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An Atlas of Carboniferous Basin Evolution in Northern England

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Why an atlas of the Carboniferous in northern England? There can hardly be a more researched system in the whole of the British Isles, given its widespread distribution at outcrop and annual appearances in numerous PhD theses (including those of the authors). But perhaps all we really know about the Carboniferous is no more than skimming the surface. In this atlas, using modern multifold seismic and borehole data collected by the oil industry in its search for petroleum accumulations, we can start to look beyond the surface exposures and gain some new insights into the structure and stratigraphy of the subsurface (and surface) Carboniferous.

The unique appeal of this atlas of seismic sections is that it is based on data from onshore UK. Although these lines were originally shot as small segments targeting individual prospects and trends, they have been spliced together to produce a series of basin-scale regional lines which should be of value to academic researchers and industry alike. With this atlas, we can walk the seismic lines at outcrop and in many cases compare exposure to both the seismic data and associated palaeofacies maps.

Cover photo by authors: Kinderscout Grit, Holybank Quarry, Tintwhistle [SK 026 976].

This quarry section exposes the delta top deposits of the Kinderscout Grit. The characteristics of these sandstones suggest that they represent large-scale fluvial channels. Some of the main geometries are trough cross bedding, which represents the migration of sinuous crested-dune forms parallel to the current direction, and multiple erosion surfaces. The lower part of the quarry is dominated by giant foresets, up to 20 metres high that are truncated by a prominent erosion surface. These foresets represent very large-scale bar forms that developed within the channel system and indicate that the channel was at least 20 metres deep. The range of sedimentary structures, the grain-size variations and geometry of the sand body suggest that the Kinderscout Grit represents a multi-storey, multilateral braided river of comparable size to the present-day Brahmaputra.

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