Grand Tour of Post-Zohr Mediterranean Prospectivity

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• > 6 MM km of 2D Seismic Data
MC Seismic Data Library in Mediterranean
Eastern Mediterranean Boom of Exploration Activity

- Lebanon License Round 2017 2 Blocks Awarded Round 2019 ongoing 5 Blocks on Offer
- 2016/17 Israel License Round Blocks Awarded
- 2016 Cyprus License Round Several Recent Discoveries
- 2016/2018 Egypt License Rounds

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Zohr Discovery August 2015 / Started-up December 2017

Zohr 1: 624m column 430m net pay
Zohr 2X: 455m column 305 m net pay

Reef atoll at edge of bioclastic lagoon

Cyprus

Egypt
Eastern Mediterranean Seismic Data Reprocessing
Original
Eastern Mediterranean Seismic Data Reprocessing
2011 PSTM
2011-2017 bandwidth Comparison

2 key results

- Identifying Zohr Analogues
- Source Rock Characterization

Deghosting recovers both low and high frequencies
Identifying and Understanding Zohr Analogues

- Zohr up to 30 TCF
- Onesiphoros and Delphynus smaller sub-commercial discoveries
- Calypso and Glafkos (>6 TCF) amongst largest discoveries 2018/2019
Delphynus 2017 PSDM Improved Image
Identifying Undrilled Zohr Analogues 2011 PSTM
Identifying Undrilled Zohr Analogues 2017 PSTM
Erastothenes Platform Control on Sand Deposition
**South Levant Discoveries > Biogenic Gas**

**Tanin**
- 2011 Gas Discovery
- 130ft net pay
- Lower Miocene 'Tamar' sands
- Reserves: Mean 1.1 TCF

**Aphrodite**
- 2011 Gas Discovery
- 310ft net pay
- Miocene sands
- Reserves: Mean 7 TCF

**Leviathan**
- 2010 Gas Discovery
- 220ft net pay
- Lower Miocene sands
- Reserves: Mean 17 TCF.
  *Reported deeper thermogenic gas zone at 21,000ft*

**Shimsom**
- 2012 Gas Discovery
- Reserves: Mean 1 TCF.

**Dalit**
- 2009 Gas Discovery
- Lower Miocene Sands
- Reserves: Mean 0.5 TCF

**Dolphin**
- 2011 Gas discovery
- 'Tamar' sands
- Reserves: Mean ca 0.5 TCF

**Tamar**
- 2009 Gas Discovery
- 2012 onstream.
- 460ft net Mid- Lower Miocene sands
- Reserves Mean 9 TCF

**Karish**
- 2013 Gas Discovery
- 180ft net Lower Miocene sands
- Reserves mean 2-3 TCF
  *Producing thermogenic light oil*

**Q: Where is the thermogenic light oil in Karish coming from?**

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South Levant to North Levant Basin Correlation

1. Oligocene
2. Paleocene – Eocene
3. Cenomanian-Turonian
1. Identification of Low Frequency Zones
   - Palaeocene/Eocene better response

2. Decrease in Al at Top and Increase in Al at Base

3. Clear AVO Type 4 at Top of Candidate Source Rock

Additional criteria tests carried out on Paleocene/Eocene candidate source rock: Criteria for good quality source rock met
Karish Oil from North Levant Source Rock Kitchen

- Long distance oil migration from Oligocene source kitchen in North Levant Basin explains light oil in Karish
- Karish is the South Levant Field nearest the North Levant oil kitchen
Lebanon Licence Round

Blocks announced Nov '18
Bidding closes January 2020

Blocks 3 & 5
>100 TCF or
>16 BBBO

Individual structures are as big as Tamar to south. Yet they are less faulted. These structures are arranged along fold axes – once de-risked, multiple repeat success potential.

Objective in Tamar thickens up to 1 km thick reservoir prone sequences in the North Levant Basin, with good quality sandstones coming from the Nile.
Staying East but not so Mediterranean....
• NE-SW fold-thrust belt developed in the offshore Turkish Eastern Black Sea
• Representing a continuation of the Lesser Caucasus/ Achara-Trialet fold belt onshore Georgia
Potential Source Rocks

- Miocene-Oligocene Maykop marine shales – TOC ~4% e.g. Chaladidi oil field
- Eocene marine shales - Kuma sequence source of Supsa oil field
- Jurassic marine shales - source of Okumi oil field onshore Georgia?
Maykop Regional Occurrence and Maturity

- Extensive presence
- Mostly in the oil window

Geothermal gradient 37° C/km at Surmene-1

Mapping area

Maturity Model

(Tissot & Welte, 1984)
Oil slicks have similar biomarker to the onshore Georgian Maykop source oils which are naturally occurring (Dembicki, 2014-AAPG).
Paleocene Carbonate Build-up Play

Anchangelsky Ridge

Carbonate build-up

Theft sands

Erosional surface

Reverse polarity amplitude attribute

Softening

Hardening

42 km

10 km

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Miocene Basin Floor Fan within Maykop Play with AVO/AVA Support

- Garaberezhouriv gas discovery in Oligocene sandstone reservoir within the Maykop sequence, 17% porosity and 2-250mD permeability (Tari et al., 2018)

Good quality reservoir coming form the Greater Caucasus to the North
Anchangelsky Ridge

Sediments input

Pelecane carbonate buildup

30 BBO Unrisked Resources

Unrisked Resources
Thank you

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