Using Computed Tomography (CT) Scans of an Adélie Basin Sediment Core to Reconstruct the Holocene

Katelyn M. Johnson[1,2], Rob McKay[1], Nancy A. Bertler[1,2], Anya Albot [1]

[1] Antarctic Research Centre, Victoria University of Wellington, P.O Box 600, Wellington, 6140, New Zealand, katelyn.johnson@vuw.ac.nz;
[2] GNS Science, National Ice Core Research Laboratory, P.O. Box 30-368, Lower Hutt, 5040, New Zealand.

Abstract

In 2010, a 180 m laminated sediment core (U1357B) was drilled in the Adélie Basin as part of the International Ocean Discovery Program (IODP) Expedition 318. Bulk organic carbon and carbonate material dates the core ~12,000 years BP, and laminae frequency suggest near annual resolution. Greyscale and grain size analyses of the core indicate three distinct Holocene climate states and cyclicity of diatom bloom events. However, cracking in the core due to gas expansion while drilling proved to be a limiting factor in the analyses. Recently, high-resolution computed tomography (CT) scans of the U1357B core were acquired in hopes of reducing noise and refining these previous analyses. Here we present the findings from the CT scans and discuss our plans to correlate this record with the Roosevelt Island Climate Evolution (RICE) ice core, which lies upstream from the U1357B site. These sites are connected through the Antarctic Coastal Current and are influenced from the waters of the Amundsen and Ross Seas, as well as local influences. The correlation between the highly resolved ice and marine sediment records offer a unique opportunity to explore the changes in deep water formation, polynya activity, sea ice extent, and the retreat of the Ross Ice Shelf grounding line through the Holocene.

Keywords: ice cores; sediment core; ice-ocean interactions; paleoclimate