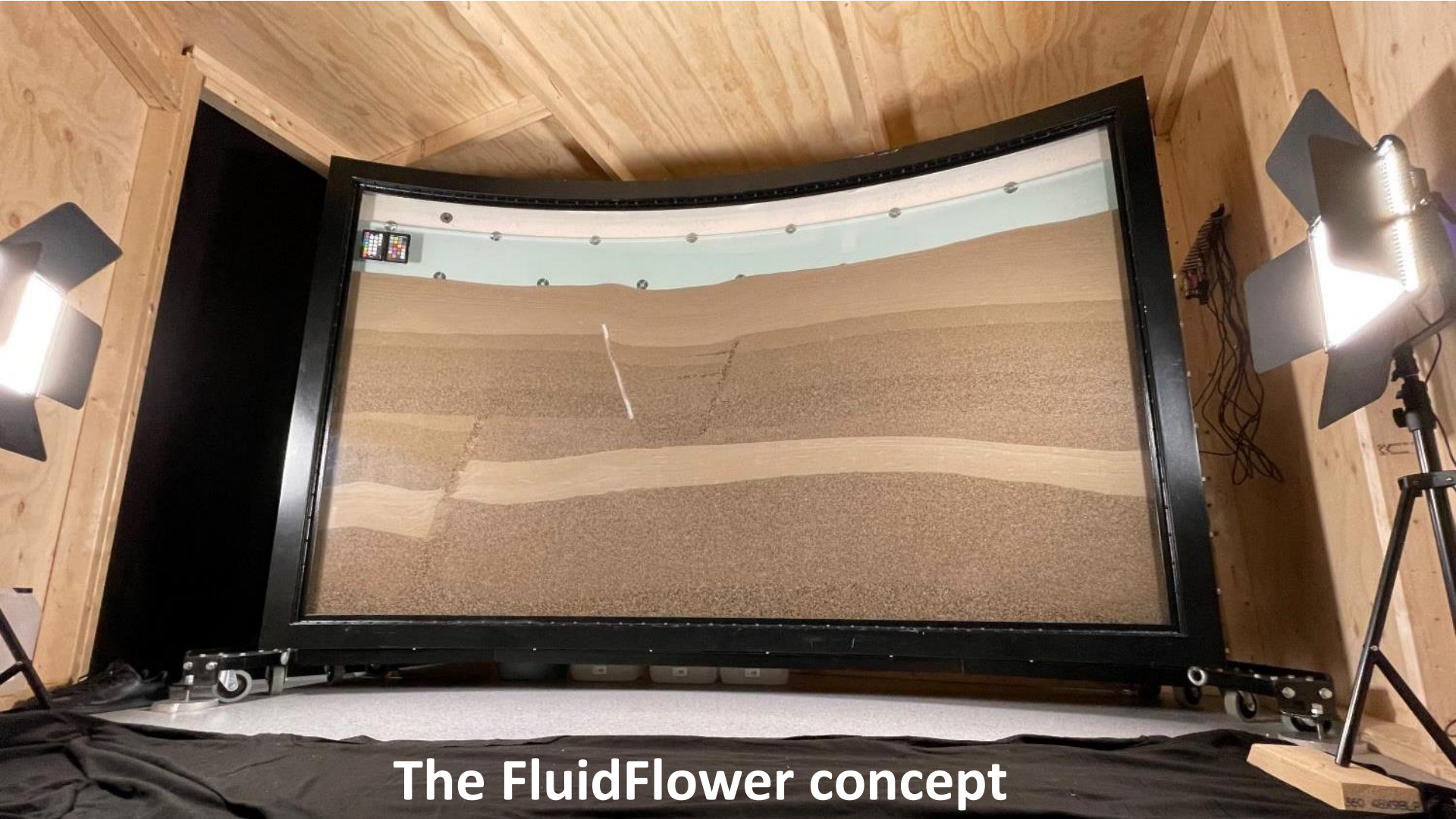
Storing carbon dioxide and hydrogen underground

