

4D Interpretation on Lower Miocene Carbonate Platform: A Significant Help for Field Monitoring and Forecast

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Abstract

The offshore Yadana gas field consists in one reservoir from Lower Miocene carbonate platform deposits at approximately 1300m beneath the seabed with about 40 m water depth. The production has started in May 1998 by natural depletion. Due to the good reservoir characteristics, this depletion is relatively homogeneous through the field and benefits from a strong aquifer support. A rise of the Gas Water Contact (GWC) has been evidenced by an observer well. Since 1998, several reservoir models were built to try predicting the global dynamic field behavior (depletion, GWC rise, Water Breakthrough) and to generate reliable production forecast to anticipate development needs (infill wells, compression platforms...) to fulfill TEPM contractual obligations in term of production plateau level and timing. Today, none of these models is reliable as all of them predict that first WBT would have occurred before July 2014, as there is still no water observed at well so far.

In 2012, the first 4D monitor was acquired in order to better map the GWC rise. In that purpose the GWC rise was mapped on the whole field and tied to the expected petro-elastic behavior. It constitutes then valuable information for History matching. Moreover, large-scale heterogeneities were detected thanks to the 4D data interpretation. On top of the dynamic behavior monitoring, it appears that the 4D time-shifts gave us access to the understanding of the geomechanical phenomenon (compaction, subsidence) in Yadana. The qualitative comparison between the 4D time-shifts extracted at top reservoir and the compaction bowl simulated by Eclipse, pointed out the bias in the porosity distribution. Taking into account these observations, a modification of depositional maps in the current reservoir model directly showed improvement of the simulated compaction bowl and then on the modeling of the field dynamic behavior.