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John E. Damuth[1], Carlos Pirmez[2] (1) University of Texas at Arlington, Arlington, TX (2) ExxonMobil Upstream Research Co, Houston, TX

The Amazon-HARP Fan Model: A Key to Sandy Reservoir Facies Distribution in Submarine Fans and Channel Systems

The Amazon Fan is one of the most important modern analogs for deep-water reservoir plays because to date it is the only modern submarine fan that has not only been well surveyed by geophysical methods, but has had its architectural elements systematically and continuously cored at 17 drill sites during ODP Leg 155. Coring revealed much more extensive distribution of thick sands than conventional models previously predicted for so called 'mud-rich fans'. High-Amplitude Reflections (HARs), recorded on seismic from the axes of channel-levee systems are thick, laterally restricted, channel fills of coarse sands (net:gross=30-75%), and more laterally extensive end-of-channel lobes on the lower fan also contain thick, coarse sands (net:gross=50-100%). More importantly, HARP units (High-Amplitude Reflection Packets on seismic), which occur at the bases of individual channel-levee systems, contain thick, laterally extensive, medium-to-coarse sands commonly with mud clasts and rock granules. Wire-line and FMS logs through unrecovered HARP intervals suggest that sandy gravels also occur. A HARP unit forms by deposition from turbidity and related gravity-controlled flows that issue from an active channel during an avulsion event, and is equivalent to an end-of-channel lobe that builds down fan. The new channel-levee system then progressively buries these coarse deposits to form the HARP unit as it progrades down fan. HARP units thus form thick (100 m), laterally extensive (10's of km) sand bodies (net:gross=50-100%) throughout the upper and middle fan that offer excellent, but as yet largely unrecognized, additional reservoir potential for 'mud-rich' submarine fans.