

# MASTER THESIS OFFER (2016/2017) MER

30 ECTS: 6 mo

TITLE	DESCRIPTION (5-10 lines)	SUPERV. (Name; Contact e-mail)	LOCATION (Res Grp; Lab, Dept, Inst, City)	FUNDING (if available)	REQUISITES / NAME (if needed /if agreed)
<b>Development of primary cell line from echinoderms, for studying nuclear envelope assembly and regulations in the initial stages of embryogenesis.</b>	The nuclear envelope is an organelle of unique complex and dynamic structure, which serves not only as a physical barrier between the nucleus and the cytoplasm, but also as a regulator of many cellular events. Mutations in nuclear envelope proteins have been associated with a wide range of diseases, the most common of which are the laminopathies [1,2]. Structural alterations in nuclei have also been observed in many types of cancer, and are used as diagnostic markers [3]. However, how these changes contribute to disease pathology is still unclear. Advances in the understanding of the mechanisms involved in nuclear envelope dynamics will be important. We have studied the assembly of the nuclear envelope extensively in echinoderms and mammalian cells [3,4,5]. Currently we wish to develop a synchronous cell line from echinoderms that will not have the disadvantages of mammalian transformed cell lines. The selected candidate will also have the opportunity in learning how to work with a cell free assay reconstituting nuclear envelope assembly as well as using different types of advanced imaging tools located in Cell Biophysics at PiE [6,7]. The selected candidate should have some knowledge of cell biology and biochemistry.	<a href="mailto:banafshe.larijani@ikerbasque.org">banafshe.larijani@ikerbasque.org</a>	Biophysics & PiE		
<b>Additional info</b> 1. Shimi T, Butin-Israeli V, Adam SA, Goldman RD (2010) Nuclear lamins in cell regulation and disease. Cold Spring Harb Symp Quant Biol 75: 525-531. 2. Worman HJ, Ostlund C, Wang Y (2010) Diseases of the nuclear envelope. Cold Spring Harb Perspect Biol 2: a000760. 3. Zink D, Fischer AH, Nickerson JA (2004) Nuclear structure in cancer cells. Nat Rev Cancer 4: 677-687. 4. Larijani B, Poccia DL (2009) Nuclear envelope formation: mind the gaps. Annu Rev Biophys 38: 107-124. 5. Marie-Charlotte Domart, Tina M. C. Hobday, Christopher J. Peddie, Gary H. C. Chung, Alan Wang, Karen Yeh, Nirmal Jethwa, Qifeng Zhang, Michael J. O. Wakelam, Rudiger Woscholski, Richard D. Byrne, Lucy M. Collinson, Dominic L. Poccia and Banafshé Larijani (2012) Acute manipulation of diacylglycerol reveals roles in nuclear envelope assembly & endoplasmic reticulum morphology PLoS One 7(7):e40669. 6. Byrne RD, Veeriah S, Applebee CJ, Larijani B. (2014) Conservation of proteo-lipid nuclear membrane fusion machinery during early embryogenesis. Nucleus 5(5):441-8. doi: 10.4161/nucl.34422. 7. Richard D Byrne, Banafshe Larijani* & Dominic L Poccia* (2016) The use of two-photon FRET-FLIM to study protein interactions during nuclear envelope fusion in vivo and in vitro. Methods in Molecular Biology. In Press					
<b>Effects of oils spills in cell and tissue level biomarkers of mussels from North Sea and Baltic</b>	This proposal is related with the H2020 project: Integrated oil spill response actions and environmental effects GRACE. The main objective is to improve the knowledge on the biological impacts of oil spills and the different oil spill response methods in the northern Atlantic and the Baltic Sea, characterised by extreme environmental conditions. This approach will result in monitoring and environmental hazard and risk assessment strategies covering a wide range of bioeffect-based tools useful for oil spill and oil spill response impacts in these particular regions.	Manu Soto <a href="mailto:manu.soto@ehu.eus">manu.soto@ehu.eus</a>  (PhD Thesis - Endika Gil-Uriarte)	Cell Biology in Environmental Toxicology (CBET) Research Group, UPV/EHU, PIE, Plentzia	GRACE project (H2020)	<b>Joyanta Bir</b>
<b>Regulation of the antioxidant network in tropical and temperate symbiotic sea anemone</b>	The ecological success and the foundation of coral reefs rely on the mutualistic relationship between invertebrate hosts (scleractinian corals) and their photosynthetic dinoflagellate of the genus <i>Symbiodinium</i> . Nevertheless, since last decades, coral reefs are declining globally due to a combination of direct and indirect human pressures. Increases in sea surface temperature combined with high levels of irradiance are of primary concern as they lead to mass coral bleaching events, a phenomenon where whole communities of corals lose a significant portion of their endosymbiotic <i>Symbiodinium</i> . While the nature of the cellular mechanisms leading to the disruption of the symbiosis is not completely unraveled, it has been reported that the initial steps of this process are linked to photosynthesis and oxidative stress in	Stephane ROBERTY (sroberty@ulg.ac.be)	InBioS - Ecophysiology and Animal Physiology, University of Liège, Belgium <u>Lab director:</u> Jean-Christophe PLUMIER		<u>Techniques that will be employed:</u> Physiological measurements (photosynthesis and respiration), HPLC, biochemical assays, Western blot, cell cultures and sea anemones cultures.

	<p><i>Symbiodinium</i> cells. Despite, the key role played by the reactive oxygen species (ROS), the response mechanisms to oxidative stress is not completely understood in symbiotic cnidarians. Therefore, this project aims to 1) determine the non-enzymatic (ascorbic acid, tocopherols, carotenoids, GSH) and enzymatic (SOD, APX, GR, GSX) antioxidant capacities in two symbiotic cnidarians (tropical vs temperate), 2) determine how organisms with enhanced antioxidant capacities deal with a subsequent oxidative stress.</p>				
<p><b>Characterization of vertebrate-like neuropeptide and amine hormones in mussels (<i>Mytilus galloprovincialis</i>).</b></p>	<p>Bivalves is one of the largest taxonomic groups among animals but their endocrine system is poorly understood. Molecules controlling gametogenesis have not been completely characterized and thus, an effort should be done in order to elucidate the mechanism controlling reproduction in this important animal group. Steroids have been isolated from bivalve tissues but recent works propose that they do not directly participate in the regulation of gametogenesis in mollusks and a potential involvement of peptide hormones has been suggested. The aim of this work is to assess the transcription levels of vertebrate-like gonadotropin-releasing hormone (GnRH) in mussel gonad tissue at different stages of the reproductive cycle. Furthermore, other non-peptide neurotransmitters such as serotonin and dopamine will be also evaluated as potential communication molecules participating in the control of gametogenesis in mussels.</p>	<p>Maren Ortiz-Zarragoitia (<a href="mailto:maren.ortiz@ehu.es">maren.ortiz@ehu.es</a>)</p>	<p>: Cell Biology in Environmental Toxicology (CBET) Research Group, Plentzia Marine Station, UPV/EHU.</p>	<p>CBET, UFI Ecosystem Health Protection</p>	<p>interest in Cell Biology.</p>
<p><b>Characterization of xenoestrogenicity in commercial fish species of Bay of Biscay.</b></p>	<p>Xenoestrogens are pollutants that mimic the effects of natural estrogens, and thus disrupt the differentiation and reproduction of exposed organisms. Their presence in the aquatic environment is well known, feminizing impacted fish populations. Presence of intersex males together with molecular markers of feminization have been observed in estuarine and marine species. This projects aims to assess the exposure to xenoestrogens of commercial fish species collected in the Bay of Biscay. For this purpose, transcription levels of vitellogenin will be determined by real time qPCR in fish liver samples. Vitellogenin, precursor of egg-yolk proteins, is a well marker of xenoestrogenicity and actually included in several international monitoring programmes. Student will obtain sequences for vitellogenin transcript in different marine species and then assess transcription levels in male or juvenile organisms.</p>	<p>Maren Ortiz-Zarragoitia (<a href="mailto:maren.ortiz@ehu.es">maren.ortiz@ehu.es</a>)</p>	<p>Cell Biology in Environmental Toxicology (CBET) Research Group, Plentzia Marine Station, UPV/EHU.</p>	<p>CBET, UFI Ecosystem Health Protection</p>	
<p><b>Toxicity of selected emerging pollutants in copepods: survival, fecundity and hatching success disruption.</b></p>	<p>Emerging pollutants are defined as microcontaminants without established regulation and/or well studied effects to biota. They included several chemicals that can interact with living organisms and negatively impact their fitness, reproduction, development and survival, thus altering population dynamics. This project aims to investigate toxic effects of selected emerging pollutants (i.e, glyphosate pesticide, nonylphenol, etc.) in copepods, assessing the survival, fecundity and hatching success as endpoints. Copepods are key invertebrate species in the marine and estuary zooplankton communities and the alteration in population structure and dynamic could compromise estuary health status. The work will form the student in the collection and identification of copepods from</p>	<p>Fernando Villate (<a href="mailto:fernando.villate@ehu.es">fernando.villate@ehu.es</a>) and Maren Ortiz-Zarragoitia (<a href="mailto:maren.ortiz@ehu.es">maren.ortiz@ehu.es</a>)</p>	<p>Plentzia Marine Station, UPV/EHU.</p>	<p>CBET, UFI Ecosystem Health Protection</p>	<p>: interest in Marine Ecology, Marine Biology and Environmental toxicity.</p>

