Geometry and Distribution of Channel and Coal in Walloon Coal Measures, Surat Basin, Australia

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AN INTEGRATED GEOLOGICAL FRAMEWORK FOR CSG

INTRODUCTION

Understanding the geometry, distribution and controls on thick coal is fundamental to understanding coal seam gas reservoirs. In the Jurassic Walloon Subgroup coal measures, the spatial continuity of the coal seams is highly variable and often difficult to map and predict even with closely spaced (<1000 m) drilling. As a result, stochastic models have been built to simulate reservoir geometries of coals and their interburden lithologies within a continental system of fluvial channels, floodplains and lakes and mires.

This study examines the statistical distribution of coal plies and channels at a basin and local scale, to determine whether a predictive pattern can be developed for the stratigraphic subdivisions and basin location relative to interpreted higher and lower accommodation settings reflecting the underlying basement proximity, syndepositional faulting and differential compaction.

STUDY AREA, DATA AND STRATIGRAPHY

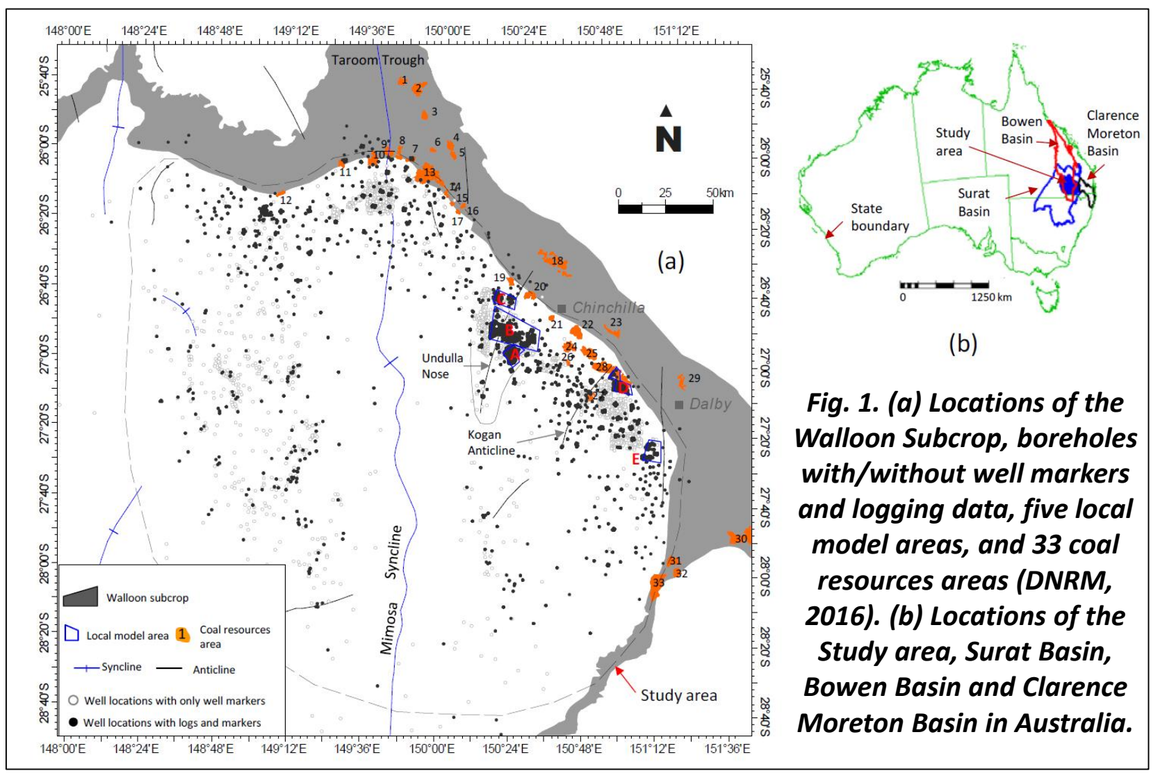

Fig. 1. (a) Locations of the Walloon Subcrop, boreholes with/without well markers and logging data, five local model areas, and 33 coal resources areas (DNRM, 2016). (b) Locations of the Study area, Surat Basin, Bowen Basin and Clarence Moreton Basin in Australia.

