Report after the Joint WP4 & WP1 workshop, 15 March 2016, London

Joint European Research Infrastructure network for Coastal Observatory – Novel European eXpertise for coastal observaTories - **JERICO-NEXT**	
Report title	Report after the Joint WP4 & WP1 workshop, 15 March 2016, London Milestone MS4: Strategic guidelines for the implementations of the JRAPs
Work Package Title	WP4 & WP1
Deliverable number	Not a deliverable, Milestone MS4
Description	
Lead beneficiary	Ifremer
Lead Authors	I. Puillat, D. Durand, A. Gremare, B. Karlson, L. Nizzetto, A. Rubio, L. Laakso, B. Mourre,
Contributors	
Submitted by	-
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Project coordinator: Ifremer, France.

History			
Revision	**Date**	**Modification**	**Author**
1.1	31 Mar 2016	JRAP1, 5, 6	J. Seppala, B. Mourre
1.2	12-19 April 2016	JRAP 4 & 5	A. Rubio, L. Laakso
1.1	19 April 2016	Addition of delay mode comment of F. Artigas	F. Artigas, I. Puillat

Approvals				
	Name	**Organisation**	**Date**	**Visa**
Coordinator	Patrick Farcy	IFREMER		
WP Leaders	Ingrid Puillat	IFREMER		

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1 Executive Summary

This document is reporting a workshop co-organised by WP1 and WP4 of the JERICO-NEXT project (H2020) the 15th March 2016 in London. The science strategy of each JRAP was presented and discussed, as a research project.
The main objective was to provide the JRAP teams with strategic guidelines, according to the project Milestone MS4, with focus on the strengthening of cross cutting towards a multidisciplinary approach, according to the Scientific and Technical Advisory Committee (STAC) of JERICO-NEXT. The JRAPs data flow was also considered.
Here after are the guidelines and statement of decisions.

JRAP #. Decision #	What?	Who?	When?
1.1	Check with JRAP3 and WP3, task 3.4, how to organise cross cutting actions: time, place and what	Bengt, Luca, Cate	By 4 April
1.2	Check with JRAP5 and WP3, task 3.5 how to organise cross cutting actions: time, place and what	Bengt, Lauri, Andrew	By 4 April
1.3	Revise the writing of the science strategy to better express the complementarity of the partnership for each area of investigation, improve the description of the local science question, and of the related MFSD	Bengt and JRAP1 partners	15 April 2016
1.4	Solve with WP5, how to deliver all biological data, which may have very different format from physical-chemical data. JRAP#1- WP5 communication needs to be very fluent to solve issues with biological data formats. Needs to know when and where the survey will be done, to make JRAP1 & 5 working together	JRAP1 and WP5 leaders + VLIZ	15 April 2016
2.1	provide evidence and details how the benthic observations may be coupled to existing infrastructures and future platforms	JRAP2 partners	15 april 2016
2.2			
3.1	2 cages to be sent to the Baltic partners (JRAP 1, 5)	Luca and JRAP1 & 5 partners	Action to be decided by 15 April 2016
3.2	Check how to better take in account the variability of the physics parameters: a point to progress upon for the strategy with JRAP# 4 & #6	Luca, Anna, Baptiste	15 April 2016
3.3	Progress on how to better make the upscaling	Luca	15 April 2016

4.1	Check how to improve the work with contaminant monitoring (JRAP#3)	Anna, Luca	15 April 2016
4.2	Improve the collaboration with JRAP# 6	Anna, Baptiste	15 April 2016
5.1	Check collaboration with Task 2.5 and 3.5 for the intercalibration workshop. Be in touch with WP leaders and task leaders	Lauri, Rajesh, Andrew, Willy, Florence S.	15 April 2016
5.2	Clarify the data analysis procedures	Lauri, Jukka	15 May 2016
5.3	Think about upscalling with other JRAPs	Lauri, Luca, Bengt, Jukka	15 May 2016
5.4	Link with ICOS: meeting 1-4 Nov. 2016 to check	Lauri, Jukka, Ingrid Dominique	Late may
6.1	Integration JRAP1, 5, 6 to enhance on the Baltic sea	Baptiste, Bengt; Lauri, Jukka	15 April 2016
6.2	Collaboration with SMHI to enhance	Baptiste, Bengt	15 April 2016
6.3	Collaboration with JRAP4 to better express	Baptiste, Anna	15 April 2016
9.1	All JRAPs: to send maps of investigation areas to jerico@ifremeR.fr	All JRAPs leaders	31 march
9.2	Table to be sent to all JRAPs to enquired time sampling and corresponding investigated process	Ingrid to JRAP leaders	31 march
9.3	WP5 to strengthen collaboration with JRAP 1 2 and 3	WP5 leaders + VLIZ and JRAP 1 2 3 leaders	End of march
9.4	Updated version of the JRAP strategy to be sent to Dominique by the 11 of April then to Ingrid by the 15 April	JRAP Leaders, Dominique	15 april

2 Objectives and Organisation

2.1 Objectives

- Presentation of the JRAPs scientific strategy,
- Milestone MS4: strategic guidelines to be communicated to the JRAPs
- Discussions to strengthen cross cutting towards a multidisciplinary approach.
- Answer to the STAC request
- JRAPs data flow: how to manage it?

2.2 Agenda

Holiday Inn Express London- ExCeL
1018 Dockside Road
London, E16 2FQ

Time slot	Topic	Speaker	Observations
Joint WP4 &WP1 workshop Tuesday, 15th of March			
8: 30-9:00	*- Introduction:* *- Link with WP1* *- identified cross cuttings and questions to solve*	D. Durand & I. Puillat	
9:00-10:30	**JRAPs presentations: 20'+10'discussion each** *- JRAP 1, 2,5*	JRAP leaders	
10:30-10:50	**break**		
10:50-11:30 (not possible to put in the afternoon, LP to the SWE workshop)	JRAPs data flow: how to manage it? Recommendations from WP5 (20'presentation+ 20'discussions with JRAPs	L. Periviolotis	
11:30-13:00	**JRAPs presentations: 20'+10'discussion each** *- JRAP 3, 4,6*	JRAP leaders	
13:00-14:00	Lunch Break		
14:00-15:00	**Discussion:** General discussion on the science strategies and to strengthen cross cutting towards a multidisciplinary approach	Moderators: A. Grémare, D. Durand	

The JERICO-NEXT project is funded by the European Commission's H2020 Framework Programme under grant agreement No. 654410
Project coordinator: Ifremer, France.

2.3 List of participants

Targeted public: JRAP leaders, JRAP participants, any available STAC members, anybody interested

29 persons	Role
Dominique Durand (COVARTEC)	WP1 leader
Lauri Laakso (FMI)	JRAP5 leader
Sami Kielosto (FMI)	
Jukka Seppälä (SYKE)	
Luca Nizzetto (NIVA)	JRAP3 leader
Bengt Karlson (SMHI)	JRAP1 leader
Pasi Ylöstalo (SYKE)	
Seppo Kaitala (SYKE)	
Anna Rubio (AZTI)	JRAP4 leader
Baptiste Mourre (SOCIB)	JRAP6 leader
Véronique Creach (CEFAS)	
Antoine Grémare (CNRS)	JRAP2 leader, coleader of WP1 & WP4
Leonidas Perivoliotis (HCMR))	WP5 leader
Margarita Bekiari (HCMR))	
Delauney Laurent (Ifremer)	WP3 coleader
Dionysios Ballas (HCMR)	
Simon Claus (VLIZ)	
Lennert Tyberghein (VLIZ)	
Diarmuiv o Conchubhair (MI)	
Joaquin Tintore (SOCIB)	
Emma Hescob (SOCIB)	
Thomas Loubrieux (Ifremer)	
Sylvie Pichereau (Ifremer)	JERICO-NEXT Project manager
Ingrid Puillat (Ifremer)	WP4 leader
Michelle Devlin (CEFAS)	WP8 leader
Catherine Boccadoro (IRIS)	
Loic Petit de la Villéon (Ifremer)	
Suzanne Painting (CEFAS)	
Kate Collindridge (CEFAS)	

3 Introductory talks

3.1 Introduction related to WP1 objectives by D. Durand (Covartec)

Dominique highlighted the link between WP4 and WP1 with regards to the science strategy. He also explained the relation with Task 1.1 dealing with environmental issues and threats and how they are presently tackled through European organizations, initiatives and projects. With inputs from the JRAPs, WP1 will propose a suitable environment observation strategy that can serve both scientific challenges and monitoring requirements with regards to OSPAR, HELCOM & Barcelona Conventions, MSFD (and WFD as well) , etc.

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3.2 Introduction related to WP4 objectives by I. Puillat (Ifremer)

Ingrid reminded the time line of WP4 since the KO meeting and for the next 18 months. She also reminded the recommendations given by the Science and Technology Advisory Committee (STAC) at the end of the KO meeting in Mallorca, end of Sept. 2015.

Oct 2015- Jan. 2016:

- First Survey: integration vs funding
- Strategy: first description, brainstorming, commonalities in place and time (ppt)
- Data survey (WP5)

Feb. March 2016

- Debriefing of the surveys: no reallocation of the JRAP funding. Commonalities in time and place are not sufficient to make science integration. Need to go farther ahead
- Template of D4.1 and organisation of it
- First draft D4.1 received

Today: Milestone MS4: strategic guidelines to be communicated to the JRAPs

Time line for the next months:

- D4.1 Version 2 the 15 April, in JERICO mail box
- D4.1 version 3 (final draft) the 15 may
- Presentation of the final version : SC meeting 23-24 may, Brussels, sending to EC
- D4.1 sent to the EC in May 2016.

STAC Advice after the KO meeting

- Give a proper place to technology development but avoid overflow from WP3 to WP4 and emphasize the important work of WP2/WP5: data quality is the ultimate yardstick!
- Make an effort to well identify the user communities, which is much important for VA/TNA. Create 'Jerico extended family' using VA / TNA strategically for this
- Focus JRAPs on 'useful knowledge production' for a better and real integration between disciplines (physics, chemistry, biology) and extrapolation from the shelf to the coastal seascape (links with models and upscalling problems).
- Formalise products at # levels
- Contribute to the definition of Essential Ocean Variables (EOV) adapted to the coastal systems.

General debriefing after D4.1 version 1

- The level of information provided in draft 1 will be homogenised in draft 2
- The JRAP's specific sampling programs should be more detailed in the next version.
- The right balance needs to be found between the importance of societal/policy questions (with regards to OSPAR, HELCOM & Barcelona Conventions and MSFD (and WFD as well), and the pragmatic considerations such as availability of data, specificity of models and related research activity engaged at local or regional level.
- Give more details about the sampling: maps, frequency etc.
- The JRAP descriptions in D4.1 are research projects giving a roadmap for the implementation of WP4.
- Discrepancies between the planned programs and operational implementation of the JRAPs may occur.

4 JRAP-1: Biodiversity of plankton, HAB and eutrophication

4.1 Presentation by B. Karlson (SMHI)

JRAP#1 is led by Bengt Karlson with Felipe Artigas as co-lead
Goals: investigate spatial and temporal variability of the biodiversity, ie:

- Objectives
  1. Study phytoplankton variability
  2. Algal blooms
  3. Novel technologies (imaging in flow systems, automated flow cytometry, multi-spectral and variable fluorometry and specrtophotometry) vs. reference technologies (light microscopy, electron microscopy)
- Methods for biodiversity:
  1. Morphology and size (imaging in flow systems, flow cytometers, microscopes)
  2. Genes: FISH, barcoding..
  3. Pigments composition/spectral phytoplankton groups (HPLC, Fluorometers, Spectrophotometers…)

Expected progress beyond the SoA: studying bloom dynamics at high frequency (not the weekly observation of standard monitoring programs) and/or at high spatial definition.
Several areas will be investigated.

Science strategy:
Integrating observing platforms to yield combinable data in analysing phytoplankton phenomena and to take benefit of the technology assessments in analysing phytoplankton (biomass, diversity, taxonomy, production) led in task 3.1 of WP3.. Usually sampling is done monthly or weekly; here the objective is to go further ahead with an increased spatial coverage and increased time sampling and to progress beyond the state of the art in that way, plus integrating recent bio-optical sensors.
Gaps with physics: No HF radar data available, needs of 3 D model. .FB gives only a surface layer signal, there will not be any satellite data.

Added comments by F. Artigas in delay mode
About HF radars: we do not target the same areas: should we consider to move one study area to fit with one HF Radar region (as the southern Bay of Biscay or in French Brittany? As the opposite will be less easy (to move one HF Radar study to a JRAP 1 site, even though it was already achieved in the past with HF Radar measurements in the Eastern Channel, combined with ADCP and Phytoplankton lagrangian studies…

About associating satellite data: We could plan to associate satellite colleagues if one of the JRAP#1 areas correspond to an already targeted area for ocean colour studies within the frame of parallel and complementary projects (which will be the case in the Eastern Channel site

4.2 Discussions

Link with JRAP#3 and WP3
- Luca: coupled sampling of JRAP#1 and JRAP#3 in Kattegatt: The combination of bio-molecular and contaminant monitoring will help integrating the phytoplankton monitoring with JRAP# 3 and WP3. It was discussed if it would be possible to have joint activities in studying algal diversity (JRAP#1) and contaminants (JRAP#3), and maybe complement these with microbial and molecular sensor techniques used and developed in Task 3.4.The study question would be if microbial and algal diversity will be different at contaminated sites vs. uncontaminated. It is agreed to check the possibility to synchronise activities of JRAP1 and JRAP3 and WP3 in the May-Aug period.

Link with JRAP#5:
We will check the measurement locations and periods which directly overlap with the locations and intensive measurement period of JRAP5. One of such locations is FMI/SYKE/SMHI measurement station at Baltic Sea (Utö combined with ferryboxes, in both JRAPs) where we will study simultaneously carbon cycle (JRAP5) and algae blooms (JRAP1). There may be other similar locations, which need to be identified. At such locations, information on algae species composition helps to understand the changes in pCO2/pH.

Link with WP2 & WP3
- Dominique: dependencies to other WPs (WP2 and 3 in particular…). Is it a risk related to the progress in the other WPs? This is to be identified in D4.1-risks.
- Bengt: In WP2 the sensors are already developed, it is dealing with harmonisation of the procedures, our workshop (WP3: June 2016, Boulogne sur mer, and Sept. 2016, Gothenburg) should contribute to the WP2 deliverable.
- Jukka: a main output for science strategy will be on optimization of observation by zone…Not all sensors are necessary everywhere … to be assessed and determined.

Link with WP5
JRAP#1 makes mainly snapshot studies collecting biological, bio-optical and supplementary physical and chemical data. For these snapshots there are not necessarily up-and-running solutions for getting online data.
JRAP#1 need to solve, together with WP5, how to deliver all biological data, which may have very different format from physical-chemical data. JRAP#1- WP5 communication needs to be very fluent to solve issues with biological data formats. Needs to know when and where the survey will be done, to make JRAP1 & 5 working together.

About the sampling strategy and the investigation areas
- Dominique: How far do you intend to go in the analysis of the data? How much resource do you have to analyse these intensive short term data?
- Antoine: how to go from short term acquisition to long term one, as we are dealing with a sustainability of the infrastructure in JERICO?
- Bengt: We are doing a showcase on short term to explore and show the methodology that then should be applied on long term (including other problems to take in account on long term: stability, fouling, energy etc. = delay mode comment added) The objective is to define an optimal observation, to prove the feasibility and of the suitability of the sensors selection with regards to the specificities of the observed blooms. These considerations will be the input for the strategy.

During measuring periods JRAP#1 will produce large amounts of data, with recently developed sensors. It will be a great challenge to have resources to analyse these data in detail. To have such analysis done is however crucial as the results of JRAP#1 should demonstrate which sensors are usable and most valuable in different conditions (including different sea areas). Key challenge will be how to integrate the results from short term studies thereby providing advice for development of general long term observation strategies and guide the future integration of different monitoring activities.

- Antoine: Firstly the number of investigation areas gave the impression of an important heterogeneity. Then I understood the partnership will help deploying a similar set of equipment in these areas. It is important to show that the cross cutting in partner contribution in the different areas will secure a good integration across the studied areas. JRAP#1 need to carefully demonstrate the links between individual studies, emphasizing that the work is actually a joint activity with common goals and research questions. At the moment this is slightly challenging as at some sites the new developments will be tested, while at some sites rather traditional systems are used to observe biomass and biodiversity (thus at those sites it may be hard to get advice for future developments and integration).

Other comments

- Links with MFSD descriptors not always clear (climate change?)
- An answer in delay mode from F. Artigas: with Pelagic Habitats work, i.e. in the frame of H2020 projects as ECAPRHA (2015-2017) for Atlantic and Channel, similar projects concerning the Baltic and the Mediterranean as well…Also Eurtophication work as well as food webs. Thus, descriptors D1, D4 and D5 of MSFD
- Actions are often too isolated from each other: need to enhance the initiated links if we look at the partnership for each action.
- Scientific objective to clarify for each region, with their own specificities (science and strategy)

JRAP are part of JNEXT and should provide inputs to WP1, this is the main outcome expected for the EC. Then publication should be targeted to demonstrate through example the capability of the JERICO RI.

4.3 Conclusions and actions

1) Check with JRAP3 and WP3 how to organise cross cutting actions: time, place and what
2) Same with JRAP5
3) Revise the writing of the science strategy to better express the complementarity of the partnership for each area of investigation, improve the description of the local science question, and of the related MFSD
4) JRAP#1 need to solve, together with WP5, how to deliver all biological data, which may have very different format from physical-chemical data. JRAP#1- WP5 communication needs to be very fluent to solve issues with biological data formats. Needs to know when and where the survey will be done, to make JRAP1 & 5 working together.

