The CO2CRC Otway Project

Charles Jenkins,
Manager, Monitoring & Verification
CSIRO and CO2CRC

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CO2CRC participants

NZ Resource Consortium

Supporting participants: Department of Resources, Energy and Tourism | CANSYD | Meiji University | Process Group | University of Queensland | Newcastle University | U.S. Department of Energy | URS

Established & supported under the Australian Government's Cooperative Research Centres Program

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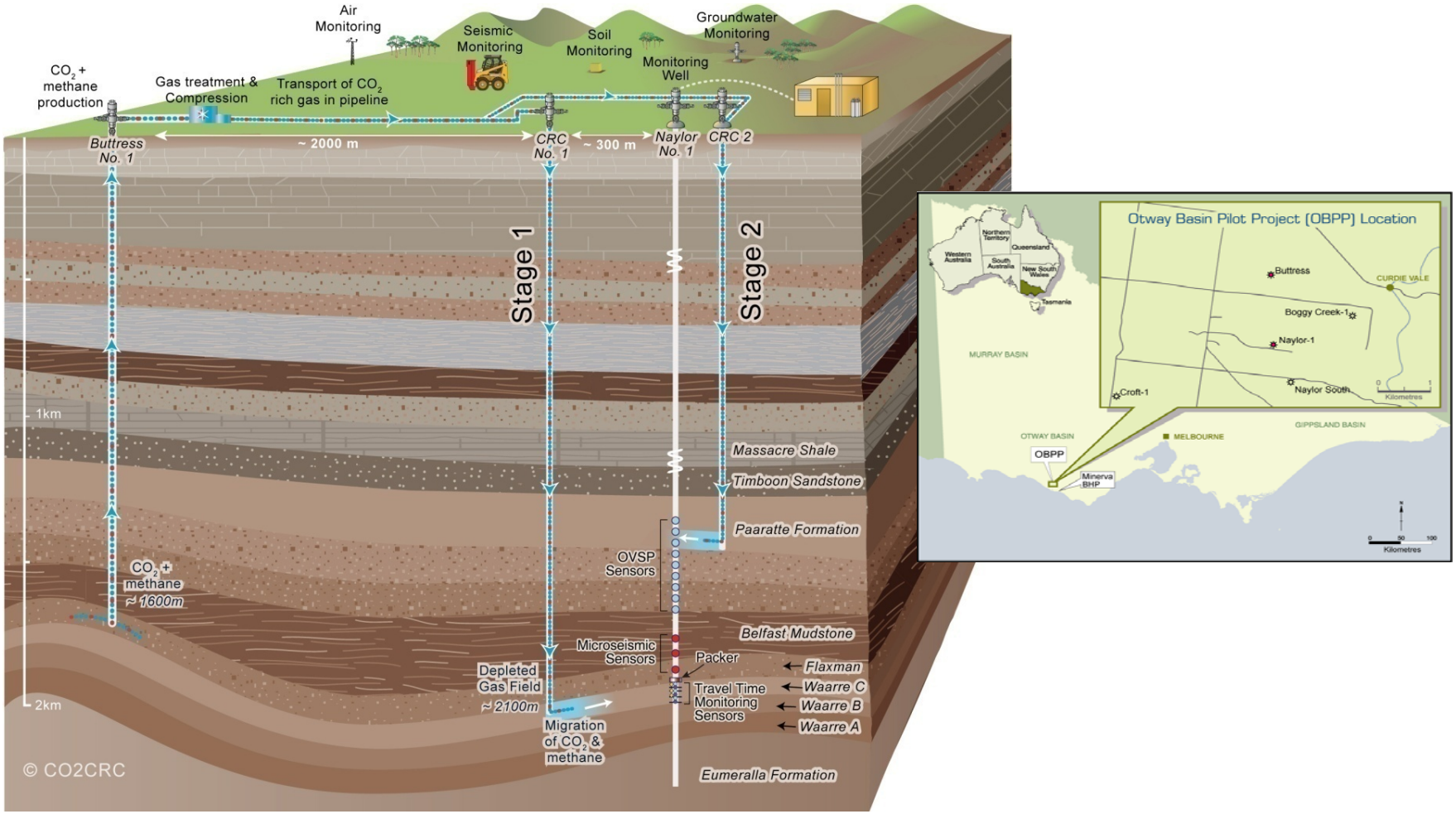
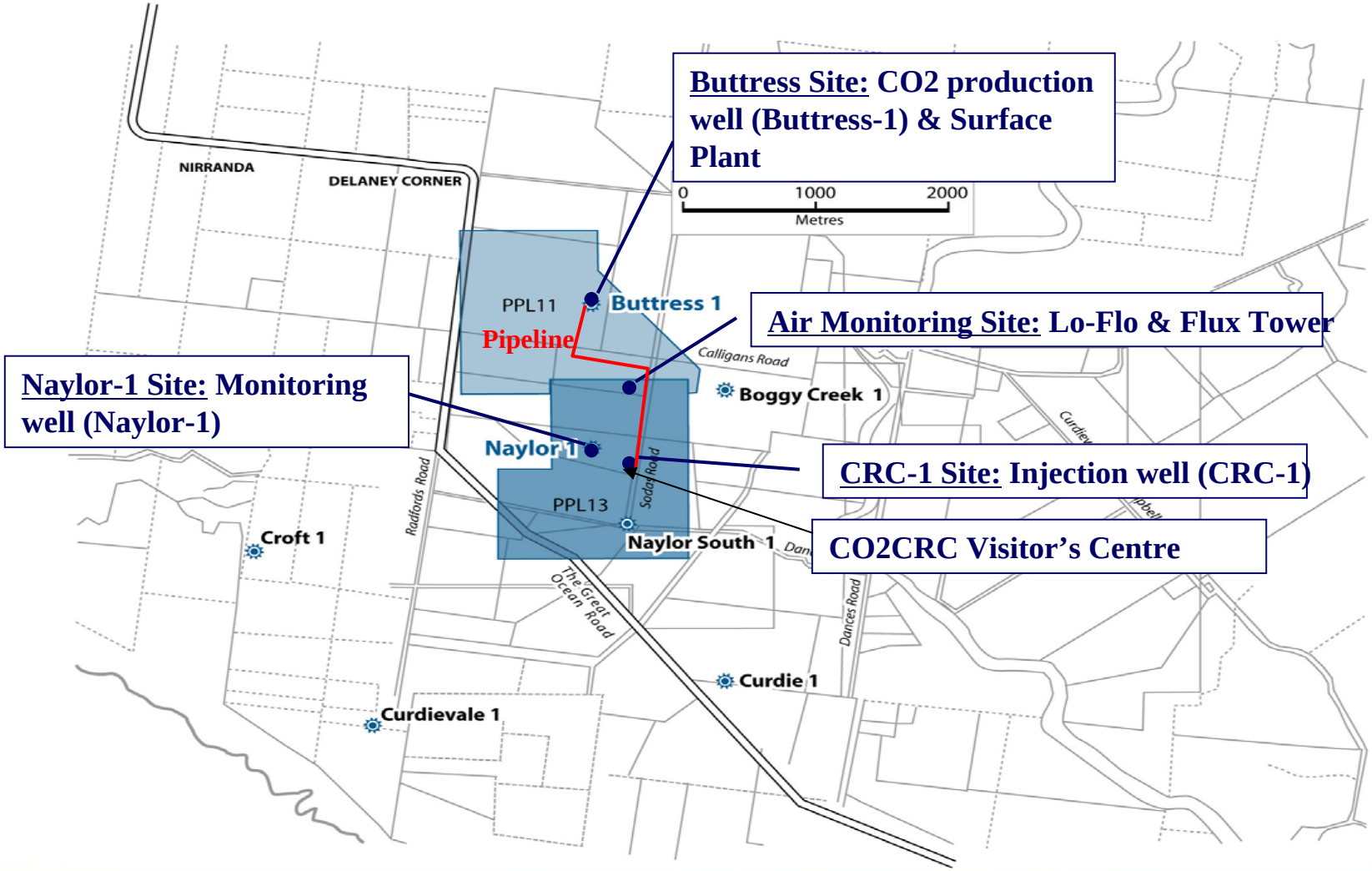
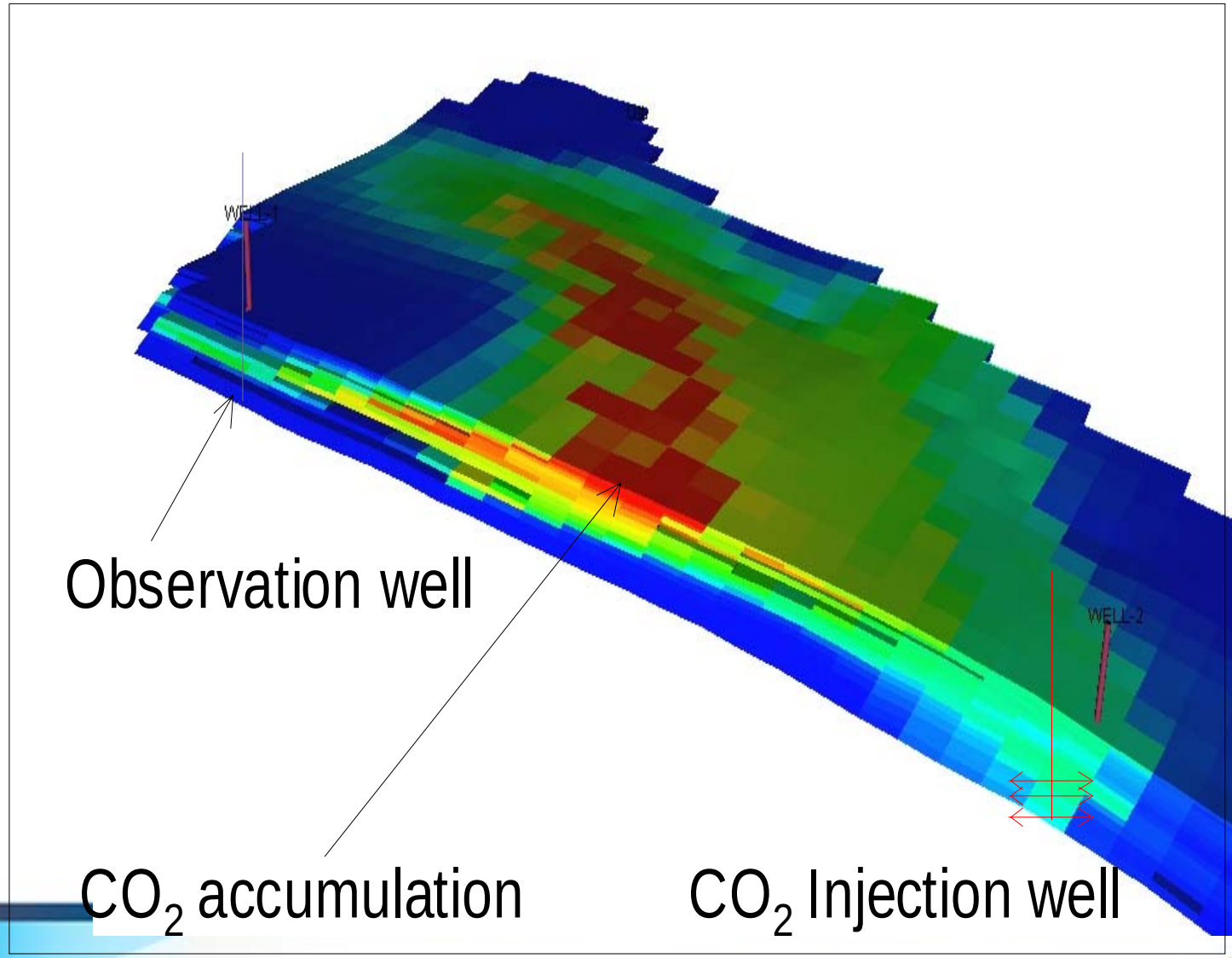
Project location & concept