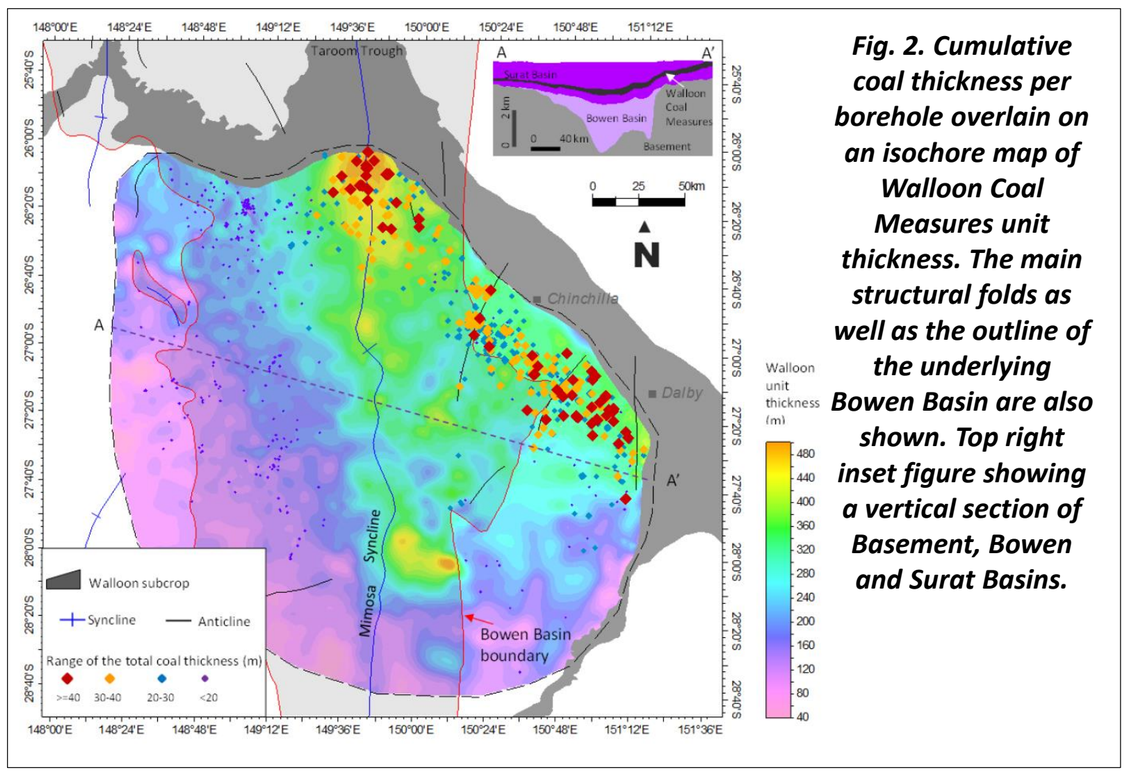

Fig. 2. Cumulative coal thickness per borehole overlain on an isochore map of Walloon Coal Measures unit thickness. The main structural folds as well as the outline of the underlying Bowen Basin are also shown. Top right inset figure showing a vertical section of Basement, Bowen and Surat Basins.

