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Julio Carvalho¹, Luppó W. Kuilman¹ (1) Sonangol P&P, Luanda, Angola

Deepwater Angola; Seafloor Pock-Marks as Hydrocarbon Indicators?

Large areas of the seabed in both the Kwanza and Congo basins are covered with so-called pock-marks. In areas covered by 3D data, the seabed is characterised by a dense distribution of pock-marks, which vary in diameter between 25 and 400 m and can be up to 80 m deep. These pronounced features are not randomly distributed, but oriented in distinct patterns. Often, but not always, these patterns align with major faults.

Several theories have been put forward to explain the origin and distribution of such pock-marks, each with its own implications for exploration/development:

1)Hydrate instability/shallow biogenic gas - indicating the presence of possible shallow gas drilling hazards 2)Seeps of thermogenic hydrocarbons - indicating an active charge system and possible migration routes. 3)Dewatering of undercompacted sediments - low velocity layers; depth conversion issues

Detailed mapping of the seafloor and the shallowest sediment package on a large 3D seismic survey clearly shows how pock-marks are linked to dewatering related fault patterns. Using a variety of 3D mapping techniques, a relationship has been established between the size distribution of the pock-marks and the thickness/depth of the stratigraphic interval characterised by dewatering.

However, when reviewing the pock-mark distribution using this relationship, a number of anomalous pock-marks become apparent; the locations of which seem to match with hydrocarbon seeps.

When validated in other deep water areas of the Angolan offshore, the relationship presented here might prove to be a relatively simple and reliable means to identify hydrocarbon seeps, and thereby the presence of active charge systems, from pock-mark distributions on the seabed.