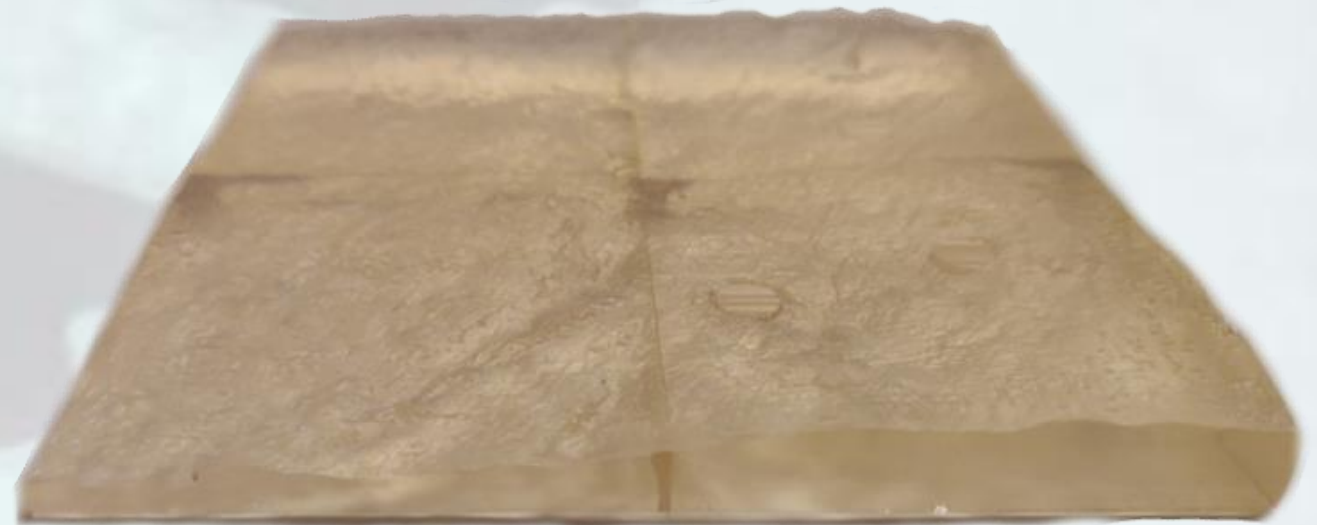# Experimental work on the visualisation of freezing groundwater in fractures

Michael Kröhn (GRS)