	field samples, design a laboratory experiment for toxicological studies and integrate the results in more holistic perspective for environmental health status management.				
<b>Assessment of the antioxidant and detoxification responses in different tissues of seabream exposed to a mixture of emerging contaminants.</b>	Emerging contaminants (ECs) are chemicals which present in the environment was not reported previously and no toxicological data is available. In recent years several compounds classified as ECs, such as pharmaceuticals, endocrine disrupting chemicals and new generation pesticides have been reported in the aquatic environment and their concentrations increased. Furthermore, toxicology effects on exposed organisms have been described. The aim of this project is to evaluate the effects of a complex mixture of ECs in juvenile seabream. The endpoints to evaluate will be enzymatic activity of antioxidant enzymes (catalase, SOD, GST and GPX) together with enzymes related with neurotransmission alterations (acetylcholinesterase), lipid metabolism (acyl-CoA oxidase) and detoxification processes (EROD activity).	Urtzi Izagirre (urtzi.izagirre@ehu.es) and Maren Ortiz-Zarragoitia ( <a href="mailto:maren.ortiz@ehu.es">maren.ortiz@ehu.es</a> )	Cell Biology in Environmental Toxicology (CBET) Research Group, Plentzia Marine Station, UPV/EHU.	consolidated research group CBET	interest in Cell Biology
<b>Brackish invaders: Do physiological and growth responses to hyposmotic stress underlie competence between native (<i>Mytilus galloprovincialis</i>) and invasive (<i>Xenostrobus securis</i>) mussel species?</b>	<i>Xenostrobus securis</i> is an invasive mytilid species reported recently in the North-Atlantic coast of the Iberian Peninsula, including the Cantabrian Sea. Broad tolerance to dilution of this species appears to have enabled rapid expansion through the estuaries where it eventually competes with other species of suspension-feeders, particularly <i>Mytilus galloprovincialis</i> . Aims of this proposal are to quantify physiological components of the energy budget (filtration and ingestion rates, absorption efficiency and metabolic and excretion rates) and compute scope for growth in groups of both the invasive and native species of mytilids acclimated to different salinities (sea-water dilutions) in order to ascertain possible differences in their patterns of response to hyposmotic stress.	Enrique Navarro <a href="mailto:enrique.navarro@ehu.es">enrique.navarro@ehu.es</a>	Research group on Physiological energetics of marine bivalves, Department GAFFA (Fisiología Animal), University of Basque Country. Campus Leioa 48940 Leioa (Bizkaia)		
<b>Endocrine disrupting chemicals can modulate thyroid axis and reproduction axis in fish.</b>	Endocrine disrupting chemicals (EDCs) constitute a group of diverse compounds that can modulate the activity of the main endocrine organs in aquatic/marine organisms. Thyroid system alteration together with abnormal reproduction and development can be observed in impacted fish. This projects aims to study the potential effects of selected EDCs on fish using molecular tools. The student will get knowledge on EDC action mechanisms in fish and get expertise in the application of transcriptomics (qPCR) and biochemical protocols.	Maren Ortiz-Zarragoitia ( <a href="mailto:maren.ortiz@ehu.es">maren.ortiz@ehu.es</a> )	Cell Biology in Environmental Toxicology (CBET) Research Group, Plentzia Marine Station, UPV/EHU.	CBET, UFI Ecosystem Health Protection	interest in Cell Biology.
<b>Potential use of the software SHAPE (quantitative assessment of organic 'forms' by Elliptic Fourier Analysis) to the problem of species delimitation within the</b>	Olividae gastropods (and especially species in the genus <i>Oliva</i> and <i>Olivancillaria</i> ) are known for their extreme shell variability (adult size, color, general shape, spire height, ...). This high <b>intraspecific</b> variability - often of geographic origin- is associated to a relatively low <b>interspecific</b> variability that constitutes a serious taxonomic problem known as "The <i>Oliva</i> species problem" (Ben Tursch). This gave rise to abundant literature: according to the authors, the number of "valid" species varies	Mathieu Poulicek : Co-promoters : Hiroyoshi Iwata (Lab. Biometry and Bioinformatics, Univ. Tokyo) & Guido Poppe (Shells Inc., Philippines)	Laboratoire d'Écologie animale et Écotoxicologie, Unité Écologie Marine, Dépt. Biologie-Écologie-Évolution (ULg Marine Ecology Unit)		<b>Used techniques and prerequisites:</b> Photography and image analysis, biometrics, statistical techniques...

<p><b>genus <i>Oliva</i> (gastropod molluscs).</b></p>	<p>from 41 (Tryon) to... 176 (Petuch &amp; Sargent). In an attempt to get independent from the subjectivity of the observer, we propose to quantify the shape of the shell (on standardized pictures of museum type-specimens illustrating the potential variability) using a software (developed by H. Iwata) based on an automated Fourier analysis and interpretation of the results by a statistical approach (PCA, Cluster,...). This should allow us to isolate the best quantitative morphometric parameters describing the intra- and interspecific variability, the validity of the sub-generic classifications, the characterization of sub-specific populations, ...</p>			
<p><b>Implementation of various colorimetric analysis software to the problem of the species, subspecies and varieties delimitations in the genus <i>Oliva</i> (gastropods molluscs).</b></p>	<p>Mollusk shells have vivid colors and/or intricate patterns. Nevertheless the nature of the pigments and their distribution are poorly known. Many species among the Olividae (particularly within the intertropical genus <i>Oliva</i>) are known for the extreme variability of their shell colors, interpreted as "varieties" (for shell collectors), subspecies or even species. This is a serious taxonomic problem known as "The <i>Oliva</i> species problem" giving rise to an abundant literature: according to the authors, the number of "valid" species varies from 41 (Tryon) to... 176 (Petuch &amp; Sargent). In an attempt to get independent from the subjectivity of the observer, we propose to describe the color and "spotting" of the shell (on standardized photographs of type museum specimens or from "great collections" and illustrating the potential variability) using colorimetric analysis software (themselves to be compared). In a second step, we should analyse and compare the nature of the pigment(s) with Laser Raman Spectrography. This should allow us to isolate innovative criterions to describe intra - and interspecific variability, validity of the sub-generic classifications ... Such an approach was suggested for other zoological groups but never actually realized in the case of the gastropods. This could therefore be generalized.</p>	<p>Mathieu Poulicek <b>Co-promoters</b> : Prof. Bernard Gilbert &amp; Guido Poppe (Shells Inc., Philippines islds.)</p>	<p>Laboratoire d'Écologie animale et Écotoxicologie, Unité Écologie Marine, Dépt. Biologie-Écologie-Évolution (ULg Marine Ecology Unit)</p>	<p>Photography (basic knowledge of color spaces, white balance, ...), image analysis, biometrics, statistical techniques (needs a basic knowledge of making pictures and image processing). Use of confocal laser Raman spectrography and other analytical techniques for pigments identification</p>
<p><b>Subjective independent shape and color analysis for "fake" specimens discrimination in the shell trade.</b></p>	<p>Like any market sector, and due to the very high price some collectors are ready to pay a so-called rarity or unique specimen (several hundreds to thousands of US\$), mollusk shell collections do not escape counterfeiting so that the english term "fake" is internationally adopted by collectors. In the past, many attempts were recorded around the world: the common <i>Cypraea arabica</i> heated over campfire, known as famous</p>	<p>Mathieu Poulicek <b>Co-promoters</b> : Prof. Bernard Gilbert &amp; Guido Poppe (Shells Inc., Philippines islds.)</p>	<p>Laboratoire d'Écologie animale et Écotoxicologie, Unité Écologie Marine, Dépt. Biologie-Écologie-Évolution (ULg Marine Ecology Unit)</p>	<p><b>Used techniques and prerequisites:</b> Photography (basic knowledge of color spaces, white balance, ...), image</p>

