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Where is the 1-million-year-old ice at Dome A?

Liyun Zhao (1), John C. Moore (1), Bo Sun (2), Xueyuan Tang (2), and Xiaoran Guo (1)

(1) College of Global Change and Earth System Science, Beijing Normal University, Beijing, China(zhaoliyun@bnu.edu.cn), (2) Polar Research Institute of China, Shanghai, China

Ice fabric influences the rheology of ice, and hence the age/depth profile at ice core drilling sites. We use the depth varying anisotropic fabric suggested by the recent polarimetric measurements around Dome A along with prescribed fabrics ranging from isotropic through girdle to single maximum in a three-dimensional, thermo-mechanically coupled full-Stokes model of a 70 km$\times$70 km domain around Kunlun station. This model allows to simulate the near basal ice temperature and age, and ice flow around the location of the Chinese deep ice coring site. Ice fabrics and geothermal heat flux strongly affect the vertical advection and basal temperature which in consequence controls the age profile. Constraining modeled age-depth profiles with dated radar isochrones to 2/3 ice depth, the surface vertical velocity, and also the spatial variability of a radar isochrones dated to 153.3 kyr BP, limits the age of the deep ice at Kunlun to 649-831 kyr, a much smaller range than inferred previously. The simple interpretation of the polarmetric radar fabric data that we use produces best fits with a geothermal heat flux of 55 mWm^{-2}. A heat flux of 50 mWm^{-2} is too low to fit the deeper radar layers, and a heat flux of 60 mWm^{-2} leads to unrealistic surface velocities. The modeled basal temperature at Kunlun reaches the pressure melting point with a basal melting rate of 2.2-2.7 mm yr^{-1}. Using the spatial distribution of basal temperatures and the best fit fabric suggests that within 400 m of Kunlun station, 1 million-year old ice may be found 200 m above the bed, and there are large regions where even older ice is well above the bedrock within 1-2 km of the Kunlun station.