

# RONDA

## COLOMBIA 2021

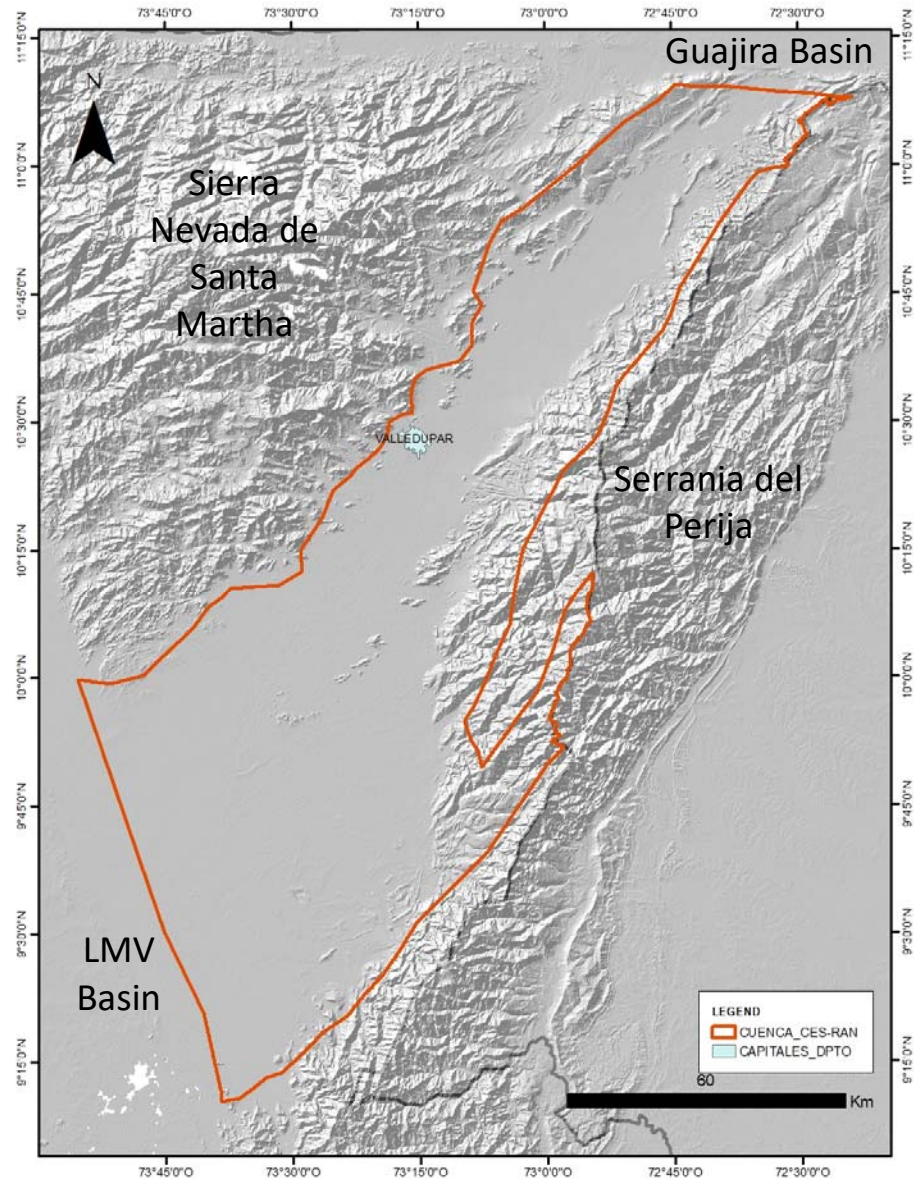
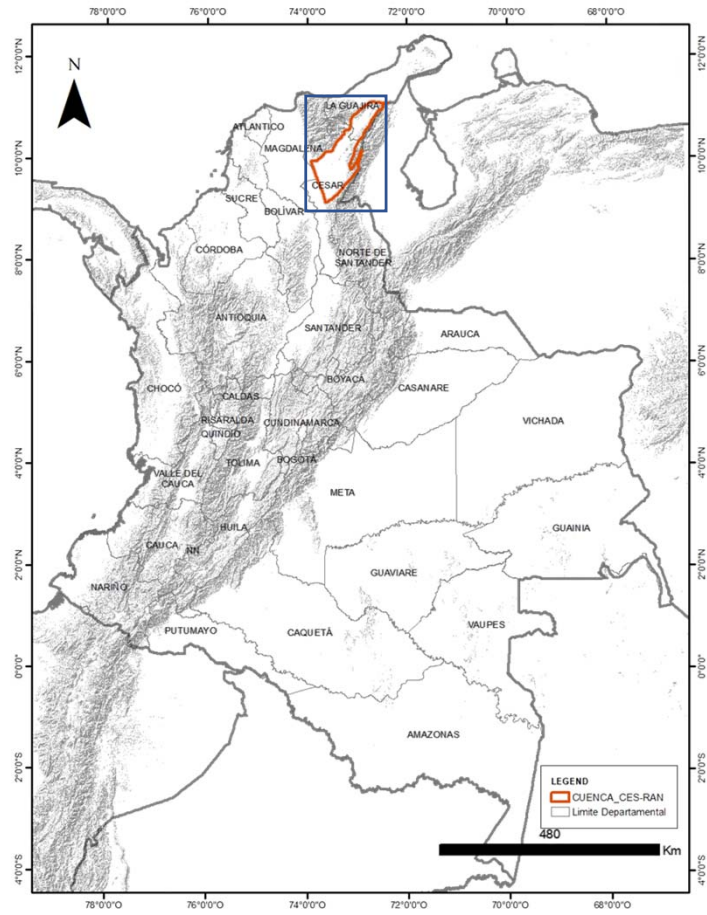
**Cesar-Rancheria Basin**

6<sup>th</sup> August 2021

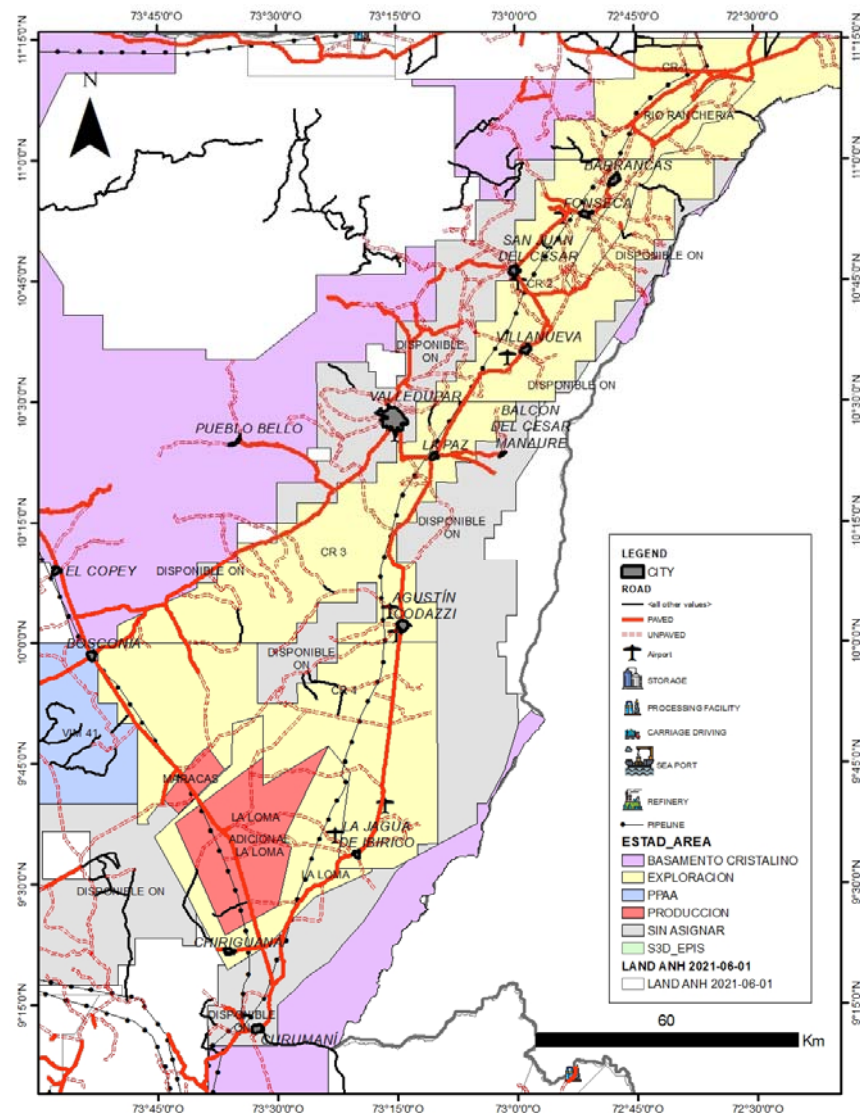
## Agenda

- Location
- Infrastructure
- Geological Framework
- Prospectivity - Available Areas
- Conclusions
- References

