Joint European Research Infrastructure network for Coastal Observatory – Novel European eXpertise for coastal observaTories - **JERICO-NEXT**

Deliverable title	Progress Report #2
Work Package Title	WP4
Deliverable number	D4.3
Description	Reports progress following JRAP's preparation (in lab and in field operations)
Lead beneficiary	Ifremer
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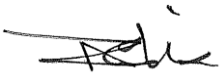
Revision number	V 2.0
Revision Date	11 Oct. 2016
Security	Public

History			
Revision	**Date**	**Modification**	**Author**
0.1	25 Sept. 2017	Gathering of JRAP contributions and harmonisation of the contribution	Puillat I. and JRAPs leaders
0.2	2 October 2017	Introduction, conclusion and executive summary done	Puillat I.
1.0	3 October 2017	First version sent to JRAP leader for review and comment	Puillat I.
1.1	4 October 2017	Revision of section for JRAP1	Karlson B. and Artigas F.
1.2	5 October 2017	Revision of section for JRAP4	A. Rubio
1.3	10 October 2017	Revision of JRAP6 : comments and conclusion	B. Mourre
1.4	11 October 2017	Add on JRAP4: photos	Puillat I
2.0	11 October 2017	Final Version	Puillat I.

Approvals				
	Name	**Organisation**	**Date**	**Visa**
Coordinator	Farcy P.	Ifremer	12 October 2017	PF
WP4 Leader	Puillat I.	Ifremer	10 October 2017	
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1. Executive Summary

The WP4 of the JERICO-Next is a synthesis of the project built upon activities in other WPs, gathering the consortium around applied Joint Research Activity Projects (JRAPs) selected to put forward the added value of JERICO-NEXT. In order to reach this objective, WP4 keeps on track the JERICO-NEXT course of actions via synthesis and application activities based on interactions with other WPs. WP4 helps establishing some topical approaches for the scientific strategy in WP1 (task 1.2) and will give inputs to establish the network strategy after JERICO-NEXT (task 1.6). Indeed, six JRAPs are being implemented to address different key environmental questions and/or policy requirements such as those considered by the MSFD, and according to the 6 JERICO scientific areas:

1- JRAP-1 on pelagic biodiversity
2- JRAP-2 on benthic biodiversity
3- JRAP-3 on chemical contaminant occurrence and related biological responses
4- JRAP-4 on hydrography and transport
5- JRAP-5 on carbon fluxes and carbonates system
6- JRAP-6 on operational oceanography.

This document reports the work led in the framework of the JRAP activities during the 2nd year of the project whereas the deliverable D4.2 reports the activities led the 1st year. In the following pages, for each JRAP, we report main achievements with comparison to the initial plan, the next steps, the acquired data (link with WP5), and acquired communication material (to feed WP8).

Hereafter is a synthesis of each JRAP status:

- In JRAP#1, JERICO-NEXT partners have successfully carried out a large number of activities including a phytoplankton workshop arranged in Gothenburg, Sweden, where state of the art instrumentation for observing phytoplankton and their activities were used in the field as well as on cultures. Field work has been carried out since 2016 in the Baltic Sea, the Kattegat-Skagerrak, the English Channel-North Sea area and in the Western Mediterranean. By using a combination of automated and manual methods JRAP#1 aims are being achieved and, moreover, a first attempt to combine both JRAP#4 and JRAP#1 approaches was effective in the southern Bay of Biscay. Ferries, research vessels, oceanographic buoys are being used as instrument platforms to allow frequent algal bloom observations in situ. A large number of scientific cruises have been made. The automated image and single-cell optical plankton analysers give information about species composition, cell abundance and plankton community structure. Bio-optical instruments are used to give additional information about community structure and phytoplankton biomass based on the content of photosynthetic pigments. The work in JRAP#1 will now focus on working up the data and to prepare for the third JERICO-NEXT plankton workshop to be arranged in Marseille, France, in spring 2018 where results will be presented and discussed.
- In JRAP2, the monitoring of the benthic biodiversity under different sources of disturbances started with the deployment of 5 sampling cruises: in the Gironde Mud patch (2 cruises), the Bay of Brest and the Creatan Sea (2 cruises) and the processing of the acquired data. A second cruise in the Bay of Brest is postponed to May 2018 due to bad weather conditions in the 2017 timing. In addition another cruise is scheduled in the Gironde Mud Patch. Analyses of the acquired samples are still in progress.
- JRAP3 is dedicated to study the occurrence of chemical contaminants in European coastal waters thanks to measurements acquired on fixed and mobile platforms of the JERICO-RI as well as the associated biological response. All field deployments are done on Ferryboxes, fixed platform and high resolution campaigns thanks to high volume flowthrough filtration and extraction and 14 passive samplers newly developed and distributed to 6 partners of the consortium. Thanks to these

efforts, artificial Sweetener Sucralose has been discovered as an ubiquitous contaminant (See http://www.jerico-ri.eu/2017/10/02/pagure-2-a-new-towed-underwater-system/). Next steps will consist in completing the chemical analysis as well as the biomarker one. Data analysis will be operated jointly with statistical modelling.

- In JRAP4; the preliminary work dedicated to assess and progress on analysis methodologies, including HF radar data and field ones was carried out in due time and new developments were tested, in collaboration with WP3. More recently several field deployments and on site implementations were led as expected in the SE Bay of Biscay, in Adriatic Sea, German Bight. Nevertheless, on site installation of the HF radar in the South East Bay of Biscay is delayed due to delays in the official permission. Collaborations with JRAP3 were effective thanks to the installation of passive samplers and with JRAP1 thanks to a joint participation to the JRAP4 cruise ETOILE in the Bay of Biscay (study of mesoscale currents and of phytoplankton and microplastic distributions in near real time). In the next steps one cruise is expected and joint analysis will be led over the 3 areas of study for a transfer to Services Access led in WP6. Five articles are already in preparation and will be submitted.
- In JRAP5, the preliminary technical work has been readjusted: partners prepared their instruments for the intensive measurement period; but the intercomparison experiment is postponed to better organise its funding and to take benefit of a possible TNA exercise if a joint proposal could be selected. Intense observation is still on the way and analysis will follow.
- In JRAP6 some models have been assessed, others are still being assessed, sensitivity experiments have been performed and DA methods have been implemented. The level of achievement actually depends of the modelled region. Indeed, models are as numerous as the investigated regions: the Ibiza channel, Adriatic Sea, Atlantic Iberian Margin, Aegean Sea, SE Bay of Biscay, South Bay of Biscay, Norwegian Sea, Baltic Sea and their development are progressing independently. Next steps will concern the synthesis of model assessments and the application of data assimilation to analyze the impact of observations.

The reported actions show JRAPs are well progressing with respect to their initial plans even if they are not developing along the same time line. All JRAPs are acquiring data, thanks to field deployments. For most of them a part of the acquired data is being analysed. Activities crossed with other WPs are real: with WP1 for the science strategy (D1.2), deployment of technologies led in WP3 (as for instance the phytoplankton workshop in JRAP1, the PAGURE-2 system deployment in JRAP2), the work in progress for the data flow harmonisation with W5. In addition, communication material for WP8 is made available supporting thus the promotion of the project.

The upcoming important action in 2018 is to progress again on the JRAPs data harmonisation with the WP5, and to work on the products delivered by JRAPs as JERICO-RI product prototypes. As some promising results were presented during the 1st general assembly, the consortium agreed to edit a JERICO-NEXT special issue of a peer reviewed journal. This is in process with the open access Journal Ocean Science (EGU) and 15 abstracts were gathered. In addition during the WP4 workshop held in Helsinki as a side meeting of the General assembly #1, in March 2017, a Working Group "Integrated monitoring analysis" was set up across the 6 JRAPs to work on:

a) methods dedicated to JOINT data analysis of i) biodiversity with ecosystem function data sets, ii) environment with biodiversity data sets, iii) comparison of the two kinds of methods.

b) establishment of INTEGRATED sampling methods/strategies: need to understand missing environmental information and data seen from the biology, biochemistry and carbon communities: JRAP1 2 3 and 5 will be asked to express their needs of physical information and data to JRAP4&6 community.

The first meeting of this WG will be in Bordeaux end of November 2017.

2. Introduction

The WP4 of the JERICO-Next is a synthesis of the project built upon activities in other WPs, gathering the consortium around applied Joint Research Activity Projects (JRAPs) selected to put forward the added value of JERICO-NEXT. In order to reach this objective, WP4 keeps on track the JERICO-NEXT course of actions via synthesis and application activities based on interactions with other WPs. WP4 helps establishing some topical approaches for the scientific strategy in WP1 (task 1.2) and will give inputs to establish the network strategy after JERICO-NEXT (task 1.6). Indeed, six JRAPs are being implemented to address different key environmental questions and/or policy requirements such as those considered by the MSFD, and according to the 6 JERICO scientific areas:

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3. Main report

3.1. JRAP#1: Phytoplankton biodiversity and HAB (Biodiversity of phytoplankton, harmful algal blooms and eutrophication)

Involved institutes: SMHI, CEFAS, CNRS-LOV, CNRS-Univ Litt, CNRS-MIO, Deltares, Ifremer, NIVA, RWS, SYKE, VLIZ, and DAFF

Lead author of JRAP#1 section: Bengt Karlson, Felipe Artigas, Arnaud Louchart and Jukka Seppälä

Contributors to this report: Pascal Claquin, Florent Colas, Veronique Créach, Reinhoud de Blok, Klaas Deneudt, Gérald Grégori, Jacco Kromkamp, Alain Lefebvre, Fabrice Lizon, Klas Möller, Machteld Rijkeboer, Lars Stemmann, Melilotus Thyssen, Lennert Tyberghein, Guillaume Waquet.

Phytoplankton forms the base of the marine food web which is recognised in both the EU Marine Strategy Framework Directive and in the EU Water Directive as well in conventions such as OSPAR and HELCOM. Some phytoplankton organisms are harmful, e.g. by producing phycotoxins that may accumulate in filter feeders such as shellfish, posing a risk to human health. An overarching aim of JERICO-NEXT is to build a sustained long term observation system for the seas surrounding Europe. To the start the process JERICO-NEXT builds on existing infrastructure such as sampling and instrument platforms in the form of research vessels, Ferrybox systems and oceanographic observatories including instrumented buoys. One aim of JRAP#1 is to use novel automated and in part autonomous methods for observing phytoplankton and harmful algal blooms. The aforementioned platforms are used for the novel instrumentation. A major step forward is to work with individual organisms, the species/size-class composition can now be analysed automatically. Earlier, bulk measurements of parameters such as chlorophyll fluorescence, a proxy for phytoplankton biomass, were in focus. Now it is possible to discriminate potentially harmful species in samples collected and analysed automatically, to estimate in real time phytoplankton size- or pigmentary composition and to address their photosynthetic activity and parameters. One conclusion from the work carried out in JRAP#1 is that a combination of several methods is needed to observe and explain the development of algal blooms.

Objective of the JRAP (short remind):
The main objectives of JRAP-1 are:
- To enhance the understanding of the dynamics of algal blooms by combining data on phytoplankton distribution, abundance and diversity with chemical and physical oceanographic data,
- To apply novel in situ automated or semi-automated methods to address phytoplankton diversity, abundance, biomass and photosynthesis parameters in marine coastal systems, with a focus on harmful algae and eutrophication,
- To assess their potential for complementing traditional methods, which are based on discrete water sampling and labour intensive laboratory microscope work,
- To formulate inputs for science strategy related to the JERICO-RI and recommendations for its further development (roadmap for the future).

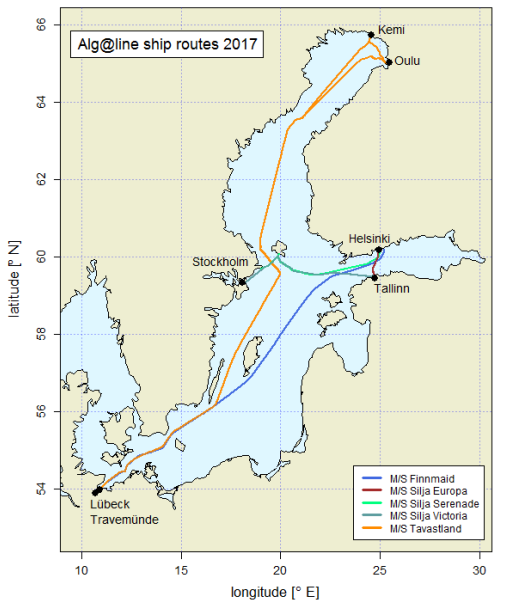
3.1.1. *Main achievements and delays*

3.1.1.1. Achievements

Initial time line and expected work	Actual time line and achieved work, problems, good surprises and opportunity met
Workshop **M13:** JERICO Plankton workshop II September 27th to September 30th, 2016 – Gothenburg (SMHI, CNRS-LOG, CNRS-MIO, IFREMER, VLIZ, UGent, RWS, NIOZ, HZG, SYKE, NIVA) (joint WP3.1 and WP4.1)	**Workshop** **M13: The second international Workshop on automated Phytoplankton observations – SMHI in Gothenburg (Sweden) – September 2016, 27th – 30th** Altogether 18 people participated. The focus was on practical aspects of observing phytoplankton using advanced instrumentation. Participants brought instruments to the practical workshop. A presentation and demonstration of the use of each sensor was carried out by participants in order to make all attendees to benefit from the details and discussions that followed presentations. The instruments were used to analyse water collected at the Tångesund observatory where SMHI operates an *in situ* imaging flow cytometer together with other oceanographic instruments. Workshop participants used *in situ* instruments at Tångesund during an excursion as part of the workshop. In addition, water was collected at Tångesund and analysed at the SMHI laboratory by the different sensors, together with phytoplankton monoculture samples. *Instruments used and demonstrated (companies and partners involved)* • Imaging Flow Cytometer: Imaging FlowCytobot (Mc Lane, WHOI-SMHI) • Pulse-shape recording Flow Cytometer with imaging capabilities: CytoSense (Two instruments, CytoBuoy, RWS and CNRS-LOG) • Plankton imager: FastCAM (IFREMER) • Fast Repetition Rate Fluorometer: FRRF – FastOcean (Chelsea Instruments, RWS) • Multi-spectral Fluorometer: PhytoPAM, (Walz, CNRS-LOG), Multi-Exciter (JFA Advantec, SYKE), FluoroProbe (bbe Moldaenke, CNRS-LOG) • Spectrophotometer: PSI-CAM (HZG)
The Baltic Sea (PIs: SYKE and SMHI)	
– Baltic Sea 1. Monitoring phycoeryhtrin fluorescence in the Baltic Sea using ferrybox system. May 2016-September 2016. – Baltic Sea 2. Continuous measurements at Utö. Spring 2017-spring 2018. – Baltic Sea 3. Continuous measurements at	– Baltic Sea 1. Phycoerythrin (PE) fluorometers from two manufacturers were used in a ferry Finnmaid, as part of Algaline flowthrough system, from May 2016 until end of year 2016. Samples for detailed laboratory analysis of PE containing cells were taken using automated water sampler onboard, and cells were counted using epifluorescence microscopy and flowCAM. Additional spectral fluorescence

ferrybox Silja Serenade between Helsinki and Stockholm. Spring 2017-spring 2018.

– Baltic Sea 4. Continuous measurements at Tavastland Ferrybox (formerly TransPaper) between Lübeck and Kemi.
– Baltic Sea 5. The Huvudskär E-oceanographic buoy. Measurements of bio-optical parameters etc.



