



Is there 1 million-year old ice near Dome C, Antarctica?

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Ice sheets provide exceptional archives of past changes in polar climate, regional environment and global atmospheric composition. The oldest deep ice drilled in Antarctica has been retrieved at EPICA Dome C (Antarctica), reaching 800,000 years. Retrieving an older paleoclimatic record from Antarctica is one of the biggest challenges of the ice core community. Here, we use a combination of internal layers identified with airborne radar and ice-flow modeling to estimate the age of basal ice along two transects across the Dome C summit. Based on the age of the bottom ice at EDC, we find a geothermal heat flux of 66.8 mW/m². Assuming the same geothermal heat flux all along both transects, we identify a region located only 40 km from the dome on a bedrock relief where the estimated basal melting is small or inexistent. As a result, basal age is estimated to be >1,500,000 years. However, this oldest ice hot spot disappears if the geothermal heat flux is only 5 mW/m² higher than at EDC. Our work also demonstrates the utility of combining radar layering with ice flow modelling to accurately represent the true nature of ice flow in the center of large ice sheets.