

Mountain glacier flow modelling: a comparison of different models from Shallow Ice Approximation to the Full-Stokes solution

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The present work intends to compare different glacier flow models and to test their applicability to mountain (valley) glaciers. Two models based on the Shallow-Ice Approximation (SIA, zeroth-order), a higher-order model and a Full-Stokes finite element model are used and will be briefly introduced.

The roles of deformation, basal sliding and mass balance are investigated separately in the different models in order to assess the importance of a more precise treatment as in the higher-order or the Full-Stokes models. Moreover, by changing the geometry of a given synthetic shape, especially regarding the aspect ratio, the deviation of SIA results can be examined.

Criterion for comparing the models are surface velocities, velocity profiles and surface geometry. Another important aspect is CPU-time and the trade-off between gain in precision and cost in CPU-time for switching from one model to another.

Here, only first results can be presented (comparison of velocities). Later, the same comparison will be extended to a real case: the Glacier of Saint-Sorlin, France.