RONDA COLOMBIA 2014

Agencia Nacional de Hidrocarburos

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Country / Oil & Gas Indicators & Facts

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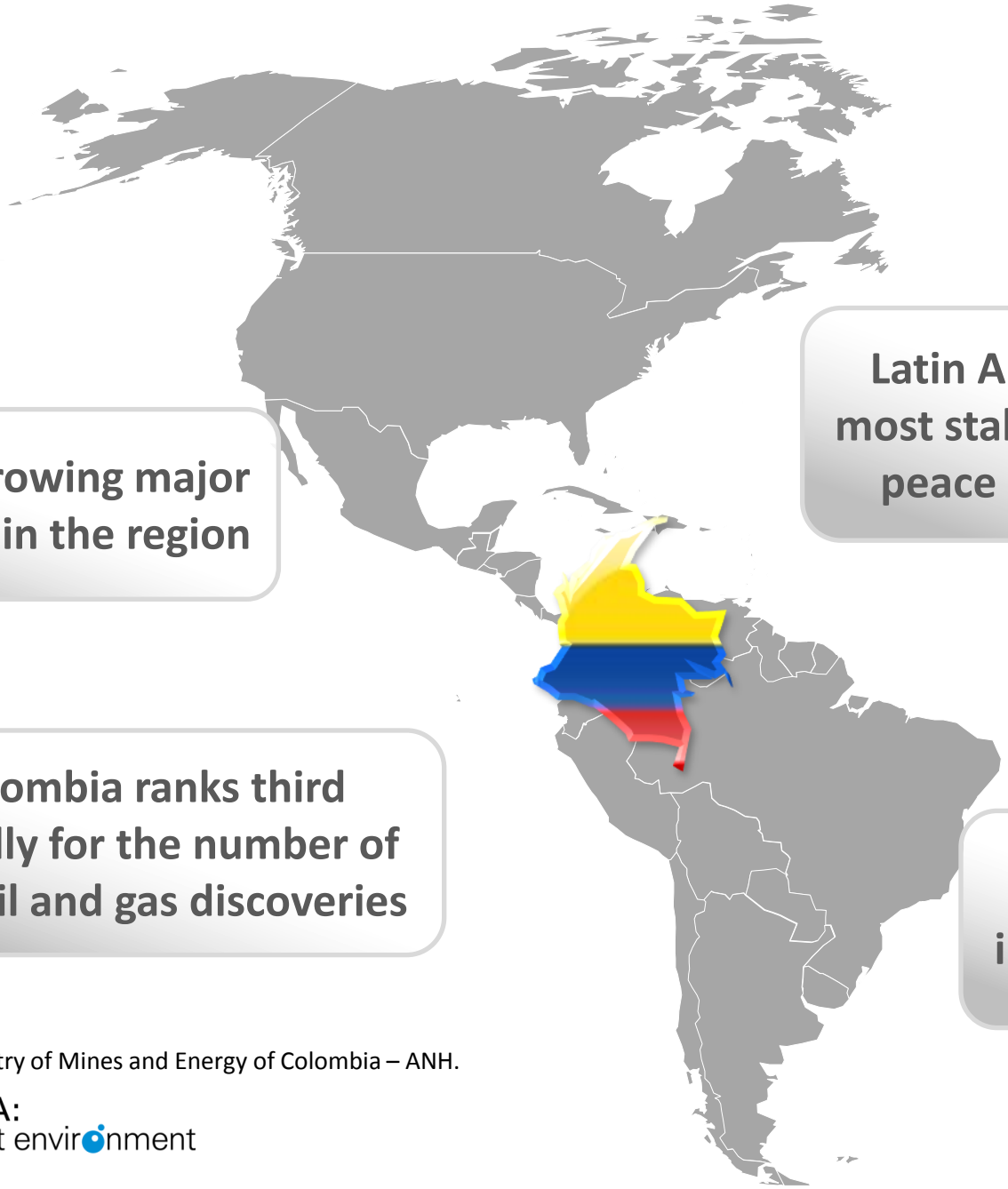

Fastest-growing major producer in the region

Latin America's oldest and most stable democracy with a peace process underway.

Colombia ranks third globally for the number of new oil and gas discoveries

Openness to investment and trade

Source: Ministry of Mines and Energy of Colombia – ANH.

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Colombia's Economic Achievements

- **GDP growth: 4,0% (2013)**

Higher growth than the Latin America average.

- **Falling unemployment rate: 8,4% (Dec 2013)**

9,6% unemployment rate for 2013

- **Direct Foreign Investment: USD 15.650 MM**

Record figure in the history of Colombia (2012)

- **An increase of 5,6% in exports of goods and services USD 60.125 MM**

Record figure in the history of Colombia

- **Controlled inflation 2013: 1,94%**

Below the target inflation

Source: Proexport - Colombia.

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Experts Opinions

Irene Mia (EIU) – Regional Director for Latin America & The Caribbean - The Economist Intelligence Unit (EIU) - May 2013:

"Colombia has been highlighted in recent years as a safe country for foreign investment with great potential both because of the size of its population and the amount of resources it has"

Christine Lagarde (IMF) - Managing Director (MD) of the International Monetary Fund (IMF) - December 2012:

"Colombia currently has a very small deficit and a quite balanced debt, so the macroeconomic situation is very promising, additionally it is in a situation in which the Fund can offer their help, which could not in the past "

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Times of Progress and Prosperity







Due to our government's efforts and determination in recent years, the appropriate conditions for a peace process have been established.

The dream of ending the armed conflict in our country will soon be accomplished.

We believe peace is within our reach.

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Oil & Gas Indicators and Facts

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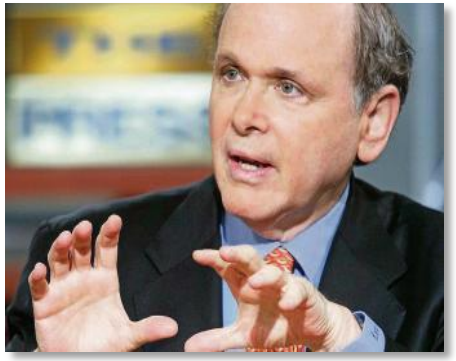
Experts Opinions

Daniel Yergin (IHS) - Pulitzer Prize-winning American author and economic researcher, Founder of CERA (Cambridge Energy Research Associates) – October 2012:



"Colombia has very attractive attributes. First, it's blessed with hydrocarbons, which will allow for funding education, health and other of society's needs. Second, has a highly skilled industry and very talented people. Third, has launched a predictable, rational and modern fiscal and regulatory system.

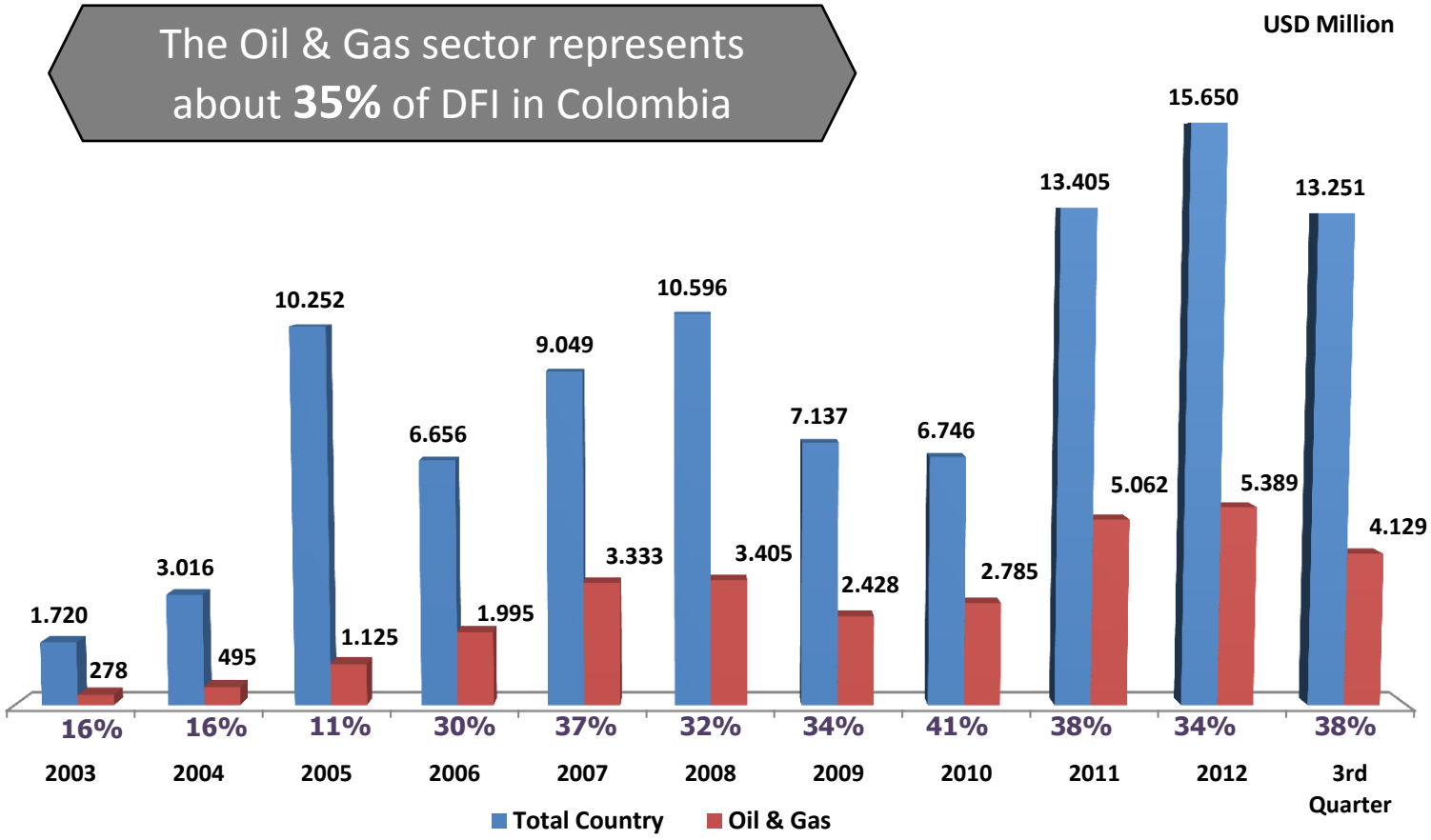
Companies need to decide where in the world to invest and Colombia has competitive advantages. Colombia has a very positive reputation and that's very valued. It is very important to think in the long term, not just short term."

Source: Portafolio Newspaper - Colombia.

Oil & Gas Indicators and Facts

Direct Foreign Investment

The Oil & Gas sector represents about **35%** of DFI in Colombia



Source: Banco de la República – Colombia.

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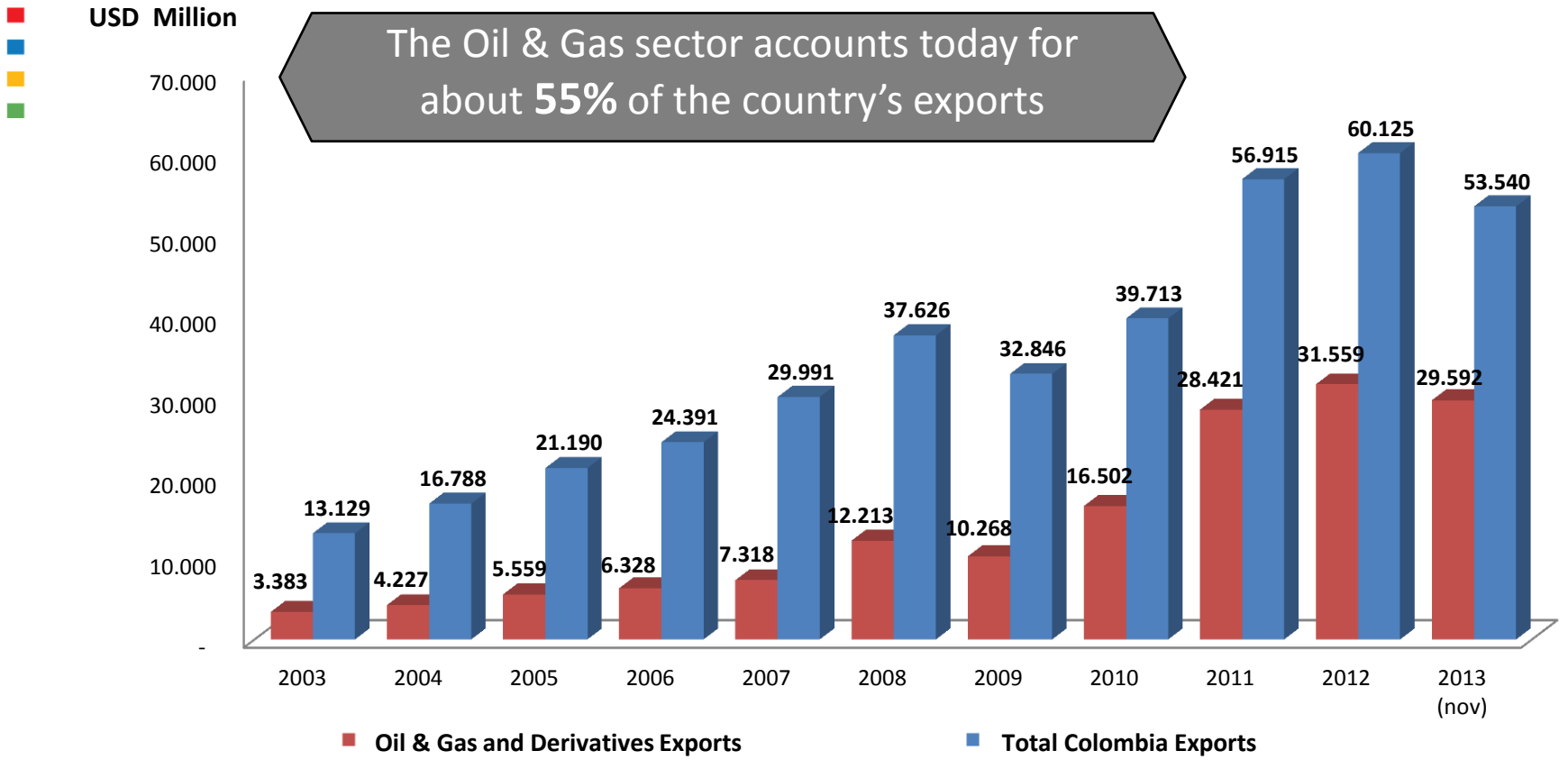
Exports



Source: Banco de la República – Colombia.

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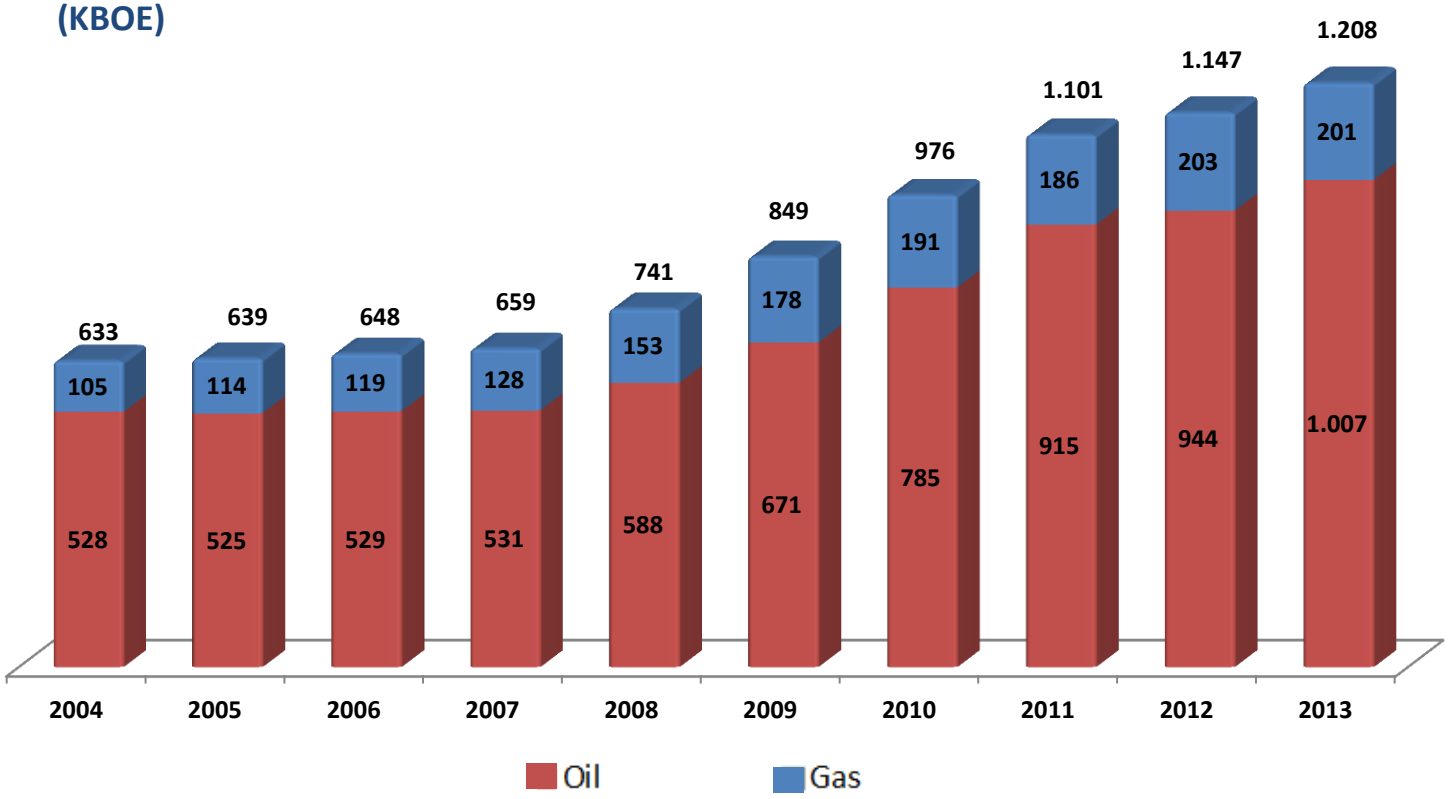
Production

Annual Average Production in Thousands of Barrels of Oil Equivalent per day (KBOE)



Source: ANH.

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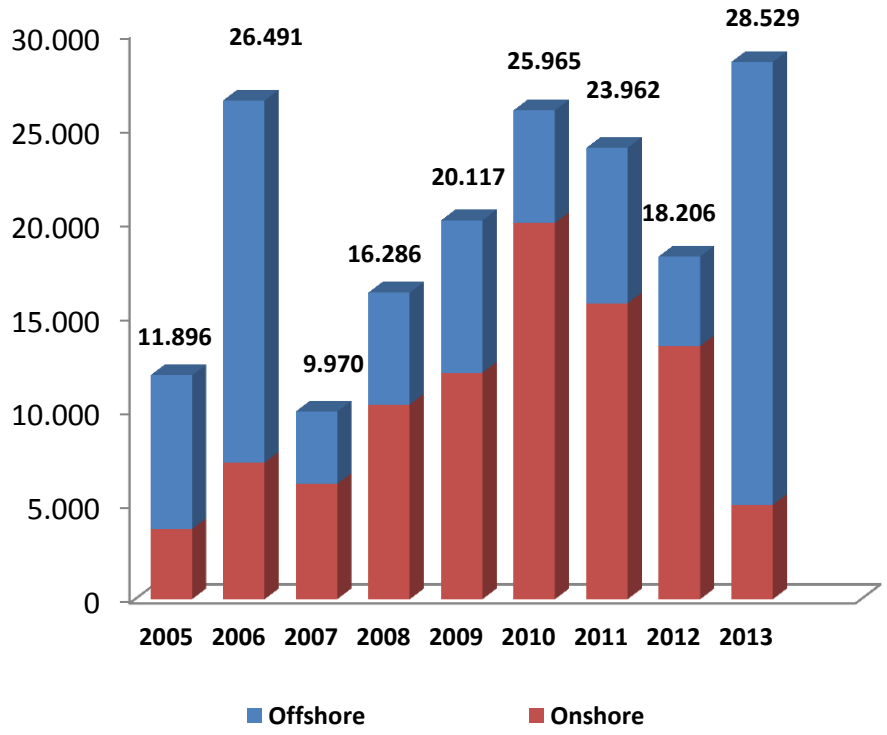
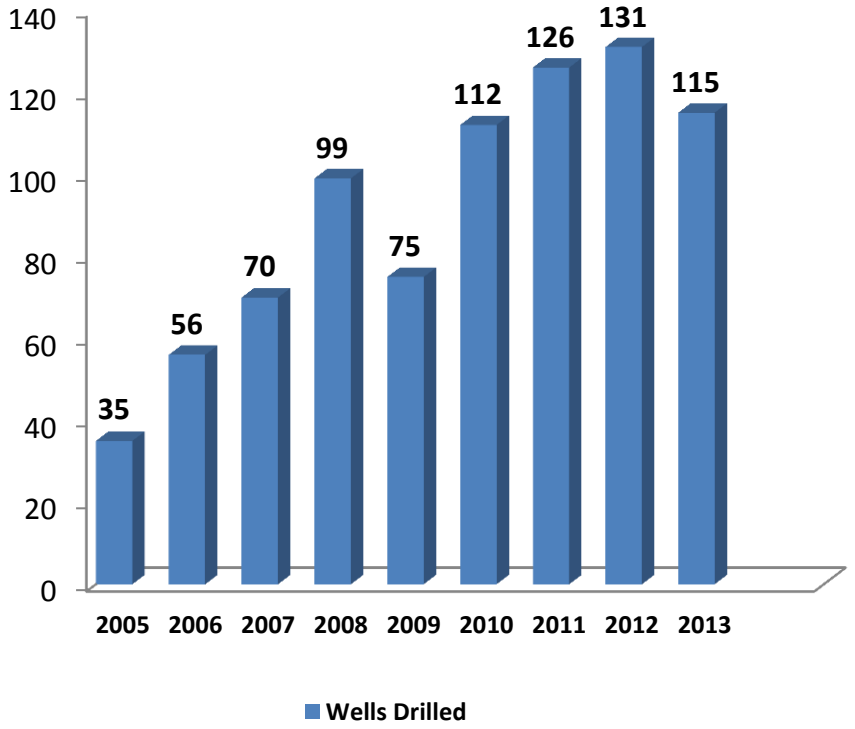
Exploration Activity

2D Equivalent Seismic in Km



Exploratory wells drilled



Source: ANH.

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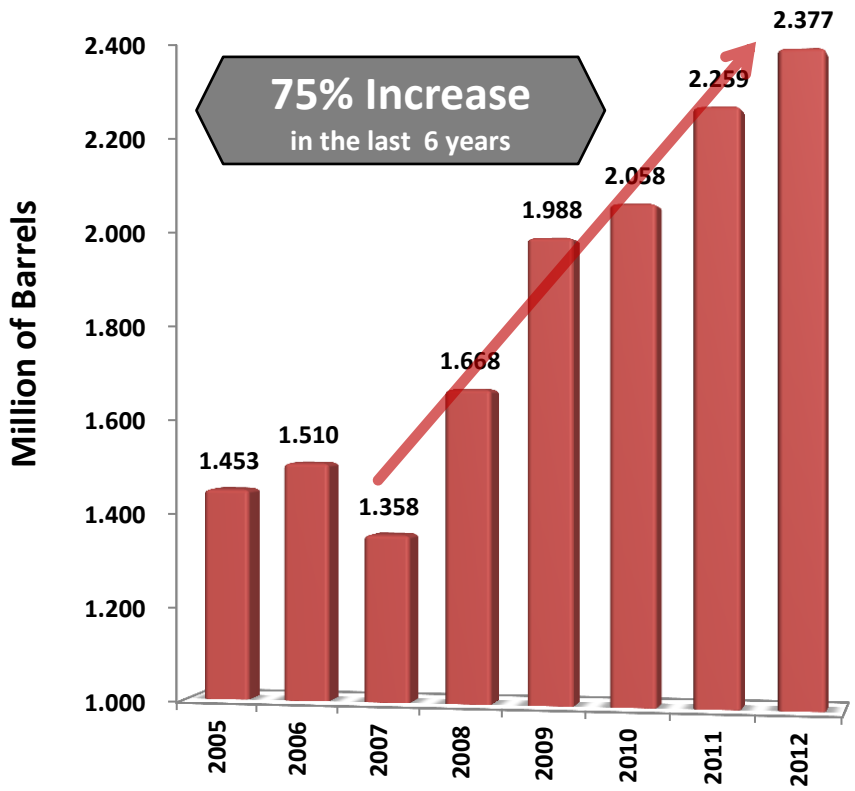
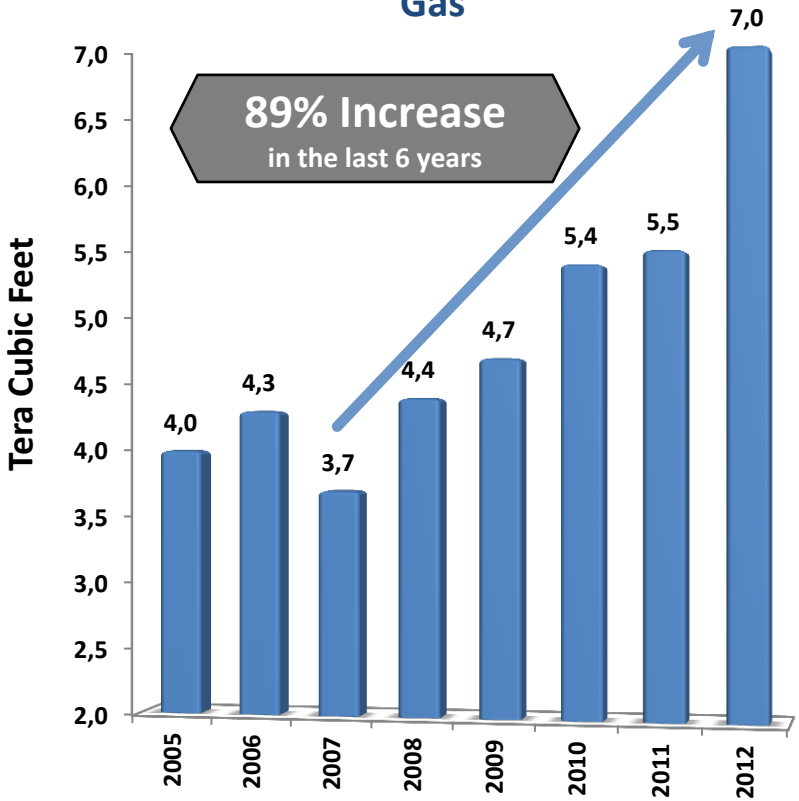
Reserves

Oil



Gas



Source: ANH – Ecopetrol.

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Areas
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Areas Offered

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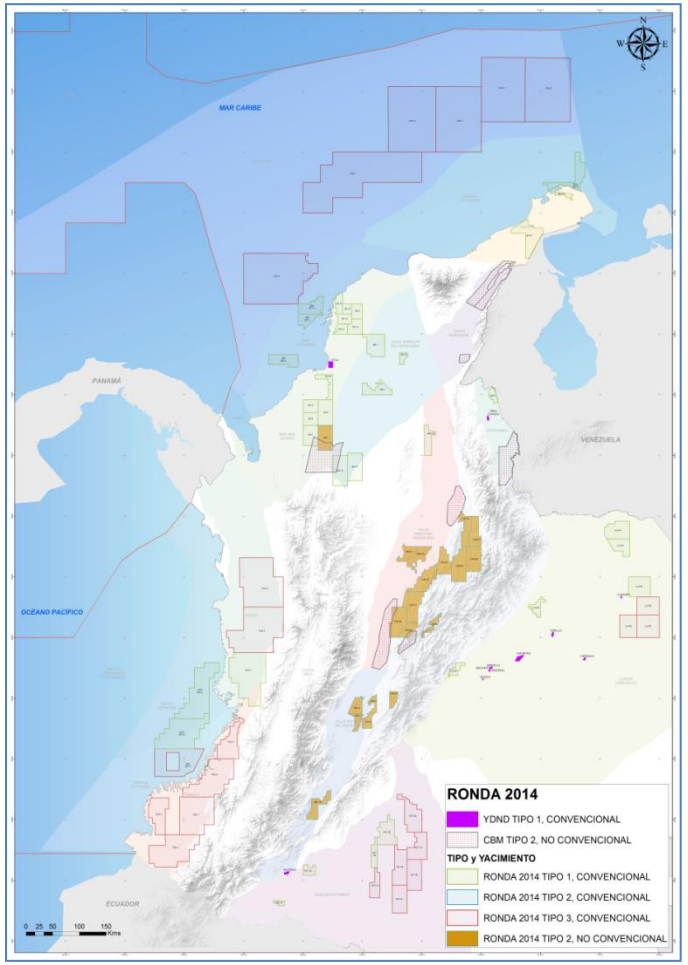
Total Surface Offered	(ha)
Continental Conventional	7'007.888
Offshore Conventional	7'961.247
Unconventional oil and gas shale	1'693.078
Unconventional of gas associated to coal bed (CBM)	1'265.892
Total RONDA COLOMBIA 2014	**17'928.105**

Total Areas in Offered	97
Continental Conventional	57
Offshore Conventional	13
Unconventional oil and gas shale	19
Unconventional of gas associated to coal bed (CBM)	8



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Terms of Reference
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Qualification

- Operator (must have and hold at least 30% participation)
- Investors

Qualificaction	Investors	Operator
Legal	√	√
Economic-Financial	√	√
Technical & Operational		√
Environmental		√
RSE (Business Social Responsibility- BSR)		√

Legal Capacity

Foreign or local companies, private or public, may be enabled as:

- Individual Bidder.
- Joint Ventures: Associations, Joint Ventures or a Promise to Future Association Contract.

Requirements:

Operator: A corporate purpose comprising development of exploration activities and production of hydrocarbons (5 years before enabling).

Investor: A corporate purpose that incorporates the execution of complementary activities for exploration and production (1 year before enabling).

Transparency Commitment and Declaration of Funds Origin.

Companies Background Review (except those listed in the Stock Market) in World Compliance.

Average Net Assets over the last three (3) years, per block:

Areas	NET ASSETS (USD)
Discovered Accumulations	2,000,000
Conventional Continental E&P	6,000,000
Conventional Continental TEA	20,000,000
Offshore E&P, Unconventional E&P, & Offshore TEA	200,000,000

The above minimum requirements are per block, individually or through a Joint Venture.

Economic & Financial Capacity

Corporations included in “The Energy Intelligence Top 100: Ranking the World's Top Oil Companies” and those able to endorse a risk qualification equal or higher than those mentioned below will qualify automatically, although they need to submit their financial information in any case.

Credit Rating Agencies	Rating
Standard & Poor’s	BBB
Moody’s	Baa
Fitch Ratings (1)	BBB
(1) Rating equal to AAA for Colombian levels	

Technical & Operational Capacity

Requirement Type	Areas	Wells Drilled (3 last years)	Reserves BOE		Operated Production BOE
Specials	**Discovered Accumulations**	1	50.000	or	300
1	**Conventional Continental E&P**	2	2.000.000		1.000
2	**Conventional Continental TEA**	-	5.000.000		5.000
3	**Offshore E&P, Unconventional E&P, & Offshore TEA**	-	50.000.000		20.000

Those corporations listed in “The Energy Intelligence Top 100: Ranking the World’s Top Oil Companies” last issue, automatically qualify.

Exceptions

Exceptions for Technical and Operational Capacity. Those companies that fulfill one of the following conditions:

- Operators which have had E&P contracts during the past 10 years with investments over five hundred million US dollars (USD$ 500.000.000) or,

- Operators that have been established for less than five years, but have assets over one billion US dollars (USD$ 1.000.000.000) and operate at least five (5) E&P contracts.

Environmental and Social Responsibility Capacities

Environmental Capacity :

- ISO 14001, equivalent certification, or a document containing the Corporate Policy and the Environmental Management System in place.

Social Responsibility:

- ISO 26000, equivalent certification, or a document that endorses the implementation of programs on Social Responsibility.

Area Type Awarding Criteria

Area Type	Criteria	
	First	Second*
• Discovered Fields (YD) • E&P Continental and Offshore	Production Participation (X%)	Additional Investment in Exploration - Phase I
• E&P Unconventional • TEA Continental and Offshore	Additional Investment in Exploration - Phase I	Production Participation (X%)

*** Tie-break Criteria**

Data Packages Value

Type	USD$
1	40,000 VAT Included
2 and 3	100,000 VAT Included

Note: The acquisition of the Data Package gives the company the right to bid if qualified.

Main Contractual Aspects
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Object:

The exclusive right to:

- Explore the subsoil under the contracted area.
- Produce the hydrocarbons discovered.
- Share of the production of the hydrocarbons within the contracted area.

The contractor shall:

- Perform all activities at its own cost and risk.
- Obtain all required permits and licenses.
- Use best oil industry practices.

E&P Contract

Duration:

- Exploration: 6 years conventional / 9 years unconventional.
- Production*: 24 years conventional / 30 years unconventional.

Exploration period:

- Conventional Hydrocarbons: Two phases of 3 years each.
- Unconventional Hydrocarbons: Three phases of 3 years each.
- First phase is mandatory.

*** With the possibility of a 10 year extension.**

Technical Evaluation Agreement (TEA)

Object:

- To conduct technical evaluation activities in an block with the possibility of converting into an E&P contract.

Duration:

- Thirty six (36) months.

Appraiser's rights:

- An exclusive extensive area to carry out technical evaluation activities.
- Selection of part of the block to be converted into an E&P contract.
- Exclusivity for conversion until the end of term.

Modifications to the Offshore Contracts

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- **Po and Volume Trigger Modifications:**
  - Deep Waters (between 300m and 1000m depth): **Increase in the barrels exempt of High Price Payment (HPP). from 5mmbbl to 200mmbbl. Increase in base price (Po) that triggers HPP from USD$ 43.37 to USD$ 82.00.**
  - Ultra-Deep Waters (above 1000m depth): **Increase in the barrels exempt of HPP. From 5mmbbl to 300mmbbl. Increase in base price (Po) that triggers HPP from USD$ 43.37 to USD$100.**
- **First Awarding Factor:**
  - Additional Investing Program: Means the amounts of money expressed in U.S. Dollars, in multiple of **one million dollars (USD$ 1.000.000)**.
- **Production Period:**
  - Production Period of **30 years**.
- **Exploration Program:**

First Phase	Second Phase	Third Phase
36 months	**36 months**	**36 months**
Acquisition of 1.000 km^2 3D seismic or equivalent in 2D seismic	-	-
80 *"Piston Core"* assays	1 exploratory well	**1 exploratory well**

Incentives for the Unconventional Contracts

- **P_o Modification and Royalty Discount:**
  - **Increase in base price (P_o) that triggers the HPP from USD$ 43.37 to USD$ 87.48.**
  - **40% discount over royalty rates established for conventionals**
- **E&P Contract Duration:**
  - Exploration period: **9 years (3 phases of 3 years each).**
  - Production Period: **30 years.**

First Phase	Second Phase	Third Phase
36 months	**36 months**	**36 months**
Acquisition of 200km 2D seismic or reprocessed of existing seismic	-	-
2 stratigraphic or exploratory wells	4 exploratory wells	**4 exploratory wells**

Coal Bed Methane - CBM

- The process will begin on June 30th, 2014.
- The process will be held on the second semester of 2014.
- Priority shall be given to holders of mining rights who associate and make bids for areas, experience in CBM is required (either directly or through a joint venture).
- The Terms of Reference drafts will be published for comments on June 30th, 2014.

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Technical Aspects

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ANH Exploration Strategy

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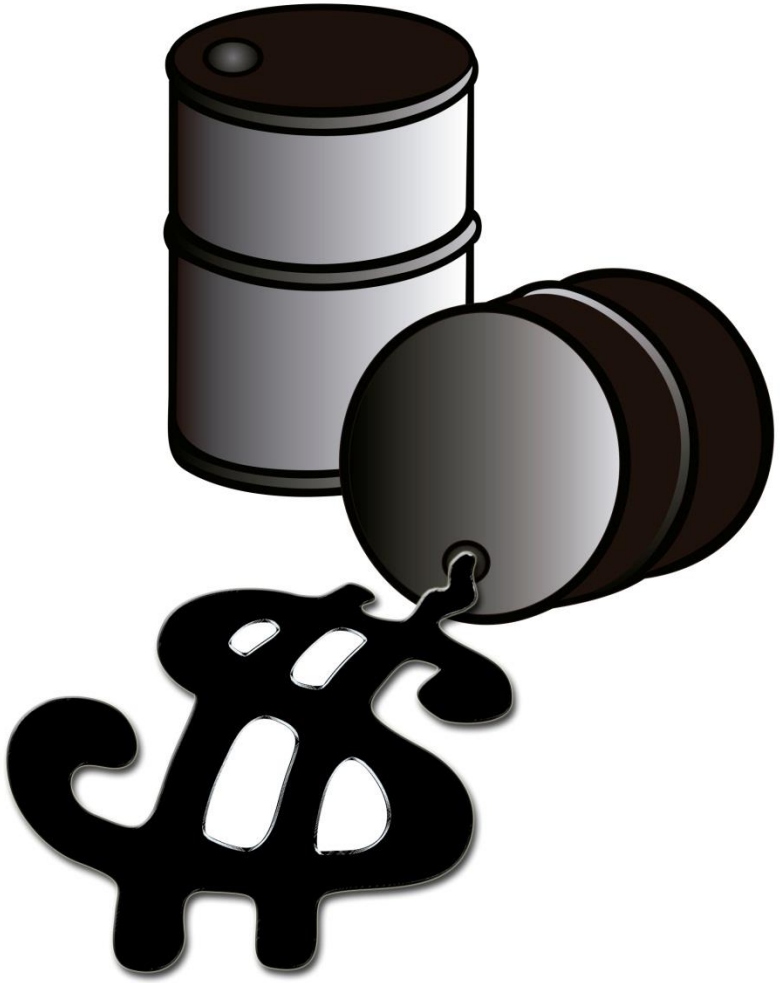
- Increase and strengthen the geological knowledge of petroleum systems
- Create exploratory and business opportunities



2013 Annual Reserves Objective: 480 MMBO

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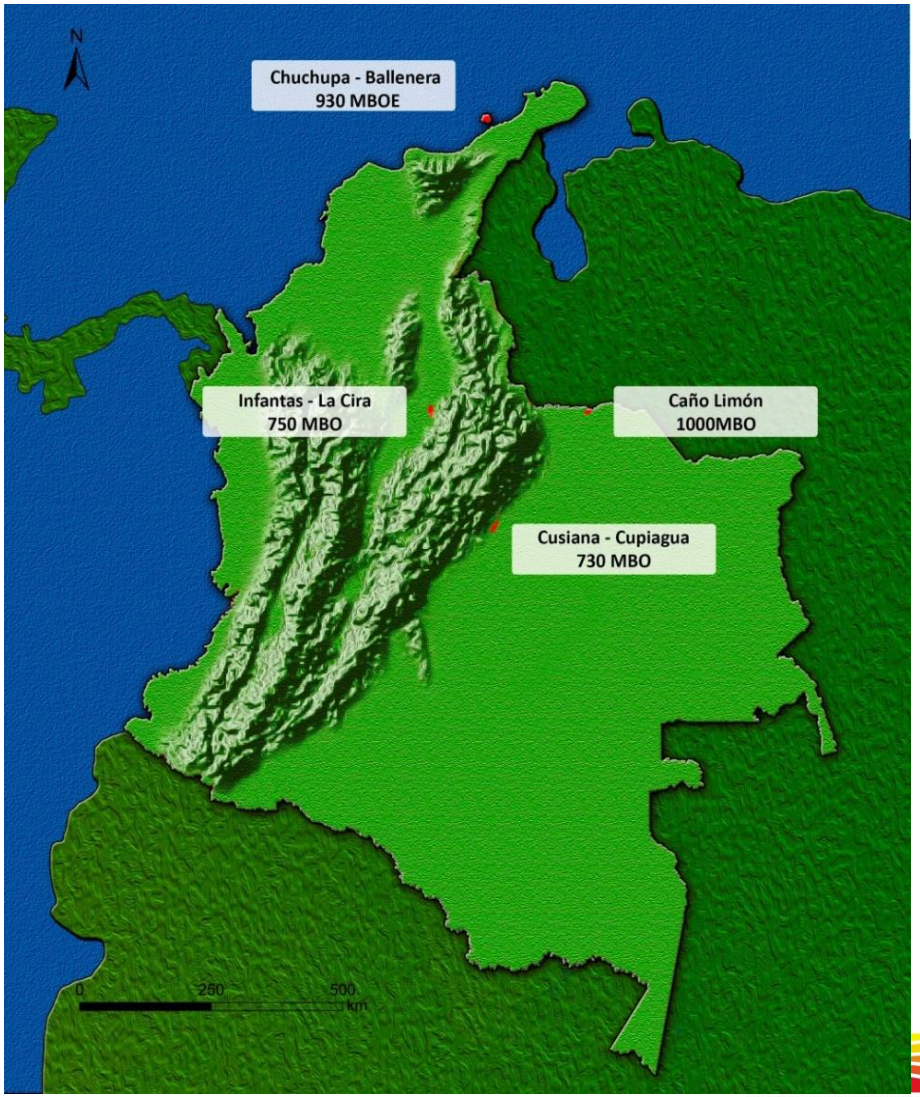
Reserves Added during 2013

- 464 MMBO Re-Evaluation
- 152 MMBO New Discoveries



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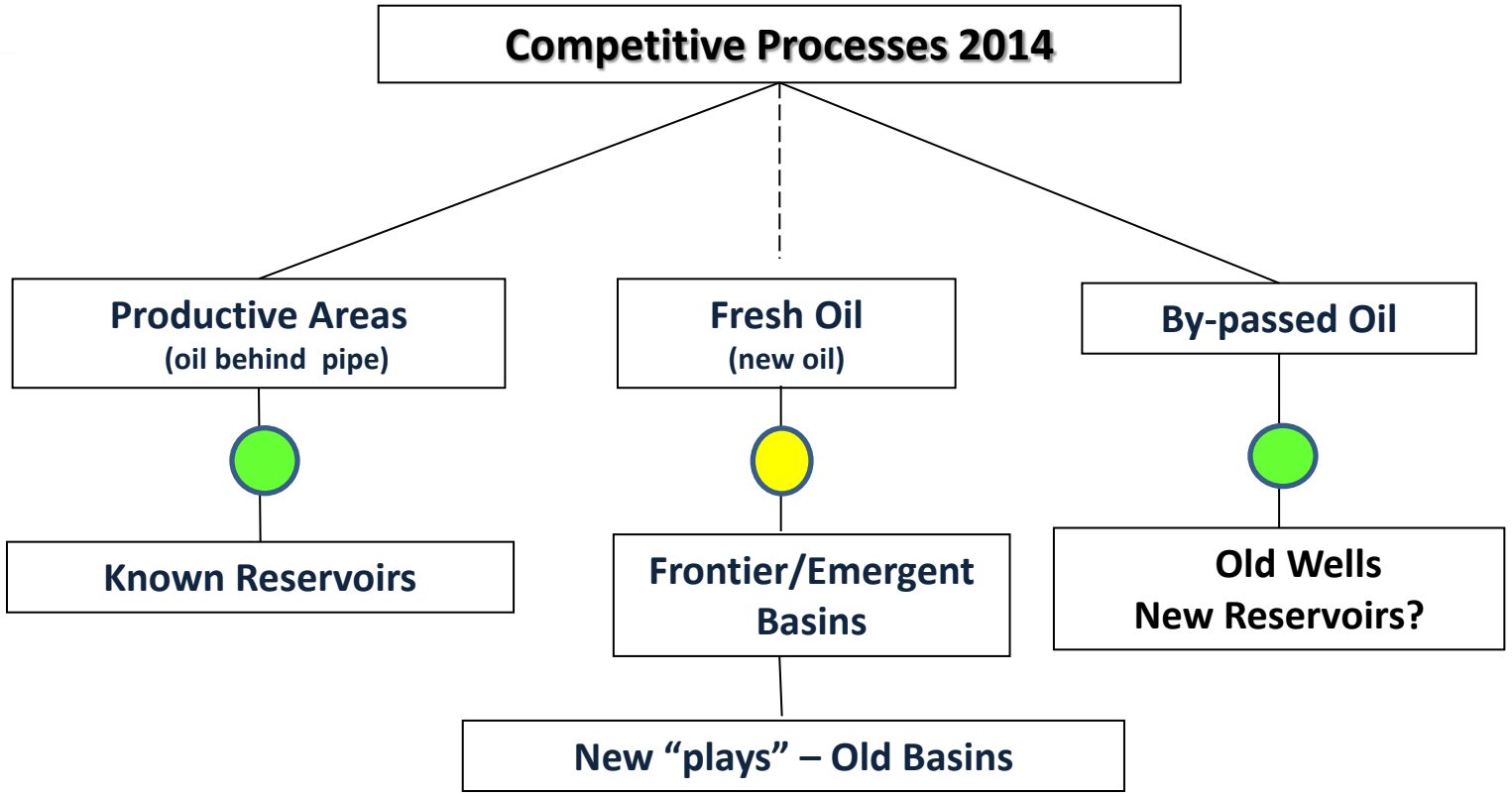
Adding Reserves through….



CBM **Unconv. Resources** **Offshore Onshore** **Caribbean & Pacific Margins** **YD**

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Distribution of Reserves vs. Reservoir Age

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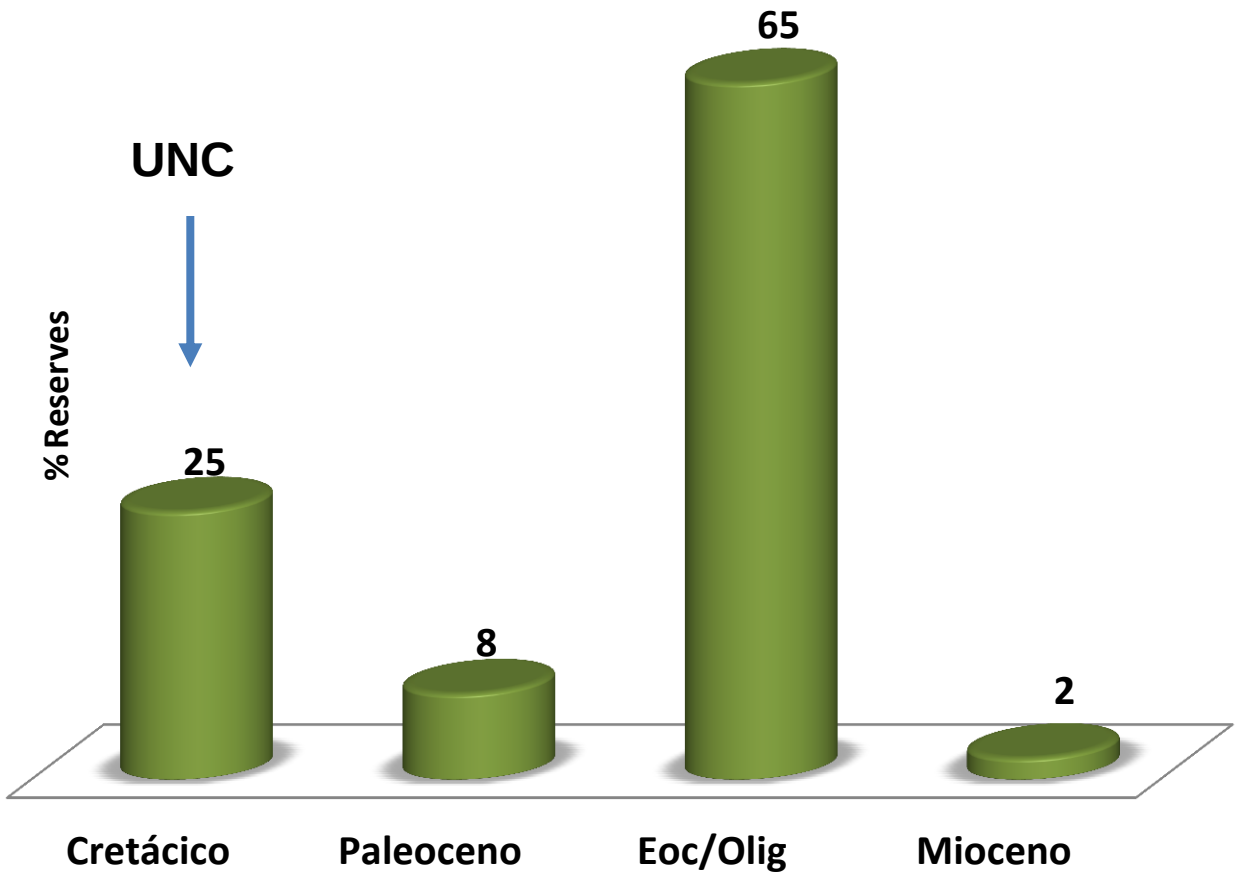
> 60% of reserves in reservoirs of Eocene-Oligocene age



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Exploration, 10 years later…..