CatchNet annual meeting

23 September 2022, Solna

Idea

- Observing fracture flow on natural samples not directly possible
- Alternative:
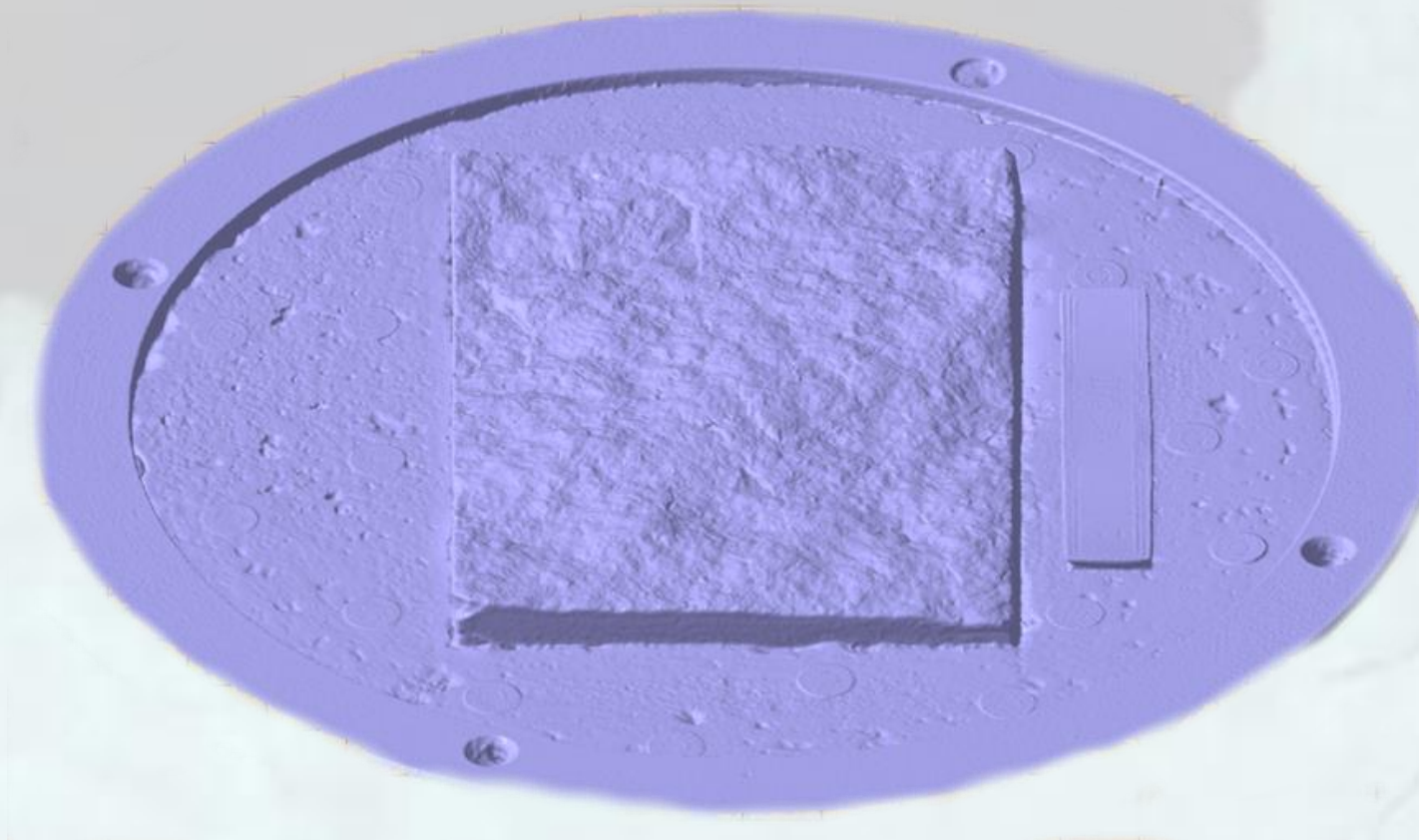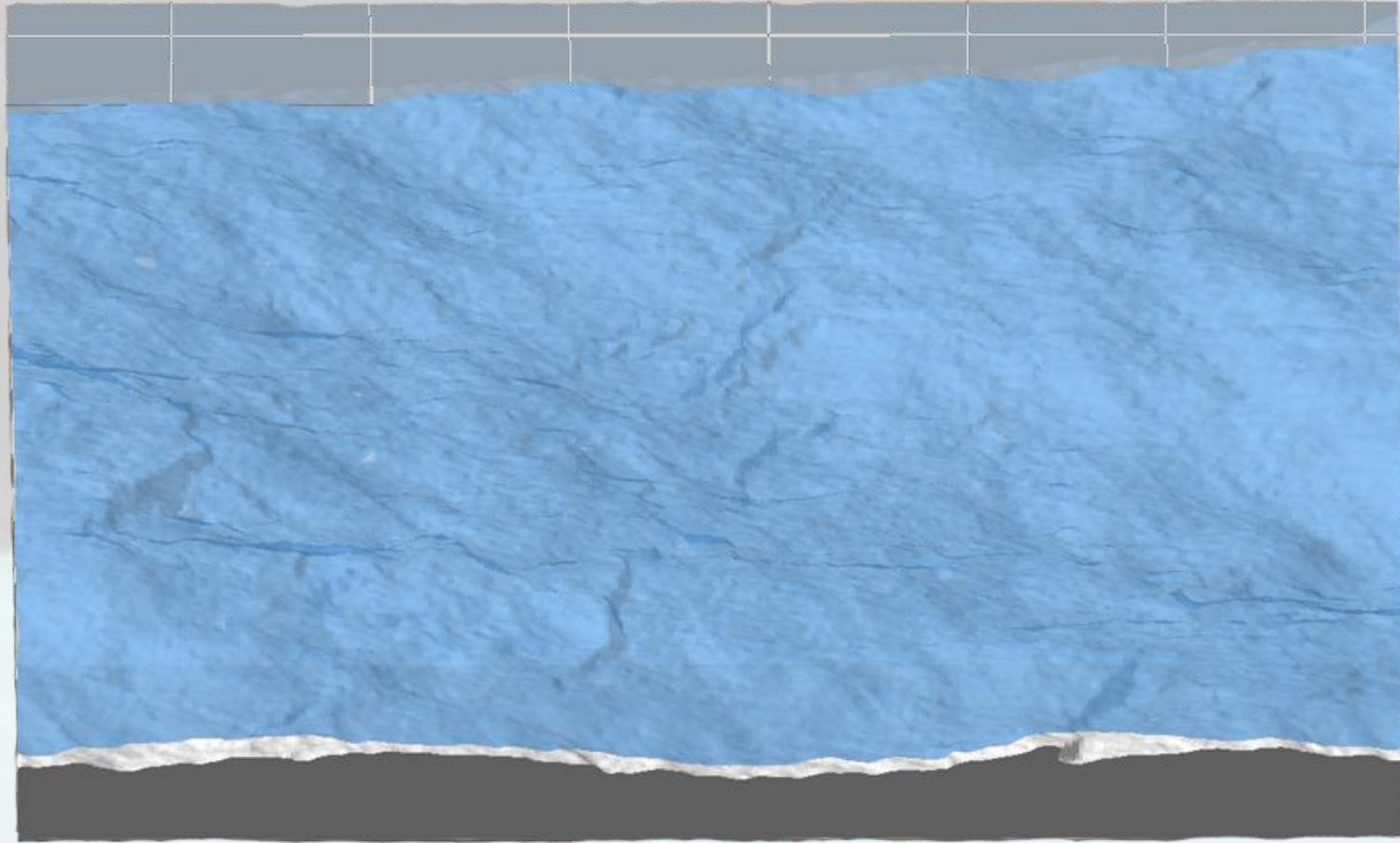 - produce transparent fracture replicas
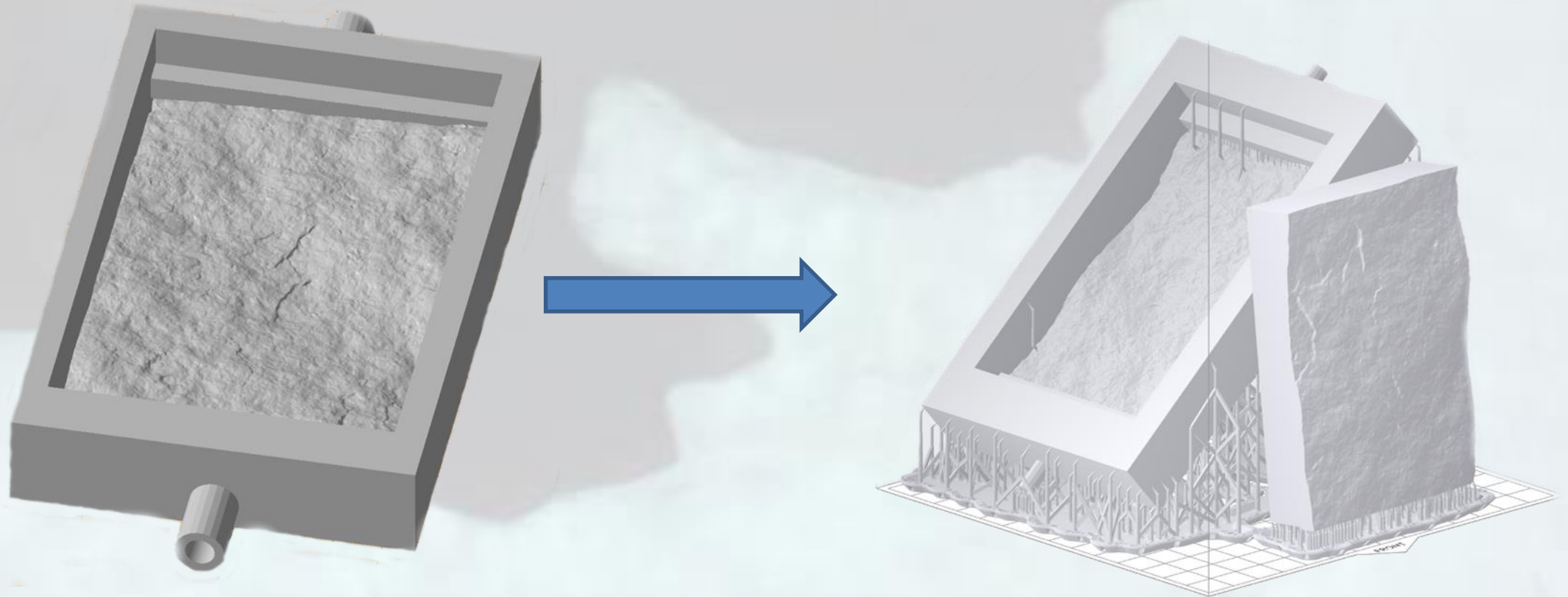
Workflow

