



# Gestion standardisée et interopérabilité des données de la Cytométrie en Flux avec l'infrastructure (EU) SeaDataCloud

Marseille, le 28 Sept. 2017

Soumaya Lahbib, Gérald Grégori, Melilotus Thyssen, Mathilde Dugenne,  
Maurice Libes, and Pierre Marrec

# 1. Introduction – Déploiement des Cytomètres



**CytoPro**



**CytoSense**

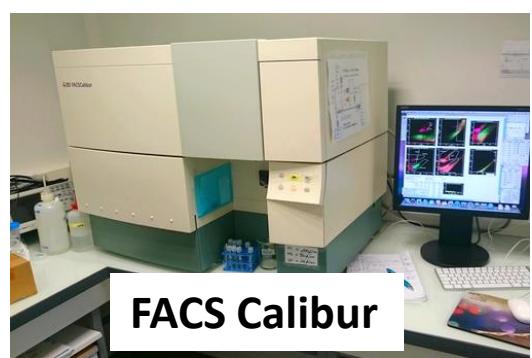
**FerryBox**



**CytoSub in a buoy**

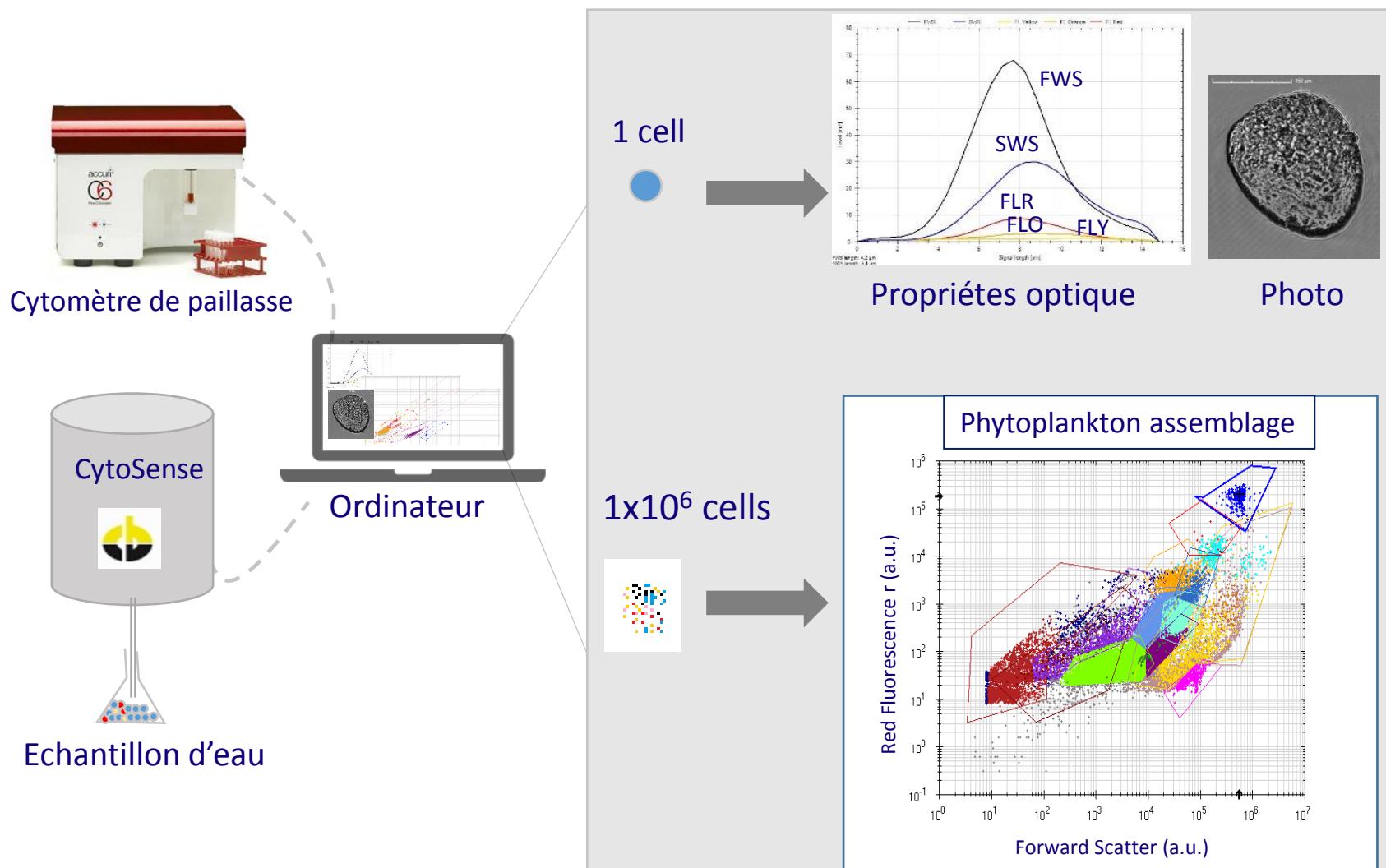


**INFLUX Mariner**



**FACS Calibur**

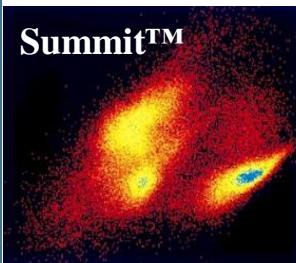
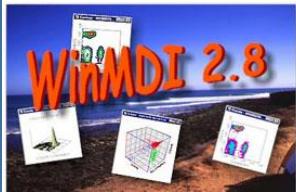
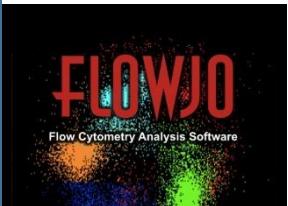
# 1. Introduction – Données de CF



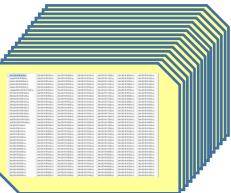
- Groupes autotrophique/hétérotrophique/abundance (comptage) par group
- Fluorescences/Diffusion par cell/ estimation de la taille après calibration de la diffusion
- Photos (taxon>20 μm)

## 2. Problématiques - Analyses des mesures CF

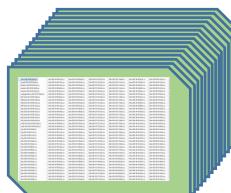
### Benchtop FCM



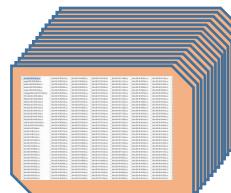
Output 1



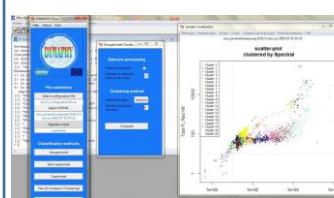
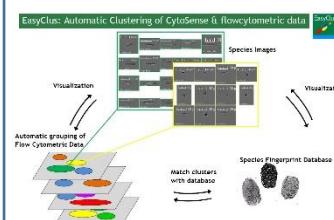
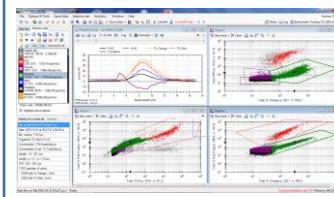
Output 2



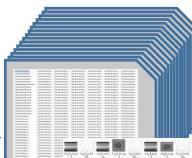
Output 3



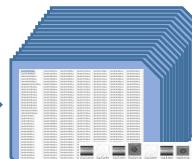
### Automated FCM



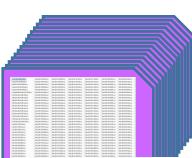
Output 1



Output 2

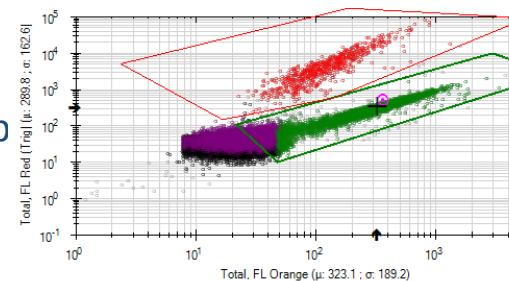


Output 3



## 2. Problématiques – Barrières d'échange

- Définition des noms de groupes: largephyto3 - N/mL, My favorite group
- Absence de metadata : SB, trigger, PMT, project, ..
- Format standard d'échange de données
- Vocabulaires standard



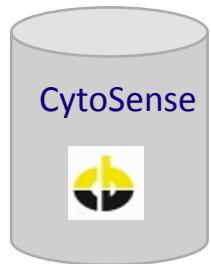
### P01 (BODC Parameter Usage Vocabulary)

Overview   Export subset of list   Export full list   New query   Found 126   Show (1-25)   Previous   Next 25				
ConceptID	Preferred label	Alt label	Definition	Modified
ADI047SD	Abundance standard deviation of Dinoflagellates (ITIS: 9873; WoRMS 19542) [Subgroup: autotrophic] per unit volume of the water body by automated flow cytometry	ADino<20um_FC_SD	Standard deviation of replicate determinations of the number of cells <20µm 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	2/22/2016 14:44:37
ADI07845	Abundance of dinoflagellates (ITIS: 9873; WoRMS 19542) [Size: <20µm Subgroup: autotrophic] per unit volume of the water body by automated flow cytometry	ADino<20um_FC	Number of particles <20µm 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.	2/22/2016 14:44:37
ANA07846	Abundance of nanoeukaryotic cells [Subgroup: heterotrophic] per unit volume of the water body by automated flow cytometry	HNan_FC	Number of particles in a unit volume of any body of fresh or salt water resolved by flow cytometry as undifferentiated eukaryotic heterotrophs in an operationally defined nanoplanckton size range; this code can be used for all types of eukaryotic cells, heterotrophic or aplastidic, and eukaryotes or flagellates, or when it is known that the counts were from the nanoplanckton size range and obtained from samples stained with a nucleic-acid specific fluorescent dye, and subtraction of photosynthetic cell counts if present	6/10/2016 15:45:26
ANA078SD	Abundance standard deviation of nanoeukaryotic cells [Subgroup: heterotrophic]			

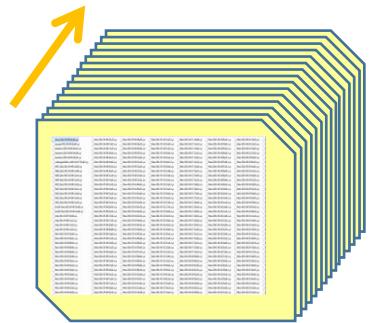
The screenshot shows the SeaDataNet search interface. At the top, there's a banner for the "PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT". Below it, the title "P01 (BODC Parameter Usage Vocabulary)" is displayed. The main area is a table listing parameter definitions. At the bottom, there's a search interface with a world map, various search filters (like "Grid Lines", "Regional sea labels", "Depth labels", etc.), and dropdown menus for "Disciplines - Topics" and "Discovery parameters".

