Australian Aid

AMEP
Australia Mongolia Extractives Program

Advanced Training for CBM Geologists

Critical Reservoir Properties for CBM

Ulaanbaatar, Mongolia

16 June 2022

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Cipher Doc#: 22-427

Schedule

Advanced Training for CBM Geologists

from	To	total time (hr:min)	Topic
9:00	**9:15**	**0:15**	**Opening Remarks & Introduction**
9:15	10:45	1:30	Origin of Reservoir Properties: from Peat to Pores
10:45	11:00	0:15	Questions/Discussion
11:00	11:15	0:15	Coffee Break
11:15	12:45	1:30	Unconventional Hydrocarbons and Geological Models
12:45	13:00	0:15	Questions/Discussion
13:00	**14:00**	**1:00**	**LUNCH**
14:00	14:45	0:45	CBM Drilling Equipment & Methods
14:45	15:00	0:15	Questions/Discussion
15:00	16:00	1:00	Coal & Rock Review - What and How to Characterise
16:00	16:15	0:15	Questions/Discussion
16:15	16:30	0:15	Coffee Break
16:30	17:30	1:00	Measuring Gas
17:30	18:00	0:30	Critical CBM Reservoir Properties: Know where to Place Your Efforts
18:00	18:15	0:15	Questions/Discussion
18:15	**18:30**	**0:15**	***Closing Remarks***

NOTE: Times are in UB, Mongolian Times

Goal of a CBM Exploration Program

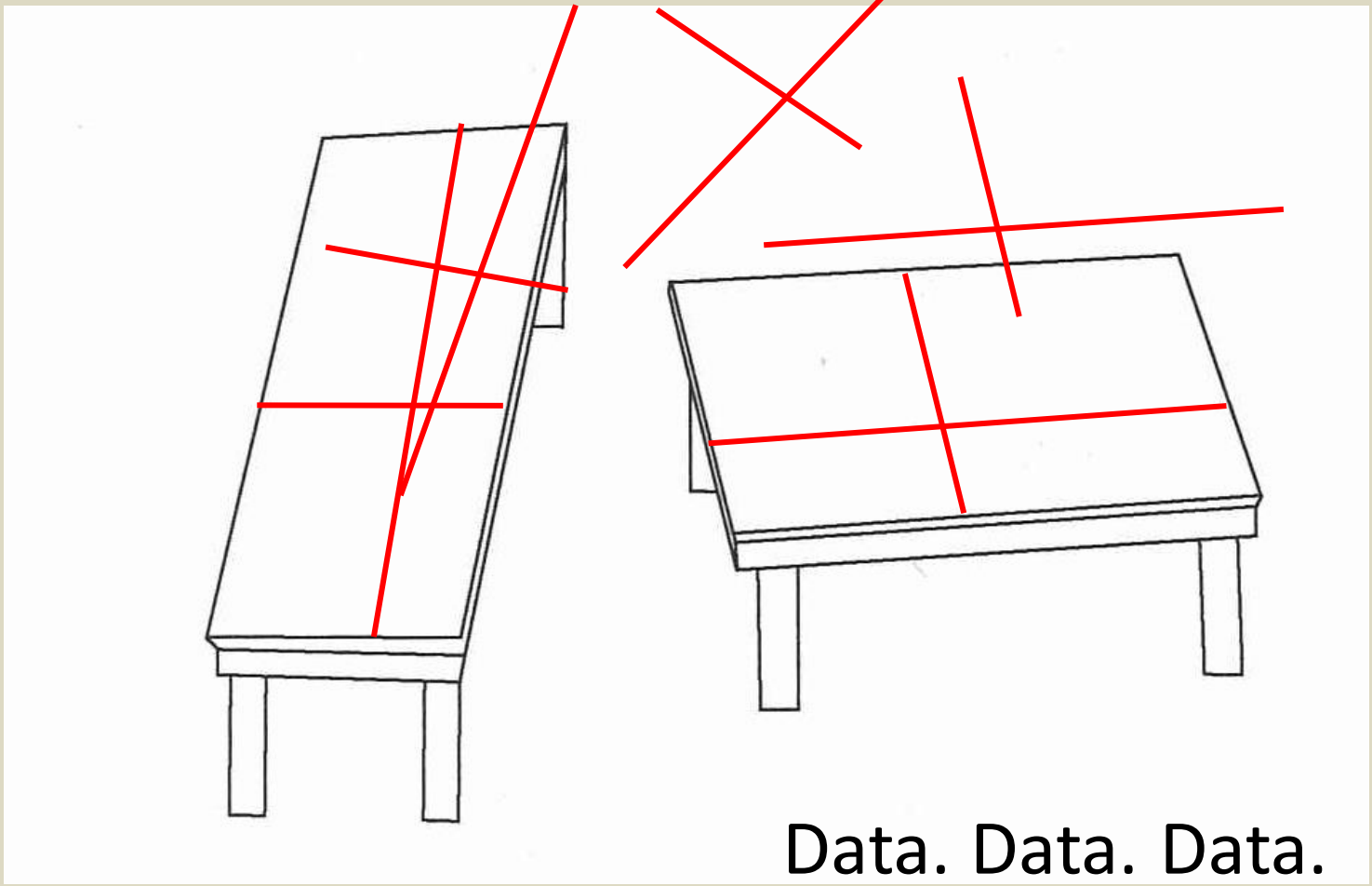
1. Define gas in-place to a sufficient certainty to allow reserve certification over a maximised area

