

Niger Delta Rock Properties Model and Application in Exploration Evaluation

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The Niger Delta is characterized by presence of seismic amplitude and AvO anomalies (DHI's) across the entire basin, from the Onshore deltaics to the outboard Deepwater turbidites. Excellent regional well control and good quality seismic data enable construction of robust and calibrated predictive models which are used in quantitative assessment of exploration opportunities. However, the presence of DHI's is not always a guarantee of drilling success and thorough understanding of lithologic and fluid aspect of seismic responses is required to establish probability of success and reduce volumetric uncertainty at a selected prospect. Quantitative assessment of prospective anomalies and prospects without clear DHI support must be carried out in an integrated way, consistent with basin modeling, reservoir quality prediction and trap analysis.

Shell has developed several methodologies in response to the increasing need for geology-based, fully integrated quantitative interpretation in support of exploration evaluation. This paper presents our current understanding of rock properties system and its controls in the Niger Delta basin, emphasizing the transition from conventional amplitude support to AvO play and non-DHI prospectivity in deeper settings. Calibrated rock properties models are used in prospect evaluation to investigate different subsurface scenarios. The selected application examples demonstrate the power of geologically constrained quantitative interpretation in derisking exploration opportunities.