GENERAL INFORMATION

Program sponsor: Princeton Environmental Institute

Position number: C1SAR2

Project title: Assessing the Ocean's Biological Carbon Pump in a Water Mass Transformation Framework

Organization/research group: Program in Atmospheric and Oceanic Sciences

Primary location(s) of internship: Princeton University, Guyot Hall and/or Sayre Hall

Additional cities and/or countries to be visited (if applicable): n/a

Note: If this internship is located in a country with an International SOS risk rating of High or Extreme, final candidates must participate in a travel review process overseen by the Travel Oversight Group (TOG), and obtain safety guidance prior to departure. The University reserves the right to revoke support and funding for travel at any time there has been a significant deterioration in the safety and security conditions surrounding travel arrangements, or in the sector of the country, or countries, where travel is to occur.

FACULTY SPONSOR(s)/HOST INFORMATION

Name(s): Jorge Sarmiento

University Department(s): Geosciences

E-mail: jls@princeton.edu

Website: https://www.princeton.edu/cee/people/display_person/?netid=jls

INTERNERNSHIP/RESEARCH PROJECT INFORMATION

Internship/project description:

The biological carbon pump is the set of biological processes that collectively move carbon from the sunlit surface layer of the ocean to its deep interior. The phenomenon forms a fundamental component of the global carbon cycle and global climate, impacting atmospheric carbon dioxide on a wide range of timescales. Difficulty in observing and simulating the ocean biosphere mean that even the magnitude of the present-day biological pump, not to mention its variability or susceptibility to change, remains highly uncertain. This project will pursue novel analysis of the global ocean's biological carbon pump using a framework based on water mass transformation theory, which places important constraints on the movement of material in the ocean. Using a new toolbox developed for such analysis, the functioning of the biological carbon pump in a state-of-the-art earth system model will be assessed, both for the present day and in future, global warming scenarios. The project is expected to facilitate a much-needed advance in our understanding of how ocean biology impacts global climate.

Student's role and responsibilities:

- the student will conduct detailed analysis of the ocean component of a state-of-the-art earth system model
- the initial focus will be quantification of the magnitude of biological fluxes in a water mass transformation framework
- beyond this, the student will have substantial freedom to explore relevant questions of interest to them
- while exploring the model, the student is expected to help with the development and improvement of the analysis toolbox
- results will be regularly presented and discussed with supervisors, and a formal presentation will be delivered at the end of the internship
Internship/project learning objectives:
- climate model (big data) analysis
- understanding of how earth system models are constructed and how they function
- knowledge of water mass transformation theory
- knowledge of global ocean biogeochemical dynamics
- communication and presentation of scientific results and ideas
- development of hypotheses and scientific exploration

PROGRAM REQUIREMENTS

Academic background and any course pre‐requisites:
Background in environmental science or physics preferred. Computer science or math also considered (focus can be placed on technical details of climate model analysis). No course prerequisites.

Technical skills:
Experience with computer coding would be beneficial but not essential (any language, python a bonus).

Additional training(s):
n/a

Equipment:
Having a laptop would be beneficial but not required

Physical demands:
n/a

Language abilities/competencies (if applicable): n/a

Additional information about the internship/project:
n/a

INTERNATIONAL TRAVEL REQUIREMENTS (if applicable)

Visa(s) required?
Yes ☐ No ☐

Research permit/pass required?
Yes ☐ No ☐

Immunizations required?
Yes ☐ No ☐

INTERNERSHIP/PROJECT SUPERVISOR(S)

Name and title of primary supervisor: Graeme MacGilchrist (gmacgilchrist.github.io)
Email: graemem@princeton.edu Phone: 609-258-6619

Name and title of additional supervisor, if applicable: n/a
E‐mail: Phone: 

PROGRAM DATES AND FUNDING INFORMATION

Weekly Stipend: $500

Number of Positions Available: 1

Tentative Start Date (mm/dd/yyyy): 06/03/2019

Number of Weeks: 8

Tentative End Date (mm/dd/yyyy): 07/26/2019

Note: PEI funding is for full‐time work, 35 hours per week minimum, and for a period of at least 8 continuous weeks.

Application deadline: January 11, 2019