From Coastal to Open Sea observations

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Workshop "Interoperability of Technologies and Best Practices: *in situ* applications to nutrient and phytoplankton fluorescence measurements"

Brest, 4-6th December, 2018
Ifremer Centre de Bretagne - France

It is a fundamental requirement when investigating major issues like global change to be absolutely confident in the data sets that are being compared. Thus, reliable phytoplankton and nutrient data are a prerequisite for a trustworthy assessment of marine systems trophic state, and relative evaluations of "good ecological status". Due to their fundamental role, significant effort has gone into developing techniques and methodologies that assess nutrient concentrations and phytoplankton distribution, biomass, composition and productivity. However, even if developments and research are still expected to progress, it has become obvious that we are now facing a diversity in the techniques and methodologies to quantify nutrient concentrations and phytoplankton biomass. With a growing use of *in situ* sensors, quality control and calibrations in accordance to reference laboratory methods are essential.

Marine community is starting to progress towards harmonization of technologies and operating practices relating to similar measurements. In that context, the ATLANTOS project and the JERICO-RI consortium are jointly organize this workshop. The goal is to improve the level of interoperability for *in situ* nutrient measurements and chlorophyll-fluorescence observations. The workshop builds on the results of previous interoperability workshops.

It is organized in 2 parts as it follows:

- Sharing experience on nutrient measurements in the laboratory and *in situ*, Best Practices measurements (Part 1).
- Automated chlorophyll fluorescence observations: needs for metrology, harmonized archiving and flow of the data towards EU channels (Part 2).

Expected outcomes

Part 1: Best practices for nutrient measurements

- Review of Best Practices in terms of reference measurements (in laboratory) and in terms of *in situ* measurements with nutrient sensors
- A position paper on Best Practices from feedback on the use of the various *in situ* nutrient sensors available on the market or developed by industry and research institutes

Part 2: Best practices for chlorophyll fluorescence observations

A white paper including:

- Fluorometer characteristics and their primary calibration: what are the primary optical properties the different sensors are detecting, how the sensors should be calibrated, how comparable data is obtained with sensors having different optical designs? Status, needs and gaps.
- Steps in quality control of the in situ measurements: synthesis of the gaps and needs in QC, field validation and metrology, with special focus on the need of reference materials.
- Harmonization of the optical biological data flow: the state of the art of the optical biological data flow through the European channels (EMODNET BIO, EurOBIS, SeaDATAcloud): Practices and how to, gaps and needs, strategy on short, medium and long term.

Total number of targeted attendees in plenary parts

- Participants: maximum 40/ maximum 20 in each part.
- Academic researchers, engineers and SMEs.

Organisation

This workshop is jointly organised by:

- The Joint European Research Infrastructure Network for Coastal Observatories (JERICO-RI, http://www.jerico-ri.eu) is a solid and transparent European system of systems dedicated to provide operational services for the timely, continuous and sustainable delivery of high quality environmental data and information products related to marine environment in European coastal seas.
- ATLANTOS (Optimising and Enhancing the Integrated Atlantic Ocean Observing Systems, https://www.atlantos-h2020.eu/) is a research and innovation project that proposes the integration of ocean observing activities across all disciplines for the Atlantic, considering European as well as non-European partners.

Organisers: Ingrid Puillat, Laurent Delauney, Anne Daniel, Agathe Laës-Huon, Chantal Compère, **Ifremer**; Rajesh Nair, **OGS**; Wilhelm Petersen, **HZG.**

Scientific Committee for the nutrient Session (part 1) organised by AtlantOS: Naomi Greenwood**, CEFAS,** Eric Achterberg, **GEOMAR**, **AtlantOS Partners**.

Scientific Committee for the phytoplankton session (part 2) organised by JERICO-NEXT project: Jukka Seppälä, **SYKE;** Felipe Artigas, **CNRS-LOG**, Klaus Simon, **VLIZ**, Naomi Greenwood**, CEFAS** (to be confirmed), Rodney Forster, **Univ. of Hull.**

Main sponsors: AtlantOS for the nutrient part – JERICO-NEXT for the phytoplankton fluorescence part.

Program and agenda

Part 1: Nutrient measurements: how to implement laboratory good practices to the *in situ* sensors utilization?

Objective: The aim of this workshop is to review the best practices applied to nutrient measurements in the laboratory context to determine what to apply to *in situ* instrumentation. This workshop promotes learning on quality procedures implemented to the laboratory reference methods to extract elements essential for the qualification of the *in situ* nutrient data sets. The goal is to propose methods which can be easily used and adopted by several organizations.