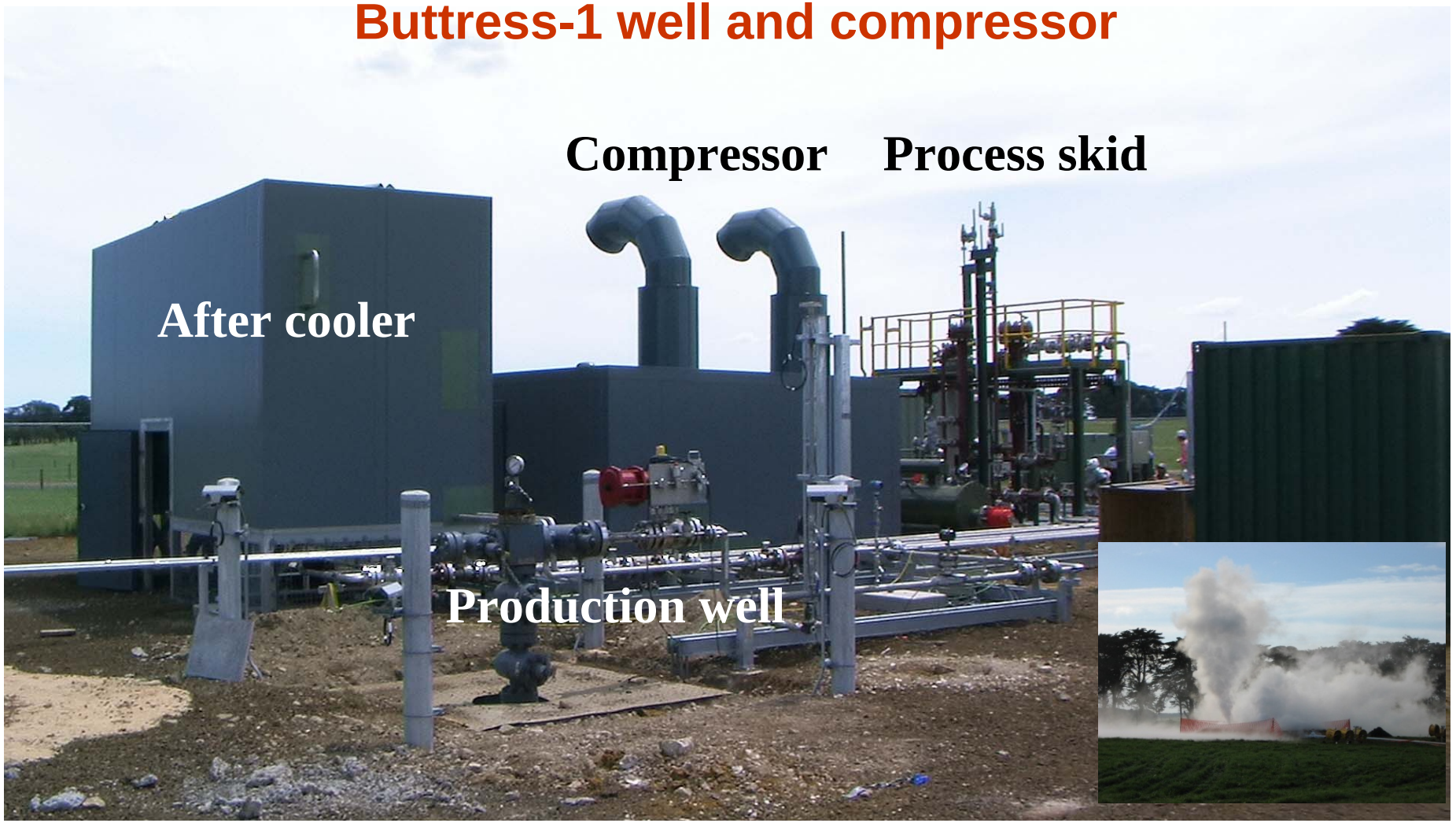
CO2CRC Otway Project facilities



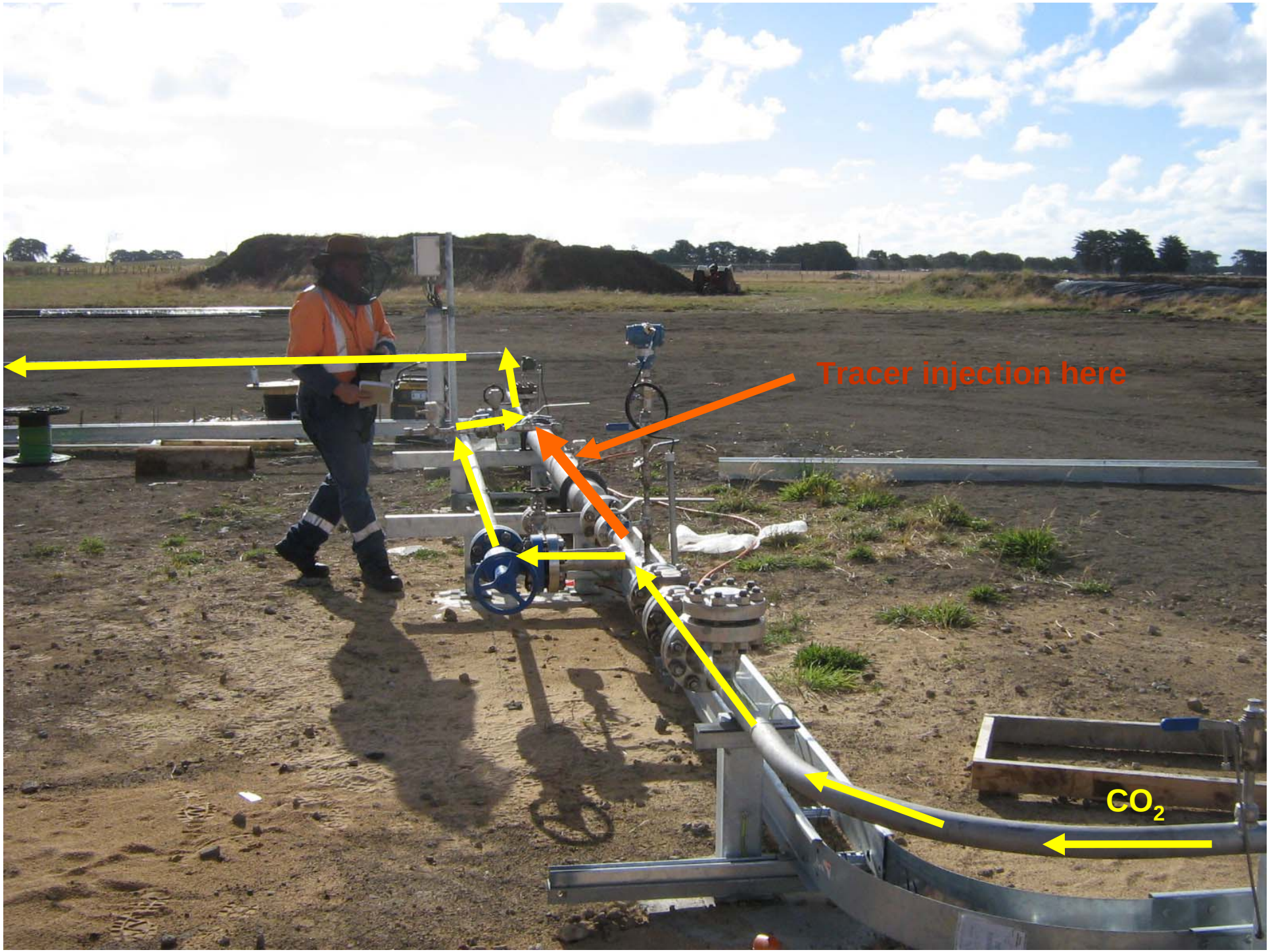
Conceptual model

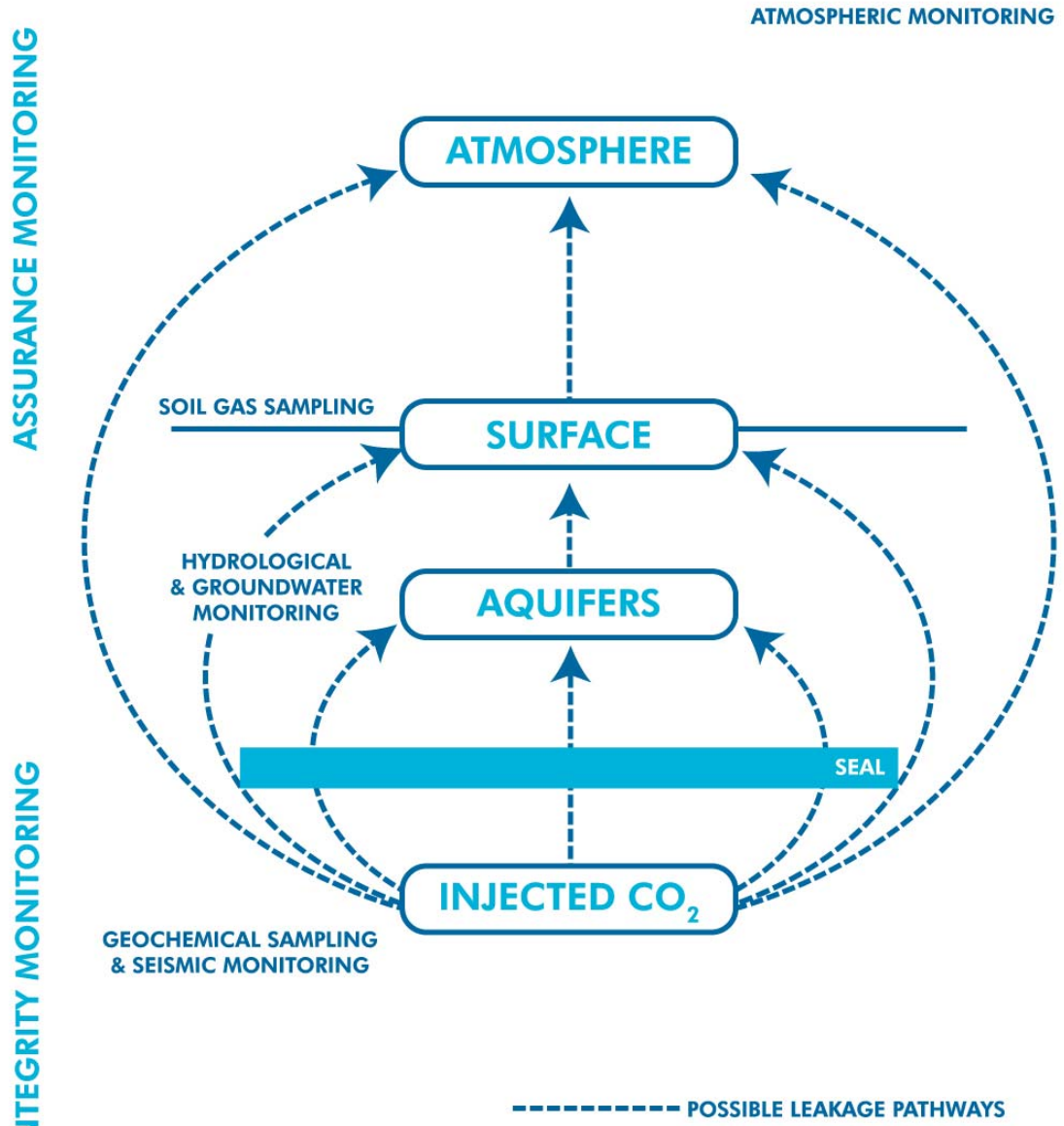


Source of carbon dioxide:
Buttress-1 well and compressor

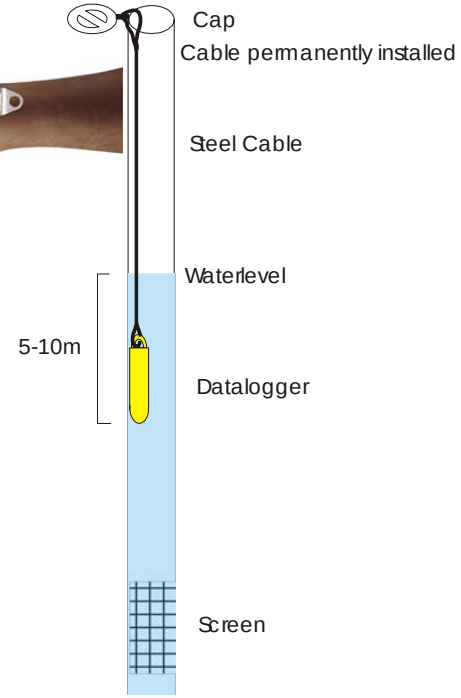


- Injection commenced 2 April 2008; total of approx 70K tonnes carbon dioxide was injected.
- Stage 1 cost A$40M
- Stage 2 may cost A$20M – drilling now
- Monitoring and verification a key component
- Learnings include technology, regulation, risk, liability.


