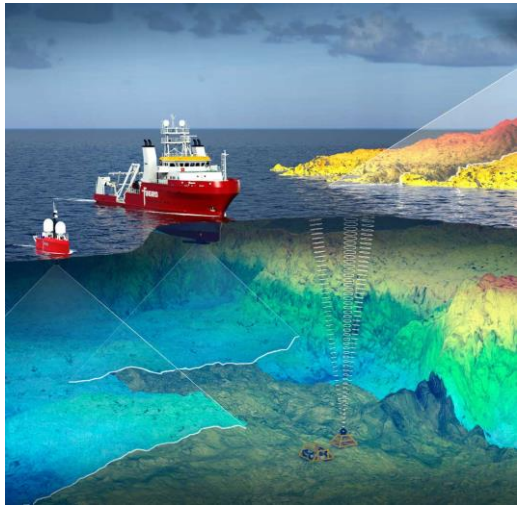
NSTA CCS MMV Technology Showcase

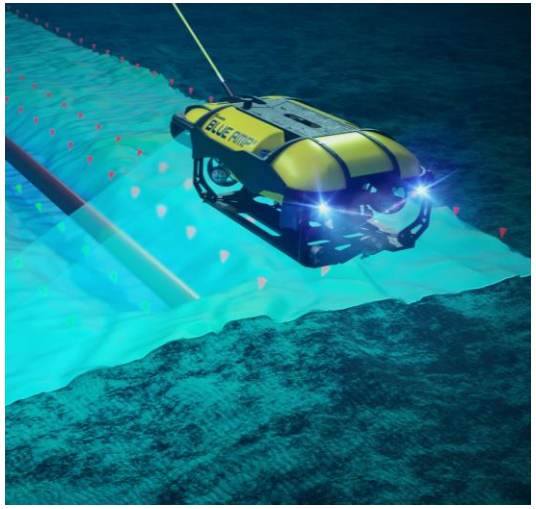
Seismic, seabed and water column monitoring

James Faroppa 29/10/24

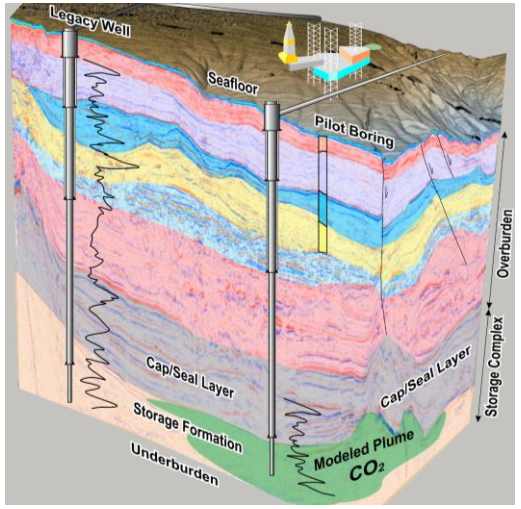
NSTA CCS MMV
Technology Showcase Introduction



