

# ISblue

INTERDISCIPLINARY GRADUATE SCHOOL  
FOR THE BLUE PLANET



2020/2021  
Projects



## CONTENTS

- P.02 Editorial
- P.03 Key figures
- P.04 Training
- P.06 Research
- P.08 International expertise & mobility
- P.10 Partnerships with socio-economic actors

**ISblue**, « The Interdisciplinary Graduate School for the Blue planet » is the only Graduate School in France dedicated to marine science and technologies, selected and financed under the French programme «Investing for the future».

This success confirms the leadership of higher education in Western Brittany (France) in this strategic field and gives it the means to increase its international influence in the 5 scientific themes.

ISblue is based on close collaboration between universities, research organisations and engineering schools to develop synergy in training (masters and PhD level) and research in marine science and technology. ISblue aims to increase the international visibility of the interdisciplinary and innovative courses offered by its members, as well as the attractiveness of its 15 research units, in particular for young researchers.

Since its beginning in 2018, ISblue has been a catalyst for new projects, both in research and in training. Despite the pandemic that has been raging since 2020, the teams have been able to adapt, propose new actions and, despite everything, continued their international collaborations.

This second newsletter is an opportunity to highlight projects initiated during the 2020-2021 academic year which are indicative of the dynamism of our research graduate school. Enjoy your reading!



## KEY FIGURES



9

### PARTNERS

2 universities,  
4 schools, 3 research  
organisations



21,8M€ / 10 years

### FUNDING PROGRAMME INVESTING FOR THE FUTURE (PIA)



5

### RESEARCH THEMES

- Ocean and climate regulation
- Ocean-sea floor interactions
- Sustainable coastal systems
- The living ocean and ecosystem services
- New technologies for observation systems



400

### MASTER'S & ENGINEERING STUDENTS



190

### RESEARCHERS & 200 LECTURER- RESEARCHERS



230

### PHD STUDENTS



15

### RESEARCH UNITS

## THE YEAR 2020/2021

- **17 young researchers supported**, with co-funding from the Brittany region: 13 doctoral students and 4 international post-doctoral students hosted for 2 years
- Launch of **3 Flagships projects**: Omega, SeaLex and Blue Revolution
- Launch of the **ISblue Hub** which is working towards students employability
- **8 emerging research projects** funded
- 7 projects to strengthen **research at sea**, from the coast to the deep sea
- 14 new **training projects** in educational innovation
- 18 master's students and 34 PhD's received a grant for **international mobility**
- **26 internship grants** as part of an exceptional call for proposals to enable students to complete their training despite the health crisis
- First **'Horizon 2030'** thematic school (40 people, including researchers, lecturer-researchers, doctoral students specialised in climatic issues related to the marine environment).
- 2nd meeting of the **international scientific council** (13 members)
- 3rd edition of the **summer school** on marine science and technology **for journalists** (23 journalists from France, French Guyana, Belgium and Quebec)
- 7th edition of the Sea & Education summer School (28 teachers from France and Belgium).

# SPOTLIGHT ON TRAINING

*To train tomorrow's experts in marine science and technology, ISblue supports educational innovation, particularly within the framework of interdisciplinary courses and training in the field, and develops programmes that are attractive and competitive at an international level.*



## UNDERWATER AND COASTAL IMMERSIVE WORKSHOPS: TEACHING MARINE SCIENCE WITH VIRTUAL REALITY

Scrutinising (sub)marine landscapes, observing their changes over time and change of scale are all objectives made problematic by the presence of ocean masses.

The AISMERALDA project was born in 2020 from the desire to bring together teachers, researchers and engineers to represent and use in-situ data for training purposes.

Beyond the improved and multi-scale visualisation of complex scientific data and the direct research-training link, virtual reality has emerged as a suitable solution to fully engage the student in an interactive learning process on the seabed and coastlines. With the support of an engineer and the expertise of the CERV\* to develop these immersive environments, this experimentation will be implemented in future master's courses from 2022.

