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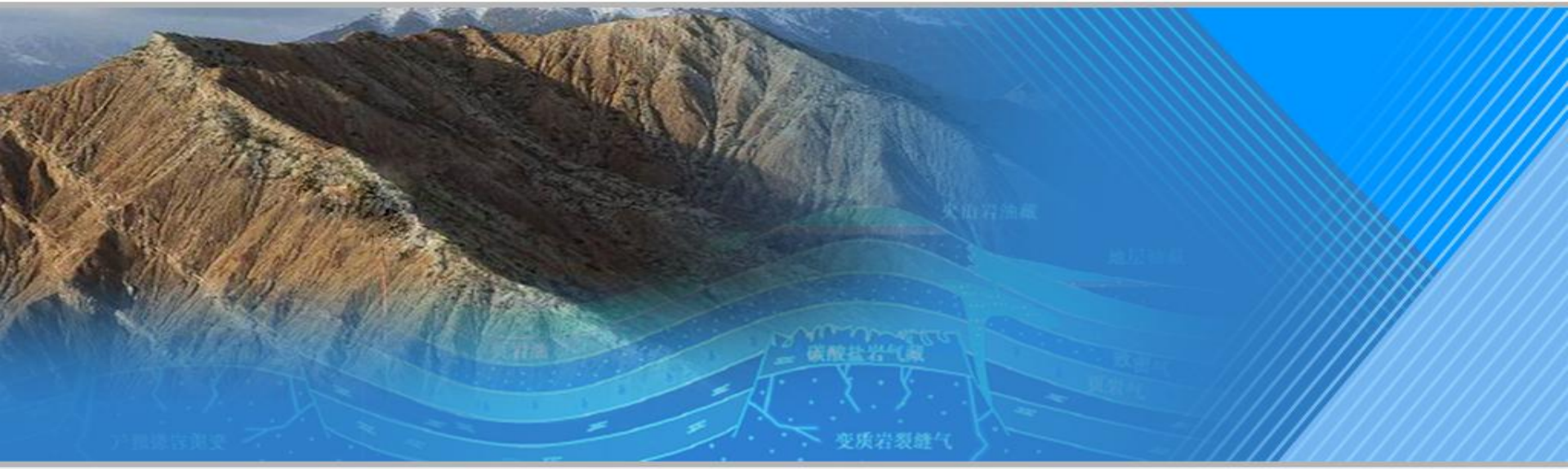
Seismic Interpretation and Structural Identification of Iroko – Mokoko - Abana Fields (IMA)

Rio Del Rey Basin (RDR), Offshore Cameroon



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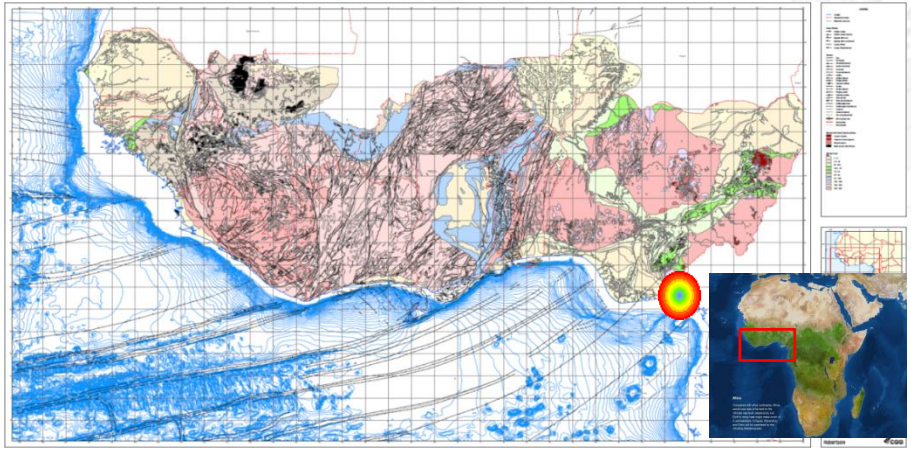
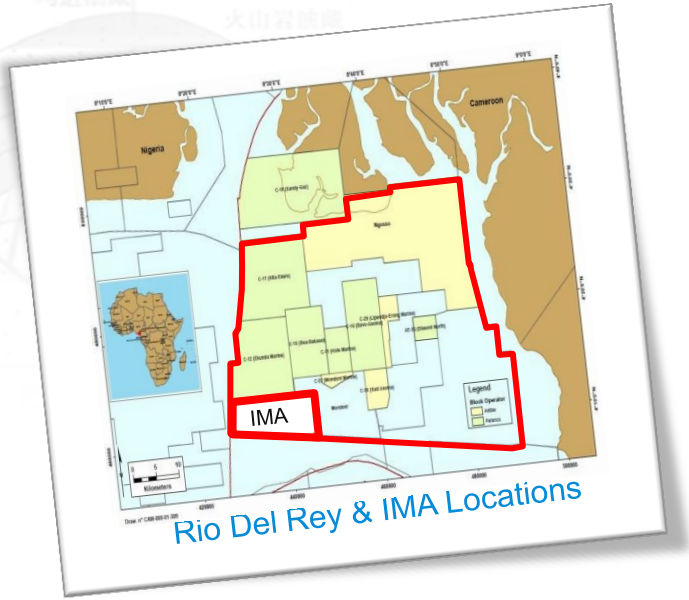
Overview



Geology & Structural Elements, CGG 2014



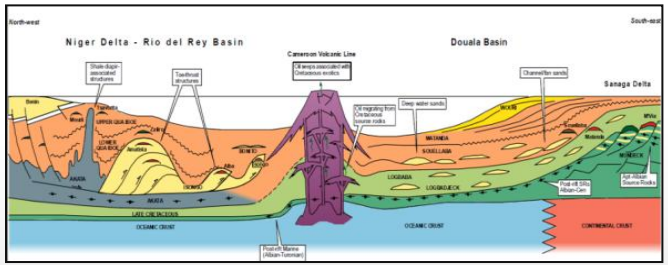
Scope of Work Study

- 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.

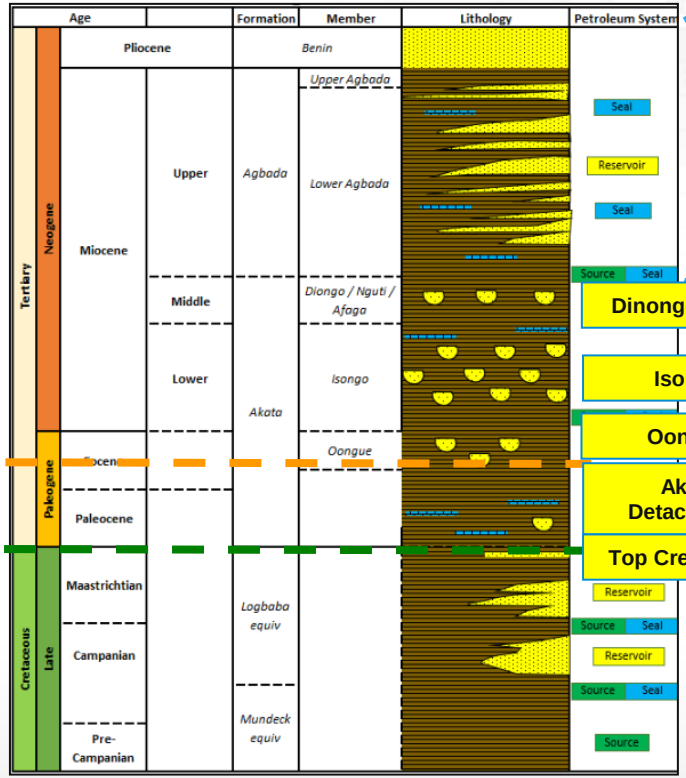
Methodology

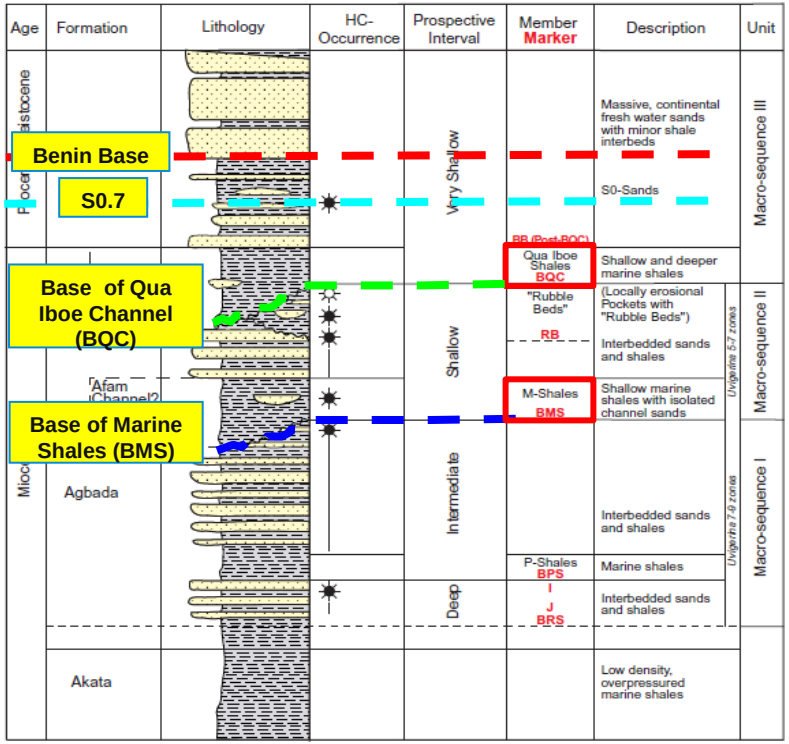
- Interpret the structures and key reservoir tops in Iroko-Mokoko-Abana (SW of RDR)

24,108 acres (97.56 Km^2)