# Location

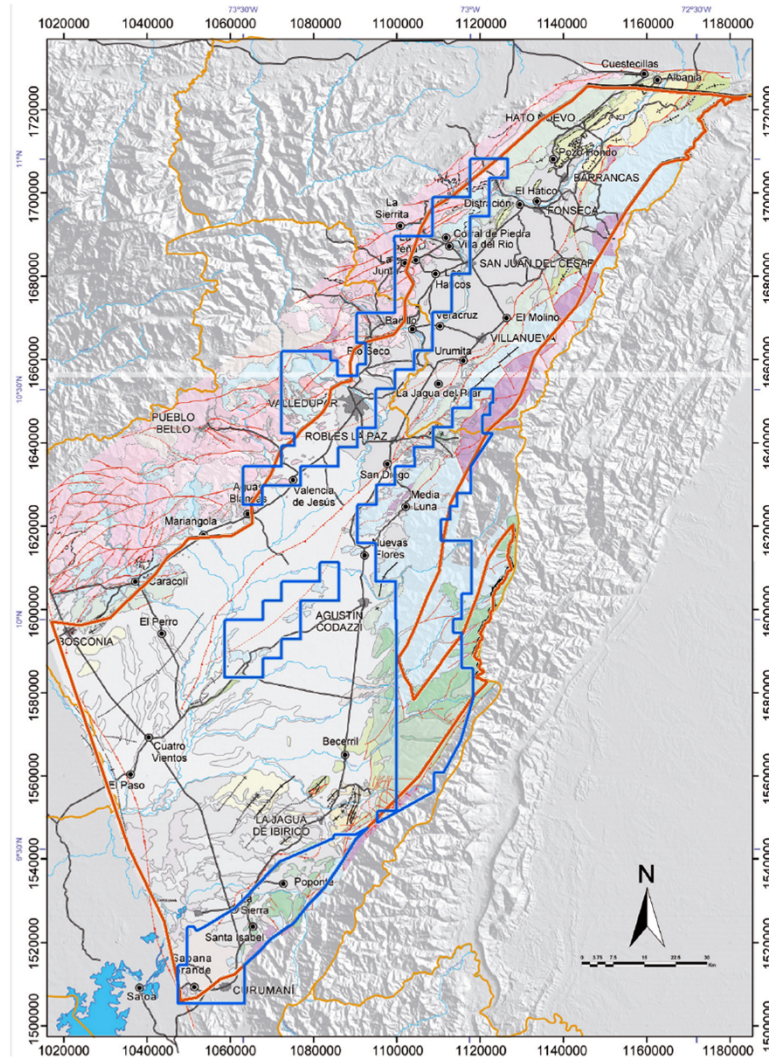


- The Cesar Rancheria Basin is located in the north of Colombia, between the Guajira and LMV basins
- To the northwest is limited by the Sierra Nevada de Santa Marta and to the east the Serrania del Perija

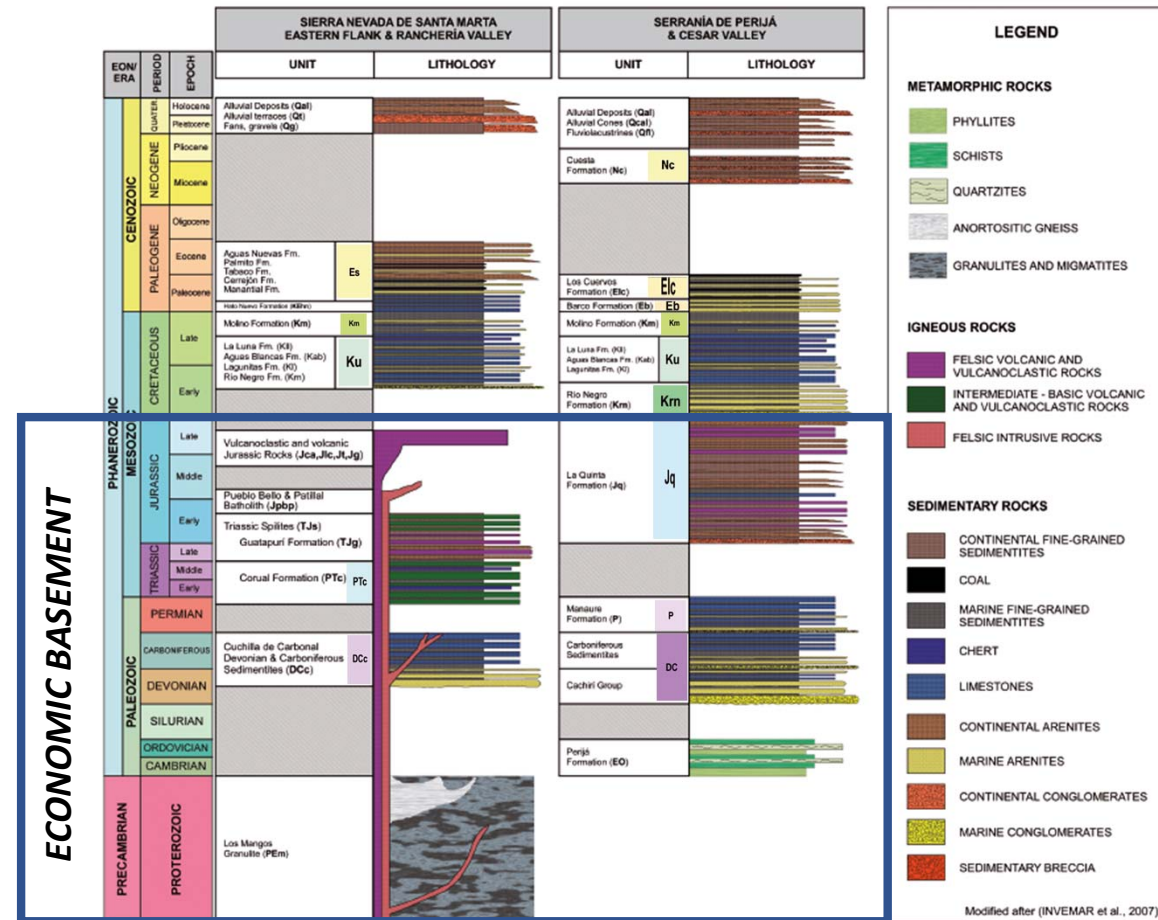


- The infrastructure of the area has main roads that connect the capital of Cesar with the center of the country.
- Within the Basin, two pipelines run through, the first being the Pozos Colorados-Galan pipeline and the Ballenas - Barrancabermeja gas pipeline.

# Geological Framework



Modified after (Mesa & Rengifo, 2011).

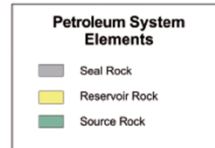
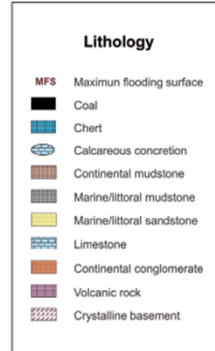
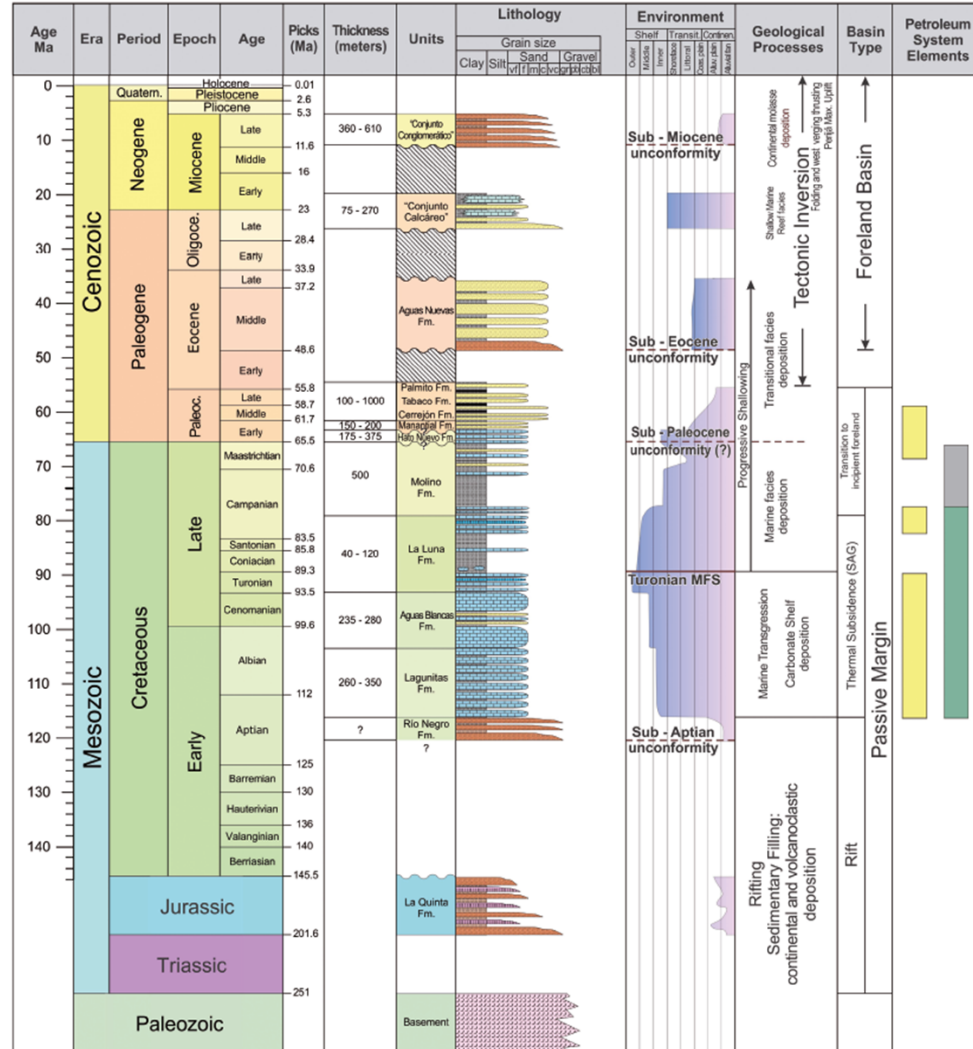


Taken from (Mesa & Rengifo, 2011).

