

LIFE BENEATH THE ICE: A HISTORY OF BENTHIC COLONISATION BENEATH THE AMERY ICE SHELF, ANTARCTICA

A.L. Post¹, M.A. Hemer¹, D. Roberts², P.E. O'Brien¹, M. Craven³

¹*Geoscience Australia, Canberra, ACT, Australia*, ²*University of Tasmania, Hobart, TAS, Australia*, ³*Australian Antarctic Division and Antarctic Climate and Ecosystems Co-operative Research Centre, Hobart, TAS, Australia*

Life beneath the Antarctic ice shelves is surprisingly abundant and diverse. This study documents the Holocene seabed community beneath the Amery Ice Shelf, East Antarctica, based on fossil analysis of a 47 cm long sediment core. The surface samples from this core reveals a rich modern fauna, dominated by filter feeders (sponges and bryozoans), with an abundant infauna predominantly of polychaetes. Mobile detritus feeders such as benthic foraminifera and ostracods have relatively low abundance, and there is also a low abundance of planktonic organisms such as planktonic foraminifera, pteropods and diatoms. Basal freezing of the ice shelf at this site indicates surface water outflow. The presence of planktonic organisms therefore implies that the surface outflow is countered at depth by strong inflow, bringing planktonic organisms as well as suspended organic matter and oxygen from the ice edge, approximately 100 km to the north. These currents thereby sustain the seabed community.

The down-core assemblage reveals a succession in the colonisation of this site. The lower portion of the core (prior to ~9600 yr BP) is completely devoid of preserved fauna. The first colonisers of the site after this time were the mobile benthic organisms. Their occurrence in the core is matched by the first appearance of planktonic taxa, indicating a retreat of the ice shelf following the last glaciation to within sufficient distance to advect planktonic particles via bottom currents. The benthic infauna and filter feeders emerged during the peak abundance of the planktonic organisms, indicating their dependence on the advected food supply. The establishment and increase in the infauna and filter feeders is associated with a decline in the abundance of mobile benthic organisms, suggesting greater competition for the food source.

The nature of this species succession reveals the delicate balance of the sub-ice shelf ecosystem. The disintegration of Antarctic ice shelves, as has happened in recent times, will have serious implications for the nature of these seabed communities due to associated changes in the organic supply.