



ACE CRC Intern Project for 2016/17

Number: RP1.1_01

Supervisors: Dr Stephanie Downes and Dr Clothilde Langlais

ACE CRC Project (RP): 1.1

Project Title:

The role of the westerlies in altering subduction hotspots and anthropogenic carbon uptake.

Background/context of project:

Located south of around 30°S, the Southern Ocean is a primary conduit for inter-basin exchange of heat, nutrients and carbon. The Southern Ocean captures 12% of the current annual fossil fuel emission, thanks to efficient surface to interior pathways. Over the past few decades the Southern Ocean has been experiencing significant circulation changes. These circulation changes are in part due to the poleward shift and strengthening of the strong westerly wind stress band around 52°S. The westerly winds, and the associated northward surface transport of water, play an important role in the subduction (i.e. volume flux of water into the ocean interior). The subduction of these ocean waters occurs in selected locations and depths across the Southern Ocean, known as subduction hotspots that are responsible for the uptake of human induced carbon.

Project outline:

This project will identify the Southern Ocean subduction hotspots, and investigate how the location of these hotspots and the associated subduction rates will vary when the overlying westerly winds change. The project will use output from high-resolution model experiments where the westerly winds have been altered in strength and/or position.

The student will analyse the experiment output, estimate the regional subduction rates and associated carbon uptake, and link results with other climate dynamics and recently published research literature.

Key deliverables:

1. Significant progress in understanding how recently observed trends in wind stress changes influences the uptake and oceanic distribution of anthropogenic carbon. This work will contribute towards production of a manuscript for submission in a high quality peer reviewed journal.

Any specific skills required:

1. This project is aimed at undergraduate students who have developed programming skills (for example, but not limited to Matlab or Python) with a background in physical sciences, although other applicants will be considered on merit.
2. An aptitude for climate research.

Contact details

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