

# Ingesting, validating, long-term storage and access of Flow Cytometry (FCM)



Marseille, from 21 to 22 March 2018

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# Portal with standards, tools, and services, both for users and data centers

SeaDataNet PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

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# SeaDataNet metadata directories



## EDMO Organisations

**SeaDataNet** European Directory of Marine Organisations (EDMO)

**Organisation details**

**DETAILS**

Name: FRENCH CENTRE OF BRETAGNE  
 Address: 29100 Brest - France (FR 29100)  
 Zipcode: 29100  
 City: BREST  
 Country: FR  
 Phone: +33 (0)2 98 26 40 40  
 Fax: +33 (0)2 98 26 40 40  
 Core Website: <http://www.fr-centre.org>

**ORGANISATIONAL PROFILE**

The Centre FRENCH OF BREST is the recent incarnation of the site FRENCH Brest's Fisheries Support 1000 boats created of the fusion of knowledge in the prevention (contaminants and fisheries) in coastal (aquaculture, fisheries, biological, geographical) space.

**ACTS OR OTHER SUPPLIES**

**ACTS**

Creating centre: FRENCH CENTRE OF BRETAGNE Information Systems for the SEA

**SeaDataNet** Cruise Summary Report Inventory (CSR)

Search

Platform Name: Cruise Name: From: To: Show

Platform Name	Cruise Name	From	To	Show
FAIRFARLURE	FAIRFARLURE	07.09.2011	28.09.2011	
PL_ANNEX	PL_ANNEX	13.03.2010	08.11.2010	
WALPOLAC	WALPOLAC	26.09.2010	16.10.2010	
BIG	BIG	01.06.2010	09.07.2010	
MESCAL_2012	MESCAL_2012	08.06.2010	20.06.2010	
MESCAL_2011	MESCAL_2011	26.04.2010	18.05.2010	
PARUS	PARUS	19.01.2010	17.04.2010	
PL_PANAMA	PL_PANAMA	04.03.2010	18.03.2010	
EDM0107	EDM0107	21.02.2010	04.03.2010	
WALPOLAC	WALPOLAC	02.02.2010	18.02.2010	

## CSR Research cruises

## EDMERP Projects

**SeaDataNet** European Directory of Marine Environmental Research Projects (EDMERP)

SEARCH

Project Name: Project ID: Start Date: End Date: Show

Project Name	Project ID	Start Date	End Date	Show
2010010101	2010010101	2010-01-01	2010-01-01	
2010010102	2010010102	2010-01-01	2010-01-01	
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2010010120	2010010120	2010-01-01	2010-01-01	

## EDIOS Observing programmes

**SeaDataNet** European Directory of Marine Environmental Data (EDMED)

SEARCH

Project Name: Project ID: Start Date: End Date: Show

Project Name	Project ID	Start Date	End Date	Show
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## CDI

**SeaDataNet** European Directory of Marine Environmental Data (EDMED)

SEARCH

Project Name: Project ID: Start Date: End Date: Show

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## EDMED Data sets

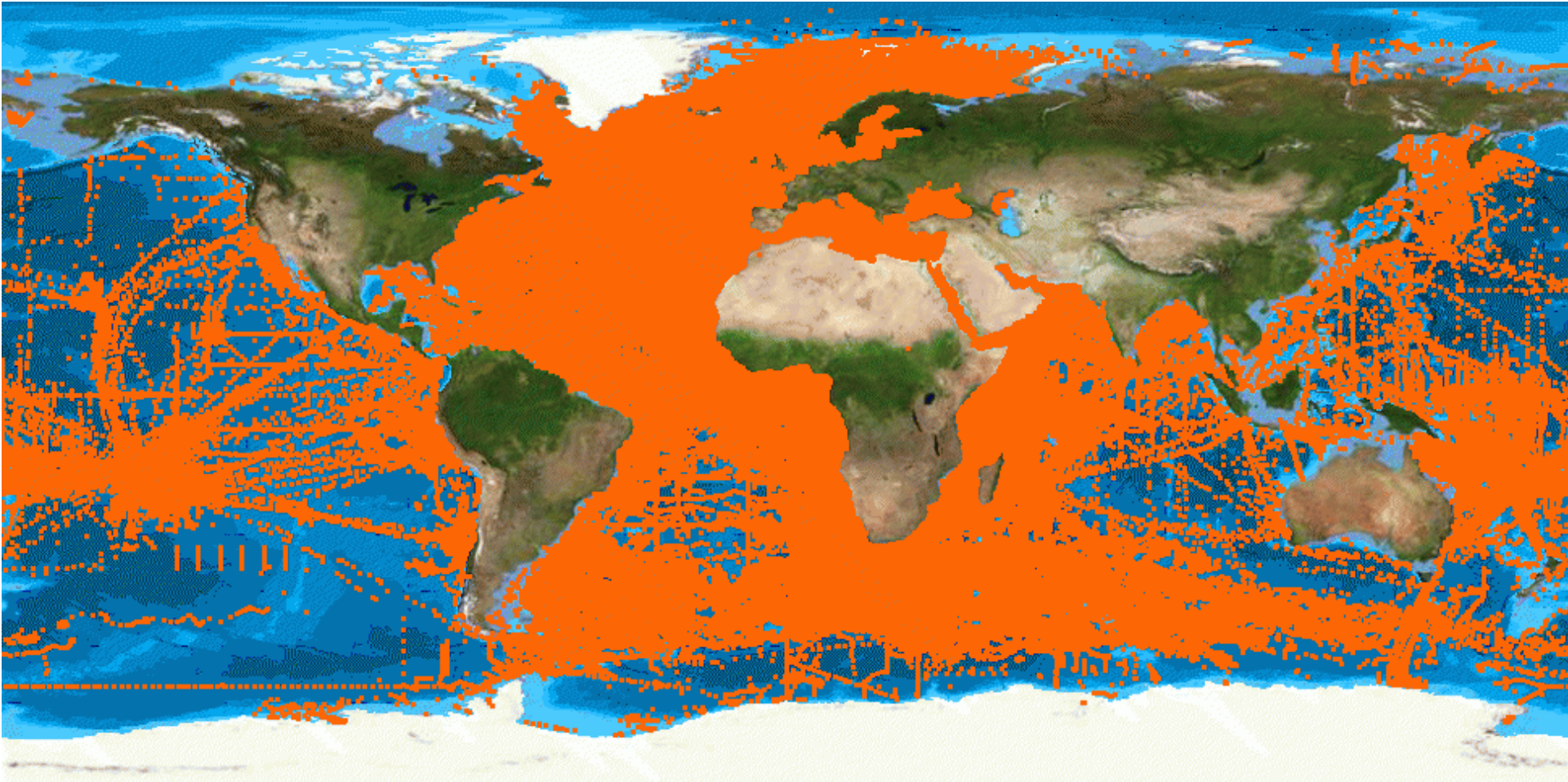
**SeaDataNet** European Directory of Marine Environmental Data (EDMED)

SEARCH RESULTS

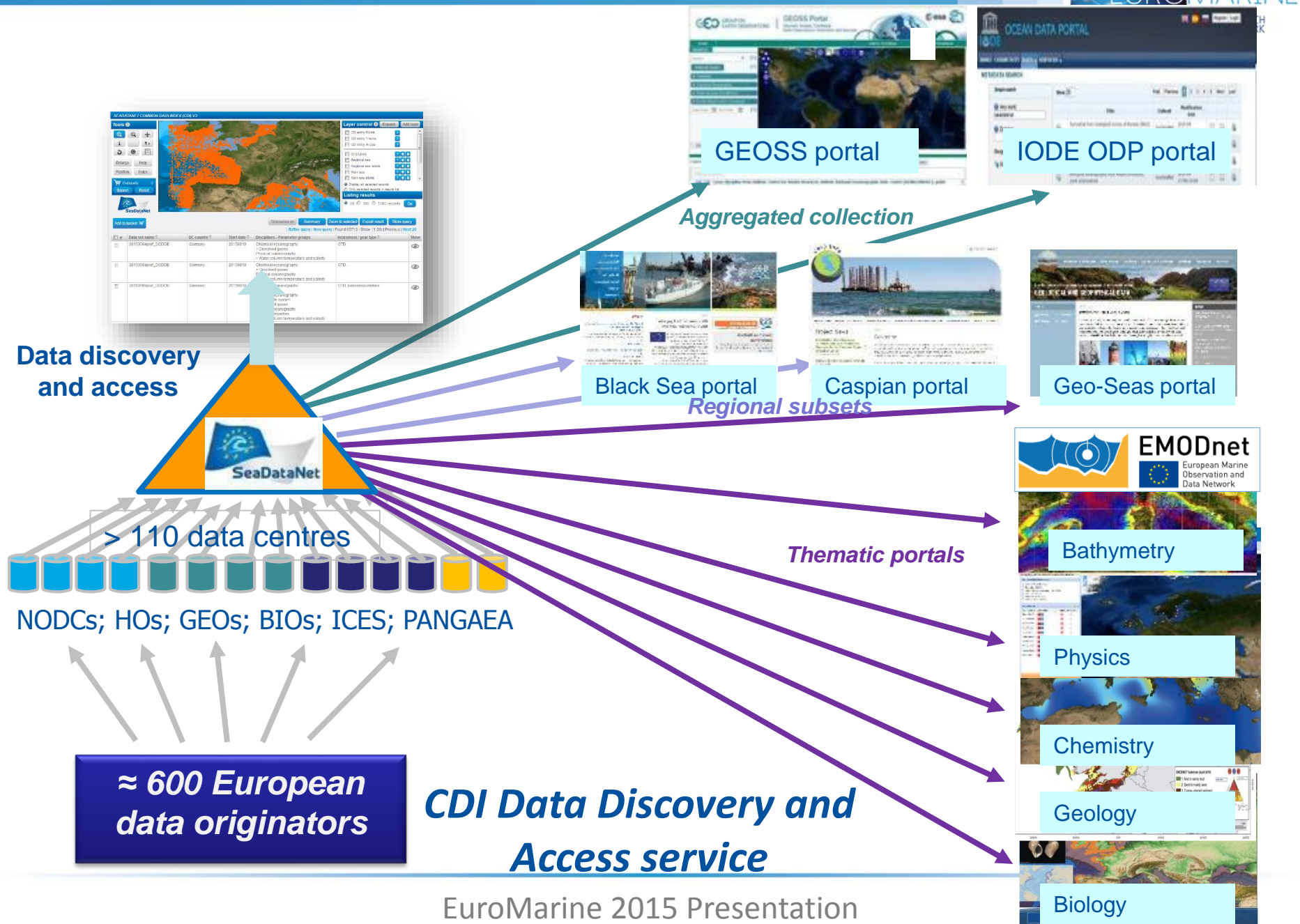
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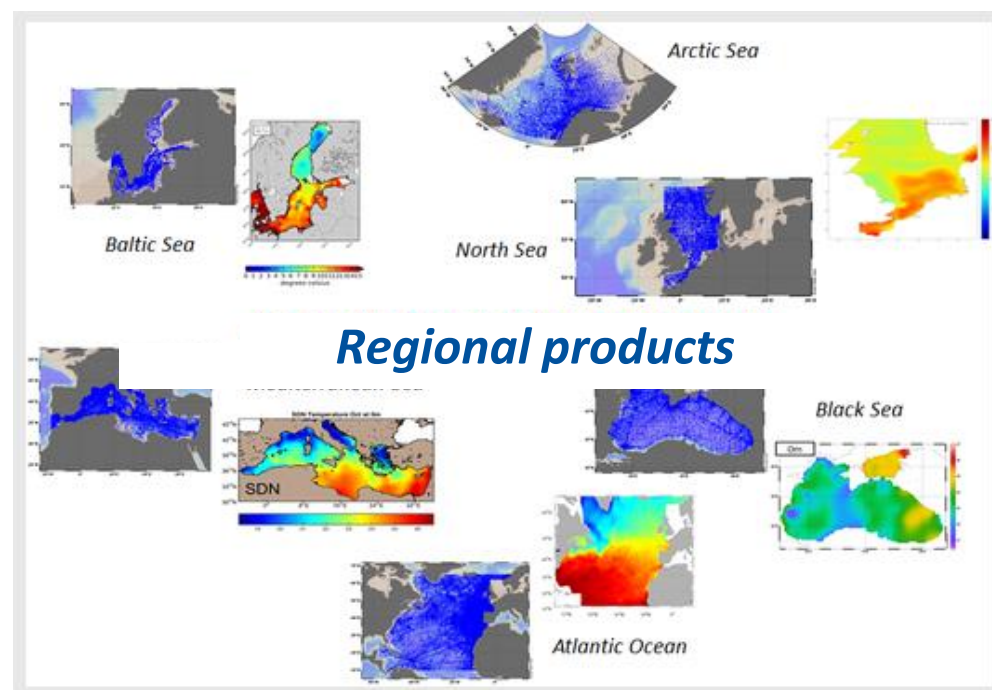
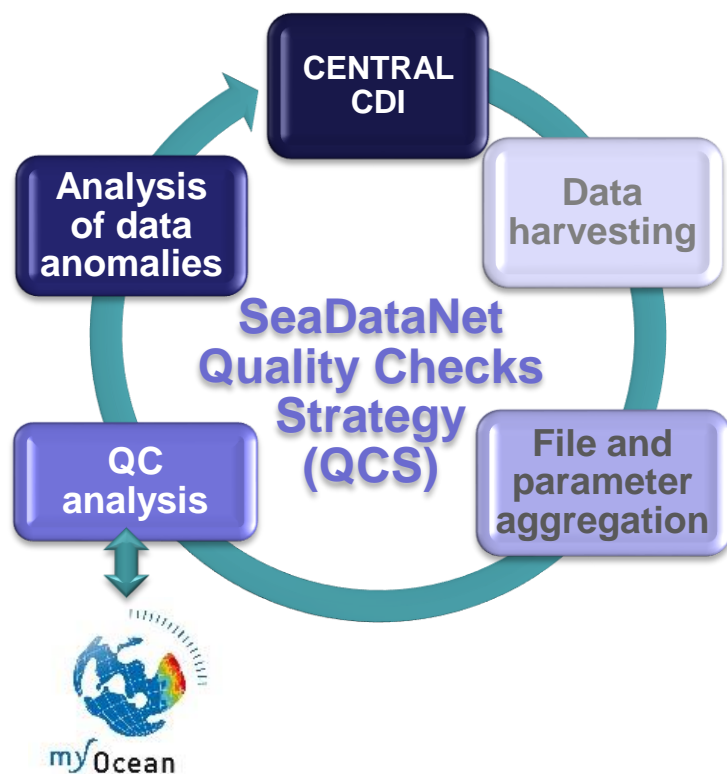
## CDI service for discovery