5 JRAP-2: Monitoring changes in macrobenthhic biodiversity

5.1 Presentation by A. Grémare (CNRS-EPOC)

New approach: Meta-barcoding and SPI

Disturbance -> diversity - > function (mineralization especially)
zones :

- continental output (Gironde) – spatio-temporal and modelling
- Dredges (Brest
- Invasive species (Brest) – bioturbation – disturbance= invasive species
- Sewage output (Heraklion)

Common field survey and data management
Interaction with JRAP#6: modeling of the dispersal and deposition of particles / sewage flow

5.2 Discussions

- Lauri: JRAP#5 may support JRAP#2 even if there are not so much activities in common.
- Suzanne: How to transform meta-barcoding data into assessment information on biodiversity?
- Simon (VLIZ): Joint monitoring programme (OSPAR)… addresses benthic observation.
- Dominique: JRAP#2 very important to build a benthic compartment block on the JERICO roadmap for the future. Use of JRAP#2 within the goals of Task 1.3 (Christos) is important.
New proposal on H2020 marine stations running now (deadline 30 mars)… the selected project will need to be taken contact with.

A challenge in JRAP#2 is how to express biodiversity of benthos (using the genetic or species data) in such a form that it will be most useful for monitoring (and other applications). The answer was not available in the meeting but need to be more elaborated in JRAP#2 team.

JRAP#2 should provide evidence and details how the benthic observations may be coupled to existing infrastructures and future platforms.

5.3 Conclusions and actions

JRAP#2 should provide evidence and details on how the benthic observations may be coupled to existing infrastructures and future platforms.

6 JRAP-3: Occurrence of chemical contaminants in coastal waters and biological responses

6.1 Presentation by L. Nizzetto (NIVA)

1. Technological protocols and best practices for monitoring chemical pollutants
2. Optimize technology
3. To study how pollutants affect assemblages of microorganisms
4. Assess the scales of variabilities

14-15 passive sampler (PS) locations… much more than envisaged when writing the proposal.
Some samplers have been sent to the Portugal;

6.2 Discussions

- Lauri wants 2 cages for the Baltic… we may try to get one passive sampler for Utö, as in the current plan, the whole Baltic Sea is missing from sampling of contaminants
- Lauri: costs: Luca answered that the cost is mostly related to the treatment of the silicon before deployment and the costs of chemical analysis after retrieval.
- Dominique: use of circulation models to link point Passive Sampler measurements
- Dominique: sampling program… task 2 task 3 and JRAP-1 Kattegatt + other ferrybox systems.
- Luca: we will have an inhomogeneous data set, with high resolution at some points, and automated water sampler that will limit the sampling frequency
- Antoine: Upscaling… try to have similar approach on spatial upscaling – JRAP3 and 5.
- Dominique: Task 1 and JRAP#4 & 6: difficulty to make science integration considering that passive samplers are making an integrated measurement over time at one point, whereas JRAP#4 & #6 are working at higher resolution. It is suggested to try to compare integrated currents or transports over similar time periods.

6.3 Conclusions and actions

1) 2 cages for the Baltic
2) Check how to better take into account the variability of the physical parameters: a point to progress upon for the strategy with JRAP# 4 & #6
3) Upscalling?
4) Consider reallocated 3-5 passive samplers to the BoB in connection with physical measurements carried out in JRAP-4

7 JRAP-4: 4-D characterisation of trans-boundary hydrography and transport

7.1 Presentation by A. Rubio (AZTI)

Application domain: analysis of distribution of floating material (contaminants plastics etc.)
Estimating transport is challenging. How coastal processes (wind-induced circulation, slope current, mesoscale eddies, high frequency processes like tides or inertial oscillations) which operate at different temporal and spatial scales contribute to ocean transport is a challenging question, very important to improve transport estimations. HFR technology offers a unique opportunity to address this question by providing high temporal (~1h or less) and spatial resolution (~5km or less) data over wide areas in a continuous manner.
How to split signals occurring at different scales is also a key question. The use of different methodologies like frequency filters, SOM or other clustering methods have been already used by several authors for this purpose. Although not discussed in London, wavelets can also be an interesting method to extract or split signals to be explored further.

Societal question
MFSD D2, D7 (permanent alteration of hydrological set up) Transport of exogens (species), exc. D10 Litter

Science strategy
Three very different areas and scenarios: 2 areas in deep water and 1 shallow area (NW Mediterranean, Se Bay of Biscay, German Bight)
Demonstration based (a lot) on historical time series and new data collection. The common work lines across different case studies:

i) Identify appropriate methodologies to estimate 4D transports taking into account different integrated observations and processes at different scales
ii) Short term predictions approaches
iii) Use of 4D model approaches to address MSFD objectives

Activities: Western Med 2 antennas on Ligurian sea soon deployed, Mastodon moorings (summer 2017). Some of the key monitoring infrastructures are not yet in place. Can this be a risk? Back up: hystorical data + Jerico next data
Modeling based on EnKF
Coupling with Bio Cal data (contaminants and ecological quantity)

Bay of Biscay. 1 new antenna to be deployed in the french Landes coast. Permit and location still to be determined. There is a risk on this new deployment but most part of the area is covered by the existing HF radars so this will not so critical.
Mastodon mooring (summer 2017). Other developments (drifting buoy). One oceanographic campaign is being defined.
German Bight. No new deployments are foreseen but many activities are planned using the existing network.

Data usage and management
NW Med: Historical data + Jerico – Next new data, HFR data fusion with hydrographic data and with multidisciplinary data from past campaigns
Bay of Biscay: Historical data + Jerico – Next new data, HFR data fusion with hydrographic data and with marine litter data bases (depending on LEMA proposal results *** breaking news, the project has been preselected we just submitted the several changes demanded by the reviewers so we hope it is being funded …)
German bight
HF radar fusion with tide data numerical model (GTEM), Pollutants drift (model data)

Potential links with JRAP

JRAP#1. Links concerning the use of Flow cytometry data have been explored but the research lines at AZTI are not compatible with the work line in JRAP1
JRAP3. Very long integration periods of passive samplers are difficult to use in combination with high frequency currents. Short term deployments are suggested but these will increase costs and workload for JRAP 2.

Risk and gaps

- Lack of data from new or existing systems. Some system are not yet deployed

7.2 Discussions

Need of collaboration with other JRAP not yet clear. Bay of Biscay seems to be the right place to work with JRAP#6 and also maybe with JRAP#3

- Antoine: Collaboration with JRAP#3: Should we deploy several PS in BoB for studying the spatial distribution of contaminant in relation to current?
- Anna: time resolution is not the same with passive sampler (integrated measurements) and HF radars (high resolution). Time resolution of monitoring (litter contaminants etc.) is always too coarse. How to use coarse time spatial resolution with high resolution model? Open issue about the extension of monitoring. Assessment of high resolution models with low resolution data is always an issue. How can we design a proper study that fulfills requirements of JRAP4? Further Skype meeting with Luca. Issue to deal with in order to develop an approach for better understanding the time-integrated measurements provided by the passive samplers with regards to the regional dynamics.

- Ingrid: link with Mastodon array can also help get an overview of the temperature in a zone.
- Baptiste: Model to be used for OSSE in JRAP-4 is not the same as in JRAP6 which does not have DA.

7.3 Conclusions and actions

1) Check how to improve the work with contaminant monitoring (JRAP#3)
2) Improve the collaboration with JRAP# 6

8 JRAP-5: Coastal carbon fluxes and biogeochemical cycling

8.1 Presentation by L. Laakso (FMI)

ICOS-OTC: coordination marine carbon observation in EU
Develop protocols (first draft in Feb 2016)
At all sites there will be measurement of Chl.-a, PCO2, and physical parameters; in some sites we will add measurements of pH, alkalinity, primary production, nutrients and carbon fluxes.
Most sites will provide spatiotemporal information on C-flux related processes
Most of the experiments will be in spring 2017-spring 2018

Marine biological processes which are important for coastal seas mainly excluded from ICOS-OTC (#blue ocean boys)
Societal questions: algae bloom, climate change,
An important workshop for intercalibration is to be organised, it is also depending on TNA, but not only. The objective is to calibrate and compare the sensors in different environmental situation (ex: Salinity = [5-34 psu]). If it is not possible to organise the workshop, the JRAP#5 can stand but with lower quality of the data. To be further planed when detailed information on instruments will be received by Lauri (deadline to send info to Lauri = 15 April).

8.2 Discussions

- Dominique: if the workshop cannot be organised… what is plan B?
- Ingrid: check with WP2: Workshop in Oct. 2015 from task 2.5 on calibration incl. pH… may be the right time for the WS proposed by JRAP-5. This is an issue to be solved.
- Laurent: there is an intercomparison exercise at the end of 2016, maybe aside with the Seatech week event in Brest, link with task 3.5 (Niva, Andrew King) to be checked as well.
- Antoine: what are the foreseen data analyses?
- Lauri: We have to look at this, we want first to assess the fluctuation range: i) what are the variability according to the conditions? Ii) then we will go more in details. The objectives are more related to the meta-analysis of the data.
- Antoine: need to better clarify this: how to? Link with the upscalling is interesting and could be a link with several JRAPs
- Dominique: How do you see the interaction with ICOS? Because WP1 is particularly interested with this collaboration (T1.3 and 1.5)
- Lauri: There is a blue ocean board in ICOS but marine biology is not the most important part of ICOS, which is most interested in biology in a general way. We can organize a meeting with ICOS to initiate JERICO collaboration and discuss the complementarity of the 2 RIs.
- Ingrid: will be in Finland the first week of Nov. 2016. Maybe this can be an opportunity
- Lauri: I will check

8.3 Conclusions and actions

1) Check collaboration with Task 2.5 and 3.5 for the intercalibration workshop (Felipe Artigas, T3.1 leader is interested too). Be in touch with WP leaders and task leaders
2) Clarify the data analysis procedures
3) Think about upscaling with other JRAPs
4) Link with ICOS: meeting 1-4 Nov. 2016 to check (with Werner Kutch)

9 JRAP-6: Operational oceanography and coastal forecasting

9.1 Presentation by B. Mourre (SOCIB)

Operational models (coastal areas are very challenging. We do not know about realism very often.)
Objectives: Evaluation and improvement of Operational coastal forecasting systems
Optimize the coastal sampling for modelling/forecasting purpose,
Improvements in coastal models.
Focus on MSFD implementation (surface circulation and physical processes with an impact on ecosystems)
How realistic are our coastal models?
What to do to improve?

Link to MSFD: 5, 7, 8, 10
Eutrophication, Hydrographic conditions, Contaminants, Marine ltter

Strategy
Task 1 Model assessment
1.1 Without assimilation
1.2 With Assimilation

Task 2 Improvement
2.1 Modelling Improvements
2.2 Observing systems improvements

Added value
New opportunity from harmonized observation systems (moorings, gliders, FerryBox, HF radar)

Data and sampling
Continuous observatories
Past measurements
New campaigns

One of the challenges will be to synthetize the results from different models, different scenarios and different data acquisition (data types).

Links

JRAP 1,2,4,5 (Sharing same measurements)
1 Algae blooms
2 Hydro-sedimentary modeling
4 Hydrographic conditions transports model data assimilation OSSEs
5 Baltic Sea measurements
There is always a problem of scales and resolution of data for the validation of models.
Level of linkage with other JRAP is (either using same methods, exchange information on methods, delivery information on hydrodynamics).
In JRAP 1: delivery data receiving data on phytoplankton
JRAP 4 similar methodology (exchange of metadata).
JRAP 5 same measurements (using the same data).

Risk and gaps
Baltic Sea measurements campaign (not clear)

Data assimilation developments (which strategy? To be decided)
Diversity of areas/model/observations: Synthesis required

Endorsed collaboration with Swedish modellers (Benqt suggested)
How do you intend to develop the discussion on cooperation in the Baltic? Individuals working across different JRAPs will guarantee harmonization of activities in the Baltic

9.2 Discussions

There are some concerns regarding the structure of biological data useful for JRAP6.
Possible integration JRAP#1, 5 and 6 on the Baltic Sea: Baptiste, Bengt, Lauri and Jukka to talk together.
The data from JRAP1 and JRAP5 will be utilized in the Baltic Sea turbulence modeling exercise.
- Bengt: SMHI volunteers to collaborate to JRAP#6 even if there is no funding from the start. SMHI is making Data assimilation on the Skagerrak area and a model runs on the Baltic Sea. So interaction with SMHI and JRAP#6 should be initiated and enhanced. A reference person in SMHI is Lars Axell.

9.3 Conclusions and actions

1) Integration JRAP1, 5, 6 to enhance on the Baltic Sea.
2) Collaboration with SMHI to be enhanced
3) Collaboration with JRAP4 to better express.

10 JRAPs data flow: Recommendation from WP5

10.1 Presentation by L. Perivoliotis (HCMR) and discussions

The traditional data flow toward the European channels was presented. Then the specificity each JRAP was exposed. Indeed a survey was organised with each JRAP leader enquiring about parameters to be measure, and the expected corresponding data flow. This was presented with one table per JRAP.

The most challenging is to deal with Biological data. It was underlined that Essential Ocean Variables (eov) are already taking in account zooplankton abundance, as well as some parameters helping to describe the algal bloom etc… It was pointed out the need to work on parameters that describe the primary calibration of optical sensors (Jukka). This should be in metadata.

Leonidas expressed that now it is need to check what JRAPs are willing to share: raw data? Derived data? Metadata etc…? Then the system should be updated. To achieve this objective an important collaboration with JRAP 1, 2 and 3 is to be driven to reach a consensus, to discuss the purpose of the dissemination of the data (make analysis only, more?); the level of information to disseminate.

It was argue this is not the responsibility of the JRAPs but of each involved partner. Ingrid Puillat pointed out that JRAPs are funded by H2020 and so data HAVE TO be available, at the project level and JRAP level as well, meaning that we are all responsible. In addition the added value of JERICO-NEXT is to make science integration, consequently the data set should be disintegrated in between physics, biology and chemistry, it would be a no sense.
The problem is that EMODNET is separating the fields.
But EMODNET is working with DOI and a DOI can point to associated data set, keeping the integrative meaning of the acquired data.

10.2 Conclusions and actions

1) JRAP 1, 2 and 3 are expected to close collaborate with WP5. The week after the meeting should be used to manage this collaboration.

11 Synthesis and conclusions

11.1 Synthesis: expectations common to the 6 JRAPs

To conclude the workshop, it was reminded the following items
- i) next deadline: the 15 April: version 2 of JRAP strategy to be received by WP4 coordination
- ii) the need to reach a harmonised level of details describing the sampling programme of each JRAPs.

The discussion went on the targeted level of details referred here above:

- Sampling should be described with a map for each investigated area. In order to harmonised the presented areas and sampling it would be better to use all the same kind of map. This would be also useful for upcoming publications and presentation. This could be extracted from GIS system. **Consequently, JRAP coordinator are requested to send a map for each investigated areas with boundaries (Latitude, longitude of the 4 corners) given by Email to jerico@ifremer.fr. Then Ingrid and Loic Petit de la Villéon will extract the some maps from a GIS system with the same boundaries.**
- These maps will be used to show the sampling stations, FB routes, Gliders sections etc.
- In addition, it was discussed the limit of the expected details in time sampling. Indeed the sensors sampling rate is not requested. What is important is to express the sampling step to be set up according to the science question and the process to study: 10-30minutes, 1-2 days or 10 days? According to the signal to observe: season? Inertial? Daily migration?
  Consequently it is agreed this information should be updated from the table sent to WP5 describing parameters to be measured: column to be added on time sampling steps and studied process (an example will be given).

11.2 Synthesis: Strategy Guidelines to JRAPs and decisions

JRAP #. Decision #	What?	Who?	When?
1.1	Check with JRAP3 and WP3, task 3.4, how to organise cross cutting actions: time, place and what	Bengt, Luca, Cate	By 4 April
1.2	Check with JRAP5 and WP3, task 3.5, how to organise cross cutting actions: time, place and what	Bengt, Lauri, Andrew	By 4 April
1.3	Revise the writing of the science strategy to better express the complementarity of the partnership for each area of investigation, improve the description of the local science question, and of the related MFSD	Bengt and JRAP1 partners	15 April 2016
1.4	Solve with WP5, how to deliver all biological data, which may have very different format from physical-chemical data. JRAP#1- WP5 communication needs to be very fluent to solve issues with biological data formats. Needs to know when and where the survey will be	JRAP1 and WP5 leaders + VLIZ	15 April 2016

	done, to make JRAP1 & 5 working together		
2.1	provide evidence and details how the benthic observations may be coupled to existing infrastructures and future platforms	JRAP2 partners	15 april 2016
3.1	2 cages to be sent to the Baltic partners (JRAP 1, 5)	Luca and JRAP1 & 5 partners	Action to be decided by 15 April 2016
3.2	Check how to better take in account the variability of the physics parameters: a point to progress upon for the strategy with JRAP# 4 & #6	Luca, Anna, Baptiste	15 April 2016
3.3	Progress on how to better make the upscaling	Luca	15 April 2016
4.1	Check how to improve the work with contaminant monitoring (JRAP#3)	Anna, Luca	15 April 2016
4.2	Improve the collaboration with JRAP# 6	Anna, Baptiste	15 April 2016
5.1	Check collaboration with Task 2.5 and 3.5 for the intercalibration workshop. Be in touch with WP leaders and task leaders	Lauri, Rajesh, Andrew, Willy, Florence S.	15 April 2016
5.2	Clarify the data analysis procedures	Lauri, Jukka	15 May 2016
5.3	Think about upscalling with other JRAPs	Lauri, Luca, Bengt, Jukka	15 May 2016
5.4	Link with ICOS: meeting 1-4 Nov. 2016 to check	Lauri, Jukka, Ingrid Dominique	Late may
6.1	Integration JRAP1, 5, 6 to enhance on the Baltic sea	Baptiste, Bengt; Lauri, Jukka	15 April 2016
6.2	Collaboration with SMHI to enhance	Baptiste, Bengt	15 April 2016
6.3	Collaboration with JRAP4 to better express	Baptiste, Anna	15 April 2016
9.1	All JRAPs: to send maps of investigation areas to jerico@ifremeR.fr	All jraps leaders	31 march
9.2	Table to be sent to all JRAPs to enquired time sampling and corresponding investigated process	Ingrid to JRAP leaders	31 march
9.3	WP5 to strengthen collaboration with JRAP 1 2 and 3	WP5 leaders + VLIZ and JRAP 1 2 3 leaders	End of march
9.4	Updated version of the JRAP strategy to be sent to Dominique by the 11 of April then to Ingrid by the 15 April	JRAP Leaders, Dominique	15 april

12 Annex: Slides presented during the workshop

JOINT WP4 &1 workshop
15 March 2016, London

I. Puillat (Ifremer)
D. Durand (Covartec)
A. Grémare (CNRS-EPOC)

JERICO-NEXT: Quicklook

…The JERICO mind…

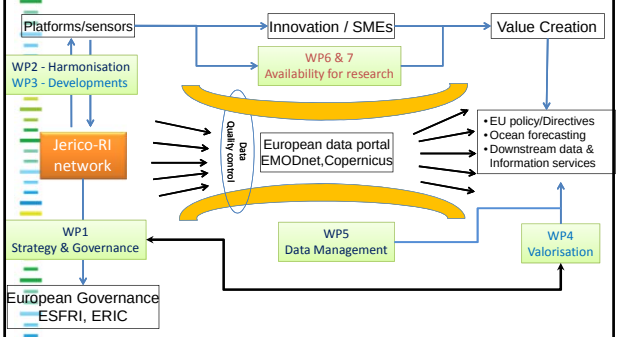
- **The JERICO-NEXT community**
  " We cannot understand the complexity of the coastal ocean if we do not understand the coupling between physics, biogeochemistry and biology."