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- ✓ Considerable Increase in Contracts signed
- ✓ Majority of exploration conducted in “mature” basins (VM, LLA, PUT)
- ✓ Do we continue to explore same ***“Plays”*** ?
- ✓ Considerable amount of data obtained by the ANH in **frontier** basins

Need for finding large fields

- ✓ Guando: **150 MMBO** (2000)
- ✓ Rubiales: **500 MMBO** (2006)
- ✓ Castilla: **450 MMBO** (2003)

Land Map

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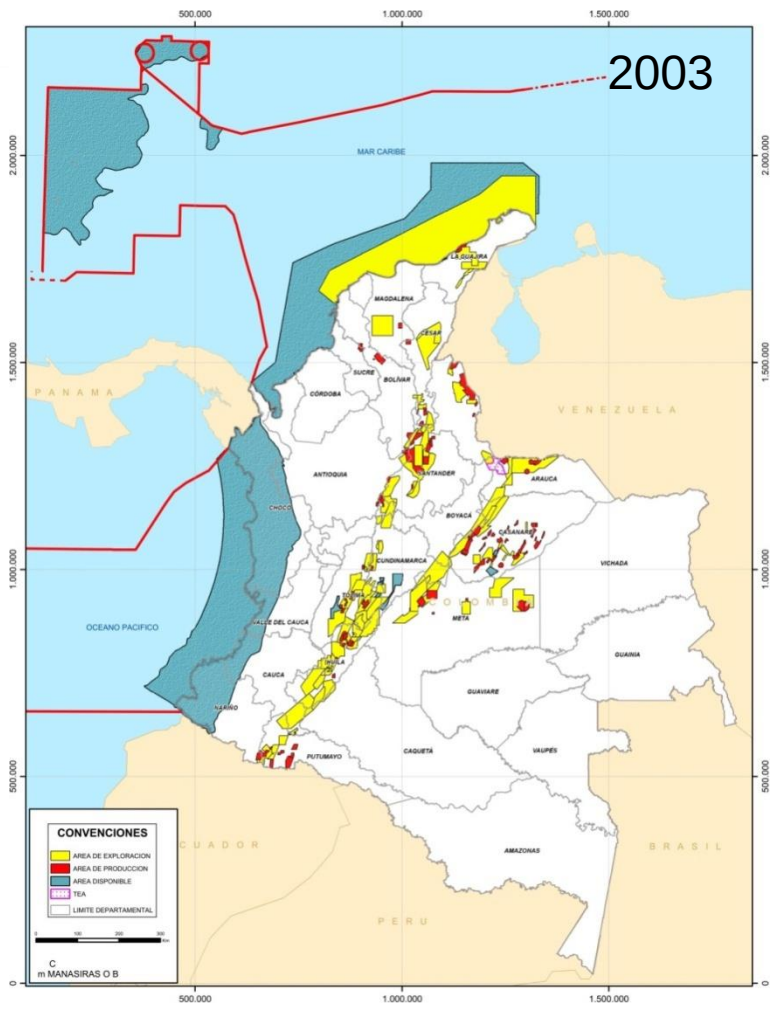

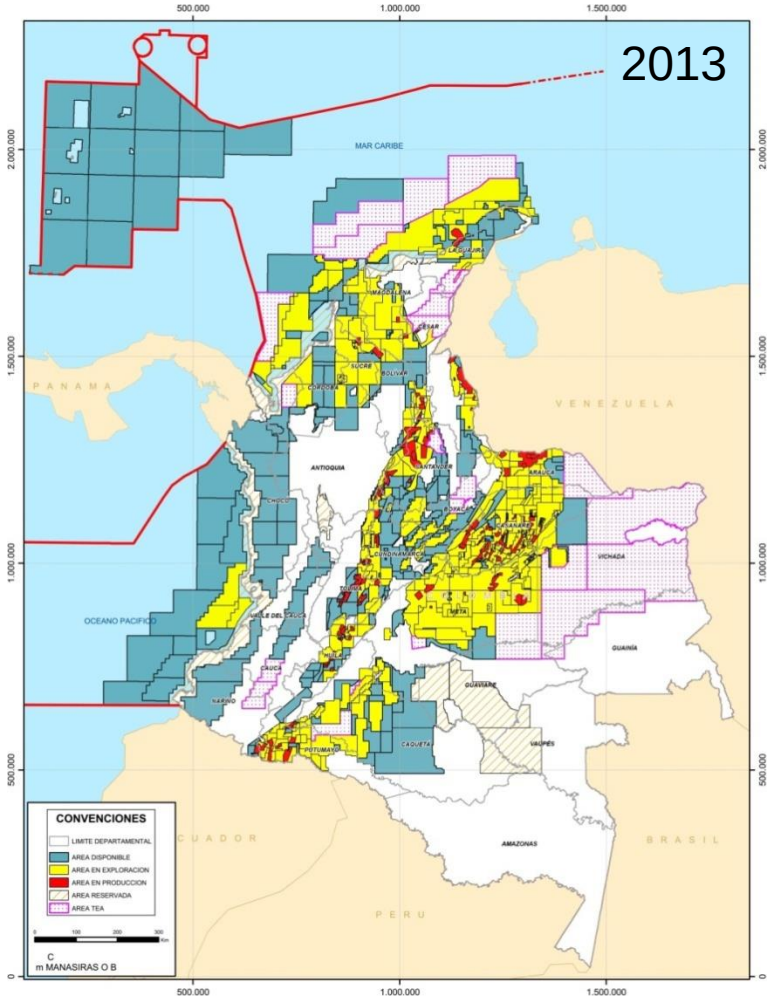

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The Challenge for the next 10 years …

- ✓ Increase Oil **Reserves**
- ✓ Discovering a **Giant field**
- ✓ Frontier basins **have** the potential for it
- ✓ ANH has concentrated its activity in these exploratory **"Niches"**
- ✓ Exploration for CBM & YNC has commenced…..

What the ANH has accomplished .....

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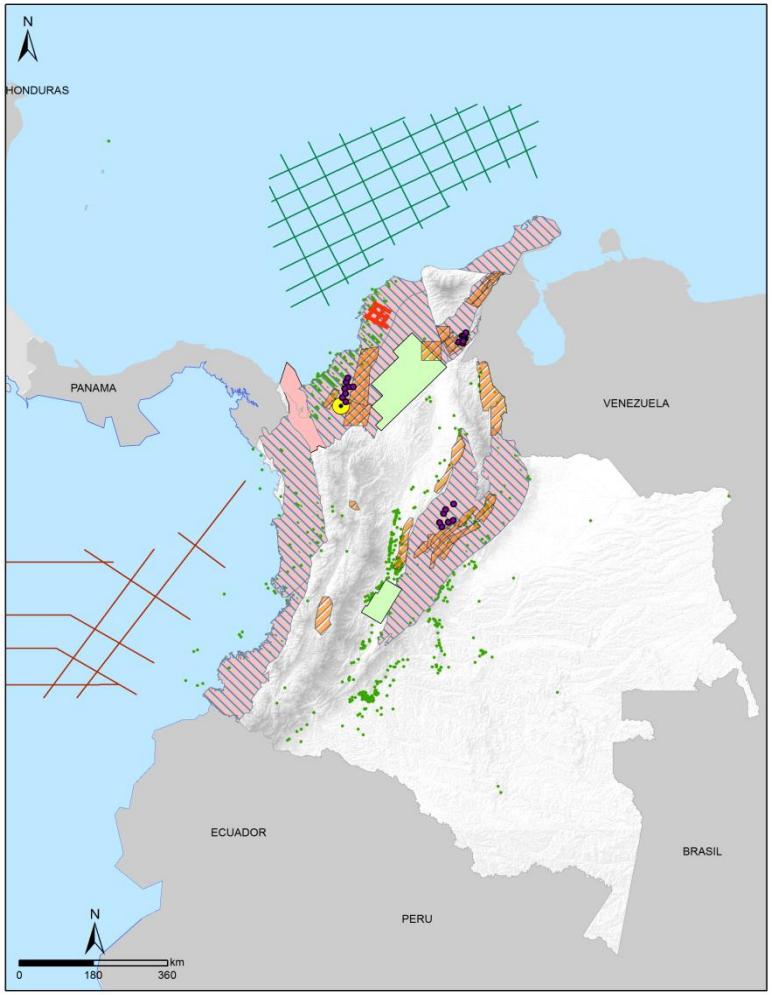
2012-2013 Projects

Legend

- Slim_Hole 2013
- Oil Seeps study
- Well ANH-TIERRALTA-1-X-P
- Sismica 2D Cuenca Colombia 2013
- Sismica 2D Pacifico Profundo
- Montes de Maria Final
- Areas para CBM
- Aerogeofisica 2013
- Reprocesamiento Sismica
- Sensores Remotos VIM-COR-SINUSJ



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Future Projects

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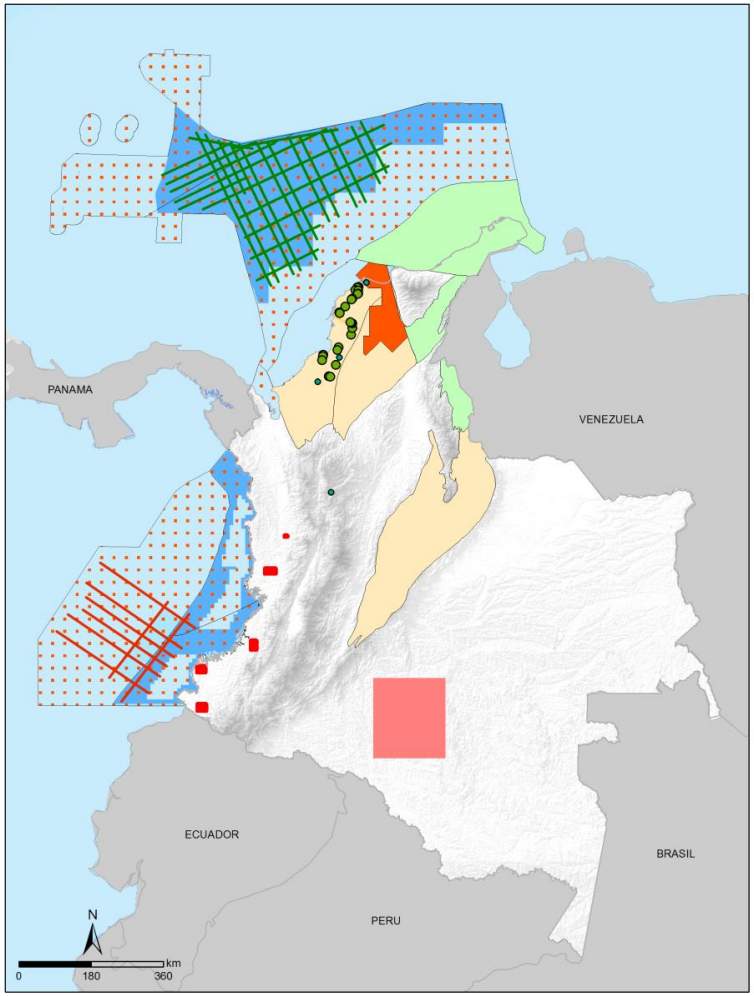
2014 Projects

Legend

- Sismica 2D Cuenca Pacífico profundo 2014
- Sismica 2D Cuenca Colombia 2014
- Magnetotelurica 2014
- Atlas sistemas petroliferos Guajira Cesár-Ranchería
- Cartografía Caguan Putumayo
- Aerogeofísica 2014
- OFT-2014
- Sensores Remotos OffShore
- Sensores Remotos VIM-COR-SINUSJ
- Batimetria 2014



Drilling Campaign

- **Slim Holes**
- **Deep stratigraphic tests**

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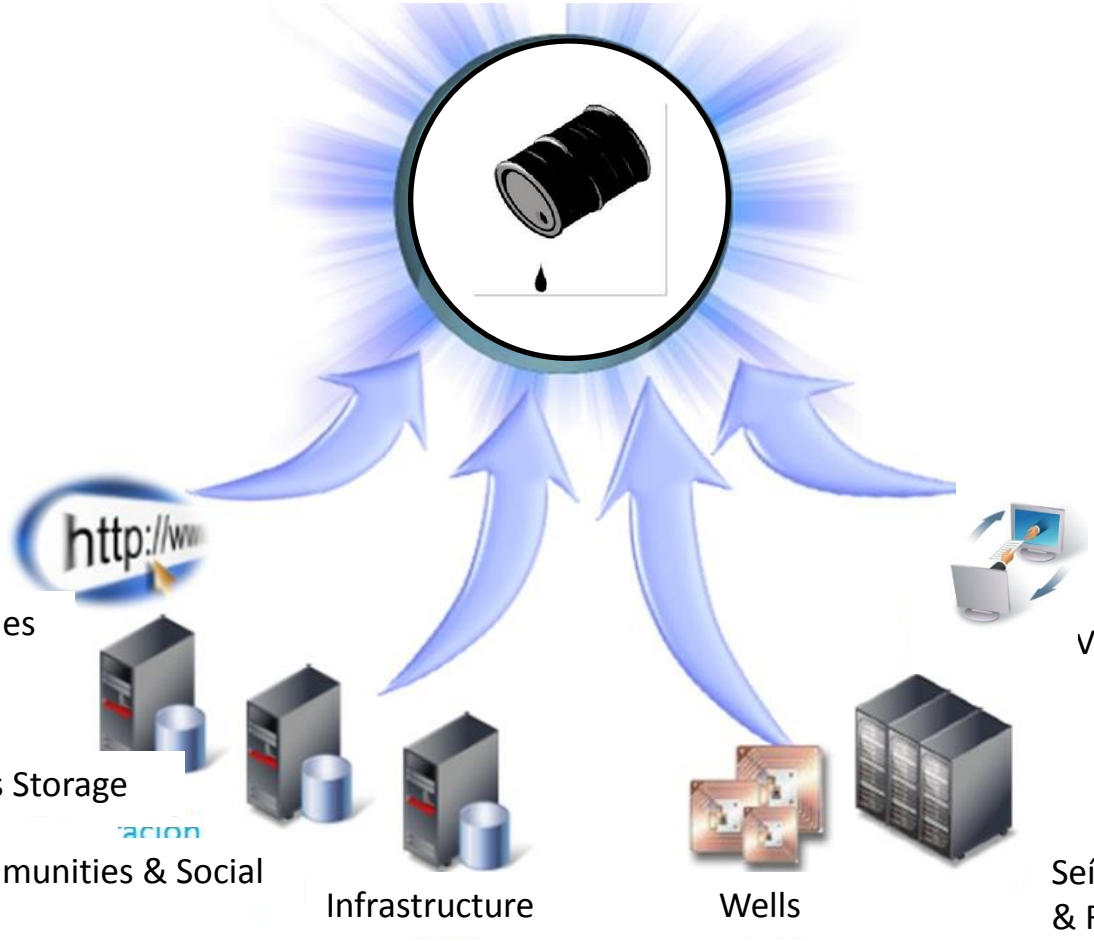
Integrating Information



Value Chain Integration

2014 Colombia Round
Conventional E&P Onshore & Offshore

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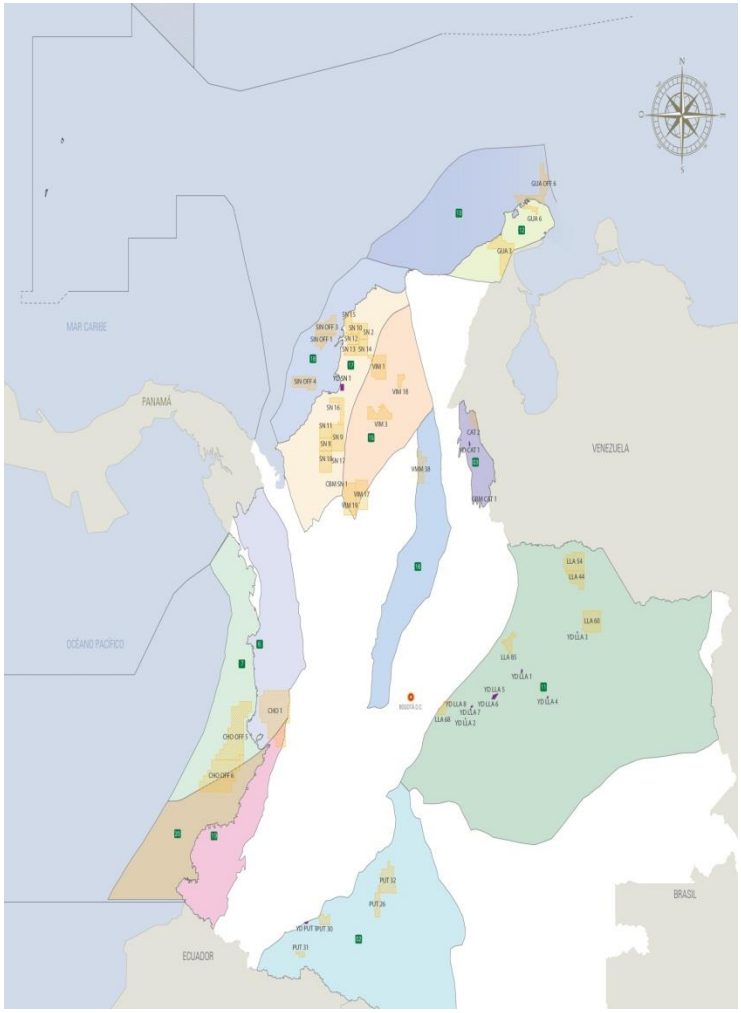

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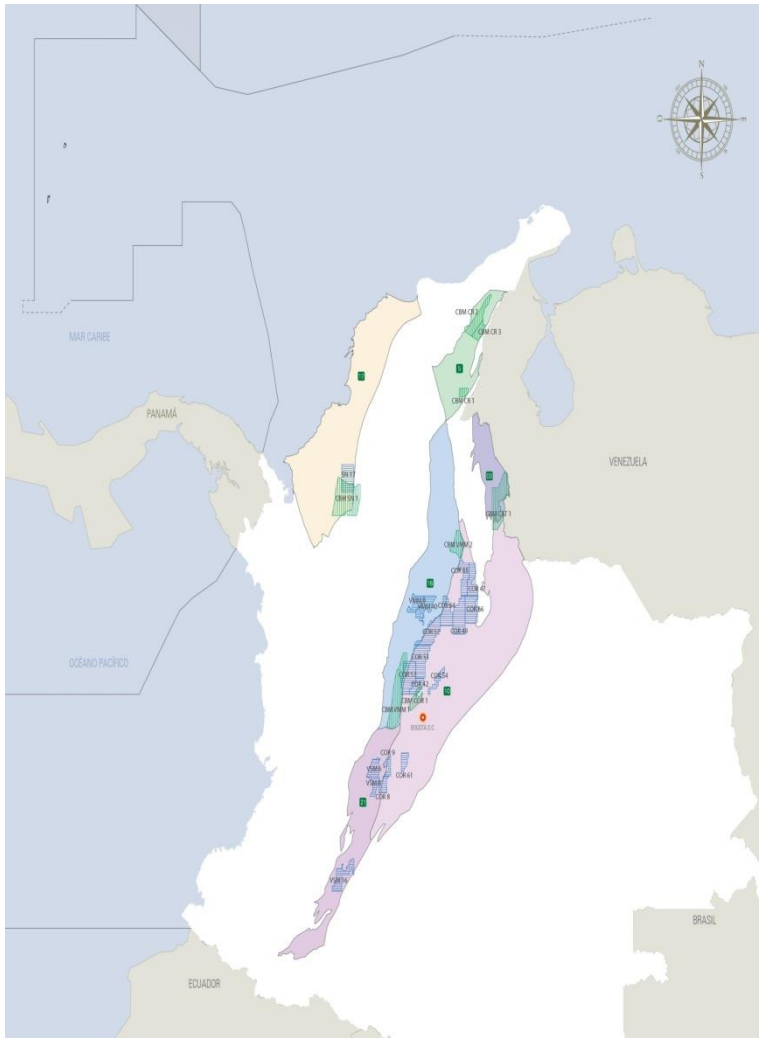
2014 Colombia Round
Unconventional (Shale Resources & CBM)



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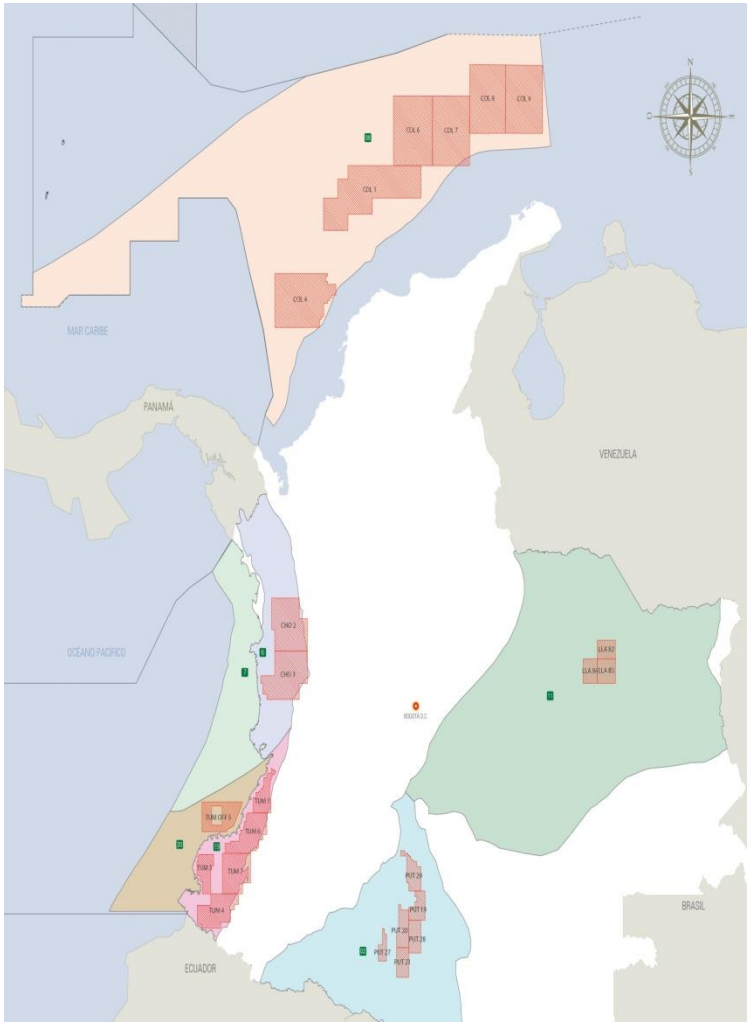
2014 Colombia Round
TEA's Onshore & Offshore



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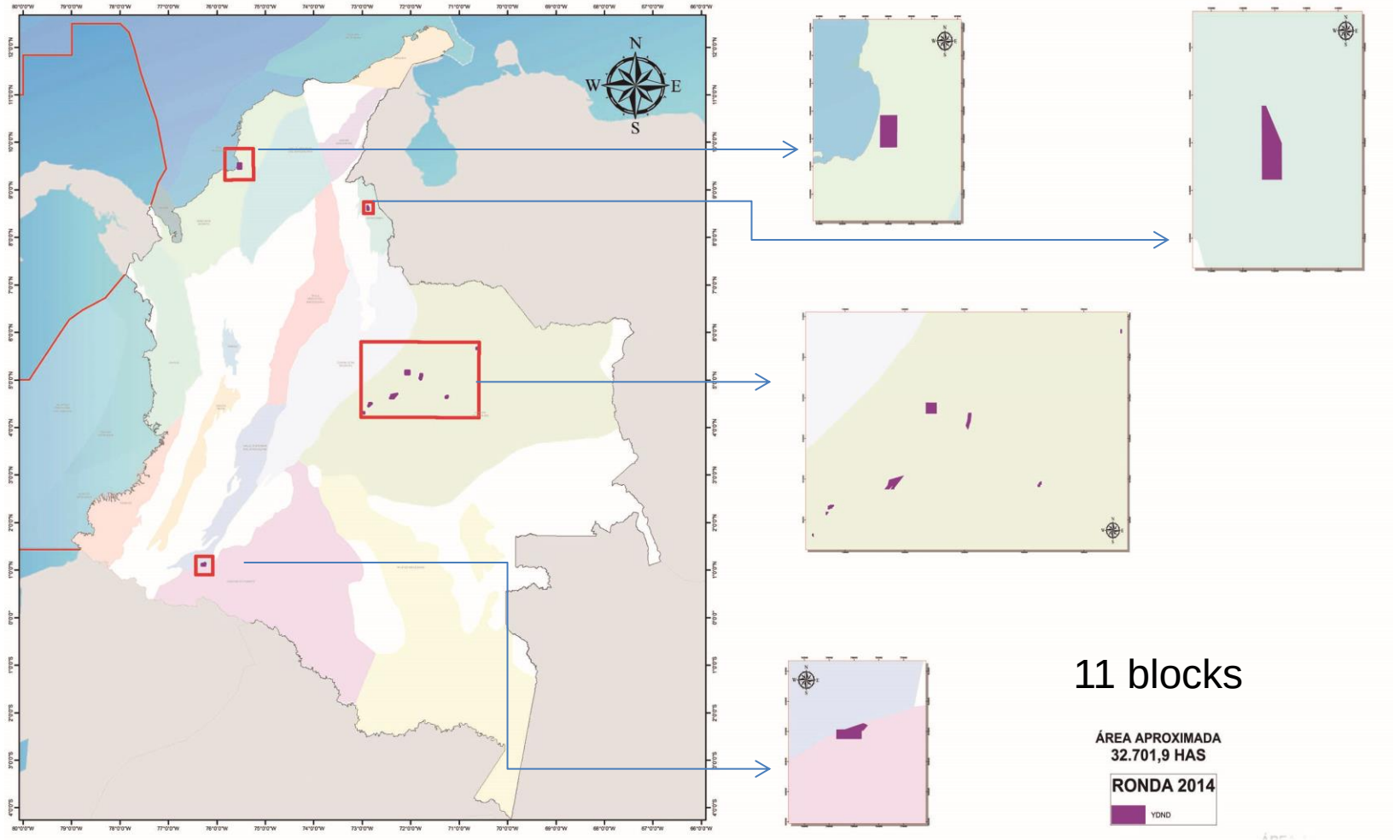
Discovered Accumulations (YD)



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Conventional

Caribbean Margin– **Sinu-San Jacinto Basin**

(Onshore & Offshore)

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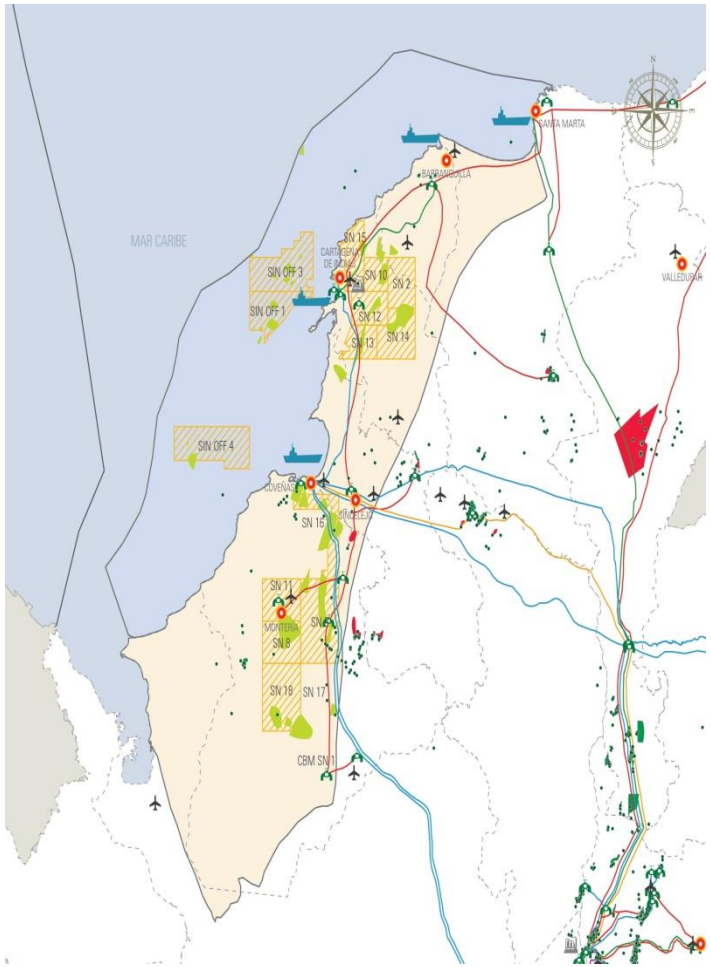
- **18** Blocks, Type I



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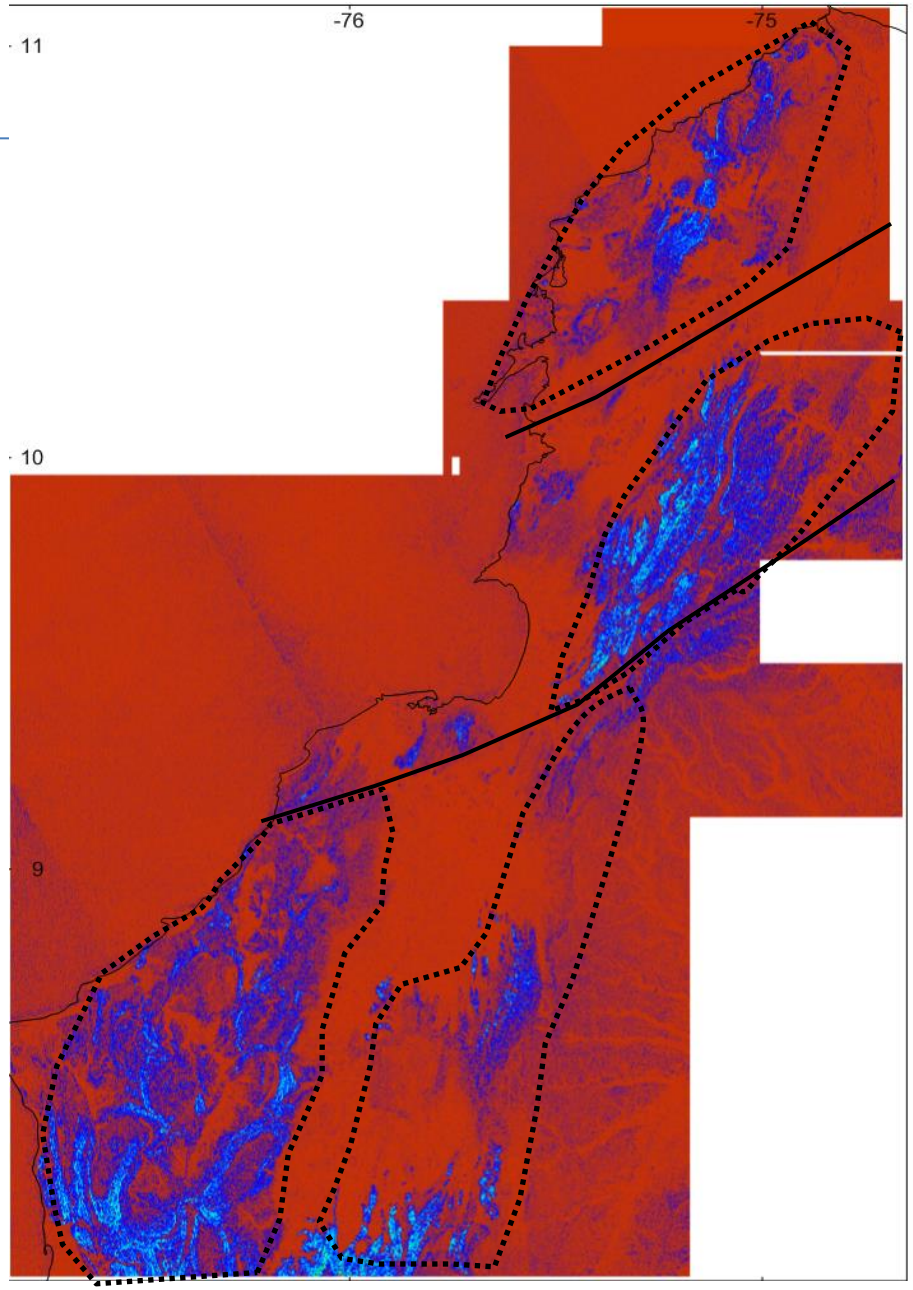
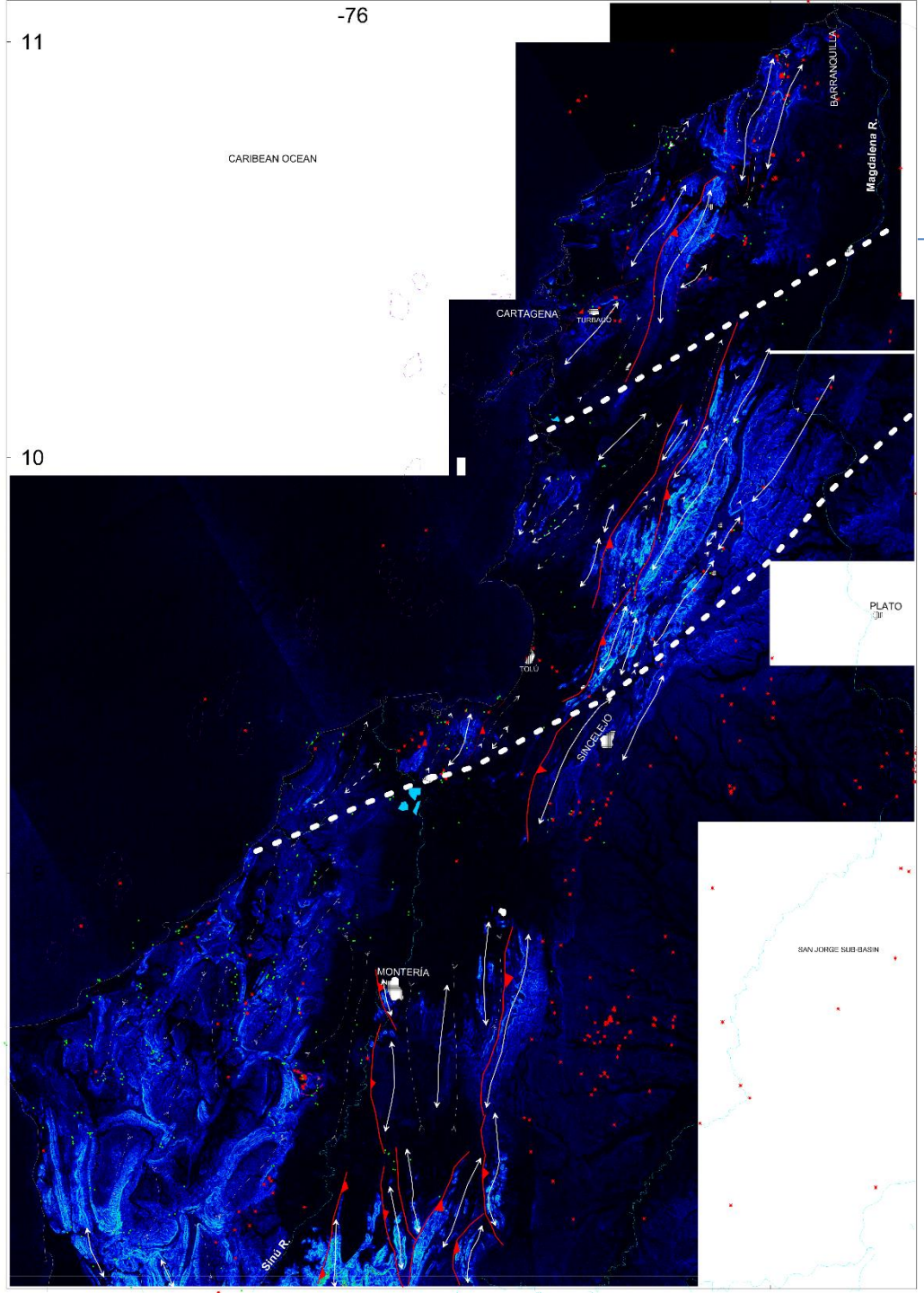
Morphotectonic Provinces



Based on Erosion Gradient
Osorio 2013



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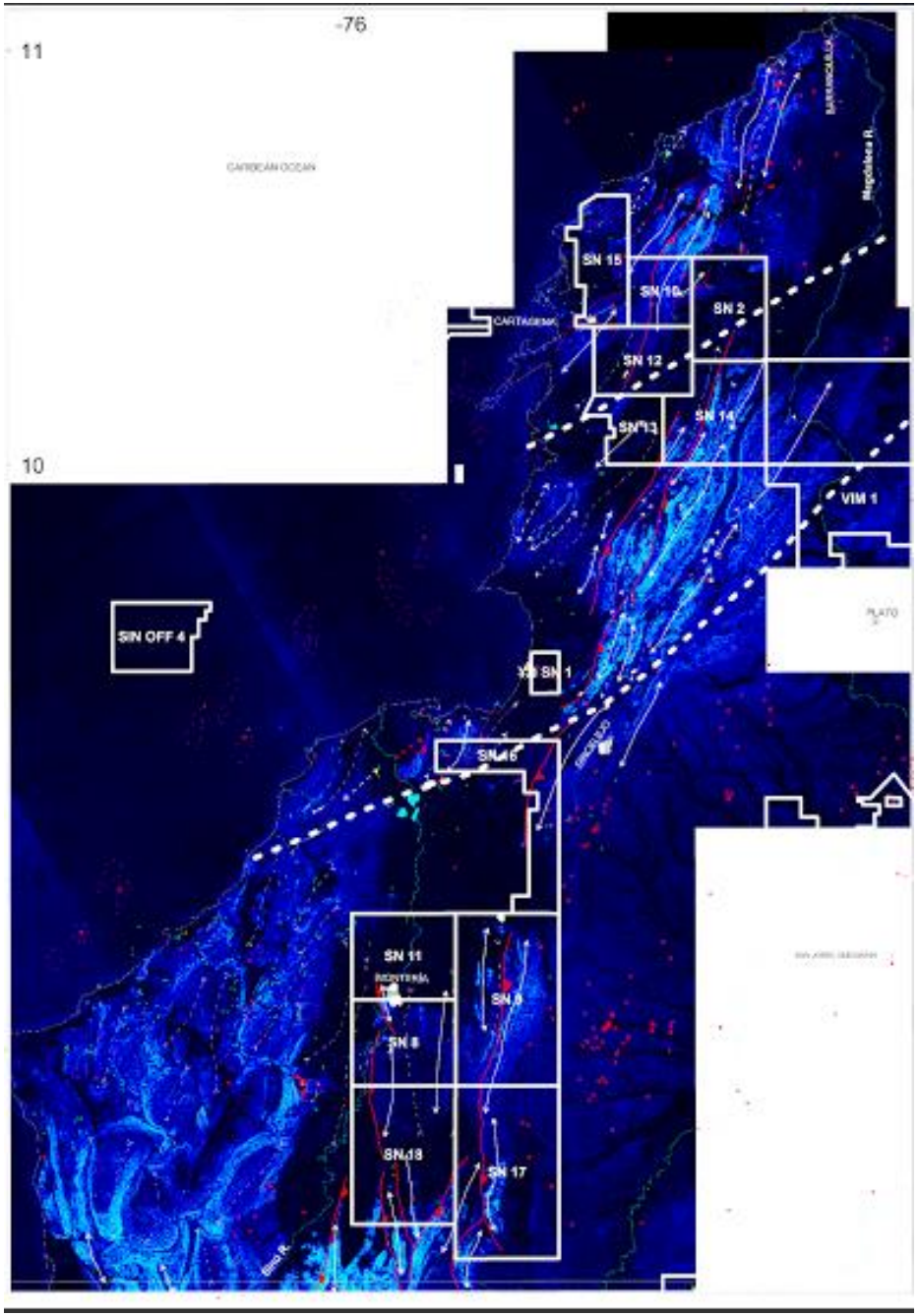

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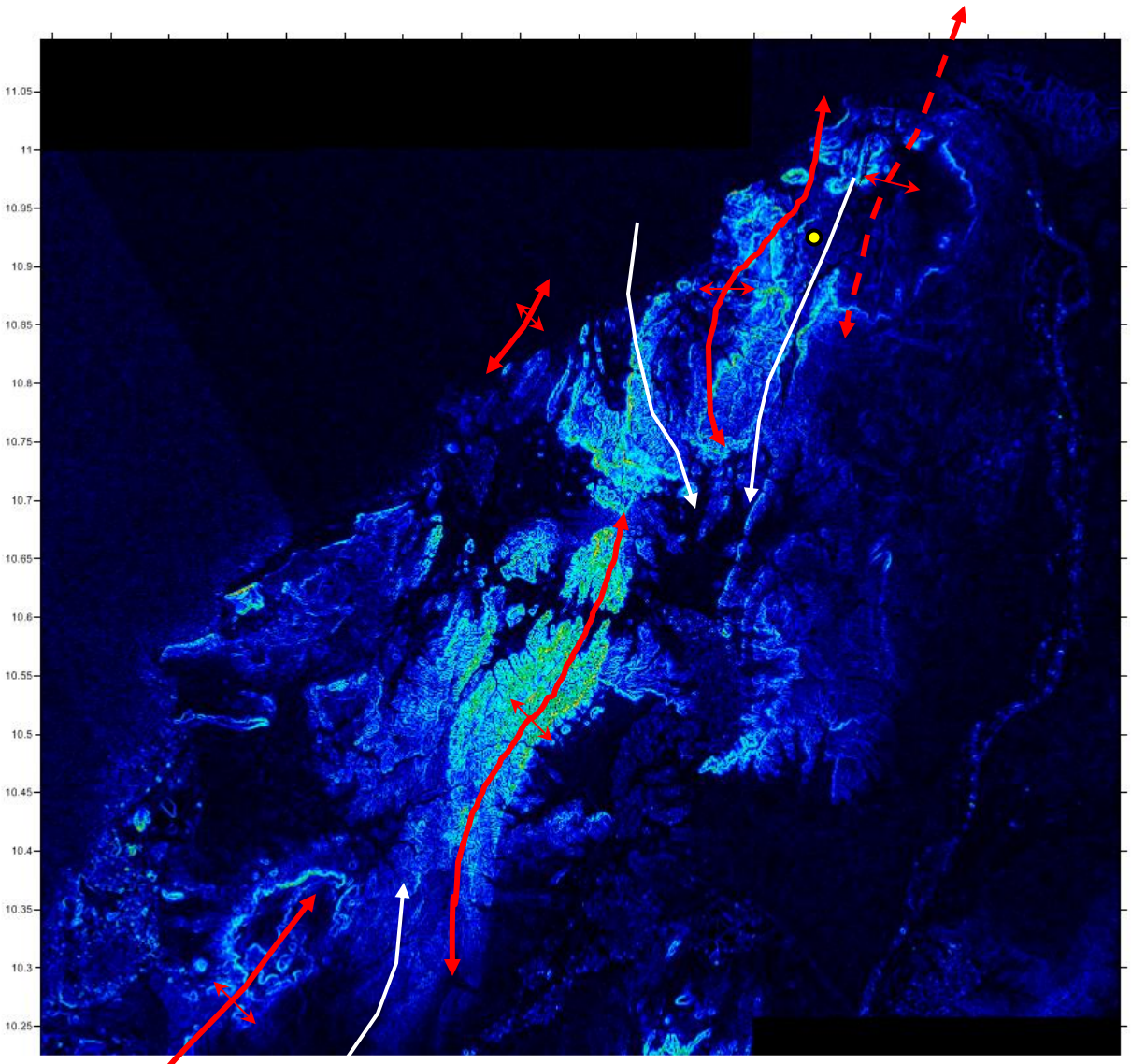

COLOMBIA:
The perfect environment

RONDA Colombia 2014

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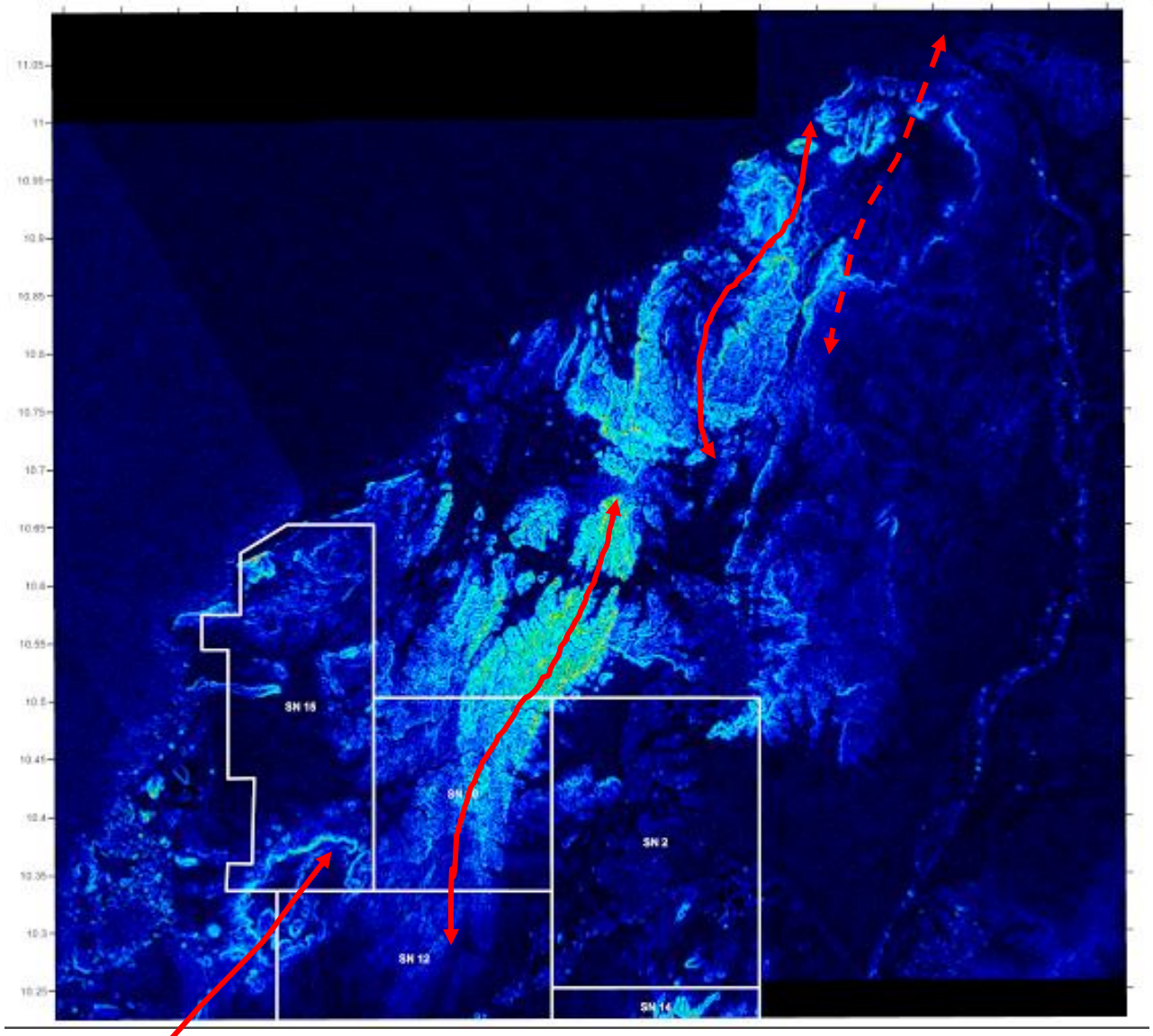
COLOMBIA