Used sample

- Dataset: 1N1 from POST 2 (SKB/RISE)
- Size: 70 by 100 mm

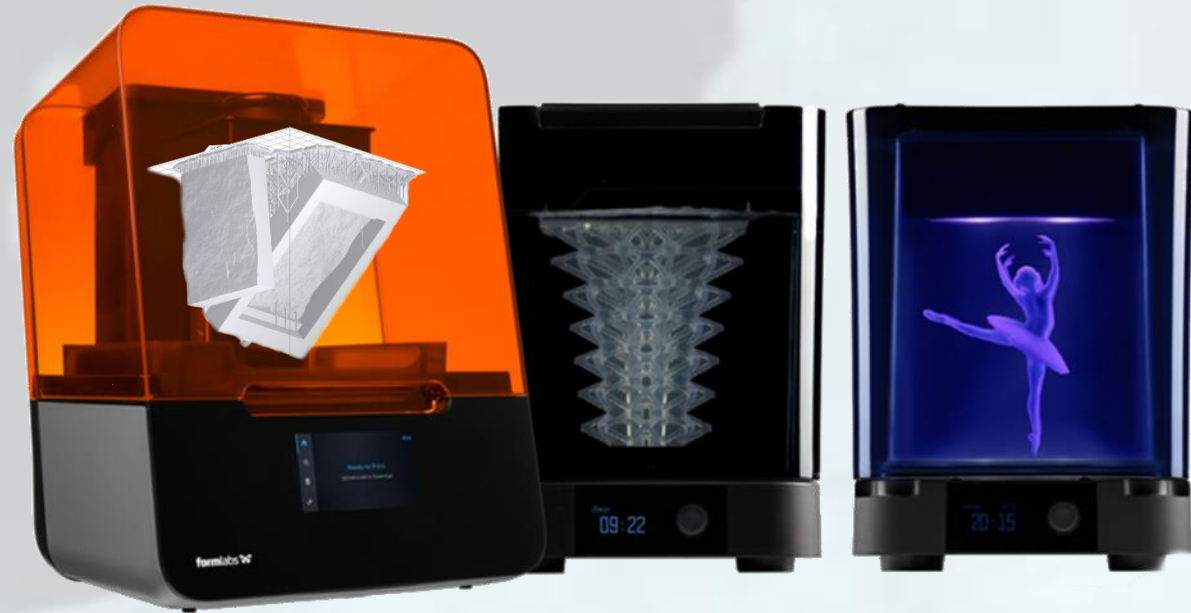# Convert scan data to watertight models

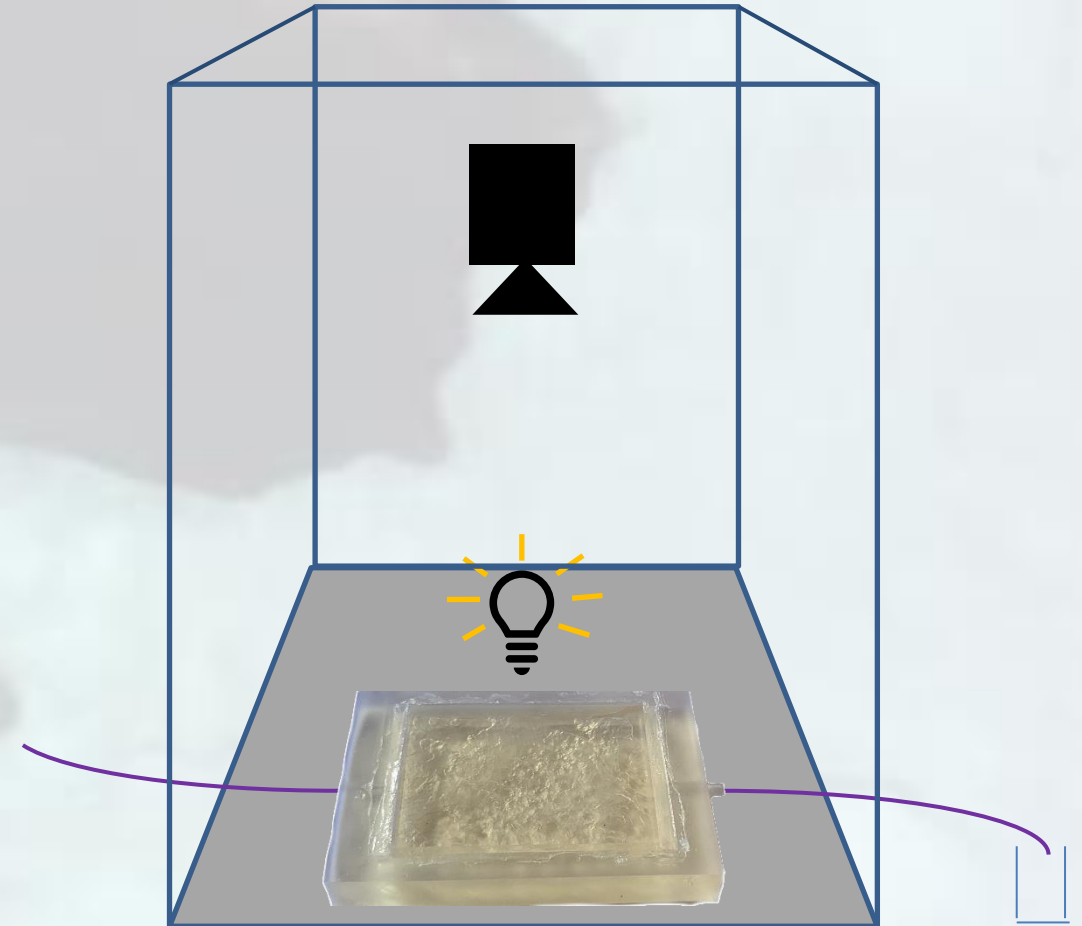# Data processing for printing

3D printing of fractures

- Formlabs Form 3 printer
  - Accuracy:
    - x,y: 25 µm positioning accuracy
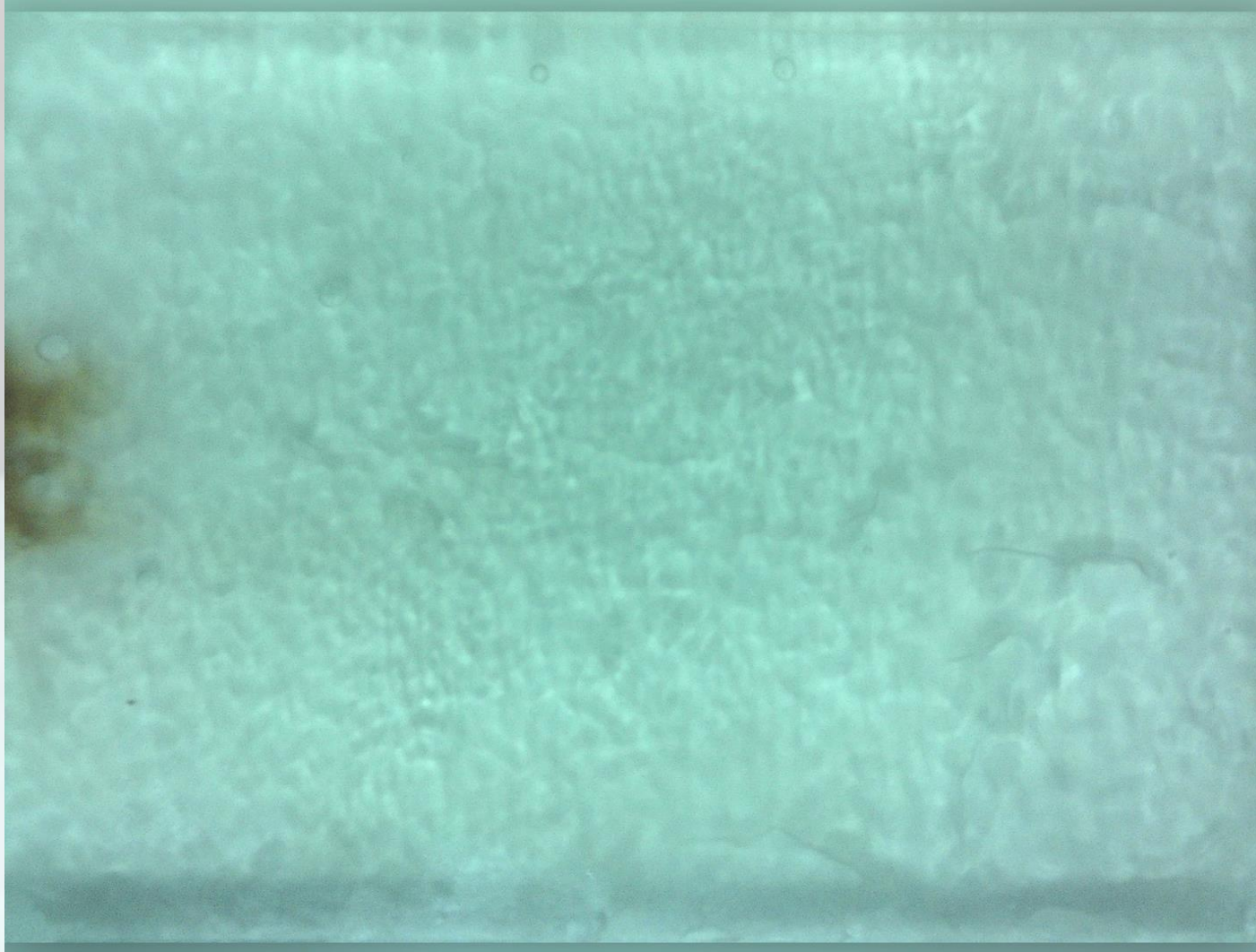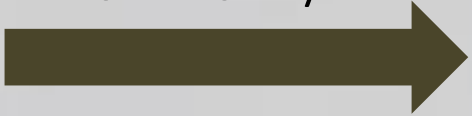   - z: 25 µm minimum layer height

