

Longyearbyen storage project

An integrated research and education laboratory

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with

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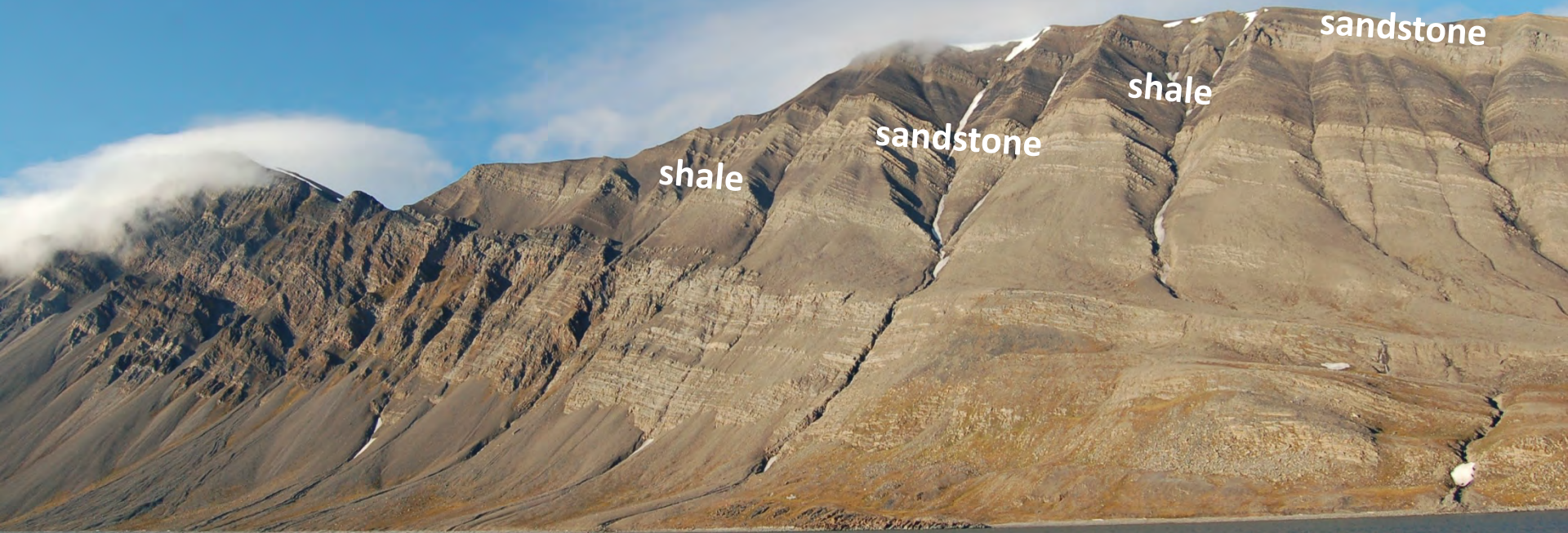
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Location Svalbard

- Coal mining community at 78° N.
- The world's northernmost settlement.
- Research base for studying and monitoring climate change.



