RONDA COLOMBIA 2021

PUTUMAYO BASIN

July 30TH 2021

Content

- Binational agreement
  - Infrastructure
  - Lands
  - Production
  - Database
  - Reservoirs
- Prospectivity Putumayo Basin
  - Available Areas

Binational Agreement
Colombia - Ecuador

Activities Developed & Methodologic (2018-2020)

- Exchange of land maps with names of operating companies on both sides of the border

Compilation of information → Edition → Thematic Map Generation

- Exchange of regional courts along the border that incorporate stratigraphic and structural information among others as reference information

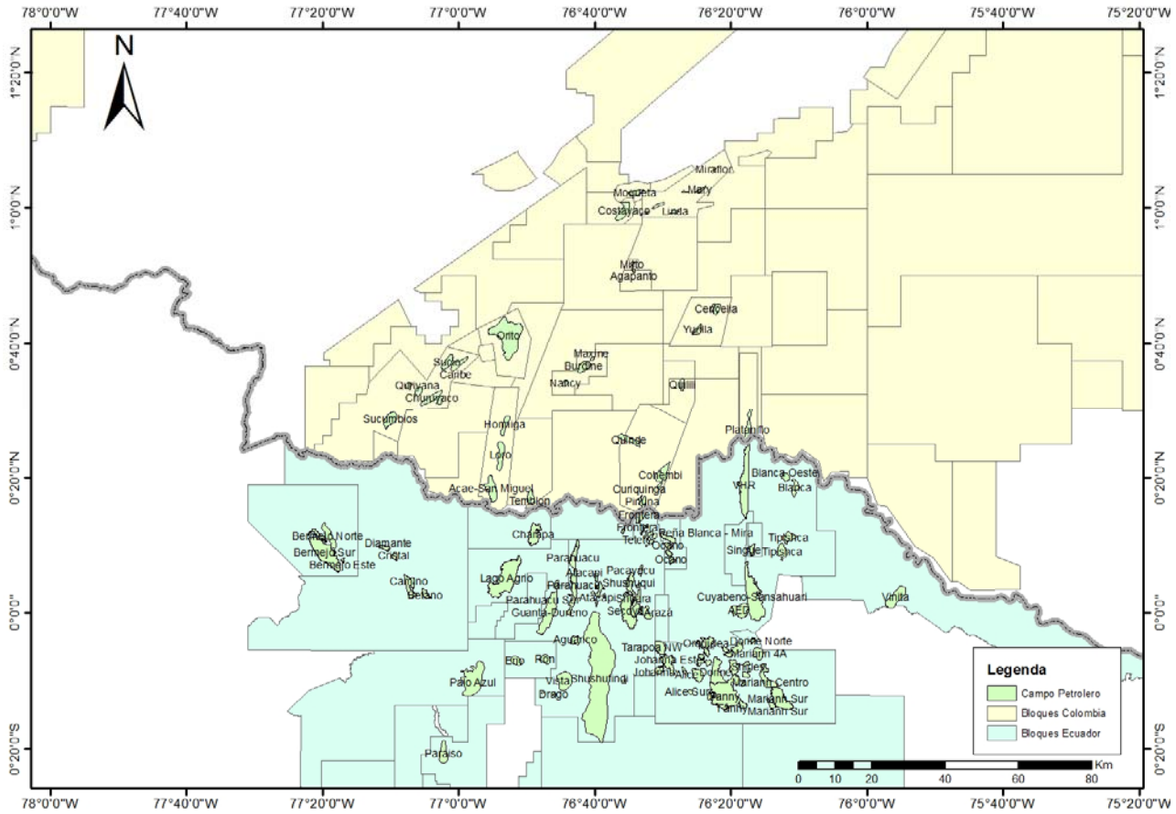
Compilation of information → Edition → Product Generation

- Interpretation of seismic and well information exchanged by both countries in onshore and offshore areas

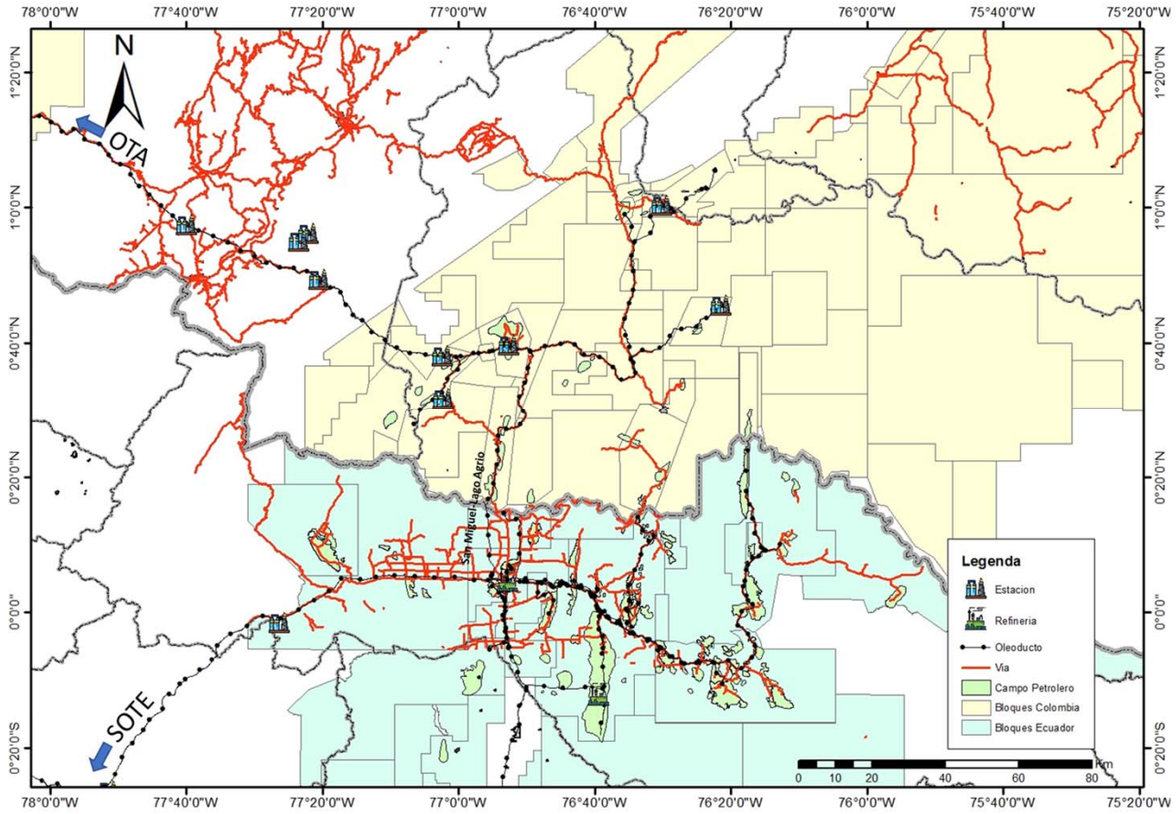
Compilation of information → Well Tops Interpretation and generation of zones → Interpolation of information → Thematic Map Generation

- Final report documenting the products used in the project and final presentation of the parties

