Joint European Research Infrastructure network for Coastal Observatory – Novel European eXpertise for coastal observaTories - JERICO-NEXT	
Deliverable title	Summer school 2
Work Package Title	WP 8: Outreach, communication and engagement
Deliverable number	Task 8.5 Deliverable 8.6
Description	Operational Oceanography for Blue Growth
Lead beneficiary	University of Malta (UM)
Lead Authors	Aldo Drago (University of Malta)
Contributors	Adam Gauci (University of Malta)
Submitted by	Aldo Drago (University of Malta)
Revision number	V1.2
Revision Date	19/08/2018
Security	Public

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

History			
Revision	Date	Modification	Author
1.0	13 August 2018		A. Gauci
1.1	16 August 2018	Revision following comments by A. Drago	A. Gauci
1.2	19 August 2018	Final revisions by A Drago	A. Drago

Approvals				
	Name	Organisation	Date	Visa
Coordinator	Patrick Farcy	Ifremer		PF
WP Leaders	S. Keeble	Blue Lobster	28/08/2018	SK

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1. Executive Summary

‘Operational Oceanography for Blue Growth’ was a week long summer school organised by the JERICO-NEXT project, hosted by the University of Malta (Physical Oceanography Research Group, Department of Geosciences). It was held between the 9th and 14th of July 2018 and delivered by an international range of renowned experts. This activity formed part of the JERICO-NEXT WP8 capacity building activities and was supported by the Copernicus Marine Environment Monitoring Service (CMEMS), the European Marine Data and Observation Network (EMODnet) and Bangor University.
The course hosted a total of 36 participants from 25 countries covering Europe, Mediterranean Sea and Black Sea neighbouring countries, and 9 further African countries.

2. Introduction

The course focused on oceanographic data exploration, elaboration, and product creation for Blue Growth. The aim was to empower participants to source, interpret and merge available data, and to acquire the key skills to transform data into knowledge and added value products. More specifically, the course intended to give a broader perspective of the impact of technological development on the marine and maritime sector, on how the Internet of Things (IoT), Big Data, cloud computing, and data analytics, can provide new approaches to data management and knowledge creation in a smart technology-enabled future. The course also covered current and future methods for data and information exchange, how and where value is created in and between organisations, and the new paradigms for performance and efficiency set by human machine interfaces. In particular, the summer school considered how all these factors can increase Blue Growth and excellence in the marine and maritime economic sectors (such as oil and gas, renewables, living resources, policy, and tourism) and related services.

The summer school included aspects on the future ocean economy, with a full day dedicated to the topic of marine and maritime economic trends in Europe, focusing on the regional seas, in particular the Mediterranean Sea and the Black Sea. This topic also tackled how technological development, including numerical modelling of coastal domains, new sensors and data acquisition platforms, ICT and other emerging disruptive technologies, will impact ocean-based industries in the coming years. The European Union vision for the future of the oceans provided the course setting for future aspirations and needs. The European Commission has been setting the pace through its Integrated Maritime Policy and more specifically by the Blue Growth initiative. This initiative identifies the potential for exploitation of technological developments to create smart and innovative applications, and for adding value to products and services provision that brings into action cutting edge levels of achievement and leads to economic benefits and competitiveness. The governance and venture structures needed to bring research and industry together were described and were regarded as key enabling factors. Another important dimension concerned

the revolution in social media; Blue Growth is ultimately about delivering a societal impact and social media impacts were considered in the context of engagement and impact.

3. Main report

The course adopted a practical and hands-on approach. It was delivered in a state-of-the-art computer lab environment offering the participants an individualised learning experience through practice. Dedicated sessions in the programme linked to the COPERNICUS Marine Environment Monitoring Service (CMEMS) and EMODnet, and together with the JERICO-NEXT Virtual Access portals were used to showcase the relevance of their data streams through dedicated hands-on practical sessions. The summer school built on the outreach activities of CMEMS, as well as those of EMODnet, and provided a great opportunity to showcase the complementarity between the two. The course further served as a platform to reach non-EU countries (especially from neighbouring countries in the Mediterranean Sea and Black Sea). The CMEMS and EMODnet sessions tackled pre-prepared tasks to provide the participants with an on-the-job experience to tackle problem-solving situations and provided background knowledge required for the mini-hackathon in the last day of the course.

The sessions of the JERICO-NEXT Summer School were recorded by 'Lecture Capture' technology. This allowed the recording of all classroom-based activities which will subsequently be made available for viewing. Although such a resource is not a substitute and will not replace face-to-face teaching, it provides the participants an aid for revision. This will also allow the content delivered during the Malta Summer School to reach a wider audience.

A number of hands-on sessions were also delivered in a computer lab equipped with audio-visual facilities. Each participant was provided with a workstation on which all software required was installed. A University of Malta computer account was also provided for Wi-Fi connectivity throughout the campus.

The first day targeted ocean economic trends in Europe with focus on the regional seas, the impact of technological development on Blue Growth, the perspective from the European Commission on the future of the oceans through its Integrated Maritime Policy and the Blue Growth initiative as well as focused on the BlueMed Initiative and the Western Mediterranean Initiative There was also an introduction to the mini-hackathon.

During the second day, the participants were introduced to coastal ocean observatories. The JERICO-NEXT programme was also showcased. The main topics discussed included the JERICO initiative, existing marine observation technologies (platforms, systems, sensors, sharing, harmonisation and future developments), JERICO-NEXT data flow and services, and introduction to the Virtual Access system, the evolution of JERICO-NEXT towards a sustainable marine RI and the Ocean

Protocol (Data, AI, and Tokens). There was also the JERICO-NEXT VA practical session.

The third day started with a briefing on the COPERNICUS Marine Environment Monitoring Service (CMEMS). There was an introduction to the CMEMS portal. This was then followed by practical hands-on session on CMEMS.

On the fourth day, the participants were introduced to EMODnet. Following an introduction to the EMODnet portals, there were practical hands-on session on EMODnet bathymetry, EMODnet Maritime Spatial Planning, EMODnet Sea Temperature Trends, EMODnet General and EMODnet HF Radar.

The fifth day was dedicated to the mini-hackathon. Following an introduction, an overview of the potential 'Blue Growth' challenges as well as the expected outcomes were presented.

On the sixth day, the students were taken to the Barkat HF Radar site.

A detailed programme can be found in Annex A.

Course Promotion

The course was promoted through different media and portals. This is evident from the number of applicantions that were submitted. The course announcement was published on the official JERICO-NEXT website (http://www.jerico-ri.eu/events/operational-oceanography-for-blue-growth/) on 5th March 2018. A link was also prominently placed on the home page. A copy of this can be found in Annex B.

The course announcement was also circulated via email to a number of dedicated groups. People with a managerial role were contacted to make them aware of this initiative and to ask them to further promote the course with other people and students within their organisation and beyond.

A dedicated Facebook advert was also created and managed by the Physical Oceanography Research Group of the University of Malta. This is shown in Figure 1. In particular, a total of €1000 was dedicated for this promotion. This campaign was scheduled between 17th May 2018 and 6th June 2018 for a total of 21 days and was displayed for a total of 2,936,536 times. 1,188,381 were unique views and the link was clicked 61,407 times.

Figure 1: JERICO NEXT – Malta Summer School Facebook Advert

The number of clicks on a daily basis can be seen in Figure 2. Figure 3 provides a chart with the gender and age distribution of Facebook users that clicked on the JERICO-NEXT Malta Summer School advert. Clearly, people between 25 to 34 years of age were the most interested in the course. Since we were interested in young researchers and people at an early stage in their career, this result indicates that the correct audience was reached.

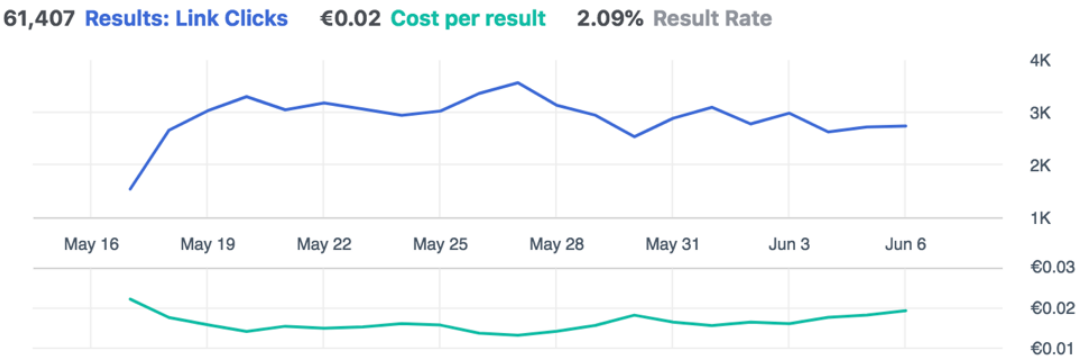


Figure 2: Amount and cost of link clicks per day

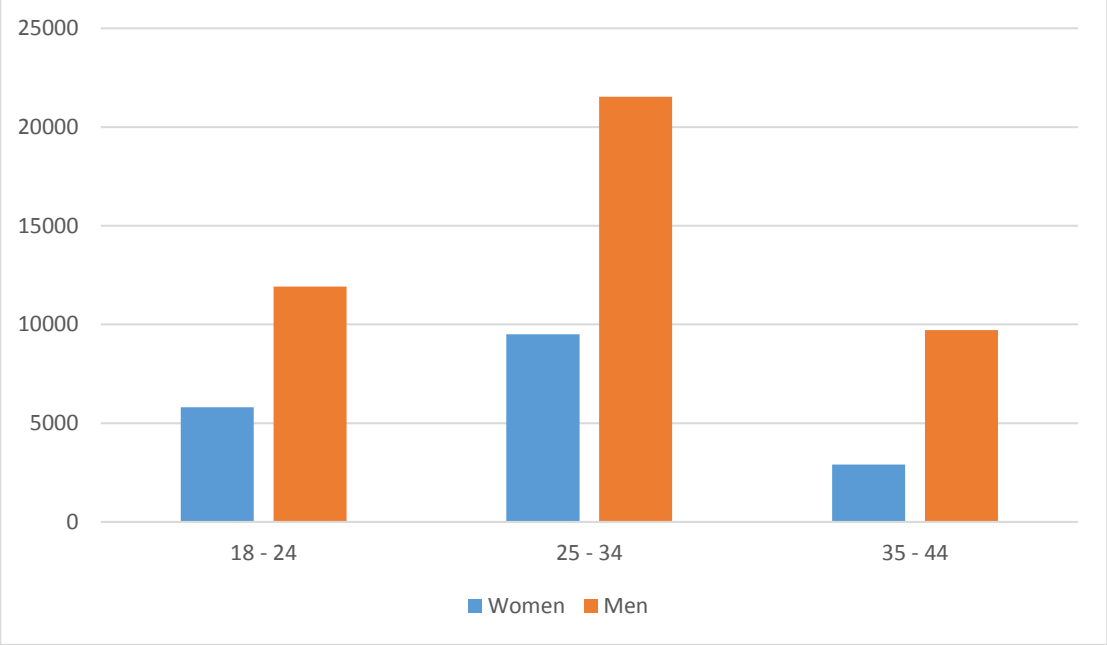


Figure 3: Clicks on JERICO NEXT Malta Summer School Advert

Application Form

Interested applicants had to fill in an online Application Form and upload the supporting documents by 7th June 2018. Each application was supported by a letter of recommendation signed by a senior official of the nominating entity, a curriculum vitae and a covering letter describing the applicant's motivation for applying and stating their ability to disseminate the knowledge and experience gained at the summer school to colleagues.

