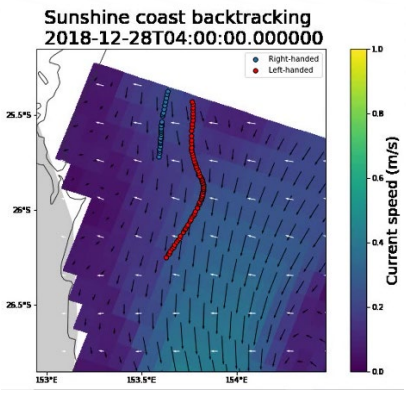
PhD opportunity:

Oceanographic particle tracking for the bluebottle



Many Australians have had a painful bluebottle sting when swimming at the beach, yet little is known about the bluebottle and its journey before reaching the coast.

This PhD project is part of a large ARC Linkage Project, BluebottleWatch, that is a collaboration between the University of New South Wales, Griffith University, the Bureau of Meteorology, and Surf Life Saving Australia. The aim of the PhD project is to understand and model the pathways of bluebottles in the ocean, controlled by ocean currents and winds.

The bluebottle (*Physalia physalis*) does not swim, but floats on the ocean surface and is transported by the currents and the wind. The float (also known as the sail) comes in left and right-handed forms, with each form predicted to move in different directions relative to the wind. The different forms are easily observed on beach stranded individuals, but no study exists in Australia on the pathways of bluebottles before they reach the coast.

Aims

Impact of winds, currents, and waves on bluebottle trajectories.

Using simulation outputs of winds and surface ocean currents, we can numerically advect a virtual particle representing a bluebottle. This so called Lagrangian particle tracking technique is a powerful tool to model the path of tracers in the ocean. Using an open-source Python-based framework for Lagrangian particle modelling (Opendrift), you will apply a specific bluebottle module and investigate the impact of winds, ocean currents, and stokes drift from waves on the trajectories of bluebottles.

Origin of bluebottles.

Using observed times and locations of bluebottles stranding, you will use the Lagrangian framework to numerically backtrack the particles and answer the key unresolved question: where do bluebottles come from.

Drivers of seasonal and inter-annual variability in bluebottle swarms

Observations show high inter-annual variability and localised trend in bluebottle beachings. You will use the particle tracking framework to identify what causes the variability and how climate signals impact the risk of bluebottles at various locations.

Student benefit

You will be based at UNSW Sydney and benefit through working with a supportive team of academics from UNSW within an large inter-disciplinary project.

Through this project, you'll learn:

- All about the bluebottle, Australia's oceanography and wind regimes
- How to use and understand modelling outputs
- How to conduct numerical particle tracking simulations
- Apply critical thinking, statistical analysis and scientific writing
- Manage a major research project
- Develop community engagement and communication skills.

Supervisors: Dr Amandine Schaeffer (UNSW School of Mathematics and Statistics, a.schaeffer@unsw.edu.au, Centre of Marine Science and Inoovation).

Candidate profile

- Recently completed an Australian Honours (First Class or good 2A honours with peer-reviewed publication) or Masters (in the last five years) in oceanography or climate science.
- Good programming skills (using Python or Matlab).
- Candidates must have enthusiasm for working with researchers across multiple disciplines, and strong written and oral English skills.

Applications:

Students will be enrolled through the Higher Degree Research Training Program at UNSW Sydney. Students need to have First Class honours (or good 2A honours with publication) or a research Master's degree with high GPA and apply for the Domestic Research Scholarship through the Australian Government Research Training Program (RTP, $35,000 per annum for 3.5 years). Please note that international students will only be considered if they are eligible for the scholarship.

If you are confident that you are eligible for an RTP domestic research scholarship, expressions of interest should first be submitted to Dr Schaeffer (a.schaeffer@unsw.edu.au) with subject line "PhD Application for Bluebottle project". Please attach a single PDF file that includes: a brief cover letter/statement of interest and experience (one page maximum), a CV including the names and contact details of two referees (two pages max), and an academic transcript.