CONVOCATORIA JAE INTRO ICU 2024

FICHA DESCRIPTIVA

Becas de introducción a la investigación en el Instituto de Ciencias del Mar (ICM)

a. Correo electrónico de contacto: projectes-osr@icm.csic.es

b. Número de becas: Hasta 18 becas.

c. Periodo y duración de cada beca: definida en cada plan de formación, la fecha de inicio se podría convenir con el/la investigador, preferible inicio 1 de abril de 2024

ICM-01: 9 meses; **ICM-02**: 6 meses; **ICM-03**: 10 meses; **ICM-04**: 10 meses; **ICM-05**: 10 meses; **ICM-06**: 10 meses; **ICM-07**: 8 meses; **ICM-08**: 10 meses; **ICM-09**: 6 meses; **ICM-10**: 5 meses; **ICM-11**: 10 meses; **ICM-12**: 6 meses; **ICM-13**: 10 meses; **ICM-14**: 10 meses; **ICM-15**: 10 meses; **ICM-16**: 5 meses; **ICM-17**: 10 meses; **ICM-18**: 5 meses

d. Importe total de cada beca, mensualidades y dotación adicional: No hay dotación adicional.

ICM-01: 7.200€ (800€/mes); **ICM-02**: 6.000€ (1.000€/mes); **ICM-03**: 10.000€ (1.000€/mes); **ICM-04**: 8.000€ (800€/mes); **ICM-05**: 6.000€ (600€/mes); **ICM-06**: 10.000€ (1.000€/mes); **ICM-07**: 4.800€ (600€/mes); **ICM-08**: 6.000€ (600€/mes); **ICM-09**: 3.600€ (600€/mes); **ICM-10**: 3.000€ (600€/mes); **ICM-11**: 6.000€ (600€/mes); **ICM-12**: 4.200€ (700€/mes); **ICM-13**: 6.000€ (600€/mes); **ICM-14**: 9.000€ (900€/mes); **ICM-15**: 8.000€ (800€/mes); **ICM-16**: 3.000€ (600€/mes); **ICM-17**: 10.000€ (1.000€/mes); **ICM-18**: 3.000€ (600€/mes)

e. Tiempo máximo semanal de dedicación de las personas beneficiarias: 20 horas

f. Requisitos específicos solicitados a las personas solicitantes, además de los generales establecidos en la convocatoria:

i. Rama de Grado: Estar cursando un Grado en Biofísica para el plan **ICM-09**, un Grado en Estudios de Género para el plan **ICM-12**, y no estar en posesión o disposición legal de obtener un título de Doctor en el caso de todos los planes de formación.

ii. Nota media del expediente académico del Grado: definida en cada plan de formación en la escala de 0-10.

ICM-01: nota media 7; **ICM-02**: nota media 7; **ICM-03**: nota media 7; **ICM-04**: nota media 8; **ICM-05**: nota media 5,5; **ICM-06**: nota media 5; **ICM-07**: nota media 7; **ICM-08**: nota media 7,5; **ICM-09**: nota media 7; **ICM-10**: nota media 7; **ICM-11**: nota media 7; **ICM-12**: nota media 8; **ICM-13**: nota media 7,5; **ICM-14**: nota media 7; **ICM-15**: nota media 6; **ICM-16**: nota media 8; **ICM-17**: nota media 5; **ICM-18**: nota media 7.

iii. Máster Universitario Oficial: Estar cursando en el curso actual o estar admitido o matriculado en el curso 2024-2025 en un Máster Universitario de los definidos en cada plan de formación.

