MATER DATA MANUAL

VOLUME I

DATA MANAGEMENT STRUCTURE
INVENTORIES
FORMAT AND CODES
QUALITY ASSURANCE

VERSION 3 –2001

IFREMER/TMSI/IDM/SISMER/O1-058

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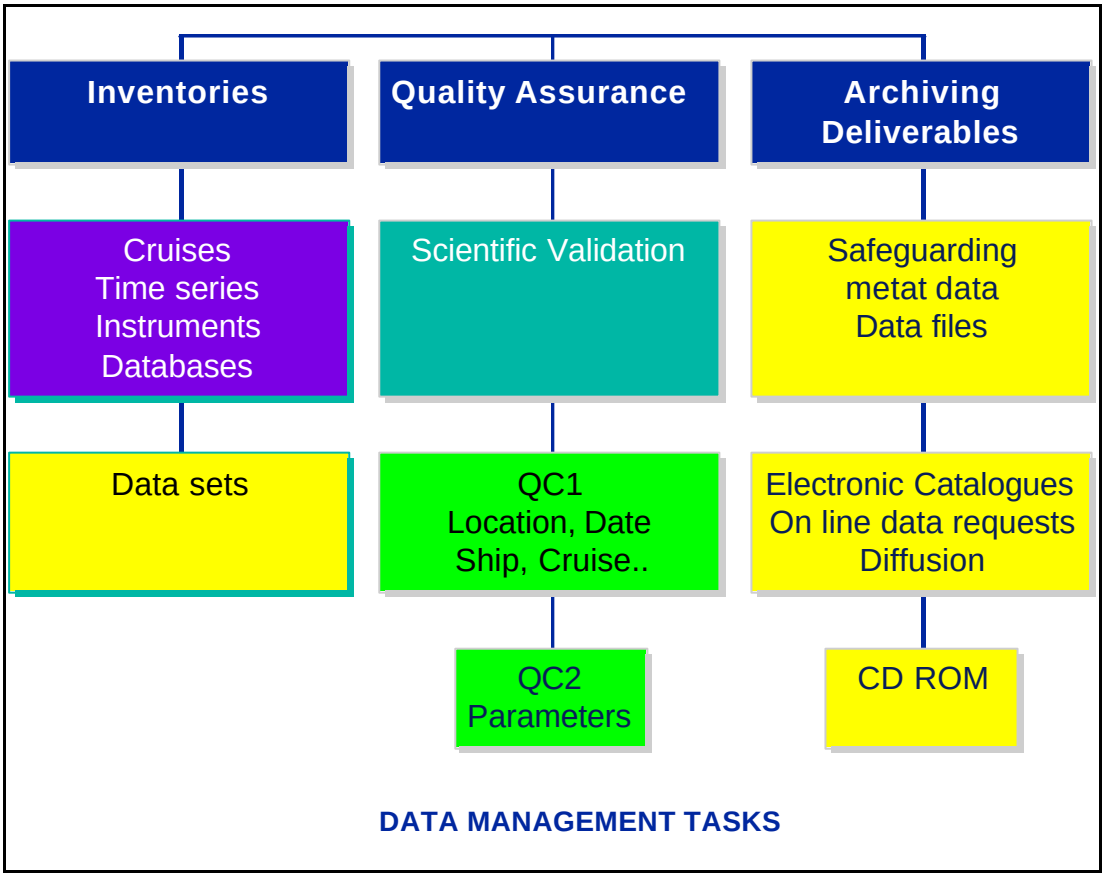
VOL. I - DATA MANAGEMENT - CONTENT

1. THE MATER DATA MANAGEMENT STRUCTURE

1.1. Objectives and General Description

According to the MAST data protocol, the MATER programme has to insure the safeguarding of quality controlled data sets properly documented (meta-data), to facilitate their circulation during the project for the benefit of the MATER scientists and make them available for public use after the project completion. The objective of the data management structure is to implement the correspond tasks which are :



The data management structure is decentralised and related to the project work packages organisation. It consists in three regional archiving centres located at research institutions and national data centres of participating MATER countries and an animation task, to facilitate the data circulation. It is supervised by a data expert committee, the project co-ordinator and the data manager.

The data management participates in the quality assurance by insuring :

1) a sufficient documentation of the data sets through the general inventories : cruises, moorings, instruments;

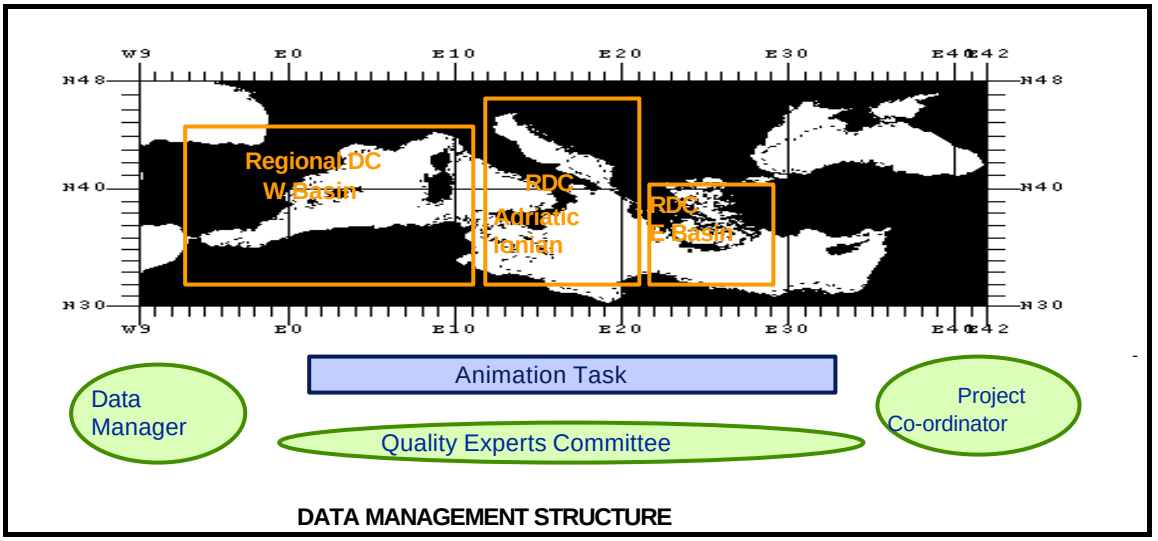
2) the use of common parameters names, units and format for the data sets;

3) some checks for quality (QC) beyond the scientific validation made by the laboratories, which are adapted to the type of observations (vertical profiles, time series, underway data,

biological samples ..) but depends also of the existing facilities and the present state of the art.

This common protocol is defined jointly by the MATER Data Expert Committee and the data managers, in conformity with the internationally agreed standards and is described hereafter.

1.2. Data Management Structure



DATA MANAGEMENT STRUCTURE

The animation task compile and updates continuously the cruise schedule, publish it on the MATER server, makes links to the regional centres catalogues and servers, and facilitates the access to the MADAM archives.

The Regional data centres compile, safeguard and give access to the data sets and the catalogues, making use of the local archiving facilities and their expertise in data management.

More specifically :

⇒ the regional data centre for the Western Basin archives the data and meta-data collected in the western basin,

⇒ the regional data centre for the Adriatic/Ionian Basin archives the data and meta-data collected in the Adriatic Sea, the Ionian basin and in the Sicily Strait

⇒ -the regional data centre for the Eastern Basin archives the data and meta-data collected in the Eastern basin.

1.3. MTP II-MATER Data Management Team

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1.4. Data Circulation and Overall Description

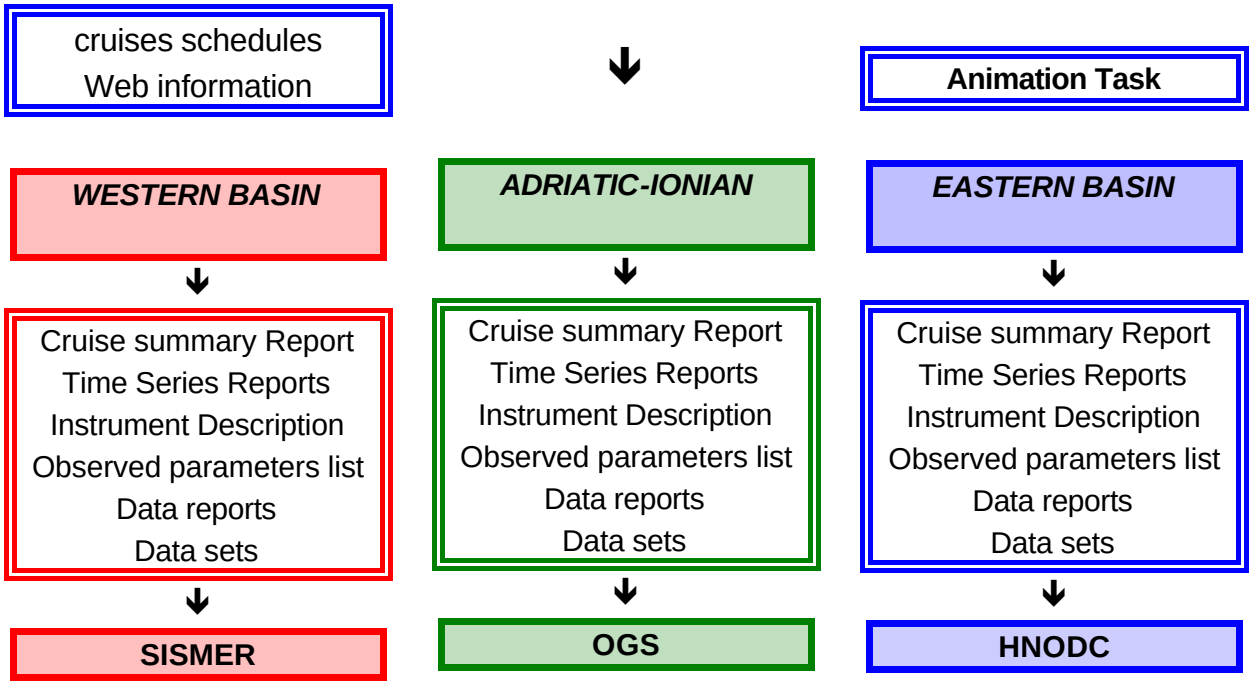
The MAST Code on Data management stipulates that :

before the cruises: ship schedule has to be widely disseminated before the cruise in order to be able to invite scientists from different work package, and also to prepare the archiving.

a month after the cruises : have to be sent to the regional data centre
- A copy of the cruise summary report and/or mooring summary report
- the main instruments description and the list of observed parameters

within six month after the field experiment : For each data set
- the data sets corrected from instrumental errors
- a data report including documentation on the data collection, processing and validation

The regional data archiving scheme of these data and meta-data is the following:



The different steps of the data and meta-data processing scheme are the following (Fig. 1):

1. Search for cruise schedule, both from project and national authorities

2. Request meta-data : summary reports for cruises (ROSCOP), moorings, instruments, data sets (EDMED) by sending standardised forms
3. Request data from these reports, reformat, safeguard, check for quality
4. Publish up to date catalogues of data and meta-data on WWW servers
5. Disseminate data and meta-data according to the project policy (with author permission and restricted to the partners during the project implementation).

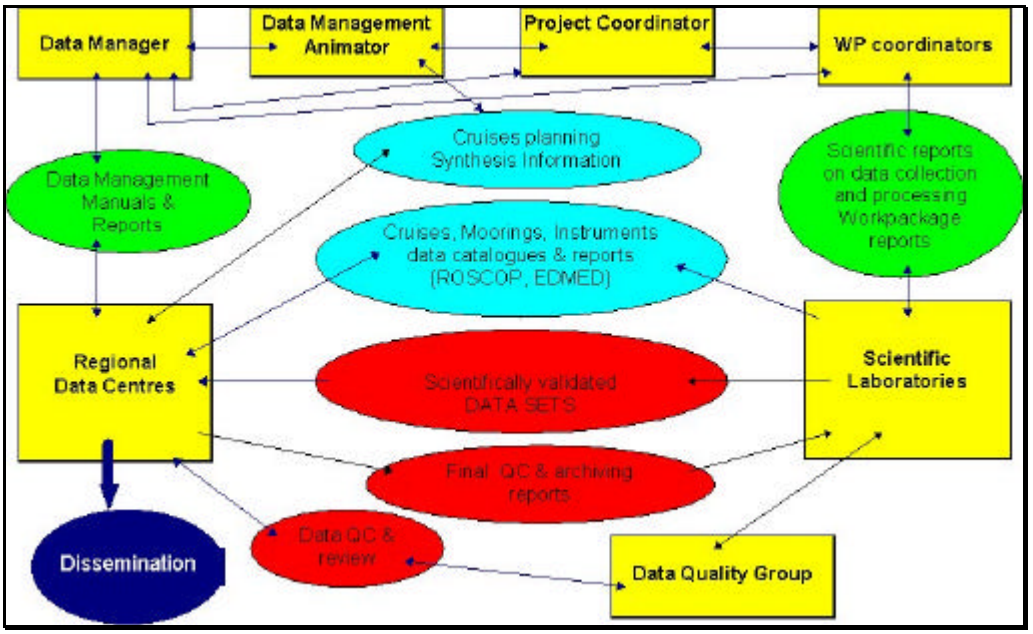


Fig 1 : CIRCULATION OF DATA & INFORMATION DURING MTP II-MATER

Rectangles : organism or person *Ellipses : Deliverables - Services - Products*

2. MTP II-MATER DATABASE - INVENTORIES

2.1. Project Databases for Multidisciplinary Data Sets

The MTP II-MATER overall data set is too large and complex to be described in a unique database as defined in the European EDMED system. To insure some homogeneity and facilitate the data management, it is subdivided in 19 databases which are listed in Table I with the corresponding key words/domains and ROSCOP codes reported in the cruise summary reports.

