Advances on 3-D Characterization of Fluvial Reservoirs Using a Process-Based Modeling Approach: Examples from the Permian Gharif Formation, Oman

Moscariello, Andrea[1], Yann Dexcote[2], Cedric Beaudelot[3], Isabelle Cojan[4], Jacques Rivoirard[4], Xavier Le Varlet[5], Jonathan Pugh[6], Rene-Charles Remondot[6] (1) University of Cambridge, UK, Rijswijk, Netherlands (2) Shell International Exploration and Production, Houston, TX (3) AMEC SPIE Oil & Gas Services (4) Ecole des Mines de Paris, Fontainebleau, France (5) Badr El Din Petroleum Company, Egypt (6) Shell International Exploration and Production, Rijswijk, The Netherlands,

A number of 'fit-for-purpose' workflows have been adopted by the hydrocarbon industry that facilitate the effective static modelling of fluvial channel architectures, using a combination of both deterministic and stochastic modelling techniques. However, significant challenges remains when it comes to the sub-surface identification and modelling of the complex deposits associated with highly sinuous meandering systems where lateral migration and the deposition of point bar deposits within meander belts results in a reservoir of highly complex and variable static connectivity. A new stochastic / process-based tool (Flumy) aiming to model meandering channels and their associated floodplain deposits is being developed and could represent a potential step-change in the 3-D modelling of such depositional systems. Migration of the meandering channel within a well-defined channel belt results in the deposition of true-to-nature sedimentary units comprising lenticular point-bar deposits. Initial results, when compared with data from the Permo-Carboniferous age, Gharif Formation (Haushi Group) of Oman, appear promising. Sedimentary architectures characteristic of both high and low accommodation conditions are modeled effectively using this new technique. The resulting sedimentary architecture is both realistic and yields a much more ordered arrangement of facies than the object or pixel-based modelling techniques applied previously. Work is ongoing, particularly in the area of conditioning the models to key outcrop and sub-surface data (e.g. well logs and cores), and hopes to deliver new insights into the effective modelling of such systems resulting in more accurate predictions of reservoir performance.