7. Ice-sheet and Iceberg discharge

SMIST (Simple Model of Ice SheeT) is used as the ice-sheet component of MRI-ESM1. When the SWE is larger than 10 m over the land surface, the excess snow is taken away from the land surface model and treated as an iceberg. The ice mass and its energy are passed to SMIST and transported by SMIST to the ocean through a TRIP channel (Oki and Sud, 1998). The algorithm is almost the same as the GRiveT algorithm (Section 3.8), but without any lake ($a = 0$). The energy E is defined as

$$E = (c_{ice} (T - T_{frez}) - L') I.$$

Here, c_{ice} is the specific heat constant of ice, T is the temperature, T_{frez} is 273.15 K (freezing point), L' is the latent heat of fusion of ice, and I is the ice mass.

SICOPOLIS (SImulation COde for POLythermal Ice Sheets; Greve 1997), a 3-D dynamic/thermodynamic model that simulates the evolution of large ice sheets, is also planned to be a component of MRI-ESM1. For the present, the effect of long-term (longer than a millennium) change of ice sheets can be calculated by a semi-offline method using SICOPOLIS.