Each data set collected during one cruise or time series of the project belongs to one of these databases. A data set can be defined by the group of parameters collected and processed by the same laboratory during a cruise and whose validated data can be grouped within the same data file. It consists in observations which can be made in several physical compartment :

- the water column,
- the particle aggregates of the water column,
- the settling particles near the water-sediment interface,
- the sediment,
- pore water
- the biota .

Moreover, several parameters are measured in each data sets (ex: nitrate, nitrite, phosphate ... for nutrients), and in with different units for the different compartments. The list of possible observed parameters and units is available in manual II. Several data sets can be collected during the same cruise by different laboratories (ex: CTD, biochemistry, radio-isotopes, microbiology).

The data can be measured in vertical profiles or times series.

In order to organise the archiving of such a heterogeneous data collection and to get a permanent visibility of the state of the collected data sets, the data management team maintains 4 different inventories :

1. Cruises (ROSCOP/CSR)
2. Mooring and Time Series (extended ROSCOP/CSR)
3. Instruments
4. Data Sets (EDMED)

All the forms to compile the inventories are sent to the chief scientists and are also available on the anonymous :

ftp.ifremer.fr directory ifremer/sismer/mater/forms

2.2. - Cruises inventory (ROSCOP/CSR)

According to the MAST code on data management, a summary of the cruises based on the international ROSCOP/CSR forms and including a list of date and location of the stations made (or sub-sample of the ship track), has to be sent to the regional data centre within a month after the cruise.

form to be completed : csmater.doc

2.3. - Time series inventory

similar to the cruise inventory for autonomous Eulerian or Lagrangian stations

form to be completed : mooring.doc

2.4. - databases inventory (EDMED)

The generic databases to which the data sets are related (Table 1) depends on three main disciplines :

- Marine Physics
- Bio-chemistry
- Other specific domains

This broad categorizing of the data encountered a lot of overlapping, and the data files are related to the "database" that fit the best to the definition.

The physical and bio-chemical data correspond to the basic parameters that are shared by the whole MATER community. Consequently they are formatted at the common exchange format and checked for quality. The other specific parameters are archived at the originator format and the quality controls are limited.

This inventory identifies also the list of data sets collected in each "database" and the scientific teams in charge of the data validation and processing. It includes the meta-data like location, date, list of observed parameters and address of all the data files (file summaries).

Each identified data set produced by a cruise (or a time series) and one (or more) instrument, is related to one database. The related database is the database with the maximum of correlation for the parameters. The forms used to load the data set information in the inventory depends on the related database (the form names are given in parenthesis with the database name).

To summary, the datasets (data files) are ranged according to the following classification:

- discipline : physics/biochemistry/ Specific
    - database
        - data file

Table I : MTP II-MATER DATABASES (EDMED)

	DATA SET NAME	Key Word /Domain	ROSCOP CODES (1)	Code IFREMER
PHYSICS	CTD PROFILES	Subsurface Hydrography (eg T, S) Optical properties of Sea water	H10 (H16, H17)	CTDXMT
	CURRENT METER TIME SERIES	Currentmetry	D01 D71	STCMMT
	LAGRANGIAN FLOATS TRAJECTORIES	Currentmetry, surface drifters & subsurface floats	D05, D06	STBDMT
	ADCP CURRENT MEASUREMENTS	Currentmetry	D71	MTPADC
	THERMISTORS TIME SERIES	Temperature, Subsurface Hydrography	H72	STTHMT
	XBT, XCTD, LAGRANGIAN DRIFTER PROFILES	Subsurface Hydrography (eg T, S), (Low resolution Temperature Profiles)	H13	XBTXMT
	OTHER PHYSICAL DATA COLLECTED UNDERWAY	SST, SSAL, Subsurface Hydrography (eg T, S), Thermosalinograph, Undulating CTD	H11, H71	
BIO-CHEMISTRY	DISSOLVED CHEMICALS IN THE WATER COLUMN	Bulk Chemistry, Nutrients, Major and trace Inorganic Elements	H21-26 H75 H76, H30 P02, P04 H73	HYDRMT
	RADIO-ISOTOPES MEASUREMENTS	Helium, Tritium, Cs, Pb, Po, Pu, Ra, Sr, Th	H32	HISOMT
	METALS	Fe, Al,Mn, Mg ..	H30	
	DISSOLVED GASES	Geochemical tracors, CO2, Freons, CFC	H33, H73, H74	
	SUSPENDED PARTICULATE MATTER DATA	Measurements in the water column, from bottles and pumps	B02, B03, B71	HPARMT
	MOORED SEDIMENT TRAPS DATA	Suspended Matter, Turbidity, Biogenic Major Elements - Carbon Cycle	B73	STPGMT
	DRIFTING SEDIMENT TRAPS DATA	Suspended Matter, Turbidity, Biogenic Major Elements - Carbon Cycle	B73	STPDMT
	SEDIMENT DATA	Sediment cores (soft bottom), Grab	G02, G04, G71, G73, G74	SED1MT
OTHER SPECIFIC DATA	RARE EARTHS MEASUREMENTS	Coastal Fauna, Deep Sea Fauna, Fishes	B11 B14 B19-21 B25-26 B28	HREEMT
	METEOROLOGICAL DATA	Automatic weather stations, Meteorological Drifting Buoys, Fetch measured by Doppler acoustic sensors	M02, M05, M06, M71	STMEMT
	UNDERWATER IRRADIANCE (PAR)		H17	IRRAMT
	ACOUSTIC REFLECTION ON MARINE ORGANISMS	Fauna, Multifreq. echosounding	B28	ECHOMT

(1) See the meaning of the ROSCOP codes in the cruise report forms, in annex

4 - Instruments/methods inventory

inventory to safeguard the methodological information. Besides the usual international ROSCOP/CSR information on cruises and moorings, further information on instruments/methods is compiled, to get information on the instruments and methods used, the calibration and the data processing, and the bibliographical references where the full methodological information is available. This instrument catalogue includes the main equipment like CTD, current meters, sediment traps.. at sea and in laboratory. It is prepared at the beginning of the project and completed with on coming information on calibration and use during the project implementation.

form to be completed : instrum.doc

2.5. Access to the inventories and Networking

Each regional data centre continuously updates these inventories at the regional level. This information (meta-data) is freely available on internet at the following sites:

Western Basin data set catalogue : http://www.ifremer.fr/sismer/program/mater/

Adriatic/Ionian data set catalogue : http://doga.ogs.trieste.it/mater/

Eastern Basin data set catalogue : http://hnodc.ncmr.ariadne-t.gr/programmes/mater/

and synthesis has be published by the **Animation Task** on the project server : http://bali.cetiis.fr/mtp/mater/

Similar home pages (Fig.2) have been developed, that give access to the catalogues, the documentation and to interfaces for data requests.

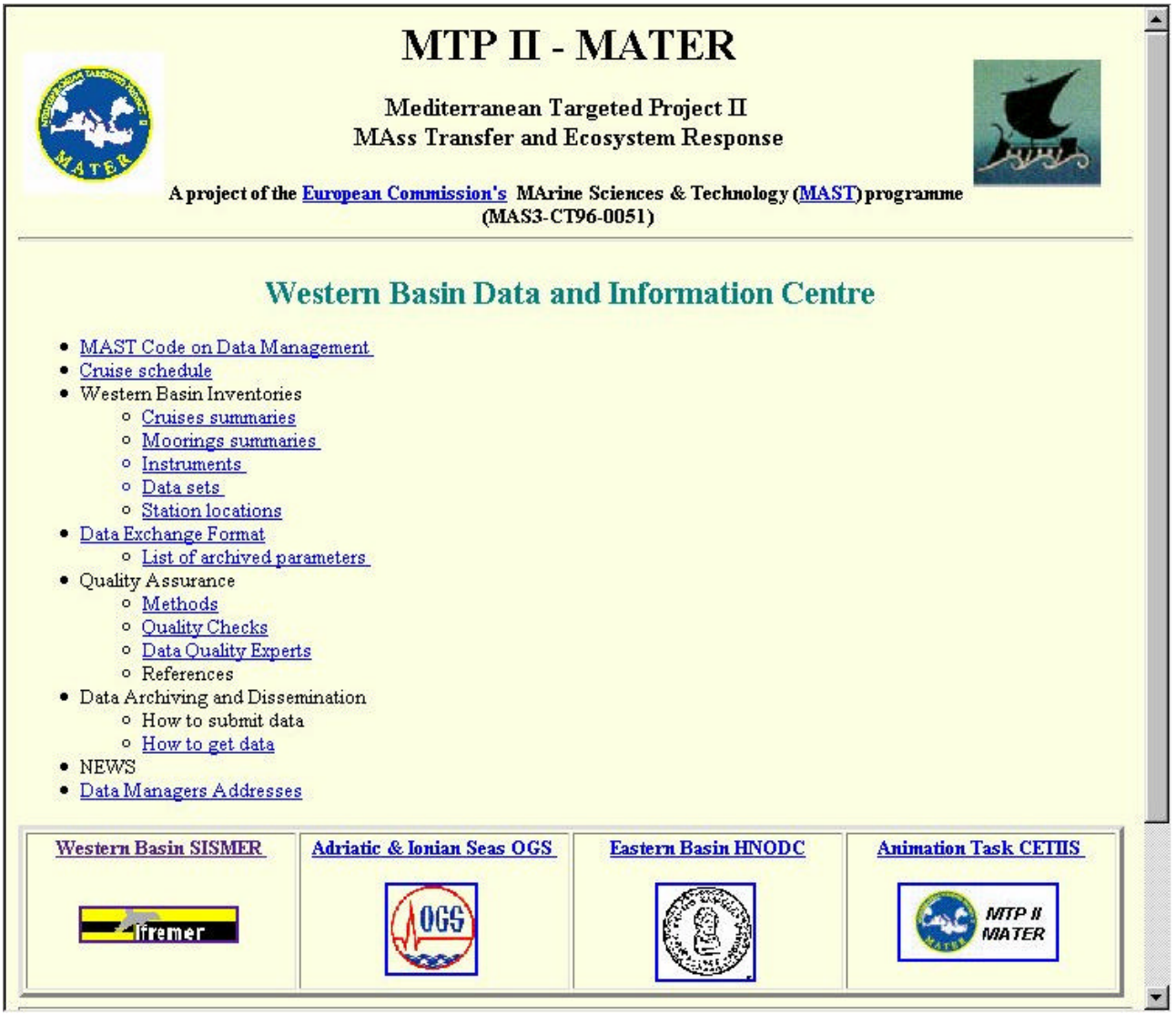


Fig 2: Data Management home page of a Regional Data Centre

2.6. Data Archiving and Dissemination

The observational data sets are safeguarded as scientific files in the archiving system of the data centres with computer tools to extract and distribute subsets of the data at the common MEDATLAS format which is described in the following chapter. The electronic address of the data files is safeguarded in the relational database system, within the data set inventory.

During the project implementation, the data dissemination is restricted to the project partners and submitted to the source scientist permission.

3. EXCHANGE FORMAT (MEDATLAS FORMAT)

3.1.General Specifications of the Format

The MEDATLAS format is used for vertical profiles and for time series. This format has been designed, in conformity with the international the ICES/IOC GETADE recommendations (see references), to fulfil the following requirements :

- To facilitate the reading of the data, (and not to optimise the data archiving on the magnetic medium, neither to speed up the data processings).
- To be independent of the computer.
- To keep track of the history of the data including the data collection and the processing. Then each cruise must be documented.
- To allow the processing of profile independently. Therefore the date, time and geographical co-ordinate must be reported on each profile header.
- To be flexible and accept (almost) any number of different parameters.
- The real numbers (floating numbers must remain in the same way as they have been transmitted, not re-formatted into integer numbers). The number of decimals must implicitly indicate the accuracy of the measurements.