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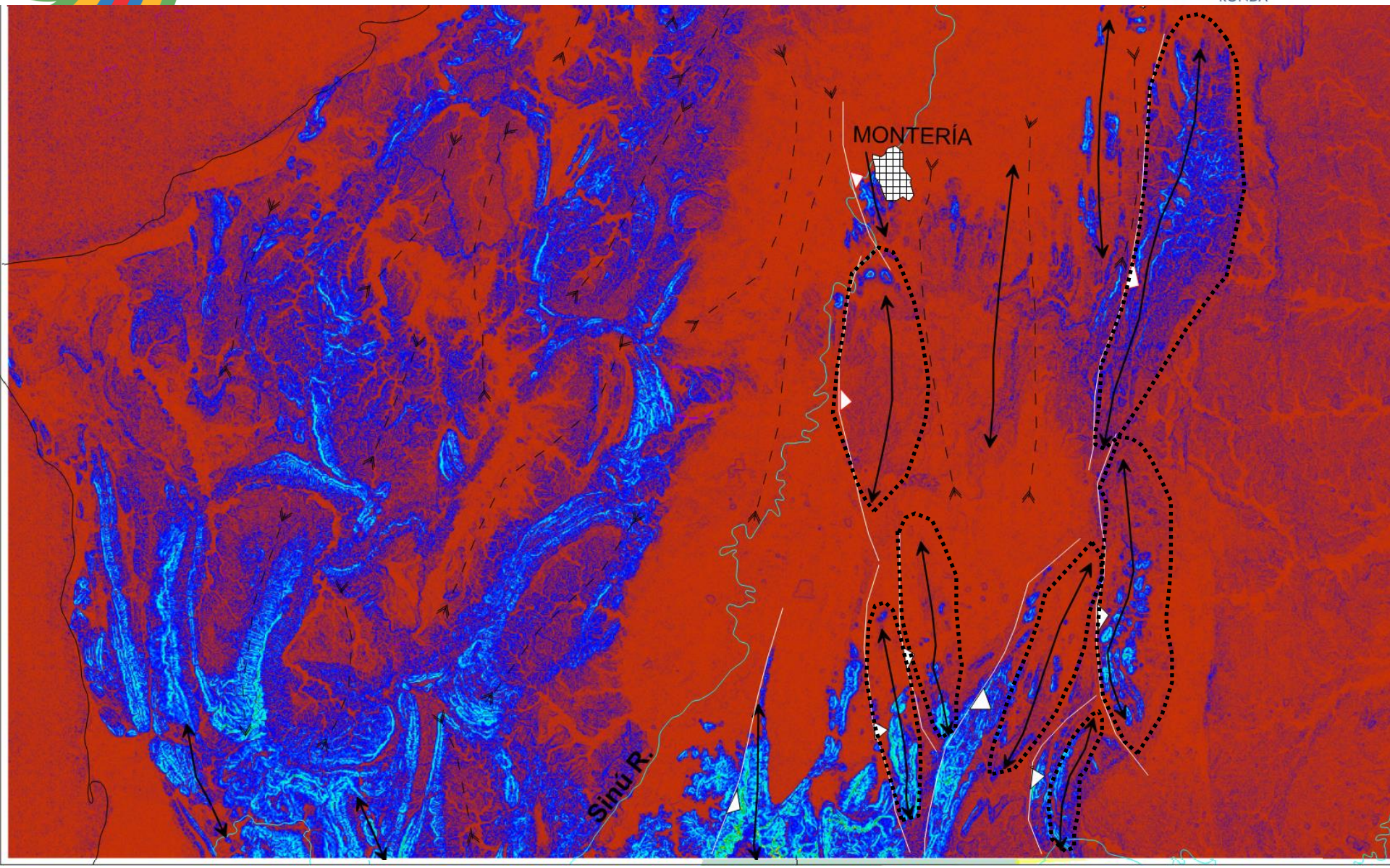
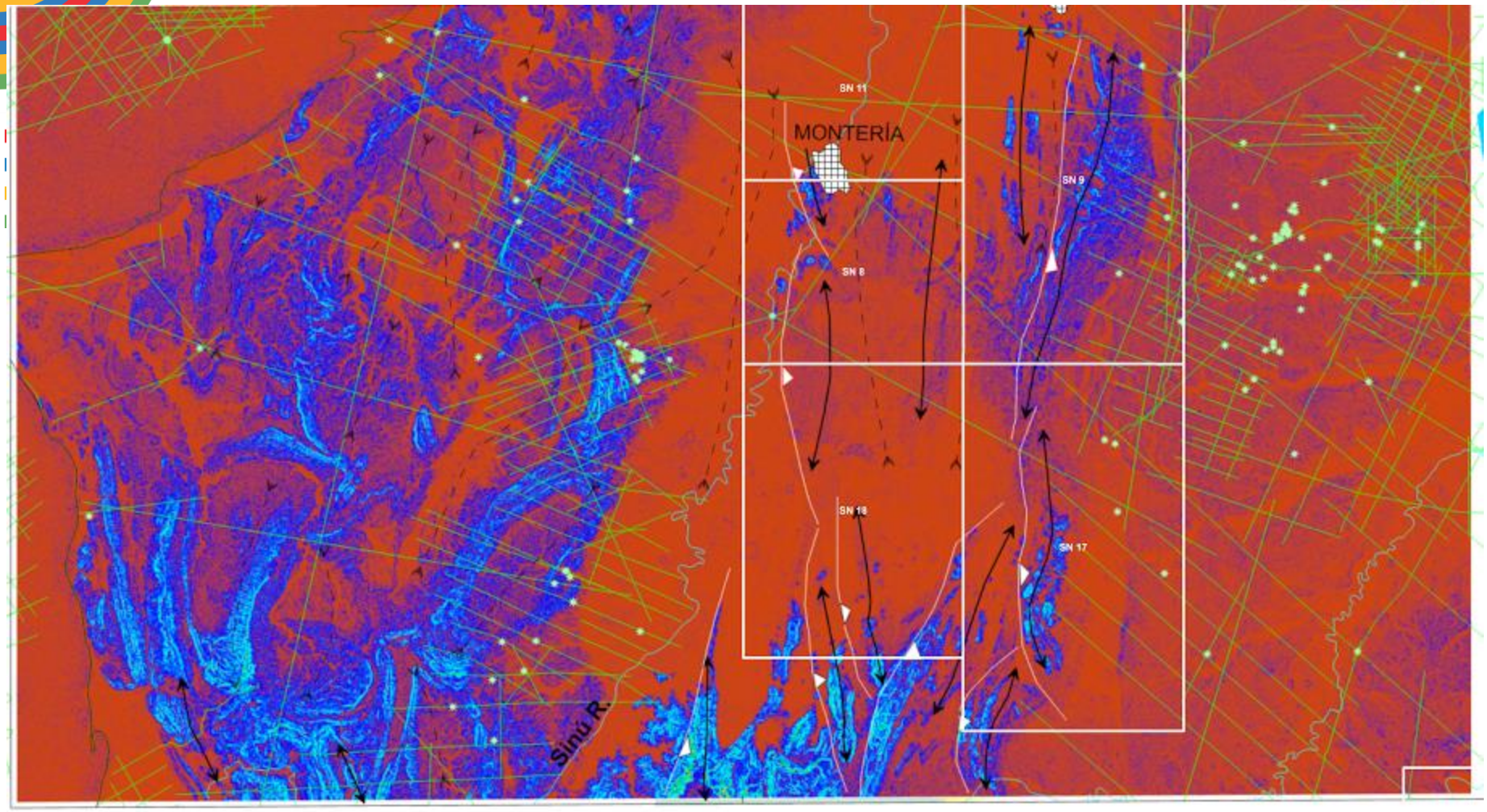
South Province



RONDA Colombia



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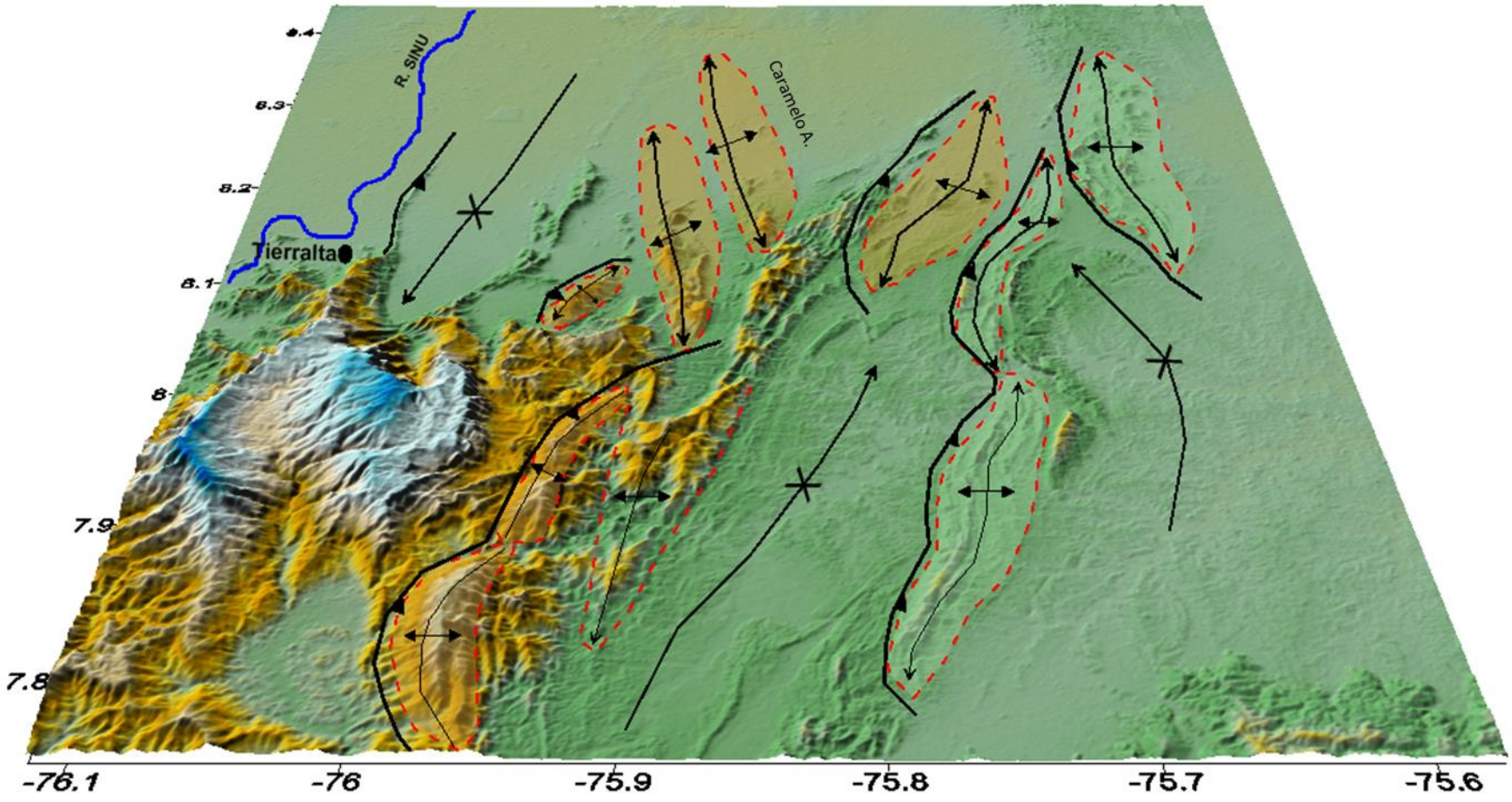
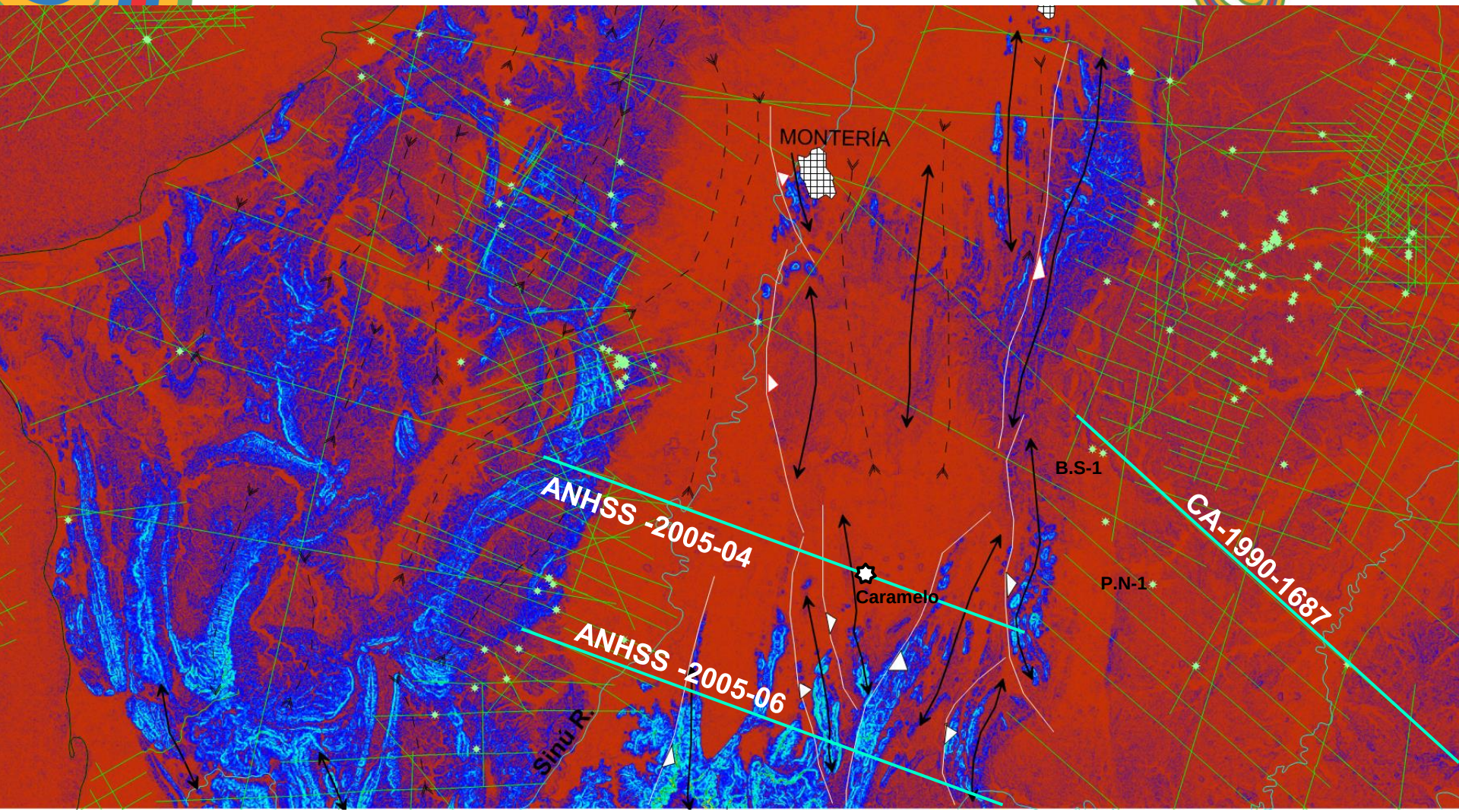
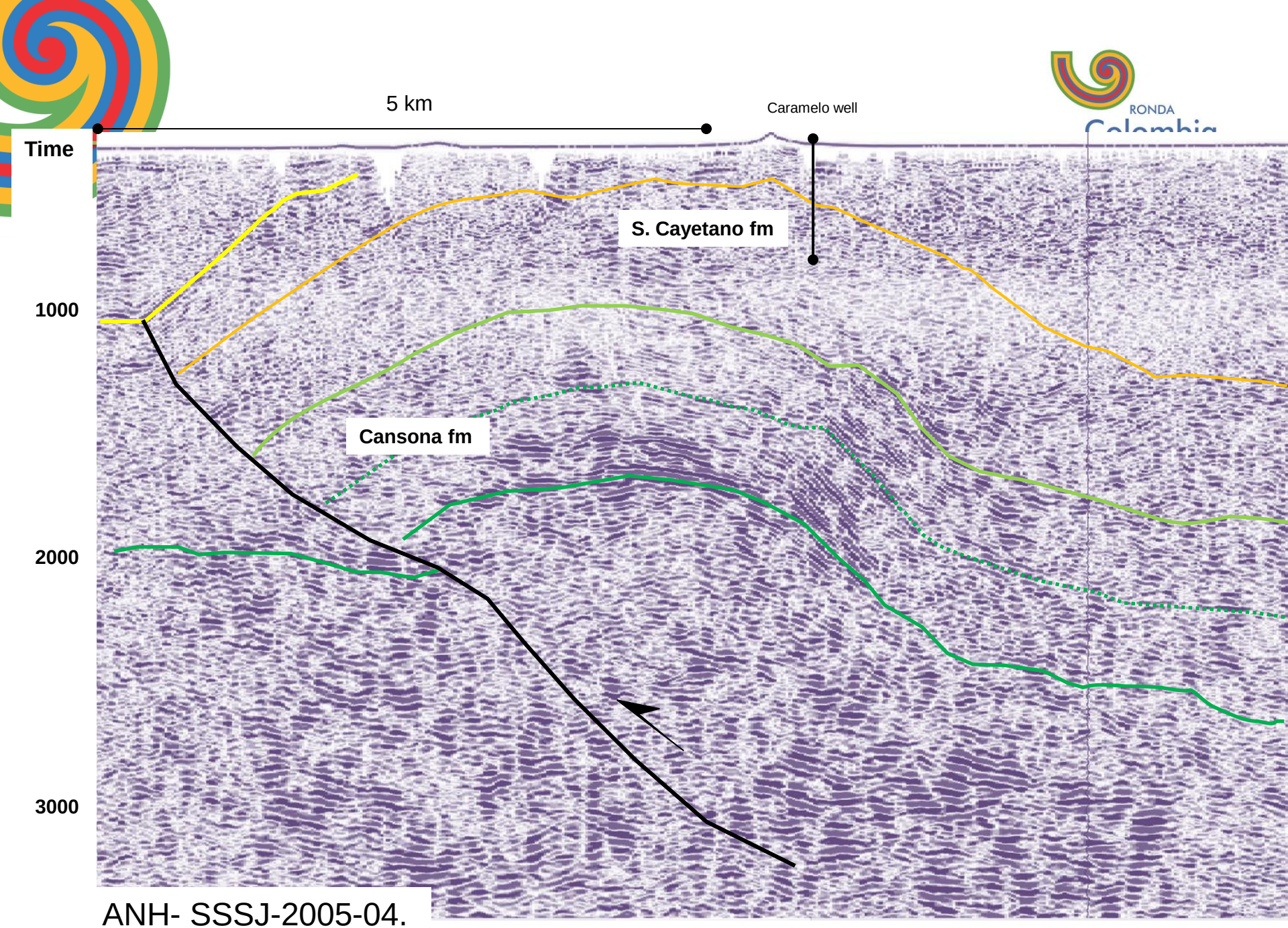
COLOMBIA

Structural Style – South Province



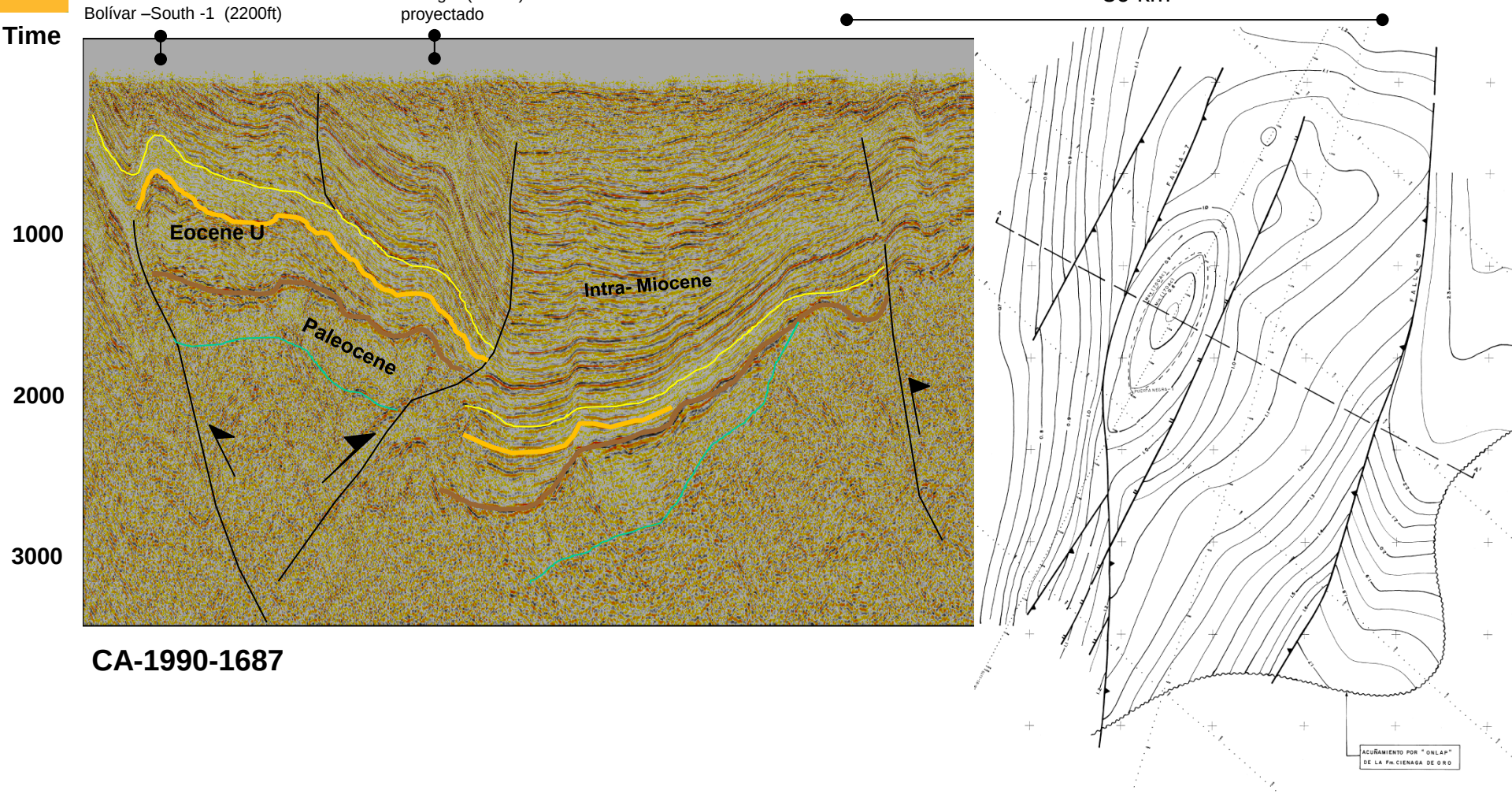

MONTERÍA
ANHSS -2005-04
ANHSS -2005-06
B.S-1
CA-1990-1687
P.N-1
Caramelo
Sinú R.

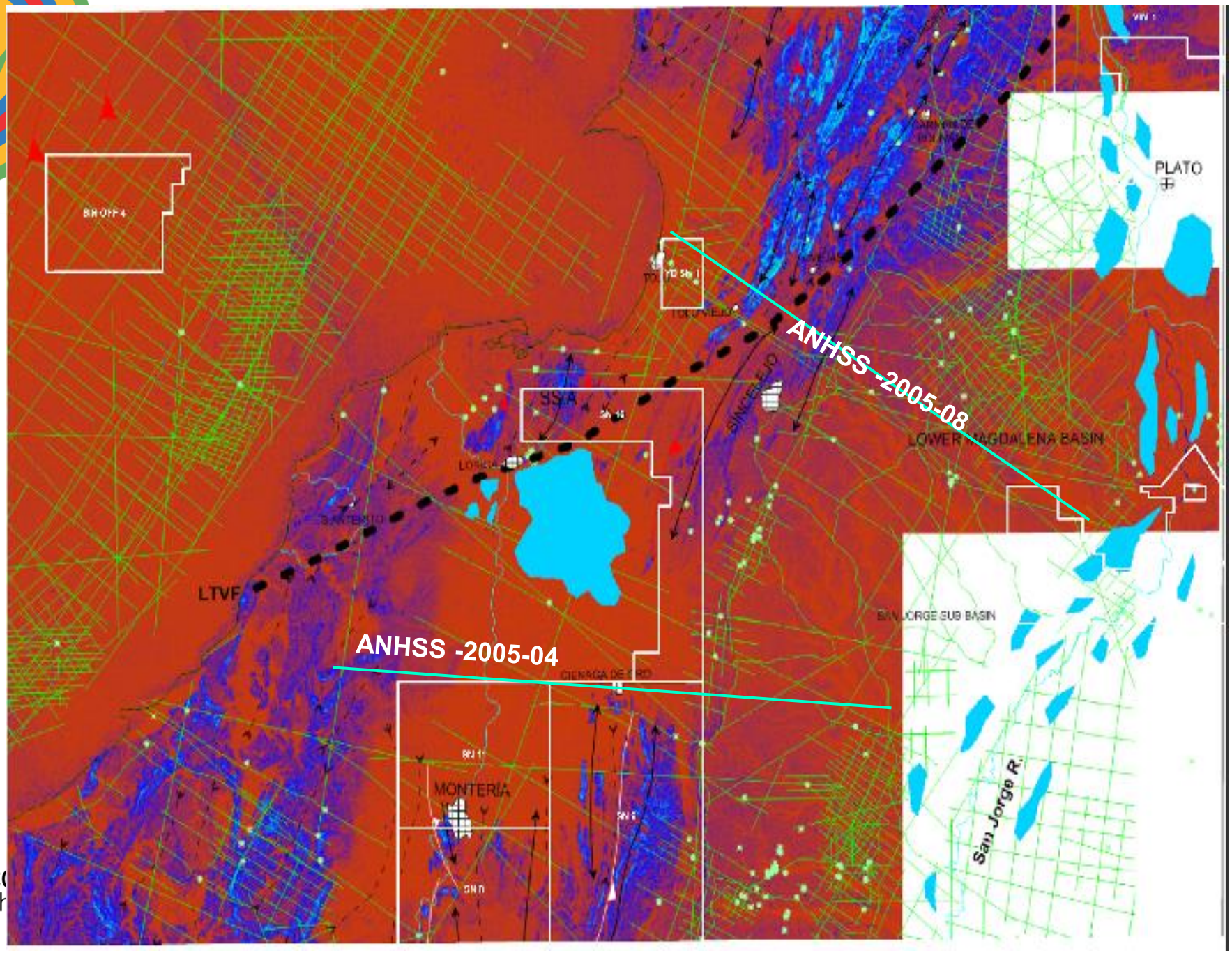


ANH- SSSJ-2005-04.

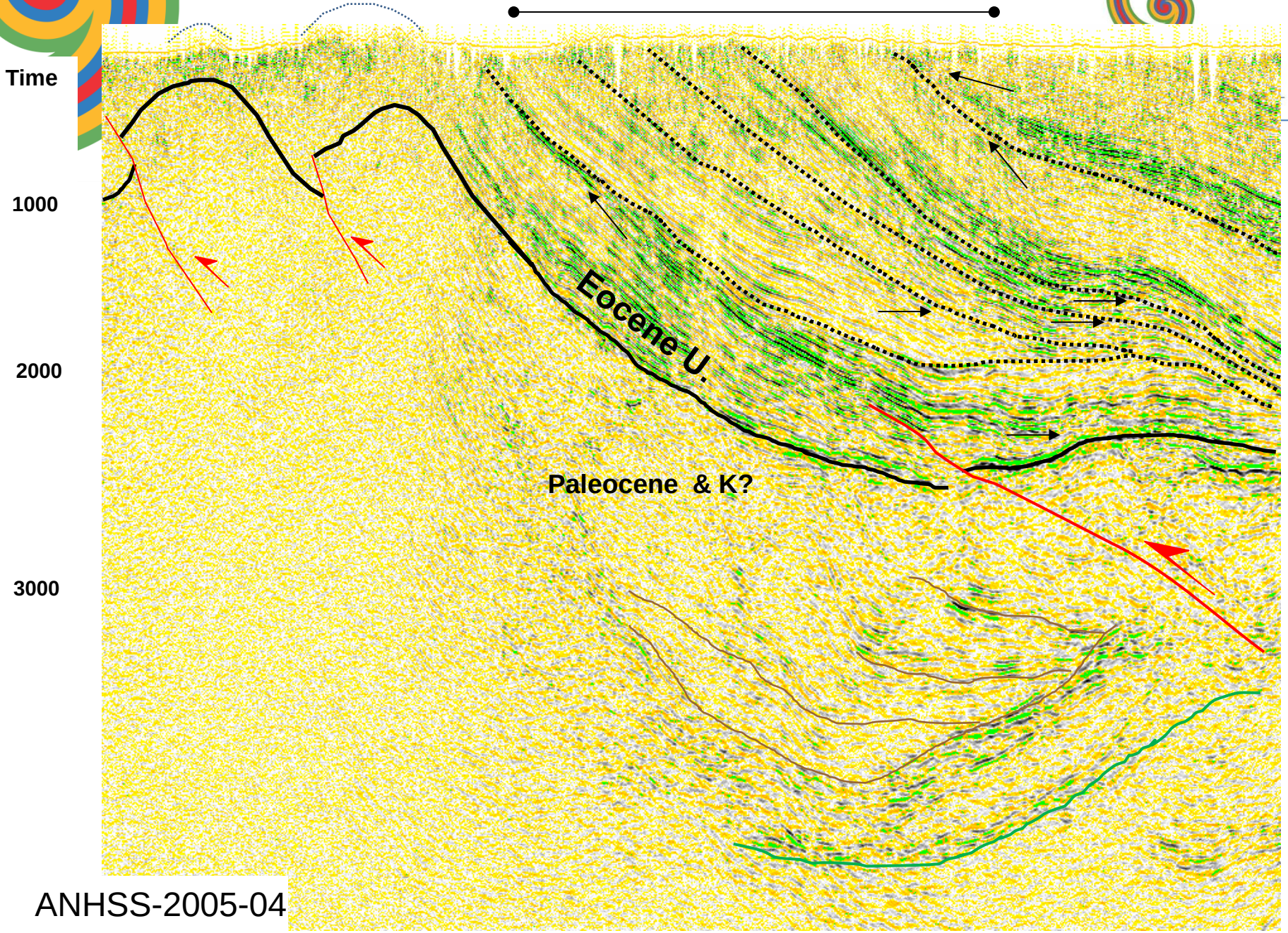
Inversion Structure

RONDA Colombia 2014



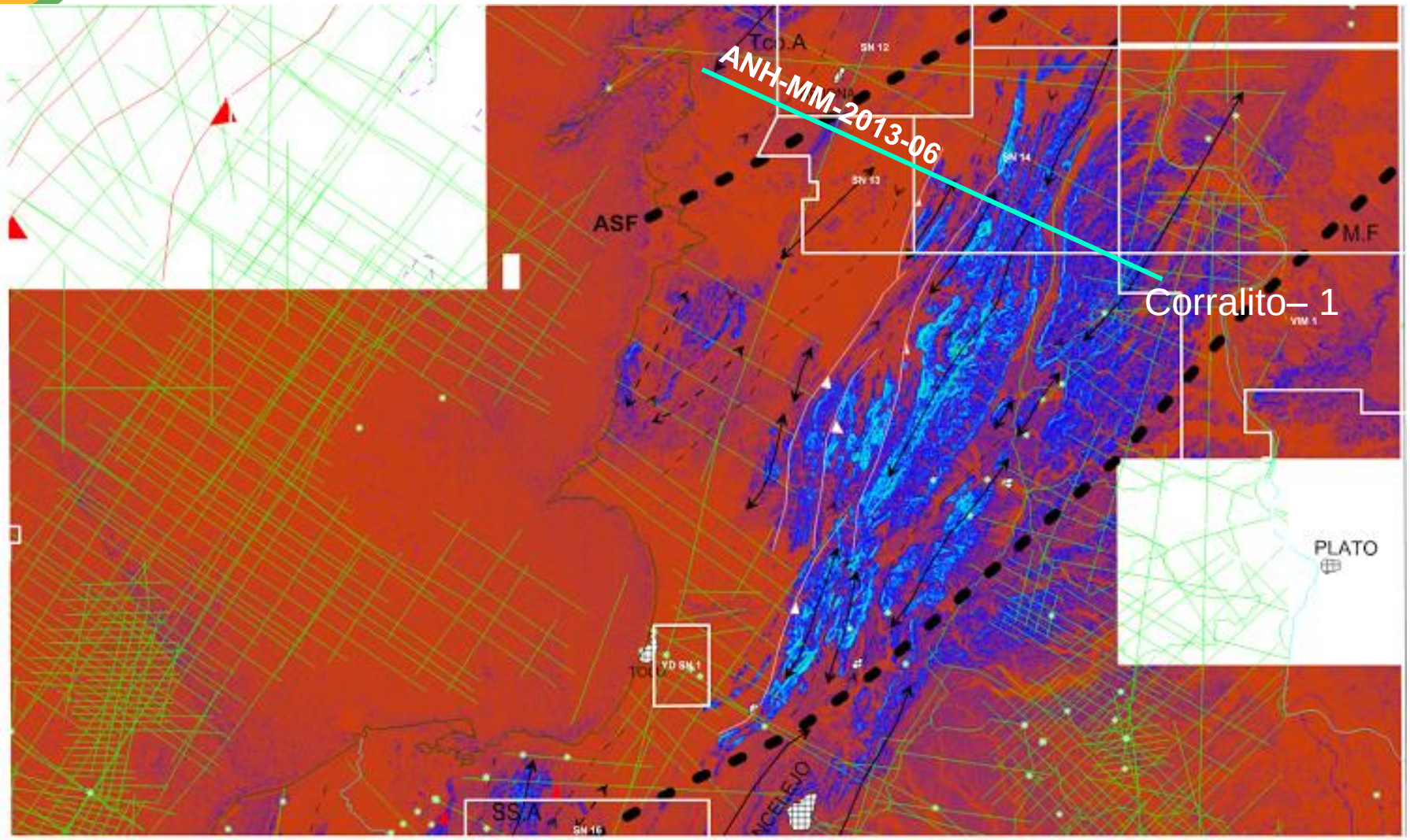

PLATO
ANHSS -2005-08
LOWER MAGDALENA BASIN
LTVF
ANHSS -2005-04
SAN JORGE SUB BASIN
San Jorge R.
MONTERIA

South Province

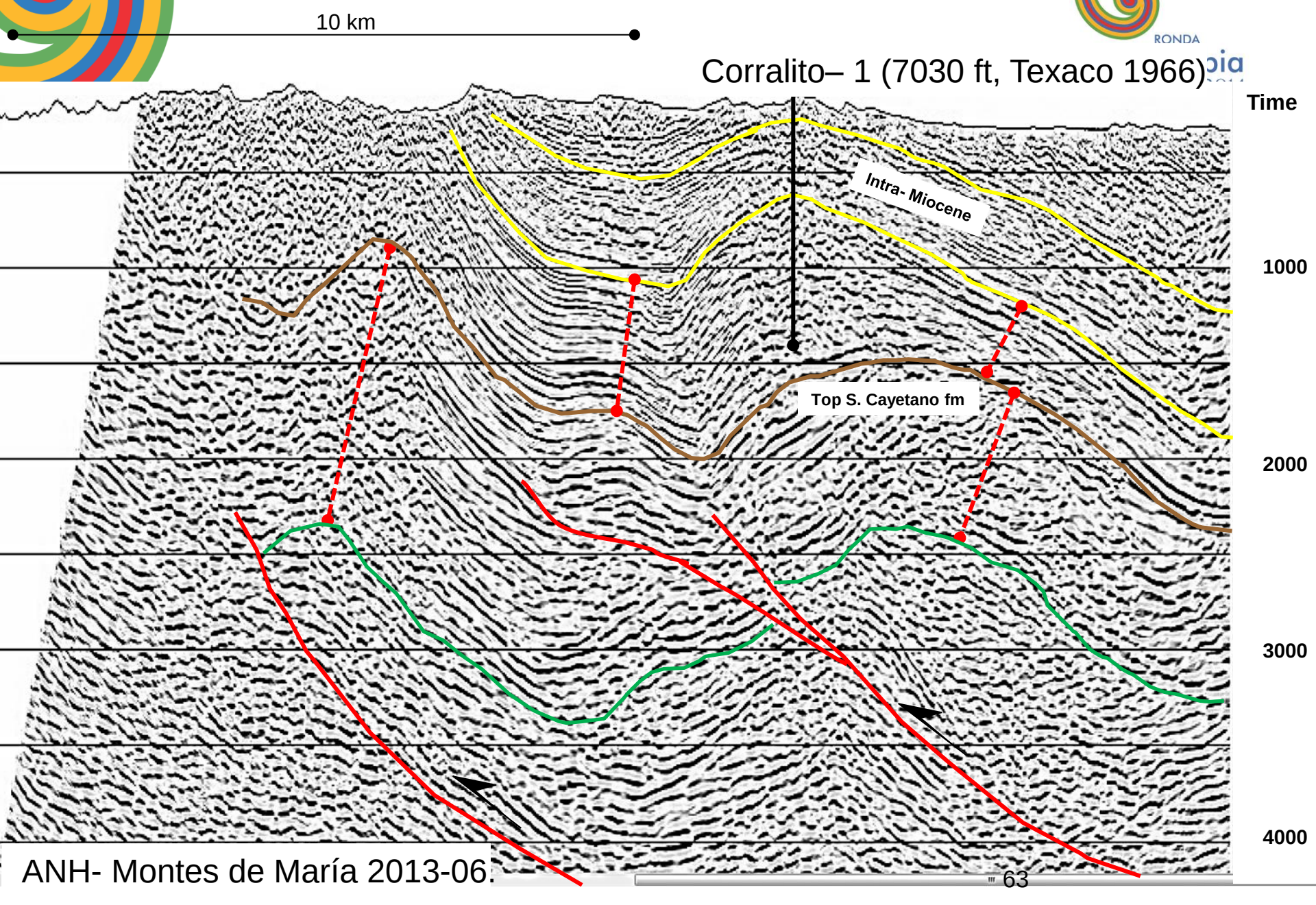


ANHSS-2005-04

RONDA Colombia 2014

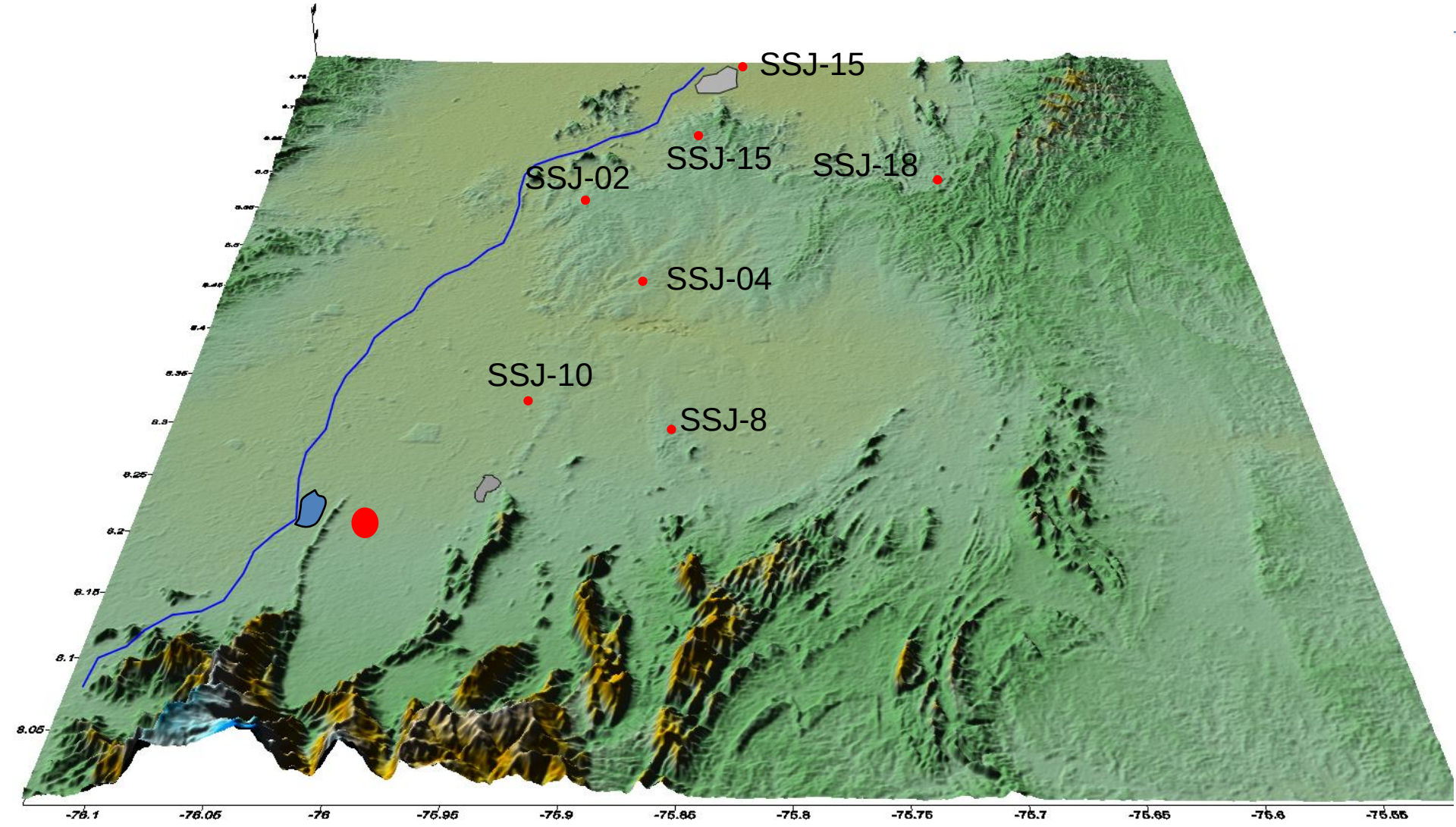


Central Province

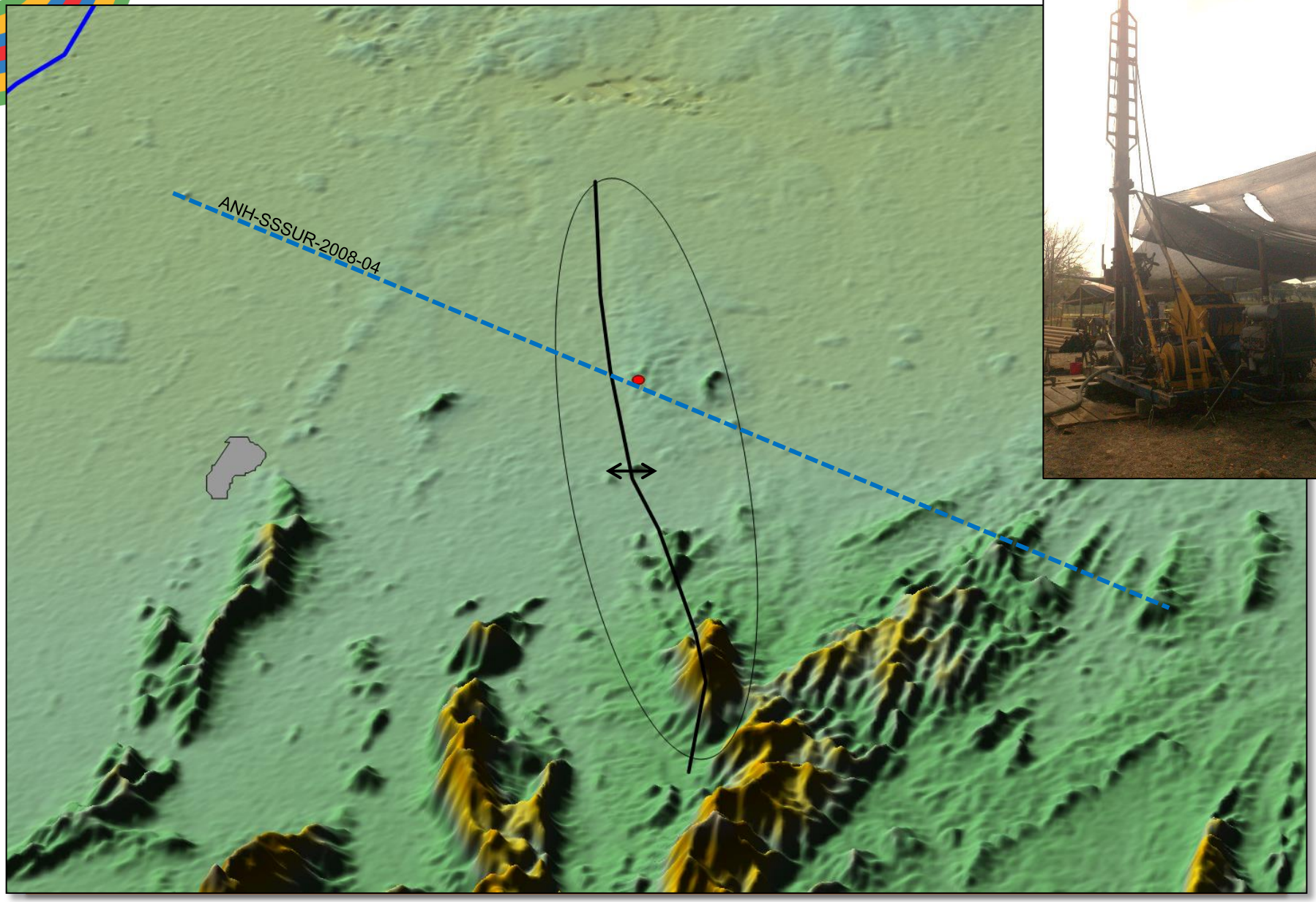


ANH- Montes de María 2013-06.