**2.10 million** CDI entries from **34** countries for physics, chemistry, geology, geophysics, bathymetry and biology; from **1805 to 2018**; **86%** unrestricted or under SDN License



# SeaDataNet products



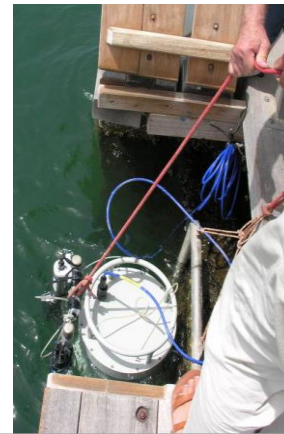
**Aggregated datasets and climatologies**

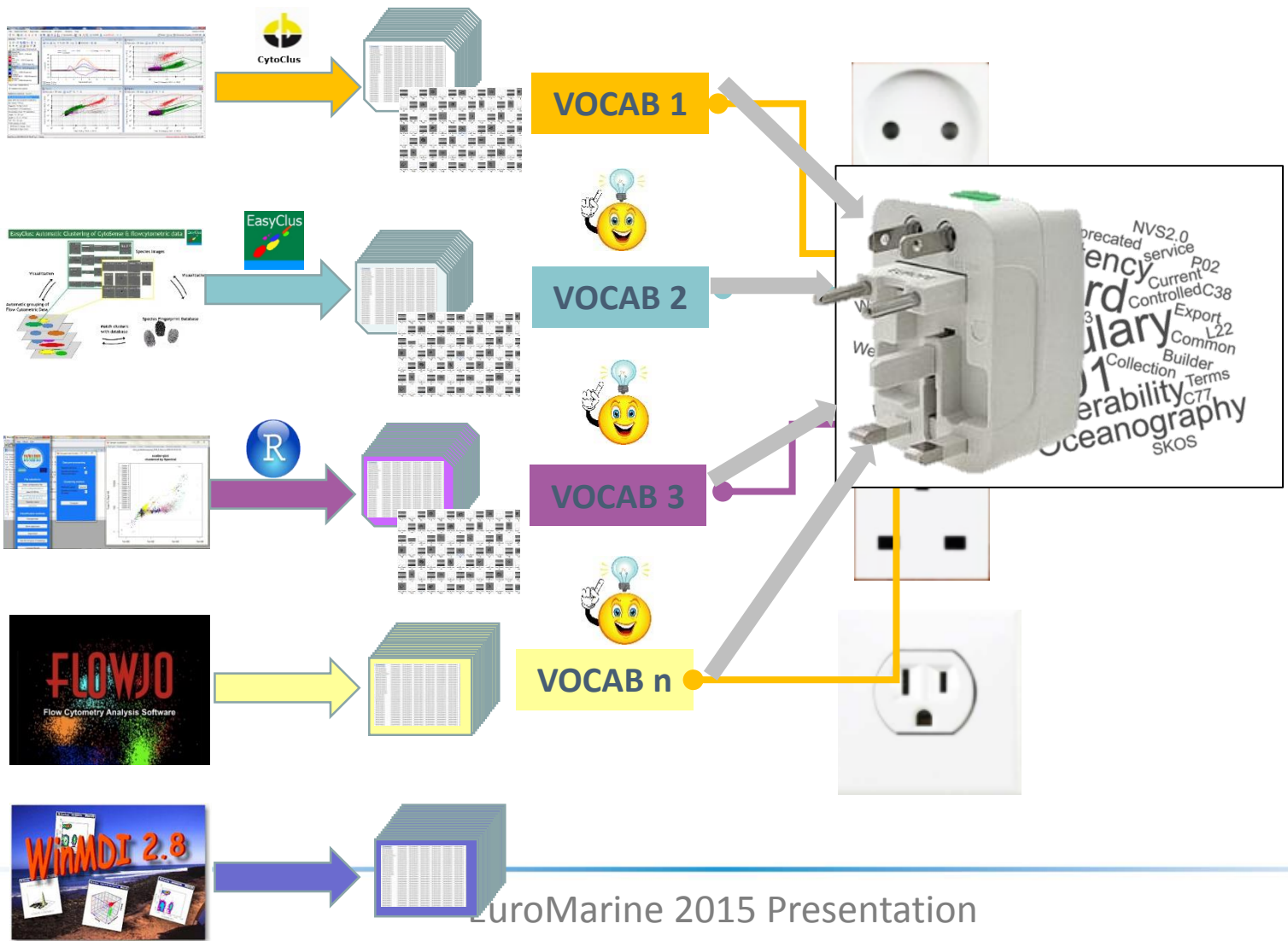
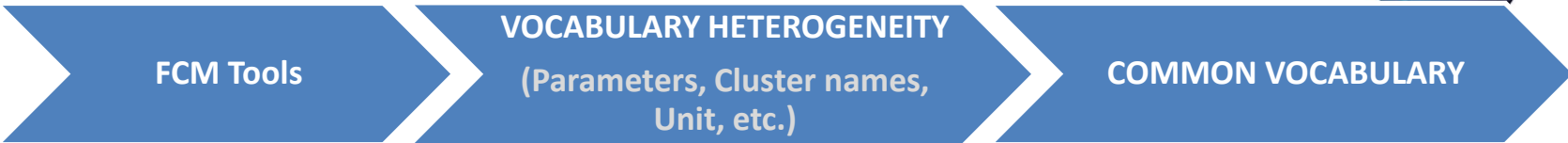
*Improvement of the data quality*



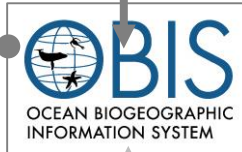
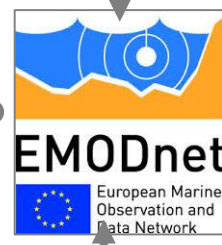
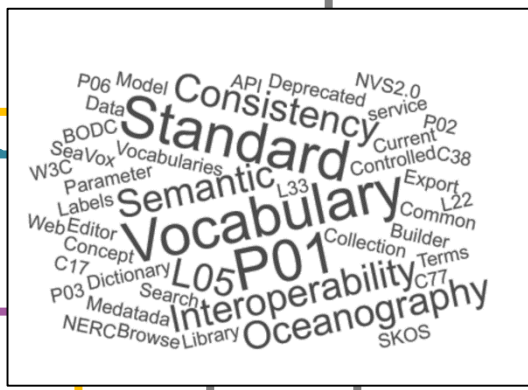
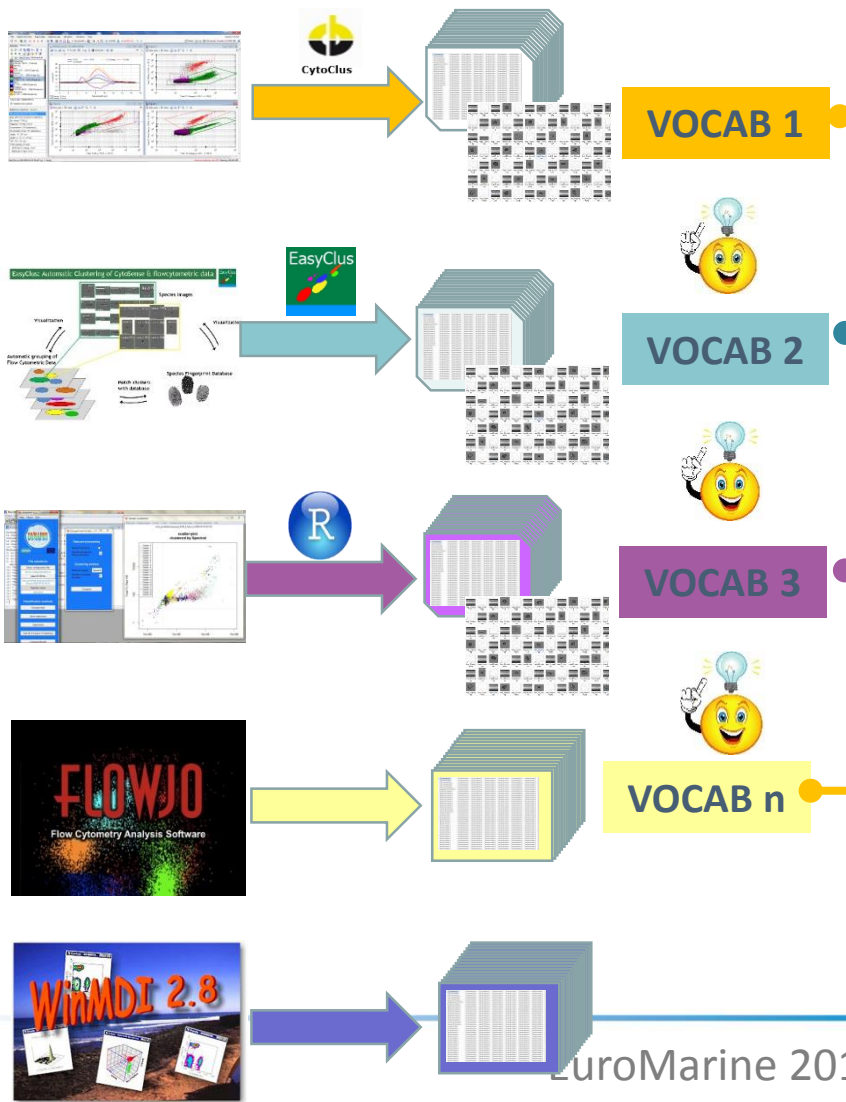
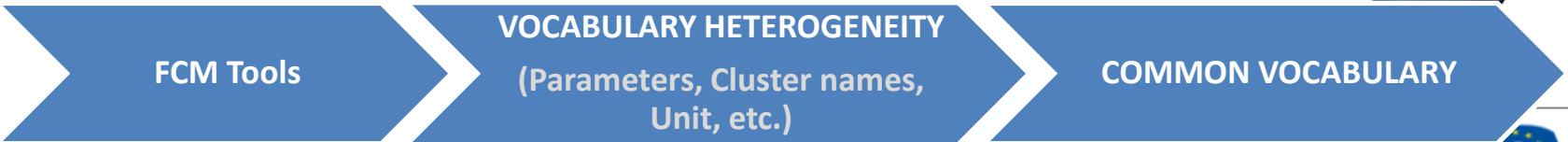
Copernicus Marine Environmental Monitoring Service (**CMEMS**)