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

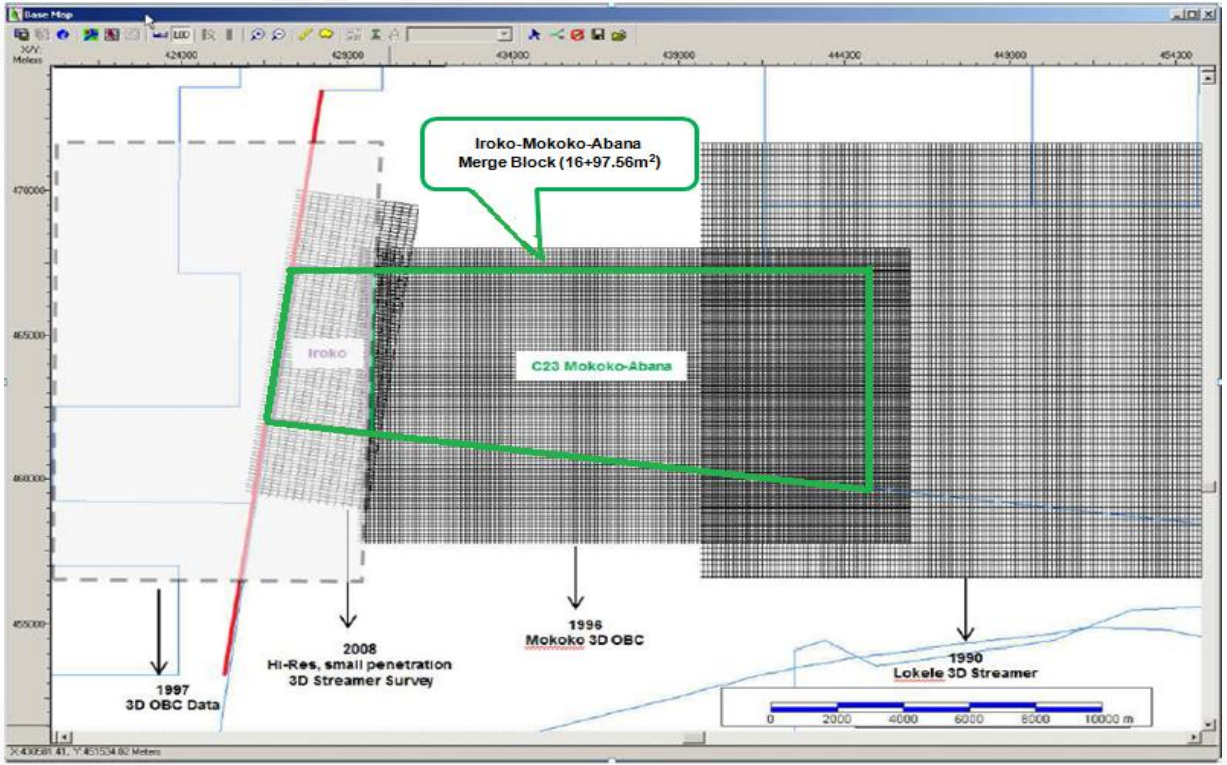
Data Sets Available

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.

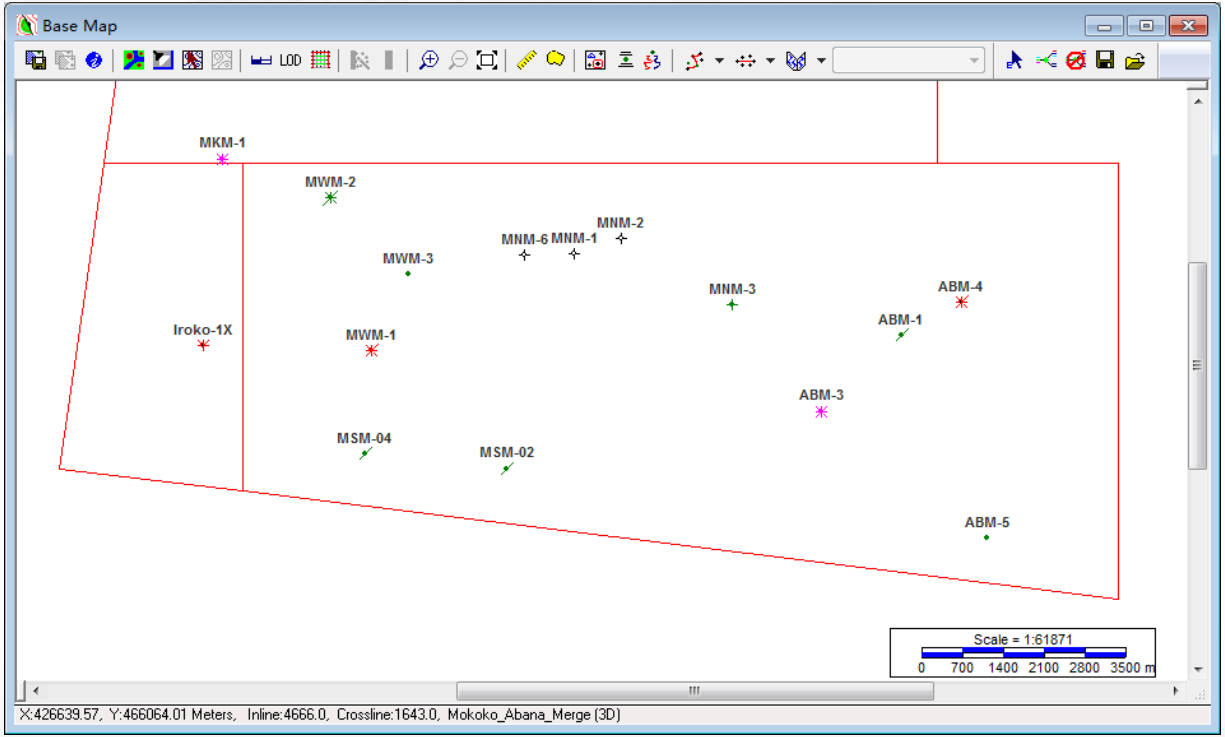


Pepris14_PreSTM_Be9b

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.



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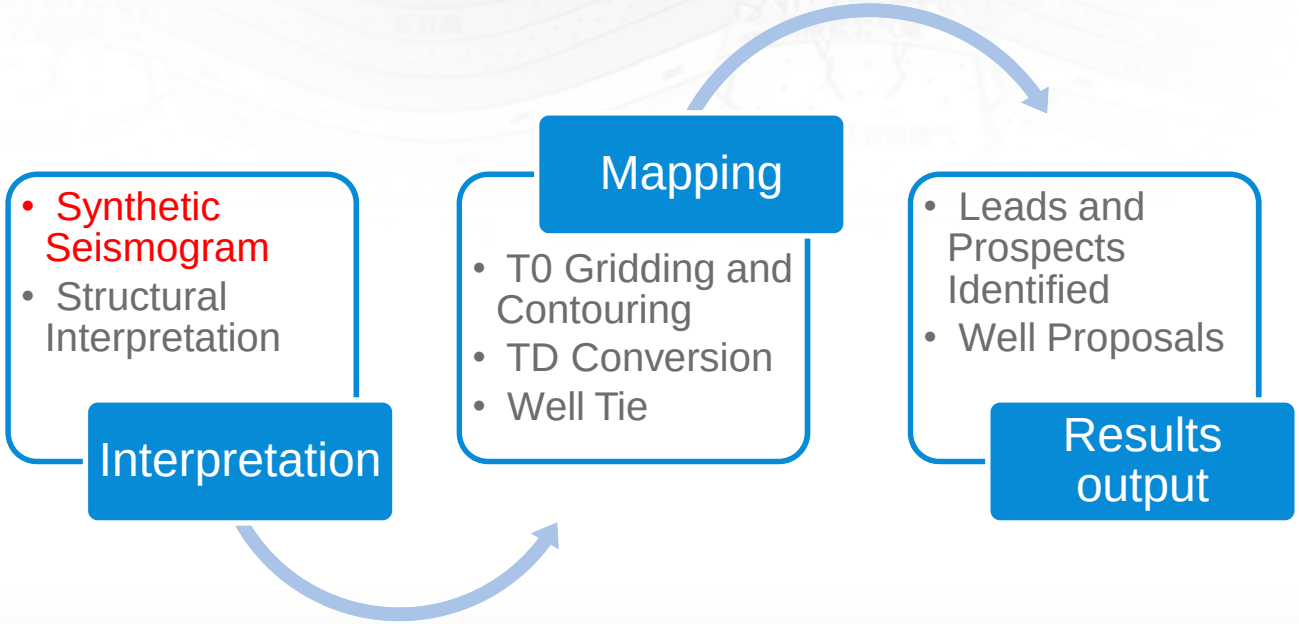
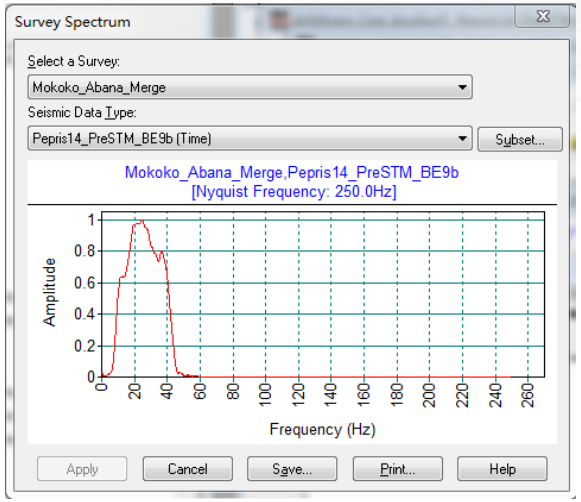
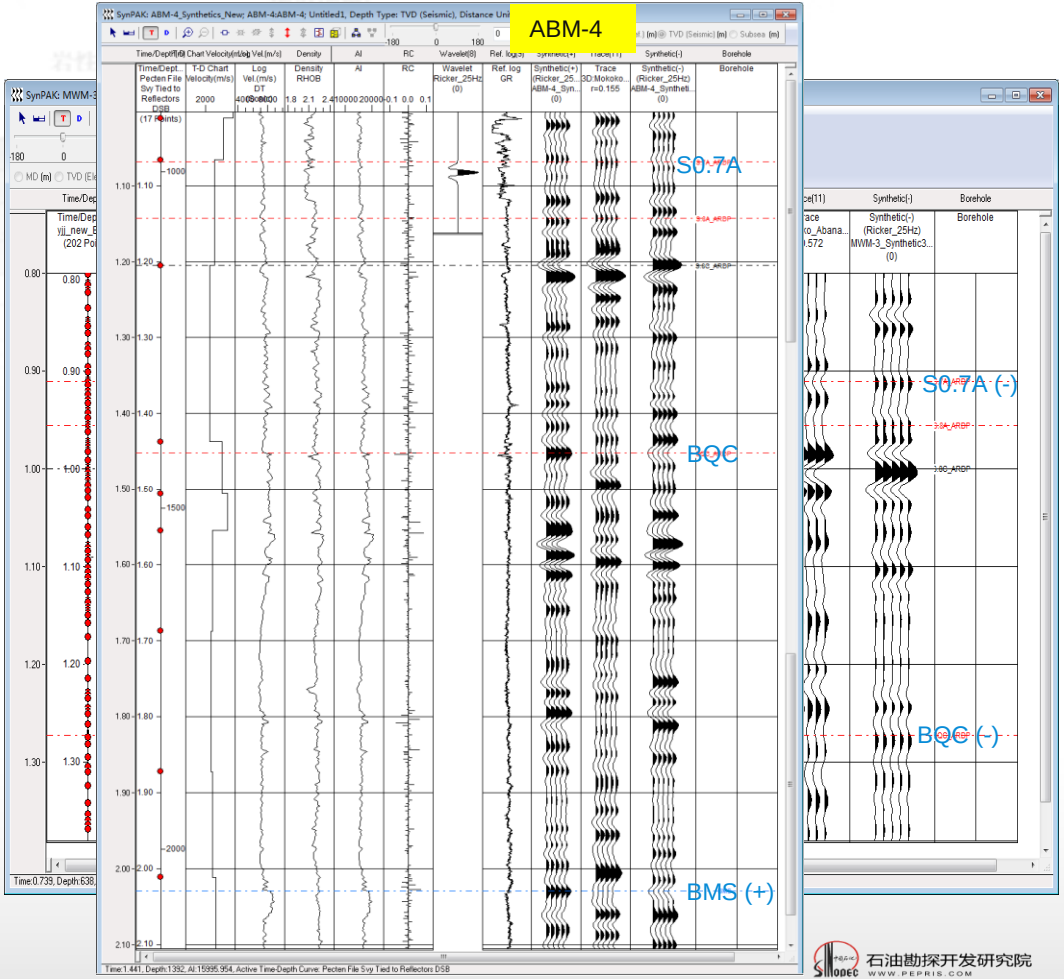
Workflow


