



石油勘探开发研究院
WWW.PEPRIS.COM

Seismic Interpretation and Structural Identification of Iroko – Mokoko - Abana Fields (IMA)

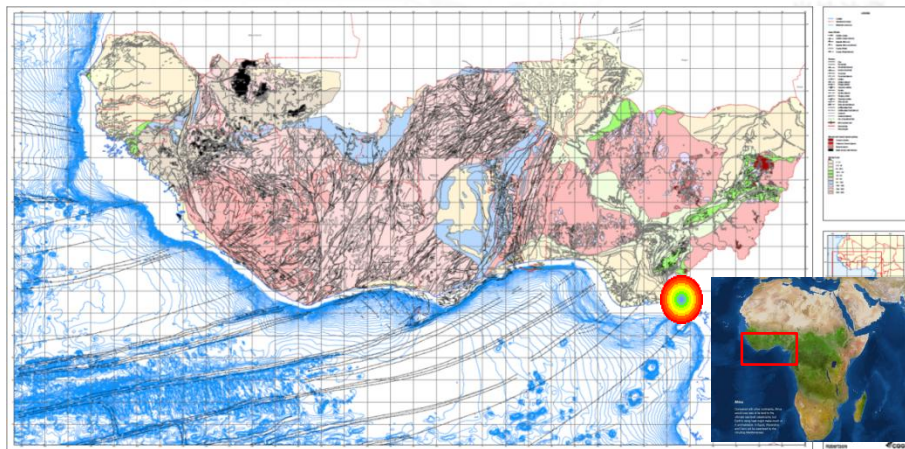
Rio Del Rey Basin (RDR), Offshore Cameroon



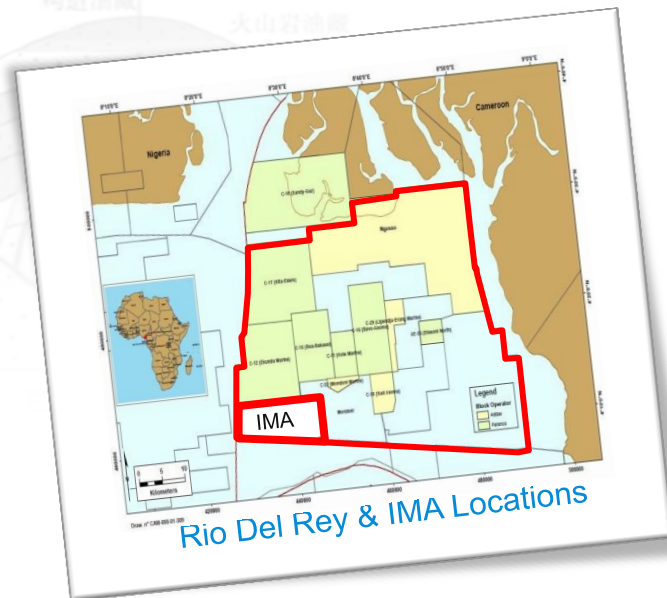
Contents

1. Introduction
2. Structural Interpretation (Workflow and Results)
3. What was revealed by and after IMA Interpretation?!
4. Conclusions

Overview



Geology & Structural Elements, CGG 2014



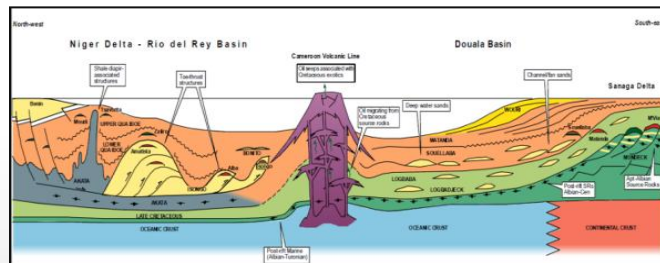
24,108 acres (97.56 Km²)

Scope of Work Study

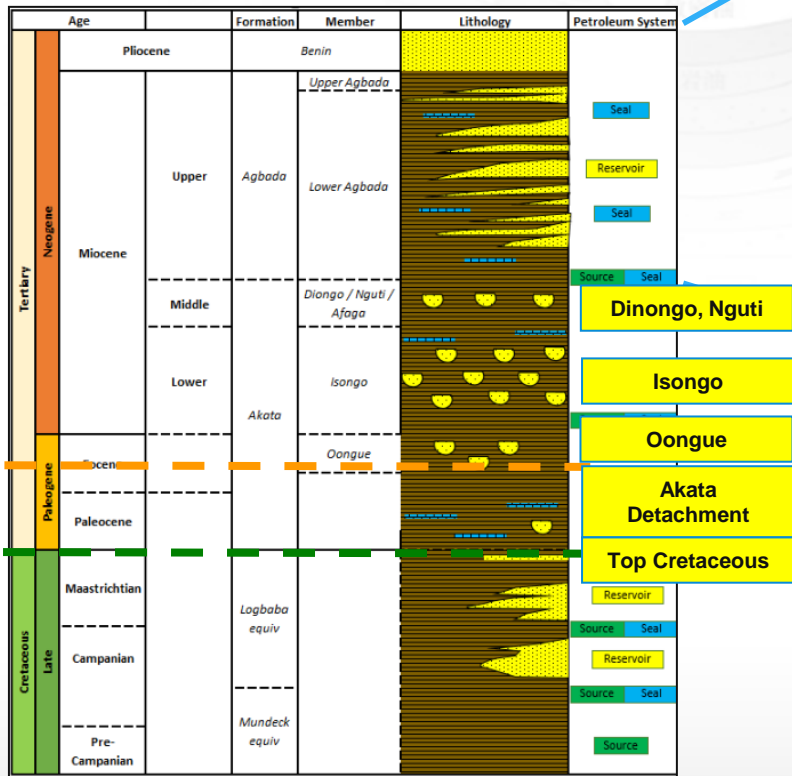
- Identify and evaluate Hydrocarbon potential and/or new exploratory opportunities in reservoir zones of Iroko-Mokoko-Abana (IMA).
- Understand the Structural Framework of (IMA).
- Solve Stratigraphic problems related to sand distribution, unconformities and facies changes.

Methodology

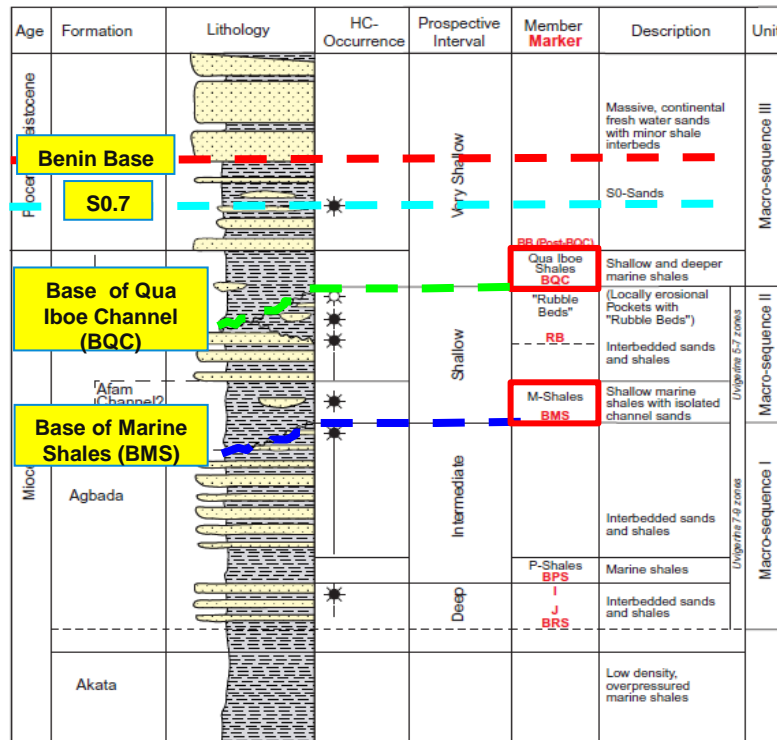
- Interpret the structures and key reservoir tops in Iroko-Mokoko-Abana (SW of RDR)