\*CERV : European Centre of Virtual Reality

## DOCUSCIENCE : PHD STUDENTS MAKE MOVIES ON THESIS TOPICS

The objective of the DocuScience project is to offer doctoral students of the EDSML\* a training in the techniques of documentary film for the mediation of scientific, societal and environmental issues. They can thus develop their autonomy in the use of these communication tools.

For one week, six doctoral students designed and produced a film about their research problem. They wrote their script, conducted interviews and chose their shooting locations. After the filming and sound recordings, they edited the film for a very professional final result.

This theoretical and technical knowledge is an undeniable asset for these future professionals who will be required to communicate with all types of audiences.

\*EDSML : The Marine & Coastal Sciences Doctoral School



**France Floch**, *Senior Lecturer, Geosciences Laboratory, UBO -IUEM and coordinator of theme 3: Sustainability of coastal systems.*

## TRAINING WHEN YOU ARE A LECTURER 3-MONTHS MOBILITY IN THE NETHERLANDS

« Thanks to the support of ISblue Theme 3, the IUEM and the ANR WEST project, I was able to travel with my daughters to Delft (Netherlands) where I worked at the Technical University from April to July 2021, in order to strengthen my collaborations with researchers at the cutting edge of my field of study (coastal hydrosedimentary dynamics), and also to improve my command of the English language.

This 3-month stay was an extremely enriching experience for my daughters and me in every respect. In terms of research, I learned a lot and shared our research and developments. We have several projects for student exchanges researcher mobilities in the coming years in the framework of projects that have become joint projects. It was also an opportunity to exchange on student training methods.

I advise all researchers to carry out an international mobility, it gives them a stronger motivation, a new lease of life in his or her research, an open mind, seeing his or her field of research in a different way.»

## TEACHING SCIENCE FOR SOCIETY: MULTI-DISCIPLINARY LEARNING FOR THE 8 DISCIPLINES OF THE IUEM MASTERS



### This project includes two training modules:

InterSML\* for Master 1 students and Sciences and Society for Master 2 students. These courses aim to open up the field of interdisciplinary possibilities by gradation of learning over the two years through the exploration or the resolution of complex problems. These courses also aim to develop students' skills such as commitment, creativity and reflexivity, which are essential in the face of major scientific and societal challenges through a field approach, serious games and project-based teaching.

In their first year, master students meet during interdisciplinary workshops in September and a project presentation in November. In their second year, they go deeper through an interdisciplinary exploration of a thesis topic provided by a doctoral student, during a 7 weeks long project.

\*SML: UBO's Marine and Coastal Sciences Department

# FOCUS ON RESEARCH

*ISblue creates new synergies between its members by supporting emerging projects and research projects at sea. In 2020 three large-scale, flagship projects have been initiated and are presented here. ISblue is continuing its international postdoctoral programme, which attracts talented young researchers and confirms the international visibility of ISblue international units.*



## **OMEGA** EFFECTS OF DECREASING AVAILABILITY OF OMEGA 3 ON GLOBAL POPULATIONS OF SMALL PELAGIC FISH AND HUMAN POPULATIONS

Marine omega-3s are necessary for the various vital functions of human beings. Populations of small pelagic fish, or blue fish, such as sardines and anchovies, are the main source of marine omega 3 for direct consumption or indirectly (manufacture of oils and meals for aquaculture and livestock farming) by human populations. The most important populations are found in the coastal areas of North and South America, West Africa and South Africa.

The ongoing climate change in these areas, combined with the increase in the global human population is leading to a clear warning that the supply of omega-3s may become insufficient by 2040.

In this context, OMEGA aims to understand the evolution of the supply and demand of marine omega-3s to address in order to meet the challenges of their availability for humans, while maintaining the health of ecosystems.

**More information:** <https://www.isblue.fr/en/research/research-projects/flagship-project-omega/>

## **SEALEX** THE SEA AS A SOCIO-ECOLOGICAL EXPERIENCE OVER THE LONG TERM

The SeaLex project aims to make a significant contribution to the contemporary societal debate on the impacts of climate change on coastal human populations through a retrospective vision of the long-term trajectories of socio-ecosystems, particularly in terms of social adaptability and resilience, from the early Holocene to the present day in several coastal areas of the North Atlantic Ocean (Brittany, Aquitaine, Jersey, Saint-Pierre-et-Miquelon, Newfoundland).