Tracer injection here
CO_2


ATMOSPHERIC MONITORING
ASSURANCE MONITORING
ATMOSPHERE
SOIL GAS SAMPLING
SURFACE
HYDROLOGICAL
& GROUNDWATER
MONITORING
AQUIFERS
SEAL
INTEGRITY MONITORING
INJECTED CO_2
GEOCHEMICAL SAMPLING
& SEISMIC MONITORING
POSSIBLE LEAKAGE PATHWAYS

Ground water monitoring

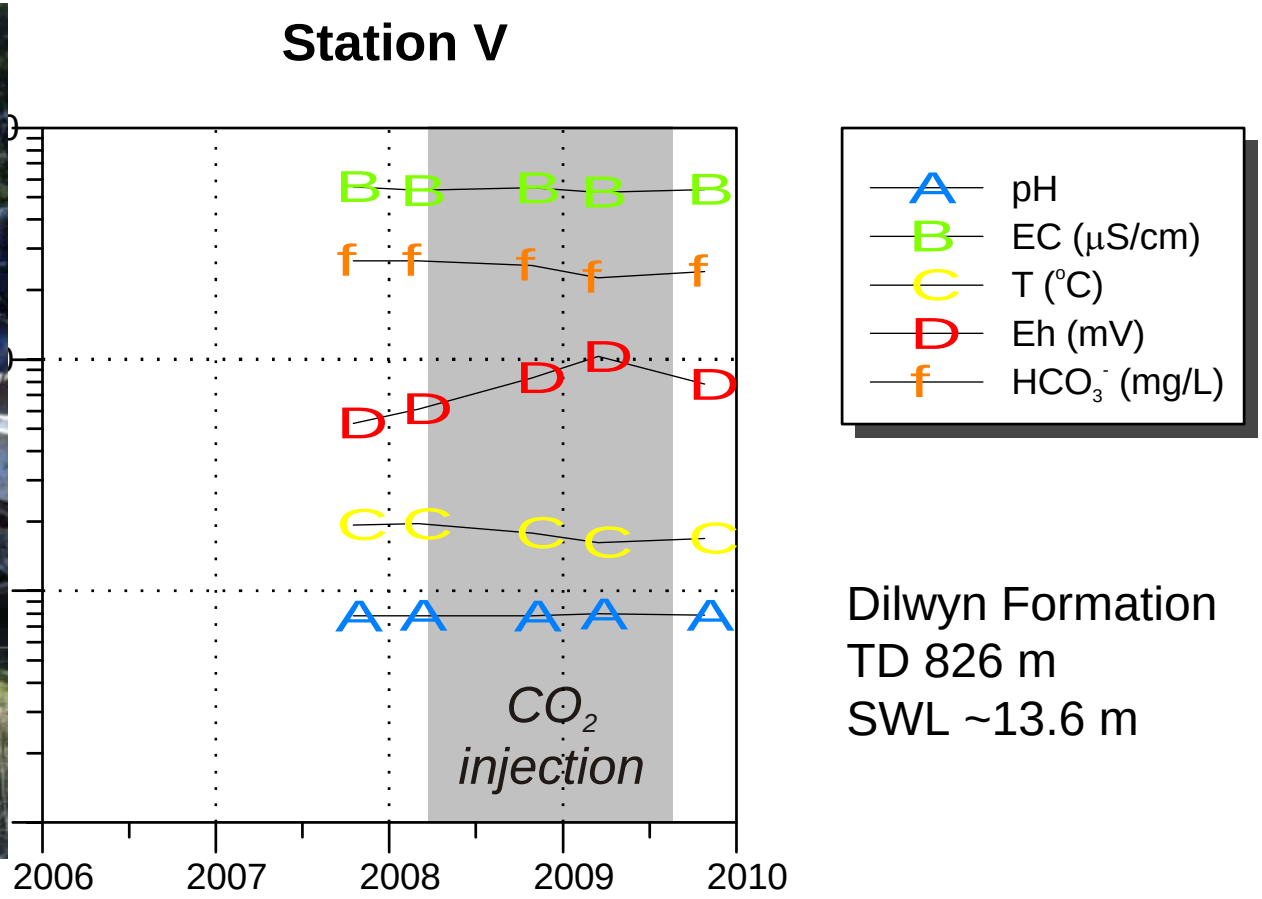


Objective:
- Monitor water levels to determine seasonal variation, flow rate and direction
- Identify any chemical changes associated with possible CO_2 leakage

Methods:
- Dataloggers
- Water chemistry

Aquifers monitored:
- Shallow unconfined Port Campbell Limestone,
- Deep confined Dilwyn aquifer

Example: Wannon Water Bore



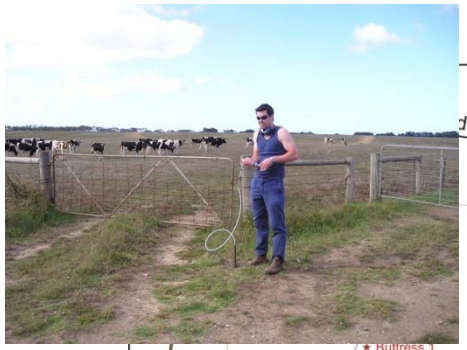
Dilwyn Formation
TD 826 m
SWL ~13.6 m

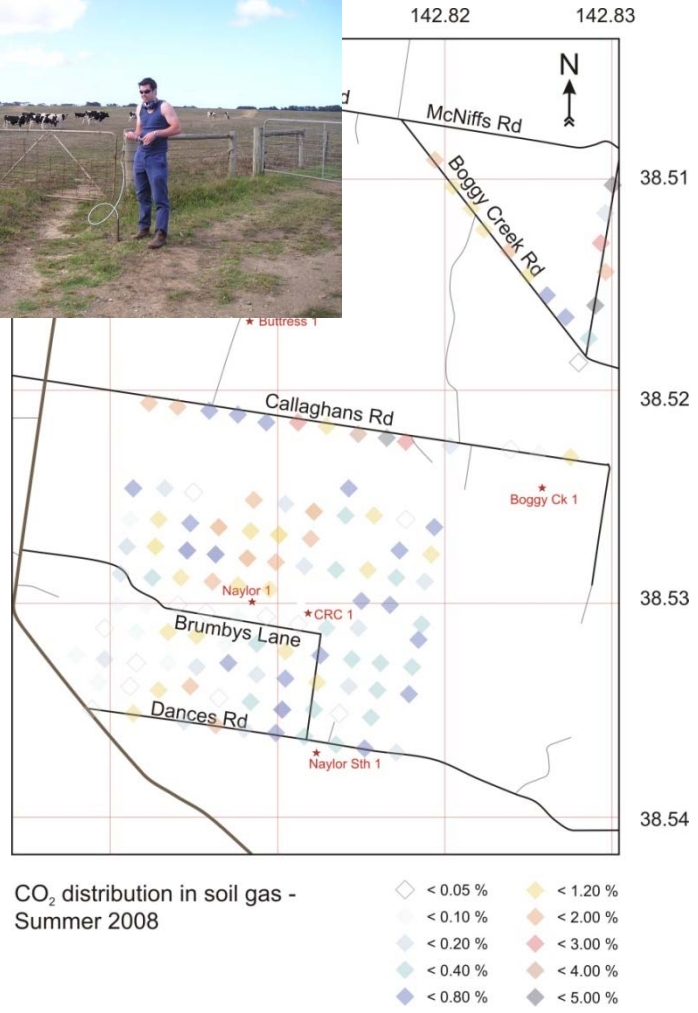
Soil gas

Objective:
- Establish CO2 variations within the extended area beyond the CO2CRC tenements
- Determine the likely source of origin
- Differentiate natural from injected CO2.

Methods:
- The soil gas program extracts air from the unsaturated soil zone above the water table.
- Samples are analysed on site (portable gas chromatograph) and in the laboratory for CO2, CH4 and isotopes.