→ Absence de données de CF dans les portails (EU)

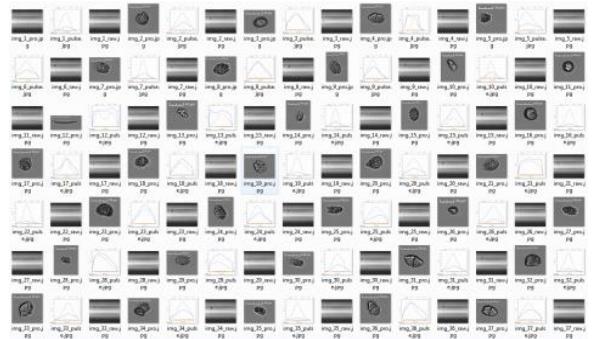
## 2. Problématiques – Bancarisation et restitution



Classification

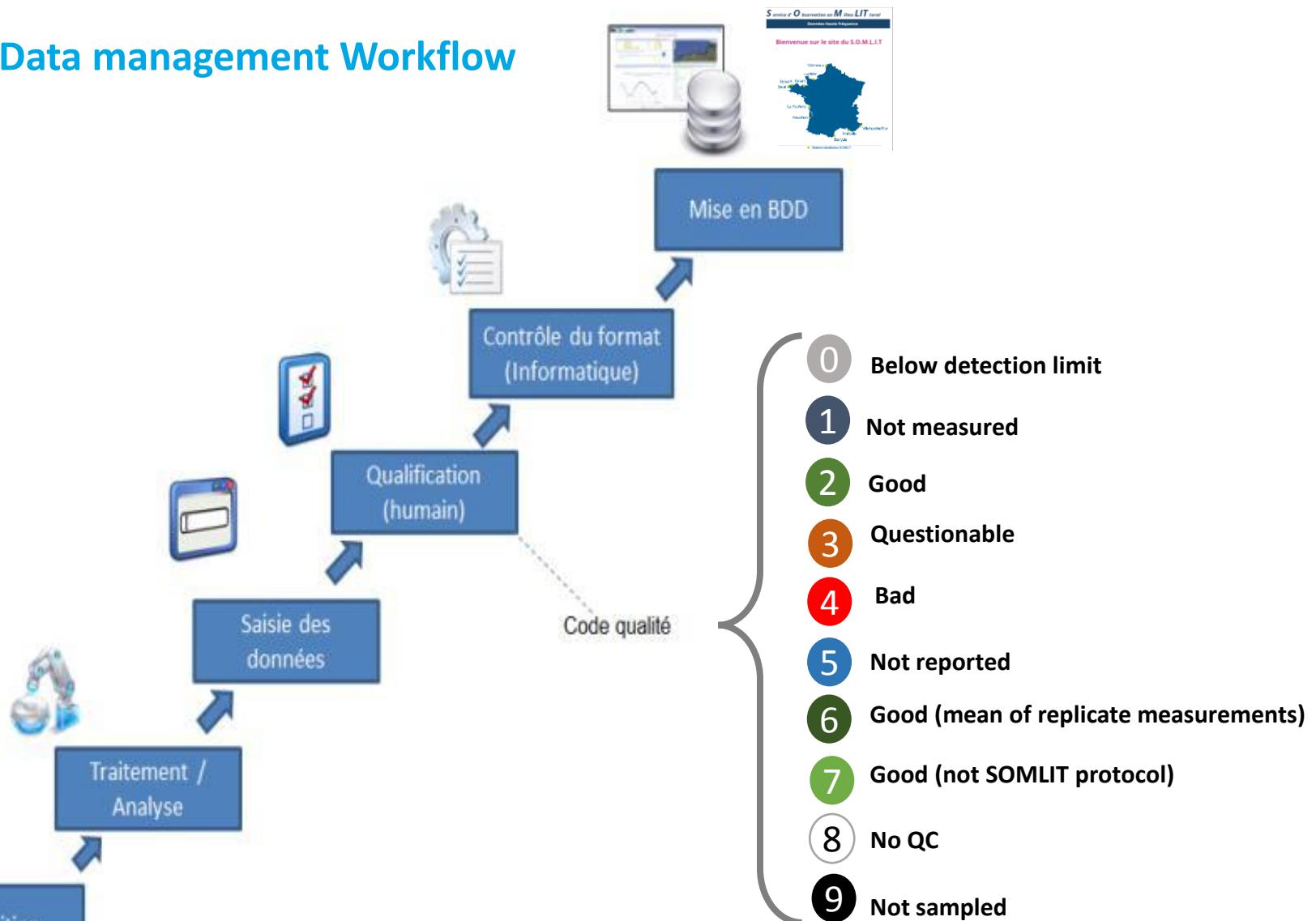


Sauvegarde



# 3. Gestion des données de CF – Cas du SOMLIT

## SOMLIT Data management Workflow



<http://somlit-db.epoc.u-bordeaux1.fr/bdd.php?serie=ST>

## Paramètres Biologiques (pico-nano)

Paramètres	Description
TotBac cells/mL	Nombre total de cellules bactériennes par millilitre
TotBac SSC/1µm	Intensité du SideWardScatter sur le nombre total des bactéries par micromètre
TotBac FL verte/1µm	Intensité de Fluorescence verte sur le nombre total des bactéries par micromètre
HNABac cells/mL	Nombre de cellules bactériennes représentantes de la fraction (HNA) par millilitre
HNABac SSC/1µm	Intensité du SideWardScatter sur le nombre total des bactéries HNA par micromètre
HNABac FL verte /1µm	Intensité de Fluorescence verte sur le nombre total des bactéries HNA par micromètre
LNABac cells/mL	Nombre de cellules bactériennes représentantes de la fraction (LNA) par millilitre
LNABac SSC/1µm	Intensité du SideWardScatter sur le nombre total des bactéries LNA par micromètre
LNABac FL verte/1µm	Intensité de Fluorescence verte sur le nombre total des bactéries LNA par micromètre
Cry cell/mL	Nombre des cellules du groupe Cryptophytes par millilitre
Cry SSC/1µm	Intensité du SWS sur le nombre total des cellules du groupe Cryptophytes par micromètre
Cry FL rouge/1µm	Intensité de FLR sur le nombre total des cellules du groupe Cryptophytes par micromètre
Cry FL orange/1µm	Intensité de FLO sur le nombre total des cellules du groupe Cryptophytes /micromètre
Syn cell/mL	Nombre des cellules du groupe Synechococcus par millilitre
Syn SSC/1µm	Intensité du SWS sur le nombre total des cellules du groupe Synechococcus/micromètre
Syn FL rouge/1µm	Intensité de FLR sur le nombre total des cellules du groupe Synechococcus /micromètre
Syn FL orange/1µm	Intensité de FLO sur le nombre total des cellules du groupe Synechococcus/micromètre
Pro cell/mL	Nombre des cellules du groupe Prochlorococcus par millilitre
Pro SSC/1µm	Intensité du SWS sur le nombre total des cellules du groupe Prochlorococcus/micromètre
Pro FL rouge/1µm	Intensité de FLR sur le nombre total des cellules du groupe Prochlorococcus/micromètre
PicoE cell/mL	Nombre des cellules du groupe Picoeukaryotes par millilitre
PicoE SSC/1µm	Intensité du SWS sur le nombre total des cellules du groupe Picoeukaryotes/micromètre
PicoE FL rouge/1µm	Intensité de FLR sur le nombre total des cellules du groupe Picoeukaryotes /micromètre
NanoE cell/mL	Nombre des cellules du groupe Nanoeukaryotes par millilitre
NanoE cell/mL	Nombre des cellules du groupe Nanoeukaryotes par millilitre
NanoE SSC/1µm	Intensité du SWS sur le nombre total des cellules du groupe Nanoeukaryotes /micromètre

Temps d'acquisition= une analyse/30 min.

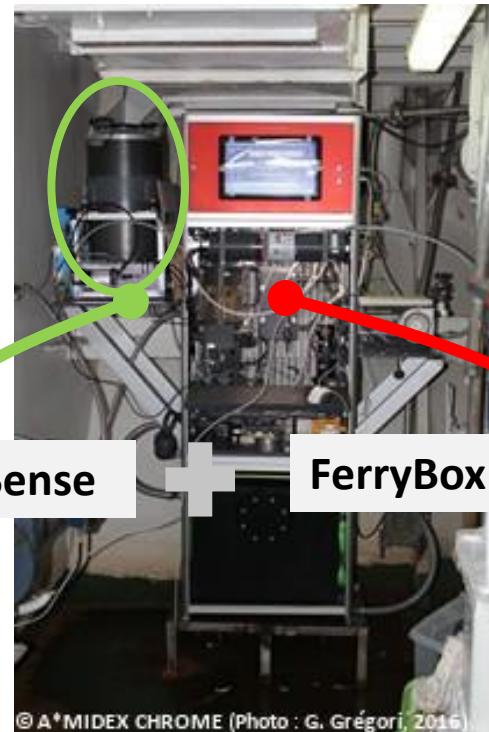


— C/F CARTHAGE trajectories

./30min

- Phytoplankton functional groups
- Phytoplankton abundance per group
- Fluorescences/scatter per cell
- Size estimation after calibration of scatter
- Phytoplankton images (taxonomical identification >20 µm)