# Application to FCM data







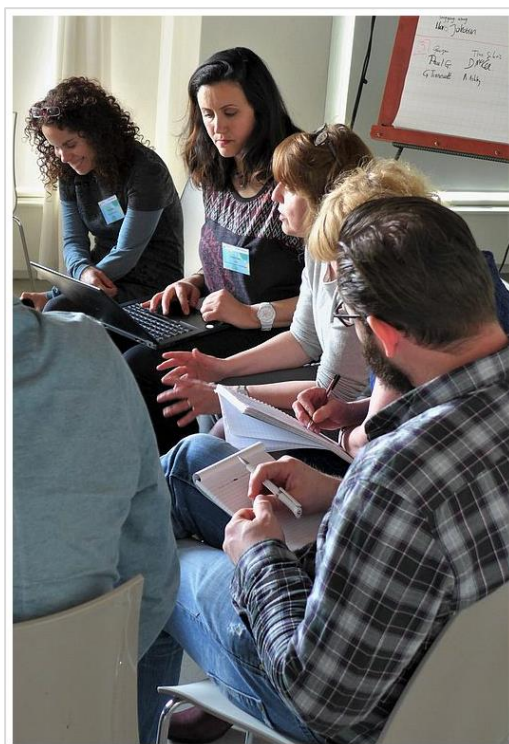


# I. FCM Common Vocabulary

1. Analysis of the existing FCM Common vocabulary
2. Captured parameters (Cefas, MIO, RWS, ULCO and VLIZ)
3. Setting up FCM common vocabulary
4. FCM Questionnaire

# 1. Analysis of the existing Common vocabulary

Cytobuoy Meeting, March 2017 → Parallel session – Harmonisation of flow cytometry use and data (protocol, standardisation, definition of functional types, quality control)



→ 34 FCM codes existed in the BODC VS

P01 (BODC Parameter Usage Vocabulary) -existing vocabulary for flow cytometry

conceptid	prelabel	modified	altlabel	definition	Deprecate Y/N	FCM Community Feedback
PYPKAFB1	Abundance of Bacteria (ITIS: 202421: WoRMS 6) [Subgroup: group PSB1 autotrophic] per unit volume of the water body by flow cytometry	4/17/2016 15:50:07	Bact_PS B1_auto	Number of particles resolved as photosynthetic bacteria cells from the uncharacterised cluster PSB1 in a unit volume of any body of fresh or salt water determined by flow cytometry analysis of unstained samples.		Prochlorococcus they don't know what it is. It is not clear we need to separate syno and proclo and give definition for each one: difference by size and pigment.
PYPKAFB2	Abundance of Bacteria (ITIS: 202421: WoRMS 6) [Subgroup: group PSB2 autotrophic] per unit volume of the water body by flow cytometry	4/17/2016 15:50:07	Bact_PS B2_auto	Number of particles resolved as photosynthetic bacteria cells from the uncharacterised cluster PSB2 in a unit volume of any body of fresh or salt water determined by flow cytometry analysis of unstained samples.		Synechococcus (1 - 2 um)
P18318A9	Abundance of Bacteria (ITIS: 202421: WoRMS 6) [Subgroup: heterotrophic; high nucleic acid cell content] per unit volume of the water body by flow cytometry	4/17/2016 15:50:07	Abund_B E006316	Number of particles resolved as heterotrophic bacteria cells from the high nucleic acid content cluster (HNA) in a unit volume of any body of fresh or salt water determined by flow cytometry analysis of samples stained with a nucleic acid-specific fluorescent dye, and subtraction of cyanobacteria cell count if present.		Not concerned
ADIO7845	Abundance of Dinoflagellates (ITIS: 9873: WoRMS 19542) [Size: <20um Subgroup: autotrophic] per unit volume of the water body by flow cytometry	2/22/2016 14:44:37	ADino<2 Dum_FC	Number of particles <20um identified as most likely small dinoflagellates in a unit volume of any body of fresh or salt water determined by flow cytometry analysis of unstained samples.		How can you define them by FCM??
P200A0Z	Abundance of Dinoflagellates (ITIS: 9873: WoRMS 19542) per unit volume of the water body by flow cytometry	2/18/2016 15:18:01	P200A0 0Z	This code was updated on 18-feb-2016 so that the name Dinoflagellates is used instead of Pyrrophyphyta in the preferred label field. The vernacular term 'dinoflagellates' maps to Pyrrophyphyta in the ITIS taxonomy and Dinophyceae in the WoRMS taxonomy. In the		not agree and not clear
PU00A0ZA	Abundance of eukaryote picophytoplankton per unit volume of the water body by flow cytometry	4/17/2016 15:50:07	UndifEU PicoPhyt Abund	Number of particles resolved as photosynthetic eukaryote cells in the picoplankton size range in a unit volume of any body of fresh or salt water determined by flow cytometry analysis of unstained samples.		not agree and not clear

# 1. Analysis of the existing Common vocabulary

Cytobuoy Meeting, March 2017 → Parallel session – Harmonisation of flow cytometry use and data (protocol, standardisation, definition of functional types, quality control)

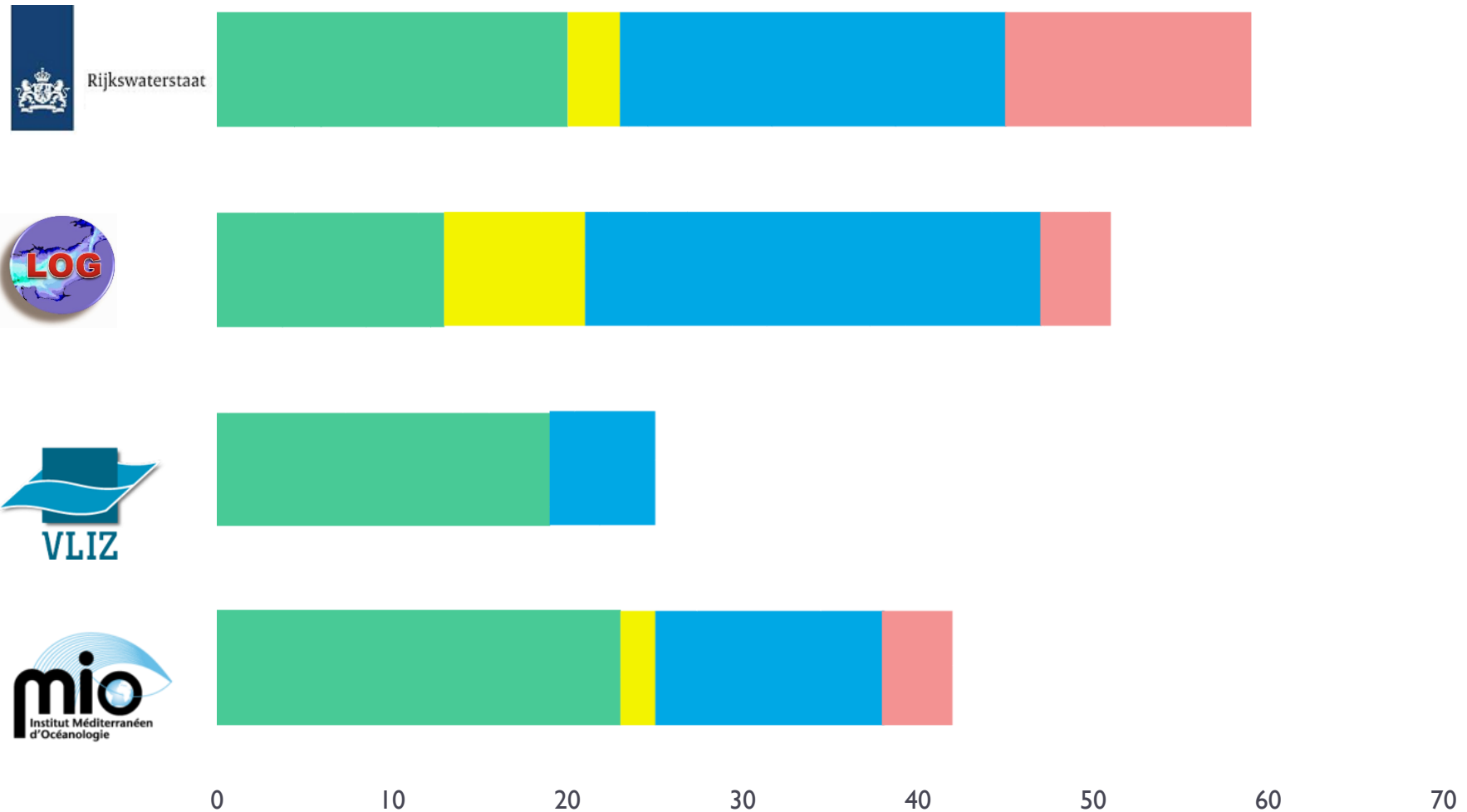


→ 34 FCM codes existed in the BODC VS

- Some codes are good
- Redundancy
- Definitions are not clear for FCM users and difficult to understand

