



# Decommissioning and Restoration – Fostering Excellence through Regulations, Innovation, and Sustainable Practices

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## Reconfiguring Tertiary Education for Energy Transition and Decommissioning

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# Motivation

Societies and communities are backing away from petroleum rapidly

- Museums and galleries are rejecting sponsorship

- Pension funds are being forced to divest petroleum assets

Universities are being pressured to move away from fossil fuels

- Petroleum engineering courses are being scrapped

- Industry funding for petroleum research is being rejected

The traditional pool of graduates and research students is drying up



# What specialist skills are we losing?

Mechanical or chemical engineering and physics graduates have traditionally been recruited into graduate programmes in large companies.

But they aren't taught some core skills that I believe are essential for petroleum engineering, including decommissioning;

- Fluid flow in porous media

- Geomechanics

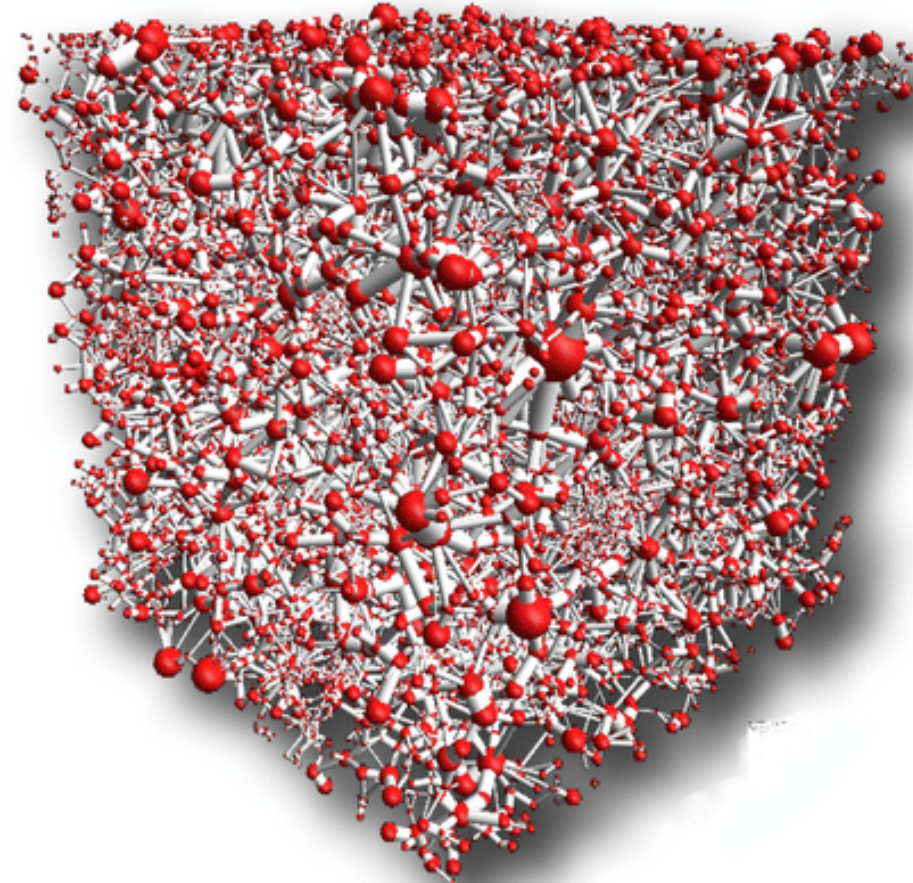
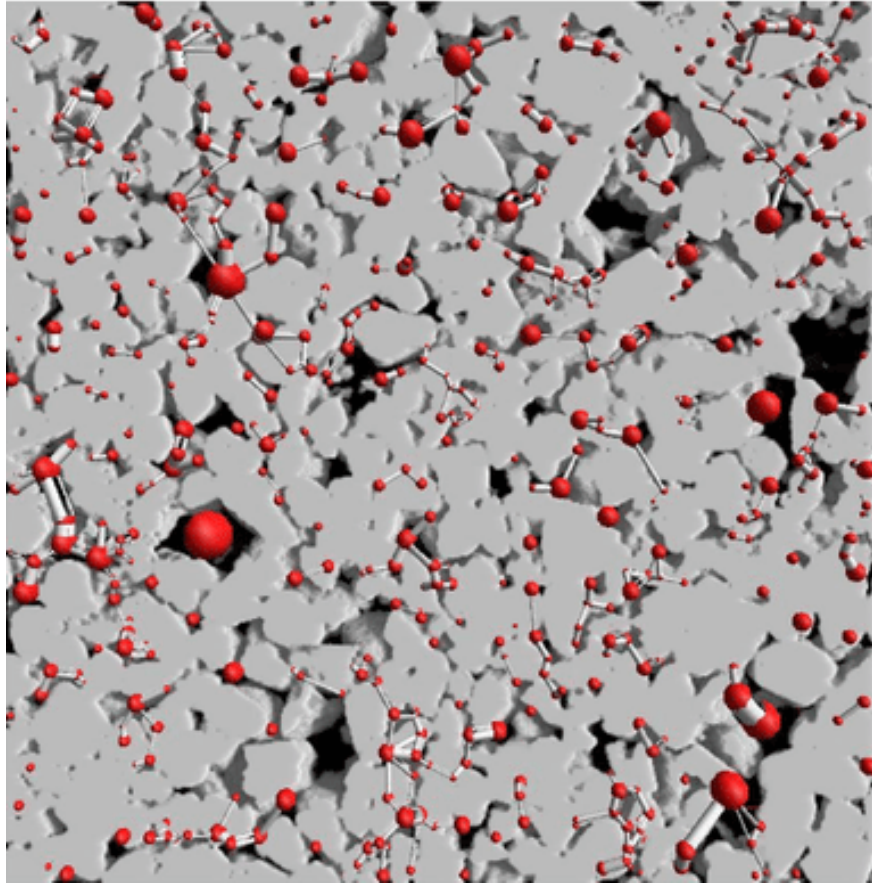
- Sedimentary geology and depositional settings

