

Sensitivity studies of the position and elevation of Dome Fuji, Antarctica using a high-resolution numerical ice-sheet model

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Ice divides are important locations for deep drilling on ice-sheets. Precise computation around a divide requires spatially very high resolution due to the characteristics of ice-flow around the divide, therefore, one effective way to simulate the evolution of divide flow for a long time scale (e.g., more than 1Myr) is to apply a 'nesting' of a local high resolution model into a large low resolution model. Moreover, ice flow pattern is significantly different between an ice divide and the other areas: the flow around the divide requires more terms to compute than the other area, which prefers a nesting model again. A simple way to introduce the nesting is to fix the nested area through the computation, therefore, sensitivity of the ice-divide shapes (position and/or elevation) to changes in various boundary conditions should be investigated beforehand.

Saito (2002) presents a series of numerical experiments of Antarctic ice sheet using an ice-sheet model IclES. Possibility of changes in the position of Dome Fuji driven by the evolution of glacial/interglacial climate, as well as a variety of ice-grounded area are discussed, however, the resolution of the ice-sheet model in the study was relatively low (40km). Moreover, only maximum possible or even overestimated patterns of the ice-grounded area were used in the study.

In this study, the work of Saito (2002) is updated using a latest version of IclES with higher resolution (8km). More detailed sensitivity study of the position/elevation of Dome Fuji to a variety of boundary condition is discussed.

Keywords: Ice-sheet modeling, Dome Fuji