Overview



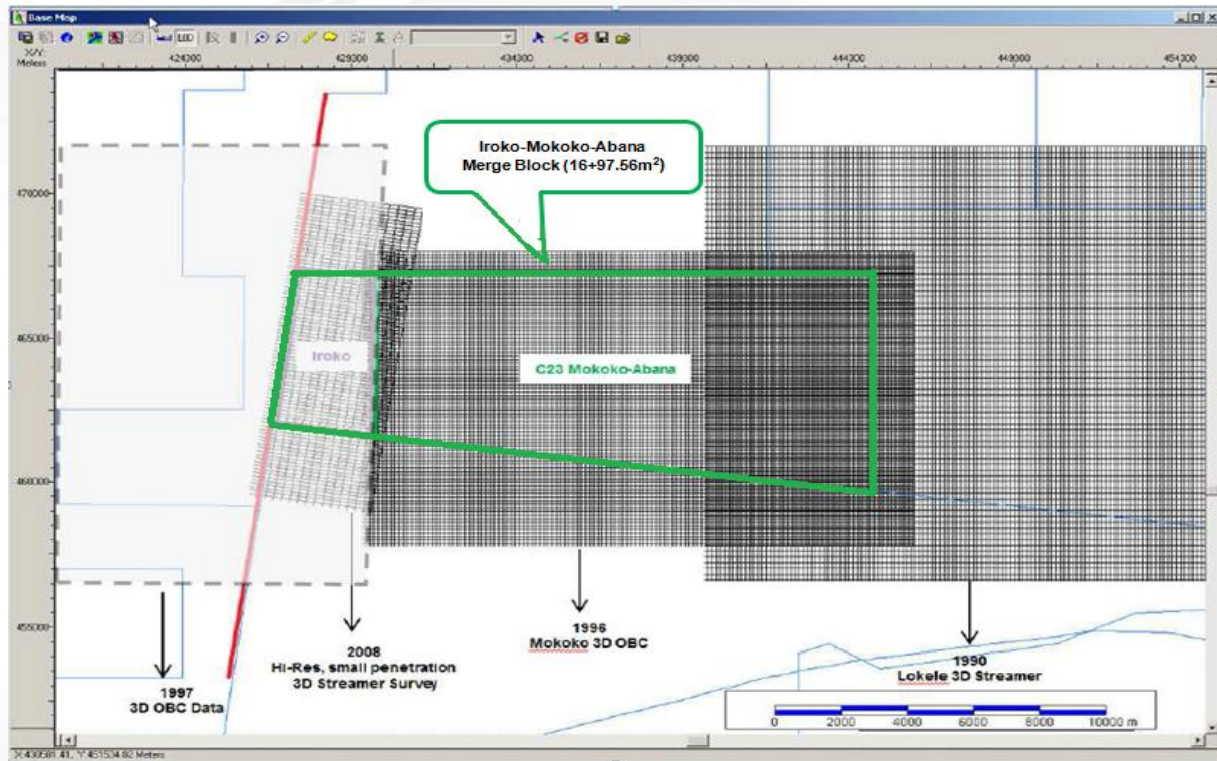
Stratigraphic Column of Eastern Rio Del Rey Basin (Jameson et al., 2016)



- Upper Akata is the Main Source rocks
- Oil is Produced from Turbidites and Interbedded Sandstones within Agbada Formation
- Several Distributary Channels rise the complexity of traps settings

Data Sets Available

1. Three merged Surveys by Pepris Processing Center (2013.6~2014.6):
 - a) Hi-Res, small penetration 3D Streamer Survey_2008.
 - b) Mokoko 3D OBC_1996.
 - c) Mokoko 3D OBC_1996.

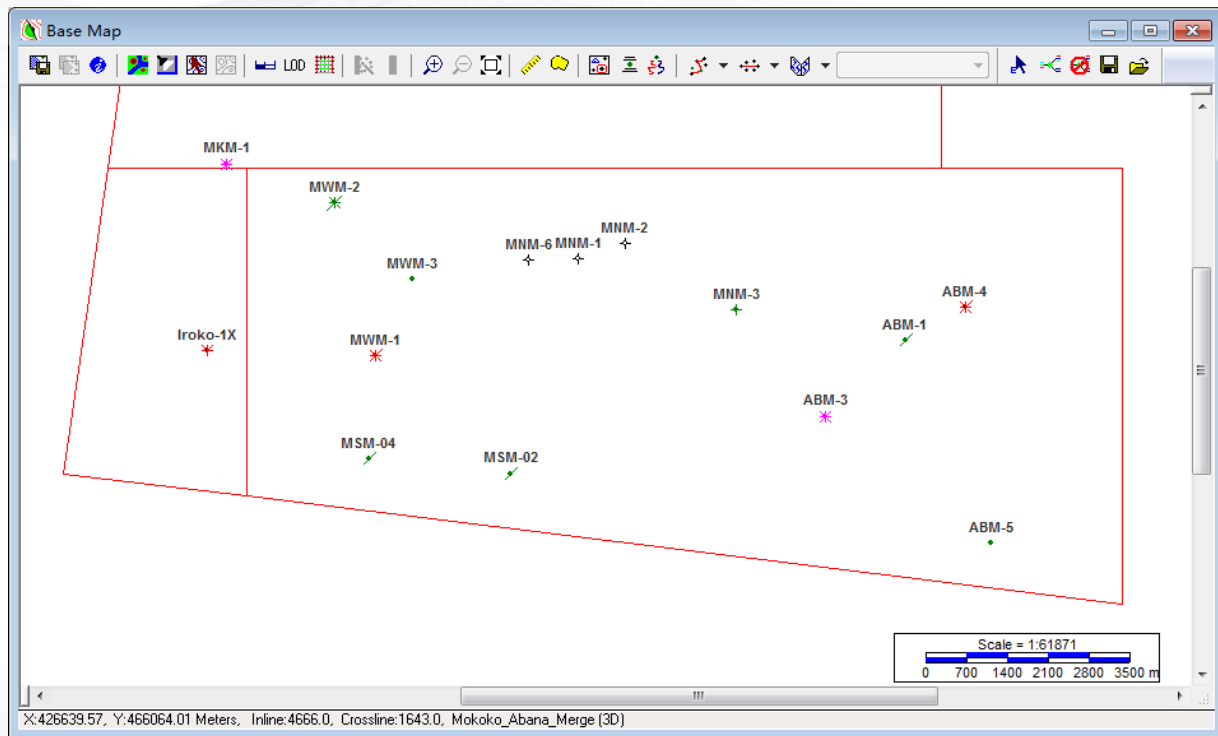


Pepris14_PreSTM_Be9b

Data Sets Available

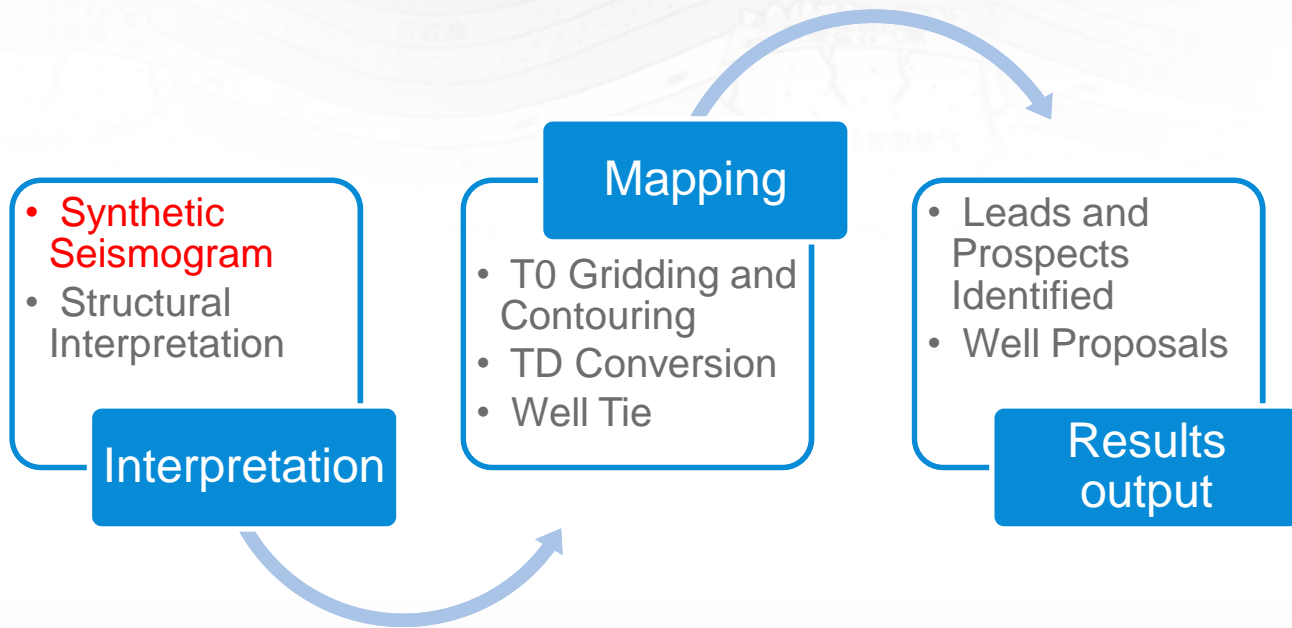
2. 16 Vertical Wells with Sonic and Density logs:

MKM-1 , MWM-1 , MWM-2 ,
MWM-3 , MNM-6 , MNM-1 ,
MNM-2 , MNM-3 , ABM-4 ,
ABM-5 , ABM-1 , MSM-02 ,
MSM-04 , MSM-01 , MSM-03
and IROKO-1.