Applicants that required help with costs also had to give reasons to justify this.

The online application form had the following fields:

- Email address *
- Name of applicant *
- Phone number *
- Nationality *
- Contact address *
- Current institution address *
- Position *

- Gender *
  - Female
  - Male
  - Prefer not to say
- Age group *
  - 20 to 29
  - 30 to 39
  - 40 to 59
- Support needed (please mark accordingly)
  - Travel
  - Accommodation
  - Subsistence
  - None
- Background knowledge (tick all that apply)
  - Operational oceanography
  - Ocean modelling
  - Computer science
  - Data management
  - Graphics and data visualisation
  - Environmental management
  - Software development
  - Web services
- Software and computing skills (list software and technologies you are familiar with)
- How familiar are you with the following platforms?
  - COPERNICUS Marine Environment Monitoring Service (CMEMS)
  - European Marine Observation and Data Network (EMODnet)
  - JERICO-NEXT Virtual Access portals
- Do you feel competent to lead a mini-hackathon group? (If yes, please specify why you should be selected.)
- Does your position allow you to disseminate the experiences to be gained in the summer school?
- What is your rate of involvement in public and/or private research endeavours?
- English language self-assessment

- Have you written or contributed to relevant publications?

Selected Applicants

The selection was based on the submitted CV, the motivation for application, and its relevance to the JERICO-NEXT course objectives. The selection was done by a panel composed of partners from WP8, and subsequently approved by members of the project Steering Committee. The candidates were notified about the final results by e-mail. The adopted marking scheme is shown in Table 1~~Table 1~~.

Table 1: Marking scheme

Qualifications	20	If PhD, Masters or first degree; relevance of qualifications to subject of course.
Work experience in operational oceanography	10	Referring to jobs in which applicant is/was involved and relation to subject of course.
Technical Expertise	10	Ability to program and software development.
Increasing JERICO impact	20	Multiplier impact that course will have on other individuals that applicant can influence through his/her training.
Support of course to applicant's career	20	Impact that applicant envisages to achieve from the course and relevance to his/her career.
Recommendation	10	Level of person recommending the applicant: high = if env mgt authority or director of institute; medium = institute; low = purely academic.
Geographical representation	10	High if from SE Med or Black Sea country; medium if from Europe; low if outside Europe.

The list of all applicants together with the score given can be found in Annex C. The marks were allocated and agreed by Aldo Drago and Adam Gauci from the University of Malta, Simon Keeble from Blue Lobster, and Veronique Creach from CEFAS. These were subsequently approved by the Steering Committee.

The organising committee went through the process of making a preliminary selection and chose nine non-EU applicants to be supported from the project. These were informed before the other participants in order to have sufficient time to apply and obtain their VISA in order to be able to travel and allowed entry into Malta. Such

participants were from Morocco, Tunisia, Ukraine, Algeria, and Russia. The addition of these students allowed for a good geographical coverage and gender balance.

Besides the focus on Mediterranean and Black Sea countries, the course also considered applicants outside these two regions. The Malta Ministry of Foreign Affairs and Trade Promotion, through its Commonwealth Small States Centre of Excellence, further supported the travel and accommodation of nine candidates from Commonwealth states. This further broadened the scope of the course and the visibility of the JERICO-NEXT project.

Mini-Hackathon

Hackathons fall broadly into two types: an 'open' hackathon designed to facilitate the creation of innovative solutions to specific problem and a training event where the emphasis is on the learning experience rather that the final product. Bearing in mind that an open event requires a larger amount of time to complete, the mini-hackathon organised on the last day of the JERICO-NEXT Malta Summer School was limited to fall primarily into the training category.

It was encouraged to regard the mini-hackathon as a place to put into practice some of the knowledge and know-how that was gained during the preceding part of the summer school alongside the existing capability.

The objectives of the mini-hackathon were:

- To provide experience of multi-disciplinary team work
- To enable students to understand how to find, extract and re-use data from existing data sources using appropriate tools
- To enable students to engineer solutions to a specific pre-defined problem that requires data to be transformed into useable information
- To enable students to translate end-user requirements into a process resulting in a useable product or service
- To enable more advanced teams to identify a different end-user requirement and design a solution

Seven challenges were prepared. These were presented on Monday afternoon. Each of the mini-hackathon challenges was proposed by summer school mentors who were present and able to provide support. Details of these challenges can be found in Annex D.

Each participant was allocated to a team of typically 4-5 participants. Each group was set such as to have a range of complementary skills and have the capability to tackle any of the challenges. Toward the end of the mini-hackathon there was an assessment of the degree of success in tackling the challenges for each team.

Each team made a presentation of ten minutes describing how they approached the challenge (e.g. data sources, types, analysis and technologies used) and on how they would further develop the product or service with more time available. There were also few minutes for questions from the expert panel.

The teams were assessed on the basis of:

- Overall effectiveness of the solution (what is the readiness level of the solution, how much extra work to complete, look and feel of solution)
- Use of appropriate data
- Understanding of the data limitations (what is missing e.g. Quality Assurance level, timeliness, spatial and temporal coverage)
- Use of the appropriate technology to engineer the solution
- Team work (were all the team members engaged with tackling the challenge)
- Quality of the presentation (how good is the 'pitch' i.e. selling of the concept)

The final outcome was a combined assessment by the panel and from the peer review process. The team members and the marks given can be found in Annex E. The result was announced at a prize giving ceremony during the social dinner on Friday. The winners were given a trophy to commemorate their success.

Rather than the final 'product', the emphasis of the mini-hackathon was on the process that each team and its members went through to address the challenges. From the words of the participants themselves the mini-hackathon was a fun and enjoyable experience.

Course Faculty

Table 2: Lecturers that contributed to the Malta Course

Lecturer	Affiliation
Aldo Drago	University of Malta
Adam Gauci	University of Malta
Alex Borg	MITA
Anthony Galea	University of Malta
Antoine Gremare	Université de Bordeaux
David Mills	Bangor University
Graham Worley	Bangor University
Ingrid Puillat	IFREMER
Joel Azzopardi	University of Malta
John Enevoldsen	BigchainDB, Ocean Protocol
Kate Collingridge	CEFAS
Laurent Delauney	IFREMER
Mario Sprovieri	IAMC CNR
Pascal Derycke	EMODnet Physics
Patrick Gorringe	EMODnet Physics
Paz Rotlan	SOCIB
Rita Lecci	CNR
Vinca Rosmorduc	CLS

Course Participants

Table 3: Participant in the Malta Course

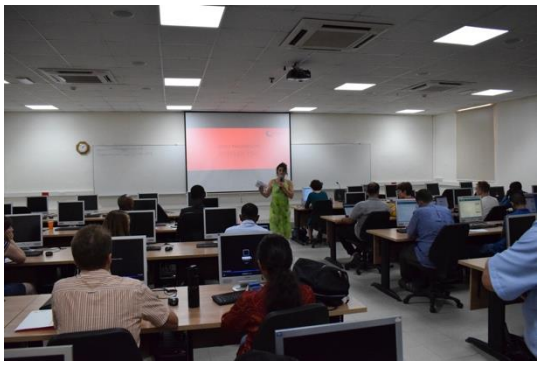
Participant	Affiliation
Ahmed Eladawy	Mansoura University, Egypt
Antonio Giacoletti	Universita' degli Studi di Palermo, Italy
Cem Serimozu	Middle Eastern Technical University, TRNC, Turkey
Cyrine Chouba	Faculté des Sciences de Tunis, Tunisia
Darshika Manral	University of the Basque Country, Spain
Ekaterina Kochetkova	Russian State Hydrometeorological University (RHSU), Russia
Elena Zhuk	Marine Hydrophysical Institute of the Russian Academy of Science, Russia
Evgeny Ivanov	University of Liège, Belgium
Federica Strati	University of Malta, Malta
Ghada Neji	Tunisia
Giulia di Franco	Universita' degli Studi di Palermo, Italy
Katherine Higgie	UK Hydrographic Office, UK
Kyra Hoevenaars	Aquabiotech, Malta
Maria del Mar Chaves Montero	Istituto Nazionale di Oceanografia e Geofisica Sperimentale, Italy
Marina Yarina	University of Haifa, Israel
Marina Beltri	Aquabiotech, Malta
Mohamed Elhassanine Adjal	Algeria
Mounia Zemamou	Ibn Tofail University, Kenitra, Morocco
Paolo Oliveri	Istituto Nazionale di Geofisica e Vulcanologia, Italy
Sara Durante	ISMAR-CNR Trieste, Italy
Sara Fountir Benbrahim	Rabat Prefecture, Morocco
Slim Gana	El Menzah, Tunis Governorate, Tunisia