These requirements have been taken into account in the MEDATLAS exchange format which has been designed by the MEDATLAS and MODB consortia, in the frame of the European MAST II programme. The profiles measured with the same instrument (eg. bottles, CTD, XBT..) during the same cruise, are grouped within the same file which includes :

☐A **cruise header** based on the international ROSCOP information

☐A **profile or time serie header** including the cruise reference, the originator station reference within the cruise and the time and location

☐The **data points** of the profile

The sequence 'profile/time serie header + data points ' is repeated for each profile.

3.2. Cruise Header

BP = Beginning Position, **SL** = string length,
MAND = Mandatory if X in the column
NDT= Number of data types (ROSCOP)
NCO = Number of comment lines (textual information on the cruise)

LINE	FIELD	DESCRIPTION	BP	SL	TYPE	MAND.
1	1st character	*	1	1	char	X
	cruise	MEDATLAS cruise reference	2	13	char	X
	name	originator cruise name/reference	16	32	char	X
	ship code	standardised WDCA/ICES/IOC code	49	4	char	X
	ship name	full ship name	54	25	char	X
2	start date	DD/MM/YYYY	1	10	char	X
	end date	DD/MM/YYYY	12	10	char	X
	region name	GF3 table	23	35	char	X
3	country	Source laboratory country code	1	2	char	X
	address	Laboratory, institution, town	4	75	char	
4	name	chief scientist full name	1	40	char	X
	key word	'Project='	42	8	char	X
	project	name of the project	50	28	char	
5	key	'Regional Archiving='	1	19	char	X
	data centre	regional archiving centre code	21	2	char	X

	key word	'Availability='	42	13	char	X
	availability	Data Availability code (P/L/C)	55	1	char	X
5+1 to 5+NDT	key word	'Data Type='	1	10	char	X
	data type	ROSCOP code	11	3	char	X
	key word	'n='	15	2	char	X
	number	number of profiles for the type	17	4	num	X
	key word	'QC='	22	3	char	X
	QC	Y/N (Yes or No)	25	1	char	X
6+NDT to 5+NDT+NCO	key word	'COMMENT'	1	7	char	
	.	comment line 1.....	1	80	char	.
	.	comment line n	1	80	char	.

3.3. Cruise reference

The cruise identifier is coded on 13 characters (no blank character allowed)

BP=*Beginning Position,* SL= *string length*

FIELD	DESCRIPTION	BP	SL	TYPE	MAND.
Data centre code	Regional data centre in charge of the dataset	1	2	char	X
Country code	Country of the institution who performed the measurements	3	2	char	X
Year	Year of the beginning of the cruise : format yyyy	5	4	number	X
Serial number	number given by the data center or by the originator	9	5	number	X

3.4. Profile or Time Series Header

In the station header, the first character of each line is a '*'.

BP =Beginning Position **SL** = string length
MAND = Mandatory if X in the column
NP = number of observed parameters incl. the reference (pressure)
NCO = number of comment lines in the header

The first observed parameter is the reference :

- ☐ pressure in decibar for the observations in the water
- ☐ depth (in meters) below the bottom for sediment observations
- ☐ date + time + seconds (optional) for Eulerian time series

LINE	FIELD	DESCRIPTION	BP	SL	TYPE	MAND
1	start character	'*'	1	1	char	X
	reference	MEDATLAS ref.(cruise+station+cast)	2	18	char	X
	key word	'Data Type='	21	10	char	X
	data type	ROSCOP code	31	3	char	X
2	date	'*DATE='DDMMYYYY	1	14	char	X
	time	'TIME='HHMN	16	9	char	X
	latitude N/S	'LAT='N or S	26	5	char	X
	lat. degrees	latitude degrees (0 to 90)	31	2	char	X
	lat. minutes	latitude minutes.hundredth	34	5	char	X
	longitude E/W	'LON=', E or W	40	5	char	X
	long. degrees	longitude degrees (0 to 180)	45	3	char	X
	long. minutes	minutes.hundredth	49	5	char	X
	key word	'DEPTH='	55	6	char	X
	bottom depth	bottom depth in metres (nothing if unknown)	61	6	num	
	key word	'QC='	68	3	char	X
	time flag	QC flag on date and time	71	1	num	X

	lat. flag	QC flag on latitude	72	1	num	X
	long. flag	QC flag on longitude	73	1	num	X
	depth flag	QC flag on bottom depth	74	1	num	X
3	key word	'*NB PARAMETERS= '	1	15	char	X
	nb. of columns	number of measured parameters (NP)	16	2	num	X
	key word	'RECORD LINES='	19	13	char	X
	number of lines	number of observation records (NL)	32	5	num	X
3+1 to 3+NP	1st character	*	1	1	char	X
	code param. p	Code for parameter p	2	4	char	X
	parameter p	parameter full name (IOC def.)	7	30	char	X
	unit param. p	('IS/IOC unit')	37	30	char	X
	key word	'def.='	68	5	char	X
	default val.	string of '9'.string of '9' same format as the parameter p	73	nlen(np)	num	X
4+NP	key word	'*GLOBAL PROFILE QUALITY FLAG='	1	29	char	X
	profile QC	global quality flag for the profile	30	1	num	X
	key word	'GLOBAL PARAMETERS QC FLAGS='	32	27	char	X
	profile QC	global quality flags for the NP parameter	50	NP	num	X
5+NP	key word + collect hist.1	'*DC HISTORY='method, instrum. etc	1	80	char	X
6+NP	collect hist.2	'*'continuation	1	80	char	X
7+NP	key word + archv. hist.1	'*DM HISTORY', data management history	1	80	char	X
8+NP	archv. hist.2	'*'continuation	1	80	char	X
9+NP to 8+NP+NCO	key word	'*COMMENT'	1	8	char	X
	comment	'*'comment line 1	1	80	char	X
	comment	'*'comment line n	1	80	char	
9+NP+NCO	key word + surface obs. 1	'*SURFACE SAMPLES=', samples	1	80	char	X

10+NP+NCO	surface obs. 2	'*'continuation	1	80	char	X

3.5. Station reference

total 18 characters (no blank character allowed)

BP=*Beginning Position,* SL= *string length*

FIELD	DESCRIPTION	BP	SL	TYPE	MAND.
cruise reference	Cruise reference to which the station belongs	1	13	char	X
station number	station reference	4	4	char	X
cast	This can be used as a fifth character for the station number or as a character to describe the cast of one station if several casts are performed as the same location	1	1	char	X

3.6. History and information on the data processing

In order to maintain some flexibility with the format and not to loose existing complementary information on the data processing, meteorological observations etc. not taken into account in the format, three specific fields terminate each header profile :

***DC HISTORY** for the information linked to the data collection at sea (like instrument, calibration)

***DM HISTORY** for the information linked to the data management and archiving (like the source latitude if the sign or the value has been changed)

***COMMENT** for all optional data and meta data . The number of comment lines is not limited.

For the **time series**, 5 lines must be added in the comment lines of the header :

LINE	FIELD	DESCRIPTION	BP	SL	TYPE	MAND
1	key word	'*ADDITIONNAL INFORMATION - TIME SERIES	1	38	char	X
2	key word	'*EDATE='	1	7	date	X
	end date	End date of the time serie : format DDMMYYYY	8	8	char	X
	key word	'ETIME='	17	6	char	X
	end time	End time of the time serie : format HHMN	23	4	time	X
	key word	'ELAT='	28	5	char	X
	end latitude	End latitude of the time serie : N(or S)DD MM.99	33	9	lat.	X
	key word	'ELON='	43	5	char	X

	end longitude	End longitude of the time serie : E(or W)DDD MM.99	48	10	long.	X
	key word	'EDEPTH='	59	7	char	X
	end depth	End bottom depth of the time serie	66	6	num	X
	key word	'QC='	73	3	char	X
	time flag	QC flag on end date and end time	76	1	num	X
	lat. flag	QC flag on end latitude	77	1	num	X
	long. flag	QC flag on end longitude	78	1	num	X
	depth flag	QC flag on end bottom depth	79	1	num	X
3	key word	'*SENSOR DEPTH='	1	14	char	X
	sensor depth	Nominal sensor depth in meters	15	5	num	X
	key word	'(metre)'	21	7	char	X
	key word	'DISTANCE TO BOTTOM='	40	19	char	X
	dist. bottom	Distance to bottom in meters	59	5	num	.
	key word	'(metre)'	65	7	char	.
	key word	'QC='	73	3	char	X
	depth flag	QC flag on sensor depth	76	1	num	X
	dist. flag	QC flag on distance to bottom	77	1	num	X
4	key word	'*DURATION='	1	10	char	X
	duration	Time serie duration in days	11	5	num	.
	key word	(day)	17	5	char	.
	key word	QC=	73	3	char	X
	duration flag	QC flag on the duration of the time serie	76	1	char	X
5	key word	'*SAMPLING RATE='	1	15	char	X
	samp. rate	Sampling rate in seconds	16	5	num	.
	key word	(second)	22	8	char	.
	key word	'MAGNETIC DECLINATION='	40	21	char	X
	mag. decl.	Magnetic declination in degrees (format 99.9)	61	4	num	X
	key word	(degree)	66	8	char	X

3.7. Data Points

Each parameter p can have any length **nlen(p)**, but this length must be constant in the profile, and the decimal points at a constant position. The separators are one or more blanks after

each parameter value. The quality flags are grouped after the last separator, with no blank between them.

If a total of NP parameters are recorded the beginning positions of parameter p (bp(p)) and its quality fmag (bpq(p)) in the record lines are :

bp(p)=nlen(1)+ ..+ nlen(p-1) + 1
bpq(p)= bp(NP) + nlen(NP) + p-1

nlen(p) includes the blanks separator(s) for the parameter p.

For missing data, the default characters are 9 or -9 at the same format and length than the expected numbers. The number of decimal implicitly indicates the accuracy of the data.

See the Examples for vertical profile and time series data files.

3.8. Codes

Codes are used in the database when the information (meta-data) is frequently exchange. The codes may be internal to the MEDATLAS format, or international (IOC/GF3, ICES) :

DATA CENTRE CODES

CODE	NAME
FI	France IFREMER/SISMER
GN	Greece HNODC
IO	Italy OGS

IOC/GF3 COUNTRY CODES

CODE	NAME
35	France
06	Germany
36	Greece
48	Italy
29	Spain

GF3 MEDITERRANEAN OCEANOGRAPHIC REGION

CODE	NAME
D00	MEDITERRANEAN SEA
D10	MED. WESTERN BASIN

D11	GIBRALTAR STRAIT
D12	ALBORAN SEA
D13	BALEARIC SEA
D14	LIGURIAN SEA
D15	TYRRHENIAN SEA
D17	SICILIA STRAIT
D30	MED., EASTERN BASIN
D31	IONIAN SEA
D32	ADRIATIC SEA
D33	AEGEAN SEA
D41	BLACK SEA
D42	SEA OF MARMARA
D43	SEA OF AZOV
DH3	LEVANTINE BASIN

ICES SHIP CODES

CODE	NAME	COUNTRY
06PO	POSEIDON	Germany
29DB	ODON DEL BUEN	Spain
29GD	GARCIA DEL CID	Spain
29HE	HESPERIDES	Spain
35A3	ATALANTE	France
35EU	EUROPE	France
35GP	GEORGES PETIT	France
35LU	SUROIT	France
35TT	TETHYS II	France
48UR	URANIA	Italy
.	PHILIA	Greece
36AE	AEGAEO	Greece

QUALITY FLAGS CODIFICATION

CODE	SIGNIFICATION
0	NOT CONTROLLED VALUE
1	CORRECT VALUE
2	VALUE INCONSISTENT WITH STATISTICS
3	DOUBTFUL VALUE (spike, ...)
4	FALSE VALUE (out of scale, vertical instability, ...)
5	VALUE MODIFIED DURING QC (only for profile headers)
6-8	Not USED
9	NO VALUE

CONFIDENTIALITY/AVAILAIBILITY CODIFICATION

CODE	SIGNIFICATION
P	PUBLIC DOMAIN DATA
L	LIMITED TO THE PROJECT DATA
C	CONFIDENTIAL DATA

DATA TYPE (Roscop codes)

CODE	NAME
B01	Primary productivity
B02	Phytoplankton pigments (eg chloroph
B07	Pelagic bacteria/micro-organisms
B08	Phytoplankton
B09	Zooplankton
B10	Neuston
B71	Particulate organic matter (inc POC
B73	Sediment traps
B90	Other biological/fisheries meas.
D01	Current meters
D71	Current profiler (eg ADCP)
H09	Water bottle stations

