PROJECT TITLE: The Antarctic Ice Sheet of the past million years

Principal Institution: University of Bristol
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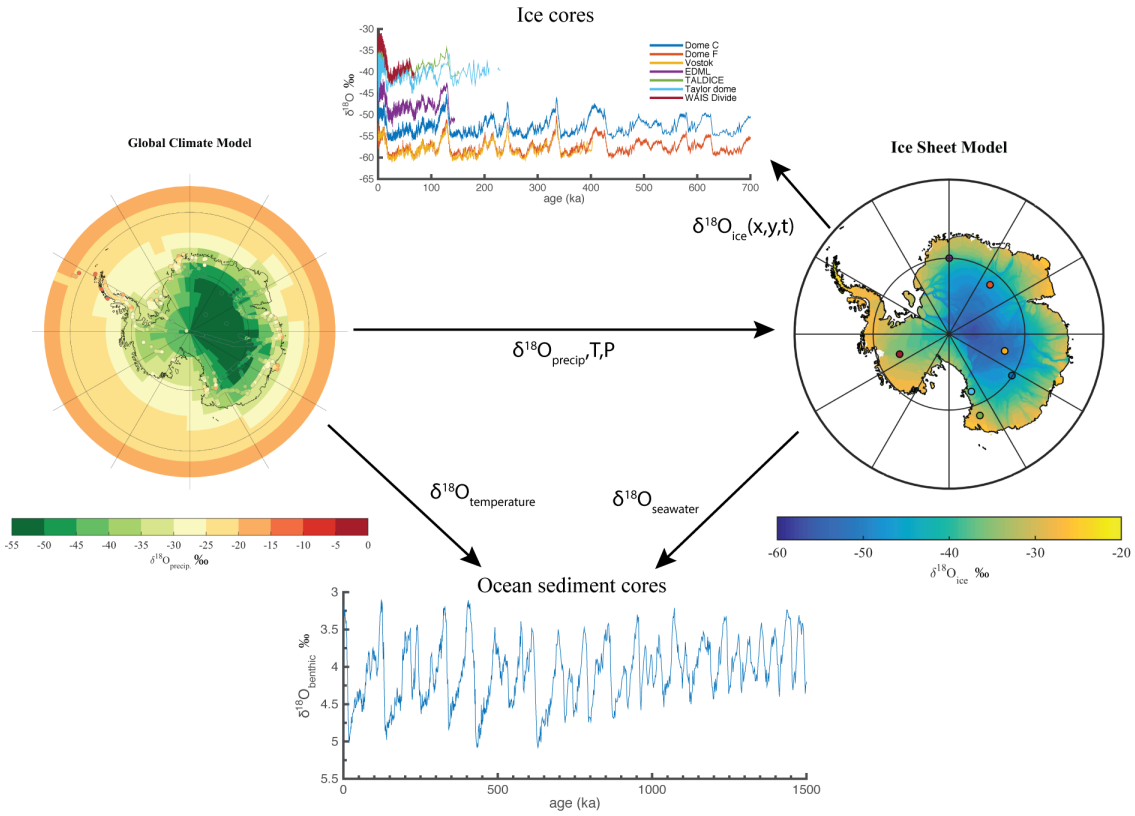

Project Background

The ice sheets are the largest potential contributor to future sea level rise and the greatest source of uncertainty. Recent studies have suggested that there was widespread and repeated retreat of portions of Antarctic ice sheet during warm intervals of the past 500,000 years. Oxygen isotope records ($\delta^{18}O$) from ice cores and calcareous microfossils recovered from deep-sea sediments are key proxies used to reconstruct past climate change. Work using these physical records in combination with climate and ice sheet models has yet to reach its full potential. This is because these proxy records are complicated by a variety of factors, including changes in the isotope composition of the ice sheets, the source of snowfall and changes in deep-sea temperature. Within this project existing climate and ice sheet models will be developed so that they can be directly compared with ice core data and attempt to understand how the Antarctic ice sheet responded to climate changes of the past million years. This work will directly inform studies of the future response of the Antarctic ice sheet to climate change.

Project Aims and Methods

This project will use a combined climate and ice sheet modeling approach to test the ability of models to reproduce variability of the past million years. These simulations will be evaluated against a variety of oxygen isotope data from ocean sediments and ice cores, in addition to geological evidence proximal to the ice sheet.

Objectives:

1) Perform oxygen isotope enabled simulations using the model HadCM3 for the last glacial cycle. Some of these simulations have already been performed; the first task will be to complete this suite of simulations.
2) Develop an existing isotope tracer scheme within an ice sheet model so that output can be compared with ice core data.
3) Perform ice sheet simulations of the Antarctic ice sheet over the past million years
4) Compare model results with a range of geological data

Candidate

The ideal candidate should have a strong interest in climate science, sea level change, and paleoclimatology. Previous experience of computer programming would be advantageous, although training can be provided. This project will involve considerable computer work so the student should have an aptitude and desire for this type of work.

Training

The student will receive training in the use of the climate and ice sheet models and the High Performance Computing facilities at Bristol. They will be able to attend courses as part of the doctoral training partnership and encouraged to attend relevant summer schools in palaeoclimate (Urbino) and glaciology (Karthaus) to complete their training. Opportunities exist for an extended research visit (~2 months) to external collaborators in the US, Australia or New Zealand. The student will be based at the University of Bristol but will also spend time working at the British Antarctic Survey in Cambridge.

References / Reading List

DeConto, R. and Pollard, D., 2016, Contribution of Antarctica to past and future sea-level rise, *Nature*, doi:10.1038/nature17145

Gasson, E., et al., 2016, Modelling the oxygen isotope composition of the Antarctic ice sheet and its significance to Pliocene sea level, *Geology*, doi:10.1130/G38104.1

Wilson, D., et al., 2018, Ice loss from the East Antarctic Ice Sheet during late Pleistocene interglacials, *Nature*, doi.org/10.1038/s41586-018-0501-8

Funding

This is a fully funded position, providing a stipend of £14,777 p.a., home/EU fees and a research allowance.

Position is open until filled; we will begin reviewing applications from the 1st Dec 2018. **Due to funding rules the candidate must be able to start this PhD by the 31st Mar 2019**

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