→ **new technological developments for continuous monitoring of a larger set of parameter**

→ **a priori definition of the optimal deployment strategy**

- **JERICO-NEXT focus**
  - interactions between physics, biogeochemistry and biology
  - not restricted to pure technological aspects : include fundamental scientific considerations

The JERICO-NEXT Approach



Objectives of the workshop

- Presentation of the JRAP science strategy
- Exchange views of these strategies
- Reinforcing science integration across JRAPs
- Answer to the STAC questions
- Milestone MS4: Guidelines communicated to JRAPs
- Organisation towards the draft 2
- Exchange on good practices with regards to the JRAPs data (WP5)

WP1 : Integrated Science Strategy and Governance from local to European Scales

D. Durand- Covartec (NO)
A. Grémare - CNRS-EPOC (FR)

WP1 : Tasks and organisation

- **Task1.1: Literature review** (S. Painting, **CEFAS**) M1-M18
  - main environmental issues and threats and how they are presently tackled through European organizations, initiatives and projects
- **Task 1.2: Science strategy** (A. Grémare, **CNRS**) M1-M42
  - To tackle key scientific questions about how best to observe physical, chemical and biological parameters in European waters and the adequacy of present observation strategies to meet key scientific and societal challenges in the coastal ocean
  - Science committee – follow-up
- **Task 3 & 4** (C. Arvanitidis, **HCMR**; J. Tintore, **SOCIB**) M1-M42
  - Specific interactions with other relevant European and international ocean observing systems and infrastructures that provide complementary observations of biological (task 1.3) and /or physical, chemical (task 1.4) parameters
- **Task 1.5** (P. Gaughan, **MI**) M18-M42
  - Strategy towards sustainability. To look at long term financial and legal governance structures for the sustainable implementation of JERICO-NEXT infrastructures
- **Task 1.6** (P. Farcy, **Ifremer**) M24-M48
  - Roadmap for the future and the JERICO label

Task 1.1 – literature review

M1-M18

- Lead partner: Suzanne Painting (CEFAS)
- Partners: Ifremer, Ingrid: CNRS (Antoine); Dominique
- all WP1 partners considered as national representatives and acting through other tasks
- Aim to
  - Consolidate the backbone of the future science strategy
  - consider the main environmental threats within European coastal waters
  - get an overview of coastal monitoring programs around Europe

Task 1.1: action plan

- Workshop M1 (Minutes of workshop: **MS1**)
- Use the MSFD descriptors as a basis for analysing threats
- M1 – M7 (Feb 2016):
  - CEFAS and CNRS prepare a template of metadata for their respective country
  - To build on Jerico 1 overview of Jerico European observing networks and evaluate in relation to identified threats
  - Inputs to WP8 on criteria for establishing the end-user panel
- M7-M9 (Spring 2016):
  - Communication towards national representatives (WP1 partners; End-user panel)
- M9-M15 (Summer 2016):
  - National representatives populate the metadatabase for their own country
  - Progress meeting at M12 (Sept 2016)
  - Inputs from task 1.3 and 1.4 on contributions from other OOS and BOS
- M14-M18: Data analysis and synthesis
- M18: **D1.1** Report

Task 1.2: Science strategy

… Societal challenges …

- **key environmental challenges and service and/or policy requirements** on:

MSFD

1) pelagic biodiversity,
2) benthic biodiversity,
3) chemical contaminant occurrence and related biological responses,
4) hydrography and transport,
5) carbon fluxes and carbonate system,
6) operational oceanography.

WP4 : *Valorisation through applied joint research*

I. Puillat - Ifremer
A. Grémare - CNRS-EPOC

WP4 Main objectives & organisation

Objectives

- a synthesis of the project
- built upon activities in other WPs,
- gathering the consortium
- around applied **J**oint **R**esearch **A**ctivity **P**rojects (**JRAPs**) according to the 6 JERICO scientific areas
- to put forward the added value of JERICO-NEXT

WP4 Main objectives & organisation

- ❑ Coordination: I. Puillat, Deputy coordinator: A. Gremare (CNRS)
- ❑ Expected effort: 162 Men months
- ❑ 6 JRAPs in line with the 6 JERICO scientific areas:
  - JRAP-1 on pelagic biodiversity (B. Karlson, SMHI)
  - JRAP-2 on benthic biodiversity (A. Grémare, CNRS)
  - JRAP-3 on chemical contaminant occurrence and related biological responses (L. Nizzetto, NIVA)
  - JRAP-4 on hydrography and transport (A. Rubio, AZTI)
  - JRAP-5 on carbon fluxes and carbonate system (L. Laakso, FMI)
  - JRAP-6 on operational oceanography (B. Mourre , SOCIB)

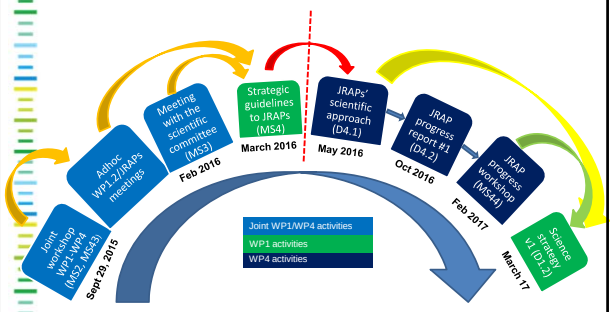
JRAPs in WP4

JRAP #	lead	Partners	Sites
1	B. Karlson, SMHI	SMHI, CEFAS, CNRS-LOV, CNRS-Univ Litt, CNRS-MIO, Deltares, Ifremer, NIVA, RWS, SYKE, VLIZ, and DAFF	Northern Baltic, Kattegat-Skagerrak, Eastern Channel and Southern North Sea, Bay of Biscay, Ligurian Sea, Benguela Current
2	A. Gremare, CNRS-EPOC	CNRS-EPOC, HCMR, Ifremer-Benthos, CNRS-UBO	Gironde estuary, Aegean Sea , Brest estuary
3	L. Nizzetto, NIVA	NIVA, HZG, IMR, IRIS, CEFAS	North Sea, Norwegian Sea (possibly Baltic and Biscay Bay)
4	A. Rubio, AZTI	AZTI, Ifremer, CNR-ISMAR, CNRS-MOI, CNRS-LEGOS, CMCC, HZG	SE Bay of Biscay, NW Med. sea, German Bight
5	L. Laakso, FMI	FMI, SYKE, NIVA, SMHI, HZG, HCMR, CNR , CNRS -SBR	Baltic Sea, Med Sea, Norwegian Shelf, Barents Sea, North Sea, West channel, Bay of Biscay
6	B. Mourre, SOCIB	SOCIB, IH, AZTI, CMCC, CNR, FMI, HCMR, IMR	Ibiza Channel, Adriatic Sea, South Bay of Biscay, Aegean Sea, Portuguese Nazare Canyon area, Baltic Sea, Norwegian Sea

STAC Advice after the KO meeting

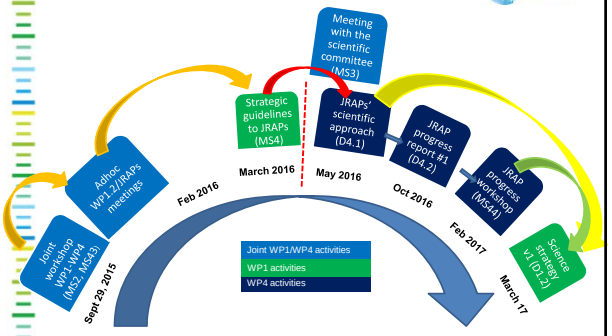
- Give a proper place to technology development but avoid overflow from WP3 to WP4 and emphasize the important work of WP2/WP5: data quality is the ultimate yardstick!
- Make an effort to well identify the user communities, which much important for VA/TNA. Create 'Jerico extended family' using VA / TNA strategically for this
- Focus JRAPs on 'useful knowledge production' for a better and real integration between disciplines (physics to biology) and extrapolation from the shelf to the coastal seascape (links with models and upscalling problems).
- Formalise products at # levels
- Contribute to the definition of Essential Ocean Variables (EOV) adapted to the coastal systems.

Coordinated action plan WP1/WP4



- MS6 First feedback from the JRAPs (**M36**)
- D1.2 - Science strategy v2 (**M44**)

Coordinated action plan WP1/WP4



- MS6 First feedback from the JRAPs (**M36**)
- D1.2 - Science strategy v2 (**M44**)

Time line until Aug. 2017

Time Line	MS/D/WS	Actions	WPs	Validation criterias
Sept.15 (M1)	MS43	Presentation of JRAP projects during KO meeting. Presentation of WP4 activities and time schedules agreed with WPs and partners. Actions with WP1 & 8 planed.	WP4, WPs	Reported in a KO meeting report
Mar. 16 (M7)	MS4	Strategic guidelines for the implementations of the JRAPs.... OI London 15 march	WP1,	Guidelines communicated to and
May 16 (M9)	D4.1	Present approaches to monitor European coastal seas (Covartec)		
Sept. 16 (M13)	D4.2	Progress report #1 (Ifremer)		
Feb. 17 (M18)	MS44/ **WS#1**	**WP4 Workshop#1:** Presentation of JRAP progress, highlighting links with other WPs .	WP4, WPs	Reported in WP4 workshop#1
Aug. 17 (M24)	**D4.3**	**D4.3 Progress report #2 (Ifremer)**	**WP4**	

How to reach the deadline? Process set up after the KO meeting

KO meeting
- STAC: more integration
- Presentation of deadlines

Oct. 2015-Jan 2016
- First Survey: integration vs funding
- Strategy: first description, brainstorming, commonalities in place and time (ppt)
- Data survey (WP5)

Jan-Mar 2016
- Debriefing of the surveys
- Template of D4.1 and organisation of it
- First draft D4.1

March 2016
- Debriefing of JRAP inputs
- Presentation during the Joint WP4 & 1 workshop 15 March in London

April May 2016
- D4.1 Version 2 the 15 April
- D4.1 version 3 the 15 may
- Presentation of the final version : SC meeting 23-24 may, Brussels, sending to EC

Debriefing after the first surveys Fall 2015

- Consensus: no funds reallocation in each JRAPs to organise an integrating activity
- Commonalities in time an place are not sufficient to make science integration
  - need to go further ahead…
- Template of D4.1 adopted
- WP5 gathered most of the data outcoming from JRAPs

D4.1, version 1, General Debriefing

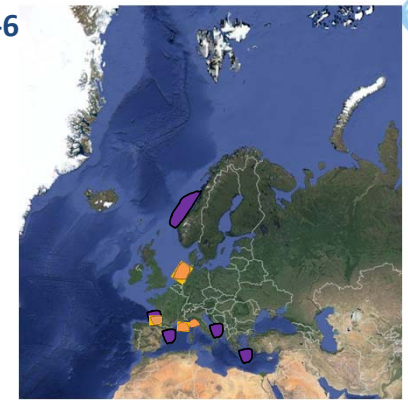
- The level of information provided in draft 1 will be homogenised in draft 2
- The sampling programme should be more detailed in the next version.
- The right balance needs to be found between the importance of societal/policy questions and the pragmatic considerations such as availability of data, specificity of models and related research activity engaged at local or regional level.
- Give more details about the sampling: maps, frequency etc.

The JRAP descriptions in D4.1 are research projects giving a roadmap for the implementation of WP4.
Discrepancies between the planned programs and operational implementation of the JRAPs may occur.

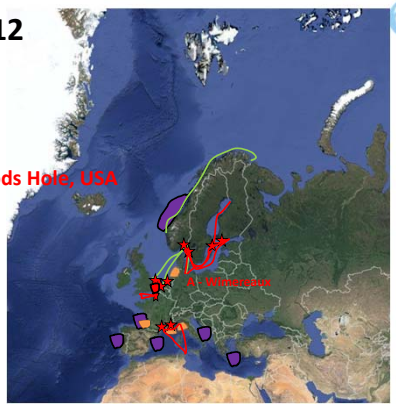
JRAPs: dates and periods

	Area	Route	Fixed	Calibration/other activity
•JRAP #1				A
•JRAP #2				A
•JRAP #3				A
•JRAP #4				A
•JRAP #5				A
•JRAP #6				A

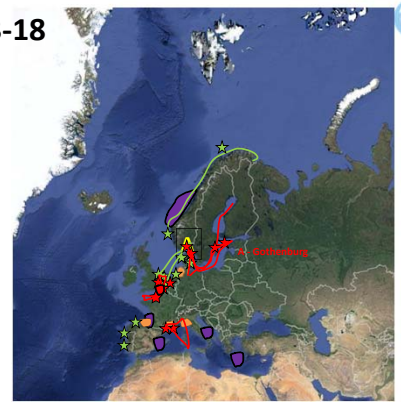
M1-6



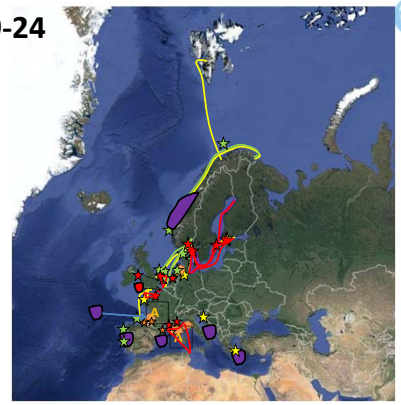
M7-12



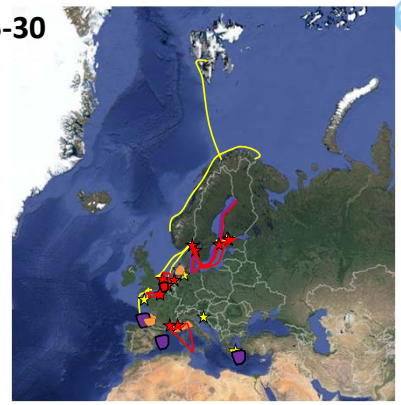
M13-18



M19-24



M25-30

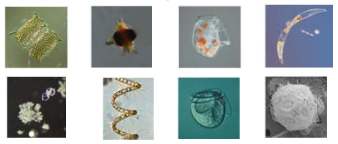


Thank you for your attention,
& Thanks to them!!!

JERICO-NEXT team, sept. 2015

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.

JRAP-1
Pelagic biodiversity
Biodiversity of plankton, harmful algal blooms and eutrophication



Presenter: Bengt Karlson
bengt.karlson@smhi.se

WP1/WP4 JRAP meeting / London / UK / March 15, 2016

JRAP1 participants

SMHI, Bengt Karlson and Malin Mohlin
Subcontractors Woods Hole Oceanographic Institute (Michael Brosnahan and Don Anderson) and Scanfjord AB
NIVA, Wenche Eikrem and Kai Sørensen
SYKE, Jukka Seppälä
RWS – Machteld Rijkeboer
Subcontractors Thomas Rutten b.v. and CytoBuoy b.v.
Deltares - Anouk Blauw
VLIZ – Klaas Deneudt
Sub-contractor Univ. of Gent - Wim Vyverman
CEFAS – Veronique Creach
Ifremer – Alain Lefebvre
CNRS
Felipe Artigas (Univ Littoral) & Fabrice Lizon (Univ Lille) – CNRS LOG Wimereux
Pascal Claquin (Univ Caen) – CNRS BOREA Caen
Lars Stemman (Univ Paris VI) – CNRS OSU Villefranche sur Mer
Melilotus Thyssen and Gérald Grégori – CNRS M.I.O. Marseille
Collaborator in Republic of South Africa: DAFF – Grant Pitcher

Main objectives

To investigate the spatial and temporal variability in phytoplankton diversity, abundance and biomass.

To improve the understanding of the development of algal blooms

To use and evaluate novel automated or semi-automated methods to investigate phytoplankton diversity, abundance and biomass with a focus on harmful algae.

