Glacier Modelling

The large ice sheets of Greenland and Antarctica are of major importance for the global climate system, as there are complex interactions with ocean and atmosphere. It has now been verified that ice sheets and glaciers are losing mass worldwide. This trend towards loss of mass is clear and shows that the ice masses were responsible for more than half of the annual rise in sea level in the period from 2005 to 2010.

Modelling of flow of ice sheets and glaciers aims to establish prognoses of future evolution of ice sheets and their contribution to sea level rise. The modeling team of the AWI Section Glaciology performs system studies with the finite element model ISSM to make use of unstructured meshes, inversion capabilities etc. and the well-established PISM model. Beside system studies for the entire ice sheets of Greenland and Antarctica, individual ice stream-ice shelf systems, e.g. Recovery Glacier – Filchner Ice Shelf, Pine Island Glacier, Jakobshavn Isbræ, 79°N Glacier, Petermann Glacier, and process are studied. The system studies follow a hybrid-physics multi-scale approach, which balances uncertainties and computational resources efficiently. Process studies include the modeling of subglacial water, temperate ice, grounding line migration, sliding and calving.