Infrastructure



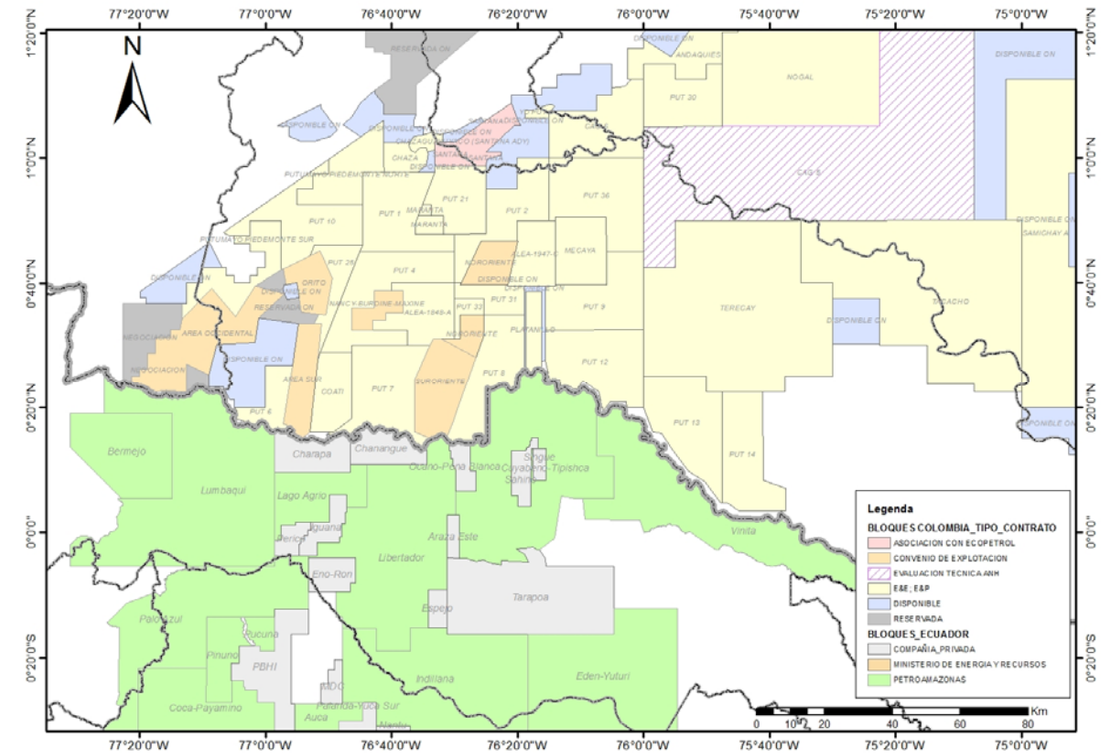
Oil fields



Oil Infrastructure

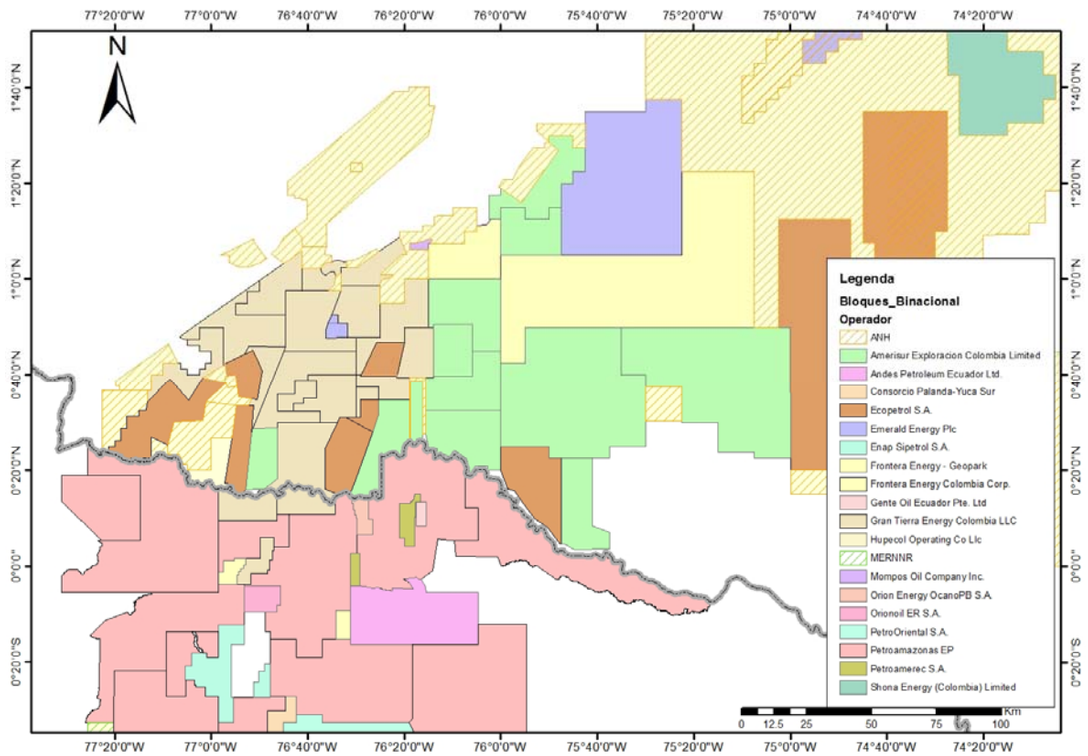
The relationship of international cooperation has managed to make an efficient transport of hydrocarbons through the OTA (Trans-Andean Pipeline) and SOTE (Trans-Ecuadorian Pipeline System) pipelines.

Lands



Type of Contract

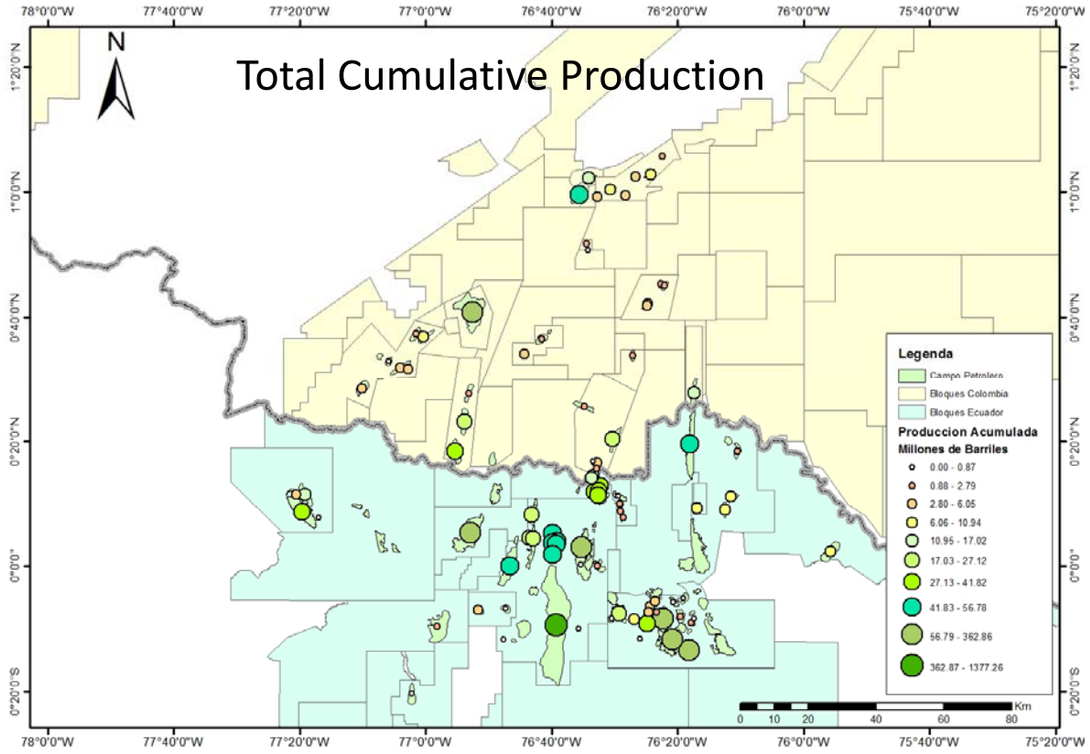
A total of 18 areas contracted for the exploration and production of hydrocarbons are shared between the two countries (11 on the Colombian side and 7 on the Ecuadorian side), with one area available and one under negotiation in Colombia.



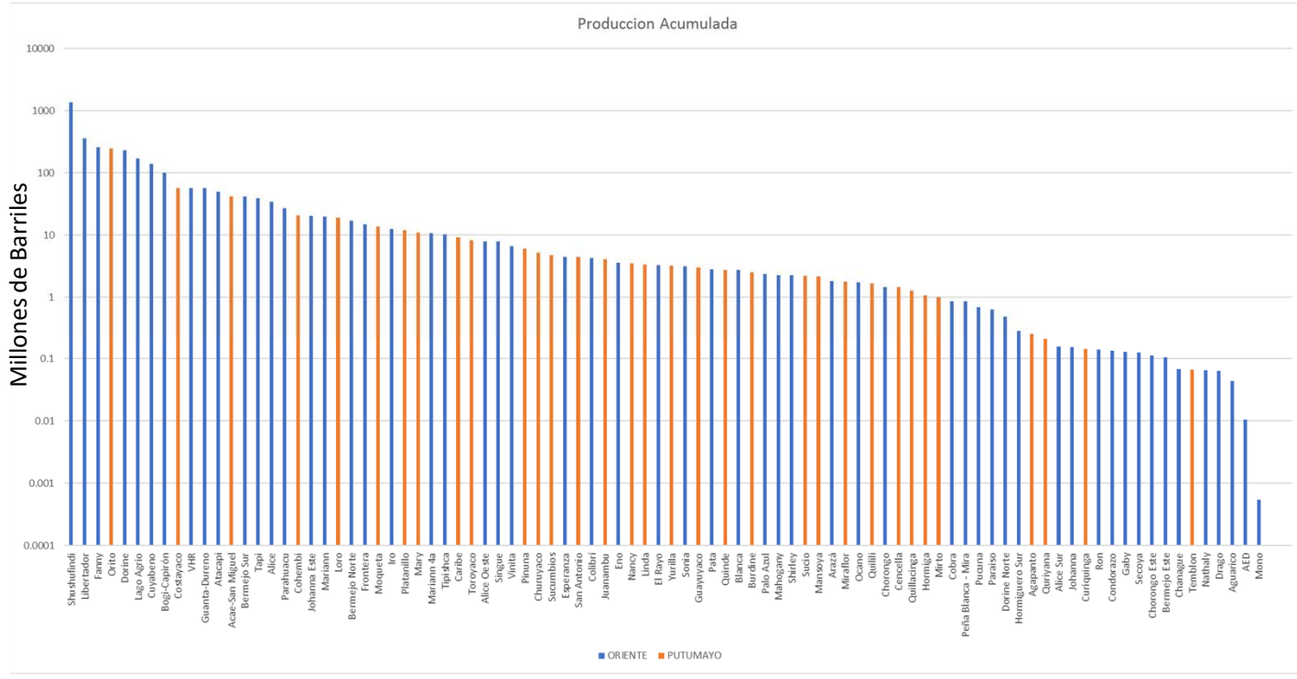
Operator Type

The operators of the border area, Petroamazonas EP has the largest border area, followed by Amerisur Exploración Colombia, Ecopetrol with 4 blocks in the Colombian area and Gran Tierra Energy Colombia shares 3 blocks on both sides of international boundary.