	<p>"<i>trafficata</i>" form of Madagascar, or 19th century rice paste reproduction of <i>Epitonium scalare</i> from China □ (the fakes are in this case much more expensive than the real ones, 10-15 €). Now, filipinos appear as the most consistent in inventiveness, transforming practice in art while providing "new" shells, ... at very high prices, and at almost industrial rates.</p> <p>In an attempt to get independent from the subjectivity of the observer, we propose to describe the color and/or shape of shells on standardized photographs of type museum specimens or from "great collections" (illustrating the potential variability) compared to "fake" specimens, either coming from the trade market or artificially created in the lab using shape and color analysis software. In a second step, we should analyze and compare the surface textural features through SEM and nature of the pigment(s) with Laser Raman Spectrography. This should allow us to isolate innovative criterions to detect man-made alterations on collection material.</p>	 <p>real "classical" pacific form, 5-20 \$ Real "gold" caledonian form, &gt; 250 \$</p> <p><b>FAKES &gt; 650 \$ !</b> Rice pasta replica, 19th century, ... <b>1015 €</b></p>	<p>analysis, biometrics, statistical techniques (needs a basic knowledge of making pictures and image processing). Use of Scanning Electron Microscopy (perhaps with other added techniques) and confocal laser Raman spectrography and other analytical techniques for pigments identification</p>	
<p><b>Uptake and toxicity of nanoplastics compared to microplastics and their role as carriers for POPs in the marine environment.</b></p>	<p>This master thesis is part of an EU JPI-Ocean funded project (PLASTOX) aiming to understand the ecotoxicological impact of nano and microplastics in combination with persistent organic pollutants (POPs) on key European marine species and food webs. Specifically, the master thesis will investigate nano and microplastic uptake and toxicity <i>in vitro</i> using cultures of hemocytes, immune cells of mussels. Due to their filter-feeding activity and well-developed endo-lysosomal system, mussels have been considered an important target for nano and microplastic toxicity in the marine environment. Several cytotoxicity and functional <i>in vitro</i> tests well established in the laboratory will be applied using nano and microplastics of different sizes and physicochemical characteristics, in combination with relevant POPs. The study will allow to characterize nano and microplastic uptake and accumulation at the cellular level and to determine their mode of action, as well as the role of POPs adsorption on their toxicity.</p>	<p>Alberto Katsumiti (<a href="mailto:alberto.katsumiti@ehu.eus">alberto.katsumiti@ehu.eus</a>) and Miren P. Cajaraville (<a href="mailto:miren.p.cajaraville@ehu.eus">miren.p.cajaraville@ehu.eus</a>)</p>	<p>Cell Biology in Environmental Toxicology (CBET) Research Group, UPV/EHU, Leioa and PIE, Plentzia</p>	<p>PLASTOX Res. Proj. CBET, UFI Ecosystem Health Protection</p>
<p><b>In vitro toxicity profiling of the effects of oil and oil remediation strategies on mussels <i>Mytilus galloprovincialis</i></b></p>	<p>This master thesis is part of the ongoing EU H2020 research project GRACE (2016-2018) on the "Integrated oil spill response actions and environmental effects". The aim of the master thesis is to obtain ecotoxicity data, based on <i>in vitro</i> tests with mussel hemocytes, for the environmental risk assessment of oils of interest for the studied regions (northern Atlantic and Baltic sea) as well as for different response treatments after oil spills (e.g., dispersants, burning). We will investigate modes of action (MOA) and ecotoxicity of pure oil and dispersant samples and fractions using small-scale cell-based mode-of-action <i>in vitro</i> assays and testing water accommodated fractions as well as SPME extracts obtained under different scenario conditions. The results</p>	<p>Alberto Katsumiti (<a href="mailto:alberto.katsumiti@ehu.eus">alberto.katsumiti@ehu.eus</a>) and Miren P. Cajaraville (<a href="mailto:miren.p.cajaraville@ehu.eus">miren.p.cajaraville@ehu.eus</a>)</p>	<p>Cell Biology in Environmental Toxicology (CBET) Research Group, UPV/EHU, Leioa and PIE, Plentzia</p>	<p>H2020 GRACE research project, CBET, UFI Ecosystem Health Protectio</p>

	obtained will provide a good picture of the toxicity profile of oil pollution associated to spills in the N Atlantic ocean and the Baltic sea and to prospective oil spill responses. The <i>in vitro</i> multi-endpoint assays with mussel hemocytes will address oxidative stress, genotoxicity, alterations in lysosomes, membrane transporter functions and cytoskeletal integrity.			
<b>Marine microalgae as sensitive model to study the toxic interactions of nanomaterials with organic contaminants</b>	The potential toxicity of engineered nanomaterials (NMs) for human and environmental health represents an emerging issue, due to the continuous development and production of manufactured NMs. Further, NMs in the aquatic environment could act as vehicles of organic contaminants to aquatic organisms, increasing their bioavailability and generating the so-called “Trojan horse” effect. Microalgae are at the base of aquatic food chains, which makes them potential starting points of biomagnification processes that transport increased amounts of accumulated contaminants into food chains. Thus, microalgae are considered relevant potential targets for the toxicity of NMs. This master thesis aims to determine the toxicity of NMs alone or in combination with organic contaminants on marine microalgae. For this, the OECD algae growth inhibition test TG201 will be followed. The test will be adapted to be used in the marine species <i>Isochrysis galbana</i> (Prymnesiophyceae), which has a relatively soft cell coating. Microalgae will be exposed to a wide range of concentrations of tested NMs alone and in binary mixtures NMs-organic contaminants. Test solutions will be prepared by mixing the nanomaterial stock solution with test medium and algae. Then, growth inhibition will be quantified under the microscope and obtained data will be used to calculate EC50, LOEC and NOEC values. Special attention will be paid to assess the possible mechanisms of damage in algae.	Eider Bilbao ( <a href="mailto:eider.bilbao@ehu.eus">eider.bilbao@ehu.eus</a> ) and Miren P. Cajaraville ( <a href="mailto:miren.p.cajaraville@ehu.eus">miren.p.cajaraville@ehu.eus</a> )	Cell Biology in Environmental Toxicology (CBET) Research Group, UPV/EHU, Plentzia.	CBET, UFI Ecosystem Health Protectio
<b>Development of an <i>in vitro</i> assay using mussel gonad explants for contaminant toxicity testing of emerging pollutants.</b>	This work aims to establish a protocol for obtention and maintenance of mussel gonad explants for its application in toxicological studies. Mussels are used worldwide as sentinels of marine pollution but few <i>in vitro</i> assay protocols exist, out of those based on hemocytes and gill cells. We propose the adaptation of protocols established with fish tissue explants to mussel mantle/gonad tissue as a promising tool for ecotoxicological studies. This will offer the possibility of testing several contaminants in rapid <i>in vitro</i> assays and of understanding potential mechanisms altered by emerging pollutants such as pharmaceuticals, endocrine disruptors, nanomaterials and nano-microplastics alone or in combination in binary mixtures. At a first step mussel gonad explants will be maintained in different culture conditions and for different times to assess explants viability. Endpoints will include cell viability assays such as neutral red retention time, MTT assay and LDH release assay. In parallel, a histological description of explants tissue structure will be performed.	Maren Ortiz-Zarragoitia ( <a href="mailto:maren.ortiz@ehu.eus">maren.ortiz@ehu.eus</a> ), Miren P. Cajaraville ( <a href="mailto:miren.p.cajaraville@ehu.eus">miren.p.cajaraville@ehu.eus</a> )	Cell Biology in Environmental Toxicology (CBET) Research Group, UPV/EHU, Leioa and PIE, Plentzia.	EU PLASTOX research project, CBET, UFI Ecosystem Health Protectio