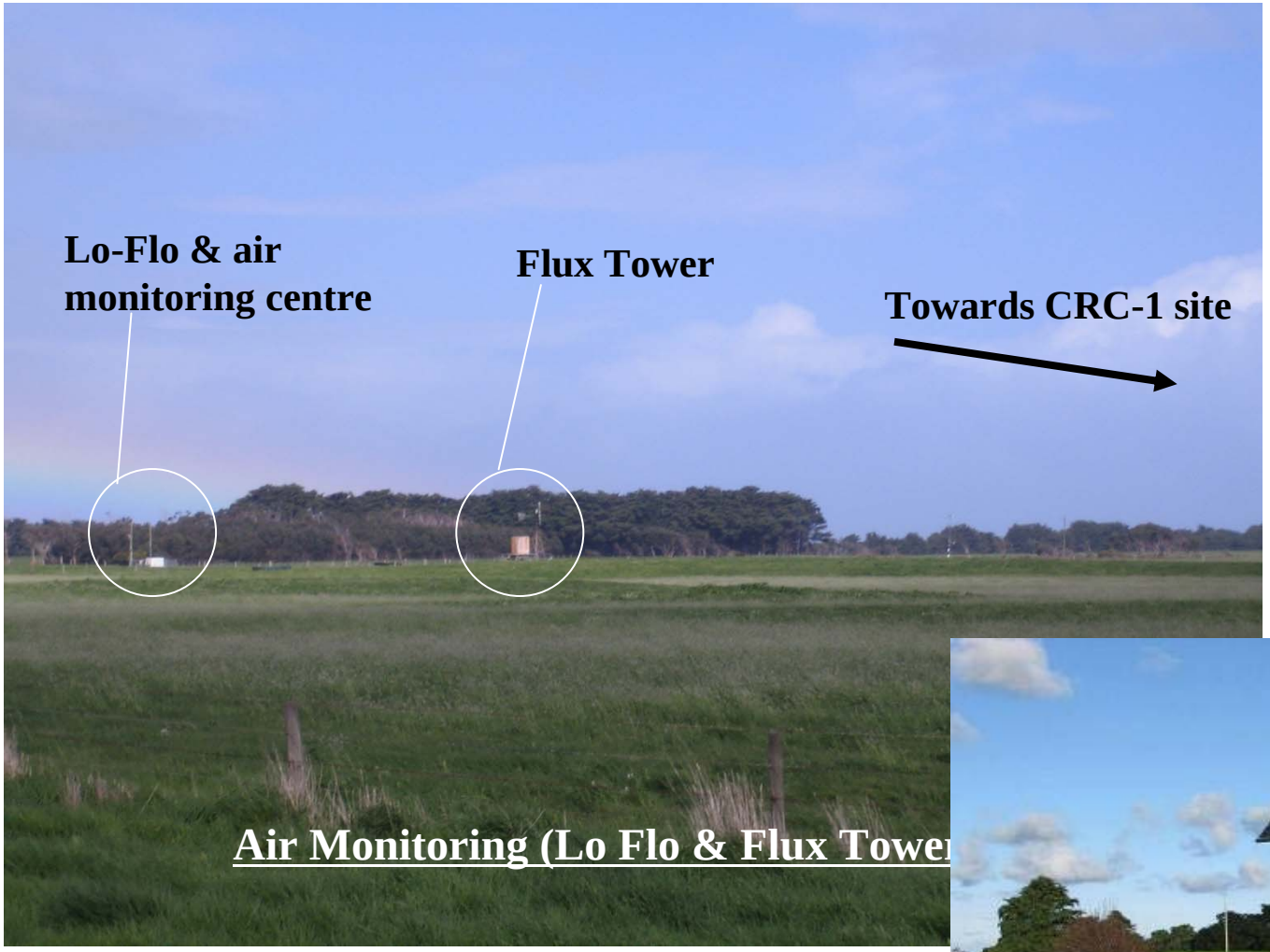
Frequency
- Baseline: Four surveys
- Once a year during and after the injection





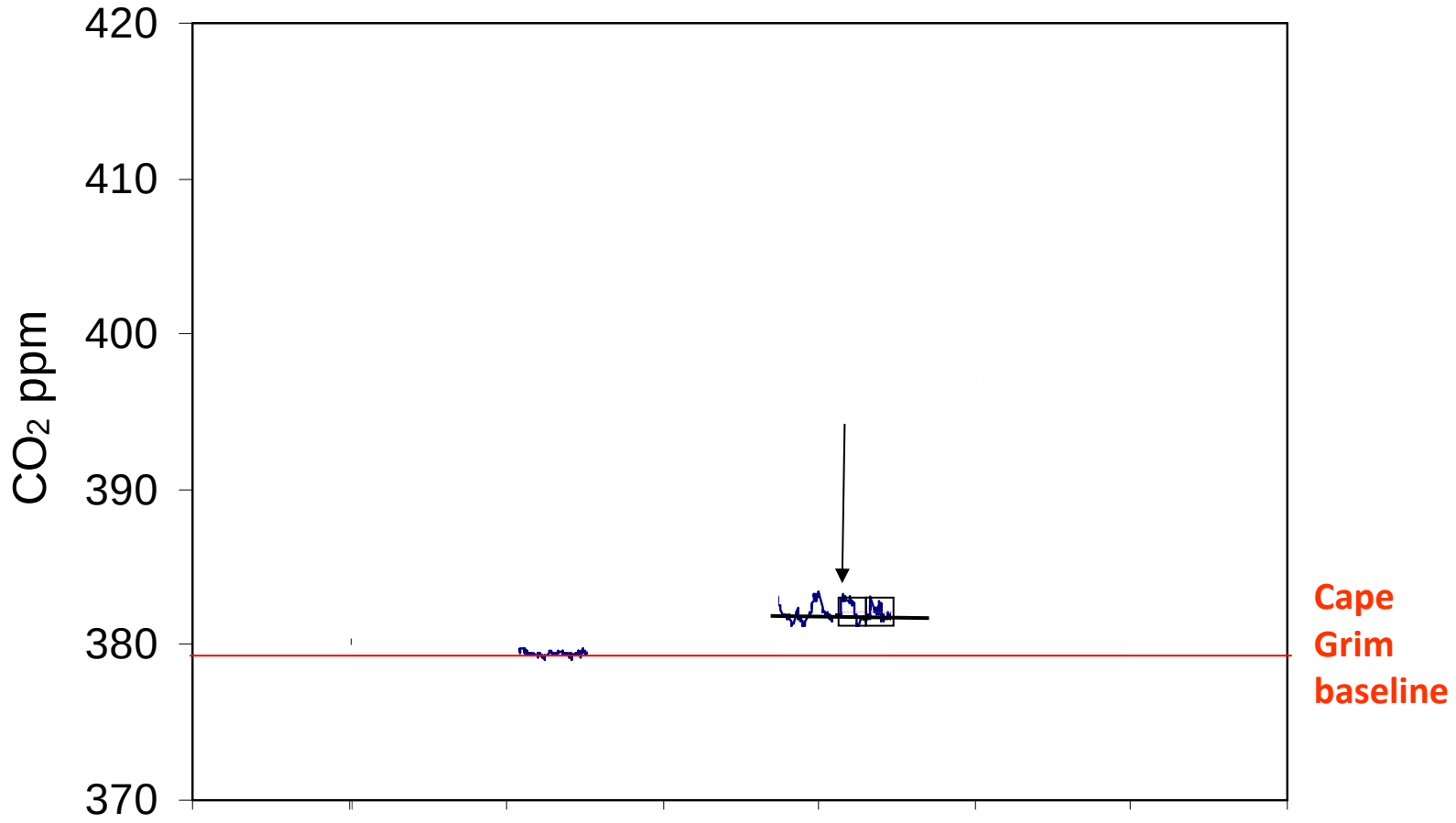
Atmospheric monitoring

Objectives:
To verify that injected CO2 stays underground; or in the unlikely event of leakage to surface, demonstrate the capacity to detect and quantify surface leakage

