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ANALYSING THE EVOLUTION OF THE ANTARCTIC ICE SHEET

N P M Baker

Scott Polar Research Institute, University of Cambridge, Cambridge, United Kingdom

Antarctica has been glaciated for approximately 34 million years, but its ice sheets have fluctuated considerably and are one of the major driving forces in global sea level and climate change. The current volume of the Antarctic Ice Sheet contains 90 percent of the world's ice, enough to raise global sea levels by an estimated 65 m. Therefore, it is essential that we understand the mechanisms that drive ice sheet fluctuations.

While it is important to consider how the Antarctic Ice Sheet operates as a whole, it is a complex system. Not only will the marine-based West Antarctic Ice Sheet and the continental-based East Antarctic Ice Sheet have different driving mechanisms, but glaciers, ice streams, ice shelves, sea ice and the surrounding ocean further complicate processes.

My research involves employing the ice sheet model GLIMMER, a three-dimensional thermo-mechanically coupled ice sheet model, to interpret the continent-sized evolution of the Antarctic Ice Sheet. In addition, I will undertake several smaller glacier-scale studies, such as at the Byrd Glacier, to better understand how and why the margins of the ice sheet may be changing. These areas are not well described by ice sheet models because of resolution issues and the complications that arise due to ocean and ice shelf interactions with the ice sheet. Due to the remoteness of Antarctica, I will use remote sensing techniques, where available, and the published results of others to assess ice velocity, thickness and grounding line changes. My research may involve developing a hydrology component for GLIMMER, as this is not included in the current model. The exact temporal boundaries of this project are still in discussion, but they will be in line with Antarctic Climate Evolution (ACE) framework.

I am currently undertaking a SCAR Fellowship at Bristol Glaciology Centre to learn the fundamentals of ice sheet modelling and of GLIMMER. This will be followed by my PhD at Scott Polar Research Institute, University of Cambridge.