Slim Holes

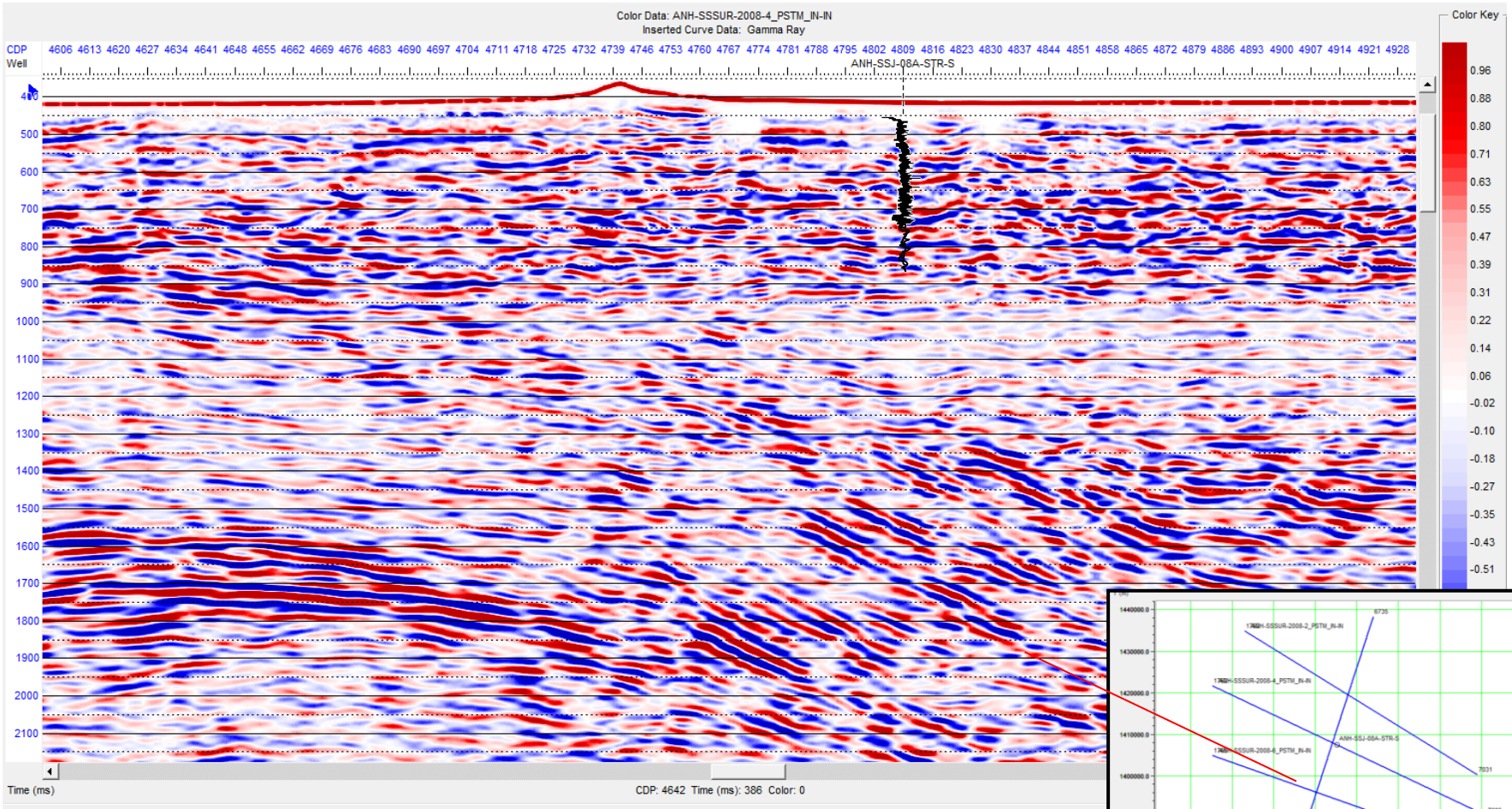

SSJ-15
SSJ-15
SSJ-18
SSJ-02
SSJ-04
SSJ-10
SSJ-8
8.35
8.3
8.25
8.2
8.15
8.1
8.05
-76.1
-76.05
-76
-75.95
-75.9
-75.85
-75.8
-75.75
-75.7
-75.65
-75.6
-75.55

ANH-SSJ-08- EL CARAMELO-1



ANH Slim Hole SSJ-08A

RONDA Colombia 2014



COLOMBIA:
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Conventional Resources

Caribbean Margin– SSJ (Onshore & Offshore)

Pozo ANH-SSJ-08 - EL CARAMELO

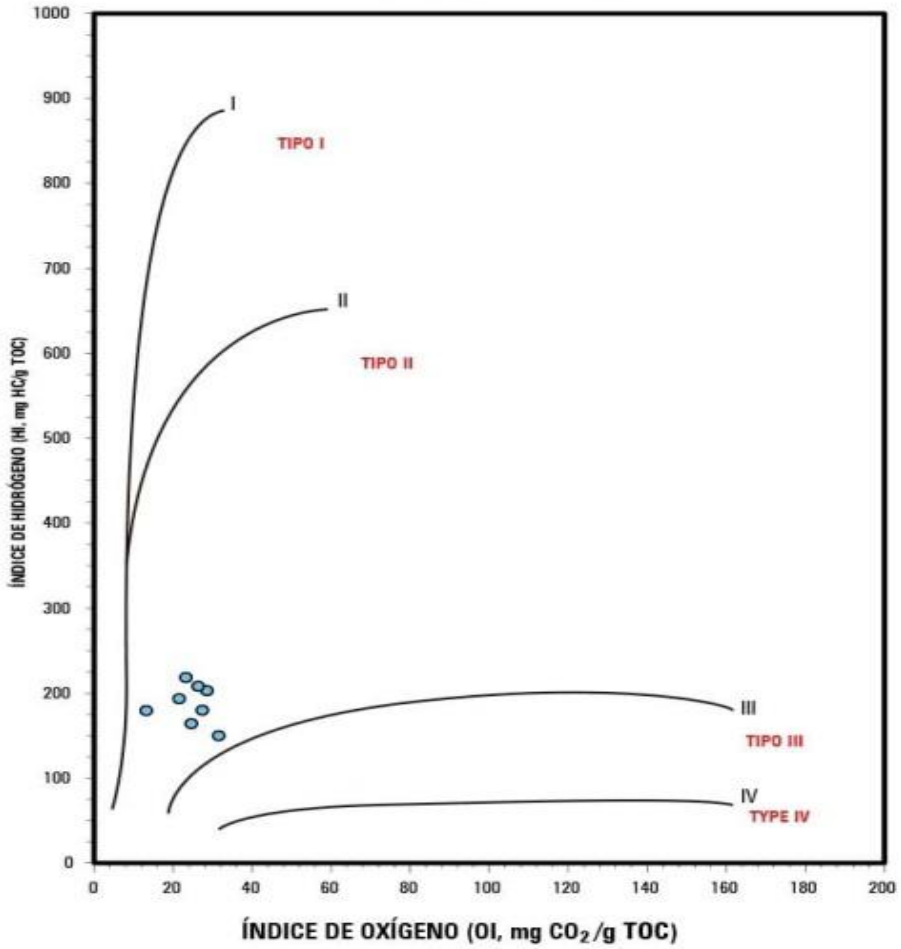
- Quartzose sand
- San Cayetano Fm
- 35° API (400´saturated)
- Marine Shale (Cansona Fm.)
- K: 100-200 md (average)
- Ø : 20%
- Depth: 800 ´

Conventional Resources

Caribbean Margin– SSJ (Onshore & Offshore)

RONDA Colombia 2014

TIPO DE KERÓGENO



Intervalo Generador Paleoceno

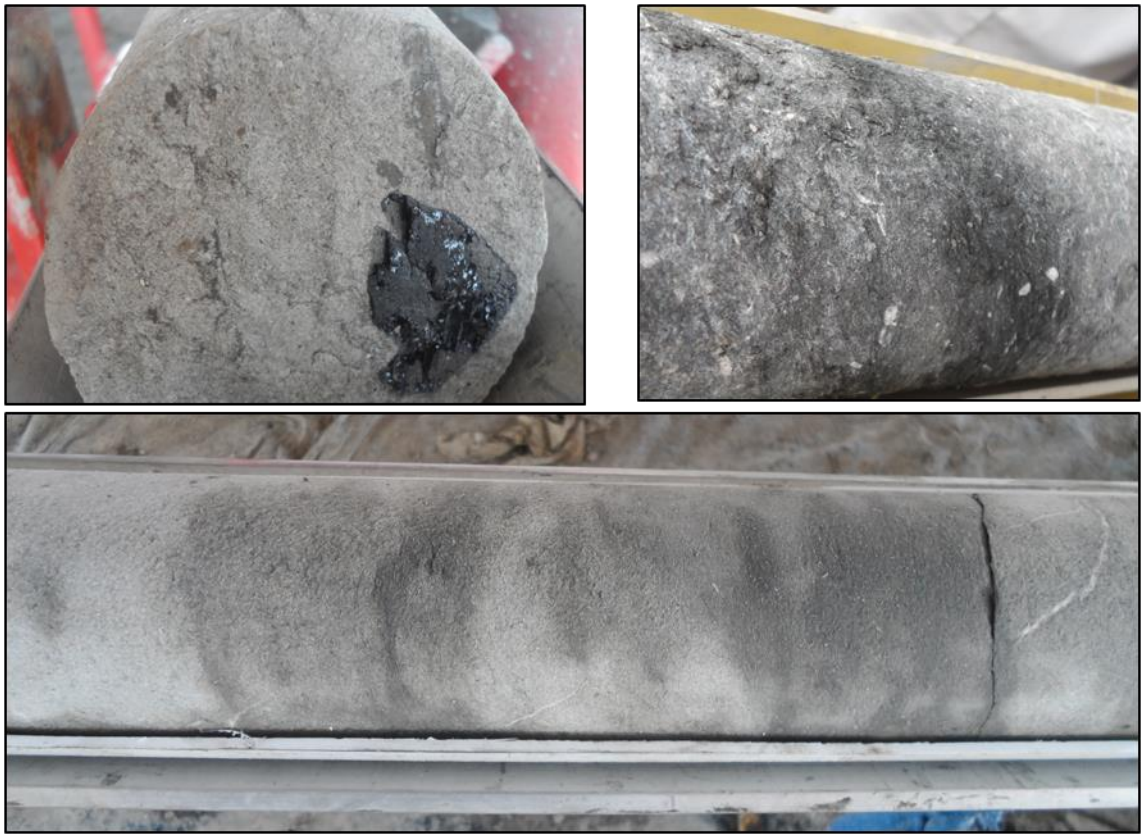
Fm. Cansona _ Slim Hole

COLOMBIA
The perfect environment

ANH AGENCIA NACIONAL DE HIDROCARBUROS COLOMBIA

Conventional Resources

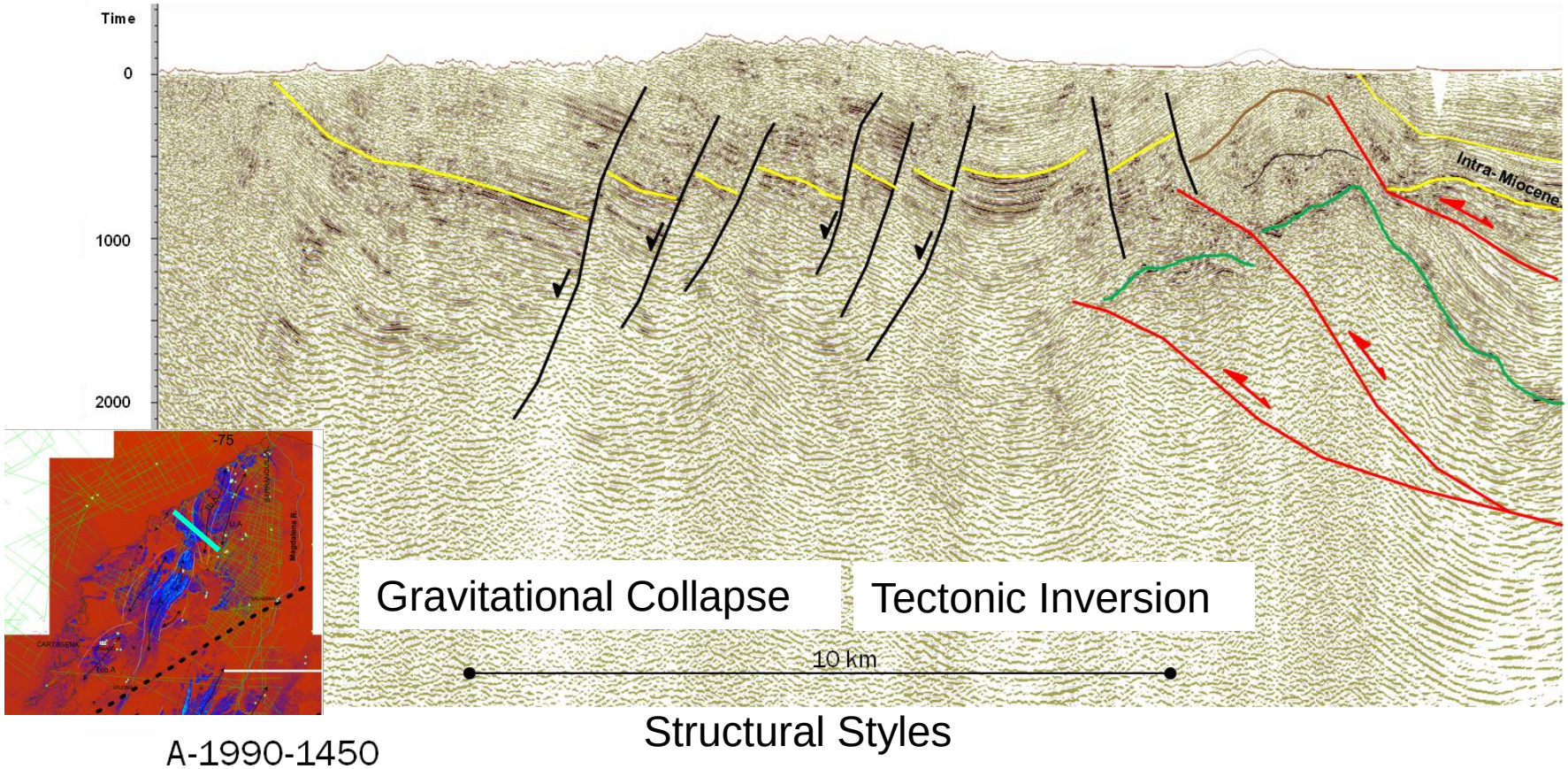
Caribbean Margin– SSJ (Onshore & Offshore)



Eocene Lime with oil and tar
ANH Well Tierralta St

Conventional

Caribbean Margin– SSJ (Onshore & Offshore)



A-1990-1450

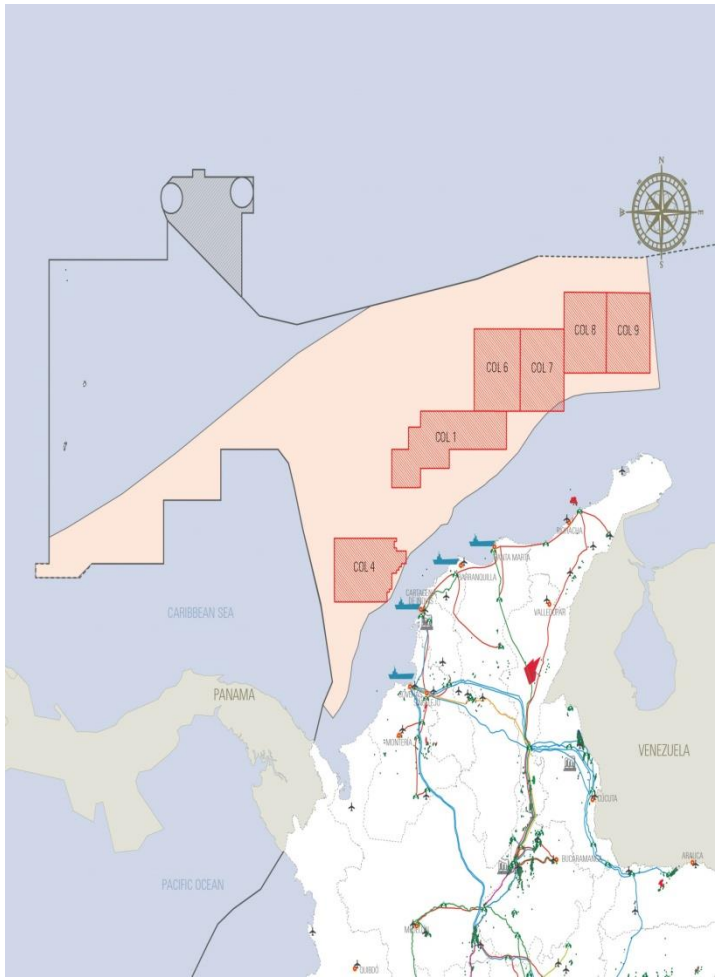
Structural Styles

Conventional

Caribbean Margin – **Colombia Basin**

RONDA Colombia 2014

- **6** Blocks, Type III



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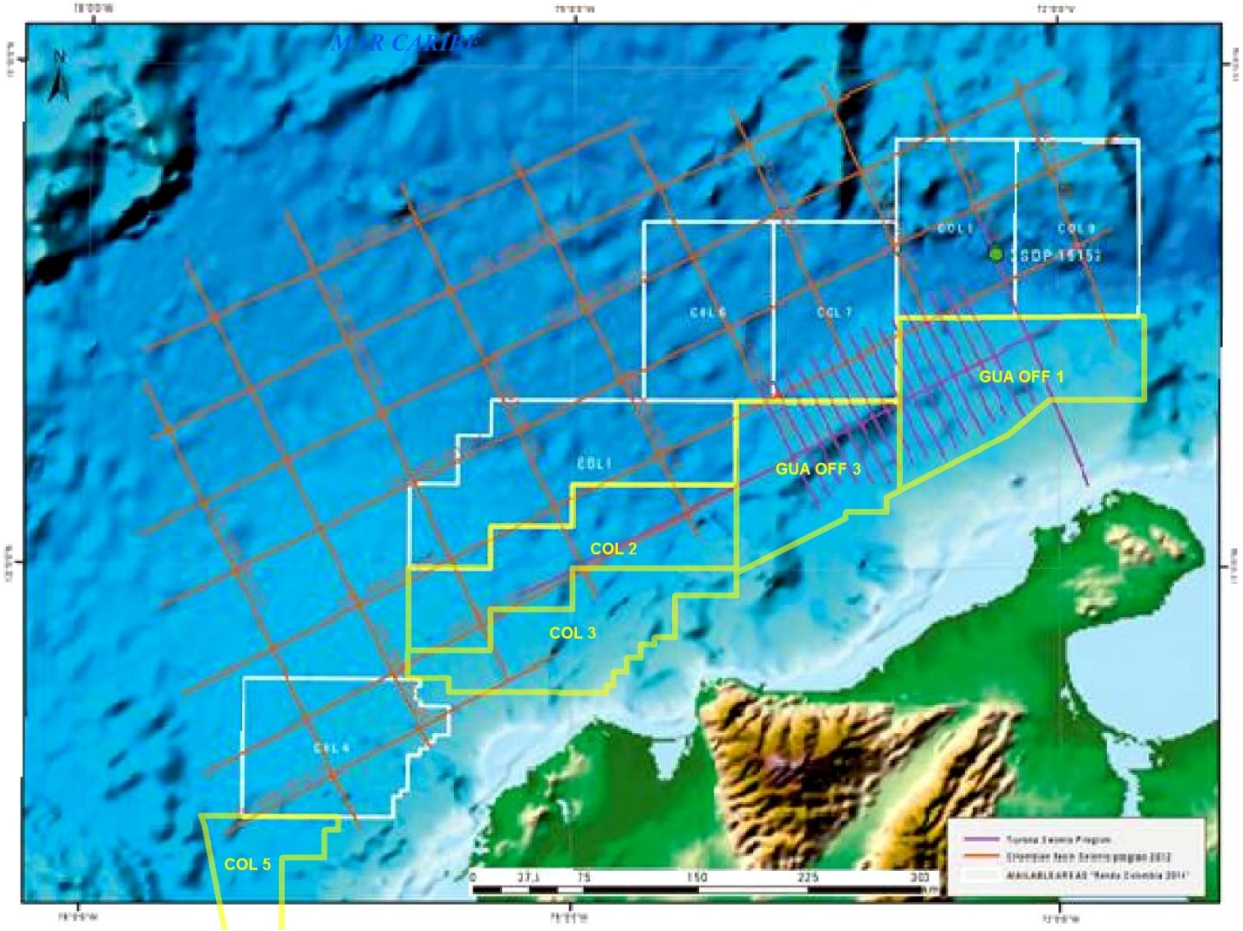
COLOMBIA

Conventional

Caribbean Margin – **Colombia Basin**



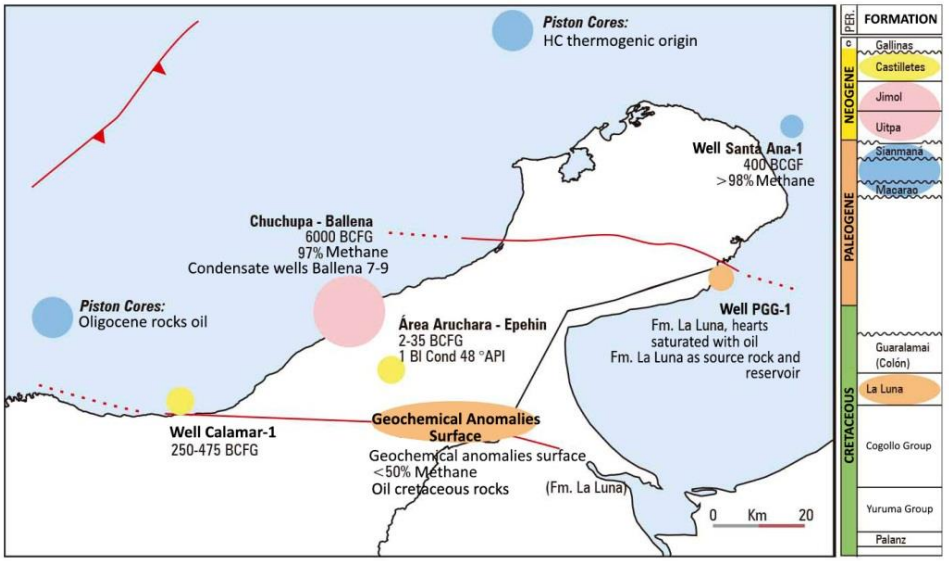
COLOMBIA:
The perfect environment

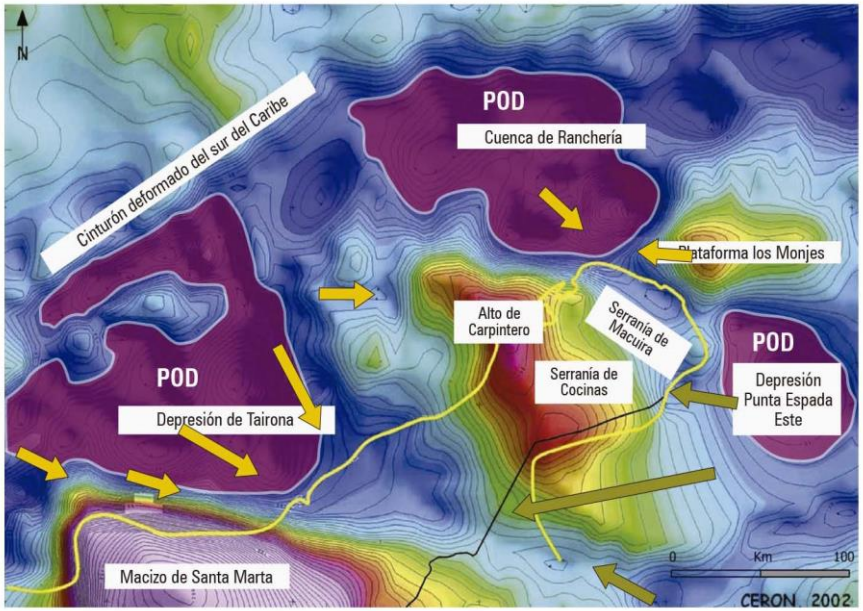
Conventional

Onshore and Offshore

RONDA Colombia 2014

- Oil and Gas Samples





- Location of Source Rock “Pods”

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COLOMBIA

Conventional

Caribbean Margin –**Colombia Basin**

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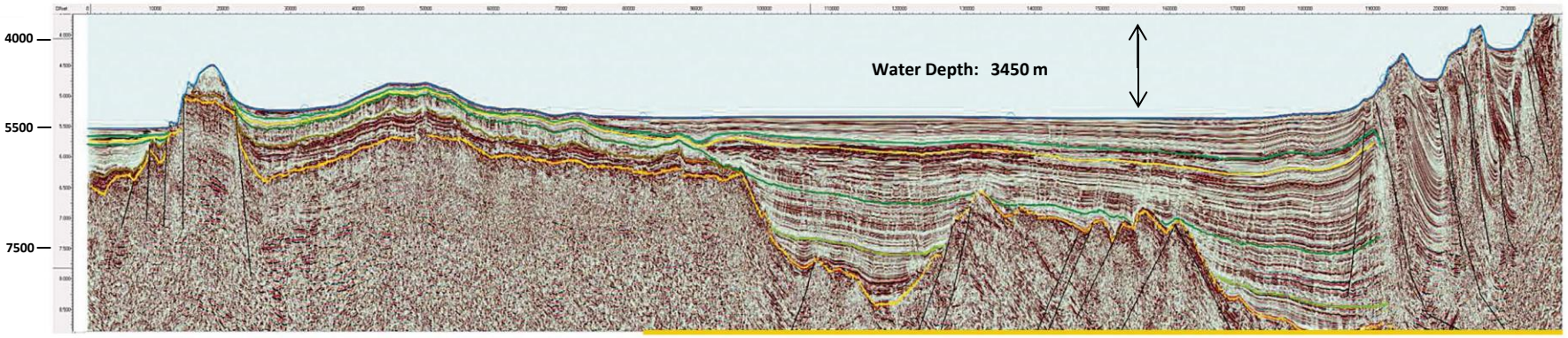
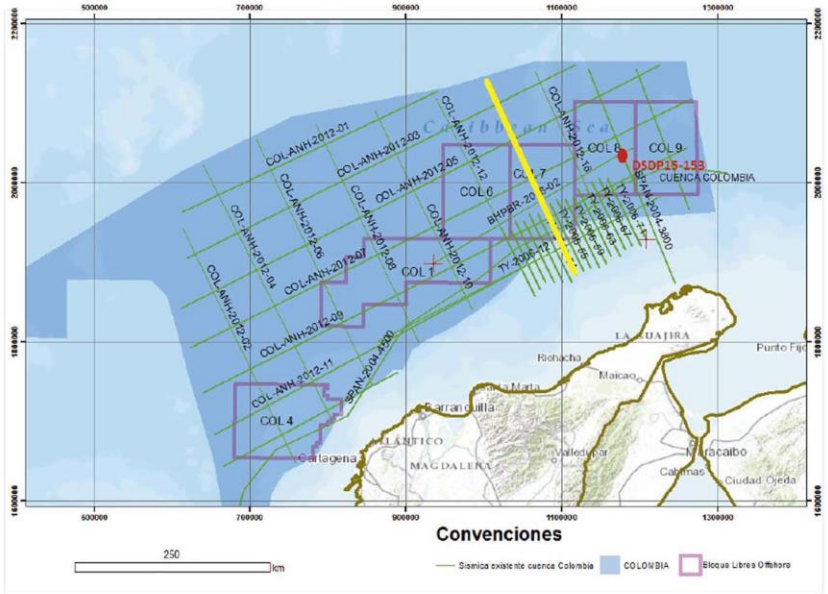
SW NE





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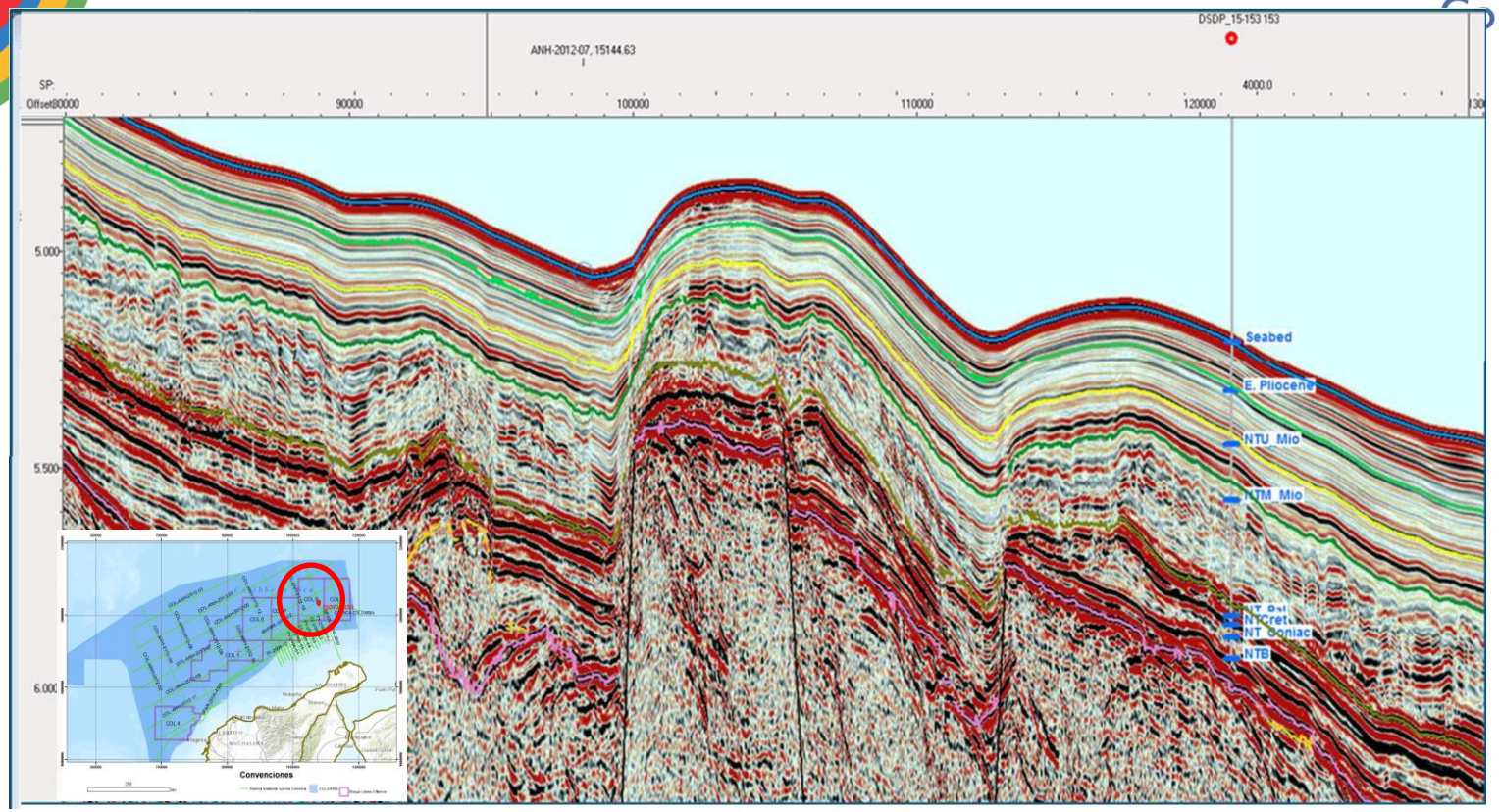
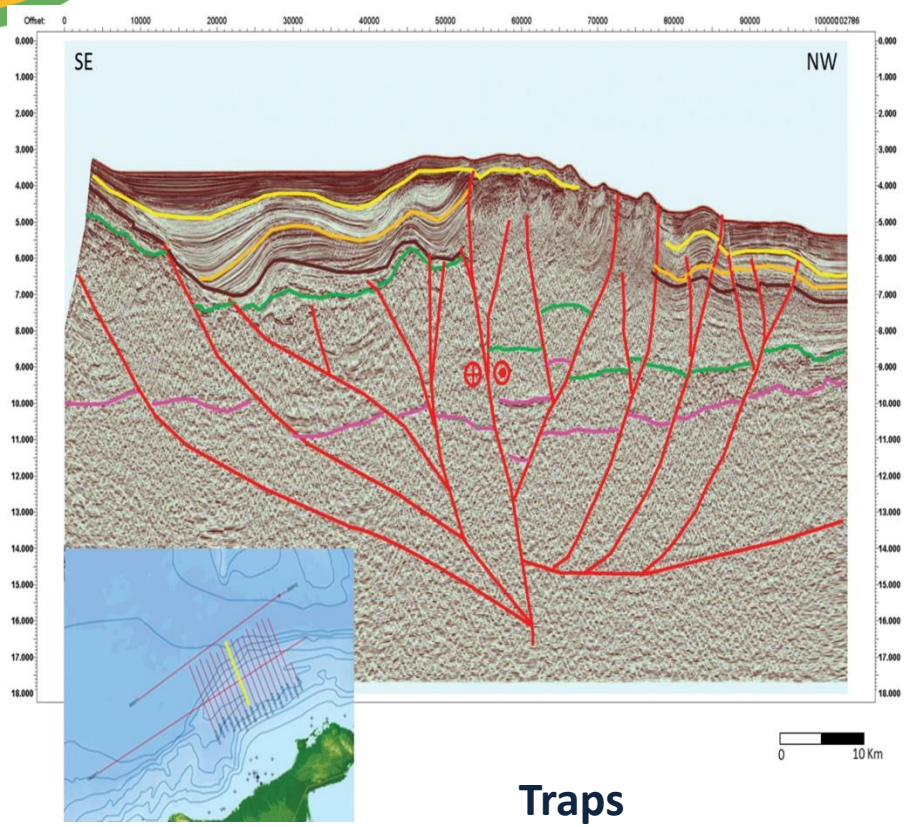
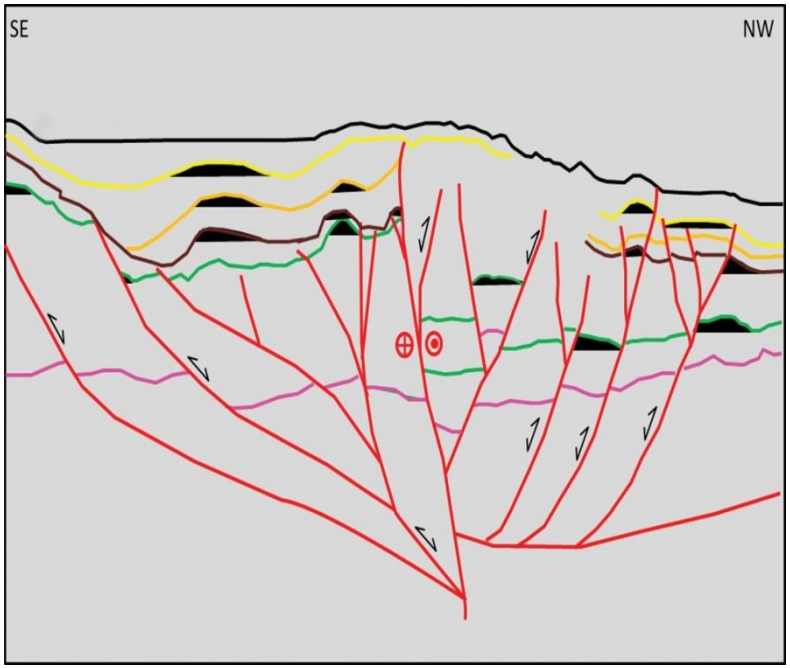
COLOMBIA



Well DSDP-15-151 penetrated a calcareous Cretaceous sequence with TOC values of 2,7 to 4,2%.

Colombia Basin





From poster presented at the AAPG/ICE in Cartagena (2013) by L. E. Ardila, J. Erickson & L. Diaz.

Traps

- Inversion Structures
- Potential Carbonates ?
- Turbidites
- Anticlinal features formed by transpression

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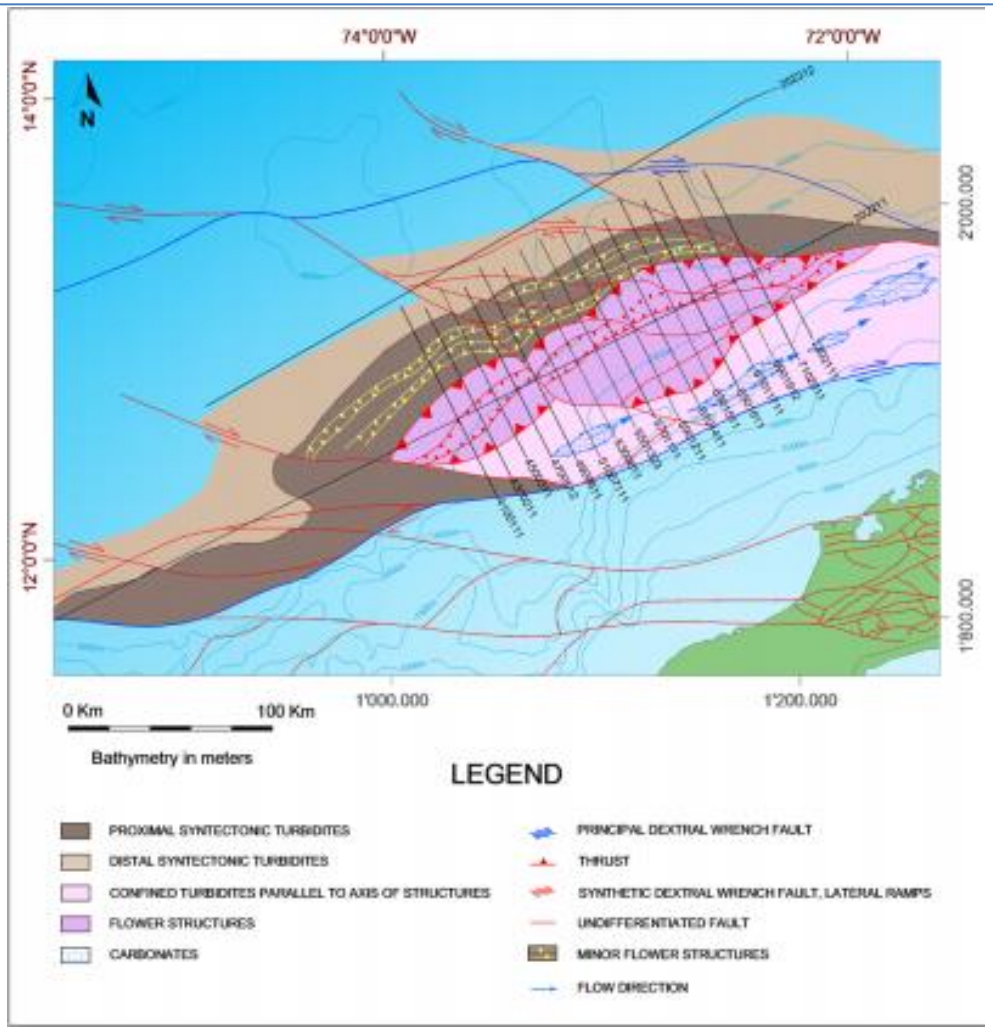
COLOMBIA

Play Map

SE Portion of the Colombia Basin



From poster presented at the AAPG/ICE in Cartagena 2013 by L. E. Ardila, J. Erickson & L. Diaz.

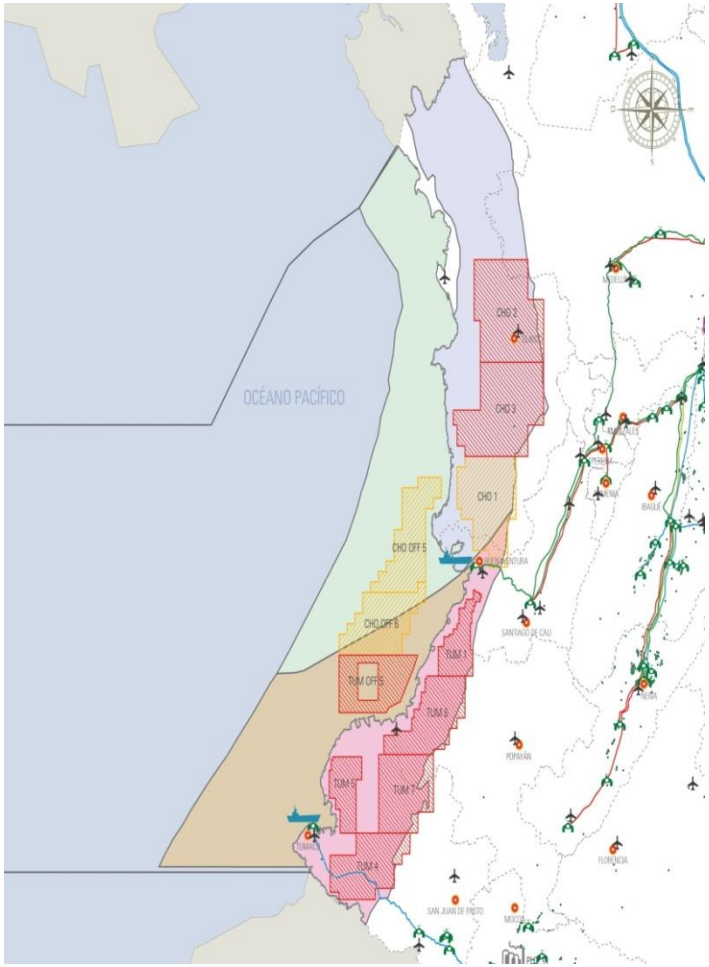
Conventional

Pacific Margin – **Pacific Basins**

(Onshore and Offshore)

RONDA Colombia 2014

- **11** Blocks, Types I and III



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COLOMBIA

Wells & Reprocessed Seismic

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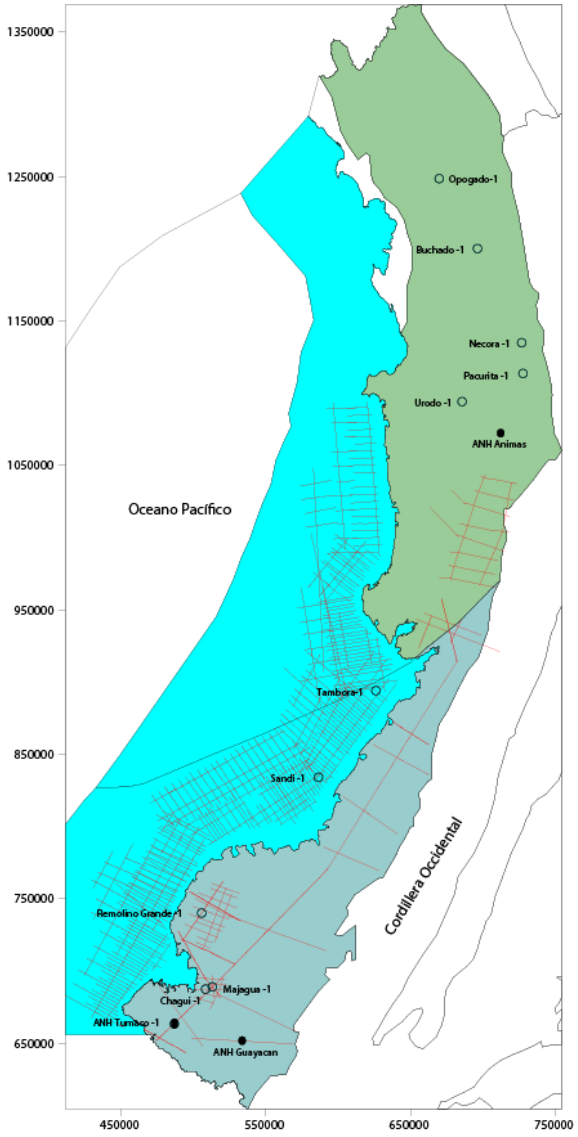

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COLOMBIA

Generalized Stratigraphic Column

South Pacific Margin

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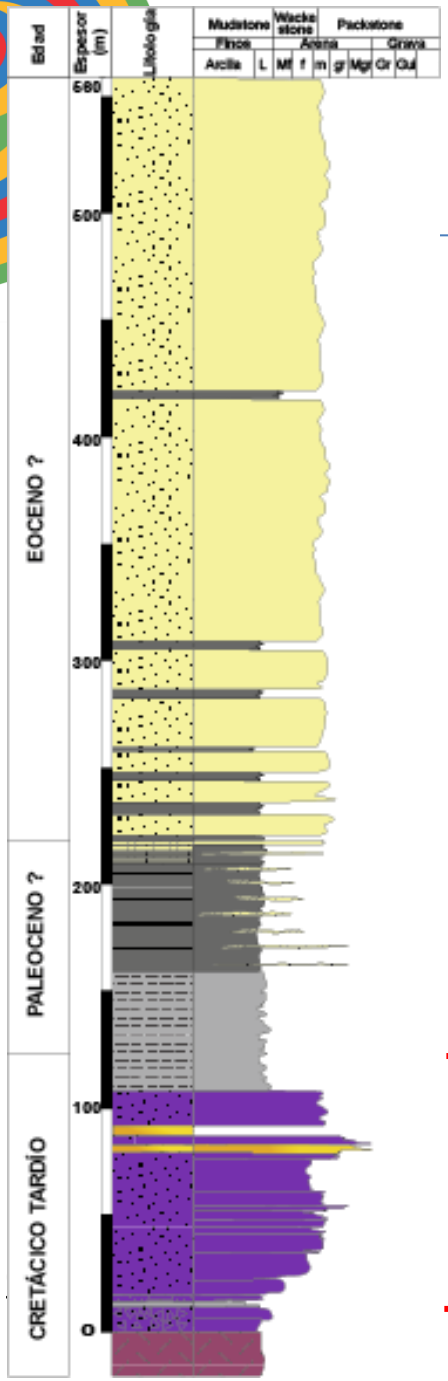

Clastic-Carbonatic Sequence

Outer Platform Sequences

Bimodal Volcano-Sedimentary Sequence

Cretaceous Basement

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COLOMBIA

Sequence Distribution

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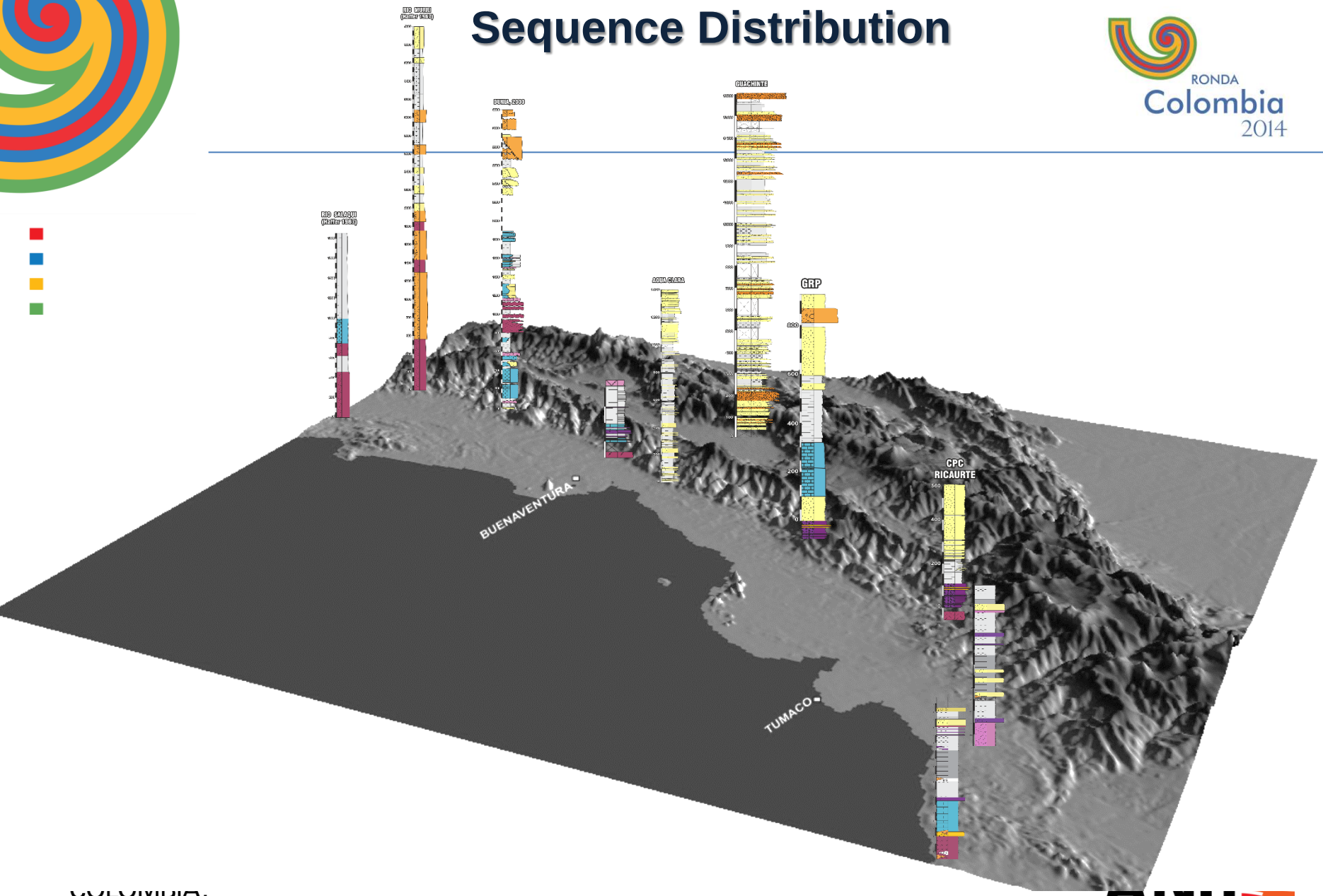