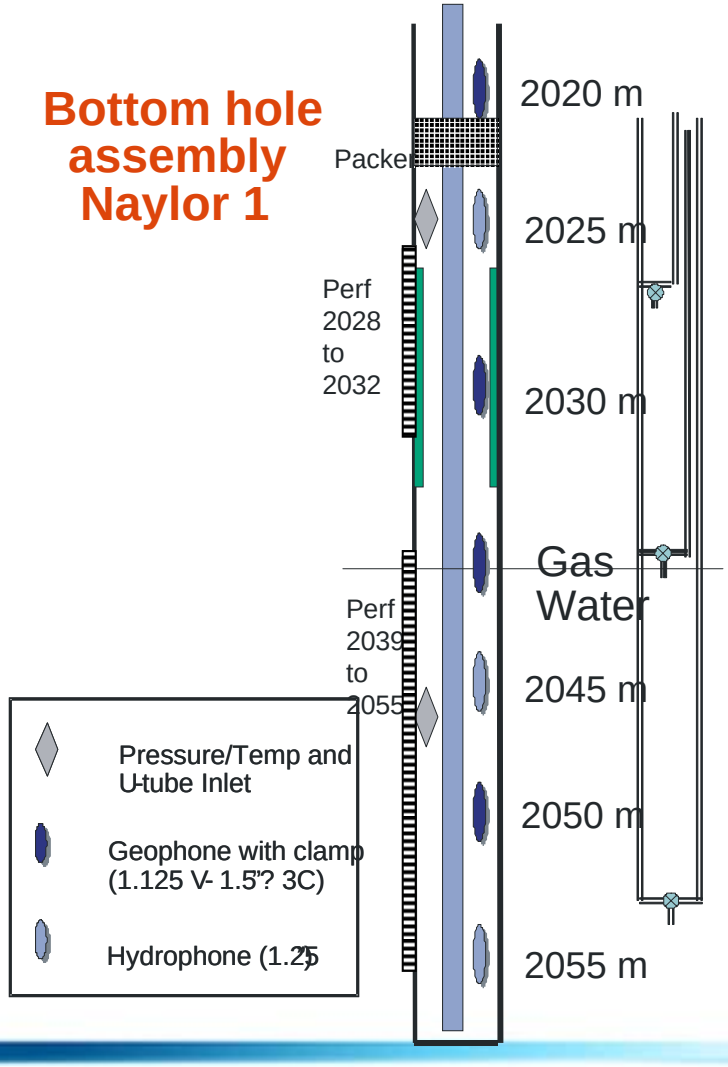


Air Monitoring (Lo Flo & Flux Tower

Atmospheric monitoring

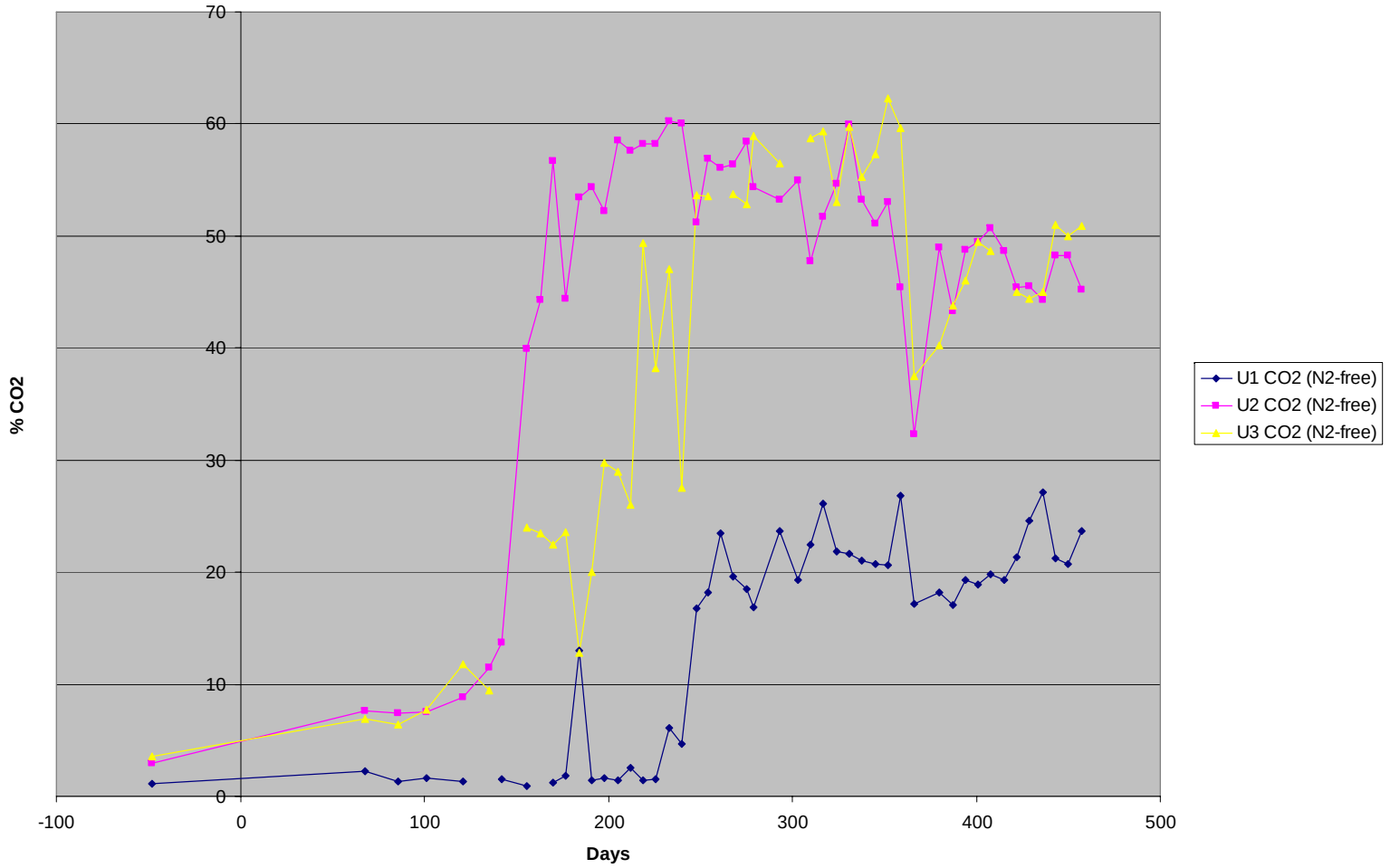


The Naylor observation well



The Naylor observation well

CO_2 time series from Naylor



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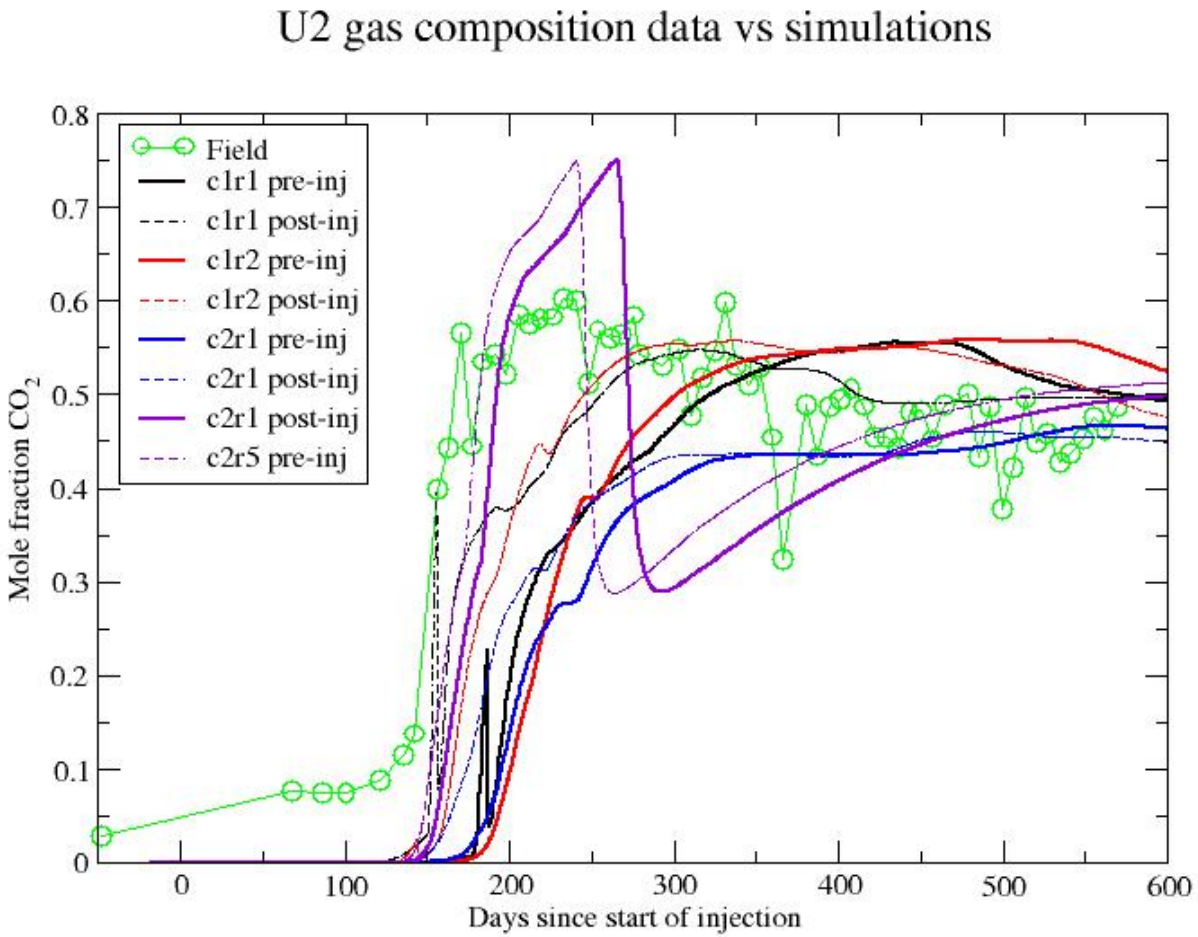