- **ICM-01**: Ciencias Medioambientales (Biología, Bioinformática, Ciencias del Mar);
- **ICM-02**: Master in Health & Science Management (UAB);
- **ICM-03**: related to Economic Management or to Experimental Sciences;
- **ICM-04**: Oceanography, Marine Sciences, Archaeology or Statistics;
- **ICM-05**: Matemáticas, Física o Ingenierías Informática o Telecomunicaciones;
- **ICM-06**: any field that can be related to Knowledge Transfer;
- **ICM-07**: Applied Microbiology, Biotechnology or Biomedical Science;
- **ICM-08**: Science or Engineering;
- **ICM-10**: Advanced Telecommunications Technologies, Telecommunications Engineering, or Computer Vision;
- **ICM-11**: Mathematics, Physics, Engineering or similar;
- **ICM-13**: Ciencias, Ciencias Sociales, Ciencias de la Educación o Ciencias del Mar.
- **ICM-14**: Social Sciences or Natural Sciences;
- **ICM-15**: Mathematics and Statistics;
- **ICM-16**: Master in Science of Engineering;
- **ICM-17**: Ciencias o Ciencias de la Salud;
- **ICM-18**: Engineering, Marine Sciences or Environmental Sciences.

iv.Otros méritos:

- **ICM-04**: Should hold a Bachelor in Biology, Marine Sciences, Archaeology or Palaeontology. Skills in statistics and programming in R will be considered positive;
- **ICM-05**: English and programming skills (Python);
- **ICM-06**: Spoken and written Catalan, Spanish and English;
- **ICM-07**: English;
- **ICM-08**: Competence in python programming is a must. Basic understanding of biomechanics is desirable;
- **ICM-12**: Very good English skills;
- **ICM-13**: Se valorará positivamente las actividades y acciones de voluntariado social y naturalista, medioambiental o de divulgación;
- **ICM-14**: Se valorará experiencia en comunicación;
- **ICM-17**: Priority will be given to candidates with experience in bioinformatics and/or biotechnology.

g. Planes de formación ofertados y personal investigador:

1. Plan de formación ***ICM-01: Changes of microbial eukaryotic communities across the deep chlorophyll maximum in contrasted oceanic areas*** *IP: Ramon Massana*
2. Plan de formación ***ICM-02: Post-award support assistant*** *IP: Marta Vendrell, co-IP: Sònia Sagristà*
3. Plan de formación ***ICM-03: Pre Award support*** *IP: Sònia Sagristà, co-IP: Marta Vendrell*
4. Plan de formación ***ICM-04: Disentangling the impact of climate change through a historical and paleoecological reconstruction of the Mediterranean marine ecosystems*** *IP: Maria Bas*
5. Plan de formación ***ICM-05: Improving Sea Surface Temperature satellite maps in a global warming context*** *IP: Cristina González Haro, co-IP: Joaquim Ballabrera*
6. Plan de formación ***ICM-06: ICM Transfer Officer Assistant*** *IP: Francesc Piferrer*
7. Plan de formación ***ICM-07: Exploiting unique CRISPR-Cas9 nucleases from Polar Regions*** *IP: Silvia Gonzalez Acinas*
8. Plan de formación ***ICM-08: Kinetic analysis of Spider crab movement to guide the development of an underwater legged robot*** *IP: Giacomo Picardi, co-IPs: Nathan Jack Robinson y Jacopo Aguzzi*
9. Plan de formación ***ICM-09: Modelización huésped parasito en el sistema planctónico costero.*** *IP: Esther Garcés*
10. Plan de formación ***ICM-10: Correcting ECMWF ocean forcing biases with Deep Learning*** *IP: Evgeniia Makarova*
11. Plan de formación ***ICM-11: Operational research and optimization processes in studies of marine species' movements and connectivity between marine habitats*** *IP: Francisco Ramírez, co-IP: David Romero*
12. Plan de formación ***ICM-12: Integrating the gender dimension in ICM's research*** *IP: Silvia Donoso*
13. Plan de formación ***ICM-13: Avaluació de programes d'educació i formació de professorat*** *IP: Carine Simon*
14. Plan de formación ***ICM-14: Dissemination and Exploitation of Research Results – the case of PETRI-MED*** *IP: Marco Talone, co-IP: Elisa Berdalet*
15. Plan de formación ***ICM-15: Network modelling for marine ecological applications*** *IP: Marta Coll, co-IP: David Romero*
16. Plan de formación ***ICM-16: Characterization of hurricane structure from satellite-derived wind fields*** *IP: Marcos Portabella Arnús*

