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Site selection for Australia's Million Year Ice Core Project

Content

Obtaining replicated ice cores spanning the Mid-Pleistocene Transition which deliver records of both greenhouse gases and climate through this period, is a key goal of the international ice coring community (IPICS, 2020). Here we detail the selection of the site for the Australian Million Year Ice Core (MYIC) Project to recover oldest ice, located nominally 122.52059 °E, 75.34132 °S (subject to small adjustment following a site inspection). This is approximately 35 km SW from the EPICA Dome C site on Little Dome C.

Radar surveys of the surrounding area show the MYIC site is on a topographic high ridge, separated by a valley from the new Beyond EPICA (BE-OI) site, approximately 5.2 km away. The separation distance exceeds the local ice thickness (ca. 3 km), thereby increasing the independence of the oldest ice records from these two sites.

The age and resolution are modelled toward the base of the ice sheet using a one-dimensional model constrained by ice penetrating radar and isochrones traced back to the EPICA Dome C ice core site. The target for selection was to find a site with ice at least 1.4 million years old, resolution better than 14 thousand years per metre, and regular, essentially horizontal internal layers with minimal basal melting. We also sought to conservatively target ice that was well above the bed and the basal 'unit' where ice layering becomes less clear and the stratigraphic continuity less certain.

The final site selection involved consideration between MYIC and BE-OI researchers of the added value of the parallel drilling efforts at Little Dome C in overall risk mitigation across the two drilling efforts. The site was chosen with the objectives of securing independent records for joint replication and verification.

Reference:

IPICS Oldest Ice Whitepaper, Wolff et al., 2020, https://pastglobalchanges.org/sites/default/files/download/docs/working_groups/ipics/white-papers/ipics_oldaa_final.pdf

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