	Then, different selected emerging pollutants will be tested alone or in binary mixtures in the mussel gonad explants.				
<b>Sequencing of vitellogenin gene in mussel <i>Mytilus galloprovincialis</i> and seasonal variations in transcription levels.</b>	In vertebrates, vitellogenin (Vtg) is the egg yolk protein synthesized in females under estrogen regulation. Some emerging environmental pollutants called endocrine disruptors mimic estrogenic hormones and cause feminization of aquatic organisms, giving rise to induction of Vtg expression in juvenile and male organisms. In recent years, Vtg-like proteins have been measured in mussels using an indirect method, as a potential biomarker of exposure to endocrine disruptors. Further, a partial sequence of Vtg mRNA was recently sequenced in our laboratory. The aim of this master thesis project is to sequence the whole gene of Vtg using gene walking and to develop specific molecular tools in order to characterize the seasonal variations in transcription levels of Vtg along an annual reproductive cycle. Obtaining the whole DNA sequence of the Vtg gene will allow us to identify its regulatory regions and to understand the basis of regulation of transcription of this important gene. The work will be developed in the framework of a wider research line on the presence and impact of endocrine disruptors in estuaries of the Basque Country.	Miren P. Cajaraville ( <a href="mailto:mirenp.cajaraville@ehu.eus">mirenp.cajaraville@ehu.eus</a> ) and Maren Ortiz-Zarragoitia ( <a href="mailto:maren.ortiz@ehu.eus">maren.ortiz@ehu.eus</a> )	Cell Biology in Environmental Toxicology (CBET) Research Group, UPV/EHU, Leioa and PIE, Plentzia	consolidated research group CBET, UFI Ecosystem Health Protectio	<b>SARKER MOHAMMED IBRAHIM</b>  <b>[sibrahim001@ika.sle.ehu.eus]</b>
<b>A seasonal study of cancer and other histopathological alterations in cockles <i>Cerastoderma edule</i> from the Urdaibai Biosphere Reserve.</b>	Our research group has developed a research line on the mechanisms of carcinogenesis in aquatic organisms, especially devoted to explore potential linkages between cancer development and environmental contamination. In this context we recently discovered that cockles inhabiting the Urdaibai Biosphere Reserve are affected by hemic or disseminated neoplasia. The ethiology of disseminated neoplasia in bivalve molluscs is not known but has been generally associated to a possible viral infection, although environmental contamination could also contribute. The aim of this master thesis is to study the prevalence of disseminated neoplasia along the reproductive cycle of cockles, based on the screening of hemolymph samples and on the histopathological analysis of digestive gland and gonad tissues in different cockle populations of the Urdaibai Biosphere Reserve. Furthermore, tissue samples will be submitted to chemical analysis to measure levels of bioavailable priority and emerging contaminants. Some samples will be analyzed by TEM in order to search for possible viral infections.	Miren P. Cajaraville ( <a href="mailto:mirenp.cajaraville@ehu.eus">mirenp.cajaraville@ehu.eus</a> )	Cell Biology in Environmental Toxicology (CBET) Research Group, UPV/EHU, Leioa and PIE, Plentzia	CBET, UFI Ecosystem Health Protectio	
<b>Pivotal study: Develop Dried Blood</b>	This proposal is based on the necessity of develop a non-invasive methodology to search for pathogens in wild or farmed aquatic	Oihane Díaz de Cerio & Urtzi Izagirre	Cell Biology in Environmental Toxicology (CBET) Research Group, UPV/EHU, Leioa and PIE, Plentzia		

<p><b>(DBS)/Haemolymph Spot Technology for fish health status monitoring</b></p>	<p>organisms, as well as, on ornamental ones. For this purpose we propose a pivotal study using DBS sampling methodology, which is basically based on the minimal blood sampling. Basically, a drop of blood is dried in a filter paper (at room temperature) and stored at -80 for further analysis. This methodology has been widely probed in mammals, more in detail in humans and the techniques used afterwards range between chemical analyses to molecular analysis (protein, DNA/RNA). More information about this methodology based researches can be found in SpotonScience Company (<a href="http://www.spotonciences.com/dbs/">http://www.spotonciences.com/dbs/</a>). One of the goals of this methodology is the novelty on aquatic organisms, as well as the possible technical transference as new assays to measure different targets in aquaculture or environmental research. In fish only an article has been published using DBS as sampling technique, and has been related to pharmacological studies, where zebrafish spotted blood has been used to measure drug concentrations (Kulkarni et al, 2014). No info has been found about invertebrate haemolymph studies using this sampling methodology.</p> <p><b>Hypothesis.</b> DBS sampling methodology could be a non-invasive methodology for aquatic organism health status monitoring To probe this hypothesis as true, those <b>objectives</b> will be tested:</p> <ul style="list-style-type: none"> <li>• To choose the best RNA/DNA extraction methodology in DBS aquatic vertebrate samples</li> <li>• To choose the best RNA/DNA extraction methodology in DBS aquatic invertebrate samples</li> <li>• To measure different targets in DBS samples (such as pathogens and/or known immune genes responding to pathogens)</li> <li>• To compare DBS sampling methods results and results obtained through other sampling methods (whole blood, liver tissue, gill tissue, etc)</li> </ul>	<p>Master student will learn the following <b>skills</b></p> <ul style="list-style-type: none"> <li>• Fish sampling management proper ethical skills</li> <li>• Fish maintenance skills</li> <li>• Histology based skills: staining methods and fixation methods</li> <li>• Molecular biology methodologies: DNA/RNA extractions using different approaches, qPCR measurements, cloning, electrophoresis.</li> <li>• Bioinformatic skills: primer design, sequence comparison (clustalws), phylogenies</li> <li>• Statistic skills: SPSS package</li> <li>• Database search: NCBI, GenBank, and bibliography management</li> <li>• Critical thinking</li> <li>• Good laboratory practises</li> <li>• Standard Operational Procedure (SOP) writing skills</li> </ul> <p>Congress communication skills</p> <p><b>References</b></p> <p>Kulkarni P, Chaudhari GH, Sripuram V, Banote RK, Kirla KY, Sultana R, Rao P, Oruganti S, Chatti K. 2014. Oral dosing in adult zebrafish: Proof-of-concept using pharmacokinetics and pharmacological evaluation of carbamazepine. <i>Pharmacological Reports</i>. 66: 179–183</p> <p><b>Further information worth reading</b></p> <p>McDade et al, 2007. What a drop can do: dried blood spots as a minimally invasive method for integrating biomarkers into population based research. <i>Demography</i>. 44-: 899–925</p> <p>SpotOnScience. Dried Blood spot technology (<a href="http://www.spotonciences.com/dbstechnology">http://www.spotonciences.com/dbstechnology</a>)</p> <p>Product applications (<a href="http://www.spotonciences.com/applications/">http://www.spotonciences.com/applications/</a>)</p> <p>World organisation for animal health (OIE). International Standard Setting. Manual of Diagnostic Tests for Aquatic Animals 2014. <a href="http://www.oie.int/international-standard-setting/aquatic-manual/access-online/">http://www.oie.int/international-standard-setting/aquatic-manual/access-online/</a></p>			
<p><b>Study of the value added by a mesoscale model in the computation of turbulent fluxes at the ocean surface of the Bay of Biscay</b></p>	<p>There are important exchanges of matter, energy and linear momentum between the ocean and the atmosphere, such as the turbulent fluxes of sensible, heat, the latent heat fluxes, equivalent to evaporation or wind stress on the surface of the ocean by the atmosphere. Many of them are routinely analyzed by means of large-scale reanalyses with a relatively coarse horizontal resolution such as ERA Interim, from the ECMWF, the NCEP/NCAR reanalysis or MERRA2, amongst others. In the group EOLO of the University of the Basque Country, as a result of an ongoing research project funded by the Spanish Ministry of Science, a high</p>	<p>Jon Sáenz &amp; Ganix Esnaola. <a href="mailto:jon.saenz@ehu.es">jon.saenz@ehu.es</a> <a href="mailto:ganix.esnaola@ehu.es">ganix.esnaola@ehu.es</a></p> <p>Group EOLO. <a href="http://www.ehu.es/eolo/index_en.html">http://www.ehu.es/eolo/index_en.html</a></p>	<p>Plentzia Itsas Estazioa, PIE and Faculty of Sciences and Technology, UPV/EHU</p>	<p>No</p>	

resolution long run with the atmospheric model WRF using 3DVAR data assimilation every six hours (00UTC, 06UTC, 12UTC and 18UTC) covering the period 2010-2014 has been produced. The people involved in the project are analyzing many of the output fields of the integration, but it is very likely that this product could also be used for the analysis of the coupled energy fluxes between the ocean and the atmosphere over the Bay of Biscay. In order to check whether it is so, it must be carefully validated over the area. Figure 1 shows that the heat fluxes from the high resolution simulation show a higher detail in terms of spatial variability, as could be expected from the higher resolution, than the one corresponding to the coarse resolution reanalysis used to force the mesoscale model. On the other hand, there are also some apparent biases that need to be addressed. The first objective is to carefully verify the turbulent energy fluxes between the ocean and the atmosphere (sensible and heat fluxes) derived from the WRF+WRFDA based simulation with observations such as the ones in the World Ocean Database or ICOADS, by applying to in-situ observations bulk-equations that allow the computation of heat fluxes [1,2]. Other alternative gridded databases such as OAFflux will also be used. The second objective is to compare the major verification scores obtained with the ones that can be achieved by using fields from the forcing reanalysis (ERA Interim) at the original resolution used to prepare the initial and lateral boundary conditions used to perform the integration with the high resolution model.

