



GERG

Young Researcher's Prize

Nov 25, 2015



Bjørn H. Morland

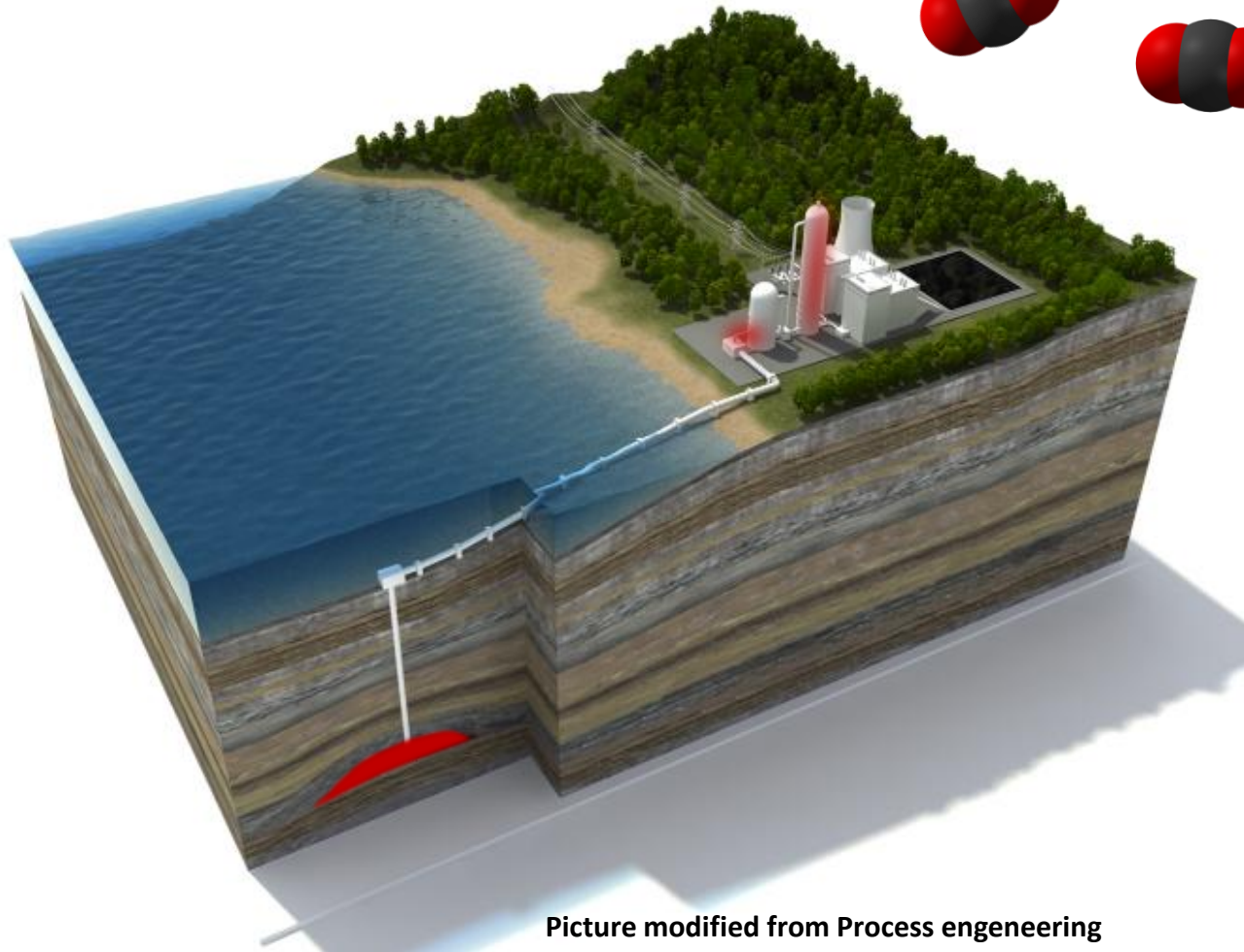
Carbon steel corrosion in dense phase CO₂: Above and below the water solubility limit