2. Gain information on the reservoir which will give maximum success to a pilot program (with success being defined as economic flow rates being achieved)

To obtain these goals, three crucial pieces of data need to be collected:

1. *Volume of the reservoir*
2. *Level of gas saturation in the reservoir*
3. *Permeability of the reservoir*

Why spend good money knowing things you already know?



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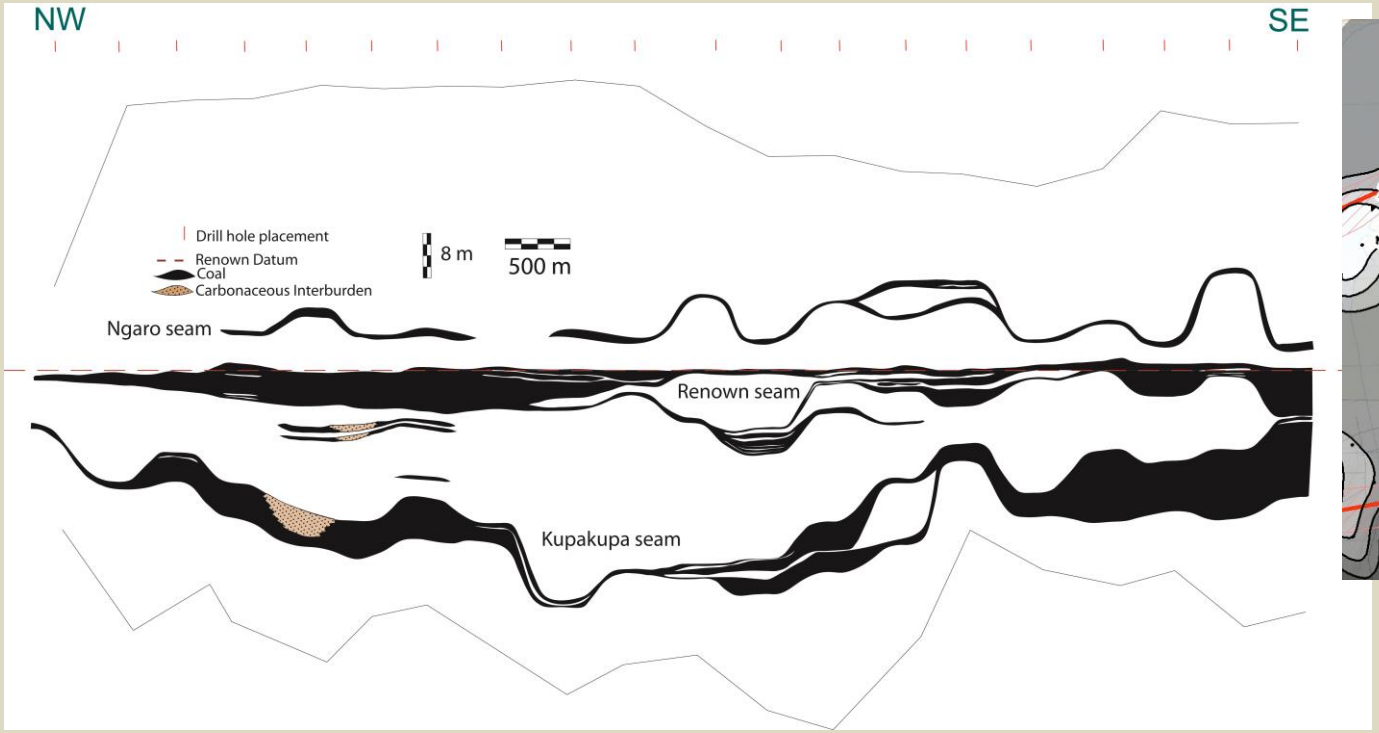
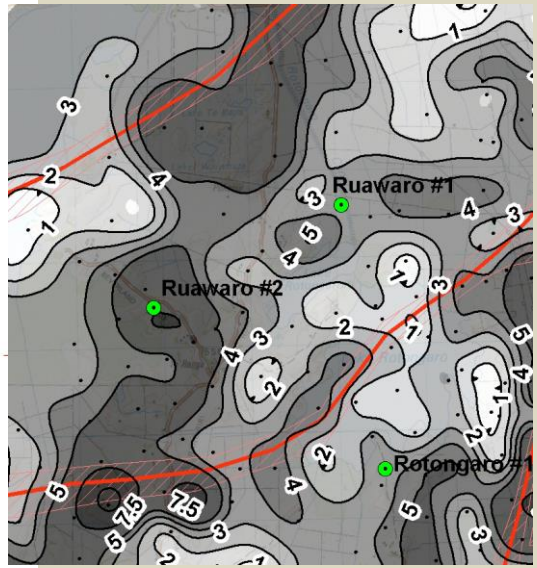
Rock Volume: Thickness and Continuity





