

URTEC-198241-MS

Modelling the contribution of individual seams to Coal Seam Gas production

Vanessa Santiago, The University of Queensland

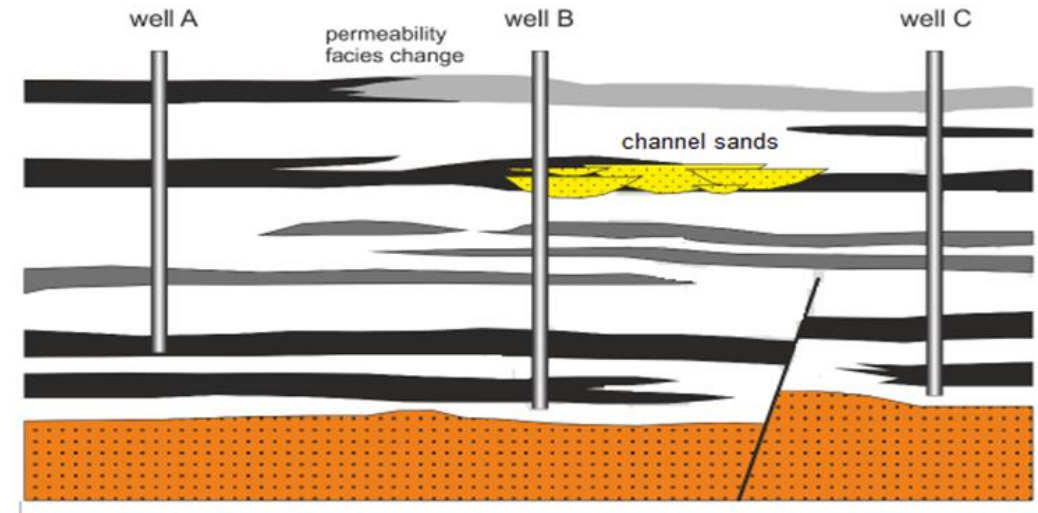
Ayrton Ribeiro, The University of Queensland

Suzanne Hurter, The University of Queensland

INTRODUCTION

In coal seam gas (CSG) fields, **some of the individual seams hardly contribute to comingled gas recovery.**

The *interaction between individual coal layers* can influence the response of other seams to pressure during multi-seam gas drainage (Jiang et al. 2016).



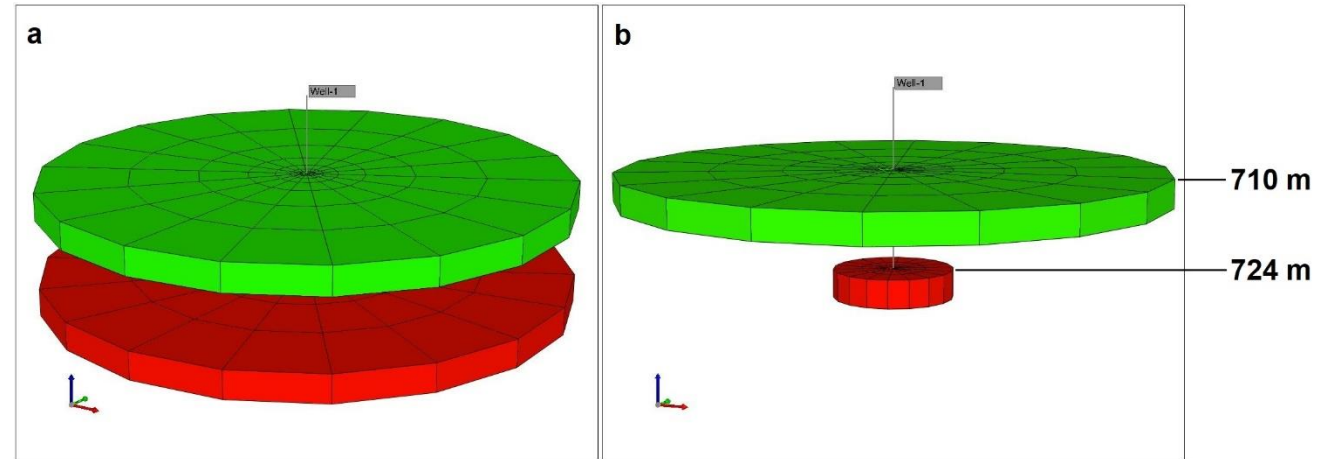
(modified from Mavor and Nelson 1997)