Professor Martin Fernø

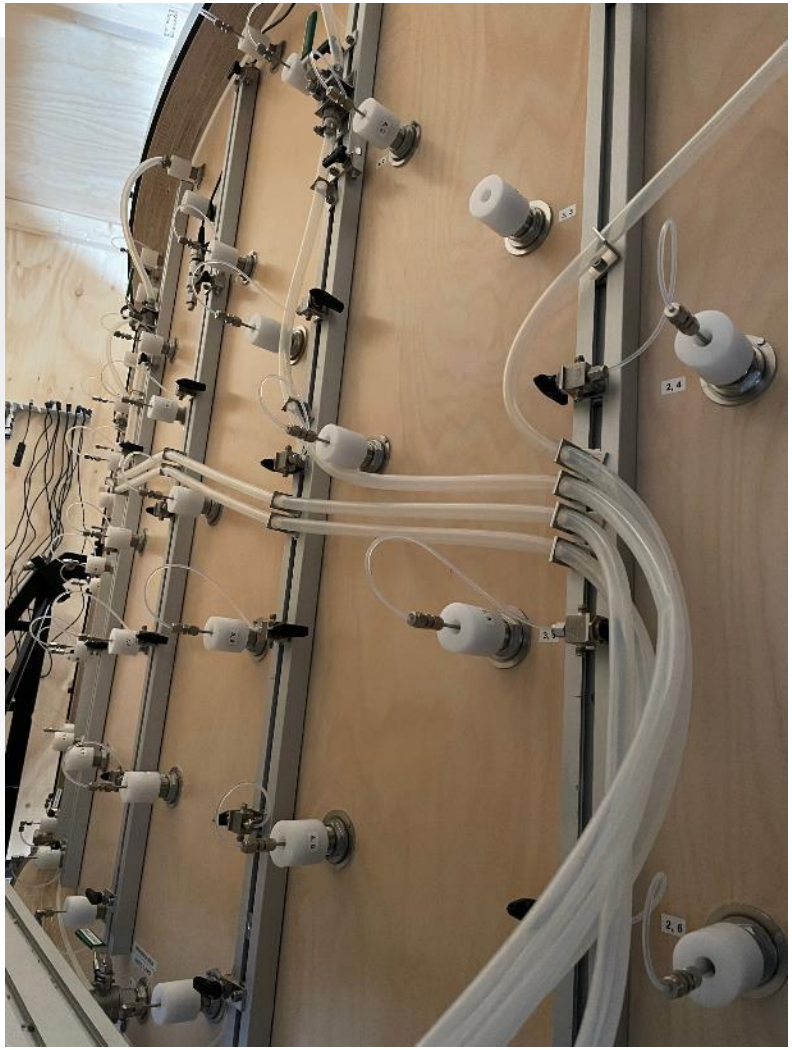
Bergen Energy Lab webinar November 2021

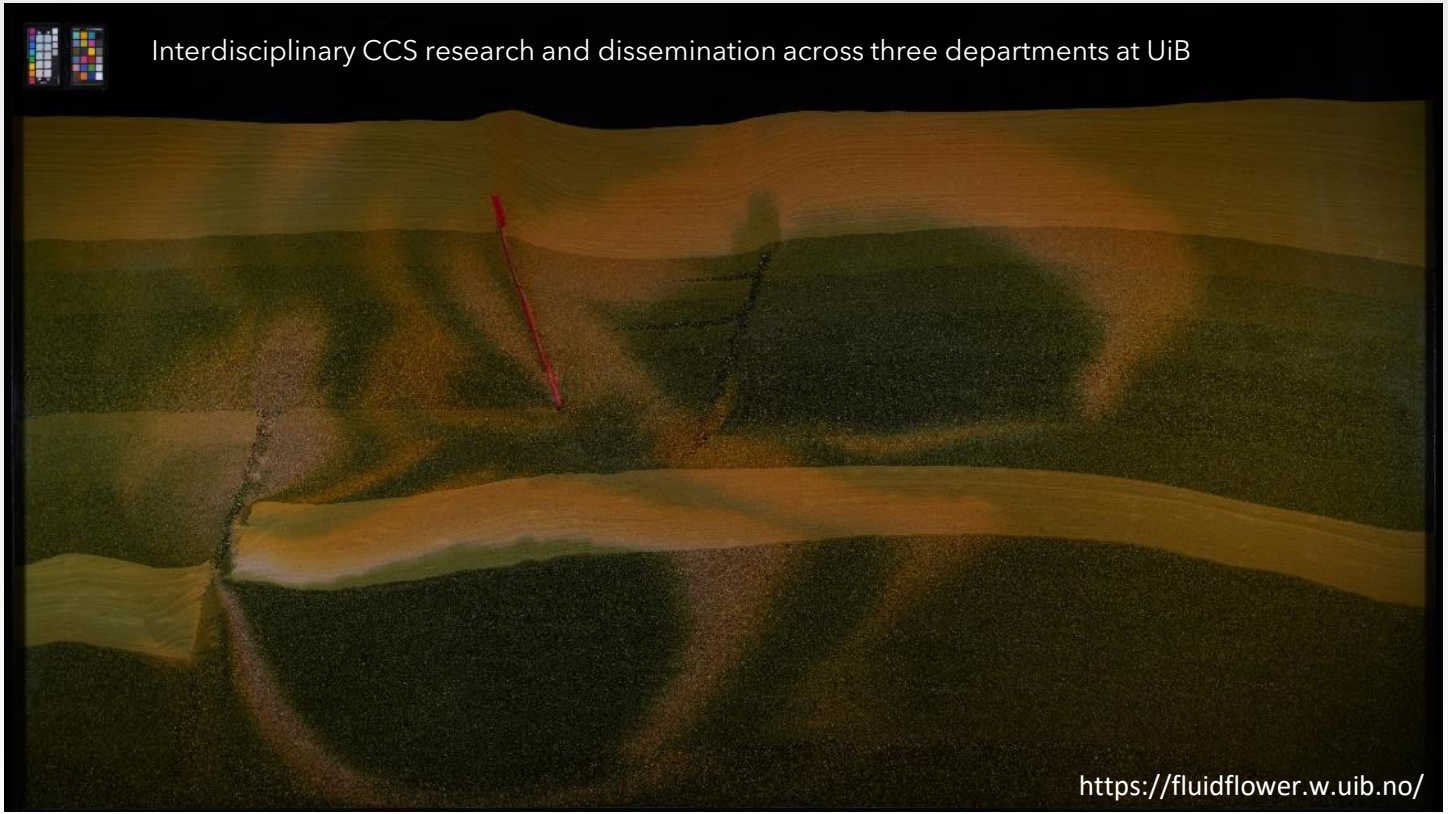
UNIVERSITY OF BERGEN



The FluidFlower concept

behind
the scenes





Ongoing CCS projects (selection)

International Benchmark Study

To provide a full-physics validation of the state-of-the-art simulation capabilities within the international porous media community.