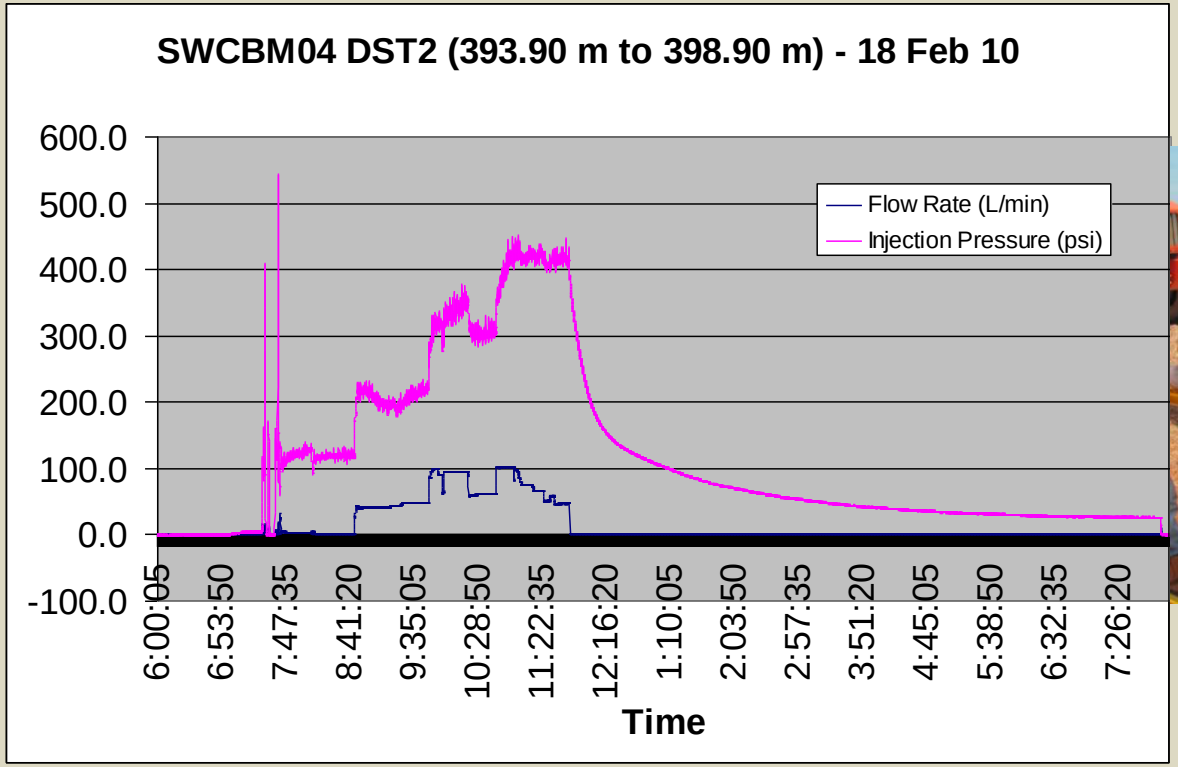
Measures for %Gas Saturation

1. Desorption Isotherms
   - ❖ “slow”, “fast” or “in between”
   - ❖ reservoir temperature
2. Adsorption Isotherms
   - ❖ reservoir temperture
   - ❖ fresh samples!

%g = 1-((a-d)/a)*100

where,
%g, is gas saturation
a, is maximum gas holding capacity [adsorption]
d, is total measured gas [desorption]

Permeability



Sangatta Perm Testing
Sangatta West CBM PSC

Difficult to get: worth the effort & expense
IFO/DST/DDR ….