Printed sample

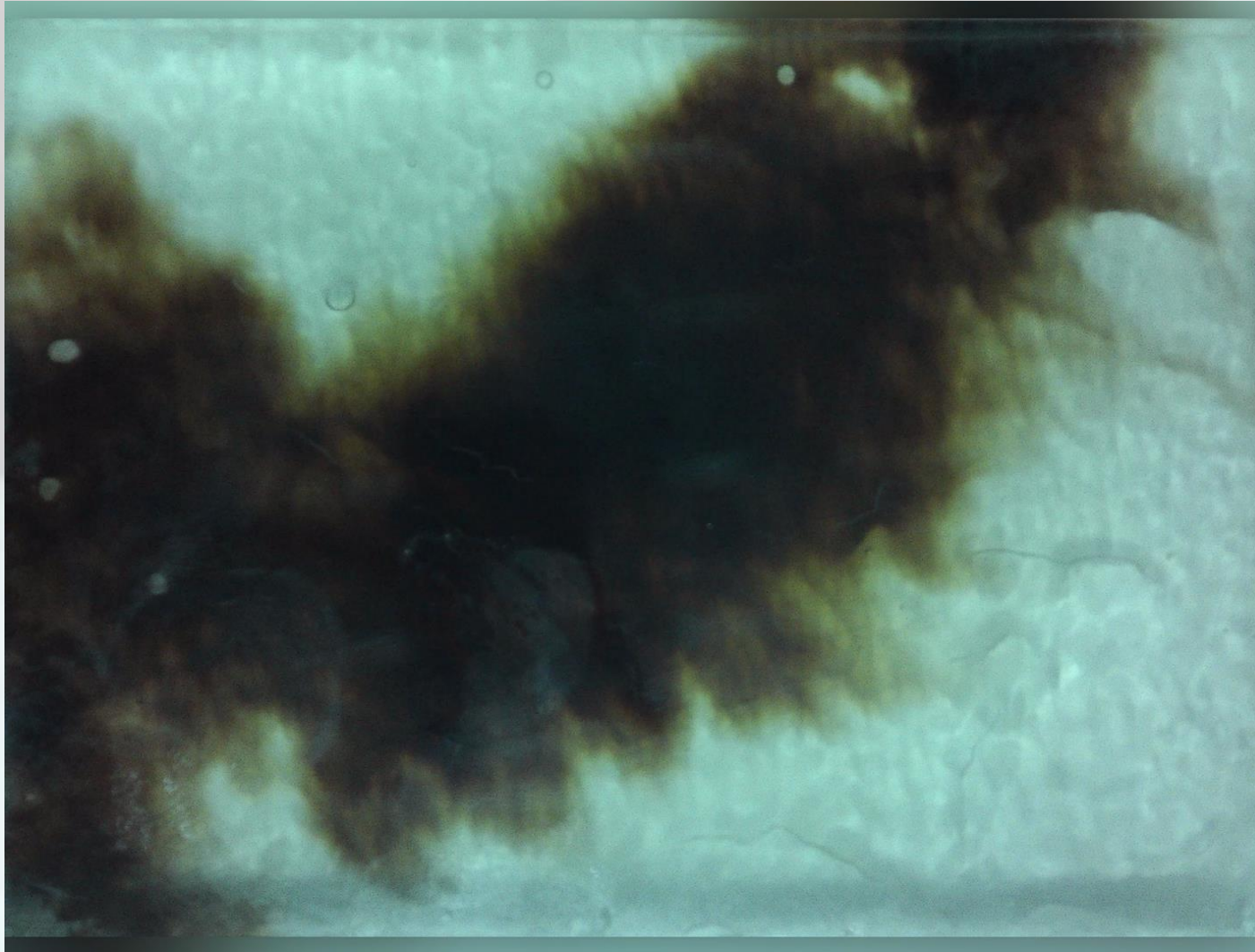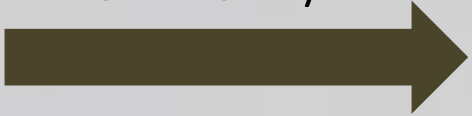# Experimental Setup
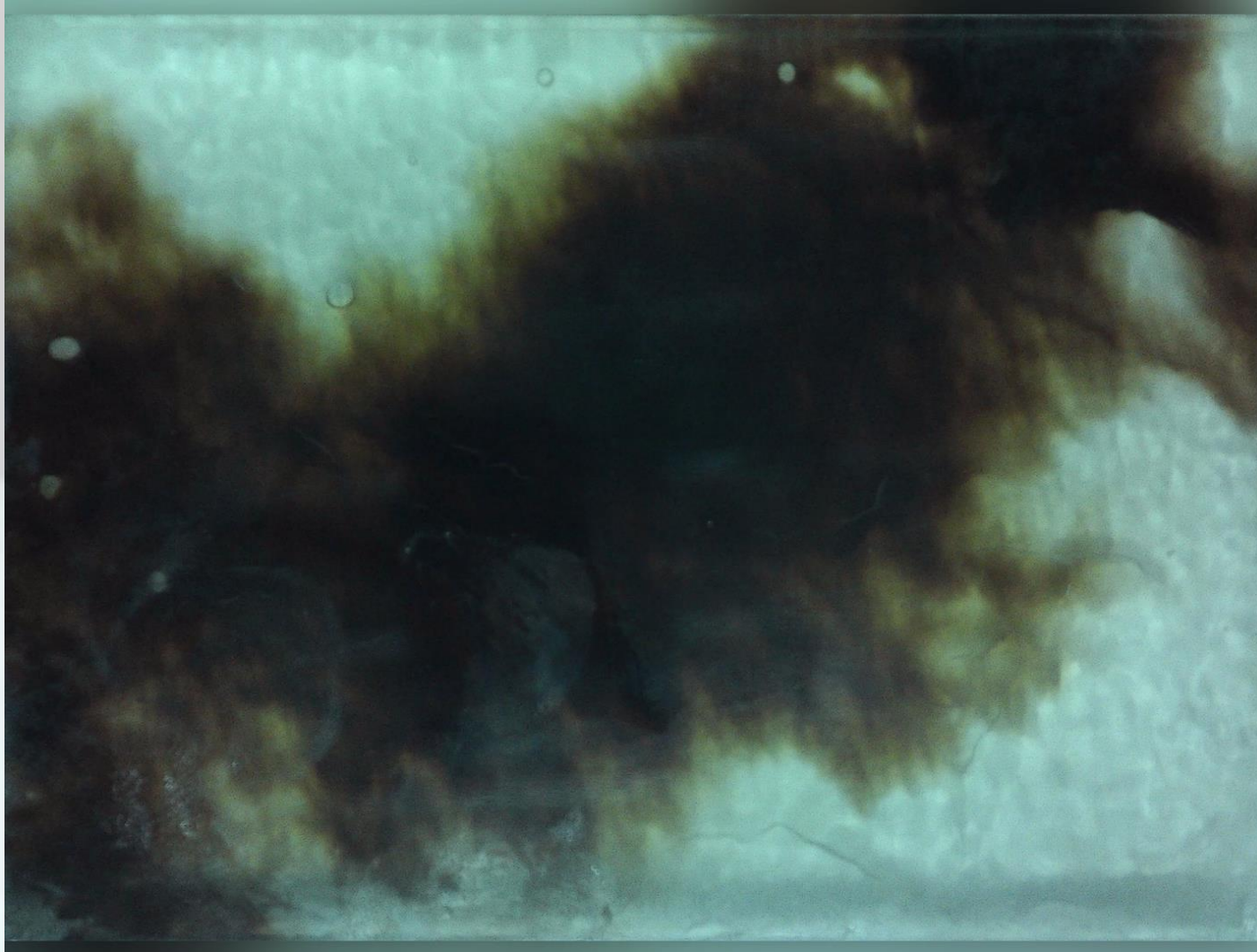
First observed freezing