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Motivation



CCS – Carbon Capture and Storage

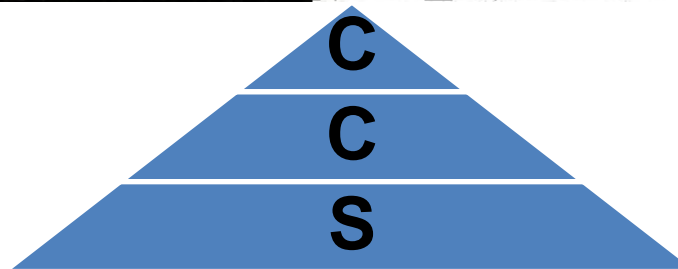


Picture modified from Process engineering

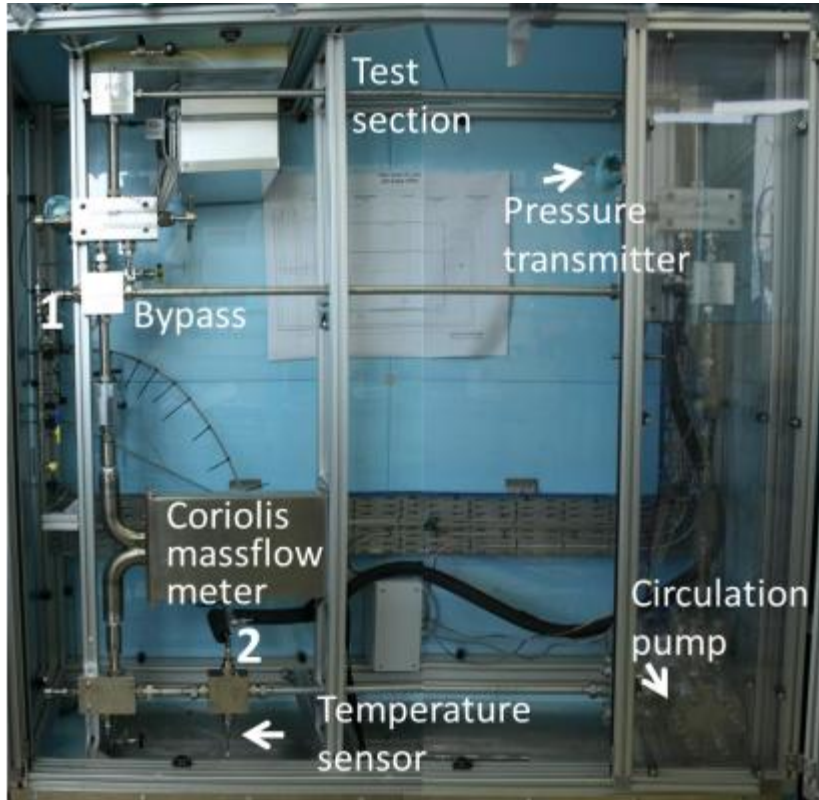
Literature

Dugstad, 2011
Gill, 1985
**No
Corrosion**
Newton, 1984 Propp, 1996
West, 1974
McGrail, 2009
Schremp, 1975

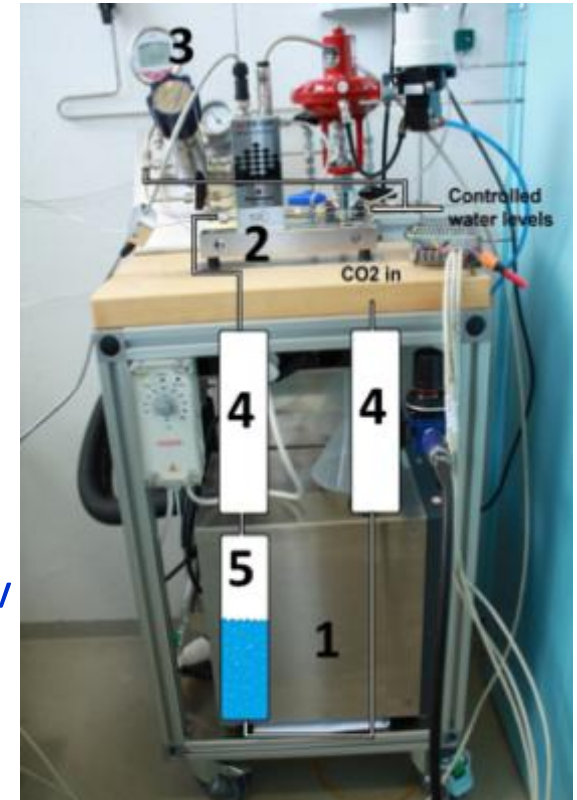
Hua, 2014
Ayello, 2010
0.1 to 3 mm/y
Localised attacks
Choi, 2010 Sim, 2013
Thodla, 2010