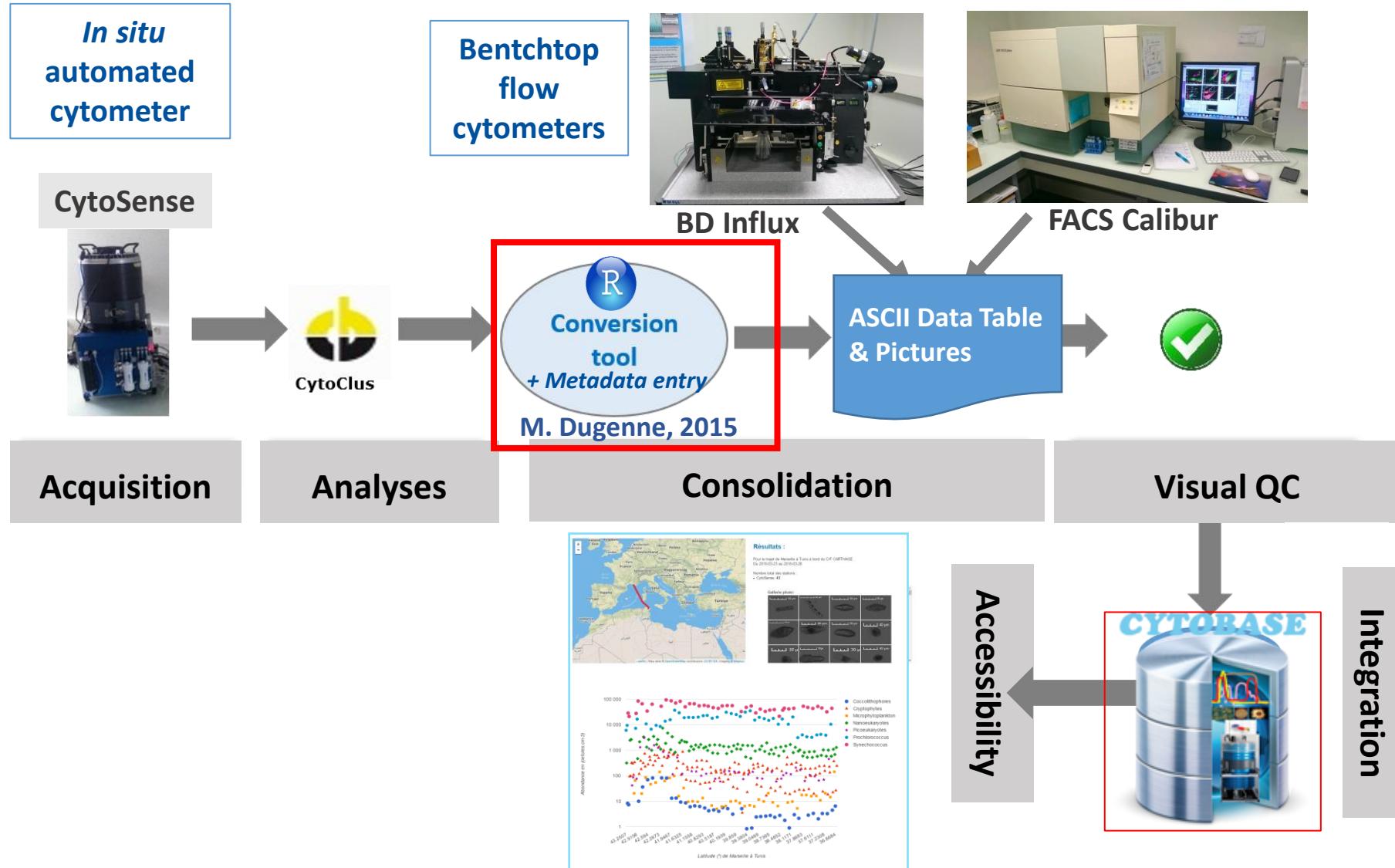
Pont 1 – C/F CARTHAGE



./1min

- Temperature
- Salinity
- Fluorescence
- Turbidity
- pH
- pCO<sub>2</sub>
- Oxygen

### 3. Gestion des données de CF – Cas de CHROME



# → Consolidation

## Cytobase Input Processor (Mathilde Dugenne, 2015)

[mathilde.dugenne@mio.osupytheas.fr](mailto:mathilde.dugenne@mio.osupytheas.fr)

**CYTOBASE**



Create Inputs folder

Metadata

Data

Warning:

Upload successful

Project and samples context		Raw data	Size conversion																																																	
Project	Project date	PI	Cytometer ID																																																	
Enter project name	2015-08-18	Enter PI name	Enter cytometer ID																																																	
Station	Depth	Latitude	Longitude																																																	
Filename model																																																				
Filename	BERRE_082013_3F_FLR9 2013-12-17 13l																																																			
Samples operator	Standards reference	Clustering method	Observation type																																																	
Enter name of operator	Enter standards beads ref	Automated	In situ																																																	
<table border="1"> <tbody> <tr><td>2013-12-17T14:17:00Z</td><td>2013-12-17T14:17:00Z</td><td>16,056.60</td><td>Synechococcus</td><td>BERRE_082013_12S_FLR9 2013-12-17 14u17.cy</td><td>1.99</td><td>FL Red</td><td>10</td></tr> <tr><td>2013-12-17T14:17:00Z</td><td>2013-12-17T14:17:00Z</td><td>16,056.60</td><td>Cryptophytes</td><td>BERRE_082013_12S_FLR9 2013-12-17 14u17.cy</td><td>1.99</td><td>FL Red</td><td>10</td></tr> <tr><td>2013-12-17T14:43:00Z</td><td>2013-12-17T14:43:00Z</td><td>16,056.61</td><td>Beads 2 mu</td><td>BERRE_082013_16F_FLR9 2013-12-17 14u43.cy</td><td>2.04</td><td>FL Red</td><td>10</td></tr> <tr><td>2013-12-17T14:43:00Z</td><td>2013-12-17T14:43:00Z</td><td>16,056.61</td><td>Microphytoplankton</td><td>BERRE_082013_16F_FLR9 2013-12-17 14u43.cy</td><td>2.04</td><td>FL Red</td><td>10</td></tr> <tr><td>2013-12-17T14:43:00Z</td><td>2013-12-17T14:43:00Z</td><td>16,056.61</td><td>Picoplankton 2</td><td>BERRE_082013_16F_FLR9 2013-12-17 14u43.cy</td><td>2.04</td><td>FL Red</td><td>10</td></tr> <tr><td>2013-12-17T14:43:00Z</td><td>2013-12-17T14:43:00Z</td><td>16,056.61</td><td>Picoplankton 1</td><td>BERRE_082013_16F_FLR9 2013-12-17 14u43.cy</td><td>2.04</td><td>FL Red</td><td>10</td></tr> </tbody> </table>					2013-12-17T14:17:00Z	2013-12-17T14:17:00Z	16,056.60	Synechococcus	BERRE_082013_12S_FLR9 2013-12-17 14u17.cy	1.99	FL Red	10	2013-12-17T14:17:00Z	2013-12-17T14:17:00Z	16,056.60	Cryptophytes	BERRE_082013_12S_FLR9 2013-12-17 14u17.cy	1.99	FL Red	10	2013-12-17T14:43:00Z	2013-12-17T14:43:00Z	16,056.61	Beads 2 mu	BERRE_082013_16F_FLR9 2013-12-17 14u43.cy	2.04	FL Red	10	2013-12-17T14:43:00Z	2013-12-17T14:43:00Z	16,056.61	Microphytoplankton	BERRE_082013_16F_FLR9 2013-12-17 14u43.cy	2.04	FL Red	10	2013-12-17T14:43:00Z	2013-12-17T14:43:00Z	16,056.61	Picoplankton 2	BERRE_082013_16F_FLR9 2013-12-17 14u43.cy	2.04	FL Red	10	2013-12-17T14:43:00Z	2013-12-17T14:43:00Z	16,056.61	Picoplankton 1	BERRE_082013_16F_FLR9 2013-12-17 14u43.cy	2.04	FL Red	10
2013-12-17T14:17:00Z	2013-12-17T14:17:00Z	16,056.60	Synechococcus	BERRE_082013_12S_FLR9 2013-12-17 14u17.cy	1.99	FL Red	10																																													
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2013-12-17T14:43:00Z	2013-12-17T14:43:00Z	16,056.61	Picoplankton 1	BERRE_082013_16F_FLR9 2013-12-17 14u43.cy	2.04	FL Red	10																																													

Please associate each selection set to trigger, PMT's amplification and standardized phytoplankton category  
NB: All incompatible entries will be removed

Expert name	Trigger	PMT's amplification	Standardized name
Cluster	Channel/Level	SWS	Cluster
Beads 2 mu	FL Red 10		Standard beads
		FLO	

# → Consolidation

## Picture selection

Project and samples context Raw data Size conversion Image-In-Flow pictures Stations explorer

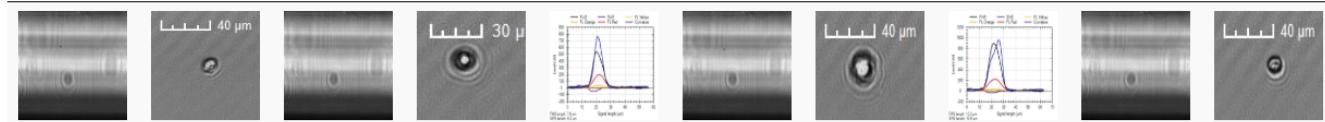
Add samples pictures

Select file DEWEXL2FLR10 2013-04-05 15u04.cyz

Add pictures Choisir les fichiers 15 fichiers Upload complete

Check all

Show 4 entries Search:



## Stations Explorer

Project and samples context Raw data Size conversion Image-In-Flow pictures Stations explorer

Select station S1

X axis Mean Total FWS

Y axis Mean Total FLR

Scatter plot

Mean Total FLR  
100k  
10k  
1000  
100  
10

Mean Total FWS  
100  
10k  
1M

- PicORED
- PicoORG
- NonaSWS
- New Set 4
- New Set 3
- NanoORG1
- NanoRed
- NanoORG2



Bordeaux, Pau, Languedoc-Roussillon-Midi-Pyrénées, Nîmes, Provence-Alpes-Côte d'Azur, Marseille, Genova, La Spezia, Ferrara, Rimini, Emilia-Romagna, Toscana, Ancona, Perugia, Grosseto, Italia, Abruzzo, Lazio, Casteddu/Cagliari, Sardinia, Comunidad Foral de Navarra, Aragón, Perpiñan, Girona, Reus, Catalunya, Barcelona, Comunitat Valenciana, Albacete, Espana.