METHODOLOGY

Sensitivity Study



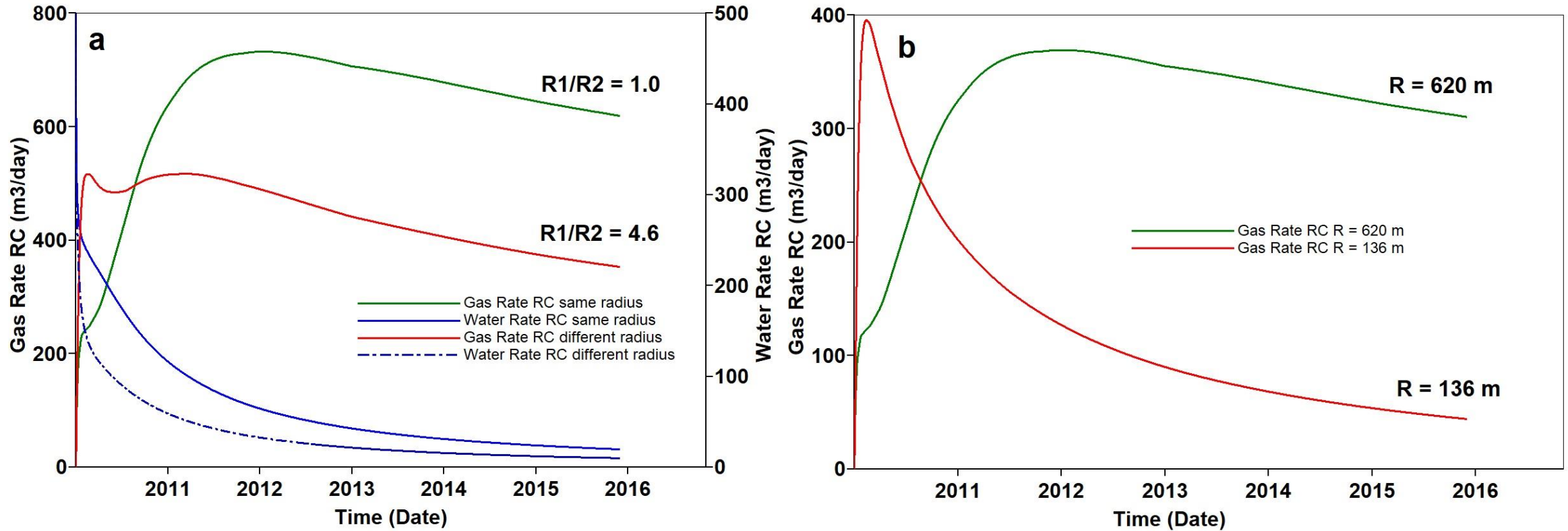
Application of
analysis on a
Surat Basin well



Porosity	Initial Pressure (kPa)	Radius (m)	Permeability (mD)	Thickness (m)	Compressibility (1/kPa)
2 - 4%	6066 - 8203	136 - 620	50 - 500	2 - 6	4 - 20E-5