Soumia Bengoufa	National Higher School of Marine Sciences and Coastal Management, Algeria
Stephen Grixti	Malta College of Arts, Science and Technology, Malta
Tiago Garcia	EurOcean, Portugal
Vesna Bertoncelj	University of Ljubljana, Slovenia
Yevgen Gazyetov	Odessa National II Mechnikov University, Ukraine
Aden Moussa Douksiye	Djibouti Ports & Free Zones Authority, Djibouti
Carlos De Wasseige	Namibia University of Science and Technology, Namibia
Emanuel Olaoluwa Eresanya	Regional Meteorological Training Centre (West Africa), Nigeria
Mercy Amai Emojong	National Environment Management Authority, Kenya
Julius Edward Salema	National Environment Management Council, Tanzania
Luc Mathurin Malou	Ministry of the Environment and Sustainable Development, Senegal
Mkondo Earl Moyo	Department of Surveys, Ministry of Lands, Malawi
Mohamed Omar Ibrahim	Office of the President of Somalia, Somalia
Samuel Alemeyhu	Ministry of Foreign Affairs, Ethiopia

Course Photos


Data, AI and Tokens:
Ocean Protocol


JERNXTSC

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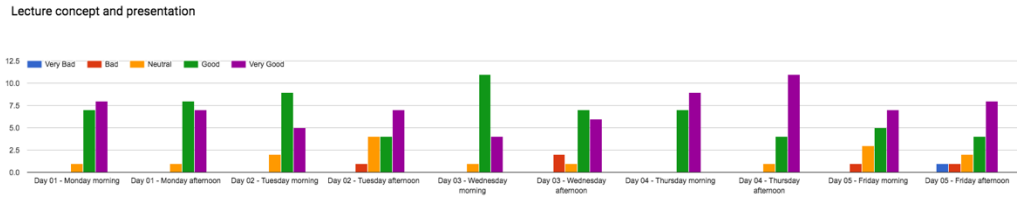
4. Conclusions

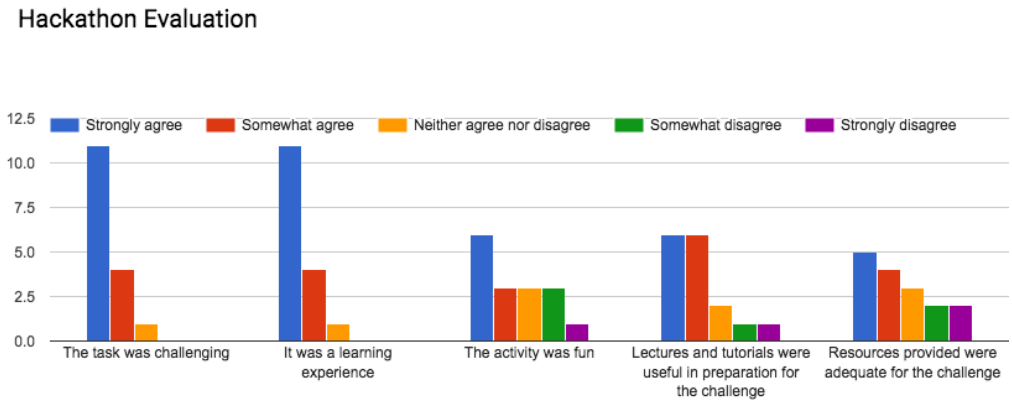
On the last day of the course, all participants were asked to provide anonymous feedback through an online form. This targeted various aspects of the course. The questions ranged from lecture concept and presentation to overlaps and gaps in the presentations. Feedback was also collected on the overall hackathon experience and the logistical preparations. The results can be found in the panels below.



Were there any overlaps (repeated information) or gaps (missing information) in the course presentations? Did you find delivery inadequate or enlightening?

5 responses

No at all
Mostly the information was new to me and it was very educational.
I generally like everything of this summer school, topics far from my background more interesting than what I already knew, understandable and complete.
Among lectures I especially loved the blockchain data exchange (something truly unique and non-standard). All practical tasks were relevant and the scripts will help me in the future.
There were not enough technicians for the practical to help those who were not familiar with opening the programs. Delivery was good and varied but alot of information! finishing at 6 would have been better.

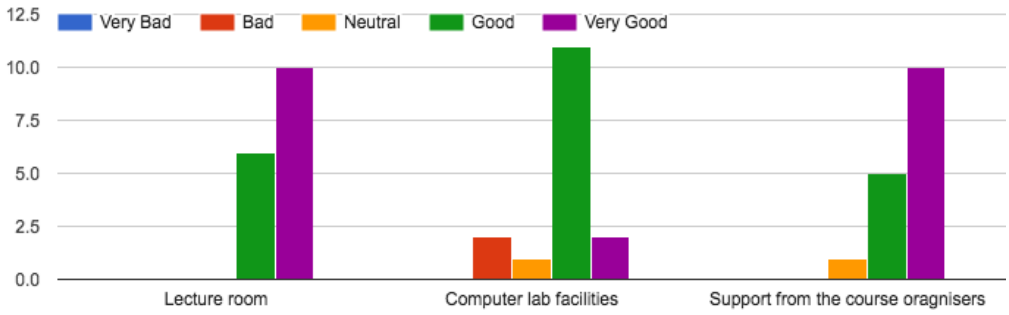


Feedback on the overall hackathon challenge

9 responses

Time is too short
8 out of 10
Not enough time to fulfill the task.
My response of the hackathon are mostly influenced by our mentor and would have been much more positive if not for the events that transpired during the days leading to and including the hackathon.
Challenging, fun and useful, just maybe I would have had the opportunity to really finish something more, maybe a couple of hours in the days before reserved for discussing the challenge with the computers available and perhaps download data before the "processing" day...could have been useful! We spoke a lot before, but just with "paper and pencil", no personal computers and weak internet connection outside the university...

Rate the course logistics

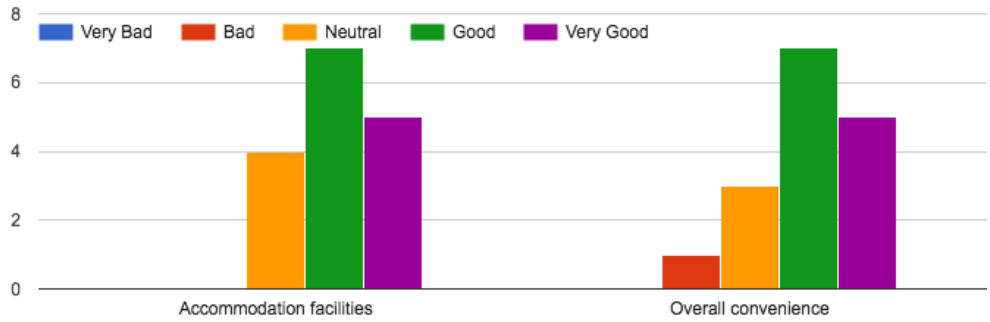


Feedback on the overall course logistics

8 responses

10 out of 10
Everyting was great except too much air conditioning.
The virtual machine was an awful idea, taking images of one test computer and applying it to the others might have been a better solution.
Too cold!!!!!!! Sometimes a little bit dispersive in the computer lab, useful audio and video a little bit higher/bigger
The computer room needs sockets, cause it's better to work with our own laptops - they are much faster then the stationary computers. The course materials can be spread with installation of virtual machines with preinstalled software in advance to the course instead of dealing with the slow server.
Great support team, always responded to our queries asap
Location was well equipped. Staff very knowledgeable
Very good ! except the absence of GIS software

Rate the accommodation arrangements

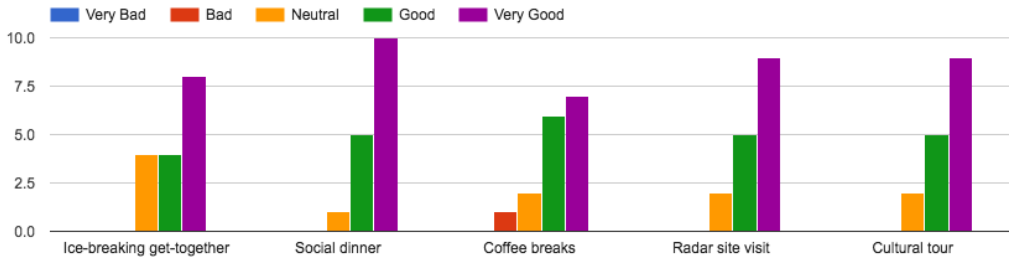


Feedback on the accommodation arrangements

5 responses

10 out of 10
Very good.
Maybe closer to the university would have been better, with less waste of time in bus traveling
The accommodation was very comfortable however being far from the venue, the bus journey was quite exhausting.
We really nice to be by the sea. Accommodation was, however a long way from the university and internet was poor so could not do much hackathon prep.

Rate social programme and hospitality



What other activities would you have liked us to include?

6 responses

None
It was nice that we had some sightseeing at the end! The food was good and it was very good to have the ice-breaking event.
Perfect balance of activities!! Maybe could have been nice some gadgets...cloth bags, or a copybook, or a usb pen, or a cup (random ideas), something to take home and re-use in everyday life, to remember the beautify experience!
Coffee machines could be nicer than the sublimated one :)
an evening trip to Valletta
more night events for the ice breaking

Other comments

9 responses

None
Two suggestions: eliminate all single-use plastic (like plastic cups and spoons) from all coffee breaks and lunches and replace cookies and cakes with fruit.
Thanks a lot
Overall, I was suprised by the very good organisation and happy by the very educational lectures!
The course was interesting and informative and would definitely want to participate in further events of the sort. For future hackathon please make sure the mentors are capable of assisting the challenge they have given.
Everything was very very well organized and pleasant...lectures, people, places, I liked all a lot. My remarks in comments are subtleties! The last remark for me is, generally speaking, too much disposable...in the future a totally free of disposable summer school would be appreciate! Thank you anyway for everything!
Many thanks to the organizers, after all it was a very interesting experience that I won't forget. I appreciated the amount of forces was put into the logistic of this event, the lectures that were given to us and the opportunity to meet so many talented and inspiring people.
It would be good to have detailed plan of the programme 1-2 weeks in advance, to help everyone prepare for it.
Thank you ! you are the best

Participants Marks	6	7	4	3	2	5	1
Judges Marks	5	6	1	3	4	7	2
Totals	11	13	5	6	6	12	3
Rank	5	7	2	3	3	6	1

5. Annexes and references

Annex A: Course Programme

JERICO-NEXT Malta Summer School 2018
Operational Oceanography for Blue Growth
9th to 14th July 2018