Routes of the ships participating in SYKE's Algaline monitoring project (source: http://www.ymparisto.fi/en-US/Sea/What_is_the_state_of_the_Baltic_Sea/)

and absorption measurements were performed, targeting to quantification of PE in different size-fractions. Overall data quality is good. Preliminary data analysis has been carried out and a MSc thesis has been written. Next step is the detailed data analysis aiming in the publication of the results and getting QC data available.

– Baltic Sea 2. SYKE started continuous measurements at Utö in April 2017 and they will continue until March 2018. Water is collected at measurement site from 5 m depth using underwater pump, pumped 300 m to measuring hut where it is distributed to stationary ferrybox system. Continuous measurements include spectral fluorescence (MultiExciter), chlorophyll a, phycoerythrin, phycocyanin and CDOM fluorescence, turbidity, oxygen, Fast repetition rate fluorometry, and spectral irradiance. Four 7 day measuring campaigns with additional measurements have been carried out, during expected phytoplankton bloom occasions, including continuous measurements for spectral absorption (Oscar system) and reference measurements form water samples (three times per day), including quantification of chlorophyll a, spectral absorption by filter pad method, full excitation emission spectra of pigment fluorescence, primary production (C-14 light curves) and cell counts form lugol fixed samples and epifluorescence counts of picoplankton. Overall the system has been working well, but there are doubts on functioning of phycoerythrin sensor and have been technical problems with peristaltic pumps and software of FRRF system (resulting in data recovery rate approx.. 60%, while for all other instruments have a rate close to 100%). Data is transferred to institute in near real time and highlights are displayed in data portal with 1 hour intervals (http://swell.fmi.fi/Uto/latest.html). Imaging FlowCytobot has been installed on site in April, as part of activities of other project, and at least for some supporting data may be obtained. Data analysis comparing optical and traditional methods will be started during winter 2017-18.

– Baltic Sea 3. Continuous measurements along the Silja Serenade ferry line (Helsinki–Tukholma) have been carried out as planned, including chlorophyll a, phycocyanin and CDOM fluorescence and turbidity. Measurements of extracted Chlorophyll a has been carried out as planned monthly/weekly, depending on the season. Near real-time visualization of results has been implemented, but is in the internal use only so far. Aim is to analyse the data along data from Utö, starting during winter 2017-18, thereby extending the high resolution temporal measurements with spatial coverage, as the ferrybox line crosses the Utö nearby.

– Baltic Sea 4. Continuous measurements along the Tavastland Serenade ferry line (Oulu-Kemi-Lübeck) have been carried out as planned, including chlorophyll a,

M23: Aranda cruise
In total approximately 30 stations will be visited, 18 for JERICO-Next and 5 for FRRF measurements. Approximately eighteen of these are planned for sampling as part of the JERICO-NEXT study (red stations on figure 1). The main objectives were:

- To investigate the vertical and horizontal distribution of cyanobacteria
- To characterize the phytoplankton using:
  UVP5
  Microscope analysis
  CytoSense flow cytometer
  FlowCam
  Spectral fluorometry (bbe Moldaenke fluoroprobe)
- To investigate the vertical and horizontal distribution of zooplankton using the UVP5
- To investigate the vertical distribution of particles around the oxycline using the UVP5
- To test *in situ* PhytoPAM
- To test *in situ* Fast Repetition Rate Fluorometry (FFRF) for measuring parameters related to photosynthesis

The standard measurements included were:

- CTD-casts
- Oxygen
- Chlorophyll *a*
- Inorganic nutrients
- Total nitrogen and phosphorus
- Primary production, pH and total alkalinity
- Phytoplankton
- Zooplankton

phycocyanin and CDOM fluorescence and turbidity.
– Baltic Sea 5. Hourly measurements using the Huvudskör E. buoy. For phytoplankton chlorophyll and phycocyanin fluorescence are the most relevant parameters,

M23: Aranda cruise (PI B. Karlson)
The Baltic Sea is characterized by a thermos-halino gradient from East to West which causes variability in phytoplankton distribution. Moreover, Cyanobacteria are dominant in phytoplankton composition in the Baltic Sea.

The Aranda cruise investigated the Baltic Sea, and the Kattegat and Skagerrak on July 2017, 10th – 17th. 30 stations were investigated as announced and 18 for JERICO-NEXT. 16 profiles were done with the FRRF3, so did with the FluoroProbe. UVP5 casts were carried out at each station because the sensor was mounted directly on the rosette. The FlowCam was also used but due to broken cuvette it was not possible to do many samples.

Following measurements were done:

- CTD
- FluoroProbe casts (CNRS-LOG)
- FluoroProbe continuous recording (CNRS-LOG)
- FRRF casts (CNRS-LOG)
- FRRF continuous recording (CNRS-LOG & Cefas)
- Microscopy analysis (SYKE)
- CytoSense continuous recording (CNRS-LOG)
- Chlorophyll *a* extraction (SMHI)
- FlowCAM analysis (SMHI)
- UVP5 analysis (CNRS-LOV)
- PhytoPAM (CNRS-LOG)
- Nutrients
- Oxygen
- Phytoplankton preserved samples

	Partners are currently processing samples/data (e.g. UVP5, Hydrological parameters, CytoSense, FluoroProbe). One Ph.D. (CNRS-LOG/ULCO) participated in the cruise and will work with FCM and FLP data. Another Ph.D. student (CNRS-LOG/UL1) will work on FRRf data.

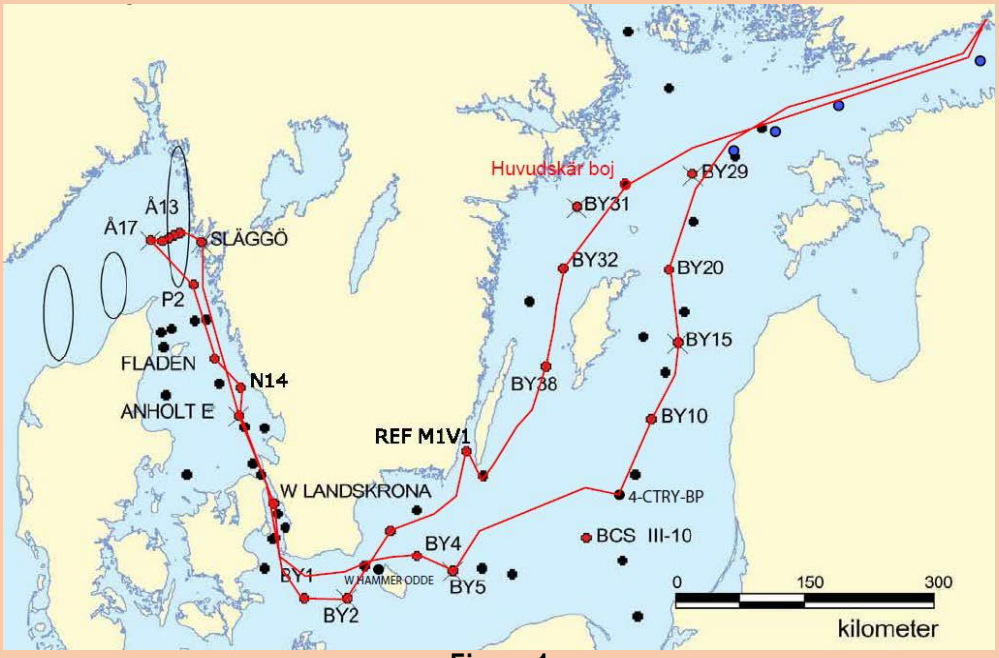
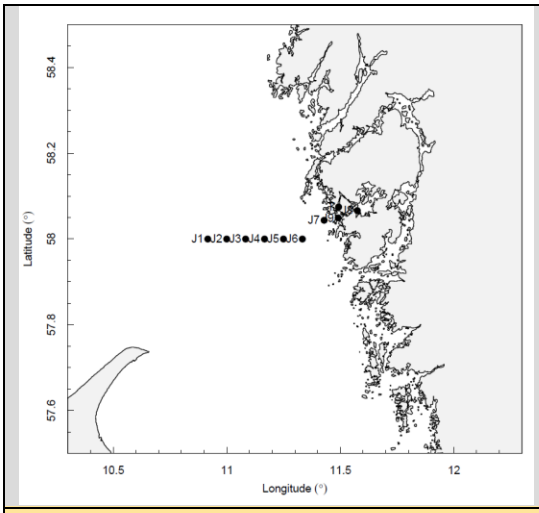
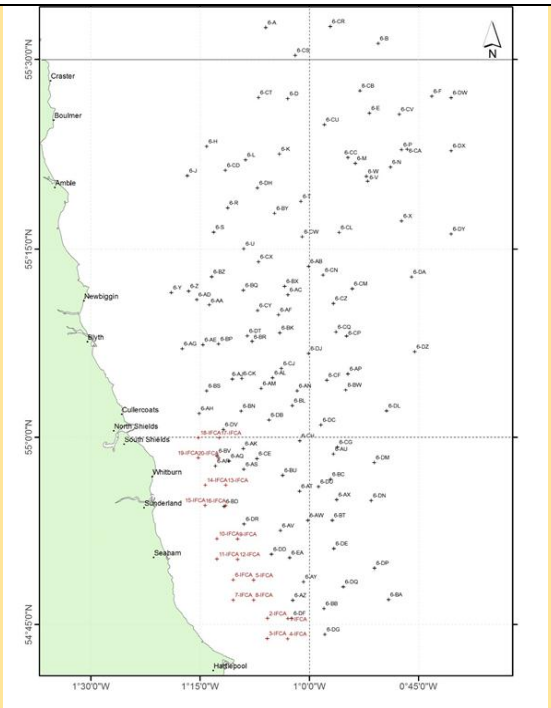


Figure 1

Skagerrak-Kattegat area (PI: SMHI)
The Tångesund harmful algal bloom study

Harmful algal bloom study near a mussel farm using the Imaging FlowCytobot etc. (SMHI, WHOI and NIVA with contributions from UGOT and AWI).	The Tångesund observatory was established in summer 2016. It included an oceanographic buoy and a sub-surface mooring and a raft with advanced instrumentation. An automated underwater microscope, the Imaging FlowCytobot (IFCB), was used during a study of harmful algal blooms from August to October 2016. Data was collected autonomously from six depths and displayed in near real time on the internet. Water sampling was carried out weekly. Phytoplankton abundance and composition, chlorophyll *a*, inorganic nutrients and other parameters were measured in the laboratory. In addition to the study at the mussel farm three one day cruises were carried out. Analysis of water samples is complete. The analysis of IFCB data is ongoing and the detailed comparisons of the different datasets will commence. Two students shared by SMHI and UGOT has completed their master theses based on work carried out in connection

	with the Tångesund study.
English Channel – North Sea area PI: Cefas	
English Channel – North Sea area **Opportunities of Automated FCM continuous recording in UK fisheries cruises.**	**M9: Nephrops TV Survey** DURATION: 21 June – 28 June 2016 Specific objectives: To conduct a standard underwater TV survey of *Nephrops* burrow densities on the Farn Deeps grounds, 55° 35' - 54° 45' N and 1° 30' - 0 ° 40' W, and to evaluate *Nephrops* abundance (110 stations), to conduct a seabed multibeam survey (at each TV survey station) and to collect environmental information such as: - Surface (4 m) salinity, temperature, fluorometry, oxygen and pH and Fe/Fm from the 'Ferrybox', phytoplankton functional types with 2 flow cytometers (Cytosense) from Cefas and RWS with the collaboration of Machteld Rijkeboer.



Map of the stations during the survey 12/16

English Channel – North Sea area: PHYCO (CNRS-LOG), VLIZ and RWS spring cruises (2017)

The eastern English Channel is characterized by eutrophic and mixing conditions. Spring blooms are dominated by diatoms and the haptophyte *Phaeocystis globosa,* and are characterised by a succession of these two groups. The main objective of the hereafter described 3 cruises (PHYCO, VLIZ and RWS cruises) is to follow the spatial and temporal development of phytoplankton spring blooms from eastern Channel towards North Sea.

M20-21: PHYCO cruise

The PHYCO cruise is devoted to the study of the phytoplankton spring bloom in the Eastern Channel-southern North Sea region, by combining both reference sampling as well as the implementation of combined methods for high resolution observation of phytoplankton. We will define the biogeochemical characteristics, the bio-optical environment and the distribution and characterization of phytoplankton communities along inshore-offshore and eastern-western gradients in both sides of the Channel, from the Bay of Seine to the strait of Dover, at high temporal and spatial resolution, in a season characterized by starting and/or decaying phytoplankton blooms (particularly those of diatoms and *Phaeocystis globosa*) and a great spatial heterogeneity and important community changes. We will combine in situ continuous recording at sub-surface waters and discrete sampling and profiling at fixed stations, collecting and analysing samples both in surface and at different depths. We will

M20-21: PHYCO cruise (PI F. Artigas, CNRS-LOG)

The PHYCO cruise (April 2017, 21st - 30th) on board the "Côtes de la Manche" RV (CNRS/INSU) consisted in inshore-offshore transects on both side of the Channel, from the Bay of the Seine to the Strait of Dover. Automated instruments were in order to follow at high temporal and spatial resolution the phytoplankton dynamics: CytoSense, FRRF, AOA.

48 stations were investigated with automated and conventional techniques:

study the abundance, composition (functional groups, taxonomy) and physiological state of phytoplankton assemblages discriminated by in situ multi-spectral fluorometry, pulse shape-recording flow cytometry, image in flow analysis, Pulse Amplitude Fluorometry (PAM) and Fast Repetition Rate Fluorometry (FRRF). We will also carry out reference determination of phytoplankton species and pigmentary groups by microscopic observation and pigments analysis. The PHYCO cruise will also allow us to gather marine reflectance as well as optical properties of both dissolved and particulate matter in order to calibrate and to allow the discrimination phytoplankton functional types (PFT) from space. This cruise is the first of a series of three cruises of the implementation of innovative semi-automated techniques for defining an automated observatory of phytoplankton and HABs, Joint Research Action Project #1 (JRAP#1) of the JERICO-NEXT project and is a follow up of INTERREG IV-A "2 Seas" DYMAPHY Project. It represents an observation action of the French Regional "Hauts de France" project MARCO as well as a monitoring exploratory action for the French Monitoring Program of Pelagic Habitats of the Marine Strategy Framework Directive (MSFD) co-funded by CNRS and the French Ministry of Ecology.	- CTD - FluoroProbe casts (CNRS-LOG) - AlgaeOnlineAnalyser-PocketFerryBox continuous recording (IFREMER) - FRRF casts (CNRS-LOG) - FRRF continuous recording (CNRS-LOG & Cefas) - PhytoPAM (CNRS-LOG) - CytoSense (CNRS-LOG) - Chlorophyll *a* extraction (CNRS-LOG) - SPM filtration (CNRS-LOG) - Phytoplankton preserved samples (CNRS-LOG) - Nutrients (CNRS-LOG) The area covered by the PHYCO cruise was overlapped by the VLIZ cruise in order to follow semi-continuously dynamics. One Ph.D. (CNRS-LOG/ULCO) participated in the cruise and will work with FCM and FLP data. A M.Sc. student (CNRS-LOG/ULCO) has completed her master thesis based on fluorescence work carried out in connection with the PHYCO cruise. Another Ph.D. student (CNRS-LOG/UL1) will work on FRRf data.
M21: VLIZ spring cruise During this cruise 44 stations were planned to be investigated. 	**M21: VLIZ spring cruise** (PI L. Tyberghein, VLIZ) The VLIZ spring cruise (May 2017, 8th - 12th) onboard the "Simon Stevin" *RV* investigated mainly the North Sea and Strait of Dover. Four institutes were involved on this cruise: CNRS-LOG, VLIZ, RWS and NIOZ. 44 stations were investigated with several measurements: - CTD - FluoroProbe casts (CNRS-LOG) - FRRF casts (CNRS-LOG) - FRRF continuous recording (NIOZ, RWS) - PhytoPAM (CNRS-LOG) - CytoSense continuous recording (CNRS-LOG, RWS, VLIZ) - Chlorophyll *a* extraction (VLIZ) - Plankton nets (VLIZ) - Secchi disk (VLIZ) - Phytoplankton preserved samples (VLIZ)*

* The samples fixed during both the RWS and the VLIZ cruises are used for an inter comparison of the clustering method (manual and automated) by JERICO-Next partners and owners of Cytobuoy flow cytometers (Rijskwaterstraat, VLIZ, CNRS-LOG, CNRS-MIO and CEFAS) for WP3.1. The first results are discussed in the deliverable D3.1.2.
The area covered by the VLIZ cruise overlapped the RWS cruise in order to follow semi-continuously the bloom dynamics from South to North.