**References.** [1] J. P. Peixoto and A. H. Oort, Physics of Climate, 1992, American Institute of Physics, New York. [2] A. E. Gill, 1982, Atmosphere-Ocean Dynamics, Academic Press, London

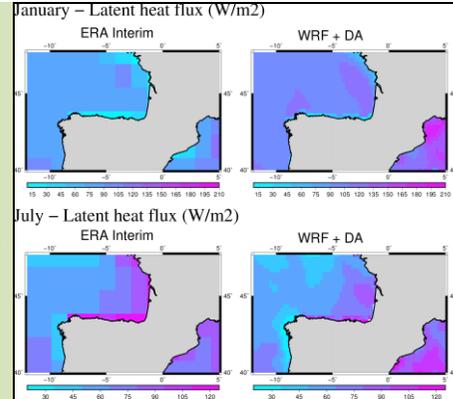


Figure 1. Latent heat flux between the ocean and the atmosphere, seasonal average during winter (January) and Summer (July) according to the coarse model forcing the mesoscale model (ERA Interim) and the high resolution results from the WRF+WRFDA simulation

This M. Sc. Thesis requires above average computer skills from the student. Being able to proficiently work with at least two computer languages (one high level such as R, matlab or python) and another low level one (such as Fortran or C) is very convenient. Bash scripting abilities will definitely help. It has to be considered that many products will be available as netCDF files but, particularly for in-situ observations, other non-standard formats are also used and must be processed.

Experience with data analysis tools such as R, matlab, octave, python, .

**Analysis of seagrass recovery in experimentally harvested plots in a tropical seagrass meadow in Gazi Bay, Kenya.**

Seagrasses play an important role as ecosystem engineers, contribute significantly to nutrient cycling within coastal areas and cover around 20% of the global carbon stored in marine sediments (Duarte, Middelburg, & Caraco, 2005). They provide shelter and food supply for a large variety of (juvenile) fish, crustaceans, mollusks and polychaetes. Nevertheless seagrasses are globally threatened due to anthropogenic activities (Green & Short, 2003). The role of seagrasses in belowground carbon storage, sediment dynamics and epifaunal and infaunal diversity is not well understood and has been particularly poorly studied along the East African coast. Especially the impact of anthropogenic disturbance on seagrasses' associated ecological and chemical processes is not known. This interdisciplinary project will focus on regrowth and general recovery of seagrasses in a tropical seagrass meadow. Measurements take place within priorly (experimentally) harvested plots. The student will

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Napier University, Edinburgh, Scotland

**Charles Cadier**  
Interested students are kindly requested to send a motivation letter, an overview of their grades for completed courses of the MER master and their two most recent MER reports (literature review, project proposal, essay, or something alike) to Professor Huxham. An independent, curious and pro-active attitude is essential to successfully complete this project. Furthermore, experience with benthic fauna identification is helpful but not essential. The student will spend approximately two to three

	<p>be involved in 1) measuring seagrass regrowth, 2) sediment sampling for measurements of organic carbon and 3) epifauna and infauna sampling and identification, among others. There is also space for the setup of additional experiments. The majority of time will most likely be spend on fauna sampling and identification.</p> <p>Duarte, C. M., Middelburg, J. J., &amp; Caraco, N. (2005). Major role of marine vegetation on the oceanic carbon cycle. <i>Biogeosciences</i>, 2, 1–8.</p> <p>Green, E. P., &amp; Short, F. T. (2003). <i>World atlas of seagrasses</i>. Botanica Marina (Vol. 47). Berkeley, USA: University of California press.</p>			<p>months for fieldwork in Gazi village (Kenya) where the KMFRI field station is located. Therefore the student should be 1) capable of working in an independent manner, 2) able to cope with life in a small African village: be sensitive to local culture through clothing and behaviour and 3) able to live within challenging climatic and environmental conditions: heat, heavy rainfall.</p>
<b>Microzooplankton changes in the estuary of Bilbao during 1994-2012: effect of climate and anthropogenic factors</b>	Using zooplanktonic and environmental time-series of the highly humanised estuary of Bilbao and multifactorial methods will be analysed the long-term effect of climate and water quality on microzooplankton structure and dynamics	Fernando Villate <a href="mailto:fernando.villate@ehu.es">fernando.villate@ehu.es</a>	Lab. of zooplankton ecology. Dept. of Plant Biology and Ecology, Faculty of Science and Technology, UPV/EHU, Leioa	
<b>Chlorophyll a concentration in the estuary of Bilbao during 1998-2012: effect of sewage pollution abatement and climate</b>	Using raw and deseasonalized time-series, the relationship of an eutrophication indicator, such as chlorophyll a concentration, with hydro-climatic factors (temperature, river flow, stratification) and sewage pollution indicators (e.g. ammonium) will be analyzed using correlation and regression analysis.	Arantza Iriarte <a href="mailto:arantza.iriarte@ehu.es">arantza.iriarte@ehu.es</a>	Lab. of zooplankton ecology. Dept. of Plant Biology and Ecology, Faculty of Science and Technology, UPV/EHU, Leioa	
<b>Distribution of the microzooplankton at different spatio-temporal scales in the northwestern Mediterranean</b>	The knowledge of the patterns of abundance and distribution of zooplankton is essential to understand the functioning of marine ecosystems. In this work, the distribution of microzooplankton at different spatio-temporal scales in the Mediterranean during June and November 2005 in relation to environmental features will be analysed.	Ibon Uriarte <a href="mailto:ibon.uriarte@ehu.es">ibon.uriarte@ehu.es</a>	Lab. of zooplankton ecology. Dept. of Plant Biology and Ecology, Faculty of Science and Technology, UPV/EHU, Leioa	
<b>Stop-over oceanographic habitats of a migrating predator in the Bay of Biscay</b>	The marine habitats used as stopovers by transequatorially migrating pelagic seabirds while refueling during their migratory journey are poorly known. This is the case of the Sabine's gull <i>Xema sabini</i> that performs transequatorial migrations between the Arctic breeding grounds and wintering areas in the west African coast, while staging at two productive stopovers. A recent biologging study revealed that the species spend an average of 45 days around the Bay of Biscay during its southward migration. We used at-sea observations to characterise the stopover habitats of migrating Sabine's gull in the area. We will develop species distribution models using presence/absence data to identify those environmental variables that most accurately described the stopover locations of this species. We will consider both dynamic (e.g., sea surface temperature, chlorophyll a, frontal systems) and static (e.g., bathymetry, distance to the coast and shelf-break) environmental variables in our analyses. These results will have important implications for improving our understanding of the migration ecology of pelagic seabirds, while tracking productive waters during their migration. This will be the first study	Maite Louzao Arsuaga <a href="mailto:mlouzao@azti.es">mlouzao@azti.es</a>	AZTI, Marine Ecosystem Functioning, Pasaia	IM14CHAL L Background in marine ecology, R programming, oceanography