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COLOMBIA

Conventional

Pacific Margin– Pacific Basins

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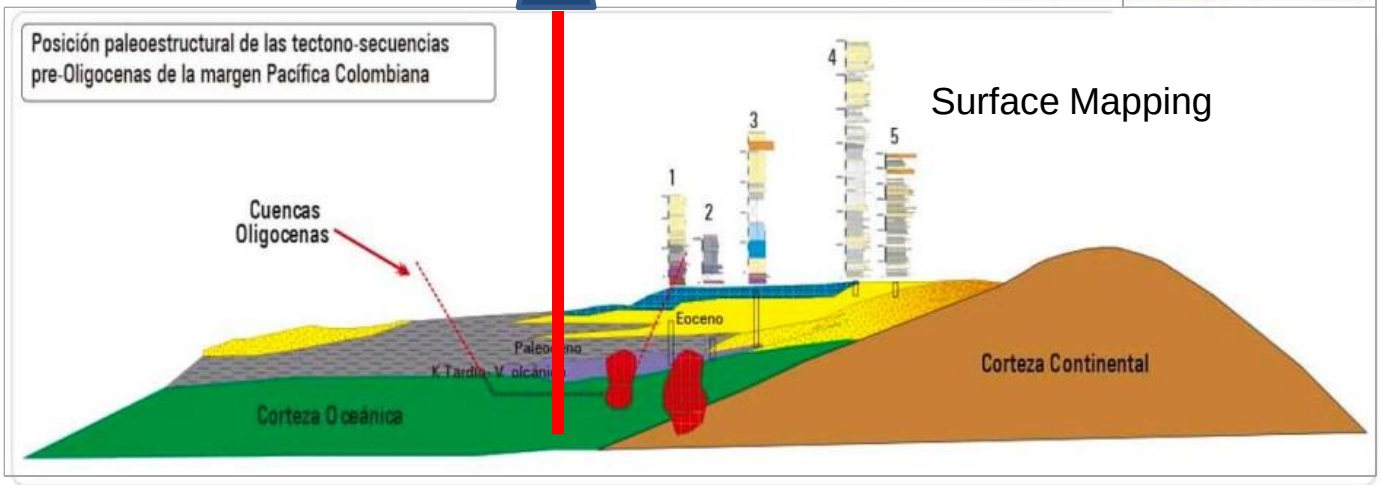
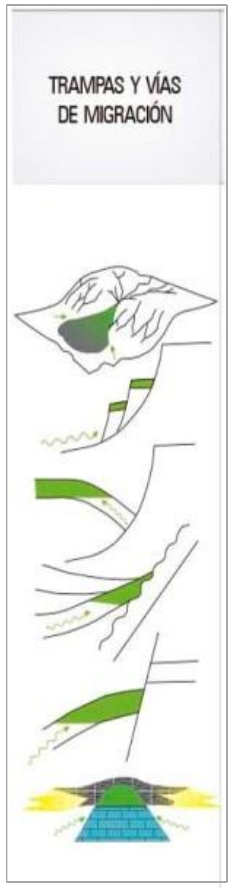
3 Pre-Oligocene Sequences (K, Pal, Eoc)

ANH-Guayacana - 1
(Stratigraphic Test)





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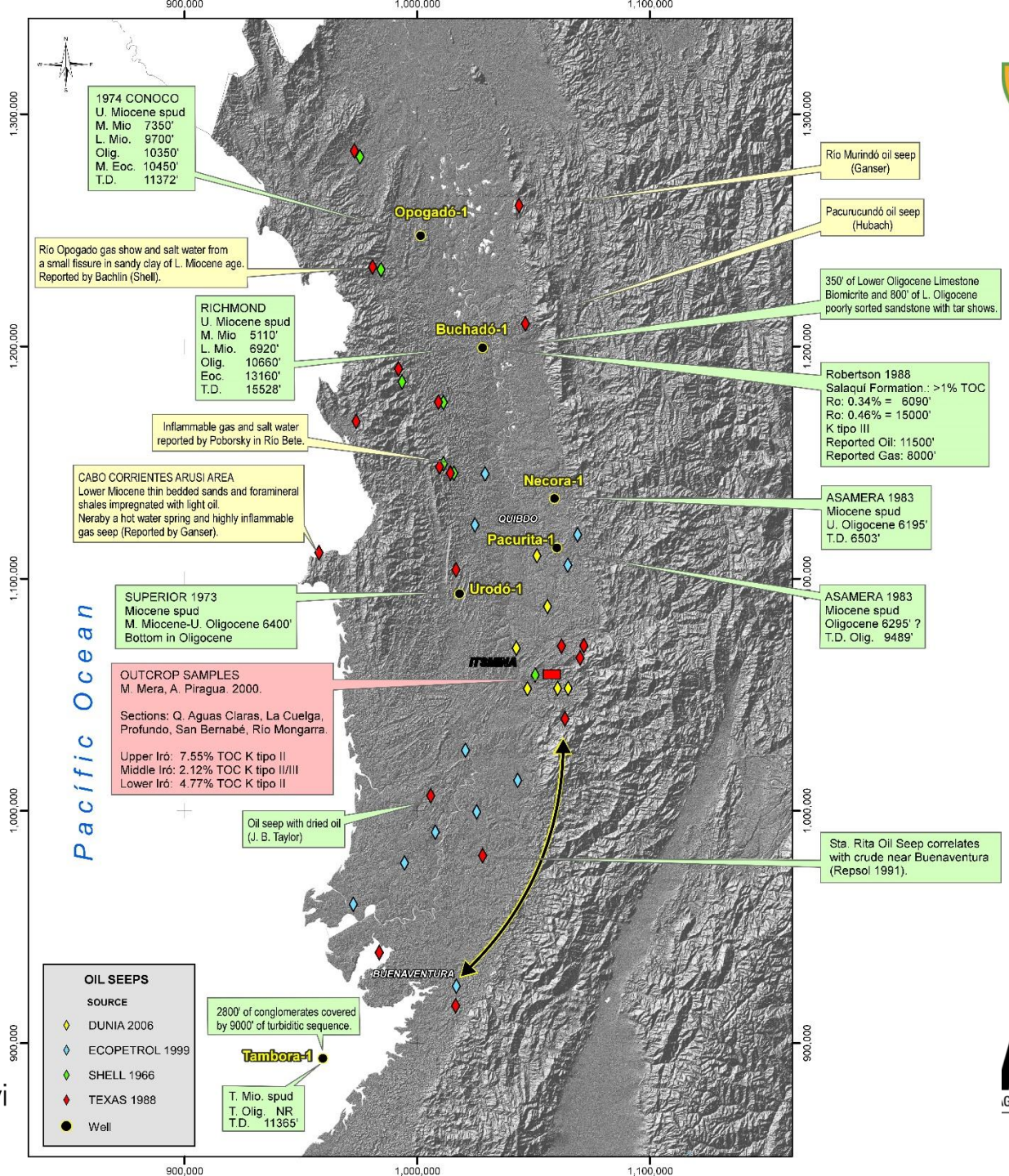

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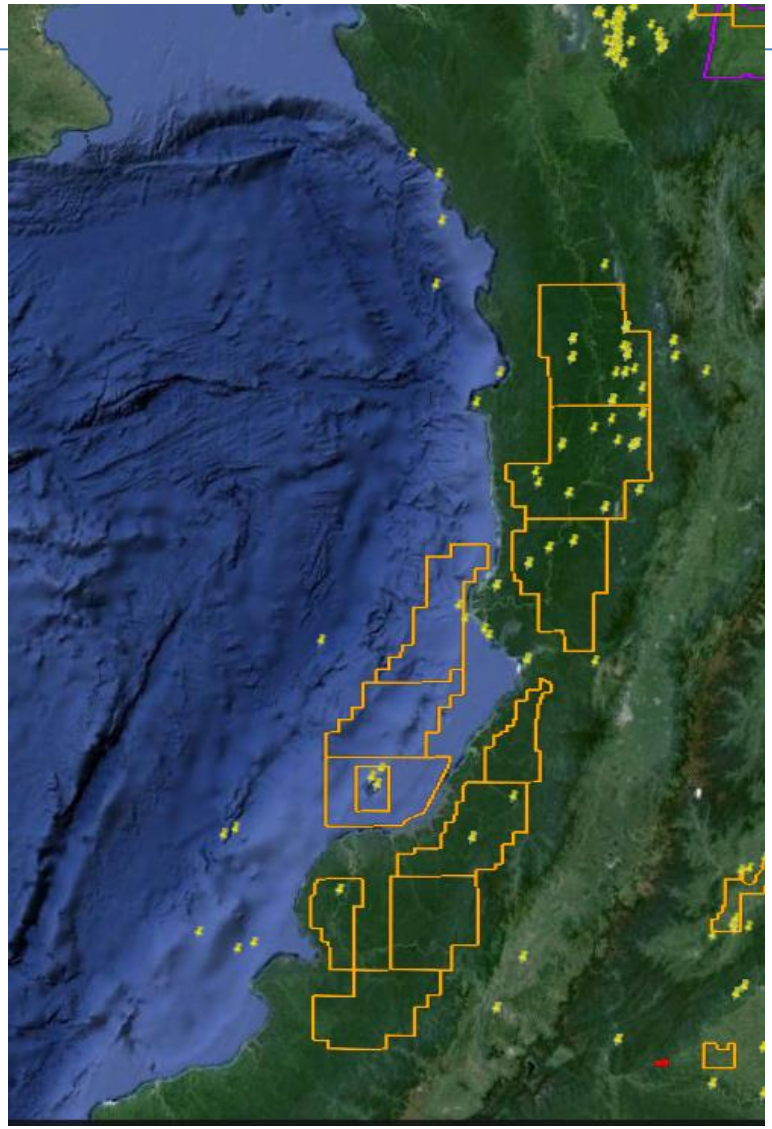
Oil Seeps



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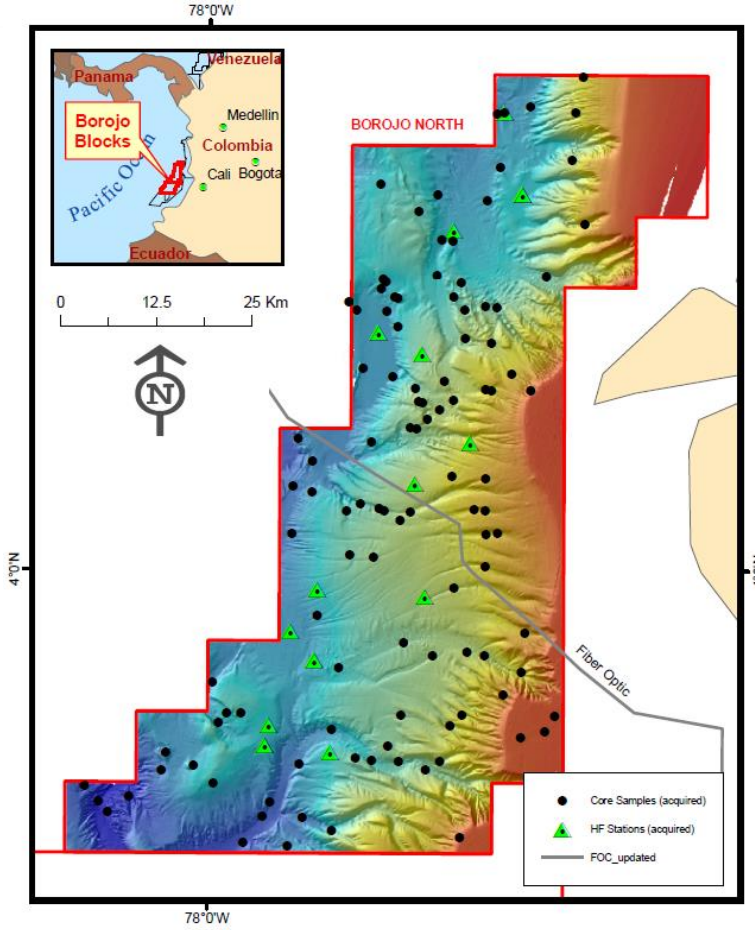
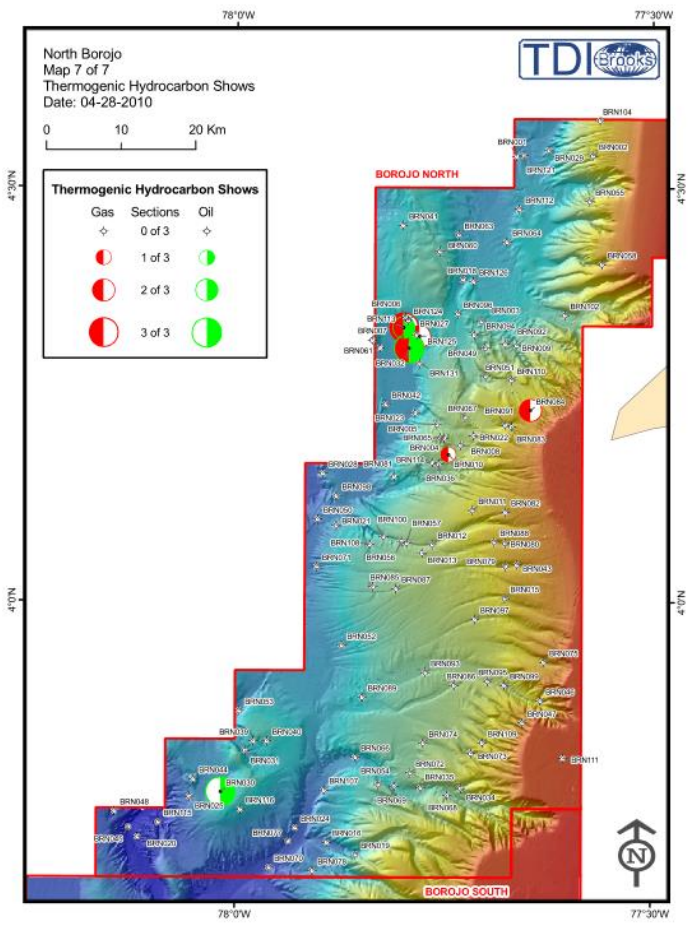
COLOMBIA

PISTON CORE – BLOQUE BOROJO





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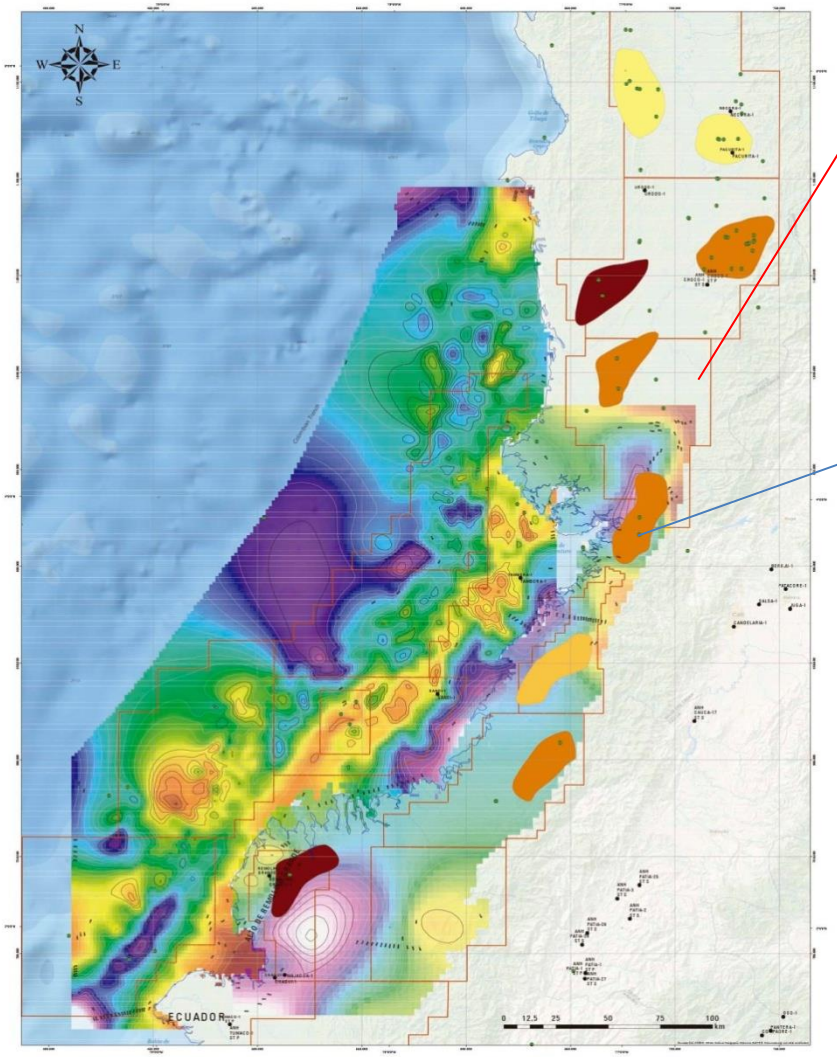
COLOMBIA

Conventional Resources

Pacific Margin – Pacific Basins



- E&P Type I
- Proven Source rock: Iro Fm. w/ TOC >10%
- Eoceno Ss. and carbonates
- Oligocene Fluviatile sands
- Oil Seeps
- Seismic Information
- Geobotanic Anomalies
- Structural Hights
- Major Depocenters

Top Cretaceous Structural Map

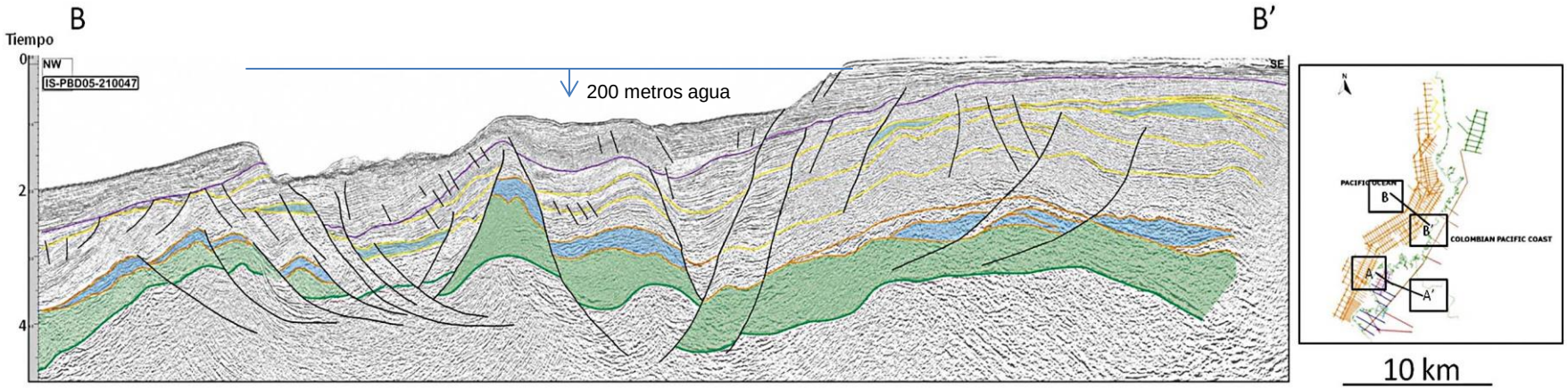
Conventional

Pacific Margin – Pacific Basin

RONDA Colombia 2014

- **Collapsed Platform**
- **Extensional Structural Style**
  - **Listric Faults**
  - **Inversion Faults**
  - **Carbonates**

Offshore E&P



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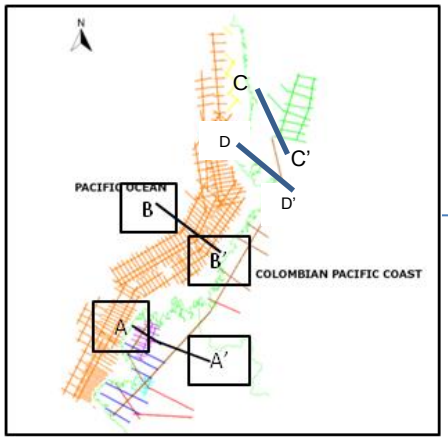
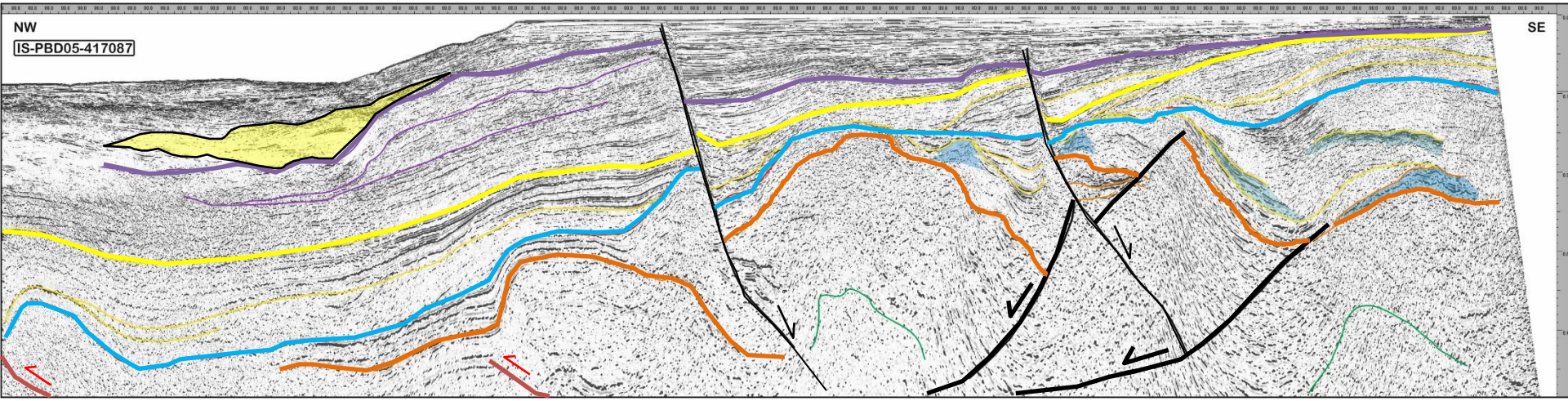
COLOMBIA

D



C

C'



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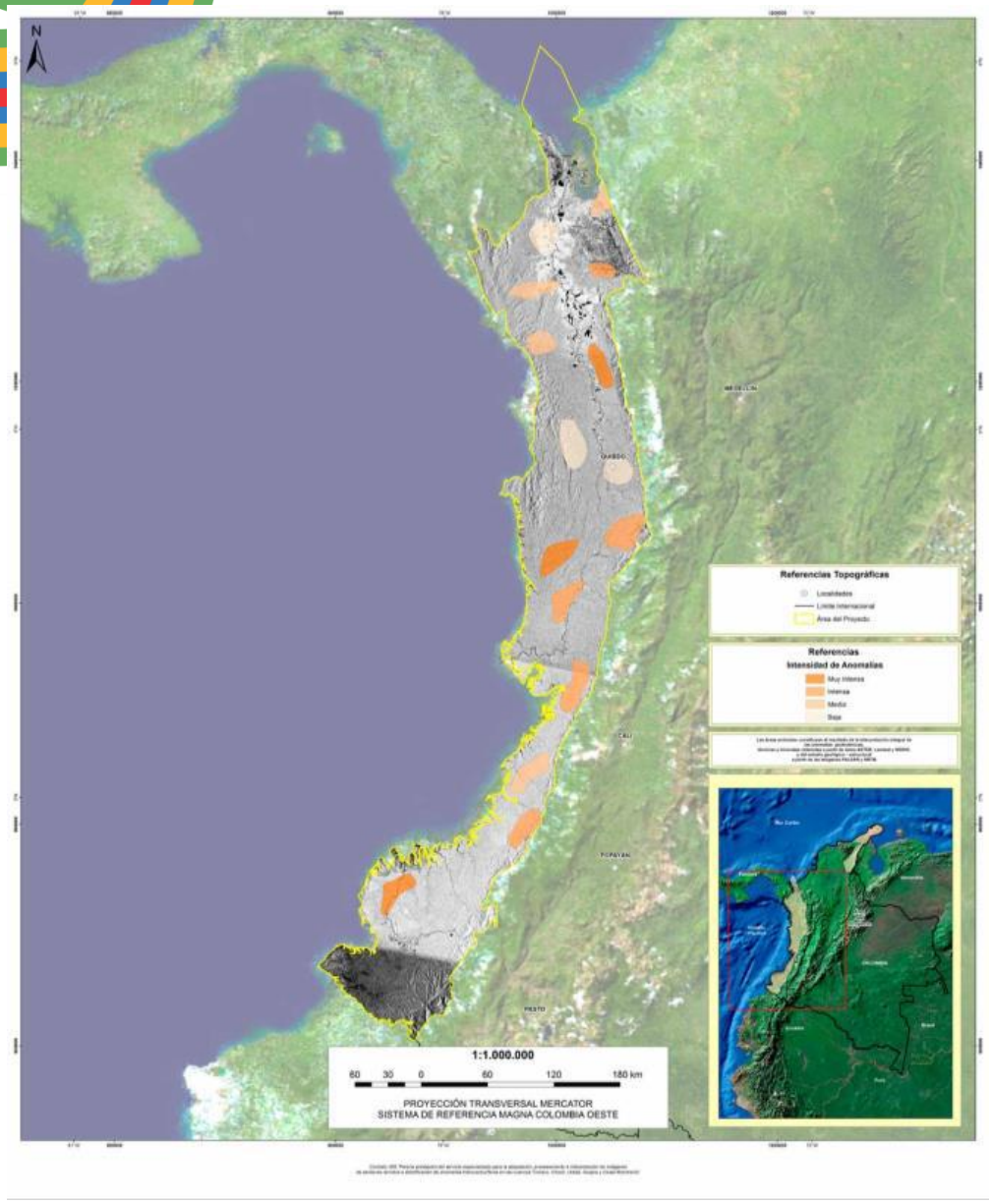
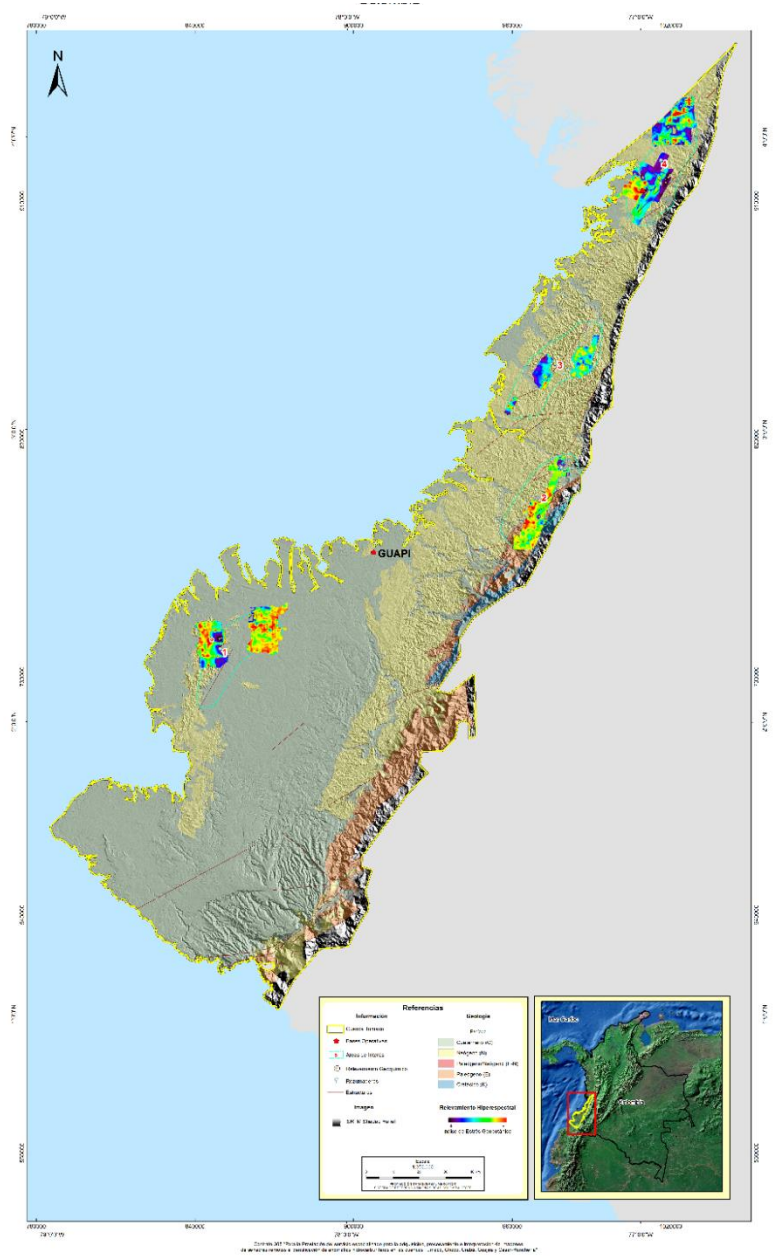
COLOMBIA

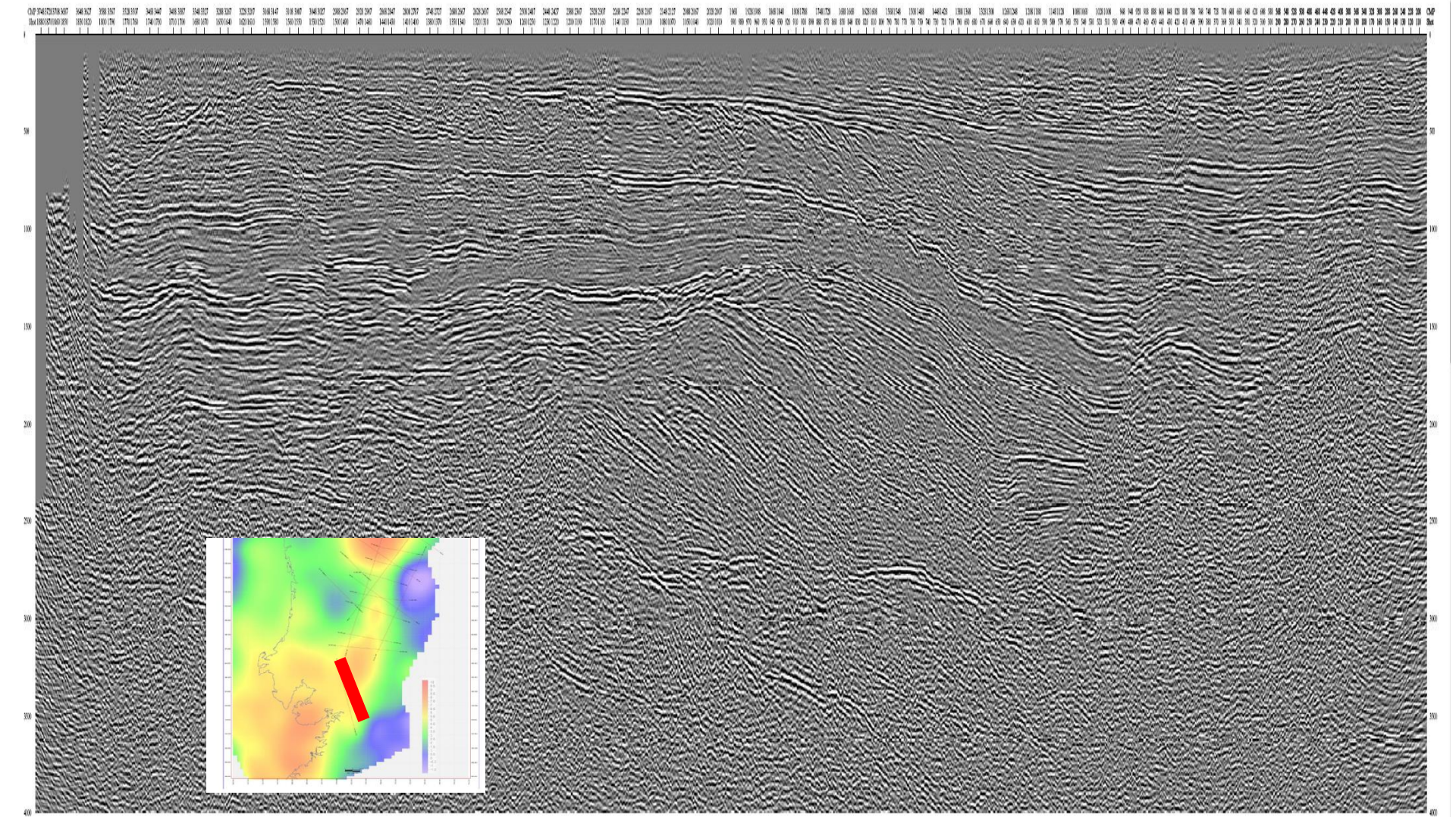
Geobotanical Anomalies





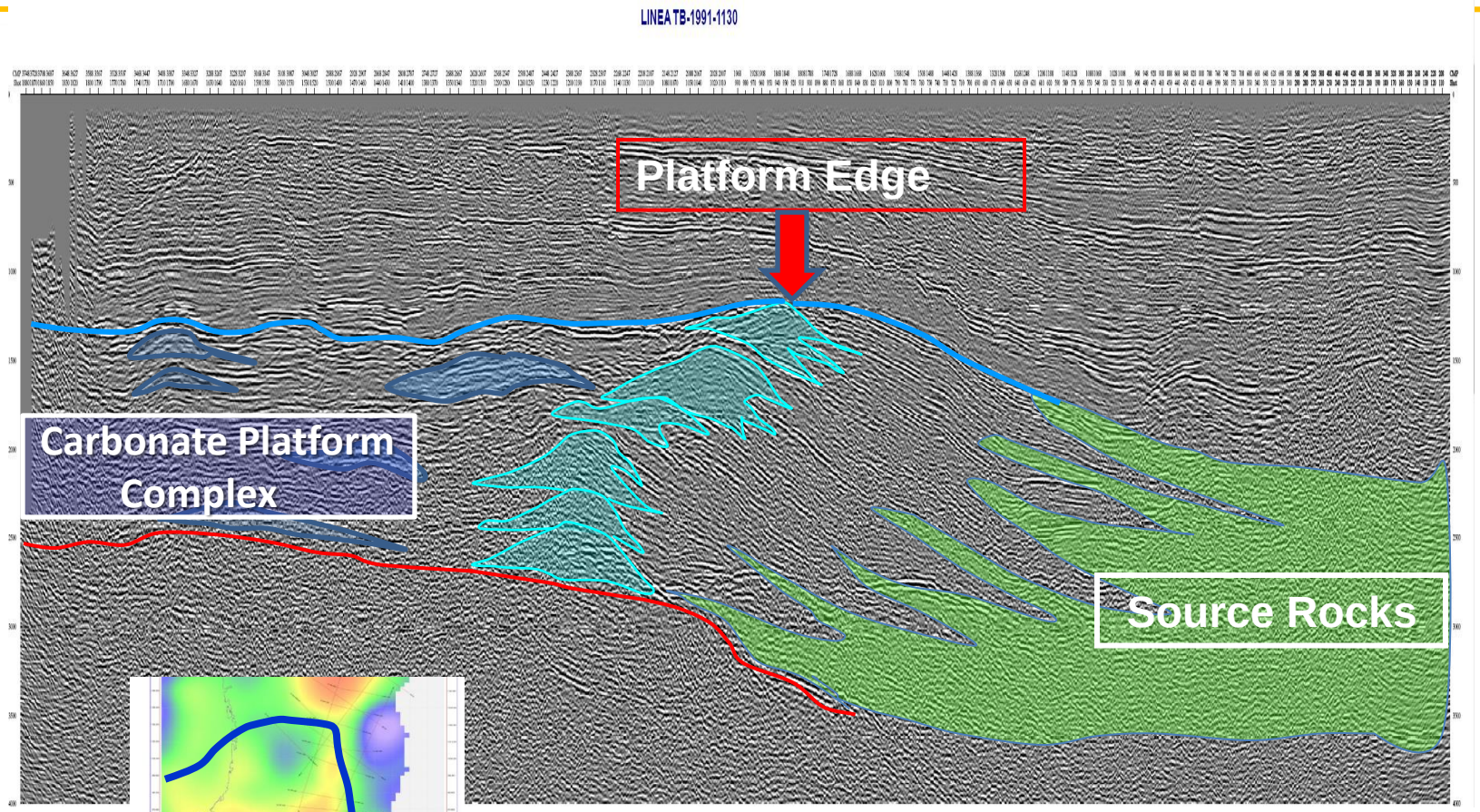
RONDA Colombia 2014

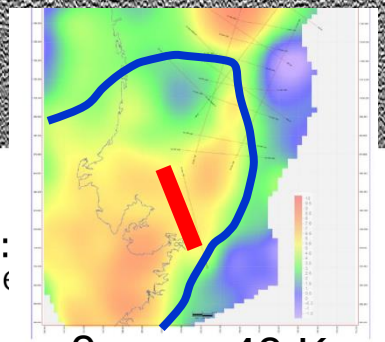
LINEA TB-1991-1130



Eocene Carbonate Play

RONDA Colombia 2014





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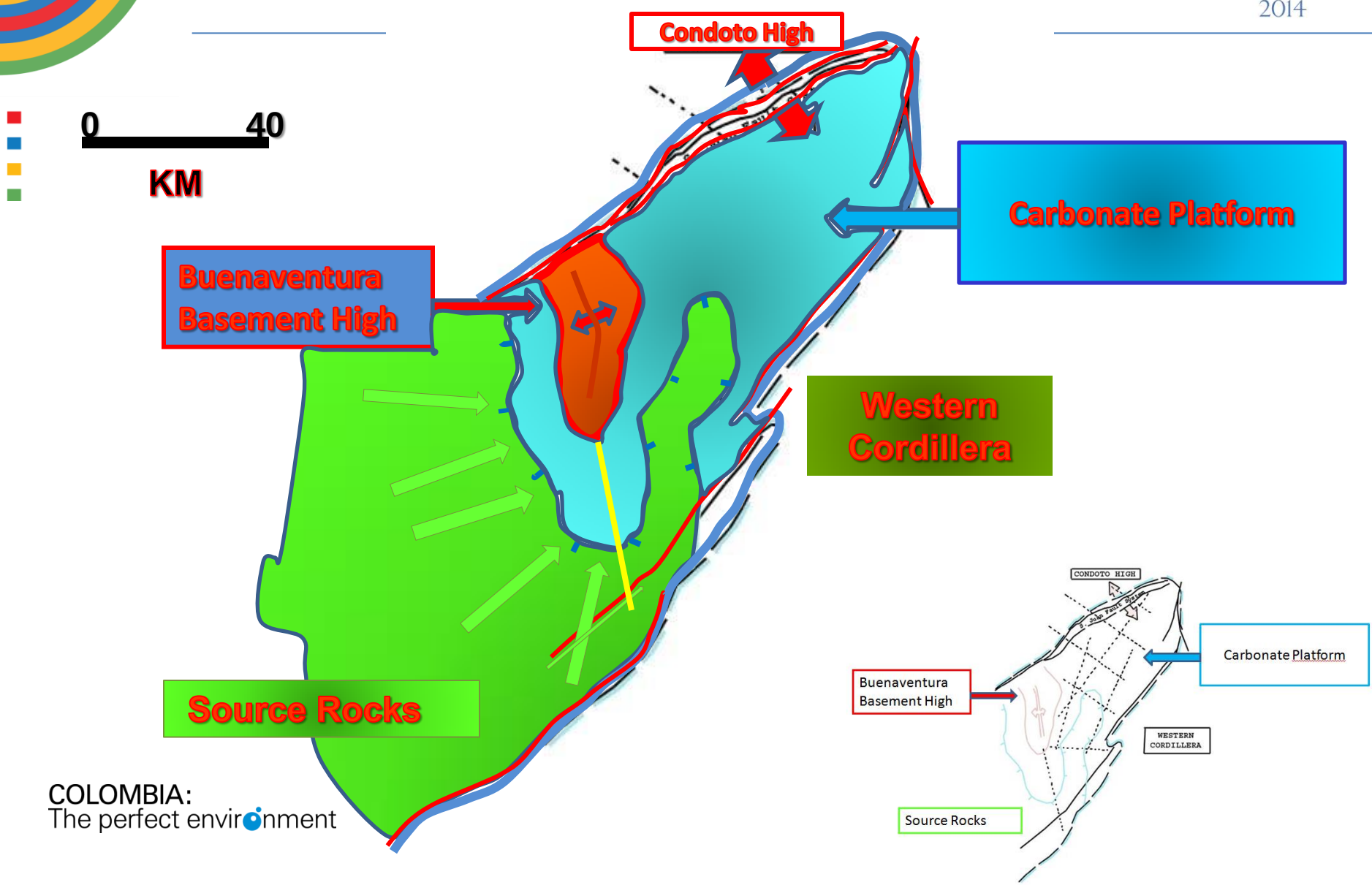
COLOMBIA

Schematic Illustration
Eocene Carbonate Play

RONDA Colombia 2014



COLOMBIA:
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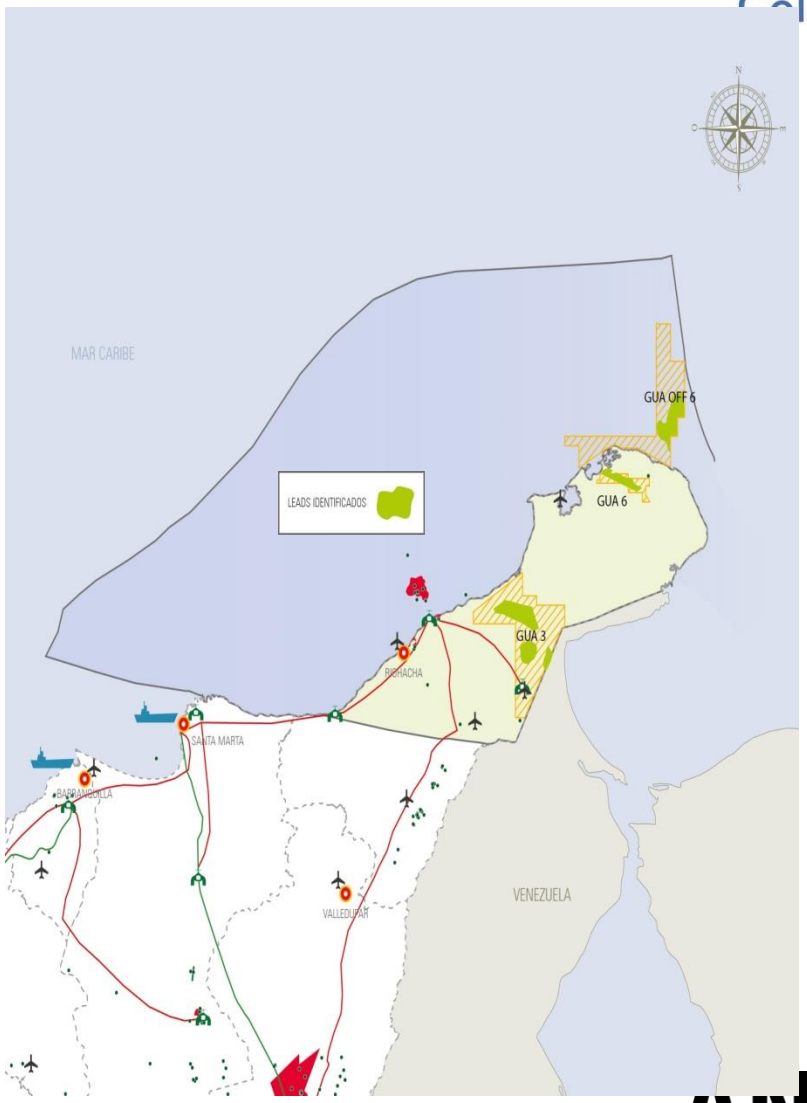
Conventional

Onshore and Offshore – **Guajira**

- **4** Blocks, Type I



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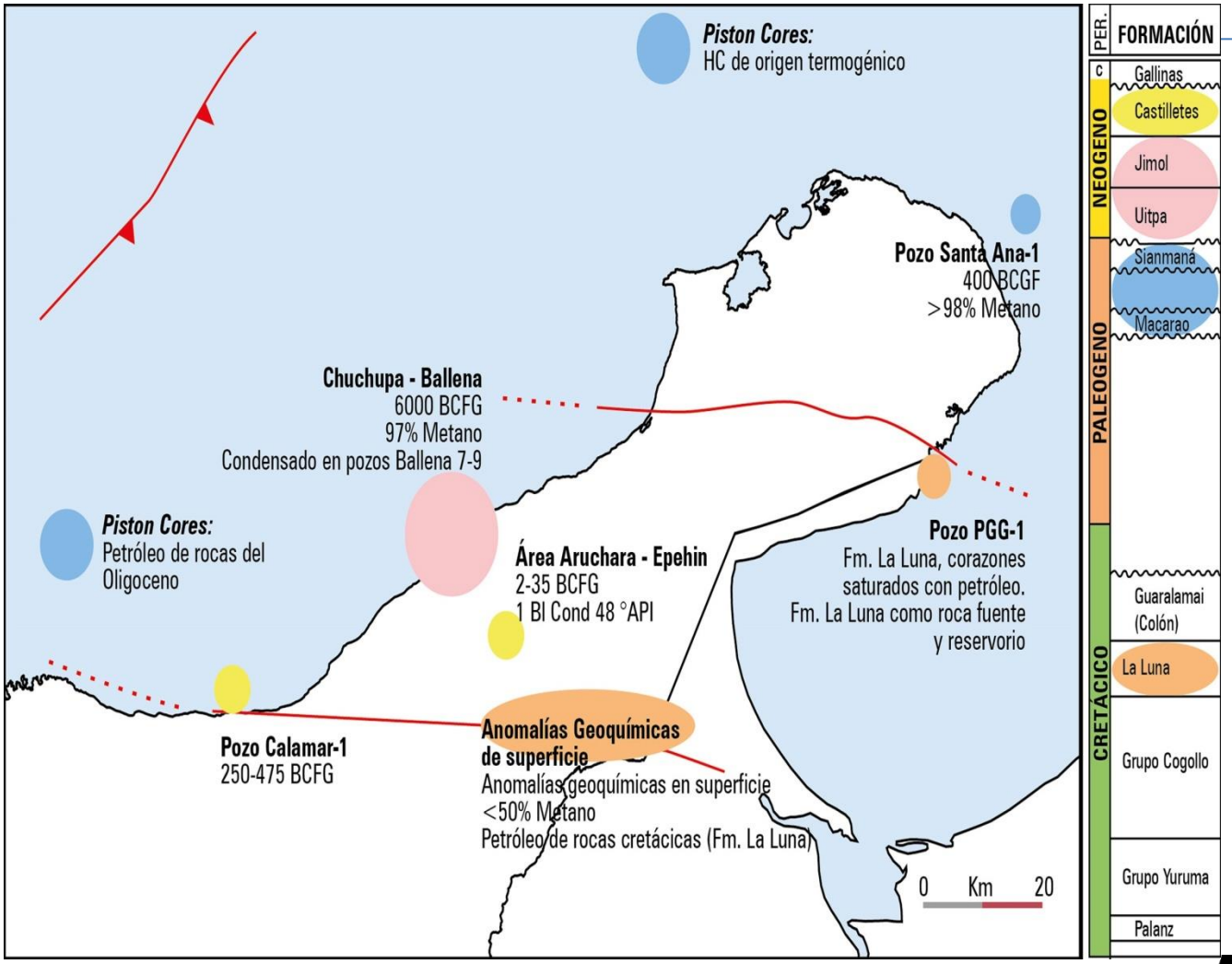
Conventional