1. Holistic ranking of optimal CO_2 storage sites



2. CO_2 Transport MMV



3. Derisking the near surface CO_2 storage roof

4. Remote monitoring, measurement and verification (MMV)

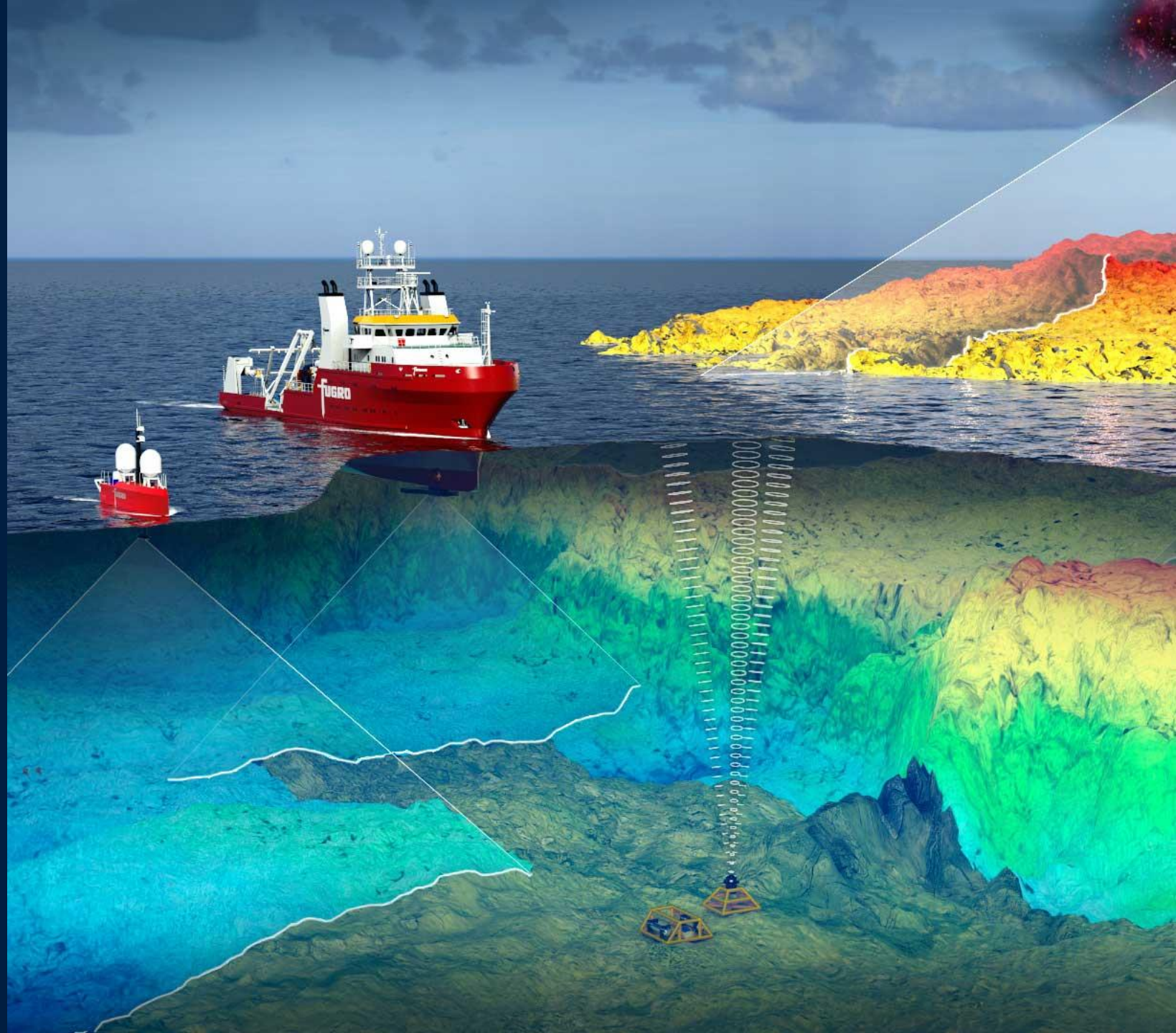
1. Holistic ranking of optimal CO_2 storage sites