Modified after (Mesa & Rengifo, 2011).

# Geological Framework

## Rancheria Sub-basin



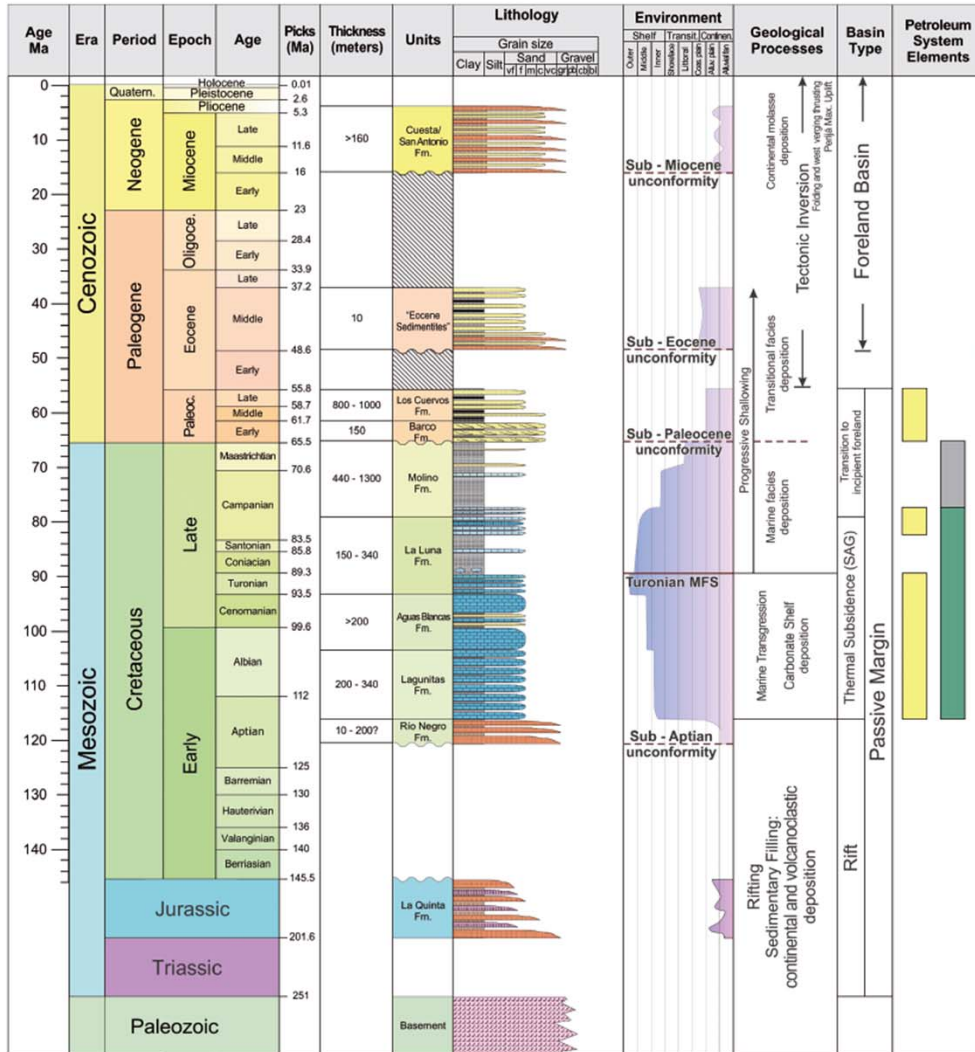
FORMATION	ORGANIC MATTER CONTENT	HYDROCARBON GENERATION POTENTIAL	HYDROCARBON ACCUMULATION POTENTIAL	POSSIBLE HYDROCARBON TYPES	SEAL
<b>Tabaco Fm.</b>	Very low	Null (immature)	Low	None	Bad
<b>Cerrejón Fm.</b>	Very high, as humic organic matter	Regular to good	Good in sandstones, to the base mainly	Dry gas (methane)	Regular to good
<b>Manantial Fm. Hato Nuevo Fm.</b>	Low	Low. No thermal maturity	Moderate, in fractured limestones mainly	Dry gas	Bad to regular
<b>Molino Fm.</b>	Good	Low thermal maturity. Moderate burial rate	Very low. Few reservoir rocks (sandstones)	Gas condensate	Good to excellent
<b>La Luna Fm.</b>	High	Low thermal maturity	High, in fractures mainly	Condensate. Light crude oil	Regular
<b>Cogollo Group</b>	Moderate	High. Good thermal maturity. High burial rate	Moderate, in fractures only	Semi-heavy crude oil	Regular
<b>La Quinta Fm.</b>	Very low	Null	Moderate, in fractured volcanic rocks or sandstones	Heavy crude oil	Bad
<b>Manaure Fm.</b>	Low	Very low to low. Mature to overmature organic matter	Moderate, in fractures only	Wet gas	Regular
<b>Cachirí Group</b>	Low to moderate, as carbonaceous organic matter	Moderate, mature to overmature organic matter	Very low to low, in fractures	Wet gas	Good

Taken from (Mesa & Rengifo, 2011).

Taken from (Mesa & Rengifo, 2011).

# Geological Framework

## Cesar Sub-basin



Taken from (Mesa & Rengifo, 2011).

**Lithology**

- MFS Maximum flooding surface
- Coal
- Chert
- Calcareous concretion
- Continental mudstone
- Marine/littoral mudstone
- Marine/littoral sandstone
- Limestone
- Continental conglomerate
- Volcanic rock
- Crystalline basement