Onshore and Offshore – **Guajira**



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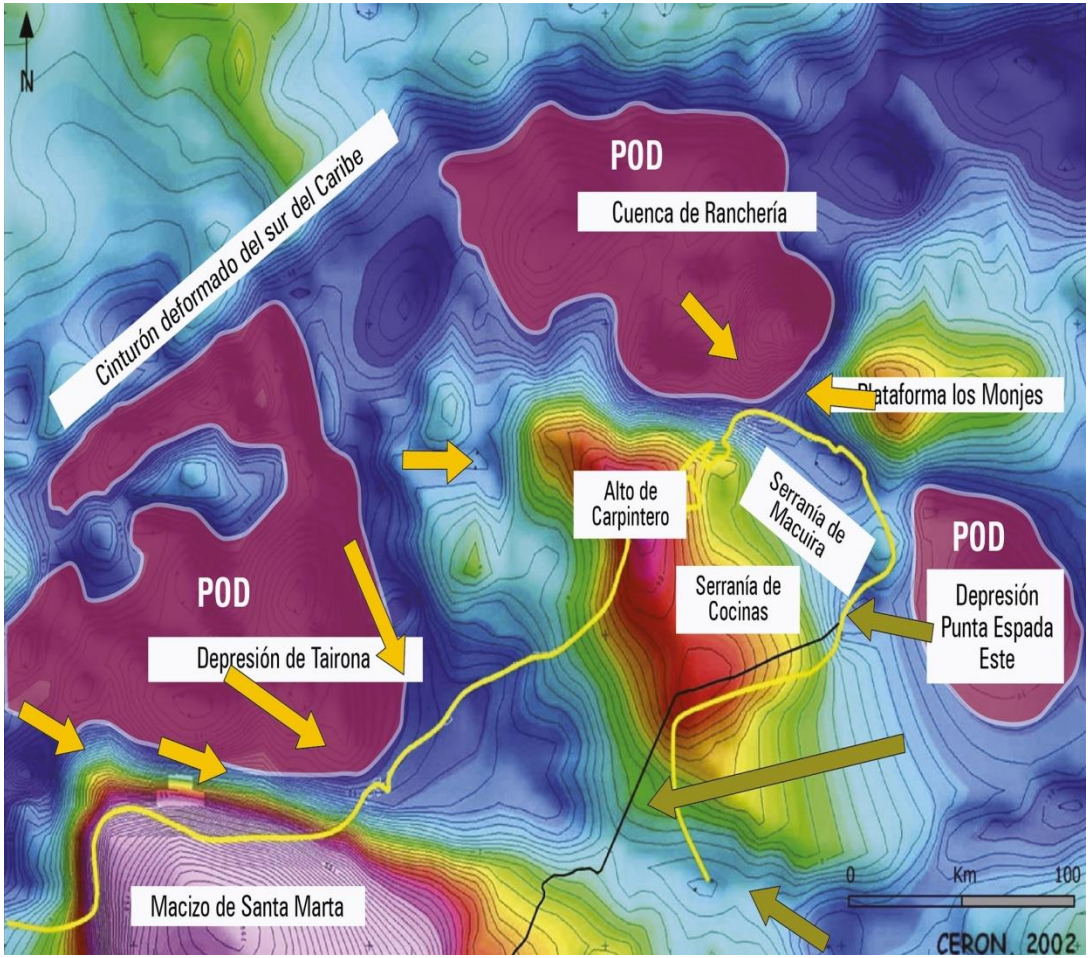
Generation Pods



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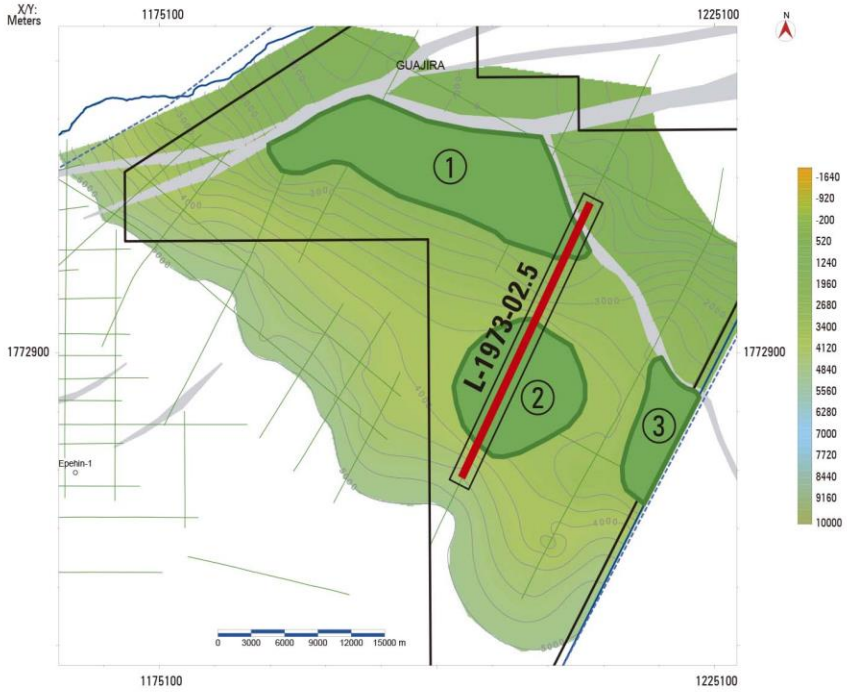
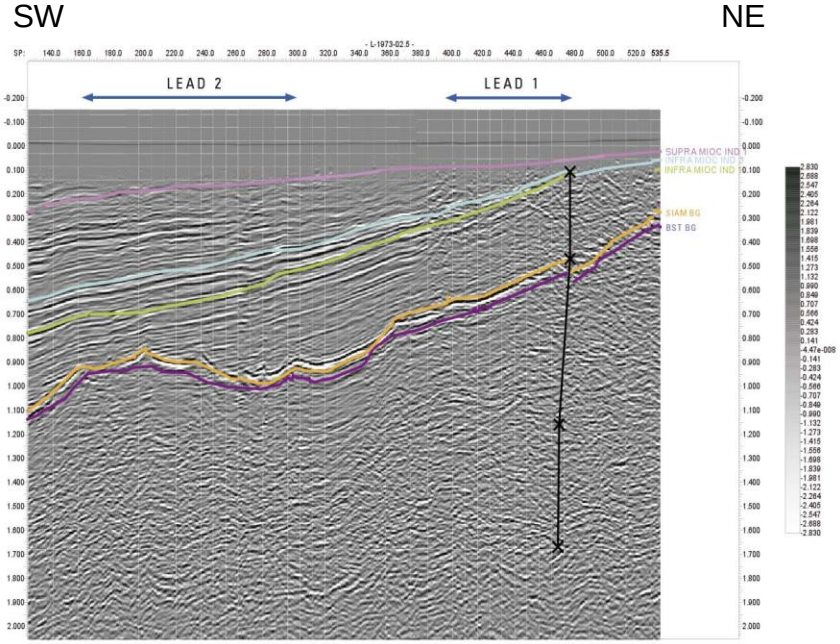
Conventional Resources

Caribbean Margin – Guajira Leads

- Closures in Upthrown block of Normal Faults
- Paleogeomorphic Trap





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Conventional

Caribbean Margin – Lower Magdalena Basin

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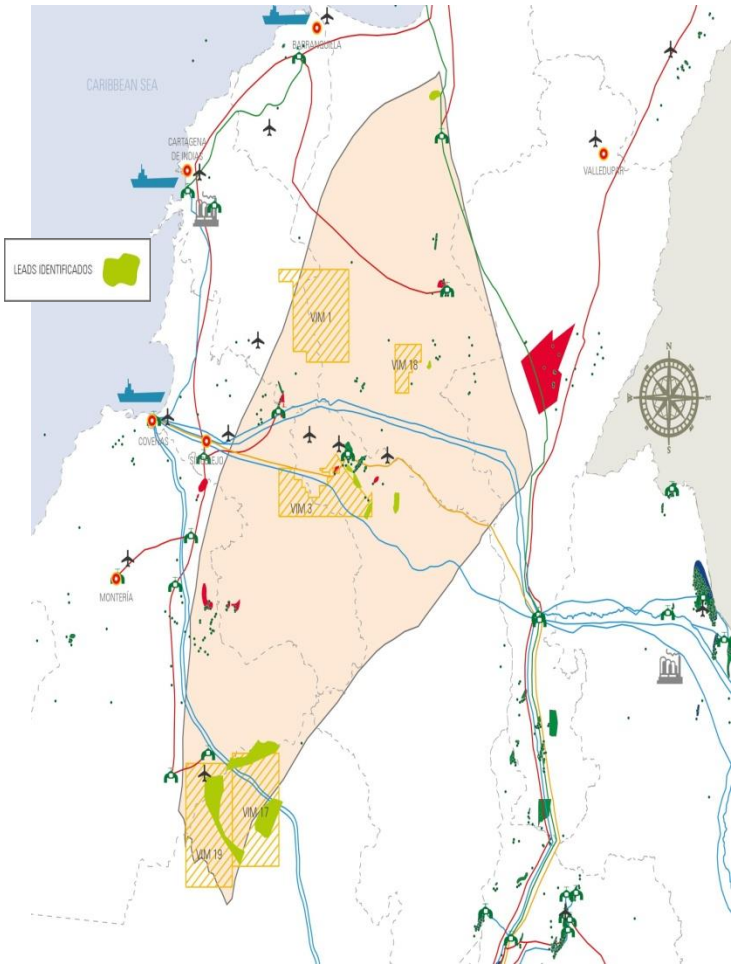
- **5** Blocks, Type I



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Conventional

Caribbean Margin – **Lower Magdalena Basin**

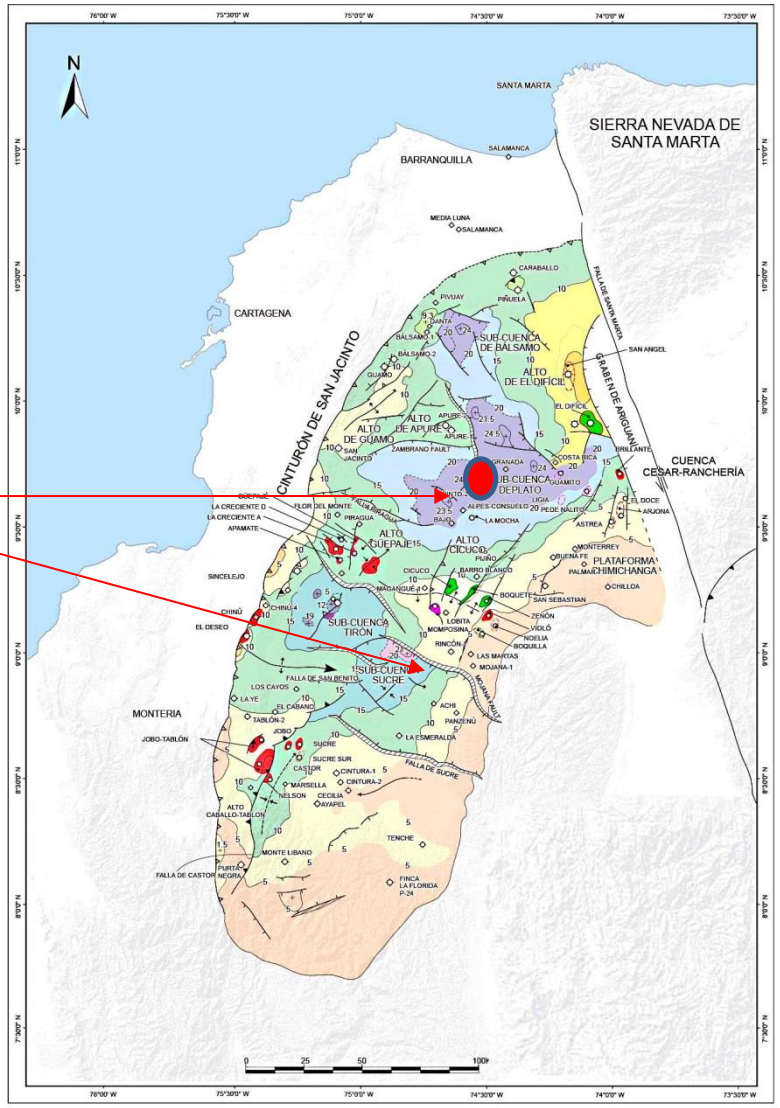
Traps

- ***Structural***
- ***Stratigraphic***

Generation ***Pods***

2014

Drilling of Well ANH-St-Plato Profundo



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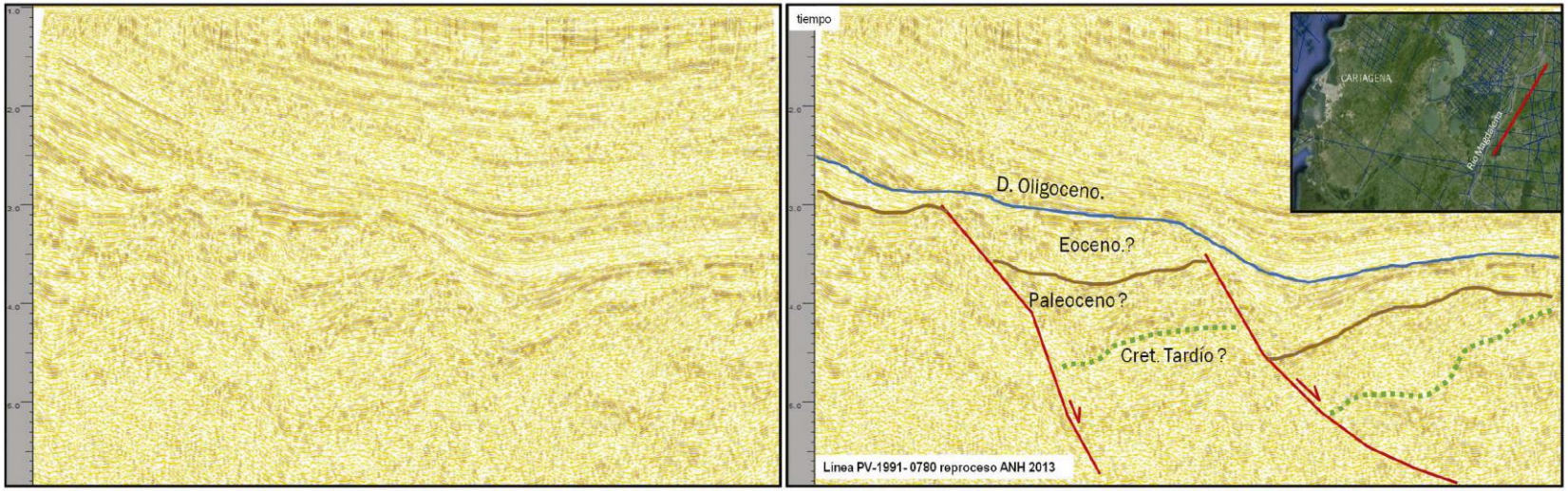
Structural Extensional Rotational Style



Old Bedrock

Seismic Line PV-1991-1120

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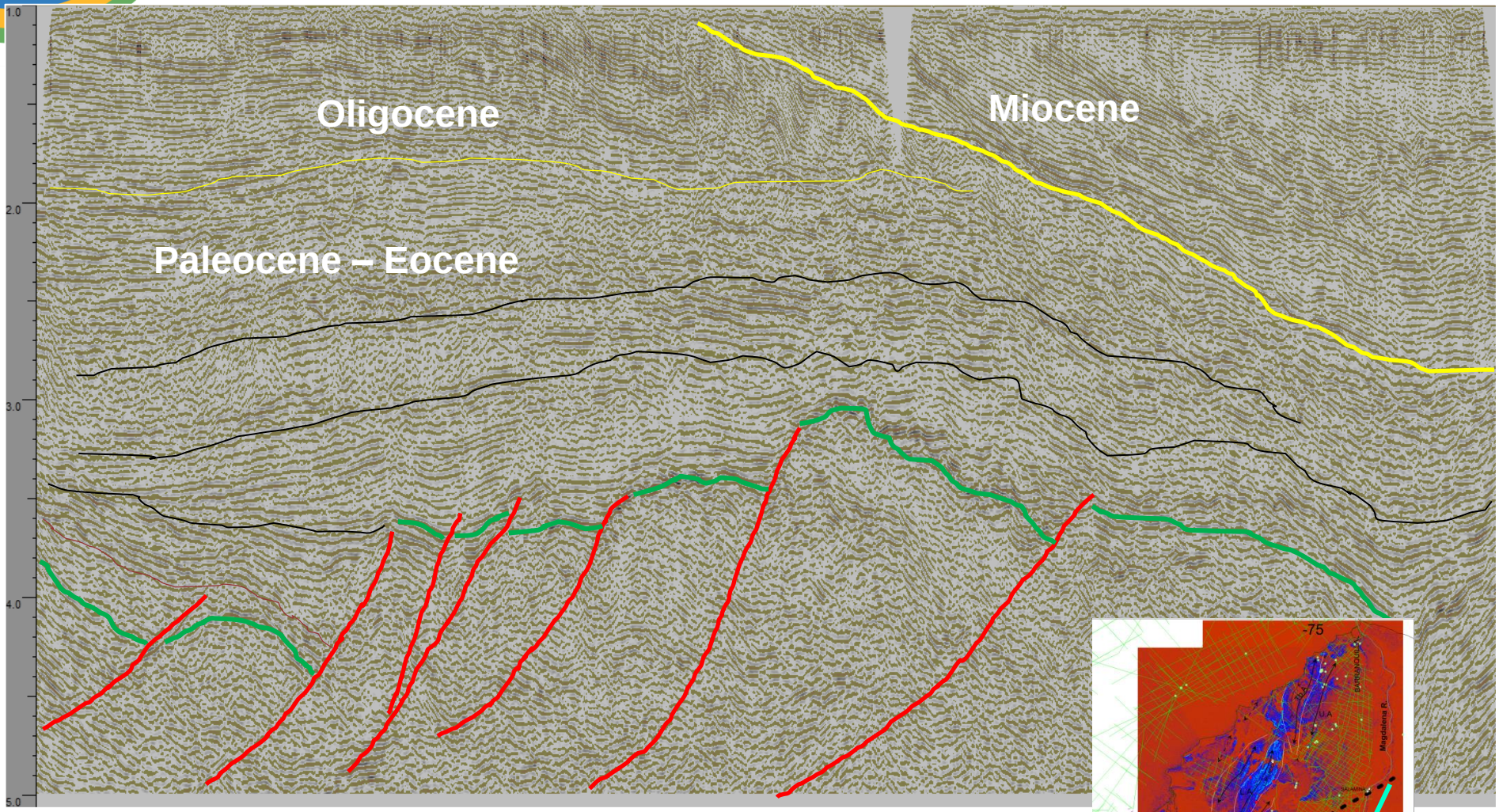
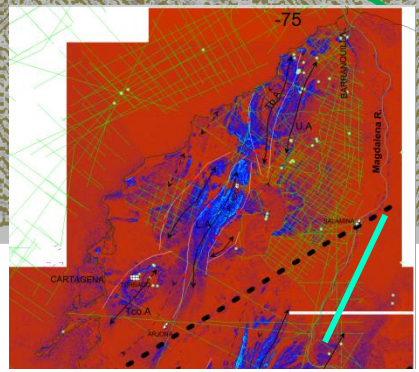
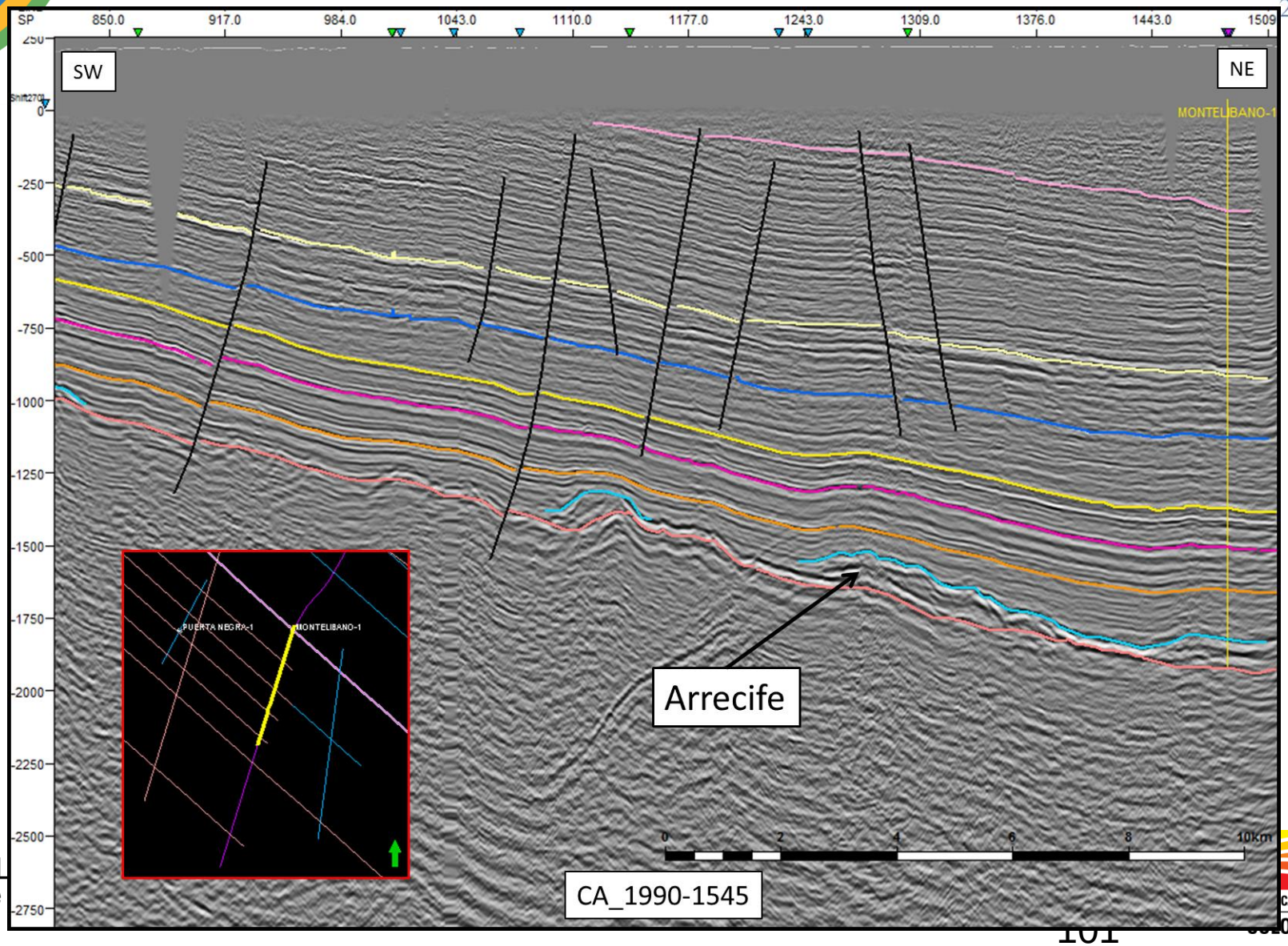


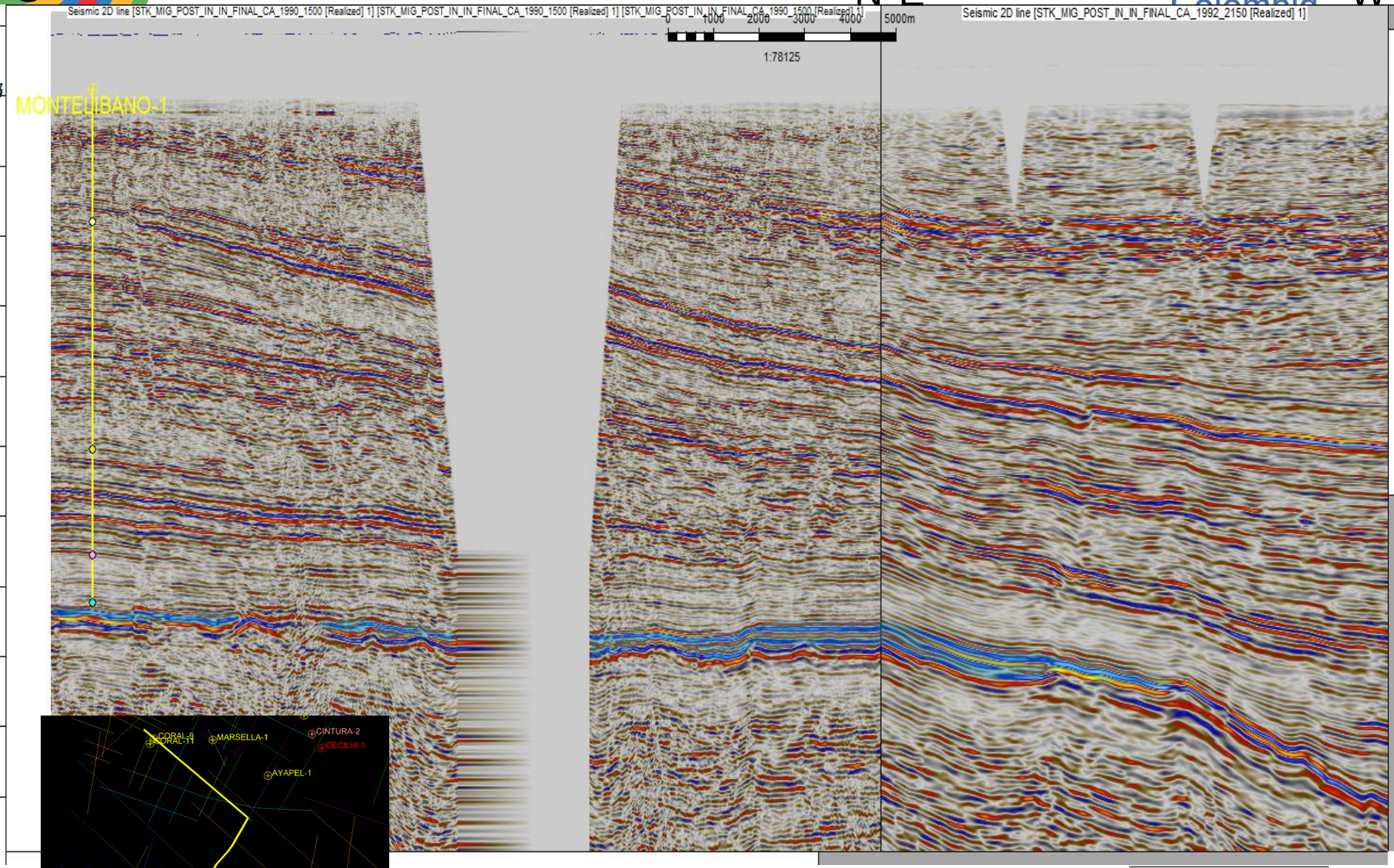


Carbonate Build-ups



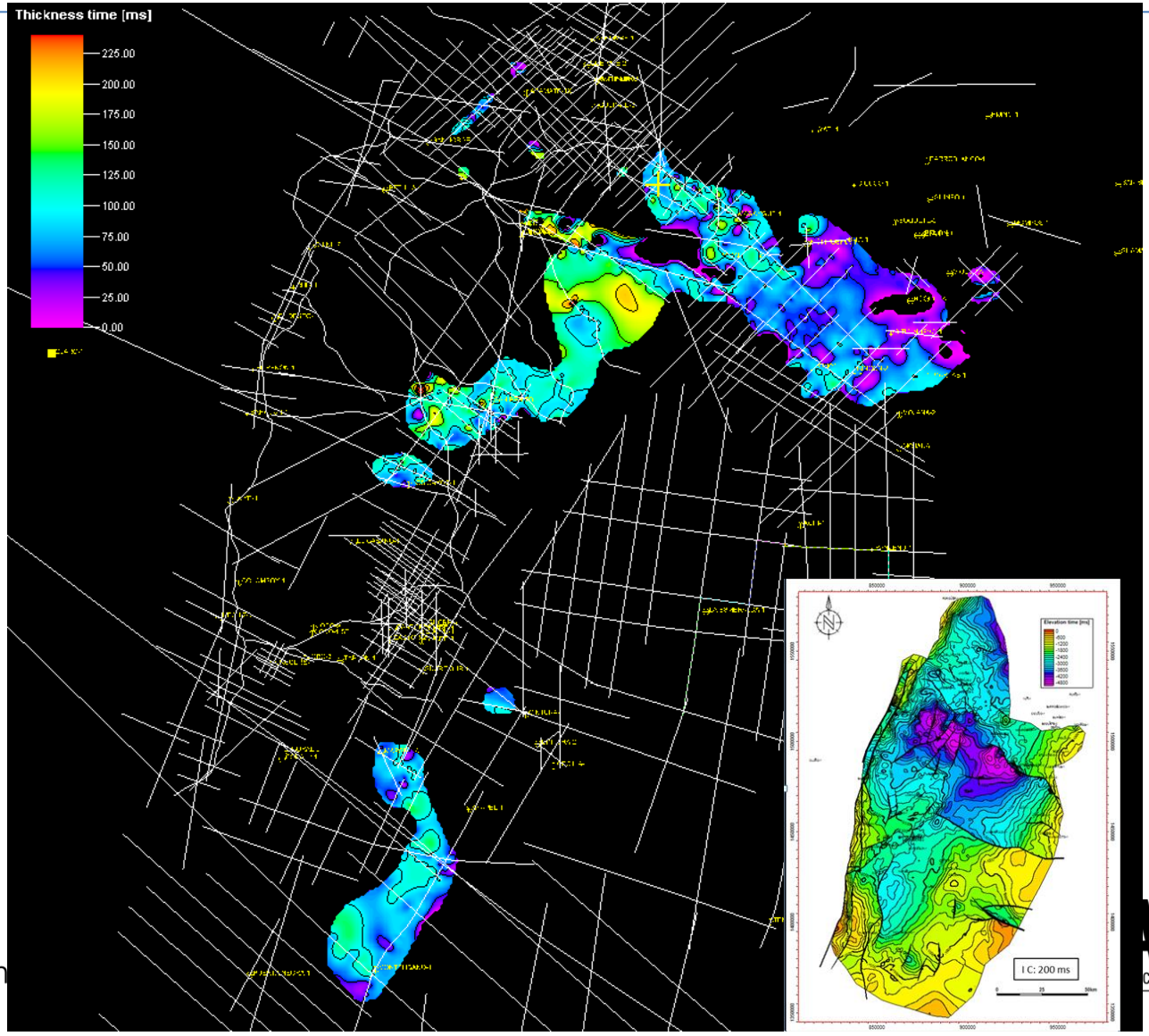
Seísmic Lines CA-1990-1500 and CA-1992-2150

S N E W



COLOMBIA

Early Miocene Carbonate Platform Isochrone Map (time thickness)



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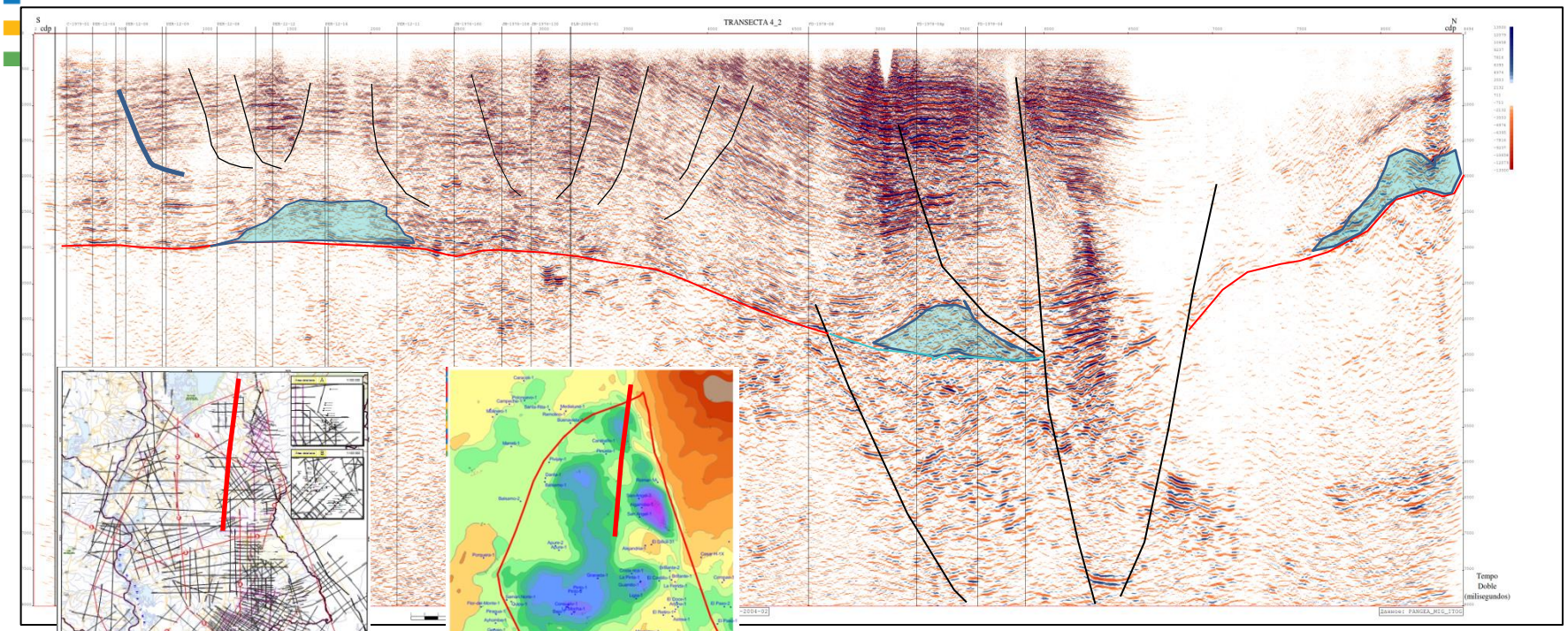
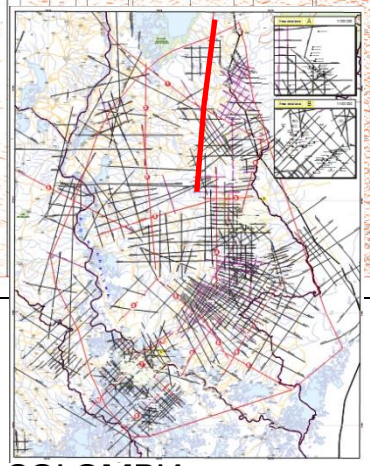
S

N





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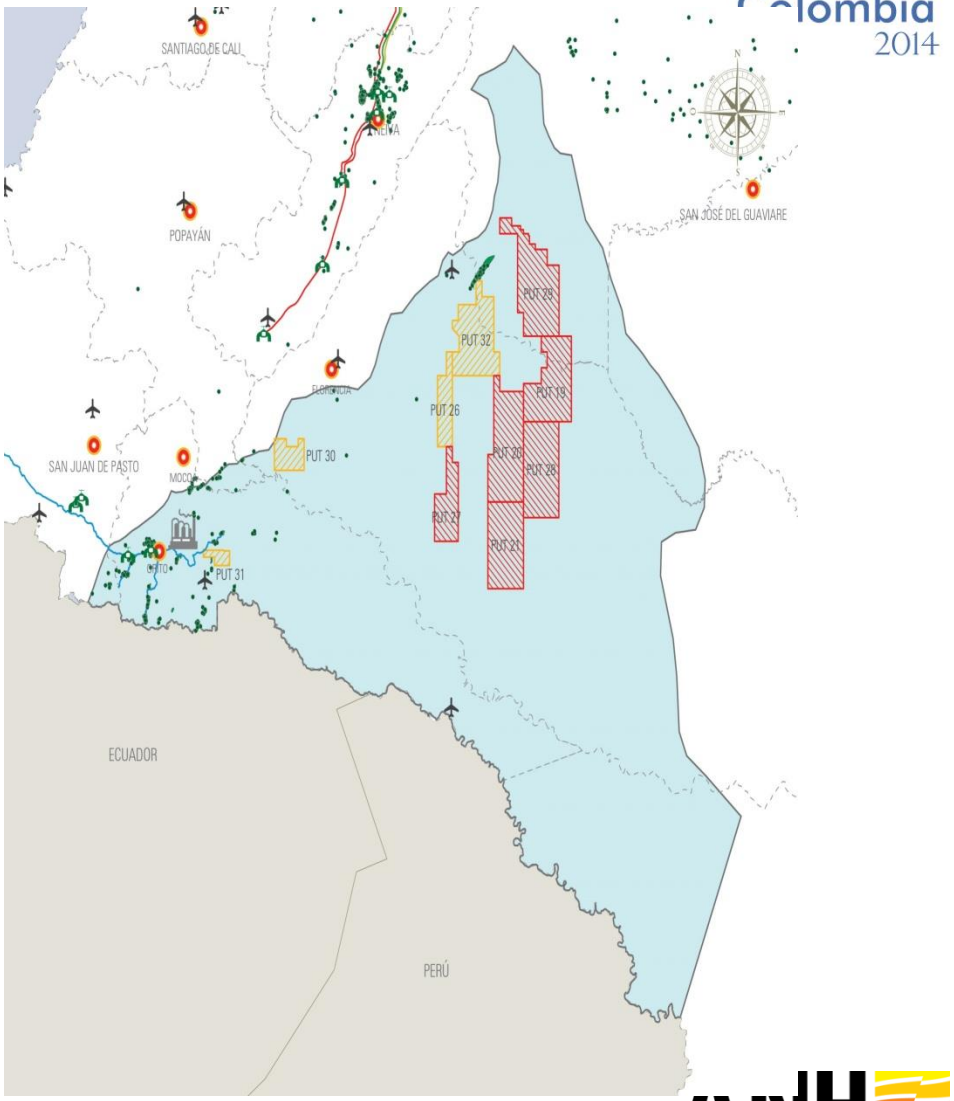
Conventional

Caguan Putumayo Basins

- **10** Blocks, Types I and III



CONVENCIONES GENERALES

Pozo	Ciudad Principal
Campo Petróleo	Refinería
Campo Gas	Puerto
Campo Mixto	Estación de Bombeo
Departamentos	Aeropuerto

INFRAESTRUCTURA PETROLERA

Combusteoloducto	Propanoducto
Oleoducto	Gasoducto
Poliducto	SD

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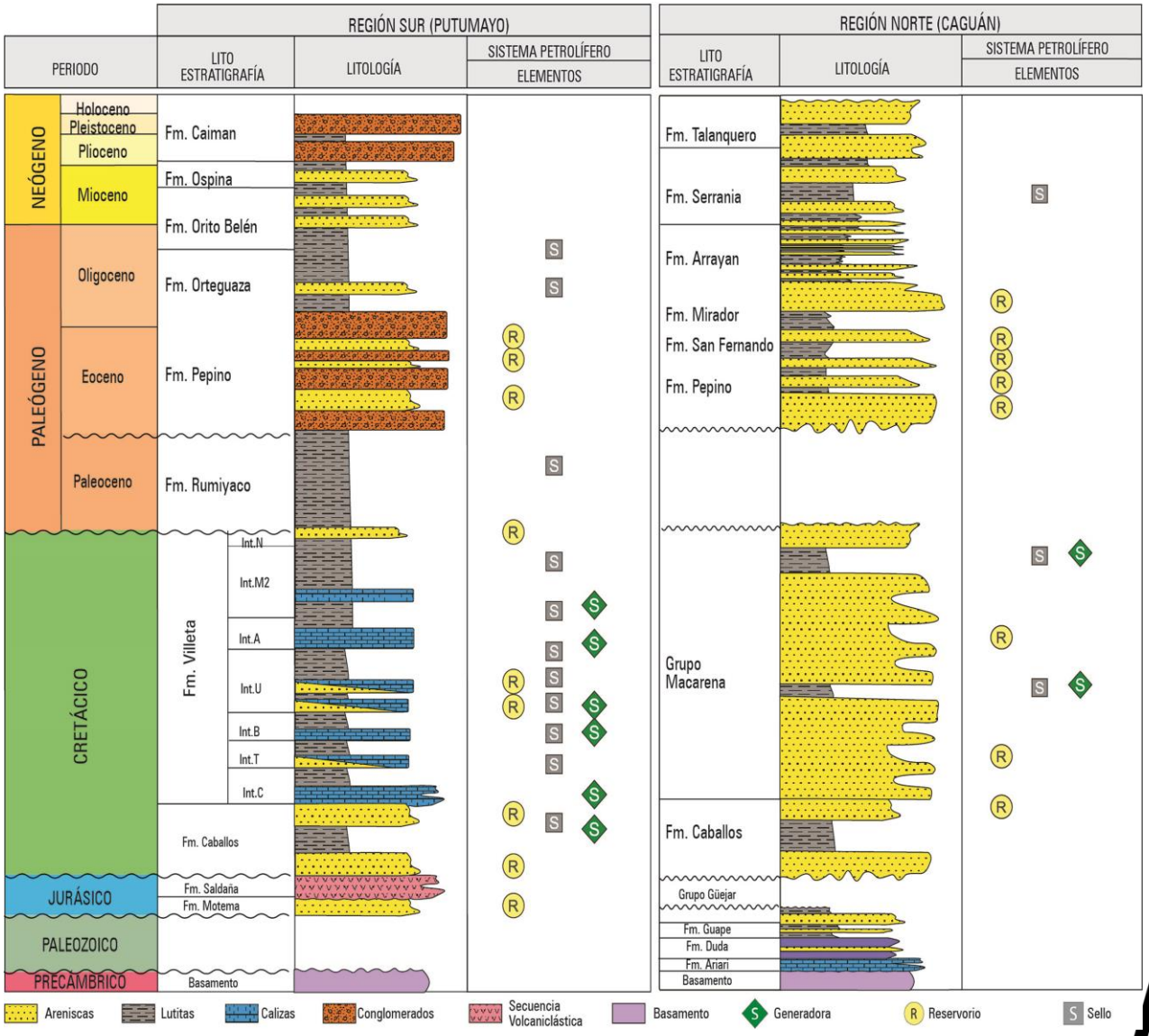
Generalized Stratigraphic Columns



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Conventional Resources
Caguan Basin

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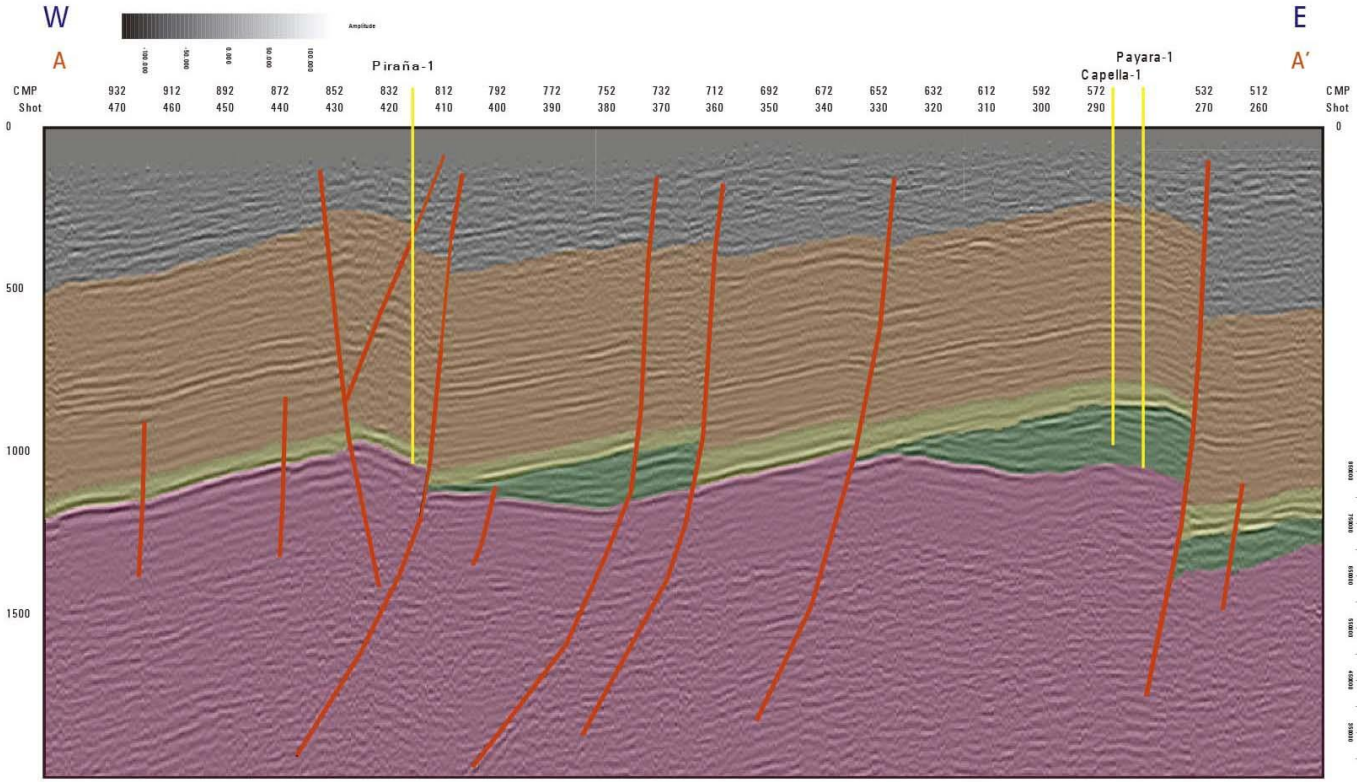
Inversion Structures



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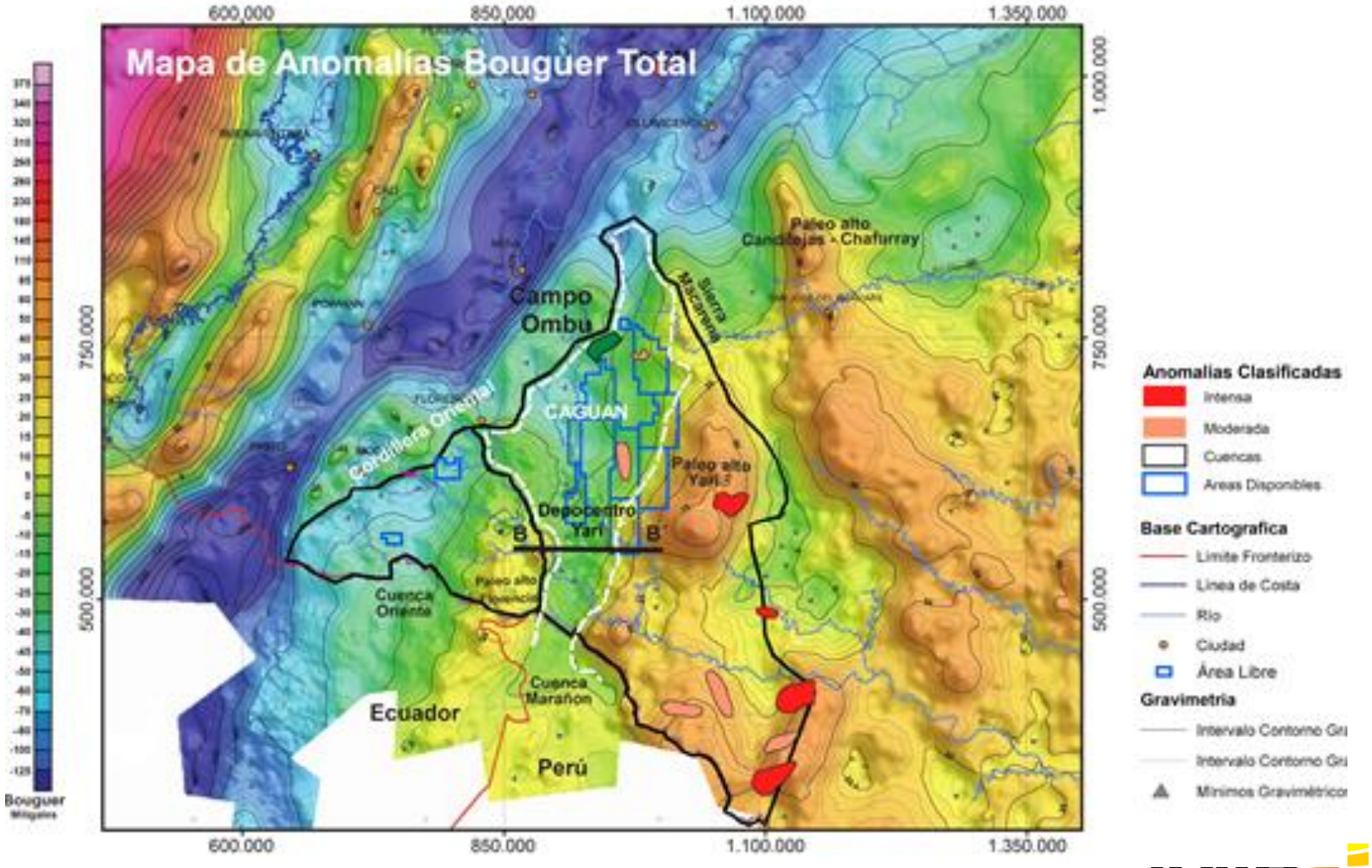