	describing the offshore oceanographic habitats of this long-distance migrant.				
<b>Delimitating thermal niches of ecologically relevant marine bacteria through cell culturing.</b>	Temperature is a major driver of microbial diversity and metabolic rates in the ocean. Each microbial species has a limited thermal niche, with increasing metabolic rates until they reach a temperature optimum, and decreasing metabolic rates under thermal stress. Delimitating the thermal niches of different microbial species is a first step towards understanding their potential distribution in different marine regions and their sensitivity in a warmer ocean scenario. The objective of this master project will be to delimitate the thermal niches of a set of genome-sequenced marine bacterial strains by performing temperature acclimation experiments in the lab and relate their thermal response with their distribution in global ocean sequencing databases.	Laura Alonso Sáez laura@azti.es	Molecular Ecology and Biotechnology Group, Marine Research Division, AZTI, Sukarrieta, Spain	Project TECCAM (Transcriptomic Experiments on Climate Change Acclimation of Marine Microbes); MINECO	Basic knowledge or interest in Microbiology work
<b>Joint evaluation of northern and southern hake stocks by means of the SS3 evaluation model</b>	Nowadays, advice on TACs and quotas are given on the premise of the existence of two hake stocks. Northern hake that ranges from northern Norway to the Bay of Biscay and southern hake, included in Iberian waters (VIIIc & IXa). However, this division is only administrative, since fluxes of southern hake to the north and vice-versa are known. Given the different existing perception between both stocks, it would be very interesting to join all the data and reevaluate the state of hake population assuming they conform a single stock.	Dorleta Garcia/Agurtzane Urtizberea dgarcia@azti.es	AZTI (Sukarrieta) Sustainable Fisheries resources management team.	IM17DEM UE	Advanced skills in maths and statistics. R programming.
<b>Statistical analysis of Anchovy Egg mortality and environmental covariates in the Bay of Biscay from BIOMAN Egg Survey series</b>	Statistical analysis of Anchovy Egg mortality and environmental covariates in the Bay of Biscay from BIOMAN Egg Survey series. Egg Mortality is a parameter required to obtain Daily Egg Production for the estimation of spawning biomass in Egg surveys. However this is one of the most difficult parameters to estimate due to the spatial & temporal limitations of the egg sampling and the spatial variability of this mortality process. The usual approach to handle this complexity is to assess a single survey egg mortality value common across all sampled areas on a survey by survey basis. The student will have to analyze a set of survey series of egg samples for potential relationships between Egg mortality (Z) and environmental (mainly temperature, salinity, geographic location) or biological (egg abundance of other pelagics) covariates	Andres Uriarte auriarte@azti.es	AZTI (Pasaia) Sustainable Fisheries resources management team.		Advanced skills in maths and statistics. R programming.
<b>Decision Supporting tools for aquaculture site selection under ecosystem based Marine Spatial Palnning</b>	The increasing demand for sea-space for existing and new economic activities and the necessity of the maintenance of the marine conservation status will have impacts on the development of such activities. As a consequence, it is important to understand the potential interaction between the maritime uses as a way of exploring the potential conflicts (and solutions if needed). The focus of this research is to investigate the interactions between the marine aquaculture sector and other activities with special emphasis on artisanal fishing activities. The Southern Eastern part of the Bay of Biscay, which supports a high level of fishing and other uses along the continental shelf, is adopted as a case study. The student will aim at: (i) data issues: analysis of the data needed	Ibon Galparsoro/Arantza Murillas igalparsoro@azti.es	AZTI (Pasaia) Marine environment and sustainable resources management teams	AquaSpace	Interest in Marine Spatial Planning and Geographic Information Systems. Interdisciplinary approach may be appropriate <b>CAROLINE COCCIOLI</b>

	(aquaculture sites, cultivated species, human activities, etc.); (ii) mapping the main variables related to the activities development (location, economics, effort for fisheries, etc.; (ii) spatial analysis of the interactions between activities; (iii) assess the potential conflicts of uses and the fishing effort displacement as a consequence of the aquaculture activities with the corresponding impact on both activities, and finally, (iii) main results will be analysed.				
<b>Estimation of coastal surface transport using operational current data and model outputs</b>	The main purpose is to compare sea surface currents in the southeastern Bay of Biscay obtained with the Basque high-frequency (HF) radar and drifting buoys, and these with forecasts from the Regional Ocean Modeling System (ROMS), using Matlab and Fortran codes. The results will show the differences between the measuring systems (HF radar and drifting buoys) and the degree of accuracy of ROMS.	Luis Ferrer / Anna Rubio arubio@azti.es	AZTI Pasaia, Marine Technologies area	JERICO-NEXT y el LIFE LEMA	Programming in Matlab, fortran. Basic knowledge of Linux. Background in physical and operational oceanography
<b>Relationship between physical and biological components of the pelagic ecosystem in the SE Bay of Biscay</b>	Ocean dynamics results from a complex combination of different processes acting in a wide range of scales. Non-uniform distribution of waters masses, ocean currents and vertical motions have been shown to be key for the modulation of biological activity in the ocean. The main objective of this work will be to identify and understand the key physical processes affecting the distribution of biological components of the pelagic ecosystem in the SE Bay of Biscay. This will be conducted using historical data series from in-situ and satellite observations. The presence of coherent structures in the ocean, as mesoscale fronts and eddies, and their effect on the biological distributions through retention and/or enrichment of surface waters will be particularly investigated.	Ainhoa Caballero/Anna Rubio/Ainhize Uriarte/Maite Louzao acaballero@azti.es	AZTI Pasaia, Marine Research Division	CHALLENGES, JUVENA y oferta OOTRANS	Programming in Matlab, R. Background in physical oceanography and marine ecology
<b>Analysis of morphological trends of Zarautz beach in different timescale (videomonitoring and modelling); towards index of management</b>	The beach of Zarautz is located on the Basque coast in the Southeastern Bay of Biscay. It is a 2.3 km long embayed and moderate exposed beach (NNW facing), with a quasi-rectilinear plan shape delimited by two headlands. The beach presents an important urbanistic pressure with 70% of the beach backed by a concrete seawall and houses. In contrast, the remaining 30% eastern part of the beach, still remains quite natural, is one of the largest and best preserved dune system along the Basque coast. Since June 2010, a KOSTASystem video station is operating. The station is composed of four cameras, covering the beach shoreface, the dry part of the beach as well as the surf zone. The present work will use the data of the video station to analyze the temporal and spatial variability of the beach morphology in different time scales. In the large scale the mean seasonal states of the beach will be analyzed, together with nearshore sandbars morphological evolution. In the short scale extreme variations over short periods of time associated with extreme events will be analyzed. These data will be compared with different empirical formulations of beach morphological evolution. This work aims to address a better knowledge of the Zarautz beach morphological evolution and define some management indexes that characterize the morphological state of the beach and its expected evolution.	Irati Epelde / Pedro Liria pliria@azti.es	AZTI Pasaia, Marine Research Division	POCTEFA MAREA	Background in coastal morphodynamics; skills in programming in Matlab or Python would be appreciated
<b>Determining in situ TS of small pelagics in conditions of high density of aggregation -</b>	In situ analysis of anchovy and sardine in the Bay of Biscay by means of night fishing data from JUVENA and BIOMAN field cruises collected over the past 10 years. The objective is to adapt and replicate the methodology used to obtain the TS of tunas in fish aggregating devices	Guillermo Boyra; gboyra@azti.es	AZTI (Pasaia) Sustainable Fisheries resources management team.		Background in biology, marine sciences, physics, mathematics or

<b>case study of anchovy and sardine in the Bay of Biscay</b>	(FADs). The output will be a publication of high impact in a moment where big discussions exist among the scientific community in relation to the convenience to change the TS value of anchovy in all the evaluation cruises of southeast Europe.				computing; R programming
<b>TS-length relationships of tuna species in the Bay of Biscay life bait fishery</b>	Estimating size-specific acoustic target-strength (TS) values of juvenile albacore ( <i>Thunnus alalunga</i> ) and bluefin tuna ( <i>Thunnus thynnus</i> ) in the Bay of Biscay, based on several surveys led in the Bay of Biscay between 2009 and 2016. This basic parameter will provide more accurate biomass estimates of both species in the Bay of Biscay. Objective: a scientific publication, with direct implication on the ongoing BFT index survey aiming at providing a fishery-independent abundance of bluefin tuna.	Nicolas Goñi / Guillermo Boyra ngoni@azti.es	AZTI (Pasaia) Sustainable Fisheries resources management team.		Background in biology, marine sciences, physics, mathematics or computing; R programming
<b>Evaluation of the global zooplankton diversity in relation to location, depth and environmental factors by analysis of high-throughput sequencing data obtained from samples collected during the Malaspina expedition.</b>	Understanding the biogeographic patterns and metabolic activity of zooplankton is essential for understanding the functioning of marine ecosystems. For that aim, in a previous project, we have produced metabarcoding and metagenomic data from micro and mesozooplankton samples collected around the globe during the Malaspina expedition. The objective of this master project will be to analyze such data in order to correlate the observed biodiversity and metabolic patterns with environmental variables and distance across sampled stations in order to further understand the patterns that shape zooplankton distribution in the global ocean.	<a href="mailto:nrodriguez@azti.es">Naiara Rodriguez Ezpeleta (nrodriguez@azti.es)</a>	AZTI Sukarrieta		Because the projects requires handling large quantities of data in a UNIX environment, some knowledge of basic UNIX commands, programming (eg. python), R or shell scripting is desirable.
<b>Impacts of maritime activities on natural capital and potential solutions: an application to coastal tourism</b>	The Southern Eastern part of the Bay of Biscay supports an intensive level of diverse traditional (e.g. fisheries, aquaculture, tourism and maritime transportation) and emerging (e.g. renewable energies, etc.) activities. Substantial economic benefits are derived from these activities, which directly and indirectly depend on the natural capital (e.g. beaches, waves, benthic habitats). Nevertheless, the intensification of such activities can negatively affect the natural capital for current and future generation. One potential solution is to first assess the natural capital, both quantitatively and qualitatively, to integrate this valuation into management measures. Coastal tourism will be the focus of this thesis, in which the student will aim at i) Establish the links between the most relevant coastal activities and the natural capital with especial emphasis on coastal tourism activities, ii) assess the impact of specific tourism activities on the natural capital, and iii) identify potential solutions to make the coastal tourism sustainable.	Arantza Murillas & María C. Uyarra amurillas@azti.es	AZTI Sukarrieta	N/A	Interest on interdisciplinary research, with dominant knowledge on any of the following sciences : economy, ecology, sociology,...
<b>Application of new tools (passive samplers) for the monitoring of organic compounds in transitional and coastal</b>	The interest in developing our knowledge in passive samplers derives from the need to invest in new methodologies or instruments that allow us to address the limitations of conventional techniques for the assessment of water quality in general and, in particular, for the monitoring of contaminants that are difficult to detect in the marine environment, such	María Jesus Belzunce mbelzunce@azti.es	AZTI- Pasaia	N/A	Degree in Chemistry, Biology or Marine Sciences. Knowledge in marine