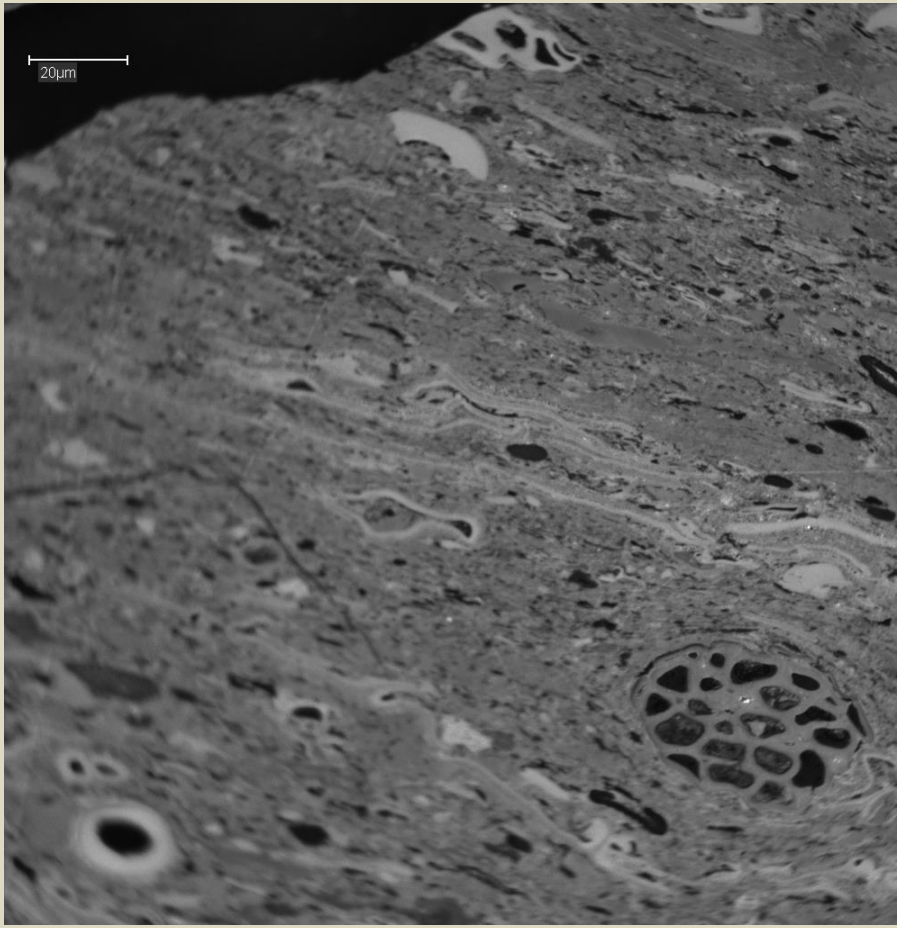
Other Significant Reservoir Properties

Gas Quality (CH_4, CO_2 etc.)

Gas Type (via isotopes for biogenic, thermogenic)

Coal quality (ash, moisture, volatile matter)