Note: The development of methods is found in 3.1

Methods for investigating phytoplankton diversity

Methods for investigating the biodiversity of phytoplankton are mainly based upon:

- Morphology
  - Imaging Flow Cytometry – detailed
  - Light microscopy – high detail
  - Electron microscopy – very high detail
- Genes
  - FISH –high detail for a few selected species
  - Barcoding - detailed (depends on method used)
  - There are other methods as well
- Pigment composition
  - HPLC - low detail (chemotaxonomic information)
  - Fluorometers – low or very low detail
  - Absorbtion detectors – low or very low detail
  - Satellite remote sensing – very low detail

General scientific questions

What is the temporal and spatial distribution of phytoplankton?
- Biodiversity – what organisms?
- Abundance – how many? (cell numbers)
- Biomass, how much? (e.g in carbon units)

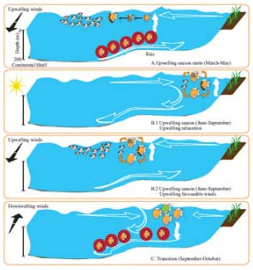
In collaboration with other JRAPs
- What is the production?
- What is the productivity?
- Advection of blooms
- Concentration of blooms due to physical forcing

Some specific scientific questions

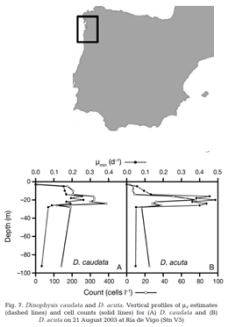
Kattegat-Skagerrak
Are *Dinophysis* transported from offshore to the coast during certain wind conditions?

Do *Dinophysis* dwell near the pycnocline and do physical forcing bring *Dinophysis* to the mussel farms on occassion

The Iberian *Dinophysis* story



Velo-Suarez et al. 2013



Velo-Suarez et al 2009

Some specific scientific questions

The Channel - Western North Sea

The strategy will consist in tracking the starting and extension (spatial and temporal) of the spring bloom and more specifically of the *Phaeocystis* bloom (main HAB in the area) as well as *Pseudonitzchia* spp. blooms from the Bay of Seine towards the North Sea. Sporadic blooms of dinoflagellates would also be detected in summer and autumn.

23/03/2016

Some specific scientific questions

The Baltic Sea

The spring bloom

- What is the development in time and space?
- During what conditions are dinoflagellates dominating?

Summer cyanobacteria bloom

- What is the horisontal distribution of cyanobacteria?
- What is the vertical distribution of cyanobacteria?
- How does the time of day and weather affect the vertical distribution of cyanobacteria?

23/03/2016

Expected progress beyond the state of the art

The use of high frequency automated sampling using flow cytometry will make it possible to study the biodiversity and distribution of phytoplankton in ways previously not possible.

The focus on harmful algae is likely to result in an improved understanding in harmful algal bloom development.

It is expected that the use of multi spectral bio optical sensors will give new insights into the distribution of phytoplankton at the group level.

23/03/2016

Societal questions

The MSFD include phytoplankton in descriptors related to:

- Biodiversity
- Food webs
- Invasive species
- Harmful algal blooms
- Climate change

23/03/2016

Effects of Harmful Algal Blooms

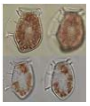
Ecosystem disruptive blooms affect the whole marine ecosystem

Examples include blooms of *Karenia mikimotoi* in Ireland and Scotland and a bloom of *Prymnesium polylepis* in Scandinavia

23/03/2016

More effects of Harmful Algal Blooms

Biotoxin producing species affect aquaculture, e.g. mussel farms.



Dinoflagellates produce:

- Paralytic Shellfish Toxins
- Diarrhetic Shellfish Toxins
- Azaspriacidic Shellfish Toxins
- Etc.

Diatoms of the genus *Pseudo-nitzschia* produce

- Amnesic Shellfish Toxins

The toxins accumulate in shellfish and pose a risk to human health. Marine mammals may be affected as well

23/03/2016

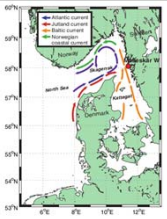
Even more effects of Harmful Algal Blooms

- Fish killing species affect fish farms and fisheries
- High biomass blooms may cause anoxia in deep water

23/03/2016

Scientific strategy

- Carry out short terms studies of different types of algal blooms
- Multi discipline approach
  - Biological, chemical and physical oceanography
- Multi platform approach
  - Research vessels
  - Buoys
  - FerryBox systems
  - Remote sensing (not part of JERICO NEXT)
- To combine novel methods with established ones
  - Automated water sampling and traditional water sampling
  - Automated in situ sensors for bio-optical parameters such as chl. fluorescence and spectral fluorometry for photosynthetic pigments
  - Automated identification and enumeration of organisms
    - Pulse-shape recording Flow Cytometry (in situ and on ship)
    - Imaging Flow Cytometry (in situ and on ship)
    - High Troughput sequencing of 16S and 18S rDNA
  - Counting and identifying organism using the light and electron microscope



The study at Tångesund

- Time series August to October 2016
- Oceanographic buoy
  - Salinity, temperature, oxygen, chlorophyll fluorescence
- Weekly or daily CTD casts
- Weekly water sampling
- Possibly also a diurnal study

- Phytoplankton
  - Imaging flow cytometer
  - Water samples
    - Large volume
    - Utermöhl
    - SEM
    - Autotrophic picoplankton
    - Chlorophyll a
  - Evaluation of automated sampling device AFIS-sys
- Bacteria
- Algal toxins
  - Net sampling
  - Toxins in water?
  - Toxins in mussels

Planned cruises with R/V Skagerrak (mainly UGOT-funded)

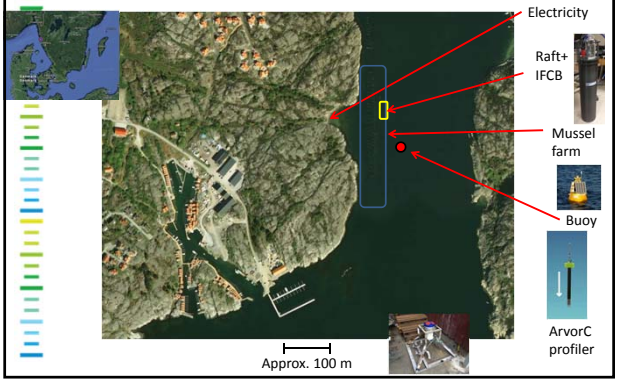
Cruise 1
15-17 Aug. (Monday-Thursday)
Deployment of CTD rigs and ADCP
CTD-casts
Water sampling

Cruise 2
6-8 Sep. (Tuesday-Thursday)
CTD-casts
Water sampling
Sediment sampling in fjord

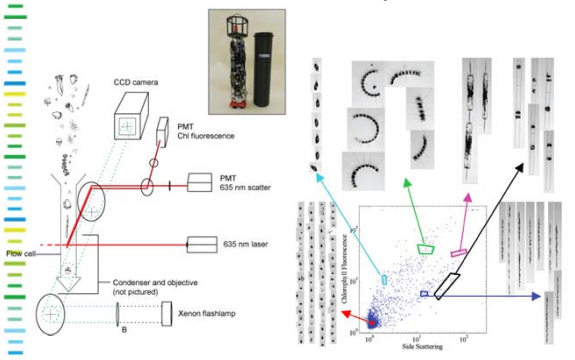
Cruise 3
4-6 Oct. (Tuesday – Thursday)
Recovery of CTD rigs and DCP
CTD-casts
Water sampling

Preliminary locations of sampling sites and locations for buoys, rigs and ADCP:s

Tångesund observatory



The Imaging FlowCytobot (IFCB) is an automated, submersible microscope

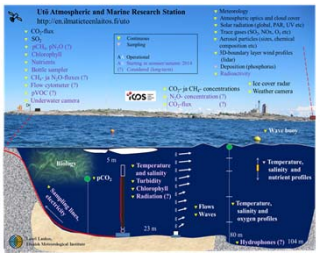


Sosik and Olson, 2007

Baltic Sea

Research vessel, Utö observatory, FerryBoxes and buoys

- Different bio-chem-phys marine observations at one site
- Marine and atmospheric observations at one site
- Different platforms (fixed, moving, trad. sampling)



20

Channel- Western North Sea

- MAREL Carnot instrumented Station
- SMILE buoy
- Smartbuoy (?)
- Research vessels
- Ferrybox lines:
  - Ouistreham-Porstmouth
  - Calais-Dover (2017)
  - Zeebrugge-Hull (?)

Western Mediterranean Sea

– Temperature
– Conductivity/salinity
– Fluorescence/Chlorophyll-a
– CDOM/FDOM
– pH
– pCO_2
– Oxygen
–Phytoplankton abundance and functional description

CNRS – EoL Buoy

Cytobuoy cytometer with the Image in flow device

Organization and time line

- Baltic Sea (SMHI, SYKE, CNRS)
  - Spring 2017
  - Summer 2017
- Kattegat-Skagerrak (SMHI, NIVA and others)
  - August-October 2016
  - (posibly another study in 2017)
- Channel – North Sea (Ifremer, CNRS, VLIZ, RWS, Deltares, Cefas)
  - Now to 2017
- Western Mediterranean (CNRS)
  - Now-2017

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Some links to WP2

Fixed platforms and profilers

- SMHI coastal buoy and profiler at Tångesund observatory
- SMHI Väderö buoy (Skagerrak)
- SMHI Huvudskär buoy (Baltic Sea)
- SYKE Utö observatory
- IFREMER – MAREL Carnot Buoy
- CNRS – EoL Buoy
- CNRS/IFREMER – SMILE Buoy
- Cefas – Smartbuoy
- etc.

Harmonizing new network sensors

- Sensors for nutrients (coord. Cefas)
- Optical sensors for biological parameters (coord. Syke)

FerryBox systems

- SMHI/SYKE TransPaper
- SYKE Finnmaid, Silja Serenade
- NIVA Color Fantasy
- Cefas Endeavour
- VLIZ Simon Stevin
- Ifremer
  - R/V Côtes de la Manche - Pocket Ferry Box system
  - Calais-Dover FerryBox
- CNRS
  - Tunisia ferry
  - Pocket FerryBox BOREA-UniCaen
  - etc.

HF radar

- Skagerrak
- ??

Links to WP3

- Task 3.1
  - Development of Imaging flow methods
  - Development of single-cell optical characterization methods
  - Development of other bio-optical methods
- Task 3.2 HF radar (e.g. advection of blooms)
- Task 3.3 Profiling coastal waters
- Task 3.4 Microbial and molecular sensors
- Task 3.5 Carbonate system
- Task 3.6 Benthic compartments and processes (benthic microalgae?)
- Task 3.7 OSE/OSSE (e.g. advection of blooms)

Links to WP4 - other JRAPS

- Task 4.2 Benthic biodiversity – general biological questions
- Task 4.3 Chemical contaminants (common platforms for sampling)
- Task 4.4 Hydrography and transport (e.g. advection of blooms)
- Task 4.5 Coastal carbon fluxes (e.g. primary production and effects of blooms on pH)
- Task 4.6 Operational oceanography and forecasting (e.g. advection of blooms)

Links to WP5

- Delivery of data sets
- Definition of new data types and formats

Risks and gaps

Risks

- Platforms such as research vessels, FerryBox systems and buoys may become unavailable for unforeseen reasons
- Field studies may be affected by weather conditions
- Expected algal blooms do not occur during the planned studies
- Damaged equipment, e.g. leaks in underwater enclosures

Gaps

- Only a few sea areas will be investigated
- Lack of integration with studies of physical oceanography in some sites
  - No HF radar data available
  - No verified 3D model results available at some sites
- Sub surface blooms are under sampled
- Satellite remote sensing (Sentinel 3a and 3b) is not included – during cloud free conditions the data would be useful

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.

Risks and gaps

Risk	Mitigation measure	Comment
Ship with Ferrybox system changes route	Moving of Ferrybox system to another ship Changed focus of study	This may be very time consuming if possible The ship TransPaper no longer goes to the harbour in Gothenburg. This has partly moved the focus for SMHI to the study at Tångesund.
Damaged equipment, e.g. leaks in underwater enclosures	Proper routines for working with in situ equipment	Some instruments, e.g. flow cytometers, are essential in the planned studies and difficult to replace.
Algal bloom or target organisms do not occur where or when expected	Moving the study in time if possible. Choosing other target organisms.	The development of algal blooms are partly stochastic phenomena. The blooms cannot always be predicted.

Gaps

- The sub surface blooms are under sampled due to the selection of sampling platforms (ferrybox systems and buoys)
- Lack of integration with studies of physical oceanography in some sites
  - No HF radar data available
  - No 3D model results available at some sites
- Satellite remote sensing data is missing in the studies (in general) – not part of JERICO-NEXT

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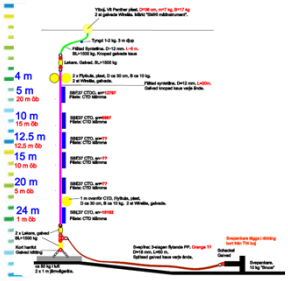
Tångesund buoy



JRAP-2

Monitoring changes in benthic diversity

Presenter: Antoine Grémare email: antoine.gremare@u-bordeaux.fr

Contributor(s): B. Deflandre, S. Schmidt, G. Bernard, J. Grall, A. Carlier, C. Arvanitidis, C. Pavloudi

WP1/WP4 JRAP meeting / London / UK / March 15, 2016

Main objectives

- ✓ Assessing spatio-temporal changes in (macro- and micro-benthic) diversity under different sources of disturbance
- ✓ Assessing functional consequences resulting from spatio-temporal changes in benthic diversity
- ✓ Contributing to the definition of a strategy for the future monitoring of European coastal waters (inputs to WP1, Task 1.2)

Scientific questions and expected outcomes beyond the SotA (1)

- ✓ ***Scientific questions***
  - Identifying potential environmental controls and thus potential proxies of benthic diversity
  - Unraveling the relationship between benthic diversity and sedimentary organics mineralization
  - Coupling between biological, biogeochemical and physical data through coordinated data acquisition and/or modelling
- ✓ ***Changes in benthic diversity under different sources of disturbance***
  - Using new tools for assessing benthic biodiversity
  - Testing new technological developments
  - Including new biological compartments in the assessment of benthic diversity
  - Coupling biological data and hydro-sedimentary modelling
  - Coupling new data acquisition with other existing observing/research projects

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Scientific questions and expected outcomes beyond the SotA (2)

Diversity-function relationship

- Including new biological compartments in the assessment of benthic diversity
- Testing new technological developments
- Coupling new data acquisition with existing observing systems and research projects
- Using a hierarchical approach to unravel the effects of benthic diversity and confounding factors in controlling the mineralization of sedimentary organics

Contribution to the definition of a future strategy

- Definition of biodiversity proxies
- Practical tests for the coupling of data of different kinds
- Practical tests for the pooling of *a priori* non coordinated observation/research projects

23/03/2016

Societal questions

- ✓ ***Societal questions***
  - Assessing and monitoring current biodiversity loss
  - Assessing the functional consequences of biodiversity loss
- ✓ ***Associated MSFD Descriptors***
  - Biological diversity D1
  - Non indigenous species D2
  - Food web D4
  - Eutrophication D5
  - Sea floor integrity D6

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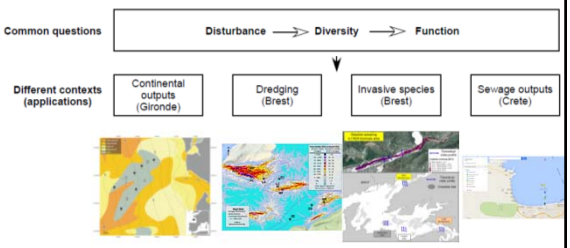
Science strategies (1)



Added value of the JERICO Infrastructure

- Tackling a common question in different contexts (4 sources of disturbances and 3 geographical areas)

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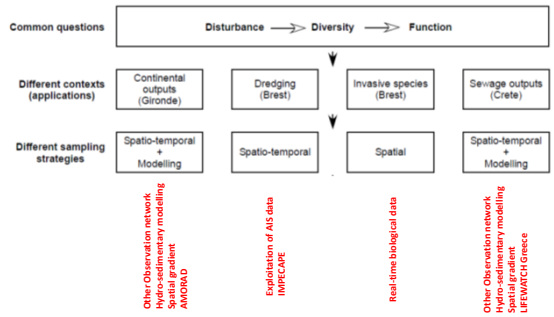
Science strategies (2)

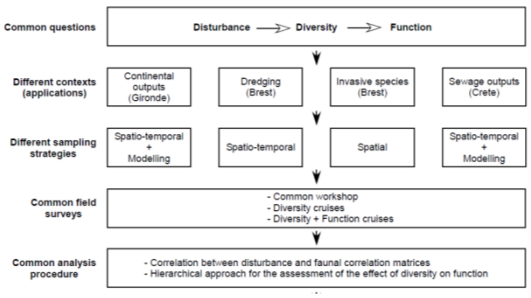


Added value of the JERICO Infrastructure

- Use of existing data
- Coupling with hydro-sedimentary modelling
- Coupling with other monitoring and research projects

23/03/2016

Science strategies (3)



Added value of the JERICO Infrastructure

- Exchange of know-hows and expertise
- Common field surveys and data analysis procedure

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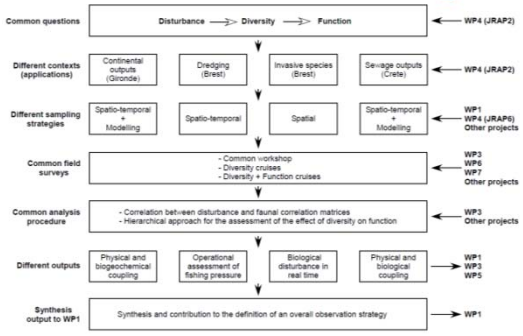
General organization



Equilibrium between diversity and unity

- 4 individual actions, each with a local person in charge
- but common field surveys and data analysis procedure

23/03/2016

Links with other WP and JRAPS (1)

✓ ***Interaction with other JRAPS***

- The *Cretan Sea* action will interact with JRAP 6 for the modeling of the dispersal and deposition of the particles originating from a sewage outflow

✓ ***Technological developments: Interactions with WP3 and JERICO(Next)***

- New towed video system will be developed in Task 3.6 of WP3.
- This is also the case of the eddy co-variance and sediment micro-profiling system that will be used to assess the remineralization of sedimentary POM.
- The software used for the analysis of sediment profile images (SPIArcBase) and video sequences acquired with a mobile carrier (AVIExplore) have been developed within JERICO
- *The Cretan Sea action will potentially interact with WP3 Task 3.4 ("Microbial and Molecular Sensors")*

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Links with other WP and JRAPS (2)

✓ ***Data acquisition and transfers***

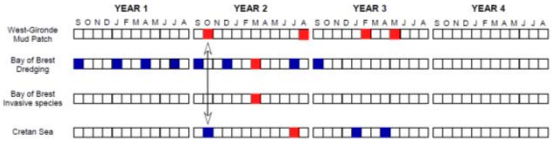
- The *Cretan Sea* action will interact with WP7 through the use of Heraklion Coastal Buoy and Poseidon ferry box data.
- JRAP 2 will contribute to feed WP5 (Data management) and more specifically its Task 5.2 (Integration of biological data).

