

The ICM offers PhD positions to train the next generation of researchers in marine sciences

The Institut de Ciències del Mar (ICM) aims to train the next generation of researchers in marine sciences to build the future we imagine for our oceans. These PhD fellowships will be funded by the Spanish Ministry of Science and Innovation through a predoctoral call ([‘Ayudas para contratos predoctorales para la formación de doctores 2022’](#)).

Candidates should be admitted to a doctoral programme for the academic year 2022/2023 at the time of the beginning of the scholarship (no later than 1 October 2023). Besides, they must have a strong commitment to scientific research and have not yet been awarded a doctoral degree.

Interested candidates can only apply to one of the following projects, and it is highly recommended that they contact the researcher in charge before submitting the application:

- **Impact of photoperiod on the epi- and metagenomes in Atlantic cod (EPIMETA)** (Reference: CEX2019-000928-S-20-5, PI: Jorge Fernandes)
- **Elucidating the Southern Ocean Control of Atmospheric CO₂ using a Selection of paleo-archives and proxies (ESCACS)** (Reference: PID2021-122451OB-I00, PI: Carles Pelejero and Eva Calvo)
- **Microbial COLonization of Ocean paRticles: from mechanistic understanding to global patterns (MICOLOR)** (Reference: PID2021-125469NB-C3, PI: Josep M. Gasol, Marta Sebastián, Olga Sánchez and Laura Alonso-Sáez)
- **Connectivity of particle-attached prokaryotes across continental margins and their potential use as particle source and organic carbon degradation proxies (CONPART)** (Reference: CEX2019-000928-S-20-2, PI: Viena Puigcorbé and Pere Puig)
- **Application of the Multifractal Theory of Turbulence to the understanding of the flux of energy between scales in the upper ocean** (Reference: PID2021-123457OB-C2, PI: Jordi Isern-Fontanet and Lionel Renault)
- **Male reproductive endocrinology in fish** (Reference: PID2021-126128OB-I00, PI: François Chauvigne)

- **The Sponge Carbon Pump and the missing roles of marine sponges in biogeochemical cycles (Sponge-pump)** (Reference: PID2021-124856NB-I00, PI: Marta Ribes and Rafael Coma)
- **A Safe Operating Space for Penguins: fostering the present and future conservation of penguins and their associated marine systems** (Reference: CEX2019-000928-S-20-1, PI: Francisco Ramírez)
- **Assessment of the fate of methane in subseafloor sediments** (Reference: CEX2019-000928-S-20-4, PI: Marta Sebastián and Xavier Garcia)
- **Assessment of the effects of warming and emerging pollutants in marine zooplankton** (Reference: CEX2019-000928-S-20-3, PI: Montserrat Solé and Enric Saiz)

PhD fellows at ICM will receive a 4-year contract with a gross annual salary of 17,222€ for the first annuity; 18,452€ for the second annuity, and 23,065€ for the third and fourth annuity, apart from an additional grant of 6,860€ for mobility and training for the 4-year period.

The ICM encourages applications from highly motivated graduates from all over the world who wish to undertake a doctoral degree in marine sciences. Successful candidates will join research groups headed by top-level scientists and will carry out their research in cutting-edge fields of marine sciences in a stimulating environment.

Applications will be **open from 12 to 26 January 2023** through the following [link](#). We encourage future applicants to contact the Principal Investigators of the advertised offers.

About ICM

The ICM is the fourth largest research institute of the Spanish National Research Council (CSIC) and the largest dedicated to marine research. ICM researchers study most broadly marine topics and the global ocean as a whole. Under the motto “Ocean Science for a Healthy Planet”, the ICM conducts frontier research and foster both knowledge and technology transfer on topics related to ocean and climate interactions, conservation and sustainable use of marine life and ecosystems, and impact mitigation of natural and anthropogenic hazards.