17. *Plan de formación* ***ICM-17: Marine Virus Endolysins (MaVE)*** *IP: Felipe Hernandes Coutinho*

18. *Plan de formación* ***ICM-18: On sustainable fish farming: an oceanic route with a global impact on social, economic and environmental aspects*** *IP: Josep L Pelegrí*

h. Composición de la Comisión de Selección:

1) Presidencia: Valentí Sallarès Casas

2) Vocales:

i) Vocal 1, Marta Vendrell Corbalán, Gerente del ICM-CSIC

ii) Vocal 2, Josep Mª Gasol Piqué, Director Científico Severo Ochoa

3) Secretaria: Neus Figueras Balaña, Gestora de proyectos de la Oficina de Soporte a la Investigación

Firmado electrónicamente por la dirección del ICM

i. Descripción de los programas:

1. **ICM-01: Changes of microbial eukaryotic communities across the deep chlorophyll maximum in contrasted oceanic areas** IP: Ramon Massana (ramonm@icm.csic.es)

   The deep chlorophyll maximum (DCM) is a subsurface region in most oceanic systems where a peak of pigmented biomass occurs. Typically it forms a thin layer (a few meters wide) at depths of 50 to 100 meters where very strong gradients of light, temperature and inorganic nutrients converge. Therefore, it is expected that the phototrophic microbial populations forming the DCM, both unicellular cyanobacteria and a wide taxonomic array of microbial eukaryotes also vary along this biological structure. However, most studies investigating the DCM have sampled at rough vertical resolution, leaving the fine spatial structure poorly characterized. Here we will take advantage of previous fine samplings of about 10 depths across the DCM structure in several Mediterranean and Atlantic stations. Environmental DNA has been extracted from these samples and a metabarcoding dataset of the V4 region of the 18S rDNA has been generated. The objective of this master will be to analyze this already available sequencing dataset to a) identify the main taxonomic groups of microbial eukaryotes forming these oceanic structures, b) describe fine vertical changes of eukaryotic groups and species, and c) identify particularities and generalities by comparing the DCM surveys available. The master candidate will acquire expertise in the management of large sequencing datasets under the R package phyloseq and in standard routines for sequence alignments and phylogenetic trees. She/he will gain knowledge in the use of molecular tools to study the biodiversity and environmental variation on of microbial assemblages, known to exert critical functions in the marine ecosystem.

2. **ICM-02: Post-award support assistant** IP: Marta Vendrell (gerencia.icm@csic.es), co-IP: Sònia Sagristà

   Streamlining the workflow and scheme support to researchers related to the following tasks:
   - Supporting researchers in the financial management of the awarded funds
   - Supporting researchers in the follow-up of the scientific reporting of active projects
   - Advising researchers on compliance requirements towards funding bodies
   - Support in project management aspects (such as amendment requests), liaising with funding bodies, CSIC administration, and researchers.

3. **ICM-03: Pre Award support** IP: Sònia Sagristà (ssagrista@icm.csic.es), co-IP: Marta Vendrell

   Streamlining the workflow and scheme support to researchers related to the following tasks:
   - Screening and identification of funding opportunities
   - Administrative requirements for grants applications

- Compliance requirements towards funding bodies in awarded projects
- Support in grant application and management aspects

4. **ICM-04: Disentangling the impact of climate change through a historical and paleoecological reconstruction of the Mediterranean marine ecosystems** IP: Maria Bas (mbas@icm.csic.es)