Synthetic Seismogram
Structural Interpretation
Interpretation
Mapping
T0 Gridding and Contouring
TD Conversion
Well Tie
Leads and Prospects Identified
Well Proposals
Results output

Synthetic Seismogram

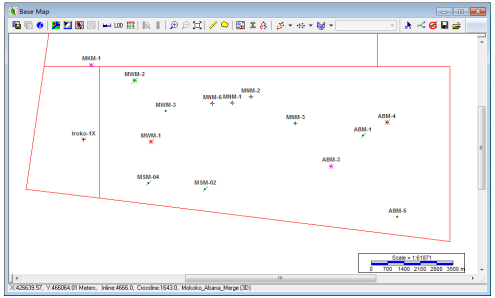


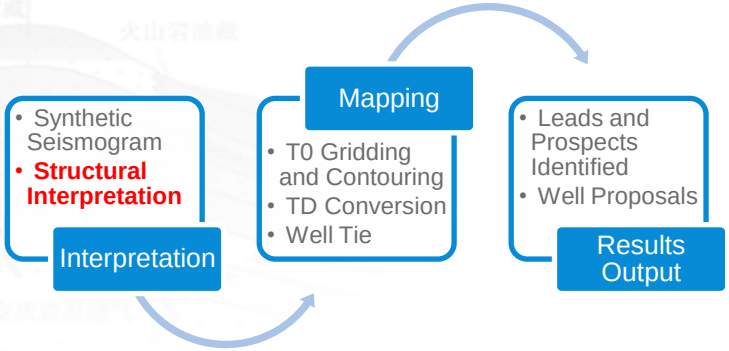
Survey Spectrum analysis of the Pepris14_PreSTM_Be9b data set



Structural Interpretation

1. Six key profiles interpretation

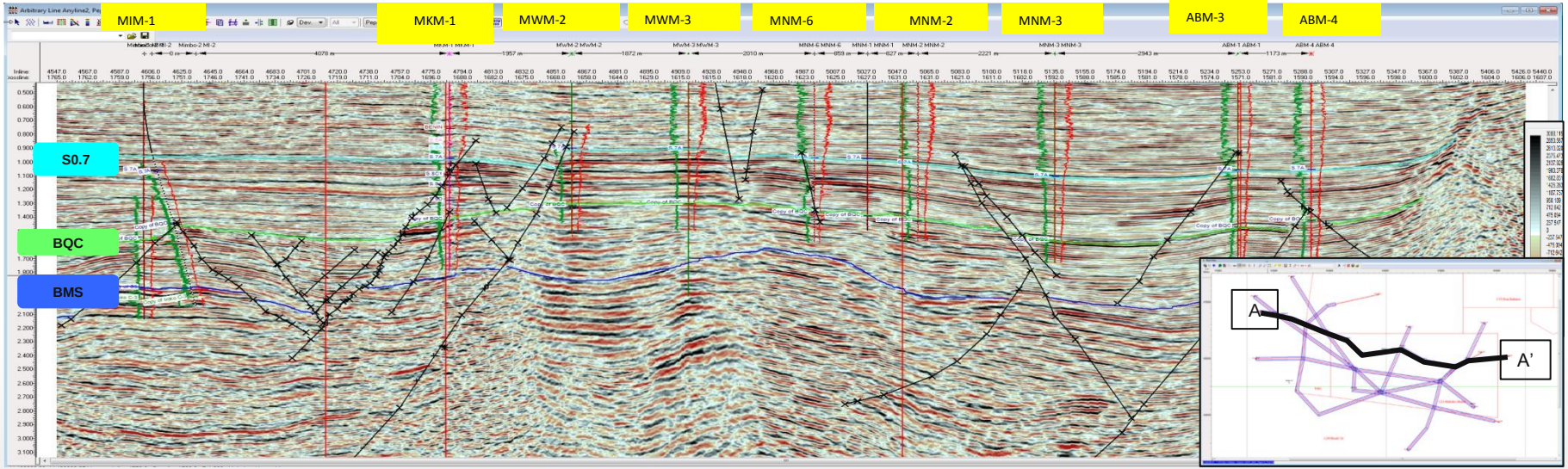




A

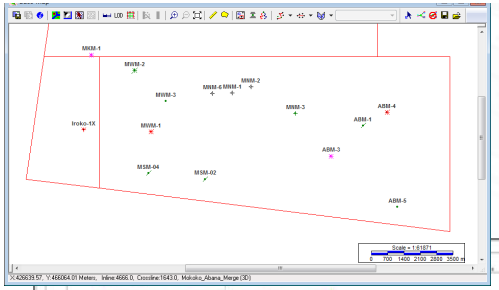
Profile No. 1

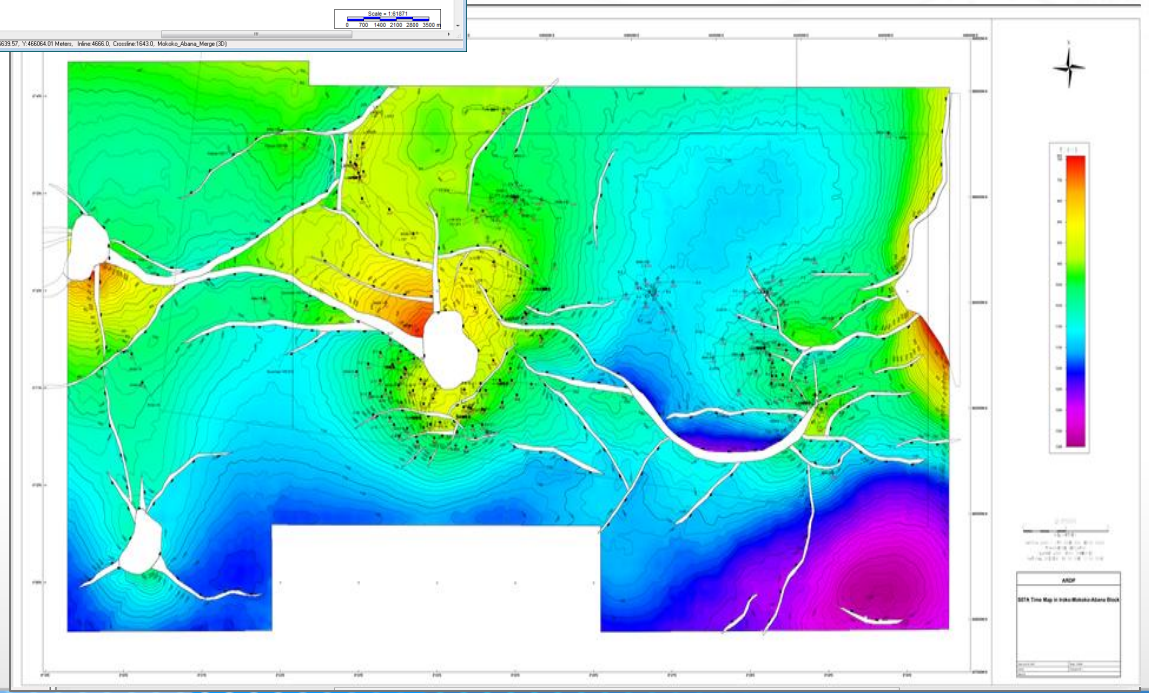
A'