Title: Impact of photoperiod on the epi- and metagenomes in Atlantic cod (EPIMETA)**PhD Supervisor:** Jorge Fernandes**Summary:**

Atlantic cod (*Gadus morhua*) is one of the most commercially important fish species worldwide and its aquaculture production has great potential for expansion. However, there are key knowledge gaps and bottlenecks that need to be overcome. The major challenge during the on-growing phase is the reduction in growth rate and even weight loss associated with precocious sexual maturation. Puberty initiates a shift of energy reserves towards the maturation of the gonads, which has a negative effect on growth, fillet quality and post-spawning mortality. This increases production time and results in significant economic losses for the cod farming industry. Moreover, precocious maturation has a negative impact on the environment, since sexually mature farmed cod can reproduce in sea cages and release fertilized eggs in the sea. It has been shown that application of continuous light from the summer solstice prior to maturation delays gonadal development to some extent but the underlying molecular mechanisms are poorly understood. Our novel hypothesis is that epigenetic mechanisms, such as DNA (hydroxy)methylation and histone modifications, play a key role in regulation of the puberty onset by photoperiod. Also, it is plausible that photoperiod-induced microbiota changes are involved in the modulation of growth and sexual maturation.

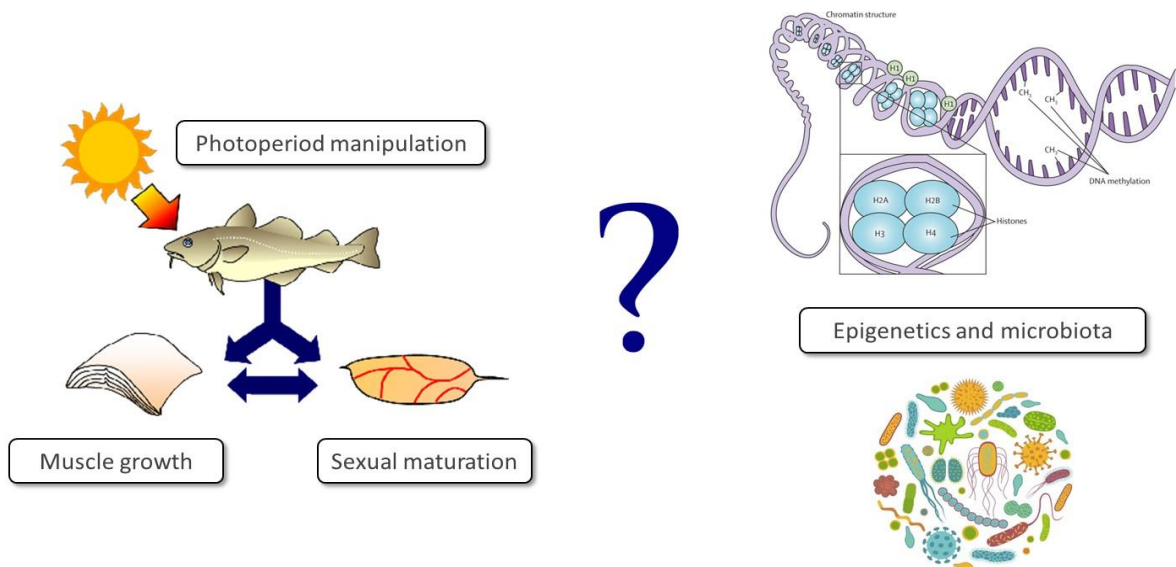
As illustrated below, the overall aim of this multidisciplinary PhD project is to investigate how photoperiod influences the metagenome and epigenetic landscape in relation to growth and sexual maturation in Atlantic cod. To achieve this, we will use cutting-edge epigenomic, metagenomic and transcriptomic approaches.

Specific objectives are:

1. To characterize genome-wide chromatin accessibility and gene expression in the pineal gland from light-stimulated and control Atlantic cod.
2. To obtain DNA methylome and transcriptome profiles in pituitary and muscle/gonads.
3. To characterize the gut microbiota using whole genome sequencing and to examine how it changes with photoperiod manipulation.
4. To integrate the data in the context of growth and sexual maturation.

In addition to providing exciting insights into the regulation of gene networks responsible for growth and puberty, the fundamental knowledge generated from this timely project will

provide substantial benefits to the cod farming industry, namely the identification of new targets to minimise the negative impact of maturation on growth performance and the development of molecular markers of puberty and growth for selective breeding programmes.