Production



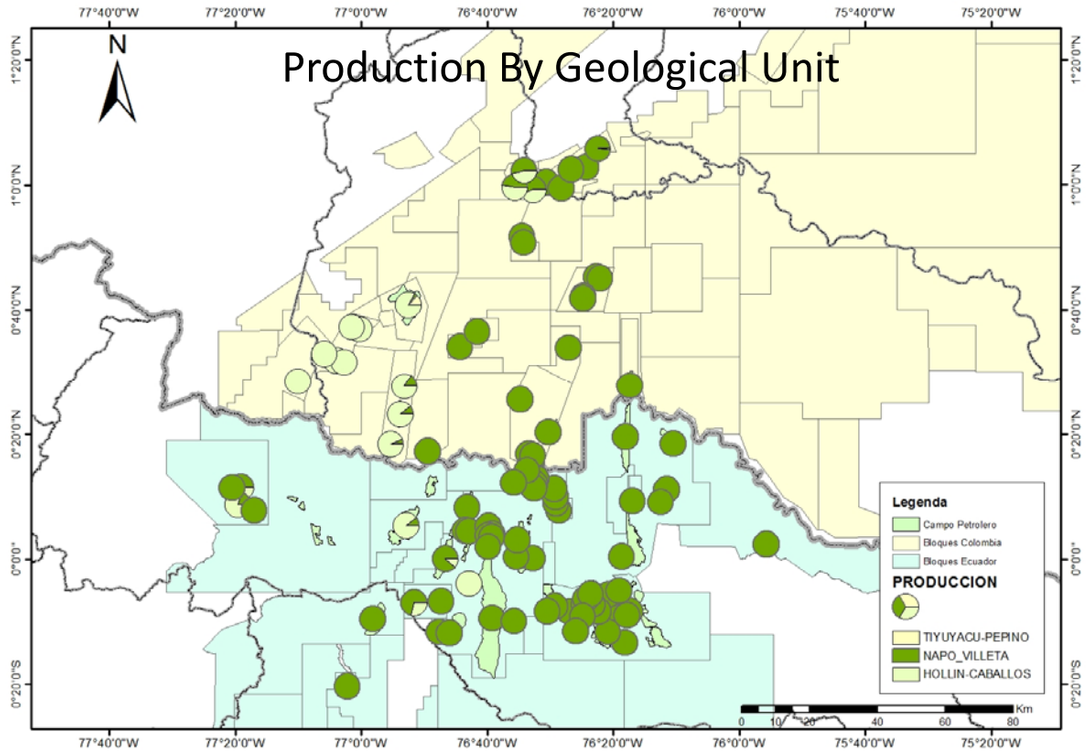
Graph of Accumulated Production Bars



Between the northern part of the Eastern Basin and the Putumayo Sub-basin, about 3611 million barrels of oil have been produced in 90 fields, with a percentage of 86% in Ecuador and 14% in Colombia.

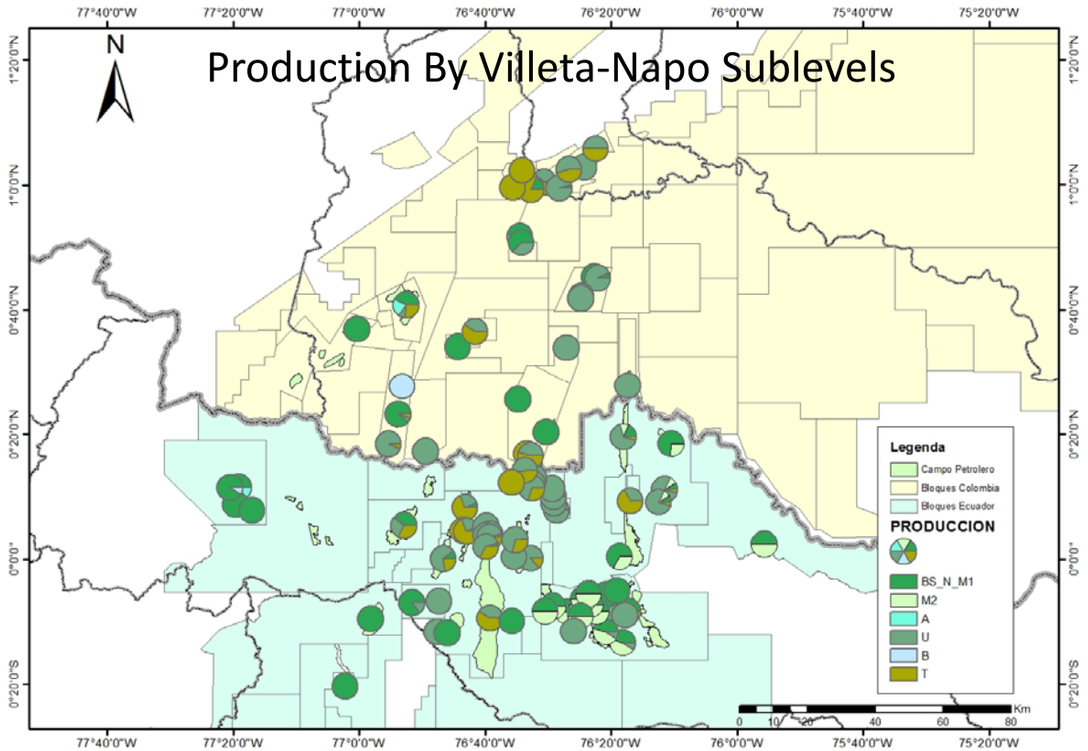
Cumulative Production Per Unit

Production By Geological Unit



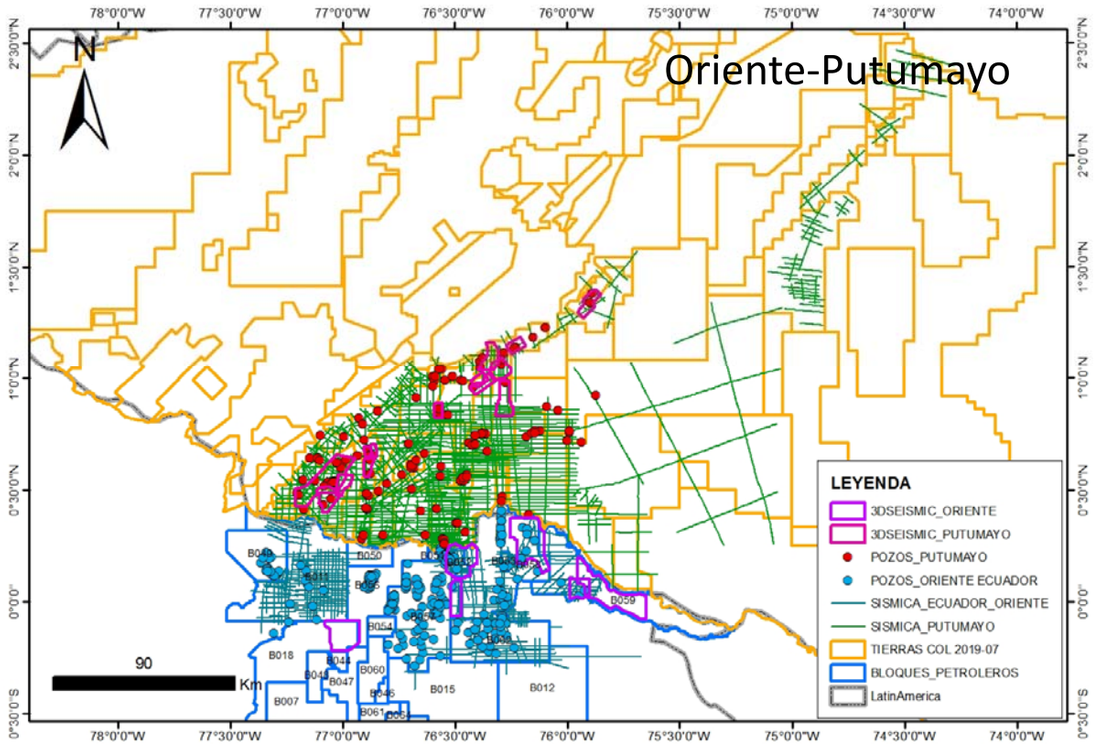
In the central area of the basin dominate the producing fields of the Napo-Villeta Formation and to the west the Hollin-Caballos Formation

Production By Villeta-Napo Sublevels



The main production level in the Basin is the sandstones of level U, followed by level T

Database



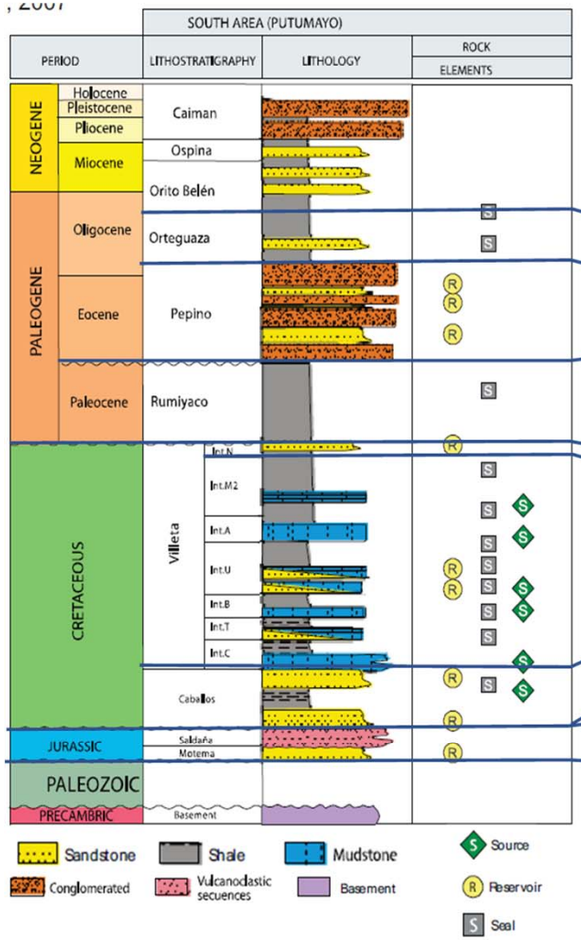
Putumayo

- Seismic 3D (13 Programs, 1049Km2)
- Seismic 2D (547 Lines, 10317 Km)
- Wells 142

