3D SEISMIC INTERPRETATION OF MARS FIELD OFFSHORE DAHOMEY BASIN NIGERIA

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This researches characterize the potential reservoir of the off shore Dahomey basin using 3D Seismic and Well logs. This study involves integration of wells and 3D Seismic data to delineate and map the potential reservoir of the Mars Field Dahomey Basin Nigeria. The mapped reservoirs intervals are the Turonian reservoirs with consist predominately consist of oil, gas and condensate. The seismic interpretation shows that the structural style within the field are Normal fault and fault assisted closures. The time and depth map were generated for all the identified Turonian reservoirs.

The Mars Field is located in the in the Western part of Nigeria approximately 23Km offshore Western Nigeria, it is close to the Benin border and forms part of the Dahomey Embayment. The Mars Field is a shallow offshore block with water depth ranging from 0.1km to 1km and it covers an area of about 70km^2. This is seen in Tano and Keta basins in Cote D'Ivoire, and Ghana and Benin basin. Pre- rift (Pre- transform) Pan African basement stage is characterized by lineaments and faults produced during crustal consolidation. The pre-rift may also include Paleozoic, Triassic, and Jurassic continental and shallow marine sediments. The whole Cretaceous section is referred to as the Abeokuta Group, subdivided into three recognisable lithostratigraphic units of formational rank Araomi Fm, Afowo Fm and Ise Fm. The Ise Fm. is considered as a pre-drift sequence of continental sands, grits and siltstones overlying the Basement Complex.

The available dataset available for the evaluation are 3D seismic cube, well logs from four wells Mars -01, Mars -02, Mars -04 and Mars -05, well headers, coordinate, deviation data and checkshot data from all the wells. The quality of the 3D seismic data provided is relatively fair to good at the shallow depth, but the quality of the data deteriorates considerably with depth. There is a reasonable seismic data coverage across the farm-out area. The methodology adopted for the seismic interpretation are Data gathering, Data QC, well correlation, fault interpretation, well to seismic tie, time and depth map generation. The stratigraphy of the field is underlain by basement followed by the possible presence of carbonate facies deposited during the Albian, this was later followed by deposition of sand and shales form the Turonian to Cretaceous. At the cretaceous period their appears to be an unconformity due to the presence of erosional surface such as channels and canyon. This was followed by succession of Tertiary, Eocene and Oligocene sediment. At the recent we have the prograding clinoform with top set, fore set and bottom set as the sediment are depositing into the basin.

The structural framework was generated using the horizon surface and fault model to shows the stratigraphic variation and distribution of sediment within the subsurface. The Structural framework was carried out on the cretaceous sediment and this reveals the effect of erosional activity on the late cretaceous sediment. Towards the south it shows that the part of the late cretaceous sediment was completely eroded. This further delineate the presence of uniformity around the late cretaceous when the basin was exposed. This gives rise to the presence of canyon and channels within the late cretaceous sediment.

The Seismic interpretation was carried out to delineate the structural style of the basin. The fault was mapped as normal fault using inline and variance time slice.

The stratigraphy of the basin was interpreted has horizon in which time map and depth map of potential hydrocarbon bearing reservoir were generated.

The local stratigraphy reveals the presence of clinoform, channels, unconformity, stratigraphic successions and basement within the Benin Basin.

The structural framework was generated to understand the geomorphology of the late cretaceous sediment which reveals the degree and the effect of the unconformity on the late cretaceous sediment showing that some part has been completely eroded.

The trapping style in the field is faulted anticlinal closures. The fault has therefore offset the continuity of the reservoirs thereby juxtaposing the reservoir beds (Sands) with non-reservoir beds (Shales) essentially trapping hydrocarbons.

The Cretaceous sediment is the major hydrocarbon reservoir within the basin and Four hydrocarbon bearing reservoir maps of were generated to show the hydrocarbon distribution within the basin.