We are looking for a highly motivated candidate for this PhD position. EPIMETA will be implemented in cooperation with Nord University (Norway) and the successful applicant is expected to collaborate with a multidisciplinary team (www.jmofernandes.com) and spend some periods abroad. This project offers an exceptional opportunity for hands-on training in state-of-the-art methods, such as single-nuclei RNA-seq, single-cell ATAC-seq and Nanopore sequencing.

Requirements:

- MSc degree in Genomics, Bioinformatics, Marine Biology, Epigenetics or related fields
- Excellent academic record
- Solid background in Molecular Biology
- Hands-on experience in R and analysis of next-generation sequencing data are advantageous
- Proficiency in oral and written English

To be considered for this position, applicants are required to submit i) a motivation letter (max 1 page), ii) their curriculum vitae, including a list of publications (max 3 pages), iii) a research proposal of a potential research project (max 2 pages) and contact details for at least two referees.

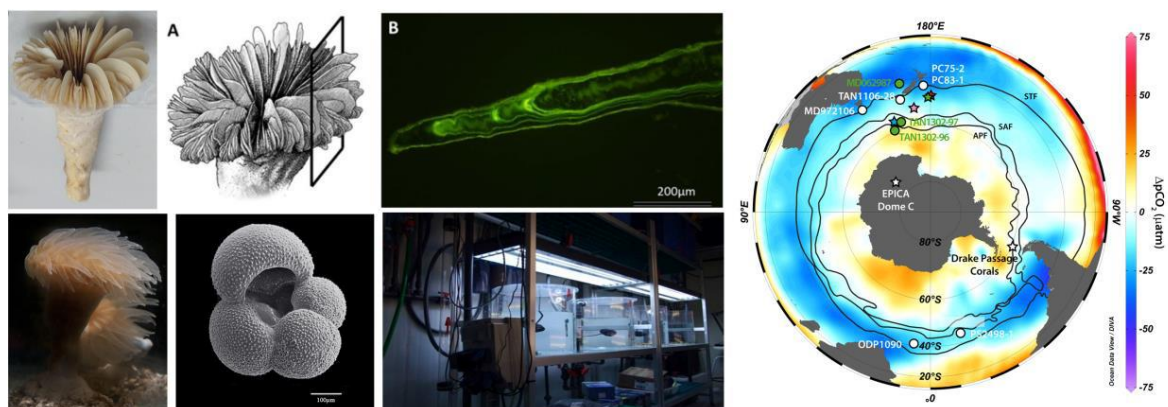
Contact: Jorge Fernandes (jorge.m.fernandes@nord.no)

Title: Elucidating the Southern Ocean Control of Atmospheric CO₂ using a Selection of paleo-archives and proxies (ESCACS)

PhD supervisors: Carles Pelejero and Eva Calvo

Summary:

An FPI (Formación de Personal Investigador) PhD contract is offered linked to the Spanish Ministry of Science and Innovation funded project ESCACS “Elucidating the Southern Ocean Control of Atmospheric CO₂ using a Selection of paleo-archives and proxies” (PID2021-122451OB-I00). The PhD Thesis will be undertaken within the Research Group of Marine Biogeochemistry and Global Change at Institut de Ciències del Mar, Barcelona (CSIC), focused in carrying out paleoreconstructions of acidity (pH) and concentration of dissolved CO₂ in the Southern Ocean waters using marine sedimentary cores and fossil cold water corals. Through the analysis of boron isotopes and specific organic compounds, reconstructions of these and other parameters related to the physics, chemistry and biology of the Southern Ocean will be carried out at glacial/interglacial scales and at different temporal resolutions. The student will also participate in the calibration of proxies related to pH in cold water corals through experiments in aquaria. This project will offer the opportunity of hands-on training in a number of cutting-edge analytical techniques, including MC-ICPMS and LA-MC-ICPMS, and will be undertaken in collaboration with research groups from Germany (Frankfurt University), Australia (University of Queensland), United States (Rutgers University) and the University of Barcelona.



We seek 1) Bachelor's degree in Chemistry, Geology, Environmental Sciences, Marine Sciences, Biology, Environmental Biology or similar; 2) Master's degree that allows access to a PhD program; 3) Very good level of English; 4) Good academic record; 5) Availability to carry out stays abroad; 6) Experience and/or interest in paleoceanography/paleoclimatology and chemical/geochemical analyses.