   Climate warming severely affects marine ecosystems, with food-web simplification and a general decline of marine animal biomass negatively affecting human societies worldwide. Yet, the mechanisms behind these changes remain unclear, mainly because most studies use modern data to form their initial baselines and hypotheses, which are already affected by human-induced climate change and lack future data to validate their predictive models. Looking to the deeper past, during the Early-Middle Pleistocene Transition, the climate system shifted to its modern state of 100-kyr glacial-interglacial cycles. The geological past holds periods when the climate changed in ways similar to those taking place at present, which can be used as analogues, to predict the impact of climate warming on marine ecosystems. The Mediterranean Sea is one of the hotspot areas of the world exhibiting high increases in the sea surface temperature and extreme events and human exploitation of marine resources has also been documented since prehistoric times. This project aims to evaluate and enhance our understanding of the long-term impact of climate change on the marine fauna of the Mediterranean Sea using paleo- and historical ecology perspectives. It is proposed a comparative study of the modern and ancient marine ecosystems can allow us to isolate the relative contributions of the environmental stressors in the Mediterranean Sea today and provide meaningful recommendations for the management and conservation of the marine resources in the region. The student will be trained through the entire fellowship providing him/her with an interdisciplinary skill set, from paleontological, archaeological and historical disciplines (analysing the literature and doing data treatment) to modelling (species distribution models).

5. **ICM-05: Improving Sea Surface Temperature satellite maps in a global warming context** IP: Cristina González Haro (cgharo@icm.csic.es), co-IP: Joaquim Ballabrera

   The Sea Surface Temperature (SST) plays key role in monitoring the state of the ocean through the seasons of the year. But it is also a key variable to predict and assess the impact of climate change. Sensors mounted in satellite platforms have provided global and synoptic observation of SST during the last forty years.. At the Institut de Ciències del Mar (ICM) premises, a satellite receiving station was working from 2001 to 2022. This station received satellite observations from NOAA and EUMETSAT satellites and feeded a processing chain to retrieve SST observations for the Mediterranean region. Using the experience acquired during that period, we aim to reprocess the temperature record at the Mediterranean region to reduce uncertainties in the surface temperature data, a step necessary to better determine SST trends.

6. **ICM-06: ICM Transfer Officer Assistant** IP: Francesc Piferrer (piferrer@icm.csic.es)

Assistance to Knowledge Transfer Officer. Of the many aspects, there could be material for a project of interest for the candidate, e.g., mapping of KT activities, hypothesis testing, etc.

7. **ICM-07: Exploiting unique CRISPR-Cas9 nucleases from Polar Regions** IP: Silvia Gonzalez Acinas (sacinas@icm.csic.es)

   CRISPR-Cas genome editing is probably the biggest scientific discovery of the century and is having, and would have, a tremendous impact on biomedicine and biotechnology. The heart of this technology is Cas nucleases that bind and cut DNA at specific sites in the genome. The recognition of these sites depends on PAM sequences. The most common Cas nuclease, Cas9, uses NGG as a PAM sequence. Despite genomes present many NGG sites, there are regions uncovered by this PAM. This is relevant because for certain CRISPR-Cas assays would need to target small sequences, such as microRNAs, that may not have NGG sites. Our group is currently working on establishing two patent licenses for the use of two cas9 enzymes retrieved from the deep ocean and the goal of this proposal is to expand the search for novel CRISPR-Cas sequences from two resources: i) new microbial metagenomes from photic and deep ocean from polar regions and ii) bacterial isolate genomes sequences from polar sea water, sea-ice and sediments.

8. **ICM-08: Kinetic analysis of Spider crab movement to guide the development of an underwater legged robot** IP: Giacomo Picardi (gpicardi@icm.csic.es), co-IPs: Nathan Jack Robinson y Jacopo Aguzzi

   The proposed project exists at the interface of robotics and marine biology. Specifically, we will collect and analyze data on how European spider crabs (Maja squinado) coordinate the movement of their legs to tackle various types of marine terrain, and then use this information to guide the development of control strategies for a bio-inspired Underwater Legged Robot (ULR). This project will fill an important knowledge gap as while several studies have already conducted gait analyses on European spider crabs on flat terrain, no current studies have assessed how these animals alter their gate when presented with variable terrains or steep/sheer inclines.
   The JAE student will be involved in all the phases of the project, including the experimental design, data collection at an aquarium (the Oceanografic) in Valencia, and finally the application of the data collected from the crabs to the ULR. More specifically, the student will be responsible for:
   - Designing the experimental setup (number of individuals, number and type of terrains tested, use of external stimuli to trigger the crabs movement, duration of footage for analysis, etc…)
   - Preparing the filming tanks at the Oceanografic and perform data collection.
   - Labelling of the video dataset and performing motion tracking of joints using DeepLab Cut Software for markerless pose estimation.
   - Performing a gait analysis for the selected terrains.
   - Collecting morphological measurements on each video tracked individual, i.e. dry and underwater weight, length and weight of individual body parts, joint stiffness and range, tenacity of dactyls, etc …

- Scaling and adaptation of the strategies adopted by spider crabs to the ULR SILVER2 and benchmarking with respect to existing control strategies.