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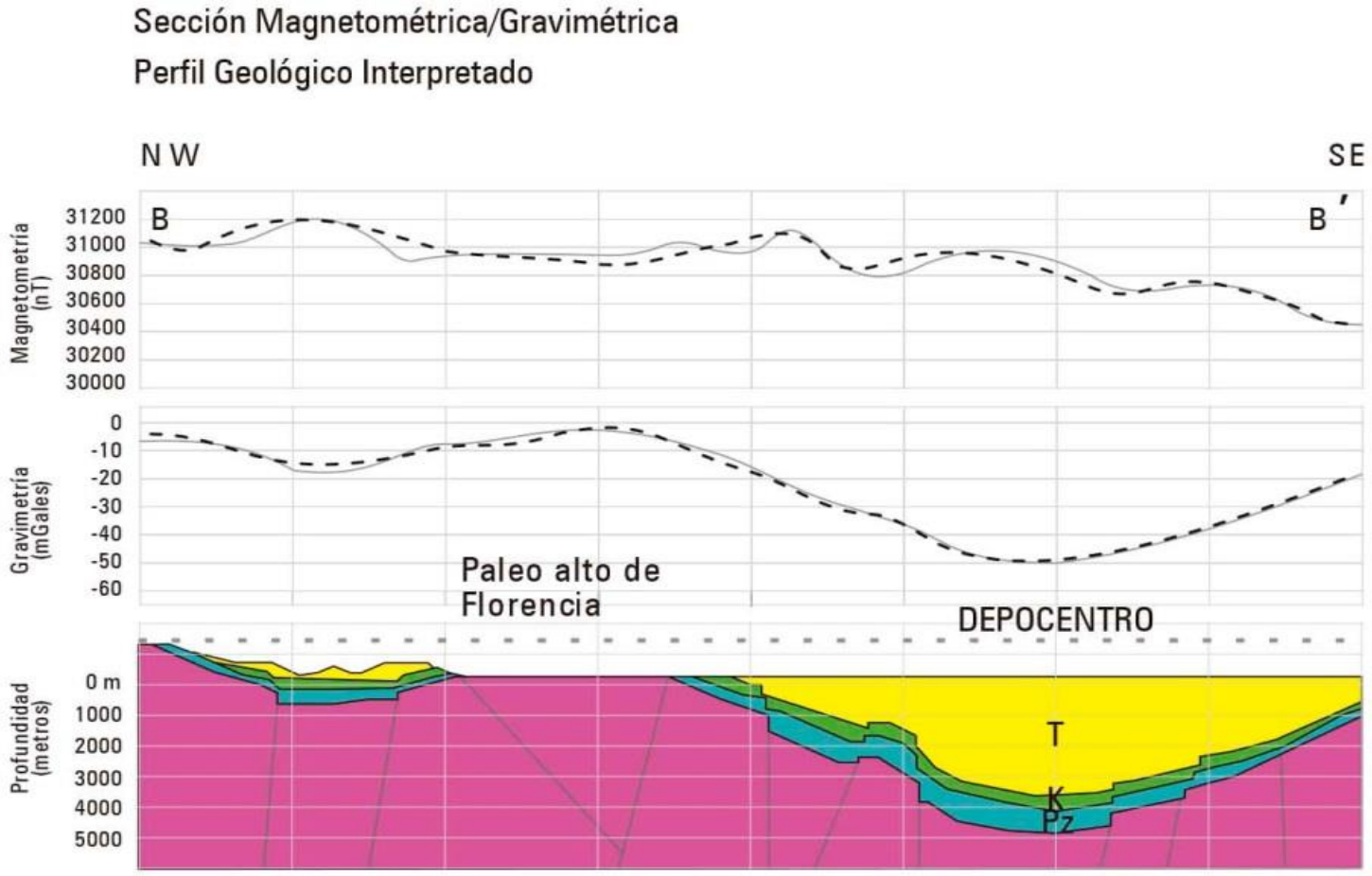
Conventional Resources
Caguan Basin



Conventional
Catatumbo Basin

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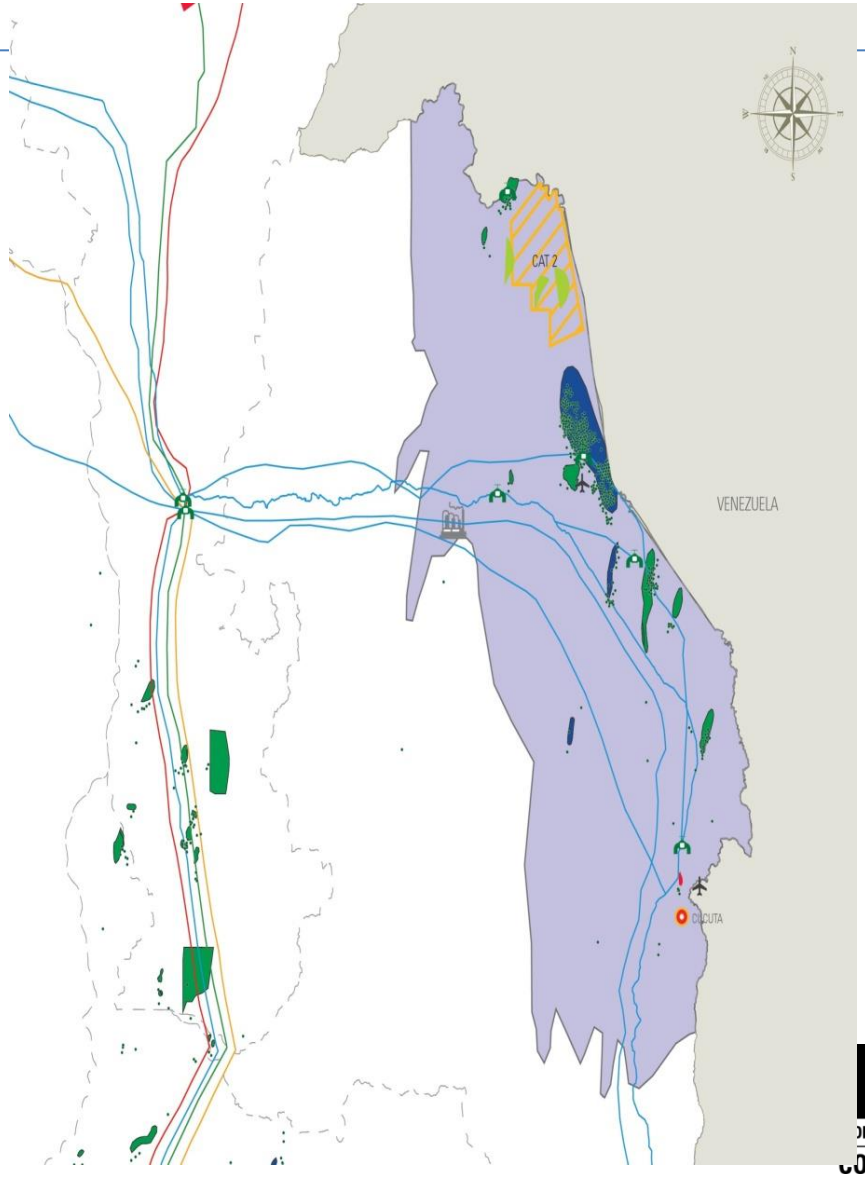
- **3** Blocks, Types I & II



COLOMBIA:
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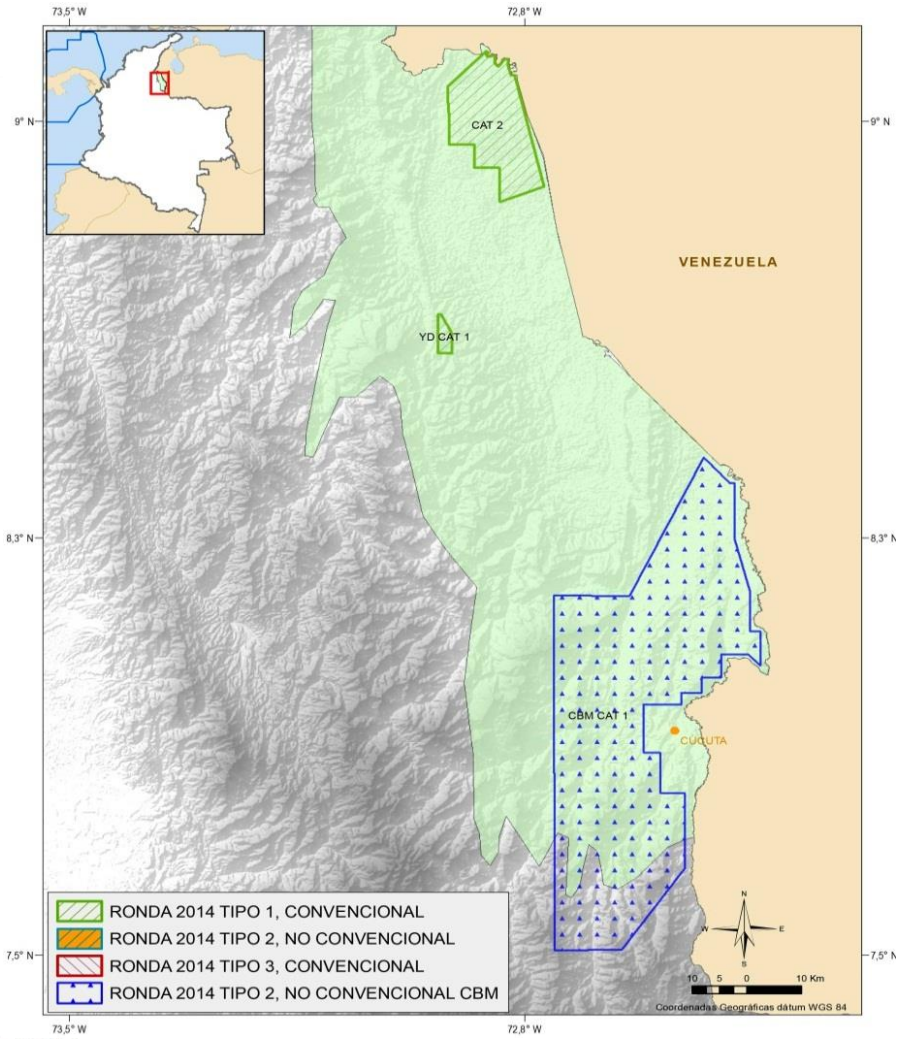
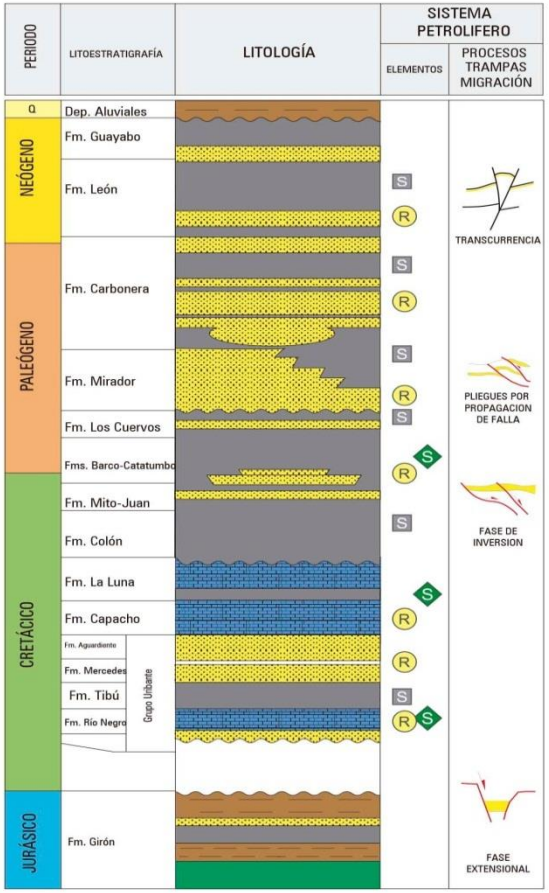
HIDROCARBUROS COLOMBIA

Conventional Resources
Catatumbo Basin





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Conventional
Llanos Basin

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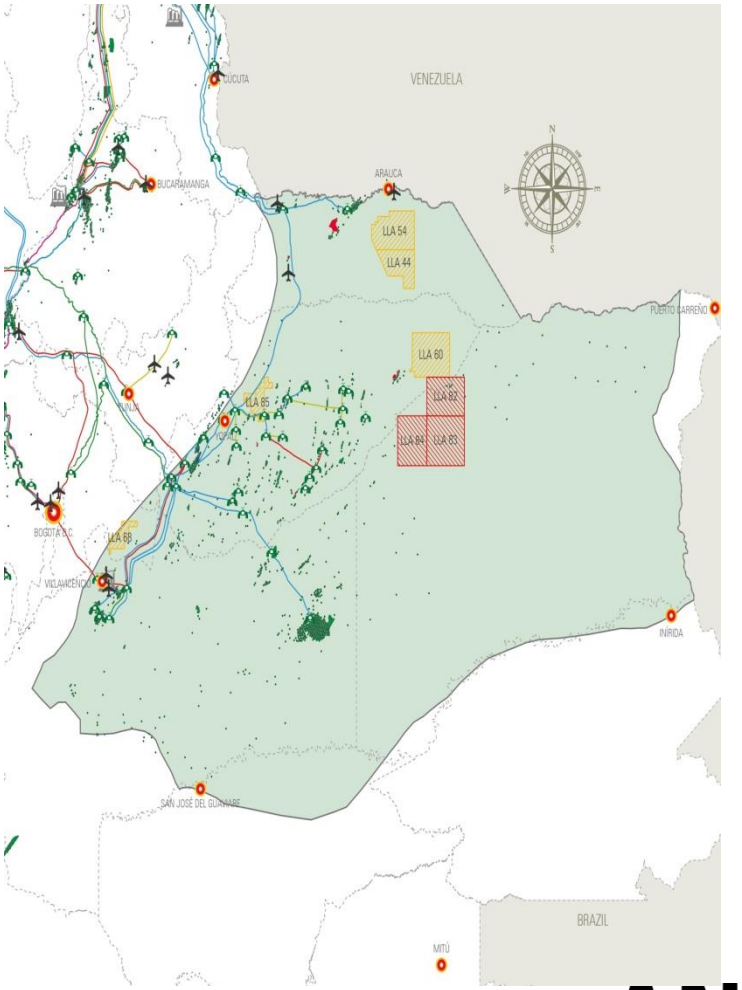
- **14** Blocks, Types I and III



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Conventional and Unconventional Resources

Middle Magdalena Basin

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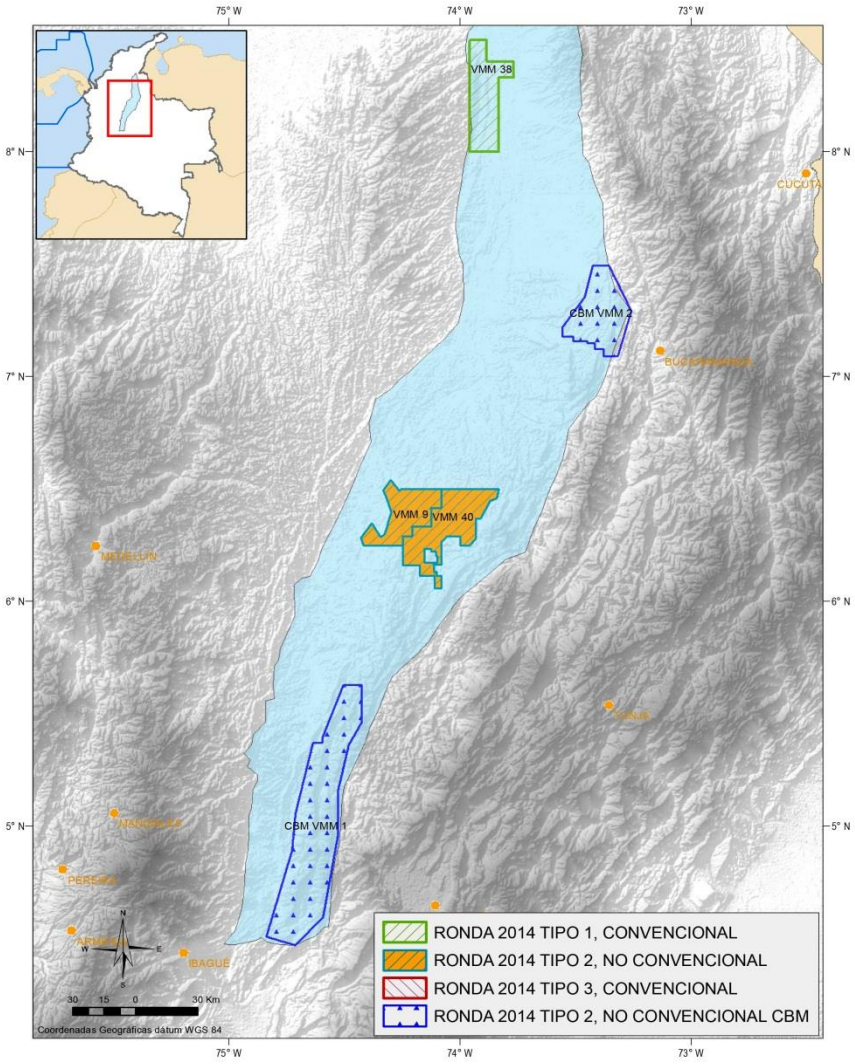

- **4** Blocks, Types I and II

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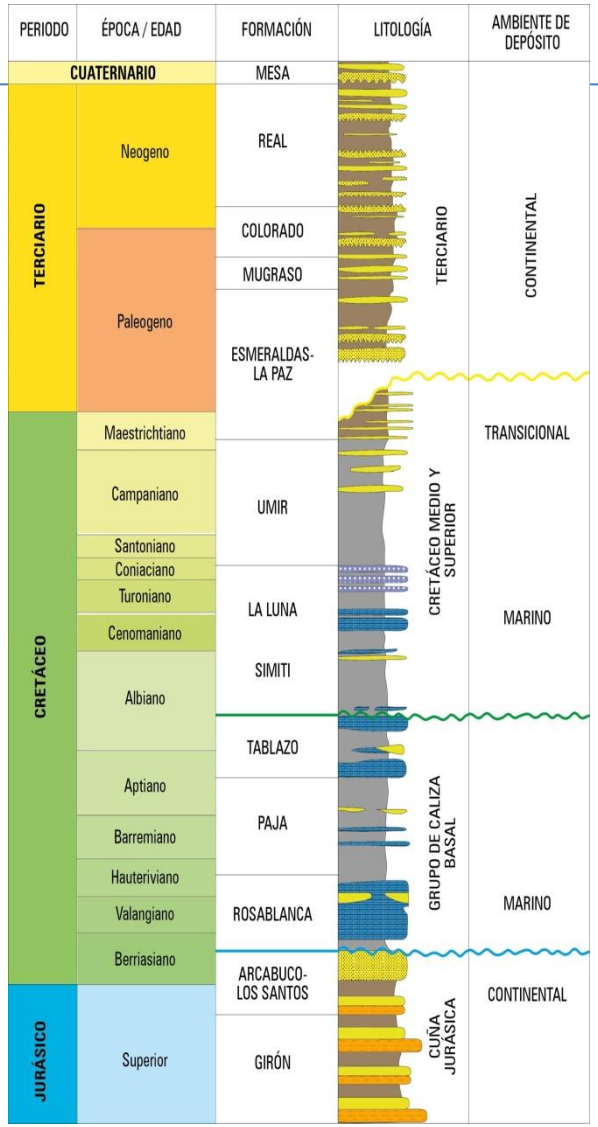
Generalized Stratigraphic Column



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Middle Magdalena Basin

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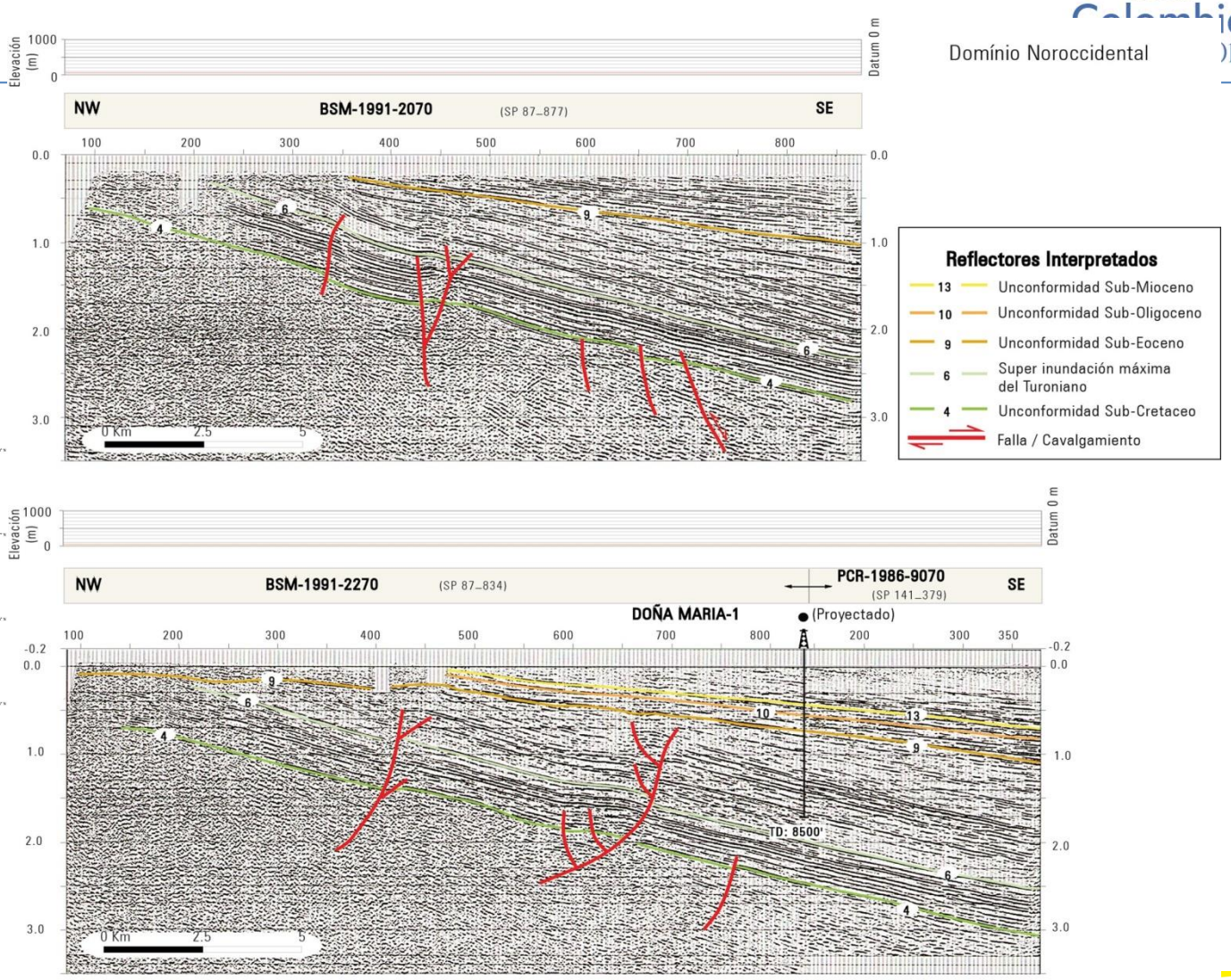
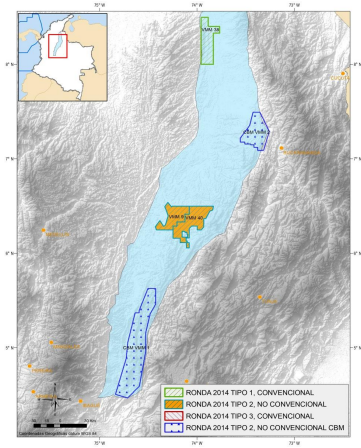
Domínio Noroccidental





Geotec, Robertson Research, Ecopetrol (1998)

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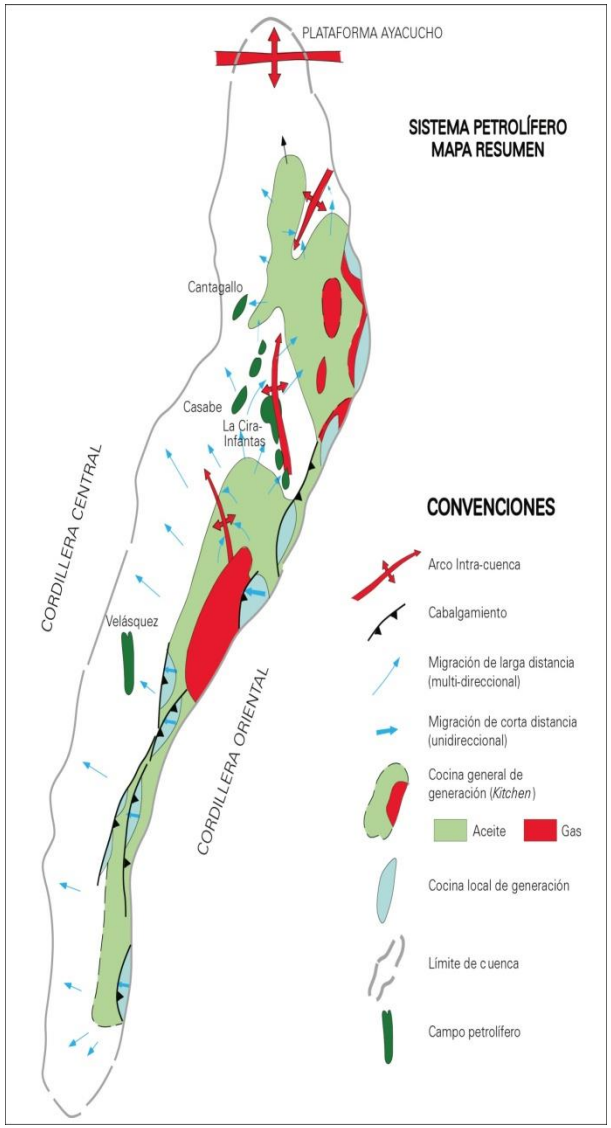
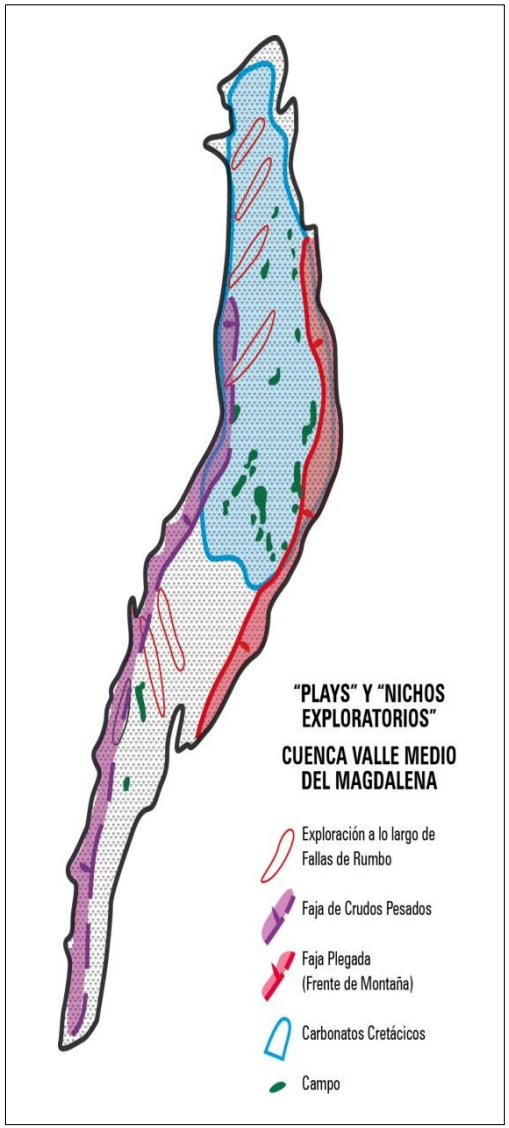
Kitchen Areas and Play Map



Mapa de cocinas de la Cuenca VMM.



Mapa conceptual de *plays* de la Cuenca VMM.

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DISCOVERED ACCUMULATIONS

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Discovered Accumulations

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Generalities

11 Areas on offer

- *1 in Caguan-Putumayo basin*
- *1 in Catatumbo basin*
- *8 in Eastern Llanos basin*
- *1 in Sinu-San Jacinto basin*

Blocks on offer range in size between 400 and 8000+ ha

Exploratory wells of reference

- *9 wells classified as B3* (8 in Llanos, 1 in Sinu-San Jacinto)
- *2 wells classified as A3* (Caguan-Putumayo and Catatumbo)

Information included in the data pack

- *32 wells distributed in the 11 Areas*
- *Ca. 2400 km 2D seismic*
- *Reference data of 3D seismic coverage*

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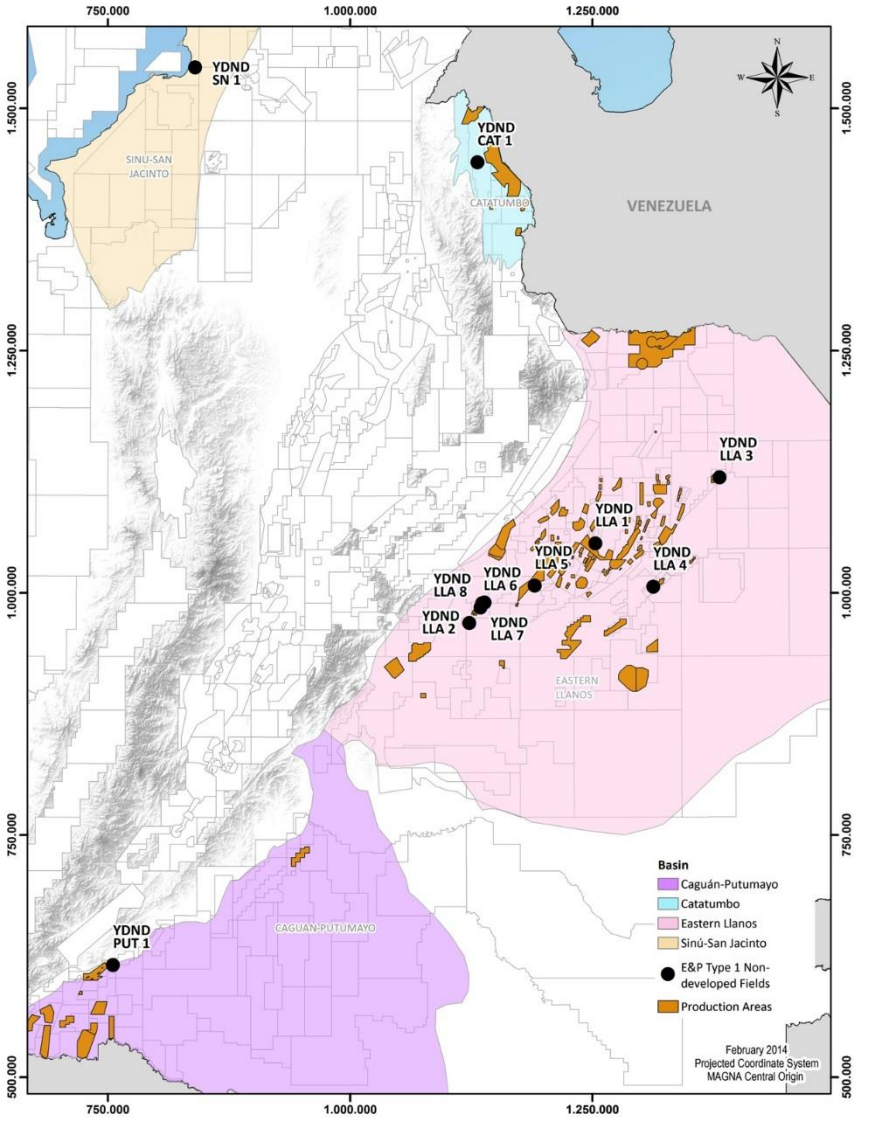
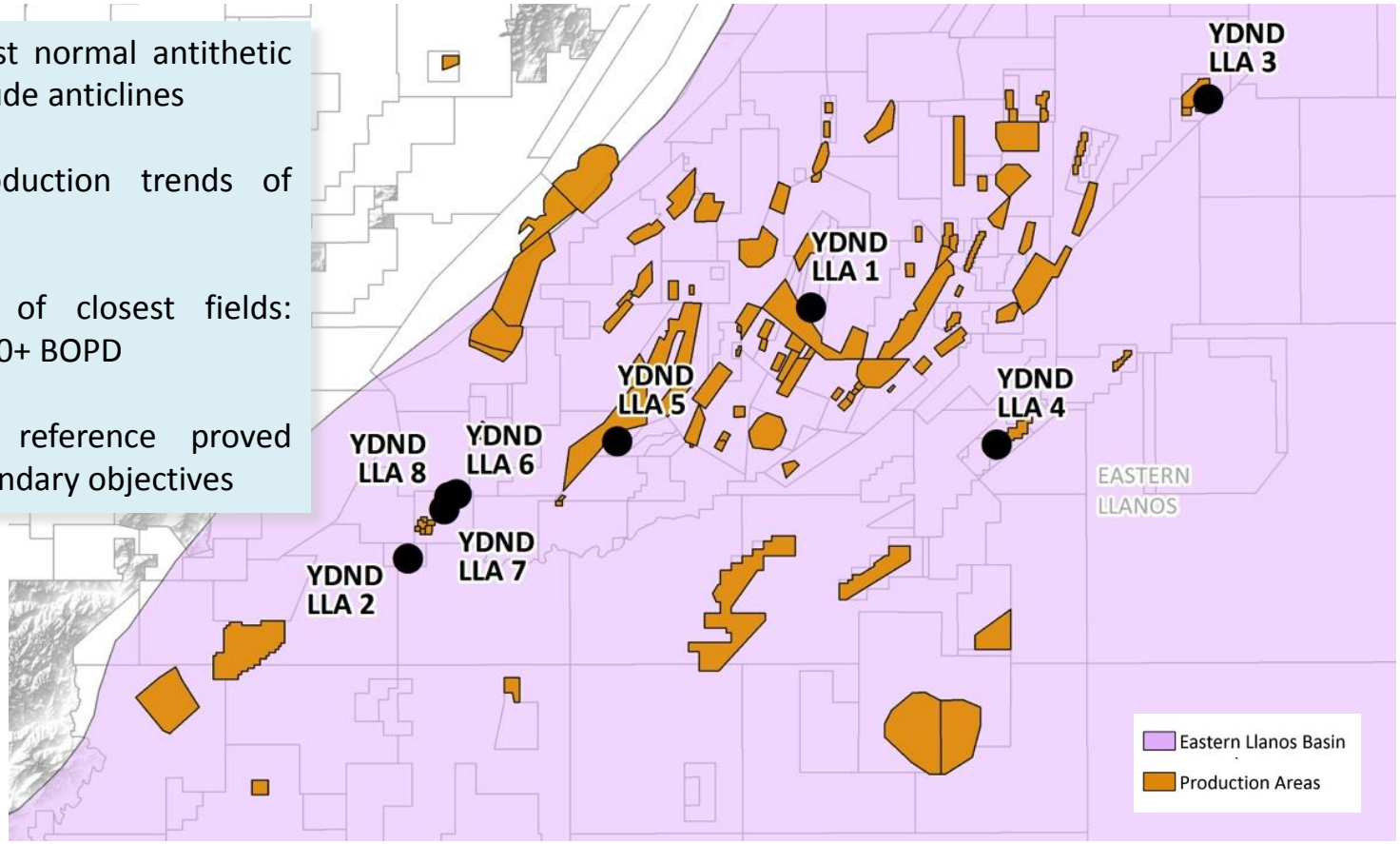


Eastern Llanos

RONDA Colombia 2014

Highlights

- Traps: closures against normal antithetic faults and low amplitude anticlines
- Areas following production trends of minor oil fields
- Average production of closest fields: between 300 and 4300+ BOPD
- 5 of 8 wells of reference proved hydrocarbons on secondary objectives



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Eastern Llanos

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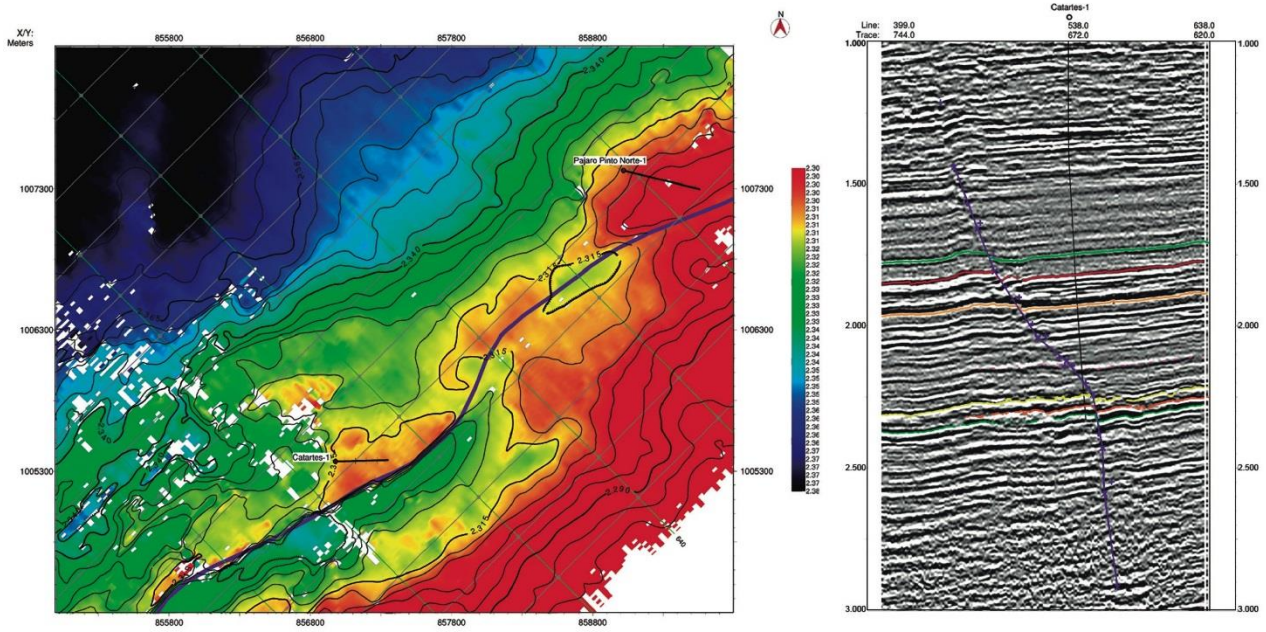
YD LLA 5

Well name	Objective	Shows	Shows intervals	Initial production	Initial BSW	Cumulative production	Cumulative H_2O
Catartes-1	Mirador (P)	Crude	9.320'-9.346'	-	-	-	-
	Guadalupe (S)	Crude	9.448'-9.457'	347 BOPD	5,00%	2.540 Bls	9.966 Bls
			9.461'-9.467'				
	Gacheta (S)	Crude+gas	9.800'-9.815'	6 BOPD	86,50%	203 Bls	304 Bls
			9.818'-9.823'				
			9.894'-9.904'				
			9.952'-9.961'				
	Ubaque (P)	Crude+gas	10.027'-10.067'	-	-	-	-

- To evaluate well location



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Caguan-Putumayo

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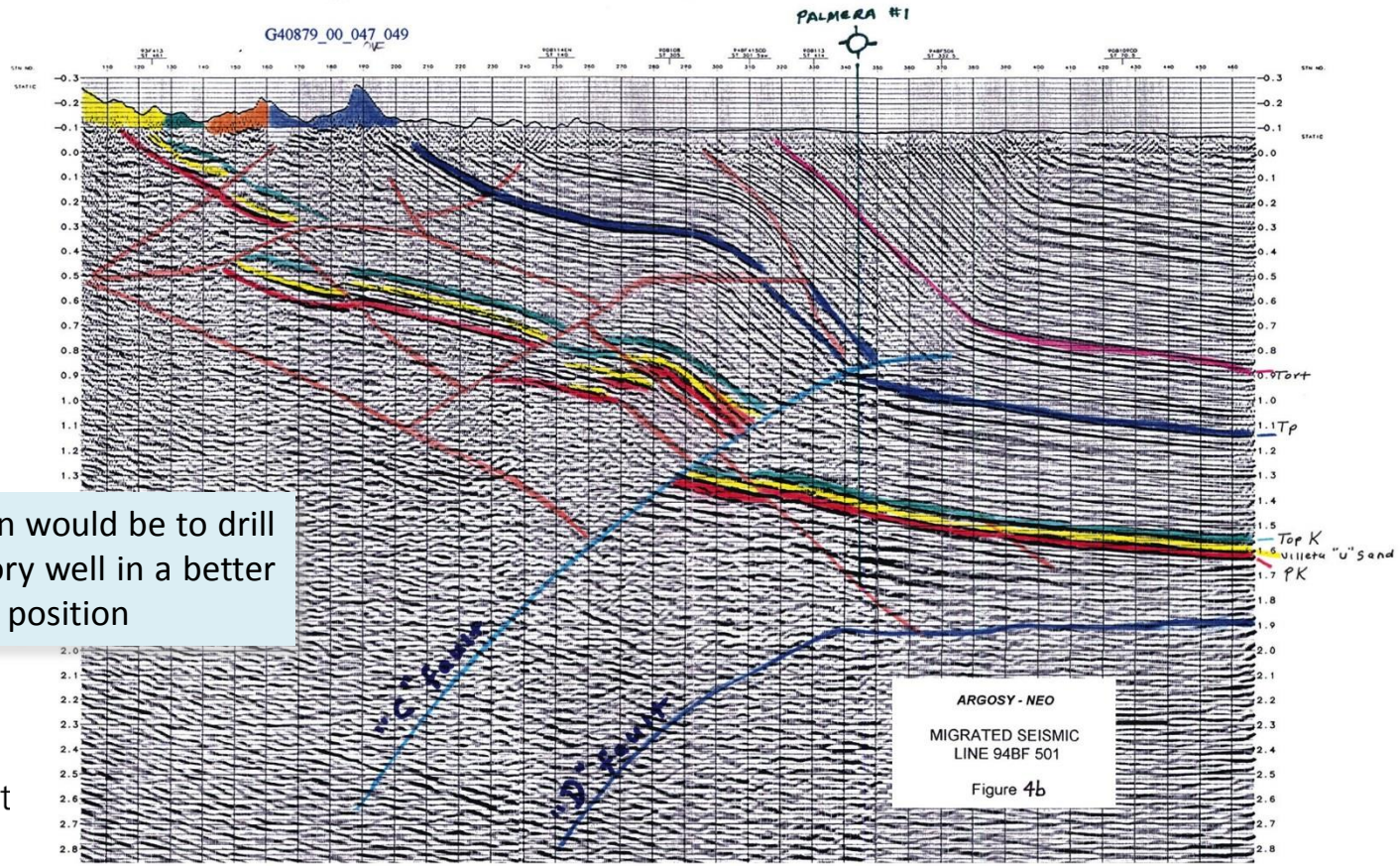
YD PUT 1

Well name	Objective	Shows	Shows intervals	Initial production	Initial BSW	Cumulative production	Cumulative H_2O
Palmera-1	Villeta (P)	Res. crude	-	-	-	-	-
	Caballos (S)	Res. crude	-	-	-	-	-
Re-entry	Villeta (P) (ss Kg)	Crude	7.844'-7.864'	47,5 BOPD	0,80%	385 Bls	1 Bl



- A feasible option would be to drill a new exploratory well in a better structural updip position

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UNCONVENTIONAL RESOURCES

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Areas On Offer

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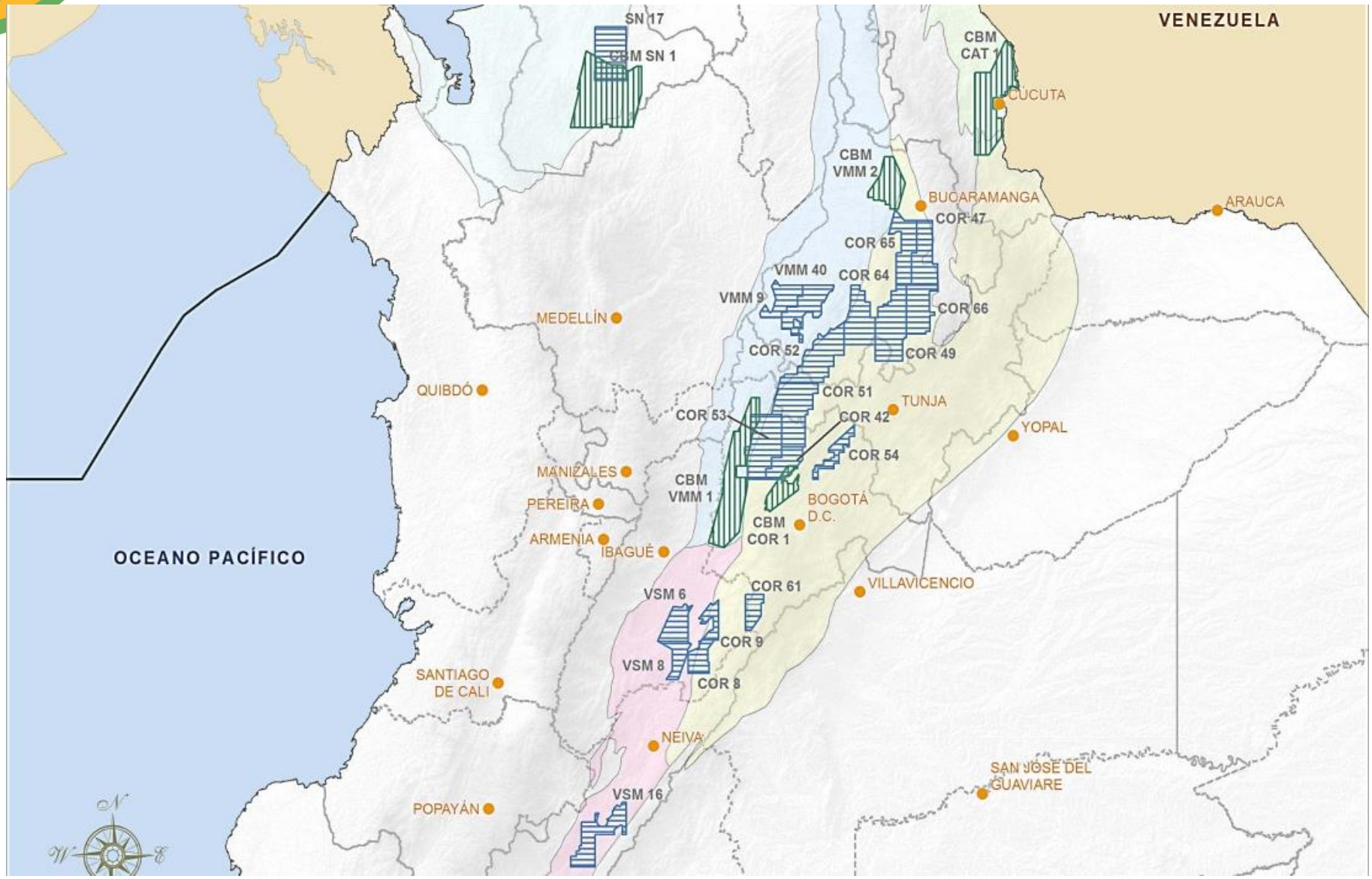


Unconventional Reservoirs

RONDA Colombia 2014

Highlights

- Detailed database containing petrographic, geochemical, petrophysical and stratigraphic (facies) information, corresponding to basins with potential to explore for Unconventional resources
- New Unconventional province: Sinu-San Jacinto basin. Thick source rock sequence of the Cansona Fm.
- Areas on Offer selected from “sweet spot” maps
- Reports and data associated with ongoing studies will be available in the Q3/14

Middle Magdalena Valley

ANH-EGI_UTAH

Umir
TOC 0,7 – 12,2% Ro 0,5 – 0,55%

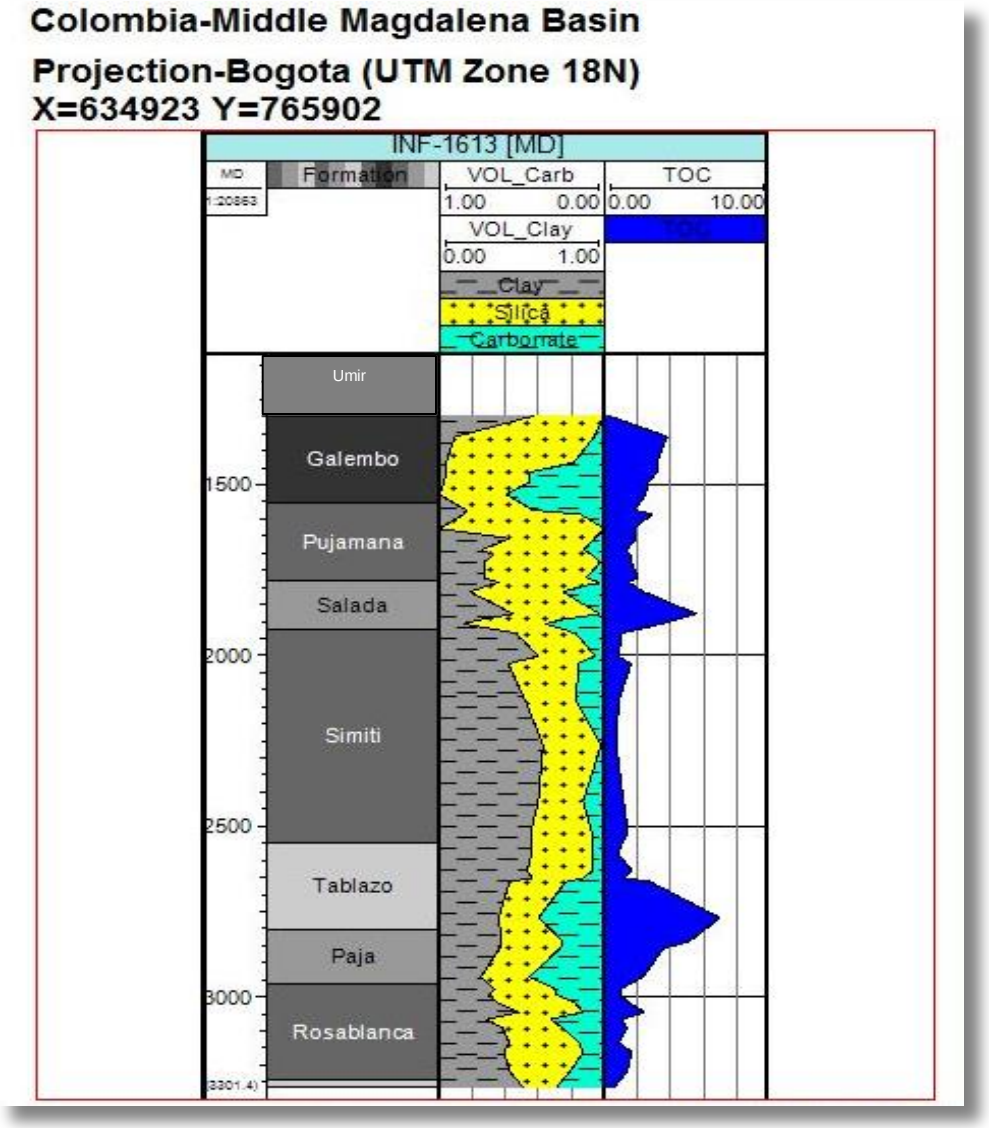
La Luna
TOC 0,3 – 12,25% Ro 0,3 – 4,92%

Simiti
TOC 0,55 – 12,08% Ro 0,72 – 1,98%

Tablazo
TOC 0, 8 – 6,28% (Very high Ro) (?)