Tuesday 4th December

Morning session (9:00-13:00, IPEV meeting room, 1st floor): Session 1: Presentation of Continous Flow Analysis (CFA) reference method and best practices implemented for the nutrient measurements in the laboratory

Chairperson: *Eric Achterberg (Geomar)*

9h00	1. Welcome, introduction, objectives, logistics
9h10	2. Chemical principles and performances of the nutrient CFA reference method. Methodological limitations: sample storage, contaminations, salt effect (Karel Bakker, NIOZ)
9h40	3. Use of SCOR-JAMSTEC CRMs to properly guarantee comparability of data from different laboratories and revision of the GO-SHIP nutrients manual (Malcolm Woodward, PML)
10h10	4. European intercomparison exercises by Quasimeme (Marc Knockaert, Quasimeme)
10h40	***Coffee Break***
11h10	5. Protocol for method performance assessment and uncertainty determination in the laboratory ; experience feedback on the normative aspects and accreditation (Anne Daniel, Dominique Munaron, Ifremer)
11h40	6. Assessing the performances of devices for *in situ* monitoring of nutrients in rivers: standardized protocols and feedback from an Aquaref study. (AQUAREF representatives, Nathalie Guigues and Bénédicte Lepot)
12h10	7. Requirements for nutrient meta data reporting (to be confirmed, Ifremer)
12h40	8. Discussion

Lunch time (Salon de la Rade)

Afternoon session (14:00-17:30, Dyneco Laboratories): **Session 2: Reference laboratory methods "practices"**

Chairperson: *Anne Daniel, Agathe Laës-Huon (Ifremer)*

Measurements of nutrients with segmented flow analyser in laboratories (Ifremer) 2 groups, maximum: 8-10 persons in each group, only workshop participants. Preparation of calibration solutions, use of CRMs, control charts, determination of blank values, salt effect, etc.

Wednesday 5th December

Morning session (9:00-13:00, IPEV meeting room, 1st floor): Session 3: *In situ* nutrient measurements "protocols presentation".

Chairperson: *Rajesh Nair (OGS), Naomi Greenwood (CEFAS)*

9h00 1. *In situ* measurements of nutrients (Agathe Laës-Huon Ifremer)

9h15 2. Flash presentations of nutrient sensors commercially available or developed for research projects: (measurement principle, figures of merits, interferences, power supply, deployment feedback)

- Wiz sensor (SME Systea) - Orianne Jolly, Caen University Fr
-UK Lab-on-a-Chip sensor (NOCS) - Alex Beaton, NOCS
- ANESIS sensor - Carole Barus Legos Fr
- Chemini sensor (Ifremer) - Dominique Munaron, Ifremer Fr

10h30 ***Coffee Break***

Topic review (all sensors users) :

11h00 3. Pre and Deployment experience: types of environment, mode, length of deployment, sampling frequency, self-calibration life, maintenance, biofouling, reagent storage, other…(Facilitator Carole Barus)

11h30 4- Post-deployment phases: data transmission (real time…), signal treatment, interoperability, post maintenance, quality control (Facilitator Alex Beaton)

12h00 5- How to select the right sensor and for which application? TRL, technical barriers to advancement or modification, multiple plug and play sensors, next generation of sensors (Facilitator to be confirmed)

12h30 6- Discussion

Lunch time (Restaurant Ifremer)

Afternoon session (14:00-17:30, RDT/LDCM Laboratory): Session 4: *In situ* nutrient measurements "Practices"

Chairperson: *Anne Daniel, Agathe Laës-Huon (Ifremer)*

Use of several nutrient sensors (Chemini, WIZ, SUNA, NOCS Lab on Chip, ANESIS): pre-deployment, deployment of sensors and post-deployment – 2 groups 8-10 persons in each group, only workshop participants

Dinner (Restaurant in Brest town Center)

Thursday 6th December

Morning and afternoon (9:00-16:00, IPEV meeting room, 1st floor): **Session 5: *In situ* nutrient measurements, interactive discussion**

Chairperson: *AtlantOS and JERICO-NEXT leader of work packages + other partners*

Debriefing of Tuesday and Wednesday sessions

10h30	***Coffee Break***
13h00	***Lunch time (Salon de la rade)***

Preparation of a draft white paper to express the expectations and a roadmap for future
Conclusions and way forward

Part 2 – Chlorophyll fluorescence observations

Wednesday 5th December

Afternoon session (14:00-16:00, Salon de l'Océan): Session 1: Instrument characteristics and their primary calibration (2h)

Objective: Provide a description of the different technologies and sensors and which optical properties they are detecting. Discuss how the sensor primary calibration should be conducted, to obtain as comparable data as possible, when using different technologies. Discuss the pros-and cons of the different calibration protocols. Preparation of a draft white paper

