

氷河底の力学に依存する氷床体積発展の変動

Tatsuru Sato¹

¹北海道大学低温科学研究所

Changes of ice volume evolution on basal sliding mechanisms

Tatsuru Sato¹

¹*Institute of Low Temperature Science, Hokkaido University*

Basal sliding is an important component in glacier/ice-sheet dynamics and mass balance. It is considered depends on basal sediment properties, pressure, water pressure and thermal conditions. However the sliding mechanism is still on discussion. There are various approaches on implementing basal sliding into the glacier/ice-sheet flow dynamics; a boundary layer theory with certain wavelength roughness (Fowler, 1979), including a cavitation effect into sliding (Lliboutry, 1968). These differences also causes difficulties on analyze climate sensitivities of ice-sheet evolution using ice flow models. Here sensitivity experiments of basal sliding mechanism, and each component of sliding; pressure, water pressure, thermal conditions are conducted. In this experiment, it is focused on ice volume changes on such basal sliding mechanisms.

Application of a simple Coulamb type sliding causes large ice volume changes when ice sheet is growing. Increased ice thickness produced large basal stresses. Then it caused further ice thickness increases. Changing thermal dependency also causes significant effects on ice volume changes, particularly in the Antarctic ice sheet experiments. It changes ice flow speed, ice flux from inland to coast significantly. It causes grounding-line migrations or changes of ice-sheet/ice-shelf area. Consequently, it changes sea-level equivalent ice volume of the ice sheet.

Lliboutry, L. 1968 General theory of subglacial cavitation and sliding of temperate glaciers. *J. Glaciol.*7 (49), 21–58.

Fowler, A. C. 1979 A mathematical approach to the theory of glacier sliding. *J. Glaciol.* 23 (89), 131 – 141.