The project is divided into four main research areas: Ancient coastal societies: distribution, chronology and lifestyles, Coastal environmental changes and forcing: reconstructions from sedimentary archives, Digital models of past coastal hydrological processes, Development of virtual reality tool.

**More information:** <https://www.isblue.fr/en/research/research-projects/flagship-project-sealex/>



**Manoj Mathew**,  
*international post-doctoral fellow,  
Geosciences Ocean laboratory*

## MANOJ MATHEW ANALYSING SOURCE-TO SINK DYNAMICS IN AN ANTHROPOGENICALLY- DISTURBED TROPICAL LANDSCAPE

« The ISblue fellowship provided me an ideal and exceptional opportunity to pursue my research project to quantify the accelerated rates of chemical weathering and bedrock erosion attributed to the depletion of carbon sinks and climate change, which is instigated by the prevalent anthropogenic disturbances of pristine landscapes in the tropical island of Borneo.

This, in turn, can inevitably exacerbate sediment flux to coastal seas and offshore basins. The study aims to contribute towards a mechanistic and holistic understanding of the deleterious effects of human-induced ecosystem and atmospheric changes on natural geomorphic processes and marine sedimentary systems in the tropics. »

## BLUE REVOLUTION UNDERESTIMATION OF BIODIVERSITY ON OUR BLUE PLANET: ARTIFICIAL INTELLIGENCE REVOLUTIONISES BENTHIC TAXONOMY

Subtidal benthic (sediment-dwelling) communities are among the most diverse groups of organisms in the world, and are ideal ecological indicators and sentinels for ecosystem health.

However, only a small fraction of this diversity has been described, and knowledge of their biology and their ecology is fragmentary. Because of their high abundance, diversity, wide distribution, relatively fast generation times and rapid metabolic rates, benthic organisms are one of the best marine bioindicators available to assess global environmental change.

The BLUE REVOLUTION project will develop methods for holographic microscopy and 3D fluorescence imaging methods as well as in situ 3D fluorescence classification tools to generate quantitative and functional data on benthic communities at unprecedented rates, never seen, before.

BLUE REVOLUTION will produce fast and reliable tools for rapid and accurate impact assessments and biodiversity studies, while training the next generation of integrated benthic taxonomists/ecologists

**More information :** <https://wwz.ifremer.fr/bluerevolution/>



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# INTERNATIONAL EXPERTISE & MOBILITY

*ISblue is developing international training, through online courses or co-diplomas with foreign universities. International mobility during training is essential for Master's and PhD's students to acquire expertise recognised at the highest level. ISblue offers support for inbound and outbound mobility in internships, and funds PhD co-supervision through partnerships with laboratories abroad.*



## SILICA SCHOOL

### AN INTERNATIONAL SPOC\* DEDICATED TO THE STUDY OF SILICON

Silicon. Why should we be interested in this element? Because it is particularly abundant in the form of silica and silicate minerals on planet Earth and on the telluric planets (Mercury, Venus, etc.). But, why then are living organisms based on carbon and not on silicon? Is there any chance of encountering silicon-based life somewhere in the universe? If, on planet Earth, living organisms are carbon-based, do they also contain silicon? Are these silicified organisms important for marine life and for the carbon cycle in the ocean? How has this evolved over time?

These and other questions are answered by the Silica School, organised by Dr Jill Sutton and Professor Paul Tréguer (European University Institute of the Sea, University of Brest). It opened in November 2020 with the support of ISblue. A second session is planned for November 2021.

