Call for applicants for 4-month contract on South African larval dispersal model-data comparison

May 27, 2021

Contents

This announcement is also available in French.

1 Basic information

- **French name of project:** Modélisation de la dispersion larvaire des espèces exploitées sur la côte sud de l'Afrique du Sud dans un contexte d'aire marine protégée et de la sureploitation
- **English name of project:** Larval dispersal modeling of exploited marine species along the southern coast of South Africa in a context of marine spatial planning
- **Application deadline:** June 25, 2021
- **Contract duration:** 4 months
- **Salary:** Salary will depend on experience, but the target applicant pool are individuals with a Masters in Marine Science or related disciplines capable of occupying a position at the Study Engineer (i.e., "Ingenieur d'étude" - IE) or Research Engineer (i.e., "Ingenieur de recherche" - IR) levels

2 Description of the project

2.1 Context

South Africa is in the process of expanding and diversifying the nation's network of Marine Protected Areas (MPAs) in order to assure viable marine ecosystems, including proposing to declare most of Algoa Bay, the central area for this project on which Port Elizabeth is located, as a MPA (Dorrington et al. 2018). This MPA and associated changes to Algoa Bay management pose many important questions regarding connectivity within and between reserves and non-reserve areas, and the potential impact of the MPA for population sustainability and fisheries. The extent to which MPAs reseed heavily-impacted, non-MPA areas via larval dispersal is an essential open question for assessing the long-term impacts of climate change (Jury 2020) and the sustainability of South Africa's coastal marine fisheries. For all of these reasons, quantifying larval dispersal of coastal species along the southern coast is essential for meeting South Africa's development goals.

The southern coast of South Africa represents an excellent region to study marine larval connectivity as the oceanography of the region has been well studied (Tedesco et al. 2019), a number of empirical (Pattrick & Strydom 2008, Porri et al. 2014) and numerical (Garavelli et al. 2012, Denis 2020) studies have been carried out on larval dispersal of both fish and invertebrate taxa, and the area has a long history with spatial management of marine resources (Kerwath et al. 2013, Dorrington et al. 2018). A fine-scale regional ocean circulation model (<1 km spatial resolution) has recently been developed for Algoa Bay. An initial simulation study of coastal larval dispersal using this model indicates a complex mixture of offshore larval transport and mixing and retention in embayments (Denis 2020), highlighting the need for a fine scale understanding of regional transport. Particularly promising is the possibility to compare model outputs to empirical data on the distribution of larvae within the plankton (Pattrick & Strydom 2008, Porri et al. 2014), providing a rare opportunity to test the outputs from larval dispersal simulations.

2.2 Project objectives

The primary objective of this project is to develop a set of fine-scale larval dispersal models for the southern coast of South Africa to better understand marine connectivity in and around the regions MPAs and, thereby, contribute to sustainable management of South Africa's marine resources. Models will be adapted to at least one fish species (e.g., red roman, *Chrysoblephus laticeps*; or South African white seabream, *Diplodus capensis*), and one invertebrate (.e.g., brown mussel, *Perna perna*), to be chosen based on the extent of existing knowledge in South Africa (Pattrick & Strydom 2008, Porri et al. 2014). Different representations of larval development and behavior (Garavelli et al. 2016) will be tested to see which most accurately reproduces observed larval distributions (Pattrick & Strydom 2008, Porri et al. 2014).

2.3 Scope of work

The project will consist of the following steps:

1) Larval dispersal simulations will be carried out for the study region based on the publicly available dispersal model Ichthyop (Lett et al. 2008) using outputs from an existing fine-scale ocean circulation model.
2) Complexity of larval development and behavior in the dispersal model will be varied and the impact of these on regional connectivity around MPAs will be assessed (Garavelli et al. 2016).
3) Simulated dispersal patterns will be compared with field of observations of larval distributions in the plankton (Pattrick & Strydom 2008, Porri et al. 2014) to assess model accuracy.
4) A report of project results and conclusions will be written and submitted to FSPI on or before February 2022.

3 Context of the contract

3.1 Project direction

- David M. Kaplan (david.kaplan@ird.fr), UMR MARBEC, IRD, Sète, France

- Christophe Lett (christophe.lett@ird.fr), UMR MARBEC, IRD, Sète, France

The project also involves a number of South African researcher, with which the contractee will interact extensively:

- Francesca Porri (F.Porri@saiab.ac.za), South African Insitute for Aquatic Biodiversity (SAIAB), Makhanda (Grahamstown), South Africa
- Paula Pattrick (paula@saeon.ac.za), South African Environmental Observation Network (SAEON), Port Elizabeth, South Africa
- Warren Potts (w.potts@ru.ac.za), Rhodes University, Makhanda (Grahamstown), South Africa
- Dylan Bailey (dylan@bayworld.co.za), Bayworld, Port Elizabeth, South Africa

3.2 Hosting laboratory

The contractee will be affiliated with the UMR MARBEC in Sète, France and will be employed by the French National Research Institute for Sustainable Development (IRD). Ideally, the contractee would be physically located in Sète or potentially at one of the South African partners, though given the current COVID-19 situation, working at a distance is also a possibility for a well-organized and self-motivated candidate.

The contractee will be expected to travel at least once to South Africa (or to France if based in South Africa) over the course of the contract to meet regional partners, develop larval dispersal models and identify appropriate model-data comparisons.

3.3 Expected start date and duration

The project should begin as early as possible after the candidate has been selected, ideally on or before mid-July. The initial contract will be for 4 months, though an extension of 1-2 months may be possible if there are sufficient funds.

3.4 Funding

The project is financed by a grant from the "Fonds de Solidarité pour les Projets Innovants" (FSPI).

4 How to apply

4.1 Desired qualifications

The ideal candidate for this project will have a Masters in marine science or related disciplines that included practical experience with modeling, numerical simulations and/or statistics. Previous experience with larval dispersal modeling and/or Lagrangian particle tracking is a plus, though not essential so long as the candidate has a strong foundation in quantitative marine science. Previous use of R (or potentially Python, Matlab, etc.) is highly desirable.

As the project will involve extensive interaction with South African researchers, a good working knowledge of English is important.

4.2 Application materials

Interested applicants should send an email on or before **June 25, 2021** with subject "FSPI SA larval dispersal application" to david.kaplan@ird.fr containing the following materials:

- A letter of motivation, including discussions of the aspects of the applicant's background that make him or her particularly appropriate for the project (e.g., any modeling, numerical or statistical experience)
- A detailed CV
- Names and contact information for 2-4 professional references
- Information that will allow us to evaluate the scholastic achievements of the candidate (e.g., most recent course grades and class rankings, Masters internship report)

Cited references

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