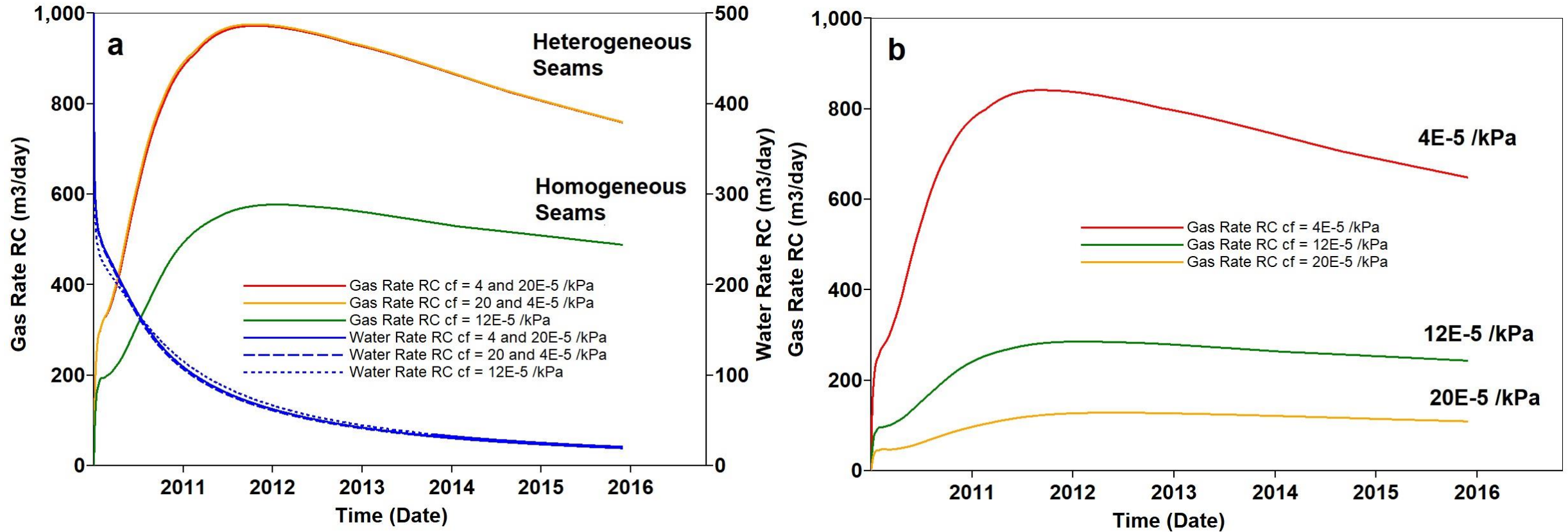
SENSITIVITY RESULTS

Coal Seam Radius

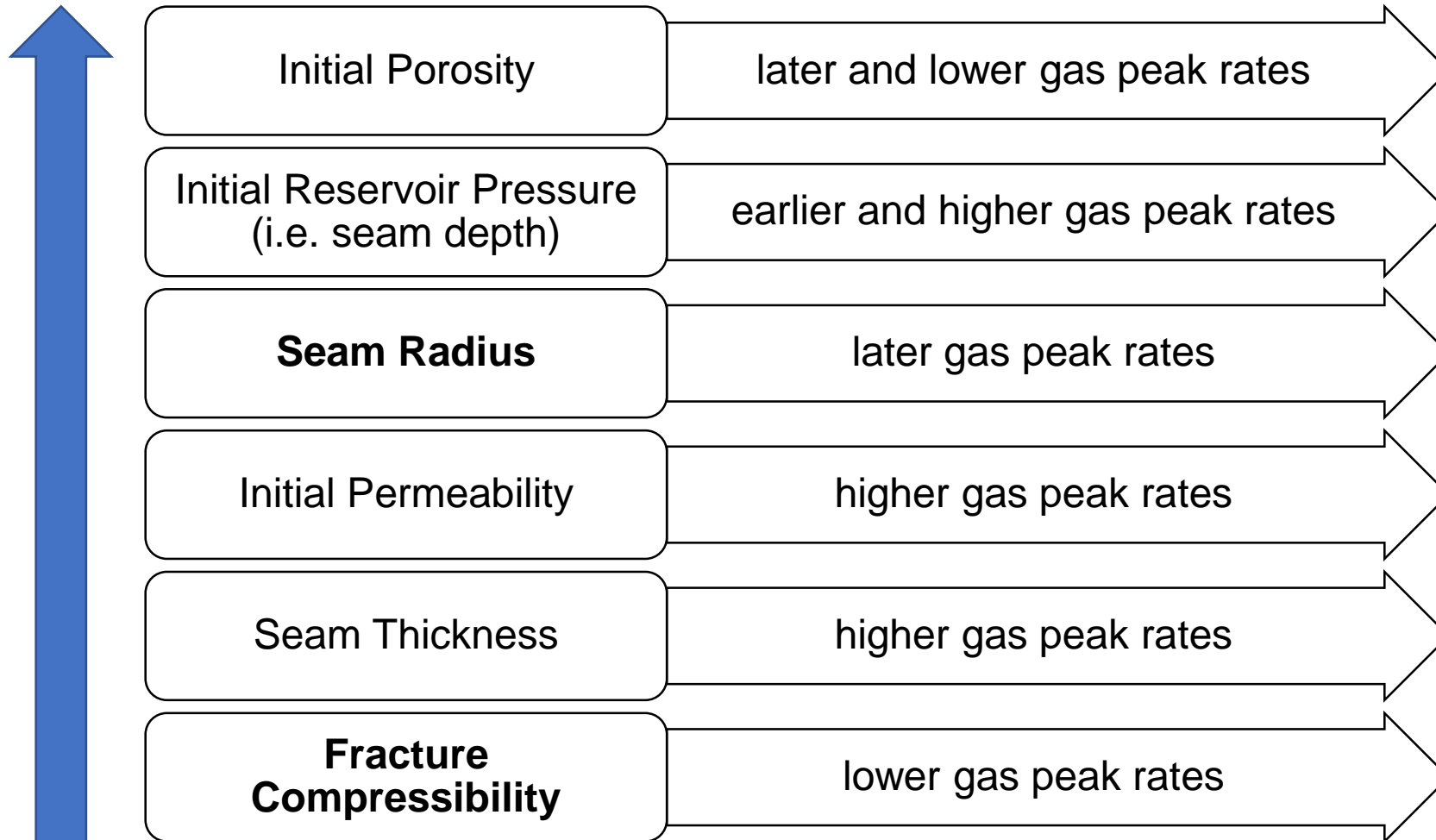


SENSITIVITY RESULTS

