Insights into the Genetic Controls on Production Performance of Deepwater Reservoirs: Analogies from Quaternary Case Studies

Savoye, Bruno[1], R.T. Beaubouef[2], T.R. Garfield[2] (1) IFREMER, Plouzané, France (2) ExxonMobil Exploration Co, Houston, TX

During the 1990s, exploration for hydrocarbon reservoirs in deep-water basins resulted in the discovery of numerous significant new fields (GoM, offshore Nigeria and Angola). Spurred by this activity, a great deal has been learned about turbidite-dominated deep-water reservoirs. However, observations made during the development of these fields has tested conventional wisdom and indicate there is much more to learn about deep-water depositional systems and depositional controls on performance behavior. Early production and 4-D seismic monitoring data from many of these fields indicate heterogeneities near and below seismic resolution are common and are important controls on fluid flow. The depositional processes responsible for the formation of these heterogeneities are poorly understood and therefore, difficult to predict and to represent in geologic and reservoir simulation models.

One source of information bearing on the problem(s) comes from case studies of Quaternary systems. Detailed case studies of the Congo, Var, Amazon and Corsican fans are here used to better understand and illustrate fundamental geologic processes impacting reservoir characteristics. From these studies, significant progress has been made on a variety of relevant topics including: channel sinuosity and lateral migration, channel-fill heterogeneities, confining levees and terraces, channel-levee transition zones, channel avulsion processes and related deposits and distal, terminal lobe deposits. These insights, when integrated with knowledge gleaned from 3-D and 4-D seismic images, well logs, cores and production information from subsurface settings provide a process-based understanding of deep-water reservoirs and their production performance.