	Monday 9th July	Tuesday 10th July	Wednesday 11th July	Thursday 12th July	Friday 13th July	Saturday 14th July
	FOUNDATION Day	**JERICO-NEXT Day**	**COPERNICUS CMEMS Day**	**EMODnet Day**	**Mini-Hackathon Day**	**Course Excursion**
Morning Session 1 09:00 – 10:30	**Venue: VC101** Course Coordinator **Aldo Drago** Intro to the course - Operational Oceanography for Blue Growth **David Mills** The ocean-based economy in 2030	**Venue: VC101** **Antoine Gremare** JERICO initiative – why and what? **Laurent Delauney** Existing marine observation technologies: platforms, systems, sensors - sharing, harmonisation and future developments	**Venue: VC101** **Aldo Drago** Intro to COPERNICUS and its Marine Environmental Monitoring Service (CMEMS) **Anthony Galea** The value of COPERNICUS **Adam Gauci** The online CMEMS catalogue	**Venue: VC101** **Patrick Gorringe** Intro to EMODnet – Scope, evolution and future **Patrick Gorringe** Intro to the EMODnet portals; Linking the European data aggregators; the European Atlas of the Sea	**Venue: MP602** Hackathon Leader **David Mills** Hackathon Mentors **David Mills** **Paz Rotlan** **Joel Azzopardi** **Adam Gauci** **Kate Collingridge** **Vinca Rosmorduc** **Graham Worley** Logistical intro to the hackathon Hackathon Group exercises	Visit to HF radar site at Ta' Barkat
10:30 – 11:00	Coffee Break					
Morning Session 2 11:00 – 12:30	**Venue: VC101** **Graham Worley** Digital age in operational oceanography **Mario Sprovieri** The concept of blue growth – and the EU vision for the marine sector	**Venue: VC101** **Kate Collingridge** JERICO data flow and services – Introducing the Virtual Access system **Ingrid Puillat** Evolution of JERICO towards a sustainable marine RI	**Venue: MP602** **Vinca Rosmorduc** CMEMS Sea Level TAC – Practical 1	**Venue: MP602** **Pascal Derycke** EMODnet bathymetry practical session 1 EMODnet Maritime Spatial Planning practical session 2	**Venue: MP602** Hackathon Group exercises (cont.)	Visit to Hagar Qim Neolithic Temples Free time on the beach
12:30 – 13:30	Lunch Break					

Afternoon Session 1 13:30 – 15:30	**Venue: VC101** **Mario Sprovieri** Focus on the Mediterranean -The BLUEMED CSA experience **Mario Sprovieri** Brainstorming session on Blue Growth **Alex Borg** Validating a problem using Design Thinking approaches	**Venue: MP602** **John Enevoldsen** The Ocean Protocol: Data, AI, and Tokens **Kate Collingridge** JERICO VA practical Session 1	**Venue: MP602** **Paz Rotlan** CMEMS INSITU TAC – Practical 2	**Venue: MP602** **Pascal Derycke** EMODnet Sea Temperature Trends practical session 3 EMODnet General practical session 4	**Venue: MP602** Hackathon Group exercises (cont.)	
15:30 – 16:00	Coffee Break					
Afternoon Session 2 16:00 – 17:30	**Venue: VC101** **David Mills** **Aldo Drago** Introducing the mini-hackathon and selection of challenges and groups	**Venue: MP602** **Kate Collingridge** JERICO VA practical Session 2	**Venue: MP602** **Rita Lecci** **Francesco Palermo** CMEMS Satellite and model products – Practical 3	**Venue: MP602** **Adam Gauci** **Aldo Drago** EMODnet HF Radar practical session 5 **Patrick Gorringe** **Pascal Derycke** EMODnet Feedback exercise	**Venue: MP602** Hackathon Group Presentations Hackathon Assessment	
from 20:00	Icebreaker event				Visit Three Cities + Social dinner + Awards Ceremony	

Organised by the Physical Oceanography Research Group
Sponsored by
University of Malta, MALTA

Coordinator: Prof. Aldo Drago
(aldo.drago@um.edu.mt)

L-Università ta' Malta

Copernicus The European Earth Observation Programme
EMODnet European Marine Observation and Data Network
Prifysgol Bangor University

Annex B: Course Announcement

JERICO-NEXT Malta Summer School 2018

Operational Oceanography for Blue Growth

Coordinated by the Physical Oceanography Research Group
Member of the COPERNICUS Academy Network
Department of Geosciences, University of Malta

9th to 14th July 2018
University of Malta, MALTA

This activity forms part of the JERICO-NEXT WP8 capacity building activities and supported by

the COPERNICUS Marine Environment Monitoring Service (CMEMS)

and the

European Marine Observation and Data Network (EMODnet)

"**Operational Oceanography for Blue Growth** is a week long summer school organised by the **JERICO-NEXT** project, hosted by the **University of Malta** (Physical Oceanography Research Group, Department of Geosciences). It will be held from 9th-14th July 2018 and delivered by an international range of renowned experts.

The planning and funding of the course is provided by the H2020 JERICO-NEXT project with the support of the COPERNICUS Marine Environment Monitoring Service (CMEMS), and the European Marine Observation and Data Network (EMODnet).

The course will focus on oceanographic data exploration, elaboration and product creation for Blue Growth. The aim is to empower participants to source, interpret and merge available data, and to acquire the key skills to transform data into knowledge and added value products. More specifically the course is intended to give a broader perspective of the impact of technological development on the marine and maritime sector, on how the Internet of Things (IoT), Big Data, cloud computing and data analytics can provide new approaches to data management and knowledge creation in a smart technology-enabled future. The course will also cover current and future methods for data and information exchange, how and where value is created in and between organisations, and the new paradigms for performance and efficiency set by human machine interfaces. In particular, the summer school will consider how all these factors can increase Blue Growth and excellence in the marine and maritime economic sectors (such as oil and gas, renewables, living resources, policy, and tourism) and related services.

The summer school will include aspects on the future ocean economy, with a full day dedicated to the topic of marine and maritime economic trends in Europe, focussing on the regional seas, in particular the Mediterranean Sea and the Black Sea. This topic will also tackle how technological development, including numerical modelling of coastal domains, new sensors and data acquisition platforms, ICT and other emerging disruptive technologies, will impact ocean-based industries in the coming years. The

European Union vision for the future of the oceans will provide the course setting for future aspirations and needs. The European Commission has been setting the pace through its Integrated Maritime Policy and more specifically by the Blue Growth initiative. This initiative identifies the potential for exploitation of technological developments to create smart and innovative applications, and for adding value to products and services provision that brings into action cutting edge levels of achievement and leads to economic benefits and competitiveness. The governance and venture structures needed to bring research and industry together will be described and are regarded as key enabling factors. Another important dimension concerns the revolution in social media; Blue Growth is ultimately about delivering a societal impact and social media impacts will be considered in the context of engagement and impact.

The course will adopt a practical and hands-on approach. It will be delivered in a state-of-the-art computer lab environment offering the participants an individualised learning experience through practice. Dedicated sessions in the programme will link to the COPERNICUS Marine Environment Monitoring Service (CMEMS) and EMODnet, and together with the JERICO-NEXT Virtual Access portals will be used to showcase the relevance of their data streams through dedicated hands-on practical sessions. The summer school will build on the outreach activities of CMEMS, as well as those of EMODnet, and provide a great opportunity to showcase the complementarity between the two. The course will further serve as a platform to reach non-EU countries (especially from neighbouring countries in the Mediterranean Sea and Black Sea). The CMEMS and EMODnet sessions will tackle pre-prepared tasks to provide the participants with an on-the-job experience to tackle problem-solving situations and provide background knowledge required for the mini-hackathon in the last day of the course.

School Website

http://www.jerico-ri.eu/events/operational-oceanography-for-blue-growth/

School Highlights

Day 1
Ocean economic trends in Europe with focus on the regional seas; impact of technological development on Blue Growth; the perspective from the European Commission on the future of the oceans through its Integrated Maritime Policy and the Blue Growth initiative; focus on the BlueMed Initiative and the Western Mediterranean Initiative. Introduction to the mini-hackathon.

Day 2
Coastal ocean observatories and showcase of the JERICO-NEXT programme; digital age in Operational Oceanography.

Day 3 and Day 4
Briefing on the COPERNICUS Marine Environment Monitoring Service (CMEMS); introduction to the CMEMS portal; Practical hands-on session on CMEMS.

Briefing on EMODnet; Introduction to EMODnet portals; Practical hands-on session on EMODnet.

Day 5
Introduction to the mini-hackathon, overview of potential 'blue growth' challenges, expected outcomes
Mini hackathon – problem focussed session making best use of on-line data (JERICO Virtual Access Services, EMODnet, CMEMS) to develop smart products and services.

Day 6
Visit to HF radar site

Who may apply

Considering the multi-disciplinary nature of the summer course, we expect to encompass a cross sector range of participants including operational oceanographers, ocean modellers, domain experts, computer scientists, data scientists, data managers, graphics artists/data visualisers, software developers, commercially based students, and environmental managers. The challenge will be to offer a programme that brings together these participants with different skills to achieve a common understanding of team capabilities, and how to work together to achieve outcomes not possible by working alone. The course aims to showcase the way to facilitate blue growth, namely by breeding a new culture of professionals that can work as part of a team and exploit individual competences for applications and service provision.

The last day of the course will take the form of a mini-hackathon, giving the opportunity to participants to work in groups where each group would propose, plan and develop a prototype solution to an agreed blue growth 'challenge'. This may take the form of a visualisation, software application or other tool developed within a larger application (e.g. MATLAB, R etc) that makes use of the data and information resources available through the JERICO-NEXT Virtual Access capabilities alongside EMODnet and CMEMS. To ensure each group has access to the relevant ICT expertise, we plan to sponsor at least four participants with skills in software development to participate in each of the four anticipated groups which will compete for the best smart and innovative application.

Applicants who are in a position to disseminate the experience gained from the school to others will be favoured.

Applications are accepted from both JERICO-NEXT partner and non-partner institutions.

Pre-requirements to the applicants

General knowledge of oceanography; experience with computer programming languages will be an advantage.