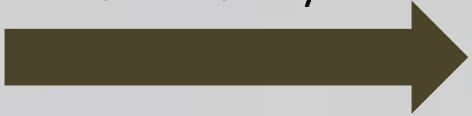
Beginning
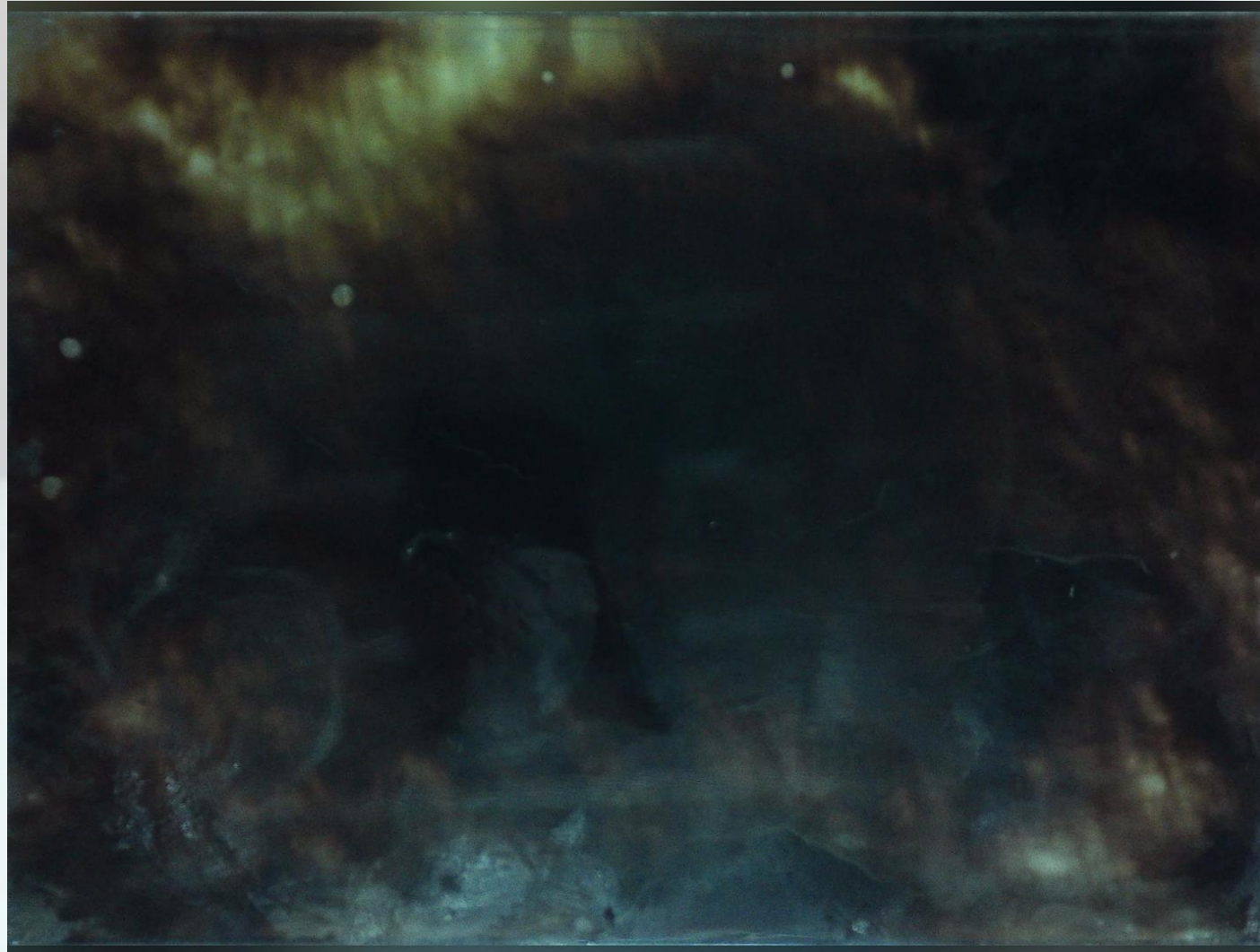
Inflow: 10 ml/h
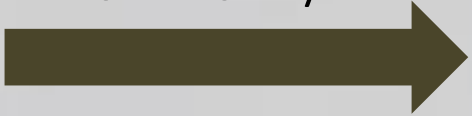
Breakthrough of the tracer