✓ ***Inputs to WP1***

- Experience will be gained from the conduction of each of the 4 JRAP actions
- Experience will be gained on the coupling between biological and biogeochemical data with hydro-sedimentary modelling
- Experience will be gained on the coupling of new data acquisition with other existing observing/research projects

23/03/2016

Time line



✓ ***Two kinds of cruises (Diversity, Diversity + Functioning)***
✓ ***All cruises completed by the end of year 3***

23/03/2016

Risks and gaps

- ✓ ***Operational risks common to all operation at sea.*** *(Limited) rescheduling possibilities*
- ✓ ***Necessity to apply for complementary funding.*** *Reduction of JRAP2 with a priority to the completion of each action*
- ✓ ***Difficulty to schedule all cruises in case of full success in all complementary applications.*** *Increase the transfers of technology and know-hows*

23/03/2016

Thank you for your attention...

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.

JRAP-3
Occurrence of chemical contaminants in coastal waters and biological responses

Presenter: Luca Nizzetto email : Luca.nizzetto@niva.no

Contributor(s):Catherine Boccadoro, Elisa Ravagnan (IRIS) , Kate Collingridge (CEFAS).

WP1/WP4 JRAP meeting / London / UK / March 15, 2016

Main objectives

1) To identify new contaminants in coastal waters

2) To describe spatial distribution of chemical contaminants

3) Exploring the drivers controlling spatial distribution

4) Exploring co-linearities between contaminant concentrations and biological responses

Secondary obejectives

1. To deliver technical protocols and best practices for the monitoring of chemical pollutants
2. To optimize existing chemical sensor technology for use CI
3. To provide guidelines for the implementation of contaminant monitoring strategies using JERICO infrastructures

Scientific questions and expected outcomes beyond the SotA

Contaminants are central in scientific and regulatory agenda.

Their presence in coastal water is of concern. Impacts on biota and ecological services are unknown.

Marine monitoring is costly. Chemical data can only be obtained at low temporal and spatial resolution (Too expensive analysis)!

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Scientific questions and expected outcomes beyond the SotA

Can we demonstrate an effective and "smart" use of CI?

Does pollution affect assemblages of microorganisms? (subtle biological effects). Bringing ecotoxicology to a different level!

Can we define optimal monitoring strategies to enable high data intelligibility at the lowest possible cost?

23/03/2016

Societal questions

- Descriptor 8 of MSFD:
"to ensure that the levels of contaminants in the marine environment do not generate impacts"

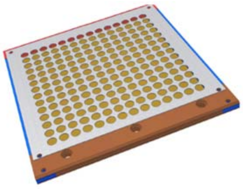
- definition of priority substances list
- Assessing impacts (biological responses)
- Defining EQS for chemical pollutants

Chemical pollution is included in al European and International (UNEP) strategic docmunets. Necessary components of JERICO.

23/03/2016

Science strategies

Task 1: Establishing the first continental scale marine water monitoring campaign using passive samplers on fixed platforms (focus on regulated substances).



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Science strategies

Task 1: March – October 2016

Deployment periods 3-6 months

Deployment/retrieval of passive samplers syncronized with routine visits to the moorings.

Analysis for Several regulated substances (POPs, DDT, HCB, PAHs, possibly brominate flame retardants)

23/03/2016

Science strategies

Task 1: Additional deliverables

Best practices, protocols

New sensor configuration specifically designed for Jerico CI

Tracking of sensor performance from deployments in different conditions through the use of performance reference compounds.

Complementariety: Voluntary contribution from many Jerico Partners.

23/03/2016

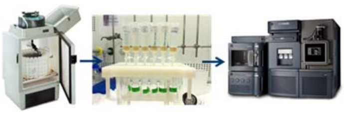
Science strategies

Task 2: Developing a monitoring campaign using a set of FerryBox platforms to the scope of discovery new contaminants and analyse their spatial distribution.

23/03/2016

Science strategies

Pharmaceuticals	
Acetaminophen	92±12
Atenolol	75±8
Caffeine	101±6
Carbamazepine	62±13
Clofibric acid	125±11
Diclofenac	56±13
Hydrochlorothiazide	99±13
Ibuprofen	95±6
Ketoprofen	116±17
Naproxen	86±7
Sulfamethoxazole	54±11
Personal care products	
DEET	110±12
Triclocarban	113±6
Triclosan	120±19
Sweeteners	
Acesulfame K	17±1
Saccharine	52±5
Sucralose	48±7
Selected Currently used pesticides	
Acetochlor	76±10
Carbaryl	90±8
Carbendazim	75±11
Chlorsulfuron	76±9
Isoproturon	88±12
Metribuzin	78±7
Pirimicarb	98±13
Pyrazon	77±2
Simazime	76±6



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Analyte	Ionization mode	Precursor ion (m/z)	Capillary voltage (V)	Product ions (m/z)	Collision energy (eV)	MDL (ng/L)
Pharmaceuticals						
Acetaminophen	ESI+	152	30	110, 93	15, 25	0.27
Atenolol	ESI+	267	30	190, 145	20, 30	0.01
Caffeine	ESI+	195	30	182, -	15, -	1.18
Carbamazepine	ESI+	237	30	194, 179	20, 35	0.04
Clofibric acid	ESI-	213	20	127, 85	17, 10	0.01
Diclofenac	ESI+	296	20	214, -	32, -	0.02
Hydrochlorothiazide	ESI-	296	10	205, 269	20, 20	0.03
Ibuprofen	ESI-	205	30	159, 161	10, 10	0.28
Ketoprofen	ESI-	253	30	209, -	5, -	0.22
Naproxen	ESI-	229	20	170, 185	10, 10	0.02
Sulfamethoxazole	ESI+	254	30	156, 92	16, 26	0.02
Personal care products						
DEET	ESI+	192	20	119, -	10, -	0.04
Triclocarban	ESI-	313	20	160, -	10, -	0.04
Triclosan	ESI-	287	10	35, -	5, -	0.29
Food additives						
Acesulfame	ESI-	162	3400	78, 82	22, 15	0.01
Saccharine	ESI-	182	3400	92, 106	20, 17	0.95
Sucralose	ESI-	395, 397	3400	359, 361	12, 12	0.11

Analyte	Precursor ion (m/z)	Productions (m/z)		Rt (min)	DP	EP	CE	CXP	MDL (ng/L)
Acetochlor	270.1	224.2	148.1	4.2	51	10	13	20	0.07
Acetochlor-D11	281.1	235.1	159.1	4.1	71	10	13	22	
Alachlor	270.1	238.1	162.1	4.2	51	10	15	18	0.28
Atrazine	216.1	174.2	68.0	3.5	46	10	27	18	0.03
Azinphos methyl	318.0	160.0	132.0	3.7	51	10	11	14	0.07
Carbaryl	201.9	145.0	127.1	3.2	61	10	17	12	0.03
Carbendazim	192.0	160.0	131.9	2.9	51	10	25	14	0.11
Chlorpyrifos	349.9	96.9	197.9	6.1	41	10	51	10	0.14
Chlorpyrifos-D10	361.9	98.8	200.8	6.1	116	10	49	10	
Chlorsulfuron	357.9	141.0	c167.0	2.3	66	10	25	12	0.07
Chlortoluron	213.1	72.2	46.2	3.4	81	10	31	4	0.14
Clopyralid	191.9	145.9	173.9	5.8	49	10	20	15	0.83
DIA-D5	179.0	68.9	104.9	2.6	81	10	39	8	
Diazinon	305.0	169.0	96.9	4.6	86	10	31	14	0.07
Dimethachlor	256.1	224.0	148.1	3.5	81	10	21	26	0.14
Dimethoate	230.0	198.9	124.9	2.8	71	10	13	16	0.01
Dimethoate-D6	236.0	205.0	130.9	2.7	51	10	13	20	
Disulfoton	275.0	88.9	61.0	4.8	76	10	23	10	0.03
Diuron	232.9	71.8	46.1	3.5	106	10	25	12	0.07
Fenitrothion	278.0	124.9	108.9	4	111	10	31	16	2.78
Fenitrothion-D6	284.0	248.9	115.1	4	126	10	23	16	
Fenoxaprop-ethyl	362.0	288.0	77.0	5.3	116	10	25	22	0.01
Fenpropimorph	304.2	147.0	117.0	8.2	86	10	39	4	0.01
Florasulam	360.0	129.0	109.0	7.4	51	10	13	10	0.01
Fluroxypyr	255.0	208.9	180.9	2.2	71	10	21	18	0.28
Fonofos	247.0	109.0	136.9	4.6	46	10	27	10	0.07
Isoproturon	207.2	72.1	46.1	3.5	51	10	21	18	0.03
Isoproturon-D3	210.1	75.0	49.0	3.5	71	10	25	10	
Malathion	331.0	127.0	99.0	3.9	81	10	17	12	0.14
Metamitron	203.0	175.1	104.0	2.8	71	10	23	20	0.14
Metazachlor	278.2	134.2	210.2	3.8	71	10	27	4	0.03
Metolachlor	284.1	252.2	176.1	4.2	51	10	21	18	0.07
Metribuzin	215.1	187.1	84.0	3.2	56	10	25	18	0.07
Parathion-methyl	264.0	125.0	232.0	3	51	10	15	18	1.39
Pendimethalin	282.2	212.0	194.2	6.3	71	10	17	18	0.03
Phosmet	318.0	160.0	76.9	3.7	66	10	21	14	0.07
Pirimicarb	239.0	71.8	182.1	3.4	101	10	33	10	0.01
Prochloraz	376.0	308.0	70.0	4.7	46	10	17	24	0.01
Propiconazole	342.0	159.0	69.0	4.5	76	10	41	16	0.03
Pyrazon	222.0	104.0	77.0	2.8	56	10	31	16	0.03
Simazine	202.0	132.0	124.1	3.2	61	10	27	12	0.03
Simazine-D10	212.0	137.1	104.9	3.2	76	10	29	10	
Tebuconazole	308.1	70.0	125.0	4.4	96	10	61	8	0.14
Temephos	466.9	419.0	124.9	5.7	161	10	27	18	0.01
Terbufos	289.0	103.0	232.9	5.7	51	10	13	10	0.03
Terbuthylazin	230.1	174.0	67.9	3.9	61	10	23	16	0.03
Terbuthylazin-D5	235.0	179.0	69.0	3.9	66	10	25	16	
Tribenuron-methyl	396.1	155.0	181.0	6.2	58	10	14	23	0.01

23/03/2016

Science strategies

Task 2: April – October 2016

Running two campaigns (summer and winter) using (at least) 3 ferry lines.

Consistently collecting data from FerryBox sensors (salinity, temperature, Fluor., etc.)

Identify co-lineraties between chemicals and water parameters.

Analysis for Several non-regulated substances (Pesticides, personal care products, pharmaceuticals, antibiotics….

Science strategies

Task 3: Development of a high spatio/temporal resolution campaign focusing on the integrated analysis of chemical signals and biological responses.

Highest possible resolution

Variable frequency to collect data in contrasting areas

Chemical analysis + Biomarker of microbial communtiy compositions

Analysis of co-variance.

Multivariated analysis (water parameter)

Integration with JRAP 1.

Integrated analysis of pollutant distribution, molecular marker, and phytoplankton diversity, abundance, production.

Consistent sampling in Kattegat Skagerrak.

We will deliver information direct markers of anthropogenic pressure (wastewater markers, bioactive substances).

Links with other WP and JRAPS

WP1. Inclusion of chemical monitoring in the long term strategy for integrated coastal observatories in Europe to serve scientific research, environmental protection and governance.

WP2 Task 2.4: Delivery a new harmonized tool and standard procedures for the routine inclusion of chemical contaminant sensing on JERICO fixed platforms through the use of passive samplers.

WP2 Task 2.6: Providing inputs for the inclusion of passive sampling based measurements of chemical pollutants into the context of JERICO quality label.

Links with other WP and JRAPS

WP 3 Task 3.4 Field testing of microbial molecular methodology for pollution detection. Delivery integrated chemical and biochemical data for in field demonstration activities.

Delivery of chemical contamination data from ferrybox unit to JRAP 1. Data can be used to analyze possible drivers controlling phytoplankton assmblages.

Risks and gaps

- Logistics and bureaucracy can represent a bottle-neck!
- Platforms may become unavailable
- Difficulty on integrating Task 1 activity and results. But this task is necessary for the overal strategy (WP1)
- Continuity in the future?
- Spatio/temporal resolution of contamination data will be very different from that delivered by standard sensors. Difficulties in proper integration of data.

Thank you

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.

JRAP#4: 4D characterization of trans-boundary shelf/slope hydrodynamics and transport

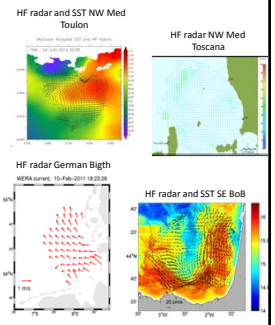
Presenter: Anna Rubio email: arubio@azti.es

Contributor(s): CNR-ISMAR, CNRS (MIO & LOS), IFREMER, HZG, CMCC

WP1/WP4 JRAP meeting / London / UK / March 15, 2016

Main objectives

- 4D characterization of shelf/slope circulation and its time variability year-round in three trans-boundary areas, through the joint analysis of multiplatform data of surface currents and hydrology (HF radars, drifters, satellite imagery …) and information from the water column (drifters, moorings, gliders, satellite altimetry, coastal profilers…).
- Quantifying transport by ocean currents and its potential impact on the distribution of floating matter (plankton or other pelagic organism, marine litter…) in line with MFSD main descriptors (7,10 and 2).

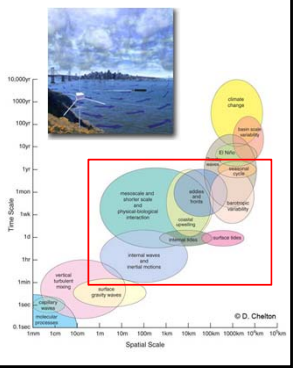


Scientific questions and expected outcomes beyond the SotA

Estimating ocean coastal transport is very challenging because it is inherently chaotic and depends on the details of the surface velocity field at several scales

HF radars (and the combination with other systems within COOS) offer today the opportunity to observe scales from mesoscale to high frequency processes (inertial currents and tides).

Which are the main coastal ocean processes and scales for transport and applications resolved by Hf radars? How can we isolate their signals to better understand their role on transports and to provide improved forecasts and 4D estimation?



Societal questions

The JRAP#4 aims to contribute to assess the following MFSD descriptors:

- D7 (*Permanent alteration of hydrographical conditions*). JRAP#4 will allow for the continuous monitoring of hydrographic conditions.
- D10 (*Properties and quantities of marine litter*): Marine litter is advected or drifted by marine currents. JRAP#4 will provide information about hydrodynamics and derived transport to infer the spatial distribution (e.g. convergence areas and coastal arrivals) of this not-desirable material.
- D2 (*Non-indigenous species introduced by human activities*): Ocean changes (e.g. ocean warming) induced by the climate change (partly induced by human activities) could be the reason of the arrival of non-indigenous species (including gelatinous organism,s such as the Portuguese man-of-war *Physalia physalis*), with low swimming abilities and whose spatial distribution is highly depending on hydrodynamics

JRAP#4 will also provide inputs for other JRAPs, focused on other descriptors (e.g. JRAP#1, dealing with pelagic biodiversity, which will require information about hydrographical and hydrodynamical conditions and spatiotemporal changes)

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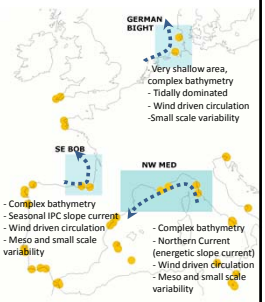
Science strategy

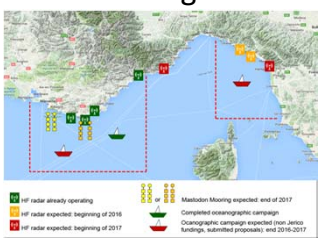
- 3 STUDY AREAS –diversity of processes
- Demonstration based on HISTORICAL DATA and NEW OBSERVATIONS (scales: hourly, > 1 year)
- OSSEs (*Task 3.7, JRAP#6*) to objectively propose optimization in existing observing networks

Main WORKLINES:

1. **4D trasnports estimation.** Identify appropriate methods to project surface velocity at selected scales in the water column: DA and data fusion (OMA and vertical projection using hydrofraphic profiles)
2. **Short term prediction.** Test STP methods (several approaches: parametrical statistical models, empirical models , Lagrangian models form FSLE, neural networks) and assimilation using HFR and available data to forecast 4D estimates with applications to 3
3. **Use 4D transports to address MSFD descriptors.** Lagrangian models to provide diagnostics in relation to several applications



Science strategies – NW Med



Added value of JERICO infrastructure:

- MASTODON MOORINGS
- HFR deployment, data processsing & QA/QC
- Other-developements (T3.7, T2.3)

- **Main ocean processes**: analysis of historical (4D data from TOSCA project: CNRS-MIO & CNR-ISMAR, including HFR, ship CTD and ADCP, drifters, gliders) and JERICO_NEXT data in the area.
- **Methods for the estimation of 4D transport** : EnKF developed by the CMCC and used in OSEE in the NW Med region, amongst other (to be tested in numerical model outputs).
- **COUPLING WITH BIO*CAL DATA:** Potential impact on issues related to MSFD D2 and D10 will be addressed if synergies with other projects will allow it. In particular proposal (IMPACT) to INTERREG Italy-France Maritime Cooperation will provide data on contaminants and ecological quantities in the NW Med

Science strategies – SE BoB

Added value of JERICO infrastructure:

- MASTODON MOORINGS T3.3)
- NEW HFR (Task 2.3.2)
- HFR deployment, data processsing & QA/QC
- Other-developements (T3.7, T2.3)

- **Main ocean processes**: analysis of historical (4D data from AZTI campaigns & through COriolis ReAnalysis validated products (CORA, in the regional version CORA-IBI) and JERICO_NEXT data in the area.
- **Methods for the estimation of 4D transport** : HFR data fusion with hydrographic data in the area, combination of HFR and models
- **COUPLING WITH BIO*CAL DATA:** Potential impact on issues related to MSFD, marine litter, depending partially on proposal (LEMA) submitted to 2016 LIFE call and historical data from past multidisciplinary campaings

Science strategies – German Bight

Added value of JERICO infrastructure:

- HFR deployment, data processsing & QA/QC
- Other developements (T3.7, T2.3)

- **Main ocean processes**: analysis of historical data to study and separate the effect of winds and tides on transports in the area.
- **Methods for the estimation of 4D transport** : HFR data fusion with tide gauges and numerical models (GTEM) for volume transports & data assimilation.
- **COUPLING WITH BIO*CAL DATA:** Potential impact on issues related to MSFD, pollutants drift in a very shallow area. Closed box Wangerooge –Helgoland, Büsum – Helgoland and coastline where budget calculations will be performed.