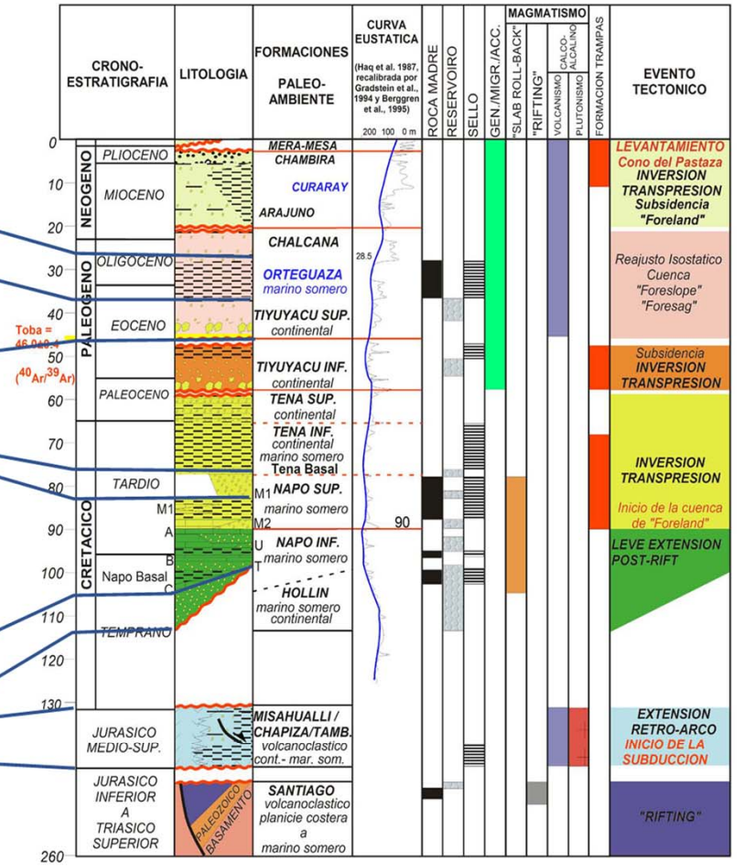
Oriente

- Seismic 3D (6 Programs, 1299Km2)
- Seismic 2D (279 Lines, 4637 Km)
- Wells 260

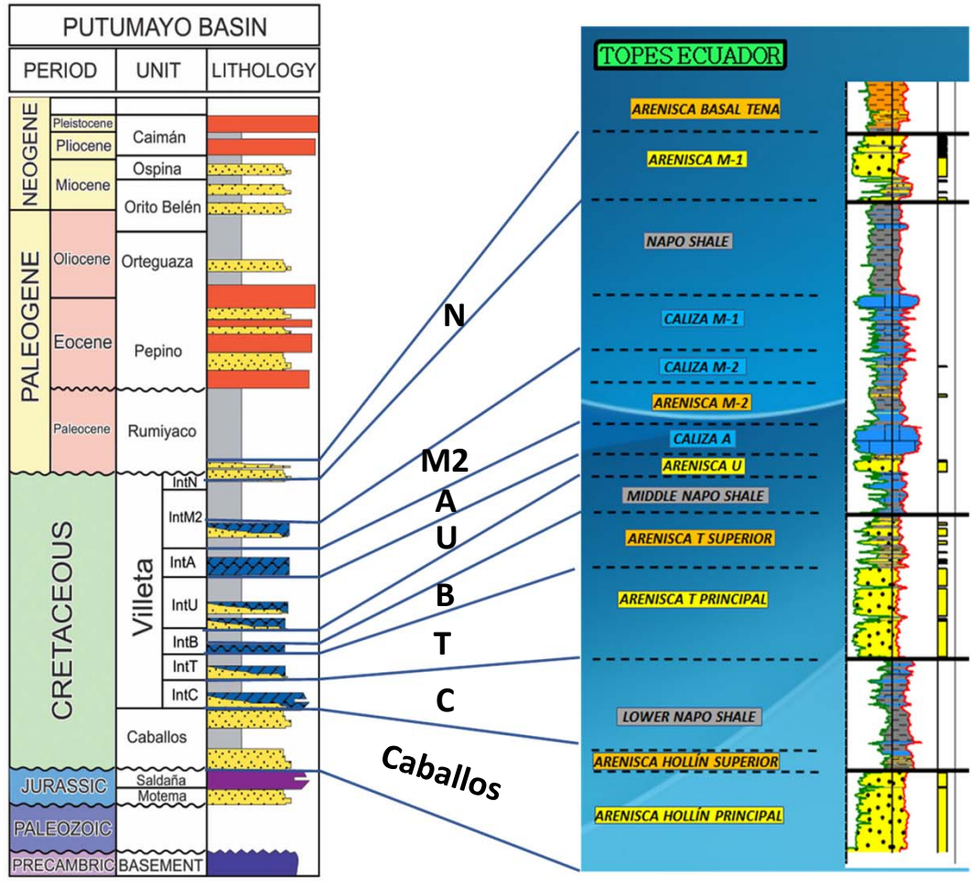
Reservoirs - Generalidades



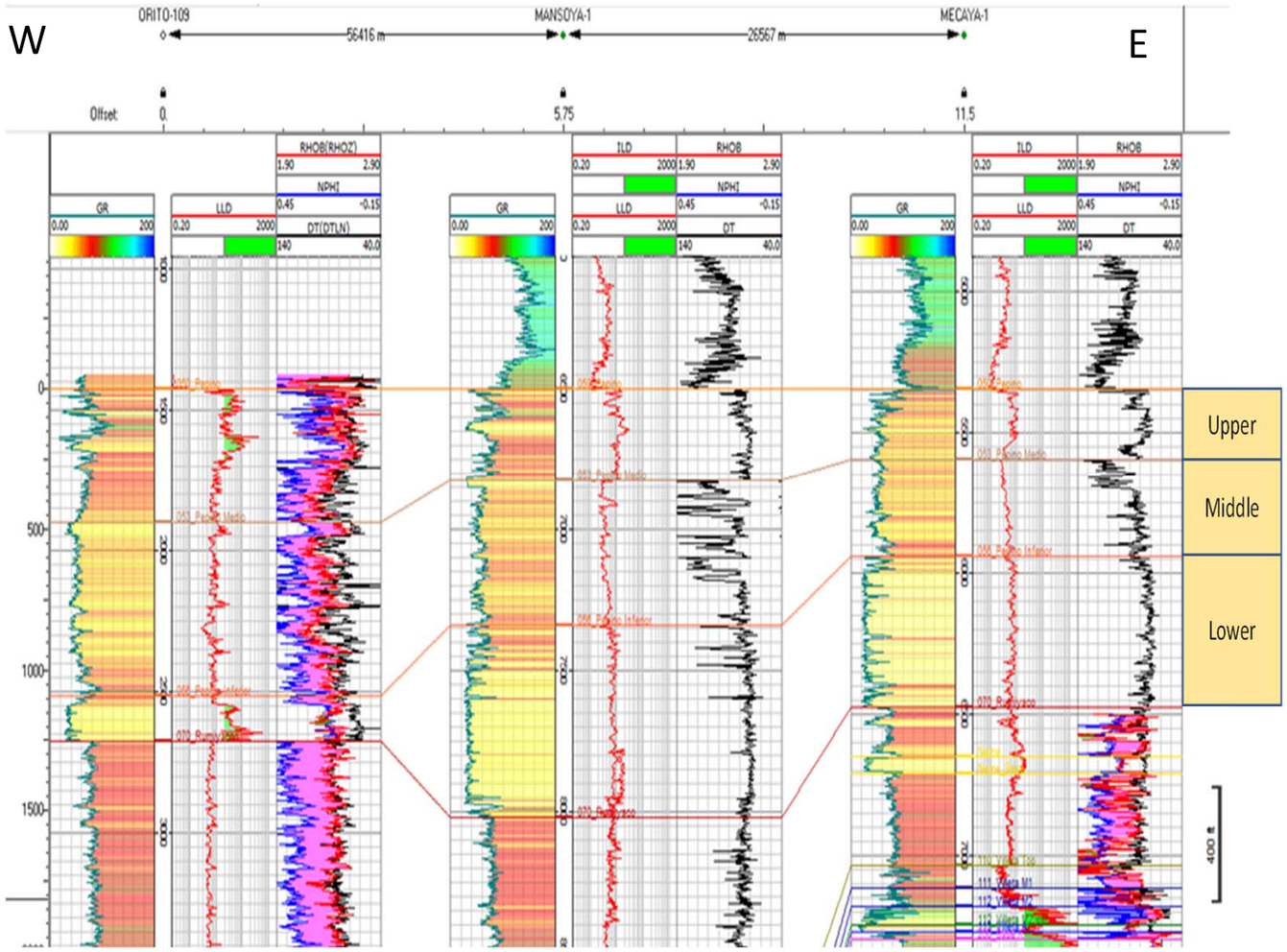
Tomado de: Organic Geochemistry Atlas of Colombia 2nd Ed. 2010.

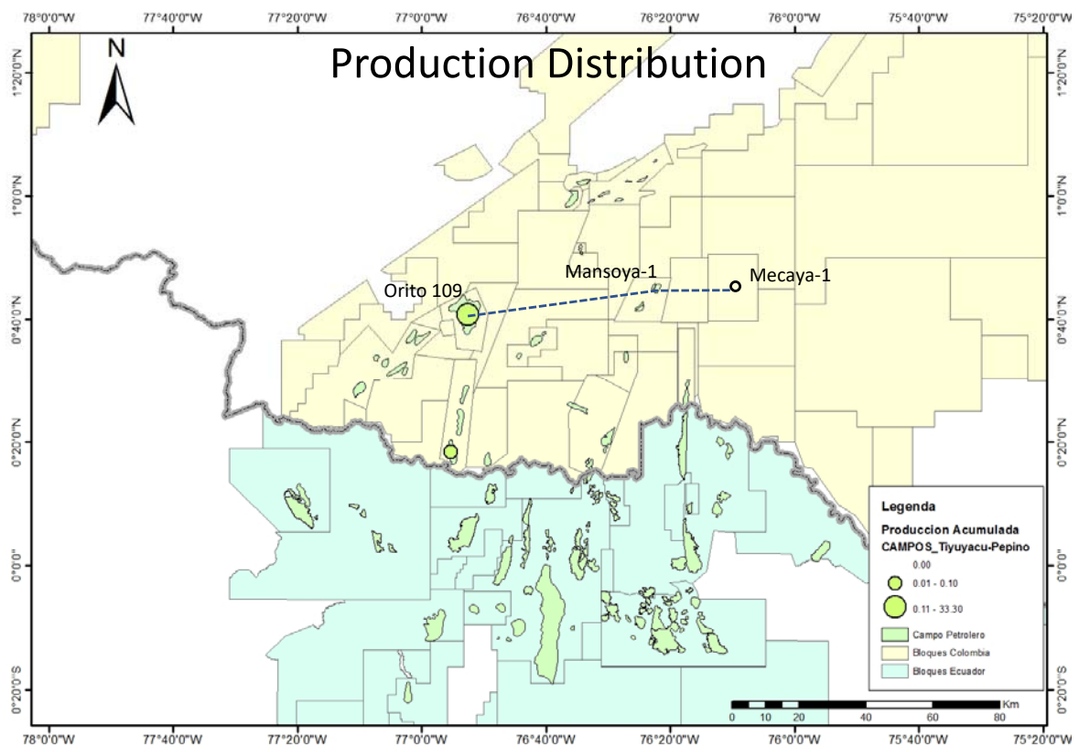


Tomado de: La Cuenca Oriente: Geología y Petróleo, 2004.



