Instituto Milenio de Oceanografía
Universidad de Concepción P.O. Box 1313, Concepción 3 – Chile
Phone: 56-41-2661266
www.imo-chile.cl

POSTDOCTORAL POSITIONS IN OCEANOGRAPHY AT THE MILLENNIUM INSTITUTE OF OCEANOGRAPHY (IMO), UNIVERSITY OF CONCEPCION, CHILE

Full-time postdoctoral positions are available starting between September 1st 2019 and January 31st 2020 at the **Millennium Institute of Oceanography (IMO)** to undertake innovative research and to develop questions in three proposed topics within IMO's larger research lines. Candidates will have to demonstrate experience and motivation to do research in their preferred research line, using observational, experimental and/or modelling approaches. Successful candidates will be expected to develop their research topics in association with two or more of IMO's Associate Researchers, to publish their research as first author in high impact journals, to write and help write grants for external funding, and contribute collaboratively to related research projects.

Proposed Topics and Lead IMO Researchers:

- **Topic 1a: Circulation and carbon biogeochemistry in the deep ocean. Rubén Escribano, Osvaldo Ulloa, Oscar Pizarro**
- **Topic 1b: Ecological connectivity, (meta)genomics, biodiversity and trophic food webs of deep ocean pelagic communities. Rubén Escribano & Osvaldo Ulloa**
- **Topic 2a: The impact of oceanographic processes on speciation processes and the ability of local adaptation in eukaryotic phytoplankton. Peter Von Dassow**
- **Topic 2b: Adaptations of phytoplankton in a variable and changing ocean. Cristian A. Vargas & Peter Von Dassow**

(Detailed information provided in Annex 1)

The **Millennium Institute of Oceanography (IMO)** is a Center of Excellence devoted to fundamental oceanographic research in the South Pacific, hosted by the Universidad de Concepción, in Concepción, Chile and the Pontificia Universidad Católica de Chile in Santiago, Chile. IMO's main research lines are:

1. **A Variable and Changing Ocean**: This theme is organized around three grand questions:

a): How well do biogeochemical flows, community composition, and population structure of key species correlate with physical oceanographic drivers?

b) How does biogeochemical function differ among norm-oxic, hypoxic and anoxic conditions in marine systems?

c) What are the resilience and adaptive responses of key communities and organisms to a changing ocean, and can that be predicted by their origin?

2. **The Deep Ocean**: Community structure and function, and the biogeochemical characteristics of the deep and ultra-deep waters of the South Pacific. This theme is organized around a single grand question:

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What are the physical and biogeochemical characteristics of deep and ultra-deep waters of the eastern South Pacific, and which of those determine the diversity and functional structure of their pelagic communities?

(For more information about IMO, please visit http://imo-chile.cl/research-lines/)

Applications will be received until 31 July 2019. The appointment will be for a minimum of one year with extensions of up to four years, pending progress. The annual gross salary is approximately USD 26,000 after taxes and, for foreign candidates, a gross installation fund of app. USD4,200.

Postulation requirements include:

1. Ph.D. degree completed before taking up the appointment and received no earlier than January 2014.
2. Curriculum Vitae, with a minimum of two first-author publications in ISI-ranked journals.
3. A letter expressing the motivation of the candidate for applying for the position, referring to the research topic and IMO's general research themes.
4. Names of three scientists with whom the candidate has previously worked or interacted including emails and telephone numbers.

Candidates are strongly encouraged to contact IMO Associate Researchers with whom they are interested in working, prior to submitting their applications (contact info below).

Please send completed application materials to: Ms. Francisca Osses, Secretary, **secretaria.imo@imo-chile.cl, Millennium Institute of Oceanography (IMO), University of Concepcion - www.imo-chile.cl; P.O. Box 1313, Concepcion 3; Zip Code: 4030000, Chile.**

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Millennium Institute of Oceanography (IMO) - Associate Researchers

1. Dr. Osvaldo Ulloa, Scientific Director
Department of Oceanography, Faculty of Natural and Oceanographic Sciences
University of Concepción
oulloa@udec.cl

2. Dr. Ruben Escribano, Deputy Director
Department of Oceanography, Faculty of Natural and Oceanographic Sciences
University of Concepción rescribano@udec. cl

3. Dr. Wolfgang Schneider
Department of Oceanography, Faculty of Natural and Oceanographic Sciences
University of Concepción
wschneid@udec.cl

4. Dr. Cristian Vargas
Department of Aquatic Systems, Faculty of Environmental Sciences and Environmental Sciences Center EULA Chile University of Concepcion crvargas@udec.cl

5. Dr. Oscar Pizarro
Department of Geophysics, Faculty of Physical and Mathematical Sciences
University of Concepcion
oscar.pizarro@imo-chile.cl

