"Geological Characterisation of Shallow Marine Sands for Reservoir Modelling and High Resolution Stratigraphic Analysis"

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This lecture wil review recent developments in the geological analysis of hydrocarbon-bearing reservoirs, particularly those formed in shallow marine environments, in relation to: (1) sedminentary facies analysis, (2) sequence/genetic stratigraphy, and (3) reservoir characterisation. The integration of sedimentary facies analysis and the rapidly evolving concepts of sequence stratigraphy provide the basis for the improved prediction of reservoir geometry and architecture (thickness, width, orientation, geometry, etc.) by evaluating the relative interplay between depositional processes, sediment supply and accommodation space creation (relative sea-level changes). This provides the framework for reservoir characterisation and the quantitative analysis of the distribution of reservoir geometry, heterogeneities and permeability, which form the basis for fluid flow modelling.

This will be illustrated through examples of reservoir models from coastal, inshore and shelf environments, based on outcrop and subsurface studies, including lowstand shoreface, marine-influenced incised valley-fills and tide-dominated estuarine and deltaic systems. The nature, geometry, orientation and internal architecture of these reservoirs are especially sensitive to both physical depositional processes and to relative sea-level changes, which will be demonsrated with examples from the Jurassic and Cretaceous of NW Europe. This active research area is being stimulated by the continuing need for high-resolution stratigraphic models, both in relation to further hydrocarbon exploration for subtle accumulations, but especially for improved oil recovery from existing fields. This will be exemplified for tidally-influenced reservoirs, which are particularly heterogeneous, difficult to evaluate with conventional well logs and are likely to contain significant volumes of by-passed oil.