SALA DE PREMSA
press@icm.csic.es / www.icm.csic.es

We are interested in receiving expressions of interest asap to assess possible candidates.

Contact: Carles Pelejero (carles.pelejero@icrea.cat)

Microbial COLonization of Ocean paRticles: from mechanistic understanding to global patterns (MICOLOR)

PhD supervisors: Dr. Josep M. Gasol & Dr. Marta Sebastián (Institut de Ciències del Mar-CSIC, Barcelona), Dr. Olga Sánchez (Departament de Genètica i Microbiologia, UAB), & Dr. Laura Alonso-Sáez (AZTI-Tecnalia, Sukarrieta)

Summary:

MICOLOR is a marine microbial ecology project that studies the microbiome of oceanic particles ("sea snow") through oceanographic surveys and laboratory experiments. It will be carried out in coordination by three centers: The ICM in Barcelona, the Autonomous University of Barcelona, and AZTI, in Sukarrieta (Basque Country).

Project subject in which the thesis work fits:

We will study the microbiome (prokaryotes, eukaryotes and fungi, as well as their genes) of different types of ocean particles collected with various methods. Additionally, particles will be taken to the laboratory where their colonization and degradation will be studied. We will try to associate the composition of the microbiome with the degradation of the particles and the degree of ocean carbon sequestration. The project mixes oceanography, microbial ecology, genomics, ecology and biogeochemistry.



The student will be based in Barcelona, at the ICM, but will also do stays at AZTI and the UAB, in addition to participating in oceanographic campaigns in the Mediterranean, the Atlantic and the Cantabrian Sea and carrying out training stays abroad.

Requirements:

- Undergrad in Biology, Microbiology, Bioinformatics, Oceanography, Environmental Studies, or similar.
- Applicants will have to be enrolled or have been admitted to a doctoral program for the 2022/2023 course (although this can be formalized later).



- Good academic record. High or very high English level. Good writing abilities.
- Knowledge of R and/or python, statistical and bioinformatics tools, or the capability and motivation to learn these tools will be valued.
- Curiosity, desire to learn and capacity for teamwork.

Work team:

The selected candidate will join a dynamic group (<http://emm.icm.csic.es>) with more than 10 doctoral students and postdocs, and several lab technicians in a department and institute (<http://www.icm.csic.es>) which develops a large number of research projects on various topics and has received the Severo Ochoa distinction of excellence, the only marine center to have received it to date. The group maintains a firm commitment to training with its students to ensure maximum learning benefit, including participation in courses and conferences, stays in other laboratories, seminars and other training strategies. The group maintains close contact with national and international researchers in the fields of microbial ecology, molecular ecology, coastal ecology, microbiology, oceanography and biogeochemistry, so as to maximize the repertoire of topics available to the student. In addition, we are fully committed to the "10 simple rules towards healthier research labs" (<https://shorturl.at/iZ358>).

Web pages of the involved researchers: <http://emm.icm.csic.es/member/josep-m-gasol/>, <http://gent.uab.cat/olgasanchez/>, <http://marelab.es>.

Contact: Dr. Josep M Gasol (932309500, pepgasol@icm.csic.es)

Title: Connectivity of particle-attached prokaryotes across continental margins and their potential use as particle source and organic carbon degradation proxies (CONPART)

PhD supervisors: Viena Puigcorbé and Pere Puig

Summary:

Particle scavenging through the water column is an essential component of many marine biogeochemical cycles and is also a mechanism to remove atmospheric CO₂, thus impacting climate. In this context, there are increasing international research efforts devoted to developing a predictive understanding of the export and fate of global ocean primary production and its implications for present and future climate (e.g., EXPORTS (USA), COMICS (UK) and APERO (France)). Microbes colonize these organic particles and play a crucial role in their degradation along the water column. Changes in the particle microbiome reflect changes in particulate organic carbon lability, hence, the degree of connectivity among particle-associated microbial communities can potentially provide a new way of measuring particle degradation. ***CONPART aims to contribute to the understanding of the fate of marine particles by studying the synergies between particle-attached prokaryotic communities and organic carbon degradation throughout the transport across continental margins, via submarine canyons.*** The PhD will also study the structure-function relationship of the prokaryotic communities to ***assess the potential responses of these microbial communities to environmental changes, thus enhancing our capacity to predict if these responses could also impact the ocean's biogeochemical cycles at large-scale.***