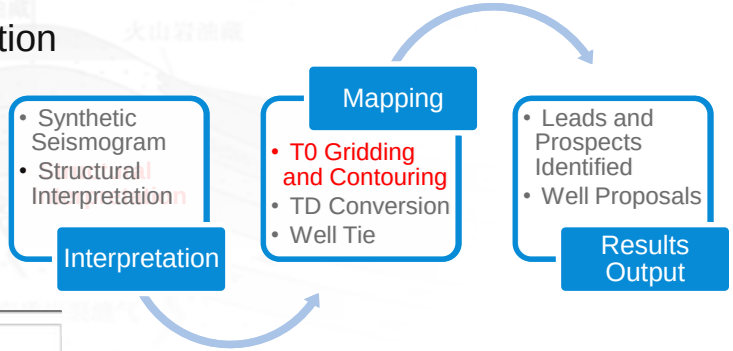


T0 Gridding and Contouring

Fault sets and horizons interpretation







a) Confirm the structural setting

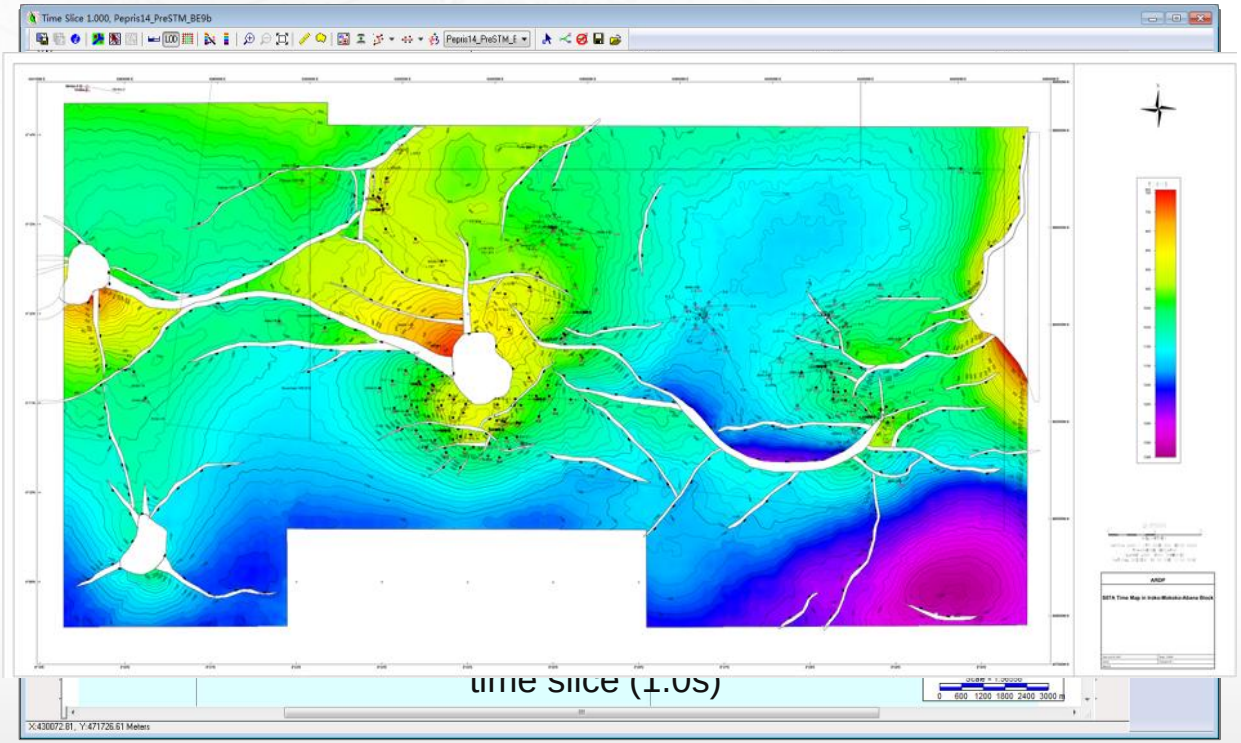
b) 5*5 spread interpretation

T0 Gridding and Contouring

S.7A Horizon Interpretation/TWT Mapping

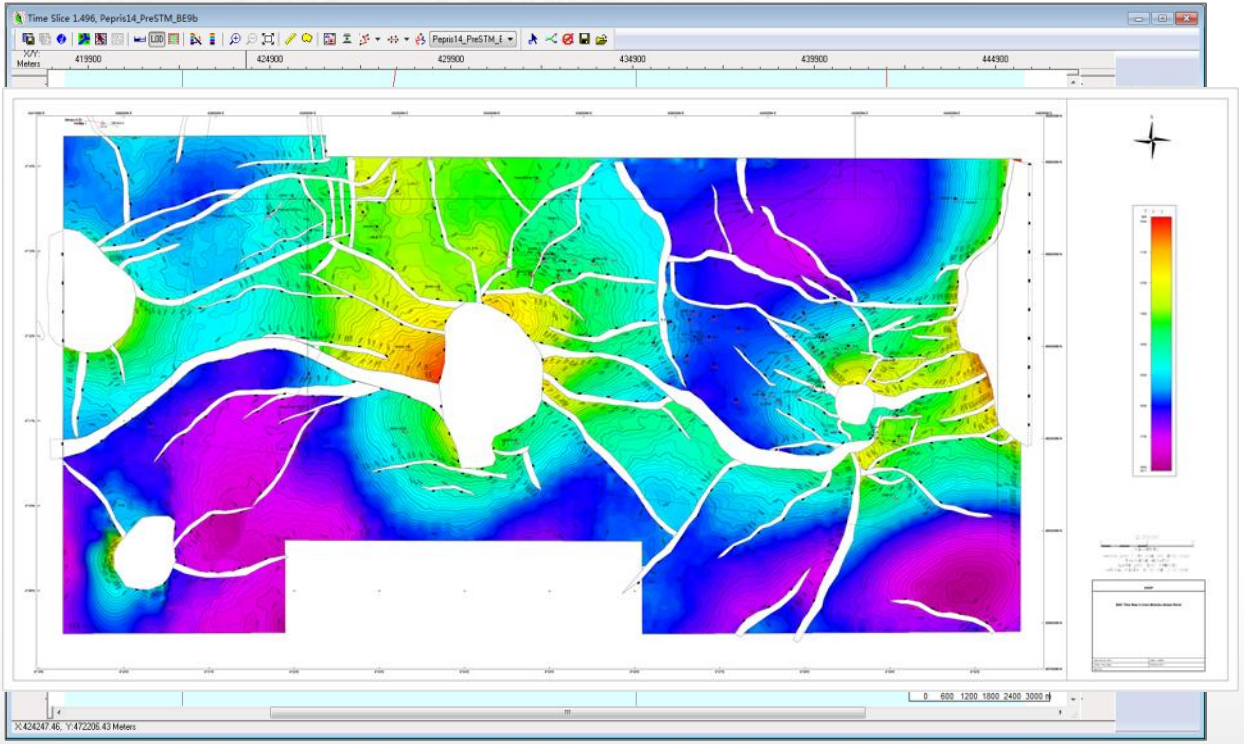
S0.7A Picking Area:280km^2 Grid: 5*5 line Fault Polygon:61

- 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.



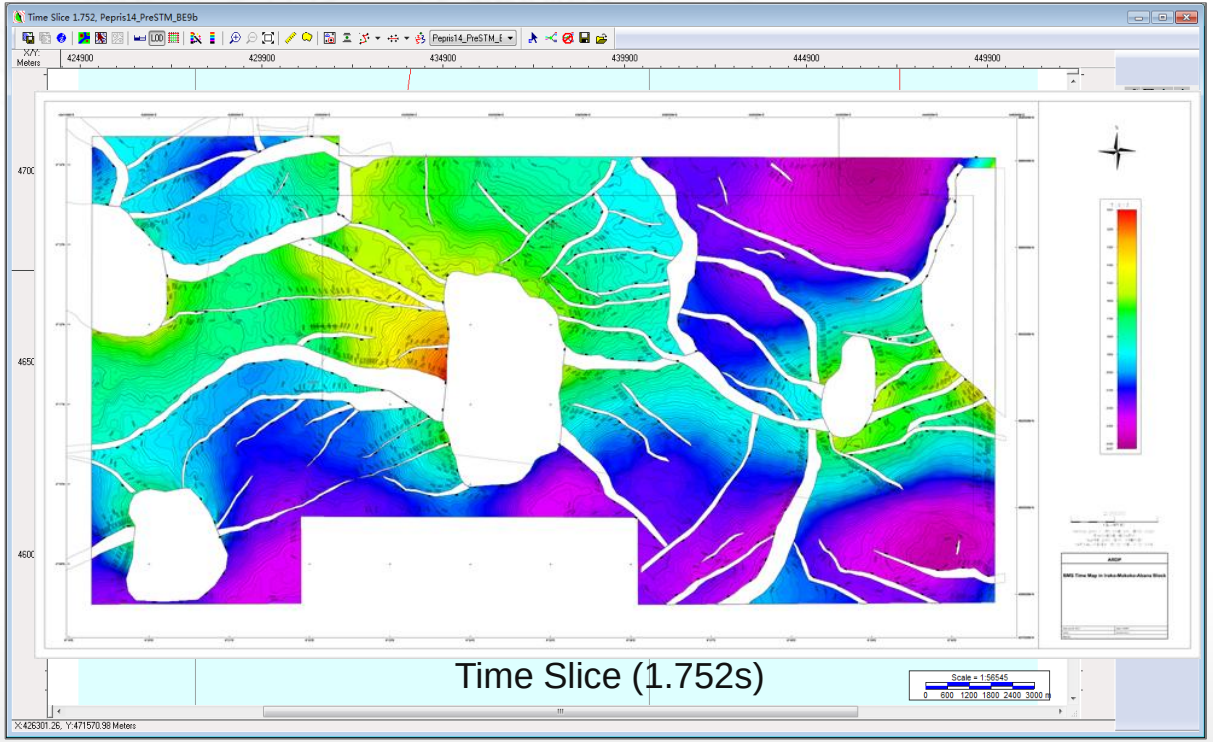
BQC Picking Area:280km^2 Grid: 5*5 line Fault Polygons:92