1. Maximise the value of existing geodata

2. Asses near surface geohazards and site limitations

3. Change mapping to consider a dynamic seabed

4. Opex and Capex from day 1



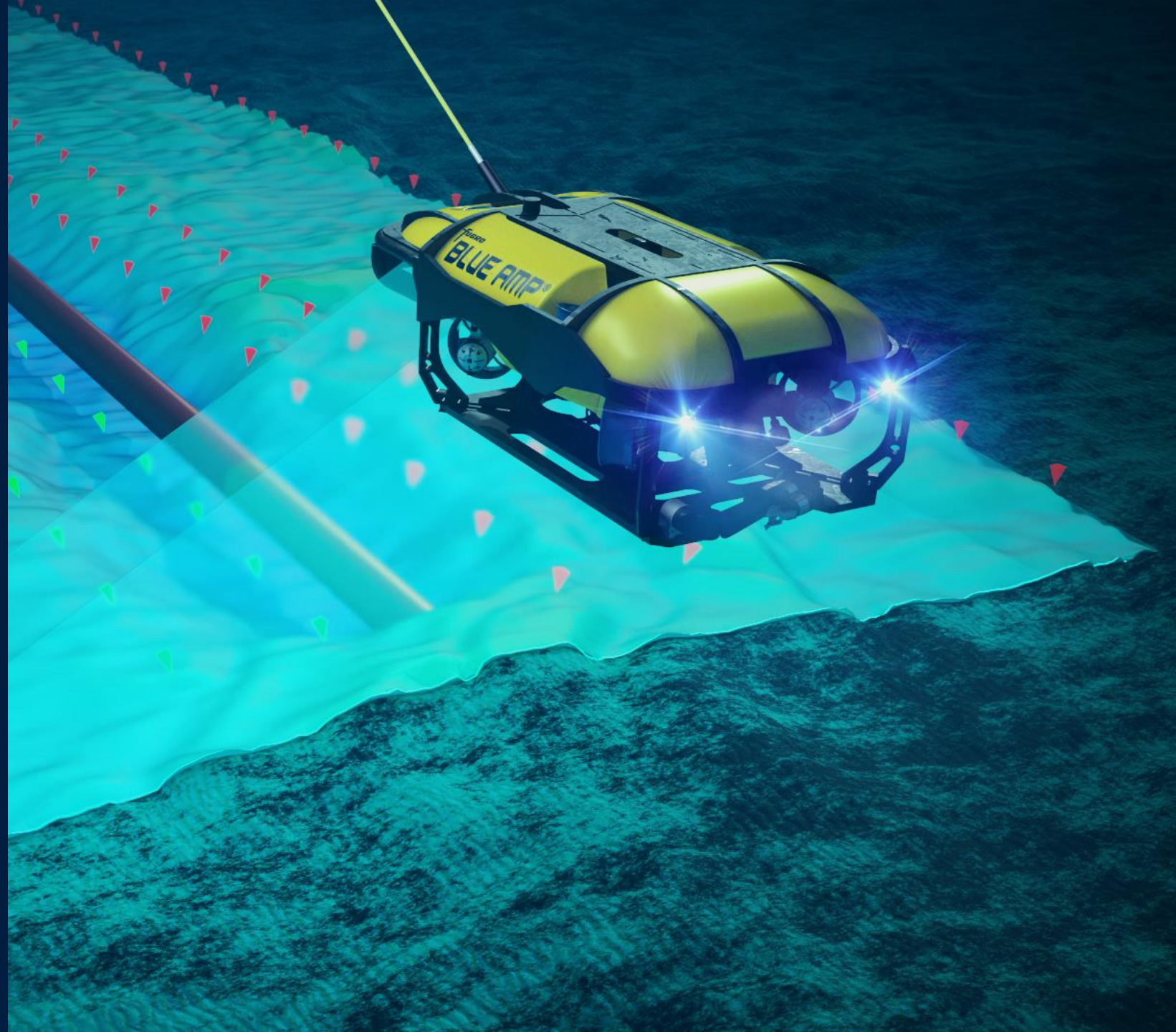
2. CO_2 Transport MMV

1. Blue Amp fully electric ROV fleet - 20 kW of power - fast remote inspection.

2. Dual head set up for multibeam data acquisition