One Ph.D. (CNRS-LOG/ULCO) participated in the cruise and will work with FCM and FLP data. Another Ph.D. student (CNRS-LOG/UL1) will work on FRRf data.

M8 – M10 – M20 – M21 – M22 – M24: RWS
These different cruises were part of routine measurements for the RWS, the description of main objectives were:

16 Stations should be investigated. The stations were located along five inshore-offshore transects.

Flowcytometry: online and discrete.

- Online to characterize the phytoplankton community in Southern North Sea area.
- Discrete: samples from the Rosette sampling system
  1. for comparison between all types of measures (the same sample) and the 3 flow cytometers (different configuration)
- 2. for comparison between underway system and the rosette sampling
- Linkage Ferrybox-FCM-FRRF
- Testing different protocols for FCM
- Calibration of FCM with other parameters (fluorescence and Chlorophyll)

WISP measure: discrete: measure the water leaving radiance (colour of water) for comparison with satellite data and for validation water quality parameters like Chl-a, TSM
FRRF
Fluoroprobe
PhytoPam

RWS cruises (PI: M. Rijkeboer)
M8: RWS

- Phytoplankton diversity (Flowcytometer (FCM) online sampling)
- Calibration of FCM with other parameters (fluorescence and Chlorophyll, nutrients, DNA, phytoplankton taxonomy)
- Linkage Ferrybox-FCM-FRRF
- Test fixation on discrete samples with FCM (RWS/VLIZ)

M10: RWS

- Phytoplankton diversity (Flowcytometer (FCM) online sampling)
- Linkage Ferrybox-FCM-FRRF-Fluoroprobe
- Linkage with FytoPam
- Calibration of FCM with other parameters (fluorescence and Chlorophyll *a*)

M20: RWS

- Phytoplankton diversity (Flowcytometer (FCM) online sampling)
- Linkage Ferrybox-FCM-FRRF
- Testing different protocols for FCM
- Comparison Online and Discrete sampling (FCM)
- Testing new IMF camera for building Phytoplankton database

M21: RWS (PI M. Rijkeboer)
The RWS cruise (May 15th - 18th) onboard the "Zirfaea" *RV* investigated the North Sea. Four institutes were involved on this cruise: CNRS-LOG, VLIZ, RWS and NIOZ.

The following measurements were carried out:

- CTD
- FluoroProbe continuous recording (CNRS-LOG)
- FRRF casts (CNRS-LOG)
- FRRF continuous recording (NIOZ, RWS)
- PhytoPAM (CNRS-LOG)
- CytoSense (CNRS-LOG, RWS)
- Chlorophyll a extraction (RWS)
- Fixative samples (RWS)*

* The samples fixed from the RWS and the VLIZ cruise are used for an inter-comparison of the clustering method (manual and automated) by JERICO-Next partners and owners of Cytobuoy flow cytometers (Rijskwaterstraat, VLIZ, CNRS-LOG, CNRS-MIO and CEFAS) for WP3.1. The first results are shown in the deliverable D3.1.2.

One Ph.D. (CNRS-LOG/ULCO) participated in the cruise and will work with FCM and FLP data. Another Ph.D. student (CNRS-LOG/UL1) will work on FRRf data.

M22: RWS

- Phytoplankton diversity (Flow Cytometer (FCM) online sampling)
- Linkage Ferrybox-FCM-FRRF
- Testing different protocols for FCM
- Testing new IMF camera for building Phytoplankton database

M24: RWS

- Phytoplankton diversity (Flow Cytometer (FCM) online sampling)
- Linkage Ferrybox-FCM-FRRF
- Testing different protocols for FCM
- Testing new IMF camera for building Phytoplankton database

In December 2017 (6th - 8th), a workshop is planned in Ostend (Belgium) to discuss about the results of the three cruises, before a common workshop in March 2018 in Marseille.

English Channel – North Sea area: PELRAD cruise (PI CNRS-LOG)

M23: PELRAD cruise

The PELRAD cruise (July 2017, 4th - 6th then 17th - 19th), onboard the RV "Sépia II" (CNRS/INSU), focused on phytoplankton distribution along the eastern English Channel in summer, to be compared spring features.
22 stations were sampled. Coordinates of these stations were the same as those visited during the PHYCO cruise.

M23:

The following measurements were carried out:

- CTD
- FluoroProbe casts (CNRS-LOG)
- FRRF casts (CNRS-LOG)
- CytoSense continuous recording (CNRS-LOG)
- Chlorophyll *a* extraction (CNRS-LOG)
- SPM filtration (CNRS-LOG)
- Phytoplankton preserved samples (CNRS-LOG)
- Nutrients (CNRS-LOG)

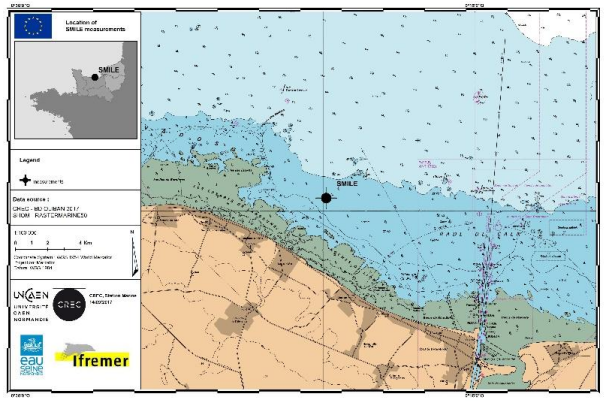
One Ph.D. (CNRS-LOG/ULCO) participated in the cruise and will work with FCM and FLP data.

For English Channel and North Sea cruises, most of the data are still being processed, analysed and will be published.

English Channel – Bay of Seine (PI:P. Claquin and F. Jacqueline, (CNRS-BOREA & Ifremer): The SMILE buoy

An instrumented buoy called SMILE was installed in the bay of Seine (English Channel - France) in June 2016. This project is conducted by the University of Caen (CREC – UMR CNRS BOREA) and IFREMER. Beside traditional high-frequency measurements performed in oceanography, a Fast Rate Fluorometer Act2 Chelsea Instrument, which allows estimating primary production of phytoplankton, was installed on the buoy. Several technical issues had to be solved to allow such type of measurements from a buoy. The energy supply was the most challenging.

The SMILE buoy is very innovating because the energy is supplied by wave energy and sun with hydrogen battery as a backup. These various sources of renewable energy allowed fuelling the FRRf. At the moment Production/Energy curves are performed every 2 hours. After many technical adjustments and software development to pilot the FRRf, the FRRf is operational since March 2016.
Parameters and frequency:
-Parameters measured every 20 min since the 15th of June 2016: Tempertaure, salinity, dissolved O_2, turbidity, fluorescence
-Paramerters measured every 20 min since the 19th of June 2017: Meteorogical parameters and PAR
- Photosynthetic parameters - every 2 hours P/E curves by using Fast Rate Fluorometer Act2 Chelsea Instrument since the 3rd of March 2017. The frequency of measurements were adaptated as function of energy availibity during the first few months.
All data except photosynthetic parameters are available on line on Coriolis web site:
http://data.coriolis-cotier.org/platform/6200310/2017-06-18T00:00:00.000Z/2017-07-18T00:00:00.000Z



Smile buoy – University of Caen (CREC – UMR CNRS BOREA) and IFREMER

Western English Channel – Celtic Sea: M14 cruise (PI: Cefas)

M14: Small pelagic fish in the coastal waters of the western Channel and Celtic Sea

Participation into annual multidisciplinary pelagic surveys of the Western Channel and Celtic Sea waters as part of project Poseidon, which aims at estimating the biomass of-, and gain insight into the population of the small pelagic fish community (sprat, sardine, mackerel, anchovy, horse mackerel, herring) using trawl and acoustic, to collect ichtyoplankton (eggs and larvae, 270 µm) of pelagic species which will be identified, counted and (in case of clupeids) measured onboard and combined with information from maturity to identify spawning areas and other I information.

DURATION: 3 October – 19 October 2016

Specific objectives: To carry out the fifth and final of five annual multidisciplinary pelagic surveys of the Western Channel and Celtic Sea waters as part of project Poseidon, and to couple continuous recording of phytoplankton groups by automated flow cytometry (CytoSense) together with other measurements.

- Surface (4 m) salinity, temperature, fluorometry, oxygen and pH and Fv/Fm from the 'Ferrybox', phytoplankton functional types with a flow-cytometer (Cytosense) and zooplankton with the Plankton Image Analyser (PIA)
- Chlorophyll *a* concentration, dissolved oxygen concentration, salinity, temperature, inorganic nutrients concentration and the relevant QAQC samples for calibration of the equipment from discrete samples.
- Seabirds and Marine Mammals. Locations, species, numbers and activities observed will be recorded continuously during daylight hours by three Marine life

observers from bridge.
- phytoplankton and micro-zooplankton at predetermined 18 primary stations for further analysis back to the lab (species composition, abundance, biomass and size distribution).

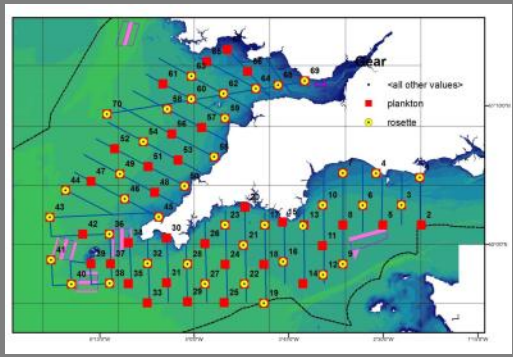


Fig: map of the different stations during the survey 22/17

Western English Channel – Celtic Sea: M19 – 20 cruise (PI: Cefas)

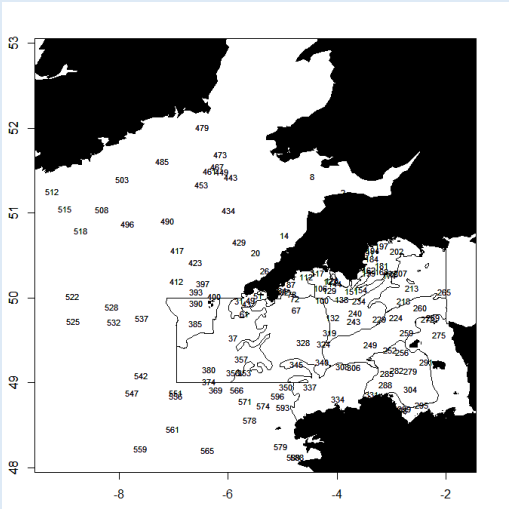
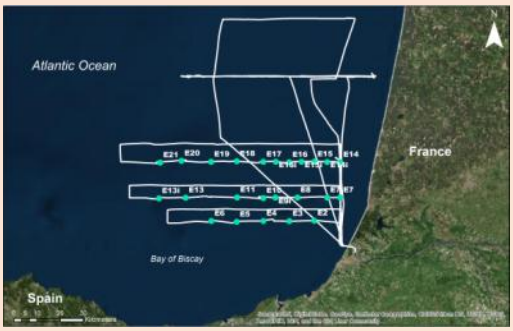


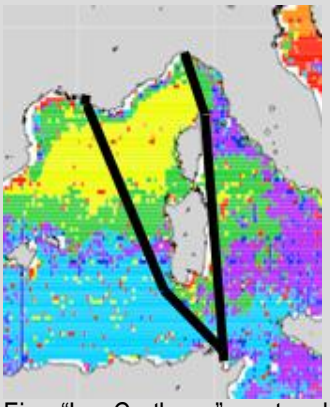
Fig: map of the different stations during the survey 4/17

DURATION: 7 March – 5 April 2017

Specific objectives: to carry out an integrated monitoring survey of the Celtic Sea, south-western approaches and the western Channel using a random stratified survey design for the purposes of providing fish stock assessment data (distribution, size composition and relative abundance of fish) and the collection of associated ecosystem information such as:

- chlorophyll, oxygen, salinity temperature, nutrient samples and the relevant QAQC samples for calibration of the equipment. Water samples will be collected and fixed on board for analysis post-hoc. Vertical plankton nets/ring nets will also be deployed.
- The benthic macro infauna, Benthic infauna, Sediment particle size analysis, Bulk chlorophyll, Bulk nutrients
- Surface (4 m) salinity, temperature, fluorometry, oxygen and pH and Fe/Fm from the 'Ferrybox', phytoplankton functional types with a flow-cytometer (Cytosense) and zooplankton with the Plankton Image Analyser (PIA)
- To record details of surface sightings of any marine mammals, sea turtles and large pelagic fish, and record observations on jellyfish aggregations.
- To collect water samples for caesium and tritium analysis
- To tag/release specimens of various commercially exploited skates (Rajidae) and other selected elasmobranchs.
- To collect specimens of selected species for ID purposes as well as length-weight measurements where still required.
- To collect length and weight measurements of jellyfish caught.

