Controls on the Geometry, Stratigraphic Distribution and Quality of Coals of the Middle to Upper Jurassic Strata in Eastern Australia

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Challenges

- The heterogeneous character of the Walloon Coal Measures make regional correlations difficult, with impacts on exploration and understanding gas yields across the Surat Basin.
- Various stratigraphic frameworks are used by different groups (e.g. Coal Measures vs. Subgroup).
- Paleogeographic reconstructions of the Walloon Coal Measures are questionable without a reliable stratigraphic framework.
- Geologic controls on the formation of thin (0.4m), discontinuous (<10km) coal seams remain enigmatic.

Goals and Outcomes

- Date a series of ash fall tuffs from the Walloon Coal Measures in order to improve current understanding of regional chronostratigraphic relationships across the Surat Basin.
- To recalibrate palynostratigraphic and lithostratigraphic frameworks in eastern Australian basins to the International Geologic Time Scale.
- To construct a new, robust sequence stratigraphic framework for the Walloon Coal Measures as a basis for paleogeographic reconstructions.
- To determine the relative roles of subsidence and climate on coal formation in the Surat Basin.

Results as of December 2015

- 20 ash fall tuffs from 9 wells have yielded zircon suitable for dating. CA-TIMS (chemical abrasion thermal ionization mass spectrometry) dating techniques have been used to obtain U-Pb isotopic ages, ranging from 168.10 Ma to 149.83 Ma -/+ 0.04 Ma.
- Ash fall tuffs can be correlated between wells on a regional scale using U-Pb isotope ages.
- Recalibrating the palynostratigraphic framework is on going, but proving challenging due to the paucity of key spore-pollen taxa.
- Subsidence curves produced.

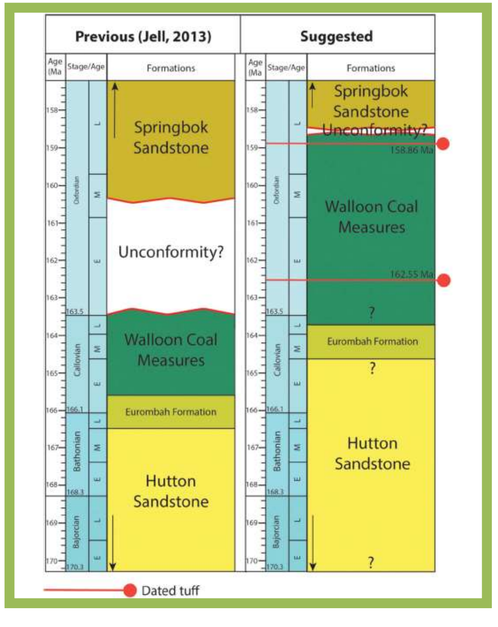

Figure 1. Previous and suggested lithostratigraphic framework of the Surat Basin; from the Bajocian to the Oxfordian (Wainman *et al*., 2015).

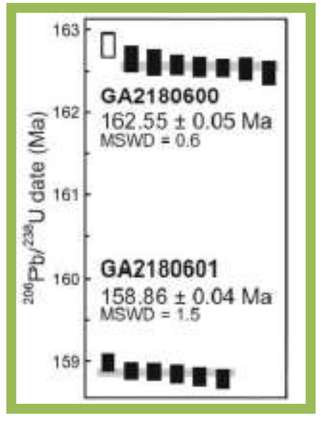

Figure 2. CA-TIMS dates obtained from Stratheden 4 (Wainman *et al*., 2015).

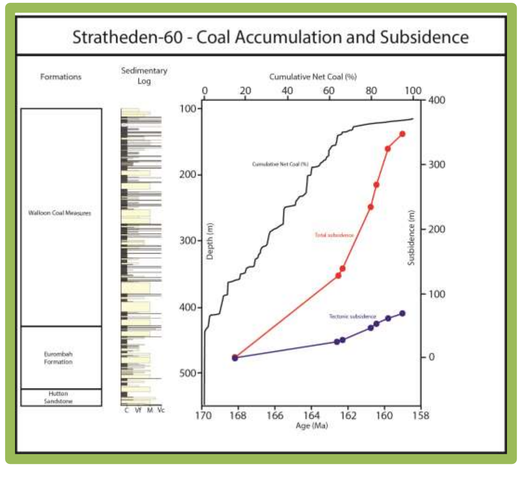

Figure 3. Relationship between coal formation and subsidence through the Walloon Coal Measures

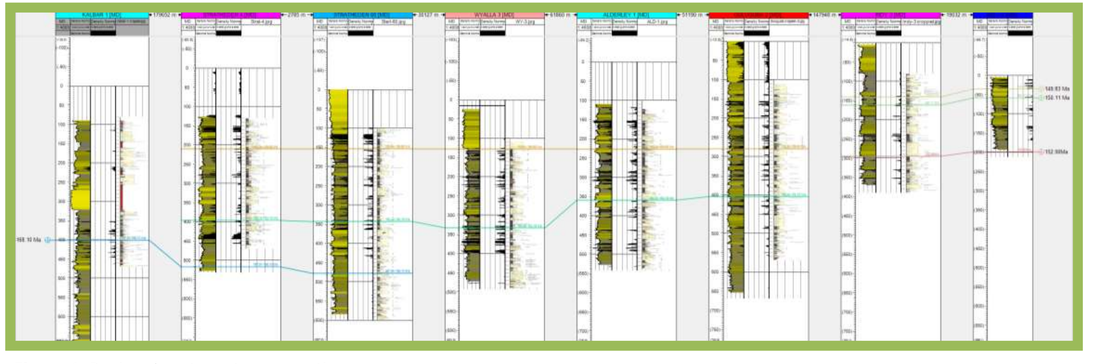

Figure 4. Regional east-west cross section

Wainman CC, McCabe PJ, Crowley JL, Nicoll RS. 2015. "U-Pb zircon age of the Walloon Coal Measures in the Surat Basin, southeast Queensland: implications for paleogeography and basin subsidence". Australian Journal of Earth Sciences. **DOI:** 10.1080/08120099.2015.1106975.

Wainman C, McCabe P. 2015. "Mires In the Dark: High Latitude Coals of the Walloon Coal Measures, Surat Basin, Australia" AAPG ICE 2015 .

Acknowledgements

Joan Esterle and colleagues at the Centre for Coal Seam Gas, University of Queensland
Bob Nicoll, Geoscience Australia
Senex Energy
Arrow Energy
Jim Crowley, Boise State University
Carey Hannaford, MG Palaeo