3. Enhanced visualisation achieved by 4K smart vision system

4. Deployable from 18m USV, operated from ROC



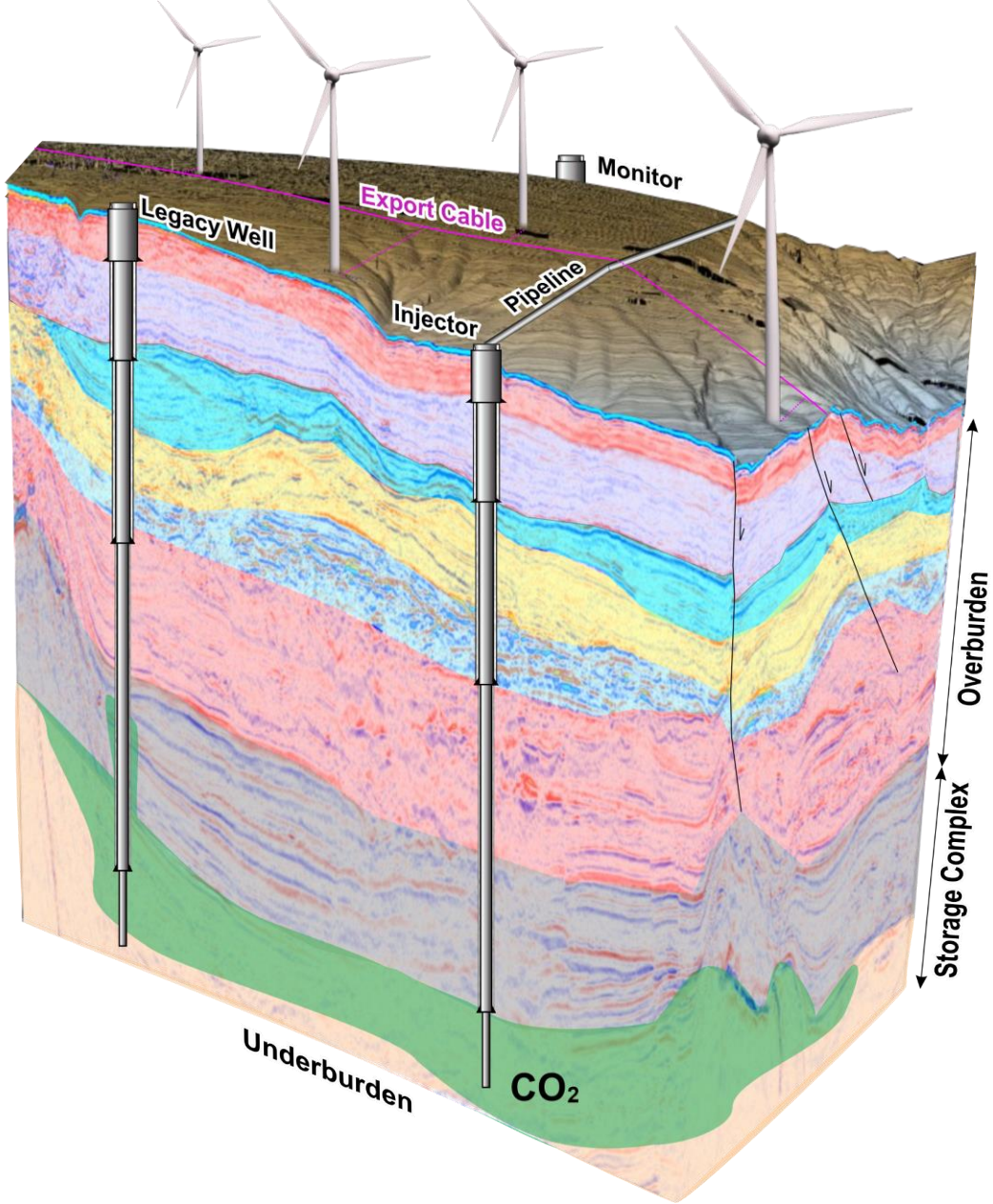
3. Derisking the near surface CO_2 storage roof

1. Near surface resolution

2. Near surface skills

3. Near surface risk mitigation

4. Near surface shared usage - colocation



"The Roof"