	- To collect specimens of cuttlefish to aid identification and for Cefas on-going projects.
The Bay Of Biscay: Etoile cruise (PI: P. Lazure Ifremer, contributor: F. Artigas CNRS- LOG) in July-Aug. 2017	
The dynamics at the mesoscale in the south of the Bay of Biscay and features of the gyres were described by Serpette et al, 2006, Caballero et al. 2014, 2016 around 4°W. Eastern to this area, the area was not well-documented. Rubio et al, 2013, in rev. described gyres structures on the "Plateau des Landes » and the effects on circulation based on current observation from HF radar and the use of lagrangian techniques. The Leg2.2 objectives were: - To characterize Floating Marine Litter distribution in the first meters of the water column using Neuston and Pairovet nets. - To characterize phytoplankton distribution at meso/sub-meso-scale using automated flow cytometer and multispectral fluorometry. These measurements should be complementary to discrete sample at three depths (surface, sub-surface and chlorophyll maximum). The Leg 2.2 objectives aimed at completing databases for multidisciplinary oceanic variability in the JERICO-Next project and to combine the action of the JRAP#1 (pelagic biodiversity) and JRAP#4 (coastal ocean transport)	The Etoile cruise was firstly devoted to understand hydrological dynamics in the Bay of Biscay. Moreover, a physical-biological coupling was effective (JRAP#1 and JRAP#4) by including phytoplankton monitoring in surface and at some water column depths. The cruise was held from July 25th to 31th (Leg 2.2.1) and from August 2nd – 5th, 2017(Leg 2.2.2)  Following deployments were done: - Mastodon-2D moorings (IFREMER) - ADCP moorings (IFREMER, SHOM) - CTD Casts (IFREMER or AZTI) - Pairovet nets (AZTI) - Neuston nets (AZTI) - Drifting buoy (AZTI) - CytoSense continuous recording (CNRS-LOG) - FluoroProbe continuous recording (CNRS-LOG) - Fluoroprobe casts (CNRS-LOG) One Ph.D. (CNRS-LOG/ULCO) will analyse FCM and FLP data.
Western Mediterrranean (PI: CNRS-MIO)	
Improvements of combined phytoplankton and hydrological data observation from a fully sub mesoscale analysis system thanks to a continuous flowthrough of sea water and a succession of sensors. Adaptation for the Ferrybox system (mesoscale resolution due to	In the frame of the A*MIDEX CHROME project (leader, CNRS MIO), a ferrybox (4H JENA) coupled with an automated flow cytometer (Cytobuoy b.v.) were installed onboard the "Le Carthage" of the Compagnie Tunisienne de navigation. The ship crossed the Western Mediterranean sea from Marseille to Tunisia and from Tunisia to Genova 4 times

the speed of the ship).  Fig: "Le Carthage" routes between France, Tunisia and Italy	a week. The project, in collaboration with the *Institut des Sciences de la Mer de Tunisie* (C.Sammari) yealded to two successful coupling (March 2016 and October-January 2016-2017). A total of 400 samples, i.e.80 samples per crossing, were collected and are currently under analysis. The datasets will be available for the JERICO-NEXT community through a dedicated database (CYTOBASE, S. Lahbib, M. Dugenne) and standard vocabulary dedicated to the output data are under discussion in the frame of the SeadataCloud EU H2020 project.

3.1.1.2. Acquired data and archiving made

Table 1: Instruments on board the different cruises or field stations with numbers of acquisitions and measurement types (C: continuous recording in surface or sub-surface waters; P: Profiles (casts) in the water column; D: Discrete measurements in (sub)-surface or along the water-column). Crosses indicate measurements with the corresponding device with no detailed information on numbers of samples.

Project	Period	CTD	PSFCM (C)	PSFCM (D)	Plankton Imaging Systems	PhytoPAM (stations)	FluoroProbe (C)	FluoroProbe/Multiexciter (P)	FB	Chloro	SN	FRRF2 (C)	FRRF 3(P)
Le Carthage	2016		X (CNRS-MIO)						x				
Finmaid Ferry	2016				FlowCAM			x					
VLIZ	2016	22	(VLIZ) (RWS)		CytoSense (RWS + VLIZ)	15 (3 depths per station)	1057	14		x	X		
RWS	2016	x	(RWS)	x	CytoSense (RWS)	18	4353		x	x	X		
Tangesund observatory	2016	x		x	Imaging Flowcytobot FastCAM (IFERMER)	x	x	x				x	
Le Carthage	2016		X (CNRS-MIO)						X				
Nephrops TV Survey	2016	X	X		X				X	X	X		
CEFAS Pelagic Fish	2016	X	X		X				X	X	X		
SMILE Buoy	2016 - 2017											x	
CEFAS	2017	X	X		X				X	X	X		

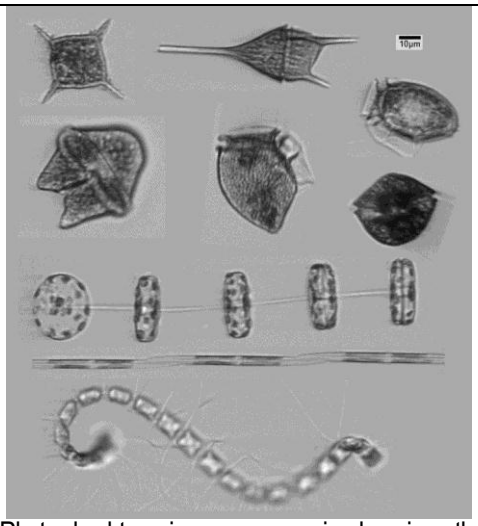
Utö	2017 - 2018				Imaging Flow Cytobot			X	x	x	x	x	
PHYCO	2017	46	1064 (CNRS-LOG)	197	CytoSense (CNRS-LOG)	46 (surface) 48 (bottom)	AOA (IFREMER)	47	x	48 surface 48 bottom	48	x	37
VLIZ	2017	44	641 (CNRS-LOG) (VLIZ) (RWS)	106	CytoSense (CNRS-LOG, RWS, VLIZ)	25 (surface) 25 (bottom)		27					19
RWS	2017	19?	322 (CNRS-LOG) (RWS)	61	CytoSense (CNRS-LOG, RWS)	18 (surface) 15 (bottom)	4194		x				17
Silja Serenade Ferry	2017 - 2018								x	x			
Aranda	2017	30	783 (CNRS-LOG)	246	CytoSense (CNRS-LOG) Flow CAM (SMHI) UVP5 (CNRS-LOV)	19 103 (many depths per station)	5415	16	x			x	16
Pelrad	2017	22	136 (CNRS-LOG)		CytoSense (CNRS-LOG)		781	17		22 surface 22 bottom	22	x	6
ETOILE	2017	25	859 (CNRS-LOG)	117	CytoSense (CNRS-LOG)		10638	15					

Table 2: Providers of data and current status of analysis.

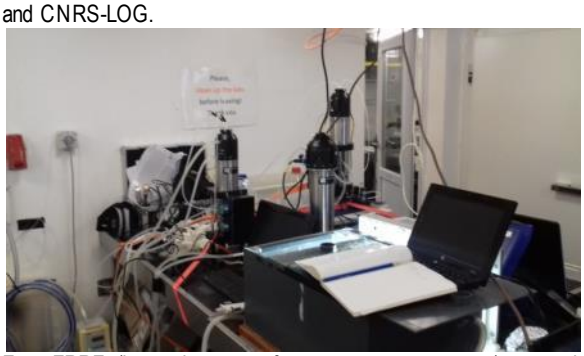
Acquired Data type (parameters)	Archiving place: how to get the data?	Status: raw data, processed data, Quality checked, needs to make the data flowing to the standardised channel?
CTD-data	CNRS-LOG	Processed
CTD-data	VLIZ	
CTD-data	RWS	
CTD-data	SMHI	Processed
Phytoplankton data based on microscopy	CNRS-LOG	Samples to be analysed
Phytoplankton data based on image Inflow cytometry	SMHI and WHOI	Analysis in progress
Phytoplankton data based on flow cytometry	CNRS-LOG	Raw data – analysis in progress
Phytoplankton data based on flow cytometry	VLIZ	
Phytoplankton data based on flow cytometry	RWS	
Data on photosynthetic parameters (Fast Repetition Rate Fluorometry)	CNRS-LOG	Analysis in progress
Carbon fixation, C-13 method	NIOZ	
Carbon fixation, C-13 method	RWS	
Ferrybox data: Phycocyanin, fluorescence	SMHI and SYKE	
Data on photosynthetic parameters (PhytoPAM)	CNRS-LOG	Raw data
Phytoplankton based on multi spectral fluorometry	CNRS-LOG	Analysis in progress
Plankton data based on underwater camera	CNRS-LOV	Analysis in progress
Baltic Sea 1. Phycoerythrin fluorescence; cell counts	A local server at SYKE	Data processed, quality checked and available. Fluorescence data in text format, cell counts in the excel sheets. Needs action to deliver data to dataportals
Baltic Sea 2. Fluorescence records; spectral fluorescence; spectral absorption; quantum efficiency of photosystem II; Chlorophyll concentration; primary production	A local server at FMI.	Raw data, data collection ongoing. Many data types are in new formats, so there is need of discussion before delivered to databases
Baltic Sea 3. Fluorescence records; Chlorophyll concentration;	A local server at SYKE	Data processed and available from SYKE. Needs action to deliver data to dataportals.
Baltic Sea 4 Fluorescence records	SMHI	Data is being quality controlled
Baltic Sea 5 Fluorescence records	SMHI	Data is being quality controlled

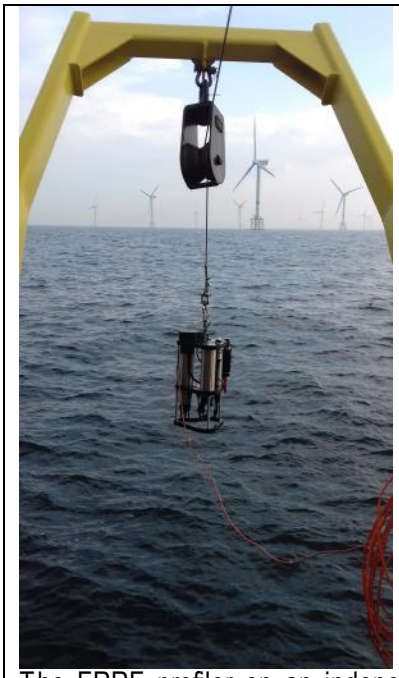
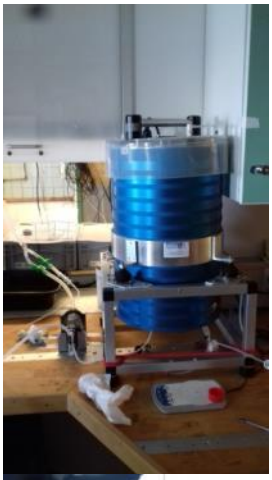
3.1.1.3. Communication materiel

Type (photos, video, articles, conference, other)***	Topic (3 lines max)	How to get it? Copyright etc. URL?
Images and some video  The surface part of the Tångesund buoy.  The Imaging FlowCytobot	Tångesund observatory Plankton, field work etc.	Contact SMHI

 Phytoplankton images acquired using the Imaging FlowCytobot  The raft at the Tångesund observatory and with winches for vertical movement of underwater microscope (Imaging Flow Cytobot) and CTD. The hut on the raft contains batteries, computers, communication equipment etc.		
Images	Baltic Sea cruise focussed on cyanobacteria Plankton, field work etc.	Contact SMHI
Images	VLIZ cruise 2016	Contact VLIZ
Images	RWS cruise 2016	Contact RWS
Images	PHYCO cruise	Contact CNRS-LOG

 Left to right: PhytoPAM, CytoSense, FRRF.  FRRF profiler (two FastOcean Chelsea sensors integrated on an APD system) plus an independent hyperspectral radiometer TRIOS (GmbH) on the "Côte de la Manche" ship.		
Images	RWS cruise 2017	Contact RWS

 The FRRF profiler on an independent winch on the Zirfea.		
Images  Three CytoSense were put on this cruise. Left to right: VLIZ, RWS and CNRS-LOG.  Four FRRF (in continuous surface water measurements) were also implemented on this cruise. Only three are visible: two from the NIOZ and one from the RWS. The last one was designed for profiling the water column (CNRS-LOG).	VLIZ cruise 2017	Contact VLIZ

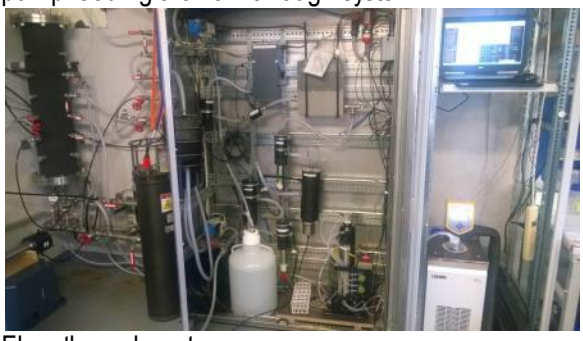
 The FRRF profiler on an independent winch of the Simon Stevin ship.		
Images     Up-left: The FRRF is pumping water through the FerryBox system.	Aranda cruise	Contact SMHI

So did the flow cytometer (picture up-right). Down-left, the FluoroProbe was mounted in order to analyse phytoplankton composition continuously. Down-right, FluoroProbe casts in the water-column  The FRRF profiler on an independent winch of the Aranda and laboratory work for blank measurements.		
Images  Picture on the left shows the FluoroProbe connected in the continuous mode to the termo salinometer on the RV "Sépia II". Picture on the right shows the CytoSense pumping continuously the water in the water chamber.	PELRAD cruise	Contact CNRS-LOG
web page	FINMARI web page announcement that JERICO-NEXT related real-time Utö station data is getting available, with links to data	https://www.finmari-infrastructure.fi/?x118281=192606
Photos from Utö station	measurement system at Utö	Contact SYKE

Utö measuring cabin outside

…and inside

… and view from sea, at the location of underwater pump feeding the flow-through system



Flow-through system.

3.1.2. Next steps (Sept. 2017-Aug. 2018)

When	what
Whole period	– Continued analyses of data and preparation of D4.4 and manuscripts for scientific articles
Sept 2017-March 2018	– Baltic Sea 2 and 3 deployment continued
October 2017	– Some results will be presented at the 8th Ferrybox meeting – JRAP#1 strategy will be presented in the *Symposium high throughput methods in marine time series* in Hannover
19-21 March 2018	– Third JERICO-NEXT phytoplankton workshop, Marseille
21-26 October 2018	– Presentation of some results at the International Conference on Harmful Algae in Nantes, France, https://www.icha2018.com/
Before the end of JERICO-NEXT	– Scientific publication of results, possibly in a special issue focussed on automated and autonomous *in situ* observations of phytoplankton and harmful algal blooms.

In JRAP#1 on the Biodiversity of Phytoplankton, harmful algal blooms and eutrophication, JERICO-NEXT partners have successfully carried out a large number of activities including a phytoplankton workshop arranged in Gothenburg, Sweden where state of the art instrumentation for observing phytoplankton and their activities were used in both field and laboratory samples. Field work has been carried out in the Baltic Sea, the Kattegat-Skagerrak, the English Channel-North Sea area and the Western Mediterranean as planned, by combining the most relevant automated techniques as possible and by integrating scientific questions and approaches of many partners. Moreover, a fifth marine area (the Bay of Biscay) was also studied, in an attempt to combine both physical (JRAP#4) and biological (JRAP#1) approaches. By using a combination of automated and manual methods JRAP#1 aims are being achieved. Ferries, research vessels and oceanographic buoys are being used as instrument platforms to allow frequent algal bloom observations *in situ.* A large number of scientific cruises have been made. The automated image and single-cell optical plankton analysers give information about species composition, cell abundance and plankton community structure. Bio-optical instruments are used to give additional information about community structure and phytoplankton biomass based on the content of photosynthetic pigments, as well as on photosynthetic parameters and productivity. The work in JRAP#1 will now focus on working up the data collected and to prepare for the third JERICO-NEXT plankton workshop to be arranged in Marseille, France, in spring 2018 where results will be presented and discussed. Moreover, scientific publication of results is in focus.

3.1.3. Updates with regards to the scientific strategy of this JRAP

About the JRAP#1 strategy to address spatial distribution of phytoplankton at a fine spatial or temporal scale in the different coastal systems considered, one must emphasize that accordingly to the system or the season, it might be not enough to perform continuous recording in only sub-surface waters, and that there is a need for considering casts (at low or high temporal resolution, as performed in some fixed stations and/or research cruises) of some of the automated devices as well, in order to be able of producing accurate estimates of the vertical distribution and total biomass, abundance and/or diversity of phytoplankton, including HAB species.