The main general tasks to achieve the proposed aims are to:

- Quantify the carbon export and export efficiency by means of a multi-approach based on radiotracers
- Determine shifts in the taxonomic composition of prokaryotic communities along environmental gradients
- Assess changes in prokaryotic functions in the particles and evaluate the structure-function relationship
- Characterize the biogeochemical composition of the sinking particles and surface sediments and link that to the microbial colonizers, their community structure, and their functionality



This project will be conducted in the Palamós Canyon (NW Mediterranean). Extensive work has been done in this submarine canyon, providing detailed background information on its geomorphology and sedimentary dynamics. Microbial communities have not been studied in detail in this area (nor almost in any sedimentary system of the NW Mediterranean), which per se is a highly innovative aspect. CONPART will be supported by 3 funded projects: BACRAD (PI: V. Puigcorbé); ARCO (PI: P. Puig) and MICOLOR (PI: JM Gasol) and will bridge two very relevant lines of research at ICM: Microbial Ecology and Sedimentary Dynamics.

The PhD candidate will benefit from the multidisciplinary character of the project and will be trained in state-of-the-art i) molecular biology and genomic techniques, ii) use of radiotracers and iii) sedimentary particle dynamics. CONPART relies on already planned oceanographic cruises, robust international collaborations, and all the necessary infrastructure and instrumentation existing at the ICM to allow the PhD candidate to develop an innovative and impactful research project and gain a unique scientific toolbox that will be highly advantageous when targeting issues related to Global Change and for opting to future competitive postdoctoral grants.

To be considered for this role, the requirements are:

- Master's degree in molecular biology, biochemistry, biotechnology, marine sciences or similar
- Experience in molecular biology and bioinformatics is desirable
- Knowledge in R software will be an asset
- Highly developed written and verbal communication skills
- Highly developed organisational skills with ability to set priorities and to meet deadlines
- Ability to work independently, show initiative, problem solve and work as part of a team
- Availability to travel and participate in oceanographic expeditions

Contact: Viena Puigcorbé (vienap@icm.csic.es)



Title: Application of the Multifractal Theory of Turbulence to the understanding of the flux of energy between scales in the upper ocean

PhD supervisors: Jordi Isern-Fontanet (ICM-CSIC) and Lionel Renault (LEGOS-IRD)

Summary:

Predicting the evolution of a turbulent flow such as the ocean motion remains a long-standing problem in physics. Beyond the difficulties of developing a closed theory from fundamental laws, the range of interacting scales involved in oceanic motions, i.e., between 10⁻³ and 10⁷ m, is too large to be resolved by ocean and climate numerical models. As a consequence, some kind of parameterizations of the unresolved processes has to be implemented to correctly reproduce the flux of energy between scales. But, the details of such flux in the ocean are rather complex and still poorly understood. As a result, the required parameterizations introduce biases and errors in ocean models that affect both scientific analysis and decision making in a wide range of applications with ecological, economical and societal impacts.

Within this context, the proposed PhD will investigate the processes responsible for the energy fluxes in the upper ocean (upper 1000 m), which should lead to propose better parametrizations of unresolved processes and, thus, reduce the biases and errors in present-day hydrodynamic models of the ocean. The approach that will be followed will consist on the systematic application of recent advances in turbulence analysis and the multifractal theory of turbulence to both idealized direct numerical simulations of turbulence and realistic numerical simulation of ocean currents.

The PhD candidate will be hosted at the *Institut de Ciències del Mar* (ICM-CSIC, Barcelona) but, she/he will regularly visit Dr. Lionel Renault at the *Laboratoire d'Études en Géophysique et Océanographie Spatiales* (LEGOS-IRD, Toulouse). Depending on the needs of the PhD candidate, she/he will be invited to assist to specific courses devoted to ocean modeling, turbulence, etc. The training of the PhD student will be complemented with a training on communication skills through his/her regular participation in internal seminars and his/her participation in international meetings.

We are seeking for a highly motivated candidate with a degree in physics or mathematics. Related disciplines will be considered.