PoroTwin

Develop a digital twin with real-time integration of reservoir flow, simulation and control with experimental operational parameters.

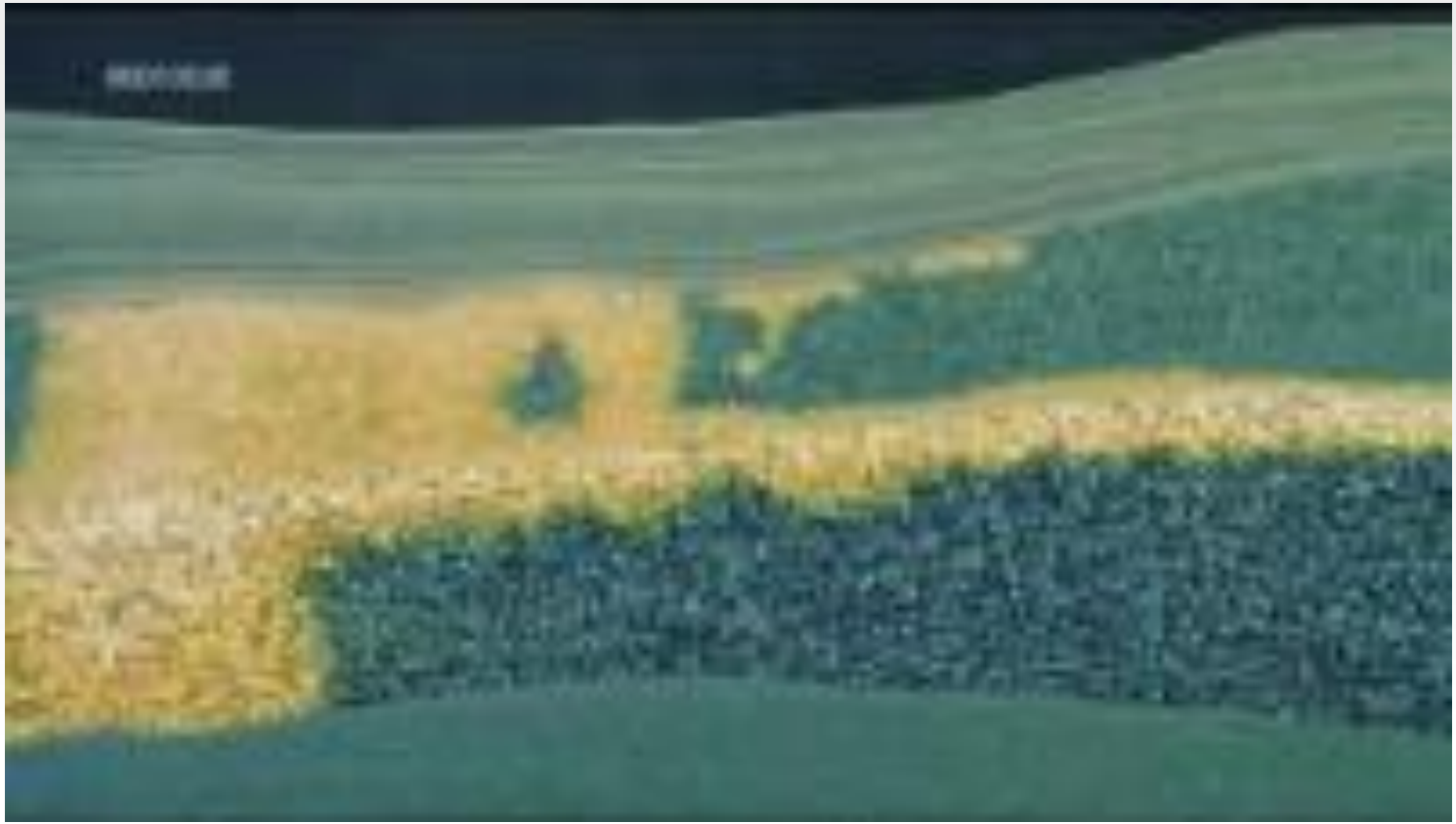
Non-uniqueness in multiphase flow

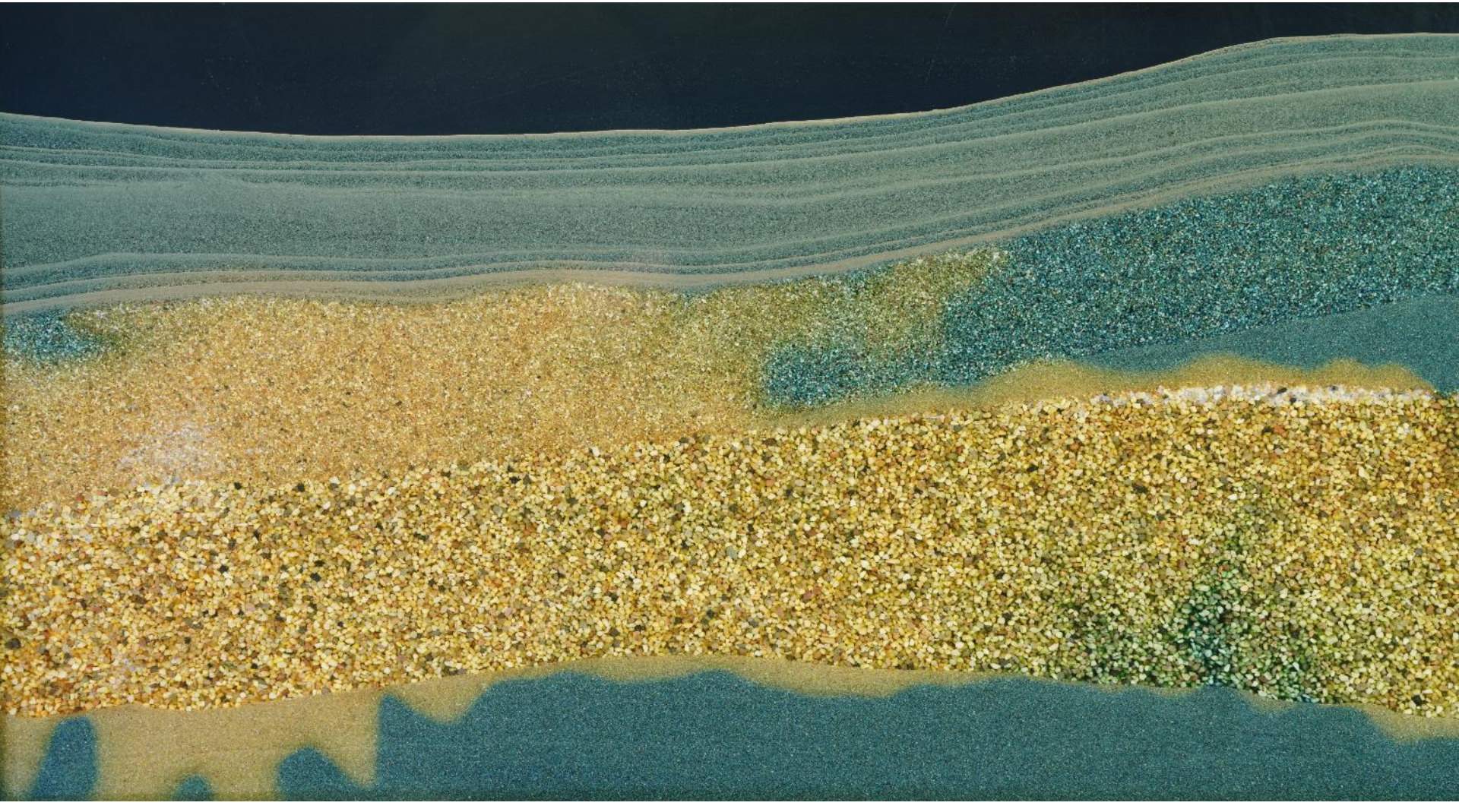
Evaluate model-to-data fit using laboratory-scale CO_2 injection experiments combined with stochastic invasion-percolation numerical models.

Research collaborators

Massachusetts Institute of Technology
Imperial College London
Stanford University
University of Stuttgart
The University of Texas at Austin
CSIRO
Los Alamos National Laboratory
simula
TU Delft
Heriot-Watt University
NTNU Norwegian University of Science and Technology
NORCE
SINTEF
Universitas Bergensis