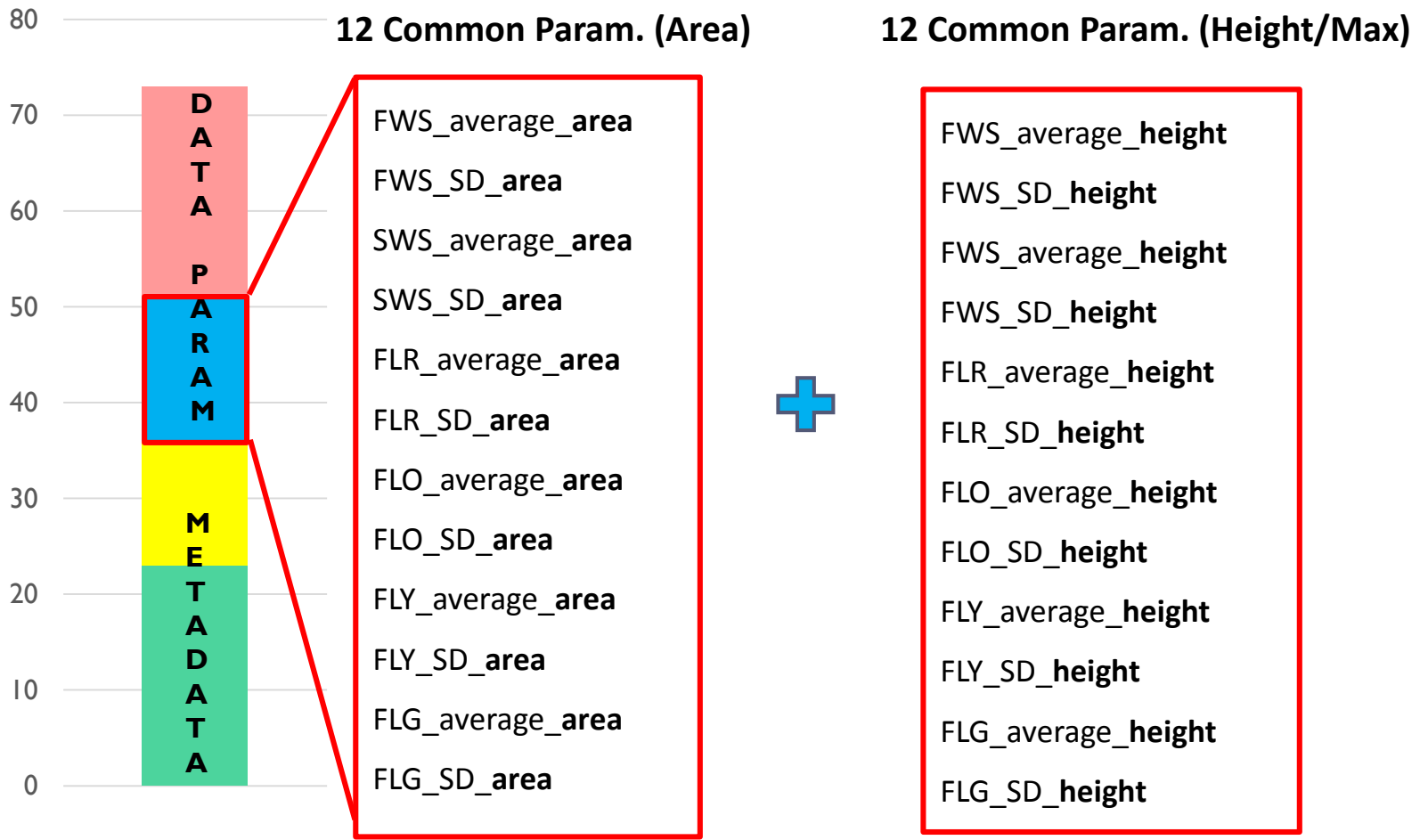
## 2. FCM captured parameters

■ Common Metadata    ■ Unique Metadata    ■ Common Data    ■ Unique data



# P01 (BODC PARAMETER USAGE VOCABULARY)

→ 24 Captured Common Data paramters sent to BODC



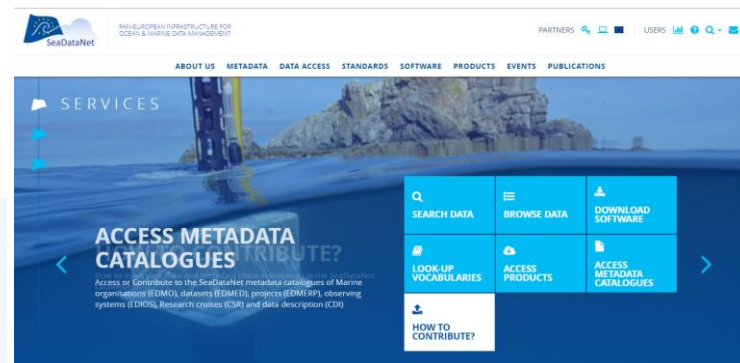
# 3. Setting the FCM Standardized Common Vocabulary

- Semantic model (BODC)

Chemical model	Biological model	Physical model	
<p>Measurement Substance</p> <p>Measurement matrix relationship</p> <p>Matrix</p> <p>Matrix subcomponent</p>	<p>Measurement Organism Name</p> <p>Organism Specifics</p> <p>Measurement matrix relationship</p> <p>Matrix</p> <p>Matrix subcomponent</p> <p>Method</p>	<p>Measurement Statistical</p> <p>Physical entity</p> <p>Measurement matrix relationship</p> <p>Matrix</p> <p>Method</p>	<p>Area</p> <p>Mean of</p> <p>Forward light scatter pulse</p> <p>per cluster from the</p> <p>Water body by</p> <p>flow cytometry</p>
<p>Concentration of carbon (total inorganic) {TCO<sub>2</sub>} per unit mass of the water body [dissolved plus reactive particulate phase]</p>	<p>Abundance of Bacteria (ITIS: 202421: WoRMS 6) [Subgroup: heterotrophic] per unit volume of the water body by automated flow cytometry</p>	<p>Area mean of Forward light scatter pulse per cluster from the water body by flow cytometry</p>	<p>The cluster name is managed in a separate vocabulary list</p>

- FCM Standardized Common Vocabulary

➔ <https://www.seadatanet.org/>



### BODC WEBSERVICES V2 (LIBRARIES) CL12

Library	Thesaurus	Title	Alt Title	Version	Members	Modified
C16		SeaDataNet sea areas	SDN sea areas	9	127	11/7/2012 2:00:06 AM
C17		ICES Platform Codes	ICES Platforms	712	5607	3/20/2018 2:00:05 AM
C19		SeaVoX salt and fresh water body gazetteer	SeaVoX water bodies	17	263	2/21/2018 2:00:03 AM
C32		International Standards Organisation countries	ISO countries	7	251	1/14/2016 2:00:02 AM
C34		Activity purpose categories	Purpose categories	4	22	8/27/2011 3:00:05 AM
C35		European Nature Information System	EUNIS3 Habitats	1	56	2/19/2010 2:01:37 AM

<b>F02</b>		SeaDataCloud Flow Cytometry Standardised Cluster Names	SDC flow cytometry cluster names	2	11	2/3/2018 2:00:02 AM
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P01			BODC Parameter Usage Vocabulary	BODC PUV	800	37732	3/14/2018 2:00:03 AM
P02			SeaDataNet Parameter Discovery Vocabulary	SeaDataNet PDV	107	435	2/13/2018 2:00:03 AM

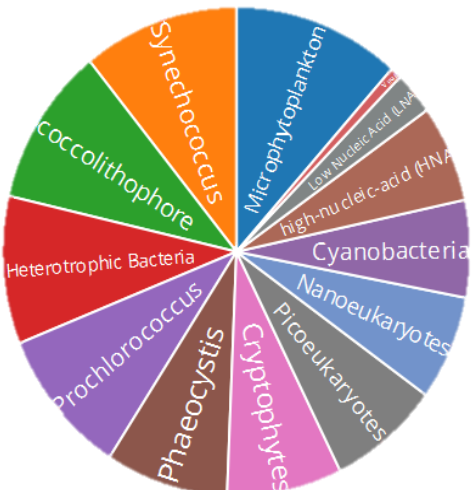
<b>L22</b>			SeaVoX Device Catalogue	SeaVoX Device Catalogue	324	1280	3/6/2018 2:00:04 AM
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<b>P06</b>			BODC data storage units	BODC units	99	346	2/16/2018 2:00:02 AM
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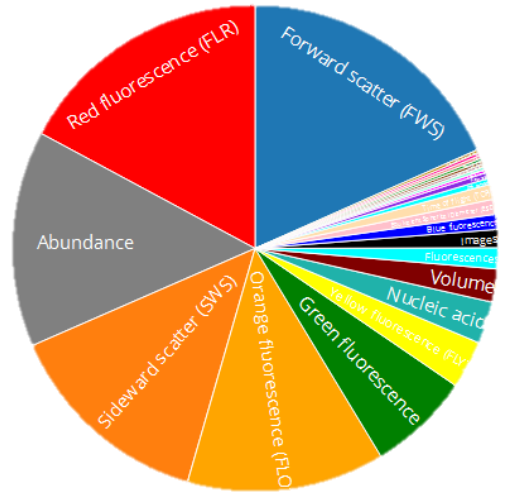


Literature review from 1983 till 2017

Clusters



Parameters



**COMMENT**

Shotton, B. (1983). *Flow cytometry and cell sorting: A technique for analysis and sorting of aquatic particles!*

© 1989 Alan R. Liss, Inc. Cytometry 10:629-635 (1989)

**HETEROGENEITY IN FRAGILITY AND OTHER BIOCHEMICAL AND BIOPHYSICAL PROPERTIES**

**A Simple Method to Preserve Oceanic Phytoplankton for Flow Cytometric Analyses**

D. Vaulot, C. Courties, and F. Partensky

CNRS, Station Biologique, 29211 Brest cedex, France

performed daily at noon in each mesocosm with a HANNA multi-parameter water quality meter (model HI9142). These measurements showed that the water column was homogeneous during the whole experiment.

22. Flow cytometry

Samples were collected using 1 dm<sup>3</sup> dark containers and directly transferred into 12 cm<sup>3</sup> vials for the **CytoSense** analyses, and 5 cm<sup>3</sup> vials for the **EPICS ALTRA flow cytometer** analyses, both prefiltered with glass fiber (0.1 μm final concentration). The samples were immediately stored at -80 °C for less than a month. Flow cytometry analyses were conducted using two different types of instruments in order to achieve accurate estimations of cell counts from the smallest picoplankton to the largest microphytoplankton, and to collect cellular information using their light scattering properties (forward light scatter (FWS) and side ward light scatter (SWS)) and their auto fluorescence properties (red fluorescence from chlorophyll (Chl) and orange fluorescence from phycoerythrin (PE)). The picoplankton cells (Pico, diameter < 2 μm) and the smallest heterotrophic flagellates (Nano, < 2 μm) were analyzed using an Epics Altra flow cytometer (Becton Dickinson) equipped with a 15 mW Argon-ion laser (excitation 488 nm). Samples were thawed at room temperature and analyzed immediately. Fluorescence beads (Fluoresbrite YC, microspheres of 0.1 μm diameter) were previously added to each sample as an internal standard, in order to normalize the fluorescence emission and light scatter signals obtained from the Epics Altra flow cytometer. Abundance estimations were derived from the cell counts and the corresponding analysis volumes defined by the acquisition time and sample flow rate. The flow rate was obtained from weighing the vials before and after analysis and dividing the mass signal by the sample density. Size was estimated by analyzing bead suspensions of different bead sizes and determining the relationship between size and forward scatter (Venkatapathi et al., 2006). The FLR (0.75 ± 10 nm) and the FWS of the cells were recorded as the signal peak, thus giving little information on their shape, although the instrument is able to analyse the time of flight which gives an indication of their length. FLR and FWS peak values from the EPICS ALTRA are further defined as FLR and FWS.

Cells larger than 2 μm were analyzed using a CytoSense flow cytometer from CytoBuoy Inc. equipped with a 488 nm laser operated at 15 mW. The pulse shape of FLR (0.68 ± 24 nm), FLO (0.01 ± 0.68 nm) and FWS signals from the cells were recorded, allowing complex cells to be differentiated and chain-forming cells to be accounted for. Integrated values of the CytoSense FLR and FWS signals are further defined as FLR and FWS. Abundances were directly measured from the analysis of the samples through a stable 90° angle pump routinely tested by using bead suspensions of known concentration. Fluoresbrite polystyrene beads (Invitrogen), namely 2 μm red fluorescent and 10 μm orange fluorescent beads, were used as an internal standard to normalize scatter and fluorescence signals. Flow protocols were used to optimize the abundance estimation of the small and large cells respectively. Cells < 10 μm were analyzed with a peristaltic pump speed of 3.08 mm<sup>3</sup> s<sup>-1</sup> and a trigger level of 7 mV on FWS. Cells > 10 μm were analyzed with a peristaltic pump speed of

2.3. Chlorophyll *a* and nutrient analysis

Chlorophyll *a* (chl *a*) content was determined by High Performance Liquid Chromatography (HPLC). A volume of 400–600 cm<sup>3</sup> was filtered onto a 25 mm Whatman GF/F filter. Filters were stored at -80 °C. Pigments were then extracted and analysed by HPLC after Zapata et al. (2000). Nitrate-nitrite (NO<sub>3</sub> + NO<sub>2</sub>), phosphate (PO<sub>4</sub>), and silicic acid (Si(OH)<sub>4</sub>) concentrations were determined from 25 cm<sup>3</sup> precombusted GF/F filtered seawater samples collected (60 cm<sup>3</sup> triplicate) from each mesocosm at 0 h. An equal volume of seawater was discarded prior to storing the sample in plastic acid cleaned 100 cm<sup>3</sup> bottles, kept from at -20 °C until analysis at EMIR within 1 month, using a Bran Luebbe AutoAnalyzer 3 system based on the method by Grasshoff et al. (1983).