Contact: Jordi Isern-Fontanet (jisern@icm.csic.es)



Title: Male reproductive endocrinology in fish

PhD supervisor: François Chauvigne

Summary:

The Laboratory of Molecular Endocrinology of Spermatogenesis, situated at the Institute of Marine Sciences (ICM-CSIC) in Barcelona, is seeking a highly skilled and motivated PhD student candidate for a 4-years predoctoral contract. The work will be focused on a project that aims at finding **novel biotechnological solutions to oligospermia in a cultured fish**, the Senegalese sole, by synchronizing the entire spermatogenic process to obtain a higher number of viable spermatozoa.

The PhD student will be trained in various techniques of molecular and cell biology, such as FACS, immunoblotting, CASA, histology, immunofluorescence microscopy and cell culture. The PhD student will also benefit from ongoing national and international collaborations with top-quality laboratories. The research will be developed at the ICM-CSIC with some experiments performed at the Institute of Biotechnology and Biomedicine (IBB), located at the Universitat Autònoma de Barcelona (UAB). The contract is funded by the Spanish Ministry of Science and innovation and will start in spring/summer 2023.

The **specific requirements for the position** are:

- To hold a Msc master degree in Biotechnology, Biochemistry, Biology or related fields before September-October 2022, when candidature has to be sent.
- To have a demonstrated background in molecular biology and/or biotechnology.
- And ideally to have prior experience in reproductive biology, and particularly on spermatogenesis

For a glimpse of the current research interests of the group, please check the recent publications at <https://www.researchgate.net/profile/Francois-Chauvigne>

Applicants should send their expression of interest, a detailed curriculum vitae, and names and email addresses of at least two references to chauvigne@icm.csic.es

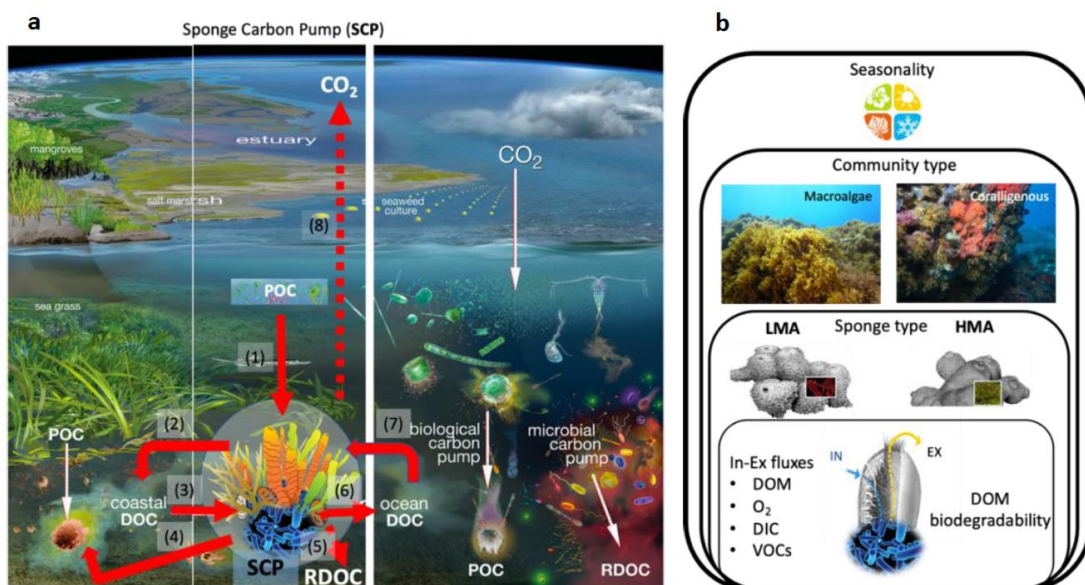
Contact: François Chauvigne (chauvigne@icm.csic.es)

Title: The Sponge Carbon Pump and the missing roles of marine sponges in biogeochemical cycles (Sponge-pump)

PhD supervisors: Marta Ribes and Rafel Coma

Summary:

An FPI predoctoral contract, funded by the “Ministerio de Ciencia e Innovación”, is offered for a PhD student in the project: “**The Sponge Carbon Pump and the missing roles of marine sponges in biogeochemical cycles (Sponge-pump)**” (PID2021-124856NB-100). The PhD thesis will be carried out within the Marine Biogeochemistry and Global Change group at the Institute of Marine Sciences (ICMCSIC) in collaboration with the Center for Advanced Studies in Blanes (CEAB-CSIC). In the conceptual framework of the Sponge-pump project, it is hypothesized that in coastal areas marine sponges can play an important role as transformers of dissolved organic matter (mostly produced by algae), into less edible compounds and therefore “sequestering” CO₂ from the atmosphere. Within this framework, this thesis aims to evaluate the hitherto overlooked fluxes of volatile organic compounds (VOCs) from/to the benthos (macroalgae and sponges). VOCs, although present at low concentrations in seawater, play key roles in chemical communication and defense mechanisms, as well as in atmospheric chemistry and climate regulation. In coastal areas, the main source of VOCs is suggested to be macroalgae and, most probably, sponges are one of the key consumers due to their water pumping capabilities and the broad diversity of metabolic processes conferred by the associated microbiota.



The qualifications and abilities we seek are: 1) Degree in Biology, Chemistry, Environmental sciences, Marine sciences or similar; 2) Master’s degree that allows access to a doctoral



program; 3) Very good level of English; 4) Good academic record; 6) Experience and/or interest in chemical analyses and lab work; 5) Availability to stay abroad for a while; 7) Field work experience.

There is still no exact date for the publication of the call in the “BOE”, although it is foreseeable that it will occur in the coming days. However, we accept expressions of interest to evaluate potential candidates

Contact: Marta Ribes (mribes@icm.csic.es)

Title: A Safe Operating Space for Penguins: fostering the present and future conservation of penguins and their associated marine systems

PhD supervisor: Francisco Ramírez

Summary:

Oceans provide humans with natural benefits such as seafood provisioning, carbon storage and climate regulation—the so-called ecosystems services. However, they are also vulnerable to a wide range of climate and anthropogenic threats. Identifying present and future key marine areas and species that require specific management and conservation actions is a major societal challenge that can contribute to adapt and mitigate environmental consequences of Global Environmental Change (GEC); and move towards the necessary shift to sustainability. However, this may represent a major challenge for marine conservation today because of the lack of holistic approaches based on the combination of reliable spatial-temporal information on the simultaneous distribution of key marine species and main stressors in the complex, remote and vast oceans. In this PhD project, the student will incorporate the highly interdisciplinary research team of the project SOSPEN (PID2021-124831OA-I00), which is aimed at contributing to the present and future conservation and sustainable use of marine communities and ecosystem services of the southern hemisphere.

The project will focus on penguins as ‘sentinel’ species for environmental health monitoring. Penguins are widely distributed through the southern hemisphere, and, because of their charismatic appeal, they may act as “ambassadors” and play a vital role in education to help explain environmental issues to the public. Penguins are facing severe threats and deserve conservation priority, but may also act as “umbrella/flagship” species and promote the conservation of key marine ecosystems while supporting living resources and, therefore, essential economic, nutritional, recreational and health needs of societies.

The student will contribute to compile the most comprehensive dataset on penguin biology and ecology (e.g. diets, dynamics, and distributions). This information will be combined with highly resolved spatial assessments for climate impacts and human stressors within cutting-edge, spatial-temporal marine ecosystem modelling tools for hindcasting and forecasting penguin responses to different scenarios of climate change and human driven pressures. This will contribute to the scientific capability to project what the future marine ecosystems in the southern hemisphere may look like and how different scenarios may play out. The project will provide, therefore, the necessary framework and scientific knowledge to enrol citizens



and stakeholders in reliable and effective management and conservation actions to preserve the highly valuable marine ecosystems and the associated ecosystem services.

Requirements: Bachelor in Biology, Marine Sciences, Environmental Sciences or similar. Fluent English. Interest and some experience in Marine and Spatial Ecology studies are desirable.