Fracture Compressibility

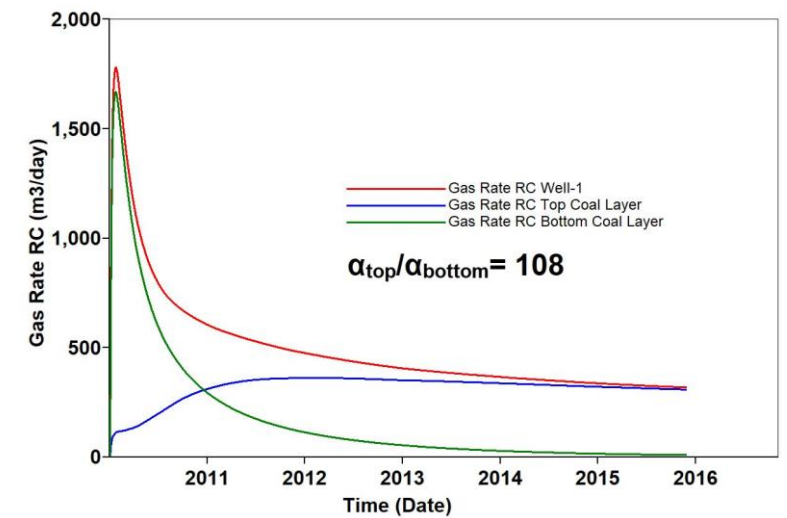
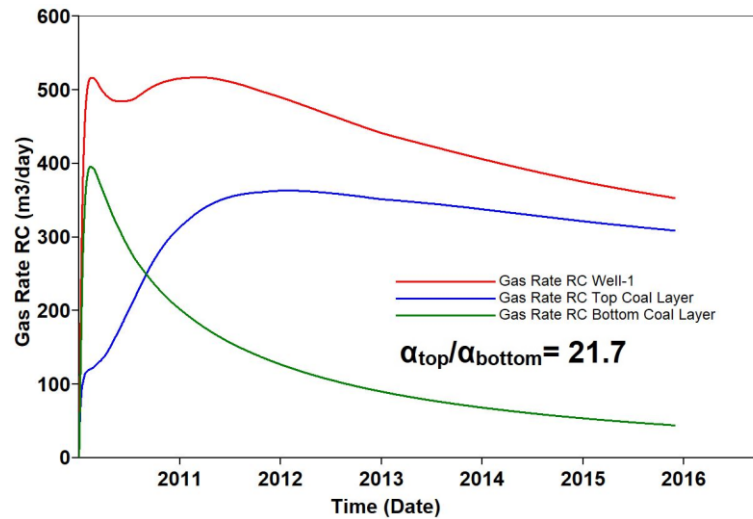
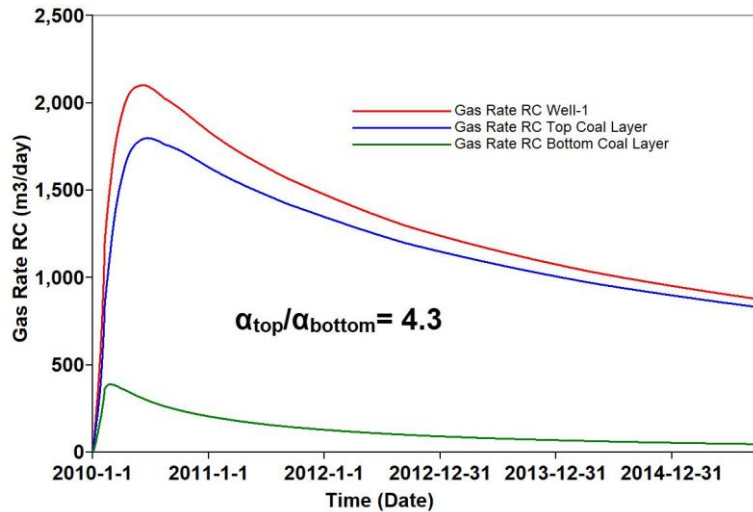