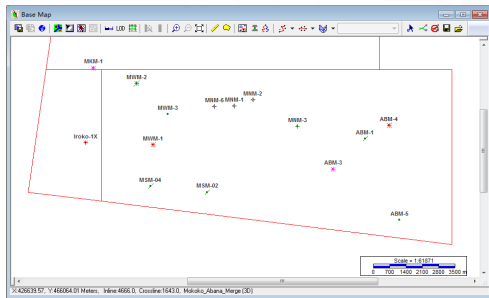
Contents

1. Introduction
2. Structural Interpretation (Workflow and Results)
3. What Was revealed by and after IMA Interpretation?!
4. Conclusions



Structural Interpretation

1. Six key profiles interpretation



• Synthetic Seismogram
• **Structural Interpretation**

Interpretation

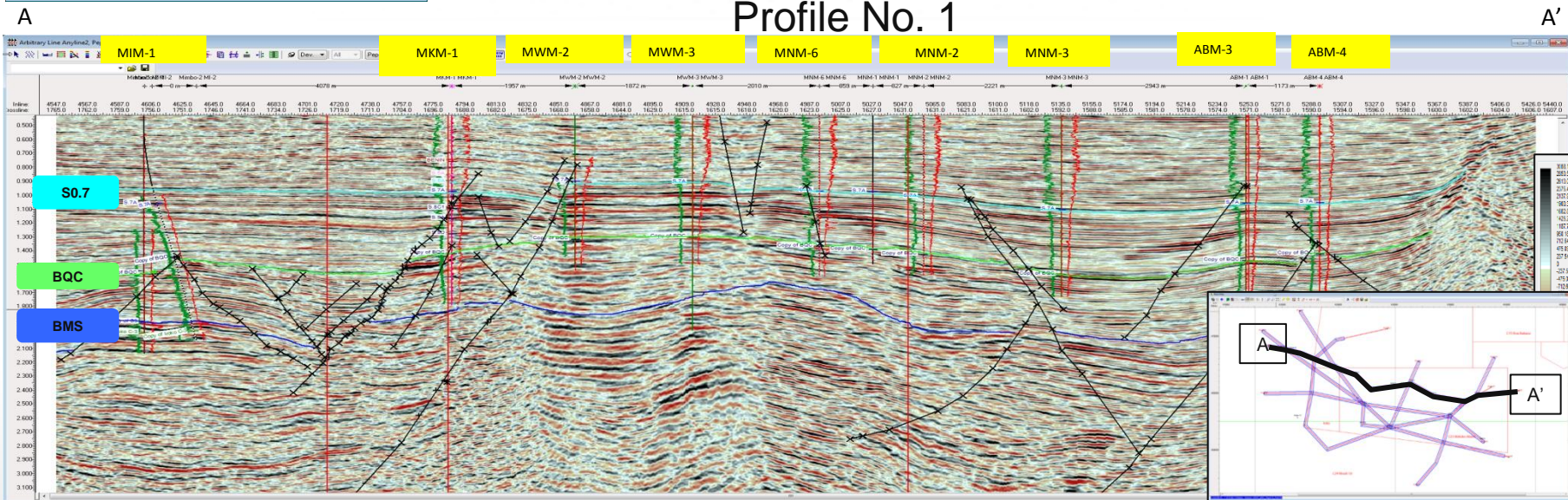
Mapping

• T0 Gridding and Contouring
• TD Conversion
• Well Tie

• Leads and Prospects Identified
• Well Proposals

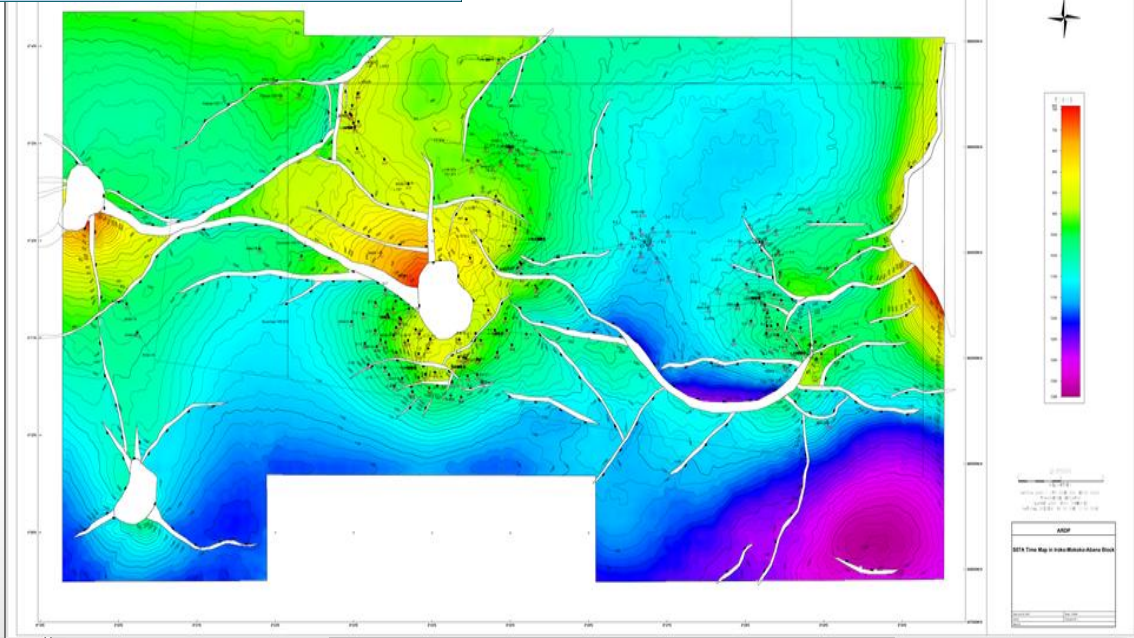
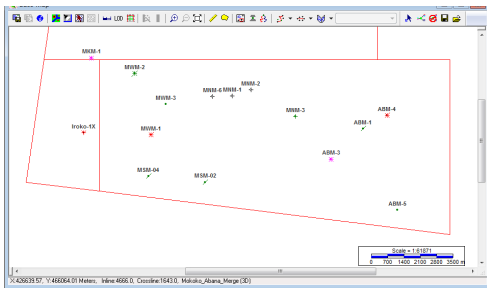
Results Output