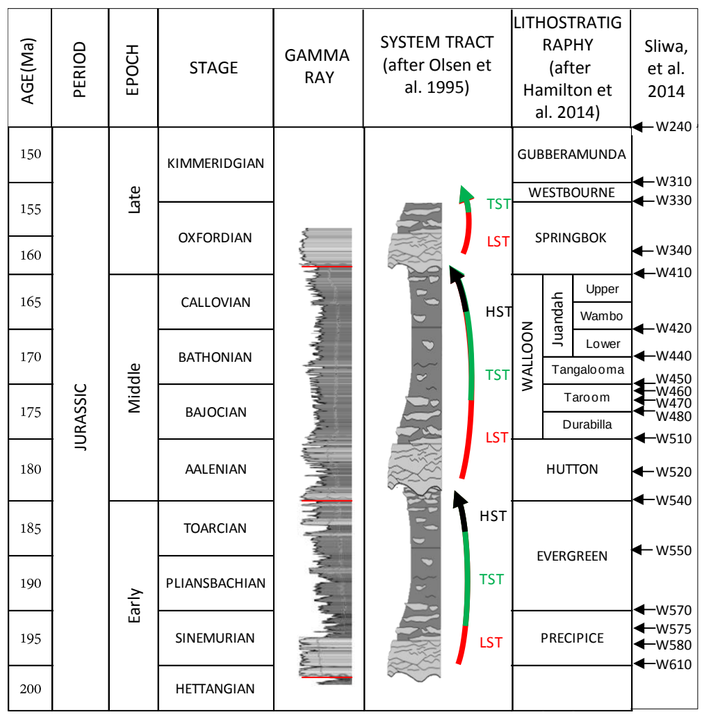

Fig. 3. Sequence and litho-stratigraphic subdivisions of the Surat Basin (after Shields and Esterle, 2015).

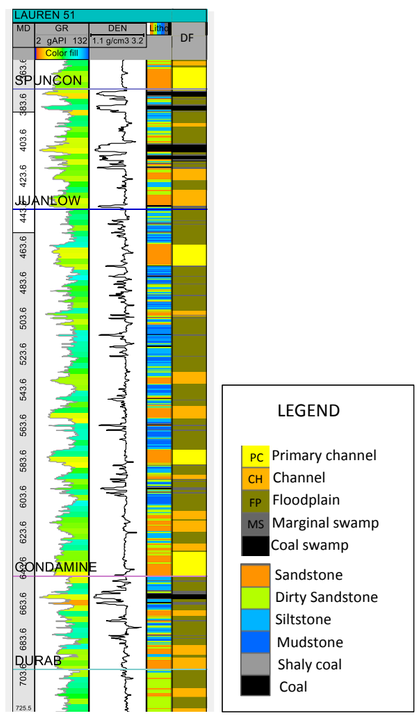

Fig. 4. Example of well logs analysis at the well Lauren 51.