- Structural geology

And, in a good petroleum engineering degree, these subjects are not taught in isolation but blended with the rest of the curriculum



# Flow in Porous Media

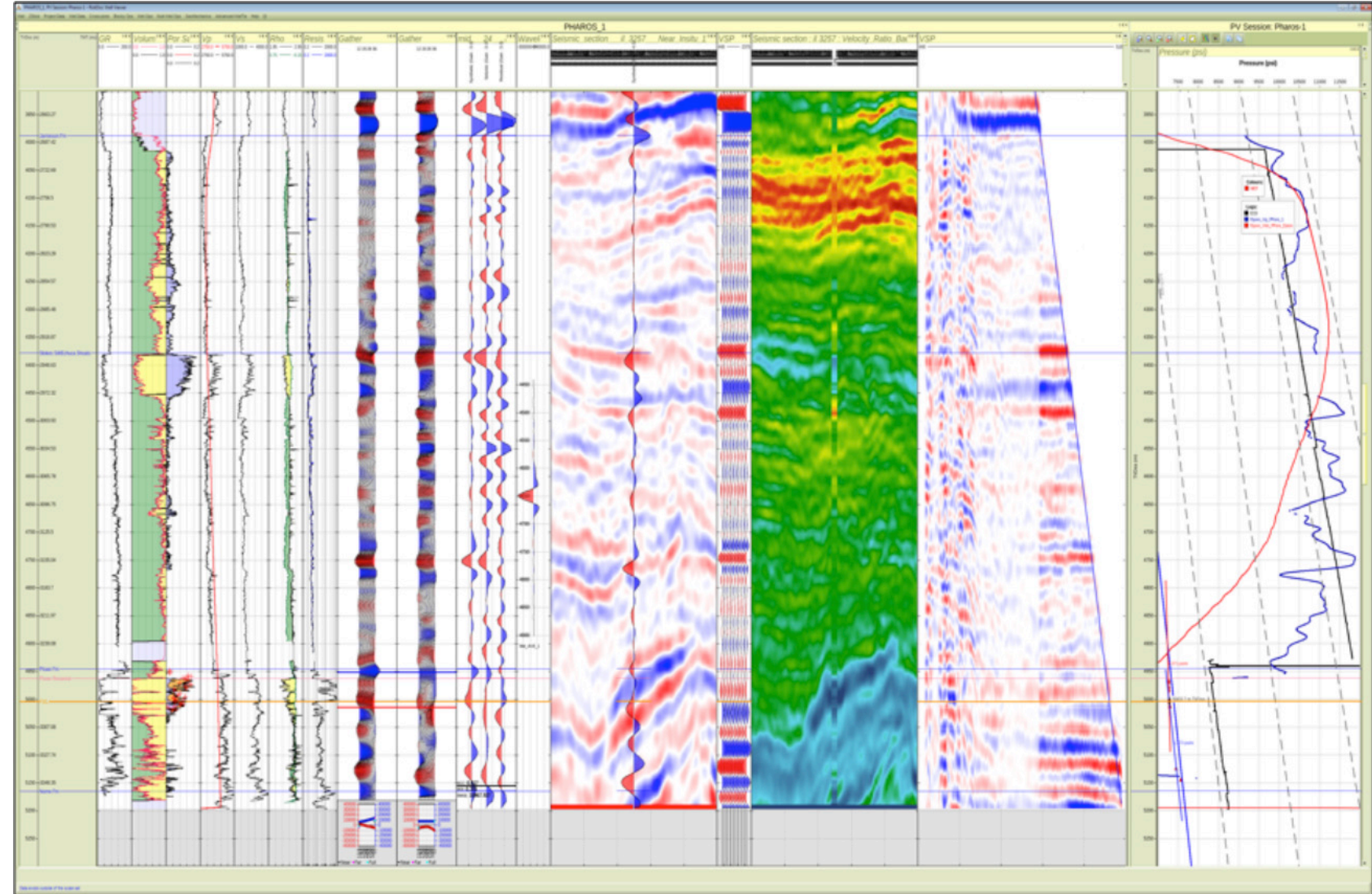