Preference will be given to participants who are already engaged in (or have the potential to participate in) public or private endeavours favouring research, innovation and value addition in smart marine downstream services. Applicants who are in a position to disseminate the experience gained from the school to others will be favoured. This is in line with the major target of the course to develop a new culture of professionals that can spread their knowledge and skills through the scientific community to achieve excellent performance in favour of Blue Growth.

How to apply

Please, fill in the **Application Form** and send it together with supporting documents (listed below) electronically to both:

- **Prof. Aldo Drago** (aldo.drago@um.edu.mt), Course Manager, Head of the Physical Oceanography Research Group, and
- **Dr. Adam Gauci** (adam.gauci@um.edu.mt), Course Technical Assistant

by 7th **May 2018.** In the subject field please write:
"JERICO-NEXT Summer School Malta `Name Institute Country`"

Applications need to be supported by:

1. A letter of recommendation signed by a senior official of the nominating entity, university, institution, national or regional organisation,
2. A curriculum vitae,
3. A covering letter describing the applicant's motivation for applying and stating their ability to disseminate the knowledge and experience gained at the summer school to colleagues. If the applicant is seeking help with costs (see Financial conditions, below) their reasons should be clearly stated and justified.

Selection criteria

The selection will be based on the CV, the motivation for application and its relevance to the JERICO-NEXT course objectives. The selection will be done by the members of the project Steering Committee and the candidates will be notified about the final results by e-mail. The list of the successful candidates will be also posted on the dedicated school web-site.

Financial conditions

There are no fees or bench charges to be paid for participation. Participants will be expected to cover their own travel, accommodation and meal costs. Guidance on approximate costs for accommodation can be provided on request.
Financial support will be available for a limited number of participants to cover expenses (e.g. air fare ticket, accommodation and meals) to attend the school.
The travel arrangements will be a responsibility of the participant. Sponsored participants will be reimbursed upon arrival provided that costs are the lowest fares available, are supported by receipts and are approved by the organizers.

About the location

The course will be held at the IT services building of the University of Malta. Details on the facilities can be viewed here.

Important dates

Deadline for Application:	**7th May 2018**
Notification of Successful candidates:	**21th May 2018**
Course dates:	**9th to 14th July 2018**

Annex C: Applications, allocated marks and selected applicants

Applicant Name	Sponsorship	Applicant Country of residence	Region	Qualifications relevant to course /20	Work experience relevant to course /10	Technical Expertise /20	Increasing JERICO impact /20	Support of course to applicant's career /15	Geographical representation /15	TOTAL	Comments
Tiago Garcia	Full sponsorship required	Portugal	EU	18	8	14	18	12	15	**85**	Phase 2. Accepted accomodation only
Vesna Bertoncelj	Full sponsorship required	Slovenia	EU	17	8	14	17	15	15	**86**	Phase 2. Accepted full support
María del Mar Chaves Montero	Full sponsorship required	Italy	EU	15	7	17	17	14	15	**85**	Phase 2. Accepted accomodation only
Sara Durante	Accomodation/ Subsistance	Italy	EU	18	8	17	17	14	15	**89**	Phase 2. Accepted travel support
Antonio Giacoletti	Travel/ Accomodation	Italy	EU	17	7	17	17	14	15	**87**	Phase 2. Accepted travel and accomodation
DARSHIKA MANRAL	Travel/ Accomodation	Spain	EU	18	6	17	16	13	15	**85**	Phase 2. Accepted accomodation only
Katherine Higgie	None	England	EU	16	8	17	15	14	15	**85**	Phase 2. Accepted since self-paying
Cem Serimozu	None	Turkey	EU	18	6	16	17	14	15	**86**	Phase 2. Accepted since self-paying
Giulia Di Franco	None	Italy	EU	18	7	15	16	14	15	**85**	Phase 2. Accepted since self-paying
Paolo Oliveri	Full sponsorship required	Italy	EU	18	7	17	17	14	15	**88**	Phase 2. Accepted full support
Andromachi Chatziantoniou	Travel/ Accomodation	Greece	EU	14	7	14	16	14	15	**80**	
Alla Khosrovyan	Full sponsorship required	Armenia	EU	17	8	14	15	12	6	**72**	
Razvan Mateescu	Accomodation/ Subsistance	Romania	EU	17	8	0	17	12	15	**69**	
Krzysztof Pilczynski	Travel/ Accomodation	Poland	EU	17	8	17	17	10	15	**84**	
stefania russo	Full sponsorship required	Italy	EU	14	7	15	16	14	15	**81**	

Francesco Paolo Mancuso	Travel/ Accomodation	Italy	EU	16	7	15	17	13	15	**83**	Late Application
Wagner Luiz Langer Costa	Travel/ Accomodation	Spain	EU	18	6	0	17	14	15	**70**	Late Application
Mounia Zemamou	Full sponsorship required	Morocco	Non-EU	17	8	14	18	12	15	**84**	Phase 1. Accepted with full JERICO NEXT Support.
Sana Ben Ismail	Full sponsorship required	Tunis	Non-EU	18	9	14	18	13	15	**87**	Phase 1. Accepted with full JERICO NEXT Support.
Slim GANA	Full sponsorship required	Tunis	Non-EU	18	9	16	18	10	15	**86**	Phase 1. Accepted with full JERICO NEXT Support.
SARA FOUNTIR BENBRAHIM	Full sponsorship required	Morocco	Non-EU	18	7	18	18	11	15	**87**	Phase 1. Accepted with full JERICO NEXT Support.
Yevgen Gazyetov	Full sponsorship required	Ukraine	Non-EU	18	9	16	17	12	15	**87**	Phase 1. Accepted with full JERICO NEXT Support.
Ghada	Full sponsorship required	Tunis	Non-EU	18	9	16	16	11	15	**85**	Phase 1. Accepted with full JERICO NEXT Support.
Adjal Mohamed Elhassanine	Full sponsorship required	Algeria	Non-EU	17	7	14	17	13	15	**83**	Phase 1. Accepted with full JERICO NEXT Support.
Ekaterina Kochetkova	Full sponsorship required	Russia	Non-EU	18	7	16	17	12	15	**85**	Phase 1. Accepted with full JERICO NEXT Support.
Evgeny Ivanov	Accomodation/ Subsistance	Russia	Non-EU	18	8	20	12	14	15	**87**	Phase 1. Accepted Accomodation Only
Elena Zhuk	Accomodation/ Subsistance	Russia	Non-EU	18	8	15	17	13	13	**84**	Phase 2. Supported with accomodation
Ahmed Eladawy	Travel	Egypt	Non-EU	17	8	17	18	10	15	**85**	Phase 2. Supported with travel only
cyrine CHOUBA	Travel/ Accomodation	Tunis	Non-EU	17	7	15	16	14	15	**84**	Phase 2. Supported with travel and accomodation
Marina Yarina	Accomodation/ Subsistance	Russia	Non-EU	18	6	17	16	14	13	**84**	Phase 2. Supported with accomodation only
BENGOUFA Soumia	Full sponsorship required	Algeria	Non-EU	17	7	17	16	14	15	**86**	Phase 2. Supported with accomodation and travel
Nezha MEJJAD	Full sponsorship required	Morocco	Non-EU	17	5	0	17	12	15	**66**	

Tahereh Haghroosta	Travel/ Accomodation	Iran	Non-EU	16	7	12	12	10	10	**67**	
Rahmani Meraits Lyes	Full sponsorship required	Algeria	Non-EU	18	9	8	15	11	15	**76**	
HARAGOBINDA BAIDYA	Full sponsorship required	Bangaldesh	Non-EU	18	7	8	5	7	3	**48**	
Dr.(Mrs) Kalpana Chaudhari	Full sponsorship required	India	Non-EU	18	7	0	12	7	3	**47**	
INAL AHMED	Travel/ Accomodation	Algeria	Non-EU	17	7	12	16	13	15	**80**	
Ziv Zemah Shamir	Full sponsorship required	Israel	Non-EU	17	5	4	15	13	12	**66**	
Md Masud-Ul-Alam	Full sponsorship required	Bangaldesh	Non-EU	18	8	16	12	11	3	**68**	
Oleksandr Neprokin	Full sponsorship required	Ukraine	Non-EU	16	8	0	15	11	15	**65**	
Ali Jamous	Travel/ Accomodation	Syria	Non-EU	16	8	14	10	13	15	**76**	
ANDREW EHIABHI AKHIGHU	Full sponsorship required	Nigeria	Non-EU	10	8	10	10	10	3	**51**	
Hamidatou mouloud	Full sponsorship required	Algeria	Non-EU	10	5	0	5	10	15	**45**	
Abolfazl yousefi	Full sponsorship required	Iran	Non-EU	17	8	16	17	13	10	**81**	
Noussaiba ROBBANA	Full sponsorship required	Tunis	Non-EU	16	6	12	16	14	15	**79**	
Dashkevich Liudmila Vladimirovna	Full sponsorship required	Russia	Non-EU	18	8	0	18	12	13	**69**	
Anastasia Magaeva	Full sponsorship required	Russia	Non-EU	17	8	10	16	14	13	**78**	
Seema Rani	Travel	Bangaldesh	Non-EU	16	8	15	17	12	3	**71**	
MOKRANE ZAKIA	Full sponsorship required	Algeria	Non-EU	18	7	0	17	13	13	**68**	Late Application
NOBOU FRANCK EMERIC	Full sponsorship required	Africa	Non-EU	17	5	14	10	11	6	**63**	Late Application

Annex D: Mini-Hackathon challenges

JERICO NEXT Malta Summer School 2018
Mini-Hackathon

13th July 2018

Organised by
Physical Oceanography
Research Group
University of Malta

L-Università ta' Malta

Supported by

Copernicus The European Earth Observation Programme

EMODnet European Marine Observation and Data Network

PRIFYSGOL BANGOR UNIVERSITY

Background

Hackathons fall broadly into 2 types: an 'open' hackathon designed to facilitate the creation innovative solutions to specific problem and a training event where the emphasis is on the learning experience rather that the final product. An example of a recent hackathon is the EMODnet OpenSeaLab event. This was an 'open' hackathon but designed to test the capability of the EMODnet data management infrastructure to meet demands for new products and services that could drive European Blue Growth.

Bearing in mind that an open event requires a larger amount of time to complete we have to limit the scope of our mini-hackathon so that it falls primary into the training category. However, it may be possible for individual teams to take an 'open' approach if they feel confident to do so and is agreed with the organisers.