The 2009 seismic survey

Repeating surveys done in 2000 and 2008

Improved source

Improved geophone density

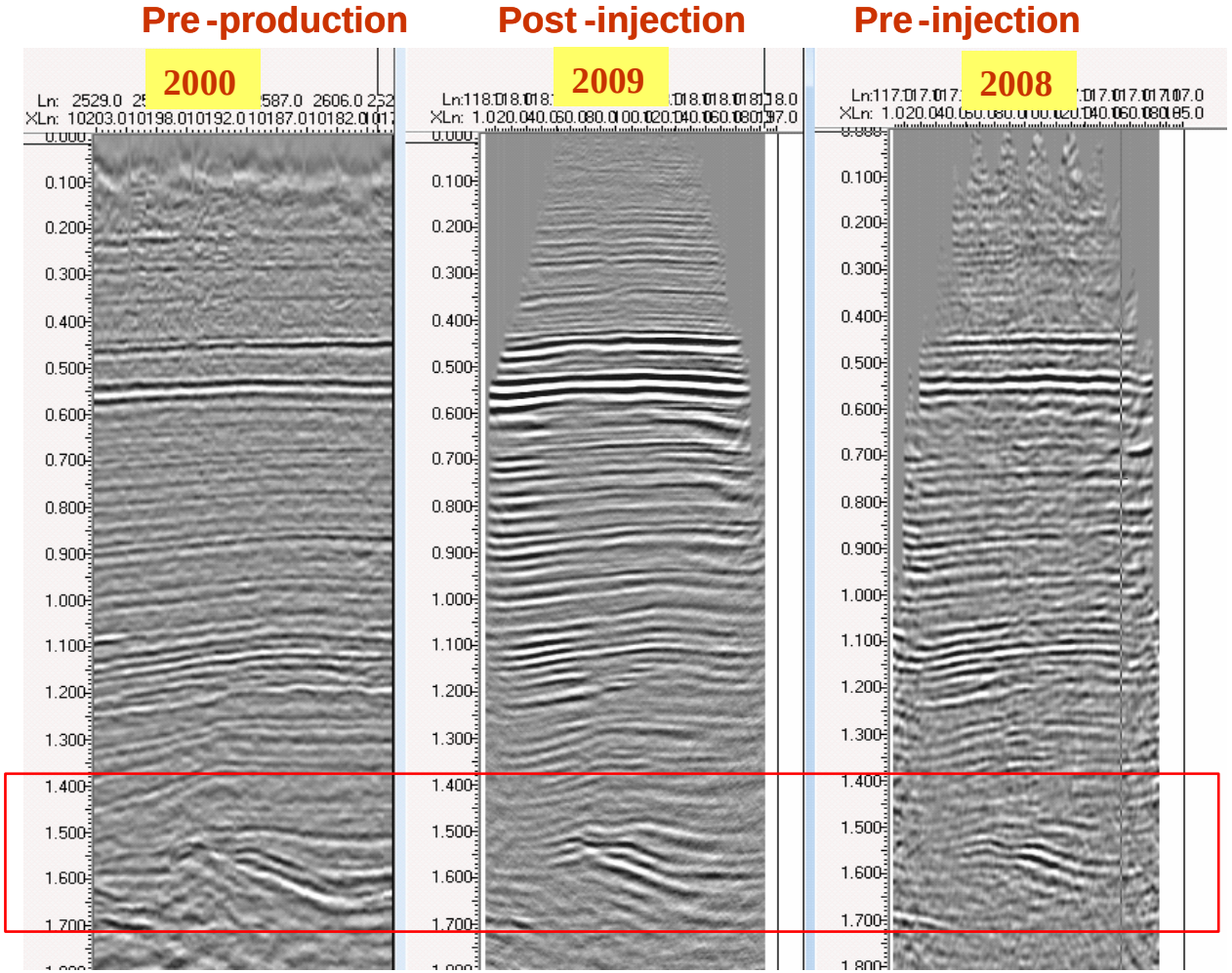
Experience of local and subsurface conditions

Leaks into overlying aquifer have been modelled

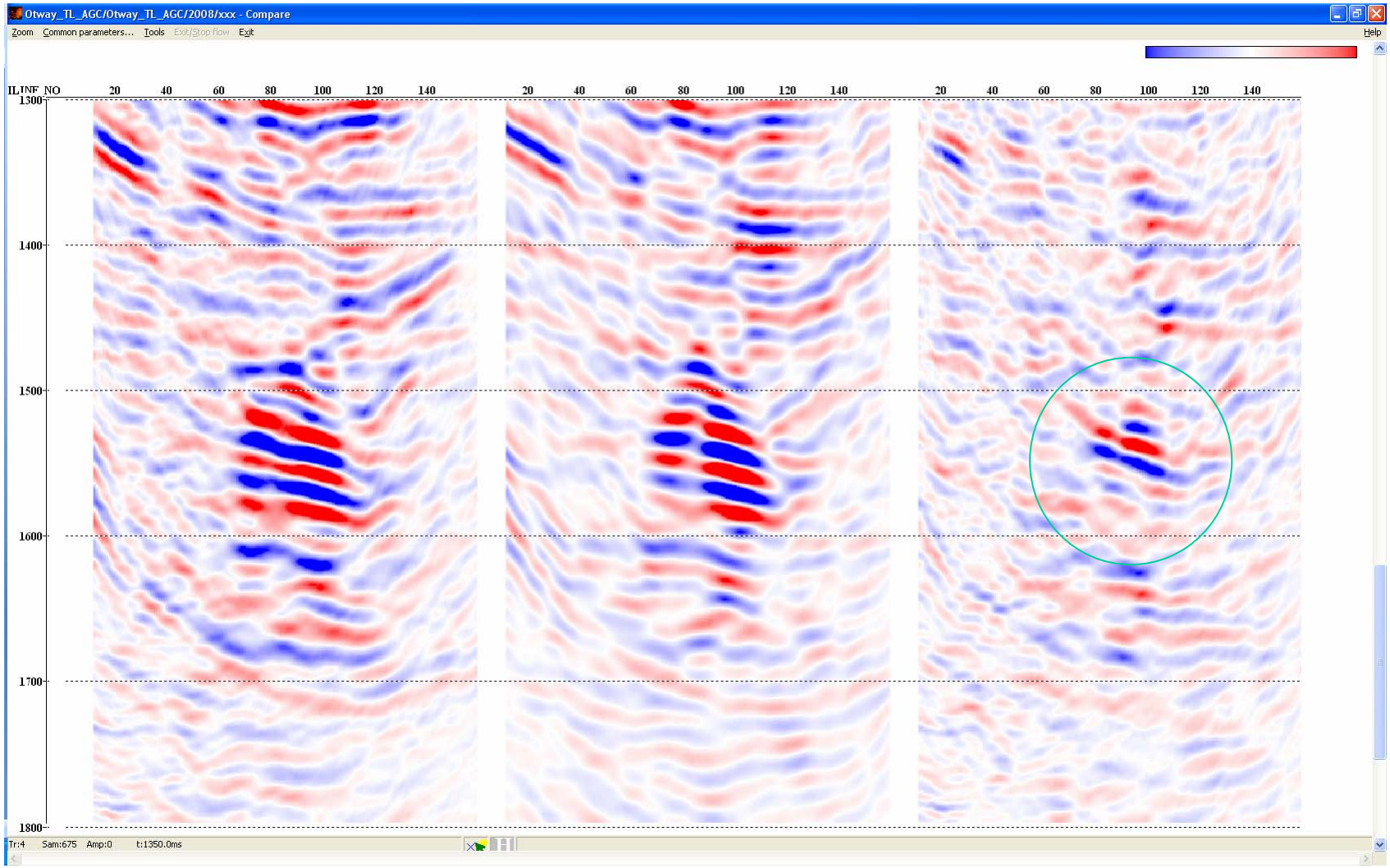
2D sensitivity modelling of a CO2 “leak” in the Paaratte saline formation - input from reservoir simulation

The CO_2 quantities shown in thousand tonnes. CO_2 occupies thin layer, with small areal extent (less then Fresnel radius) - diffracted energy is roughly proportional to CO_2 volume; 30% of background noise (A_f-filed) was used in this simulation.