About automated techniques to study photosynthetic activity (variable fluorescence), it could be interesting for future work to implement research cruises with a specific sampling strategy regarding the time scales of photosynthesis and photo-acclimation processes during the daylight period. Until now, we have implemented this technique on national cruises of the different JERICO-NEXT partners to sample different marine systems. But

each national cruise has a specific spatial sampling strategy. Thus, it is necessary to sample a given station and to move relatively fast to the next one in order to cover a big area per day of the cruise. Photo-physiological processes of a given phytoplankton community can greatly change during the day. So, the sampling strategy applied until now is not well-adapted to understand spatial variation of photo-physiological processes because no accurate comparison is possible between spatial and temporal variation of these processes for the different phytoplankton communities sampled in one day. Indeed, photo-physiological processes are well known to be controlled by environmental factors such as turbulence. Vertical mixing can export cells across the vertical gradient of light and so change the light climate in quantity and quality of cells in relationship or not with re-suspension of particles and/or nutrients. Consequently, for the study of photoacclimation processes by variable fluorescence and for primary production estimations, it would be more accurate to sample, in dedicated research cruises, several fixed stations during a 24h cycle in all the representative areas of different marine systems considered. The aim will be to address both temporal and spatial variability (including vertical water column dimension) of phytoplankton photo-physiology at different scales and the relationship with other potential controlling factors.

3.1.4. Any comment

None

3.2. JRAP#2: Monitoring changes in benthic biodiversity

PI: Antoine Grémare
Involved institutes: CNRS (UB, UBO), IFREMER, HCMR

Objective of the JRAP:
The main aims of JRAP 2 are (1) to monitor changes in benthic biodiversity under different sources of disturbances, and (2) to assess the functional consequences of these changes. JRAP 2 is composed of 4 actions corresponding to different combinations of localizations and disturbances: (1) West Gironde Mud Patch / natural organic enrichment, (2) Bay of Brest / trawling, (3) Bay of Brest / invasive species, and (4) Cretan Sea / anthropogenic organic enrichment.

3.2.1. Main achievements and delays

3.2.1.1. Achievements

Initial time line and expected work	Actual time line and achieved work, problems, good surprises and opportunity met
M13-M15 (sept-nov 2016): Objectives: Conducting the first sampling cruises	M13-15: - *West-Gironde Mud Patch*: the first sampling cruise was conducted in October-November 2016 on board of the R/V Côte de la Manche - *Bay of Brest (trawling)*: a sampling cruise (biodiversity of macrofauna, sediment granulometry, organic content, live maerl coverage) was conducted in October 2016 on board of the R/V Albert Lucas - *Cretan Sea*: The first sampling cruise was conducted in October 2016 with the R/V Philia.
M16-M18 (Dec 2016. Feb. 2017): Objectives: Continuing sampling cruises, analysing collected samples	M16-M18: - *West Gironde Mud Patch*: Processing of collected samples - *Bay of Brest (trawling)*: Processing of sediment and biological samples. A sampling cruise (biodiversity of macrofauna, sediment granulometry, organic content, live maerl coverage) was conducted in January 2017 on board of the R/V Albert Lucas. - *Cretan Sea*: Processing of collected samples for the assessment of environmental parameters.
M19-M21 (Mar. 2017. May. 2017): Objectives: Continuing sampling cruises, analysing collected samples	M19-M21: - *West Gironde Mud Patch*: Processing of collected samples - *Bay of Brest (trawling)*: Processing of sediment and biological samples. A sampling cruise (sediment profile imagery, quadrat photograph, benthic metabolism) was conducted in March 2017 on board of the R/V Albert Lucas. Another sampling cruise (biodiversity of macrofauna,

	sediment granulometry, organic content, live maerl coverage) was conducted in May 2017 on board of the R/V Albert Lucas. - *Bay of Brest: invasive species*: Preparation of the 'Pagure-Next-2017' cruise, which was planned in March 2017 but had to be cancelled because of bad weather conditions. The cruise is rescheduled to May 2018, - *Cretan Sea*: Processing of the samples collected for assessment of macrobenthic diversity.
M22-M24 (Jun. 2017 Aug. 2017): Objectives: Continuing sampling cruises, analysing collected samples	M19-M21: - *West Gironde Mud Patch*: Processing of collected samples. The second sampling cruise was conducted in August 2017 on board of the R/V Côte de la Manche. - Bay of Brest trawling: Processing of sediment and biological samples. The sampling cruise specifically dedicated to the collection of sediment cores was postponed because of the lack of availability of SCUBA divers. *Cretan Sea*: Processing of collected samples for macrobenthic diversity. The second sampling cruise was conducted in July 2017 on board of the R/V Philia.

3.2.1.2. Acquired data and archiving made

Acquired data and archiving made, where, how?

Acquired Data type (parameters)	Archiving place: how to get the data?	Status: raw data, processed, Quality checked, needs to make the data flowing to the standardised channel?
Hydrology (T, S, O2, fluorescence)	Not available yet	Raw data
Sediment (granulometry, C, N, total and available amino acids, chloropigments)	Not available yet	Raw data
O2 (in situ sediment microprofiles, sediment consumption)	Not available yet	Raw data
Nutrients (sediment profiles, fluxes at the water sediment interface)	Not available yet	Raw data
Sediment profile images	Not available yet	Raw data
Benthic macrofauna composition	Not available yet	Raw data
Benthic microfauna diversity	Not available yet	Samples to be analyzed

3.2.1.3. Communication materiel

Type (photos, video, articles, conference, other)***	Topic (3 lines max)	How to get it? Copyright etc. URL?
Video	Presentation of the new towed video system 'Pagure-2'	Long French version at: http://wwz.ifremer.fr/webtv/Campagnes-a-la-mer/PAGURE-2 Short English version at: https://filesender.renater.fr/?s=download&token=ac705204-4c8c-77c2-9602-60846550d477

3.2.2. Next steps (Sept. 2017 - Aug. 2018)

when	what
M25-M27: (Sept. 2017-Nov. 2017)	Objectives: Continuing sampling cruises, analysing collected samples - *West Gironde Mud Patch:* Processing of collected samples - *Bay of Brest (trawling)*: Processing of sediment and biological samples. Conducting the sampling cruise dedicated to the collection of sediment samples. - *Cretan Sea*: Processing of the sediment samples collected from the Cretan Sea and the West Gironde mud patch for microbial community assessment. Processing of the samples collected for assessment of macrobenthic diversity at the Cretan Sea sampling stations (2nd sampling cruise). Processing of the samples collected for estimation of environmental parameters of the Cretan Sea sampling stations (2nd sampling cruise).
M28-M30: : (Dec. 2017-Feb. 2018)	M28-M30: Objectives: Continuing sampling cruises, analysing collected samples *West Gironde Mud Patch:* Processing of collected samples. Conducting the third sampling cruise on board of the R/V Côte de la Manche. *Bay of Brest (trawling)*: Processing of sediment and biological samples. - *Cretan sea*: Processing of the sediment samples collected from the Cretan Sea and the West Gironde mud patch for microbial community assessment. Processing of the samples collected for assessment of macrobenthic diversity at the Cretan Sea sampling stations (2nd sampling cruise). Processing of the samples collected for estimation of environmental parameters of the Cretan Sea sampling stations (2nd sampling cruise).
M31-M33: (Mar. 2018-May. 2018)	Objectives: Continuing sampling cruises, analysing collected samples *West Gironde Mud Patch:* Processing of collected samples. Conducting the fourth sampling cruise on board of the R/V Côte de la Manche. *Bay of Brest (trawling)*: Processing of sediment and biological samples.

	Bay of Brest (invasive species): Conducting the 'Pagure-Next-2018' cruise. - *Cretan sea*: Analysing the microbial community data from the Cretan Sea and the West Gironde mud patch. Analysing macrobenthic community data.
M34-M36: (Jun. 2018-aug. 2018)	Objectives: Analysing and interpreting collected data -*West Gironde Mud Patch*: Processing of collected samples -*Bay of Brest (trawling)*: Processing of sediment and biological samples. Analysis and interpretation of the overall data set -*Bay of Brest (invasive species):* Processing of collected samples -*Cretan Sea*: Analysis of the microbial community data from the Cretan Sea and the West Gironde mud patch. Analysis of the macrobenthic community data.

3.2.3. Updates with regards to the scientific strategy of your JRAP

No changes

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3.2.4. Any comment

None

3.3. JRAP#3: Occurrence of chemical contaminants in coastal waters and biological responses

PI: Luca Nizzetto (NIVA)
Involved institutes: NIVA, HZG, CEFAS, IMR, IRIS

Objective of the JRAP:
1) To identify new contaminants in European coastal waters that are not yet addressed by regulation but which can pose a pressure to the coastal marine ecosystem.
2) To describe spatial distribution of chemical contaminants in European coastal waters exploiting integrated fixed and mobile monitoring infrastructures.
3) To investigate the patterns of the spatial distribution exploiting information from physical and chemical sensors available on the infrastructures.
4) To Analyze co-linearity between contaminant signals and biological signals (specifically tracking the presence of pollution feeding microorganisms in areas with high contamination exposure.
Specific objectives of the JRAP3 are:

- To deliver technical protocols and best practices for the monitoring of chemical pollutants using existing coastal infrastructures
- To optimize existing chemical sensor technology for use on fixed coastal monitoring infrastructures
- To provide guidelines for the implementation of contaminant monitoring using JERICO infrastructures (e.g. information on outcomes from adopting different spatial resolutions.

3.3.1. Main achievements and delays

3.3.1.1. Achievements

Initial time line and expected work	Actual time line and achieved work, problems, good surprises and opportunity met
M13-M15 (sept-nov 2016): Objectives: – Initiate deployments of passive samplers on fixed platform – Development of an in-situ active sampling device for operations in contaminated atmosphere – Continuing sampling through the FerryBox unit for the analysis of emerging contaminants	M12-15: *More in details: explain what is done what is delayed and why* – Newly developed passive sampler cages were distributed to 6 JERICO-NEXT Partners (14 Units in total including sampling materials (11 Units) and measurement quality assurance and control materials (3 Units)) – A high volume, flowthrough filtration and extraction unit was developed for application in the machine room of ferry boxes. The main developments include the filtration of a high volume (20L) waters in protected atmosphere. The development was necessary to carry out sampling for PAH (Polyclic Aromatic Hydrocarbon, toxic substances originated during combustion of foxil fuels) in the marine waters while operating in the highly contaminated atmosphere of the machine room. – Completed FerryBox sampling along the

	routes: Tromsø Longyearbyen, Bergen-Kierkenes total collected 45 Samples.
M16-M18 (Dec 2016. Feb. 2017): Objectives: – Deployment of passive samplers by the involved partners – Running high resolution campaign (Oslo-Kiel transect) for PAHs and DNA biomarkers	M16-M18: – Passive samplers deployed by all partners. – High resolution campaign conducted (January 2017). Collected 24 samples high volume samples for PAH analysis. 75 Samples for DNA biomarker analysis. – Completed FerryBox sampling for emerging contaminants (collected 20 samples).
M19-M21 (Mar. 2017. May. 2017): Objectives: – Retrieval of passive samplers from fixed platform – Shipment of samplers to chemical laboratory	M19-M21: – Retrieved 10 Passive samplers from field deployment. 1 sampler unit went lost during the deployment in MONICAN 1 buoy (Coast of Portugal). – Shipments of samples were carried out efficiently using commercial courier express.
M22-M24 (Jun. 2017 Aug. 2017): Objectives: – Running chemical analysis – Running analysis of DNA biomarker form the samples collected during the high resolution campaign	M19-M21: – Chemical analysis for contaminants of emerging concern from the Ferry Box sampling on going (80%) – Chemical analysis for PAHs in the samples from the high resolution campaign completed. Proved effectiveness of the newly developed sampling device in protecting from ship-based contamination sources. – DNA biomarker analysis on going (20%) – Analysis of passive sampler not yet started. This represents a small delay. However the number of samples is relatively small and will be processed in a single batch during M25-M30

3.3.1.2. Acquired date and archiving made

Acquired Data type (parameters)	Archiving place: how to get the data?	Status: raw data, processed, Quality checked, needs to make the data flowing to the standardised channel?
Chemical analysis	NIVA	Raw data
Temperature	NIVA	Processed
Salinity	NIVA	Processed
Turbidity	NIVA	Processed
Chlorophyll	NIVA	Processed

3.3.1.3. Communication materiel

Type (photos, video, articles, conference, other)	Topic (3 lines max)	How to get it? Copyright etc. URL?
Dissemination Articles on JERICO-NEXT newsletter	Discovery of Artificial Sweetener Sucralose as an ubiquitous contaminant	Accessible on JERICO webpage
Photo CF1	Sampling during high resolution campaign	Published with the newsletter article
Photo CF2	Sampling during high resolution campaign	Published with the newsletter article

3.3.2. Next steps (Sept . 2016-Aug. 2018)

when	what
M25-M27: (Sept. 2017- Nov. 2017)	Objectives: – Complete all chemical analysis – Complete biomarker analysis
M28-M30: : (Dec. 2017- Feb. 2018)	M28-M30: – Run data analysis and statistical model – Uploading data to publicly accessible repository
M31-M33: (Mar. 2018- May. 2018)	Objectives: - Run data analysis and statistical models - Preparation of scientific papers
M34-M36: (Jun. 2017- aug. 2018)	Objectives: – Preparation of scientific paper – Publication of scientific papers

3.3.3. Updates with regards to the scientific strategy of this JRAP

None

3.3.4. Any Comment

None

3.4. JRAP#4: 4-D characterisation of trans-boundary hydrography and transport

PI: Anna Rubio (AZTI)
Involved institutes: AZTI, Ifremer, CNR-ISMAR, CNRS, CMCC, HZG

Objective of the JRAP:
JRAP4 aims to demonstrate the potential of coastal observatories and the JERICO Research Infrastructure for the understanding and monitoring of the 4D shelf/slope circulation, with applications in line with several MSFD descriptors. The work will concentrate in three pilot areas (SE Bay of Biscay, NW Mediterranean and German Bight) and rely on the use of information from Observing Systems (HF radar, moored high-frequency thermistor chains, drifting buoys) and high-resolution numerical model experiments (OSSES).