- 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



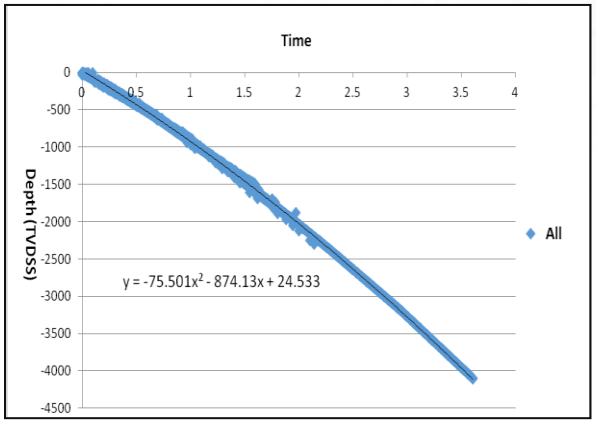
BMS Picking Area:280km^2 Grid: 5*5 line Fault Polygons:69

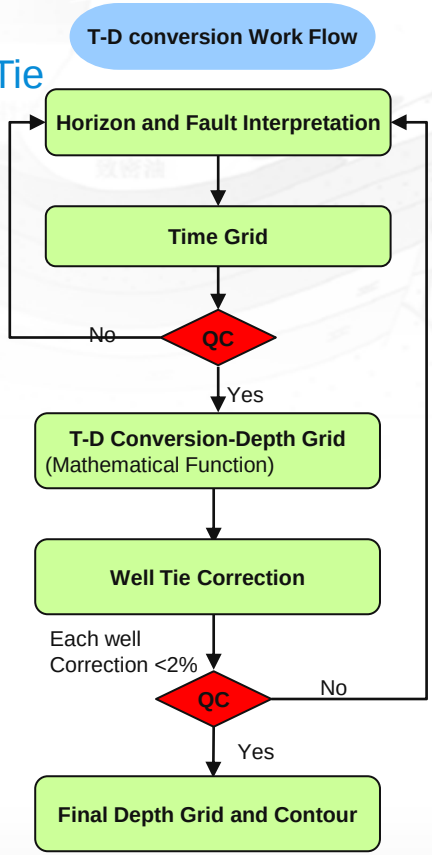
- Transgressive marine shale that lies in the deepest level of the Macro-Sequence III of the Tertiary sediments. Like the BQC, it is also a regional marker unconformity but only few wells have been drilled down to its level.
- The shale diapirs appear wider in the interpretation compared to the S.7A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

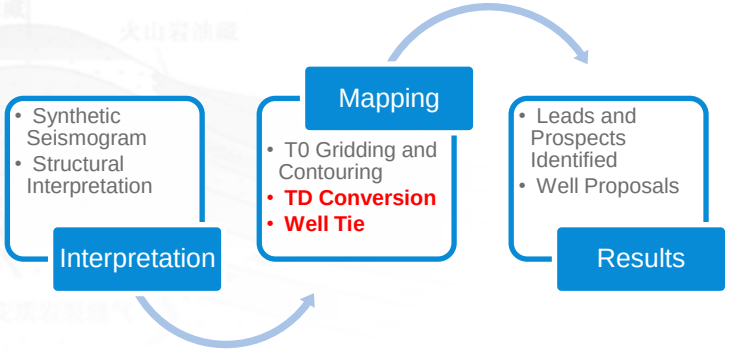


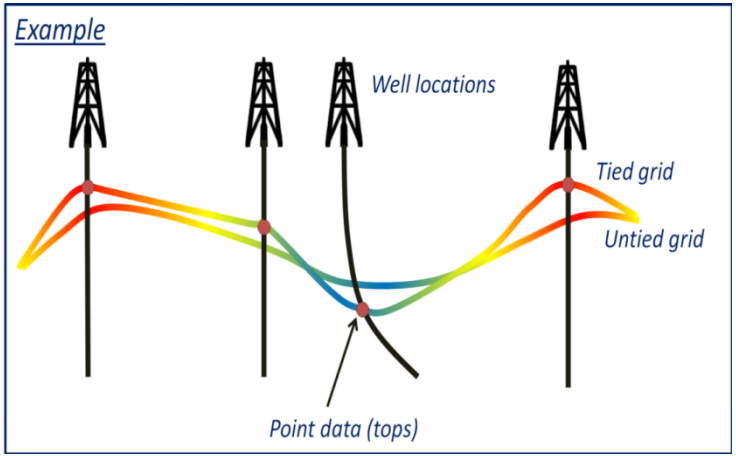
Time Slice (1.752s)

Time-Depth Conversion & Well-Tie



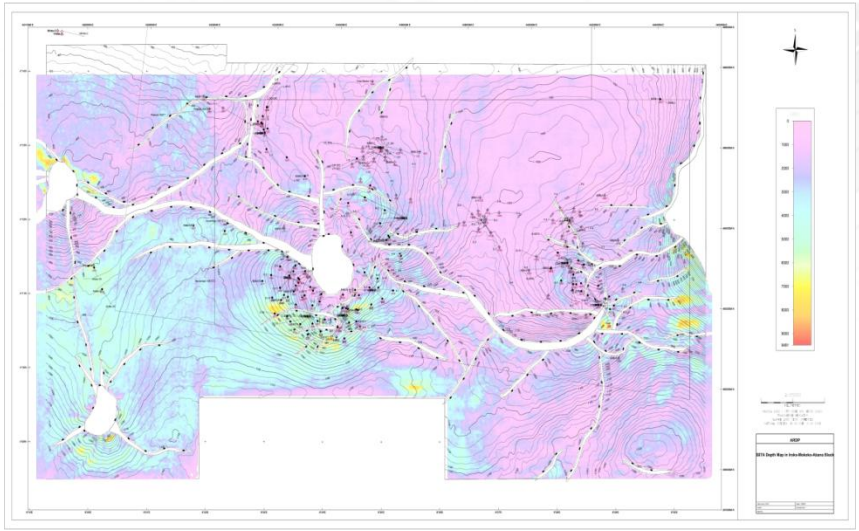


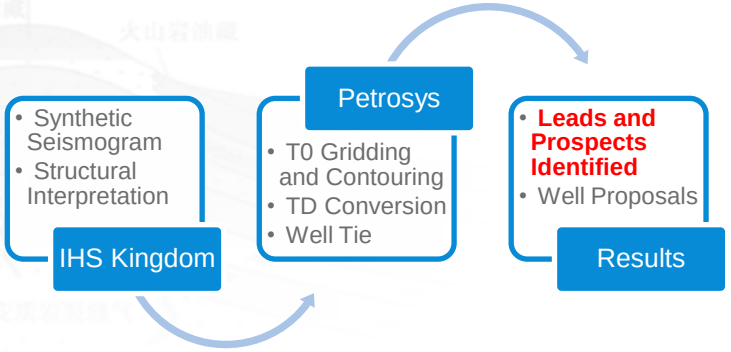


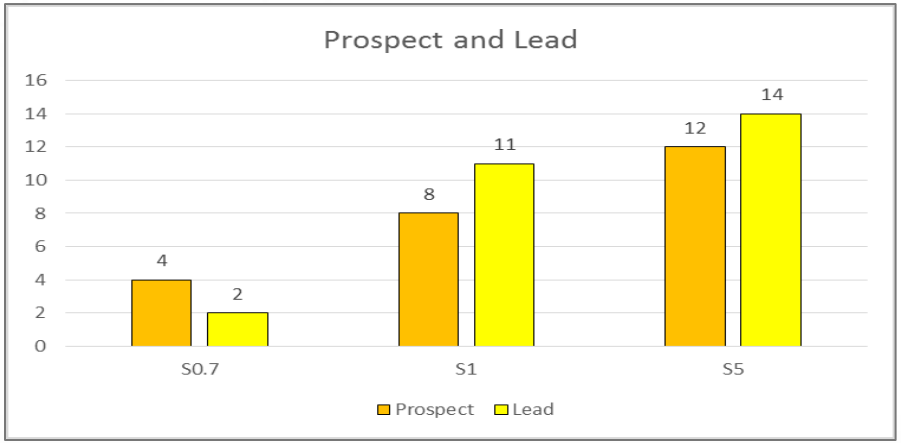


Well Name	X	Y	Z	Untied Grid	Diff Before	Tied Grid	Diff After	Correction
ABM-4	442309	464819	-2062	-2031.22	30.78	-2062.1	-0.1	-30.88
BWM-1	444168.7	467158.6	-2319	-2267.09	51.91	-2318.97	0.03	-51.88
MNMI-2	435309.6	466605.4	-1787.3	-1756.01	31.28	-1787.27	0.02	-31.26
November-1XR ST2	429776.9	462968.6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

