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STRUCTURAL EVOLUTION 3D SEISMIC APPROACH ON SIF FATIMA

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Sif Fatima structure (block 402 b) is located in the central part of Berkine basin on the major North East – South west Ourhoud – Rhourd Ouled Djemaa structural trend.

The main petroleum objectives are represented by the TAGI sandstones producing oil and gas condensate within the Berkine basin.

SF 1 well drilled on 1983 by TOTAL French Cie showed oil within thin depleted trias carbonate interbedded sandstone and a thick sequences of TAGI fluvial sands.

The first wells on Ourhoud, ROD, HBNS, had encouraged the first 3D seismic acquisition (80 fold and 25 * 25 bin size) on HBS field.

The process of 3D acquisition was progressively extended to other fields as ROD - Sif Fatima and EME – EMK fields.

The improvement of the seismic markers as S4 – Trias carbonate - Strunian – frasnian and upper Ordovician allows:

- a best comprehension for structural components as fault systems, extension, nature and relation ship with the amplitudes and trap shape.
- a Triassic tectonic system approach witch impact on top TAGI reservoir mapping and trap definition.

The tectonic model recognized within the Berkine basin is related mainly to the Trias – Lias extension period, followed by compressional Austrian phase with minor impact during tertiary, resulting by a lateral movement of several structural panels along Northeast – Southwest faults (strike slipe faults) with local tectonic inversion on some of them (i e El Borma fault).

The traps presents low relief structures and their amplitude are related to the importance of the fault troughs (lateral seal allowed by the trias carbonate shale or by interbedded TAGI shales).

The top of the TAGI reservoir mapping is generally apprehended and based on mapping the S4 or Trias carbonate levels.

It was already recognized from the 3D seismic lines the impact and influence of Triassic tectonic extension with evidence of rapid lateral variations of the thickness of the S4 – Trias carbonate interval, along the main synsedimentary normal faults system.

On Sif Fatima, the 3D showed the evidence of ante S4 tectonic events. This is defined by the earliest structural panels (narrow horsts and grabbens inside the main structure) boarded by relatively small secondary faults which has no effect on S4 level.

It seems that the structural configuration relationship between S4 and top TAGI levels may not always present similarities due to the presence of ante S4 small fault systems.

This structural complexity impacts on exploration risk and hydrocarbon resources calculation.