3.4.1. Main achievements and delays

3.4.1.1. Achievements

Initial time line and expected work	Actual time line and achieved work, problems, good surprises and opportunity met
M13-M15 (sept-nov 2016) **PHASE 4.2 (M10-M23): On site implementation with deployment and recovery of complementary moorings, HF radar, drifters.** **Subtask 4.2.1. -Deployment and recovery of MASTODON moorings** **Subtask 4.2.2.- Configuration of the HF radar systems**	M13-M15 (sept-nov 2016) **Subtask 4.2.1** ACTUAL TIME LINE: unchanged ACHIEVED WORK: -M13, CNR-ISMAR, AZTI, IMEDEA-SOCIB: Participation to the HR radar experts workshop (INCREASE. Lerici, (SP), Italy, 13-15 sept) including JERICO-NEXT partners meeting to discuss methodologies for the JRAP4 analysis. -M13 to M15, AZTI, IMEDEA: Analysis of historical series of HF radar and satellite data to study mesoscale surface transports in the SE Bay of Biscay. -M13-M15, HZG: Selection of suitable tide gauges in the German Bight to estimate pressure gradients -M14, Ifremer: Successfully tested the MASTODON lines during October 2016 in the NW Med. They will be deployed again in August 2017 to October 2017. **Subtask 4.2.2.** ACTUAL TIME LINE: Unchanged ACHIEVED WORK:- M13-M15, IFREMER: work to define the location of the new HF radar in the SE Bay of Biscay - M13-M15, CNR-ISMAR: Calibration of the HF radar antenna on Tino Island in September. Maintenance of HF radar antenna in Monterosso in November. - M13-M15, CNR-ISMAR: Since sept 2016 acquisition and archiving of the HFR surface current data following the common formats and Quality Control (QC) procedures established in WP5.
M16-M18 (Dec 2016. Feb. 2017): **PHASE 4.2 (M10-M23): On site implementation with deployment and recovery of complementary moorings, HF radar, drifters.**	M16-M18 (Dec 2016. Feb. 2017): **On site implementation and Subtask 4.2.1** ACTUAL TIME LINE: Unchanged ACHIEVED WORK: -M16-M18, IFREMER, work for preparation of MASTODON mooring deployments. -M16-M18, CNR-ISMAR: Preliminary analysis to identify correlation

Subtask 4.2.1. -Deployment and recovery of MASTODON moorings **Subtask 4.2.2.- Configuration of the HF radar systems** SE BOB deployments: HF radar – End of 2016 or beginning of 2017 (expected to be running at least for a year) – TASK 3.2.2 **Subtask 4.2.3.- OSSEs extended exercises to define strategy for complementary onsite deployments.** OSSES will be oriented to: -Test a posteriori the sampling strategy proposed/developed - Optimise new sampling strategies with complementary measurement (drifter, gliders)	between wind patterns and surface currents from HF radars in La Spezia area. The analysis represents also a guideline for the DASPO oceanographic cruise planning. -M18, CNR-ISMAR: DASPO cruise in La Spezia Gulf in February 13-16 to test the glider and acquire water column measurements in the area covered by HF radars. -M16-M18, HZG: Quality checks of drifter data acquired in the German Bight Other specific achievements: -M18, AZTI, NIVA: Deployment of passive samplers in a cross-cutting action between JRAP4 and JRAP3. Two passive samples were deployed at 50m depth (Mendexa longline) in February 2017. - M16 and 18, AZTI, IMEDEA-SOCIB: Analysis of historical series of HF radar and satellite data to study mesoscale surface transports in the SE Bay of Biscay work was presented in AGU GA: "HF Radar Insight Into Coastal Mesoscale Eddies And Associated Cross-Shelf Transports In The South Eastern Bay Of Biscay (NE Atlantic) "(OS11C-02, Invited). Rubio et al., AGU- Fall Meeting, San Francisco, USA, December 2016. In February 2017, a paper was send to Remote Sensing of Environment: Rubio et al. Eddy-induced cross-shelf export of high Chl-a coastal waters in the SE Bay of Biscay (2017, under review). **Subtask 4.2.2. – SE BoB HFR deployments** ACTUAL TIME LINE: DELAYED ACHIEVED WORK: M16-M18, IFREMER - the location of the new HF radar in the SE Bay of Biscay is defined. Some complementary hardware components for the installation antenna are bought. The antenna is not yet installed due to delays regarding the official permission for the installation. **Subtask 4.2.3.** ACTUAL TIME LINE: Ongoing ACHIEVED WORK:M16-18, IFREMER :In a joint work with the task 3.7, the targeted method (ArM method) has been extended to HF Radar observation (radial velocities). A first experiment using three simulated locations for the HF Radar system on the Landes coast has been driven. However these first experiments based on MARS3D model simulation have been performed with a coarse spatial resolution (4km) model configuration. This resolution does not allow clearly distinguishing impact of different HF radar distributions.
M19-M21 (Mar. 2017. May. 2017): **Subtask 4.2.4.- Deployment of auxiliary instruments; Other data collection**	M19-M21 (Mar. 2017. May. 2017): **Subtask 4.2.4. – Extension of CNR-ISMAR network** ACTUAL TIME LINE: UNCHANGED ACHIEVED WORK:-M21, IFREMER/AZTI: ETOILE campaign planning and submission of the final proposal with the detail on foreseen sampling strategy. -M19-M21, HZG: Optimisation of quality checks for data from three HF radar antenna stations in the German Bight Other specific achievements: -M19, AZTI, NIVA: Deployment of passive samplers in a cross-cutting action between JRAP4 and JRAP3. AZTI moored the Donostia slope buoy and one passive sampler at the subsurface in March2017. One of the samplers at Mendexa was successfully recovered in April

Subtask 4.2.5- Data processing. Collection of data, harmonization of outputs **WORKSHOP: Presentation of JRAPs progress** during JERICO-NEXT GA (FEBRUARY 2017)	2017. -M20, AZTI, CNR, HZG: A Proposal for Transnational Access to Coastal Observatories (2nd Call) for a glider campaign in the SE Bay of Biscay is submitted **Subtask 4.2.5** ACTUAL TIME LINE: UNCHANGED ACHIEVED WORK: M19-M21, CNR-ISMAR: analysis of the historical dataset to reconstruct the 3D current field by using HF radar, ADCP, and glider dataset. Comparison of surface data from HFR and glider. Identification of current patterns according to prevailing winds over the area. **WORKSHOP** ACTUAL TIME LINE: UNCHANGED ACHIEVED WORK: M19, ALL: Participation in WP4 workshop on 14,15 March 2017, as a side event of the project General Assembly#1 in Helsinki (Finland). The first part was dedicated to present the JRAPs and their preliminary results, and the second one to discussion.
M22-M24 (Jun. 2017 Aug. 2017): **Subtask 4.2.4.- Deployment of auxiliary instruments; Other data collection** SE BOB deployments: MASTODON moorings – summer 2017; DRIFTERS - around summer 2017 **Subtask 4.2.5- Data processing. Collection of data, harmonization of outputs**	M22-M24 (Jun. 2017 Aug. 2017): **Subtask 4.2.4. – SE BoB deployments** ACTUAL TIME LINE: UNCHANGED ACHIEVED WORK: - M24, IFREMER, AZTI: In summer 2017 the deployment of MASTODON moorings in the SE Bay of Biscay was completed during the ETOILE campaign (July-August 2017). In addition, during the ETOILE campaign a multidisciplinary experiment was conducted, with CTD, MVP, ADPC, surface drifters, real time monitoring of phytoplankton and plastic sampling in a cross-cutting action with JRAP2 (F. Artigas, CNRS). -M22, AZTI: Maintenance and calibration of Matxitxako and Higer antennas. Other specific achievements: -M22 and 24, AZTI, NIVA: Deployment of passive samplers in a cross-cutting action between JRAP4 and JRAP3. One sampler was deployed at Mendexa in June 2017 and successfully recovered in August 2017. -M23, AZTI, CNR, HZG. The BB-TRANS - Three-dimensional circulation and transport within the south-eastern Bay of Biscay from a multi-platform approximation, proposal for the 2nd call of TNA has been accepted. A glider mission will be perfomed in the SE BoB area in March 2018. **Subtask 4.2.5** ACTUAL TIME LINE: UNCHANGED ACHIEVED WORK:-M22-M24, CNR-ISMAR: analysis of the historical dataset to reconstruct the 3D current field by using HF radar, ADCP, and glider dataset. Geostrophic current component identification and wind correlation. -M24, AZTI, preliminary processing of ETOILE campaign CTD data to obtain hydrography and geostrophic current fields. Analysis of plastic sampling is in progress. -M22-M24, HZG: Assessment of FINO-1 platform data near the offshore windpark Alpha Ventus in the German Bight for retrieval of surface wind and current information

3.4.1.2. Acquired data and archiving made

Acquired data and archiving made, where, how? (Ref to the excel file "data inventory table.xls").

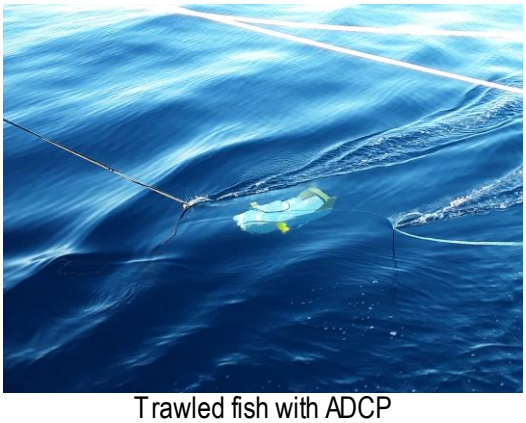
Acquired Data type (parameters)	Archiving place: how to get the data?	Status: raw data, processed, Quality checked, needs to make the data flowing to the standardised channel?
surface currents (from HFR)	CNR Thredds[1] server (open access) (150.45.136.27 :8080/thredds)	Quality checked
Waves (from HFR)	CNR thredds server (open access)	processed
Hydrology (T, S, water column currents) (DASPO cruise)	CNR webgis (open access) (cruise.sp.ismar.cnr.it)	processed
Surface currents (from HFR)	AZTI thredds server (open access and connected to Emodnet) (http://oceandata.azti.es/thredds/catalog/data/RADAR_OO/catalog.html) Also in the new Euskoos portal: http://www.euskoos.eus/datos/datos-en-tiempo-real/higer-rt/	Quality checked
Radial components from three HF radar stations located at the islands of Wangerooge, Sylt and Büsum.	HZG has acquired continuously these measurements available every 20 min and are stored in netcdf format on a 2 km grid along with the derived meridional and zonal current components. The data are available on the COSYNA web server.	Processed

3.4.1.3. Communication materiel

Type (photos, video, articles, conference, other)	Topic (3 lines max)	How to get it? Copyright etc. URL?
Photos and videos	ETOILE campaign in the SE BoB	By email, free (arubio@azti.es)
Photos and videos	Passive sampler deployment in the SE BoB	By email, free (acaballero@azti.es)

[1] THREDDS : Thematic Real-time Environmental Distributed Data Services (https://www.unidata.ucar.edu/software/thredds/current/tds/TDS.html)

Some photos of the Etoile Cruise (Ingrid Puillat, Ifremer)

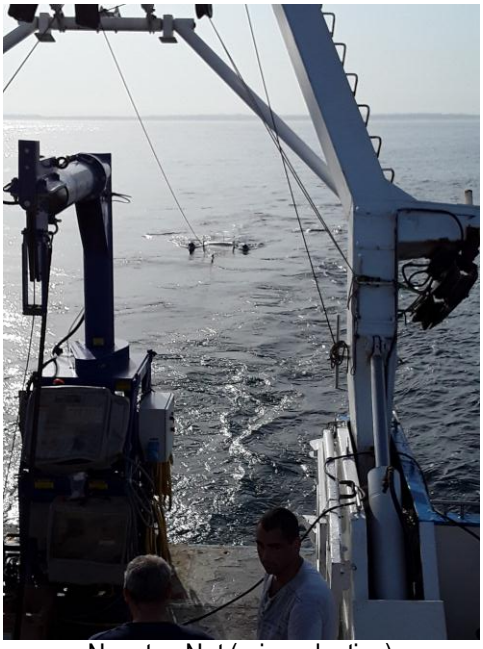


Trawled fish with ADCP

Recovering of a Mastodon-2D

Multivariable Profiler (T ,S)

Pairovet Net (microplastics)



Neuston Net (microplastics)

3.4.2. Next steps (Sept . 2017-Aug. 2018)

when	what
M25-M27: (Sept. 2017- Nov. 2017)	PHASE 4.3 (M24-M36): Joint data analysis over the 3 study areas and transfer to virtual access service (WP6), results synthesis and publication to WP8: Individual platform data analysis. Subtask 4.3.1 Data processing (cont.) Other specific steps: -CNR-ISMAR: Participation to LOGMEC oceanographic cruise (September) by providing HFR surface current maps and analysis of wind patterns VS current patterns. -CNR-ISMAR: Relocation of the Monterosso HFR station within the same area but in a new site with dedicated infrastructures by the end of November). -AZTI, IFREMER: Processing and preliminary analysis of ETOILE campaign data - CNR-ISMAR: Local communication event on HFR systems on Tino Island (September 2017) - CNR-ISMAR: 2 abstracts submitted for the JERICO-NEXT special issue. Submission deadline Jan 2018. - AZTI: 3 abstracts submitted for the JERICO-NEXT special issue. Submission deadline Jan 2018. - AZTI: Participation at the ROW workshop, Luneburg (Germany) in September 2017. -HZG (M25-M36) will analyse the HF radar data in combination with tide gauge measurements to optimise estimates for transports. This will be done using results from task 3.7 where analysis tools are developed to combine different types of observation data and numerical models. Drifter data from a measurement campaign in spring 2015 will be used for further analysis.
M28-M30: (Dec. 2017- Feb. 2018)	PHASE 4.3 (M24-M36): Joint data analysis over the 3 study areas and transfer to virtual access service (WP6), results synthesis and publication to WP8: Individual platform data analysis. Subtask 4.3.2 Data analysis. Other specific steps: - CNR-ISMAR: Validation of HFR surface currents with drifter trajectories deployed during LOGMEC cruise. - CNR-ISMAR: Analysis of the historical dataset combining HF radars and glider. - AZTI, IFREMER: Analysis of ETOILE campaign data. Multidisciplinary analysis of data and combination with HF radar fields.
M31-M33: (Mar. 2018- May. 2018)	PHASE 4.3 (M24-M36): Joint data analysis over the 3 study areas and transfer to virtual access service (WP6), results synthesis and publication to WP8: Individual platform data analysis. Subtask 4.3.2 Data analysis. Other specific steps: - CNR-ISMAR: analysis of the HFR radar field together with hydrographic profiles and drifter trajectories collected during LOGMEC

	cruise. - CNR-ISMAR: Analysis of the historical dataset combining HF radars and glider. - AZTI, CNR, HZG: Processing and analysis of new glider data in the HF radar area.
M34-M36: (Jun. 2018- aug. 2018)	PHASE 4.3 (M24-M36): Joint data analysis over the 3 study areas and transfer to virtual access service (WP6), results synthesis and publication to WP8: Individual platform data analysis. Other specific steps: - CNR-ISMAR: Deployment of a new HFR antenna (25MHz) in Viareggio (LU, Italy) to extend the actual HFR network coverage toward south-east. Subtask 4.3.3. Results synthesis and diffusion Deliverable D4.4 (M36): First results of JRAPS par region (results to WP8, data to WP5), MS45 (WP4 workshop 2)

3.4.3. Updates with regards to the scientific strategy of this JRAP

No changes

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3.4.4. Any comment

None

3.5. JRAP#5: Coastal carbon fluxes and biogeochemical cycling

PI: Lauri Laakso, FMI; Jukka Seppälä, SYKE
Involved institutes: FMI (Finland), SYKE (Finland), NIVA (Norway), SMHI (Sweden), HZG (Germany), HCMR (Greece), CNR (Italy), CNRS (France)

Objective of the JRAP:
JRAP#5 will exemplify how JERICO-NEXT can contribute to address the role and responses of the European Coastal Ocean and Marginal Seas in the global C-cycle, and to provide recommendations for a European integrated C-cycle monitoring. In practice, we observe sea surface water pCO2-concentration and other relevant parameters throughout EU utilizing fixed stations and Voluntary Observing Ships (VOS). The aim in this JRAP is to measure for one full year simultaneously, combine results and along with publishing the results, try to find best practices for observations, and standard operating procedures.

