

CHEMICAL AND BIOLOGICAL PROPERTIES OF MARINE ICE FROM THE AMERY ICE SHELF, EAST ANTARCTICA

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Ice shelves play a major role in the discharge of ice from Antarctica both from iceberg calving and basal melt, and processes of ocean-ice interaction beneath the shelf are of increasing scientific interest. In the 2002/03 season a glaciological expedition team of the 19th Chinese National Antarctic Research Expedition recovered a 296-m long continuous ice core from the Amery Ice Shelf (69°26.2'S, 71°25.9'E). Stable oxygen isotopic analysis of the whole ice core shows that the ice shelf at this site consists of three parts. The uppermost layer, from 0 to 60 m depth, is formed from locally deposited snowfalls and has $\delta^{18}\text{O}$ values of about -20 ppt. The second section from 60 to 276 m is ice which has flowed from the inland Lambert Glacier drainage basin where $\delta^{18}\text{O}$ is depleted, and the values of $\delta^{18}\text{O}$ are about -40 ppt. The third part (from 276-296 m in the core) is marine ice which has frozen on to the base of the shelf from the underlying ocean and this has values of $\delta^{18}\text{O}$ of about +2ppt.

The marine ice accreted under the Amery Ice Shelf contains entrapped marine organic material, both particulate and dissolved. The composition of this organic material provides information on the processes of circulation, crystallization and accretion beneath the Amery Ice Shelf. We have made chemical and biological analyses of marine ice from the Amery Ice Shelf including major trace ions measurements by ion chromatography, flow cytometer measurements of particulate abundance and size distribution, environmental scanning electron microscopy for microorganism identification and electron probe microanalysis. The results from these analyses and their interpretation are discussed in this paper.

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