Carbon sequestration experiment

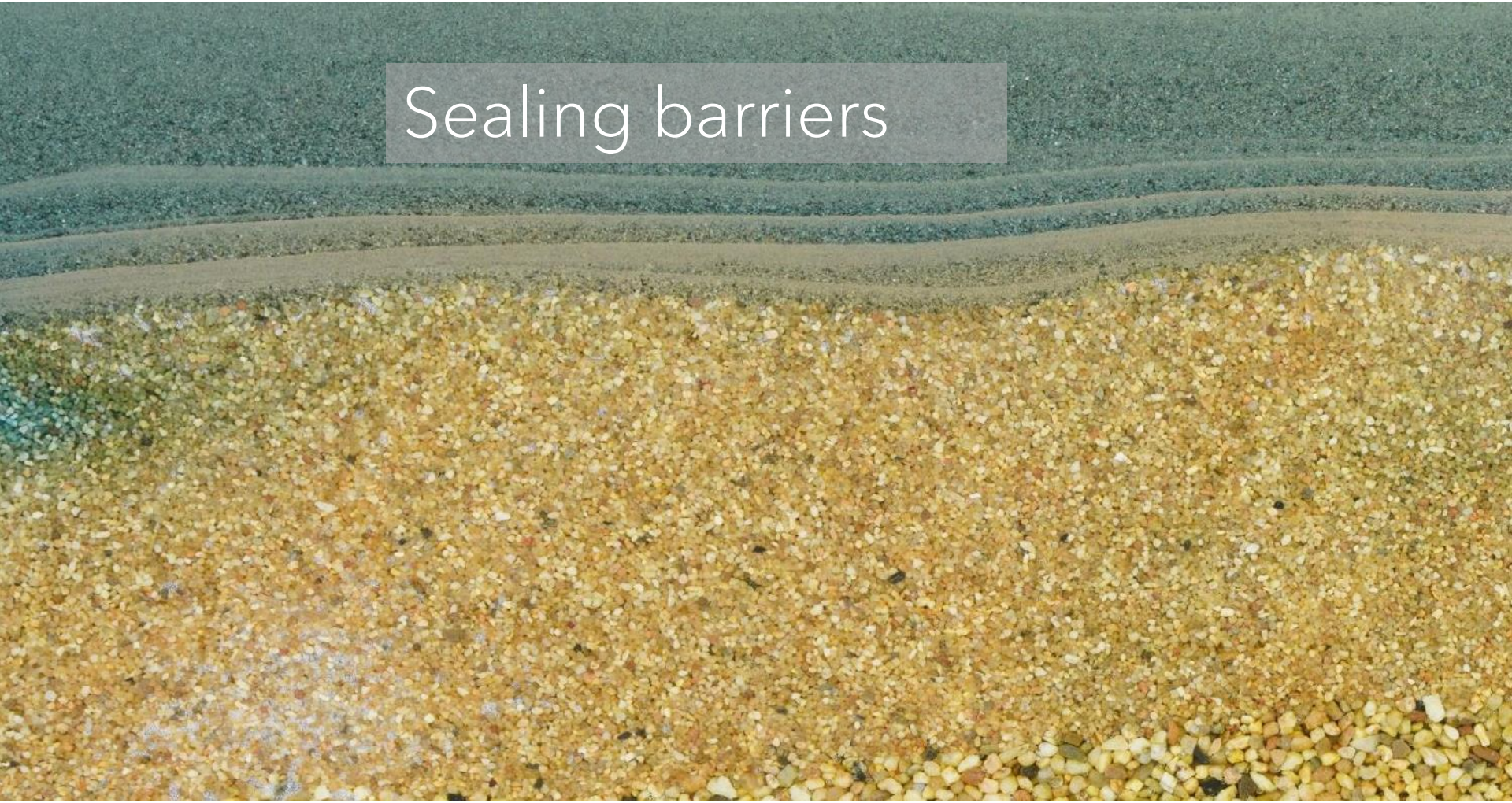




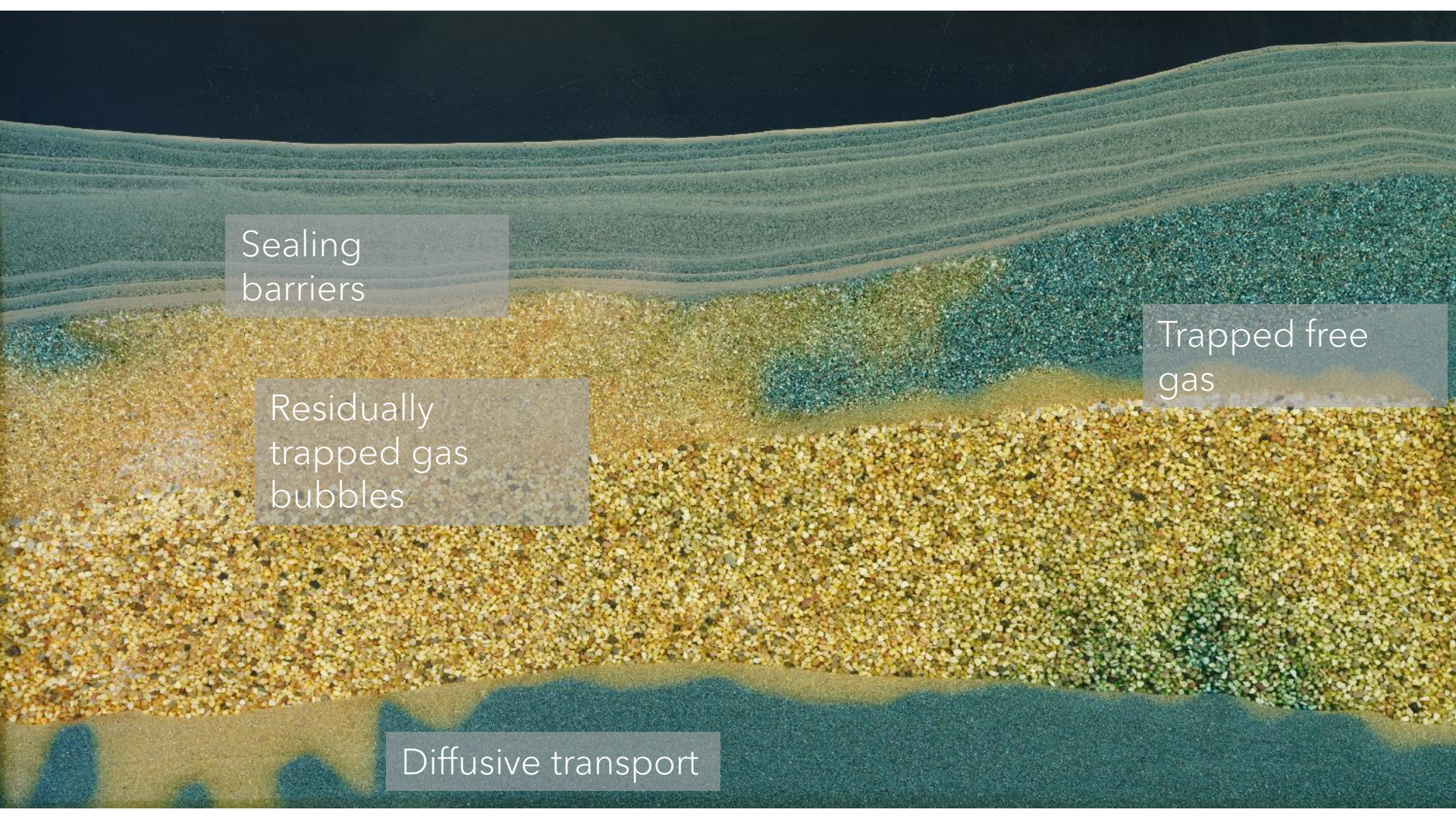

Residually trapped
gas bubbles


Trapped free gas

Sealing barriers