You may regard the mini-hackathon as a place to put into practice some of the knowledge and know-how that you will have gained during the preceding part of the summer school alongside your existing capability.

Objectives

The objectives of the mini-hackathon are:

- To provide experience of multi-disciplinary team work
- To enable students to understand how to find, extract and re-use data from existing data sources using appropriate tools
- To enable students to engineer solutions to a specific pre-defined problem that requires data to be transformed into useable information
- To enable students to translate end-user requirements into a process resulting in a useable product or service
- To enable more advanced teams to identify a different end-user requirement and design a solution

Team selection and flexibility

You have been allocated to a team of typically 4-5 people with other team members who should have a range of complementary skills. This should mean that each team has the capability to tackle any of the challenges.

It is possible to swap (transfer) team members, but this should ideally not result in a team losing a key skill or capability, and needs to be agreed with the course organisers. We have also tried to distribute those participants willing to lead a team across the proposed teams.

Choosing the challenge

There are 7 challenges and the proposers have already determined that these should be feasible for completion in the time available. The description of each challenge includes information about the skills and technologies required to fulfill them. After meeting your team members you will need to discuss and decide which challenge to undertake. In making this decision think carefully about the skills your team possesses and what is required for the challenge. The organisers request that you provide a list of three challenges in the order of preference that you may be willing to undertake. Based on this list from each of the team the organisers with decide on the final challenge to be allocated to a team. Our intention is to ensure each team undertakes a different challenge.

To help in choosing an appropriate challenge the majority of the mini-hackathon proposers (and mentors) will be available on Monday afternoon and will provide a short overview of their challenges and will be available for discussion. We propose that you take time to consider with your team member the challenge you wish to undertake. To give you time to think about the choice and be supported in making the choice we will finalise the challenge choice on Tuesday morning at the latest.

We would prefer for each team to choose a different challenge. However, where two teams or more choose the same challenge the final choice will be based on a simple lottery.

For any team considering an ‘open challenge’, that is a challenge defined by the team, we would urge you to contact other team members prior to arrival in Malta in order to initiate discussion and consensus among all team members. In framing an ‘open challenge’ think carefully about whether your proposal is scientifically valid, data is readily available and that there is sufficient time to undertake the task. As a guide look at the existing challenge options to give you an idea for what we think is achievable within the time scale.

Support for the mini-hackathon

Each of the mini-hackathon challenges has been proposed by summer school mentors who will be present and able to provide support. The challenge proposers will form a group of mentors who will be available to support teams during the mini-hackathon on the last day of the course as well as in the preparatory phase in the days preceding the event.

Assessment process

Toward the end of the mini-hackathon there will be an assessment of the degree of success in tackling the challenges for each team. We propose a light-hearted approach with an expert panel (to be selected), but also a peer review process where each participant can assess the performance of other teams (apart from their own). Each team will be expected to make a presentation of 10 minutes describing how they approached the challenge (e.g. data sources, types, analysis and technologies used) and given more time how they would further develop the product or service. There will be an additional few minutes for questions from the expert panel.

The final outcome will combine the assessments by the panel and from the peer review process. The result will be announced at a prize giving ceremony during the social dinner on Friday. The winners will be given a trophy to commemorate their success.

Assessment Criteria

- Overall effectiveness of the solution (what is the readiness level of the solution, how much extra work to complete, look and feel of solution)
- Use of appropriate data
- Understanding of the data limitations (what is missing e.g. Quality Assurance level, timeliness, spatial and temporal coverage)
- Use of the appropriate technology to engineer the solution
- Team work (were all the team members engaged with tackling the challenge)
- Quality of the presentation (how good is the 'pitch' i.e. selling of the concept)

Expected outcomes

Rather than the final 'product', the emphasis of the mini-hackathon is on the process that each team and its members go through to address the challenges. We hope the challenges can stretch the capabilities of team members, facilitate the development of confidence in sourcing and using diverse data sources to solve problems as well as working in a multi-skilled team with different prior experience and capabilities. We also hope very strongly that you have fun and enjoy the mini-hackathon.

Time table

You will have received this information prior arrival and hope it stimulates you to begin to think about the challenge you may wish to your team to tackle. On Monday afternoon there will be a dedicated session introducing the mini-hackathon and the mentors supporting the mini-hackathon. At the end of this session we expect each team to have identified the challenge they wish to undertake. The summer school practical sessions on Wednesday (CMEMS) and Thursday (EMODnet) should help you to acquire some of the key knowledge required to address the challenges.

We urge each team to begin work on addressing the challenge as soon as possible. You may find opportunities prior to the mini-hackathon to initiate work on the challenge.

Challenge 01

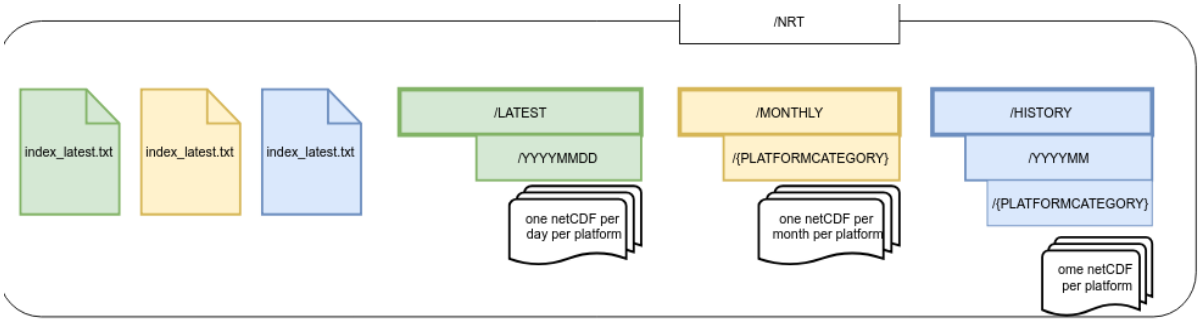
In Situ Thematic Assembly Centre API (Application Programming Interface)

Proposer: Paz Rotllan Garcia

Objective: To develop a backend service that can power websites to access and discover In Situ TAC data (REST API)

Rationale:
Copernicus In Situ Thematic Assembly Centre (in Situ TAC) is the only provider of **on-site** (in situ) marine observations within the Copernicus programme. Such data can be used to monitor environmental conditions (temperature, salinity, currents, oxygen, waves etc) that are critical to understanding certain processes/events (i.e fish mortality linked to ocean temperature and oxygen availability in the water column). This challenge show how it may be possible to build the capability to provide easy access to Copernicus in situ data to support a range of different purposes.

Description:
Within the Copernicus programme data gathered from In Situ TAC platforms (marine sampling platforms i.e. data buoy) are available via FTP (File Transfer Protocol) as a series of netCDF files on a central server ordered in directories related to their recency (latest, monthly, history), platform category (drifters, profilers etc) and temporal period (month, days etc). To assist users to navigate through the directory structure and select suitable netCDF files, In Situ TAC provides a series of so called *index files*, which provide the file name of every netCDF available via FTP for a product and some additional file metadata (*geospatial_lat_min, geospatial_lat_max, geospatial_lon_min, geospatial_lon_max, time_coverage_start, time_coverage_end, provider, date_update, data_mode, parameters).*



In recent times web technologies have evolved to share data using RESTful (Representational State Transfer) means. There are many frameworks for implementation, a popular and easy to use one being the DJango framework built upon the Python programming language. Using Django and Python your team will:-

- Build a data model and a database (SQLite) to store and access the metadata to discover & access In Situ TACs datasets.
- Provide a web service to access and query the data using the Django REST Framework
- Create an example web page to illustrate how the web service may be used by end users. e.g. http://apps.socib.es/data-catalog *(There may not be sufficient time to complete this last stage).*

A successful implementation of the In Situ TAC API will reduce to a minimum the programming skill needed for subsequent users to access and find In Situ data.

Skills:
Your team should have members with some familiarity with Python programming language. A tutorial showing how to use the Django REST framework is available at http://www.django-rest-framework.org/tutorial/1-serialization/

Required Resources:
In order to complete this challenge you will need to make use of the following resources:-

- Django REST Framework v1.1
- Python (Which version?)
- Python PIP Installer
- VirtualEnv Wrapper
- **HTML/JavaScript (only required for the final part)

The data you will need to use can be accessed from the following locations. Security credentials to access these services may be obtained from NEED TO FILL THIS IN!

- Index_platform.txt ftp://nrt.cmems-du.eu/Core/INSITU_GLO_NRT_OBSERVATIONS_013_030/myo_index_platform.txt
- Index_latest.txt ftp://nrt.cmems-du.eu/Core/INSITU_GLO_NRT_OBSERVATIONS_013_030/index_latest.txt
- Index_monthly.txt ftp://nrt.cmems-du.eu/Core/INSITU_GLO_NRT_OBSERVATIONS_013_030/index_monthly.txt
- Index_history.txt globalftp://nrt.cmems-du.eu/Core/INSITU_GLO_NRT_OBSERVATIONS_013_030/index_history.txt

The structure and specification of the web service to be constructed in this challenge is shown below.

GET /**PLATFORM-CATEGORY**/
GET /**PLATFORM-TYPE/**
GET **/DATA-TYPE/**
GET **/PARAMETER/**

GET /**PLATFORM**
platform_category (Drifters, Moorings…)
platform_type (Drifters reporting currents, Drifters, River Flows…)
data_type (Time Serie, Profile)
bounding_box
time_period
parameters

GET **/PLATFORM/{id}**

GET **/PLATFORM/{id}/DATA/?**
time_period
parameter

Challenge 02
Extreme Events Warnings Dashboard

Proposer: Paz Rotllan Garcia

Objective: To develop an interactive map to display point-based warnings regarding a certain parameters and thresholds.

Rationale:
Copernicus In Situ Thematic Assembly Centre (in Situ TAC) is the only provider of **on-site** (in situ) marine observations within the Copernicus programme. Such data can be used to monitor environmental conditions (temperature, salinity, currents, oxygen, waves etc) that are critical to understanding certain processes/events (i.e fish mortality linked to ocean temperature and oxygen availability in the water column). This challenge show how it may be possible to build the capability to provide easy access to Copernicus in situ data to support a decision support tool in the form of an interactive map.

