The application of sequence stratigraphy to Upper Carboniferous fluvio-deltaic strata of the onshore UK and Ireland: implications for the southern North Sea

Hampson G. J., Elliott T., Davies S. J. (1997)

Journal of the Geological Society, London 154:719–733

http://jgs.lyellcollection.org/content/154/4/719.abstract

Abstract

Stratigraphical correlations and facies interpretations of Upper Carboniferous fluvio-deltaic strata have been based traditionally on cyclothems bound by marine flooding surfaces (marine bands). The recent recognition of major, regionally extensive erosional unconformities (Exxon-style sequence boundaries) within selected cyclothems questions their validity as units of genetically related strata. U sing examples from the Carboniferous of the onshore UK and Ireland, we present sedimentological criteria for the recognition of sequence boundaries, placing particular emphasis on the regional context of these surfaces. Sequence boundaries comprise widespread, deeply eroded surfaces at the base of major fluvial sandstone complexes, and laterally equivalent palaeosols developed on interfluves at the margins of the fluvial complexes. These sequence boundaries define units of genetically related strata (sequences) which contain other key surfaces of time-stratigraphic significance, including marine bands and regionally extensive coals. The recognition of key surfaces enables the construction of a high resolution stratigraphic framework within which coeval facies relationships can be interpreted. Sequence boundaries can be correlated between individual basins in the onshore UK, by reference to their position in relation to a particular marine band. For example, the sequence boundary at the base of the Farewell Rock in the South Wales Basin can be correlated with that at the base of the Rough Rock in the Pennine Basin, northern England, since both these sandstone bodies are directly overlain by the Subcrenatum Marine Band. Interbasinal correlations of this nature imply that potential fluvial sandstone reservoirs within major incised valley fills in the Upper Carboniferous strata of the southern North Sea can be predicted by correlation with the onshore UK. The stratigraphical framework can be extended and tested using core and well-log data, particularly spectral gamma-ray data, which are able to identify key sequence stratigraphic surfaces.