The sedimentology of the Walloon Subgroup (WSG) is well studied and over the past few decades a coherent alluvial facies model has emerged and been tested repeatedly (Exon 1976, Yago 1996, Ryan et al. 2012, Martin et al. 2013). Despite this existing body of work, there are significant gaps in our understanding of the sub-group's internal architecture and the relative controls upon the distribution of the CSG reserves contained therein. In this study an open file 3D PSTM seismic survey recorded on the NW flank of the Mima Syncline (complemented by 19 intersecting open file wells with wireline and checkshot data sets) was studied to understand: (1) the geometry of WSG alluvial architecture (and the CSG reservoirs contained therein) and (2) the controls upon the sedimentary organisation in the Middle Jurassic Walloon Sub-group. Core analysis, well correlation, seismic interpretation, and attribute analysis were integrated to resolve the WSG's internal architecture.

Prior to seismic characterisation, an in-depth study of WSG sediments was undertaken from cored wells. Four basic architectural elements were identified in cores and calibrated to wireline motifs. These include simple isolated channels 6-8 m thick, compound (multi-stored) channel belts 14-18 m thick, stacked crevasse splay complexes 6-8 m thick, and heterolithic peat mire successions up to 10 m thick.

These successions are believed to be seismically resolvable as they are above the seismic tuning thickness of 6-7 m and were tied to seismic reflections via correlation of synthetic seismograms in 6 wells.

**Dataset**

**Seismic Architecture of a WSG Seam-Group**

Macalister seam amalgamates forming a single thick coal layer - coherent reflection with very high amplitude.

Macalister seam splits around a crevasse splay.

**Seismic Envelope**

**Histgram of Splay Dimensions**

**Histgram of Channel Width**

**Mechanics of WSG Compensational Stacking**

**Conclusions**

Previous studies (e.g. Yago 1996) have described differential compaction as the “main factor” controlling the complex organisation of the Walloon alluvial system. In contrast, this study suggests that although a “memory” by which younger elements are influenced by the position of older ones (i.e. compensational stacking) appears to exist, WSG cycles may also be influenced by reactivation of deep seated structural features. On top of structural highs (e.g. Horseshoe 2) anomalously thick and homogeneous seams groups amalgamate. Here, the thick coal prone successions compact significantly and thus may attract younger channels that can erode WSG seam groups, thereby reducing the net coal thickness. Down dip and on structural flanks, increases in accommodation space results in thinner coal seam-groups, more splays and an overall increasingly heterolithic succession (e.g. Oglive Creek 1).