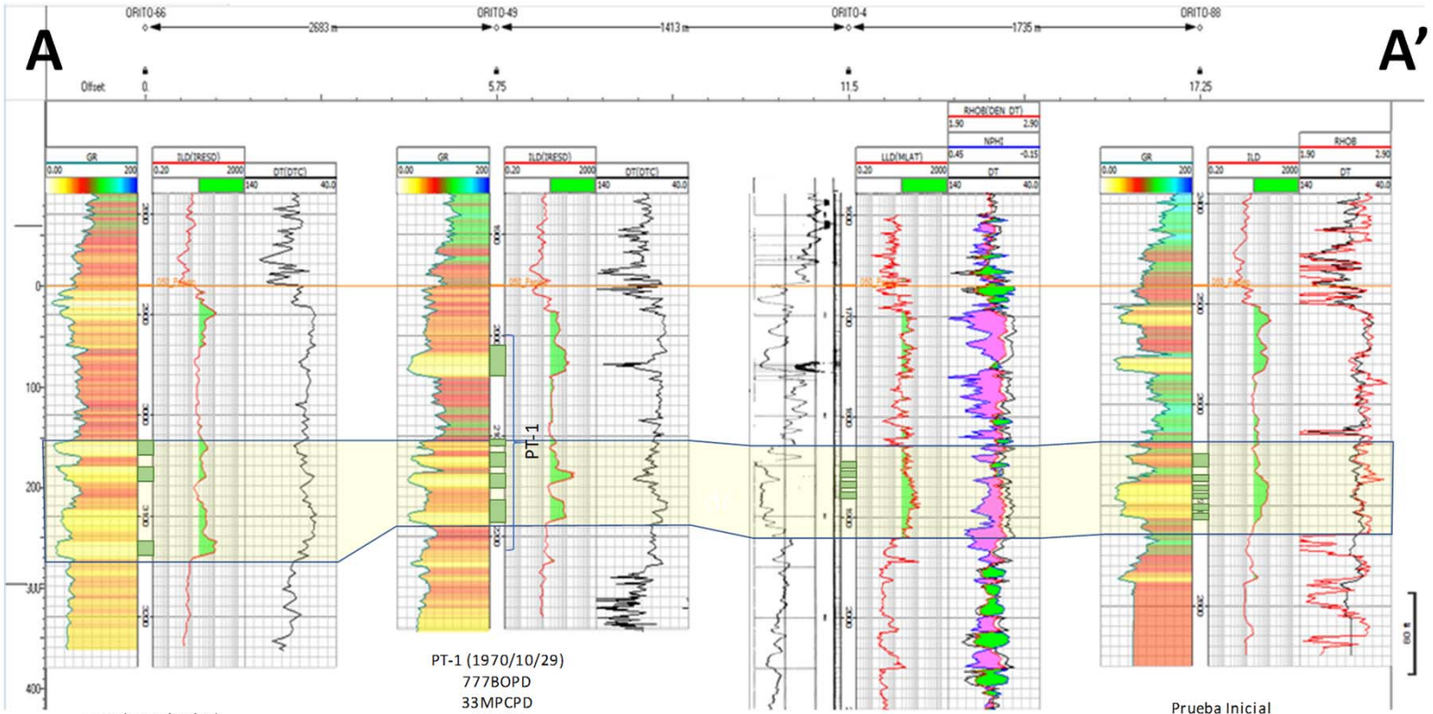
Reservoirs (Pepino-Tiyuyacu)





The Pepino Formation (Tiyuyacu) is made up of 3 sublevels, a lower one characterized by thick layers of conglomerates, an intermediate section of clayey and sandy intercalations and the upper level, mainly constituted by sandy levels separated by clayey levels

Reservoirs (Pepino-Tiyuyacu)



PT-1 (1971/12/01)
188BOPD
337MPCPD
GOR 1755
API 26.1

Accumulated Prod.
13107 barrels

PT-1 (1970/10/29)
777BOPD
33MPCPD
GOR 32
API 27.9

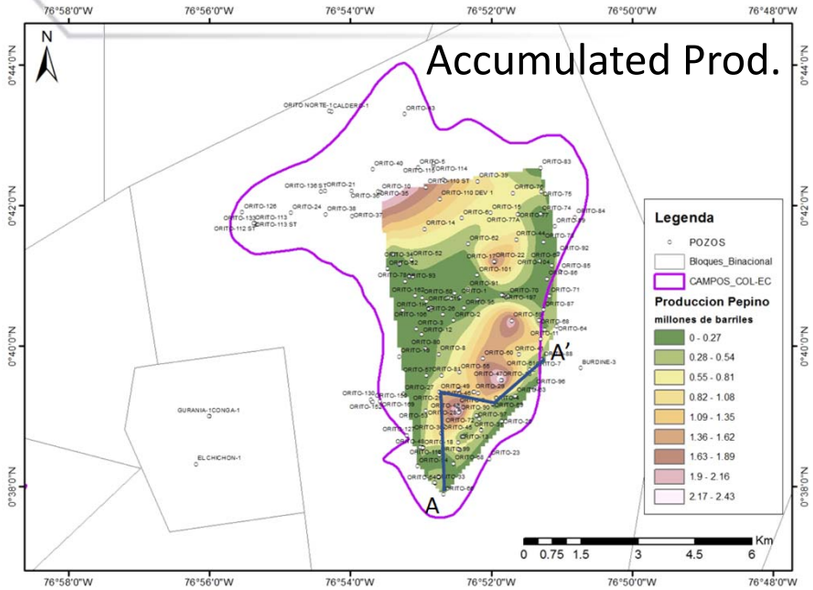
Accumulated Prod.
0.22 Million bbls

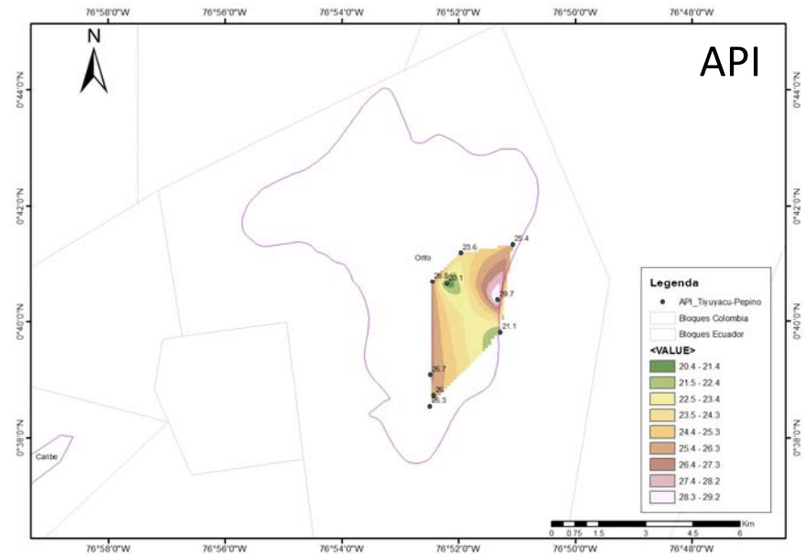
PT-4 (1964/07/23)
600BOPD
42.6MPCPD
GOR 71
API 27.4

