

Kickoff fro the subGlacial Hydrology model Intercomparison Project (GHIP)

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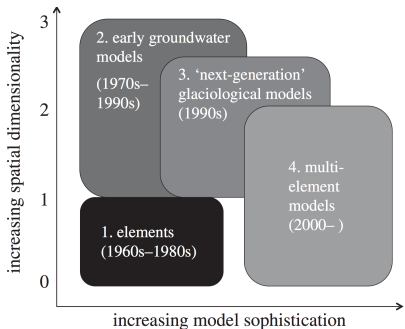
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Overview of Subglacial hydrological modeling

Founding principles on subglacial hydrology modeling dates back to the 1960's, when the elements of the drainage system were theorized.



1. Theory of the drainage elements
2. “Paleologically” interested models
3. Effective pressure is assumed
4. Effective pressure is part of the solution

Figure from Flowers (2015)

State of the art in Subglacial hydrology modeling

Flowers (2015) summarized the existing models (around 20) and the methods used two model each component of the drainage system

Inefficient drainage system morphologies

- cavities
- macroporous sheets
- turbulent/laminar sheets
- porous medium / till
- englacial storage

Efficient drainage system morphologies

- 1D R-Channels
- 2D R-Channels
- 1 per cell R-Channels
- water routing scheme
- porous medium

A number of model are used incorporating different physical process which make their results hard to compare.



Reason for an intercomparison

Validation of subglacial drainage models is difficult

Even the densest available datasets are probably not good enough to thoroughly validate subglacial models and fit their parameters. Even if such a dataset was available, no rigorous validation/fitting procedure has been established.

Intercomparison as an alternative

But the emergence of models allow to perform some intercomparison that will allow to get a better understanding of the different ways that are used to model subglacial hydrology.

The subGlacial Hydrology model Intercomparison Project (GHIP)

No commonly agreed “good way” of treating the problem will result on a qualitative rather than one-to-one comparison

- Comparison on a number of experiment set-ups each aiming to investigate a specific reaction of the subglacial drainage system.
- Comparison will be mainly performed on spatially averaged variables.
- Comparison will mainly be done on effective pressure.
- We are not aiming at a one to one comparison between models.

Participation Condition

The only requirement for the models is that they have to output the effective pressure.

Organization of the proposed exercise

Suite	Geometry	Temporal	Drainage systems	Varying parameter	Remarks
A	sqrt	steady	no channels	input volume	Fitting to A3
B	sqrt	steady	with channels	input volume	Fitting to B5
C	sqrt	steady	Model dependant	moulin density	Use B param.
D	sqrt	diurnal	Model dependant	diurnal amp. with moulins	Starts from C5
E	sqrt	seasonal	Model dependant	temperature	Starts from B1
F	valley	steady	Model dependant	geometry	Use B param.
G	valley	seasonal	Model dependant	temperature	Use B1 input F1 geometry for spin-up

Agenda

- Who is interested in participation ?
- Who is interested to see the results ?
- Remarks on the proposed set-up.
- Timeline (Proposition from organizers)
 - Beta testing this summer
 - Call in August
 - Results submitted by November
 - Presentation of the results at next EGU
 - Paper submission in the following summer

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Links

GHIP website : <http://ghip.bitbucket.org/>

GHIP setup : https://bitbucket.org/ghip/hydro_intercomparison