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Subglacial Hydrology Model Intercomparison Project (SHMIP)

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The SHMIP project is the first intercomparison project of subglacial drainage models (http://shmip.bitbucket.org). Its synthetic test suites and evaluation were designed such that any subglacial hydrology model producing effective pressure can participate. In contrast to ice deformation, the physical processes of subglacial hydrology (which in turn impacts basal sliding of glaciers) are poorly known. A further complication is that different glacial and geological settings can lead to different drainage physics. The aim of the project is therefore to qualitatively compare the outputs of the participating models for a wide range of water forcings and glacier geometries. This will allow to put existing studies, which use different drainage models, into context and will allow new studies to select the most suitable model for the problem at hand.

We present the results from the just completed intercomparison exercise. Twelve models participated: eight 2D and four 1D models; nine include both an efficient and inefficient system, the other three one of the systems; all but two models use R-channels as efficient system, and/or a linked-cavity like inefficient system, one exception uses porous layers with different characteristic for each of the systems, the other exception is based on canals. The main variable used for the comparison is effective pressure, as that is a direct proxy for basal sliding of glaciers. The models produce large differences in the effective pressure fields, in particular for higher water input scenarios. This shows that the selection of a subglacial drainage model will likely impact the conclusions of a study significantly.