Accumulated Prod.
1.11 Million bbls

Prueba Inicial
85BOPD
93MPCPD
GOR 1065
API 27.3

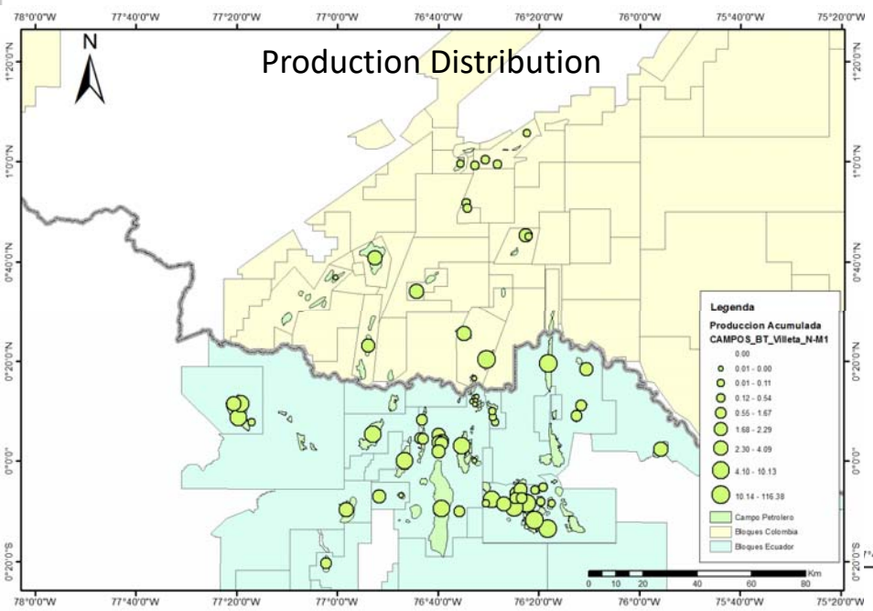
Accumulated Prod.
1.11 Million bbls



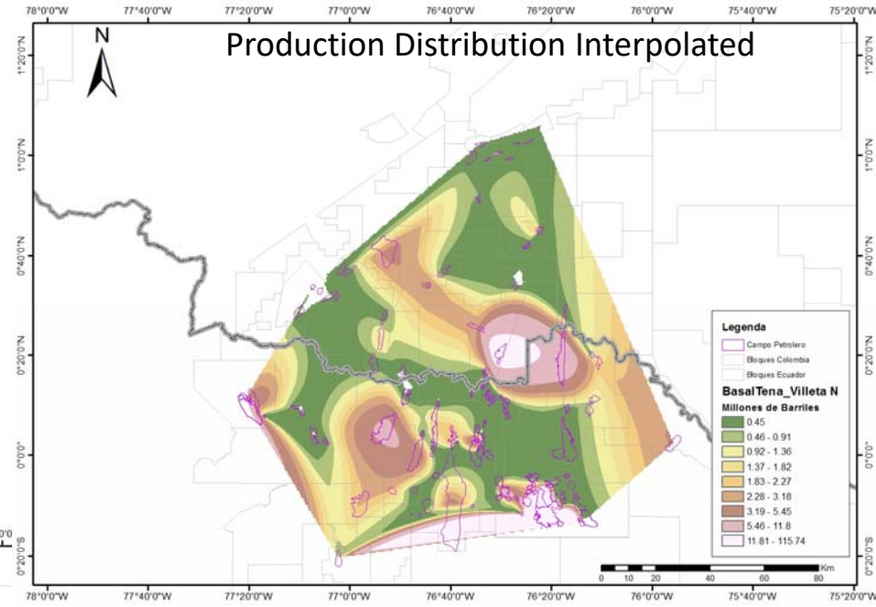


Reservoirs (Villeta N – Basal tena Napo M1)

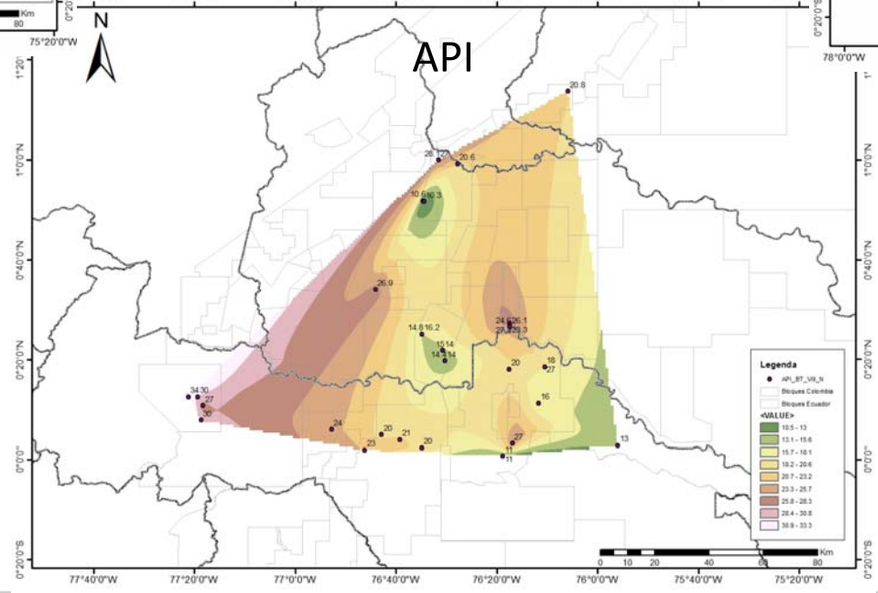
Production Distribution



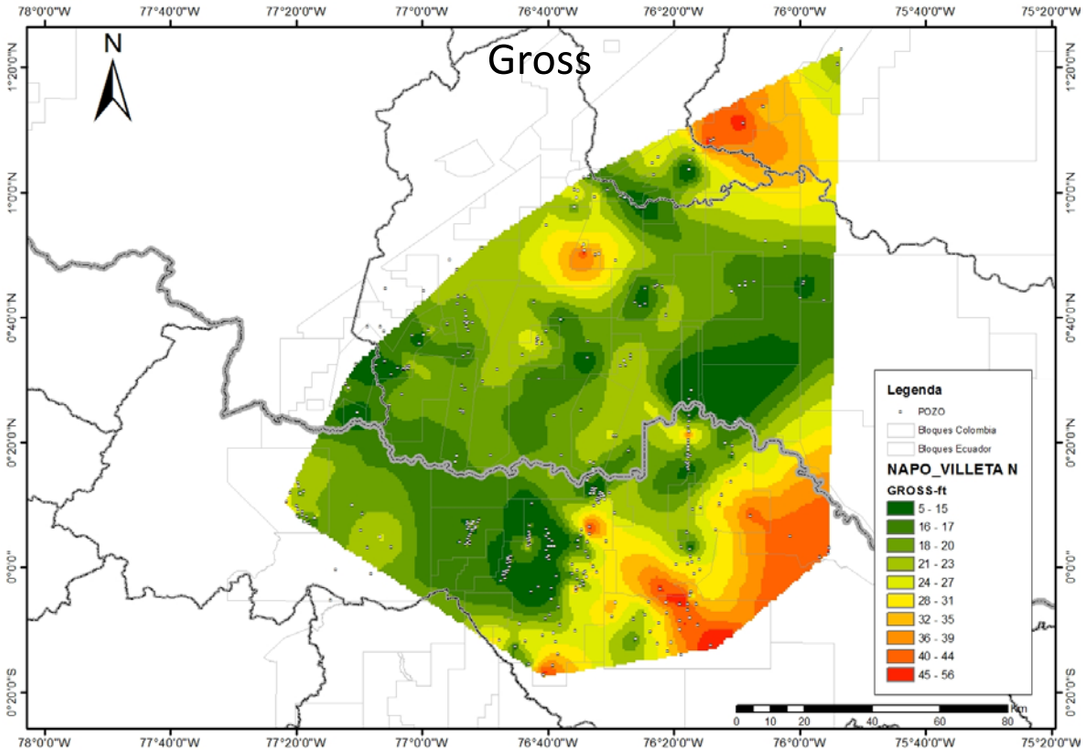
Production Distribution Interpolated

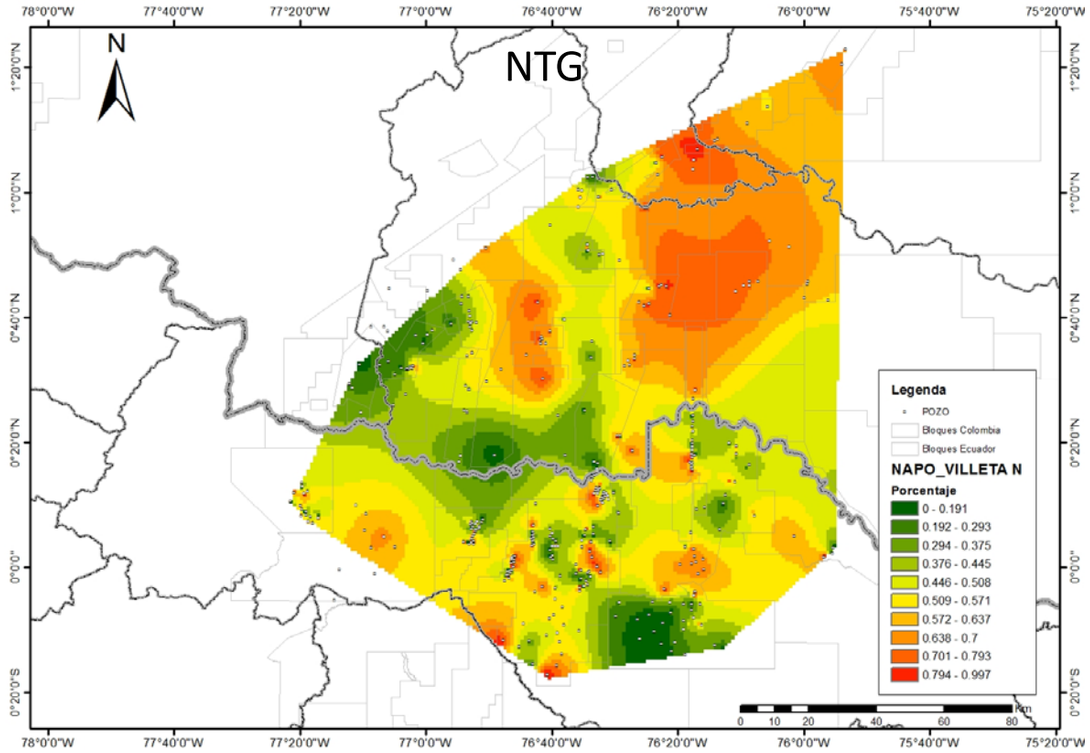


API



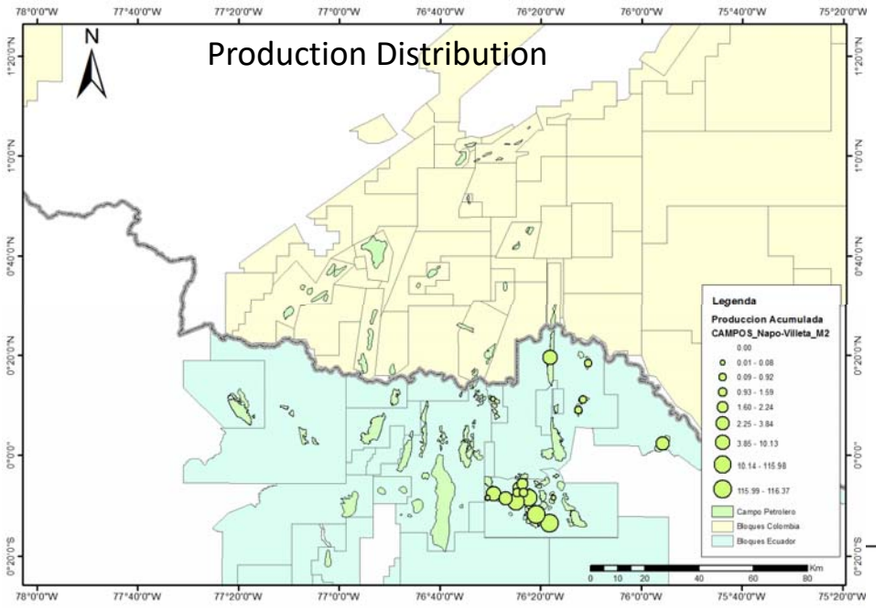
Reservoirs (Villeta N – Basal tena Napo M1)