<b>waters</b>	as organic substances. It is increasing the number of research and environmental institutions that incorporate these techniques in their monitoring networks because they have been shown to provide a more representative and relevant information on water quality and potential adverse effects of pollutants. In this study we will focus on the detection and quantification of petroleum substances (polyaromatic hydrocarbons) and on the selection of the most appropriate passive samplers (by in situ and laboratory testing) for these type of substances.				geochemistry, statistics and in field work and laboratory
<b>Development and validation of passive dosing procedures to estimate the toxicity of the water accommodated fraction of oils spills</b>	The main aim of this proposal is the development and application of the passive dosing procedure to develop in vitro toxicity test. To this aim we will work two different alternatives: i) to cast the bottom part of a glass vial (5-10 ml) with silicone and to spike this silicone with oil fractions; ii) to accumulate the hydrocarbons in PDMS sheets and O-rings. On the one hand, the casted vials may be useful to carry out in vitro analysis and will allow exposure experiments at different concentrations. On the other hand, the PDMS sheets can be saturated with the water accommodated fraction (WAF) of oils solutions or directly in methanol. Based on these sheets we can run exposure experiments in low-medium media and based on the use of O-rings (i.d. 15 mm) they could be used in well plates to expose embryos of fish, sea urchin or mussel. A battery of in vitro toxicity test will be used to estimate the dose-response relationships and the validation will be carried out comparing these results with the standard procedures.	Ailette Prieto and Olatz Zuloaga	Analytical Chemistry. Leioa and Plentzia		
<b>Accumulation and depuration of flame retardant compounds in fish tissues</b>	The main aim of this project is to expose fishes (seabass or gilt-head bream) under controlled conditions to a low concentration of a single contaminant (ng/l). The exposure are expected to last one or two weeks and a further week to depurate. From time to time (e.g. 2, 4, 7, 10, 15, 18, 21 days) some fishes will be taken from the exposed aquaria and the control one and the blood, muscle, liver, bile, brain and gills will be obtained to measure the accumulated concentrations. Simultaneously the concentration in water solution will be measured either directly or by passive sampling procedures. From these measurements the bioconcentration fractions (BFC) in all those organs will be estimated. All the analytical measurements will be carried out by GC-MS after the corresponding extraction and clean-up. In these experiments several parallel tasks will be carried out. On the one side, the metabolic transformation products will be identified and on the other side the metabolomic profiling will be built up.	Maitane Olivares and Nestor Etxebarria	Analytical Chemistry. Leioa and Plentzia		
<b>Analysis of the functional and taxonomic diversity of macrofauna on the Black sea's north-western shelf. Link with the variability of the</b>	BENTHOX is a research project financed by the Scientific Research Foundation of the Wallonie-Bruxelles region and targeted towards the understanding of marine coastal hypoxia (i.e. $O_2 < 62 \mu\text{mol/l}$ ) and its consequences on benthic-pelagic exchanges, diagenesis and ecosystem functioning. BENTHOX gathers physicists, biochemists and geologists from the Liege University and Brussels University. It involves field and	Marilaure Gregoire <a href="mailto:mgregoire@ulg.ac.be">mgregoire@ulg.ac.be</a>  (This master thesis topic will be done in collaboration with the	Univ. Liege. Ecological Modelisation	BENTHOX	

<p><b>environment.</b></p>	<p>laboratory work combined with mechanistic and statistical modelling. In May 2016, sediment samples have been collected in the frame of an UNDP (United Nation Development Program) expedition in order to understand the impact of hypoxia on the status of the benthic ecosystem and biogeochemical cycling in the Black Sea. Macrobenthos samples have been collected by Vanveen grabs at 15 stations and the macrofauna has been identified to the species level. The aim of the master thesis is to use statistical tools (e.g. constrained and unconstrained ordination techniques and clustering methods) in order to analyse the collected data sets and explain the variability of the species distribution in terms of environmental variables. Additionally, the functional composition of the macrobenthos will be described in terms of selected traits (e.g. bioturbation potential, sensitivity to perturbation, feeding behaviour) and statistical tools will be used in order to identify the traits that allow differentiating the macrobenthos distribution and the environmental variables that explain this differentiation. Results will be compared with those found with previous data sets and differences will be interpreted in terms of modifications of the Black sea environment during these last years. Taxonomic and functional diversity indexes will be estimated and communities of particularly high biodiversity values will be identified for conservation purpose.</p>	<p>University of Brussels)</p>			
<p><b>Linking Biodiversity and ecosystem services using a trait based approach</b></p>	<p>Marine organisms provide a wealth of services to humans. The Millennium Assessment report classified these services among different categories which are "Provisioning services" (Products obtained from ecosystems, e.g. food, medical resources, biotechnology resources, energy), "Regulating services" (Benefits obtained from regulation of ecosystem processes, e.g. climate regulation, organic waste processing), "Cultural services" (Nonmaterial benefits obtained from ecosystems e.g. recreation, culture, tourism), and "Supporting Services" (Support services: Services necessary for the production of all other services, e.g. Primary production, Oxygen production, Nutrient Cycling). Using existing collected data on macrobenthos biomass and abundance (Calvi bay and Black sea), the aim of the master thesis consists in assessing the services delivered by the benthic ecosystem through a biological trait analysis of its species. The traits will be selected to be linked with the investigated services. Once the different traits are determined for each dominant species of the investigated communities, statistical analysis will be performed in order to assess the functional diversity of each community and between communities. The diversity between sites will be explained in terms of variability of environmental variables (e.g. substrate composition, organic matter content and composition). Correlations between the different types of traits (e.g. traits related to different processes, sensitive traits and traits related to ecosystem services) will also be determined. Communities including species with traits that are</p>	<p>Marilaure Gregoire  <a href="mailto:mgregoire@ulg.ac.be">mgregoire@ulg.ac.be</a></p> <p>(this master thesis topic will be done in collaboration with the STARESO team, Corinne Pelapra, Annick Donnay).</p>	<p>Univ. Liege. Ecological Modelisation</p>		

	important for the delivering of ecosystem services to humans will be identified and compared with regions of high diversity				
<b>Modelling Biophysical conditions in the Calvi Bay (Corsica, France).</b>	Since 30 years, the Liege University has access to a Marine Research Station (STARESO, <a href="http://www.stareso.com/">http://www.stareso.com/</a> ) in the Calvi Bay where pluri-disciplinary data are collected and stored in a database since several years. This place is considered a reference unperturbed site where a large a Posidonia meadow can be found until ~40m depth. The management of the resources of the Bay requires the development of a mathematical model coupling the hydrodynamics and biogeochemistry including a representation of the benthic ecosystem. This model has to be at high resolution since it has to be able to simulate coastal processes. The master thesis consists in implementing such a model starting from an initial configuration already running for the Bay. Model results will be validated with satellite products (Sea Surface Temperature, chlorophyll) specifically processed for the Bay.	Marilaure Gregoire <a href="mailto:mgregoire@ulg.ac.be">mgregoire@ulg.ac.be</a>  (Marilaure Grégoire, Alexander Barth, Aida Alevera, Arthur Capet)	Univ. Liege. Ecological Modelisation		
<b>Present and future impact of atmospheric deposition on the structure and functioning of plankton communities in the Mediterranean Sea (Peacetime project and cruise)</b>	This master thesis will be conducted in the frame of the PEACETIME (Process studies at the air-sea interface after dust deposition in the Mediterranean Sea) project that aims at extensively studying and parameterizing the chain of processes occurring in the Mediterranean Sea after atmospheric deposition, especially of Saharan dust and to put them in perspective of on-going environmental changes. The specific objectives of this work will be to assess the impact of atmospheric deposition on biogeochemical processes and fluxes in various trophic regimes and various climate conditions. Several controlled perturbation experiments will be performed on board R/V during the PEACETIME cruise (30 days May 2017) under various environmental conditions. In the framework of this collaborative project, the M2 student will be in charge during the cruise of following the response of the plankton community structure to new nutrients inputs (nitrogen, iron...), and to evaluate the potential modifications of its functioning. We will use new experimental devices currently developed at LOV: the minicosms that are large tanks (300 L) equipped on their top-end with a combination of LEDs that can be modulated to fully reproduce the sun spectrum and irradiance intensity of surface Mediterranean waters during the period of investigation. Thanks to an integrated sampling and to their conical-end shape, minicosms allow following a large number of chemical, biological and physical parameters and to accurately quantify particle export. Eight of these experimental units will be on board to follow simultaneously and with a high temporal resolution, the evolution of biological activity (metabolism, <sup>13</sup> C flow), nutrients stocks, dissolved organic matter as well as particles dynamics and export both under present environmental conditions and following a realistic climate change scenario.	Cécile Guieu <a href="mailto:guieu@obs-vlfr.fr">guieu@obs-vlfr.fr</a>  Frédéric Gazeau <a href="mailto:gazeau@obs-vlfr.fr">gazeau@obs-vlfr.fr</a>	Laboratoire d'Océanographie de Villefranche (LOV), N° UMR : 7093, Lab dir: Antoine Sciandra  LOV, UMR 7093, Université P&M Curie, Observatoire Océanologique de Villefranche Station Zoologique, 181 Chemin du Lazaret 06230, Villefranche-sur-mer, France		A candidate with a background in chemical oceanography and field work experience is sought. Good communication and coordination skills are also required as the experiments will bring together scientists from several European laboratories.