2.4. Statistical analysis

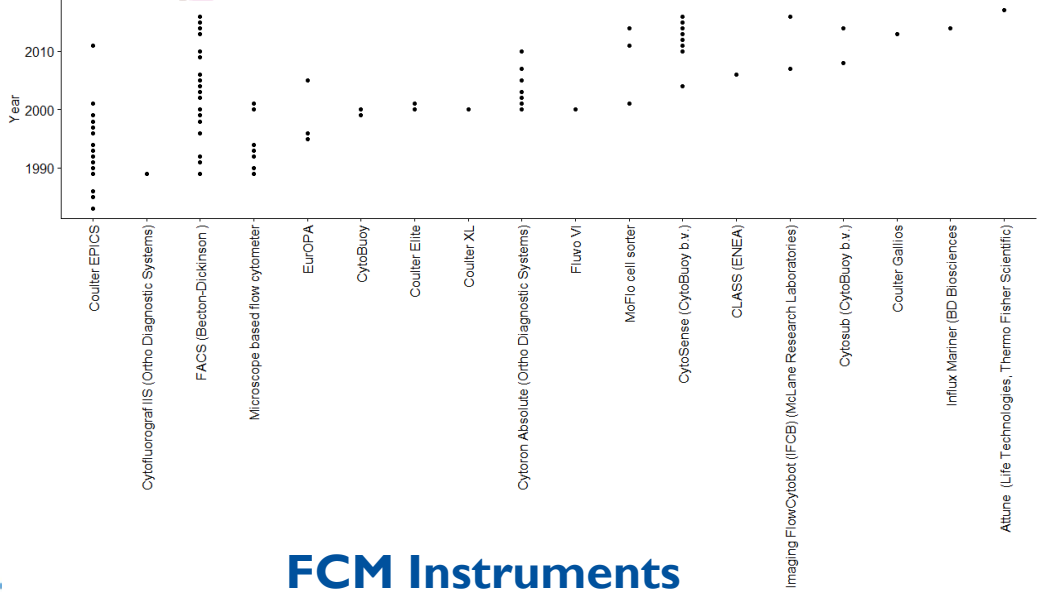
Statistical analyses were run under R software (<http://cran.r-project.org/>). For each phytoplankton cluster, abundance, average FWS, and average FLO were calculated in order to identify differences between treatments during 3 different stages of phytoplankton development. A set of statistical analysis was run, for each defined phytoplankton stage, a normality test (Shapiro test) followed by a test of sphericity (Mauchly test) was run in order to define the best variance test. When data followed a normal distribution and sphericity was observed, a RM-ANOVA (repeated measures) was used. When normality was violated, but no sphericity, or when normality was not violated, a Friedman rank test was run. Relative phytoplankton average abundances, the average FWS and FLO relative average FLO were calculated to show the differences between NTNW (control) and the treated mesocosms (HN1W, NT1W and HT1W) during the 3 different stages of the phytoplankton development, while considering the respective NTNW value as a running post hoc tests for each cluster and each phytoplankton stage, would have lead to complex interpretations. Significant differences were identified using a paired Wilcoxon signed rank test. Periodic processes in the dynamics of abundance, average FWS, and FLO as *c* values per cell were verified using comparing periodograms with a Fast Fourier transformation smoothing the results with a series of modified Daniell smoothers (moving averages giving half weight to the end values, Daniell, 1964) generating spectral plots. These algorithms were computed on the average values between replicates.

3. Results

3.1. UVK, temperature, salinity, chlorophyll *a* and nutrient concentrations

The photometric depth (*Z*<sub>ph</sub>, 10% of surface incident light) represents the depth at which UVB has significant biological effects (Nale et al., 2001). *Z*<sub>ph</sub> reached depths between 27 and 57 cm between 26 and 36 cm for radiance at 303 nm and 313 nm, respectively (Fig. 1A, B). Fig. 1C and D shows the 305 nm and 313 nm average irradiances in the water column from surface to *Z*<sub>ph</sub>, calculated according to Moreire and Cohen (1996). Average water column UVB irradiance increase in the 10W mesocosms were 77.8 ± 10.7% and 45.4 ± 16.8% for 305 and 313 nm, respectively (Fig. 1C, D), as compared to NTNW treatments.

The initial temperature in all the mesocosms was -11 °C and was increased by 2 °C from day 2 to day 4. At day 4, temperature stable below -15 °C in the normal temperature and at -18 °C in the high temperature treatment mesocosms on day 5 (Fig. 2A). Salinity values varied between 24.14 to 24.19 in NTNW on day 6 and 25.19 to 25.10 in HTNW on day 1 (data not shown). Chlorophyll *a* concentrations increased from day 1 up to day 5 in HTNW and NTNW, reaching maximal values of 6.91 ± 1.6 μmol m<sup>-3</sup>



FCM Instruments

### Flow Cytometry vocabulary standardization Questionnaire

This flow cytometry vocabulary standardization questionnaire is dedicated to identify your metadata and data vocabulary that you use during your measurements. it will take approximately 10 to 15 minutes to complete.

This questionnaire is carried out within the framework of JERICO NEXT and SeaDataCloud (H2020 projects) so as to build a common vocabulary in order to standardize, validate and guarantee a long-term storage and access of flow cytometry datasets.

It is divided into four main parts:

- Part I : Group name and definition
- Part II : Flow Cytometer Metadata
- Part III : Sample Metadata
- Part IV : Flow Cytometer Data

*There are 56 questions in this survey.*

Load unfinished survey

Next ▶

Exit and clear survey

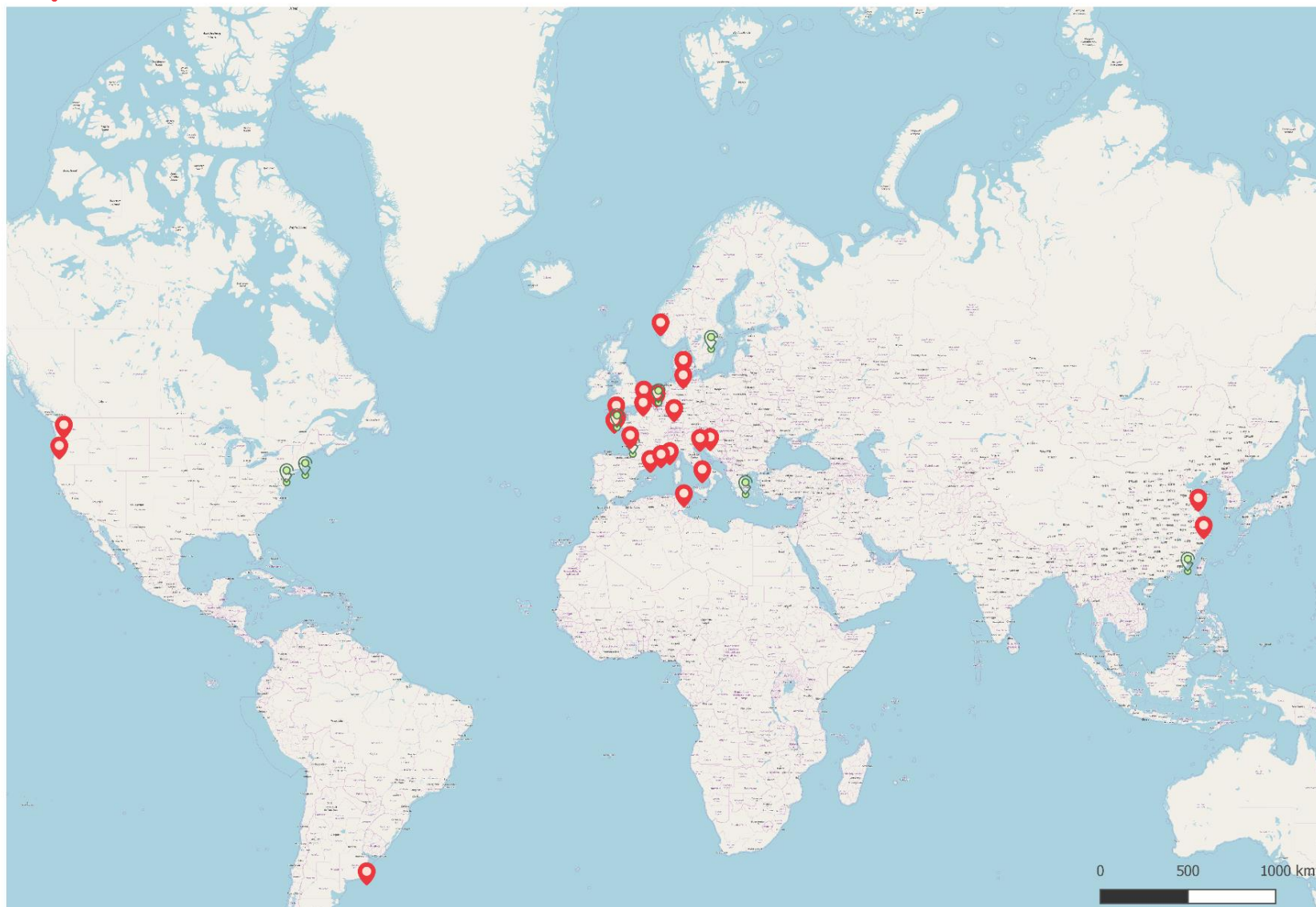


Questionnaire sent to 180 FCM users all around the world

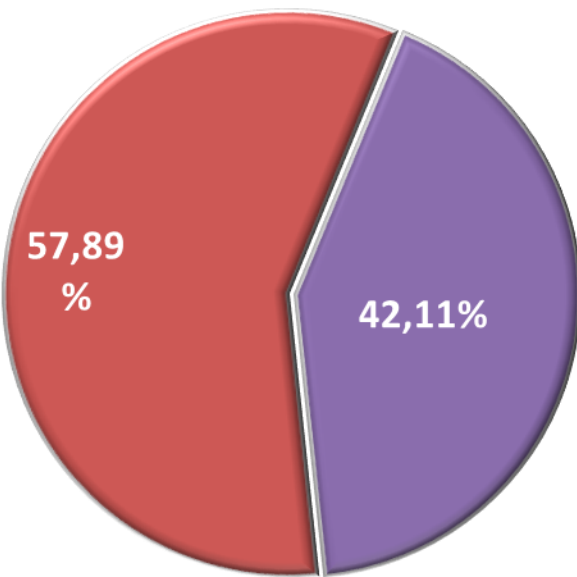
→ 38 Answers to questionnaire (2 months)