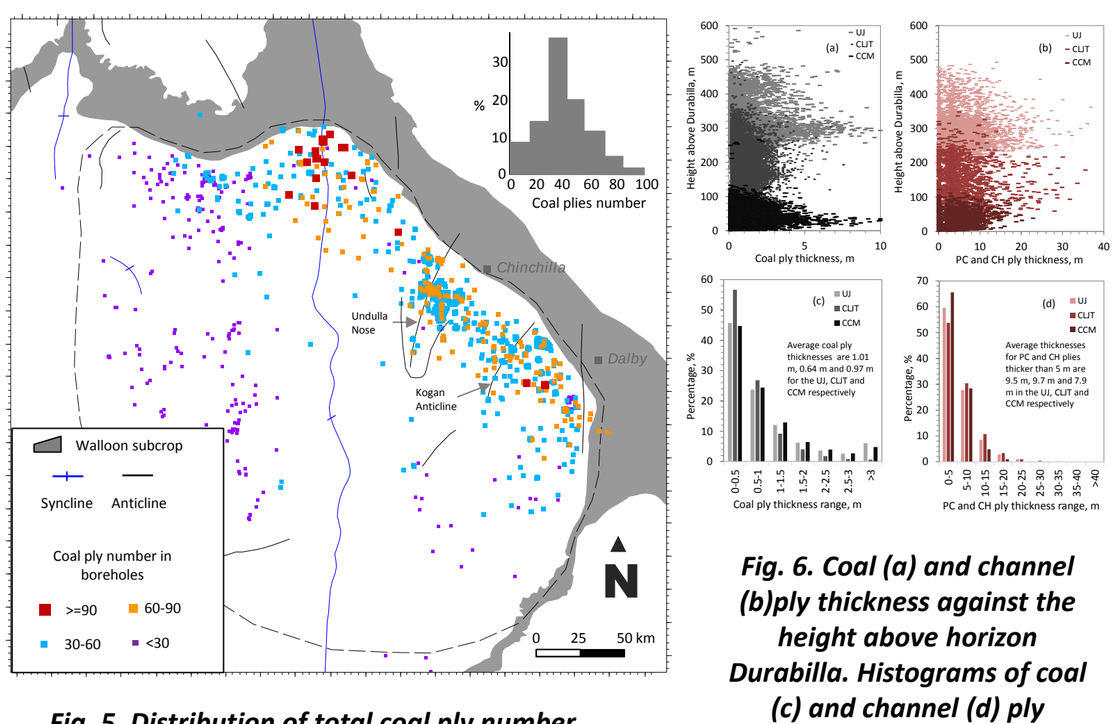

Fig. 5. Distribution of total coal ply number for the WCM.

Fig. 6. Coal (a) and channel (b)ply thickness against the height above horizon Durabilla. Histograms of coal (c) and channel (d) ply thickness.

RESULTS

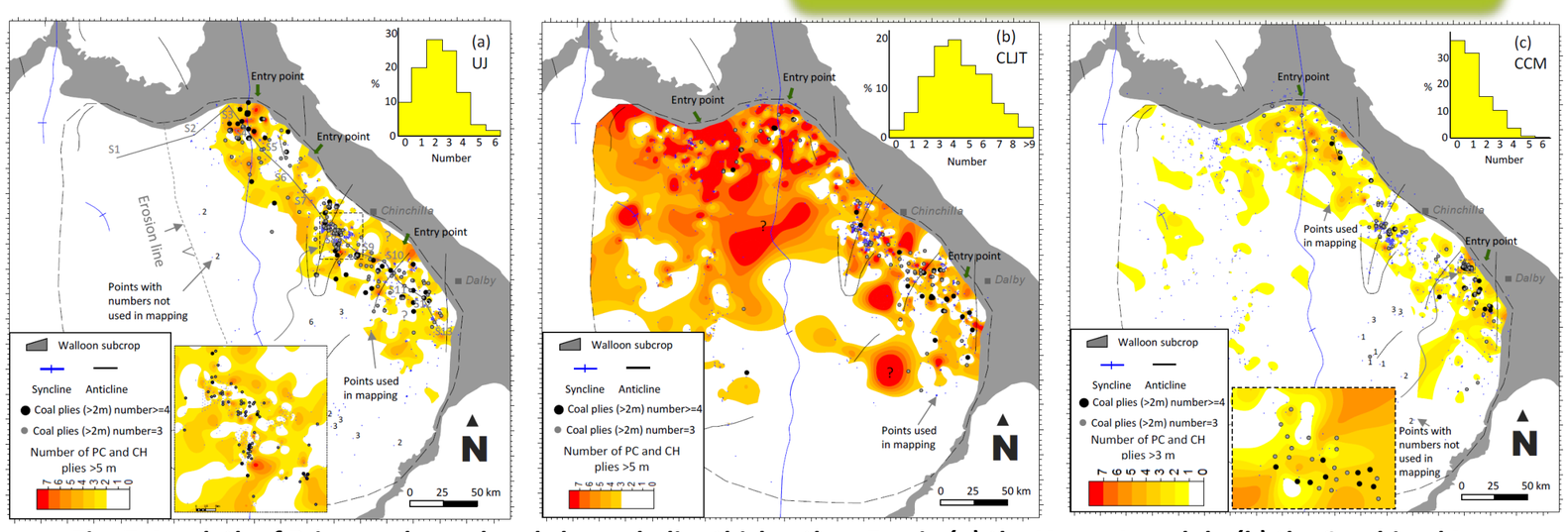

Fig. 7. Isopleth of Primary channel and channel plies thicker than 5 m in (a) the Upper Juandah, (b) the Combined Lower Juandah-Tarooms and Primary channel and channel plies thicker than 3 m in (c) the Condamine Coal Measures.