Profile No. 1



T0 Gridding and Contouring

Fault sets and horizons interpretation



Interpretation

- Synthetic Seismogram
- Structural Interpretation

Mapping

- T0 Gridding and Contouring
- TD Conversion
- Well Tie

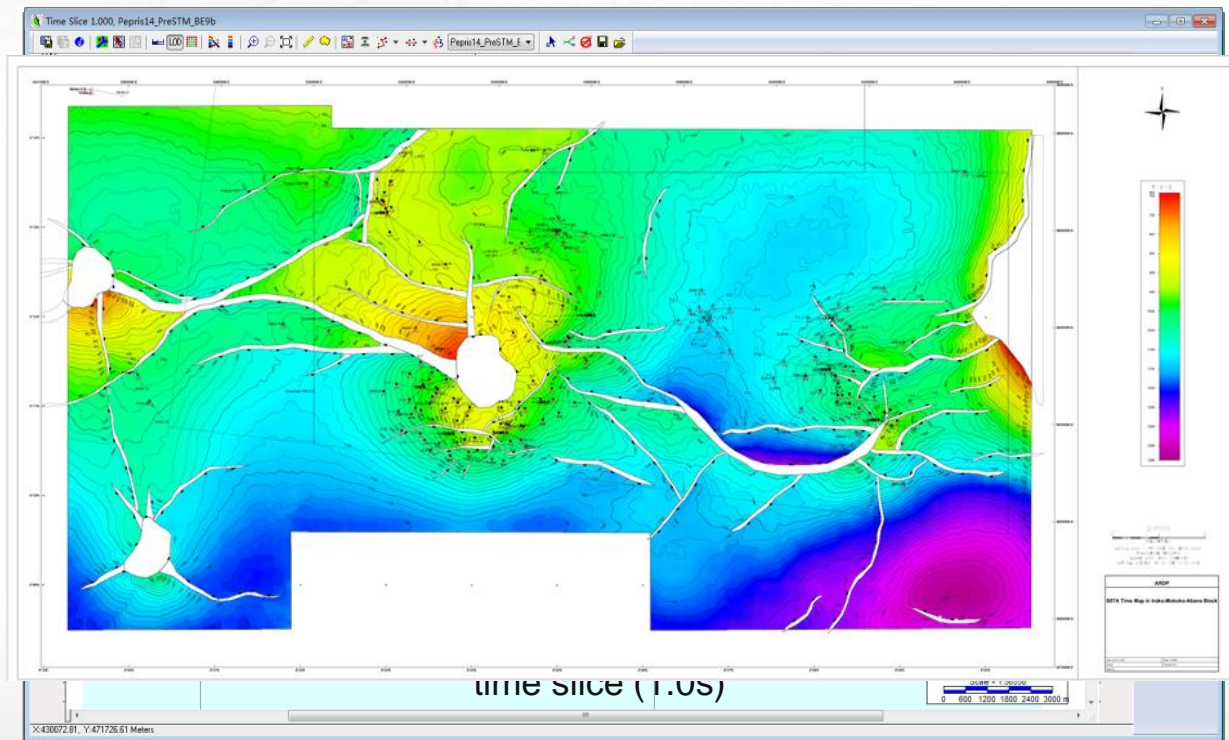
Results Output

- Leads and Prospects Identified
- Well Proposals

- a) Confirm the structural setting
- b) 5*5 spread interpretation

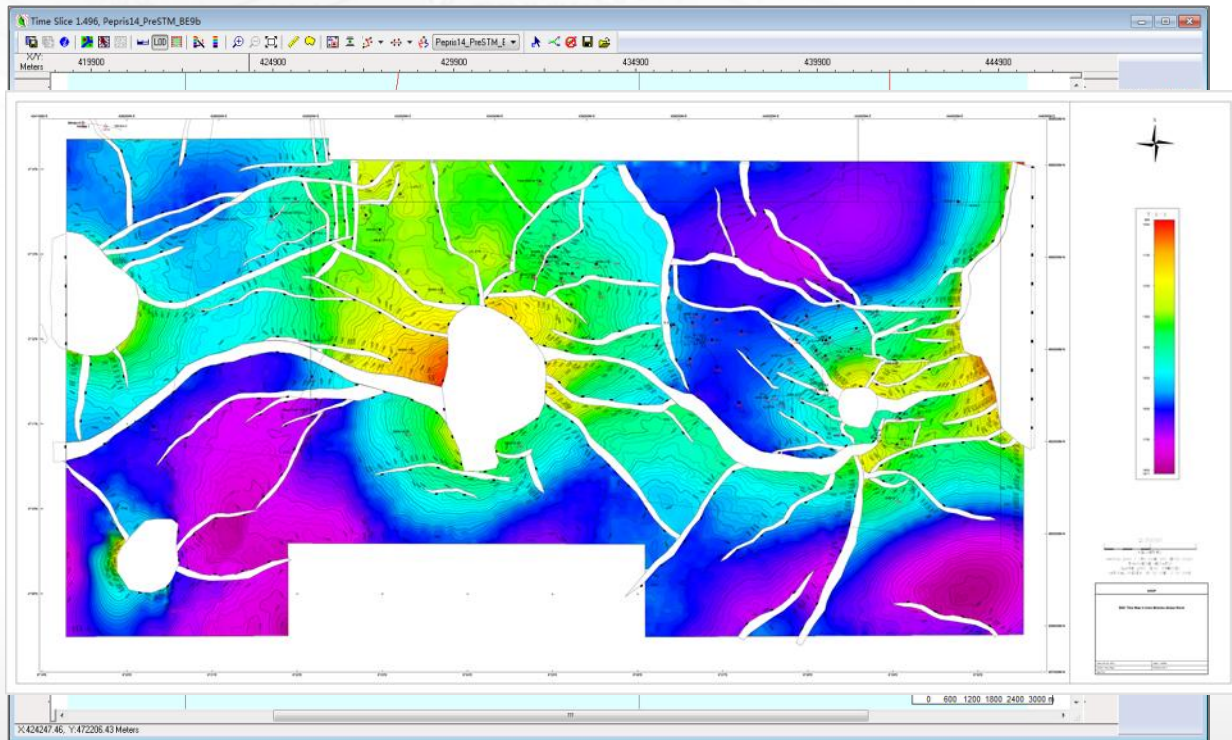
S0.7A Picking Area:280km² Grid: 5*5 line Fault Polygon:61

- The fault surfaces and S.7A Polygon set were consistent to the interpreted horizon and were geologically acceptable.
- 60 fault surfaces were interpreted for the S.7A horizon associated with three diapirs.



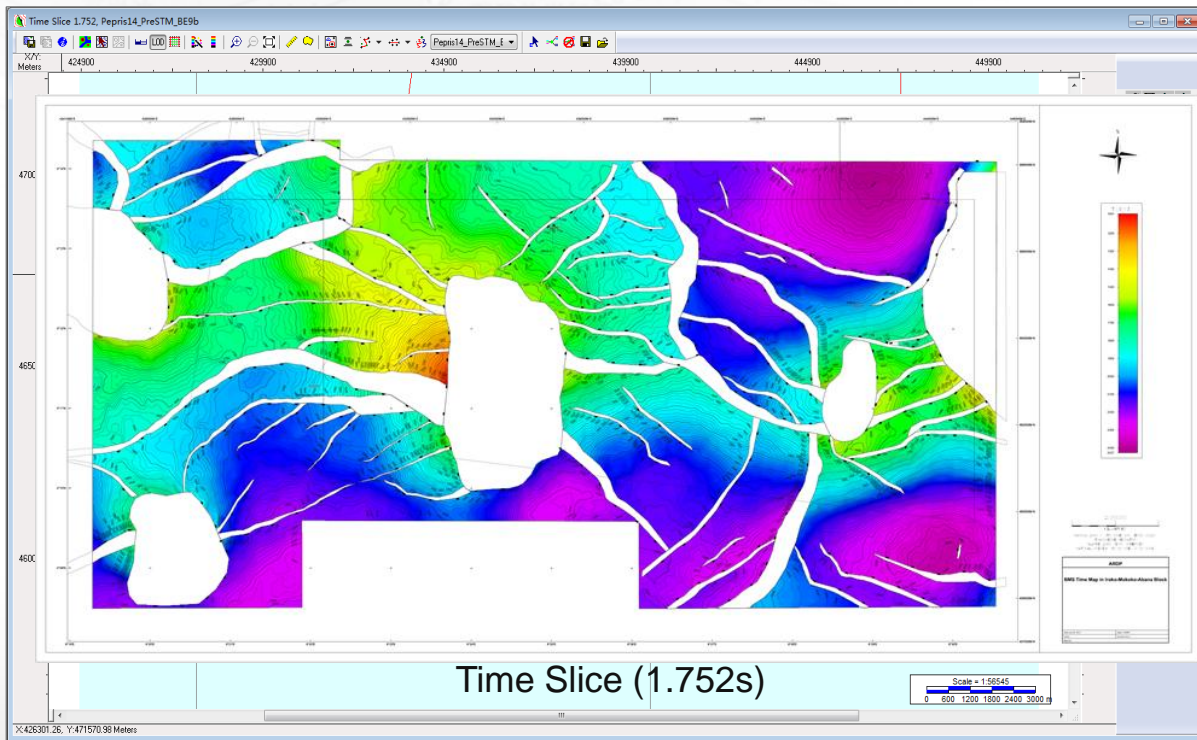
BQC Picking Area:280km² Grid: 5*5 line Fault Polygons:92

- The Base Qua Iboe Channel unconformity (BQC) is considered one of the main regional seismic markers in the Iroko-Mokoko-Abana area.
- Much more complicated faults structure than the S.7A because of the shale diapirs growth effect at deeper levels.
- 89 faults were picked and four diapirs were interpreted



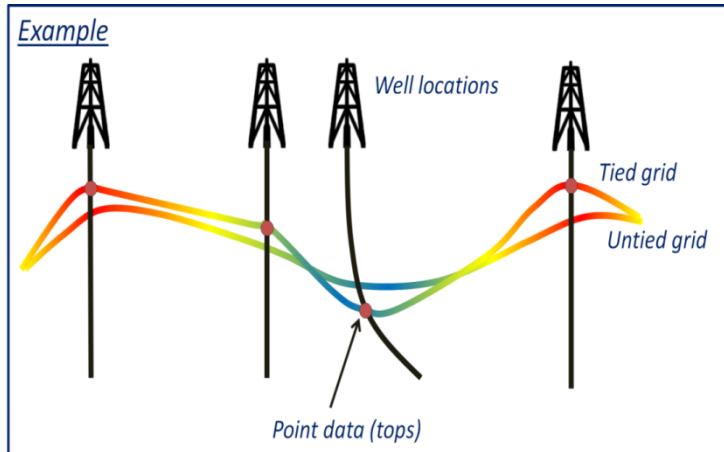
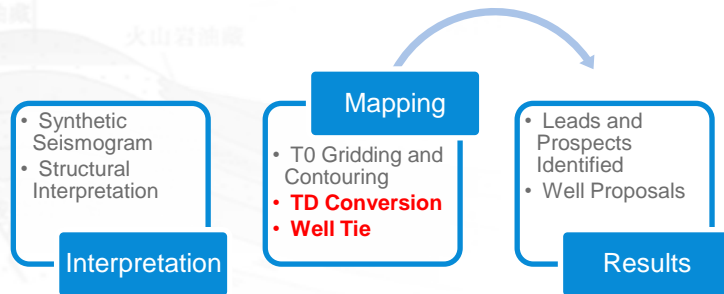
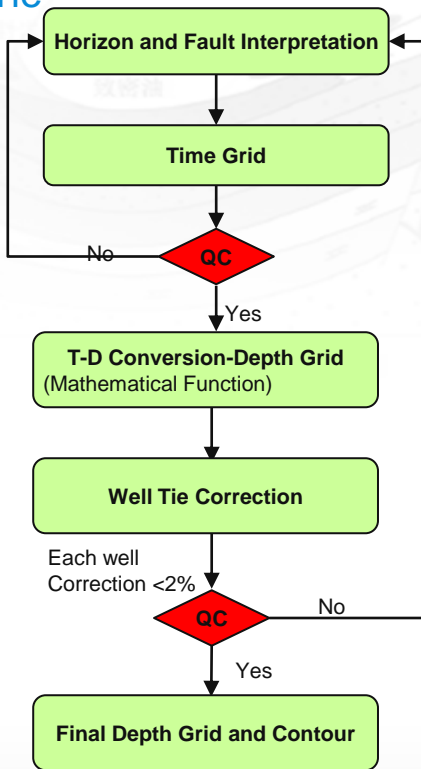
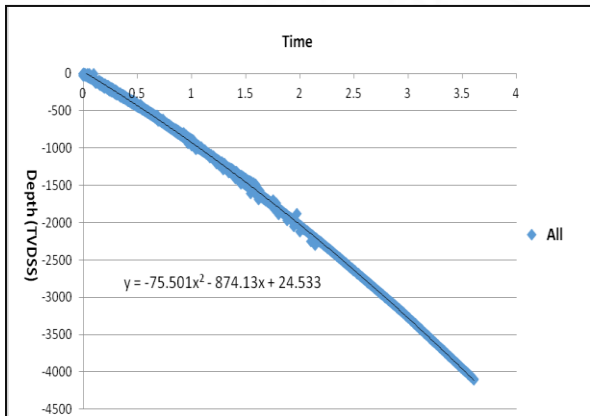
BMS Picking Area:280km² Grid: 5*5 line Fault Polygons:69

- Transgressive marine shale that lies in the deepest level of the Macro-Sequence III of the Tertiary sediments. Like the BQC, it is also a regional marker unconformity but only few wells have been drilled down to its level.
- The shale diapirs appear wider in the interpretation compared to the S.7A and BQC interpretations. 69 faults were picked for the BMS and they were mostly associated with the shale diapirs.