Contact: Francisco Ramírez (ramirez@icm.csic.es)



Title: Assessment of the fate of methane in subseafloor sediments

PhD supervisors: Marta Sebastián and Xavier Garcia

Summary:

Methane is a potent greenhouse gas, and therefore assessing the sources of methane to the ocean and atmosphere is fundamental in the current scenario of global change. Ice sheet mass loss and posterior isostatic rebound can trigger the release of massive amounts of methane stored in gas hydrates. In the Northern Antarctic Peninsula gas hydrates are currently under unstable conditions due to this isostatic rebound, which could potentially release this powerful greenhouse gas. Some of the methane released from the hydrates is consumed by microbial activity, but sediments also harbor microbes able to generate methane, and bubbles detected in the water column suggest that not all gas is consumed, indicating a complex relationship between generation, storage and transport of gas in sediments to the surface. In this PhD project the student will be part of an interdisciplinary team to evaluate the budget and fate of methane gas on subseafloor sediment by combining microbiological analyses with shallow geophysics, geological and chemical approaches. Specifically, the main goals of the project are to:

1. Evaluate the budget between genesis and consumption of methane
2. Investigate the diversity and metabolic potential of gas hydrate-associated microbial communities, with the aim having a predictive understanding of methane dynamics.
3. Establish links between geophysical data and sediment chemical and microbiological properties.
4. Extrapolate the results obtained in objective 3 to larger areas where geophysical data are available, with the aim of estimating regional methane budget and dynamics.

To achieve these goals the student will attend the ICEFLAME cruise planned for early 2024, where she/he will oversee the collection, storage and onboard analysis of samples. The student will need to master usage of Unix and R or Python and gain expertise on specific software needed for the treatment of geophysical data, GIS, on bioinformatic treatment of sequencing data, and microbiological, molecular and microscopy techniques.

Requirements:

- Master degree in Environmental Sciences, Marine Sciences, Biology, Microbiology, Bioinformatics, Oceanography, or similar.



- Good academic record. High or very high English level. Good writing abilities.
- Knowledge of R/Python, statistical tools, as well as bioinformatics tools.
- Motivation to learn and to work as a team.

Working environment:

The selected candidate will join a dynamic institute (<http://www.icm.csic.es>) that develops a good number of research projects of varied themes. The PhD advisors maintain a firm commitment to training students to ensure maximum learning benefit, including participation in courses and conferences, stays in other laboratories, seminars and other training strategies. Given the multidisciplinary approach of this project, the student will be working in each of the supervisor's groups and will collaborate with other researchers from the ICEFLAME project, including international partners. As part of her/his training, the student will attend courses on soft skills such as writing and communication, including dissemination and outreach skills.

Contact: Marta Sebastián: msebastian@icm.csic.es (EEM group <https://emm.icm.csic.es/>)



Title: Assessment of the effects of warming and emerging pollutants in marine zooplankton

PhD Supervisors: Montserrat Solé and Enric Saiz

Summary:

Zooplankton are key components of the marine pelagic food web currently threatened by the progressive increase of water temperature and by the growing threat of emerging pollutants, such as plastic, in the oceans. The consequences of emerging contaminant exposures in a climate change scenario, however, have been scarcely studied. In particular, plastic litter (and their derivatives such as plastic additives and mostly plasticisers) is a topic of great concern for their large presence in the marine environment and for the bioaccumulation effects it may cause in marine organisms, including zooplankton. This is a topic of great relevance for its potential impact on the ecological and fisheries resources, since zooplankton are the link between primary producers and fish but also have a crucial role in the biological pump (export of carbon to deep waters) and in nutrient regeneration.

The main objective of this Ph.D proposal will be to assess the response of zooplankton to stressing factors such as emerging contaminants under a scenario of increased ocean temperature. We aim to evaluate the physiological and biochemical effects of environmental chemical stressors, alone or combined with temperature, on marine zooplankton. Particularly, we will focus on the feeding, growth, and reproductive performance of the zooplankters as physiological endpoints, combined with the determination of biomarkers of chemical exposure in an ecotoxicological approach under the different environmental scenarios.

We are seeking for a highly motivated candidate with a very good academic record and fluent in English. Only candidates with degrees in biological sciences or related disciplines will be considered. Interest/experience on ecology, zoology and ecotoxicology will be valued. The tasks will involve handling of zooplankton cultures, laboratory experimentation and determination of physiological and biochemical parameters.

Contact: Montserrat Solé (msole@icm.csic.es)