The student will be supervised by Dr. G. Picardi, who will provide expertise in biomechanics, visual tracking methodologies, robotics, and access to the ULR SILVER2. The student will also be supervised Dr. N.J. Robinson, who will provide expertise in spider crab physiology, experimental design involving live animals, and access to the Oceanographic facilities.

9. **ICM-09: Modelización huésped parasito en el sistema planctónico costero.** IP: Esther Garcés (esther@icm.csic.es)

   El estudio de los microorganismos marinos ha avanzado en las últimas décadas, pero todavía hay mucho por aprender sobre la diversidad y funciones de estos organismos, incluyendo el parasitismo, que es una forma poco estudiada de nutrición y plantea desafíos en la modelización de ecosistemas. Los parásitos pueden acceder a concentraciones más altas de materia orgánica y controlar proliferaciones tóxicas de dinoflageladas, y las preguntas en este campo de investigación son diversas. En mi grupo trabajamos para entender mejor estos procesos y las actividades de los organismos huéspedes y parásitos a nivel individual en las redes de plancton, mediante trabajos de campo y estudios de fisiología de laboratorio. El estudio de los parásitos y sus interacciones con sus huéspedes en el ecosistema marino requiere de modelos matemáticos precisos y fiables para comprender mejor estos procesos y predecir sus efectos. A través de modelos matemáticos, podemos estudiar cómo las especies de parásitos afectan a la dinámica poblacional de sus huéspedes, predecir sus efectos y entender el impacto en el ciclo de carbono.
   Se buscan estudiantes interesados en ecología, interacciones bióticas y modelización de las interacciones biológicas con interés por la modelización matemática para entender el parasitismo y los efectos que puede tener en los ecosistemas marinos. Los objetivos de esta formación serán:
   - 1-Comprender el papel del parasitismo de protistas marinos en los ecosistemas marinos y su impacto en la biodiversidad marina.
   - 2-Desarrollar habilidades en modelización matemática para analizar y predecir patrones de parasitismo en protistas marinos.
   - 3-Aprender a utilizar herramientas de software especializadas en modelización matemática y análisis de datos para estudios de parasitismo en protistas marinos.
   - 4-Identificar y analizar datos empíricos relevantes para la construcción de modelos de parasitismo en protistas marinos.

10. **ICM-10: Correcting ECMWF ocean forcing biases with Deep Learning** IP: Evgeniia Makarova (makarova@icm.csic.es)

    Global Numerical Weather Prediction (NWP) model sea-surface wind output is commonly used to force ocean models due to their time and space continuity. However, the output of the NWP models presents local biases, with one of the most systematic and longstanding biases in the sea surface wind direction. After the assimilation of the stress-equivalent winds measured by scatterometers, the European Centre for Medium-Range Weather Forecasts (ECMWF) model output still presents the mentioned biases, which need to be corrected since

they mostly represent unresolved geophysical processes by NWP models. The aim of this project is to predict the NWP model biases with the use of deep learning based on other NWP atmospheric and oceanic parameters, which are thought to be related to the resulting biases, as inputs.
After preparing the ECMWF ERA5 and scatterometer datasets, the selected candidate will select several Deep Learning architectures suitable for the task and choose the best performing ones on a test subset for further validation . The second validation step will be done against an independent scatterometer dataset that is not used in model training. If the trained model shows significant error reduction in the second validation step, it will be further selected to be trained on the operational ECMWF dataset and used to correct the operational ocean-forcing forecasts.
The selected candidate for this work should have some experience with Deep Learning libraries and be able to implement some of the architectures used in computer vision/time series analysis. He or she should also be able to process efficiently big quantities of georeferenced numerical data to prepare the training and validation datasets.