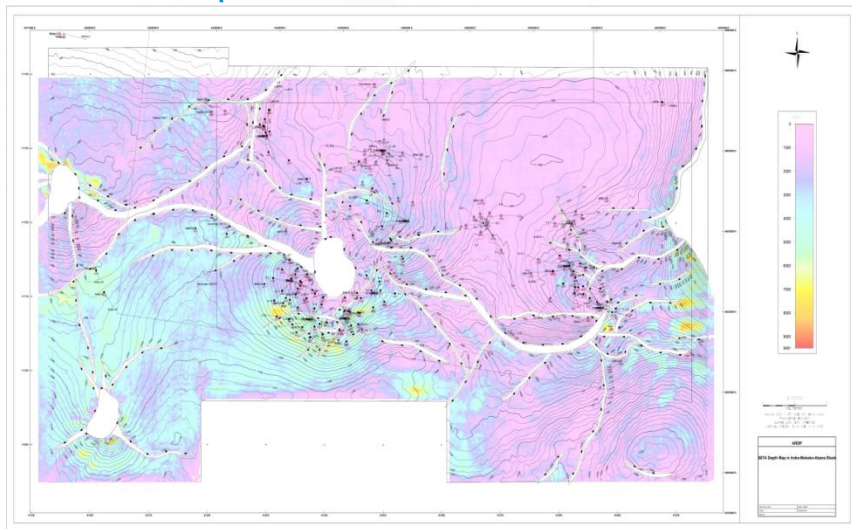
Time-Depth Conversion & Well-Tie

T-D conversion Work Flow

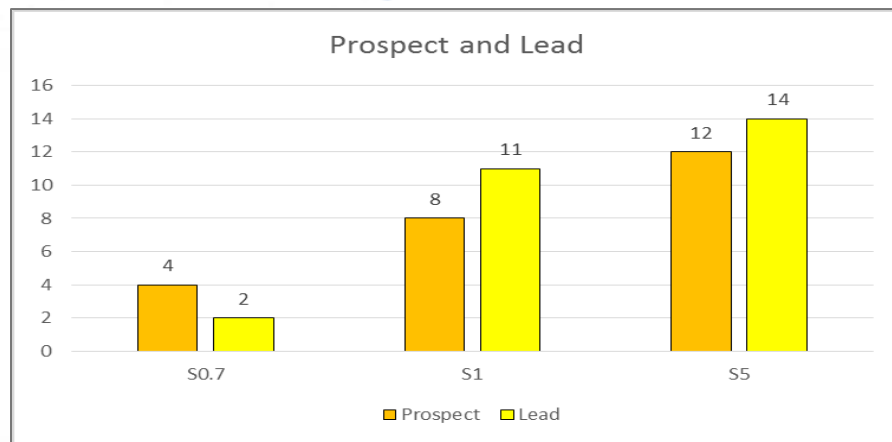
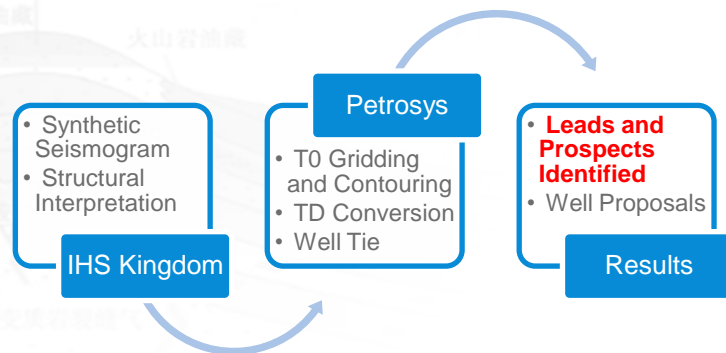


Well Name	X	Y	Z	Untied Grid	Diff Before	Tied Grid	Diff After	Correction
ABM-4	442309	464819	-2062	-2031.22	30.78	-2062.1	-0.1	-30.88
BWM-1	444168.7	467158.6	-2319	-2267.09	51.91	-2318.97	0.03	-51.88
MNMI-2	435309.6	466605.4	-1787.3	-1756.01	31.28	-1787.27	0.02	-31.26
November-1XR ST2	429776.9	462968.6	-1940	-1939.04	0.96	-1940.03	-0.03	-0.99

Leads & Prospects Identified



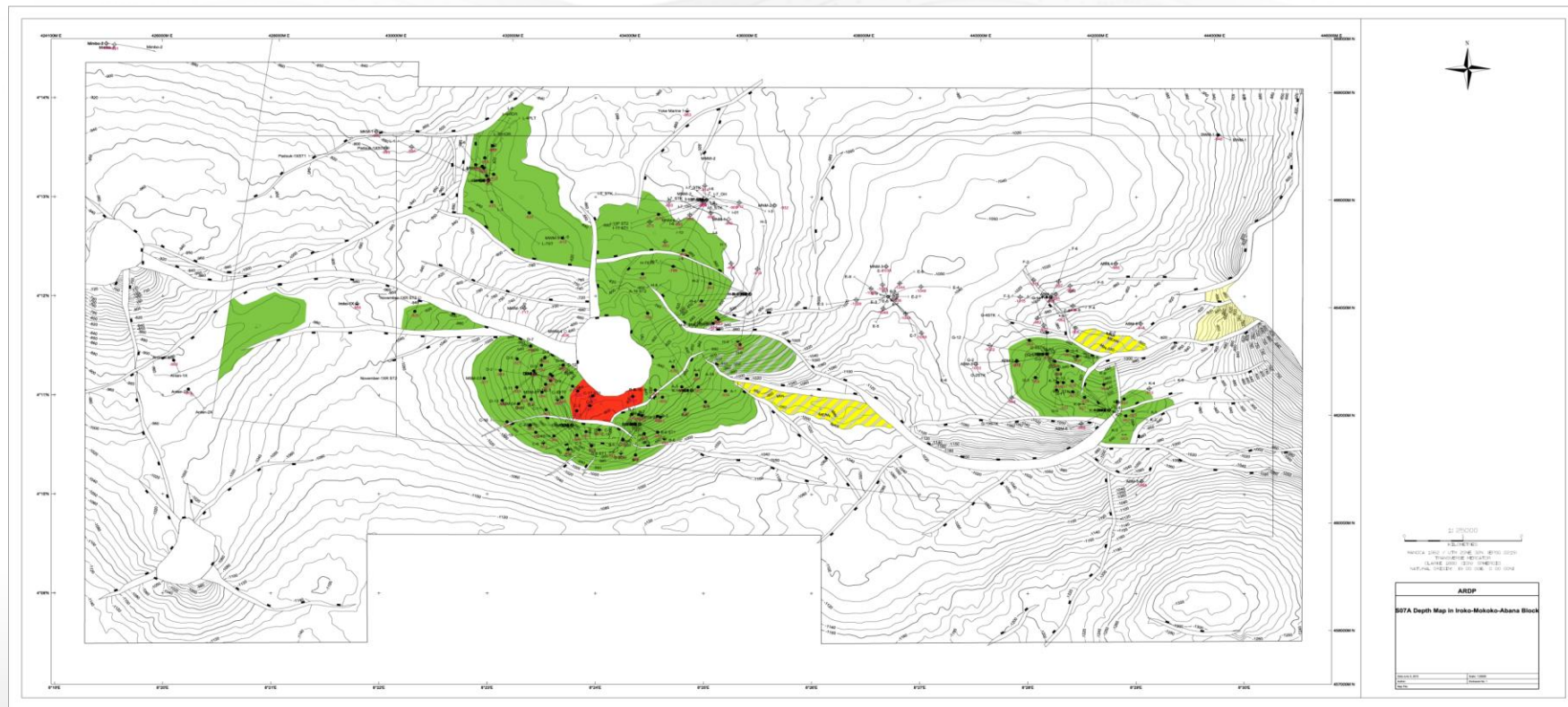
Reservoir	Prospects	Leads
S0.7	4	2
S1	8	11
S5	12	14
SUM	24	27



6 wells were proposed in this study, they penetrate the three interpreted levels with a total unrisksed OOIP of **42.8MMB** and **22.4MMB** risked.