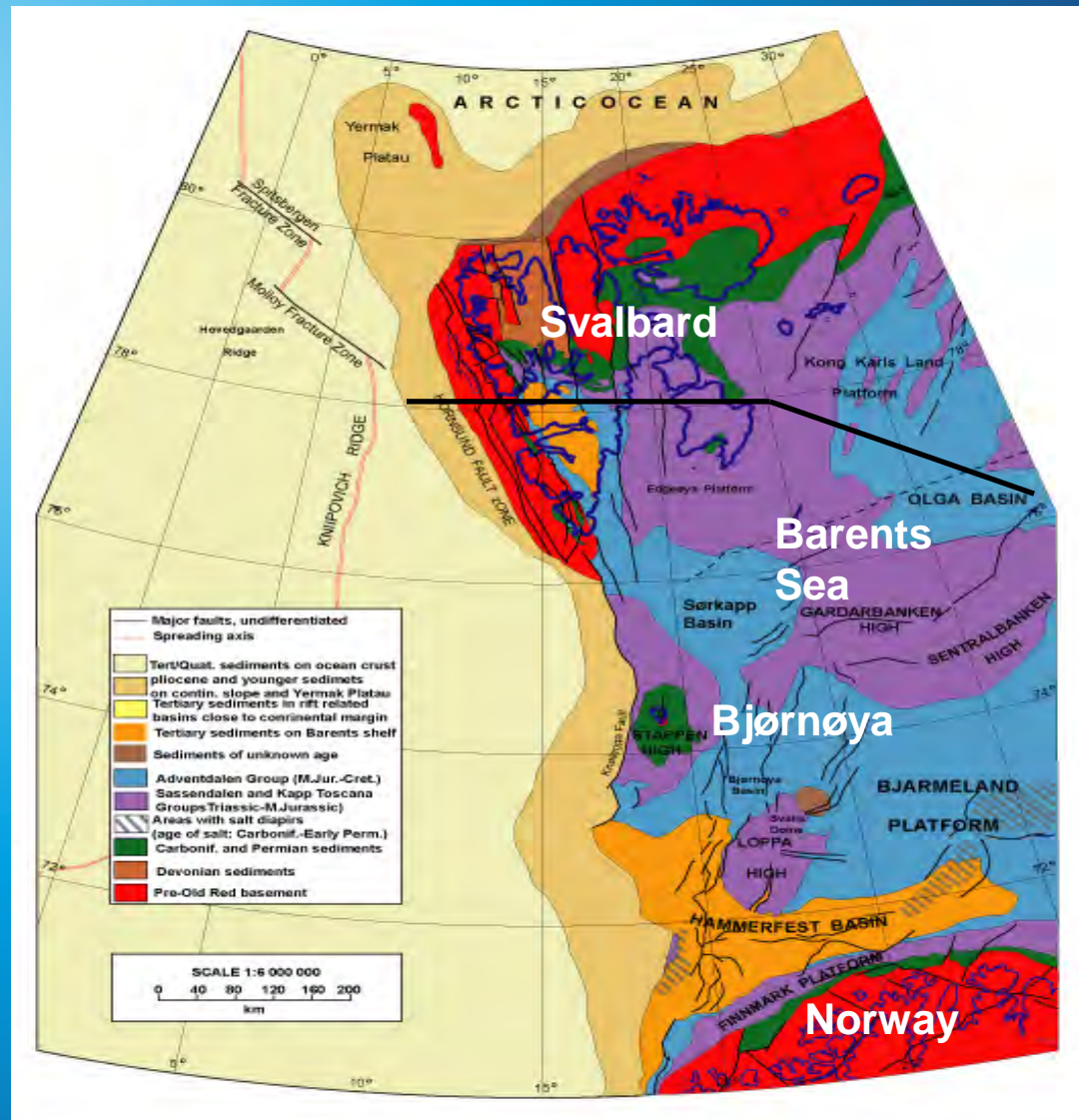
The geology is favourable



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Uplifted part of the Barents Sea