H10	CTD stations
H13	Bathythermograph
H16	Transparency (eg transmissometer)
H17	Optics (eg underwater light levels)
H21	Oxygen
H22	Phosphate
H24	Nitrate
H25	Nitrite
H26	Silicate
H32	Isotopes
H72	Thermistor chain
H73	Geochemical tracers (eg freons)
H75	Total - N
H76	Ammonia
M90	Other meteorological measurements
P01	Suspended matter

PARAMETER CODES

(See the Data Dicitionary)

CODE	NAME	UNIT
C1UW	14C UPTAKE 0.2-1 MICRON	milligram carbon/(m3.day)
BFUP	19'BUTANOYLOXYFUCOXANTHINE	milligram/m3
HFUP	19'HEXANOYLOXYFUCOXANTHINE	milligram/m3
ASDW	ABSORPTION STANDARD DEVIATION	milligram/m3
MALS	Al IN THE SEDIMENT	%
AXAP	ALLOXANTHINE	milligram/m3
ABCP	ALPHA BETA CAROTENES	milligram/m3
AMON	AMMONIUM (NH4-N) CONTENT	millimole/m3
NHRW	AMMONIUM REGENERATION	micromole nitrogen/(m3.day)
NHUW	AMMONIUM UPTAKE	micromole nitrogen/(m3.day)

ATMS	ATMOSPHERIC PRESSURE - SEA LEV	millibars
MBAS	Ba IN THE SEDIMENT	ppm
BCMW	BACTERIAL BIOMASS IN SEA WATER	milligram C/m3
BATH	BATHYMETRIC DEPTH	meter
MBRS	Br IN THE SEDIMENT	ppm
MCAS	Ca IN THE SEDIMENT	%
MCES	Ce IN THE SEDIMENT	ppm
CH1P	CHL-A(LESS DIVINYLCHL-A)	milligram/m3
CH2P	CHL-B(LESS DIVINYLCHL-B)	milligram/m3
CHAF	CHLOROPHYLL-A FLUX	milligram/(m2.day)
CPHL	CHLOROPHYLL-A TOTAL	milligram/m3
CHCZ	CHLOROPHYLL-C1+C2	milligram/m3
CHC3	CHLOROPHYLL-C3	milligram/m3
CHLT	CHLOROPHYLL-TOTAL	milligram/m3
MCRS	Cr IN THE SEDIMENT	ppm
MCUS	Cu IN THE SEDIMENT	ppm
EWCT	CURRENT EAST COMPONENT	meter/second
NSCT	CURRENT NORTH COMPONENT	meter/second
DCAW	DARK CARBON ABSORPTION	milligram/m3
CDFW	DARK FIXATION	milligram carbon/(m3.day)
DAYX	DAY WITHIN MONTH	dd
DEPB	DEPTH BELOW SEA BOTTOM	meter
DEPH	DEPTH BELOW SEA SURFACE	meter
DXAP	DIADINOXANTHINE	milligram/m3
TXAP	DIATOXANTHINE	milligram/m3
HCDT	DIRECTION REL. TRUE NORTH	degree
ETHW	DISSOLVED 234 TH ACT. ERROR	Bq/m3
TH4W	DISSOLVED 234TH	Bq/m3
CF1W	DISSOLVED CFC11	picomole/kg
CF2W	DISSOLVED CFC12	picomole/kg

DOX1	DISSOLVED OXYGEN	ml/l
DOXY	DISSOLVED OXYGEN	millimole/m3
CHBD	DIVINYL-CHLOROPHYLL-B	milligram/m3
CHAD	DIVINYL CHLOROPHYLL-A	milligram/m3
DRYT	DRY BULB TEMPERATURE	Celsius degree
CNDC	ELECTRICAL CONDUCTIVITY	millimho/centimeter
CHAE	EPIMERE CHLOROPHYLL-A	milligram/m3
MFES	Fe IN THE SEDIMENT	%
FLU1	FLUORESCENCE	volt
FLUO	FLUORESCENCE	relative unit
FUCP	FUCOXANTHINE	milligram/m3
GSPD	GUST WIND SPEED	meter/second
HCSP	HORIZONTAL CURRENT SPEED	meter/second
MIIS	I IN THE SEDIMENT	ppm
SPDI	INDICATED PLATFORM SPEED	meter/second
RDIN	INCIDENT RADIATION	watt/m2
MKKS	K IN THE SEDIMENT	%
MLAS	La IN THE SEDIMENT	ppm
LTUW	LEUCINE UPTAKE RATE	microgram carbon/(m3.h)
LCAW	LIGHT CARBON ABSORPTION	milligram/m3
TUR1	LIGHT DIFFUSION COEFFICIENT	m-1
LGH3	LIGHT IRRADIANCE CORRECTED PAR	micromole photon/(m2.s)
LGHT	LIGHT IRRADIANCE IMMERGED PAR	micromole photon/(m2.s)
LGH4	LIGHT IRRADIANCE SURFACE PAR	micromole photon/(m2.s)
TUR3	LIGHT TRANSMISSION	%
LTHF	LITHOGENIC FRACTION FLUX	milligram/(m2/day)
MSMP	MEAN SPHERIC DIAM. MEDIAN	millimeter
MSDP	MEAN SPHERIC DIAM. OF PARTICLE	millimeter
MSZW	MESOZOOPLANCTON DRY WEIGHT	milligram/m3
MMGS	Mg IN THE SEDIMENT	%

MMNS	Mn IN THE SEDIMENT	%
MMOS	Mo IN THE SEDIMENT	ppm
MNTH	MONTH	mm
MRBS	Mr IN THE SEDIMENT	ppm
MNAS	Na IN THE SEDIMENT	%
MNBS	Nb IN THE SEDIMENT	ppm
MNDS	Nd IN THE SEDIMENT	ppm
NETR	NET RADIATION	watt/m2
MNIS	Ni IN THE SEDIMENT	ppm
NTRA	NITRATE (NO3-N) CONTENT	millimole/m3
NTRZ	NITRATE + NITRITE CONTENT	millimole/m3
NOUW	NITRATE UPTAKE	micromole nitrogen/(m3.day)
NORW	NITRIFICATION	micromole nitrogen/(m3.day)
NTRI	NITRITE (NO2-N) CONTENT	millimole/m3
BCCW	NUMBER OF BACTERIA CELLS SW	10+9 cell/m3
NUMP	NUMBER OF PARTICLES	number/m3
CICW	NUMBER OF SW CILIATES	10+3 cell/m3
PCEW	NUMBER OF SW PICOEUCARYOTES	10+6 cell/m3
PRCW	NUMBER OF SW PROCHLOROCOCCUS	10+6 cell/m3
SNCW	NUMBER OF SW SYNECHOCOCCUS	10+6 cell/m3
MPPS	P IN THE SEDIMENT	%
MPBS	Pb IN THE SEDIMENT	ppm
SIOF	PART. BIOGENIC Si FLUX	milligram/(m2.day)
CO3F	PART. CaCO3 FLUX	milligram/(m2.day)
CHTF	PART. TOTAL CARBOHYDRATES	milligram/(m2.day)
TCCF	PART. TOTAL CARBON FLUX	milligram/(m2.day)
TNNF	PART. TOTAL NITROGEN FLUX	milligram/(m2.day)
ETHP	PARTICULATE 234 TH ACT. ERROR	Bq/m3
TH4P	PARTICULATE 234TH ACTIVTY	Bq/m3
POCP	PARTICULATE ORGANIC CARBON/POC	milligram/m3
PONP	PARTICULATE ORGANIC NITROGEN	milligram/m3

PNTP	PARTICULATE TOTAL NITROGEN	milligram/m3
PERP	PERIDININE	milligram/m3
PHTF	PHAEOPIGMENTS FLUX	milligram/(m2.day)
PHEA	PHEOPHYTIN-A	milligram/m3
PHOS	PHOSPHATE (PO4-P) CONTENT	millimole/m3
HEAD	PLATFORM HEADING REL. NORTH	degree
PSAL	PRACTICAL SALINITY	P.S.U.
PXAP	PRASINOXANTHINE	milligram/m3
PRRT	PRECIPITATION RATE	millimeter/hour
RELH	RELATIVE HUMIDITY	%
MSCS	Sc IN THE SEDIMENT	ppm
PRES	SEA PRESSURE sea surface=0	decibar=10000 pascals
SSTP	SEA SURFACE TEMPERATURE	Celsius degree
TEMP	SEA TEMPERATURE	Celsius degree
MSIS	Si IN THE SEDIMENT	%
SLCA	SILICATE (SIO4-SI) CONTENT	millimole/m3
MSRS	Sr IN THE SEDIMENT	ppm
MTHS	Th IN THE SEDIMENT	ppm
MTIS	Ti IN THE SEDIMENT	%
TIME	TIME WITHIN DAY	hhmmss
NTOT	TOTAL DISSOLVED NITROGEN	millimole/m3
TDPW	TOTAL DISSOLVED PHOSPHORUS	millimole/m3
EPMP	TOTAL SUSP. PART. MATTER/ESTER	gram/m3
GPMP	TOTAL SUSP. PART. MATTER/GLASS	gram/m3
TSMF	TOTAL SUSPENDED MATTER FLUX	milligram/(m2.day)
TUR6	TURBIDITY	milliF.T.U Formaz Turb Unit
MUUS	U IN THE SEDIMENT	ppm
MVVS	V IN THE SEDIMENT	ppm
VERR	VELOCITY ERROR	meter/second
VOCP	VOLUME CONC. OF PARTICLES	p.p.m.
WDIR	WIND DIRECTION REL. TRUE NORTH	degree

WSPD	WIND SPEED	m/s
MYYS	Y IN THE SEDIMENT	ppm
YEAR	YEAR	yyyy
ZXAP	ZEAXANTHINE	milligram/m3
MZNS	Zn IN THE SEDIMENT	ppm
MZRS	Zr IN THE SEDIMENT	ppm

4. QUALITY ASSURANCE

4.1. Objectives and General Description

Data Quality Assurance is a high point of the MTP II-MATER project. The data sets are of high standard of quality, and directly usable for scientific or operational purposes.

The quality assurance for data collection depends on all the stages of processing :

- The data are collected and validated by the scientific laboratories according to the internationally agreed standard procedures. A data report is written explaining the methodology. These reports are reviewed by the MTP quality experts, to insure the use of common units and the same level of accuracy for a given data type. The core measurement methodologies are described in the MTP handbook (Turley, 1996), but this is not the case for all the parameters which will be measured. during the project and the scientific data reports are even more important in this case. At least the use of common units is necessary.
- A copy of the validated data sets is transmitted to the regional data centre, with a possibility of expert review according to the scheme given above(Fig.1)
- The data sets are reformatted at the common exchange format and further controls are performed at the regional data centres before the final archiving, in conformity with the Intergovernmental Oceanographic Commission and MAST recommendations. These checks include automatic and visual procedures, and require not only the use of a common exchange format but prerequisite information on the observed parameters, like minimum, maximum and spike/gradient limit values, which is compiled in the parameter inventory (Vol II). For a few core parameters (temperature, salinity, nutrients) some statistical climatological information exists which allow to perform additional narrow range checks.

As a result, a quality flag is added to each numerical value, but the values themselves are not modified. The chosen flag scale is simple and already used in other international projects. The flags are then validated or corrected manually , taking in consideration the overall coherence of the data within the cruise, which is somehow subjective but not arbitrary. The automatic checks are made by using pre-existing knowledge on the region : extreme values for broad range checks (corresponding to high error level), and previous climatological profiles for narrow range checks; there is also some subjectivity in the tuning of these parameters. Specific software is on UNIX (SCOOP) at SISMER and HNODC, which is described here below. It is expected not to get any flag different from 1. In case of outlier, the originator will be contacted to see where is the problem and if the data point has to be corrected or rejected. An early data submission will facilitate the tasks.

- The results of these final checks are transmitted to the scientists in charge of the data sets, for validation and, if any anomaly is detected, possible further processing or intervention on the instruments.

4.2. Flag Scale

The flag scale is the flag scale adopted by the IOC for the GTSPP International program of temperature exchange in real time. The flag value if documented, is proportional to the level of

error. When the data are displayed on a screen for visual checks, a colour is assigned to each flag which are the following :

4.3. Check of the format QC-0

This check include the completeness of the documentation like ship name and code etc. Requested corrections or completion are made before any further control.

4.4. Check of he Headers : date and location QC-1

4.4.1. Check List and results

The following tests are performed automatically first and the results displayed on a screen to perform the manual check (Fig.2). As these checks concerns location and date, they may be followed with a correction (Flag=5) in case of obvious errors like sign errors or time assign to 24 hours. If this is not the case, the profile is eliminated (E) with a global flag to 4 (false).

