

Jurassic–Early Cretaceous stratigraphy of North Atlantic sedimentary basins: a review

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Integrated stratigraphies of the Jurassic and Early Cretaceous successions of more than 20 sedimentary basins situated at the Atlantic margins of North America, west and southwest Europe, and northwest Africa, were assembled for this review. Several of these basins currently produce hydrocarbons or are thought to have hydrocarbon potential. The integrated stratigraphies are based on an extensive review of the literature (>1,300 publications screened) where information on lithostratigraphy, unit thicknesses, palaeoenvironments, major stratigraphic boundaries, sea-level trends, source and reservoir rocks, tectonics, magmatism, and biostratigraphy are integrated. Schematic lithostratigraphic columns are displayed, which enable comparison of sedimentary successions at regional scale and identification of regional events. Two major phases of source rock deposition were identified: Sinemurian to Toarcian and Oxfordian to Kimmeridgian. Important reservoir rocks, in contrast, are more dispersed in time. Widespread unconformities occur in the Hettangian, Callovian, Berriasian, and Late Aptian, and, taking the current low precision of dating in several basins into account, may have regional significance.

Comparative assessment of the knowledge base for a suite of basin fills allows both regional and local uncertainties to be assessed and categorized. Overall, the current state of knowledge decreases from north to south along both the western and eastern Atlantic margins. This is, on one hand, a result of limited access, with part or all of the sedimentary succession being situated offshore or in the subsurface and much of the respective data being confidential. On the other hand, this also clearly reflects the depth of study of the respective basins. The Wessex Basin, for example, has been analyzed in great detail, and a major portion of these data is in the public domain. The Aquitaine Basin is equally well studied, but a large part of the results is not public. For other areas, like the Essaouira and Tarfaya basins, published stratigraphy is not state of the art. For several basins, finally, no biostratigraphic or chronostratigraphic constraints are available from the literature. This detailed literature review underpinned the identification of knowledge gaps (at least in the public domain) upon which targeted outcrop-based fieldwork can shed light.