

Chariot's journey in Morocco

Setting the foundations for success



South Atlantic 100 Ma Reconstruction

February 2019

High Impact Atlantic Margins Oil and Gas Company



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Agenda



Who we are

Where we have come from

What we have learned

Where we are going





High Impact Atlantic Margins Oil and Gas Company

Saipem 12000



Ocean Rig Poseidon





South Atlantic 100 Ma Reconstruction







Where we have come from - Chariot in Morocco







- First acreage captured in 2012
- Participated in 5 exploration licences, 2 currently active
- Diverse and comprehensive database:
 - 10,000km 2D Legacy Seismic Reprocessing
 - 2,250 km 2D Seismic Acquired
 - 2,700 km² 3D Seismic Acquired
 - \$ 4,000 km² Multi-Beam Bathymetry (MBES)
 - 100 Seabed Geochemical Cores
- Rabat Deep 1 (RSD 1) well drilled in 2018 operated by Eni

□NНŶМ



woodside



2013: 10,000 km 2D Seismic Reprocessing



2014: 1,700 km² 3D Seismic



2015: 4,000 km² MBES & 100 Seabed Cores



2017: 1,000 km² 3D & 2,250 km 2D Seismic





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What we have learned – Tectonic evolution



MESOZOIC EVOLUTION



Late Triassic rifting in the Moroccan Atlantic
Late Jurassic rifting onset in the Iberian Atlantic
Northern Moroccan Atlantic margin influenced by continued oblique Tethyan rifting into the mid-Cretaceous
Origin of a string of pull-apart interior basins

TERTIARY EVOLUTION



- Alpine roll-back arc reaches Moroccan Atlantic c. 5 m.a.
- Nappe accretion to the NE of Chariot acreage
- Reactivation of transform parallel strike-slip faults and mild transpressional inversion

What we have learned – Structural setting



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OIL & GAS

What we have learned – Source and Reservoir



The well encountered tight Middle Jurassic Carbonates - non-reservoir

Rabat Deep 1 (ENI 2018)

Drilled to 3185m

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WD 2187m

Opper Jurassic porous clastic reservoirs were encountered:



Fine to very fine grained, well sorted , clean sandstone



Interconnected intergranular porosity with some calcite and dolomite cement





porosity and minor grain dissolution porosity Good reservoir quality, with well preserved and interconnected intergranular porosity

Interconnected

intergranular

Geochemistry indicates the potential for a new petroleum system:

Oil extracted from SWC's encountered Oleananes – a Cretaceous or younger SR

TERPANES(m/z 191)



Elevated TOC's and HI's measured in the Cretaceous





Reason for Failure

Lack of Reservoir

What we have learned – a new Petroleum System?







Upper Jurassic Gross Depositional Environments



After Charriére & Haddoumi, 2016





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Where are we going – hunting for the new Petroleum System



RESERVOIR



Where are we going – Mohammedia / Kenitra



TRAP



SEISMIC MODELLING - RSD-1 WELL





Where are we going – Portfolio of drill-ready prospects









