Exploration opportunities in the Kura-Kartli foreland basin (onshore central Georgia)

Paolo Pace

Georgia Oil and Gas Lunch & Learn
London, March 4th 2020
Talk Outline

- REGIONAL FRAMEWORK & LICENSES OVERVIEW
- TECTONO-STRATIGRAPHY & MAIN PSE
- DATASET
- HC PROSPECTIVITY: IDENTIFIED PROSPECTS & LEADS
- MAIN TAKE AWAY MESSAGES
Tendering of offshore blocks (ongoing)
Main Fields, Discoveries & Seeps

- VERY ACTIVE PETROLEUM SYSTEM IN THE KURA BASIN
- STILL UNDEREXPLORED WITH SIGNIFICANT POTENTIAL
Play-Based Prospect Generation Workflow

- **SEISMIC INTERPRETATION**
- **INTEGRATION WITH MT & GRAV-MAG**
- **KINEMATIC RESTORATION**
- **STRUCTURAL & STRAIN MODELLING**
- **2D BASIN MODELLING**
- **PLAY & PROSPECT DEFINITION**
- **VOLUMETRICS**
- **RISK ASSESSMENT**
De-risking Strategy

- 2D PSTM & PSDM REPROCESSING OF VINTAGE SEISMIC
- MT ACQUISITION
- REGIONAL GRAVITY & MAGNETICS
- SOURCE ROCK EVALUATION
- 3D SEISMIC REPROCESSING
- RESERVOIR CHARACTERISATION FROM OUTCROP ANALOGUES
**Tectono-Stratigraphy**

- **CONTRACTION & FORELAND BASIN**
- **PASSIVE SUBSIDENCE WITH EPISODES OF EXTENSION**
- **RIFTING**

- **SEDIMENTARY SEQUENCE DOMINATED BY VOLCANOGENIC INFLUX REPEATED OVER TIME**
- **REPEATED EVENTS OF EXTENSION FROM JURASSIC TO EOCENE**
- **MAIN CONTRACTIONAL EVENT WITH THRUST BELTS DEVELOPMENT DURING MIDDLE-UPPER MIOCENE**
- **INVERSION OF PRE-EXISTING EXTENSIONAL BASINS AS TESTED VIA 2D KINEMATIC RESTORATION**
### PSEs: Main Source Rocks

<table>
<thead>
<tr>
<th>Period</th>
<th>Stage</th>
<th>Age</th>
<th>TOC Range</th>
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<tbody>
<tr>
<td>TOARCIAN</td>
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<td></td>
<td>0.5 - 2.8%</td>
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<tr>
<td>MIDDLE EOCENE</td>
<td>NAVTLUGHI SUITE</td>
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<td>0.3 - 10%</td>
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<tr>
<td>UPPER EOCENE</td>
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<td>0.5 - 11%</td>
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<tr>
<td>MIDDLE EOCENE</td>
<td></td>
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<td>0.5 - 2.8%</td>
</tr>
<tr>
<td>TOARCIAN SHALES</td>
<td></td>
<td></td>
<td>0.5 - 11%</td>
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<tr>
<td>OLIGOCENE MAIKOP SHALES</td>
<td></td>
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<td>0.3 - 10%</td>
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### PSEs: Main Reservoirs

<table>
<thead>
<tr>
<th>Period</th>
<th>Epoch</th>
<th>Age</th>
<th>Main Reservoirs</th>
</tr>
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<tbody>
<tr>
<td>Cenozoic</td>
<td>Oligocene</td>
<td>Eocene</td>
<td>Oligocene Maikop Sandstones</td>
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<td></td>
<td></td>
<td>Upper Eocene Sandstones</td>
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<td>U. Cretaceous Fractured Carbonates &amp; Volcanogenic Sediments</td>
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</tbody>
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**Images:**
- L. Miocene Maikop Sandstones
- Oligocene Maikop Sandstones
- Upper Eocene Sandstones
- M. Eocene Fractured Volcanogenic Sediments
• ABOUT 4000 km OF 2D SEISMIC DATA
• ABOUT 400 km² OF 3D SEISMIC DATA
• ABOUT 730 WELLS
• 105,000 km² GRAVITY AND MAGNETIC MAPPING
• GEOCHEMICAL ANALYSES ON HUNDREDS OF SAMPLES
• 350 km MT DATA
Sweetspots & Overall Potential

- **STOIIP >3800 MMbbl**
  - MIDDLE EOCENE & CRETACEOUS

- **OGIP >3 Tcf**
  - STOIIP 900 MMbbl (CONDENSATE)
  - MIDDLE EOCENE

- **NORIO**
  - Similar potential to Norio (ongoing)

- **SAMGORI**
  - productive area

- **PROSPECTIVE AREA**

- **KARTLI**
  - prospective area

- Outcropping Achara-Trialeti Thrust-Fold Structures

- **TOP MIDDLE EOCENE DEPTH**
  - Outcropping or not interpreted (white)

- **SIMILAR POTENTIAL TO NORIO (ONGOING)**
Play Concept: Samgori Fields
Norio Samgori Lookalike Deep