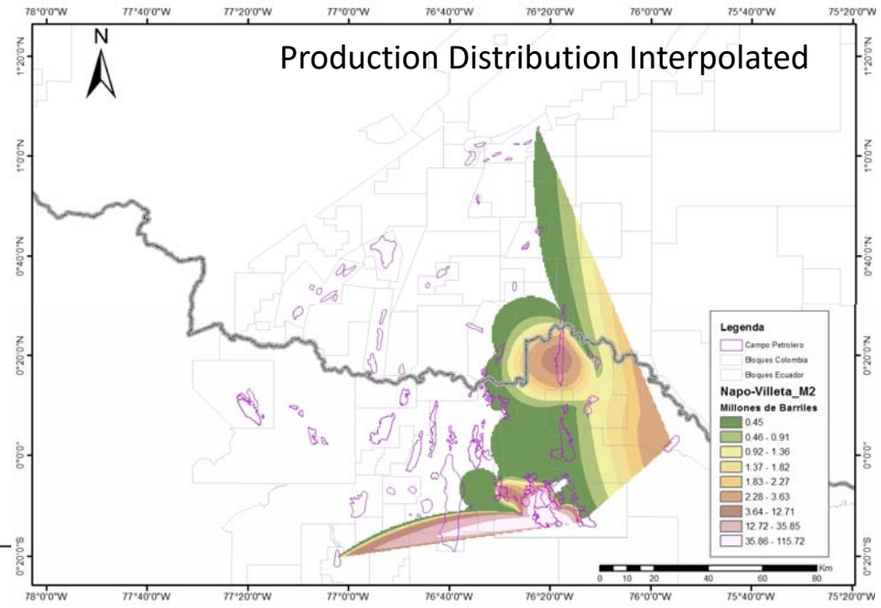


Reservoirs (Villeta M2 – Napo M2)