Organization and time line

T.1 PREPARATION (T4.1.1 - review, 4.1.2 - analysis of nature runs, T4.1.3 discussion of best sampling, 4.1.4 Report to D4.1)

T.2 ONSITE IMPLEMENTATION (4.2.1 - MASTODON, 4.2.2 - HFR, 4.2.3 Extended OSSES, 4.2.4 Auxiliary instruments, 4.2.5 data proce.)

T.3 DATA ANALISYS (4.3.1 Data processing, 4.3.2- Data analysis, 4.3.3. Syntesis and diffusion)

END for JRAPs

	CROSCUTTINGS						
Del	WP1	WP2	WP3	WP4 / JRAPs	CC WP5	Specific comment and/or attention to pay	D1 and M1
sep-15	Joint workshop WP1/WP4 (task 1.2.1)		3.7.2 (nature runs and OSSES)	4.6 - JRAP#6.1 Nature runs			MS43 (KOM)
						FIRST NATURE RUNS	
	Scientific Committee					NATURE RUNS READY	
	Strategic guidelines for the JRAPs						MS4
may-16							D4.1 JRAPS scientific and monitoring strategy
			3.2.1 and 3.2.2 (HFR) and 3.3a (MASTODON)		5.6 (HFR QA/QC)		
				4.6 RUNS with DA to perform OSSEs - (M12-M40)			D3.15; D4.2 JRAPS progress (Wp2 and WP3 outcomes)
feb-17	presentation of JRAPs progress					FIRST OSSES RESULTS READY Feedback for optimal scientific strategy	D1.2 iteration 1, D3.12, MS44 (WP4 workshop 1)
					5.7 (gliders calibration /data collection)	of RADAR SE BOB	
					all tasks in wp5	EXTENSION CNR-ISMAR HFR network and possible complementary observations MASTODON and DRIFTERS SE BOB	
PHE 2017			HFR network design + current retrieval algo (D3.1, D3.3)		all tasks in wp5: data available	SHR + MASTODON SE BOB	D3.1, D3.4, D3.10; D4.3 JRAP progress (attention to WP5) MS16
jan-2018	3.6: recommendations for improvement						
PHE 2018					Define how data is delivered to WP5		D4.4 First results of JRAPS par region (results to WP5, date to WP5); MS45 (WP4 workshop 2)
							Profile coastal water and Mastodon2D D3.5
mar-19							D4.5 (JRAP#1&#3&#6)
							D1.2 (Scientific strategy)
		MS46	Infrastructures final assesment (D3.4)				MS46 (final WP4 workshop)

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NEW ON SITE DEPLOYMENTS

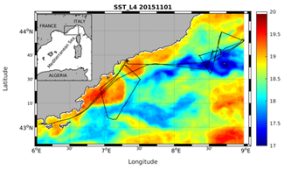
Links with other WP and JRAPS

- **JRAP#1**: related to flowcitometer use but different focus
- **JRAP#3**: Join study on the impacts of current in the offshore concentration of pollutants (ISSUES: sampling integration period)
- **JRAP#6** – High resolution modelling with (NW Med) and without (SE BoB) data asimilation

AREA	JRAP#1	JRAP#3	JRAP#6
SE BOB	?		
NW MED			
GB			

NW Med **OSCAHR campaign**
Observing Submesoscale Coupling At High Resolution
October 29 – November 6 2015

→ joint use of MVP-CTD-LOPC and continuous flow cytometer (JRAP#1) in and near the Nice HFR area



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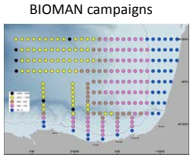
AREA	JRAP#1	JRAP#3	JRAP#6
SE BOB	?		
NW MED			
GB			

SE BOB (AZTI) In particular **two applications** : (1) studies looking for the **optimization of the monitoring of the European anchovy** (Engraulis encrasicolus) ichthyoplankton for recruitment modelling and (2) design of **harmful algal monitoring for offshore aquaculture** purposes. (Tasks 3.1 and 3.2)

BIOMAN campaigns



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Links with other WP and JRAPS

- **JRAP#1**: related to flowcitometer use but different focus
- **JRAP#3**: Join study on the impacts of current in the offshore concentration of pollutants (ISSUES: sampling integration period)
- **JRAP#6** – High resolution modelling with (NW Med) and without (SE BoB) data asimilation

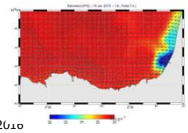
AREA	JRAP#1	JRAP#3	JRAP#6
SE BOB		?	
NW MED			
GB			

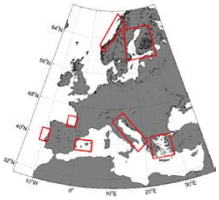
Join study on the impacts of current in the offshore concentration of pollutants like: PAHs (polycyclic aromathic Hydrocarbons, several compounds); Organochlorine pesticides (DDT, HCB, HCHs), PCBs, PBDEs (polybrominated difenil ehters) and novel brominated flame retardants (several compounds). Deployment of a passive sampler in the Donostia buoy during several (to be determined and depending on external funding) short integration periods (two weeks/one month) and HFR currents and vertical information from the buoy and moorings will be used to characterize the different hydrodynamic scenarios and their effect on the off shore concentrations measured – ALSO IN NW MED??

Links with other WP and JRAPS

- **JRAP#1**: related to flowcitometer use but different focus
- **JRAP#3**: Join study on the impacts of current in the offshore concentration of pollutants (ISSUES: sampling integration period)
- **JRAP#6** – High resolution modelling with (NW Med, T3.7 but not in JRAP) and without (SE BoB) data asimilation

AREA	JRAP#1	JRAP#3	JRAP#6
SE BOB			
NW MED			
GB			





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Links with other WP and JRAPS

WP 1	**SCIENCE STRATEGY:** Contribute to define and demonstrate science strategy			
	M9 **D4.1**	M18 **D1.2, MS44**	M36 **MS45**	M43 **D4.5** M44 **D1.2**
WP 2	**HARMONIZATION:** Use the recommendation for data quality of existing and new observing systems			
	M6 **MS9**	M12 **D4.2**	M24 **D4.3**	
WP 3 – task 3.7	HFR(T3.2), MASTODON (ST 3.3.1), numerical developments and OSSES(T3.7) (ST 3.2.3 New HFR products for 4D transports)			
	M9 **D4.1**	M12 **D4.2**	M18 – **Strategy for new deployments**	
WP4- JRAP#6	Numerical developments and OSSES			
WP5	**DATA MANAGEMENT:** Use the recomendations for data quality of existing and new observing systems			
	M24 **D4.3**	M36 **D4.4**		

MAIN DELIVERABLES RELATED TO JRAP#4

D4.1 Scientific strategy of each JRAP, according to discussions and interaction with task 1.2 of WP1

D4.2 JRAP progress (with WP2 and WP3 outcomes)

D4.3 JRAP progress (special attention to WP5)

D4.4 JRAP first results (WP8).

D4.5 FINAL RESULTS (feed 1.6 M43)

MS9 Workshop : Harmonizing new network systems

MS44-45 WP4 Workshops

D1.2 Scientific Strategy

Risks and gaps

RISKS

–Lack of data from new or existing systems. Delay in the deployment of instruments and availability of new data (e.g. HFR NW Med: permits, need to move existing systems, strong Radio Frequency Interference , HFR SE BoB : New antenna installation fro the begining)

–Needed close cooperation with other WPs. Inputs of WP3 (3.2 –HFR, 3.3 MASTODON, 3.7 OSSES) are key for scientific and technical advances in JRAP#4.

–Diversity of processes in study areas

–For the applications to MSFD issues data on contaminants and ecological quantities are required and will be acquired in other projects, presently pending.

–Possible cross-cuttings in the SE BOB reported between JRAP#4 and JRAP#1 will depend on external funding, first, for performing the monitoring of plankton and harmful algae, secondly, for analyzing jointly the information, and finally for reporting the results.

GAPS

The use of numerical model outputs is not explicitly planned for the study of 4D transport

23/03/2016

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.

JRAP-5

Presenter: Lauri Laakso, FMI email: lauri.laakso@fmi.fi

Contributor(s): Jukka Seppälä, SYKE

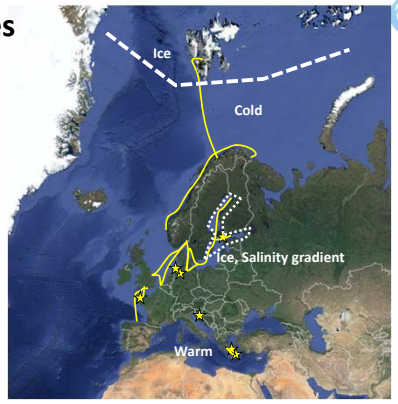
WP1/WP4 JRAP meeting / London / UK / March 15, 2016

Main objectives

1) Understanding and quantifying the influence of biological activity on carbon release or uptake, relative to physical and chemical processes affecting sea-air carbon fluxes*.
2) Describing temporal and spatial variability of #1 (not much studied)
3) Understanding the differences and similarities b/w different coastal/border sea areas is the main focus ("big picture" in addition to localized studies)

* «we have to be carefull physics is not coming (just) a supporting science for biologists»

Sites



State-of-the-art scientific question: Biological carbon cycle in such diversity of conditions

Beyond the SotA

1) Currently, ICOS-OTC (coordinating marine carbon observations in EU) is only in a development phase, protocols being created (first draft only in Feb 2016)
2) Marine biological processes (biological activity, primary production or respiration rates) important for coastal seas mainly excluded ICOS-OTC ("blue ocean boys")
   ⇒ Jerico-next will provide this component which may be included in ICOS at some later stage
   ⇒ We will also understand, for the first time, overall biological carbon uptake variability in time and space for the European seas ("Green ocean people")

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Societal questions

- Biological activity strongly linked with algae blooms: important for recreational activities
- Important for ecosystem wellbeing
- Climate change

- MSFD defines its goals by ecosystem health status rather than fixed reduction targets

⇒ Eutrophication, and its adverse effects (MSDF, D5, ANNEX 1) historically addressed in terms of nitrogen and phosphorus loads, however, almost all biogeochemical processes in marine environment connected to inorganic and organic carbon

23/03/2016

Science strategies

- At each site, we will do observations of chlorophyll, pCO_2 and physical parameters
- At some sites, extended measurements, e.g. pH, alkalinity, primary production, nutrients, carbon fluxes:
  => No other similar networks/combined observations in EU

- Physical, chamical and biological variables observed together at same sites*
- Spatio-temporal scales of carbon processes

23/03/2016

* «we have to be carefull physics is not coming (just) a supporting science for biologists»

Organization and time line

- At the moment, collecting detailed information on observing methods, calibration procedures and environmental conditions at each site, data collected from partners by June 2016
- Potential intercomparisons WS in winter 2016-17, depending on TNA funding (2%*) and interaction with WP2 calibrations
  ⇒ Important in aim to get comparable results
- Intensive observing period spring 2017 → spring 2018

* Avoid spending TNA funding during the last year of project «just to get is spent»

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Links with other WP, JRAPS

(links relevant within next 12 months)

- Interactions b/w JRAP5 and WP2 to be discussed in this meeting: can be have joint intercomparisons WS?
  - variability of Alkalinity, pH, pCO2 in conditions corresponding the diversity of European Seas
- Details in D4.1

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Links with other WP and JRAPS

- JRAP#1: simultaneous obs. at some sites.
- Algae blooms and specs support understanding influence of species on carbon balance
- JRAP#6: influence of surface turbulence on phytoplankton (→carbon fluxes)

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Risks and gaps

- TNA / WP2 funding does not allow intercomparisons WS => not ruining the JRAP5, just the quality of observations not so good & some observing sites may need to be left out from final data-analysis
  (attempt to include this in the proposal, with no success due to the fight for the funding b/w partners)
- Broken instruments
- Gaps:
  - Vertical information on e.g. chlorophyll, pCO_2,...

23/03/2016

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.

Answers to TNA plan

1 *(Niva-NRS): 877€/week/participant x 8 participant: 7.016€"* **NO** The cost is 877€ for the whole session for 1 week but NIVA can justify prep) you need to sent a proposals to the TNA Call with à User team which doesn't include Norvegian people? The PI must be from a country without such infrastructure.
2) the TNA cost that can be validated by NIVA are 877€ for 1 week for the whole infrastructure

3) Budget
"*TNA unit access costs* aration costs are defined in the DOW.

"Traveling and transport costs per participant (2 pers / institute) for 1 week: 4000€ x 8: 36.000€"
The amount of the help for TNA user will be limited. We'll probably not go further 8000€

"Calibration gases needed during the WS (1000€/50kg bottle) x 6: 6.000€"
In the TNA excel sheet, the maximum amount is 5000€ for 2 weeks that can be justified. So 2500€ for 1 week is better.

"Experiment preparations (setting up temporary tanks etc) 5.000€
(Direct cost coming from TNA experiment preparations and in-situ support for visitors during the WS)" yes as actual cost

To be accepted, the TNA should be really defined. You can't have training course within TNA but you can have an assistance ... You can't speak of calibration workshop, which is a Networking activity but calibration testing. If you want to have a workshop, please do it afterwards (even the day after) but on the WP2 budget
Make really the # between the TNA activity and the WP2 one.
The cost not eligible in the TNA should be taken by the participants and justified to the commission at the end of the reporting period.

23/03/2016

JRAP-6
Operational oceanography and coastal forecasting

Presenter: Baptiste Mourre email: bmourre@socib.es

Contributor(s): J. Vitorino, T. Vukicevic, L. Ferrer, J. Mader, L. Laakso, G. Korres, L. Perivoliotis, H. Wehde, M. Juza, J. Tintoré

WP1/WP4 JRAP meeting / London / UK / March 15, 2016

Context

- **Numerical models** are key elements of coastal operational oceanography systems
  - → represent 3-D ocean conditions and their evolution
  - → help to understand complexity
  - → predictive capability

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  - → help to understand complexity
  - → predictive capability
- Operational models (hydrodynamical, biogeochemical, waves) have been settled in a number of European coastal observatories

  … But operational ocean modelling is still highly challenging due to the intrinsic variability of the coastal ocean and model limitations (forcings, resolution, parameterizations,…)

Context

- **Numerical models** are key elements of coastal operational oceanography systems
  - → represent 3-D ocean conditions and their evolution
  - → help to understand complexity
  - → predictive capability
- Operational models (hydrodynamical, biogeochemical, waves) have been settled in a number of European coastal observatories

  … But operational ocean modelling is still highly challenging due to the intrinsic variability of the coastal ocean and model limitations (forcings, resolution, parameterizations,…)
- There have been significant advances over the last years in terms of availability of coastal observations (e.g. JERICO), allowing an improved evaluation of model results

Main objectives

Show the importance of JERICO-NEXT observations for the **assessment** of operational regional models implemented in the coastal ocean, leading to **recommendations for coastal forecasting system improvements**, both in terms of models and observations.

Scientific questions and expected outcomes beyond the StoA

→ Coastal ocean numerical model evaluation and improvements, to efficiently answer scientific and societal questions.

→ Focus on aspects related to MSFD implementations and society needs: surface circulation and physical processes involving vertical velocities and surface mixing with an impact on ecosystems.