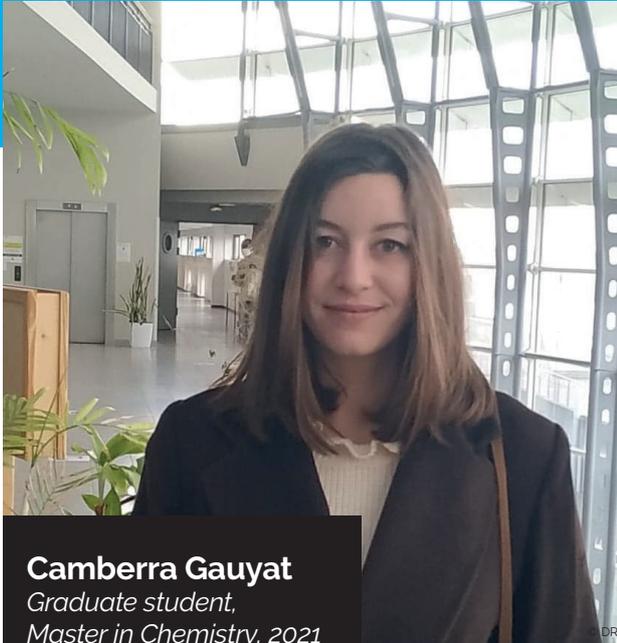
\*SPOC : small private online course

▶ **More information** : <https://www.isblue.fr/en/news/learning-project/silica-from-stardust-to-the-living-world/>

## FRANCE-QUEBEC DOUBLE-DEGREE IN MARINE SCIENCE

Brest and Rimouski have a long maritime tradition and are now renowned nationally and internationally for their expertise in the field of oceans and coasts. Numerous initiatives link the two territories such as the international cooperation of Brest Métropole, the France-Quebec Institute (IFQM) for scientific cooperation in support of the maritime sector and since 2020 the implementation of double degree courses in marine sciences between the University of Western Brittany (UBO, France) and the UQAR (University of Rimouski).

Students enrolled at IUEM (UBO) in the EGEL Masters «Expertise and management of the environment» or SMB «Marine Biological Sciences» can follow a dual degree course with the Masters in Geography or Biology at UQAR. In addition to obtaining a double Master degree recognised in France and in Quebec, the course offers students the opportunity to experience international training during a 6-to-14 month mobility period in Rimouski. The double degree also allows them to acquire work methodologies specific to both countries and, more broadly, to open up their professional network to the world.



**Camberra Gauyat**  
Graduate student,  
Master in Chemistry, 2021

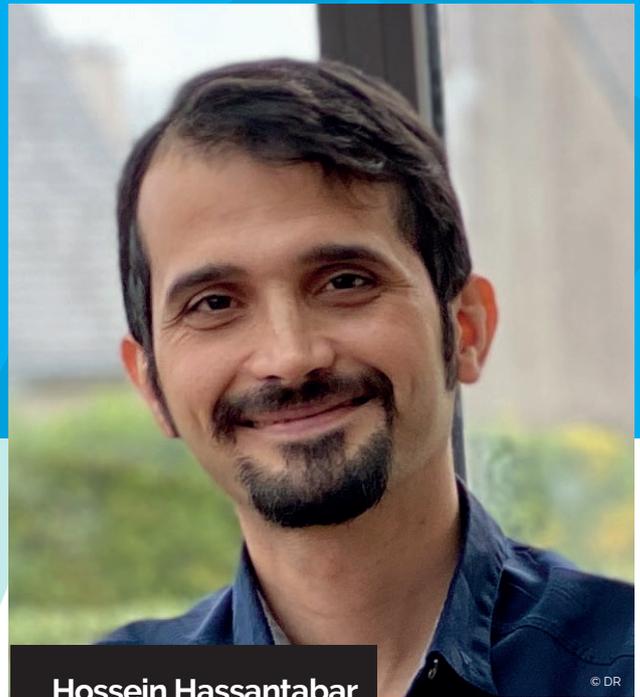
## CAMBERRA GAUYAT INTERNSHIP IN MEXICO

Camberra Gauyat completed a 5-month internship in Mexico thanks to funding from ISblue in the framework of the Master's degree in Marine Environmental Chemistry.

**Internship's topic:** valorisation of two biomasses Agave lechuguilla and Sargasso for the cosmetic industry.

«I spent 5 months in Mexico, in La Paz, Baja California Sur, in order to valorise two biomasses, one terrestrial: agave and the other marine: sargassum, to study their biological properties and to mix them together.