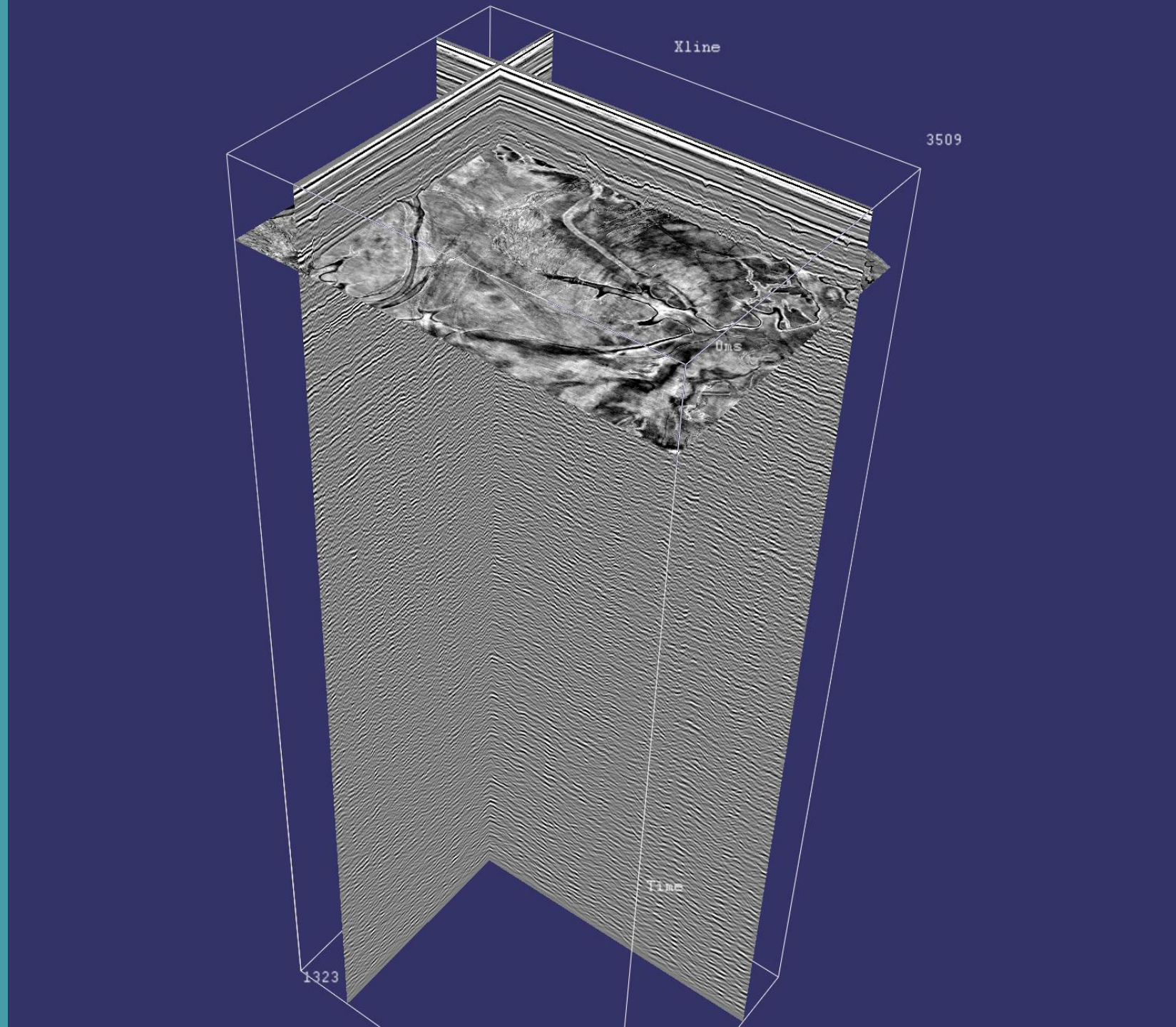
3a Ultra High Resolution 2D seismic for overburden characterisation

