

AvaFrame

Testing and Benchmarking

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Develop an **open source framework** (license EUPL) for **avalanche simulations** which replicates and simplifies ... current procedures and models at the Austrian Torrent and Avalanche control...

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Goals

- ▲ Code availability and maintenance
- ▲ Transfer developments to operational version
- ▲ Scientific and educational use
- ▲ Multi domain / multi model

HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)



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Applicability for operational use?

Testing and benchmarking

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Uncertainties in:

- ▲ Input
- ▲ Flow models
- ▲ Interpretation of results
- ▲ ...

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Uncertainties in:

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 - ▲ Flow models
 - ▲ Interpretation of results
 - ▲ ...
-
- ▲ Where do you even begin?
 - ▲ What to compare to?

▲ Goals of testing and benchmarking

Ensure

- ▲ Quality of code
- ▲ 'Correctness' of results

Enable developments/improvements

- ▲ Transparent
- ▲ Documented

Continuous integration (CI)

▲ Unit testing

general code quality, project specific

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Test cases

▲ *Knowns / expectations:* **Benchmarks**

▲ *Unknowns / developments:* **Reference framework**

avalanche simulation specific

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- ▲ Easy to run
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- ▲ Easy to analyse

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- ▲ Easy to understand
- ▲ Easy to analyse
- ▲ Targeting only one specific aspect

Best of all: analytical solution

▲ Idealized

- ▲ Configurable
- ▲ With/without channels/dams

▲ Real

- ▲ Real world topographies
- ▲ Different release/entrainment/resistance areas

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- ▲ Configurable
- ▲ With/without channels/dams

▲ Real

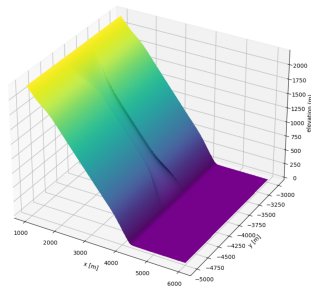
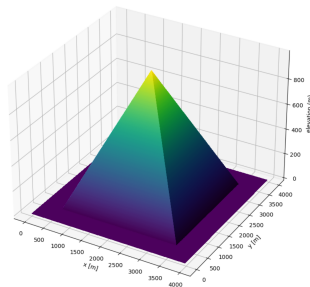
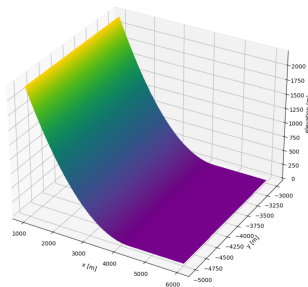
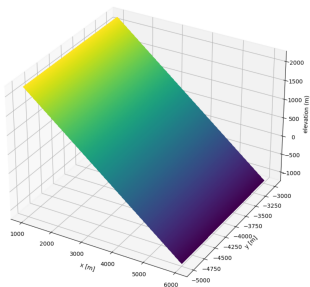
- ▲ Real world topographies
- ▲ Different release/entrainment/resistance areas

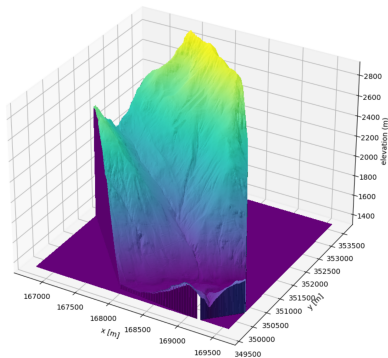
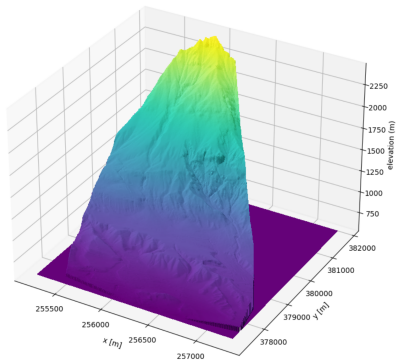
▲ Special