Leads & Prospects Identified



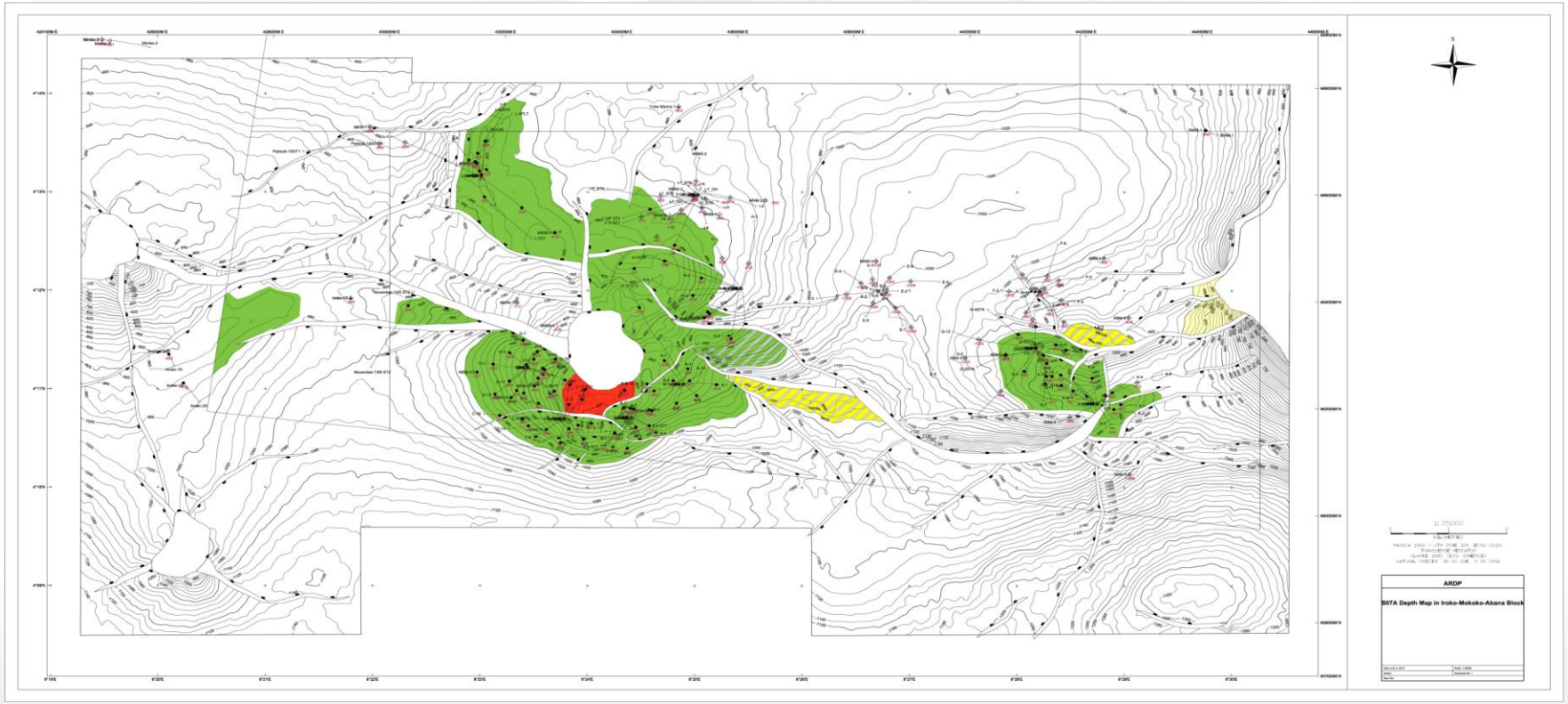




Reservoir	Prospects	Leads
S0. 7	4	2
S1	8	11
S5	12	14
SUM	24	27

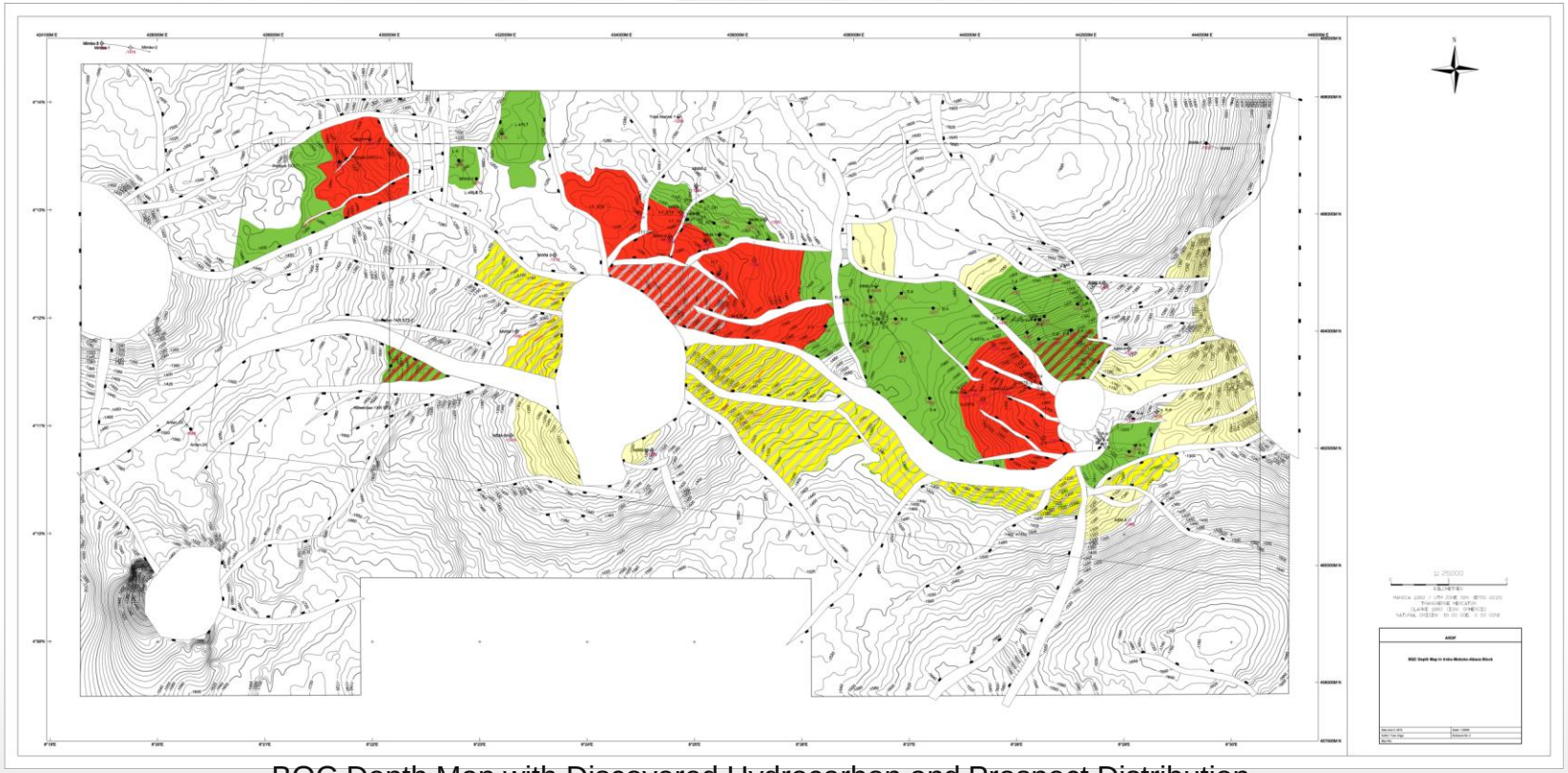
6 wells were proposed in this study, they penetrate the three interpreted levels with a total unrisked OOIP of 42.8MMB and 22.4MMB risked.

Leads and Prospects Identified



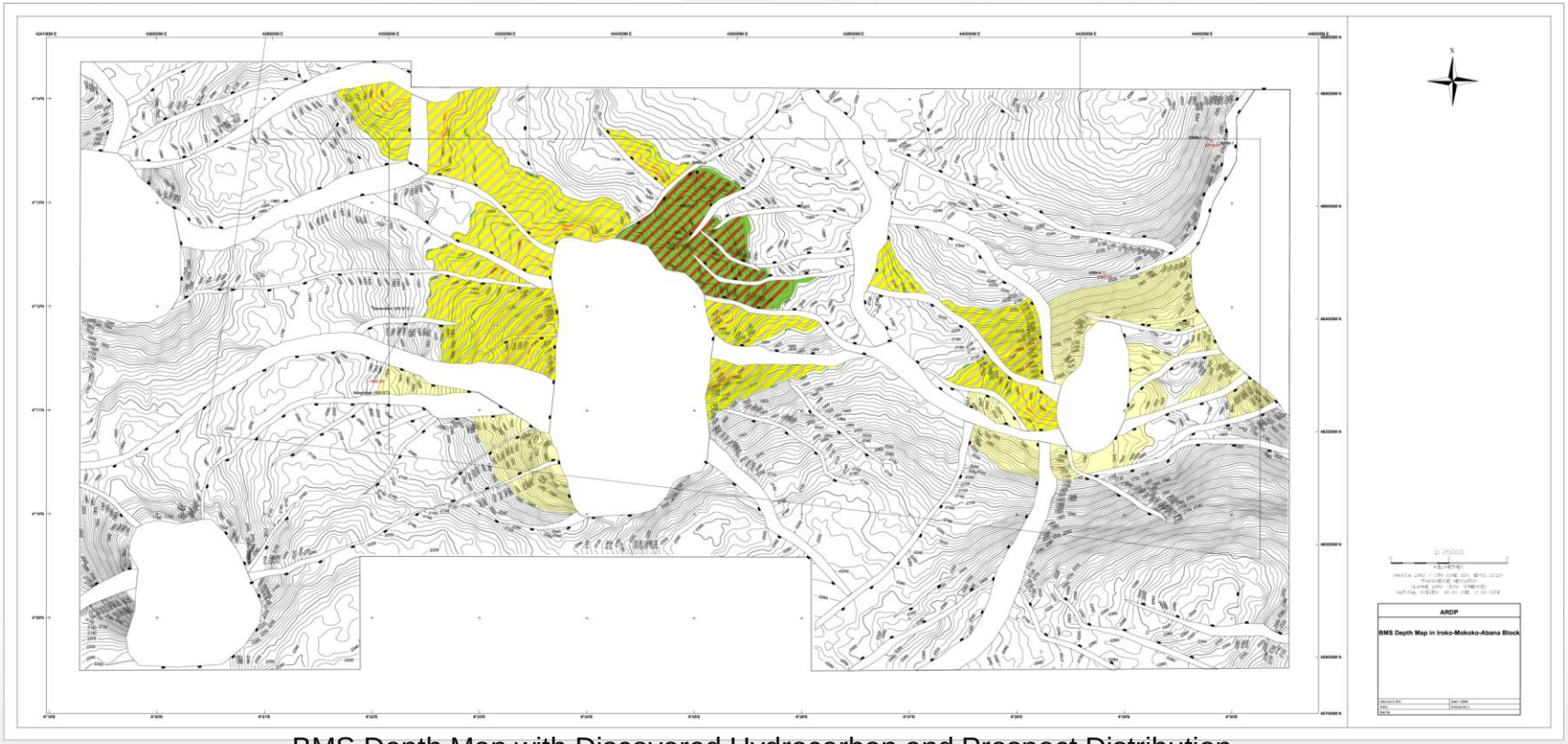
S.7A Depth Map with Discovered Hydrocarbon and Prospect Distribution