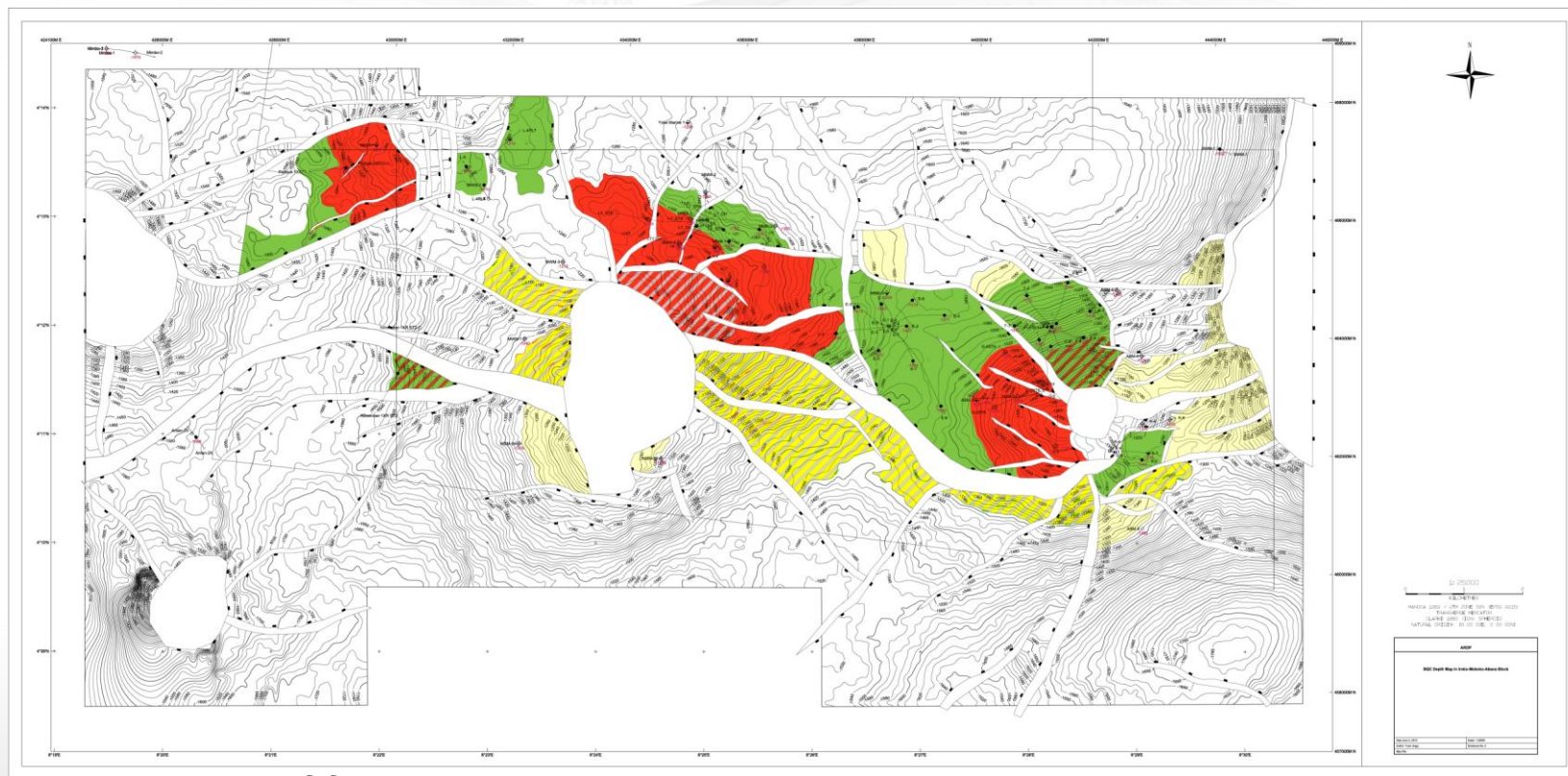
Leads and Prospects Identified

构造油藏 火山岩油藏
岩性油藏 致密油 低渗透油藏



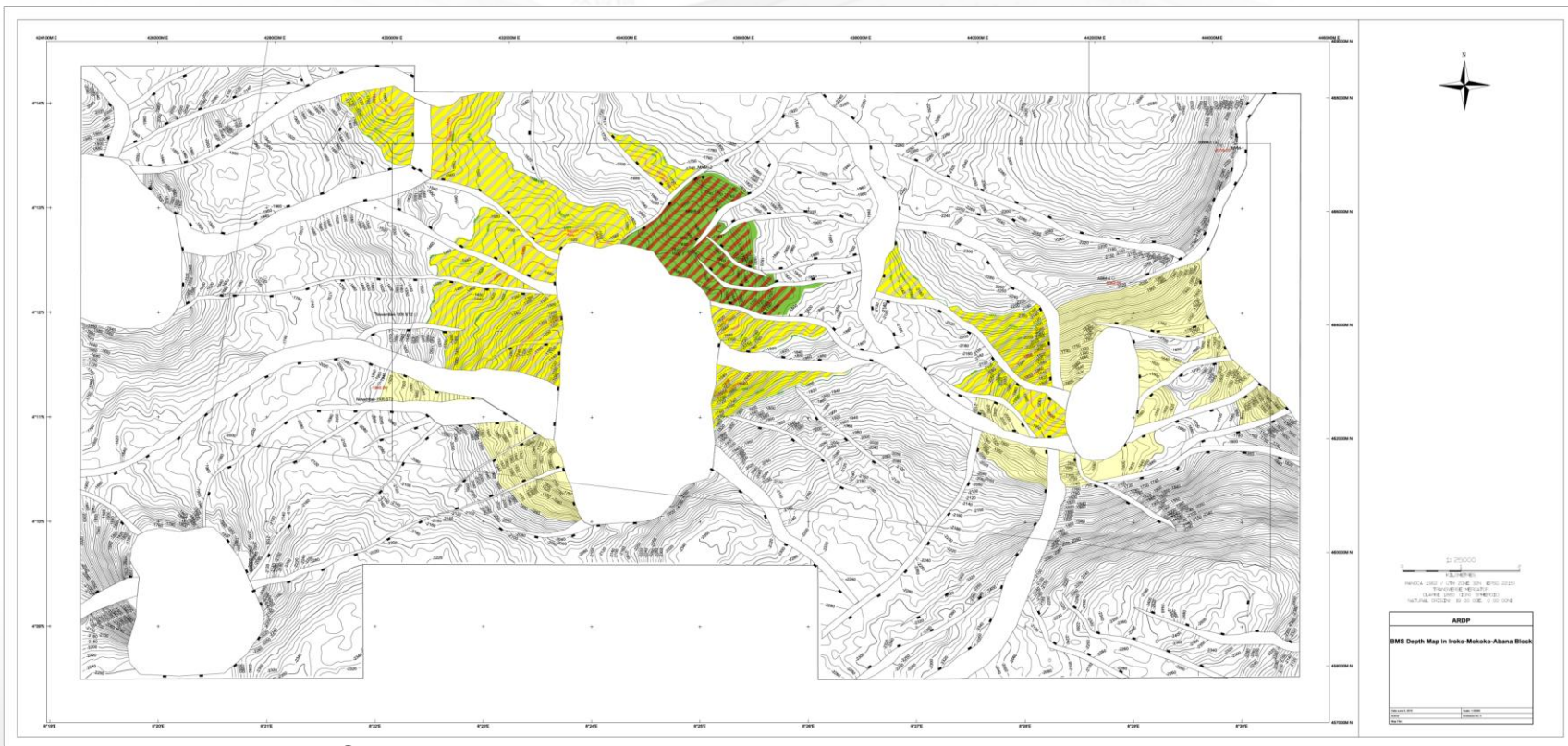
S.7A Depth Map with Discovered Hydrocarbon and Prospect Distribution