 **Completed answers (79%)**

 **Uncompleted answers (21%)**

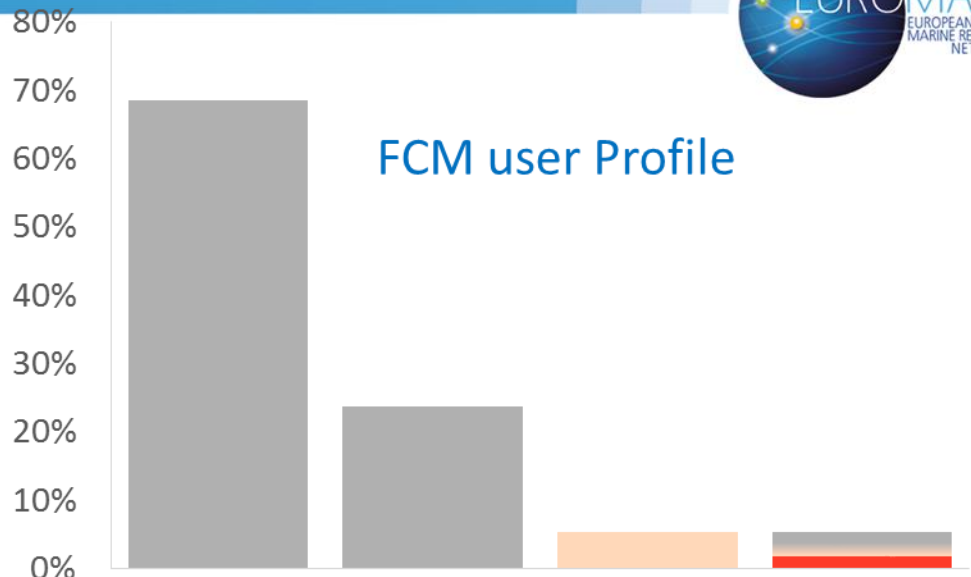


### Gender participation

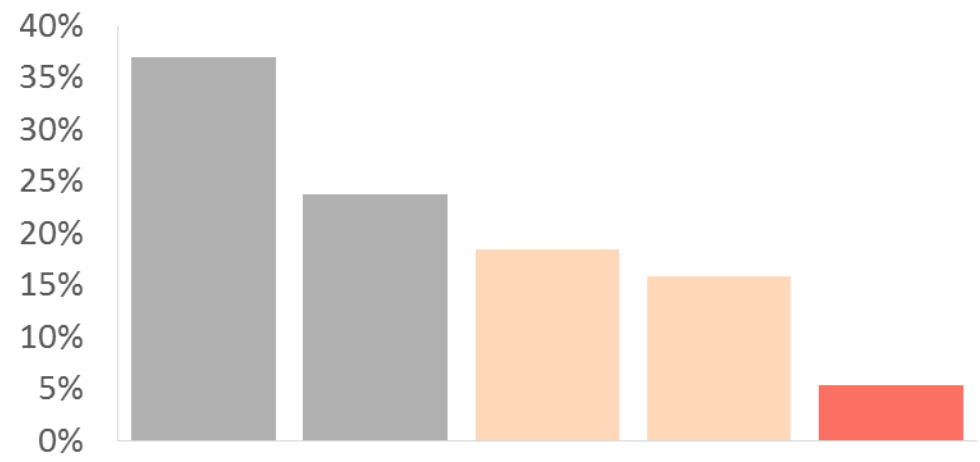


Female Male

### FCM user Profile



Researcher Engineer PhD Student Other



Confirmed Expert Advanced Intermediate Beginner

before

# II. FCM Data Management



Table Données  
Table photo  
Collection  
photos

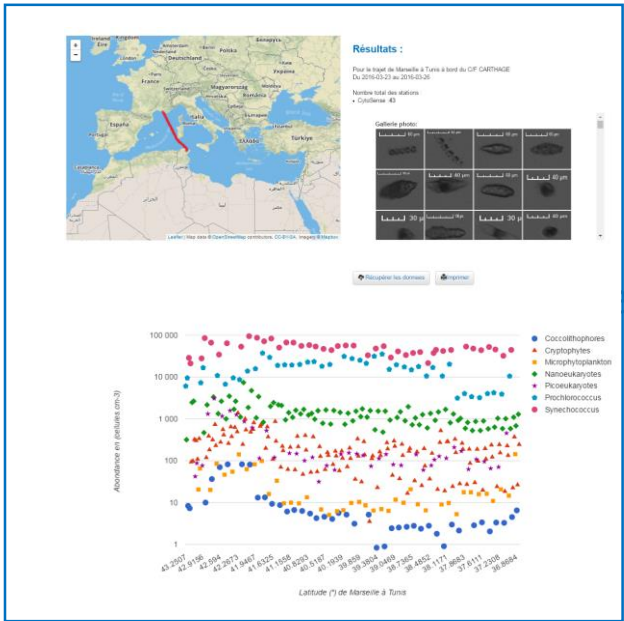


Acquisition

Analysis

Consolidation

Expert QC



entat

Accessibility

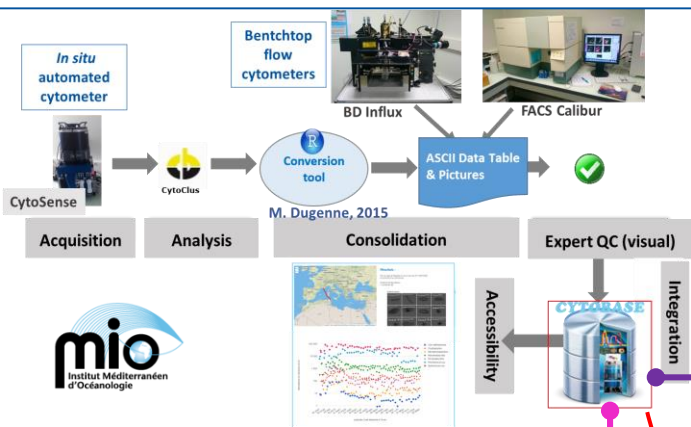


Integration



after

# II. FCM Data management



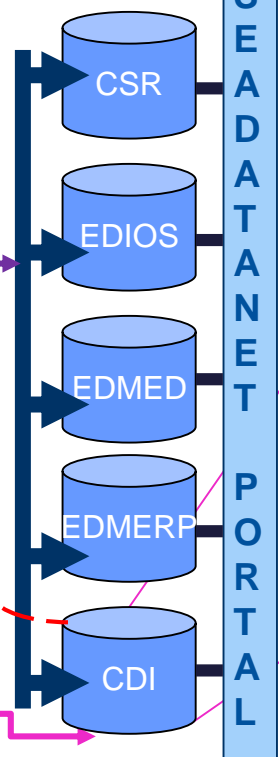
## Metadata generation



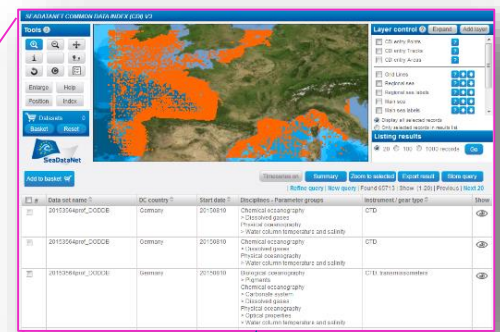
MIKADO

Coupling table

Download Manager



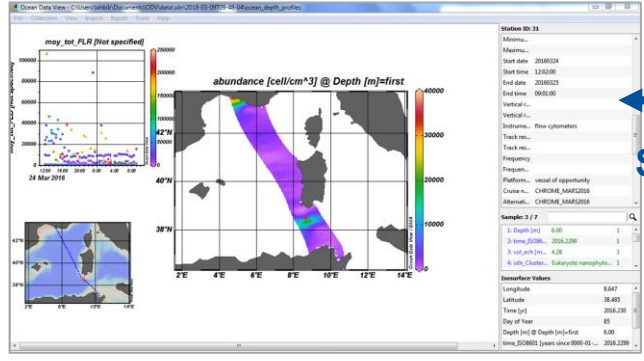
SEADATANET PORTAL



**Ocean Data View**

<https://odv.awi.de>

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IMPORT SDN Format



**Request Status Manager Menu Options**

User

- Standing download requests
- History of download requests

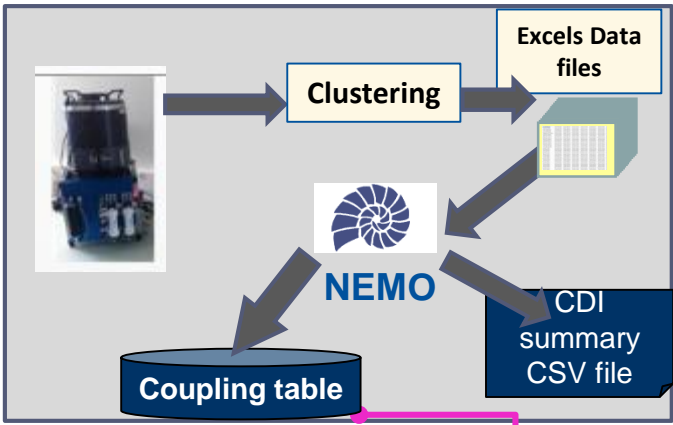
Data provider

- Standing download orders
- History of all download orders
- Report of all orders
- Report of robot testing

DOWNLOAD

OCEAN DATA VIEW ASCII FORMAT

# II. FCM Data management (without DB)

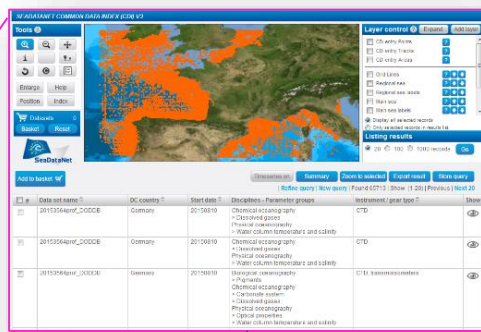
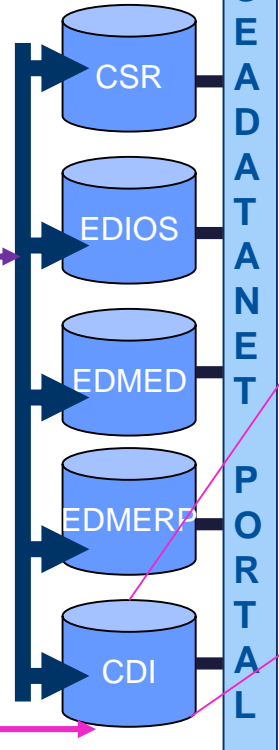


## Metadata generation

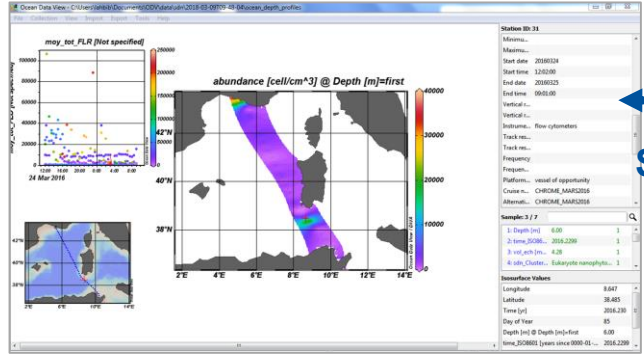


MIKADO

Download Manager



Ocean Data View  
<https://odv.awi.de>  
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IMPORT SDN Format

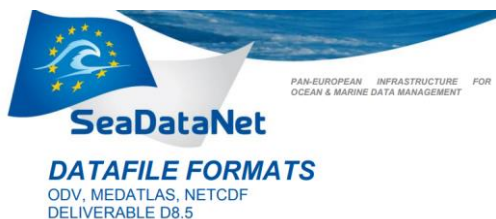


### Request Status Manager Menu Options

User	Data provider
Standing download requests	Standing download orders
History of download requests	History of all download orders
	Report of all orders
	Report of robot testing