11. **ICM-11: Operational research and optimization processes in studies of marine species' movements and connectivity between marine habitats** IP: Francisco Ramírez (ramirez@icm.csic.es), co-IP: David Romero

Marine habitats are extensive, and the distribution of marine resources is uneven. To access and exploit these resources, various marine species, including large fish, sea turtles, seabirds, and marine mammals, must undertake long-distance journeys during foraging and migratory movements. However, these movements are not random. Marine organisms are supposed to employ favourable winds and ocean currents to minimize the energy costs associated with these long travels. Yet, assessing the role of these environmental factors in determining individual movements, and the level of connectivity between marine areas is empirically challenging. By combining detailed information on species movements using animal-borne electronic tags (bio-logging devices) with spatial data on winds and ocean currents, and employing optimization tools, our objective is to determine how marine species move through optimal connections based on environmental conditions. We intend to apply this approach to different species such as seabirds or sea turtles, considering their contrasting characteristics, flight or swimming capabilities, and various spatial-temporal scales, ranging from trans-equatorial migrations to more regional foraging movements. These assessments can provide valuable insights into the primary threats these species may encounter during their travels, as well as potential alterations in movement routes or the degree of connectivity between geographical areas due to the ongoing global changes that are impacting winds and marine currents.
We are seeking a highly motivated and qualified TFM student to join our initiative. As her/his main tasks, the student will contribute to compile a unique dataset on animals' movements based on tracking data. Based on the collected and available data, the student will create the graph of connections. This graph will contain the main foraging grounds and migratory stopovers as the nodes, and the possible paths (obtained from data) as edges. After determining a cost function and specific environmental conditions, the goal is to employ optimization algorithms (such as A*) to determine the theoretical best path(s).

Subsequently, she/he will compare these theoretical paths with the actual path(s) taken by the species. Finally, real-time simulation will be carried-out.

12. **ICM-12: Integrating the gender dimension in ICM's research** IP: Silvia Donoso (donoso@icm.csic.es)

    Following the EU regulatory framework on gender equality and abiding by the guidelines of the Horizon 2020 Program, the Gender Equality Plan includes a measure that aims to the integration of sex/gender dimension in research content. For the new funding instrument HORIZON EUROPE, the integration of a gender dimension into research and innovation content is a requirement by default and evaluated under the excellence criterion unless the topic description explicitly specifies otherwise.
    No research, in any field, should be gender blind. Addressing the gender dimension of research implies that gender is considered as a key analytical and explanatory variable in research. If relevant gender issues are missed or poorly addressed, research results will be partial and potentially biased. Additionally, genders can have different views and hence diversify the approximations to a scientific subject, as one of the pillars for innovative research. Gender can thus be an important factor in research excellence.
    The inclusion of the gender dimension in marine science research has been shown to improve the quality of research and to promote a wider application of its findings to the population. Whilst not all research studies are suited for full inclusion of the gender dimension, many others may have distinct effects and results if a gender perspective or sex differences are considered in their design.
    As part of the implementation of this measure, there have already been identified best practices in the inclusion of the gender dimension in marine science at the international level; and two ICM research projects have been identified for testing the internal methodological tool we are designing to facilitate the integration of the sex/gender dimension into the research content.
    Among the actions foreseen, is also planned to carry out a mapping of the ICM's research projects to determine which of them could integrate sex variable/gender dimension. This mapping will contribute to implementing case studies and enrich the toolkit content.
    The main student tasks will be contributing to carrying out the research project mapping and the case studies. The student will receive the necessary training (conceptual and methodological) to carry out the foreseen tasks under supervision.
    It is considered that the results of this work will be also useful for other ICM areas (for example, OSR).

