

# CONTROLS ON THE GEOMETRY, STRATIGRAPHIC DISTRIBUTION AND QUALITY OF COALS OF THE MIDDLE TO UPPER JURASSIC STRATA IN EASTERN AUSTRALIA

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Jurassic coals in eastern Australia, including the Walloon Subgroup in the Surat Basin, are the continent's largest source of coal-bed methane (CBM). Unlike many other CBM plays, the Walloon coals are thin (<40cm) and discontinuous (<10km<sup>2</sup>): this creates a problem for correlation, effective exploration, and the targeting of sweet spots. To better understand the cause of discontinuous seams and improve their exploration in the subsurface, a multidisciplinary approach incorporating palynology, sedimentology and basin subsidence studies will assess the interaction of autocyclic and allocyclic processes in coal-bed thickness and lateral extent.

The abundance of volcanic tuff horizons (10+ in most cores) in the Walloon Subgroup provides a unique opportunity to understand subtle variations in subsidence rates during times of coal accumulation during deposition of the subgroup, which spans a period of ~4Ma. Using chemical abrasion-thermal ionization mass spectrometry (CA-TIMS), zircons have been extracted from the top and basal tuffs in the Walloon Subgroup. These have yielded high precision dates to within  $\pm 40$ kyr. The new dates (162.54 and 158.86Ma) are younger (Oxfordian) than the previously presumed Bathonian-Calloviaian age with implications for palaeogeography and biostratigraphy. Principal component analyses of palynomorph counts indicate distinctive transitions between plants with hygrophytic and mesophytic/xerophytic ecologies that may be related to climate change. Work is ongoing on re-evaluating previously interpreted environments of deposition from core.

Depositional models developed from the Walloon Subgroup may provide analogues for other high latitude coals including those from Alaska, South America, South Africa and Antarctica.