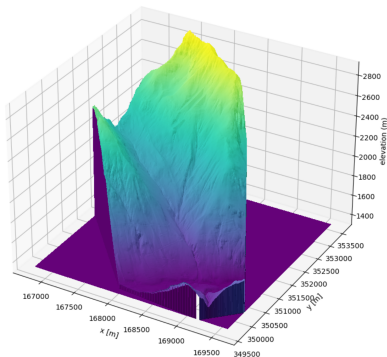
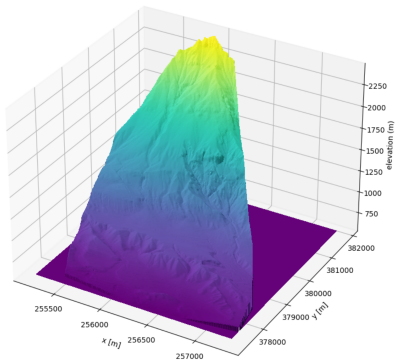
- ▲ Analytical/convergence solutions

Additional usage scenarios

e.g. parameter variation tests, rotational tests, etc.







So far no event data

Combination of AIMEC, simple and complex plots

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Indicators (Examples)

- ▲ Simple: runout distance, maximum / minimum, mass
- ▲ Intermediate: average / maximum values along profiles
- ▲ Complex: area indicators

Combination of AIMEC, simple and complex plots

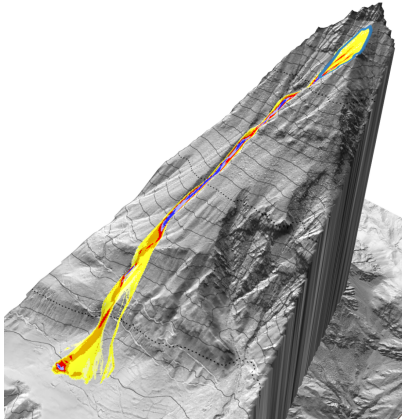
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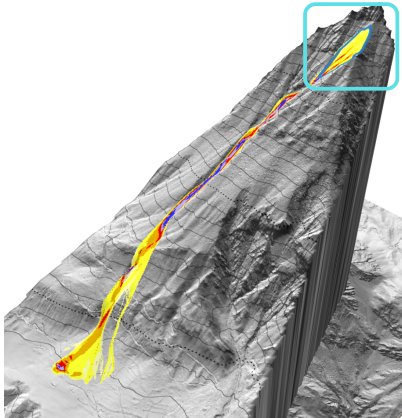
Presented as:

