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Worldwide Examples of Low Resistivity Pay

Significant hydrocarbon accumulations are 'hidden' in low resistivity, low contrast (LRLC) sands in many of the world's basins. LRLC reservoirs are found in several clastic basins including ones in Argentina, Australia, Gulf of Mexico, India, Indonesia, Italy, Malaysia, Nigeria, North Sea, Philippines and Venezuela. The Gulf of Mexico (GOM) basin is the world's leading oil and gas producer from LRLC clastic intervals. Many GOM fields have produced for more than 20 years; some for more than 45 years.

Causes of LRLC pay include clean sands interbedded with shales, silts or shaly sands; clay-coated sands; glauconitic sands; sands with interstitial dispersed clay; sands with disseminated pyrite or other conducive minerals; sands with clay-lined burrows; clay clasts; altered volcanic/feldspatic framework grains; and very fine-grained sand with very saline water. LRLC depositional systems include: deepwater fans, with levee-channel complexes; delta front and toe deposits; shingle turbidites; and alluvial and deltaic channel fills.

Useful geological and petrophysical models for evaluation of LRLC pay include the Archie clean sand model with appropriate 'm' and 'n' values or Waxman-Smiths shaly sand model. LRLC typically have very high irreducible water saturation. The Archie lithology exponent (m) and saturation exponent (n) for many LRLC reservoirs range from 1.4 to 1.85, and 1.2 to 1.8 respectively. Some shaly sand models are not suited for LRLC evaluation.