Paja
TOC 0,74 – 8,95% Ro 0,94 – 1,3% (?)

Rosablanca
TOC 0,87 – 2,44% Ro 0,75 - > 2%



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Middle Magdalena Valley

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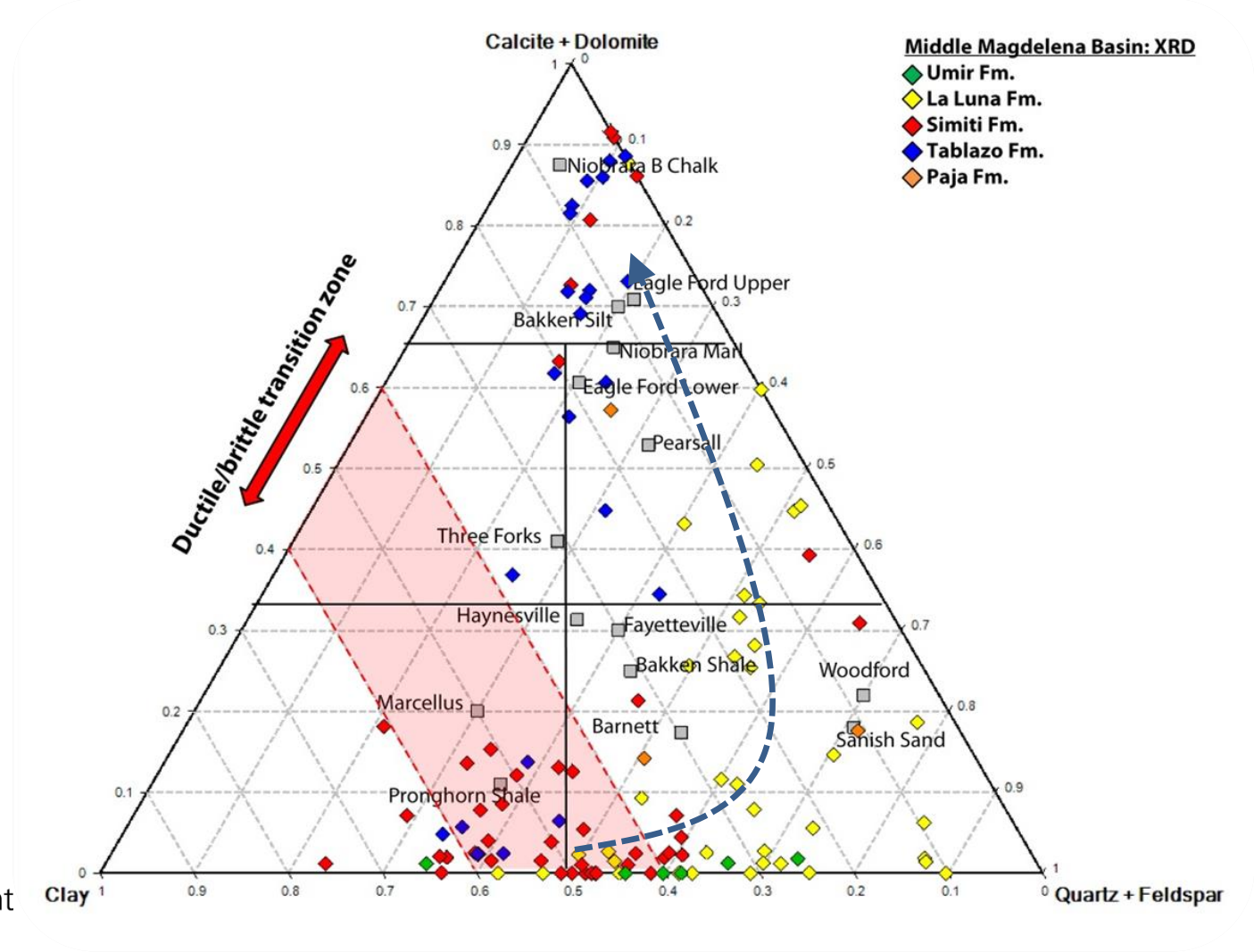
XRD mineralogy



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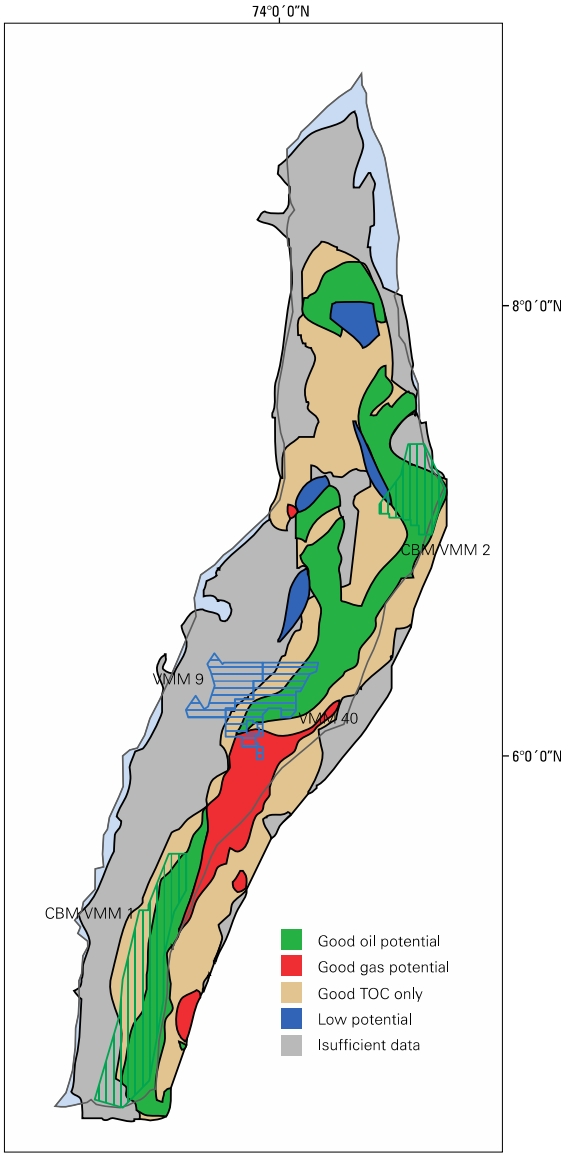
Middle Magdalena Valley

Sweet spots (multivariate analysis)



Good oil potential (TOC <1%, Ro: in generation window for oil).

Good gas potential (TOC >1%, Ro: in generation window for gas).

Good TOC only (TOC > 1%, Ro: no available data).

Low Potential (Ro: values indicating immature rocks).

Insufficient Data

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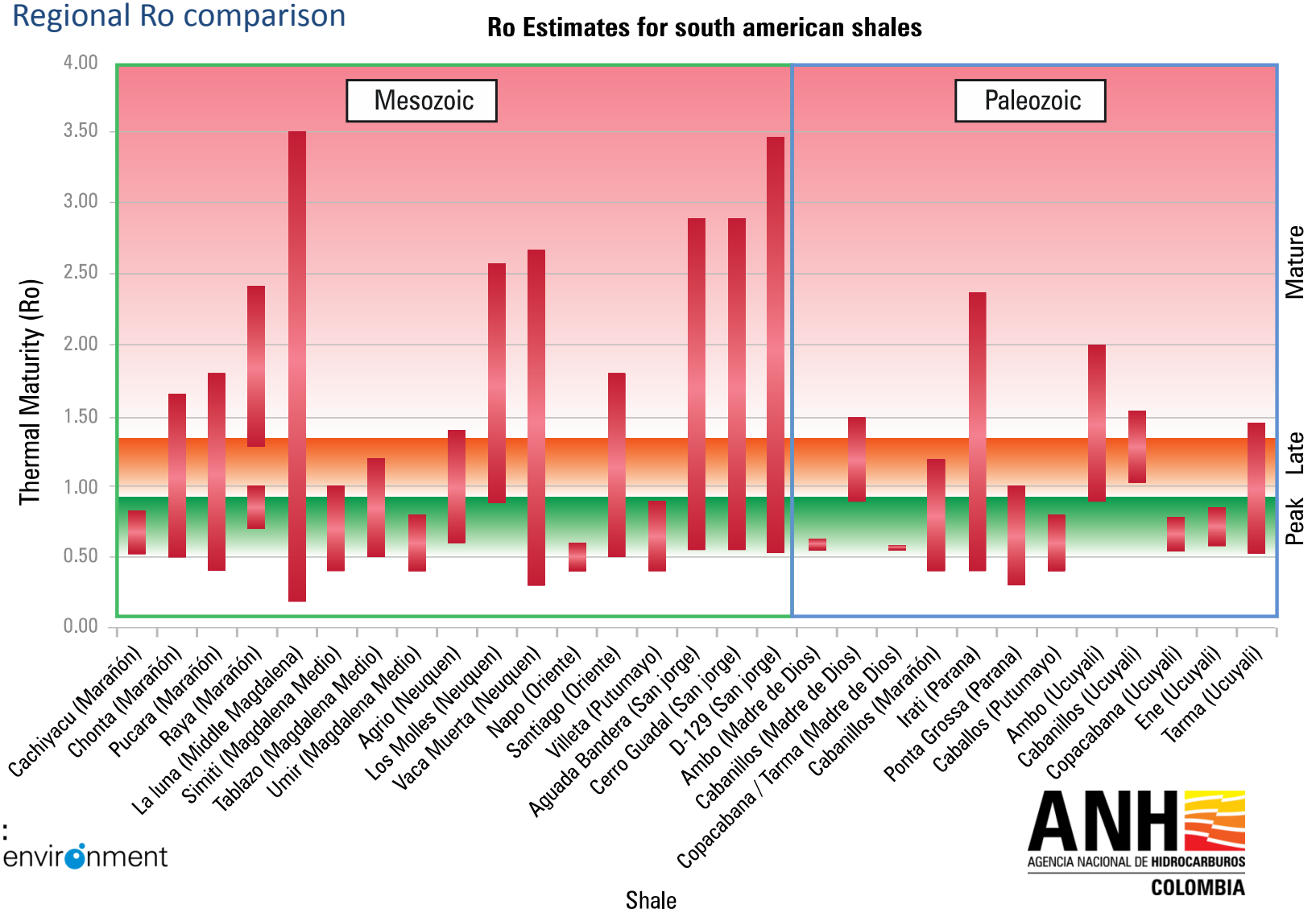
Middle Magdalena Valley

Regional Ro comparison



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ANH-Ayco 2014 Consortium

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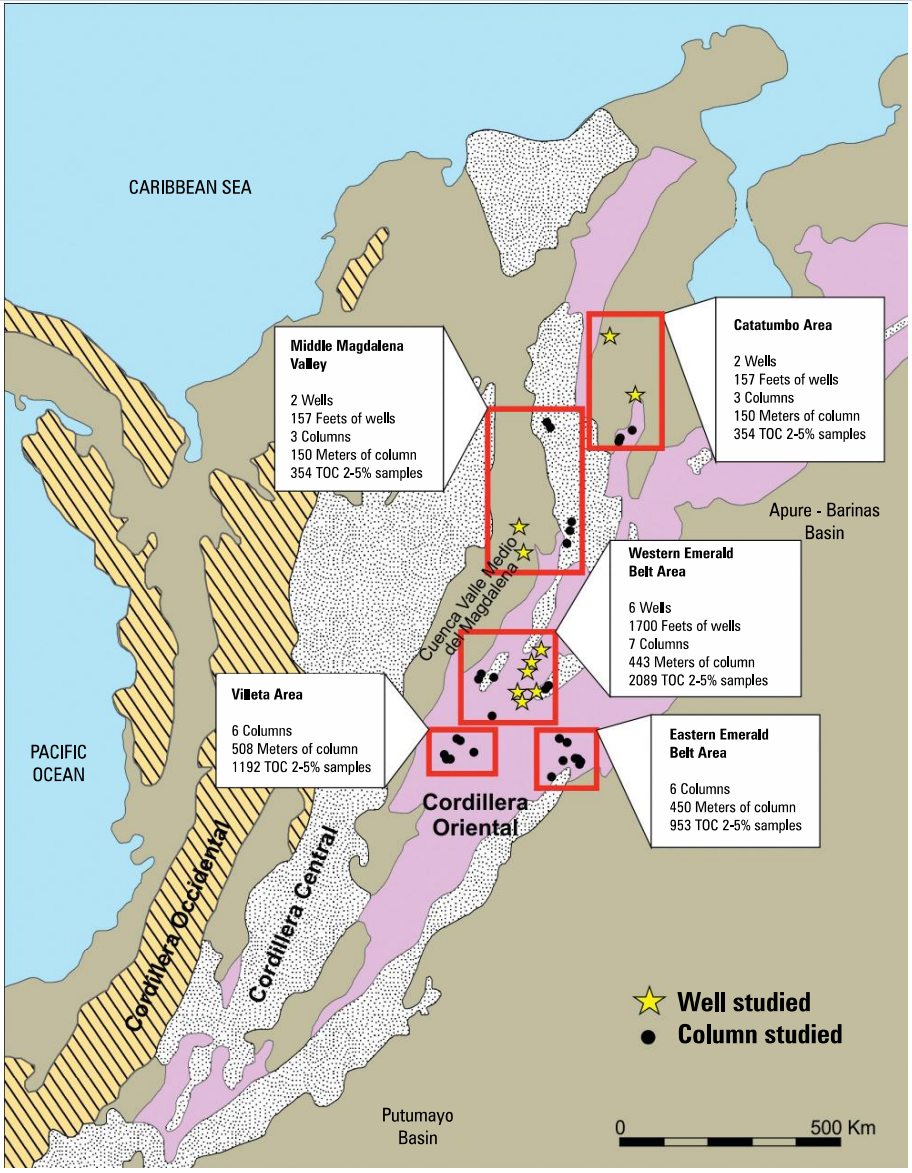
Surface and core sampling



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Eastern Cordillera

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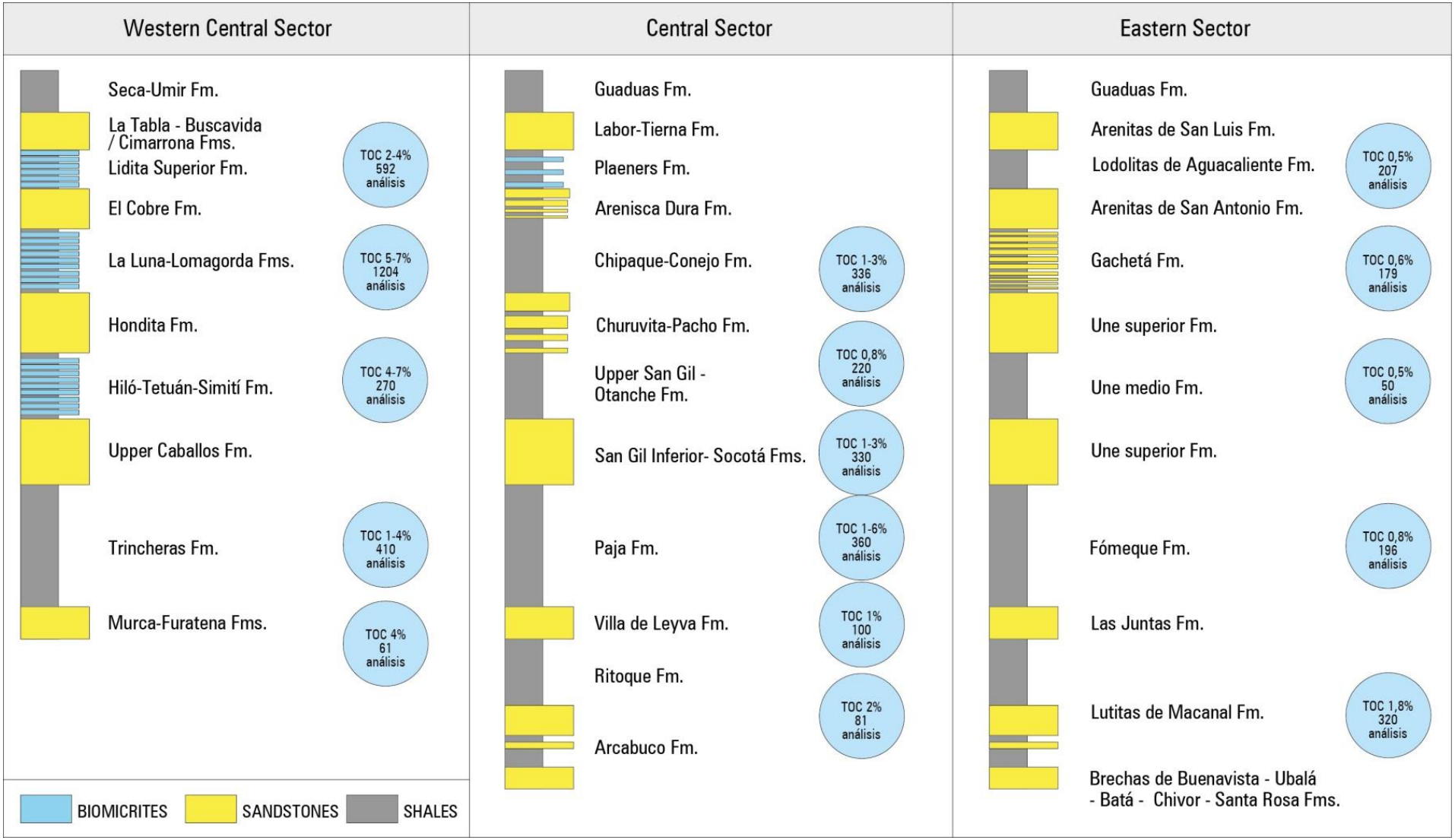
Surface and core sampling



Eastern Cordillera

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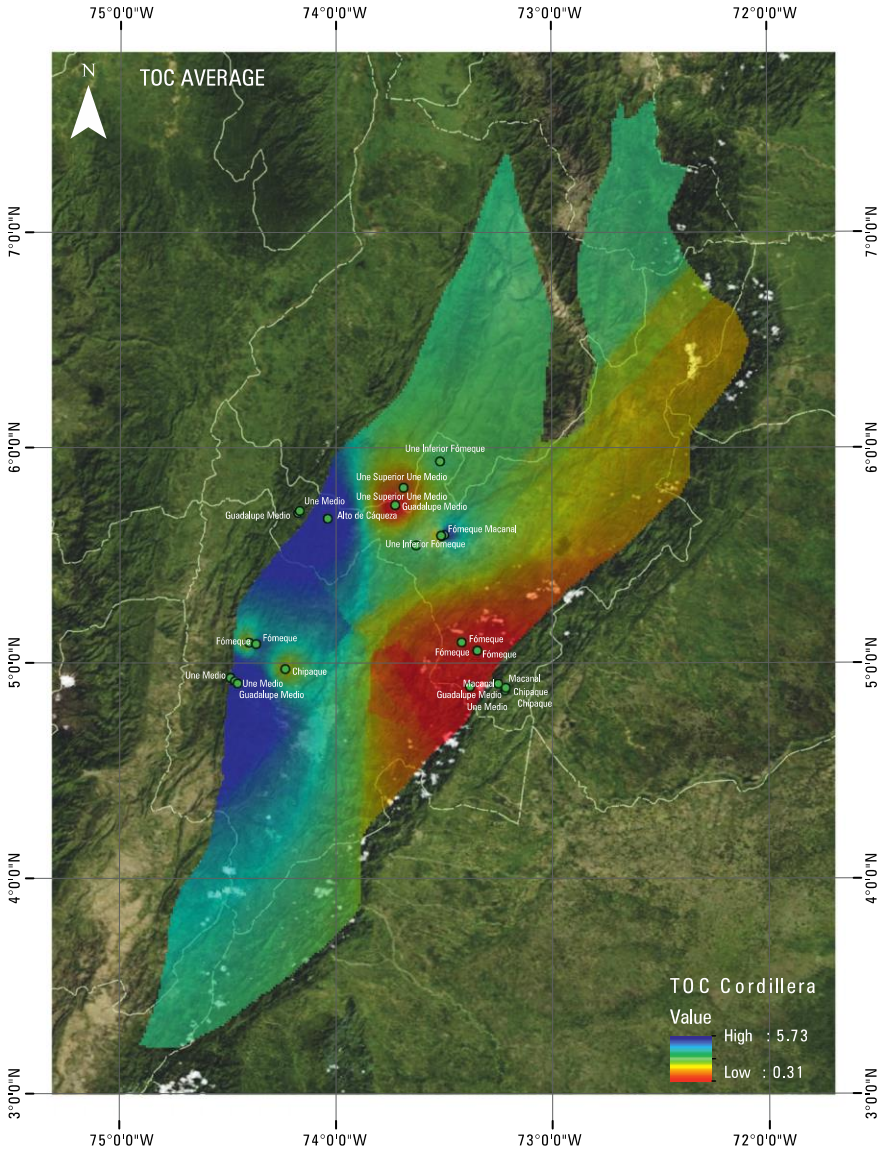
TOC average from outcrops



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Sinu-San Jacinto

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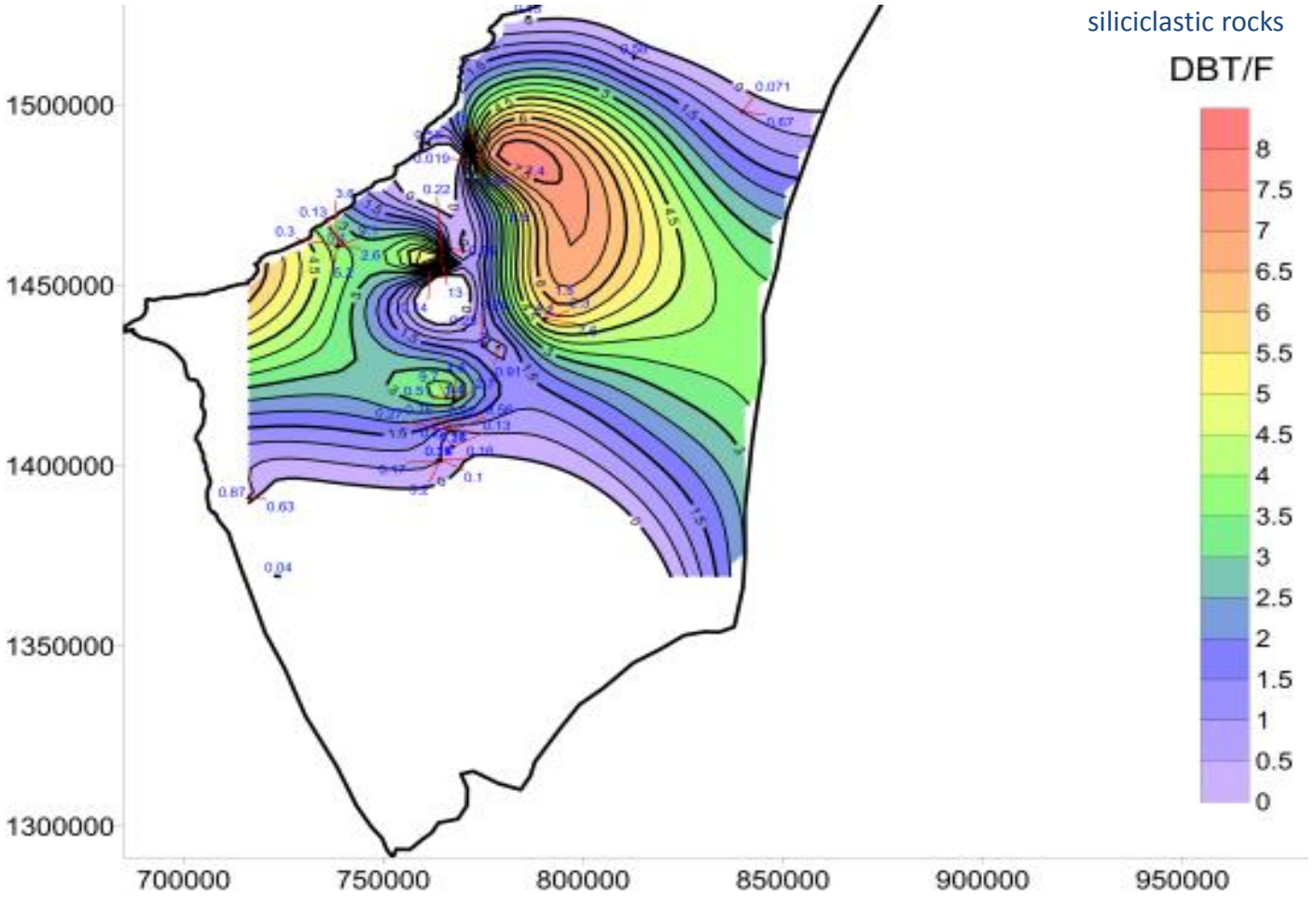
Relationship Dibenzothiophene/Phenanthrene (DBT/F)

> 3 – Limestone marine rock environments

< 3 – Transitional siliciclastic rocks

Cansona Fm.

2400'+ calcareous shales
Ligth oil > 35º API
Kerogene Type II
Oil window
Wide and gentle synclines



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Sinu-San Jacinto

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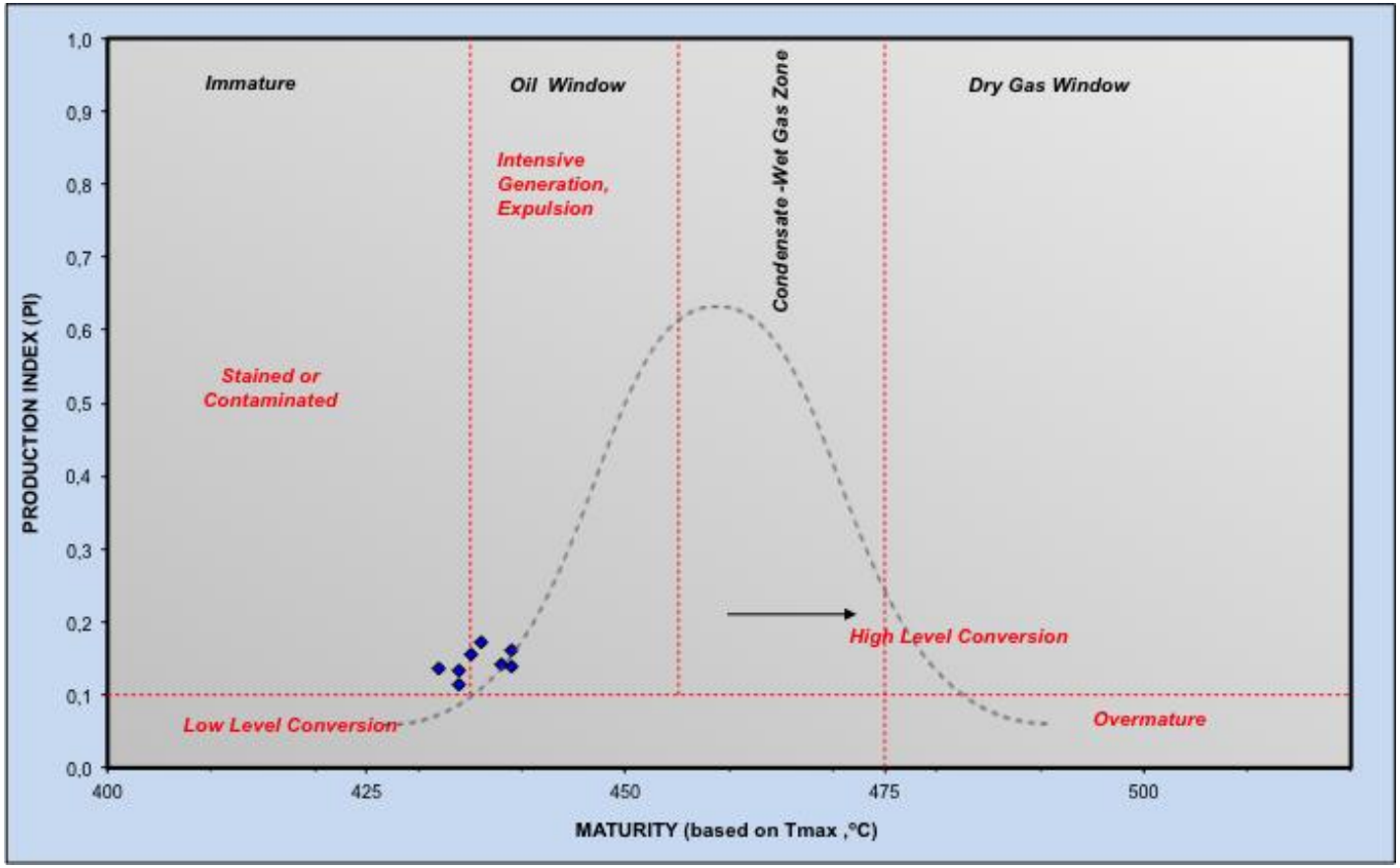
Oil sample from San Cayetano Fm. reservoir ("El Caramelo" slim hole)



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UNCONVENTIONAL RESOURCES-CBM

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Unconventional Resources CBM

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Comparación entre reservorios de CBM de Colombia, Estados Unidos e Indonesia

CUENCA	San Juan	Powdwer River Basin	Greater Green River Basin	Indonesia	Ranchería	Cesar	Cordillera Oriental	Catatumbo	Valle Medio Magdalena	Sinu-San Jacinto	Valle Inferior Magdalena
Edad de la Formación	CRETÁCICO SUPERIOR	PALEOCENO	CRETÁCICO SUPERIOR	MIOCENO	PALEOCENO	PALEOCENO	CRETÁCICO SUPERIOR-PALEOCENO	CRETÁCICO SUPERIOR-PALEOCENO	CRETÁCICO SUPERIOR-PALEOCENO	MIOCENO	MIOCENO
%Ro minimo	0,5	0,3	0,4	0,3	0,4	0,5	0,55	0,5	0,53	0,3	0,34
%Ro maximo	1,5	0,5	0,6	0,8	0,65	0,6	1,5	0,7	1,96	0,4	0,45
GIP/area (bcf/mi^2)	21	5,8	12	15	64,1	15,3	12,4	14,9	24,8	2,4	1,8
Espesor neto de Carbón (m)	18	80	25	50	79	32	8,5	5	22	20	22
Gas Biogenico		XX		XX	XX	XX				XX	XX
Gas Termogenico	XX			X	X	X	X	X			
Gas Mezcla	x		XX				XX	XX	XX		
Tipo de Estructura	Simple	Simple	Compleja	Compleja	Compleja	Simple	Compleja	Compleja	Simple	Compleja	Simple
GIP/area (bcf/mi^2)	Calculado en base a los datos de isotermas de absorción										
GIP/area (bcf/mi^2)	De publicaciones de la AAPG										

GIP: Gas in Place

XX: Recurso primario

X: Rango secundario

CUENCA COLOMBIANA	ANÁLOGO MUNDIAL
Cesar-Ranchería	Cuenca Powder River, Estados Unidos
Cordillera Oriental	Cuenca San Juan, Estados Unidos
Valle Medio del Magdalena	
Catatumbo	Cuenca Greater Green River, Estados Unidos
Sinú-San Jacinto	Cuencas de Indonesia

Para establecer la comparación se tuvieron en cuenta tres aspectos:

- Edad Similar de la Formación.
- Área similar en Km^2.
- Rango de Carbón similar según estándares ASTM.
- Espesor neto de Carbón GIP.

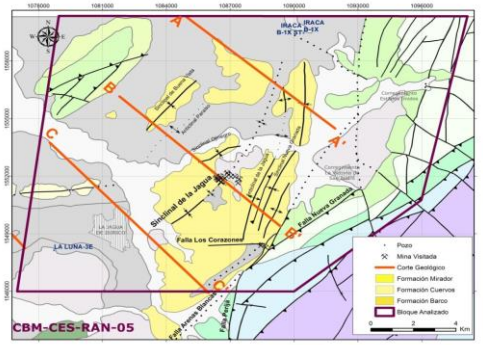
Unconventional Resources- CBM

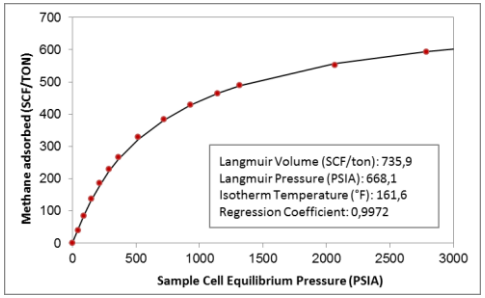
What the ANH has done

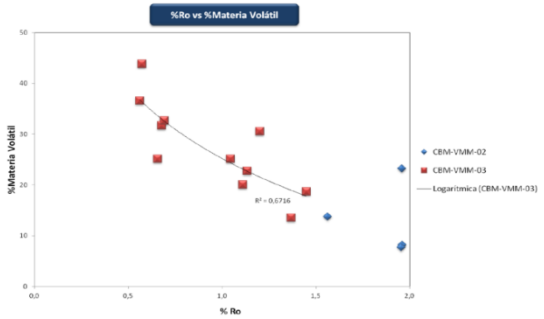
- Geologic Compillation.
- Geologic and Geochemistry Characterization in 12 Carboniferous Zones
- Sampling of 360 carboniferous locations

- Samples Analysis:
  - TOC.
  - Methane Isotherm Adsorption Curves
  - Degassing of Coal Tests
  - Gas Chromatography
  - $\delta^{13}C$ Isotopes and of Deuterium $\delta^{2}H$ in Methane
  - Moisture Aanalysis, Ashes, Volatile and Fixed Carbon
  - IH, IO, Saturation Indexes
  - Tmax
  - Vitrinite Reflectance (Ro.)
  - Macerals Content

- Economic Evaluation
  - Gas Price
  - Royalties and Economic Rights
  - Discount Rate
  - Project Economics







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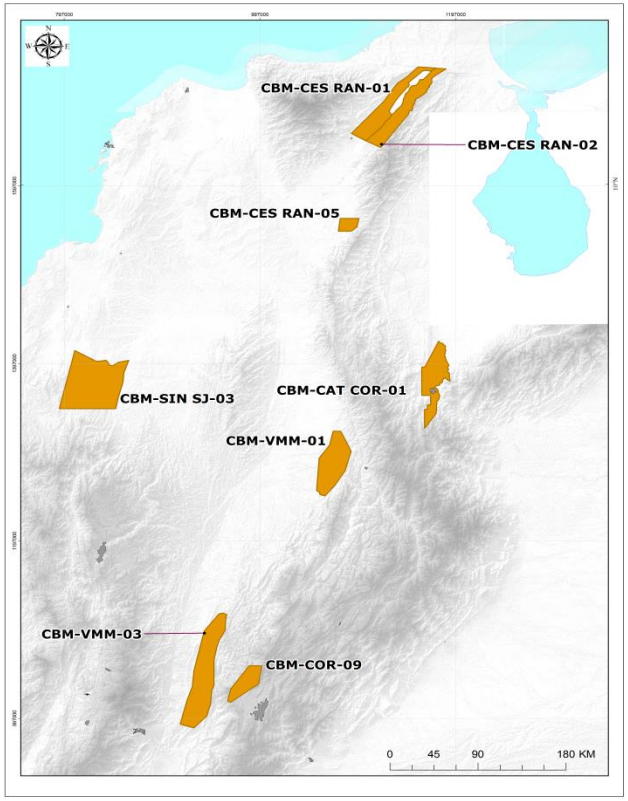
Unconventional Resources CBM



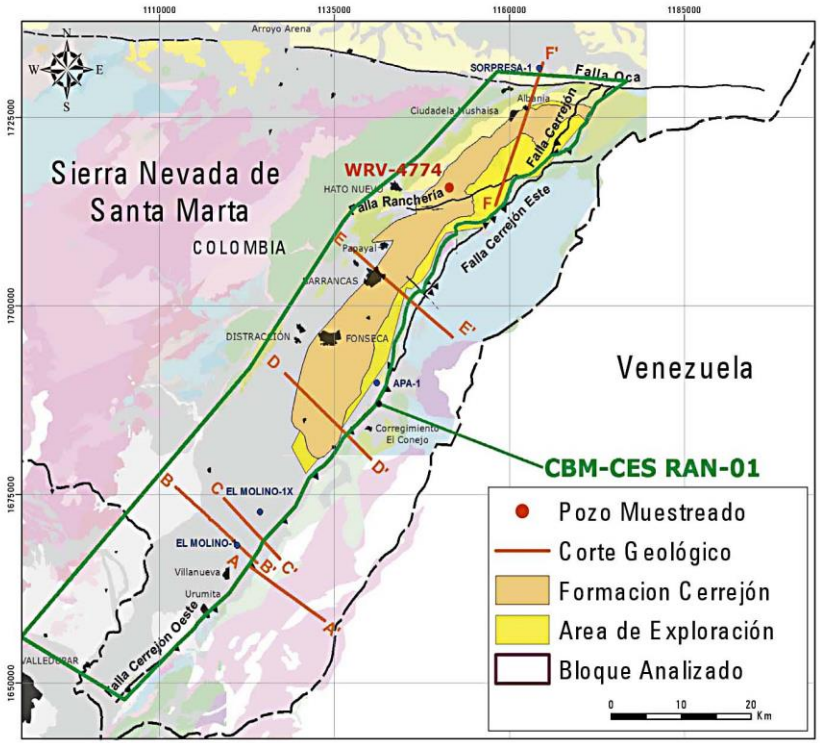
CUENCA COLOMBIANA	ANÁLOGO MUNDIAL
Cesar-Ranchería	Cuenca Powder River, Estados Unidos
Cordillera Oriental	Cuenca San Juan, Estados Unidos
Valle Medio del Magdalena	
Catatumbo	Cuenca Greater Green River, Estados Unidos
Sinú-San Jacinto	Cuencas de Indonesia

- CBM Blocks = 8
- Total Area = 1´212.616 Ha.

Tabla GIP y Recursos Carboníferos				
BASIN	GIP MIN	GIP MAX	COAL MIN	COAL MAX
	TCF		BTON	
CESAR RANCHERÍA	12,8	25,1	49,3	93,5
VIM	0,4	1,2	7,2	21,5
CAUCA PATIA	1,3	2,7	3,1	6,2
AMAGA	0,3	0,8	1,9	5,6
CORDILLERA	14,0	29,1	38,7	73,5
VALLE MEDIO DEL MAGDALENA	9,7	17,0	20,0	35,1
SINU SAN JACINTO	1,7	3,4	56,5	155,6
CATATUMBO	11,4	22,8	58,9	117,7
TOTAL	**51,6**	**102,1**	**235,6**	**508,7**

CBM Potential

Unconventional Resources CBM



Geochemical Parameters

	CRITERIO	CERREJÓN TRADICIONAL
SUBCUENCA RANCHEÍA	Nombre del Bloque	CBM-CES RAN-01
	Area del Bloque (ha)	139331,9417
	Edad	Paleoceno Tardío
	Recursos de Carbón (x109 ton)	13.0 - 28.0
	Contenido de Gas calculado (TCF)	3.79-8.18
	Rango de Carbón, Promedio Ro (%)	0.42-0.61
	Isotherm Gas Content (ft3/ton)	113-398
	Origen de Gas Dominante	Termogénico y Biogénico

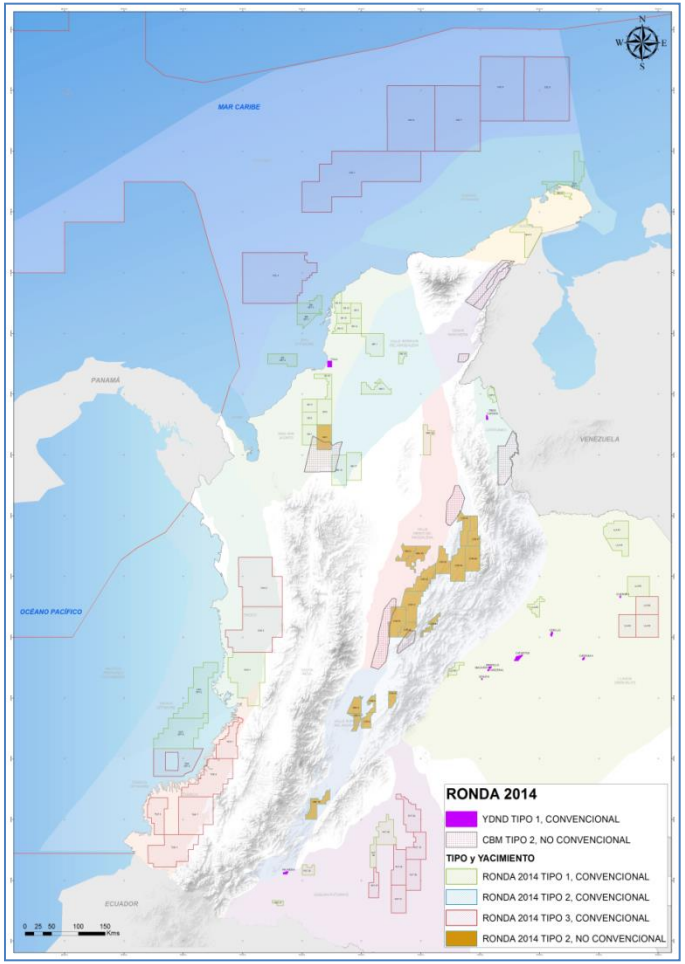
Types of Areas RC_14

Area Type	Description
E&P Type 1 Conventional	Opportunities for Exploration and Production of Continental Conventional Resources and Offshore in Emerging and Mature Areas
E&P Type 1 YD	Opportunities for Exploration and Production of Discovered Accumulations – (YD for its acronym in Spanish) in Continental Areas
E&P Type 2 Unconventional	Opportunities for Exploration and Production of Continental Unconventional Resources in "*Shales* in Emerging Areas
E&P Type 2 CBM	Opportunities for Exploration and Production of Continental Unconventional Resources of Methane Gas associatd with Coal Beds (*Coal-Bed Methane CBM*)
TEA Type 3 Conventional	Opportunities for Technical Assessment of border areas with potential for Exploration of Continental and Offshore Conventional Resources

Areas Offered RC_14

	Area (ha)
Continental Conventional	7’007.888
Offshore Conventional	7’961.247
Unconventional oil and gas shale	1’693.078
Unconventional for gas associated to coal bed (CBM)	1’265.892
Total RC_14	**17’928.105**

Total Areas Offered	**97**
Continental Conventional	57
Offshore Conventional	13
Unconventional oil and gas shale	19
Unconventional for gas associated to coal bed (CBM)	8



Exploratory Programs

E&P Type 1

Exploration and Production of Continental Conventional Reservoirs

PEM – First Phase	PEM – Second Phase
36 months	**36 months**
Acquisition of 200 km of 2D seismic	Acquisition of 100 km^2 of 3D seismic
1 exploratory well	2 exploratory wells

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E&P Type 1

Exploration and Production of Offshore Conventional Reservoirs

PEM – First Phase	PEM – Second Phase	PEM Third Phase
36 months	**36 months**	**36 months**
Acquisition of 1,000 km^2 of 3D seismic or its equivalent in 2D seismic	-	-
80 *"Piston Core"* samples	1 exploratory well	1 exploratory well

Evaluation Programs

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E&P Type 1

Evaluation of Discovered Accumulations (YD for its acronym in Spanish)

PEV – First Phase	PEV – Second Phase
12 months	**24 months**
Reprocessing of existing seismic data and petrophysical re-evaluation	"*Re-entry*" of existing well or drilling of exploratory well

Exploratory Programs

E&P Type 2

Exploration and Production of Unconventional Reservoirs

PEM – First Phase	PEM – Second Phase	PEM – Third Phase
36 months	**36 months**	**36 months**
Acquisition of 200 km of 2D seismic and/or reprocessing of existing seismic	-	-
2 Stratigraphic or exploratory wells	4 Exploratory Wells	4 Exploratory Wells

Exploratory Programs

E&P Type 2

Exploration and Production of CBM Reservoirs

PEM – First Phase	PEM – Second Phase	PEM – Third Phase
36 months	**36 months**	**36 months**
Acquisition of 300 km 2D seismic and/or seismic reprocessing intended for shallow depths	-	-
Water balance and hydrogeochemical studies, includying target formations	-	-
2 Stratigraphic or exploratory wells	4 Exploratory Wells	4 Exploratory Wells

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TEA Type 3

Technical Evaluation for Exploration in Continental Areas

PEM – Single Phase
36 months
Mapping of hydrocarbon anomalies from surface geochemistry over the full extent of the area
Acquisition of 200 km of 2D seismic
1 Stratigraphic Well

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TEA Type 3

Technical Evaluation for Offshore Exploration

PEM – Single Phase
36 months
80 *"Piston Core"* samples
Acquisition of 6,000 km of 2D seismic

Thank You!

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