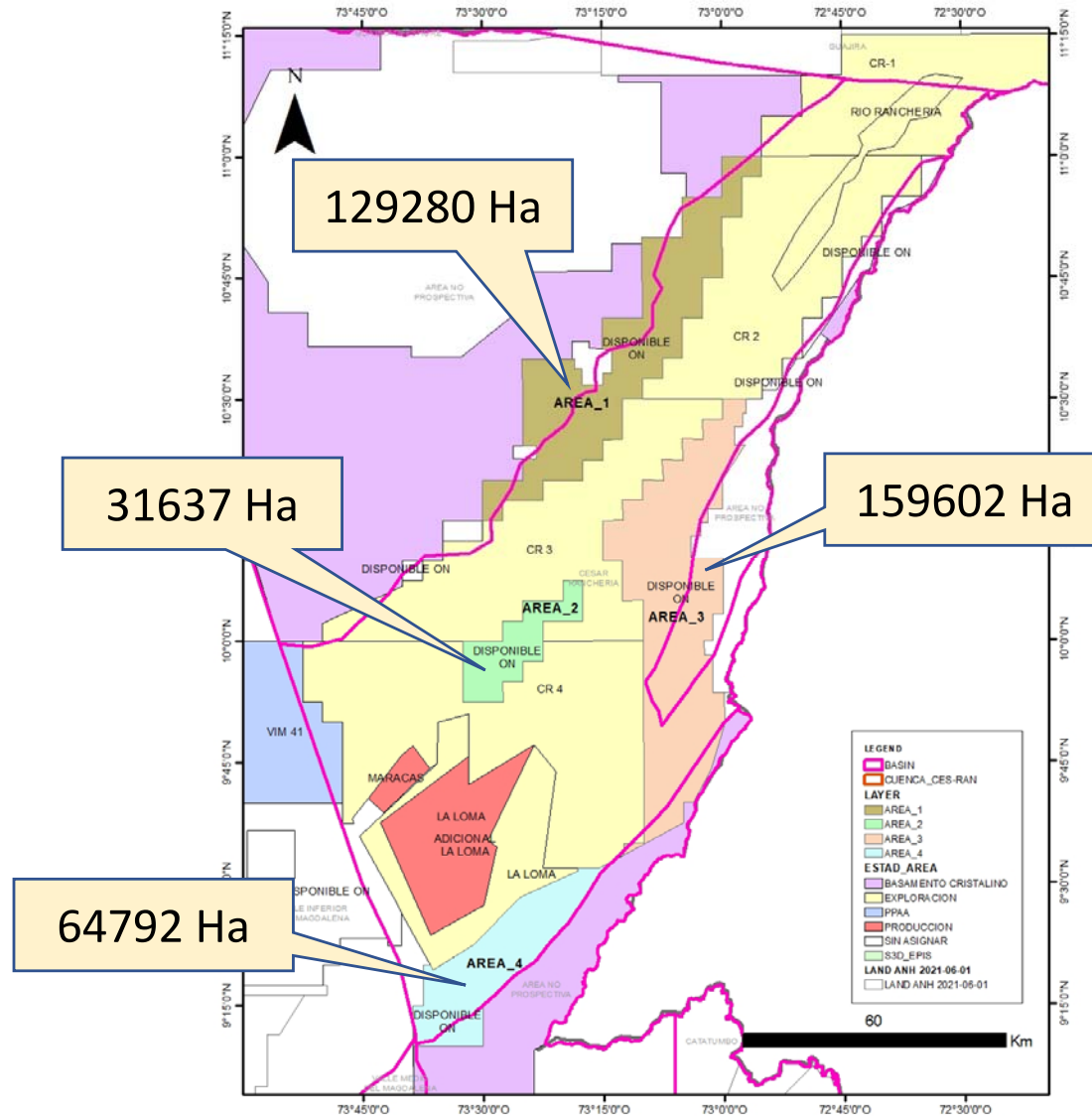
**Petroleum System Elements**

- Seal Rock
- Reservoir Rock
- Source Rock

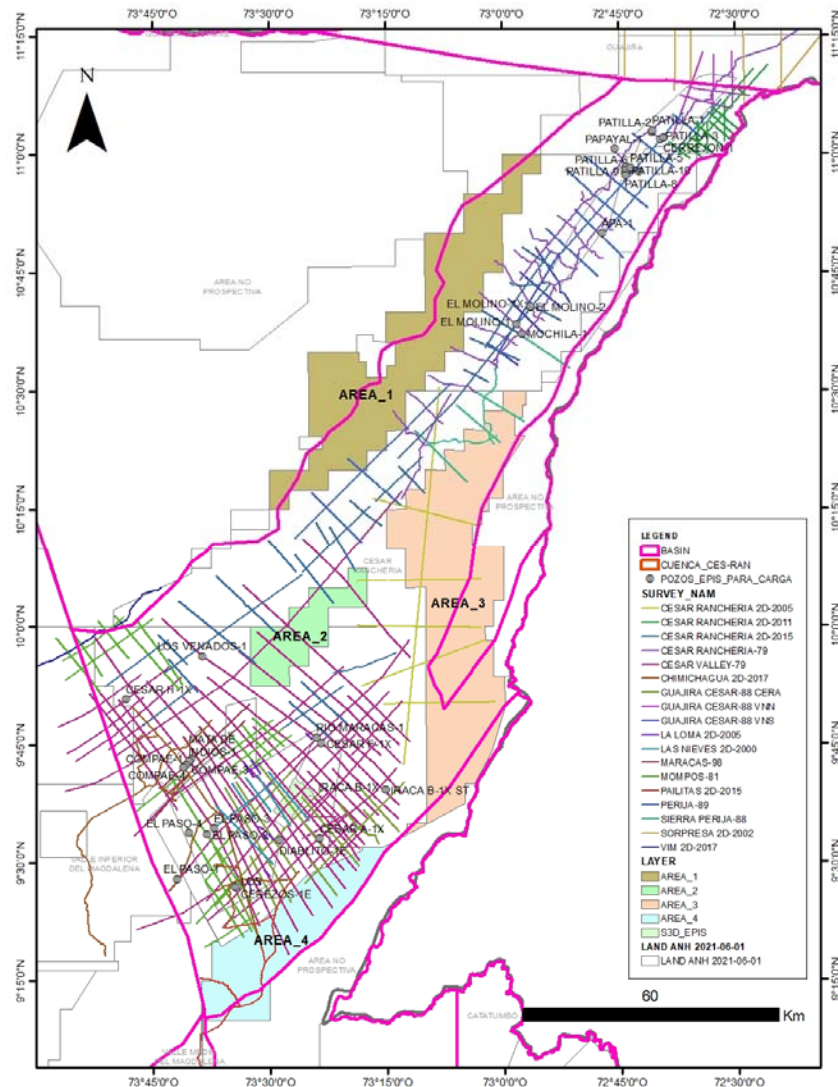
FORMATION	ORGANIC MATTER CONTENT	HYDROCARBON GENERATION POTENTIAL	HYDROCARBON ACCUMULATION POTENTIAL	POSSIBLE HYDROCARBON TYPES	SEAL
<b>Los Cuervos Fm.</b>	Very high, as humic organic matter	Regular to good, good maturity, moderate to high cooling rate	Good in sandstones, to the base mainly	Gas condensate. Light crude oil	Good (thickness formation and clays presence)
<b>Barco Fm.</b>					
<b>Molino Fm.</b>	Good, as exinitic organic matter	High. Good thermal maturity. Moderate to high burial rate	Low to moderate. Few reservoir rocks (sandstones and limestones)	Gas condensate. Light crude oil	Good to excellent
<b>La Luna Fm.</b>	High, as alginitic organic matter	Good. High maturity and burial rate	High, in fractures mainly	Condensate. Light crude oil	Regular
<b>Aguas Blancas Fm.</b>	Moderate, as exinitic organic matter	High. Excellent thermal maturity and high burial rate	Moderate, in fractures only. Good in sandstones from Tocuy member	Light crude oil	Regular
<b>Lagunitas Fm.</b>	Low to moderate	Low to moderate	Moderate, in fractures only	Semi-heavy crude oil	Regular
<b>Río Negro fm.</b>	Very low	Null	Moderate in sandstones	Semi-heavy crude oil	Regular
<b>La Quinta Fm.</b>	Very low to null	Null	Moderate in fractured volcanic rocks or sandstones	Heavy crude oil	Bad
<b>Cachirí Group</b>	Low to moderate	Very low to low. Overmature organic matter	Low, in fractures only (limestones). Moderate in sandstones	Thermic gas	Regular

Taken from (Mesa & Rengifo, 2011).

# Available Areas







### AREA\_1

SURVEY	LINES	TOTAL LENGTH	LENGTH INSIDE
CESAR RANCHERIA 2D-2015	1	8.67	0.55
CESAR RANCHERIA-79	4	63.68	11.21
PERIJA-89	2	67.66	6.81
<b>AREA_1 Total General</b>	<b>7</b>	<b>140.02</b>	<b>18.57</b>

No seismic data crossing the block

### AREA\_2

SURVEY	LINES	TOTAL LENGTH	LENGTH INSIDE
CESAR RANCHERIA 2D-2005	1	28.73	2.56
CESAR RANCHERIA 2D-2015	4	70.68	10.76
CESAR VALLEY-79	5	280.58	55.75
<b>AREA_2 Total General</b>	<b>10</b>	<b>379.98</b>	<b>69.07</b>

### AREA\_3

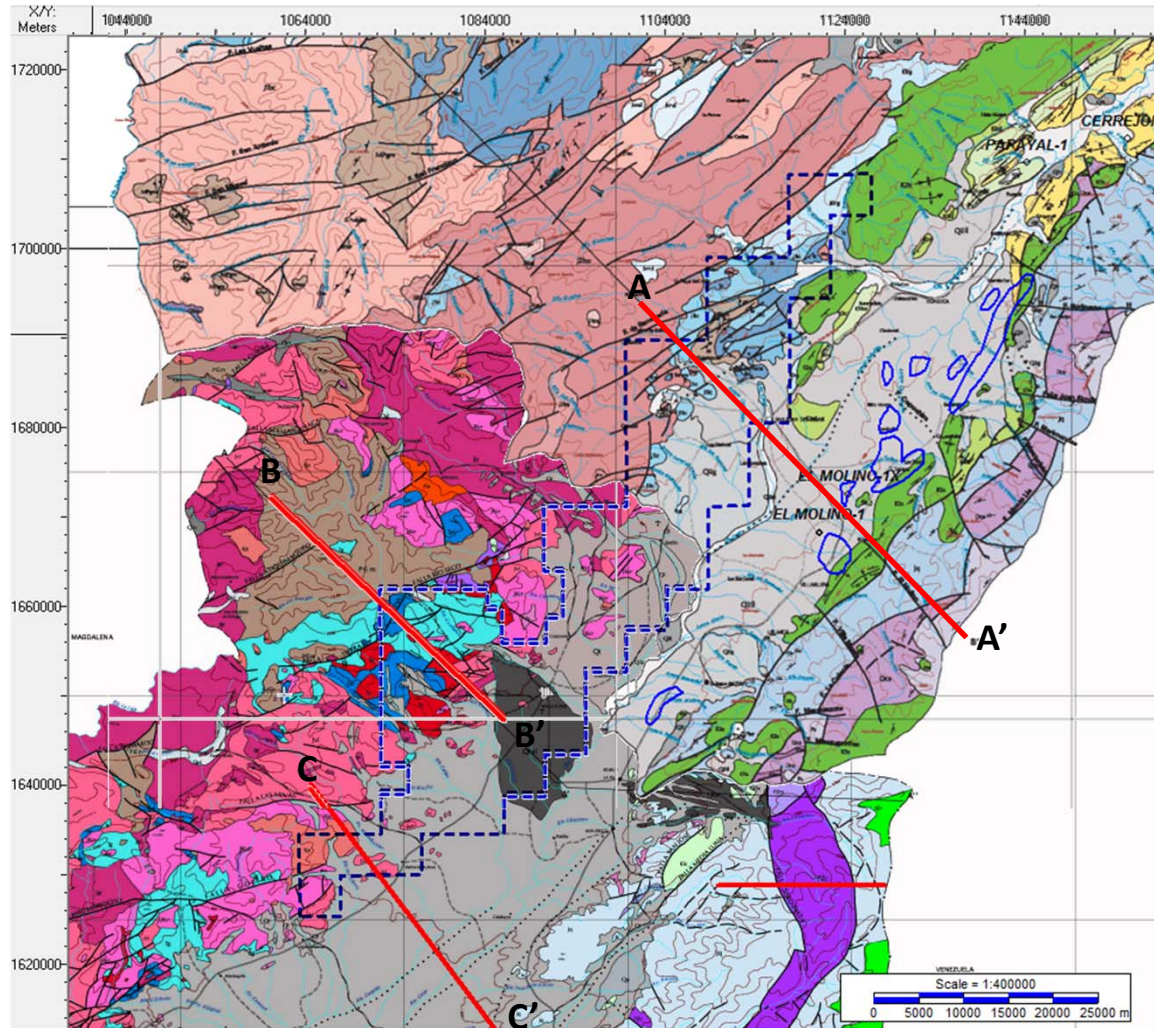
SURVEY	LINES	TOTAL LENGTH	LENGTH INSIDE
CESAR RANCHERIA 2D-2005	6	228.11	104.42
CESAR RANCHERIA 2D-2015	1	8.82	1.16
CESAR RANCHERIA-79	1	127.08	0.57
CESAR VALLEY-79	1	92.63	0.11
SIERRA PERIJA-88	5	83.60	34.42
<b>AREA_3 Total General</b>	<b>14</b>	<b>540.25</b>	<b>140.67</b>