This project was a real opportunity to combine land and sea. Furthermore, I was able to interact with a large number of professors and students and present my research as requested by CIBNOR (Centro de Investigaciones Biologicas del Noroeste). »



**Hossein Hassantabar,**  
PhD student coming  
over to Brest, at LOPS  
laboratory

## HOSSEIN HASSANTABAR PHD STUDENT SPENT A YEAR IN LOPS\* LAB

Seyed Hossein Hassantabar, a PhD student from Iran, working on the ocean eddies and sound propagation of Atlantic Ocean.

«As a mobility PhD student of IUEM/LOPS I have been aided by the ISblue grant during my one-year stay in Brest, France to conduct a research about the effect of ocean Eddies on sound propagation which led to highly useful results in the area of underwater acoustic.

My mobility has profoundly contributed to my professional and educational growth and has led to development of very significant skills that I require for completing my PhD education and has ignited sparkles of new ideas for my Post-doctoral education.

The result of the aforementioned project which is the product of a joint effort of different researchers from France, Italy and Iran will hopefully be published as a research paper in the following months.»

\*LOPS : laboratory for ocean physics and satellite remote sensing

# PARTNERSHIPS WITH SOCIO- ECONOMIC ACTORS

*ISblue is dedicated to training the next generation of innovators and leaders for a sustainable ocean. A true project hub and talent connector, the ISblue HUB supports students in expanding their career opportunities and take initiatives.*

*The proposed approach favours 'learning by doing', reinforcing the 'doing', strengthening transferable skills and creativity in the realisation of innovative projects with socio-economic actors and local initiatives (Pôle PEPITE, Disrupt'Campus, FabLabs, Pôle Mer Bretagne Atlantique, Campus Mondial de la Mer).*

## ISBLUE HUB PROFESSIONALISATION OF STUDENTS

Promoting employability and strengthening the link between training and the socio-economic world are the dual priority objectives of the HUB. A prospective study of potential partners has been undertaken to support the creation of a new master degrees in marine economics with strong links to industry.

A new training course for doctoral students has been structured with the territory's leading marine science players, offering the opportunity to become aware of the value of research and entrepreneurship, but also to exchange with researchers-entrepreneurs and benefit from expert advice and expand their professional network.

**More information :** <https://www.isblue.fr/en/isblue-hub/>

## SEA AND JOURNALISM TRAINING IN SCIENTIFIC ISSUES

The third «Sea and Journalism» summer school, co-organised by ISblue, the Ecole Supérieure de Journalisme de Lille (ESJL), the Maritime Institute France-Québec (IFQM), the Club de la Presse de Bretagne and Océanopolis was held on 24/25th August 2021 at the IUEM, both in person and remotely. The journalists came from Western France, French Guyana, Belgium and Quebec. The media represented were The Conversation France, Ouest France, Le Télégramme, Radio Evasion, Radio-Canada, Radio télévision Belge Francophone (RTBF) and freelancers, making a total of 23 participants.

This summer school dealt with the ocean of extremes, from crisis to sustainable development. Introduced by a conference on the search for oceans in exo-planets, it included a series of conferences on the following topics: microorganisms in hydrothermal springs, the impacts of global change on the Arctic Ocean, the sea and human migration and an ecosystem approach to marine renewable resources.

During the workshops dealing with coastal environments that have become anoxic (without oxygen) due to excessive anthropic pressure, the impacts of climate change on the Southern Polar Ocean, human migrations, and the implementation of an ecosystem approach to fisheries, the journalists, in interaction with scientists, were able to develop the framework for future articles or interviews on these different topics and increase their network of contacts.

**More information :** <https://www.isblue.fr/actualites/formation/retour-sur-lecole-dete-mer-et-journalisme/>





**Mathieu Bégoc**  
*Master graduate in Applied Economics, 2019*

## FORMER MASTER'S STUDENT : **MATHIEU BÉGOC**

«After completing my Master's degree in Economics applied to the sea at the IUEM in 2019, I joined two consulting firms, in Paris and then in Nantes, specialising in the port and maritime professions. When I started my professional life, my training enabled me to understand the issues at stake in spaces that are constrained because of multiple uses and fragile environments.