6. Dr. Peter von Dassow
Department of Ecology, Faculty of Biological Sciences, Pontificia Universidad Católica de Chile
pvondassow@bio.puc.cl

7. Dr. Samuel Hormazábal Sea Sciences Institute
Faculty of Sea Science and Geography
Pontificia Universidad Católica de Valparaíso, Chile
samuel.hormazabal@ucv.cl

Instituto Milenio de Oceanografía
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Annex 1 (Topic details)

Topic 1a: Circulation and carbon biogeochemistry in the deep ocean.
The key scientific question is to evaluate the relative impacts of deep circulation and local surface-derived material on carbon biogeochemistry in the deep ocean. This topic requires integration of deep ocean circulation with carbon chemistry and biogeochemistry. Empirical analysis may involve characterization of water chemistry, analysis of carbon stable isotope (^{14}C) composition of dissolved and particulate carbon, ^{14}C age analysis, and/or metagenomic analysis of microbial or animal components.

Topic 1b: Ecological connectivity, (meta)genomics, biodiversity and trophic food webs of deep ocean pelagic communities.

This topic may involve molecular analysis, traditional taxonomy and chemical analysis of pelagic metazoan, mainly meso- and macrozooplankton from epipelagic waters, but also mesopelagic abyssal and hadal fauna including fishes. The key scientific questions to deal with are: a) How deep waters communities connect ecologically, trophically and evolutionary with those from the upper ocean, b) What are the key drivers maintaining ecological zonation and pelagic biodiversity in the vertical plane and horizontal axis as well, in the context of oceanographic gradients and environmental discontinuities. A large data base and set of samples from several cruises in the past 5 years are already available, but also new field work in coming years is envisaged for which suitable equipment is available. For molecular analysis, DNA barcoding, metabarcoding, transcriptomic and genetic analysis can be applied, while trophic structure and its dynamics can be approached by stable isotopes composition and/or traditional microscopy.

For both themes 1a and 1b, applicants can consider any of these scientific questions and approaches, or a combination of them, when expressing their interest in a postdoc position. Complementary projects from Chilean national Grants will support the research.

Topic 2a: The impact of oceanographic processes on speciation processes and the ability of local adaptation in eukaryotic phytoplankton.

Postdoctoral researcher can focus on this topic in one or both of the following strategies:

1. Compare the relative importance of oceanographic breaks, environmental differentiation, and geographic distance in determining genetic and genomic divergence.
2. Investigate whether patterns of genetic differentiation on the regional scale correspond to mesoscale processes (fronts, jets, eddies)

In both cases, the focus is on key species as a model at the intra-specific level or at the intra-generic level. Population genomics can be implemented with RadSeq from the cosmopolitan species *Emiliania huxleyi*, and at the intra-generic level phylogeography can be done with sequencing of phylogenetic markers and comparative genomics with RadSeq of the genus *Pseudo-nitzschia*. Leader Researcher: Peter von Dassow. It is expected to collaborate with PhD Samuel Hormazabal in incorporating physical oceanography into the sampling design and the analysis and interpretation of patterns. It might also be possible to complement the empirical study with particle movement modeling.

In addition to IMO internal funds and own funds obtained (e.g. from a future FONDECYT Postdoc project), this postdoc project will complement and benefit from Dr. von Dassow's FONDECYT project 1141106 and the international CNRS collaboration UMI 3614 "Evolutionary Biology and Ecology of Algae".

Topic 2b: Adaptations of phytoplankton in a variable and changing ocean.

We are looking for a postdoc that will focus on comparing adaptations and/or adaptive mechanisms (evolutionary processes) that different phytoplankton can exhibit against environmental variables. We are especially interested in using the South-East Pacific as a natural laboratory, since combinations of conditions similar to the future ocean (with climate change) are naturally present here and it is possible to observe how communities and organisms respond in these environments. Some examples of questions within this subject of which the postdoc we are looking for can choose to focus:

1. Are there differences between phytoplankton in tolerance to the conditions of low concentrations of O2 and pH that naturally lie off the coast of Chile?
2. Within phytoplankton, what are their tendentious tendencies between generalists and specialists in strategies, and what are their commitments among these strategies?

3. Are there differences in tolerance to environmental fluctuations between coastal and oceanic phytoplankton?
Researchers associated with topic 2b: Peter von Dassow and Cristian Vargas. In the case of question 3, we expect that the levels of environmental fluctuations (eg, in the pH) are relevant for coastal and phytoplanktonic organisms as opposed to oceanic ones.

This project will be complemented by (and benefit from) ongoing projects FONDECYT 1170065 lead by Dr. Vargas and FONDECYT 1141106 of Dr. Von Dassow, as well as IMO internal funds.