Leads and Prospects Identified



BQC Depth Map with Discovered Hydrocarbon and Prospect Distribution

Leads and Prospects Identified

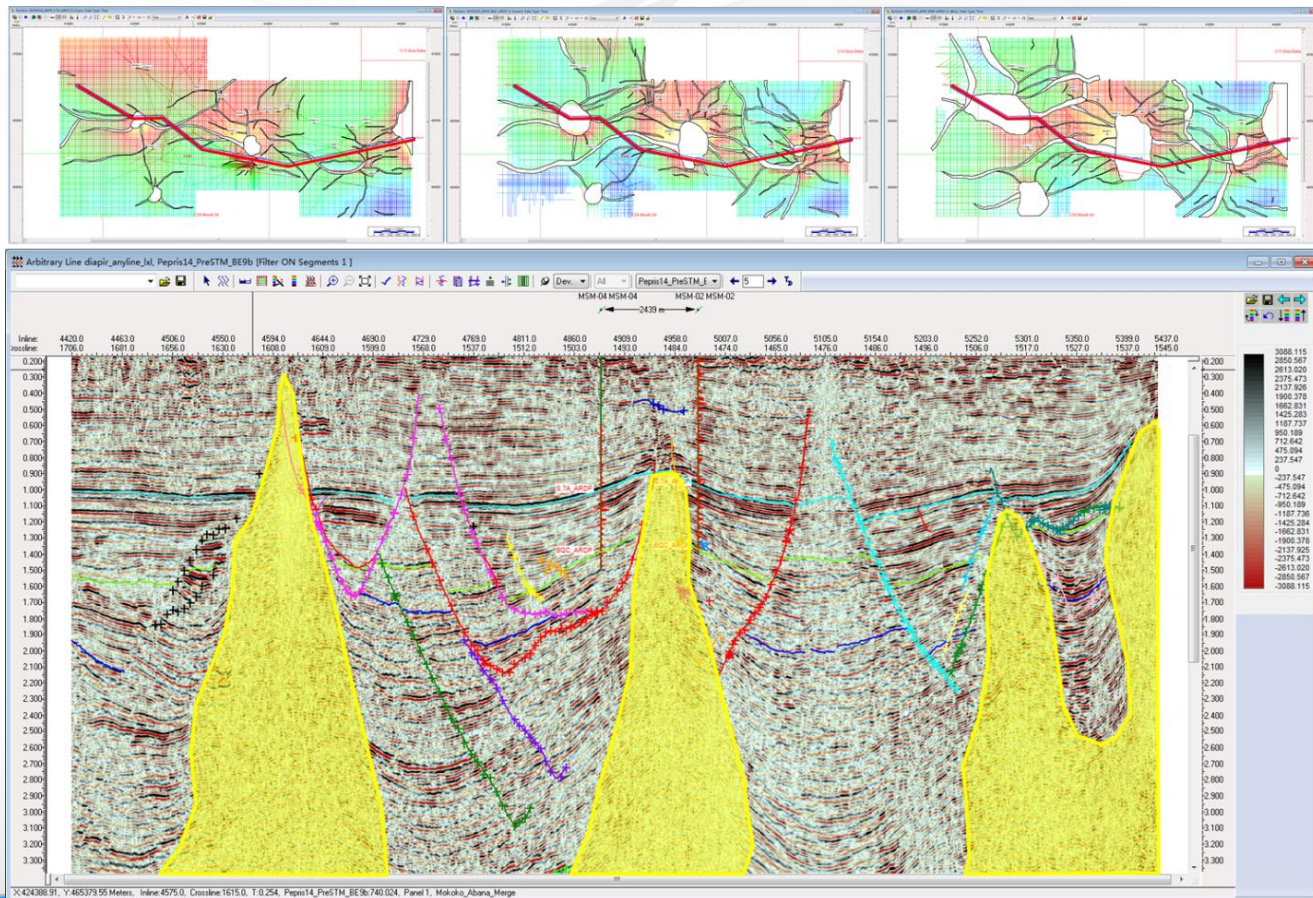


BMS Depth Map with Discovered Hydrocarbon and Prospect Distribution

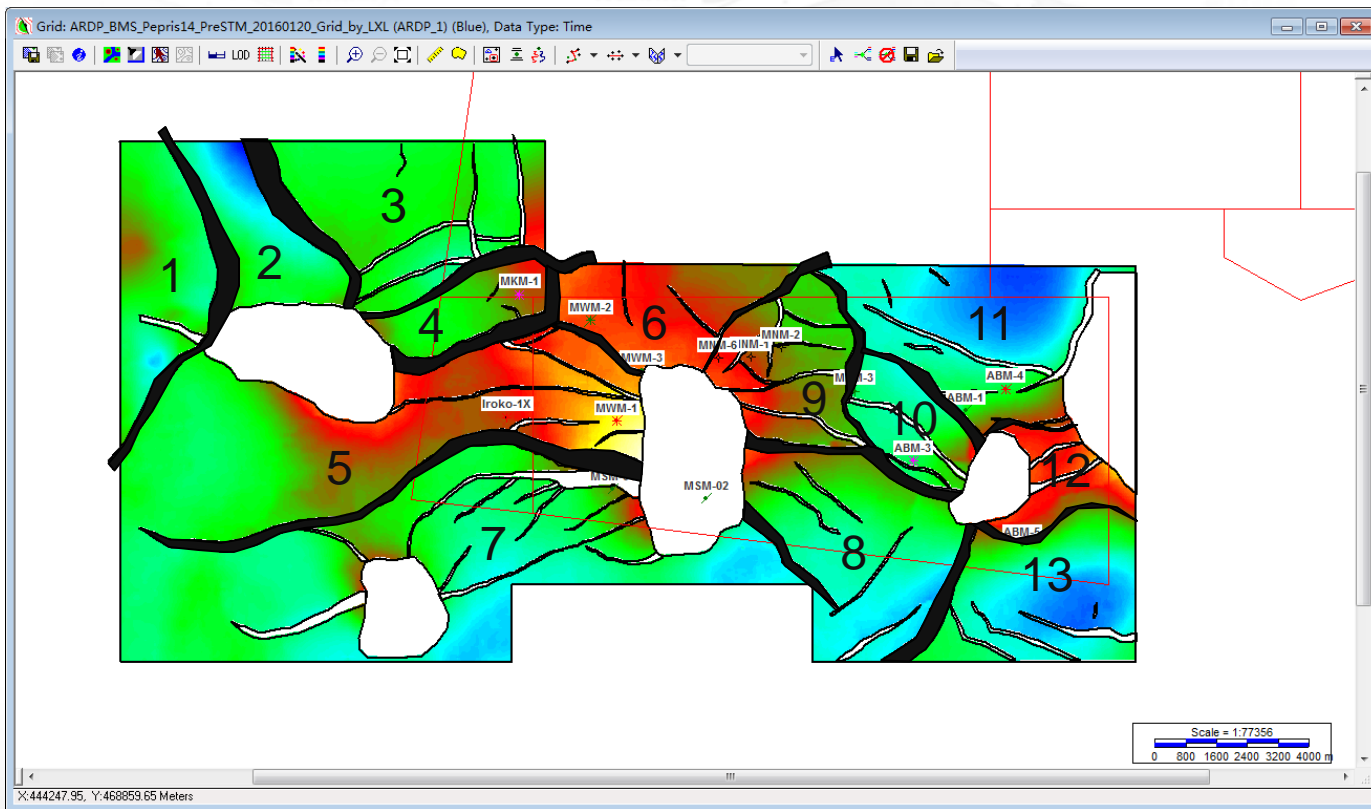
Contents

1. Introduction
2. Structural Interpretation (Workflow and Results)
3. What Was revealed by and after IMA Interpretation?!
4. Conclusions

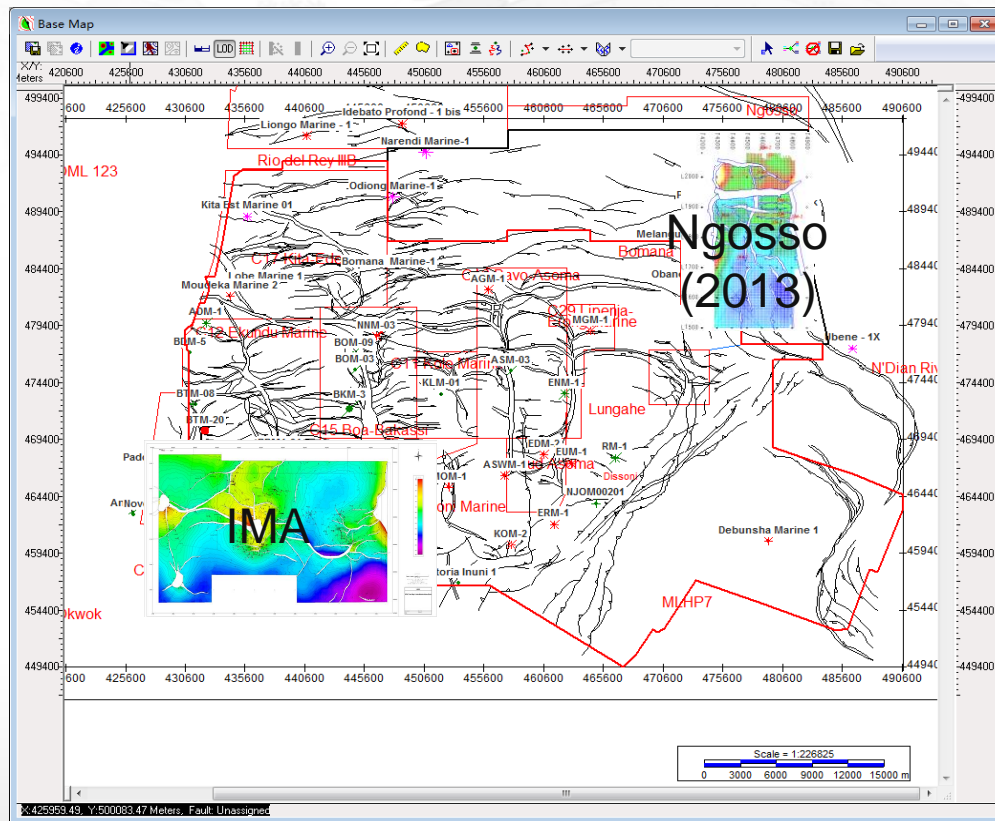
What was revealed by IMA Interpretation?!



What was revealed by IMA Interpretation?!