13. **ICM-13: Avaluació de programes d'educació i formació de professorat** IP: Carine Simon (csimon@icm.csic.es)

    A l'Institut de Ciències del Mar – CSIC (ICM), la Cultura Científica Marina (CCM) té cada vegada més pes, fruit del compromís social de l'Institut. Una de les branques fortes del grup de CCM és la d'educació on tenim diversos projectes en marxa com pot ser el de Petits Oceanògrafs i col·laboracions estretes amb els departaments d'educació de Barcelona i de Catalunya a través dels programes d'Escoles + Sostenibles i d'Escoles Verdes respectivament. El 2024 marcarà un

punt d'inflexió amb el començament del projecte europeu BlueLightS que pretén fomentar una presència més forta dels temes marins als currículums escolars alhora que la participació de centres escolars a la xarxa europea d'escoles blaves. També ha començat recentment un altre projecte europeu, ProBleu, sobre escoles blaves enfocat a l'ús d'una plataforma de ciència ciutadana.
En aquest context, ens sembla fonamental l'ajuda d'una persona experta en ciències de l'educació, concretament en la seva avaluació.
El seu paper serà:

- Establir un protocol d'avaluació d'impacte de les diverses activitats educatives, tant amb l'alumnat com amb el professorat.
- Realitzar i analitzar aquesta avaluació.
- Participació en la redacció d'un informe/article sobre aquest tema.
- També podrà ajudar a l'elaboració del material que acompanyen les activitats i a les activitats mateixes.

14. **ICM-14: Dissemination and Exploitation of Research Results – the case of PETRI-MED** IP: Marco Talone (talone@icm.csic.es), co-IP: Elisa Berdalet

    La difusión y la transferencia de los resultados es parte integrante de cualquier proyecto de investigación. Una comunicación efectiva y eficaz por un lado permite aumentar la visibilidad del proyecto, incrementando las posibilidades de asegurar su continuidad, y por otro fomenta la participación pública en la ciencia y la confianza de la sociedad en la investigación.
    La alumna o el alumno participará activamente en las actividades de difusión del proyecto PETRI-MED (Plankton biodiversity through remote-sensing and omics in the Mediterranean Sea) de la convocatoria Biodiversa+ 2021-2022 BiodivProtect (https://petri-med.icm.csic.es/), incluyendo la relación con los medios de comunicación, la gestión de la lista de stakeholders, la compilación de artículos, boletines y policy briefs específicos y el análisis de su impacto a través de métricas de uso y compromiso.
    A través de las actividades mencionadas y de tutorías personalizadas, el investigador responsable le formará sobre las bases científicas del proyecto, así como en el empleo de las diversas formas de difusión dependiendo de la audiencia y en el uso de métricas de evaluación.
    La alumna o el alumno tendrá la posibilidad de presentar su trabajo en los seminarios científicos organizados/participados por el ICM-CSIC (e.g., seminarios de departamento, FridayTalks, CafèPrismàtic, OceanoVivo, etc.).

15. **ICM-15: Network modelling for marine ecological applications** IP: Marta Coll (mcoll@icm.csic.es), co-IP: David Romero

    (1) Revise proposed methods to study ecological networks, with emphasis on prey-predator interactions, (2) adapt best method/s to investigate current network properties of Mediterranean marine ecosystems, (3) investigate the network properties of Mediterranean marine ecosystems and the role that key species play in the network.

16. **ICM-16: Characterization of hurricane structure from satellite-derived wind fields** IP: Marcos Portabella Arnús (portabella@icm.csic.es)