OCEAN DATA VIEW ASCII FORMAT

- Create New ODV data format



**Content**

- 1. Vocabulary URN Versioning ..... 6
- 2. SeaDataNet ODV import format ..... 6
  - 2.1. Introduction ..... 6
  - 2.2. The ODV Format Data Model ..... 6
  - 2.3. Encoding ..... 8
    - 2.3.1. User Comments ..... 8
    - 2.3.2. Linkages to External Resources ..... 8
    - 2.3.3. SeaDataNet Semantic Header ..... 10
    - 2.3.4. Column Header Row ..... 11
    - 2.3.5. Data Row ..... 11
  - 2.4. Spatio-temporal Co-ordinate Conventions ..... 12
  - 2.5. Example Files ..... 13
- 3. SeaDataNet MEDATLAS Format ..... 13
  - 3.1. Introduction ..... 13
  - 3.2. The MEDATLAS Format Data Model ..... 14
  - 3.3. Encoding - SeaDataNet Semantic lines ..... 15
  - 3.4. Example Files ..... 16
- 4. Climate and Forecast (CF) Convention NetCDF Format ..... 17

THE ODV FORMAT DATA MODELS	
NAME	TYPE
Biological data	Time series
Chemical	Time series
Contaminant in Biota	Time series
Tide gauge	Time series
Tide gauge with instrument	Time series
Trajectory TSG	Time series
Contaminant in sediment	Profiles
CTD	Profiles
CTD with instruments	Profiles
XBT	Profiles

	ScientificName:INDEXED_TEXT	QV:SEADATA	ScientificNameID:INDEXED_TEXT	QV:SEADATA	Sex:INDEXED	QV:SEADATA	LifeStage:IN
4.1. In							
4.2. Se							
4.3. Se	Prorocentrum	2	urn:lsid:marinespecies.org:taxname:109566	2	Not Specifie	9	Not Specifie
4.4. G	Dinophysis acuminata	2	urn:lsid:marinespecies.org:taxname:109603	2	Not Specifie	9	Not Specifie
4.4.1.	Chaetoceros	2	urn:lsid:marinespecies.org:taxname:148985	2	Not Specifie	9	Not Specifie
4.4.2.	Fragilaria	2	urn:lsid:marinespecies.org:taxname:149028	2	Not Specifie	9	Not Specifie
4.4.3.	Melosira	2	urn:lsid:marinespecies.org:taxname:149042	2	Not Specifie	9	Not Specifie
4.4.4.	Paralia sulcata	2	urn:lsid:marinespecies.org:taxname:149055	2	Not Specifie	9	Not Specifie
4.4.5.	Thalassionema nitzschioides	2	urn:lsid:marinespecies.org:taxname:149093	2	Not Specifie	9	Not Specifie
4.4.6.	Guinardia delicatula	2	urn:lsid:marinespecies.org:taxname:149112	2	Not Specifie	9	Not Specifie
4.4.7.							
4.4.8.							
4.4.9.							
4.5. Fe							
4.5.1.							
4.5.2.							
4.5.3.	SeaDataNet NetCDF Profile for Trajectory Data						46
4.5.4.	SeaDataNet NetCDF for timeSeriesProfile Data						53
4.5.5.	SeaDataNet NetCDF for trajectoryProfile Data						61
4.6.	Example Files						69



## P01 (BODC PARAMETER USAGE VOCABULARY)

[Overview](#) | [Export subset of list](#) | [Export full list](#) | [New query](#) | Found 2 | [Current](#) | [Previous](#) | [Next](#)

ConceptID ↕	Preferred label ↕	Alt label ↕	Definition ↕	Modified ↕
SCNAME01	Taxon of biological entity specified elsewhere	Name_BE007117	The scientific name of the biological object.	1/21/2016 13:55:16
SNANID01	Identifier (LSID) of biological entity specified elsewhere	LSID_BE007117	A global unique identifier for the nomenclatural details of the scientific name of a biological object (urn:lsid:marinespecies.org:taxname:ID)	1/21/2016 13:55:16



**Example: SCNAME01= *Akashiwo sanguinea* and SNANID01= urn:lsid:marinespecies.org:taxname:232546**

ConceptID ↕	Preferred label ↕	Alt label ↕	Definition ↕	Modified ↕
NMCLFL02	Registered name of flow cytometry cluster by classification to a term from the NVS SeaDataCloud Flow Cytometry Standardised Cluster Names Vocabulary (SDN:F02::)	ClusterName	Text term identifying the type of particles belonging to a specific flow cytometry cluster, taken from the NVS SeaDataCloud Flow Cytometry Standardised Cluster Names controlled vocabulary F02.	2/1/2018 21:53:44
IDCLFL02	Registered name identifier of flow cytometry cluster by classification to a term from the NVS SeaDataCloud Flow Cytometry Standardised Cluster Names Vocabulary (SDN:F02::)	ClusterNameID	Opaque key term identifying the type of particles belonging to a specific flow cytometry cluster, taken from the NVS SeaDataCloud Flow Cytometry Standardised Cluster Names controlled vocabulary F02.	2/1/2018 21:53:44