### AREA\_4

SURVEY	LINES	TOTAL LENGTH	LENGTH INSIDE
CESAR VALLEY-79	11	483.48	54.73
CHIMICHAGUA 2D-2017	1	65.23	5.18
GUAJIRA CESAR-88 CERA	6	134.90	20.43
MOMPOS-81	3	58.17	2.41
PAILITAS 2D-2015	4	114.24	57.18
<b>AREA_4 Total General</b>	<b>25</b>	<b>856.02</b>	<b>139.93</b>

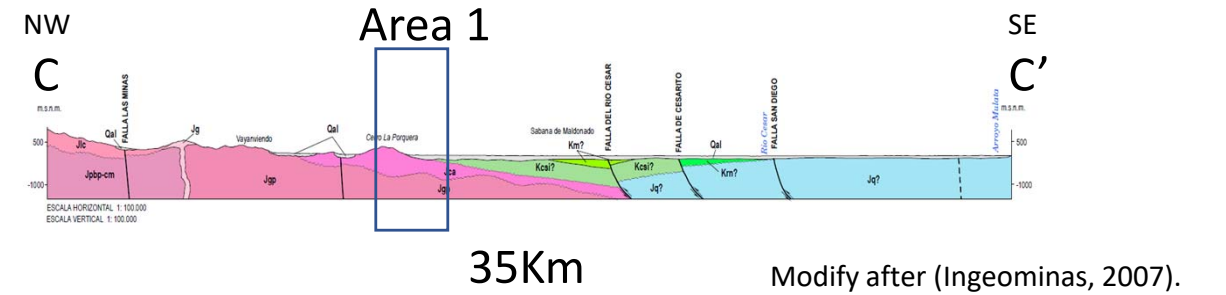
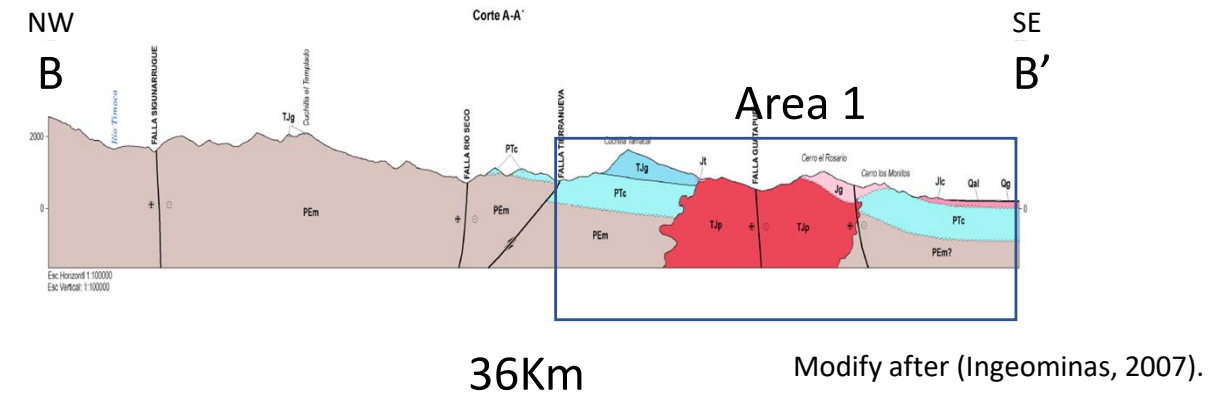
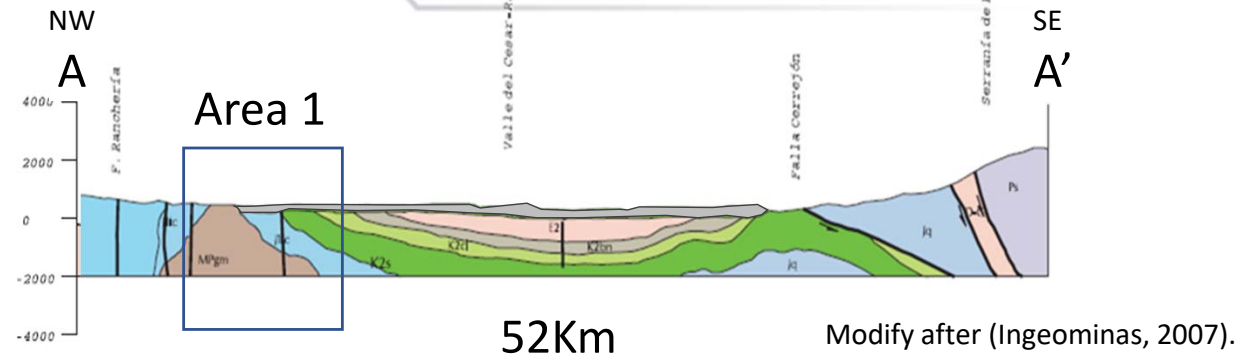
<b>Total general</b>	<b>56</b>	<b>1916.27</b>	<b>368.25</b>
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**Area 1**

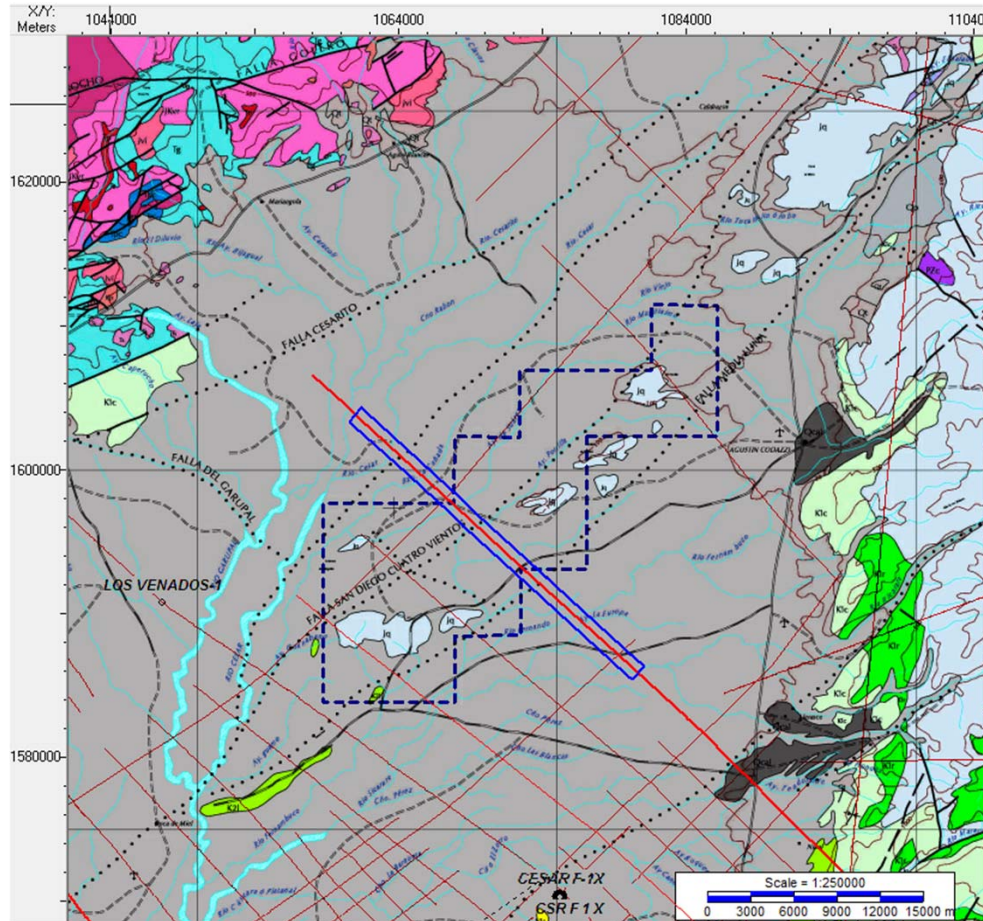


Modify after (Ingeominas, 1999 & 2002).