1. 400Hz dominant frequency - 500m

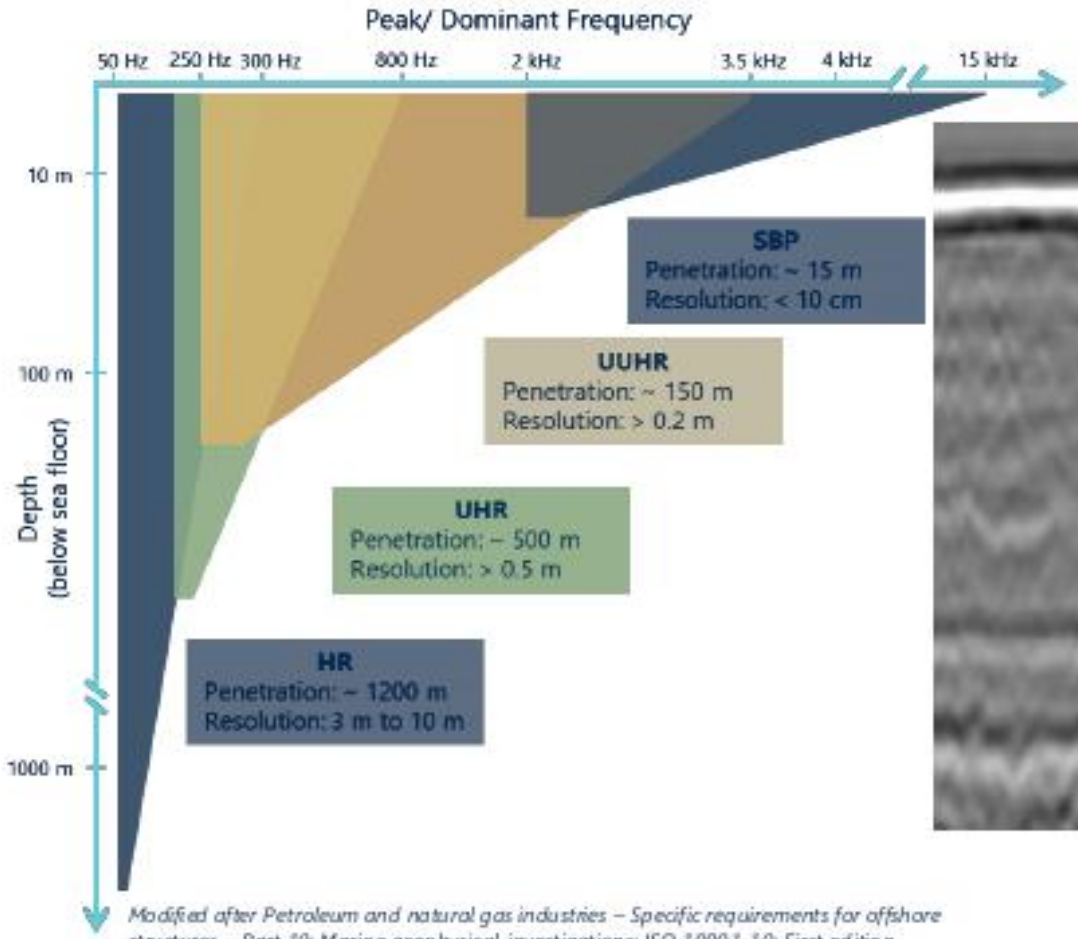
2. UUHR 2000Hz – 150m

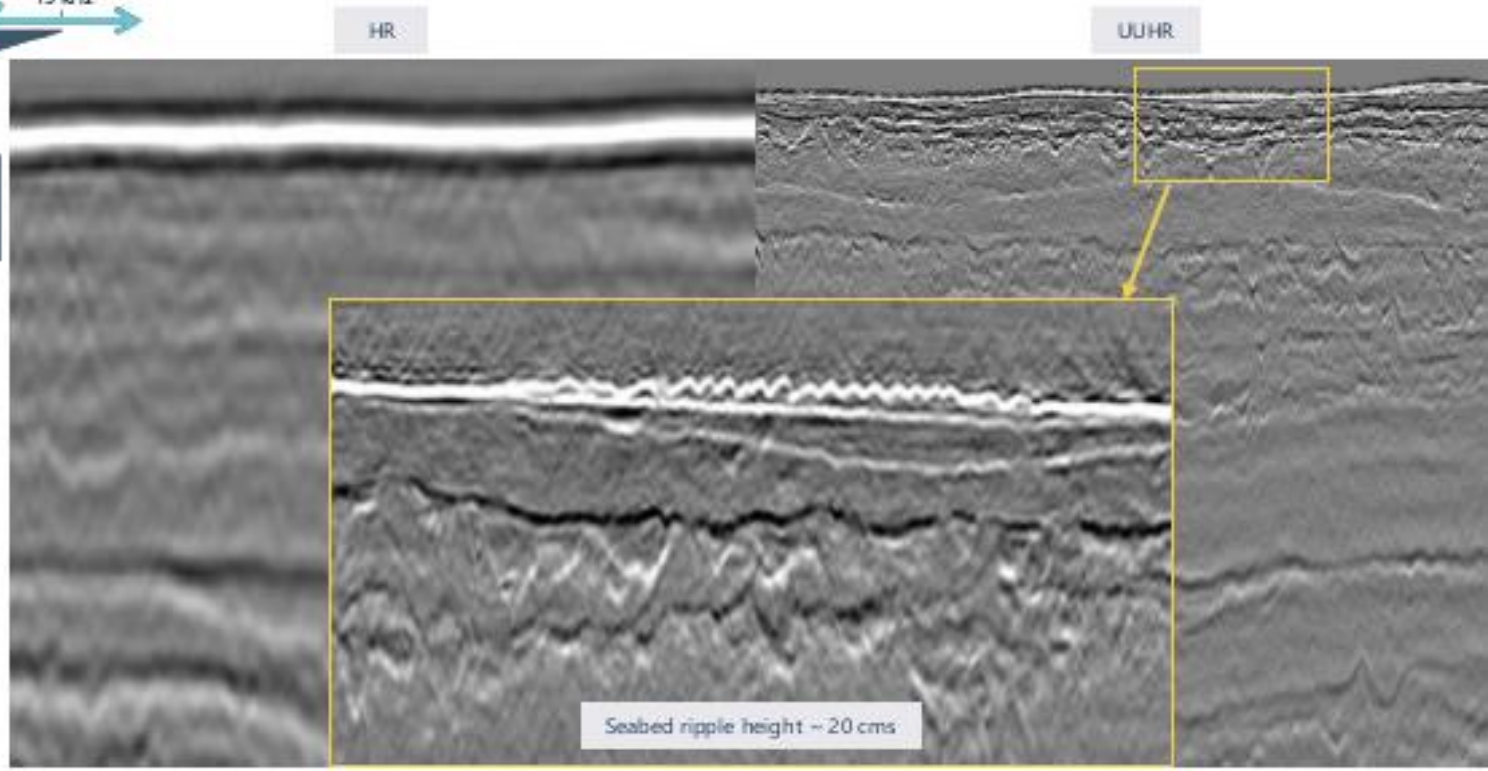
3. Avoids OWF challenges

4. Cost benefits and synergies



UHR or UUHR ?





Modified after Petroleum and natural gas industries – Specific requirements for offshore structures – Part 10: Marine geophysical investigations; ISO 19901-10; First edition 2021-03

© Fugro: EAGE Marine Acquisition Workshop, Oslo 2022

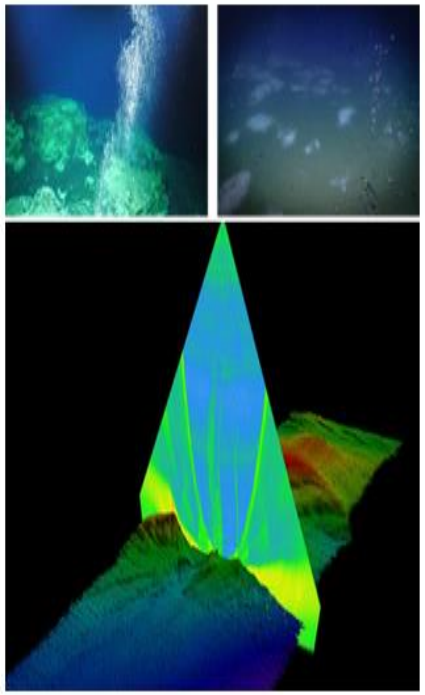
3b Environmental monitoring and geochemical surveys

Environmental surveys important in a CCS project as potential leaked fluid may reach the surface and displace ambient sediment fluids, introduce chemical reactions, and disturb biota