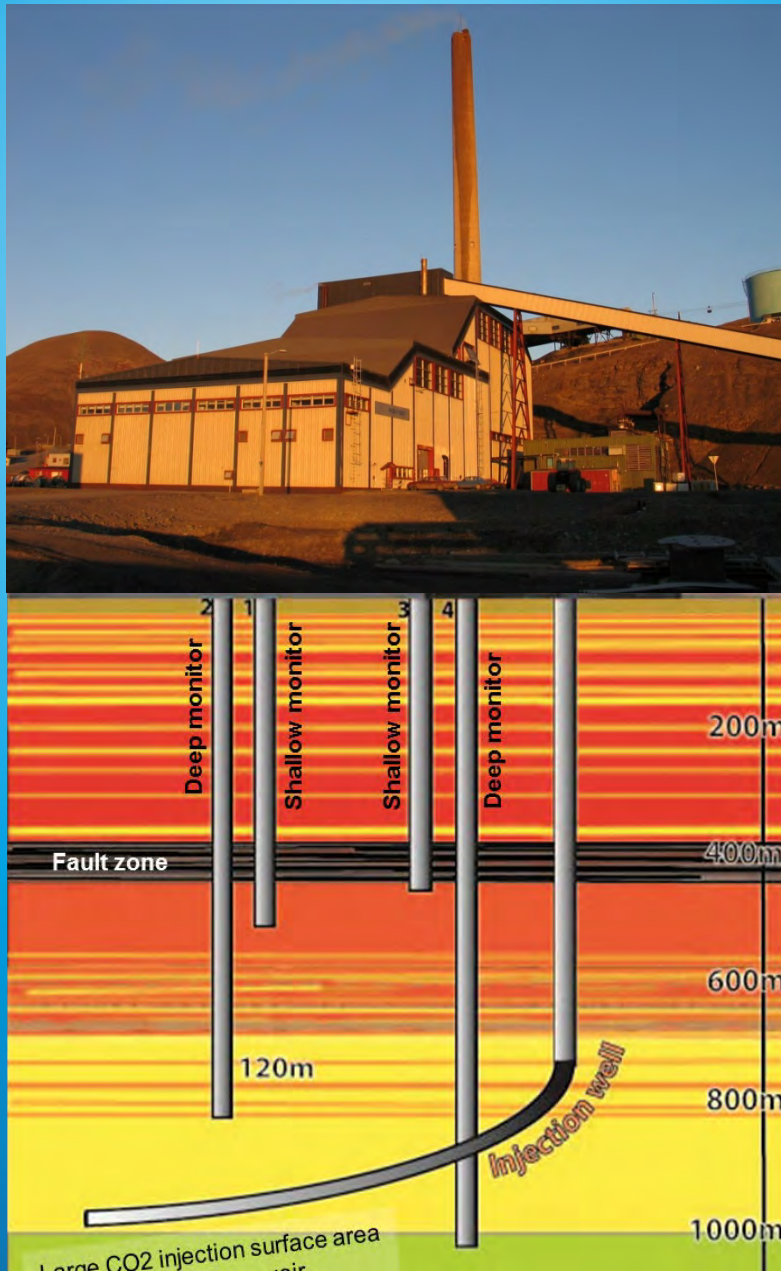
- Most of Svalbard is made up of sedimentary rocks.
- Continuation of the Barents Sea shelf of the Stokhman and Snow White fields.



Unique qualities

The UNIS vision:

- Let's follow the CO₂ from the source to the solution.
- Let's turn Longyearbyen into a high profile, green show case as a community that takes care of its emissions.
- Let's develop high level, field based, university studies along the CCS chain.



The CO₂ value chain



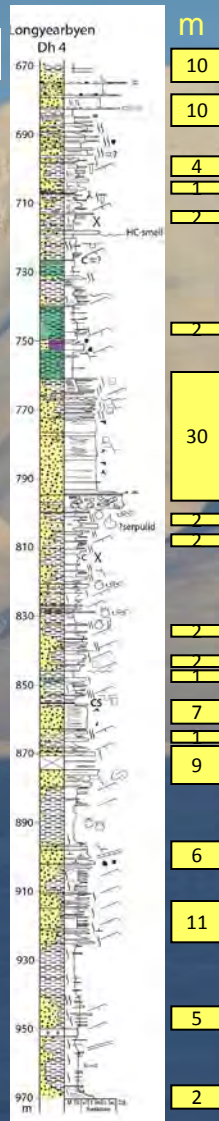
Project development



- 2006: Vision of CO₂ neutral Svalbard (Sand-Braathen)
- 2007: Drilling well 1 & 2.
- 2008-09: Drilling well 3 & 4.
- 2009: Reservoir identified.
- 2010: Injectivity verified.
- 2011: Cap rock verified.
- Seismic baseline completed.
- Geophone network in place.

Reservoir properties

DH-4



Top Reservoir 670m

700m

750m

800m

850m

900m

950m

TD 970m

Upper Triassic to Middle Jurassic marine sandstones and shales
Gross Reservoir Unit: 300m
Porosity varies from 2 to 18%
Permeability varies from 0,1 to 2 mD
Highly fractured rock – low pressure reservoir

Characteristics of Longyearbyen CO₂ lab

The reservoir:

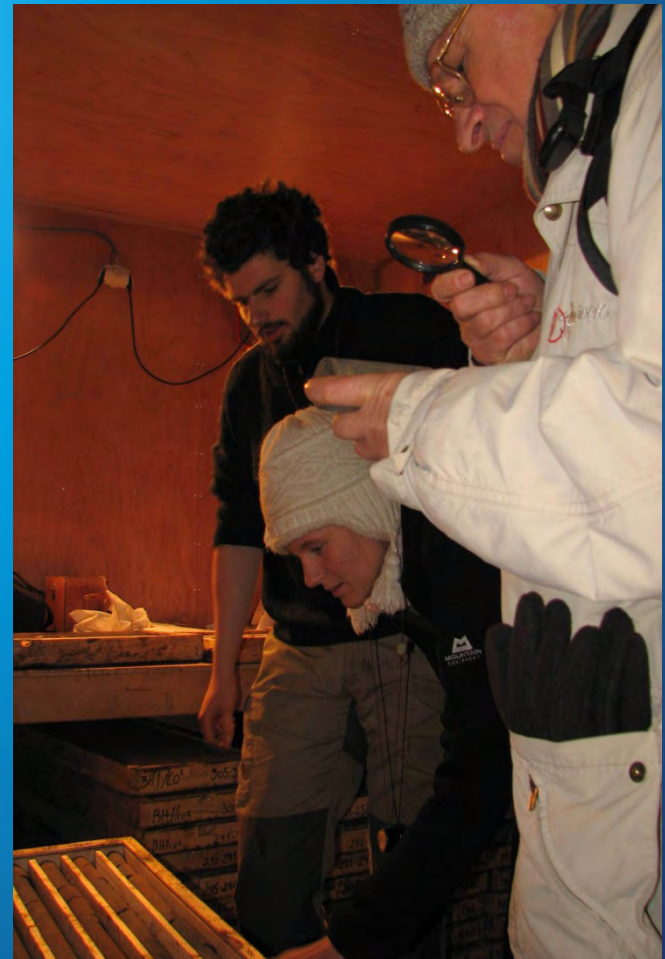
- Low porosity, low permeability, highly fractured
- Geological structures slightly tilted towards NE
- Varying pressure levels throughout the reservoir

Present infrastructure:

- 6 (7) wells completed
- Geophone network in place
- Seismic equipment in place

Field site advantages:

- Low cost drilling
- Field support available Locally.



Injection/ pressure tests using water with tracers

Studying a highly
fractured reservoir.



Partner of Euroscoops

EUROSCOOPS campaigns:

- 21 industry and R&D providers from 14 countries performing 11 pilot tests.
- Storage sites at Ketzin, Hontomin, Montmiral, Svelvik and Longyearbyen.
- The project capitalizes on substantial investments already made.

Key expected impacts of EUROSCOOPS:

- Enhance safety of CO₂ storage.
- Improve public understanding.
- Strengthen capacity building.

Euroscoops at UNIS:

- Developing/refining monitoring and modeling tools.
- 2 injection campaigns, using water and gas
- Extensive outreach program.



Education and outreach

- Development of educational program.
- Strengthen outreach activities, establish a Euroscoops network.
- Establish visitor centre Longyearbyen.
- Continuing our publication program.





No community
conflicts



Next step: Carbon capture

Pilot size capture?

- Based on present power plant, capturing 5-10.000 tons per year
- Demonstrate value chain + acquire CO₂ for storage testing

Full scale capture?