Bultreys, Tom. (2016). Two-phase flow in rocks: new insights from multi-scale pore network modeling and fast pore scale visualization.



# Geomechanics

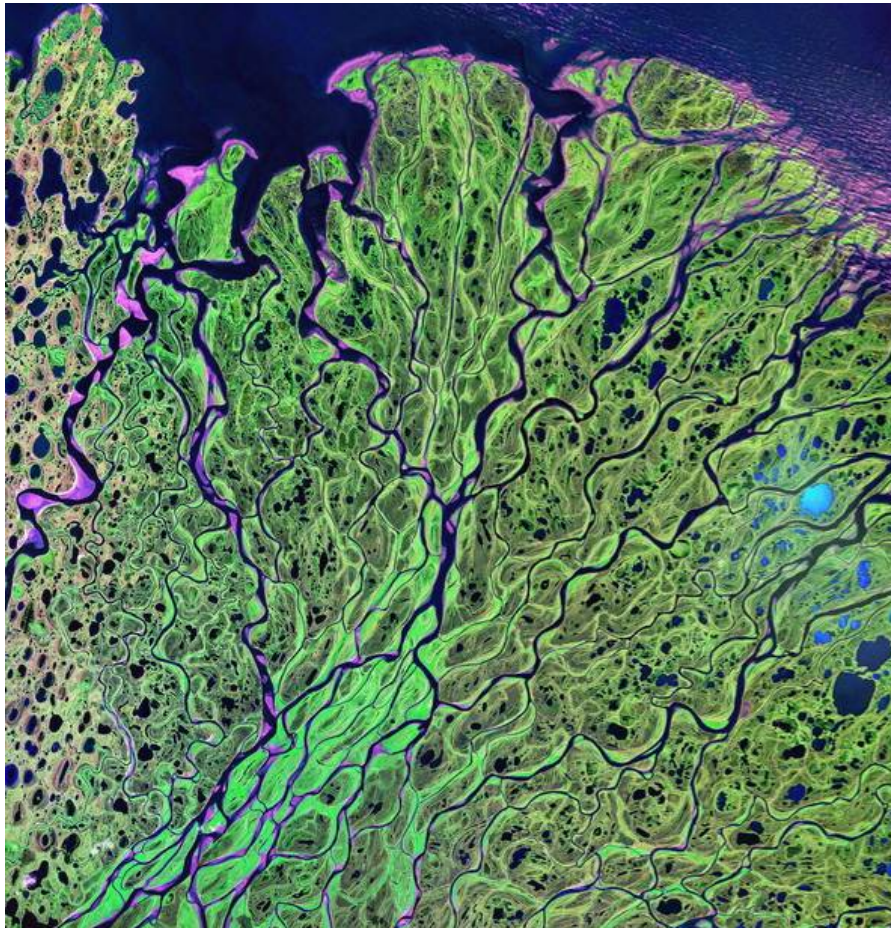
You need to understand this diagram before you design your decommissioning strategy