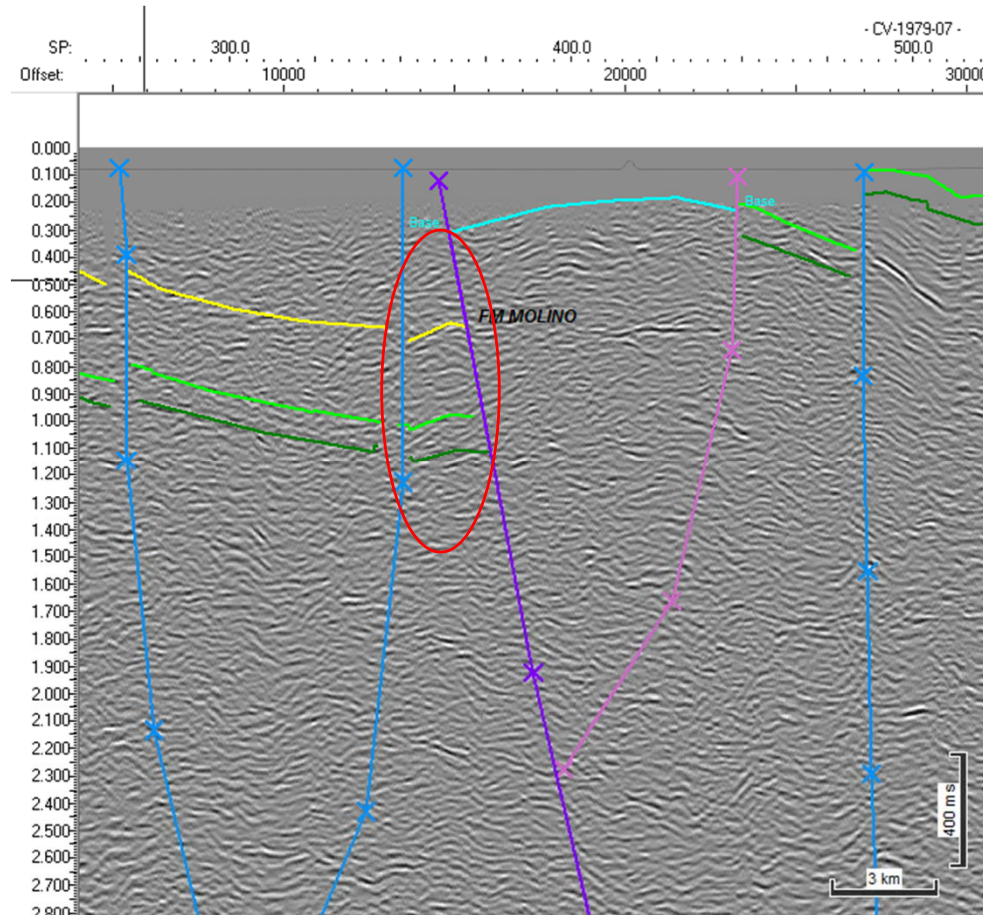
The area has numerous isolated outcrops of pre-Cretaceous rocks. In the north, the Basal Cretaceous and Jurassic emerge.



## Area 2 – Seismic Data

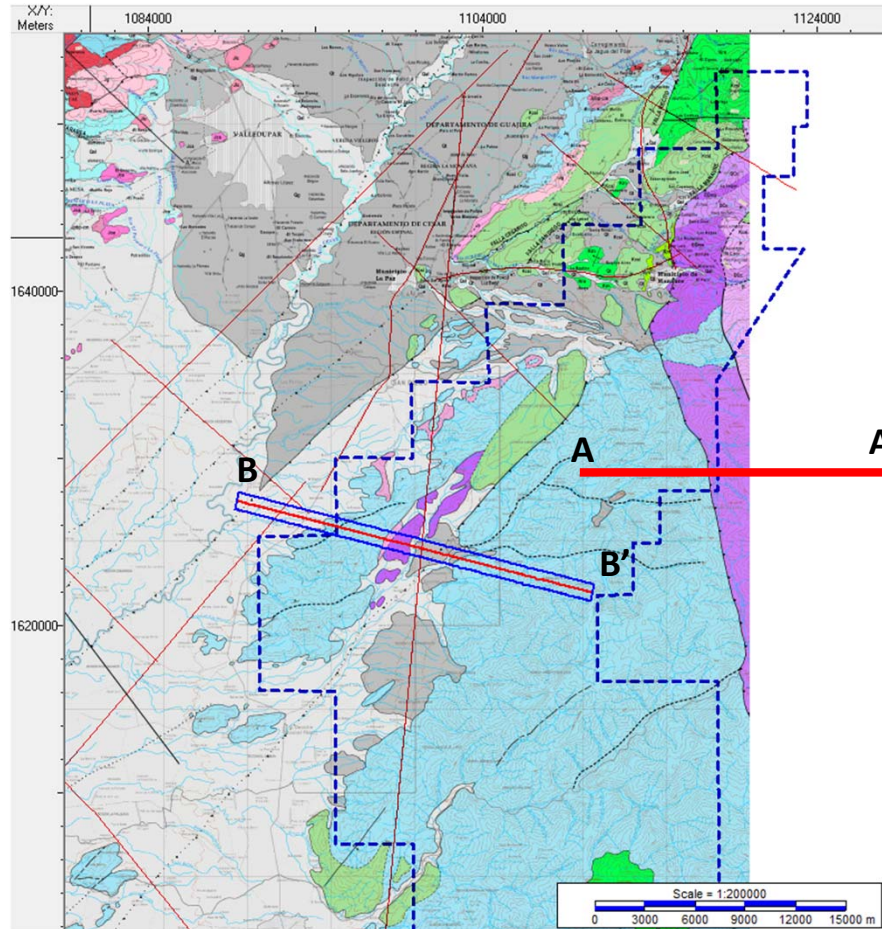


Modify after (Ingeominas, 1999).



The San Diego Cuatro Vientos Fault and Medialuna Fault, both form a horst, in the nucleus emerge Jurassic rocks of the La Quinta Formation

# Area 3 – Seismic Data

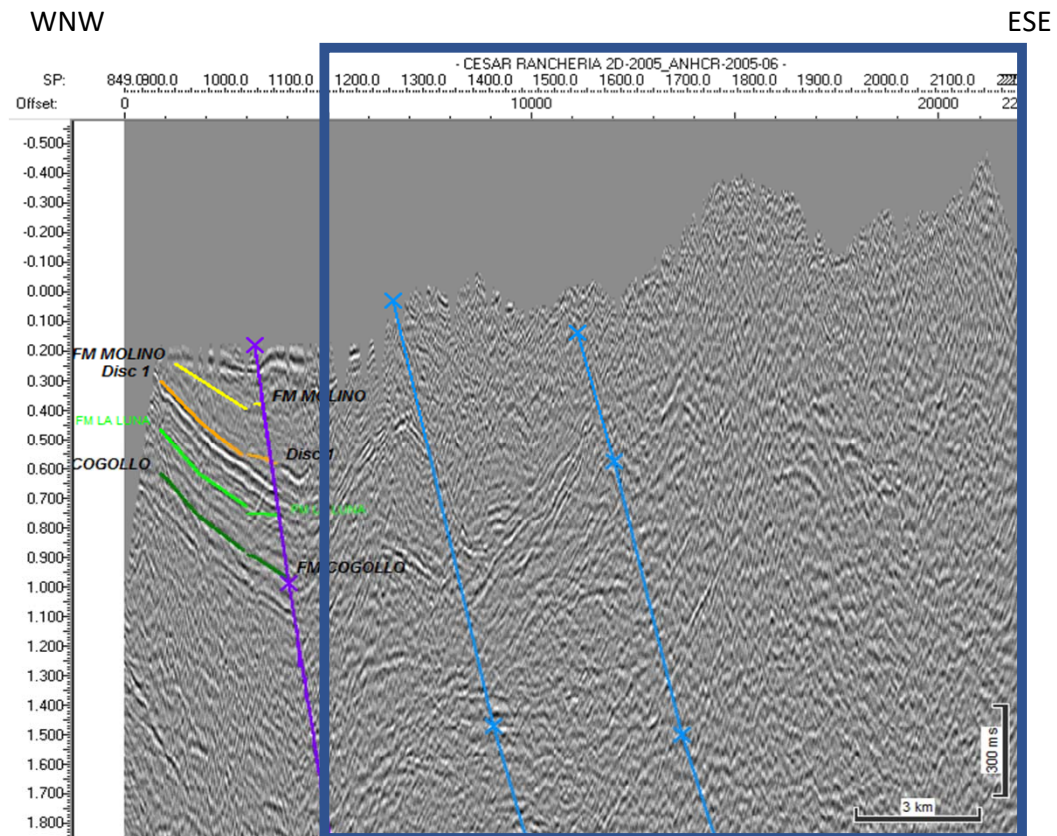


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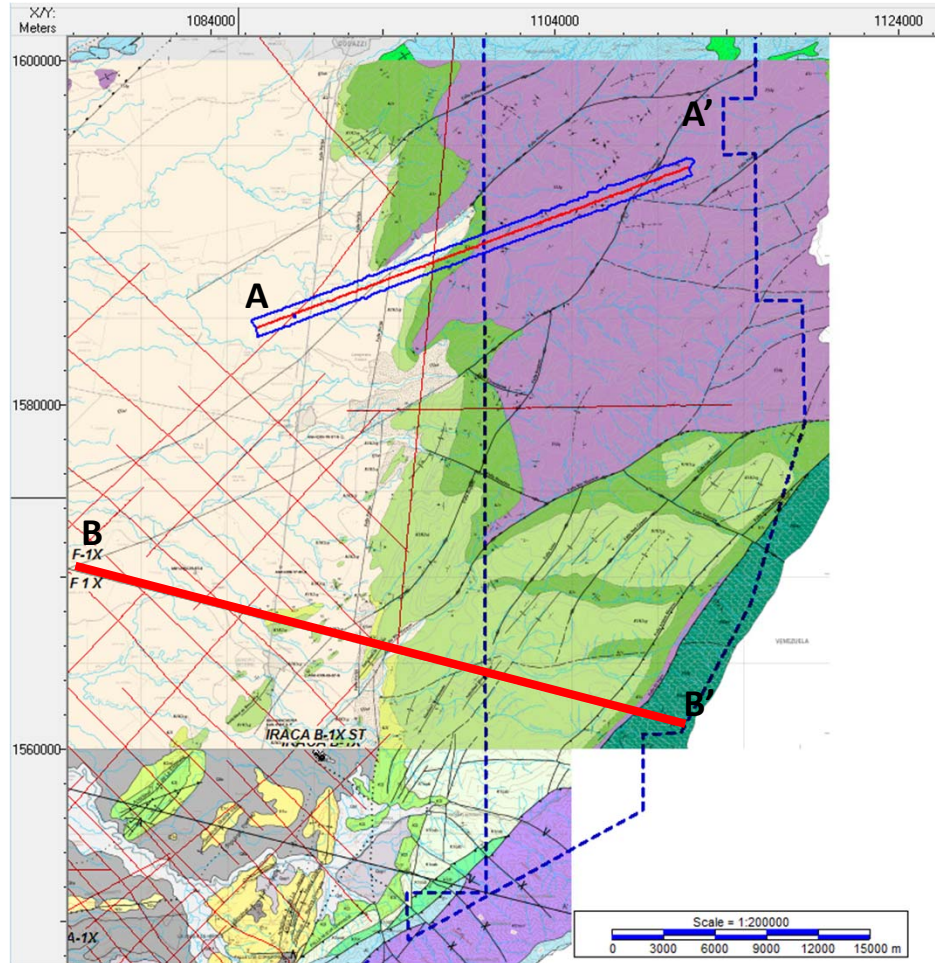
In the northern zone, Jurassic outcrops predominate