SENSITIVITY RESULTS



UNDERSTANDING WELL PRODUCTION CURVES OF MULTIPLE COAL SEAMS IN COMMINGLED PRODUCTION

$$\alpha = \frac{c_f \phi R^2}{h k_o P_0^2} \quad \alpha_{\text{ratio}} = \frac{\alpha_{\text{top}}}{\alpha_{\text{bottom}}}$$

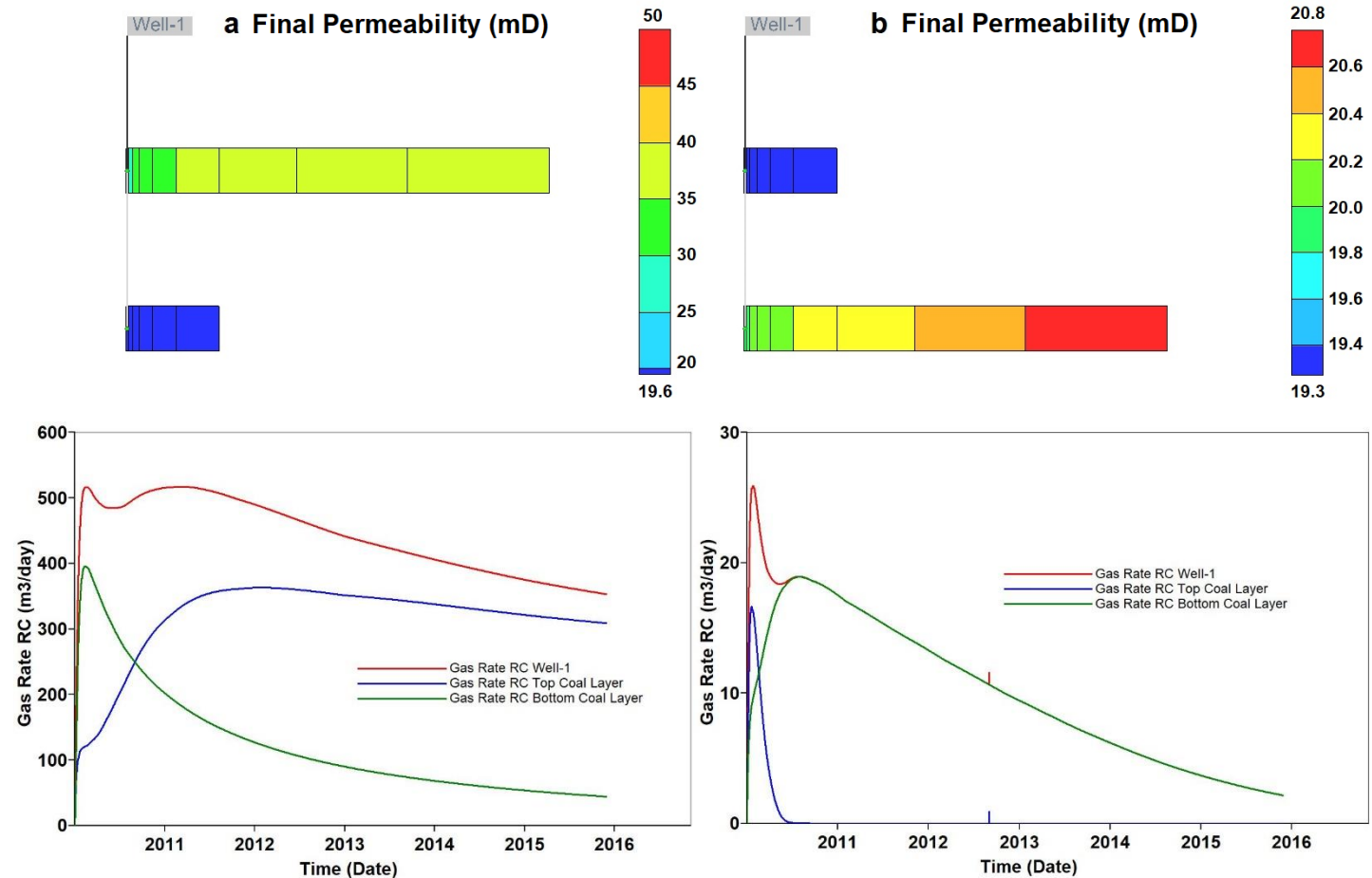


UNDERSTANDING WELL PRODUCTION CURVES OF MULTIPLE COAL SEAMS IN COMMINGLED PRODUCTION

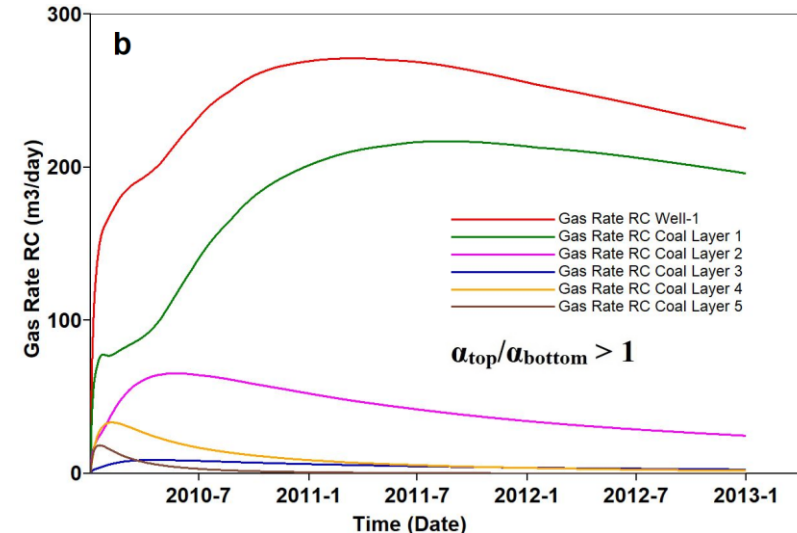
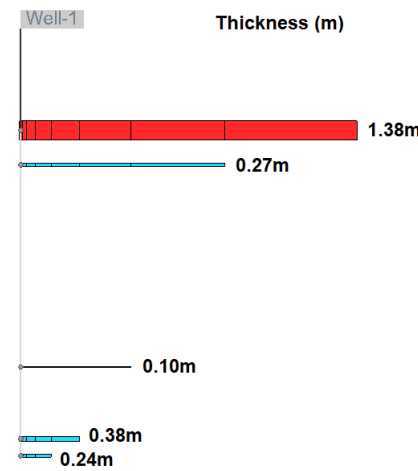
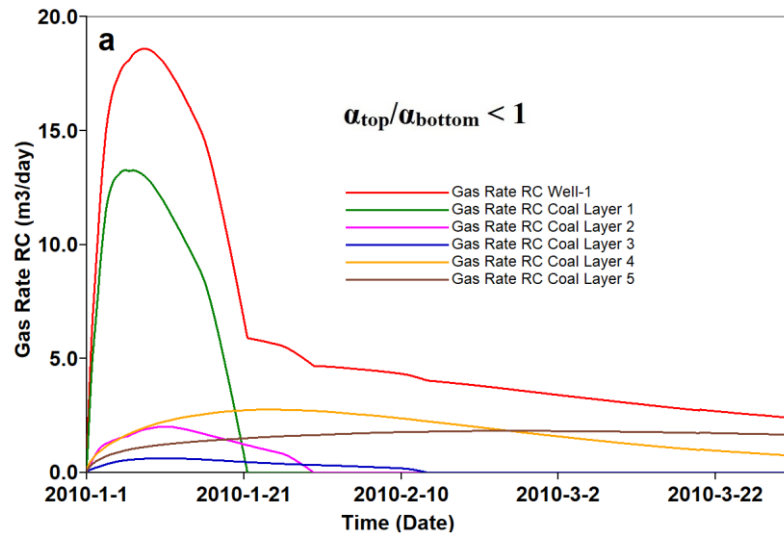