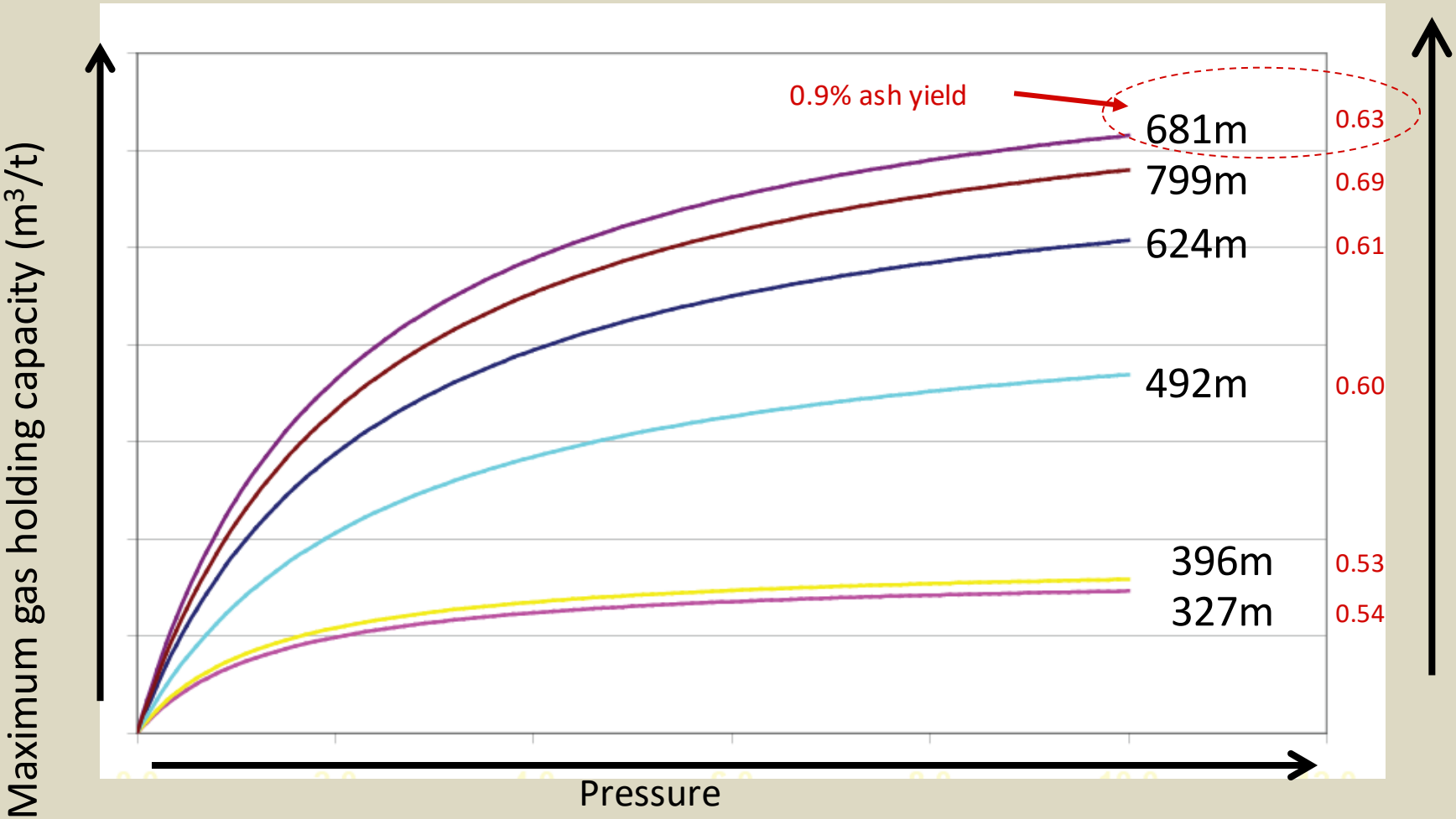
Rank and petrography



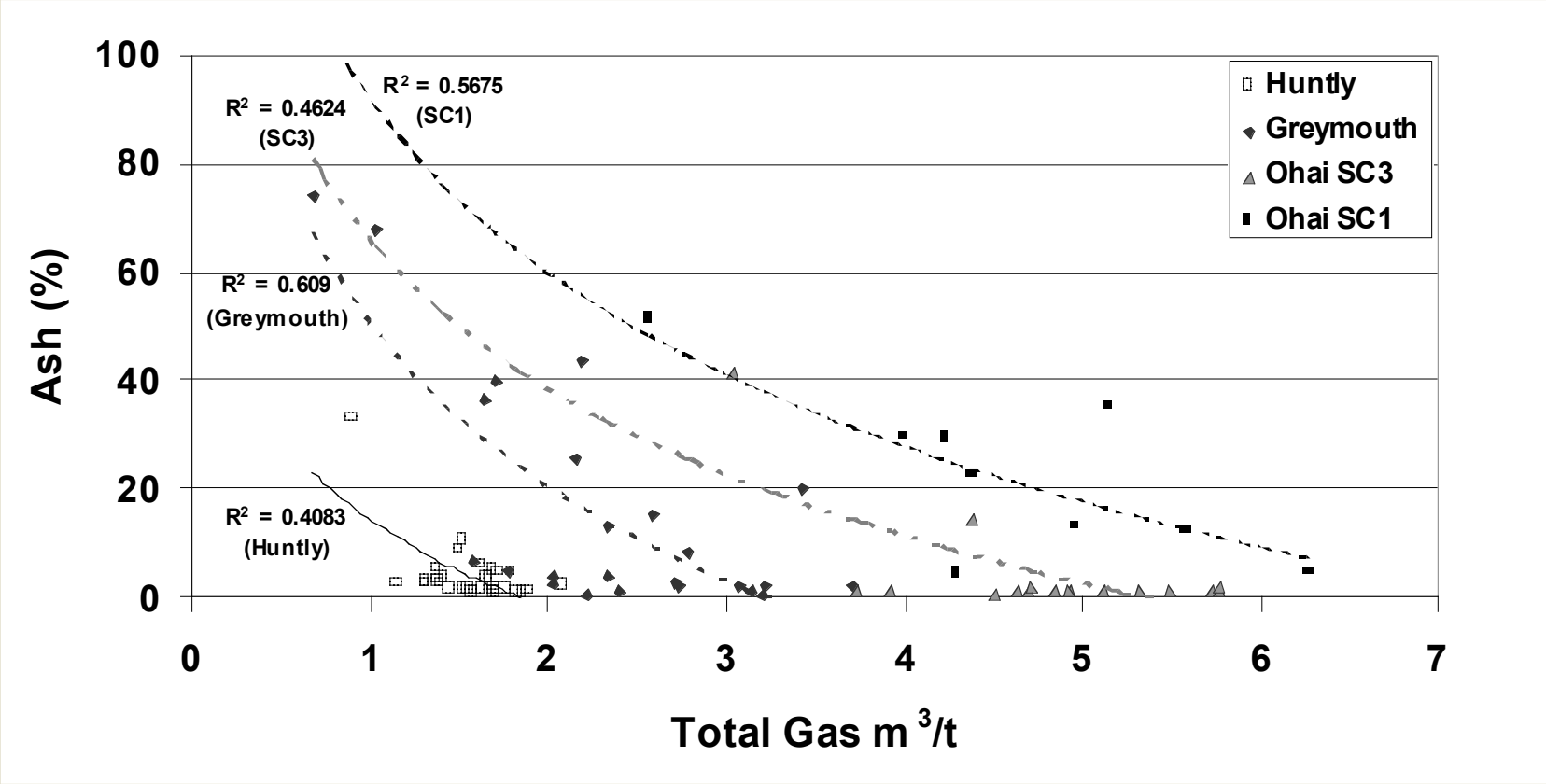
Effects on the Coal Reservoir

Rank
Inorganic matter
Organic composition