Modify after (Ingeominas, 2007).



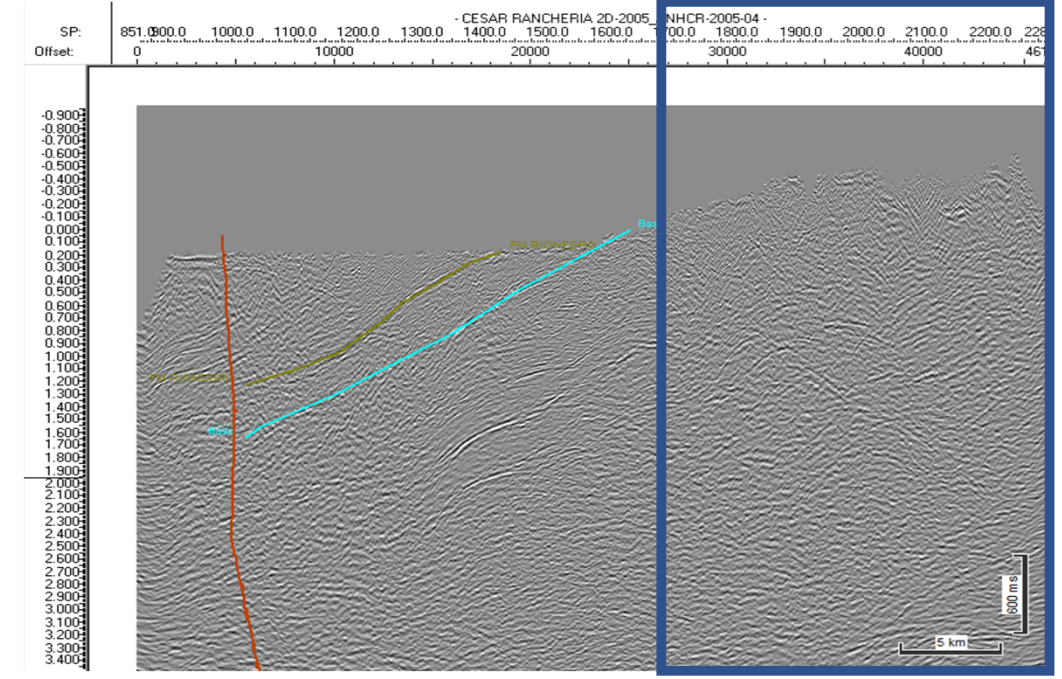
# Area 3 – Seismic Data



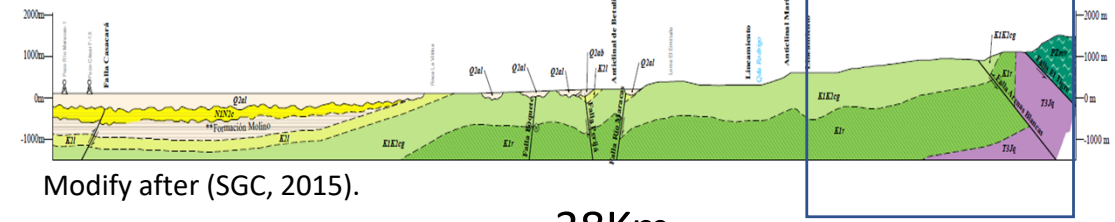
Modify after (Ingeominas, 1999).

In the southern zone, Lower Cretaceous outcrops predominate

WSW ENE  
A A'



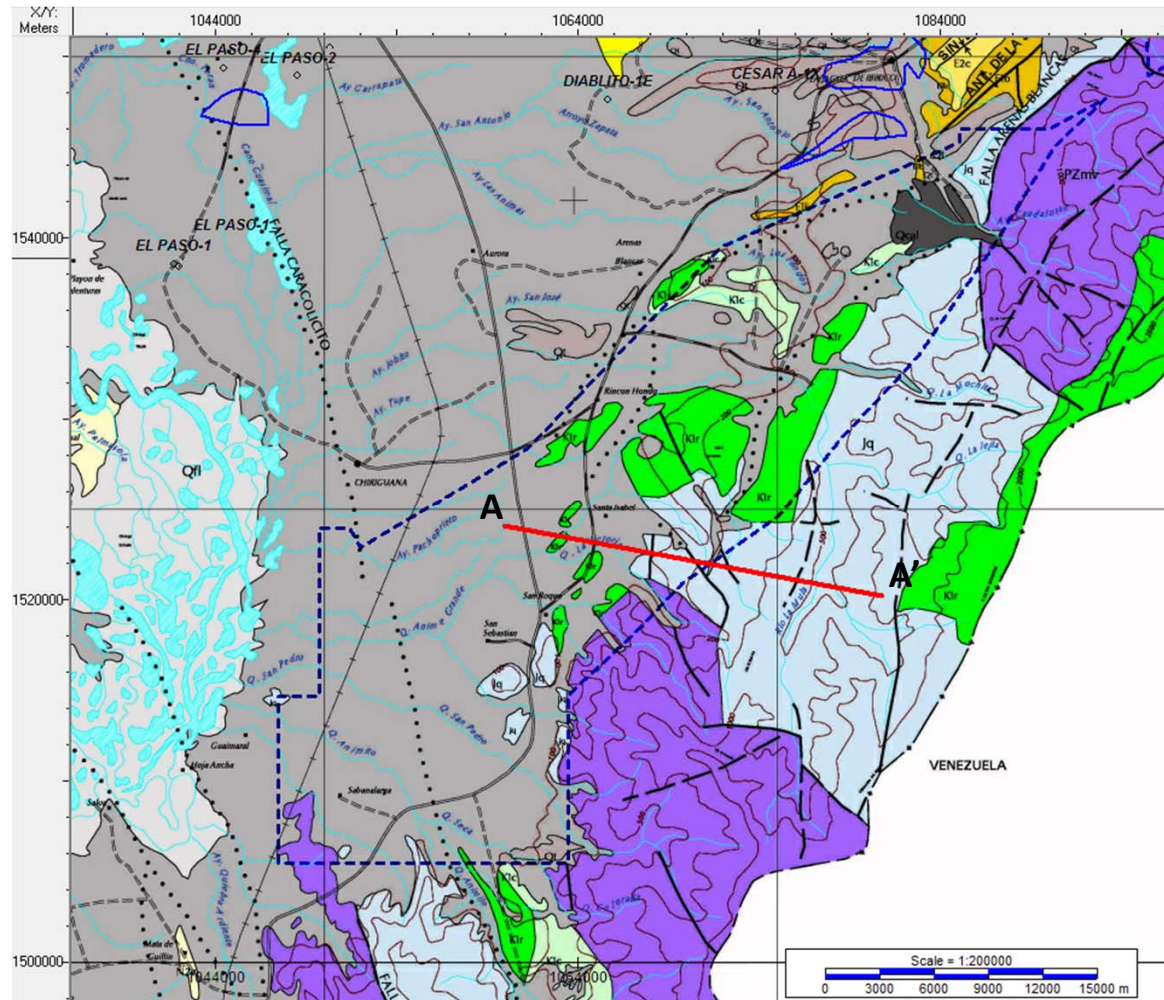
WNW ESE  
B B'



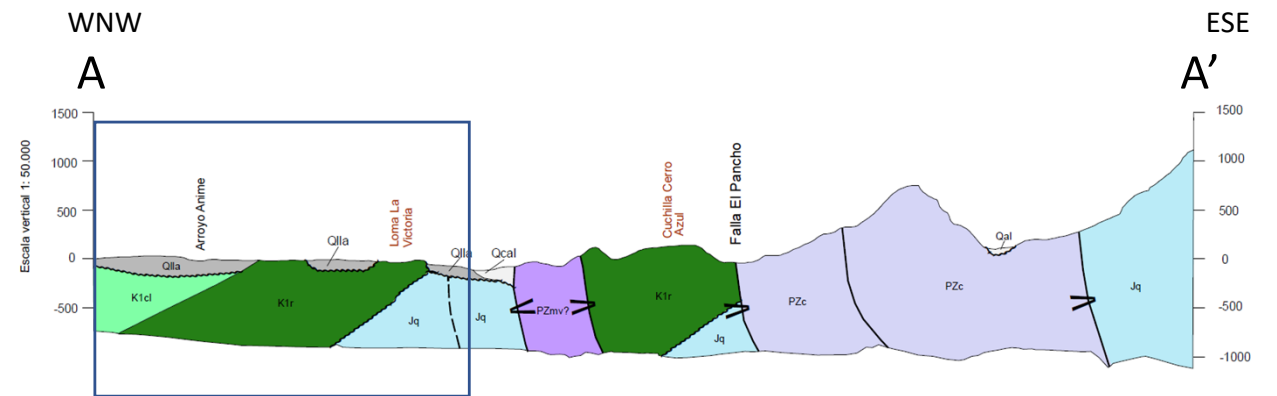
Modify after (SGC, 2015).

