

STRATIGRAPHIC STUDIES AND SURFACE-LAYER FORMATION. A CASE STUDY: EASTERN WILKES LAND, EAST ANTARCTICA

(Abstract)

by

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ABSTRACT

This paper presents the results of a detailed study on the geomorphic and diagenetic processes of surface-layer formation and its subsequent preservation in the stratigraphic record. The study supplemented stratigraphic studies carried out along a 750 km ANARE traverse route along the 69°S parallel between 112° and 131°E (which approximately follows the 2000 m contour) in the katabatic wind zone of eastern Wilkes Land.

A 100 cane farm was established at GD03 (69°S, 115°E; 1835 m a.s.l.), adjacent to a 30 m deep firn-core drill site. The cane farm was used to monitor seasonal changes in snow accumulation and the type, size, distribution and orientation of the surface micro-relief.

The annual snow accumulation at GD03 is equivalent to 300 kg m⁻² of water. This annual layer is visibly marked

by a multi-layered ice crust, typically 1–2 mm thick, which is formed in autumn during a hiatus in snow supply. Within the annual layer, single-layered thin ice crusts were observed. These correspond to short hiatus periods, of the order of 2–3 weeks, during late winter–early spring, and radiation glazes formed during summer.

Density and oxygen-isotope–depth profiles display annual cyclicity within the snow-pack. Considerable horizontal variation was found in a single annual-layer thickness, with respect to ice-crust thickness, snow-density and oxygen-isotope values, and depth-hoar development, when traced in 21 2 m cores drilled at 5 m horizontal spacing.

The observed changes in surface micro-relief distributions over the cane farm have enabled a greater understanding of vertical variations between annual layers observed in the 30 m firn core.