Depth, Rank, Type: Gas Holding Capacity



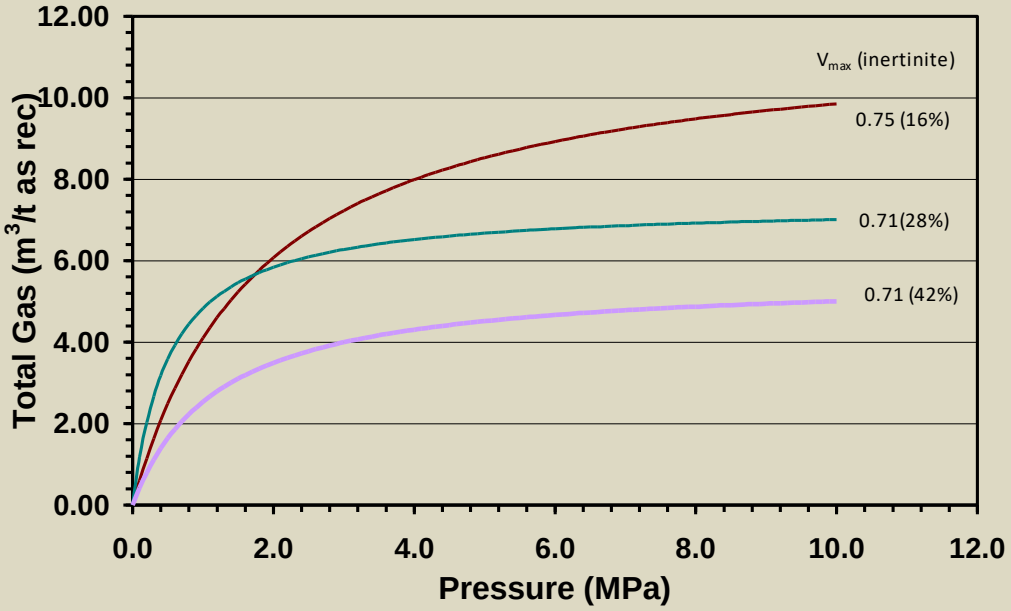
Inorganics and Measured Gas



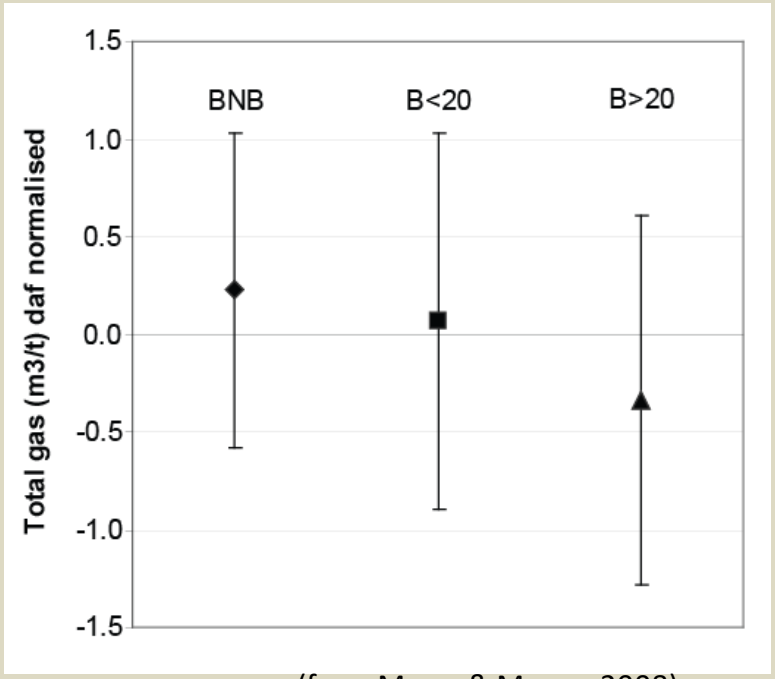
(from Butland & Moore, 2008)