Leaflet | © OpenStreetMap contributors, CC-BY-SA

Data Table  
Picture Table

 Download Table

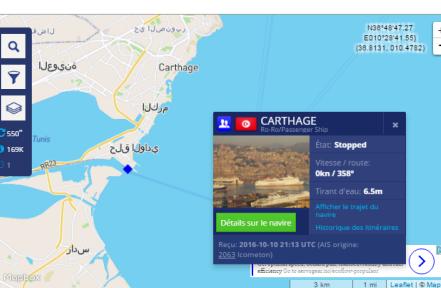
CYTObASE



# → Visualisation de Cytobase

<https://chrome.mio.univ-amu.fr/chrome-cytobase/>

**CHROME**



Continuous and High Resolution Observation of the **M**editerranean Sea

A\*Midex Institut d'Environnement Al-Marsa mio INSTM CTN

Zone d'étude (Area of Study): Mediterranean Sea - Western basin

Trajet (Transect): MRS-TUN : du 24-03-2016 au 26-03-2016

Date de début (Start Date): 23/03/2016

Date de fin (End Date): 26/03/2016

Note: Please refer to the date mentioned in "Transect"

Instruments :

- CytoSense
- Photos cellules phytoplanctoniques
- FerryBox (Données pas disponibles)

Rechercher

Copyright A\*MIDEX CHROME ©2016 | Mentions légales | Projet A\*MIDEX CHROME

**Résultats :**

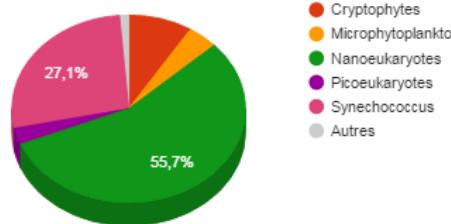
Pour le trajet de Marseille à Tunis à bord du C/F CARTHAGE  
Du 2016-03-23 au 2016-03-26

Nombre total des stations :  

- CytoSense 43

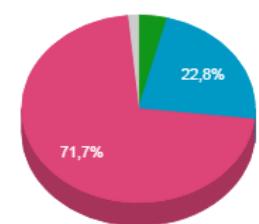
Gallerie photo:


Total Fluorescence Rouge ( $\mu\text{a}.\text{cm}^{-3}$ )



Type	Pourcentage
Cryptophytes	~7.2%
Microphytoplankton	~7.2%
Nanoeukaryotes	~55.7%
Picoeukaryotes	~27.1%
Synechococcus	~7.2%
Autres	~7.2%

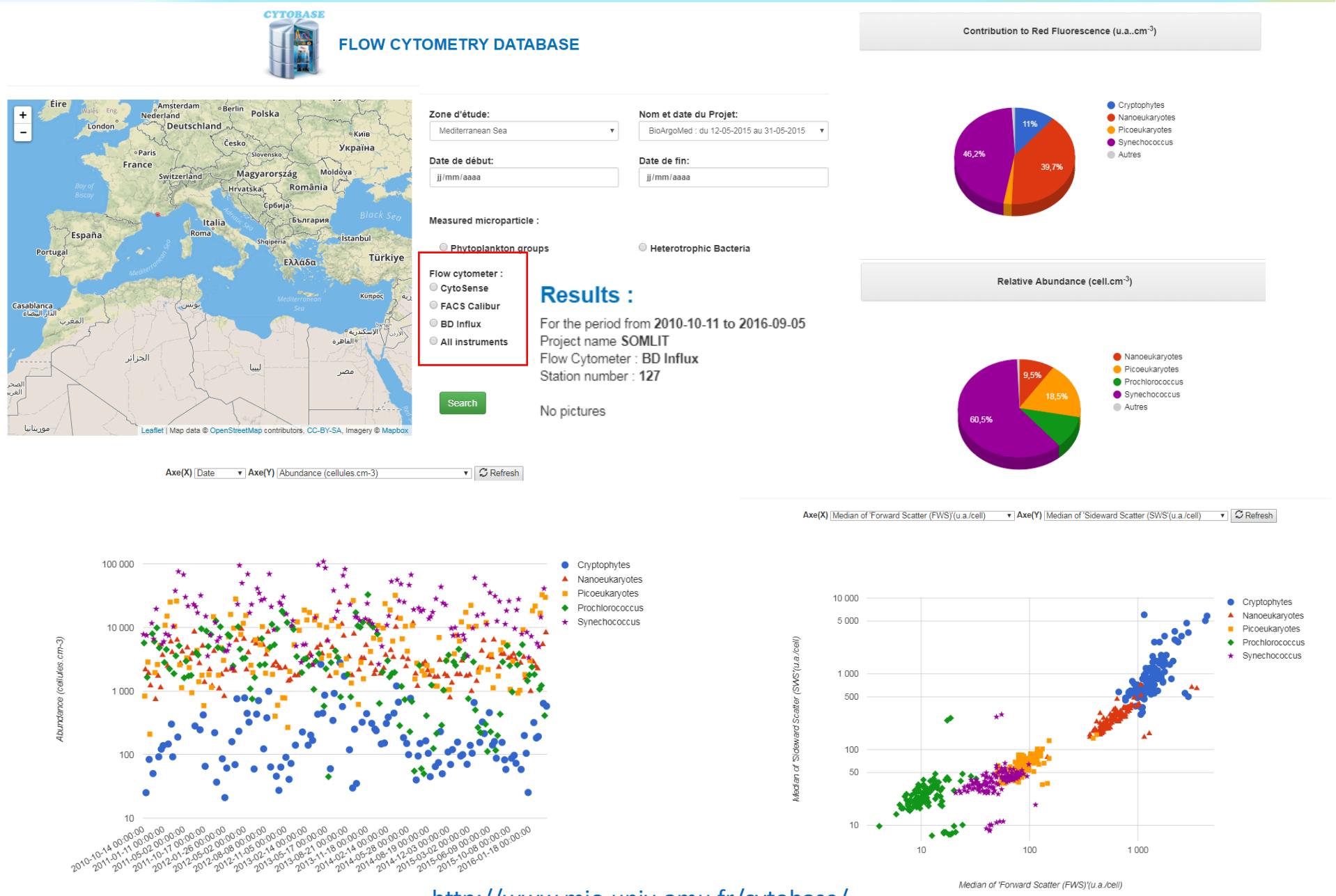
Total Abundance ( $\text{cell}.\text{cm}^{-3}$ )



Type	Pourcentage
Nanoeukaryotes	~5.5%
Prochlorococcus	~22.8%
Synechococcus	~71.7%
Autres	~5.5%



# → Intégration des données BF (Point SOMLIT)



# 4. Interopérabilité (EU)



PI: Patrick FARCY (IFREMER)



PI: Michèle FICHAUT (SISMER/IFREMER)

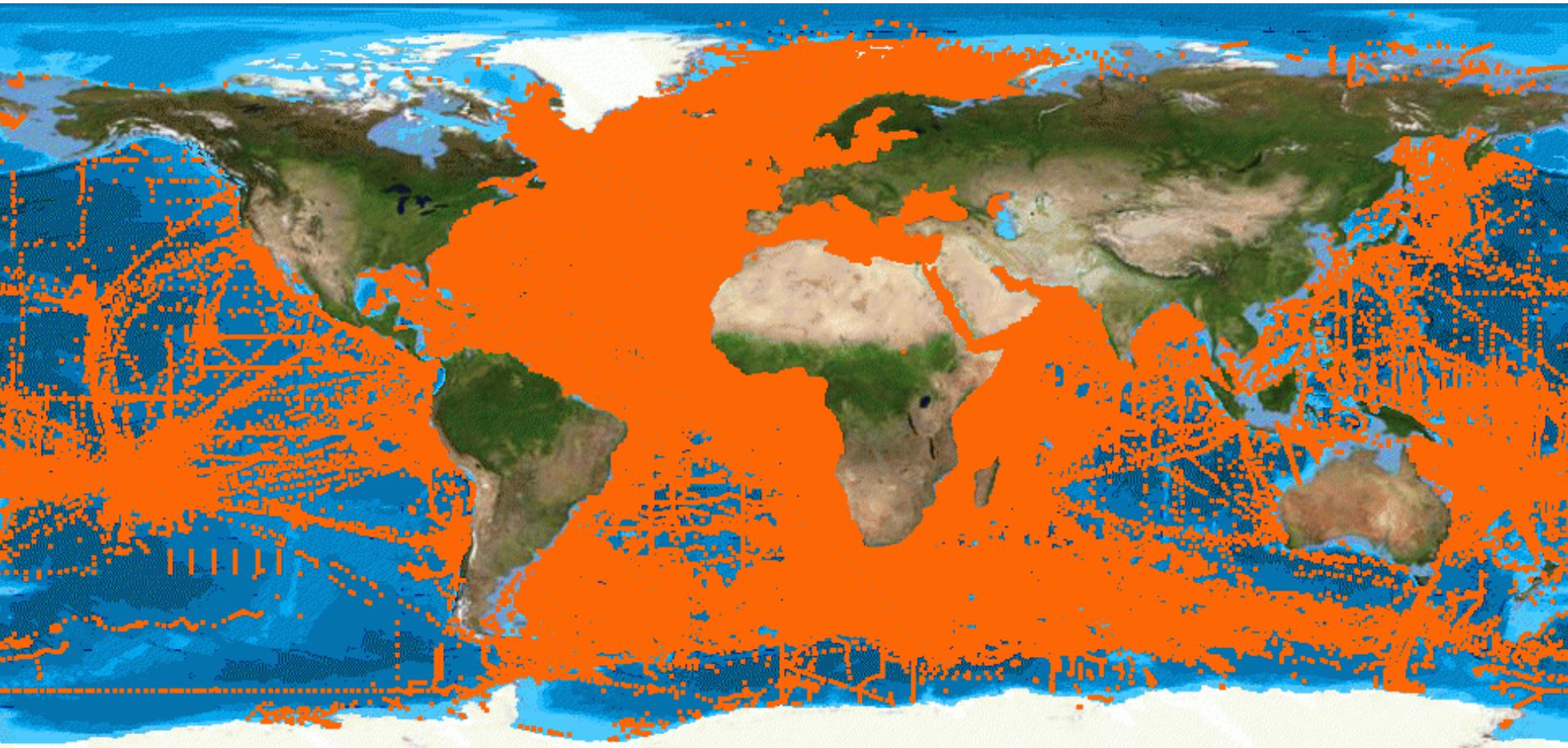
**Task 3.1:** Automated platform  
for the observation of  
Phytoplankton diversity in  
relation to ecosystem  
services



Leader: Felipe ARTIGAS (CNRS-ULCO)

