

## Searching potential sites of million year-old ice by modelling ice sheet age near New Dome Fuji region

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Finding a good site of drilling a new Antarctic ice core to cover more than one million years is crucial for our understanding of the climate system in our international community (IPICS). Previous ice flow modeling studies indicate that such old ice may exist in inland areas of the Antarctic continent, where horizontal ice flow is slow, the ice is thick, accumulation rate is low, basal temperature is well below the pressure melting point (Pattyn 2010; Fischer et al. 2013). Japanese drilling near Dome Fuji did not reach one million years because of the basal melt at the bottom of 3000m thick ice sheet. In the previous Dome Fuji drilling, modelling effort for interpreting high resolution radar measurement was missing. Here we combine the analysis of field data taken mainly by 59<sup>th</sup> and 60<sup>th</sup> Japanese Antarctic Research Expedition (JARE 59 and 60, 2017-2019) and ice flow modelling as the essential parts of the site selection activities. We estimate the temperature and age of ice, and age resolution of the ice near the bed at a dome of the ice sheet under various conditions. In the one-dimensional ice flow-thermodynamic model used in the study, the vertical velocity of the ice is parameterized with empirical functions and the coefficients were tuned to simulate and reproduce the Dome Fuji profile for both temperature and age. We show the influence of parameters (ice thickness, accumulation rate, geothermal heat flux, profile of vertical velocity of the ice) on the age of ice especially in the lowest few hundred meters. The one-dimensional model is applied along the transects of JARE 59, 60 surveys with both Japanese and American CReSIS ground radar system, using the estimated bed topography, ice thickness and simplified pattern of surface mass balance and geothermal heat flux. The calculated distribution of the age of ice are compared with internal layers of the ice (isochrone) derived from ground radar surveys for some typical cases in the region. We will focus especially on the comparison between model and CReSIS radar measurement and discuss the possibility of existence of old ice.

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