3D surface seismic from 2000 to 2009



Xline 81


Otway_TL_AGC/Otway_TL_AGC/2008/xxx - Compare
Zoom
Common parameters...
Tools
Exit/Stop flow
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ILINE NO
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60
80
100
120
140
1300
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1600
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Sam:675
Amp:0
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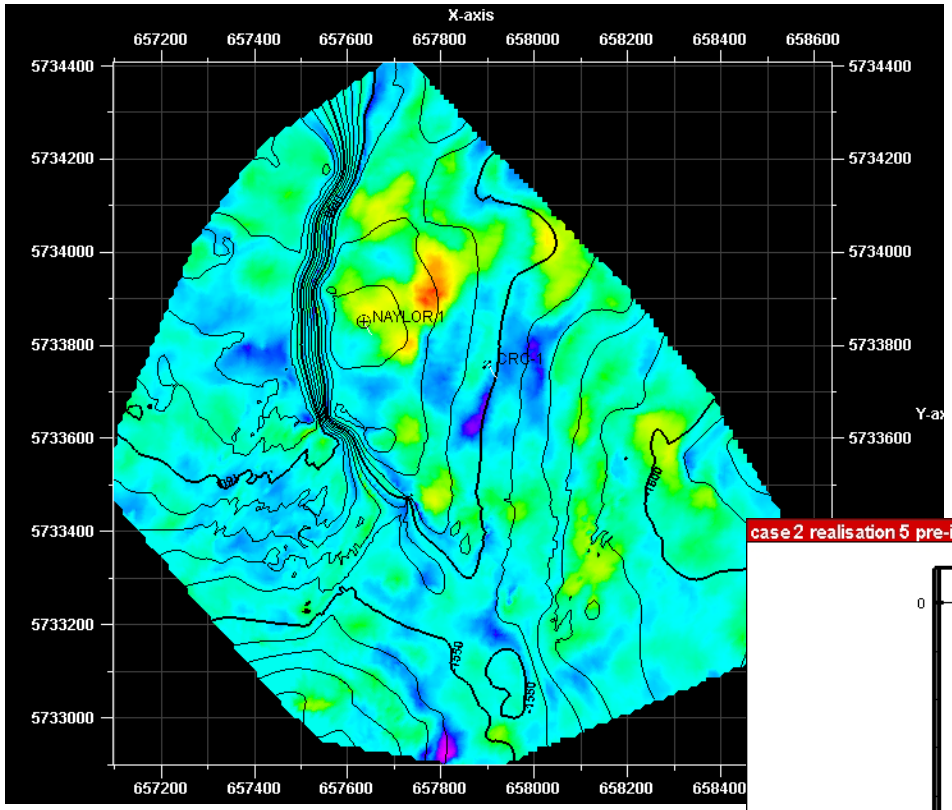
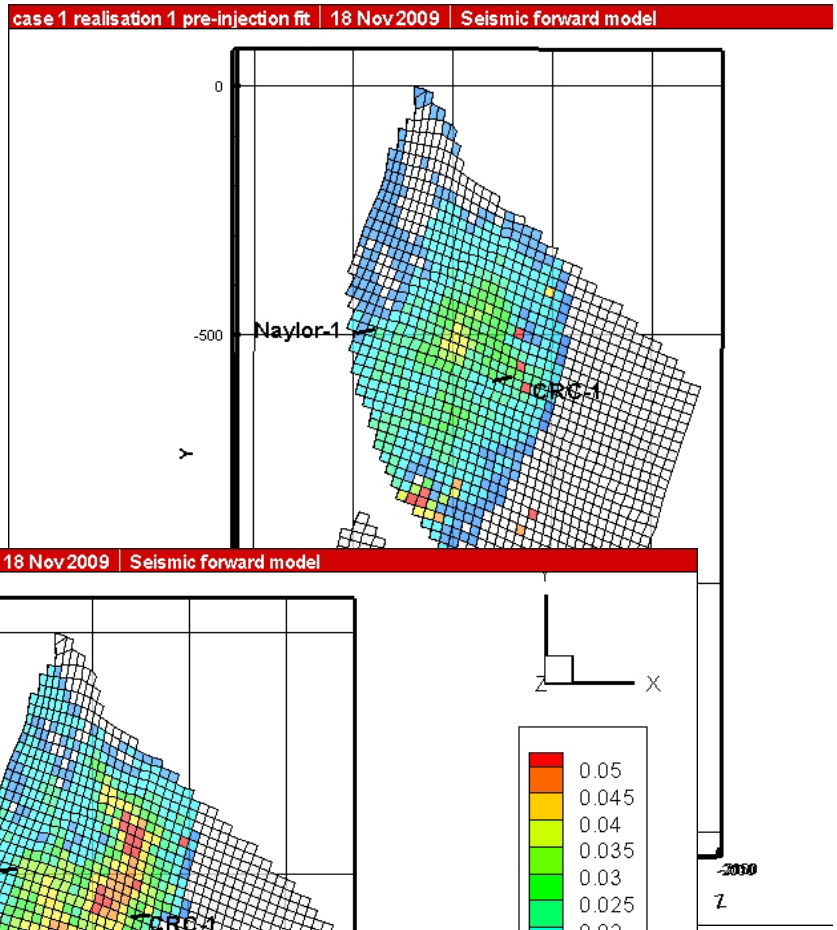
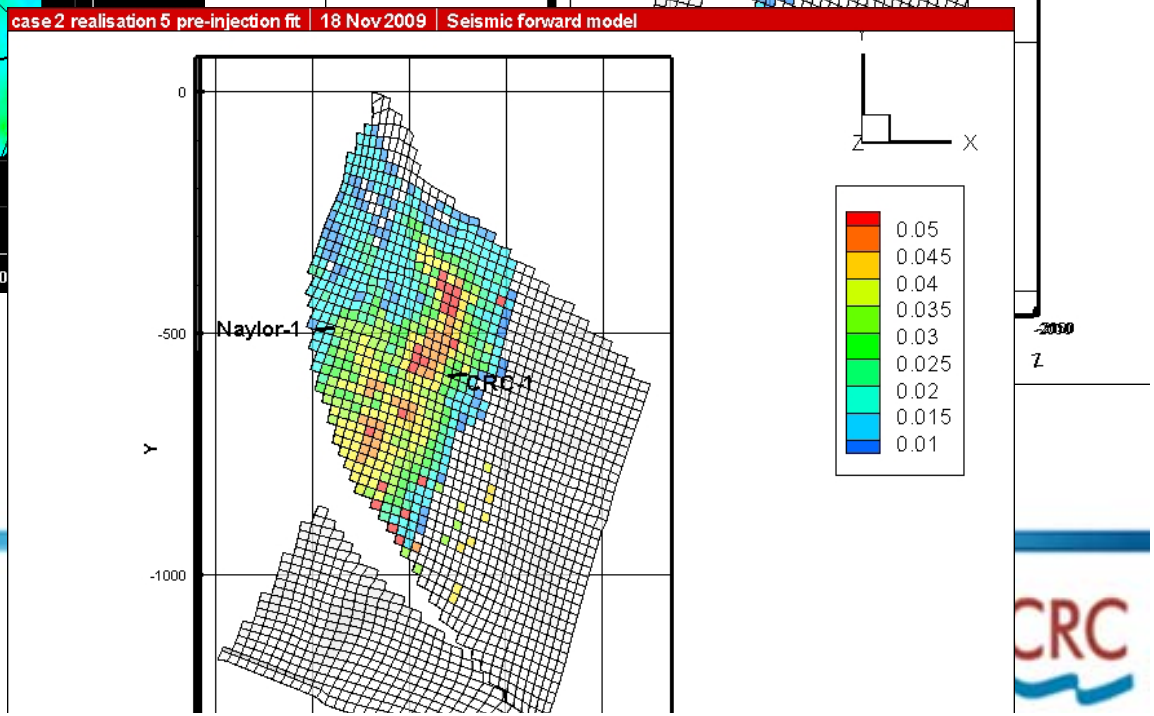
Latest seismic results at 30K tonnes





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