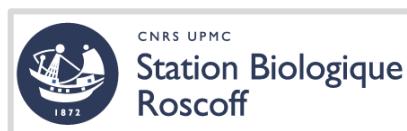
**WP9.5.2:** Ingesting, validating,  
long-term storage and access of  
Flow Cytometer data

Leaders: VLIZ, CNRS-MIO, NERC-BODC and ICES



**1.87 million CDI entries from 34 countries, 102 data centres and 597 originators for physics, chemistry, geology, geophysics, bathymetry and biology; from 1805 to 2016; 86% unrestricted or under SDN License**

# → Interopérabilité / Echange (en cours)



→ Mettre en place un **Vocabulaire commun (FCM)** standardisé

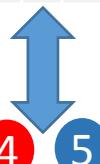


## FORMAT DOCUMENTATION

Recommended data transport format for biological data  
in the framework of SeaDataNet  
Deliverable D8.4b

ODV, MEDATLAS, NETCDF

Flag Description	ODV	GTSPP	ARGO	SEADATANET	ESAS	WOD	WOBSTATION	WOCBOTTLE	WOCCTD	WOCESAMPLE	QARTOD	BODC	PANGAEA	SMDII	OceansITES	IODE
good quality	0	1	1	1	1	0	0	2	2	2	3	blank	blank	blank	1	1
unknown quality	1	0	0	0	0	0	0	2	2	2	0	blank	*	blank	0	2
questionable quality	4	3	3	3	3	4	3	3	3	7	2	K	?	?	3	3
bad quality	8	4	4	4	4	4	3	4	4	7	1	K	?	B	4	4

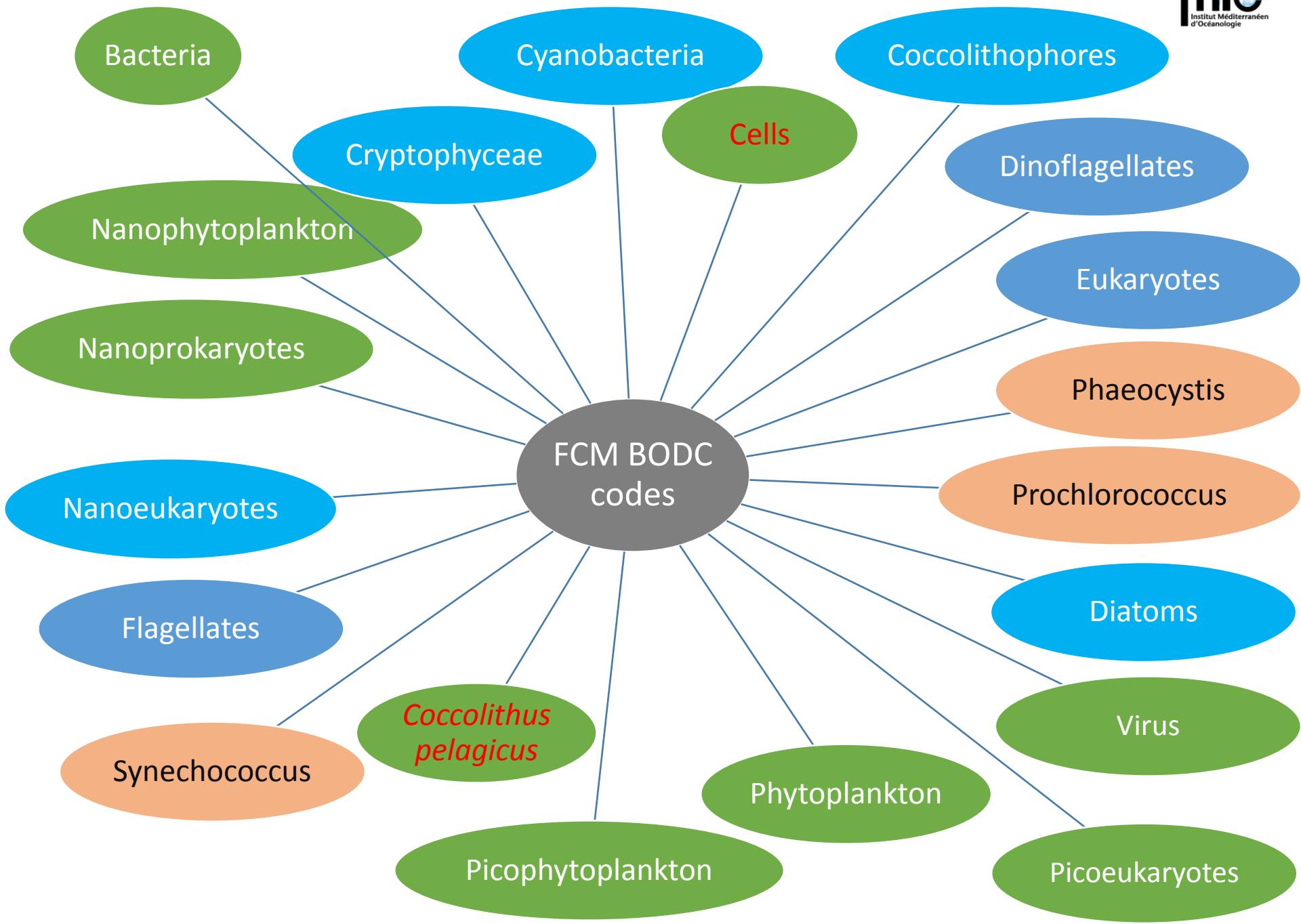


- 0 1 2 3 4 5 6 7 8 9

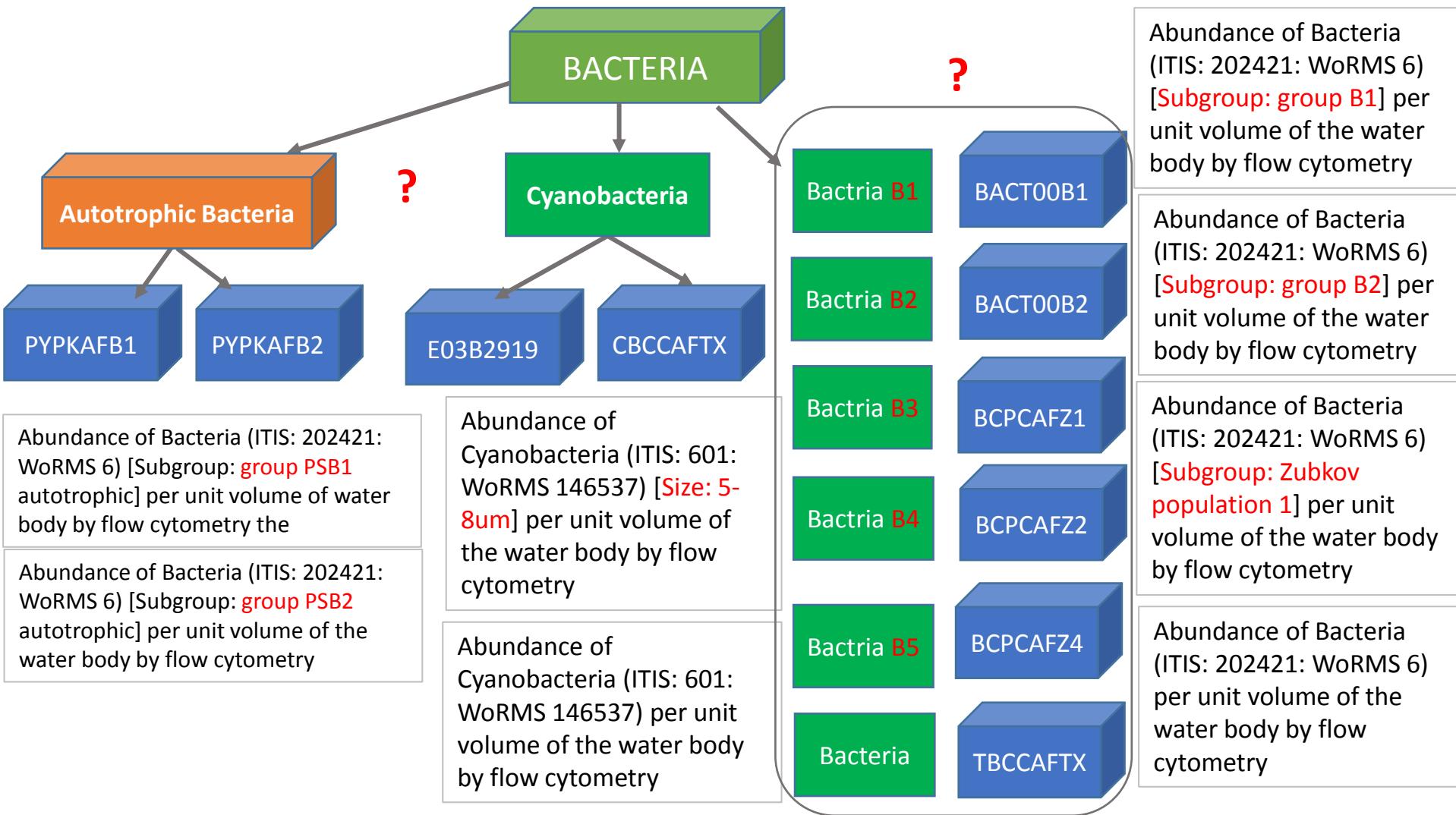
# → Construction d'un vocabulaire commun Standard

34 codes (BODC vocabulary server) existants:

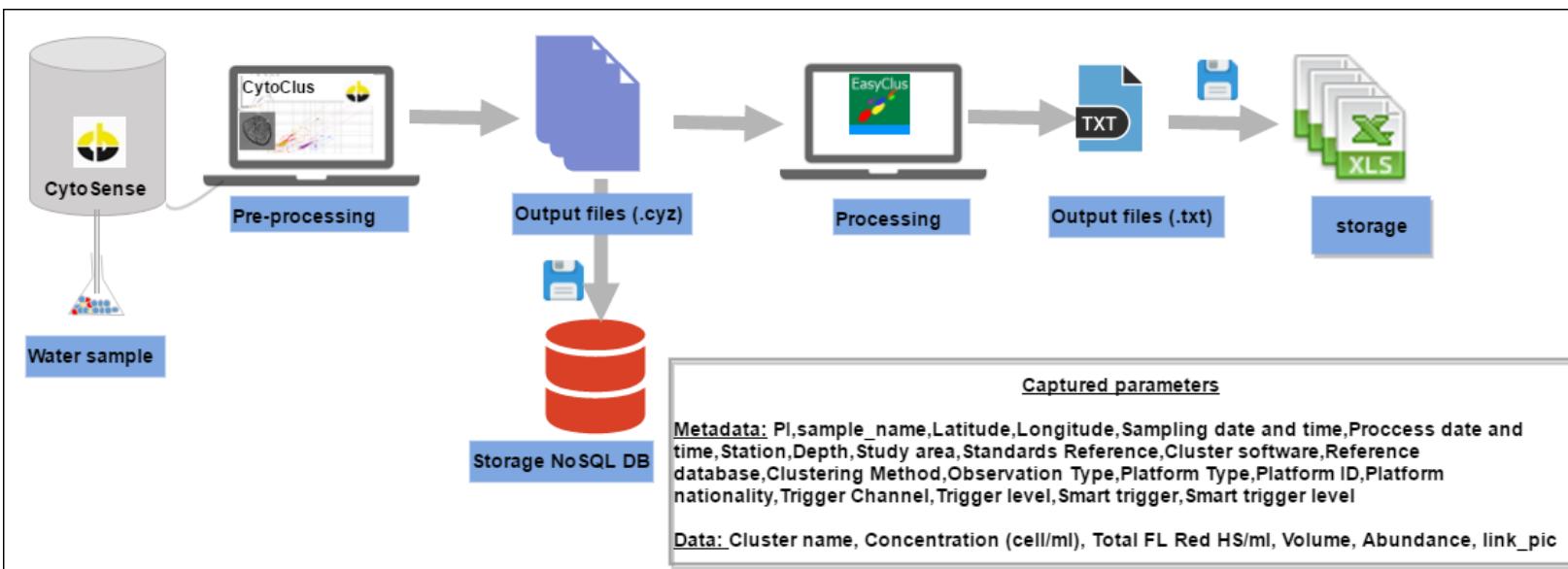
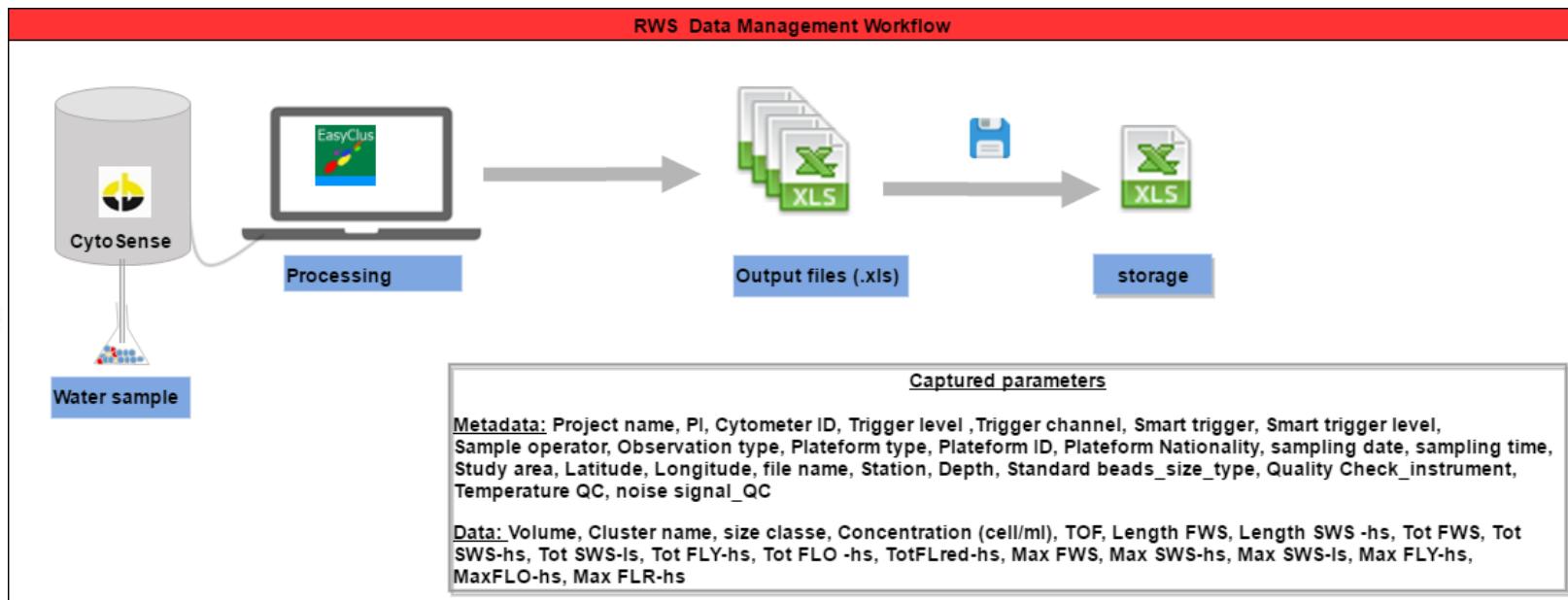
P01 (BODC Parameter Usage Vocabulary) -existing vocabulary for flow cytometry							
conceptid	preflabel	modified	altlabel	definition		Deprecate Y/N	Alternative code
PYPKAFB1	Abundance of Bacteria (ITIS: 202421: WoRMS 6) [Subgroup: group PSB1 autotrophic] per unit volume of the water body by flow cytometry	4/17/2016 15:50:07	Bact_PSB1_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.			
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_PSB2_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.			
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_BE006316	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.			
C804B6A6	Abundance of Bacteria (ITIS: 202421: WoRMS 6) [Subgroup: heterotrophic; low nucleic acid cell content] per unit volume of the water body by flow cytometry	4/17/2016 15:50:07	Abund_BE006317	Number of particles resolved as heterotrophic bacteria cells from the low nucleic acid content cluster (LNA) 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.			



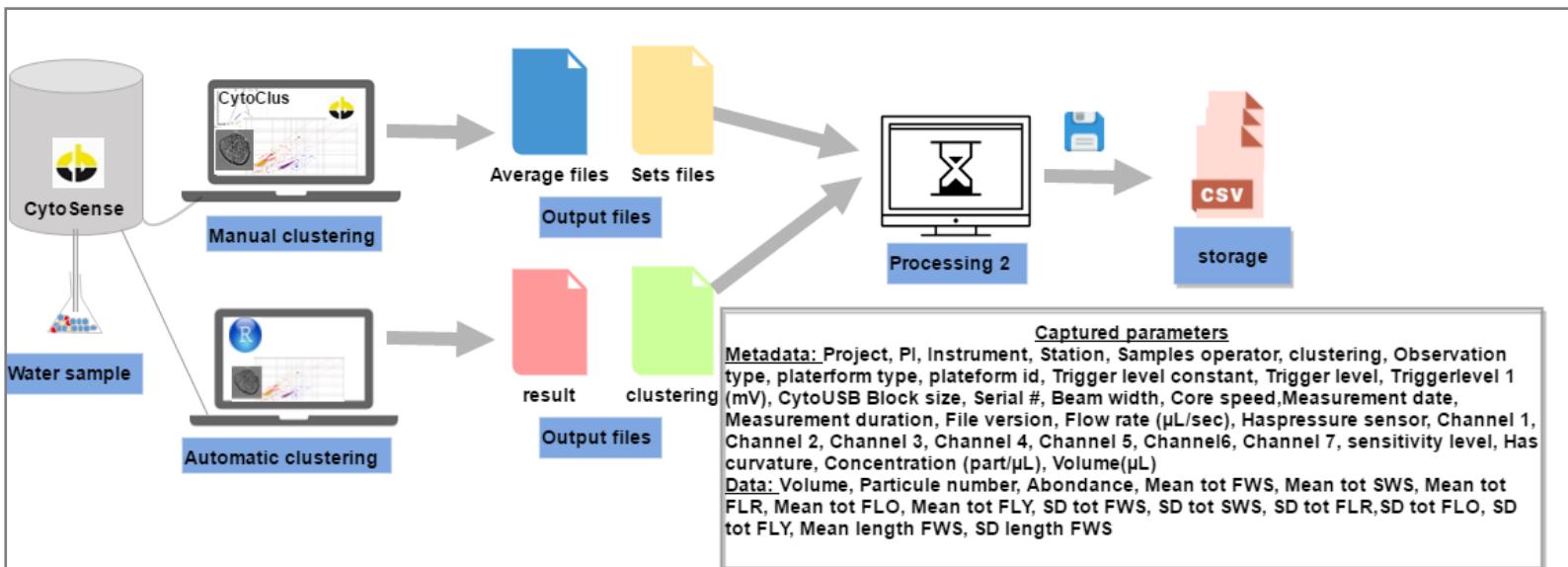
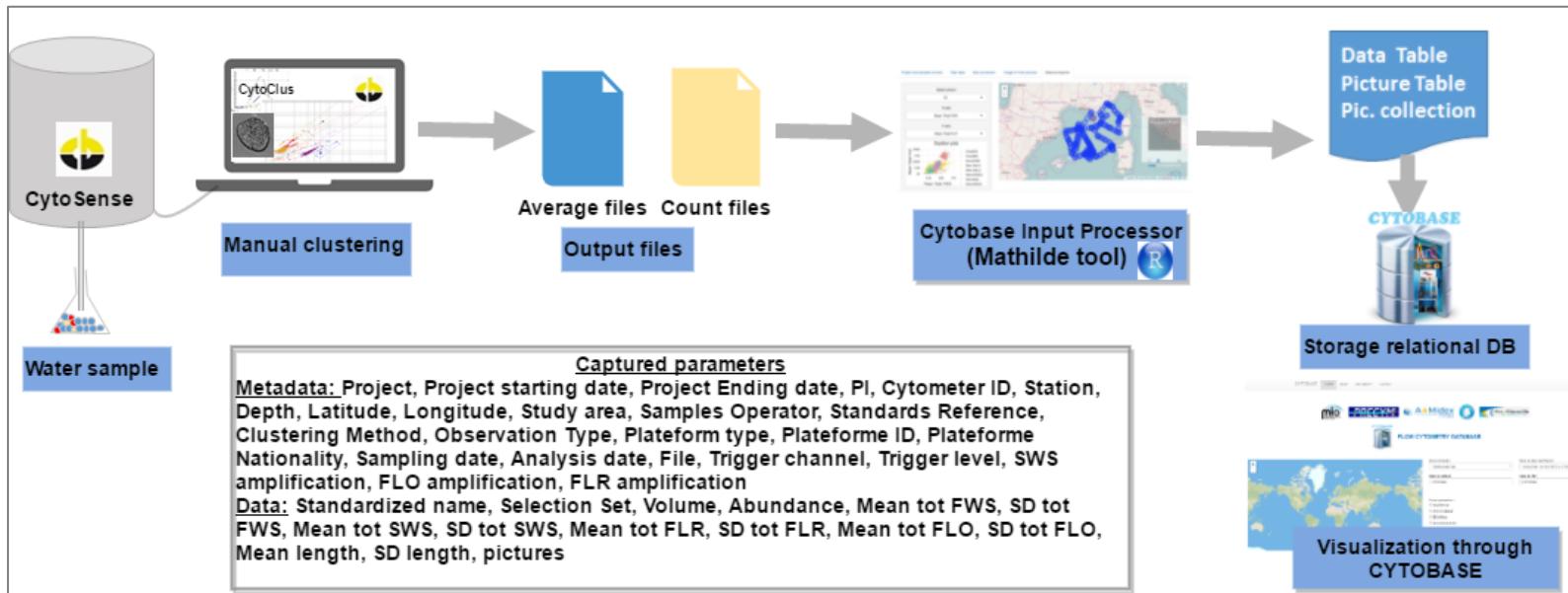
# → Analyse critique des 34 codes existants au NERC-BODC