Description:
Display in an easy to understand way the status of certain variables within user-determined acceptable ranges. This will allow users to create custom dashboards that will warm if a variable enters (model data) a hazardous range. This has particular application for planning operations such as cruises, aquaculture cage moves etc. In Situ latest platforms-locations will be also included for NRT (Near Real Time) warnings (check if a variable is reaching a certain value at their locations) if time available to do so.
The Django framework built upon the Python programming language allows the creation of web applications that can interact with database and other data sources to build dynamic content.
Using the Django framework in this challenge you will:

- Build a data model and a database (SQLlite) to store data from several sources for a 48 hour time window at specific geographic locations.
- Extract and load to a DDBB (SQLite) several sources of data in a 48h time window and in a certain points.
- Define views within Django to define parameters and acceptable ranges and to display the dashboard report results

CMEMS forecast products will be proposed as data-sources for defining environmental conditions and a leaflet map will be used for building the dashboard.

Notes: model data required but may add near real time

Skills:
Your team should have members with some familiarity with Python programming language. A tutorial showing how to use the Django framework is available at
https://docs.djangoproject.com/en/2.0/intro/tutorial01/

Required Resources:
In order to complete this challenge you will need to make use of the following resources:-

- Django
- Python
- Python PIP Installer
- VirtualEnv Wrapper
- **HTML/JavaScript (only required for the final part)

The data you will need to use can be accessed from the following locations. Security credentials to access these services will be provided during the mini-hackathon.

- MEDSEA_ANALYSIS_FORECAST_PHY_006_013
  http://marine.copernicus.eu/services-portfolio/access-to-products/?option=com_csw&view=details&product_id=MEDSEA_ANALYSIS_FORECAST_PHY_006_013
- MEDSEA_ANALYSIS_FORECAST_BIO_006_014
  http://marine.copernicus.eu/services-portfolio/access-to-products/?option=com_csw&view=details&product_id=MEDSEA_ANALYSIS_FORECAST_BIO_006_014
- MEDSEA_ANALYSIS_FORECAST_WAV_006_017
  http://marine.copernicus.eu/services-portfolio/access-to-products/?option=com_csw&view=details&product_id=MEDSEA_ANALYSIS_FORECAST_WAV_006_017

CMEMS forecast products will be proposed as data-sources for defining environmental conditions and a leaflet map will be used for building the dashboard.
Notes: model data required but may add near real time.

Challenge 03

Virtual drifter deployments for drifting pattern discovery

Proposer: Paz Rotllan Garcia

Objective: To develop an interactive map will allow the user to create virtual particles that will drift according to a certain physical data *(remote or local)*.

Rationale:
Copernicus In Situ Thematic Assembly Centre (in Situ TAC) is the only provider of **on-site** (in situ) marine observations within the Copernicus programme. Such data can be used to for a wide range of purposes. In this challenge the objective is to derive information on how particles will move (drift) horizontally in response to physical forcing. The information will be displayed in the form of an interactive map. The particles could be representative of how zooplankton (e.g. fish larvae) move in response to physical forcing or other types of particles that may be present in water including certain types of pollutants.

Description:
Search and rescue operators (SAR operators) as well as organisations responsible for environmental management have an interest in knowing where a body, oil spill or other elements might drift to in order to better define the search or operating area. In this challenge you will develop a tool that will allow the deployment of one or more virtual drifters (points), choose one or several data sources (currents form models, satellites, radar etc) and calculate the drifting trajectory the drifters will follow.
The Django framework built upon the Python programming language allows the creation of web applications that can interact with database and other data sources to build dynamic web pages.
Using the Django framework in this challenge you will:

- Perform python calculations in the background relating to lagrangian drifting patterns.
- Display a view for configuring your virtual deployment point(s) and data source(s)
- Display a view of the resulting drifting patterns.

CMEMS models will be proposed as data-sources for defining environmental conditions and a leaflet map will be used to display the resulting work.
Suggestion: Focus on one source of data (model derived) to being with.

Skills:
Your team should have members with some familiarity with Python programming language. A tutorial showing how to use the Django framework is available at
https://docs.djangoproject.com/en/2.0/intro/tutorial01/

Required Resources:
In order to complete this challenge you will need to make use of the following resources:-

- Python
- Django Framework
- Python PIP Installer
- VirtualEnv Wrapper

- A provided script will provide the lagrangian trajectory and will be implemented in of the following environments:-
  - MATLAB
  - Lagrangian
  - Trackpy

You will need to use Mediterranean Sea Physics Analysis and Forecast data from CMEMS via Copernicus. See http://marine.copernicus.eu/services-portfolio/access-to-products/?option=com_csw&view=details&product_id=MEDSEA_ANALYSIS_FORECAST_PHY_006_013

Challenge 04
Environmental data for marine animal behaviour

Proposer: V. Rosmorduc

Objective: This challenge seeks to compare satellite (and/or model) ocean data with animal tracks to propose a hypothesis for their behaviour. You will provide with codes enabling an easy overlay of different ocean parameters with an animal track (provided the same file format), and extract the values closest to the track; compute correlations, detect areas where the animal is staying longer, compute the animal absolute & relative (wrt the currents) velocity. A sea turtle track will be provided, from Galicia coasts to around Barcelona. Alternatively, you can propose with an interactive interface to browse & compare visually such data, adapted to primary to high school students (this track has been used in an educational project)

Rationale:
Marine animals are living within an ocean that satellite, in situ and models enable to determine its main parameters. Some species are endangered, most have behaviours which lead them in areas where human activities threaten them. Comparing environmental data such as available through CMEMS and animal tracks give insights to where or when concentrate the protection.

Description:
Satellite tracking as well as Earth observation satellites have enabled tremendous progresses in marine animal behaviour knowledge and understanding. In this challenge you will compare the different sources of data, to (modestly) propose with tentative explanations why a given animal may have behaved in a particular way. (e.g. travelled in a particular direction or remained for a longer period at a location etc.)
In meeting this challenge, you will discover how different datasets can be assimilated to provide new insights.

Skills:
Your team should have members with some familiarity with Python programming language or provided you can work with more limited support you may use the MATLAB environment.

Required Resources:
In order to complete this challenge you will need to make use of the following Python based resources:-

- Python
- Python Numpy Library
- Python MatPlotlib Library
- Python NetCDF Library
- Python BaseMap or Cartopy Library to manage projection

Users with sufficient experience might alternatively use:

- MATLAB
- MATLAB NetCDF Library

The following data sources will be required

- Marine mammal (elephant seal tracks) and in-depth data and measurements available in NetCDF format from
  - http://www.meop.net
  - http://www.coriolis.eu.org/Observing-the-Ocean/MARINE-MAMMALS

- Other animal track data (surface only) available on the CNES Educational Project Argonautica in CSV file format http://argonautica.jason.oceanobs.com/html/argonautica/welcome_uk.html (mostly over the Southern Ocean; a few over the Mediterranean)
- Earth observation satellite and/or model data available from Copernicus / CMEMS comprising gridded data of sea level, currents, winds, wave heights, chlorophyll and salinity. Data is available from http://marine.copernicus.eu/services-portfolio/access-to-products/ Temporary security credentials for download will be provided during the mini-hackathon.
- Additional native Argos files will be provided during the mini-hackathon

Challenge 05

Knowing meteo-marine conditions from available forecasts to plan coastal destinations in the Maltese Islands (Tourism)

Proposer: Joel Azzopardi & Adam Gauci

Objective: To identify the most optimal beach / site according to the forecasted meteo-marine conditions.

Rationale:
Marine tourism is an important component of the Blue Economy and coastal tourism in particular is predicted to rise considerably. This application will put up to date information into the hands of beach goers and other sea users in an easy to understand form to enable them to enjoy their visit to the coast by avoiding unpleasant of potentially dangerous conditions. The application can provide information about immediate conditions on beaches and the adjacent coastal water but also provide short term forecasts to aid planning.

Description:
A number of different beaches are found within a relative short driving distance of any location within Malta. Therefore, whilst a beach may not be optimal for swimming on a particular day (e.g. due to incoming currents, jellyfish or high waves), another beach may be more suitable. Tourists (as well as the local people) would find an app which determines the best beach to visit according to the forecasted weather conditions very useful. Such an app would also be useful to plan which beach(es) to visit in the coming days since forecast horizons typically extend a few days into the future.
Factors underlying the beach suitability index can include:

- Wind magnitude and direction
- Currents magnitude and direction
- Wave heights
- Jellyfish sightings.

During the hackathon, there might not be sufficient time to develop the mobile application. The participants should target to develop an innovative web interface that scales easily across multiple devices with different screen size.

Skills:
Your team should have members with some familiarity with the following:

- MATLAB
- HTML5
- JavaScript
- PHP
- SQL Databases

Required Resources:
In order to complete this challenge and be able to give an indication on the most ideal bay to visit, high resolution coastal data is required. For this task, the use of lower resolution global datasets is assumed. The grid cells closest to the Maltese islands can be considered and averaged to obtain the general wind and sea surface current directions. These can then be used to highlight the beaches that are expected to be 'sheltered' according to the meteo-conditions of the day.

The following resources can be used:

- MATLAB

- NASA Panoply netCDF, HDF and GRIB Data Viewer
- PHP
- Sqlite

The following data sources can be considered:

- Wind Data (Global Ocean Wind L4 Near Real-time 6 hour observations)
- Current Data (Global Ocean 1/12° physics analysis and forecast updated daily)
- CALYPSO HF Radar Data (available on EMODnet Physics)

Challenge 06
Aquaculture sites feasibility study

Proposer: Kate Collingridge

Objective: To create a map showing areas suitable for aquaculture of seaweeds.

Rationale:
Seaweed aquaculture is expanding in Europe with interest in using seaweeds as source for biofuel production and for human consumption. Seaweeds have specific requirements for growth in terms of temperature, salinity, nutrients etc, as well as requirements specific to the farm in terms resilience to storms. These can be used to determine which areas might be suitable for macroalgae farms.

Description:
Data layers can be downloaded from Copernicus or other sources and suitable areas selected based on the requirements of seaweed species. These can then be overlain to determine areas suitable in terms of all relevant variables.

Having selected an appropriate programming language or software product capable of analysing spatial data you will download and analyze the data layers.

Skills:
Your team should have members with some familiarity with analysing spatial data using your choice of programming language or software product.