Automatic Checks	**Results - Flag**
Duplicate data sets	*Elimination*
Date	*Elimination* or **5**
Ship/Platform velocity	*Elimination* or **5**
Location/shoreline	*Elimination* or **5**
Bottom sounding *(ETOPO5)*	*Elimination* or **3**

5 = Correction/Interpolation

3 = doubtfull depth

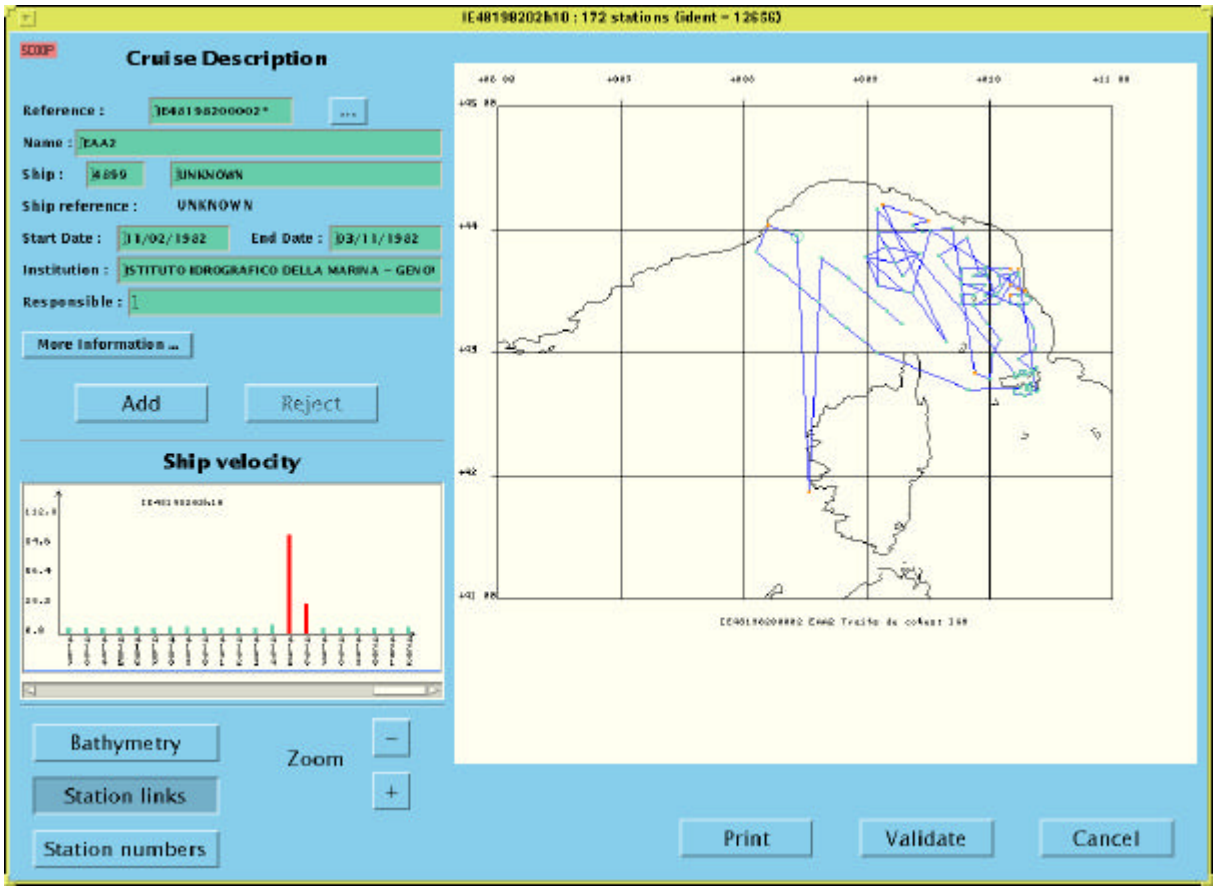


Fig3: Visual checks of the Position, Date, Bottom Depth

This check allows also the elimination of duplicates that may be a difficulty of the archiving and for which the cruise information is very important. The links between stations of the same cruise is used to compare with similar data sets. The check for duplicates includes :

- check for no pre-existing same cruise identifier
- check for cruises with same dates for beginning and end
- for same year, same country : visual check for superposed stations
- for each month, visual check of superposed stations (local position maps)

4.4.2. check for duplicate profiles

- automatic check for same profile identifiers
- automatic check for same stations positions (within 1 mile, 1 hour)
  within the same cruise
  out of the cruise
- visual check of the position maps of cruises having duplicate profiles

In case of duplicate : the *observed* data set is preferred to *reduced* (standard level) data set, or the most complete (or a combination), or the *latest* and the corresponding cruise summary

4.4.3. Check the date

- The day must be between 1 and the number of days of the month.
The year of the profile must be the same as included in the cruise reference
The month must be between 1 and 12
- The end of cruise must be later than the beginning
- The date and time of the profile must be within the cruise duration.

If this is not the case and the time flag = 4 (bad) , the values are written in the DM history field of the header and an exit call for correction is made. Obvious errors like time= 24 hours are corrected with time=0 and day=day+1 flag=5. In this case the new calculated ship velocity must be acceptable .

4.4.4. Check the ship velocity

- If the ship velocity > maximum velocity of the ship (default is 15 knots) between two consecutive profiles, find the erroneous data (date or location), copy it in the DM history field of the header, interpolate and flag= 5 (changed after QC) the modified

4.4.5. Check the bottom sounding

- If the bottom depth sounding DEPH is not reported flag=9 (missing value)
- If DEPH out of the regional scale flag= 4 (bad)
- If the sounding is within the minimum (- 20%) and maximum (+ 20%) of 9 reference values, the flag = 1 (good). If DEPH is outside this interval flag = 3 (questionable).

The references values are the ETOPO 5 gridded (5' x 5') bottom depth (4) at the station location and at the 8 nearest points.

4.4.6. Visualisation and manual controls

All the previous checks are reviewed :

- Check for position over the sea
- Check the ship velocity between the consecutive stations
- Check the bottom depth (mainly deep basin / shelf water).

In addition the overall consistency of the profiles within the data set and if necessary with data collected during another cruise

In order to facilitate the QC, the following information is permanently available (displayed or clickable) on the computer screen :

- Cruise identifier and name (permanent) and complete headers (clickable)
- Coastal lines and bathymetry ETOPO5 (4) and GEBCO (5) with zoom possible
- Stations locations (linked or not)

In case of necessity, the values and the DM history are modified. If it is not possible to get an acceptable date or position, global flag =4 (bad).

4.5. Check of the parameters - QC-2

4.5.1. Check List and results

Automatic Checks	Results/Flag	
Pressure record only	Elimination	
Out of the regional scale (min & max values)	4	
Non Increasing pressure	4	
Data below the bottom depth	4	
Coherence with pre-existing statistics (LEVITUS, REYNAUD, MEDATLAS)	2	
Constant profiles	4	
Spikes - Gradient	3	
Vertical instability > noise	4	

These checks do not modify the observation but only add the quality flags.

The higher severity checks are performed first, because there is no reason to perform for example narrow range checks, if a value is already out of the regional broad range scale. Only the vertical density check is performed at the end because it makes use of the results of the other checks and it is more difficult to implement (4 values are taken into account).

When a parameter is fully checked, a « global parameter flag » is attributed, depending on the percentage of flagged values (20%). It can be discussed if the number of values on the vertical, for examples profiles with less than 3 good levels the vertical, has to be taken into account to give the global flags. It has been chosen here not to attribute any quality index to this number, first because this test can be automatically recomputed, also because the interest of such «gappy » profiles, depends on the potential further scientific analysis for example time series of coastal stations or deep sea geostrophic computations.

4.5.2. Check for acceptable data set

- The reference parameter must be present : SEARCH for PRES as a (GF3) column title (= vertical co-ordinate) If not present, the global profile flag = 4 (bad); GO TO the next profile.

- If PRES exists but no other parameters, the global profile flag = 4 (bad); GO TO the next profile.

- SEARCH for TEMP as a column title. If no present, the global profile flag = 3 (doubtful); but continue.

4.5.3. Check for increasing pressure

The reference parameter must be increasing

- If the pressure is not continuously increasing : flag = 4 (bad) for the first redundant data.
- If the complete profile is in the reverse order, EXIT to prepare it properly.

In the particular following cases, this check returns too many problematic data and the data are processed before further QC :

- the profile is in reverse order beginning from the bottom : it is reformatted in increasing order;

- an important part is duplicated (the cast down of the CTD is interrupted to raise it a hundred meter before continuing the down cast) : the first duplicated segments are rejected;

- if the profile include more than one value per decibar, the values are filtered to about one decibar

.

4.5.4. Check for constant profiles

A parameter cannot be constant on the vertical. If all the temperatures or all the salinities are constant then global profile quality flag =4 (bad) and " constant temperature" or "constant salinity" is written in the field "DM HISTORY" of the header. data points flags = 4 (bad)

4.5.5. Check for impossible regional values

FOR each data, if the parameter is out of the regional scales (minimum and maximum), the data flag = 4 (bad).

4.5.6. Check for spikes

This check requires at least 3 consecutive acceptable values.

Select 3 consecutive acceptable values :

- If flag of the value = default value the value is not acceptable, take the following
- If flag of the value = 4 the value is not acceptable, take the following

Search the spiky values :

The IOC check is the following :

If (|V2-(V3+V1)/2 | - |V1-V3|/2) > THRESHOLD VALUE ---> flag (V2) = 3 (dubious)

However this test does not always work properly for data not regularly collected on the vertical, as it is often encompass with bottle casts. There are also difficulties with more than one value on the spike. In this case, a better algorithm to detect the spikes, taking into account the difference in gradients instead of the difference in values is :

| |(V2-V1)/(P2-P1)-(V3-V1)/(P3-P1)| - |(V3-V1)/(P3-P1)| |> THRESHOLD VALUE

In general the spike test requires manual validation.

4.5.7. Compare with the pre-existing statistics - check for pressure

The available reference statistics are the same as for the bottom depth sounding (ETOPO5) :

- If the bottom depth sounding is recorded in the header and flag = 1(good)
  If PRES > sounding + 5% , flag = 4 (bad)
- If the bottom depth sounding is recorded in the header and flag = 2 (inconsistent with statistics)
  If PRES > sounding + 5% , flag = 3 (questionable)
- If bottom depth sounding is not recorded
  If PRES > the pressure must be within 0.5 and 2 times the reference statistics if this is not the case, flag =3 (questionable)

4.5.8. Compare with the pre-existing statistics - narrow range check for the data

The narrow range check is performed by comparing the data points with the reference statistics. Presently available are :

- The global Levitus climatology annual, seasonal, monthly means in 1x1 degree, standard deviation in 5x5 square degree (LEVITUS, 1994 (6)).
- The Liege MODB Mediterranean climatology : annual and seasonal means in 0.25 square degree (BRASSEUR et al, 1996 (7)).

The choice of the reference is left to the regional expert but it is often useful to use both. These statistical profiles are defined in a limited number of standard levels, and the automatic comparison is made by linearly interpolating them at the level of the observation. The allowed distance to the reference depends varies between 3 and 5 standard deviations, depending on the type of station : over the shelf (depth < 200 m), the slope and straits regions (200< depth < 400 m), the deep sea (> 400 m).

Procedure

- Select the nearest mean statistic profile of the same month (default same season, default same year) and the standard deviation
- Interpolate the reference profile and the standard deviation at the observed pressure level
- Recall the bottom sounding DEPH (default the ETOPO5 depth of the location) and compute the acceptable range of variation :
  If bottom DEPH <= 200 then range = 5 x standard deviation
  If bottom 200 < DEPH <= 400 then range = 4 x std. deviation

If bottom 400 < DEPH then range = 3 x std. deviation

- Compute the absolute value of the difference between the data point and the (interpolated) reference at the same level. with this range :

  If difference > range then flag =2, else flag =1

4.5.9. Density inversion test

This test requires two consecutive acceptable levels of values. The automatic check is mainly used to assist the operator, the decision to flag one of the 4 values (temperature and salinity at the two levels) is always validated manually. A level of noise is attributed for the density.