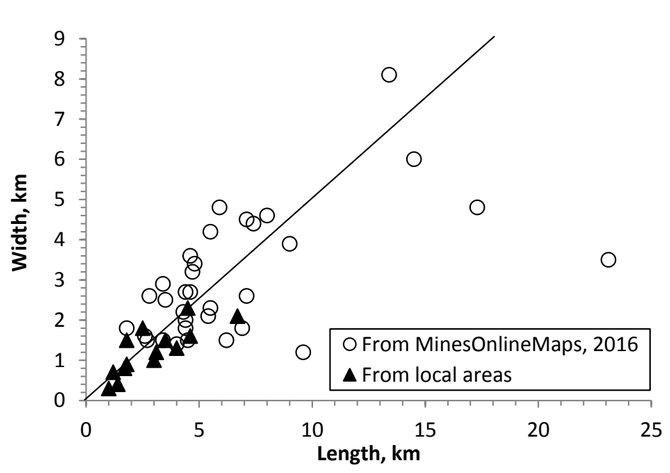

Fig. 8. Width against length measured from coal resources areas and distribution area with two or more coal plies thicker than 2 m from local areas.

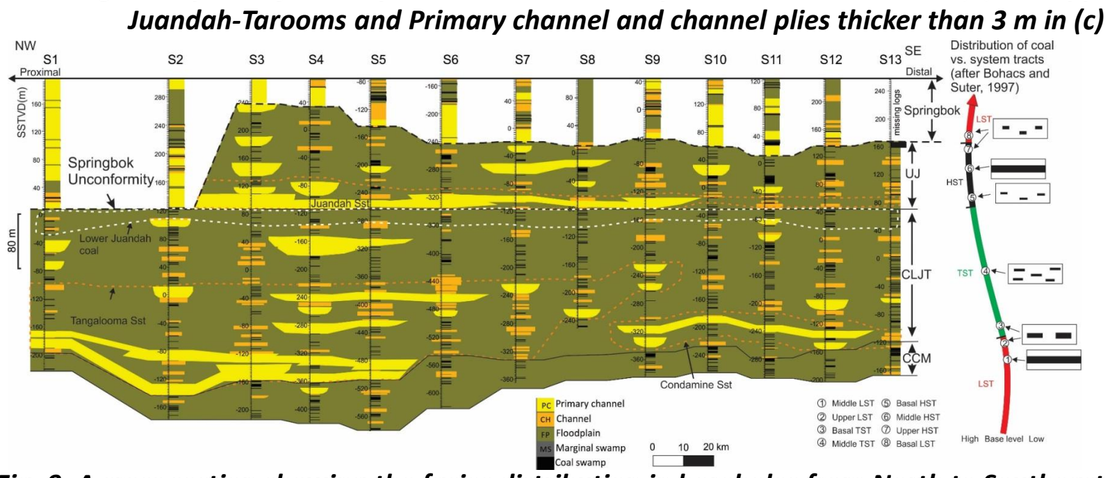

Fig. 9. A cross section showing the facies distribution in boreholes from North to Southeast.

CONCLUSIONS

- **The cumulative coal thickness and coal plies number is highest along the eastern margin of the basin.**
- **Greater number of thick coal plies is closer to greater number of PC and CH but they are not overlayed each other.**
- **This observation appears consistent with the sequence stratigraphic model of thicker coal plies forming in times of relatively slow base level rise.**

ACKNOWLEDGEMENTS

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