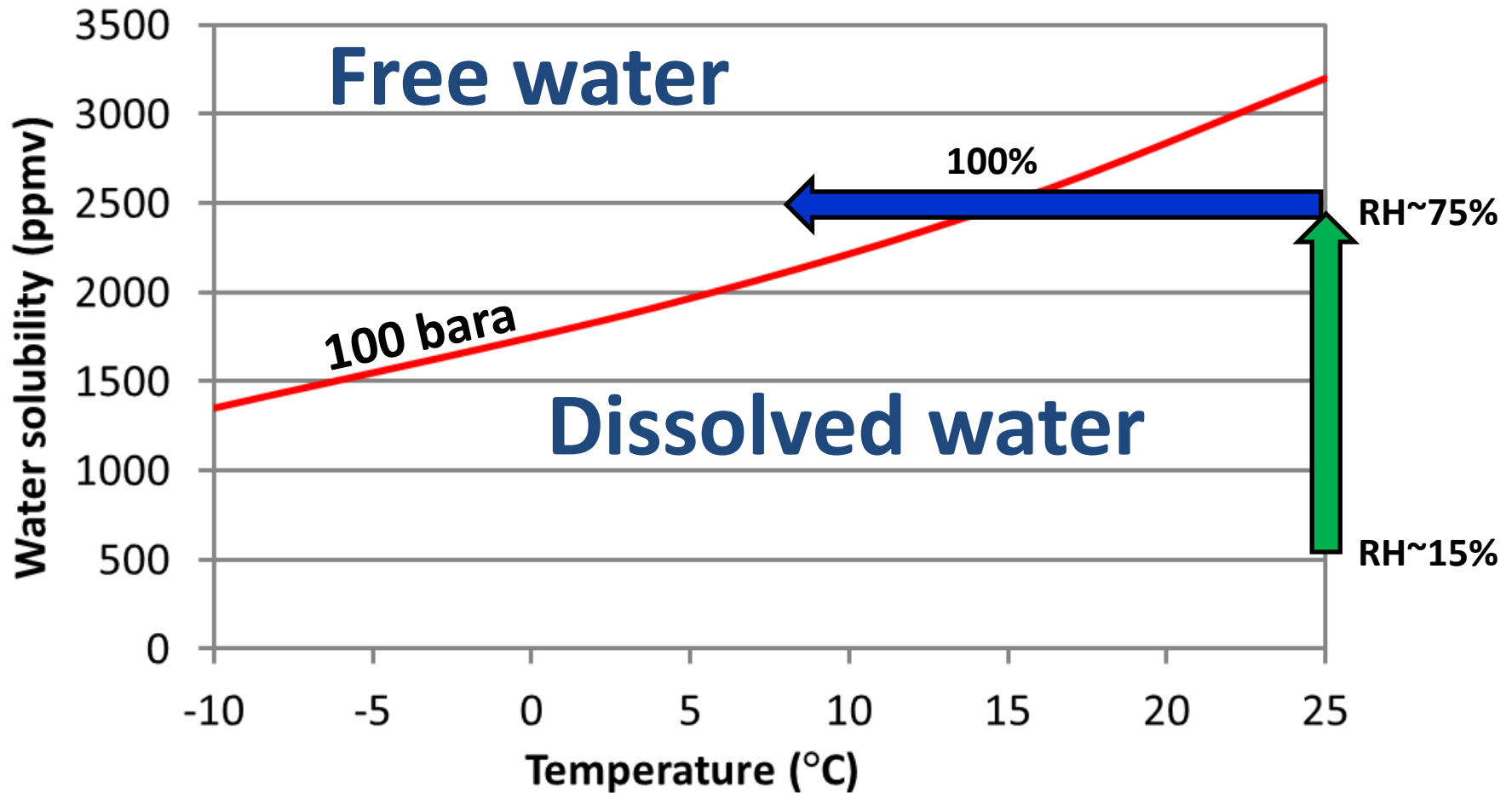
Experimental



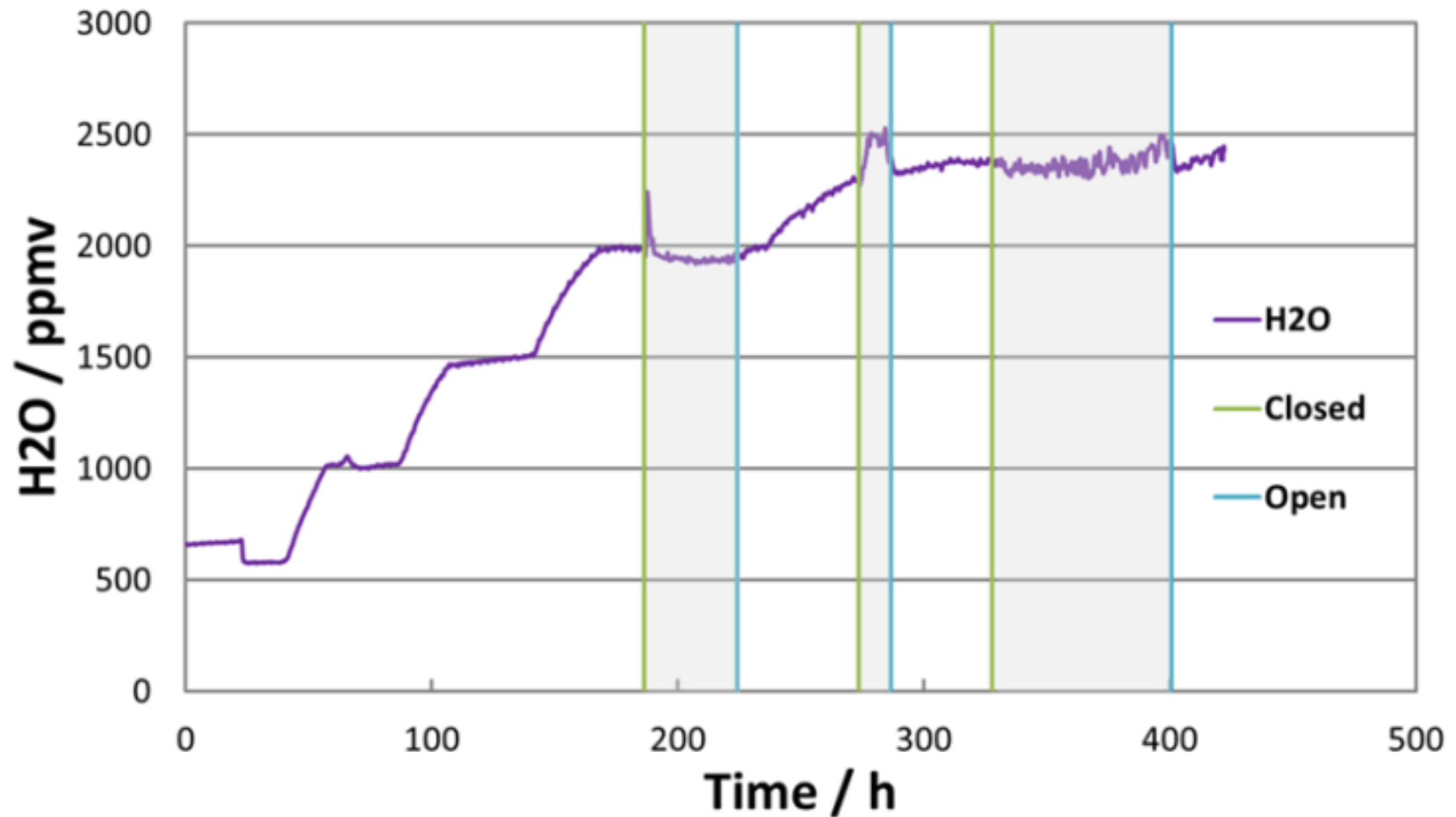
- 550 bar
- 0-80°C
- 0-5 m/s
- C-276
- 200 bar
- 0-3000 ppmv
- 0 - 5 g/min