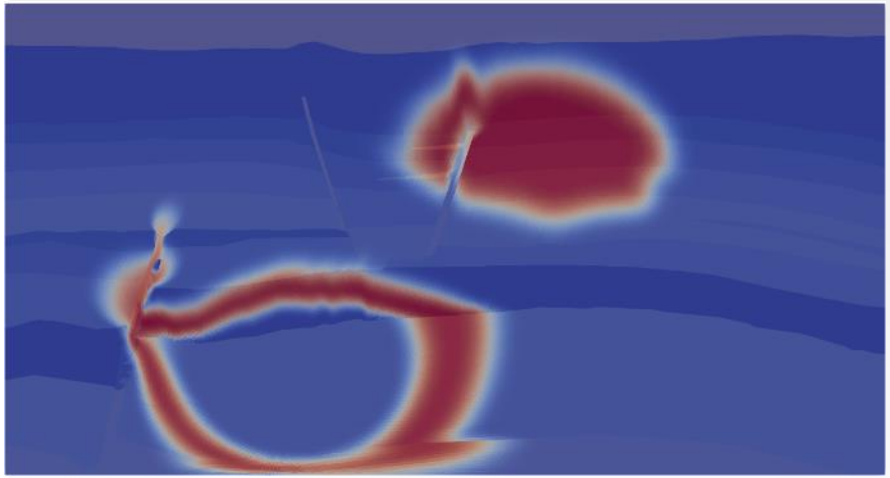



Diffusive transport

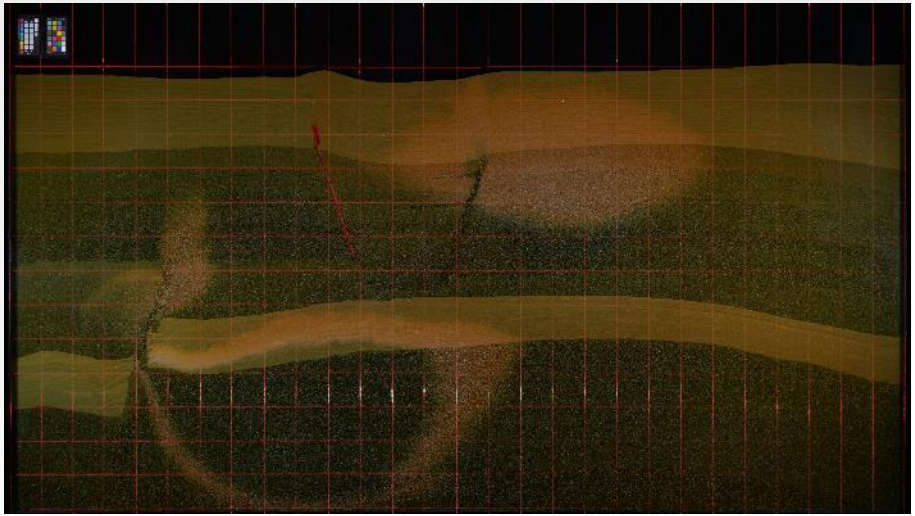

Sealing barriers
Trapped free gas
Residually trapped gas bubbles
Diffusive transport