Scientific questions and expected outcomes beyond the StoA

JRAP6 is expected to provide answers to the following questions:

- **How realistic are our coastal ocean models (focusing on specific variables and processes)**
- **What do we have to improve in the models ?**
- **What is the impact of coastal observations on the model performance when data are assimilated ?**
- **How should we optimize coastal ocean measurements ?**

23/03/2016

Societal questions

Applications: drifting of objects or organisms, eggs and larvae dispersion, oil spill applications, harmful algae blooms prediction, maritime search-and-rescue, contaminants and litter dispersion,…

MSFD descriptors 5, 7, 8, 10:

- Eutrophication and harmful algae blooms (wave turbulent mixing and surface circulation/retention)
- Hydrographical conditions: characterization of variability and prediction
- Contaminants: characterization of the coastal dispersion and prediction
- Marine litter: study of accumulation areas, microplastics dispersion

23/03/2016

Science strategies

Task 1 – Model assessment

Task 2 – Coastal ocean forecasting system improvements

23/03/2016

Science strategies

Task 1 – Model assessment

Subtask 1.1 – Models without data assimilation

Subtask 1.2 – Models including data assimilation

Task 2 – Coastal ocean forecasting system improvements

Subtask 2.1 – Modelling improvements

Subtask 2.2 – Observing System improvements

23/03/2016

Science strategies

Task 1 – Model assessment

Subtask 1.1 – Models without data assimilation

Subtask 1.2 – Models including data assimilation

⟶ Observing System Experiments (OSEs)

Task 2 – Coastal ocean forecasting system improvements

Subtask 2.1 – Modelling improvements

Subtask 2.2 – Observing System improvements

⟶ Observing System Simulation Experiments (OSSEs)

23/03/2016

Science strategies

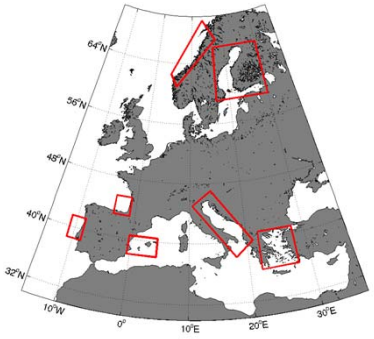
- **added value of JERICO infrastructure** : harmonized high-quality multi-platform observations in the coastal ocean give the opportunity to provide new insights into model skills, identify model limitations and then improve the simulations.
  → gliders, HF radar, Ferry Box, Moorings
- **coupling in the acquisition and processing of physical, biogeochemical and biological data:**
  Operational biogeochemical modelling still not mature enough
  → Focus on physical models (hydrodynamics significantly affects biogeochemistry !), processes impacting biogeochemistry (surface circulation, vertical mixing, upwelling, mesoscale)
  → Some biogeochemical data used (e.g. Baltic Sea, Portuguese coast, Aegean Sea TBC) when possible

23/03/2016

Organization and time line

8 partners

- SOCIB (Spain)
- IH (Portugal)
- AZTI (Spain)
- CMCC (Italy)
- CNR (Italy)
- FMI (Finland)
- HCMR (Greece)
- IMR (Norway)

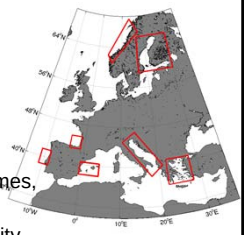


23/03/2016

Organization and time line

Processes

- Upwelling, slope current
- Wind-driven circulation, slope current, mesoscale
- Slope current, water mass exchanges, mesoscale
- Wind-driven circulation, river plumes, mesoscale
- Mesoscale to small-scale variability
- Buoyancy-driven circulation, fjords
- Wave-induced turbulence

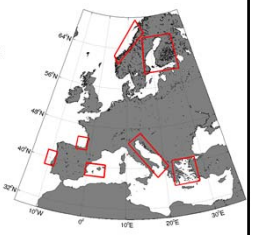


23/03/2016

Organization and time line

Data and sampling

- Continuous observatory : Balearic Sea, South Bay of Bisc Aegean Sea
- Past measurement campaigns: West Portugal, South-West Adriatic Sea
- Planned campaigns: Baltic Sea (April 2017-March 2018)



23/03/2016

Organization and time line

Partner	Study area	Observations used for model assessment / data assimilation	Data assimilation approach	Model (resolution)
SOCIB	Ibiza Channel	Fixed stations, HF radar, glider	EnOI	ROMS (2km)
IH	Atantic margin (Nazare Canyon)	Fixed stations, glider, CTDs, tide gauges	OI	HOPS (0.3km)
CMCC-CNR	Adriatic Sea	Fixed stations, HF radar	EnKF	NEMO (2km) / SHYFEM (unstructured)
HCMR	Aegean Sea	Fixed stations, glider, FerryBoxes, ARGO	SEEK filter	POM (3km)
IMR	Norway Sea	Fixed stations, FerryBoxes, CTDs	--	ROMS (0.8km)
AZTI	South-East Bay of Biscay	Fixed stations, HF radar, drifters	--	ROMS (0.67km)
FMI	Baltic Sea	Fixed stations, FerryBoxes, CTDs	--	WAM

23/03/2016

Organization and time line

Task 1 – Model assessment

Subtask 1.1 – Models without data assimilation

IH, SOCIB, AZTI, CMCC, CNR, FMI, HCMR, IMR

Subtask 1.2 – Models including data assimilation

HCMR, SOCIB, IH, CMCC, CNR

Task 2 – Coastal ocean forecasting system improvements

Subtask 2.1 – Modelling improvements

AZTI, SOCIB, IH, CMCC, CNR, FMI, HCMR, IMR

Subtask 2.2 – Observing System improvements

CMCC, SOCIB, IH, CNR

23/03/2016

Organization and time line

Milestones / Deliverables	Title	Subtask	Leading institution	Participants	Delivery date
JRAP6-R1	Strategy, preparation and implementation of the JRAP		SOCIB	SOCIB, IH, AZTI, CMCC, CNR, FMI, HCMR, IMR	Month 8 (May 2016)
JRAP6-R2	Model assessment using JERICO observations	1.1	IH	SOCIB, IH, AZTI, CMCC, CNR, FMI, HCMR, IMR	Month 18 (March 2017)
JRAP6-R3	Data-assimilative model assessment and Observing System Experiments (OSEs)	1.2	HCMR	SOCIB, IH, CMCC, CNR, HCMR	Month 30 (March 2018)
JRAP6-R4	Recommendations for modelling strategy improvements	2.1	AZTI	SOCIB, IH, AZTI,CMCC, FMI, HCMR, IMR	Month 38 (November 2018)
JRAP6-R5	Observing System Simulation Experiments (OSSEs) and recommendations for coastal observing systems	2.2	CMCC	SOCIB, IH, CMCC	Month 38 (November 2018)
JRAP6-R6	JRAP synthesis		SOCIB	SOCIB, IH, AZTI, CMCC, CNR, FMI, HCMR, IMR	Month 42 (March 2019)

Links with other WP and JRAPS

- JRAP1: algae blooms, phytoplankton variability (Baltic Sea ?)
- JRAP2: hydro-sedimentary modelling (Cretan/Aegean Sea ?)
- JRAP4: hydrographic conditions, transports, models, data assimilation, OSSEs
- JRAP5: Baltic Sea measurements (+ Aegean Sea?)

23/03/2016

Links with other WP and JRAPS

- WP2: harmonization (initial network, HF radar)
- WP3: OSSE methodology, HF radar data assimilation
- WP5: data management

23/03/2016

Risks and gaps

- Baltic Sea measurement campaign
- SOCIB and CMCC data assimilation developments
- Diversity of areas/models/observations
  → coordination to focus the work
  → synthesis required
- Involvement of subtask leaders
- Difficulties to link results with biological data

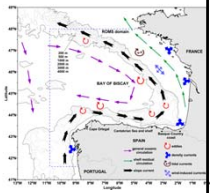
23/03/2016

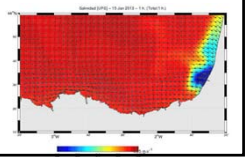
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654410.

Some details

AZTI

- South Bay of Biscay
  - Wind driven shelf circulation
  - Slope current with mesoscale variability
  - Marked seasonal cycle, tides
- ROMS model (670m resolution), without data assimlation
- Observing platforms: HF radar, buoys, drifters

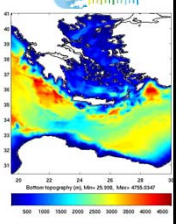




Some details

HCMR

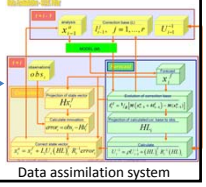
- Aegean Sea
  - Mesoscale to small scale variability
  - Short-term (hours to days) forecasts
- POM model (1/30º resolution)
- Data assimilation: localized SEEK filter (multivariate), with partial evolution of correction basis
- Observing platforms: moorings, ARGO floats + gliders



The observational network

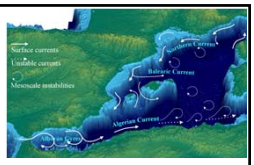
Introduce and test the Glider component of the observational network: Two gliders will be purchased before the end of 2015 through national funding. Glider sections will be additionaly assimilated into the Aegean Sea model in OSE type of experiments.

JERICO NEXT WP4: Subtask 1.2



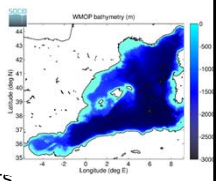
Data assimilation system

Some details



SOCIB

- Balearic Sea
  - Meridional water masses exchanges through a key control section (Ibiza Channel)
  - Mesoscale activity
- ROMS model (2km resolution)
- Data assimilation: local multimodel Ensemble Optimal Interpolation

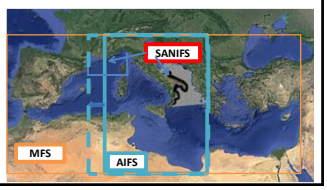


- Observing platforms: HF radar, gliders, moorings, ARGO floats, drifters and CTDs

Some details

CMCC-CNR

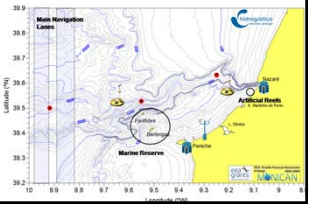
- Adriatic Sea
- NEMO regional model (2km resolution) and coastal unstructured grid model (SHYFEM, 3km to 50m resolution)
- Data assimilation: Ensemble Kalman Filter
- Observing platforms: HF radar, moorings



Some details

IH

- Atlantic margin off Portugal: Nazare Canyon area
  - Shelf/slope circulation in continental margins under the influence of submarine canyons
- HOPS model (600m resolution)
- Data assimilation: Optimal Interpolation
- Observing platforms: HF radar, moorings, tide gauges, glider, CTDs



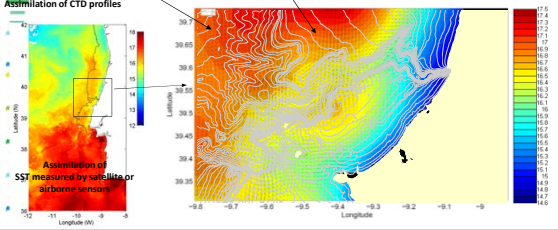
HOPS model with data assimilation used until now to produce 3D

- semi-operational forecasts
- nowcasts / hindcasts

in the framework of process studies for the Nazare Canyon area of influence

Assimilation of data collected by multiparametric platforms

Assimilation of CTD profiles

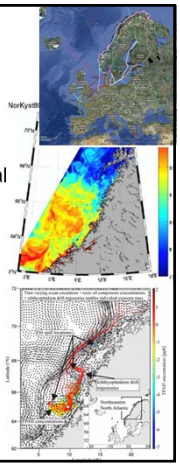


Assimilation of SST measured by satellite or airborne sensors

Some details

IMR

- Norwegian Sea
  - Assessment of dispersion of oil/chemical substances in the coastal systems of Norway/fjords
- Norkyst 800 model (ROMS, 800m resolution)
- No data assimilation
- Observing platforms: moorings, ferry box, repeated transects



Some details

FMI

- Baltic Sea
  - Assessment of wave-induced turbulence in the Baltic Sea
- Wave model: WAM
- No data assimilation

- Observing platforms:
  wave buoys, CTDs, Ferry Box

JRAPs Data Flow: Integration with WP5 (DM) activities

Presenter: **Leonidas Perivoliotis, HCMR** email: lperiv@hcmr.gr

Contributor(s): **Patrick Gorringe, EUROGOOS** (WP5 coleader), **VLIZ**, **JRAP leaders**

Jerico Next Data management

Objectives

- Integrate the biological data in the JERICO NEXT data portfolio
- Define the project's data policy by enhancing/promoting the open access to the data
- Implement a more efficient platform registration and metadata management system
- Define properly the data flow within JERICO NEXT
- Improve the quality of measurements derived from platforms that are widely used in coastal monitoring such as the FerryBoxes, HF Radars and Gliders
- Explore the possibility to connect the JERICO NEXT Data system with a Virtual Access Infrastructure

Jerico Next Data management

Challenges

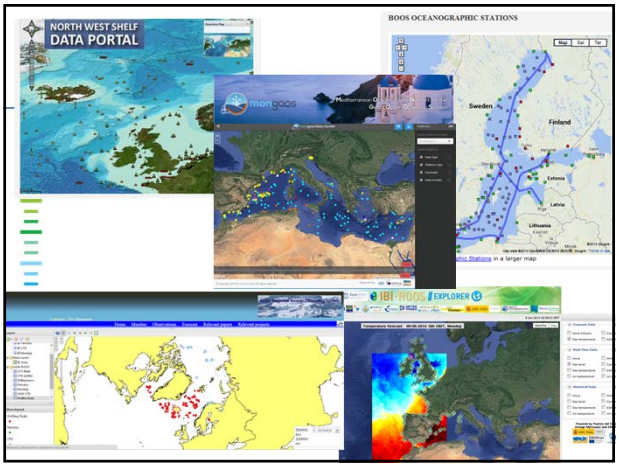
- Integration of the biological data in the JERICO NEXT data portfolio
- Manage a diverse and non-homogeneous data system as data from different communities will be available
- Maintain and strengthen the operational links with EMODNET and CMEMS (Copernicus Marine Environment Monitoring System) and the connections with the SDN network
- Increase the quantity and the quality of the data available through the major European infrastructures.

JERICO NEXT is not building its own Data Center
Data will be directed to the major European Infrastructures and they will be available to the community

Brief overview on the current status of the European data initiatives

- The **ROOSs - Regional Operational Oceanographic Systems** are the operational arm(s) of EuroGOOS
- About 60 additional partners in ROOSs
- The ROOSs cooperation focus on improved national and regional services and products
- ROOSs **coordinate the observations** and the **data transfer** for internal use and to other users
- **Regional data portals** in every ROOS simplifying the data transfer and enable interoperability and act as "data translators"

Arctic ROOS NOOS IBIROOS mongoos



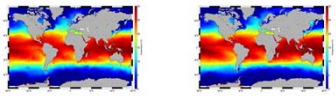
Three initiatives for marine information

DG GROWTH	DG RESEARCH & INNOVATION	DG MARITIME AFFAIRS & FISHERIES
Copernicus INSTAC	**SeaDataNet**	**EMODnet Physics**
www.copernicus.eu	www.seadatanet.org	www.emodnet-physics.eu

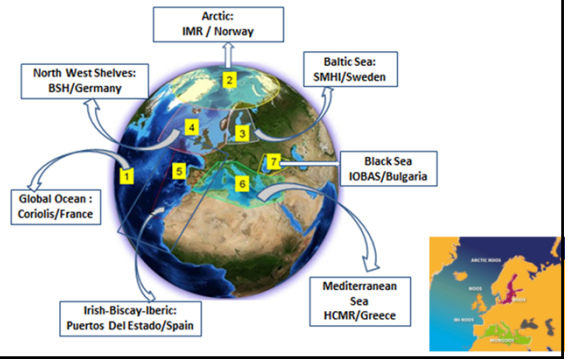
EuroGOOS
Operational oceanography community
www.eurogoos.eu

INSTAC Objectives

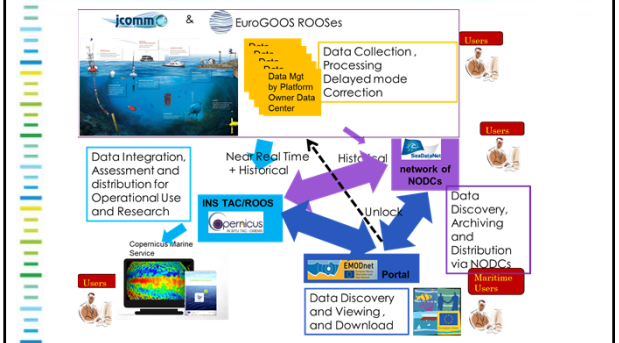
- The CMEMS (Copernicus Marine environment monitoring service) in situ TAC (INSTAC) is a distributed service which aims to provide in situ (water column & sea surface) data to fulfil **operational oceanography** needs.
- It is a distributed service integrating data from various existing sources and services
- It is in the continuity of the developments made in the Mersea & MyOcean project series turning into an operational service
- It's integrated in the European landscape of in situ data management



Operation activities

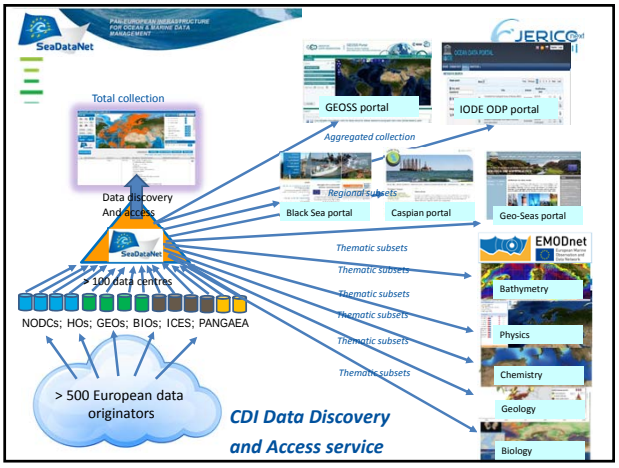


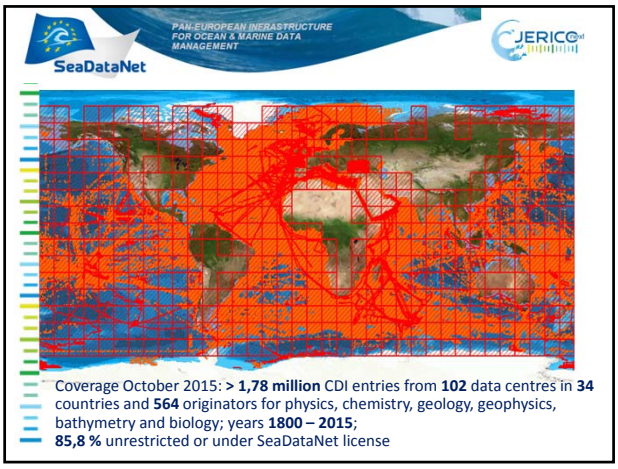
INSTAC within International and European landscape