Extreme wind events occupy an increasing place in the mass media as they have direct societal and economic implications (human loss, material destructions, etc.), and are expected to become more destructive in the future as a consequence of global warming. Besides global warming, societies and economies are becoming increasingly vulnerable to extremes.
Systematic collocations between medium (e.g. ASCAT) and low resolution (SMOS, SMAP, AMRS-2, CYGNSS) satellite observations with high-resolution Synthetic Aperture Radar (SAR) and in situ reference estimates from the Step Frequency Microwave radiometer (SFMR) and dropsondes acquired by the National Oceanographic and Atmospheric Administration (NOAA) P-3 hurricane "hunter" flights serve to compare and homogenize all these different measurements. This type of analyses can in turn provide quantifiable measures of the accuracy of the most severe storm dynamics from these products, and to derive extreme wind climate and trend analysis.
In the context of the European Space Agency (ESA) MAXSS project, satellite-derived extreme winds from active (scatterometers) and passive (radiometers) systems are adjusted using collocated SFMR winds as reference. The latter are the golden reference for the extreme-wind scientific and operational communities, and as such, these adjusted satellite products are aimed for such users. Before delivering the products though, it's important to analyse the consistency between these satellite derived wind fields and those measured by in situ (e.g., SFMR). The selected candidate will develop suitable algorithms for the estimation of different hurricane structure parameters (e.g., wind radii, radius of maximum winds, etc.) as depicted by both satellites and hurricane hunters and thoroughly analyse their consistency.

17. **ICM-17: Marine Virus Endolysins (MaVE)** IP: Felipe Hernandes Coutinho (fhernandes@icm.csic.es)

Antibiotic resistant pathogenic bacteria are a major public health concern. The World Health Organization has issued a report that calls for urgent action to avert the antimicrobial resistance crisis. One of the most promising alternatives to antibiotics are endolysins. These are viral proteins that degrade the bacterial cell-wall. Unlike antibiotics, they are specific to each bacterial species, and innocuous to the rest of the commensal microbiome. In addition, these proteins can be engineered to improve their efficiency, and no cases of resistance to endolysins have been reported so far. For these reasons, endolysins are a potential biotechnology based alternative to treat bacterial diseases. Most known endolysins have been discovered by cultivating and isolating viruses in pure cultures of human pathogens. Nevertheless, the overwhelming majority of viruses cannot be isolated through these methods. The main hypothesis of the Marine Viruses Endolysins (MaVE) project, is that marine viruses might be an underappreciated reservoir of endolysins with potential to be used in treatments against pathogenic bacteria. Previous research carried out by the PI led to the discovery of more than 2,600 putative endolysins by applying computational biology to metagenomic datasets (Fernández-Ruiz, et al. "Thousands of novel endolysins discovered in uncultured phage genomes." Frontiers in microbiology). MaVE aims to further expand this diversity, by developing machine-learning based algorithms designed to identify novel endolysins and determine their efficiency against pathogenic bacteria. Within the project, the candidate will be trained to

analyse large scale genomic datasets of viral diversity to develop machine-learning based algorithms for the discovery of endolysins in marine metagenomes. Thus, the candidate will be trained to develop their skills on topics related to genomics, marine virology, molecular biology, bioinformatics, and machine-learning.

18. **ICM-18: On sustainable fish farming: an oceanic route with a global impact on social, economic and environmental aspects** IP: Josep L Pelegrí (pelegri@icm.csic.es)

    This investigation highlights an oceanic route with a global impact on social, economic and environmental aspects, depicted through three distinct geographical areas: Chile, Barcelona, and Gambia. Our work recognises the utmost importance of the blue economy and blue justice, of alliances for sustainable development, and dialogue as an engine for society to improve the socio-political climate.
    Our work also contributes to three specific goals of the decade, and we will leave no stone unturned in achieving them. The first goal is to address clean oceans. We cannot ignore the direct link between salmon farming and ocean pollution. In Chile, the kelp forests – part of a fragile ecosystem of global importance as a CO2 sink and a hotspot for local biodiversity – are severely damaged.
    The second goal is to achieve a productive ocean, and we will not rest until we contribute to a sustainable food supply and a sustainable ocean economy. Fostering the blue economy means striking a balance between economic and social gains and preserving the role of the ocean ecosystem. As a food industry, we believe in the important role of providing protein and nutritional oils to the diet, but we cannot overlook questions regarding product quality, quality of life, and price (levels of remediation, overcrowding per cage, etc.).
    Finally, the third goal aims to inspire and stimulate an ocean-friendly community that understands and values the relationship between the ocean and the well-being of humanity. We strongly believe that citizens are the key to all processes and are agents of change, through their consumption habits and purchasing preferences, as well as because of their right to know the planetary repercussions when choosing certain products.