38Km

# Area 4



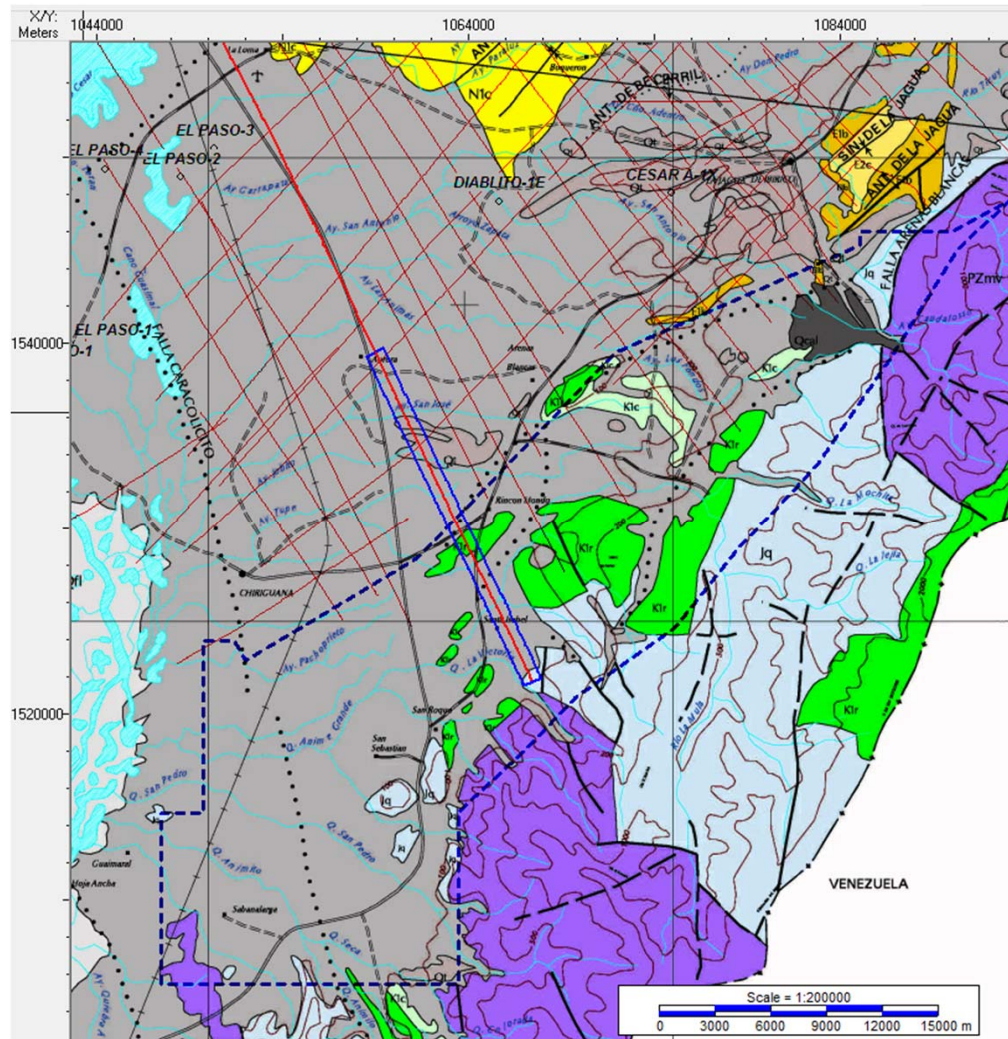
Modify after (Ingeominas, 2002).



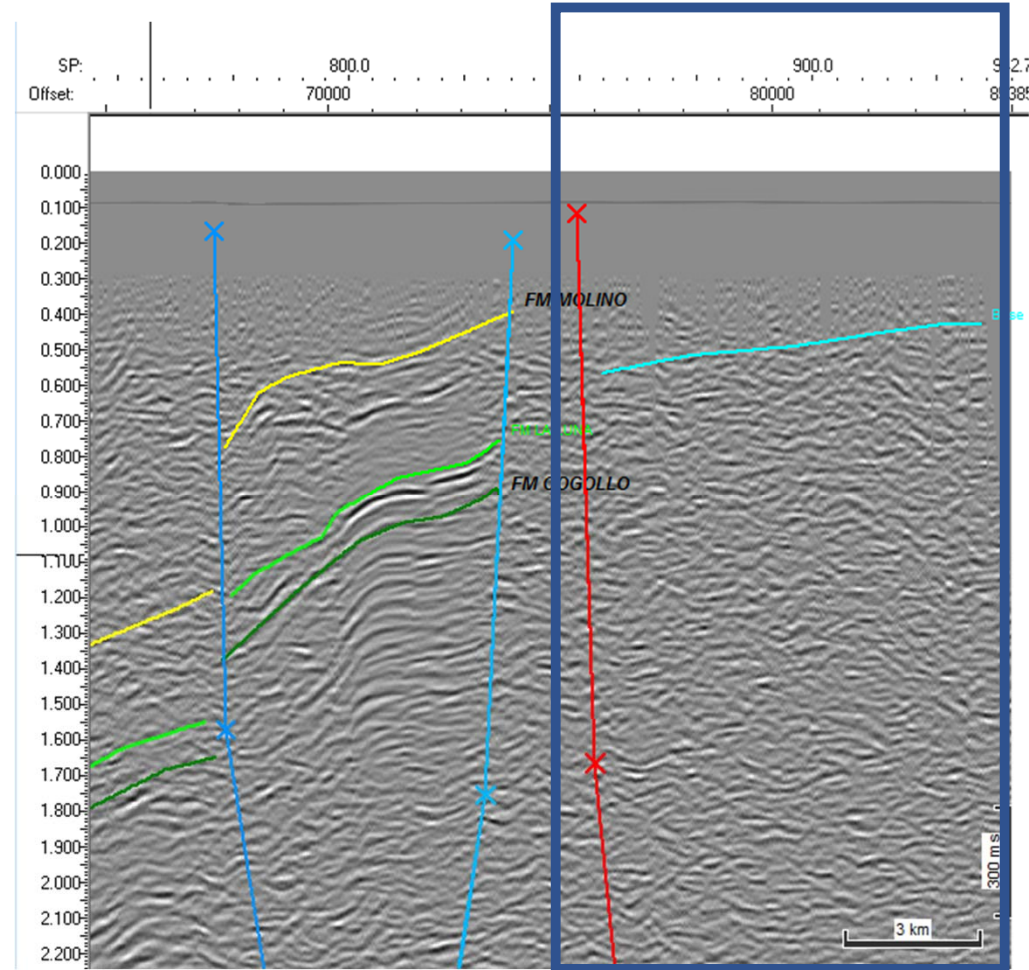
Modify after (Ingeominas, 2002).

It presents some outcrops of the Rio Negro Formation, which stand out from the covert of Quaternary alluvial rocks

# Area 4 – Seismic Data



Modify after (Ingeominas, 1999).



## Conclusions

- The Cesar-Rancheria Basin presents possibilities of hydrocarbon accumulation in Paleogene levels (Barco Fm and Cerrejon Fm) and in marine Cretaceous rocks (La Luna Fm and Cogollo Gr).
- Within the basin there are about 385 thousand hectares distributed in 4 main areas.
- Area 1 is not prospective because it contains numerous pre-cretaceous outcrops
- Area 2 although its central part has a Horst-type structure with outcrops of Jurassic rocks, there is the possibility of having structuring on the outer flanks of the Pull-up Fault System.
- Area 3 has a low potential that could only be limited to the southern area where rocks of the Rio Negro Fm emerge, but there is a lack of information to corroborate this.
- Area 4 has a low potential that could only be limited to the northeast area where rocks of the Rio Negro Fm emerge, but there is a lack of information to corroborate this.



## References

- Mesa, Ana Milena & Rengijo, Sara (2011). Petroleum Geology of Colombia. Cesar-Rancheria Basin. Agencia Nacional de Hidrocarburos and Editorial Universidad EAFIT. 159p. Medellin, Colombia. [https://www.anh.gov.co/Informacion-Geologica-y-Geofisica/Metodos-de-Visualizacion/PETROLEUM%20GEOLOGY%20OF%20COLOMBIA/VOLUMEN\\_6\\_CESAR-RANCHERIA\\_BASINS.pdf](https://www.anh.gov.co/Informacion-Geologica-y-Geofisica/Metodos-de-Visualizacion/PETROLEUM%20GEOLOGY%20OF%20COLOMBIA/VOLUMEN_6_CESAR-RANCHERIA_BASINS.pdf)
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**Thanks You**