Water solubility in dense phase CO₂

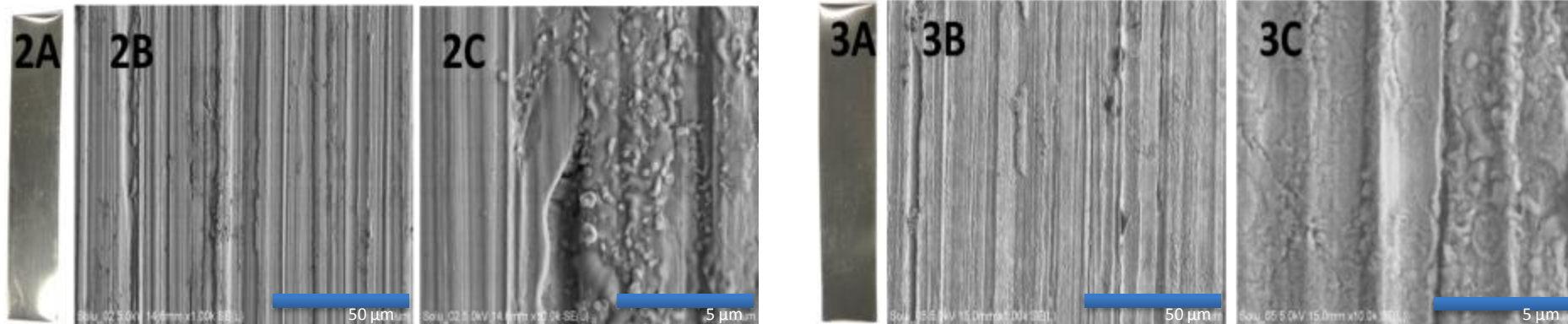


Results: Increasing water concentration

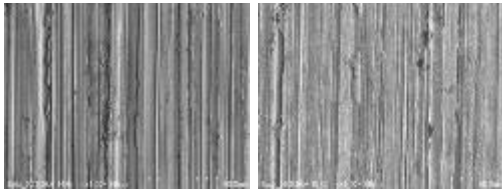


Results

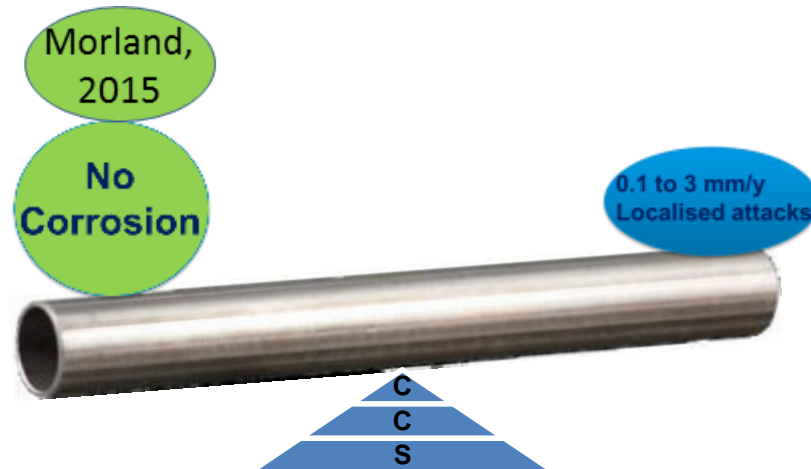
Experiment	Pressure (Bar)	Temperature (°C)	Water conc. (ppmv)	Run time (h)	surface area (cm ²)	CR (μm/y)
Exp1 (blank)	95	25	150 – 2360	362	N/A	N/A
Exp2	95	25	570 – 2380	422	1246	0.8
Exp3	95	8 ↑↓14	2500	551	1254	1.0



Conclusion



No significant corrosion rates
No localised attacks



Thank you for your attention



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