Bathymetry, Water Column, Seeps

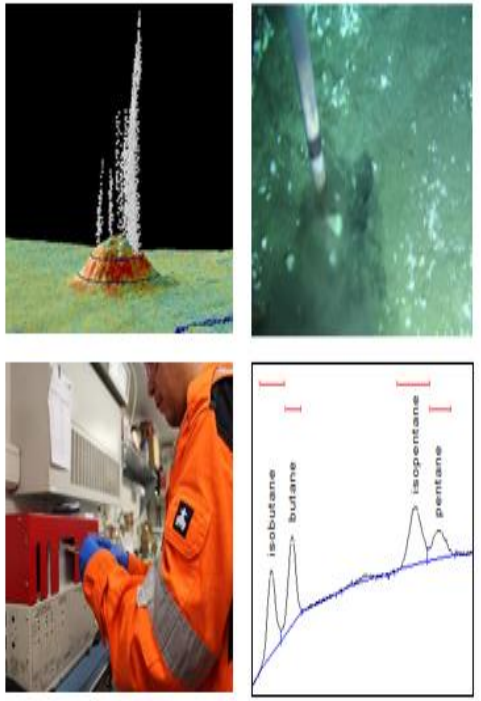
eDNA & Geochemistry

Ecosystem

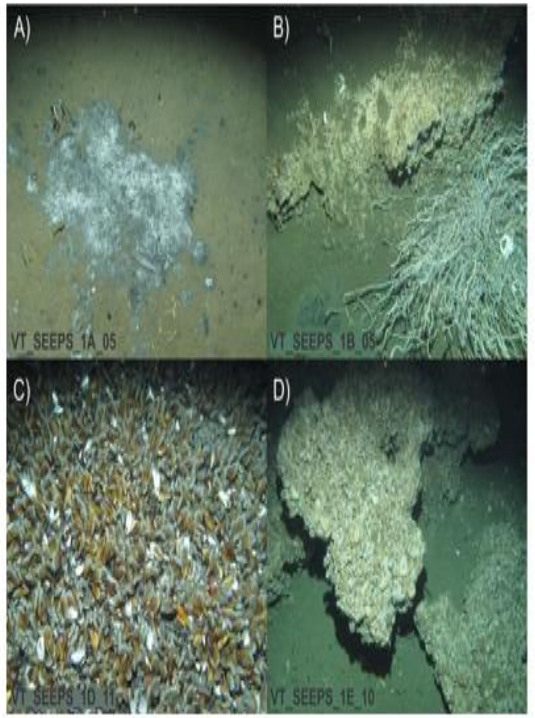


Acoustic Leak Detection

Potential for AI-based leakage flow calculation using a physics-based model and Fugro seeps data base



Sampling and Lab Analyses



Environmental Monitoring

4. Remote monitoring, measurement and verification (MMV)

1. Reduce CO2 and HSSE risk

2. Lower cost

3. Greater repeatability

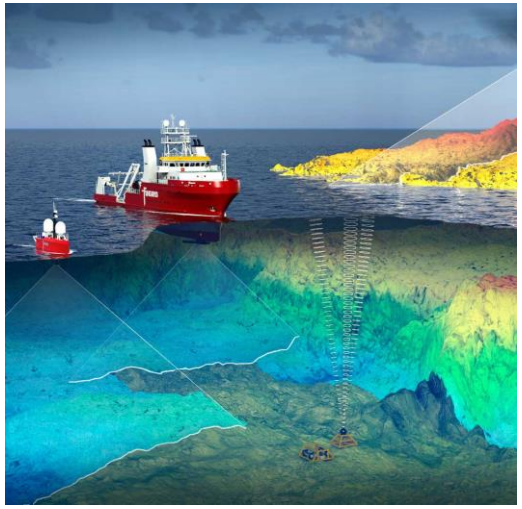
4a Seabed Environmental Monitoring

Seabed water quality measurements monitor CO2 and formation wave leakage. Fugro lander system monitors:

- Salinity & Temperature
- pH
- Dissolved Oxygen
- Nitrate
- pCO2

The system deployed either stand-alone or linked to the Seawatch buoy system in providing real-time data links back to our operations centres.

NSTA CCS MMV
Technology Showcase Summary



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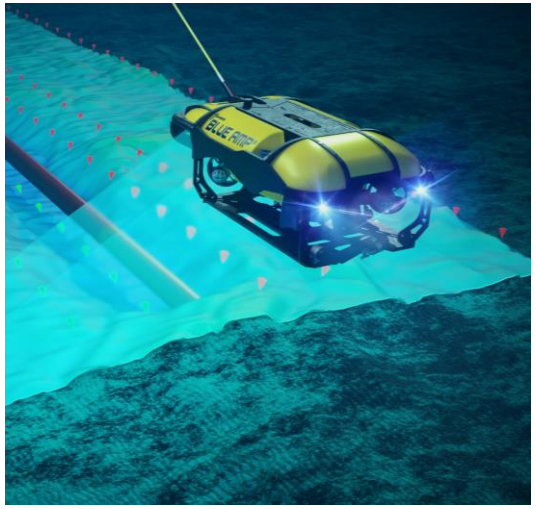

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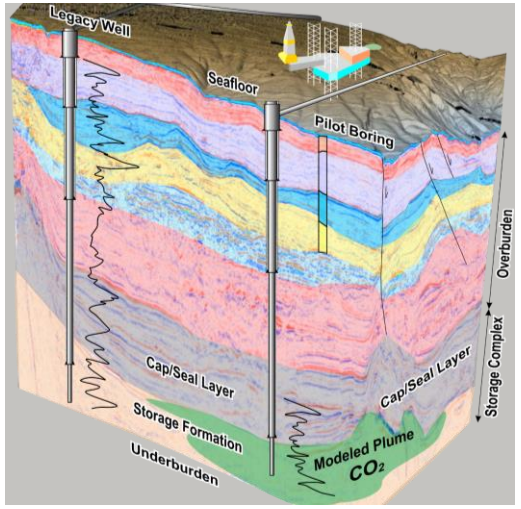

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FUGRO

Unlocking **Insights**
from **Geo-data**