<b>Electronic Monitoring in fisheries management</b>	<p>The aim of the research work focuses on the comparative study between the electronic monitoring and physical observer on board, based on image analysis. Thus, firstly this master thesis proposal deals with defining which facts/events are feasible to compare and secondly, aiming which are the advantages/disadvantages of each using statistics methods. This work offers the opportunity to learn an innovative analysis method already applied in different oceans for fisheries sustainability together with introducing the student into a practical and very close tuna fishing industry.</p>	<p>Xabier Lekube Iturrioz, <a href="mailto:Xli@digitalobserver.org">Xli@digitalobserver.org</a></p> <p>Gonzalo Legorburu Marcos <a href="mailto:glm@digitalobserver.org">glm@digitalobserver.org</a></p>	<p>Digital Observer Services (DOS).</p> <p>Bizkaia. <a href="http://www.digitalobserver.org">www.digitalobserver.org</a></p>		<p>Statistics notions</p>
<b>Effect of the composition of the diet on the thioredoxin reductase activity in the liver of the European seabass (<i>Dicentrarchus labrax</i>)</b>		<p>Iciar Martinez <a href="mailto:iciar.martinez@ehu.eus">iciar.martinez@ehu.eus</a></p>	<p>PiE-UPV/EHU</p>	<p><b>SELATUN</b></p>	<p><b>Marinelle Espino</b></p>
<b>Effect of the composition of the diet on the brain metabolome of the European seabass (<i>Dicentrarchus labrax</i>)</b>		<p>Iciar Martinez <a href="mailto:iciar.martinez@ehu.eus">iciar.martinez@ehu.eus</a></p> <p>Nestor Etxebarria <a href="mailto:nestor.etxebarria@ehu.eus">nestor.etxebarria@ehu.eus</a></p>	<p>PiE-UPV/EHU</p>	<p><b>SELATUN</b></p>	
<b>Effect of the composition of the diet on the Hg:Se ratio in the muscle of the European seabass (<i>Dicentrarchus labrax</i>)</b>		<p>Iciar Martinez <a href="mailto:iciar.martinez@ehu.eus">iciar.martinez@ehu.eus</a></p> <p>Nestor Etxebarria <a href="mailto:nestor.etxebarria@ehu.eus">nestor.etxebarria@ehu.eus</a></p>	<p>PiE-UPV/EHU</p>	<p><b>SELATUN</b></p>	
<p>(temptative) <b>Phage therapy in salmon</b></p>	<p>The UK salmon industry's most serious threat is that posed by sea lice, and these parasites have become increasingly non-susceptible to the action of chemical control agents. A new solution being introduced across the sector is the deployment of cleaner fish, such as Ballan wrasse and lumpfish, into salmon cages during production. Cleaner fish feed on the sea lice attached to salmon and help to reduce parasite numbers. Hence, cleaner fish are being mass cultured at present, but bacterial diseases are restricting production. Until effective vaccines can be developed and introduced against cleaner fish pathogens, such as atypical strains of <i>Aeromonas salmonicida</i>, there is a need to rely on antibiotic therapy. However, only three antibiotics are licenced for use in hatcheries and there is understandable concern around selecting for antimicrobial resistance. An alternative approach to combating the bacterial pathogens, and that may complement the use of chemicals, is phage therapy. The aim of this project is to isolate and characterise phage that target atypical</p>	<p>Andrew Desbois <a href="mailto:andrew.desbois@stir.ac.uk">andrew.desbois@stir.ac.uk</a></p>	<p>Univ Stirling</p>		<p><b>Mahfuza Arker</b></p>

	strains of <i>Aeromonas salmonicida</i> with a view to developing these as prophylactic or treatment control agents. Spectrum of action, killing kinetics, genome properties and appearance of isolated phage will be investigated and the potential of these phage to prevent atypical furunculosis (the disease caused by atypical strains of <i>Aeromonas salmonicida</i> ) will be investigated in an insect model of fish disease ( <i>Galleria mellonella</i> ) and also potentially by field deployment. The student will receive training in microbiology, use of alternative infection hosts, molecular techniques and fish physiology.				
<b>metagenomics/microbial ecology.</b>		Ines Arana Vladimir Kaberdin			<b>Vincenzo Donnarumma</b>
<b>Ideal versus practical ecosystem boundaries for reporting ecosystem indicators in the ICCAT Convention Area</b>	The International Commission for the Conservation of Atlantic Tunas (ICCAT) which is in charge of managing highly migratory species of tunas and tuna-like species and associated ecosystem is exploring approaches to implement Ecosystem-Based Fisheries Management (EBFM). In this undertaken, it is imperative to identify what would be the ideal scale of the management area to operationalize EBFM. Fisheries management can be applied at a number of geographic scales, ranging from large marine ecosystems or biogeographic marine provinces to small scale fishing communities. Additionally, a management area could be related to known ecological boundaries but also political and traditional fishing ground boundaries. In this study, first we aim to identify what are the current management units in place to manage ICCAT species, analyze their degree of overlap and review their origin. Second, we aim to identify what ecological boundaries would ideally better support the implementation of an EBFM approach. Third, we aim to compare the degree of overlap and compatibility between the ideal ecological boundaries and more practical fisheries management boundaries. These results have important implications, as they will inform the development of Ecosystem Report Cards and the selection of indicators to monitor ecosystem status. Ultimately the goal is to provide a stronger link between ecosystem research and fisheries management.	Maria Jose Juan-Jorda/Hilario Murua mjuan@azti.es/hmurua@azti.es	AZTI	<b>AZTI</b>	Degree in Marine Sciences or Marine Biology, english, R programming, GIS, background in marine ecology and oceanography. <b>Sara Todorovic</b>
<b>dynamic of element Pt and Te</b>		Jörg Schafer			<b>Ruoyu Hu</b>
			Thesis in San Diego, CA at the Scripps Institute of Oceanography		Camille Grimaldi
<b>potential zooplankton community grazing</b>	The first aspect of the data analysis will be to distil the dataset into relatively simple prey classes and determine their carbon contents (via	Daniel Mayor <a href="mailto:dan.mayor@noc.ac.uk">dan.mayor@noc.ac.uk</a>	university of Southampton		<b>Ali Abdulhussain Almosawy</b>

<p><b>impact on primary production and its seasonal variability</b></p>	<p>cell-volume based equations). Once this is done, you should be able to estimate the ingestion of the different prey classes by the different zooplankton size classes that Sari worked with (63-200, 200-500, &gt;500). And then you can examine how the dietary composition compares to the composition of the prey field. We're currently in the process of writing up a similar paper for a load of grazing experiments conducted at a coastal station nearby to the Celtic Sea (where Sari's work was conducted), so your study will make a nice comparative piece.</p> <p>There's also plenty of scope for you to take the project in additional directions, e.g. upscale the grazing estimates of the different zooplankton size classes using the zooplankton biomass data that sari is currently writing up for publication – so that we can look at the potential zooplankton community grazing impact on primary production and its seasonal variability.</p>				
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