Leads and Prospects Identified



BQC Depth Map with Discovered Hydrocarbon and Prospect Distribution

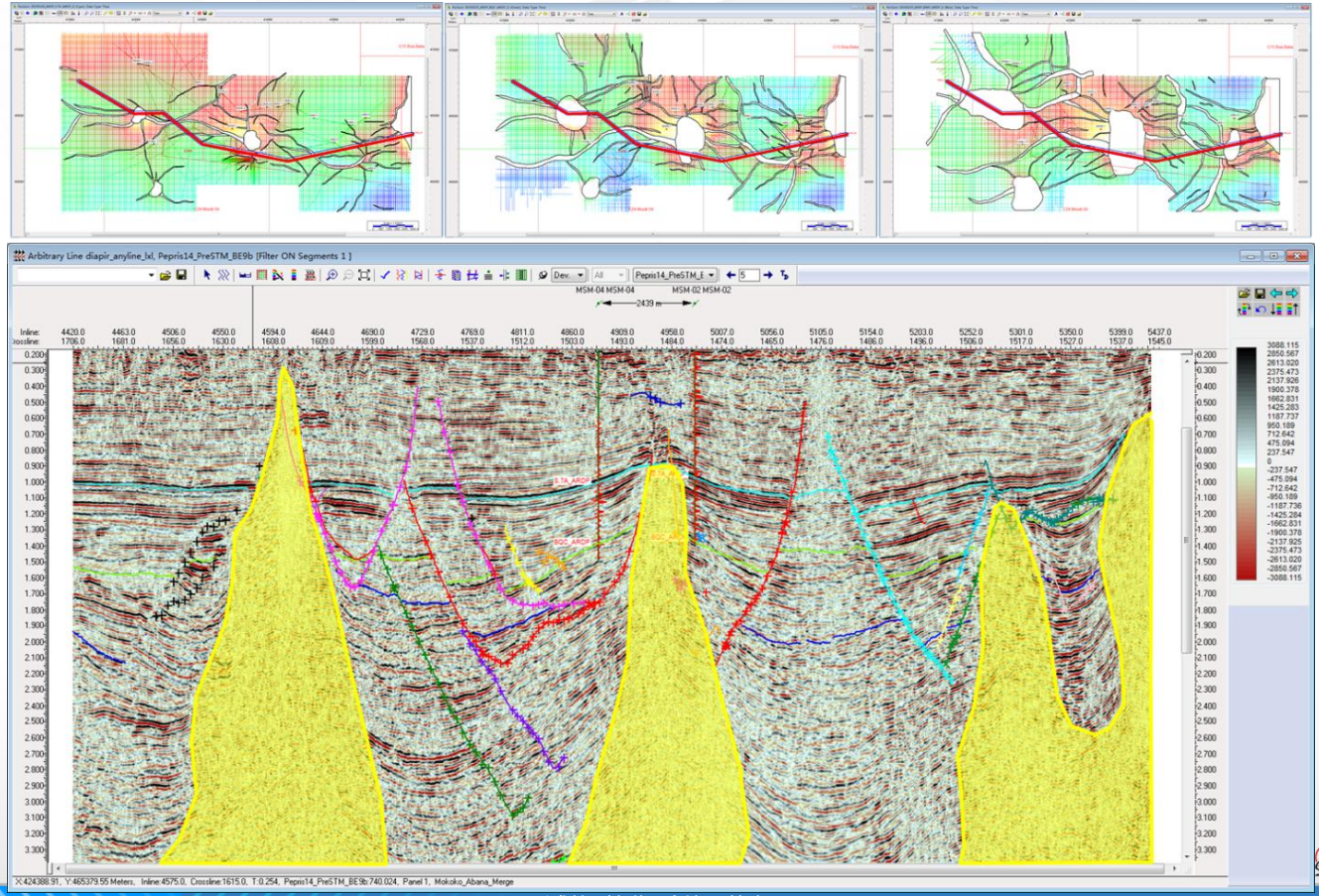
Leads and Prospects Identified



BMS Depth Map with Discovered Hydrocarbon and Prospect Distribution

Contents

What was revealed by IMA Interpretation?!



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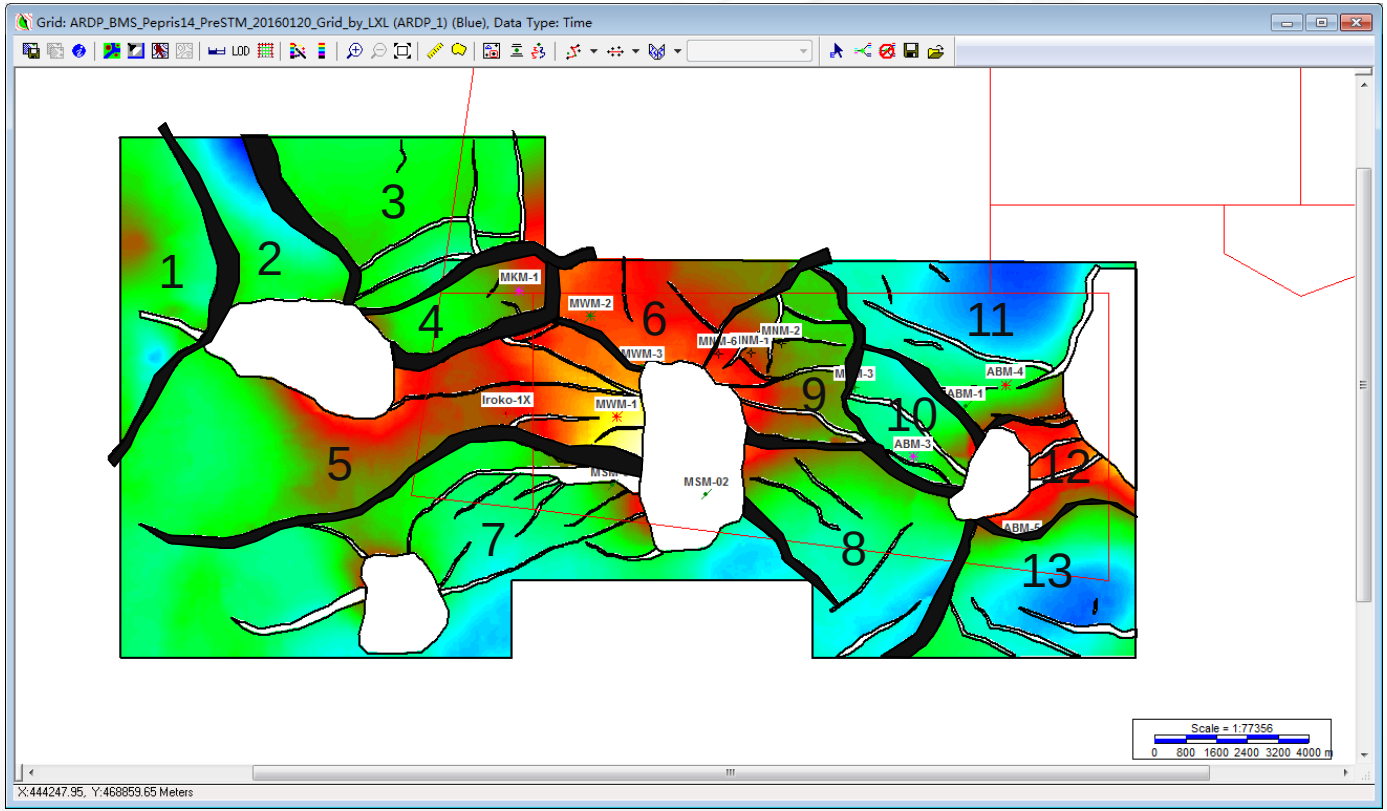