Required Resources:
In order to complete this challenge you will need to make use of the following resources:-

Software:
The R Programming Language

Literature:

Capuzzo, E., Stephens, D., Aldridge, J., Forster, R.M. (2014). Feasibility study – Potential locations for macro-algae farming off the East Anglian coast, The Crown Estate, pp.37. ISBN: 978-1-906410-61-2.
Kerrison, P.D., M.S. Stanley, M.D. Edwards, K.D. Black, A.D. Hughes (2015). The cultivation of European kelp for bioenergy: Site and species selection. Biomass Bioenergy, 80, 229–242.
van der Molen, J., Ruardij, P., Mooney, K., Kerrison, P., O'Connor, N.E., Gorman, E., Timmermans, K., Wright, S., Kelly, M., Hughes, A., Capuzzo, E. (2018). Modelling potential production of macroalgae farms in UK and Dutch coastal waters. Biogeosciences, 15, 1123-1147.

Species requirement tables:

Saccharina latissimi

Variable	Suitable	Unsuitable	Reference
Minimum Temperature (°C) (or use percentile)	>2	<2	Bolton and Lüning (1982) Kerrison et al. 2015
Maximum Temperature (°C) (or use percentile)	< 18	>18	Bolton and Lüning (1982) Kerrison et al. 2015
Minimum Salinity (or use percentile)	>15	<15	Kerrison et al. 2015
KPAR 10% light depth (m)	>1	<1	This study
Tidal velocity (m s-1)	<1.5	>1.5	Buck and Buchholz (2005)/ this study
Significant Wave height (m)	<6	>6	Buck and Buchholz (2005)/ this study
Winter TOxN (mmol m-3)	>4	<4	Kerrison et al., 2015; Broch & Slagstad
Bathymetry (m)	>4	<4	This study

Potential data sources:

- Ostia sea surface temperature from CMEMS (SST_GLO_SST_L4_NRT_OBSERVATIONS_010_001 and SST_GLO_SST_L4_REP_OBSERVATIONS_010_011)
- Physical model products from CMEMS for salinity and currents (GLOBAL_ANALYSIS_FORECAST_PHY_001_024 or NORTHWESTSHELF_ANALYSIS_FORECAST_PHYS_004_001_B)
- Biological model products from CMEMS for nutrients (GLOBAL_REANALYSIS_BIO_001_018 or NORTHWESTSHELF_REANALYSIS_BIO_004_011)

- Satellite derived products from CMEMS for KD (OCEANCOLOUR_ATL_OPTICS_L4_NRT_OBSERVATIONS_009_092 or OCEANCOLOUR_GLO_OPTICS_L4_REP_OBSERVATIONS_009_081)
- Wave products from CMEMS (GLOBAL_ANALYSIS_FORECAST_WAV_001_027 or NORTHWESTSHELF_ANALYSIS_FORECAST_WAV_004_012)
- EMODNET bathymetry
- EMODNET human activities for sea use data

This is not an exhaustive list and you are free to use any other data sources you think are appropriate.

You can also use in situ data to create your own gridded products but consider time constraints.
Copernicus data is available here:
http://marine.copernicus.eu/services-portfolio/access-to-products/
EMODNet is available here:
http://www.emodnet-bathymetry.eu/
http://www.emodnet.eu/human-activities

Approach:
You can code in any language you choose; however, it will need to be one capable of spatial analysis. R is a good option.

Region – all European seas. Bear in mind where the species is native to, you may find some areas ruled out and need to focus on a specific one. Or you could research requirements for other species.
Time period – you may choose to focus on one year for simplicity, or to find or create climatologies and look at average conditions.

Method:
- Download the data layers
- Do any processing to get the layers you need. Seasonal averages, minimum temperature etc.
- Regrid them onto the same grid
- Classify the layers into unsuitable and suitable conditions
- Overlay the layers to find areas where all parameters are suitable
- Make a map of the suitable areas

Further possibilities:
- Focus on a specific area, maybe find higher resolution data (NWS rather than global, for example)
- Apply the approach to different species (they don't even have to be macroalgae, it could work for any farmed species, e.g. bivalves, crustaceans, finfish).
- Consider existing uses of the sea – will there be any conflicts if you were to put a seaweed farm there?
- Rather than a simple yes/no suitability classification, create an index. Maybe you can define optimal and suboptimal conditions, or some kind of scale. Maybe one parameter is much more important than another so you weight them.
- Consider how much time outside suitable conditions the species might be able to cope with. Can you figure out where the temperature drops below the minimum threshold for less than 10 days at a time using daily data?

Challenge 07
Tourism Diving App (Tourism)

Proposer: Graham Worley and David Mills

Objective: To derive a map of interesting dive sites with an index of suitability

Rationale:
Diving is a popular pastime and sport and one of the important elements of coastal tourism within Europe. The aim of this challenges is provide access to users to all the relevant information in one web site or application that makes best use of newly available data through Copernicus, EMODnet or other online data resources. Providing information in an easily useable form will enable divers and possibly other coastal visitor to make the best choice of sites to visit and potentially providing links to resources they may need to make best use of their time when planning and carrying out a dive.

Description:
Divers are constrained by the depth of the dive site and may also be influenced by water clarity, contaminants, current, sea state, weather and other factors. Certain locations are selected by their interest factor, such as the presence of a wreck or other interesting feature. By combining these weighted parameters together into an index it is possible to provide a diver with valuable information to plan where to do a recreational dive for the most enjoyment in safety.

Interesting sites and a derived suitability index can be displayed either as a proof of concept on a static graphic for a given time period, or into a more elaborate web app looking at the data dynamically.

Skills:
Your team should have members with some familiarity with the JavaScript programming language and its use within HTML5 web pages. If you are going to make use of the REST service mentioned below the following tutorial for accessing REST data from JavaScript may prove useful.
https://blog.miguelgrinberg.com/post/writing-a-javascript-rest-client

Required Resources:
In order to complete this challenge you will need to make use of the following software resources:-

- JavaScript
- HTML5
- Mapping from with OpenSeabMap/OpenLayers or Google Maps APIs

You may download data directly from EMODNET and Copernicus that is relevant to this challenge.

To assist you and allow you to focus on purely displaying the data a REST service has been provided for you that has been pre-loaded with data from EMODNET and Copernicus. REST (Representational State Transfer) services are easily accessed from JavaScript and the data they return is frequently in JavaScript's own JSON notation. Full details for this service will be available during the mini-hackathon from http://www.imardis.org/matla2018

Annex E: Mini-Hackathon teams and marks

Judge	Your ranking [Group 01 / Valletta (Planning of coastal destinations in the Maltese Islands)]	Your ranking [Group 02 / Compass (Tourism diving app)]	Your ranking [Group 03 / Hungry Hippos (Virtual drifter deployment for drifting pattern discovery)]	Your ranking [Group 04 / Dartagnan and the three Mosquetieres (Aquaculture site visibility study)]	Your ranking [Group 05 / Corto Maltese (Early warning system for jellyfish impacting tuna farms)]	Your ranking [Group 06 / Antioche (Environmental data for marine animal behaviour)]	Your ranking [Group 07 / Seven Seas (Extreme events warning dashboard)]
Aldo	6	1	4	5	3	7	2
Dave	5	6	1	4	2	7	3
Graham	6	2	3	1	7	5	4
Pascal	2	6	5	1	3	4	7
Joel	4	5	1	6	3	7	2
Adam	5	7	1	4	2	6	3
Anthony	5	7	1	4	3	6	2
Vinca	6	5	4	1	7	3	2
Kate	7	5	4	2	1	6	3
Paz	2	5	4	6	7	3	1

Your team	Your ranking [Group 01 / Valletta (Planning of coastal destinations in the Maltese Islands)]	Your ranking [Group 02 / Compass (Tourism diving app)]	Your ranking [Group 03 / Hungry Hippos (Virtual drifter deployment for drifting pattern discovery)]	Your ranking [Group 04 / Dartagnan and the three Mosquetieres (Aquaculture site visibility study)]	Your ranking [Group 05 / Corto Maltese (Early warning system for jellyfish impacting tuna farms)]	Your ranking [Group 06 / Antioche (Environmental data for marine animal behaviour)]	Your ranking [Group 07 / Seven Seas (Extreme events warning dashboard)]
Group 01 (Valletta)		5	1	3	6	2	4
Group 01 (Valletta)		6	5	4	3	2	1
Group 01 (Valletta)		6	3	4	1	5	2
Group 01 (Valletta)		2	5	4	3	1	6
Group 01 (Valletta)		3	4	6	1	5	2
Group 02 (Compass)	6		3	2	1	4	5
Group 02 (Compass)	4		2	1	5	6	3
Group 03 (Hungry Hippos)	6	5		4	2	1	3
Group 03 (Hungry Hippos)	6	5		1	3	2	4
Group 03 (Hungry Hippos)	1	3		4	5	2	6
Group 03 (Hungry Hippos)	3	6		1	5	4	2
Group 04 (Dartagnan and the three Mosquetieres)	4	5	3		2	6	1

Group 04 (Dartagnan and the three Mosquetieres)	3	6	4		2	5	1
Group 04 (Dartagnan and the three Mosquetieres)	3	6	4		2	5	1
Group 05 (Corto Maltese)	6	5	2	1		4	3
Group 05 (Corto Maltese)	3	5	4	1		6	2
Group 05 (Corto Maltese)	6	5	4	2		3	1
Group 05 (Corto Maltese)	6	5	2	4		3	1
Group 06 (Antioche)	6	5	4	3	2		1
Group 06 (Antioche)	5	4	3	2	6		1
Group 06 (Antioche)	2	3	5	6	1		4
Group 06 (Antioche)	1	2	3	4	5		6
Group 07 (Seven Seas)	4	5	2	3	1	6	
Group 07 (Seven Seas)	2	5	6	3	4	1	
Group 07 (Seven Seas)	4	5	2	3	1	6	
Group 07 (Seven Seas)	6	5	4	3	2	1	
	87	112	75	69	63	80	60
Participants Marks	**6**	**7**	**4**	**3**	**2**	**5**	**1**

Participants Marks	6	7	4	3	2	5	1
Judges Marks	5	6	1	3	4	7	2
Totals	11	13	5	6	6	12	3
Rank	5	7	2	3	3	6	1