Organic Composition Effect on Gas

Max. Gas Holding Capacity

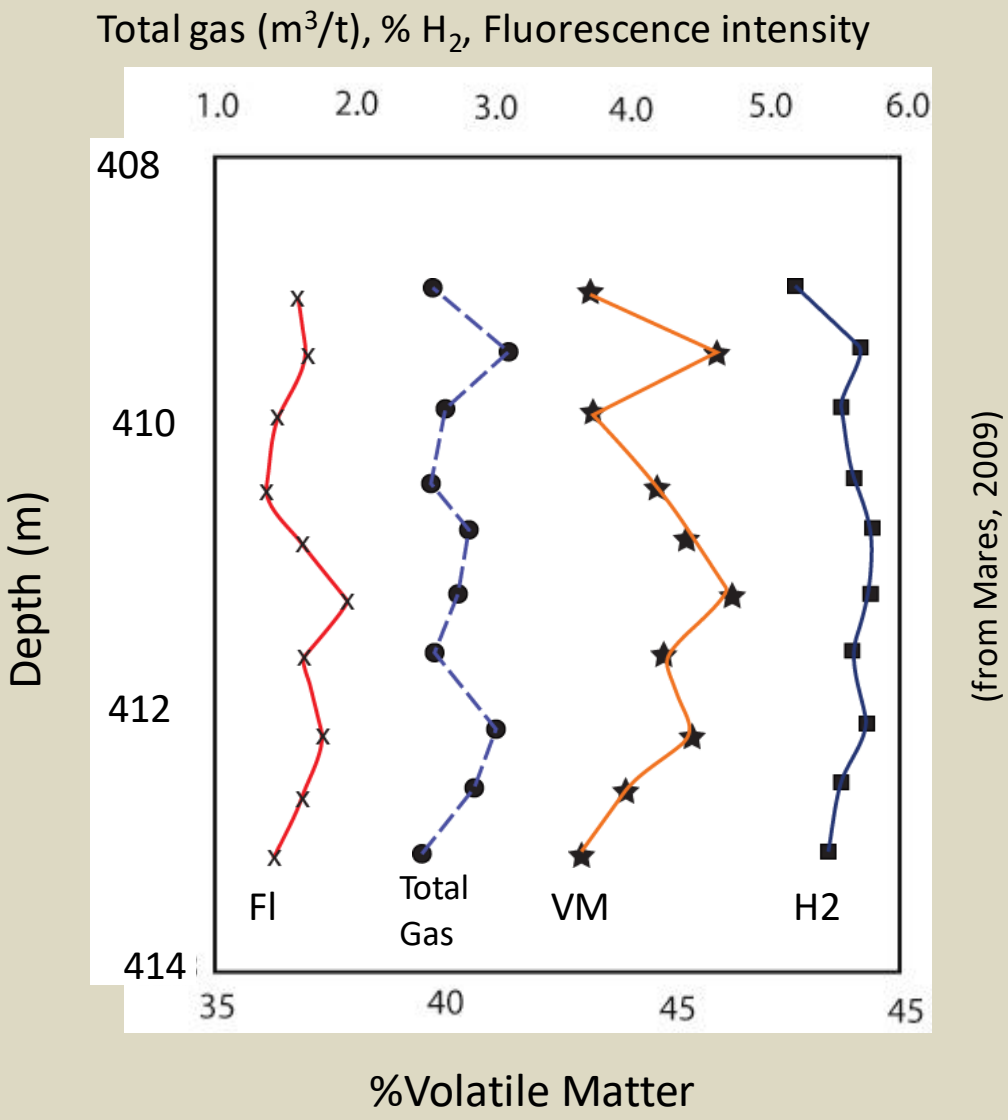


Measured Gas



(from Mares & Moore, 2008)

Control of Gas Charge in Biogenic coal?