The issue of fishing was particularly studied and it allowed me to accompany developing countries such as Comoros or Togo, to develop fisheries production in order to meet food security and sustainability issues. It also allowed me to quickly get my bearings when conducting strategic studies through the working method that had already been tried out in class.

For me, the three strong points of this training are :

- the rigour of economic reasoning
- specific and very high-level sectoral knowledge
- initiation to powerful, effective and applicable reasoning and analytic tools.»



**Laura Corsi**  
*Former PhD student,  
 LETG Brest (UMR 6554)*

## THESIS PRIZE OF THE NATIONAL COMMITTEE OF GEOGRAPHY

After a thesis in social geography at the local television station Tébéo, Laura is now a post-doctoral researcher at Labex Dynamite.

«I carried out a thesis as part of a CIFRE agreement (Conventions Industrielles de Formation par la Recherche) within Tébéo and the ID-iles programme (Initiatives and Développement in the Ponant Islands).

My work consisted in contributing to research on the installation of island neo-arrivals and the interactions of this phenomenon with territorial dynamics. Based on our work, I wrote the script of a film in a collaborative way, which I then shot, animated, edited, and broadcasted on the islands. In this way I produced a series of 19 programmes of 26 minutes each, featuring 179 participants.

I then analysed this experience through the concept of mediation, between the spheres of research, territories and television. The thesis was awarded the second thesis prize of the French National Committee of Geography.»



# ISblue

The interdisciplinary  
graduate school  
for the blue planet

## PARTICIPATING LABORATORIES AND RESEARCH UNITS

<b>AMURE</b> (CNRS, IFREMER, UBO)	Aménagement des usages des ressources et des espaces marins et littoraux / Management of the use of resources and marine and coastal areas
<b>DYNECO</b> (IFREMER)	Dynamique des écosystèmes côtiers/Department of coastal environment dynamics
<b>GM</b> (IFREMER)	Géosciences marines / Marine geoscience
<b>IRENAV</b> (ÉCOLE NAVALE)	Institut de recherche de l'École Navale / French Naval Academy research institute
<b>IRDL</b> (CNRS, ENIB, ENSTA BRETAGNE, UBO, UBS)	Institut de recherche Dupuy de Lôme / Research Institute Dupuy de Lôme
<b>LABSTICC</b> (IMT ATLANTIQUE, UBO, UBS, ENIB, ENSTA BRETAGNE, CNRS)	Laboratoire des sciences et techniques de l'information, de la communication et de la connaissance / Multidisciplinary research laboratory in the field of information and communication science and technology
<b>LBCM</b> (UBO, UBS)	Laboratoire de biotechnologie et chimie marine / Laboratory of marine biotechnology and chemistry
<b>LEMAR</b> (CNRS, IFREMER, IRD, UBO)	Laboratoire des sciences de l'environnement marin/ Laboratory of environmental marine sciences
<b>LEP</b> (IFREMER)	Laboratoire environnement profond / Laboratory of the deep sea environment
<b>LETG-BREST</b> (UBO, CNRS)	Littoral, environnement, télédétection, géomatique / Littoral, environment, remote sensing and geomatics laboratory
<b>LGO</b> (CNRS, UBO, UBS)	Laboratoire géosciences océan / Ocean geosciences laboratory
<b>LOPS</b> (CNRS, IFREMER, IRD, UBO)	Laboratoire d'océanographie physique et spatiale / Laboratory for ocean physics and satellite remote sensing
<b>LM2E</b> (IFREMER, UBO, CNRS)	Laboratoire de microbiologie des environnements extrêmes / Laboratory of microbiology of extreme environments
<b>RDT</b> (IFREMER)	Recherche et développement technologique / Technological research and development
<b>STH</b> (IFREMER)	Science et technologie halieutique / Fisheries science and technology
<b>MIXED SERVICE UNIT OF THE IUEM</b> (CNRS, IRD, UBO)	Institut Universitaire Européen de la Mer / European Institute for Marine Studies



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