

Depositional Setting and Facies Geometry of Lacustrine Coquina Reservoirs: Examples from the West African Margin

Hassan Hassan, Nicola Adams, and Ian Billing¹

Abstract

Thick successions of Barremian bioclastic limestone (coquinas) are reported in offshore Brazil and the West African margin. These coquinas were developed on topographic highs in a variety of structural settings, including fault-bounded horst blocks, tilted fault blocks and hanging wall ramps. There are many factors which control coquina deposition in a lake system, including climate, water chemistry, energy and depth, basin architecture, and siliciclastic input. However, the interaction of all of these factors is too complex to surmise accurately for any given accumulation. Water depth and energy, in all likelihood, exerted the strongest control in coquina deposition offshore Angola, with water depth in particular playing a significant role in facies distribution and thickness variations.

During the Barremian-Aptian, the local palaeo-topography was dominated by fault bounded highs in the Kwanza and Benguela basins. Movement on these faults was responsible for water depth variations and hence strongly influenced coquina accumulation. This local tectonic variance explains why the lateral distribution of coquinas is highly scattered, being found in one place but not the other, even if both places appear to be adjacent.

In offshore Angola, coquinas have been found with two different carbonate geometries: platformal facies and shoreline facies belt. When accommodation space was available over paleohighs with sufficient wave action, coquinas were deposited as carbonate platforms with flat tops and possessing well developed slopes (Lontra type). However, if the underlying structure was too shallow or emergent above lake level, coquinas would develop as stratal onlaps on the flanks of the structure, forming a belt of bivalve accumulation along the shoreline (Cabinda type). Understanding the controls on coquina geometries will have profound implications for lateral prediction of reservoir presence and calculation of volumetrics.