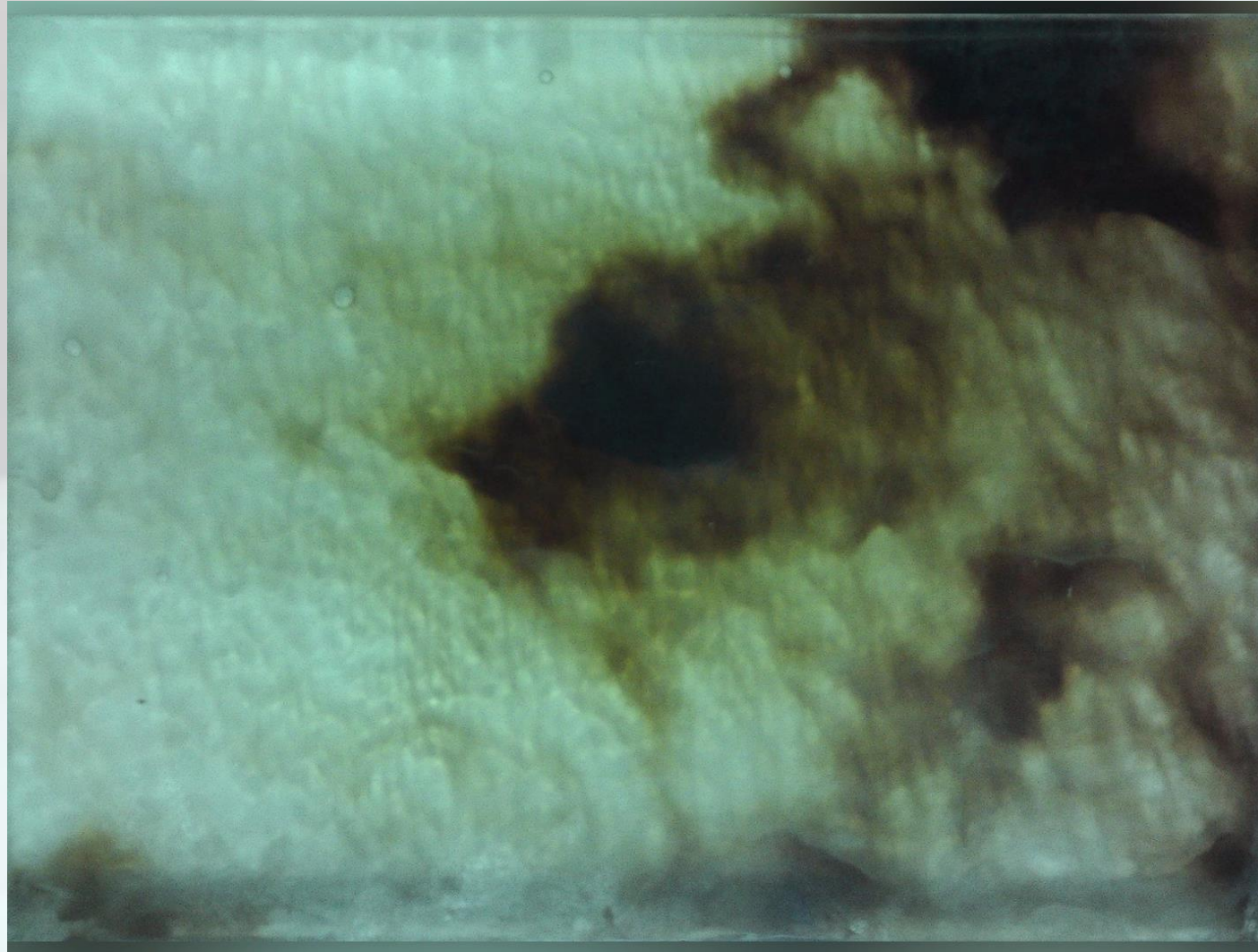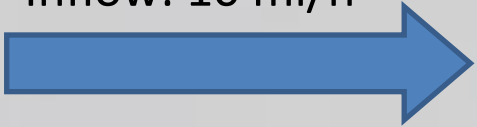Inflow: 10 ml/h