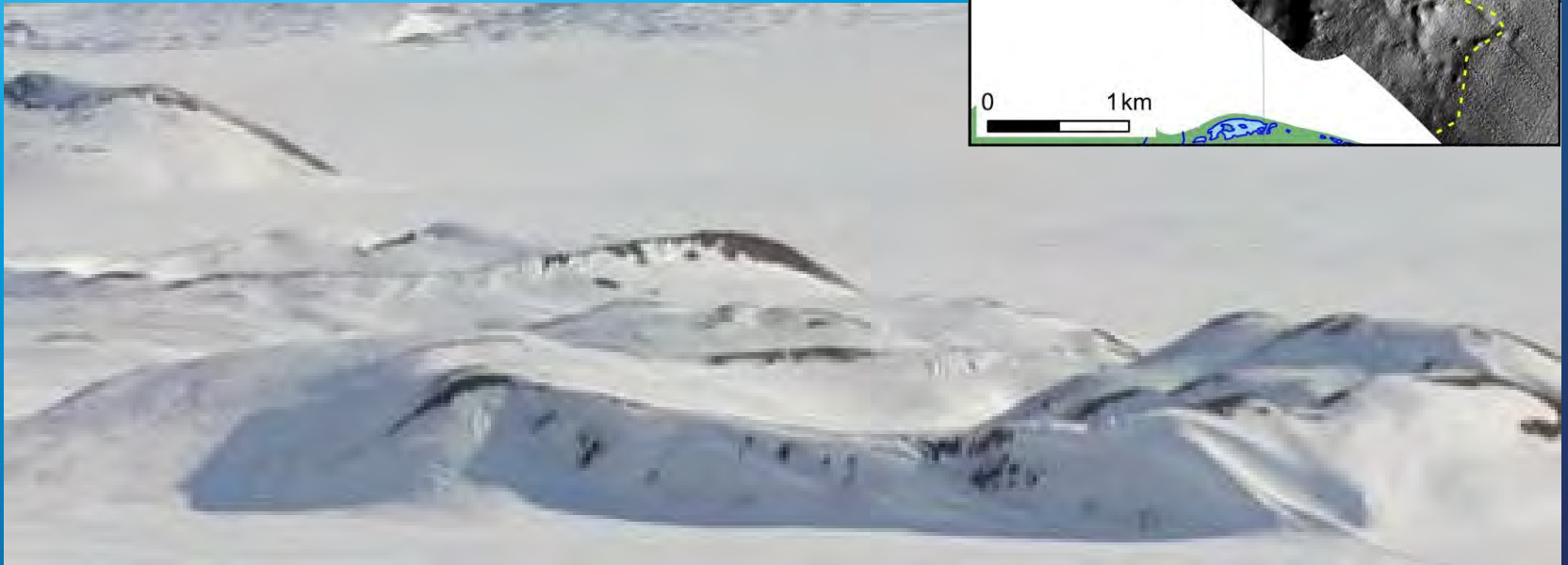
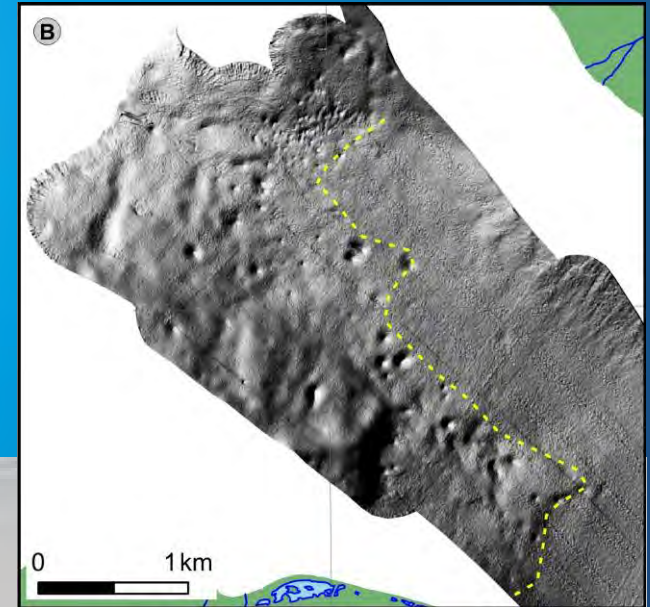
- Based on construction of new power plant, capturing 80-100.000 tons per year
- Integrated capture, research and education facility.
- Debated in Norwegian parliament.



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Long term monitoring program

- Mapping sea bottom and land surface (pockmarks, pingos).
- Monitoring ground water chemistry.
- Drilling separate monitoring wells.
- Monitoring natural and predicted pressure gradients.



The host institution



The University Centre in Svalbard

The world's northernmost institution for research and higher education

459 students from 32 countries attended UNIS in 2011

UNIS partners (2012 – 2013)

| Financial partners | Research partners |
|---|---|
|  |  |
|  |    |
|   |  |
|  |  |
|  |  |
|  |  <p>Norges geologiske undersøkelse</p> |
|  |  <p>Institutt for energiteknikk</p>  <p>Forskning for bedre fremtid</p> |
|  |   <p>Subsurface CO₂ storage- Critical Elements and Superior Strategy</p>  |

Thank you for your
kind attention!



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