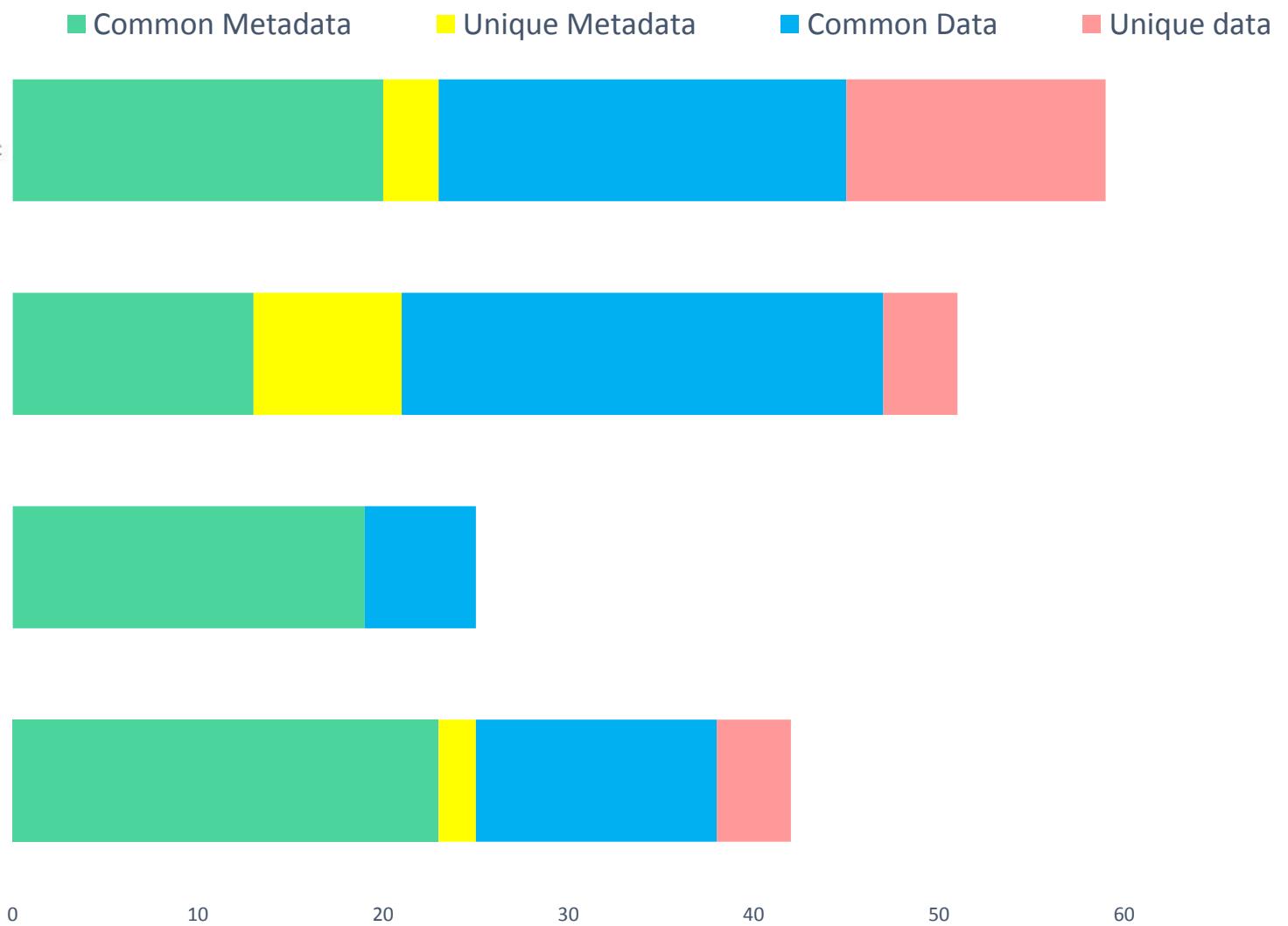
# → Exercice de construction d'un vocabulaire (HR)



# → Exercice de construction d'un vocabulaire (HR)



# → Exercice de construction d'un vocabulaire (HR)



# → Etude bibliographique de 137 articles (1983 – 2017)

Titre	Créateur	Année
Flow cytometry and cell sorting: A technique for analysis and...	Yentsch et al.	1983
Marine phytoplankton distributions measured using shipboa...	Olson et al.	1985
Discrimination between types of pigments in marine <i>Syn...	Wood et al.	1985
Effects of Environmental Stresses on the Cell Cycle of Two M...	Olson et al.	1986
Light and dark control of the cell cycle in two marine phytopl...	Vaulot et al.	1986
Effect of light on the cell cycle of a marine <i>Synechococcus</i> st...	Armbrust et al.	1989
Kinetics of bacterial processes in natural aquatic systems bas...	Button et Robertson	1989
Using phytoplankton and flow cytometry to analyze grazing ...	Cucci et al.	1989
A flow cytometric approach to assessing the environmental a...	Demers et al.	1989
Rapid analytical technique for the assessment of cell metabol...	Dorsey et al.	1989
Optical plankton analyser: A flow cytometer for plankton ana...	Dubelaar et al.	1989
Use of a neural net computer system for analysis of flow cyto...	Frankel et al.	1989
Change in Photosynthetic Capacity over the Cell Cycle in Lig...	Gerath et Chisholm	1989
Photobiology of natural populations of zooxanthellae from t...	Lesser	1989
Discrimination of eukaryotic phytoplankton cell types from li...	Olson et al.	1989
Optical plankton analyser: A flow cytometer for plankton ana...	Peeters et al.	1989
Flow cytometry and phytoplankton	Phinney et Cucci	1989
Algorithm to estimate cell biovolume using image analyzed ...	Sieracki et al.	1989
Role of light and the cell cycle on the induction of spermato...	Armbrust et al.	1990
The Rapid Analysis of Single Marine Cells by Flow Cytometry ...	Burkhill et al.	1990
DNA polymorphism within the WH7803 serogroup of marine...	wood et Townsend	1990
Flow cytometric determination of phytoplankton DNA in cult...	Boucher et al.	1991
High-density photoautotrophic algal cultures: Design, constr...	Javanmardian et Palsson	1991
Survival of <i>Aeromonas salmonicida</i> in lake water.	Morgan et al.	1991
Phycoerythrins of Marine Unicellular Cyanobacteria. I.Bilin ty...	Ong et Glazer	1991
Growth and cell cycle of two closely related red tide-forming ...	Partensky et al.	1991
The picoplankton in Antarctic lakes of northern Victoria Land...	Andreoli et al.	1992
VERTEX: biological implications of total attenuation and chlo...	Broenkow et al.	1992
Interactions between marine bacteria and dissolved-phase an...	Button et al.	1992
Prochlorococcus marinus nov. gen. nov. sp.: an oxyphototro...	Chisholm et al.	1992
Analyzing multivariate flow cytometric data in aquatic scienc...	Demers et al.	1992
Evaluation of photosynthetic capacity in phytoplankton by fl...	Furuya et Li	1992
Quantifying heterogeneity: flow cytometry of bacterial cultur...	Kell et al.	1992

- 
1. Les groupes les plus identifiés
  2. Les définitions des groupes
  3. Les paramètres les plus mesurés
  4. Les capteurs les plus utilisés

# → Questionnaire (à envoyer très bientôt)

## 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](#)

## Part I: Groups definition from the FCM point of view

Based on litterature from 1983 to 2017, do you agree on these group definitions:

### • **Prochlorococcus**

Prochlorococcus are defined as the smallest cyanobacteria found in marine environment. No staining is required to distinguish them by flow cytometry. FWS and FLR signatures are the smallest recorded up to now and require sensitive PMT or high powered lasers. The cluster, when well defined (often deep water communities) is below or may overlap that of Synechococcus group, and is often partially masked by the instrument background noise. In samples stained for Heterotrophic bacteria analysis, Prochlorococcus can be distinguished using Sideward Scatter (SWS) vs Chlorophyll Red Fluorescences (FLR) cytogram. They do not emit orange fluorescence because they lack phycoerythrin.

Check any that apply

- I agree
- I do not agree

### • **Synechococcus**

They are unicellular photosynthetic Cyanobacteria with flow-cytometry forward-scatter (FWS) and sideward scatter (SWS) signatures that are larger than those of most of marine heterotrophic bacteria. No staining is required to distinguish them by flow cytometry. The related cluster has higher FWS and red fluorescence (FLR) signatures than Prochlorococcus and a distinct orange fluorescence (FLO) signature from their phycoerythrin accessory pigment when excited by lasers whose wavelength is below 533 nm. Cyanobacteria may contain phycocyanin, excited by a red laser and emitting above the chl a emission wavelength. The Synechococcus cluster is well resolved in red vs green (FLR/FLG) and in red vs orange fluorescences (FLR/FLO) cytogrammes. Due to their small size (0.8-1.2  $\mu\text{m}$ ) as reported in the literature, Synechococcus cells exhibit low intensity FWS, SWS and FLR signals.