- **SOURCE:** UPPER EOCENE SHALES
  POTENTIAL INTRA-MIDDLE EOCENE SHALES

- **RESERVOIRS:**
  - MIDDLE EOCENE VOLCANOGENIC SANDSTONES, TUFFS
    AND SILTSTONES (FRACURED RESERVOIR) PRIMARY TARGET
  - UPPER & LOWER EOCENE AS SECONDARY TARGETS

- **SEAL:** UPPER EOCENE SHALES

- **TRAP:**
  - SUB-THRUST INVERSION STRUCTURE
  - CULMINATION AT 3780 TVDSS
  - 7 x 35 km (MAX WIDTH x ALONG-STRIKE LENGTH)

- **BLOCKS:** XIm, Xlc, NORIO, SATSKHENISI, MARTKOPI

>3 Tcf (P50) OGIP SCEN. 1
900 MMbbl (P50) STOIIP CONDENSATE SCEN. 2

MIDDLE EOCENE (UNRISKED)
Kavtiskhevi Shallow Prospect

- **SOURCE:** UPPER EOCENE SHALES
- **RESERVOIRS:**
  - MIDDLE EOCENE VOLCANOGENIC SANDSTONES, TUFFS AND SILTSTONES (FRACTURED RESERVOIR) PRIMARY TARGET
  - UPPER CRETACEOUS CARBONATES AND TUFF-SANDSTONES (FRACTURED RESERVOIR)
- **SEAL:** UPPER EOCENE SHALES
- **TRAP:**
  - SUB-THRUST INVERSION STRUCT.
  - CULMINATION AT 1000 TVDSS
  - 4.5 x 19 km (MAX WIDTH x ALONG-STRIKE LENGTH)
- **BLOCKS:** XI, VIII

2400 MMbbl (P50) STOIIP
MIDDLE EOCENE + U. CRETACEOUS (UNRISKED)
Telatgori & East-Telatgori Leads

- **SOURCE:** UPPER EOCENE SHALES
- **RESERVOIRS:**
  - UPPER CRETACEOUS CARBONATES AND TUFF-SANDSTONES (FRACTURED RESERVOIR)
- **SEAL:** INTRA-FORMATIONAL CRETACEOUS SHALES AND MARLS + LOWER EOCENE SHALES
- **TRAP:**
  - SUB-THRUST THRUST-RELATED ANTICLINE
  - CULMINATION AT 580 TVDSS
  - 2.5 x 6 km (MAX WIDTH x ALONG-STRIKE LENGTH)
- **BLOCKS:** XI, VIII

660 MMbbl (P50) STOIP
MIDDLE EOCENE + U. CRETACEOUS (UNRISKED)
Didgorni Deep Lead

- **SOURCE:** POTENTIAL JURASSIC SHALES
- **RESERVOIRS:**
  - LOWER CRETACEOUS TUFF-SANDSTONES AND VOLCANIC ROCKS (FRACUTRED RESERVOIR)
- **SEAL:** INTRA-FORMATIONAL CRETACEOUS SHALES AND MARLS
- **TRAP:**
  - SUB-THRUST THRUST-RELATED ANTICLINE
  - CULMINATION AT 2500 TVDSS
  - 5 x 13 km (MAX WIDTH x ALONG-STRIKE LENGTH)
- **BLOCKS:** XI, VIII

**800 MMbbl (P50) STOIIP**

- L. CRETAEOUS (UNRISKED)
Main Take Away Messages

- A CONSIDERABLE AMOUNT OF REPROCESSED TIME- AND DEPTH-MIGRATED SEISMIC DATA WERE INTEGRATED AND INTERPRETED FOR THE FIRST TIME THROUGHOUT THE KURA-KARTLI BASIN
- THE INTERPRETATION WAS CONSTRAINED BY SEVERAL WELL TOPS, BY SURFACE GEOLOGY MAPPED IN DETAIL CORROBORATED BY GRAV-MAG
- A SERIES OF ATTRACTIVE EXPLORATION TARGETS WERE IDENTIFIED WITH SOME OF THEM (NORIO) CONSIDERED TO BE SIMILAR TO THE SAMGORI FIELDS (SAMGORI LOOKALIKE) IN WHICH >200 MMbbls WERE PRODUCED
- THE MAIN RESERVOIR IS CONSIDERED TO BE THE MIDDLE EOCENE FRACTURED VOLCANOGENIC SEDIMENTS BUT POTENTIAL WAS IDENTIFIED ALSO IN THE UPPER EOCENE AND UPPER-LOWER CRETACEOUS
- THE IDENTIFIED TRAPS ARE THRUST-RELATED FOLDS OR INVERSION STRUCTURES IN SUB-THRUST POSITION
- POTENTIAL ADDITIONAL DRILLING CANDIDATES ARE ADDED TO THE PROSPECT PORTFOLIO BY ONGOING INTERPRETATION OF ADDITIONAL SEISMIC DATA DURING THE PROGRESS OF THE EXPLORATION WORK PROGRAMME
"There is no blue without yellow and without orange, and if you put in the blue, then you must put in the yellow and orange too, mustn't you?" (V. Van Gogh)