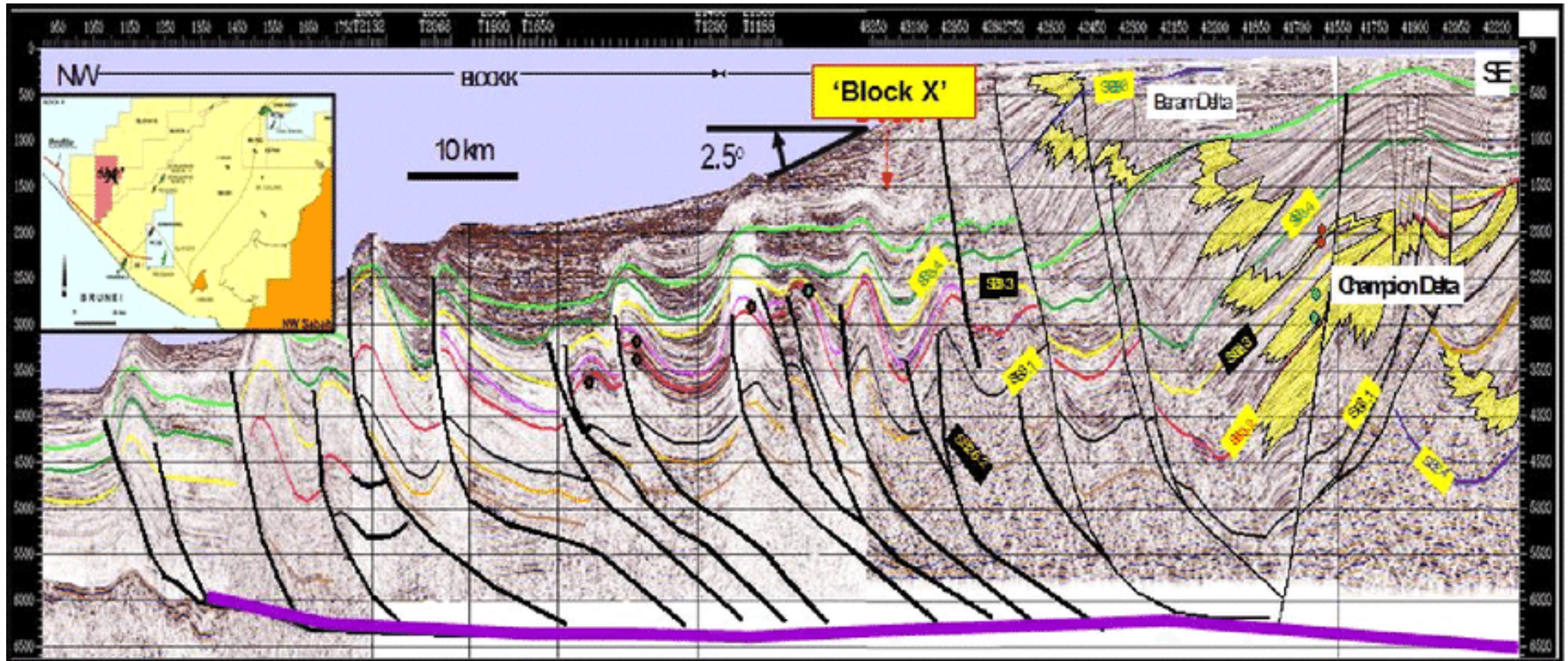
# Sedimentary Geology

How does the geology affect your decommissioning strategy>





# Structural Geology – Offshore Sabah



Jong, John & Khamis, Mohd Asraf & Wan Embong, Wan Mohd Zaizuri & Yoshiyama, Tomoyuki & Gillies, Douglas. (2016). A Sequence Stratigraphic Case Study of An Exploration Permit in Deepwater Sabah: Comparison and Lesson Learned from Pre- Versus Post-Drill Evaluation. 10.29118/IPA.0.16.51.G.



# The challenge of motivating students

Most engineering students come to university to learn how to design and make new things

NO-ONE comes to university to learn how to dismantle stuff

We need to turn that around

We need to show that reusing, repairing and repurposing is integral to engineering design.



## Is Petroleum Engineering the **greenest** course you could study?

If the course was tweaked a little to focus on correcting past mistakes

If the course was marketed as a pathway to greening the country

If, instead of pretending that teaching 'energy engineering' students about solar cells was somehow transitional, we let the electrical engineers worry about that and focus on the problems petroleum engineers will face during this transition

If we are honest about the need for petroleum engineering skills in the dismantling of the oil and gas infrastructure, rather than pretending it will all disappear without effort and expense



# Options for Tertiary Education

1. Close your eyes and pretend that everything is alright
2. Reintroduce petroleum engineering undergraduate degrees
  1. Develop appropriate marketing collateral
  2. Inform environmentalists why you are doing this and encourage them to work with you
  3. Tweak the course to moderate the hydrocarbon maturation content
3. Introduce Petroleum Engineering as a one-year taught masters
4. Develop new courses specifically for decommissioning and market them as Petroleum Abandonment or something similar



## Additional thoughts

Whole life-cycle design should be taught across all engineering disciplines

Repair, reuse, recycle should be a mantra for engineers as well as environmentalists

Undergraduate projects should assess this;

- How easily can this be repaired?

- How could you reuse this?

- If it can't be repaired or reused can you recycle the components?



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