Chairperson: *Laurent Delauney (Ifremer) and Florence Salvetat (Ifremer)*

1. Welcome, introduction to JERICO-NEXT and AtlantOS, (Ingrid Puillat, Ifremer, 10 min)
2. Introduction to workshop objectives (Laurent Delauney, Ifremer ,5 min)
3. State of the art: Synthesis presentation (Jukka Seppälä, SYKE, 20 min)
4. Presentation of sensor characteristics
   – CHELSEA (John Attridge, 15 min)
   – BBE MOLNDAENKE (Christian Moldaenke, tbc, 15 min)
   – VALEPORT Ltd. (Jim Gardiner, tbc, 15 min)

Discussion (30 min)

Afternoon session (16:00-17:30, Salon de l'Océan): Session 2: Steps in quality control of the in situ representativeness of the measurements (1,5 h)

Objective: Provide an outline for QC actions for in situ measurements. Discuss which types of reference materials may be used in in situ QC. Discuss why the reference materials are needed in field quality control. What are the specific needs of each technology? How the QC of sensors will help in field validation of data. Discuss on expectation versus possibilities.

Chairperson: *Jukka Seppälä (SYKE)*

1. State of the art: Synthesis presentation (Jukka Seppälä, SYKE, 20 mins)
2. 4 Flash presentations for QC actions
   - Steps in Quality Control of the in situ representativeness of the measurements (Eva Alou, SOCIB, 10 min.)
   - Quality control in Algaline ferrybox fluorescence data (Jani Ruohola, SYKE, 10 min.)
   - *Presentation title TBD* (Kai Sorensen, NIVA, 10 min.)
   - *Presentation title* TBD (Alain Lefebvre, Ifremer, & F. Artigas, CNRS-LOG, 10min)
3. Discussion and preparation of a white paper: expectation versus possibilities, the provider position (facilitators Ingrid Puillat, Ifremer, Laurent Delauney, Ifremer, Jukka Seppälä, SYKE, 40 mins)

Dinner (Restaurant in Brest town Center)

Thursday 6th December

Morning session (9:00- 11:00, Salon de l'Océan): Session 3: Harmonisation of the optical biological data flow

Objective: Taking into account input of sessions 1 and 2, how to improve the harmonization of the optic biological data and metadata flow? Needs of the users: expectation from the modeling community and from the satellite one. Preparation of a draft white paper to express the expectations and a roadmap for future
Chairperson: *ETT ,*EMODNET physics *tbc*

1. Optic biological data flow: status of the harmonization and gaps : Synthesis presentation (n.n & n.n, VLIZ & ETT) 20 min)
2. Flash presentations, needs from the scientists:
   presentation 1 (nn, NN, 10 mins)
   From FB quality check to the data base: (nn, SMHI tbc, 10 min)
   presentation 3 (nn, NN, 10 mins)
3. Discussion (40 mins)

Coffee Break 30 minutes

Morning session (11:00- 13:00, Salon de l'Océan): Session 4: Writing the white paper, by gathering input from sessions 1-3. 4 pages max each section, in parallel or in serial sessions

Facilitators: Ingrid Puillat, Ifremer, Laurent Delauney, Ifremer, Jukka Seppälä, SYKE,

1. Organizing ourselves to write a white paper: Needs, technical possibilities, pitfall and way forward (30 mins)

2. Group work, writing the white paper, by gathering input from sessions 1-3. 4 pages max each section, in parallel or in serial sessions, 1h 30 mins)

13h00 ***Lunch time (Salon de la rade)***

Afternoon session (14:00- 16:00, Salon de l'Océan): Session 4 continued: Writing the white paper, by gathering input from sessions 1-3. 4 pages max each section, in parallel or in serial sessions

3. Group work, writing the white paper, by gathering input from sessions 1-3. 4 pages max each section, in parallel or in serial sessions (1h mins)
4. Presenting the group work, discussion (45 mins)
5. Conclusions and way forward (Ingrid Puillat, Ifremer, Laurent Delauney, Ifremer, Jukka Seppälä, SYKE, 15 mins)