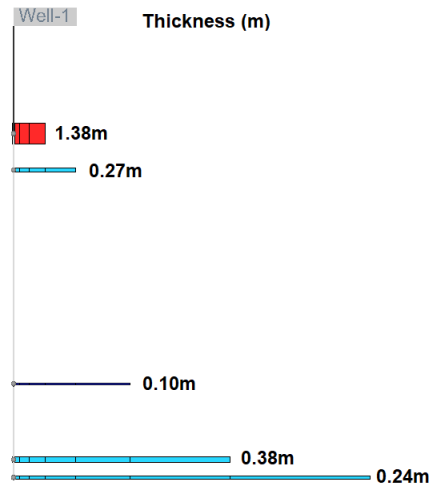
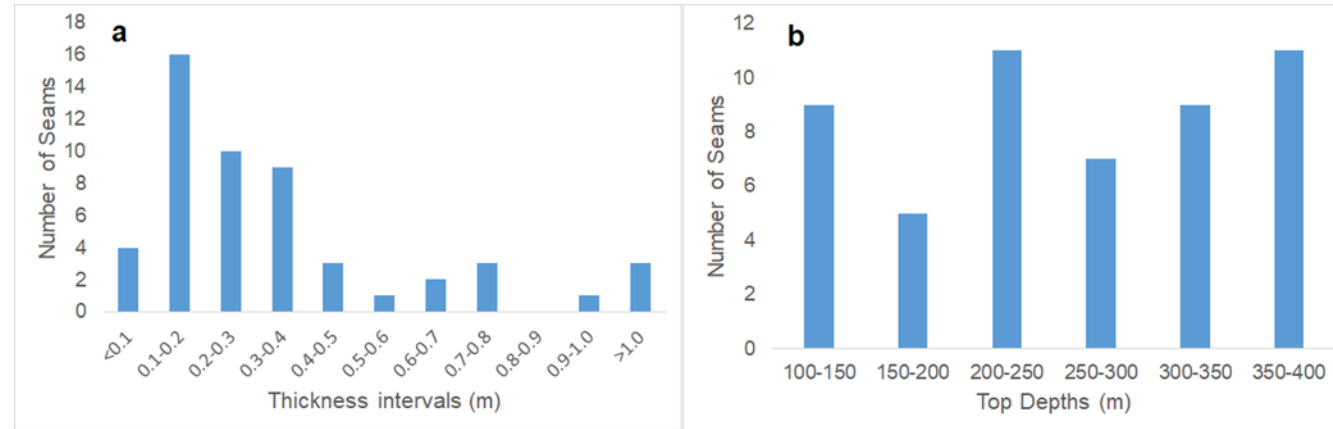
For two-layered reservoirs:

$$\alpha_{\text{ratio}} < 1.0$$

- the top seam experiences fast depletion
- total gas production rates may decrease drastically



APPLICATION OF ALPHA RATIO ON A COXON CREEK WELL, SURAT BASIN.



CONCLUSIONS

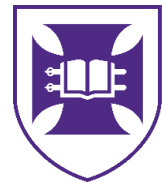
The **contrast between coal seam radii** within a stack of multiple seams plays an important role in interlayer interference and gas production profiles of commingled CSG wells.

Fracture **compressibility** strongly affects gas production curves.

In a **two-layered stack of seams with $\alpha_{\text{ratio}} < 1.0$** , gas rates and recovery may be greatly reduced.

The explicit simulation of gas production from stacked coal seams may inform **considerations for the design of well tests** and use of permanent monitoring tools.

Acknowledgements



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