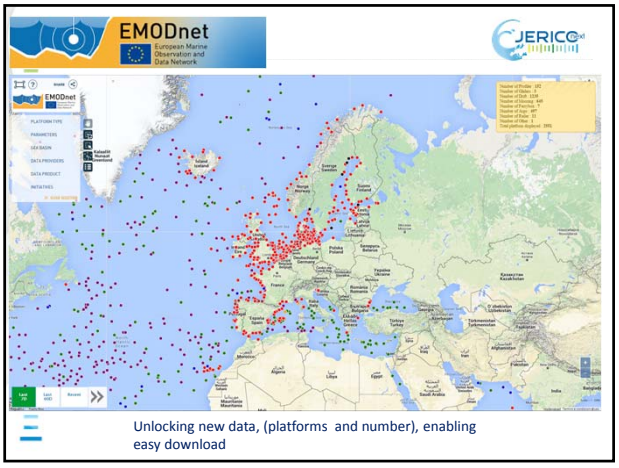
SeaDataNet
PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT

- **SeaDataNet has set up** and operates **a pan-European infrastructure** for managing marine and ocean data **by connecting National Oceanographic Data Centres** (NODCs) and oceanographic data focal points from 35 countries bordering European seas
- Set of **common standards for metadata and data formats** for the marine domain, adapting **ISO** and **OGC** standards and achieving **INSPIRE** compliance
- **Controlled vocabularies** for the marine domain (> 160.000 terms over > 60 lists)
- **Services for discovery, access, visualisation and data products**

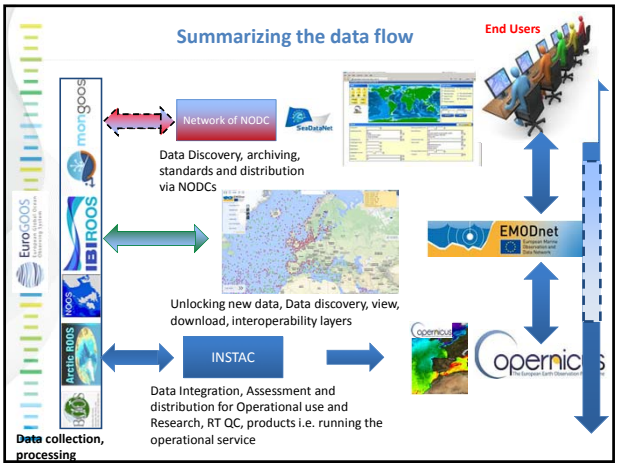


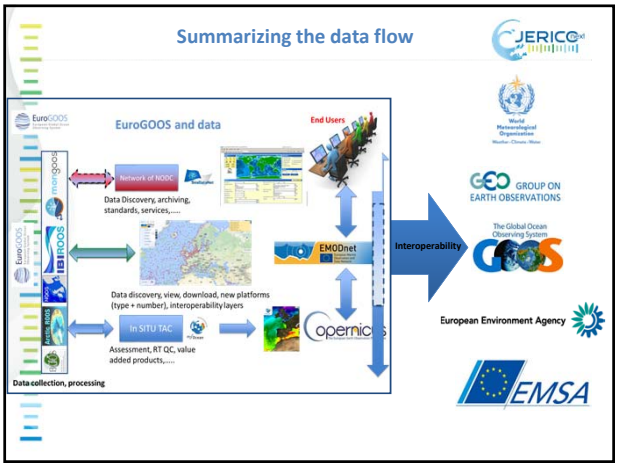


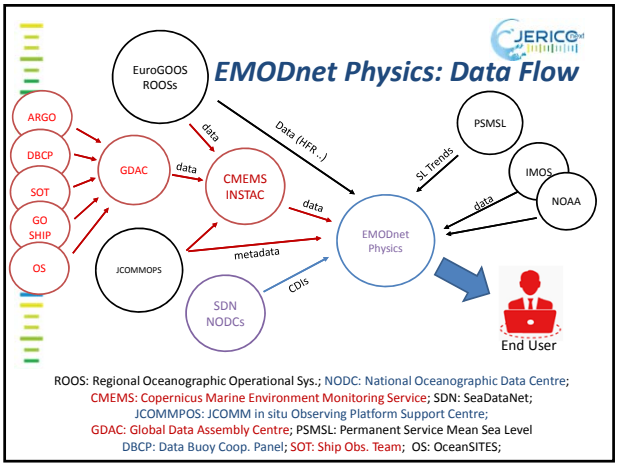
Coverage October 2015: **> 1,78 million** CDI entries from **102** data centres in **34** countries and **564** originators for physics, chemistry, geology, geophysics, bathymetry and biology; years **1800 – 2015**;
85,8 % unrestricted or under SeaDataNet license



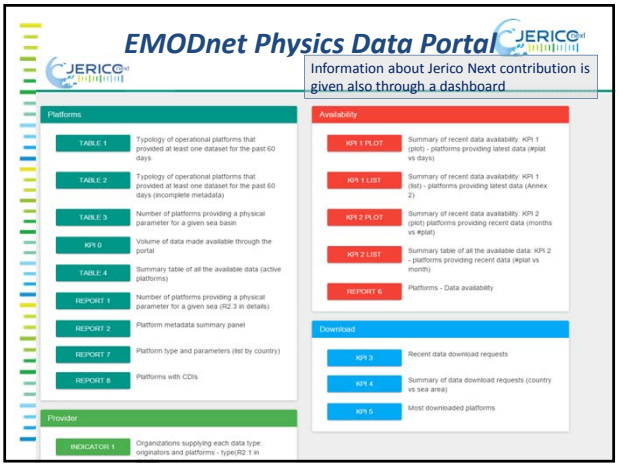
Unlocking new data, (platforms and number), enabling easy download







ROOS: Regional Oceanographic Operational Sys.; NODC: National Oceanographic Data Centre;
CMEMS: Copernicus Marine Environment Monitoring Service; SDN: SeaDataNet;
JCOMMPOS: JCOMM in situ Observing Platform Support Centre;
GDAC: Global Data Assembly Centre; PSMSL: Permanent Service Mean Sea Level
DBCP: Data Buoy Coop. Panel; SOT: Ship Obs. Team; OS: OceanSITES;



Survey for the information on the data collection during the JRAPs

A detailed data template was created by VLIZ and distributed to the JRAP leaders in order to fill in the information about the data that are expected to be collected during their activities

Information asked:

- ✓ *JRAP activity, Task Leader, Geographical information of the study area*
- ✓ *Timing of data collection, Contact person for data collection*
- ✓ *Platform-Instrument Used, Parameters collected, Data types*
- ✓ *Sampling frequency, Derived data/Data products, Local Data Storage*
- ✓ *Timing of data release, Data Citation, Contribution to EMODNET*
- ✓ *Other Notes*

The first request sent to the JPAR leaders on 24/11/2015
Only JRAP 4 and 6 responded on time. Significant delays in information delivery - Repeated reminders. JRAP1 and 2 info delivered just 10 days before the meeting (JRAP2 not yet complete)

JRAP#1 (Pelagic Biodiversity) - Biodiversity of plankton, harmful algal blooms & eutrophication (SMHI)	
Sites	Skagerrak-Kattegat, Tångesund observatory, Baltic Sea, Eastern Channel-Southern North Sea, Western Mediterranean Sea, Eastern Channel - Strait of Dover, Strait of Dover (Pas de Calais), Eastern Channel (Bay of Seine), Ligurian Sea
Timing of data collection	Aug -Oct 2016, 2016, 2017, May-Sept 2016, Spring 2017- Spring 2018, Sept -Oct 2015- January, Sept -Oct 2015- January, 2018
Platform - Instrument used	Imaging Flow Cytobot, Water samples, Tångesund buoy, UVP5, MAREL buoy , Monitoring cruises, CTD profiles with chlorophyll fluorescence and oxygen, Huvudskär buoy, Imaging Flow Cytometer, Ferrybox, FRRF, Endevour, Ship of opportunity, Automated imaging flow cytometer, multispectral flow cytometer, Phyto-PAM, Multispectral fluorometer, R.Vs
Parameters collected	phytoplankton biodiversity and abundance, chlorophyll a, salinity, temperature, phytoplankton composition, cell counts for phycoerythrin containing species, oxygen, chlorophyll fluorescence, turbidity, plankton (e.g. colonies of cyanobacteria), total fluorescence, primary production, phytoplankton taxonomical & functional composition, phycoerythrin fluorescence, spectral absorption, spectral fluorescence, FRRF fluorometry, exctracted chlorophyll, chlorophyll, phycocyanin, photosynthetic parameters
Data types	numeric, images
Sampling frequency	~30 min, ~60 min, ~10 min, hourly, weekly, monthly, 1-3 times in 2017
Time of data release	April 2018, June 2018, 31 August 2019
Contribution to EMODNet	to be decided (?) SHARK database (?), through SDN (?), via SDN

JRAP#2 (Benthic Biodiversity) – Monitoring changes in microbenthic biodiversity. Assessing potential environmental controls & functional consequences (CNRS)	
Sites	Gironde River, Cretan Sea, Bay of Brest
Timing of data collection	October 2016- May 2018
Platform - Instrument used	Sediment Profiler, SPIArcBase software, Oxygen microprofiler, Eddy covariance system, Heraklion Coastal buoy, Poseidon FerryBox
Parameters collected	apparent Redox Potential Discontinuity, traces of biological activity, benthic fauna (species abundance+biomass), 7Be, 210Pb, 234Th, O2, H2S, pH, NO3-, FE2+, MN2+, SumHS, SO42-, DSi, SRP, Particulate Mn, Fe, P, O2 and nutrients in the overlying water during incubation experiments, O2 concentration and turbulence in overlying water, organic and total C, total N, inorganic C, d13C, d15N, THAA, EHAA, chloropigments, temperature, salinity, irradiance (PAR), turbidity, radiography X, gravimetry, volume proportion of different size classes, air pressure+temperature, wind speed+direction, surface currents, wave height, pCO2
Data types	images, species/abundance tables, species/biomass tables, timetables, timeseries, vertical profiles, OTU/abundance tables (based on metabarcoding data),microgranulometry,derived parameters, numeric data in ASCII format, water content
Sampling frequency	4 specific cruises, 3 hourly, 1 min (during 6 hours every day)
Time of data release	After valorization, Near Real Time avail.
Contribution to EMODNet	Possibly Yes, can be organized by a link to an existing data flow to Coriolis or Copernicus

JRAP#3 Occurrence of chemical contaminants in Northern coastal waters & biological responses (NIVA)	
Sites	Skagerrak-Kattegat, Tångesund observatory, Baltic Sea, Eastern Channel-Southern North Sea, Western Mediterranean Sea
Timing of data collection	April 2016-March 2017
Platform - Instrument used	Moorings, fixed platforms, Ferrybox Oslo - Kiel , Ferrybox Cosyna I, FerryBox - troll fjord Bergen Kierkenes
Parameters collected	chemical contaminants in surface water: 15 polycyclic aromatic hydrocarbons, 12 polychlorinated byphenils, DDT, Hexachlorobenzene, polybrominateddiphenyl ethers (brominated flameretardants),mean water temperature, mean water salinity, snapshot concentrations of several emerging contaminants: 44 currently used pesticides, 22 pharmaceutical and personal care products, 3 artificial food additives, microbial sensor response from petroleum related species and total microbial biomass
Data types	numeric, taxonomically labelled
Sampling frequency	> 3 months time integrated concentration data, semestral (2 campaigns)
Time of data release	Before end of project
Contribution to EMODNet	?

JRAP#4 (Hydrography) 4D characterization of trans-boundary hydrography & transport (AZTI)	
Sites	German Bight, NW Med, SE BoB
Timing of data collection	all the period, beginning 2016, beginning 2017, summer 2017, end 2017
Platform - Instrument used	HF radars, MASTODON moorings, Drifters, slope buoy, ADCP, Tide gauges
Parameters collected	surface ocean currents, sea height level, ocean current in the water column, temperature in the water column, surface ocean drift, temperature, salinity
Data types	numeric
Sampling frequency	~20 minutes, hourly
Time of data release	cfr Jerico-Next open data policy
Contribution to EMODNet	near real time avail, to be decided (?)

JRAP#5 Coastal carbon fluxes & biochemical cycling (FMI)	
Sites	North Sea, Bay of Biscay, Western Channel
Timing of data collection	spring 2016-fall 2016, spring 2016- spring 2017, year around 2017-2018, summer 2017, summer 2018
Platform - Instrument used	Ferrybox Oslo - Kiel , Stationary FB Cuxhaven, Underwater node Helgoland, Ferrybox Moss/Halden-Zeebruegge-Immingham-Moss,Ferrybox Cuxhaven-Immingham, Western Channel Astan, Ferrybox Plymouth-Roscoff, Ferrrybox Cork-Roscoff
Parameters collected	pCO2, pH, temperature, salinity, O2, chlorophyll fluorescence, turbidity , meteorological and light parameters (solar radiation etc), pH, CDOM (Fluorescence), pCO2, total alkalinity, air pressure and temperature, wind speed and direction
Data types	numeric, numeric in ASCII format
Sampling frequency	10 sec - 5 min, 20 sec, every min, 1 - 10 min, 10 min, 30 min
Time of data release	near real time avail., QControled after 6 months
Contribution to EMODNet	subset of parameters via NOOS portal, further discussion (?)

JRAP#6 Operational oceanography & coastal forecasting (SOCIB)	
Sites	Ibiza Channel, Balearic Sea, Baltic Sea, Nazare Canyon (W Portugal), South-West Adriatic, Gulf of Manfredonia, South Aegean Sea, South Bay of Biscay, Norwegian Coast
Timing of data collection	2014-2015, 2015-2018, 2016-2018,April 2017- March 2018, already collected
Platform - Instrument used	Glider CTD, HF radar, mooring CTD, currentmeter, ADCP, drifters, VOS (Helsinki-Stockholm, Oulu - Lübeck, Helsinki-Travemünde), FerryBox, IMR coastal R/V
Parameters collected	salinity, temperature,surface currents, currents, phytoplankton,chlorophyll fluorescence, oxygen
Data types	Numeric (?)
Sampling frequency	5 sec - endurance line , ~1 min, hourly, weekly - monthly
Time of data release	~15 days after mission, past data already avail. , near real time
Contribution to EMODNet	?

JRAP#1 & #2

Contribution
- New biological & biochemical data

Data types
- Wide range of data formats

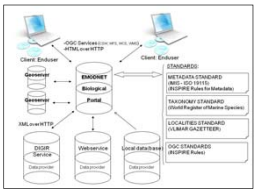
Platforms
- Several platforms / new platforms

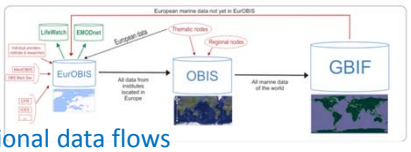
Data availability and dissemination
- 2016 – end of the project
- Real Time availability for few cases
- Very late data release (close to the end of the project)
- Policy issues remain open for a subset of data

Connection to the current European Infrastructures
- No existing link for most of the cases

Biological Data integration & standardization

- Uses (Eur)OBIS scheme for integrating spatio-temporal biogeographic data (Darwin Core)
- Geographic standards: OGC compliant, Marine Gazetteer for geographic names
- Execute a list of Quality Control steps:
  - Taxonomic
  - Geographic
  - Environmental
- Operational link with EMODnet biology in order to facilitate the data exchange between existing networks and data generated by JN





International data flows

JRAP1/ Pelagic Biodiversity - Parameters to be collected

Phytoplankton biodiversity and abundance, Plankton, e.g. colonies of cyanobacteria, Phytoplankton functional composition…

EMODnet Biology current datascheme fit for purpose

Total Fluorescence, Chlorophyll fluorescence, phycocyanin fluorescence, phycoerythrin fluorescence, spectral absorption, spectral fluorescence, FRRF fluorometry from a flow-through system, Chlorophyll from a flow-through system…

Bio-optics: Development of a data exchange scheme
(also in frame of Lifewatch, SDN, Jerico-next)

JRAP2/ Benthic Biodiversity - Parameters to be collected

Benthic fauna (Species abundance), Benthic fauna (Species biomass)
Volume proportion of different size classes

EMODnet Biology current datascheme fit for purpose

Apparent Redox Potential Discontinuity, Biological activity (SPI)
Benthic microbial diversity (OTU abundance)

Development of a data exchange scheme
(also in frame of Lifewatch, SDN, Jerico-next)

JRAP#3 & #5

For JRAPs 3 and 5 part of the collected data could be released through ROOSes and INSTAC to EMODNET Physics (to provide support to operational activities)

Part of the data should/could released through EMODNET Chemistry

- Subset of data already released through NOOS, Major Data set still undefined

JRAP#4 & #6

Contribution

- Physical data

For JRAPs 4 and 6 the already existing data flow from ROOSes to INSTAC and then to EMODNET Physics should be followed.

Data availability

- All the period + past data
- Real Time availability for most of the cases

Connection to the current European Infrastructures

- No information provided but most of the systems are connected already to the existing data infrastructures.

Jerico Next Data management

Deliverables linked with WP4 activities

D5.4 Report on Quality Control Steps of marine biological data management (M12)
D5.9 Report on data management best practices and Generic Data and Metadata (M20)
M5.2 Automated quality control services operational + handbook (M24)
D5.5 Document describing the biological data from JERICO-NEXT that are available and quality controlled (M48)
D5.9 Requirements specifications for the observatory operator console (M16)
D5.7 Definition of SWE templates for the targeted observatory networks (M24)

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