At a glance

	Tuesday 4th	Wednesday 5th		Thursday 6th	
Morning 9:00-13:00	**Part 1, Session 1:** Nutrient measurements in laboratory. Best Practices and theory ***IPEV meeting room, 1st floor***	**Part 1, Session 3:** *In situ* nutrient measurements, Theory and deployment example ***IPEV meeting room, 1st floor***		**Part 1, Session 5**: Discussion and preparation of the draft white paper ***IPEV meeting room***	**Part 2, Session 3:** Harmonisation of the optical biological data flow ***Salon de l'Océan***
13:00-14:00	Lunch ***salon de la Rade***	Lunch ***Ifremer Restaurant***		Lunch ***salon de la Rade***	
Afternoon 14:00-17:30	**Part 1, Session 2:** Nutrient measurements in laboratory: Practices ***Dyneco laboratories***	**Part 1, Session 4:** *In situ* nutrient measurements: Practices ***Research and technology laboratory***	**Part 2, Session 1:** Instrument characteristics and their primary calibration **Part 2, Session 2**: Steps in quality control of the *in situ* representativeness of the measurements ***Salon de l'Océan***	**Part 1, Session 5:** Discussion and preparation of the draft white paper Ending at 4pm ***IPEV meeting room*** ***1st floor***	**Part 2, Session 4**: Writing the white paper, by gathering input from sessions 1-3. 4 pages max each section, in parallel or in serial sessions Ending at 4pm ***Salon de l'Océan***
19h30		***Dinner (Restaurant in Brest town Center)***			

Registration

Registration is free and on a "first come - first serve" basis to welcome 40 participants at maximum, 20 participants in each group.

Registration will close as soon as the number of attendees is reached after the **7th of Nov. 2018** and not later than **the 18th Nov. 2018**.

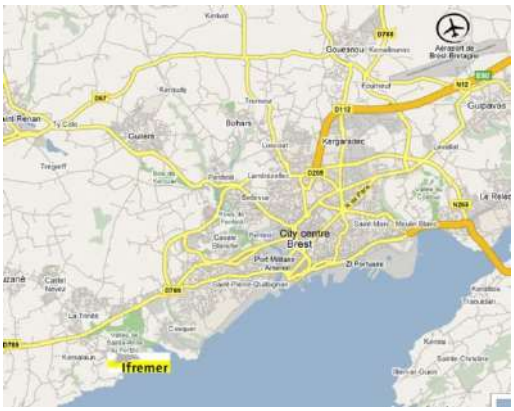
Registrations links:

For non Ifremer attendee: NON IFREMER REGISTRATION LINK HERE

For Ifremer attendee: IFREMER ATTENDEE REGISTRATION HERE

Practical information

The workshop will take place at IFREMER Institute (Technopôle Brest Iroise, Pointe du Diable, Plouzané), located less than 20 minutes away (by car) from Brest city center. The meeting will be located in the "Salon de l'océan" and "Salle de Reunion IPEV" conference rooms at IFREMER. Note that ID card must be shown at the gate entrance of IFREMER.



Airport shuttles to Brest city center: (www.brest.aeroport.fr/fr/acces/bus.html)

Airport Shuttle operates a correspondence with the tram line at the station Porte de Guipavas. This service is provided from 5:30 to 23:00, 7 days 7, all year

Taxis :

- Airport to IFREMER: about 25€ (after 7 p.m: about 30€)

- Airport to Brest center: about 15€ (after 7 p.m: about 25€)

Public transport from Brest city center to IFREMER: (www.bibus.fr)

Take the tram to the "Porte de Plouzané" terminus

Then catch bus number 13. Alight at the "Piccard" stop

Accommodation:

Name of the hotels	Address	Phone number	Website
Oceania Centre	82 rue de Siam	02.98.80.66.66	http://www.oceaniahotels.com/oceania-brest-centre.php
L'Amirauté	41 rue Branda	02.98.80.84.00	https://www.oceaniahotels.com/h/hotel-l-amiraute-brest/presentation
Les Voyageurs	2 rue Yves Collet	02.29.61.09.09	https://www.accorhotels.com/fr/hotel-A4A5-hotel-mercure-brest-centre-les-voyageurs/index.shtml
Bellevue	53 rue Victor Hugo	02.98.80.51.78	http://www.hotelbellevue.fr/
Kyriad	157 rue Jean Jaurès	02.98.43.58.58	http://www.kyriad-brest-centre.fr/fr
La Gare	2 bd Gambetta	02.98.44.47.01	http://www.hotelgare.com/
Hôtel le Continental	41 rue Emile Zola - Square de la Tour d'Auvergne	02.98.80.50.40	https://www.oceaniahotels.com/h/hotel-le-continental-brest/presentation
Abalis	7 avenue Clémenceau	02.98.44.21.86	http://www.abalys.com/
Hôtel de la rade	6 Rue de Siam	02.98.44.47.76	http://www.hoteldelarade.com/
Hôtel St Louis	6 Rue Algesiras	02.98.44.23.91	http://brest-hotel.com/
Agena	10 Frégate La Belle Poule	02.98.33. 96.00	http://agena-hotel.fr/
Hôtel Vauban	17 Avenue Clémenceau	02.98.46.06.88	http://www.hotelvauban.fr/

Main sponsors: ATLANTOS for the Nutrient part – JERICO-NEXT for the phytoplankton part