- acceptable noise level for density :

  EPS= 0.03 (increased to 0.05 near the surface, in coastal areas for bottle sampling)

- selection of two consecutive acceptable level :

  if (pressure, temperature or salinity flag) = 4 or 9 the level is not acceptable

- compute the potential (unless deep density anomalies will be found) density anomaly from the equations of state of sea water (FOFONOFF and MILLARD, 1983 (3) and MILLERO and POISSON, 1981(9)) at each selected level :
  TETA= Potential temperature (PRES, TEMP, SAL, PRES0=0)
  D = density anomaly = sigma(PRES,TETA,PSAL)

- Perform the check each two consecutive densities :
  IF D2 + EPS > D1 then the stratification is stable, the temperature and salinity flags are unchanged
  IF D2 + EPS < D1 then the stratification is unstable

- In case of instability, find out which is the bad value : checks for other anomalies detected by previous checks at one of the two levels, and modify the flag to bad :
  IF FLAG(SAL1) > 1 MODIFY FLAG(SAL1) = 4
  IF FLAG(SAL2) > 1 MODIFY FLAG(SAL2) = 4

  IF FLAG(TEMP1) > 1 MODIFY FLAG (TEMP1)= 4
  IF FLAG(TEMP2) > 1 MODIFY FLAG (TEMP2)= 4

  If the doubt is on the pressure, flag all the parameters
  IF FLAG(PRES1) > 1
  MODIFY FLAG (PRES1)= 4, FLAG(TEMP1) = 4 , FLAG(SAL1) = 4
  IF FLAG(PRES2) > 1
  MODIFY FLAG (PRES2)= 4, FLAG(TEMP2) = 4 , FLAG(SAL2) = 4

- In case of instability, if no anomaly has been previously detected (all flags = 1 at levels PRES1 and PRES2) then arbitrarily modify the flag on the level 2 only to facilitate the visualization and the further manual correction of the flags :
  FLAG (PRES2)= 4, FLAG(TEMP2) = 4 , FLAG(SAL2) = 4

4.5.10. Manual Check of the data and validation of the flagging

The coherence and continuity of the observations within a cruise is only checked subjectively, and allow to make manual corrections of the flags especially :

- in coastal water where the control values are poorly estimated
- when there is a doubt on the climatological reference, or if these values are missing

- in the thermocline where very strong gradients are assimilated with spiky values
- when the standard deviation is missing or poorly estimated (frequently, the value is two low)
- to validate the vertical stability check.

These checks are implemented by using the following displays for each parameter, including the density (which is not archived, but give additional information) :

- Separate and superposed profiles of vertical variations; the reference profile of the current profile is plotted with the envelope of « good » values when this envelope can be computed;
- waterfall diagrams;
- superposed and waterfall temperature/salinity diagrams

The data points are plotted separately or joined by straight lines between two consecutive points, and coloured according to the computed flags. During these checks, it is always possible to check the location of the profile on the map, and the cruise identifier and name will be displayed permanently during the visual inspection (Fig.4).

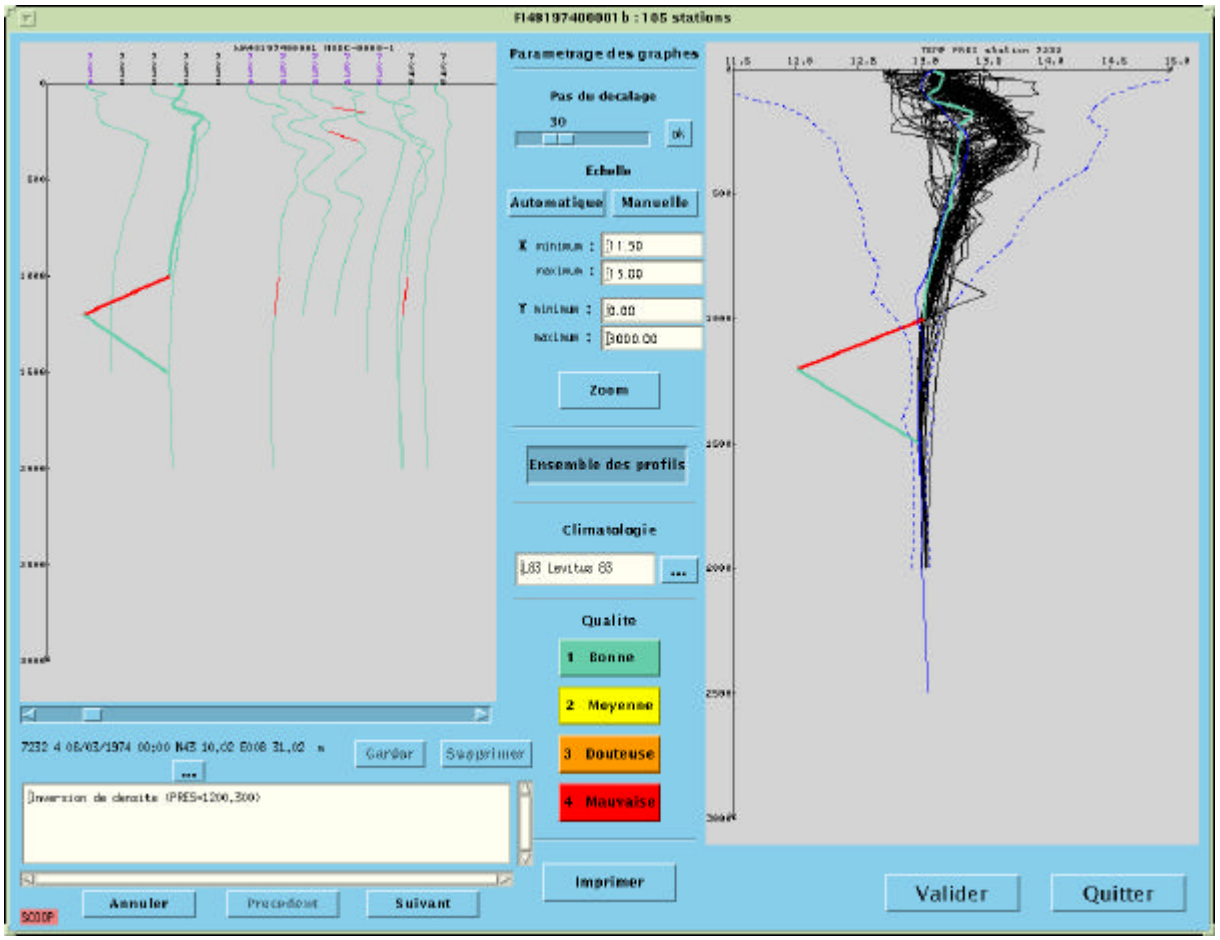


Fig4: Visual checks of the Vertical Profiles

4.6. Checks of the time series

The check of the time series is similar to the check of the vertical profiles, but it has a few differences.

4.6.1. Check of the headers (QC1)

In addition to the date, position and bottom depth, the sensor depth is checked, and also the same parameters at the end of the time series. The key words for these parameters are put after the COMMENT lines in the format, with “E” ex: EDATE, ELAT, etc.. (like End of DATE , End of LAT..).

4.6.2. Check of the data points (QC2)

The time is the abscissa and as the climatological fields are not yet available, the data are compared with the internal mean and standard deviation of the time series. The respective factors of 3, 4, 5 for multiplying the standard deviation (according to the bottom depth of the beginning of the time series) to estimate the acceptable deviation from the mean is taken into account as for the vertical profiles.

An example of the corresponding visual checks is given in Fig. 6.

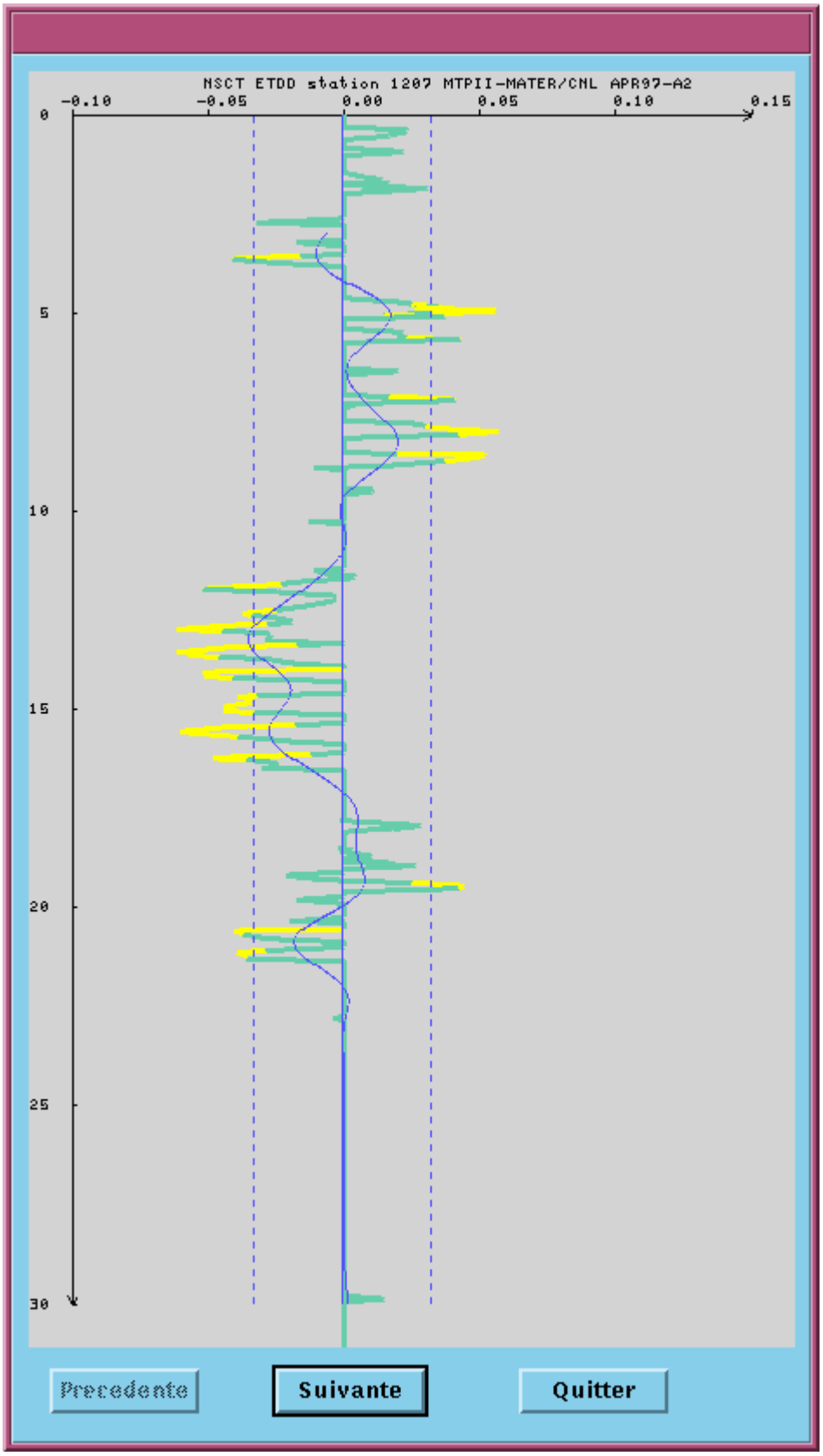


Fig. 6: Visual Check of a current meter time series

4.6.2.1. Global Quality check for the parameters and profile

Before going to the next profile, global quality test are assigned to each parameters. For each parameter, if at least 80% of the values are without outliers, the global parameter is flagged to 1 (good). If not, the global flag is assigned to the most frequent error flag.

GLOBAL Q Flags	1 Correct	2 Inconsistent with statistics	3 doubtful, questionable	4 bad, wrong, erroneous	9 Missing value
PROFILE	Few Outliers		no temperature recorded	- no pressure recorded (nor depth) - constant profiles	*not allowed*
PARAMETER	> 80% values without outliers	> 20% values with Q flag=>2	> 20% values with Q flag=>3	> 20% values with Q flag=>4	

4.7. Regional Parameterisation

4.7.1. Limits of the sub-domains

The Mediterranean is a very contrasted region from the Black Sea to the Gibraltar Straits and the same control values cannot be used everywhere. For simplicity, the region has been subdivided in rectangle geographical sub-domains, whose geographical limits and maximum depth value are the following table:

SUB-REGIONS FOR QC

CODE	NAME	LAT. MIN.	LAT. MAX	LON. MIN.	LON. MAX	DEPTH MAX.	HIER.
DF1	ALGERIAN BASIN NORTH	N39 18.00	N42 00.00	E004 30.00	E009 18.00	2900	1
DF2	GULF OF LIONS	N42 00.00	N43 36.00	E002 48.00	E006 18.00	2732	1
DF3	LIGURIAN SEA WEST	N42 00.00	N44 30.00	E006 18.00	E009 24.00	2964	1
DF4	LIGURIAN SEA EAST	N42 48.00	N44 18.00	E009 24.00	E010 48.00	1632	1
DF5	BERRE POND	N43	N43	E004	E005	100	2