Breakthrough of the tracer

Inflow: 10 ml/h

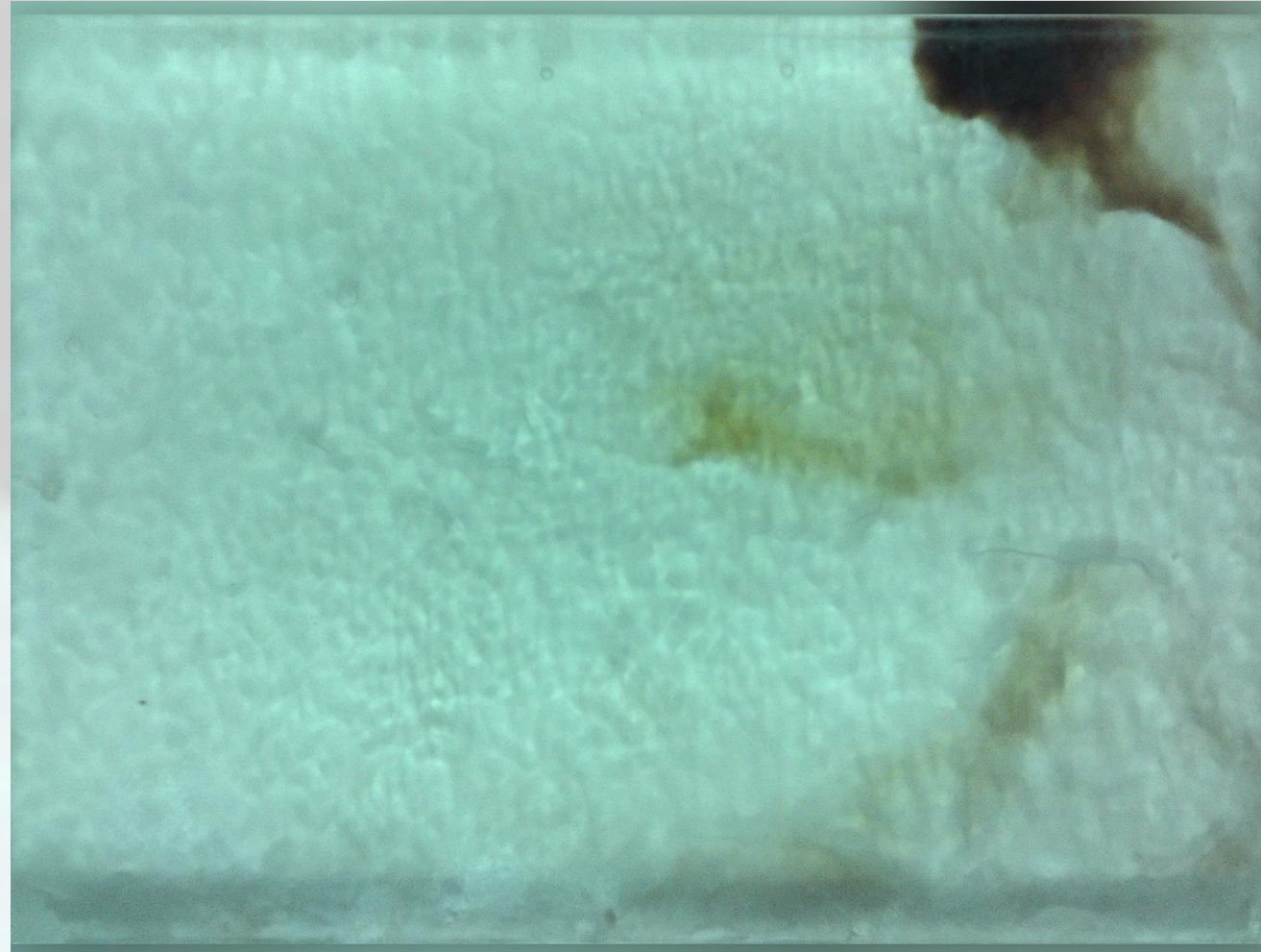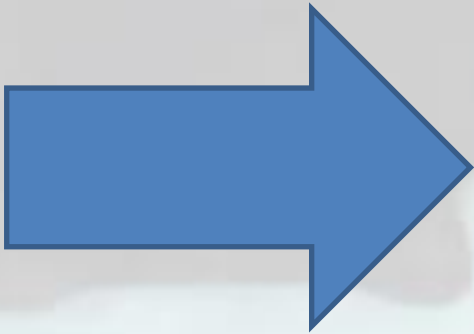# Saturated with tracer

Inflow: 10 ml/h

Slow flushing of the tracer

Inflow: 10 ml/h

Fast Flushing of the tracer

Inflow: 100 ml/h

Conclusions and outlook

- Promising first results

- More pre-testing needed

  - Interaction: tracer $\leftarrow\rightarrow$ printed material

  - Variation of pump and climate chamber settings

Thank you for your attention