Check any that apply

- I agree
- I do not agree

### • **Eukaryotes Picophytoplankton**

The common definition of this group is size dependent; i/e <2-3  $\mu\text{m}$ . No staining is required to distinguish them by flow cytometry. The smallest known eukaryotic picophytoplankton is Ostreococcus. Eukaryotic picophytoplankton exhibits a well defined flow cytometry signature, with FWS and FLR signals larger than that of Prochlorococcus and Synechococcus, and smaller than that of nanophytoplankton cells, though some overlap may happen. The FWS signal of 2  $\mu\text{m}$  beads is widely used as an optical standard to localize this group. It is important to keep in mind that cell cycle within this group may generate cells with size > 2  $\mu\text{m}$  (2-4  $\mu\text{m}$  in

# 5. Conclusion

- Construction d'un vocabulaire commun (FCM)
- CYTOBASE et SOMLIT (pico-nano) => Bancarisation, Visualisation
- Interopérabilité avec les Infrastructures EU → Visibilité et les échanges
- Adopter les bonnes pratiques: Données Physico-chimiques et Biologiques
- Participer au questionnaire

**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](#)

Merci pour votre attention.

Des questions?







**SeaDataNet**

**PAN-EUROPEAN INFRASTRUCTURE  
FOR OCEAN & MARINE DATA  
MANAGEMENT**

*SDC Kick-off meeting, Riga, Nov. 30 – Dec. 1, 2016*

- 56 partners from 29 countries
- 5 subcontractors from 5 countries
- Total of 32 countries





## PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

SDC Kick-off meeting, Riga, Nov. 30 – Dec. 1, 2016



# SeaDataNet metadata directories (1)

## EDMO Organisations

The screenshot shows the 'EDMO' section of the SeaDataNet portal. It displays the organization details for IFREMER/Centre de Brest, including its name, address, phone number, and website. Below this is a map of the Bretagne region in France, specifically highlighting Brest. A sidebar on the left lists other organizations.

The screenshot shows the 'CSR' section of the SeaDataNet portal. It displays a list of cruise entries, each with a title, date, and a small thumbnail image. A pink arrow points from the EDMO interface above to this CSR interface.

## CSR Research cruises

## EDMERP Projects

The screenshot shows the 'EDMERP' section of the SeaDataNet portal. It displays a list of projects, each with a title, description, and a small thumbnail image. A pink arrow points from the EDMO interface above to this EDMERP interface.

## EDIOS Observing programmes

The screenshot shows the 'CDI' section of the SeaDataNet portal. It displays a map of the world with various observing programs overlaid. Below the map is a table listing datasets, including their names, descriptions, and administrative dimensions. A pink arrow points from the EDMERP interface above to this CDI interface.

## CDI Data index

The screenshot shows the 'EDMED' section of the SeaDataNet portal. It displays a list of data sets, each with a title, description, and a small thumbnail image. A pink arrow points from the CDI interface above to this EDMED interface.

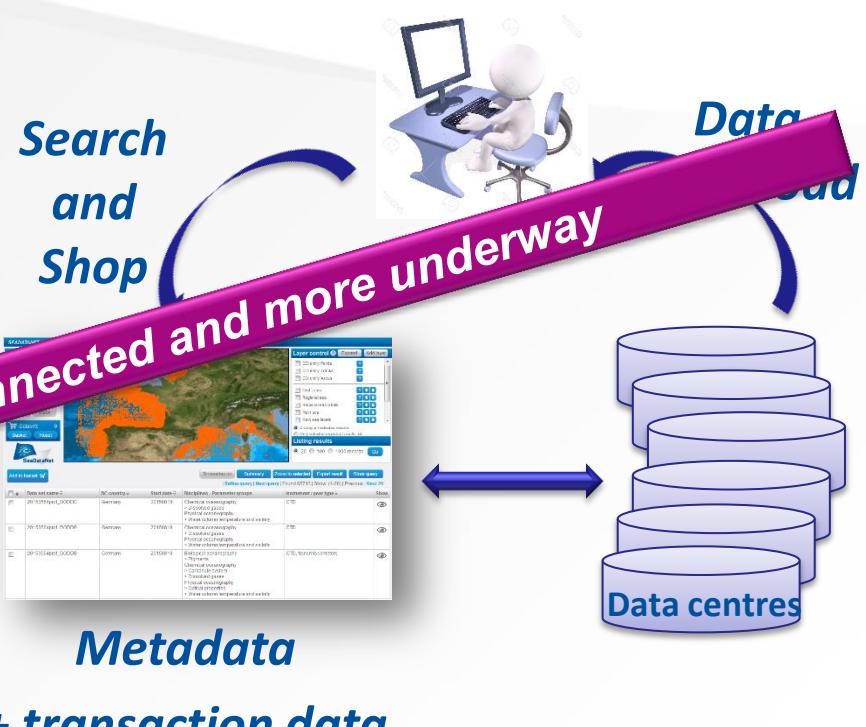
## EDMED Data sets



## CDI service for discovery and unified data access



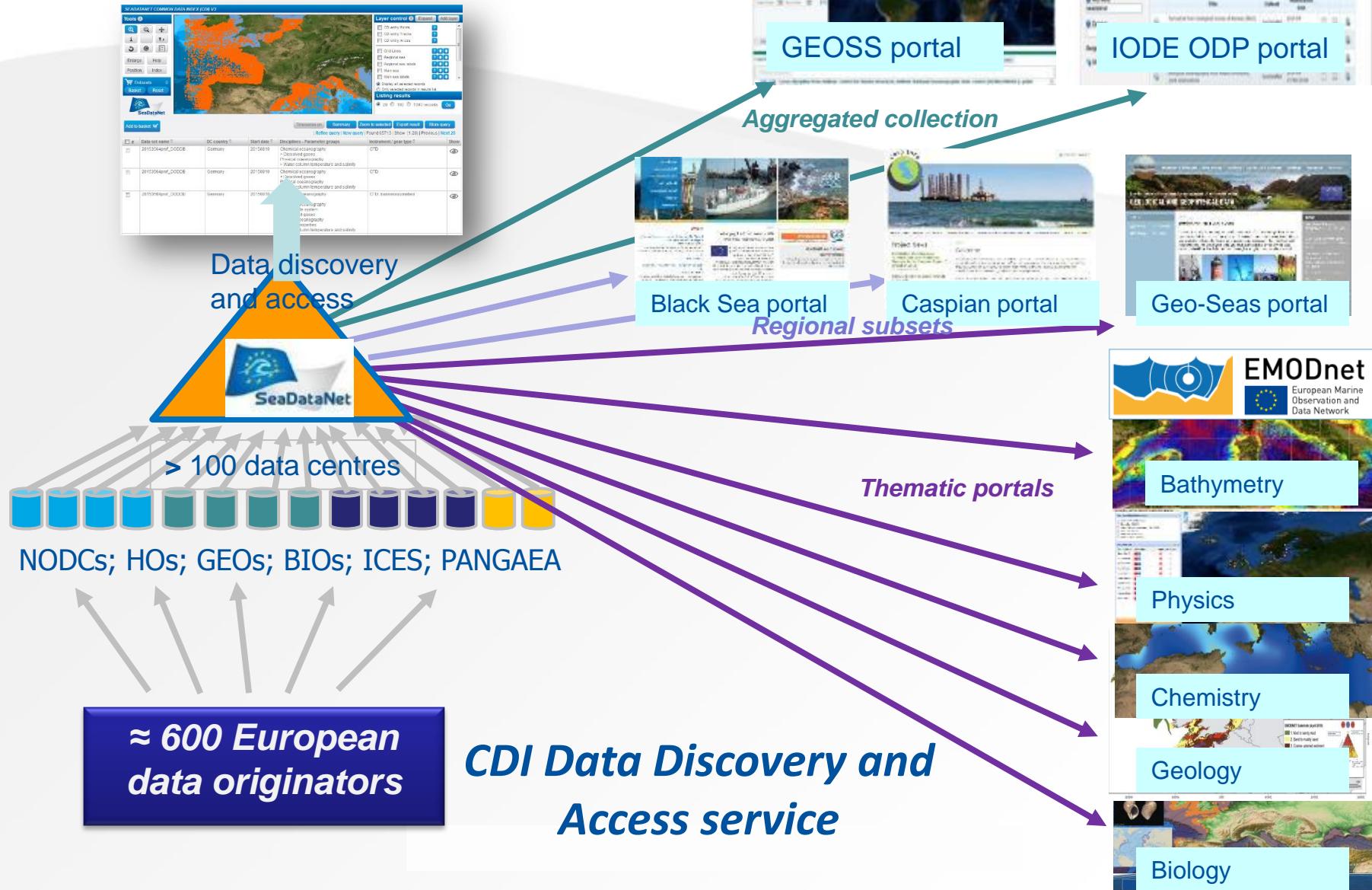
*European data sources*  
data centres ← ≈ 600 originators





PAN-EUROPEAN INFRASTRUCTURE  
FOR OCEAN & MARINE DATA  
MANAGEMENT

**SeaDataNet**



# Steps1: Build standard vocabularies

M.I.O	VLIZ	ULCO	RWS
Captured PARAM	Captured PARAM	Captured PARAM	Captured PARAM
Project		Project	Project name
Project starting Date			
Project ending Date			
Person of Interest	Person of interest	Person of interest	Person of interest
Cytometer ID		Serial#	Cytometer ID
		Beam width	
		Core speed	
		Instrument name	
		CytoUSB Block size	
			Quality check instrument
			Temperature QC (instrument)
			noise signal QC (instrument)
Station	Station	Station	Station
Depth	Depth		Depth
	Smart trigger		Smart trigger
	Smart trigger level		Smart trigger level
Standardized name			
Selection Set name	Cluseter name		Particle set
Volume	Volume	Volume	Volume
Abundance (cell/cm-3)	Abundance (cell/cm-3)	Abundance (cell/cm-3)	Abundance (cell/cm-3)
		Particule number	
Mean Total FWS_varx1			
SD Total FWS_varx2		Mean tot FWS	
Mean Total SWS		SD tot FWS	
SD Total SWS		Mean tot SWS	
Mean Total FLR		SD tot SWS	
SD Total FLR		Mean tot FLR	
Mean Total FLO		SD tot FLR	
SD Total FLO		Mean tot FLO	
		SD tot FLO	
		Mean tot FLY	
		SD tot FLY	
		Mean length FWS	
		SD length FWS	Length FWS
			Length SWS