		20.00	42.00	57.00	15.00		
DH1	AEGEAN SEA	N35 15.00	N41 12.00	E022 30.00	E027 18.00	4500	1
DH2	CRETAN PASSAGE	N31 00.00	N35 15.00	E022 30.00	E027 18.00	4220	1
DH3	LEVANTINE BASIN	N30 42.00	N37 04.00	E027 18.00	E036 30.00	4620	1
DI1	SARDINIA STRAIT	N36 48.00	N39 18.00	E008 24.00	E010 00.00	2857	1
DI3	SICILIA STRAIT	N36 00.00	N38 00.00	E010 00.00	E014 00.00	1585	1
DJ1	ADRIATIC NORTH	N41 54.00	N45 54.00	E012 11.00	E015 07.00	250	1
DJ2	ADRIATIC MIDDLE	N40 36.00	N44 54.00	E015 07.00	E018 02.00	1362	1
DJ3	ADRIATIC SOUTH	N40 00.00	N42 48.00	E018 02.00	E019 54.00	1375	1
DJ4	IONIAN 1 (NE)	N38 00.00	N40 00.00	E018 00.00	E022 30.00	3725	1
DJ5	IONIAN 2 (SOUTH)	N30 06.00	N36 00.00	E010 00.00	E022 30.00	4465	1
DJ6	IONIAN 3 (NW)	N38 00.00	N40 36.00	E016 07.80	E018 00.00	2826	1
DJ7	IONIAN 4 (MIDDLE)	N36 00.00	N38 00.00	E014 00.00	E022 30.00	5121	1
DK0	BLACK SEA AND SEA OF ASOV	N40 12.00	N47 24.00	E027 18.00	E041 54.00	2313	1
DK1	BLACK SEA NORTH WEST SHELF	N45 20.00	N46 50.00	E029 30.00	E033 50.00	1000	2
DK2	BLACK SEA NORTH SLOPE	N44 00.00	N45 20.00	E030 00.00	E039 00.00	1500	2
DK3	BLACK SEA WEST SLOPE	N42 00.00	N45 20.00	E027 30.00	E030 00.00	1500	2
DK4	BLACK SEA WEST ABYSSAL	N42 00.00	N44 00.00	E030 00.00	E033 00.00	2313	2
DK5	BLACK SEA CENTRAL ABYSSAL	N42 00.00	N44 00.00	E033 00.00	E036 00.00	2313	2
DK6	BLACK SEA EAST ABYSSAL	N42 00.00	N44 00.00	E036 00.00	E039 00.00	2313	2
DK7	BLACK SEA SOUTH SLOPE	N40	N42	E030	E039	1500	2

		55.00	00.00	00.00	00.00		
DK8	BLACK SEA SOUTH-EAST SLOPE	N40 50.00	N44 10.00	E039 00.00	E041 40.00	1500	2
DK9	BLACK SEA ADJACENT TO BOSPHORUS	N41 05.00	N42 00.00	E028 00.00	E030 00.00	1500	2
DL0	MARMARA SEA	N40 12.00	N41 05.00	E026 50.00	E030 00.00	1000	2
DL1	SEA OF AZOV	N45 20.00	N47 20.00	E033 50.00	E039 20.00	200	2
DS1	GIBRALTAR STRAIT	N33 00.00	N37 42.00	W009 00.00	W005 36.00	3000	1
DS2	BALEARIC SEA	N38 30.00	N42 00.00	W000 24.00	E004 30.00	2700	1
DS3	ALGERIAN BASIN SW	N35 36.00	N38 30.00	W001 00.00	E004 30.00	2800	1
DS4	ALGERIAN BASIN SE	N36 30.00	N39 18.00	E004 30.00	E008 24.00	3000	1
DS5	ALBORAN NW	N36 00.00	N37 30.00	W005 36.00	W003 00.00	2000	1
DS6	ALBORAN SW	N35 00.00	N36 00.00	W005 36.00	W003 00.00	2000	1
DS7	ALBORAN NE	N36 00.00	N37 30.00	W003 00.00	W001 00.00	2700	1
DS8	ALBORAN SE	N35 00.00	N36 00.00	W003 00.00	W001 00.00	2800	1
DT1	TYRRHENIAN (NW) 1	N39 18.00	N42 48.00	E009 18.00	E013 48.00	3162	1
DT2	TYRRHENIAN (NE) 2	N39 18.00	N41 18.00	E013 48.00	E016 6.00	3128	1
DT3	TYRRHENIAN 3	N38 30.00	N39 18.00	E010 00.00	E016 18.00	3146	1
DT4	TYRRHENIAN 4	N38 00.00	N38 30.00	E010 00.00	E015 00.00	1513	1
DT5	TYRRHENIAN 5 (MESSINA)	N38 00.00	N38 30.00	E015 00.00	E016 00.00	1022	1

These sub-domains are reported here below on the global Mediterranean map (Fig.5).

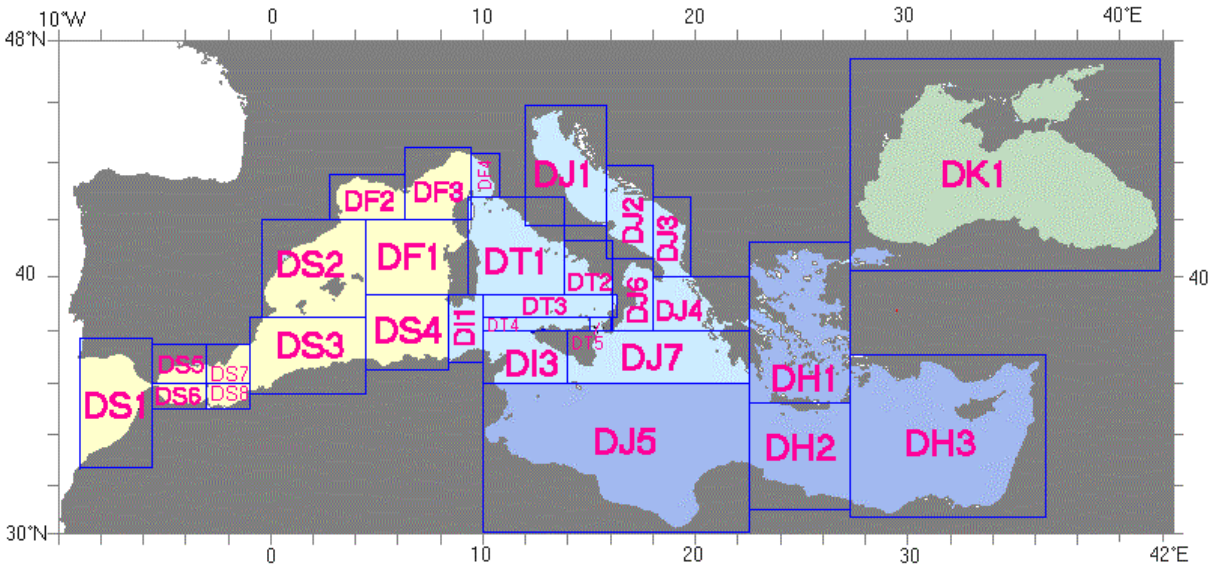


Fig. 5: Sub-regions for broad range checks of the data

4.7.2. Broad Range Control Values for Observed Parameters

For each parameter archived, a general scale of variation has been defined. These scale, and if defined, the regional adjustment for each parameter can been found by clicking the parameter code on the web server :

http://www.ifremer.fr/medar/htql/liste_param.htql

or on clicking the region on:

http://www.ifremer.fr/medar/htql/liste_region.htql

Regional adjustments for the broad range scales of variations have been estimated for temperature, salinity , oxygen and some nutrients: minimal and maximal values, spike threshold, top-bottom shear. These values may have been tuned manually in the vicinity of river mouths like the Po and Rhone rivers, but there the differences are so high, that they cannot been kept permanently and the QC is only performed manually, taking into account the local continuity. For many other parameters, these statistical values are still not estimated.

Due to the size of the corresponding tables, they values can not be printed in this document but can be retrieved from the above mentioned server.

5. REFERENCES

(1) Formatting Guidelines for Oceanographic Data Exchange. IOC/IODE/GETADE Report. IOC/ICES, Report.

(2) CEC/DG XII, MAST and IOC/IODE, 1993. Manual of Quality Control Procedures for validation of Oceanographic Data. UNESCO Manual and Guides N° 26, 436 P.

(3) FOFONOFF N.P. and MILLARD R.C., 1983. Algorithms for computation of fundamental properties of seawater UNESCO technical papers in marine science 44, 53 p.

(4) NOAA/NGDC, 1993. ETOPO5. 5-minute gridded elevation/bathymetry for the world. Global Relief Data. CDROM.

(5) JONES M.T., BODC, 1994. General Bathymetric chart of the Ocean, the GEBCO digital Atlas, CDROM.

(6) LEVITUS S., Climatological Atlas of the World Ocean , 1994 Edition (in preparation).

(7) BRASSEUR P., SCHOENAUEN R.. Seasonal Data Fields for the Mediterranean sea. University of Liege, GHER internal Report.

(8) BETHOUX J.P. and TAILLIEZ D., 1994. Deep-water in the western Mediterranean Sea, yearly climatic signature and enigmatic spreading. Communication to the 2-eme Congrès Hydrodynamique de Liège.

(9) MILLERO F.J. and POISSON A., 1981. International one-atmosphere equation of state of seawater. Deep-sea ressearch, Vol.28A, No. 6, pp 625-629.

TURLEY C.M., 1996. Handbook of Method Protocols, A pilot Study of Selected Methods used in the Mediterranean Targeted Project. MAST II report. 50 P.

ANNEX : INVENTORY FORMS

Cruise report form

TO RETURN TO ARCHIVING CENTER :

WESTERN BASIN	*ADRIATIC/IONIAN/Sicily Straits*	*EASTERN BASIN*
☐ *IFREMER/SISMER*	☐ *OGS*	☐ *NCRM/HNODC*

CRUISE SUMMARY /ROSCOP

CRUISE NAME : MTP II-MATER/.....**IDENTIFIER :**(given by the data centre**)**

Ship Name :.....**Call Sign:**.....

Ship Type : (research ship; ship of opportunity; naval survey vessel; etc)

PROJECT: MTP II-MATER

Scientific Coordinating body : (ex: UIB, NCR, NCMR, CNRS, IFREMER ...)

Chiefs Scientist(s) (*3 max, for further information, sea further with ROSCOP parameters***) :**

A) :	**B) :**.....	**C) :**.....
Laboratory :.....	**Laboratory :**.....	**Laboratory :**.....
Address :.....	**Address :**.....	**Address :**.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
Tel :	**Tel :**	**Tel :**.....
Fax :	**Fax :**	**Fax :**.....
Email :	**Email :**	**Email :** .....

Other Participating Bodies : (Scientist Name, Institute Name, Country)

D) ....

E)..... ....

F)..... ....

Objectives:

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Cruise Period **Start :** ..... **End :** .....

Port of Departure : ..... **Port of Return :** .....

SEA/OCEAN : Coded Region (*list below*) **:** ..... **Local Name:** .....

Geographical Limits

North :.....**South :**.....

West :.....**East :**.....

Description of the field observations (*10 items max, plain text)* : .....

1).....

2).....

3..... -->

STATIONS LOCATION

(preference is an ASCII file on ftp or attached document)

TYPE OF MEASUREMENTS : Enter the data type codes from ROSCOP PARAMETER CODES list (e.g. for water bottle stations with measurements of temperature, salinity, oxygen, nitrate and phosphate, the codes H09, H21, H24 and H 22 would be assigned to the entry).

STATION	DATE	TIME GMT	LATITUDE	LONGITUDE	TYPE code (ROSCOP)

DISCIPLINES

Mark the main related discipine(s) codes

CODE	DISCIPLINES
BF	MARINE BIOLOGY & FISHERIES
HC	CHEMICAL OCEANOGRAPHY (Hydrology)
GG	GEOLOGY & GEOPHYSICS
MM	MARINE METEOROLOGY
HP	PHYSICAL OCEANOGRAPHIY (Hydrology)
PC	POLLUTION & CONTAMINATION

IOC MEDITERRANEAN REGIONS

(put a cross in front of the main area in which data were collected during the cruise)

IOC REGION	
MEDITERRANEAN SEA	
MED. WESTERN BASIN	
MED., EASTERN BASIN	
GIBRALTAR STRAIT	
ALBORAN SEA	
BALEARIC SEA	
LIGURIAN SEA	
TYRRHENIAN SEA	
IONIAN SEA	
ADRIATIC SEA	
AEGEAN SEA	
BLACK SEA	
SEA OF MARMARA	
SEA OF AZOV	

BIBLIOGRAPHICAL REFERENCES (DATA REPORTS):

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ROSCOP PARAMETER CODES

Fulfil the ROSCOP information for the observations. Add the address of the scientist in charge of the data if not in p 1. ***Units of number of observations are :***

- number of vertical profiles for CTD, bottle casts, profilers etc.. or net tracks

- number of currentmeters or sediment traps, sea level gauges etc .. for time series

- number of miles for continous underway data

- number of days of observations for marine meteorology.

If not convenient, or number of observations > 9999 , write the exact unit in «measurement description» (column 3).