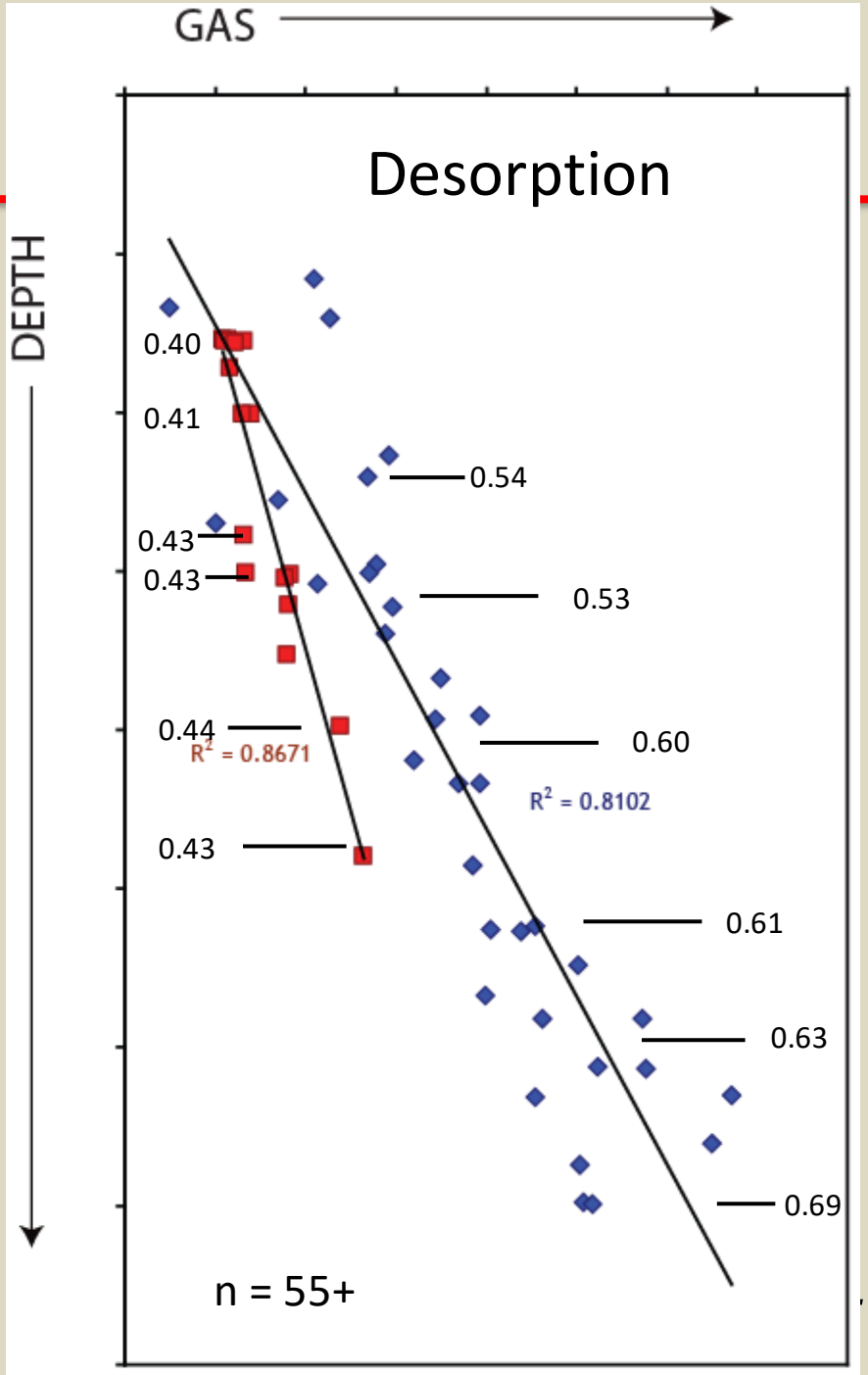


Gas, Depth, Rank

Gas increase with depth:

1. Hydrostatic head
2. Rank
3. Combination of both 1 & 2

scatter = coal composition



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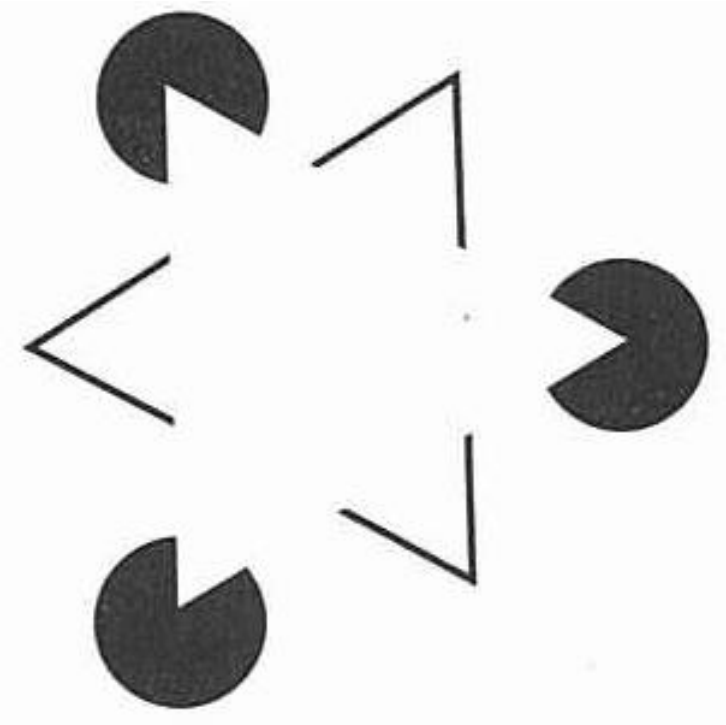
Summary

- Critical reservoir properties are:
  - ❖Rock volume (thickness & continuity)
  - ❖Gas saturation
  - ❖Permeability
- Variation of gas properties can be complex, being a function of:
  - ❖Depth (hydrostatic head)
  - ❖Rank
  - ❖Inorganics
  - ❖Coal composition

The End



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Australia Mongolia Extractives Program Phase 2 (AMEP 2) is supported by the Australian Government through the Department of Foreign Affairs and Trade (Australian Aid) and implemented by Adam Smith International.

Adam Smith International

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If you want to know more go to the Cipher website & Blog: https://www.ciphercoal.com

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Got Questions?

Please visit our website for more information about activities or contact Oyunbileg Purev, Partnership Manager at oyunbileg@amep.mn.

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