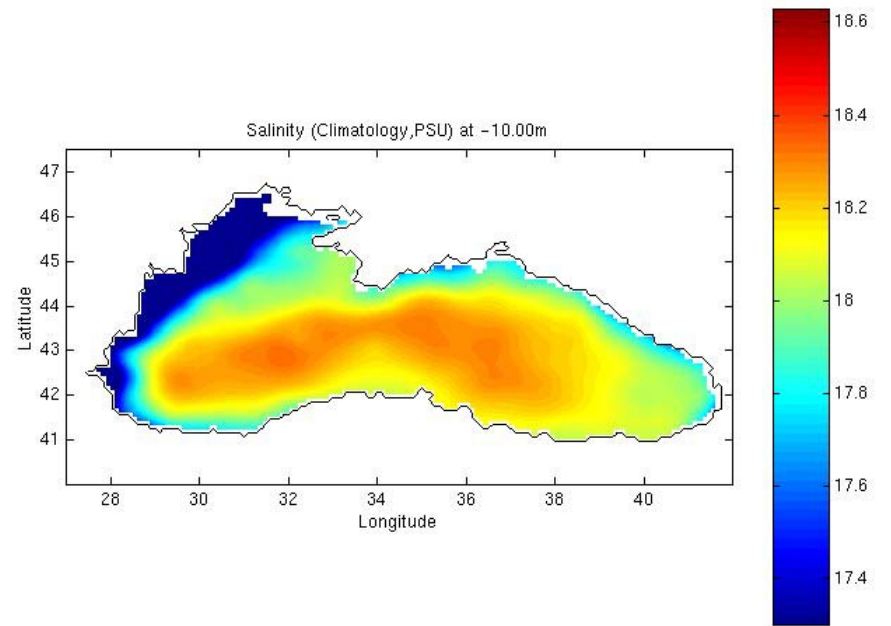












DISSEMINATION OF THE RESULTS

◆ From the beginning of the project

- **Data servicing at each NODC/DNA** through Medatlas I release + releasable new national data
- Web site : <http://www.ifremer.fr/medar/> and network websites for meta-data, data requests and dissemination of information
- **Information & Promotion** of the project at governmental levels through IOC mechanisms, Brochures, Posters, Papers and participation to scientific meetings & exhibitions

◆ From now


- MEDAR/Medatlas II data set published on Cdrom
- Access to data, data products and information at the NODC/DNA for at least 5 year
- Format & QC protocols established and disseminated with IOC manuals



NETWORKING

- ◆ WWW Links between *Coordinating, Regional, Thematic and National Websites*

Signets Adresse : <http://www.ifremer.fr/sismer/program/medar/>

EC-Marine Science & Technology Programme
(MAS3-CT98-0174 & ERBIC20-CT98-0103)

Mediterranean Data Archaeology and Rescue

Welcome on the Medar/medatlas II Web site

The overall objective of the MEDAR/MEDATLAS II project is to make available a comprehensive data product of temperature, salinity and bio-chemical data in the Mediterranean and Black Sea, through a wide co-operation of the Mediterranean countries.
On this web site you can find more information on :

[[Project](#)] [[Participants](#)] [[Cruise Inventory](#)] [[National Data Sets](#)] [[Regional Data Assembling and Quality Checks](#)]
[[Observation Data](#)] [[Climatological Data](#)] [[Quality Assurance](#)] [[Formats & Codes](#)] [[Documentation](#)] [[News, Meetings](#)]
[[IMPACTS Cluster](#)] [[Links](#)] [[Medatlas 97](#)]

Last Information : [Trieste Workshop December 2001](#)

→ www.ifremer.fr/medar

CONCLUSION

◆ DONE

- Doubling the volume of data available for public use
- Improvement of the climatology
- Contribute to decrease the time lag between data collection and data release
- Extension of the GTSP data qualification protocol from temperature to bio-chemical parameters and adjustment to the local conditions
- Development of a distributed data management structure trained in data qualifying, processing, mapping, archiving and communication

But these results are not granted for ever and still remain

◆ *TO BE DONE*

- *Archiving of recent data*
- *Other important parameters: surface data, current, CO2 data*
- *Avoid the recirculation of duplicates - common international referencing system*
- *Improvement of the on line access to data*

Acknowledgments

- ◆ European Commission for the grants MAS3-CT98-0174/ERBIC20-CT98-0103 without which this project would not have been possible
- ◆ National scientific institutes and data centres which participated to the data collection and the data archiving
- ◆ Public and private groups which contributed to the software development
- ◆ International Organisations IOC, ICES, EUROGOOS and MEDGOOS which gave support, advises and publicity to the project
- ◆ Other national organisations like Foreign Affairs Ministries which supported several missions and exchange of personnel

Time Schedule and Data Flow

Data Flow

- Bench Mark 1 : test the format of national data sets
- Bench Mark 2 : test the format, codes and overall coherence between regional QC centres and the global assembling centre
- Bench Mark 3 : test of the bio-chemical data sets processing
- ⇒ Bench Mark 4 : test of the complete data set and the full processing
- ⇒ Final processing of the complete data set

□ Reference protocol manual

Time Schedule

TASK \ Date	1/12/98	1/12/99	1/12/00	1/12/01
I - Data Rescue & Inventory	↓	↓ ↓		
II - Regional Assembling & QC	↓ BM1	↓ ↓ ↓	↓ ↓	
III - Integration, Processing, Products		↓ ↓	↓ ↓	↑↑
IV - Objective analysis, Climatologies			↓ ↓	↑↑
V - Quality Assurance	⚑	QC WS		⚑

Quality Assurance Assessments

- ◆ **MEDAR/MEDATLAS protocol** - Quality Assurance Manual for Observed data, climatological data, inventory
 - A Contribution to the development of International Standards for Marine Information Management
 - Based on existing international Reference Manuals
 - UNESCO/IOC/IODE & MAST, 1993 : Manual of Quality control procedures for validation of oceanographic data. Manual and Guides 26.
 - UNESCO/IOC & ICSU, 1991 : Manual on Oceanographic Data Exchange. Manual and Guides 9
 - UNESCO 1987 : Un format général pour les données relative à l'environnement terrestre. Description du format GF3 et des tables de code; Manuels et guides 17.
 - UNESCO/SCOR/ICES/IAPSO 1983 : Algorithms for computation of fundamental properties of seawater. Technical papers in marine science 44
 - Ref : UNESCO Intergovernmental Oceanographic Commission, 1994. IODE Handbook. Committee on International Oceanographic Data and Information Exchange
- ◆ **Workshops**
 - QC workshop for observed data : Brest and Athens 1999
 - Objective Analysis and Mapping : Liège Colloquium