- ▲ Log output
- ▲ Plots
- ▲ Compiled report

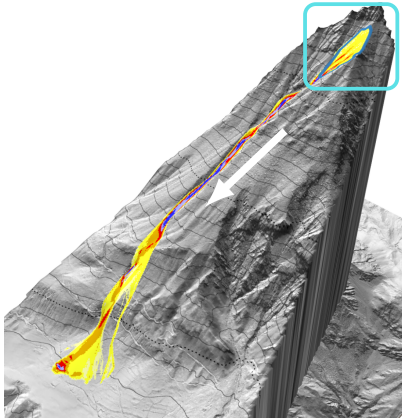
▲ DFA simulations - Peak flow depth



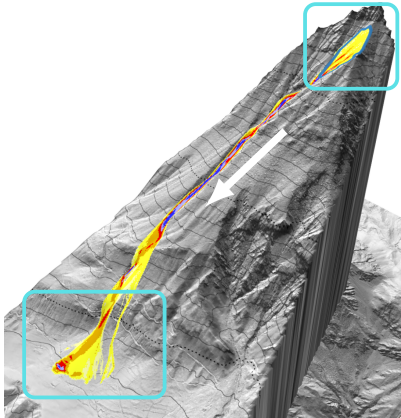
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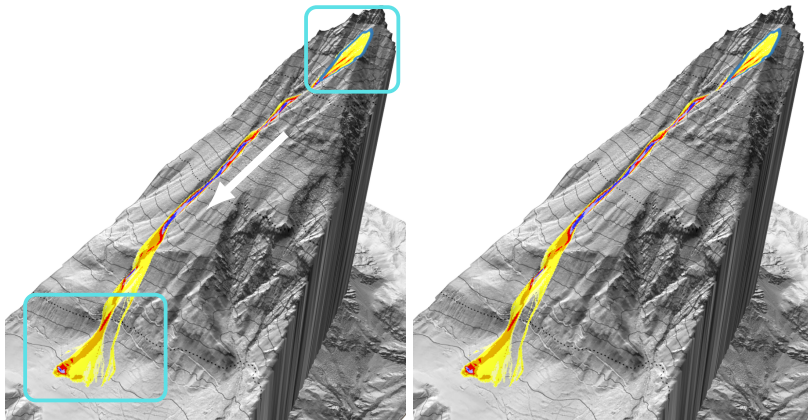
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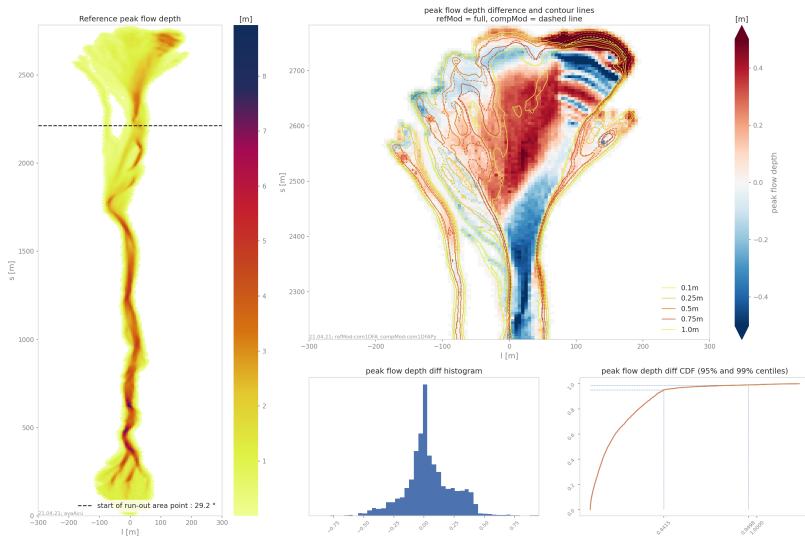
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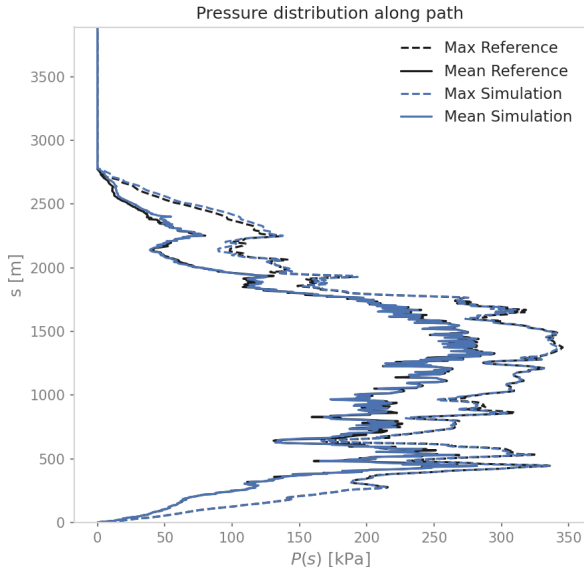
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Example Peak Flow Depth



▲ Example profile



▲ Why is this interesting for you?

AvaFrame

Open source avalanche simulation framework

All code, data and models are available

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Functions to

- ▲ Make test cases
- ▲ Analyse and plot results
- ▲ And many more

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Outlook

- ▲ Develop, develop, develop (and test core module)
- ▲ Start first scientific cooperations

- Search on github.com: AvaFrame -
docs.avaframe.org or avaframe.org

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We invite you

- ▲ To give it a try
- ▲ Use code and data
- ▲ Contact us