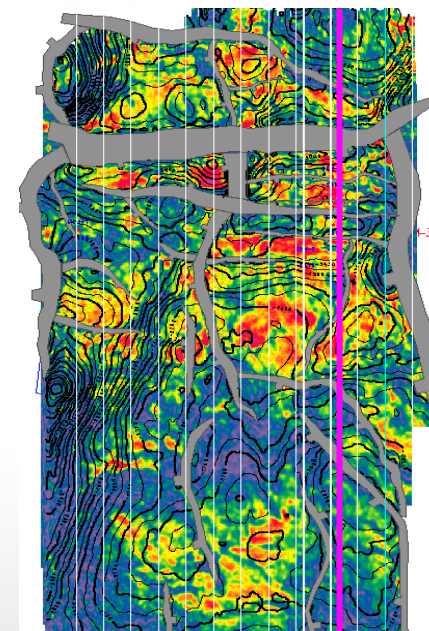
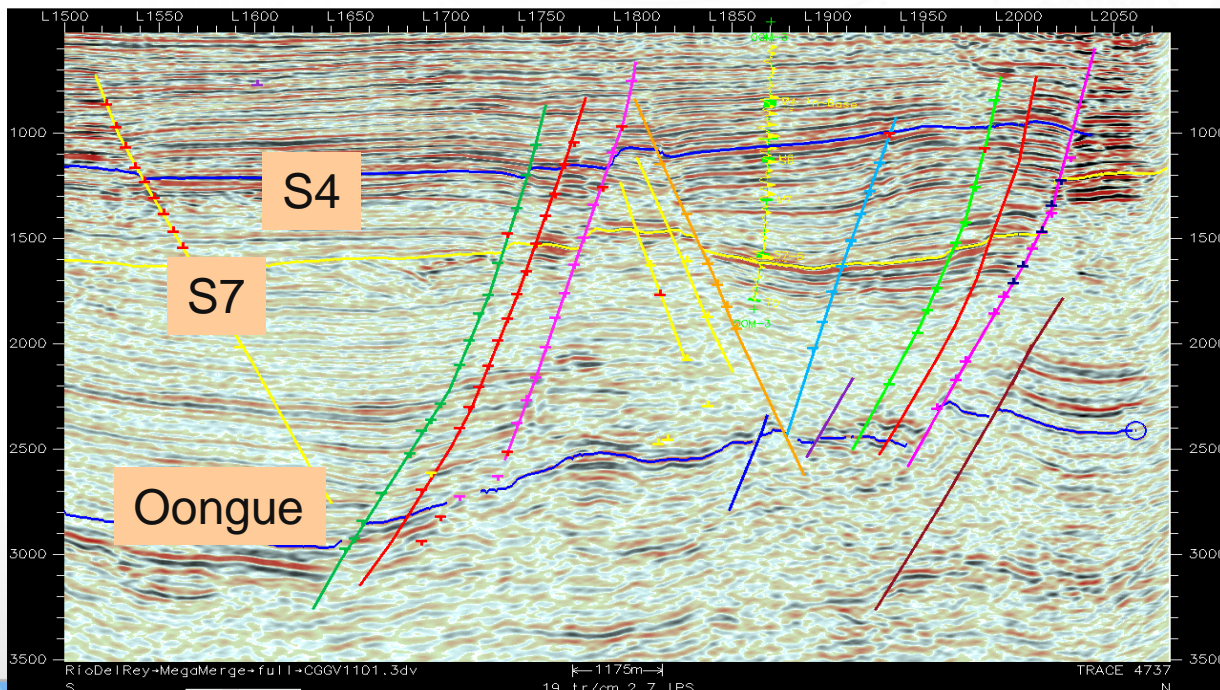
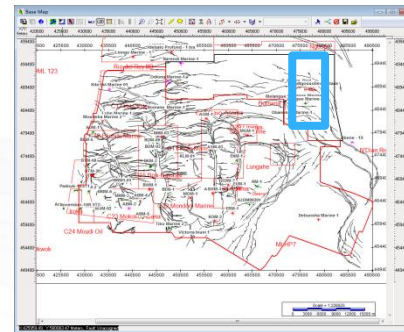


What was revealed by IMA Interpretation?!



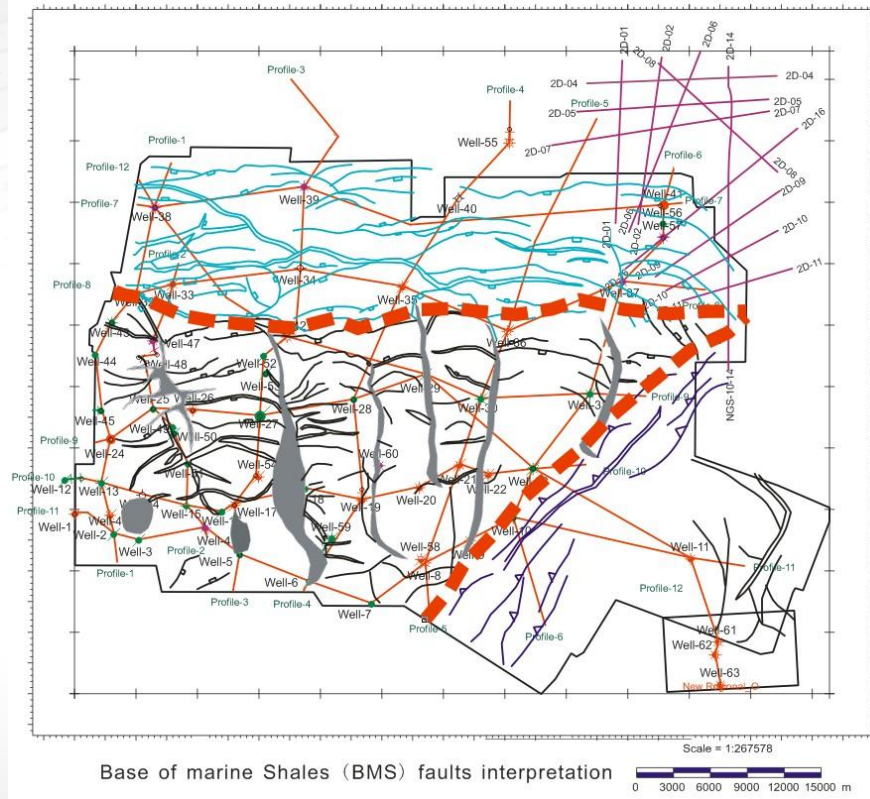
What was revealed by IMA Interpretation?!

Ngoosso's Previous work in 2013 (Deeper targets are occurred)

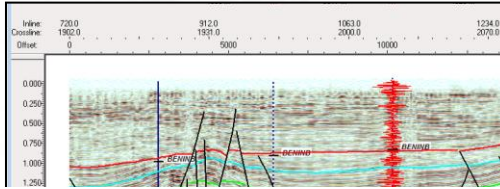


What was revealed by IMA Interpretation?!

- 12 regional profiles were Identified, intersected in 42 wells and come across 63 wells in the RDR basin. The data was obtained from two different 3D volumes and 12 2D seismic profiles.



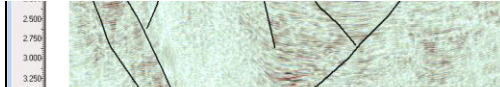
What was revealed by IMA Interpretation?!



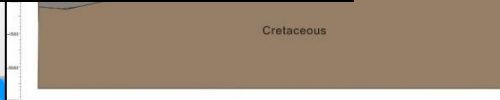
OnePetro website header and navigation menu. The page title is 'ence-paper/SPE-AFRC-2571282-MS'. The navigation menu includes 'Home', 'Journals', 'Conferences', 'Cart (0) EUR 0.00', and 'My account'. A search bar is present with the text 'Search OnePetro ...'. The currency is set to 'EUR - Euro'.

<https://www.onepetro.org/conference-paper/SPE-AFRC-2571282-MS>

Line-A



Africa ENERGY AND TECHNOLOGY CONFERENCE
SPE/AAPG Africa Energy and Technology Conference
5 - 7 Dec 2016 | Safari Park Hotel | Nairobi City, Kenya



Regional Geological Study and Potential Prediction of the Rio Del Rey Basin (RDR), Offshore Cameroon

Authors Khalid O. Altayeb (Sinopec Exploration & Production Research Institute) | Su Yushan (Sinopec Exploration & Production Research Institute) | Wu Shixiang (Sinopec Exploration & Production Research Institute) | Chen Zhankun (Sinopec Exploration & Production Research Institute)

DOI <https://doi.org/NA>
Document ID SPE-AFRC-2571282-MS
Publisher Society of Petroleum Engineers
Source SPE/AAPG Africa Energy and Technology Conference, 5-7 December, Nairobi City, Kenya

Publication Date 2016
[Show more detail](#) [View rights & permissions](#)

[Get PDF](#) [Export citation](#) [Save item](#)

Abstract

Located in the eastern end of Niger delta, the Rio Del Rey (RDR) basin has a unique, complex multi-staged geological features and different types of Structures. This study has aimed to better understand the different structural and stratigraphic setting of the fields within the RDR basin and the way they control the hydrocarbon occurrences. To do that, an integrated 2D and 3D seismic interpretation was done targeting the toe thrust boundary, the upper Cretaceous unconformity and four key horizons of different depth levels in the Tertiary formations. Twelve regional profiles of contrastive orientations that cover the whole basin were interpreted to identify the regional structures; well correlation was done to identify the shallower tertiary settings while additional detailed grids of interpretation at the

Other Resources

Looking for more?
Some of the OnePetro partner societies have developed subject-specific wikis that may help.

PetroWiki
PetroWiki was initially created from the seven volume Petroleum Engineering Handbook (PEH) published by the Society of Petroleum Engineers (SPE).

SEG Wiki
The SEG Wiki is a useful collection of information for working geophysicists, educators, and students in the field of geophysics. The initial content has been derived from : Robert E. Sheriff's Encyclopedic Dictionary of Applied Geophysics, fourth

Contents

1. Introduction
2. Structural Interpretation (Workflow and Results)
3. What Was revealed by IMA Interpretation?!
4. Conclusions

Results Obtained from the IMA G&G Study:

- Further insight in the geological situation of the work area in the frame of the Regional Geology and sands distribution.
- Detailed insight with relation to additional development potential in the reservoirs potential around the shale diaper.
- The results have brought further questions regarding other potential areas in the whole Rio Del Rey (RDR) Basin; what lead to bigger studies and discoveries.
- Better Understanding of the Geological and Structural Evolution of the RDR basin.

Results Uncertainties

- **Merged Seismic Data Quality** could have its effect on the structural interpretation quality, especially at the deeper events and along the merging boundaries.
- **The reservoirs top picking** were following either a trough (As in S.7A and BQC) or a peak (as in BMS but this was not the case all the time. The reservoir tops could follow a strong event, weak event or even a half-event depending on the reservoir thickness and fluids content and also due to the merged data parameters mismatching, therefore it was not easy to pick the exact top all the time. The Merged seismic data set quality.
- **Using Well Data's Polynomial function** for Time-depth conversion may not be applicable for the whole area, especially around shale diapirs.