International FluidFlower Benchmark Study

Sneak peak

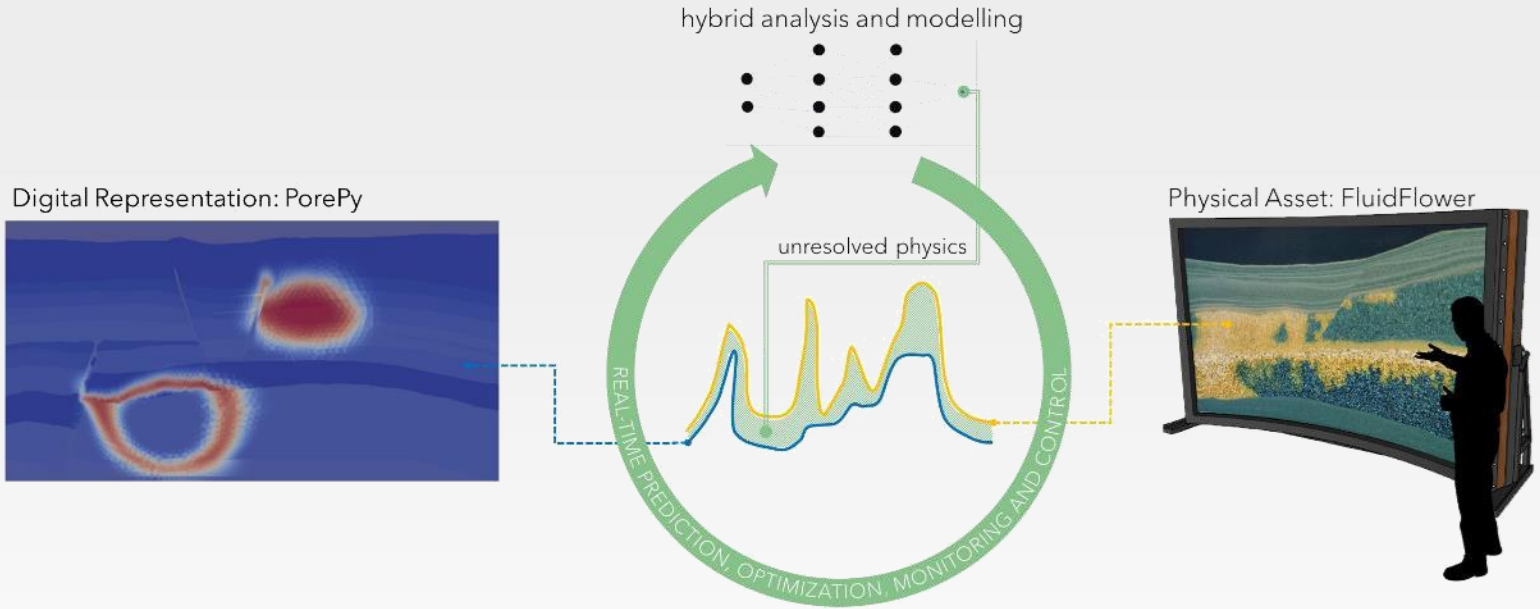


Modeling results



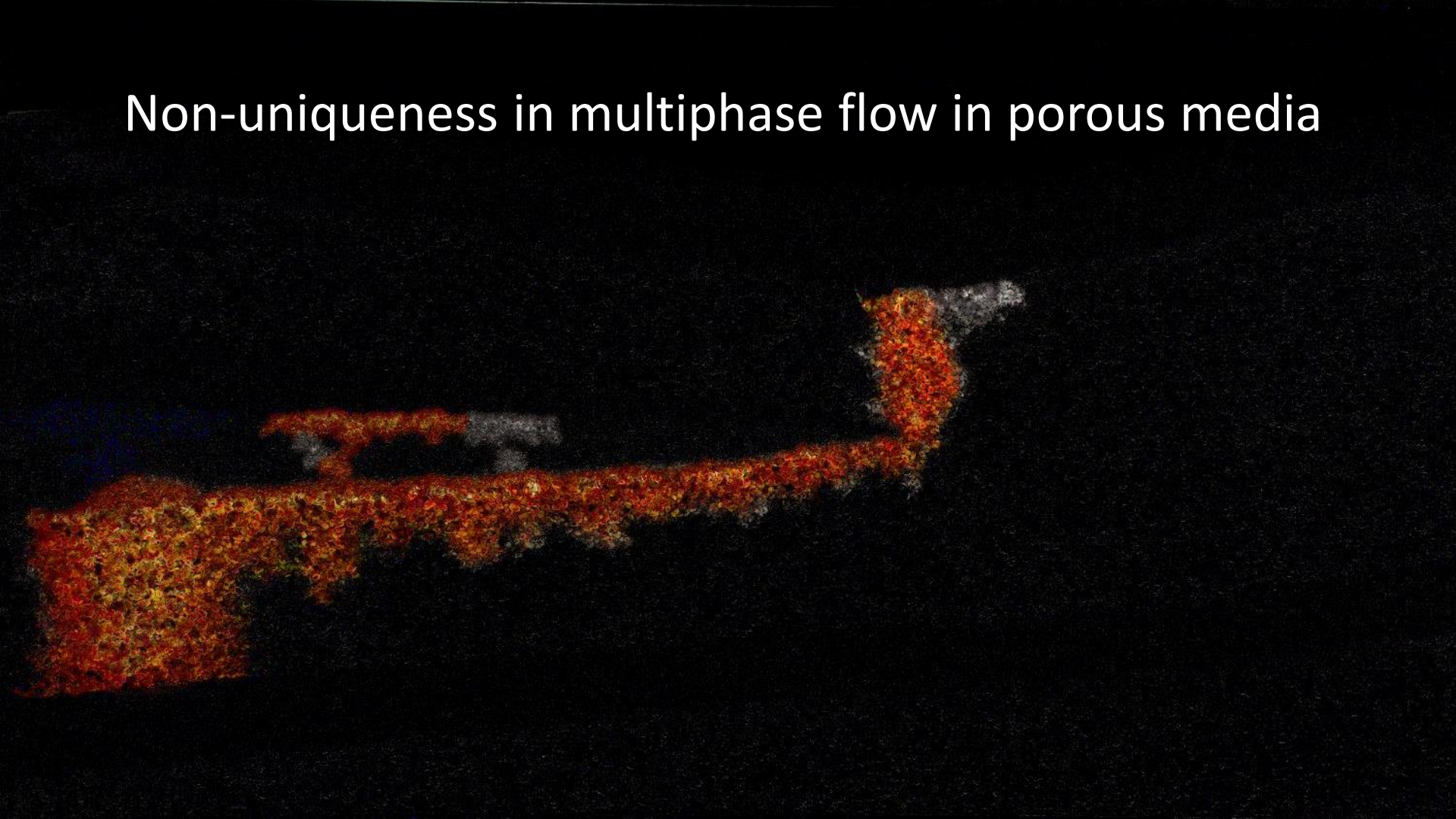
Experimental results

The PoroTwin project

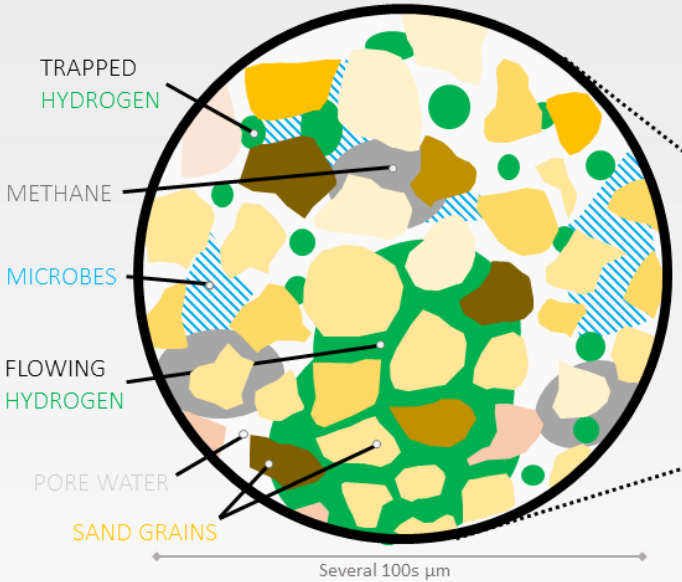


A digital twin with real-time integration of reservoir flow, simulation and control with experimental operational parameters

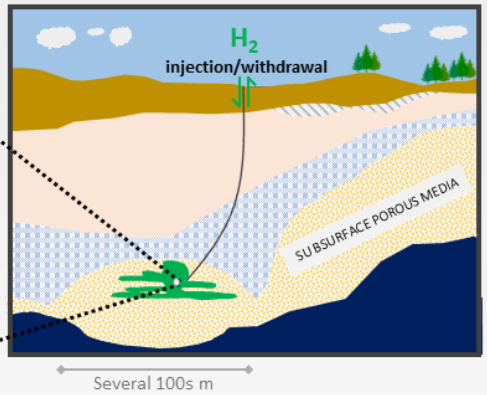
Non-uniqueness in multiphase flow in porous media



Hydrogen Storage in Subsurface **P**orous Media **E**nabling Transition to a Net-Zero Society



The HyPE project



WP1

HYDROGEN-METHANE FLOW, TRAPPING AND SOLUBILITY

WP2

MICROBIAL GROWTH AND GAS CONVERSION MECHANISMS

WP3

COUPLED PROCESSES FOR STORAGE AND INJECTION/WITHDRAWAL IN HYDROGEN-METHANE SYSTEMS WITH MICROBIAL ACTIVITY

Principal Investigator: Prof. Martin A. Fernø
Dept. of Physics and Technology, University of Bergen, Norway

CCUS continued learning course @ UiB

Content:

- 10 weeks in total
- Flexible; videos and slides, podcasts
- Quizzes
- Q&A sessions
- Digital group work

Popular course

- Hundreds of applicants
- Since 2020 four courses for industry and two courses for students

Course teachers and administration


Arne Graue


Martin Fernø


Sarah Gasda


Geir Ersland


Bergit Brattekås


Zachary Alcorn


Audun Drageseth


Maksim Lyysy


Else Johannesen


Marianne Steinsbø


Benyamine Benali

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