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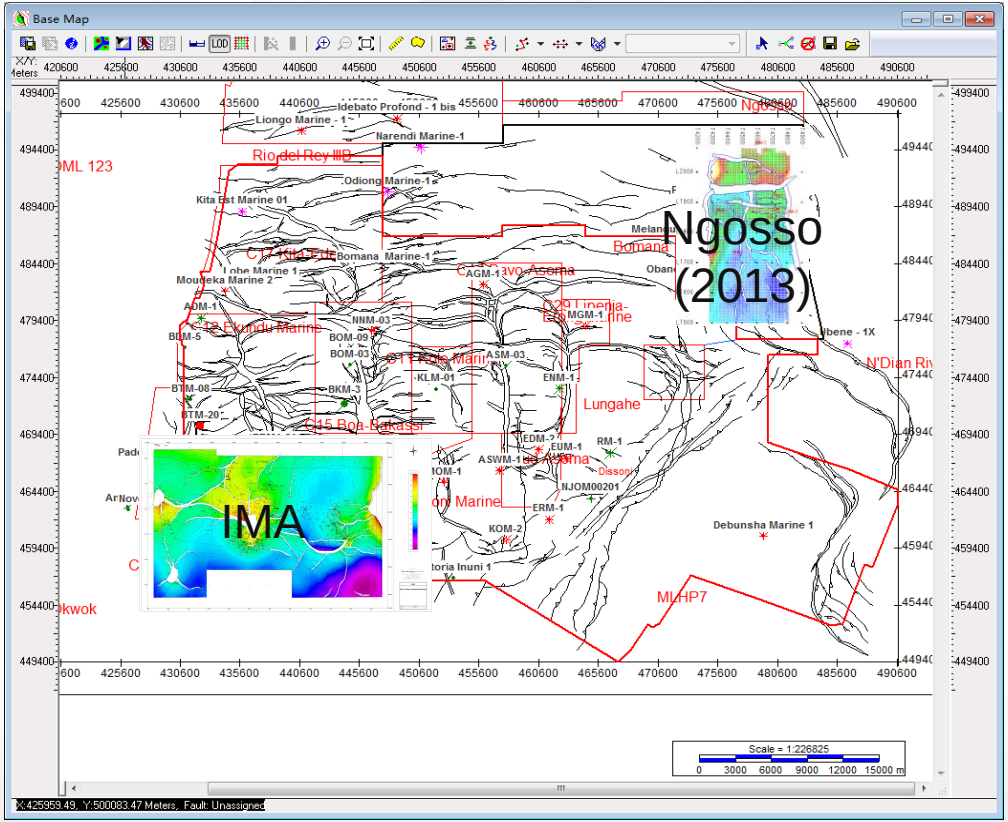
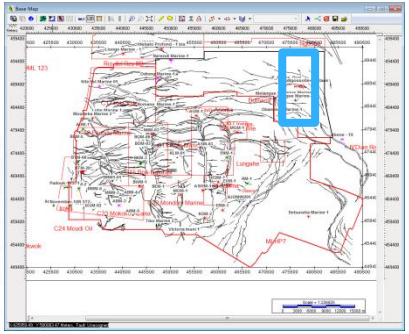
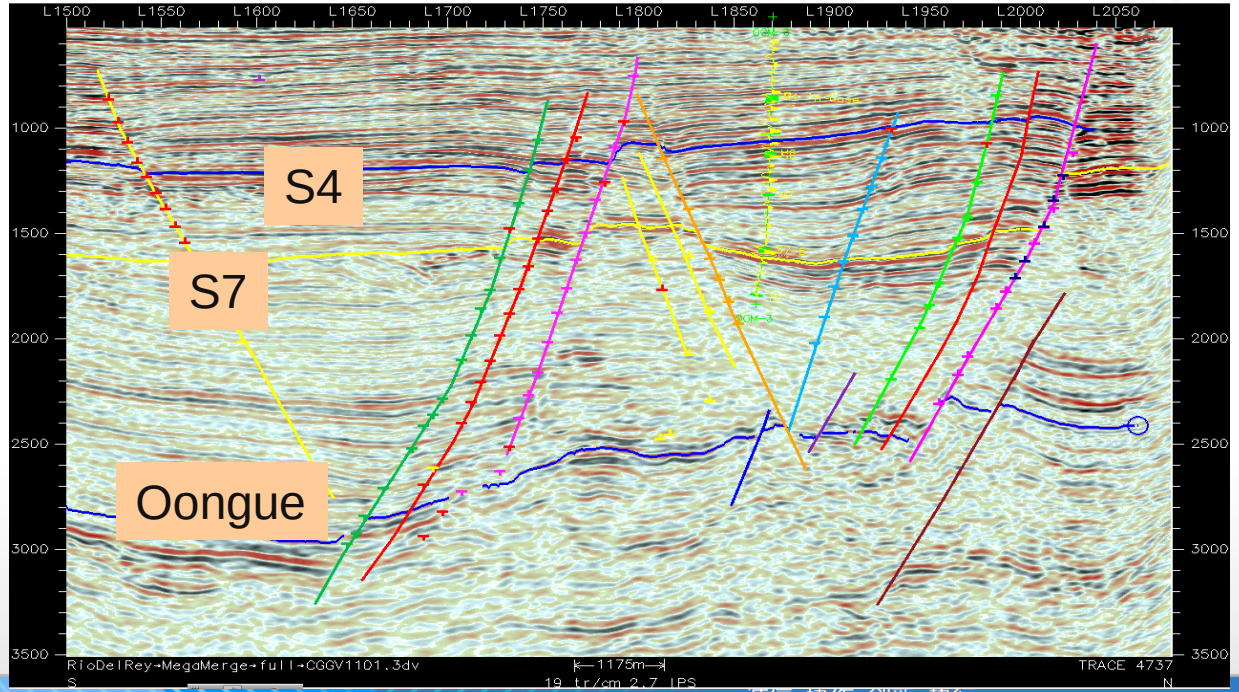


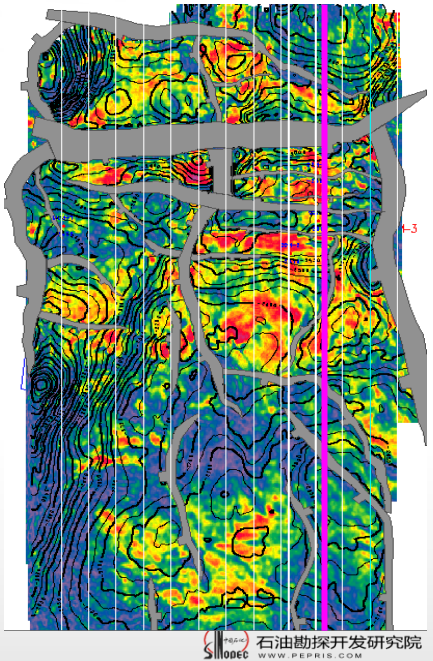
What was revealed by IMA Interpretation?!

Ngosso's Previous work in 2013

(Deeper targets are occurred)

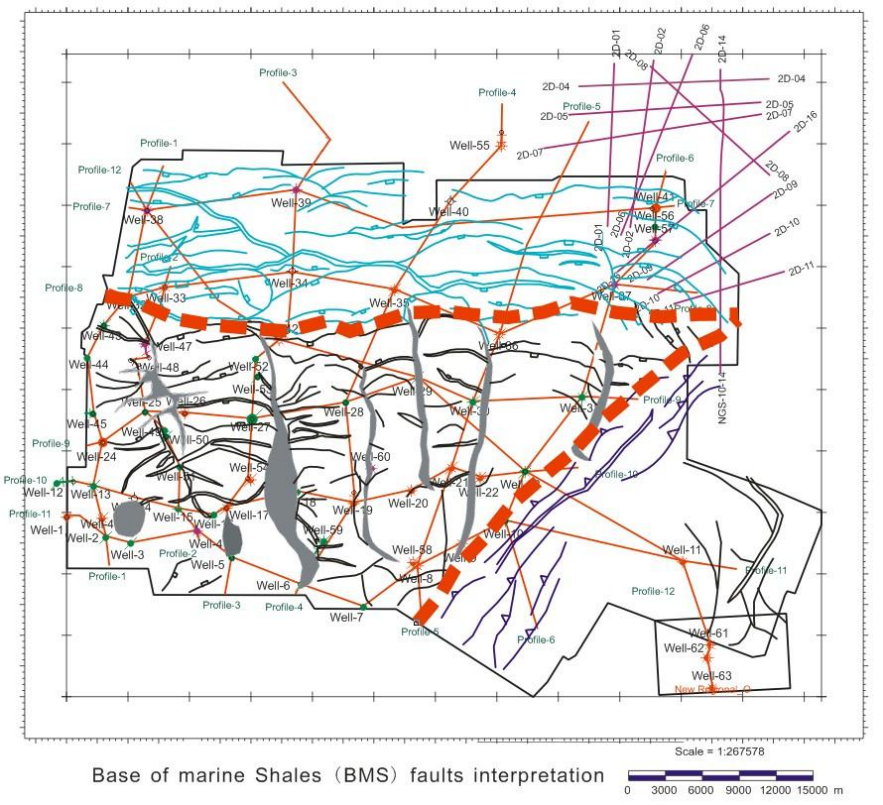




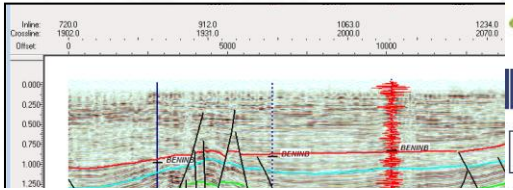


What was revealed by IMA Interpretation?!

- 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.

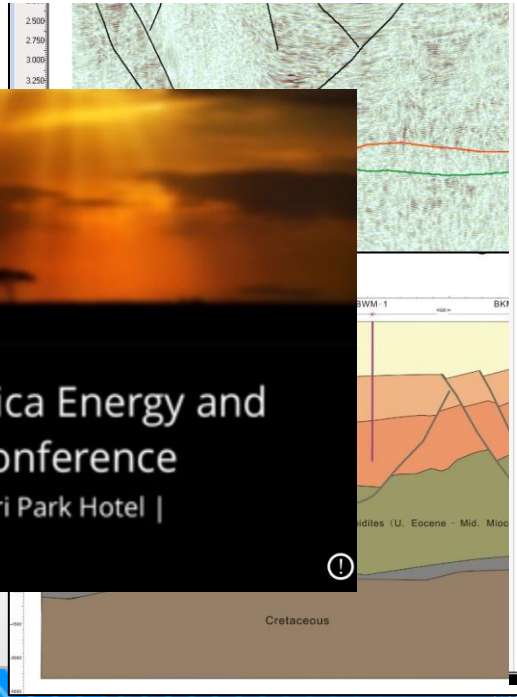


What was revealed by IMA Interpretation?!



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

Line-A



Contents

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.

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Thank you!