3.5.1. Main achievements and delays

3.5.1.1. Achievements

Initial time line and expected work	Actual time line and achieved work, problems, good surprises and opportunity met
M13-M15 (sept-nov 2016): Within JERICO-NEXT e.g. pCO2 is measured with at least 6 different methods and instruments, the same diversity of instruments applies also to alkalinity and pH measurements. This diversity may lead to observation results which are not comparable between the sites The aim of the task is to organise scientific inter-comparison exercise (note, such exerciser has not been described in the original Description of Actions, but the need for such exercise was raised during later phases of planning JRAP#5	M12-15: *More in details: explain what is done what is delayed and why* Not enough funding was found to organize the intercomparison exercise before the deployment, but hopefully it could be organized after the deployments in late 2018 or early 2019.
M16-M18 (Dec 2016. Feb. 2017): Preparations for intensive observing period 2017/04-2018/04 by the partner	M16-M18: All partners prepared their instruments for the intensive period by e.g. sending the instruments for maintenance & calibrations. JRAP5 PI (FMI) prepared a 5-page plan for the implementation of the JRAP5 intensive period and distributed it to the partner for comments
M19-M21 (Mar. 2017. May. 2017): JERICO-NEXT General Assembly. Start of Intensive period	M19-M21: JERICO-NEXT General Assembly was held in Helsinki 13-15 March 2017. Before the actual

	meeting JRAP5 had an extra kick-off meeting where the partners discussed the detailed measurement plan distributed to the partners in February 2017. Partners started the intensive measurements period in April 2017. Some partners like SYKE had additional measurement campaigns during that period focusing on labor intensive measurements support the JRAP5 aims.
M22-M24 (Jun. 2017 Aug. 2017): Intensive measurement period ongoing.	M19-M21: Intensive period proceeded as planned. All partners report every three months about the status of the measurement and other outcomes in a Google Docs sheet (https://docs.google.com/spreadsheets/d/1y7ZR-tHSOQ-ZCZ3rp79An5E05cNND2LFVrPteRzJhAg/edit#gid=0) The material collected in this sheet is too large to be included in this deliverable, please check directly from the link. There has been some instrument failures, delays in installations and similar challenges, but it was clear such challenges will be encountered. With large number of observing places, this does not significantly influence the scientific outcomes of the JRAP5.

3.5.1.2. Acquired date and archiving made

Acquired Data type (parameters)	Archiving place: how to get the data?	Status: raw data, processed, Quality checked, needs to make the data flowing to the standardised channel?
pCO2 and supporting data like T, S, chlorophyll	During the measurements, each partner stores the data in their own databases. After the intensive period, data will be collectively quality checked and documented, and submitted to databases like SOCAT.	Raw-data at the moment, later on, quality assured data submitted to SOCAT and potentially to EMODNET database

3.5.1.3. Communication materiel

Type (photos, video, articles, conference, other)	Topic (3 lines max)	How to get it? Copyright etc. URL?
Video	Utö station and FMI marine infrastructures	In English: https://www.youtube.com/watch?v=ndG5oszOwtk In Finnish: https://www.youtube.com/watch?v=ndG5oszOwtk
Finnish parliament members visited Utö station 4.-5.9.2017	Discussions on science policy	https://twitter.com/IlmaTiede/status/904967426110103552
www	New (biological) variables added to Utö station www-page	http://swell.fmi.fi/Uto/latest.html

3.5.2. Next steps (Sept. 2016 - Aug. 2018)

when	what
M25-M27: (Sept. 2017- Nov. 2017)	– Intensive observing period continues – Everyone tries to minimize the measurement gaps – Collection of data is reported in a joint google doc every three months (level of detail: OK / Not OK). This doc created by Lauri Laakso before GA – Diaries and documentation is done in coordinated way with minimum requirements prepared by Lauri Laakso before the GA (agreed in GA 2017/03) – Data issues are discussed in a workshop which will be held in Bordeaux 28 - 29 November 2017
M28-M30: : (Dec. 2017- Feb. 2018)	– Intensive observing period continues – Everyone tries to minimize the measurement gaps – Collection of data is reported in a joint google doc every three months (level of detail: OK / Not OK). This doc created by Lauri Laakso before GA – Diaries and documentation is done in coordinated way with minimum requirements prepared by Lauri Laakso before the GA (agreed in GA 2017/03) – Everybody describes the data QAQC before the end of intensive period (DL 2017/12), so that it can be discussed

	and methods & data formats mutually agreed before the actual data-analyses are done.
M31-M33: (Mar. 2018- May. 2018)	– Intensive observing period continues – Everyone tries to minimize the measurement gaps – Collection of data is reported in a joint google doc every three months (level of detail: OK / Not OK). This doc created by Lauri Laakso before GA – Diaries and documentation is done in coordinated way with minimum requirements prepared by Lauri Laakso before the GA (agreed in GA 2017/03) – Cleaning of data according to the standards agreed – Data is submitted to a jointly agreed database and it is available for WP5
M34-M36: (Jun. 2017- Aug. 2018)	– A joint paper on spatial and temporal variation written with high writing pace. This publication is also used to support writing the deliverable. – If possible, a joint few days writing WS held in summer 2018. – If possible, an intercomparison exercise for pCO_2, Alkalinity and PH instruments held around M35 – D4.4

3.5.3. Updates with regards to the scientific strategy of your JRAP

No changes needed for JRAP5 scientific strategy. The current focus is on running the high quality measurements as the intensive period is still ongoing.

3.5.4. Any comment

None

3.6. JRAP#6: Operational oceanography and coastal forecasting

PI: Baptiste Mourre
Involved institutes: SOCIB, AZTI, IH, HCMR, CMCC, CNR, FMI, IMR

Objective of the JRAP:
JRAP#6 aims to 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. These objectives will be achieved through a coordinated evaluation of numerical models in seven European coastal areas affected by different physical processes, complemented by model sensitivity tests and data assimilation experiments including Observing System impact studies (OSEs and OSSEs).

3.6.1. Main achievements and delays

3.6.1.1. Achievements

Initial time line and expected work	Actual time line and achieved work, problems, good surprises and opportunity met
M13-M24 **JRAP6 coordination** – Organization of a JRAP6 meeting at Helsinki General Assembly – Collection and compilation of contributions on subtask 1.1 on model assessment	**M13-M24** **JRAP6 coordination** – M18: Meeting at JERICO-NEXT General Assembly – M18-24: Collecting contributions to JRAP6 subtask 1.1. Delays for some of the partners have not allowed to finalize a common report on M24. This will be done in the period M24-M30. – Presentation of the JRAP6 activities, first results and plans at the GODAE Coastal and Shelf Seas Task Team Meeting in Cape Town (April 2017)
M13-M24 **ALL JRAP6 SUBTASKS:** **Subtask 1.1 - Model assessment using JERICO observations** **Subtask 1.2 - Data-assimilative model assessment and Observing System Experiments (OSEs)** **Subtask 2.1 - Recommendations for modelling strategy improvements** **Subtask 2.2 – Observing System Simulation Experiments**	**M13-M24** **ALL JRAP6 SUBTASKS:** **Subtask 1.1 - Model assessment using JERICO observations** **Subtask 1.2 - Data-assimilative model assessment and Observing System Experiments (OSEs)** **Subtask 2.1 - Recommendations for modelling strategy improvements** **Subtask 2.2 – Observing System Simulation Experiments**

Ibiza Channel – Comparisons between model outputs and HF radar, glider and mooring data in the Ibiza Channel – Report on model assessment results – Develop data assimilation system for the WMOP model	**Ibiza Channel** – Performing WMOP model-data comparisons using HF radar, glider and mooring data in the Ibiza Channel over the period 2013-2017 – Model assessment results have been synthetized in a small report to be incorporated to subtask1.1 report – Data assimilation in WMOP has been developed and tested with different data sources including HF radar data.
Adriatic Sea – Model setup – Development of model skill scores – Preparation of OSEs:period of study, assimilated validation measurements – First steps of development of data assimilation systems – Development of Nature Runs – First steps towards OSSEs	**Adriatic Sea** - CMCC continued to develop the relocatable model in the Western Mediterranean and a first setup has been defined. - CMCC started the evaluation of the relocatable system and prepared some numerical experiments - Definition of metrics to be used for the analysis of OSSEs. - Integration of HF Radar operator into AIFS-DA. - CMCC is continuing collaboration with University of Bologna in the Western Mediterranean for setting up a configuration to be used as nature run - First steps towards OSSEs have been delayed due to the delay of the Nature Run
Atlantic Iberian margin Objectives: - implementation of a limited area model for the Nazare Canyon area based on the HOPS model (HOPS-LAM) and coupled to the NEMO regional model. - skill assessment of regional model and HOPS–LAM model run without assimilation for periods during which extensive measurements were collected by IH - Acquisition of data from MONICAN system Model developments: Step1: Articulation between LAM-HOPS and regional HYCOM, tuning of LAM-HOPS Step2: Evaluation of atmospheric forcing conditions used by models Step 3: Skill Assessment of regional NEMO in the	**Atlantic Iberian margin** Developments: -Step1: strategy for coupling of LAM-HOPS with the regional NEMO model was developed and finished during this period. -Step2: Done thanks to the skill assessment of ECMWF and ALADIN models and Data collected

area of influence of Nazare Canyon. Step 4: Skill Assessment of LAM-HOPS coupled to regional NEMO model, without assimilation. (evaluation of the added value of high resolution model and improved canyon bathymetry by regard to regional model) <u>Cruises preparation & deployments</u> Mission at sea for maintenance of multiparametric buoys MONICAN 1 (M1) and MONICAN2 (M2) <u>Data analysis (parameters, reached steps)</u> Processing and preparation of data sets required for skill assessment of models without assimilation. M17-M20 (Jan 2017. Apr. 2017): Objectives: -Integration of results from skill assessment tools of models without assimilations. -Start of developments regarding simulations and skill assessment of models with assimilation - To continue the collection of data for skill assessment using the MONICAN system	at the M1&M2 buoys during the period October 2015-March2016 -Step3: done : *Data sets used*: CTD and currentmeter measurements collected by IH between 13June and 06 July 2007 SST data available from the Multiscale Ultra-high Resolution (MUR) SST project for the same period -Step 4: Skill Assessment of LAM-HOPS coupled to regional NEMO model, without assimilation, was accomplished during this period *Data sets used:* CTD and currentmeter measurements collected by IH between 13June and 06 July 2007 SST data available from the Multiscale Ultra-high Resolution (MUR) SST project for the same period In addition: Skill Assessment of WaveWatch3 wave model for the regional Portuguese margin was accomplish during this period *Data sets used:* • Wave data collected at M1 & M2 buoys between Oct2015 and Mar2016 <u>Cruises preparation & deployments</u> Mission at sea for maintenance of multiparametric buoys MONICAN 1 (M1) and MONICAN2 (M2) was conducted during Sep2016 <u>Data analysis (parameters, reached steps)</u> Final processing of CTD and currentmeter data collected between 13June and 06 July2007 used in skill assessment of regional NEMO and LAM-HOPS. Processing and preparation of atmospheric and wave data collected by M1 and M2 buoys between October2015 and March2017 and used in the skill assessment of meteorological and wave models. M17-M20 (Jan 2017. Apr. 2017): <u>Developments</u> Step4 from previous period (Models without assimilation) Several developments were conducted in the LAM-HOPS model aiming to improve outputs (e.g daily mean fields). Developments were also

Developments: Models with assimilation -Step 5 – Skill assessment of LAM-HOPS based on hindcast runs for previously collected data sets. Data analysis (parameters, reached steps) Integration of results of skill assessment of models without assimilation. Results publications and communications. Preparation of contribution to JRAP6 subtask1.1 with results of skill assessment of models without assimilation.	conducted to allow better visualization of model outputs. *Models with assimilation* Step 5 – The preparative work for the conduction of skill assessment of LAM-HOPS was started during this period with the introduction of several developments in the model to allow for assimilation runs with the model coupled to the regional NEMO model. Test runs were developed during this period. *Data sets used:* • CTD/Currentmeter Moorings for period 13 June - 06 July 2007 • MUR SST data for periods June-July2007 Data analysis (parameters, reached steps) The results of skill assessment of models without assimilation were integrated in order to be included in JERICO-NEXT reports and deliverables and to be presented in the General Assembly (March 2017). Results publications and communications. Report with the work developed on the skill assessment of models without assimilation was prepared and sent to JRAP6 coordinator. This report contributes to JRAP6 subtask1.1 Participation in JERICO-NEXT General Assembly (March2017) Participation in the Ocean Business 2017 (April2017) with a poster (MONICAN: Eyes on Europe's big canyon) which synthetises the work that is being developed under IN contribution to JERICO-NEXT. Start preparation of a scientific paper about Nazare Canyon subinertial processes to be submitted to special volume of Progress in Oceanography.
M21-M24 (May. 2017. Aug. 2017): Objectives: To continue the conduction of runs with assimilation using previously collected data and skill assessment of LAM-HOPS. Developments: *Models with assimilation (to develop until Jan2018)* Step 5 – Skill assessment of LAM-HOPS based on hindcast runs for previously collected data sets. Step 6 – Skill assessment of LAM-HOPS run in articulation with regional NEMO and with assimilation of available data for the area. Step 7 – Implementation of assimilation of HF radar surface currents in LAM-HOPS. Step 8 – OSEs:	M21-M24 Developments: *Models with assimilation* Step 5 – LAM-HOPS runs with data assimilation were continued during this period. *Data sets used:* • CTD/Currentmeter Moorings for period 13 June – 06 July 2007 • MUR SST data for periods June-July2007 Runs with assimilation of data collected in 2011 not yet started Step 6: Skill assessment of LAM-HOPS with data collected by MONICAN system during the

a) Evaluation of the add-value of assimilating temperature and/or current profiles collected by multiparametric platforms M1 & M2 b) Evaluation of the added-value of assimilating HF radar data	JERICO-NEXT period not yet started Step 7 – Implementation of assimilation of HF radar in LAM-HOPS not yet started Step 8 – proposed OSEs work not yet startet - Cruises and deployments Conduction of mission at sea for maintenance of real-time platforms installed in Nazare Canyon and contributing to JERICO-NEXT - Results, publications and communications • Continuation of the preparation of scientific paper about the Nazare Canyon to be submitted to special volume of Progress in Oceanography. Preparation of an oral communication to be presented in the conference "Journée du Gouf 2017" à Capbreton (France), 11 Sep 2017
Aegean Sea Objectives: contribute to model assessments without and with data assimilation (subtasks 1.1 and 1.2) and sensitivity tests for modelling improvements (subtask 2.1)	**Aegean Sea** Work performed for Subtasks 1.1 and 2.1 has been reported in "JRAP6-R2 Model assessment using JERICO observations (March 2017)". In detail: • Aegean Sea model sensitivity with respect to the Dardanelles Straits boundary condition • Aegean Sea model sensitivity with respect to the wind waves dissipated energy • Aegean Sea model sensitivity with respect to the atmospheric forcing Subtask 1.2: HCMR glider units suffered from serious mechanical malfunctions and have been sent back to the manufacturer for inspection. The installation of the FerryBox system in a new ship has been delayed and the instrument will be available at the end of September. Therefore, the work for Subtask 1.2 is in delay due to lack of relevant observations within the Aegean Sea.
South Bay of Biscay M13-16: Model development: couple the Regional Ocean Modeling System (ROMS) with the outputs of the Nucleus for European Modelling (NEMO) and the Weather Research	**South Bay of Biscay** M13-16: Using Matlab, we prepared the coupling between ROMS and the outputs from NEMO and WRF. The study area covers the Basque Country area with a resolution of 670 m