CODE	PARAMETER	MEASUREMENT DESCRIPTION	Nb Obs..	Scientist (p 1 letter)
B01	Primary Production			
B02	Phytoplankton pigments (eg chloroph			
B03	Seston			
B06	Dissolved organic matter (inc DOC)			
B07	Pelagic bacteria/micro-organisms			
B08	Phytoplankton			
B09	Zooplankton			
B10	Neuston			
B11	Nekton			
B13	Eggs & larvae			
B14	Pelagic fish			
B16	Benthic bacteria/micro-organisms			
B17	Phytobenthos			
B18	Zoobenthos			
B19	Demersal fish			
B20	Molluscs			
B21	Crustaceans			
B22	seaweed			
B25	Birds			
B26	Mammals & reptiles			
B28	Acoustic reflection on marine organ			
B37	Taggings			
B64	Gear research			
B65	Exploratory fishing			
B71	Particulate organic matter (inc POC			
B72	Biochemical meas. (eg,lipids,amino			
B73	Sediment traps			
B90	Other biological/fisheries meas.			
B90	Underwater photography			
D01	Current meters			
D03	Currents measured from ship drift			
D04	GEK			
D05	Surface dirfters/drifting buoys			
D06	Neutrally buoyant floats			

D09	Sea level (incl. bottom p. IES)			
D71	Current profiler (eg ADCP)			
D72	Instrumented wave measurements			
D90	Other physical oceanographic meas.			
G01	Dredge			
G02	Grab			
G03	Core rock			
G04	Core soft bottom			
G08	Bottom photography			
G24	Long/short range side scan sonar			
G26	Seismic refraction			
G27	Gravity measurements			
G28	Magnetic measurements			
G71	In-situ seafloor meas./sampling			
G72	Geophysical meas. made at depth			
G73	Single-beam echosounding			
G74	Multi-beam echosounding			
G75	Single channel seismic reflection			
G76	Multichannel seismic reflection			
G90	Other geological/geophysical meas.			
H09	Water bottle stations			
H10	CTD stations			
H11	Subsurface meas. underway (T,S)			
H13	Bathythermograph			
H16	Transparency (eg transmissometer)			
H17	Optics (eg underwater light levels)			
H21	Oxygen			
H22	Phosphate			
H23	Total - P			
H24	Nitrate			
H25	Nitrite			
H26	Silicate			
H27	Alkalinity			
H28	pH			
H30	Trace elements			
H31	Radioactivity			
H32	Isotopes			
H33	Other dissolved gases			
H71	Surface meas. underway (T,S)			
H72	Thermistor chain			
H73	Geochemical tracers (eg freons)			
H74	Carbon dioxide			
H75	Total - N			
H76	Ammonia			
H90	Other chemical oceanographic meas.			
M01	Upper air observations			
M02	Incident radiation			
M03	Near surface meteorology			
M04	Sea ice			

M05	Occasional standard measurements			
M06	Routine standard measurements			
M71	Atmospheric chemistry			
M90	Other meteorological measurements			
P01	Suspended matter			
P02	Trace metals			
P03	Petroleum residues			
P04	Chlorinated hydrocarbons			
P05	Other dissolved substances			
P12	Bottom deposits			
P90	Other contaminant measurements			

Mooring or Time Series Report Form

TO RETURN TO ARCHIVING CENTER :

WESTERN BASIN	***ADRIATIC/IONIAN/Sicily Straits***	***EASTERN BASIN***
IFREMER/SISMER	***OGS***	***NCRM/HNODC***

TIME SERIES

TIME SERIES NAME : .....***IDENTIFIER :*** (given by the data center)

Ship Name : *(at mooring deploiment or drifter launch)* ***Call Sign:*** .....

Ship Type : *(*research ship; ship of opportunity; naval survey vessel; etc...)

PROJECT: MTP II-MATER

Scientific Coordinating body : (ex: UIB, NCR, NCMR, CNRS, IFREMER ...)

CHIEFS SCIENTIST(S) (*3 max*) :

A) :	**B) :**	**C) :** .....
Laboratory :	**Laboratory :**	**Laboratory :** .....
Address :	**Address :**	**Address :** .....
.....		
.....		
.....		
Tel :	**Tel :**	**Tel :** .....
Fax :	**Fax :**	**Fax :** .....
Email :	**Email :**	**Email :** .....

TYPE OF STATION (CIRCLE)***:***

Fixed Mooring ***Lagrangian Drifter*** ***Other (to be specify) :***

OBJECTIVES :

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LOCATION DURATION	DATE	TIME (GMT)	Latitude	Longitude	Bottom Depth	CRUISE
Start						
End						

INSTRUMENTS LIST

Measured Parameters: Enter the measured parameter codes for each instrument from PARAMETER CODES list (enclosed)

IN the last column, put the letter (see p. 1) of the responsible scientist (adding more names/addresses if necessary)

INSTRUMENT	Depth	Distance to Bottom	Measured Parameters (see codes next pages)	Sampling Rate	WHO?

Technical Description : .....
.....
.....
.....
.....
.....
.....
.....

BIBLIOGRAPHICAL REFERENCES (DATA/INTRUMENTATION REPORTS)

.....

PARAMETER CODES LIST

(Put in the last column the letter (see p. 1) of the scientist in charge of the data validation if the parameter has been measured. Add lines if additional parameters have been measured)

CODE	PARAMETER NAME	UNIT	WHO?
YEAR	CALENDAR YEAR		
DATE	DATE WITHIN YEAR IN FORMAT MMDD		
TIME	TIME WITHIN DAY IN FORMAT HHMM		
SECS	SECONDS WITHIN MINUTE		
PRES	SEA PRESSURE (sea surface=0)	DECIBAR= 10 KPASCAL	
TEMP	SEA TEMPERATURE	CELSIUS DEGREE	
CNDC	ELECTRICAL CONDUCTIVITY	MHOS M-1	
HCDT	HORIZ. CURRENT DIRECTION REL. TRUE NORTH	DEGREE	
HCSP	HORIZONTAL CURRENT SPEED	m s -1	
EWCT	CURRENT EAST COMPONENT	$m \cdot s^{-1}$	
NSCT	CURRENT NORTH COMPONENT	$m \cdot s^{-1}$	
LATD	LATITUDE DEGREES (NORTH+, SOUTH-)	DEGREES	
LATM	LATITUDE MINUTES WITHIN DEGREE	MINUTES	
LOND	LONGITUDE DEGREES (EAST+, WEST-)	DEGREES	
LONM	LONGITUDE MINUTES WITHIN DEGREE	MINUTES	
FNUM	PARTICLES FLUX	$10^6 \cdot m^{-2} \cdot day^{-1}$	
FTSM	TOTAL SUSPENDED MATTER FLUX	10-6 KG M-2 DAY-1	
FIC2	PART. INORGANIC CARBON FLUX	10-6 KG M-2 DAY-1	

Instrument Report Form

TO RETURN TO ARCHIVING CENTER :

WESTERN BASIN	*ADRIATIC/IONIAN/Sicily Straits*	*EASTERN BASIN*
☐ *IFREMER/SISMER*	☐ *OGS*	☐ *NCRM/HNODC*

INSTRUMENT/METHOD ..... ***IDENTIFIER :*** (given by the data center)

NAME :

PROJECT:MTP II-MATER

Description of the main instruments/methods used at sea and in the laboratory during the project MTP II-MATER. 1 form can be used for several cruises but (detail them).

Examples : CTD, Current meter, salinometer, sediment trap, spectrometer ...

LABORATORY (Owner of the instrument or who performs the method):

.....

Address :

.....

.....

.....

Tel : ..... **Fax :** .....

Email : .....

CONTACT SCIENTIST :

INSTRUMENT NAME (60) **:** .....

MANUFACTURER (60) **:** .....

MANUFACTURING DATE (10) : .....

SERIAL NUMBER (20) : .....

DESCRIPTION (240) :

.....

.....

.....

.....

.....

.....

TECHNICAL CHARACTERISTICS (240) :

.....

.....

.....

.....

.....

COMMENTS (120) :.....

.....

INSTRUMENT TYPE (circle the main type) :

In situ Sensor (default)	**Transmitter/Receiver**	**On board recorder**
Drifter	**Towed platform**	**Expendable sensor**
Laboratory equipement	**Sediment sampler**	

OTHER ATTACHED EQUIPEMENT (in case of complex multi sensor:Paltform equipment) (10) :

MEASURED PARAMETER 1	CALIBRATION DATE	CRUISES	COMMENTS

MEASURED PARAMETER 2	CALIBRATION DATE	CRUISES	COMMENTS

MEASURED PARAMETER 3	CALIBRATION DATE	CRUISES	COMMENTS

BIBLIOGRAPHICAL REFERENCES (METHODOLOGY) : .....

.....

.....

.....

.....

.....

DATE (of updating this form) :

Data Set Report Form

TO RETURN TO ARCHIVING CENTER :

WESTERN BASIN	***ADRIATIC/IONIAN/Sicily Straits***	***EASTERN BASIN***
☐ ***IFREMER/SISMER***	☐ ***OGS***	☐ ***NCRM/HNODC***

DATA SET SUMMARY (EDMED)

Project : MAST/MTP II - MATER

Data set name : MTP II-MATER - .....

CRUISE OR MOORING : MTP II-MATER/**.....**

LABORATORY in charge of

.....

Responsible Scientist NAME :

Tel : ***Fax :*** ..... ***Email :***

DOMAINS/KEYWORDS : *(put a cross when collected)*

☐ **PHYSICAL OCEANOGRAPHY** ex :

- ☐ SUBSURFACE HYDROGRAPHY (T,S)
- ☐ CURRENTS
- ☐ FLOATS
- ☐ SURFACE HYDROGRAPHY (EG T,S)
- ☐ OPTICAL PROPERTIES OF SEA WATER

☐ **INORGANIC CHEMISTRY**

- ☐ DISSOLVED GASES
- ☐ NUTRIENTS
- ☐ RADIO-ISOTOPES

☐ **OTHER DATA TYPES** :

- ☐ WHICH ONE(S) ?

☐ **MARINE BIO-CHEMISTRY**

- ☐ BENTHOS
- ☐ ORGANIC/BIO-CHEMISTRY
- ☐ MARINE BIOLOGY
- ☐ BULK CHEMISTY (EG PH, TCO2)
- ☐ PRODUCTIVITY, BIOMASS
- ☐ PIGMENTS (EG CHLOROPHYLL), LIGHT
- ☐ PLANKTON
- ☐ FISHES
- ☐ DEEP SEA ECOLOGY/FAUNA
- ☐ MICROBIOLOGY

TIME-PERIOD (of the measurements) **:**

GEOGRAPHIC-COVERAGE :

MEASUREMENT TYPE : (W P F S O B) *(circle)*

W: sea water	**P : water column particles**	**F : settling particles near the sediment**	**S : sediment**	**O : pore water**

OBSERVED PARAMETERS :

important :

1. ***parameter names and units have to be consistent with the International System of Units described in the project Data Manual called «Parameter Inventory » ;if you do not find the parameter, please contact us.***
2. ***only the <u>measured</u> parameters are currently archived; except clasical parameter like salinity, east and north component of the current.***
3. ***Expected maximum and minimum values are important to perform cross quality checks after transcoding***

CODE	NAME ***(use the Manual called « Parameter Inventory »)***	UNIT ***(International System ex : m3)***	ACCURACY	Minimum value	Maximum value
ex :TEMP	SEA TEMPERATURE	Celsius degree	0.001	-2	32

<u>OBSERVED PARAMETERS (Continuation) :</u>

CODE	NAME ***(use the Manual called « Parameter Inventory »)***	UNIT ***(International System ex : m3)***	FORMAT	Minimum value	Maximum value

<u>INSTRUMENTS</u> (refer to an instrument described in the dedicated «instrument » form (instrum.rtf or .doc))

.....

<u>DESCRIPTION, OBJECTIVES, METHODOLOGY</u> :

.....

.....

.....

.....

.....

VOLUME/NUMBER OF PROFILES : **CONFIDENTIALITY :**

.....

DATA FILE NAME(S): (preference is an ASCII file on ftp or attached document through email)

.....

.....

.....

Important : station/time series headers with latitude, longitude date and time (TU) must be included in the data files. This information is mandatory. It is also recommended to put bottom depth and any other relevant information.

DATA REPORT(S) REFERENCES (a few technical report(s), data report(s), or paper(s) describing the experiment, not an extended list of publications):

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.....

TO ACCESS THE MATER DATA MANUAL AND THE DOCUMENTS (instrum.doc and instrum.rtf) on the ftp :

address : ftp public.ifremer.fr

login : anonymous

password : your own e-mail address

directory : mater/manuals (for the data manual : param.doc or .rtf)

mater/forms (for the instrument/method : instrum.doc or .rtf)

action : get <filname><filename>