

A holistic approach to petroleum exploration in Colombia: Acordionero Oil Field, Middle Magdalena Valley Basin

Michael E Enachescu, Euxinic Exploration, Calgary, Canada

Mario A Prince, Petronorte, Bogota, Colombia

Dan D Negut, Divestco Inc., Calgary, Canada

Ian C Edie, Divestco Inc., Calgary, Canada

Florian Romanescu, Romtech, Calgary, Canada

Todd Keedwell, Divestco Inc., Calgary, Canada

Summary

A holistic approach was used to delineate the complexity of the compressional structures in the northern Middle Magdalena Valley Basin (MMVB) and map a highly productive Paleocene reservoir. Initial knowledge of the subsurface tectono-structural style and continuous feedback from the project's geologist, petrophysicist, geochemist, reservoir geologist, etc., were essential for seismic data processing and interpretation.

Introduction

Middle Magdalena Valley Basin is an elongated intramontane basin located in central Colombia between the Eastern and Central cordilleras. 2D and 3D seismic data were reprocessed benefitting from well information and the surveys were used to map a producing reservoir within the inverted basin fill succession.

Method

The petroleum exploration of Cenozoic clastic reservoirs in northern Middle Magdalena Basin has been predominantly focused on faulted anticline-type structural plays rather than more subtle stratigraphic or combination traps.

The Acordionero field is a recent oil discovery found within an unusual structural -stratigraphic configuration, defined only after 3D and 2D seismic reprocessing benefitting from well results. Based on an anticline trap outline originally mapped with sparse 2D seismic lines, the Acordionero-1 well was located and drilled in 2012 between two 1960's abandoned dry wells. The true trap configuration delineated by reprocessed seismic data was confirmed by follow-up 2014 drilling.

In order to understand the field, multidisciplinary studies were conducted including detailed geology study of Lisama Formation using outcrop and core data, reprocessing, modeling and interpretation of seismic data with constraining geological input, detailed log analysis and exhaustive reservoir examination from test and flow data.

The field is an important accumulation in the Paleocene sandstones of the Lisama Formation and has estimated original oil in place of more than 300 million barrels. Remarkably, the oil gravity for the field ranges from 13.5 to 25° API. The production rates are also atypical for the basin; the initial test for the first well produced over 3200 bopd in natural flow.

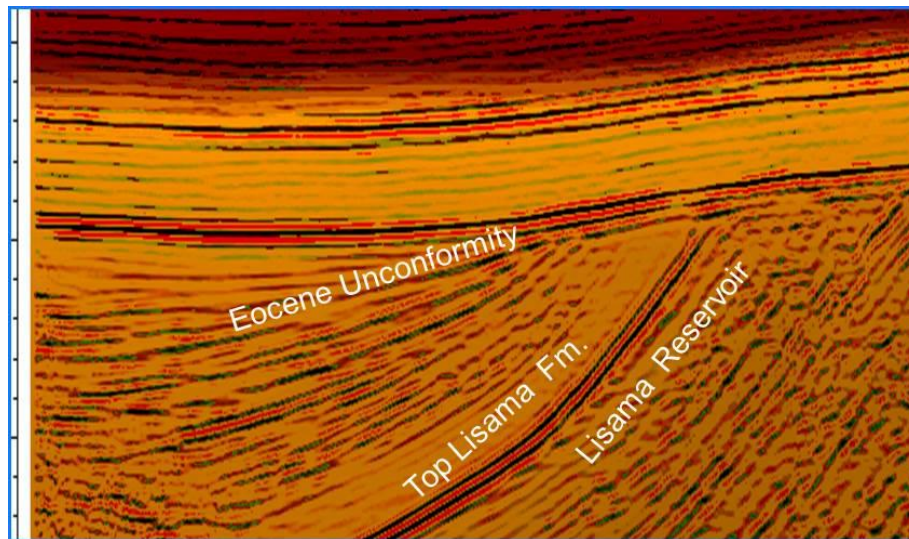


Figure 1. The Acordionero oil field, Columbia (MMVB): A subunconformity trap with Paleocene reservoir.

Conclusions

Connecting the exploration and processing teams early in the processing/interpretation loop and timely identification of processing and interpretation challenges were critical for the success of the Acordionero field's delineation program. The holistic approach to seismic data processing/interpretation loop should be routinely applied when exploring complex geological terrains.

Acknowledgements

Petronorte, Divestco Inc., Romtech Ltd.