and Forecasting model (WRF) in the Basque Country area. These outputs are used for the boundary conditions and atmospheric forcing of ROMS. Inclusion of the mean river discharges from the Nervión, Oria, Bidasoa and Adour Rivers. M17-24: Improve the model system with hourly and 3D data from NEMO, provided by Puertosdel Estado via ftp.	(43.2o N – 48o N, 6o W – 0.9o W) and 32 sigma levels in depth. Hourly WRF outputs (atmospheric forcing) and daily NEMO outputs were used for ROMS. The NEMO data used in ROMS for the boundary conditions consisted of daily outputs for temperature, salinity and velocities (3D), and sea level height (2D). The eight main harmonic components of the tide were included from the OSU TOPEX/Poseidon Global Inverse Solution (TPXO). During these months, we incorporated in ROMS the mean freshwater discharges from the Nervión, Oria, Bidasoa, and Adour Rivers. With the above data, we obtained 96-h forecasts. After several tests with ROMS, we detected that the model broke down. This was probably due to the use of the tides from the TPXO7.0 model. The data of this model provides higher tidal currents than the older version, named TPXO6.0. Therefore, we substituted the tidal data from the previous model TPXO6.0. M17-24: We were working in a new Matlab code to use hourly and 3D data from NEMO. These new data changed the previous operational system developed for the Basque Country coast, because they incorporate hourly tidal currents. This means that it is not necessary to insert tidal currents via TPXO6.0 and the boundary conditions include 3D information from NEMO.
Norwegian Sea Objective: Improve the quality of the simulation system Norkyst800 and its nested higher resolved numerical systems. In the Norwegian application high priority was given on the simulation of the spreading of Salmon lice in the near environment of aquaculture sites that is supposed to severely impact the natural stocks of wild Salmnoids. - Obtain observations for quality control model system - Improve model system	**Norwegian Sea** Norkyst 800model is implemented but no data assimilation planned in that area. Monthly research vessel surveys to the Pilot site Hardangerfjord 2016: 26.09.-28.09 / 12.10-16.10. / 31.10-02.11 05.12.-07.12. 2017: 11.01.-13.01 / 20.02.-22.02./ 14.03-17.03 /01.05.-11.05/26.06.-30.06 / 19.08-21.08. - All period Hurtigruten Ferrybox observations on the route Bergen Kirkenes - The increased Aquaculture activities impacts the wild fish stocks on mainly two specific areas: - Those farms that are located in areas where naturally caught wild fish attracted to the plants to eat on the nutrients provided to

	the farm fishes. This can affect the quality of wild fish, and it has also been claimed that fish farms can scare away spicy cod and herring, as well as affect behavior and walking patterns to saithe. - On the other hand impacts the wild fishes through the increase of salmon lice abundance which impacts the health of the fishes and forms a threat for the wild resources. During the reporting period a so called traffic light system, was improved with the help of the JERICO-NEXT support. The observations obtained during the reporting period are used for validation of the model system to assess the performance and validity of the traffic light system .A Risk report Norwegian fish farming 2017detailing the overarching potential impact was presented in May 2017. This report is published in Norwegian only and a publication of the numerical model system part in view of the JERICO Next part is in progress.
Baltic Sea - The focus is on influence of waves on sea surface mixing and the impact of turbulence on algae blooms. - Intensive observing period for JRAP5 started, when it is finished (2018/03), the results will be used as inputs in the wave simulation part of JRAP6	**Baltic Sea** Data collection as part of JRAP5 on-going as planned

3.6.1.2. Acquired date and archiving made

Acquired data and archiving made, where, how?

Acquired Data type (parameters)	Archiving place: how to get the data?	Status: raw data, processed, Quality checked, needs to make the data flowing to the standardised channel?
T,S (glider Ibiza Channel) UV (HF radar Ibiza Channel) T, S, UV (mooring Ibiza Channel)	SOCIB SOCIB SOCIB	Processed L0 L1 L2 Processed L0 L1 Processed L0 L1
T, S data	Ferrybox established on Hurtigruten Ferry traveling the	processed

	course Bergen-Kirkenes and back	
T, S, current data	Fromresearchvessselsurveys and moorings in selected fjord systems. Hardangerfjordisselected as priority fjord	Processed
T, S, current and biota data	Coast monitoring survey	Under processing
Wave parameters on MONICAN 1 and MONICAN 2 buoys	IH (MONICAN web page or IH data access system)	Qualitychecked,
Atmospheric parameters on MONICAN 1 and MONICAN 2 buoys	IH (MONICAN web page or IH data access system)	Qualitychecked,
Surface Temperature on MONICAN 1 and MONICAN 2 buoys	IH (MONICAN web page or IH data access system)	Qualitychecked,
Temperature at selected depths on MONICAN 1 buoy	IH (MONICAN web page or IH data access system)	Qualitychecked,
ADCP data on MONICAN1 and MONICAN2 buoys	IH (MONICAN web page or IH data access system)	Raw data/Processed

3.6.1.3. Communication materiel

Type (photos, video, articles, conference, other)***	Topic (3 lines max)	How to get it? Copyright etc. URL?
Poster to Ocean Bussiness2017	Synthesis of MONICAN system capacities for Nazare Canyon area and work being developed under JERICO-NEXT	Poster sent by email to WP4, WP6 & JRPA6 coordinators. Also available by demand to IH
Poster to GODAE Ocean View Coastal and Shelf Seas Task Team Meeting 2017 (Cape Town)	Presentation of JRAP6 activities, first results and plans	Poster available through GODAE COSS-TT meeting website

3.6.2. Nextsteps (Sept . 2017-Aug. 2018)

when	what
M25-M36	**Ibiza Channel:** - Assessment of model results obtained after assimilation of HF radar data in the Ibiza Channel - Preparation of a nature run applying perturbations of initial and boundary conditions on the simulation - Generation of virtual HF radar observations on the western side of the

	Channel - Study impact of the assimilation of these observations on the model **Adriatic Sea:** - Preparation of nature runs and their verification, calibration of error statistics for OSSEs by comparing OSSE and OSE results in the Ligurian Sea. **South Bay of Biscay:** – Carry out run tests with the new pre-operational system developed using hourly and 3D data from NEMO. – Improve the system including more real river discharges (quasi-real data or model data) from the Nervión, Oria, Bidasoa and Adour. Compare NEMO and ROMS outputs. – Transform the pre-operational system into operational. – Prepare the system for comparisons HF radar data and ROMS outputs every day. – Include the outputs from ROMS on the website EUSKOOS. Exchange and dissemination of research results. **Norwegian Sea** Objectives: Obtain observations for validating and improving the Norwegian coastal model system Preparing publication for summing up the JERICO-NEXT JRAP efforts – Monthly cruises as conducted in the previous period (whole periode) – Continued Ferrybox observations on Hurtigruten line (whole periode) – Extended Coastal Monitoring cruise covering most of the Coast of Norway (September/October 2017) and similar in 2018 – sending of the manuscript describing the numerical model results, the comparison with the observations as well as advice on how to further improve the modelling system is planned for the spring/summer 2018. **Iberian Atlantic margin** – <u>developments</u> To finish LAM-HOPS simulations with assimilation for June-July 2007 period. To develop skill assessment of model results for that period. To conduct LAM-HOPS simulations for April-May2011 period with assimilation of CTD and M1&M2 buoys data. To develop skill assessment of model results for that period. – <u>cruises preparation & deployments</u> To complete maintenance of M1&M2 buoys in September2017**.** – <u>data analysis</u> Preparation of data sets for assimilations runs and skill assessment for period pril/May 2011. – <u>results publications and communications.</u> Complete contribution to JRAP6-taks1.1 Submission of scientific paper to special volume of Progress in Oceanography with study of Nazare Canyon subinertial processes using the modelling

	developments and results obtained during JRAP6 work Participation in the Journée du Gouf 2017 in Capbreton (11 Sep2017) with an oral presentation about the Nazare Canyon processes and presently installed capacities for the monitoring and forecasting capacities including the JERICO-NEXT developments. Participation on the Marine Technical Conference and on the fifth session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM-5). Step 5 – Skill assessment of LAM-HOPS based on hindcast runs for previously collected data sets. *Data sets to be used:* • CTD/VMADCP/Currentmeter Moorings (June-July2007) • T/Current profiles from multiparametric platforms M1 and M2 + CTD/LADCP/VMADCP/Currentmeter Moorings/Water samples (March-April 2011) • Available SST (/SSH) data for periods June-July2007 and March-April2011 Step 6 – Skill assessment of LAM-HOPS run in articulation with regional NEMO and with assimilation of available data for the area. *Data sets to be used:* • Data collected at M1 & M2 buoys (Temp, Current profile) between Set2015 and Jan2018. • Opportunity CTD/LADCP/VMADCP data eventually collected during periods of maintenance of M1&M2 buoys (April 2016, Oct2016, April2017, Oct2017). • Available SST (/SSH) data for period Set2015 and Jan2018. Step 7 – Implementation of assimilation of HF radar surface currents in LAM-HOPS. Step 8 – OSEs: a) Evaluation of the add-value of assimilating temperature and/or current profiles collected by multiparametric platforms M1 & M2 b) Evaluation of the add-value of assimilating HF radar data **Aegean Sea:** - M25-27: testing and initial operation of gliders within the Cretan Sea - M28-34: gliders module in operational mode for at least a six month period. Transects to be performed within the Cretan Sea. Gliders observations quality control. - M35-36: OSE experiments with the Aegean Sea model assimilating GLIDERS observations **Baltic Sea** - Based on data collected in the framework of JRAP5, wave mixing simulations will be carried out using operational WAM wave model, with improved mixing parameterization.

3.6.3. Updates with regards to the scientific strategy of this JRAP

Local deployments and technical developments concerning models and data assimilation systems create delays in the delivery of results by the partners. Subtasks synthesis that were internally planned have been delayed accordingly to adapt to the partners´ needs.

3.6.4. Any comment

None

4. Conclusions

4.1. Conclusion per JRAP

- In JRAP#1 on the Biodiversity of Phytoplankton, harmful algal blooms and eutrophication, JERICO-NEXT partners have successfully carried out a large number of activities including a phytoplankton workshop arranged in Gothenburg, Sweden where state of the art instrumentation for observing phytoplankton and their activities were used in the field as well as on cultures. Field work has been carried out since 2016 in the Baltic Sea, the Kattegat-Skagerrak, the English Channel-North Sea area and in the Western Mediterranean. By using a combination of automated and manual methods JRAP#1 aims are being achieved and, moreover, a first attempt to combine both JRAP#4 and JRAP#1 approaches was effective in the southern Bay of Biscay. Ferries, research vessels, oceanographic buoys are being used as instrument platforms to allow frequent algal bloom observations in situ. A large number of scientific cruises have been made. The automated image and single-cell optical plankton analysers give information about species composition, cell abundance and plankton community structure. Bio-optical instruments are used to give additional information about community structure and phytoplankton biomass based on the content of photosynthetic pigments. The work in JRAP#1 will now focus on working up the data and to prepare for the third JERICO-NEXT plankton workshop to be arranged in Marseille, France, in spring 2018 where results will be presented and discussed.

- In JRAP2, the monitoring of the benthic biodiversity under different sources of disturbances started with the deployment of 5 sampling cruises: in the Gironde Mud patch (2 cruises), the Bay of Brest and the Creatan Sea (2 cruises) and the processing of the acquired data. A second cruise in the Bay of Brest is postponed to May 2018 due to bad weather conditions in the 2017 timing. In addition another cruise is scheduled in the Gironde Mud Patch. Analyses of the acquired samples are still in progress.

- JRAP3 is dedicated to study the occurrence of chemical contaminants in European coastal waters thanks to measurements acquired on fixed and mobile platforms of the JERICO-RI as well as the associated biological response. All field deployments are done on Ferryboxes, fixed platform and high resolution campaigns thanks to high volume flowthrough filtration and extraction and 14 passive samplers newly developed and distributed to 6 partners of the consortium. Thanks to these efforts, artificial Sweetener Sucralose has been discovered as an ubiquitous contaminant (See website XXX). Next steps will consist in completing the chemical analysis as well as the biomarker one. Data analysis will be operated jointly with statistical modelling.

- In JRAP4; the preliminary work dedicated to assess and progress on analysis methodologies, including HF radar data and field ones was carried out in due time and new developments were tested, in collaboration with WP3. More recently several field deployments and on site implementations were led as expected in the SE Bay of Biscay, in Adriatic Sea, German Bight. Nevertheless, on site installation of the HF radar in the South East Bay of Biscay is delayed due to delays in the official permission. Collaborations with JRAP3 were effective thanks to the installation of passive samplers and with JRAP1 thanks to a joint participation to the JRAP4 cruise ETOILE in the Bay of Biscay (study of mesoscale currents and of phytoplankton and microplastic distributions in near real time). In the next steps one cruise is expected and joint analysis will be led over the 3 areas of study for a transfer to Services Access led in WP6. Five articles are already in preparation and will be submitted.

- In JRAP5, the preliminary technical work has been readjusted: partners prepared their instruments for the intensive measurement period; but the intercomparison experiment is postponed to

better organise its funding and to take benefit of a possible TNA exercise if a joint proposal could be selected. Intense observation is still on the way and analysis will follow.

- In JRAP6 some models have been assessed, others are still being assessed, sensitivity experiments have been performed and DA methods have been implemented. The level of achievement actually depends of the modelled region. Indeed, models are as numerous as the investigated regions: the Ibiza channel, Adriatic Sea, Atlantic Iberian Margin, Aegean Sea, SE Bay of Biscay, South Bay of Biscay, Norwegian Sea, Baltic Sea and their development are progressing independently. Next steps will concern the synthesis of model assessments and the application of data assimilation to analyze the impact of observations.

4.2. General conclusion

The reported actions show JRAPs are well progressing with respect to their initial plans even if they are not developing along the same time line. All JRAPs are acquiring data, thanks to field deployments. For most of them a part of the acquired data is being analysed. Activities crossed with other WPs are real: with WP1 for the science strategy (D1.2), deployment of technologies led in WP3 (as for instance the phytoplankton workshop in JRAP1, the PAGURE-2 system deployment in JRAP2), the work in progress for the data flow harmonisation with W5. In addition, communication material for WP8 is made available supporting thus the promotion of the project.

The upcoming important action in 2018 is to progress again on the JRAPs data harmonisation with the WP5, and to work on the products delivered by JRAPs as JERICO-RI product prototypes. As some promising results were presented during the 1st general assembly, the consortium agreed to edit a JERICO-NEXT special issue of a peer reviewed journal. This is in process with the open access Journal Ocean Science (EGU) and 15 abstracts were gathered. In addition during the WP4 workshop held in Helsinki as a side meeting of the General assembly #1, in March 2017, a Working Group "Integrated monitoring analysis" was set up across the 6 JRAPs to work on:

a) methods dedicated to JOINT data analysis of i) biodiversity with ecosystem function data sets, ii) environment with biodiversity data sets, iii) comparison of the two kinds of methods.

b) establishment of INTEGRATED sampling methods/strategies: need to understand missing environmental information and data seen from the biology, biochemistry and carbon communities: JRAP1 2 3 and 5 will be asked to express their needs of physical information and data to JRAP4&6 community

The first meeting of this WG will be in Bordeaux end of November 2017.