**Example: NMCLFL02 = *Microphytoplankton* and IDCLFL02 = SDN:F02::F0200008**



```
//<subject>SDN:LOCAL:vol_ech</subject><object>SDN:P01::VOLWBSMP</object><units>
SDN:P06::MCUB</units><instrument>SDN:L22::TOOL1209</instrument>
//<subject>SDN:LOCAL:sdn_ClusterName</subject><object>SDN:P01::NMCLFL02</object>
><units>SDN:P06::UUUU</units><instrument>SDN:L22::TOOL1209</instrument>
//<subject>SDN:LOCAL:abundance</subject><object>SDN:P01::SDBIOL01</object><units>
>SDN:P06::NCM3</units><instrument>SDN:L22::TOOL1209</instrument>
//<subject>SDN:LOCAL:moy_tot_SWS</subject><object>SDN:P01::SWSAREAA</object><
units>SDN:P06::USPC</units><instrument>SDN:L22::TOOL1209</instrument>
```

```
//<sdn_referenc
//
//SDN_paramet
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```

Cruise	Station	Type	YYYY-MM	Longitude [°]	Latitude [de]	LOCAL_CD	EDMO_coc	Bot. Depth	DEPTH [m]	GV:SEADA	time_ISO86	GV:SEADA	vol_ech [m³]	GV:SEADA	sdn_Cluste	GV:SEADA	sdn_Cluste	GV:SEADA	abundnce [	GV:SEADA	moy_tot_Fl	GV:SEADA	FLR_TOTA	GV:SEADA	moy_tot									
CHROME_I S1	C		2016-03-24	5.26124	43.2507	FA8803201	3078	0	6	1	2016-03-24	1	0.376328	1	Eukaryote p	1	SDN:F02:F	1	87.69	1	12241.57	1	6394.2	1	247.434									
									6	1	2016-03-24	1	0.376328	1	Synechococ	1	SDN:F02:F	1	21194.4	1	384.505	1	540.018	1	1207.1									
									6	1	2016-03-24	1	0.376328	1	Prochloroc	1	SDN:F02:F	1	9437.06	1	39.4288	1	18.0369	1	27.709									
									6	1	2016-03-24	1	4.21773	1	Cryptophyt	1	SDN:F02:F	1	741.38	1	24594.84	1	11783.15	1	10133.7									
									6	1	2016-03-24	1	4.21773	1	Microphyto	1	SDN:F02:F	1	65.67	1	123711	1	151218	1	20281.1									
									6	1	2016-03-24	1	4.21773	1	Coccolithop	1	SDN:F02:F	1	7.35	1	43755.3	1	15892.1	1	24131.1									
									6	1	2016-03-24	1	4.21773	1	Eukaryote n	1	SDN:F02:F	1	2970.52	1	53946.7	1	21944.63	1	618.44									
									6	1	2016-03-24	1	0.402186	1	Prochloroc	1	SDN:F02:F	1	6069.34	1	42.2521	1	17.3289	1	28.887									
									6	1	2016-03-24	1	0.402186	1	Synechococ	1	SDN:F02:F	1	28735.5	1	876.007	1	432.296	1	1045.7									
									6	1	2016-03-24	1	0.402186	1	Eukaryote p	1	SDN:F02:F	1	42.27	1	10255.1	1	8190.031	1	254.343									
									6	1	2016-03-24	1	0.402186	1	Standard bc	1	SDN:F02:F	1	2.49	1	21157.3	1	3.7525	1	38109									
									6	1	2016-03-24	1	4.16354	1	Cryptophyt	1	SDN:F02:F	1	526.44	1	25208.31	1	16832.4	1	3793.14									
									6	1	2016-03-24	1	4.16354	1	Microphyto	1	SDN:F02:F	1	20.63	1	145903	1	180243	1	10625									
									6	1	2016-03-24	1	4.16354	1	Coccolithop	1	SDN:F02:F	1	8.39	1	42357.2	1	17263.2	1	27263									
									6	1	2016-03-24	1	4.16354	1	Eukaryote n	1	SDN:F02:F	1	2738.19	1	51546.6	1	19162.42	1	615.48									
									CHROME_I S2	C		2016-03-24	5.37174	43.092	FA8803201	3078	0	6	1	2016-03-24	1	0.377151	1	Prochloroc	1	SDN:F02:F	1	7288.88	1	43.0467	1	17.4221	1	28.381
																		6	1	2016-03-24	1	0.377151	1	Eukaryote p	1	SDN:F02:F	1	76.89	1	12170.35	1	6714.12	1	263.971
																		6	1	2016-03-24	1	0.377151	1	Synechococ	1	SDN:F02:F	1	27866.9	1	902.762	1	488.755	1	1066.9
6	1	2016-03-24	1	3.77561	1	Cryptophyt	1	SDN:F02:F										1	631.82	1	25864.58	1	18194.35	1	3524.25									
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CHROME_I S3	C		2016-03-24	5.4381	42.3156	FA8803201	3078	0	6	1	2016-03-24	1	3.77561	1	Eukaryote n	1	SDN:F02:F	1	2629.51	1	41808.22	1	17680.85	1	511.05									
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									6	1	2016-03-24	1	0.324117	1	Microphyto	1	SDN:F02:F	1	10.06	1	44887.5	1	21092.5	1	23305									
									6	1	2016-03-24	1	3.77561	1	Eukaryote n	1	SDN:F02:F	1	2629.51	1	41808.22	1	17680.85	1	511.05									

FA88032016\_00001\_FCMW\_20180302\_

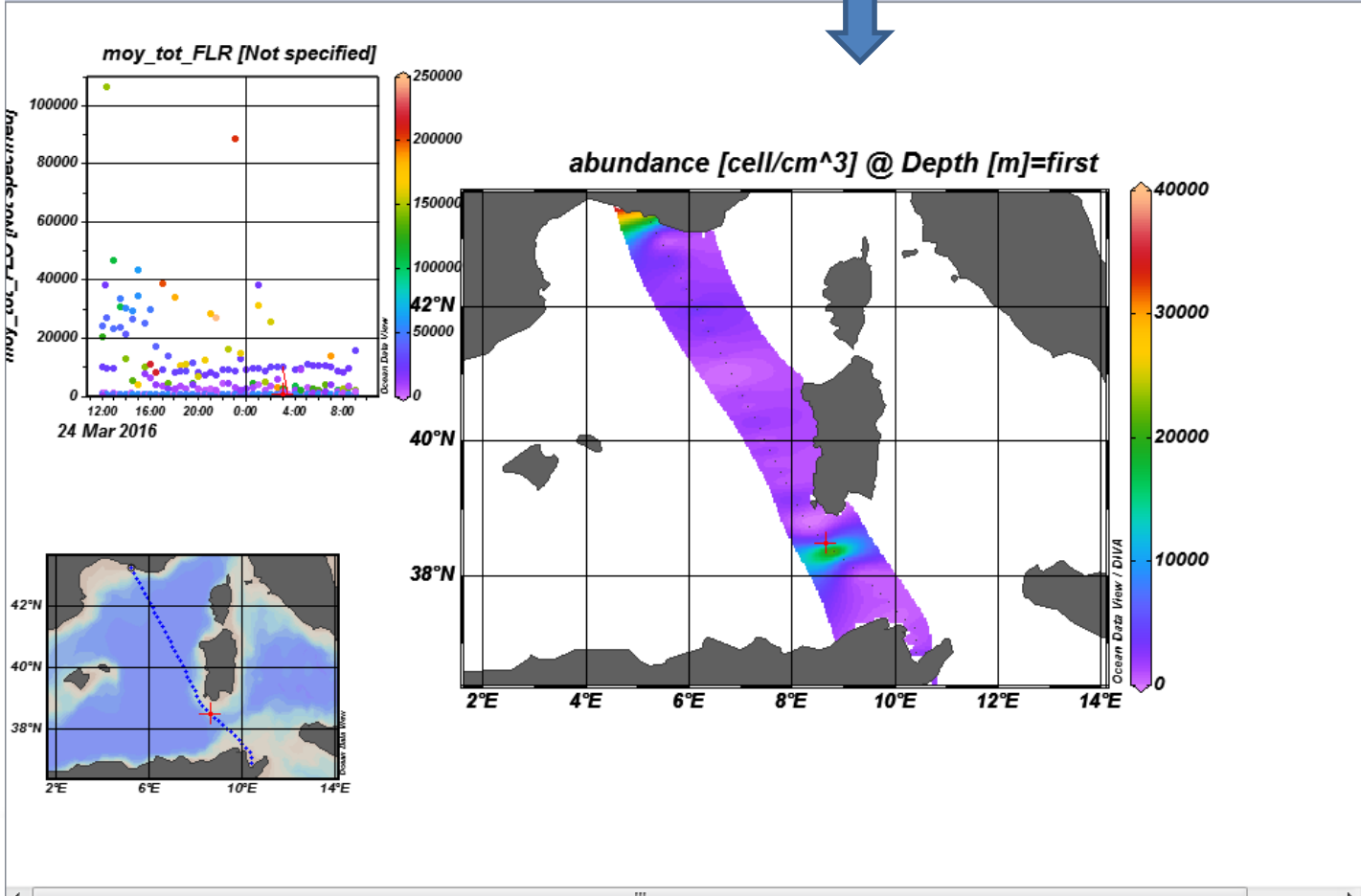
users\30e06-data\_centre\3078-2018-03-08\_result.zip  
Archive WinRAR ZIP

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Ocean Data View - C:\Users\lahbib\Documents\ODV\data\sdn\2018-03-09T09-48-04\ocean\_depth\_profiles

File Collection View Import Export Tools Help



**Station ID: 31**

Minimu...	
Maximu...	
Start date	20160324
Start time	12:02:00
End date	20160325
End time	09:01:00
Vertical r...	
Vertical r...	
Instrume...	flow cytometers
Track res...	
Track res...	
Frequency	
Frequen...	
Platform...	vessel of opportunity
Cruise n...	CHROME_MARS2016
Alternati...	CHROME_MARS2016

**Sample: 3 / 7**

1: Depth [m]	6.00	1
2: time_ISO86...	2016.2299	1
3: vol_ech [m...	4.28	1
4: sdn_Cluster...	Eukaryote nanophyto...	1

**Isosurface Values**

Longitude	8.647
Latitude	38.485
Time [yr]	2016.230
Day of Year	85
Depth [m] @ Depth [m]=first	6.00
time_ISO8601 [years since 0000-01-...	2016.2299



# CNRS MIO SDN metadata directories



EUROPEAN DIRECTORY OF MARINE ENVIRONMENTAL RESEARCH PROJECTS (EDMERP)

**DETAILS**

**GENERAL INFO**

Project code: Continuous High Resolution Observation of the Mediterranean sea  
 Project acronym: CHROME  
 Project reference: A\*MIDEX-CHROME  
 Associated programme: JERICO-NEXT  
 Project website: <https://fen-chrome.mio.univ-amu.fr/>  
 Begin date: 2015-02-01  
 End date: 2017-01-31

**LOCATION**

Geographic coverage: Western Mediterranean

**DESCRIPTION**

Abstract: Phytoplankton functional diversity and spatio-temporal distribution at the meso-scale are studied in the frame of the A\*MIDEX-CHROME (Continuous High Resolution Observation of the Mediterranean, [https://fen-chrome.mio.univ-amu.fr/?page\\_id=42](https://fen-chrome.mio.univ-amu.fr/?page_id=42)) project thanks to the combined installation of a FerryBox system (belonging to the INSTM, Tunisia) and a cytometer flow cytometer onboard the CTN's ferry "Le Carthage". Samples were collected during the cruises between Tunis-Marseille and Tunis-Genova from October 2016 to January 2017. This led to an amount of 80 transects and more than 7000 samples collected. Data analyses revealed the abundances of up to six phytoplankton functional groups based on size and pigment content.

**COORDINATOR**

Coordinating organisation: Mediterranean Institute of Oceanography - LUMINY (MIO) - UMR 7294 / 235 / 110  
 Country of coordinator: France

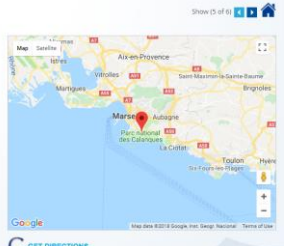
**ORGANISATION DETAILS**

**DETAILS**

Name: Mediterranean Institute of Oceanography - LUMINY (MIO) - UMR 7294 / 235 / 110 (MIO)  
 Native name: Institut Méditerranéen d'Océanologie - Luminy (MIO) - UMR 7294 / 235 / 110  
 Address: M.I.O. Institut Méditerranéen d'Océanologie OCEANOMED 163, Avenue de Luminy  
 Zipcode: 13288  
 City: Marseille Cedex 09  
 Country: France  
 Phone: +3304 91 82 92 12  
 Centre Website: <http://www.mio.univ-amu.fr/>

**ORGANISATION PROFILE**

The MIO is the result of the merging of the COM (Centre of Oceanology of Marseille), itself composed of the LOPS, the LMGM and a part of the DIMM, the LISI, the LMBC and a researcher from the IRME. This laboratory was established on 01/01/2012. The MIO Oceanography research laboratory forms part of the Océan-Pyrénées Institute and is under the joint direction of Aix-Marseille University, Brest University, the CNRS and the MIO.



**DETAILS OF CARTHAGE CRUISE CHROME\_MARS2016 (BSH REF-NO: 20173192)**

[ XML V1 | XML V2 | Print ] [ New Query | Results | Found 3 | Show 1 ]

**GENERAL INFORMATION**

Platform/Ship: Carthage  
 Cruise begin: 10.03.2016  
 Cruise end: 30.03.2016  
 Port of Departure: Marseille, France  
 Port of Return: Marseille, France  
 Chief Scientist(s): Prof. Cherif Sammani - Institut National des Sciences et Technologies de la Mer - INSTM, MILEU MARIN  
 Dr. Ben Ismail Sana - Institut National des Sciences et Technologies de la Mer - INSTM, Milleu Marin  
 Dr. Mellottus THYSSEN - Mediterranean Institute of Oceanography - LUMINY (MIO) - UMR 7294 / 235 / 110, CYBELE et Institut National des Sciences et Technologies de la Mer - INSTM

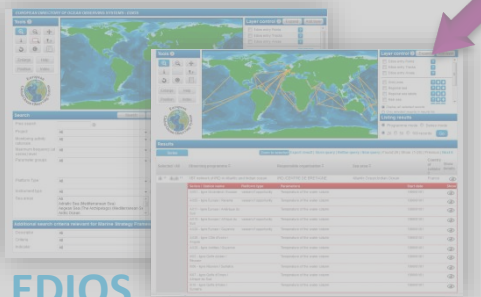
**LOCATION**

General Ocean Areas: Mediterranean Sea, Western Basin  
 Marsden Squares (S, N, E, W): 30.0, 40.0, 10.0, 20.0  
 40.0, 50.0, 0.0, 10.0  
 Bounding Boxes: 40.0, 50.0, 10.0, 20.0  
 Specific Geograph. Areas: CHROME

**CSR**

## EDMERP Projects

## Research cruises



## EDIOS Observing programmes

**SEADATANET COMMON DATA INDEX (CDI) V3**

TOOLS: [ Search | Map | Layers | Legend | Fullscreen | Help | Position | Index ]

**LAYER CONTROL**

- CDI entry Points
- CDI entry Tracks
- CDI entry Areas
- Grid Lines
- Regional sea
- Regional sea labels
- Display all selected records
- Only selected records in results list

**LISTING RESULTS**

20 | 100 | 1000 records

Data set name	DC country	Start date	Disciplines - Topics	Instrument / gear type	Show
OSCAHR_FCMW	France	20151030	Biological oceanography > Other biological measurements	flow cytometers	<a href="#">Show</a>
CHROME_MARS2016_FCMW	France	20160324	Biological oceanography > Other biological measurements	flow cytometers	<a href="#">Show</a>

## CDI Data index

European Directory of Marine Environmental Data (EDMED)

**Data set information**

[ New query | Results | Found 3 | Show 2 | Previous | Next ]

**General**

Data set name: **Marine Flow Cytometry Data from the Mediterranean Institute Of Oceanography (MIO), France (from 1993)**

Data holding centre: Mediterranean Institute of Oceanography - LUMINY (MIO) - UMR 7294 / 235 / 110

Country: France

**Project**

Mediterranean Ocean Observing System on Environment (MOOSE|MOOSE); Marine Ecosystems Response in the Mediterranean Experiment(MERMEK); Mediterranean Integrated Studies at Regional And Local Scales(MISTRALS); JERICO : Towards a joint European research infrastructure network for coastal observatories(JERICO-NEXT); JERICO-NEXT : Towards a joint European research infrastructure network for coastal observatories(JERICO-NEXT); Continuous High Resolution Observation of the Mediterranean sea(CHROME); Observing Submesoscale Coupling at High Resolution (OSCAHR|OSCAHR)

**Time period**

Ongoing: Yes

**Geographical area**

Mediterranean Sea; English Channel; Atlantic Ocean; Pacific Ocean; Antarctic Ocean; China Sea; Saint Lawrence River; Kerguelen Islands

**EDMED**

abundance in water bodies; Phytoplankton generic abundance in water bodies

**Instrument**

**Data sets**

as they are transported by a liquid sheath (flow) through a light source excitation (most often on one or several laser beams). Similar cells, i.e. with similar optical properties, define a population. Thanks to flow cytometry, pico- and nano-phytoplankton, heterotrophic prokaryotes, virus and heterotrophic nanoflagellates can be analysed. Flow cytometry analysis is performed at a high throughput, typically hundreds up to several thousand cells analysed per second depending on the flow cytometer model. The analysis is multiparametric, generating multiple and complex information: for each particle (cell) analysed, light scattering (forward and

## Conclusion

- ▶ Whatever the instrument used → Common Vocabulary (CV)
- ▶ We created 44 FCM CV → European portals
- ▶ Decide on a group of experts interested in contributing to the vocabulary work and decide on a co-ordinator
- ▶ Update is possible/The BODC Vocabulary Editor webpage: [https://www.bodc.ac.uk/resources/vocabularies/vocabulary\\_editor/](https://www.bodc.ac.uk/resources/vocabularies/vocabulary_editor/)
- ▶ BODC is setting up some repositories on GitHub for each individual collection and F02 will have its own too. So this could be used to share and discuss issues more widely.
- ▶ MIO will share CYTOBASE and Mathilde tool
- ▶ Quality control protocol for FCM data (70% no data flag)

*Thank you for your attention*