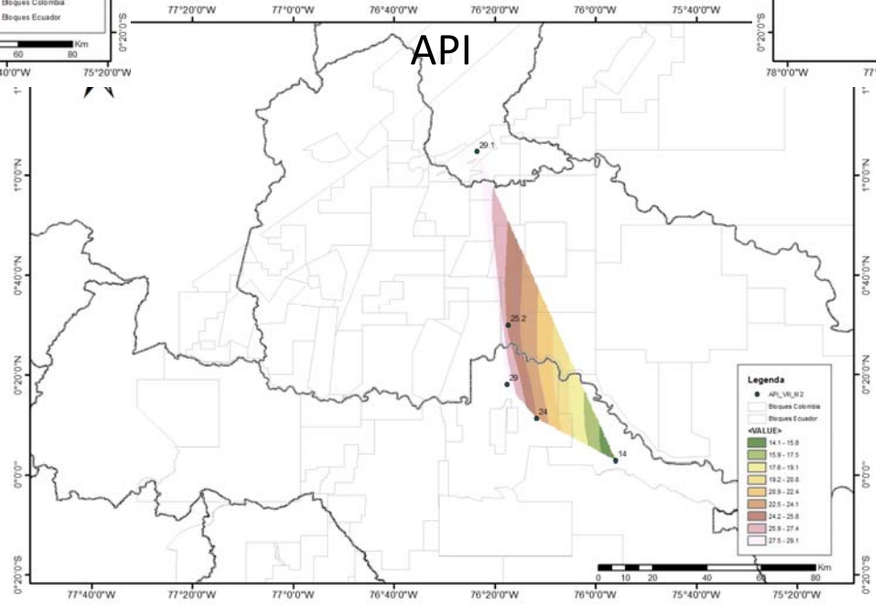
Production Distribution



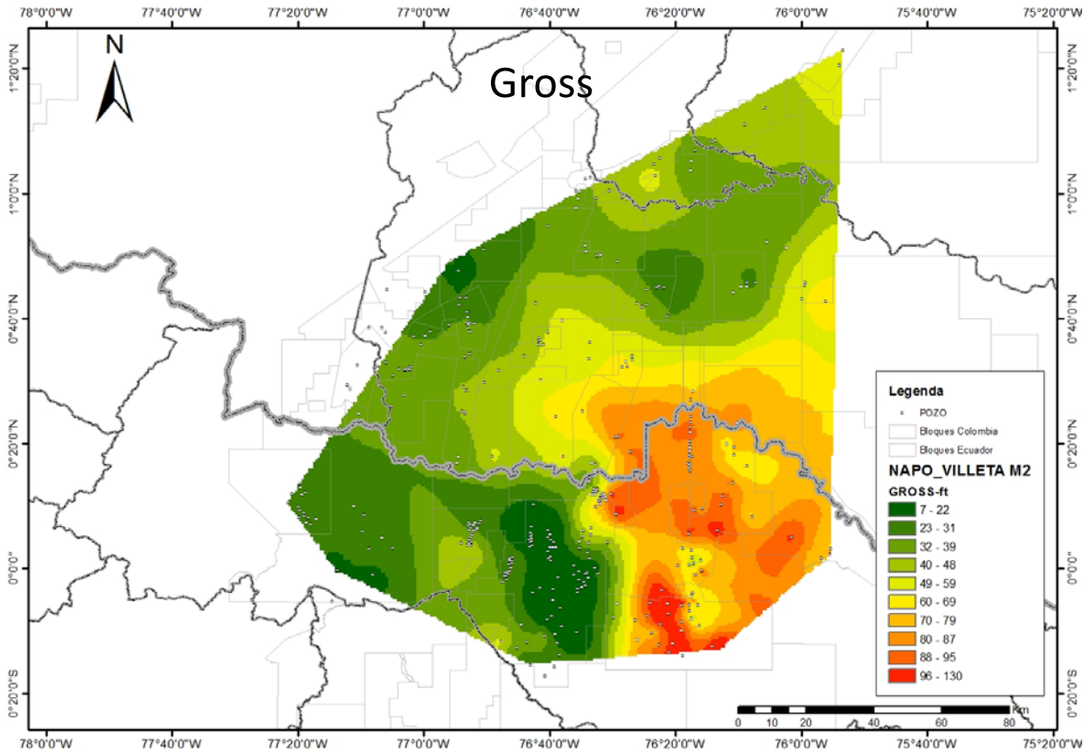
Production Distribution Interpolated

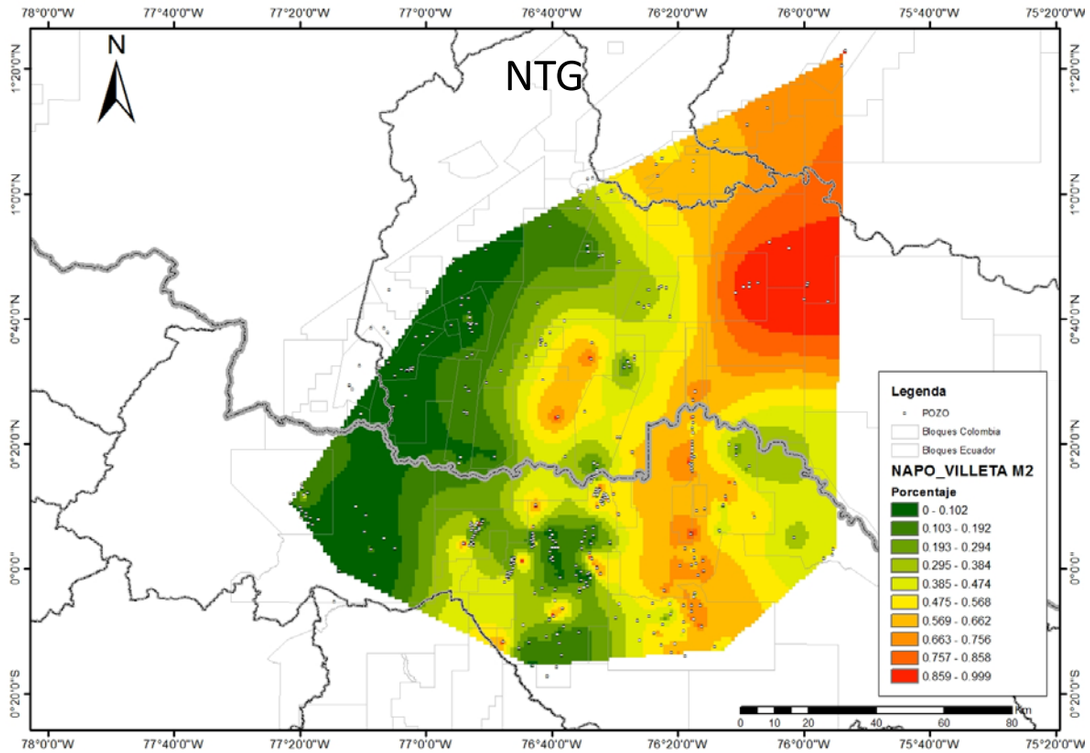


API

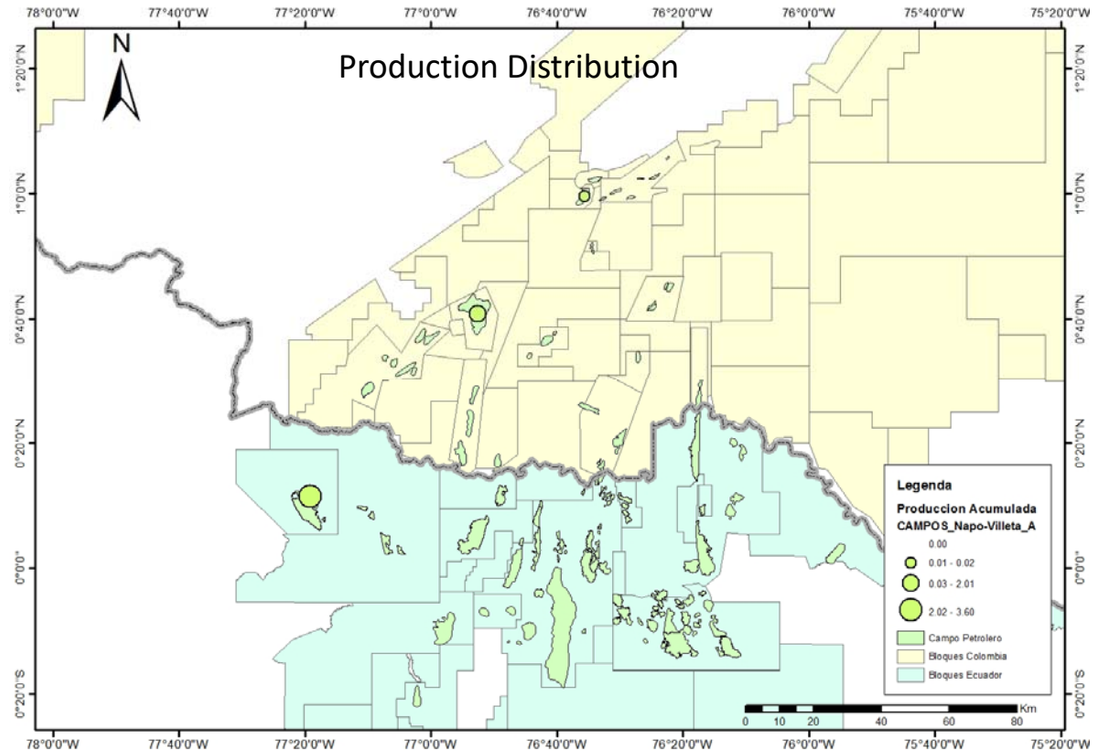


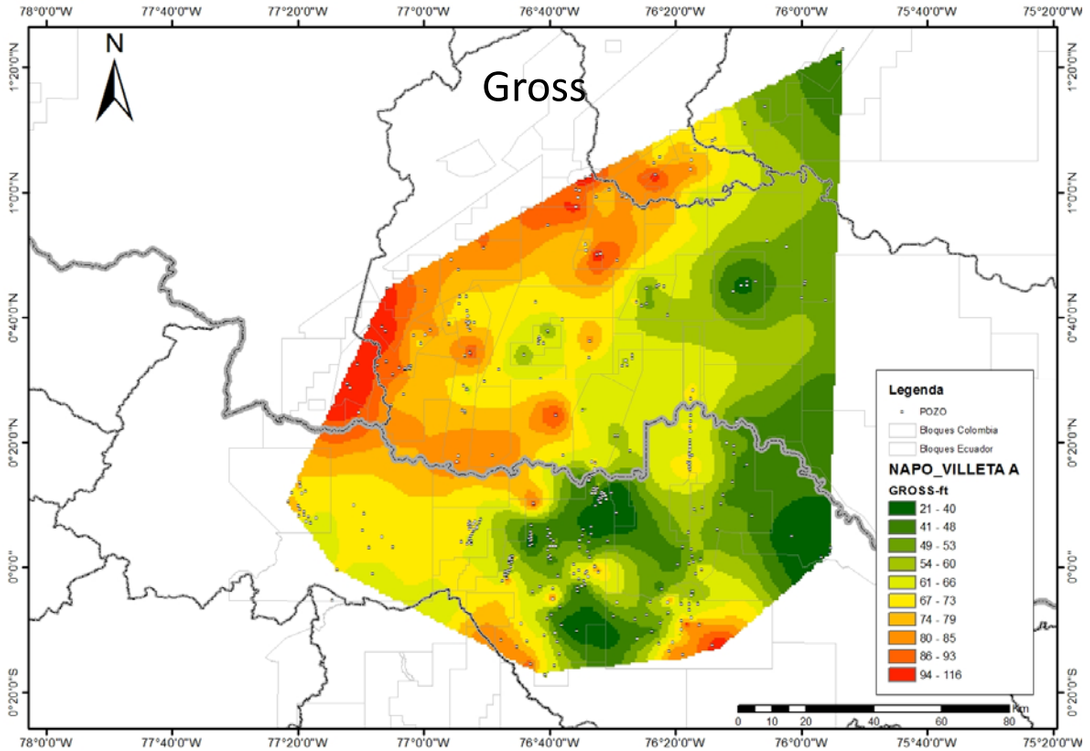
Reservoirs (Villeta M2 – Napo M2)





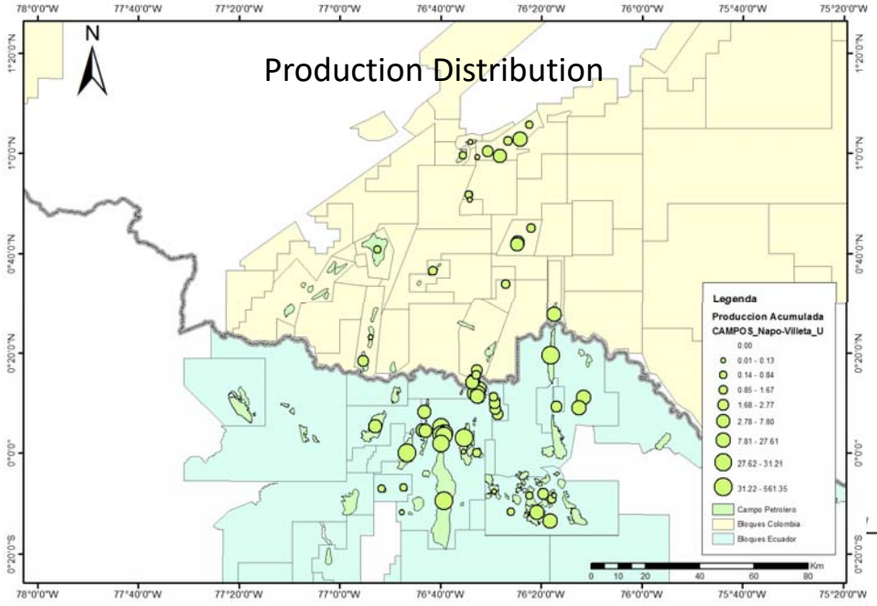
Reservoirs (Villeta A – Napo A)



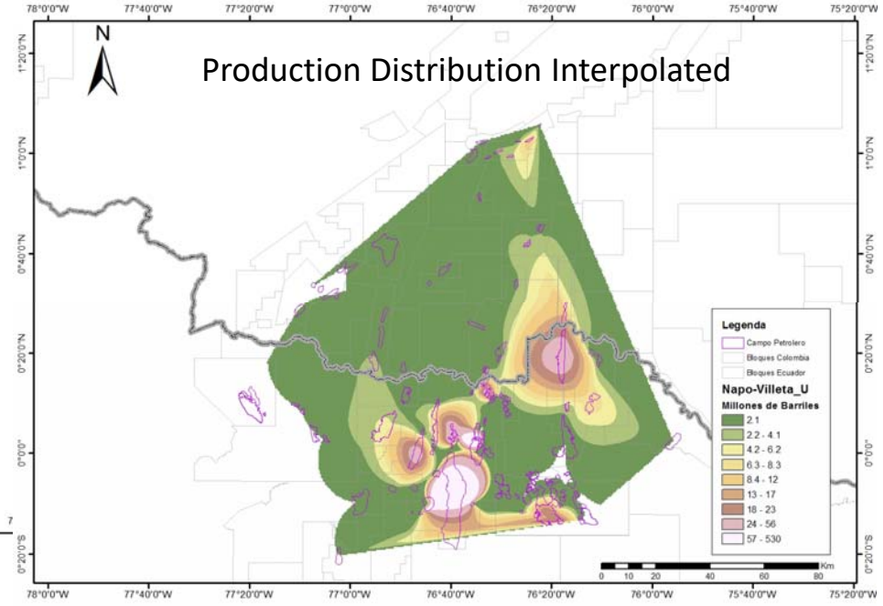


Reservoirs (Villeta U – Napo U)

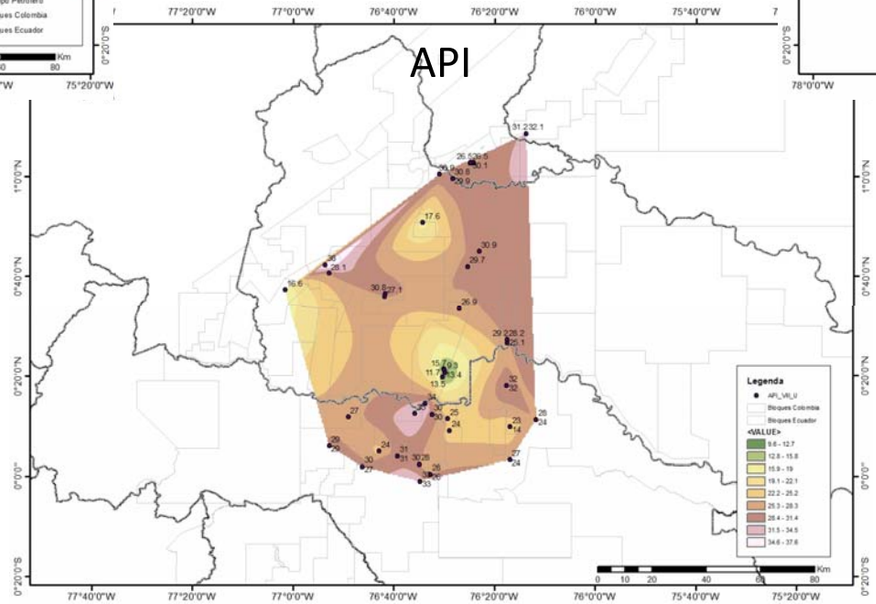
Production Distribution



Production Distribution Interpolated

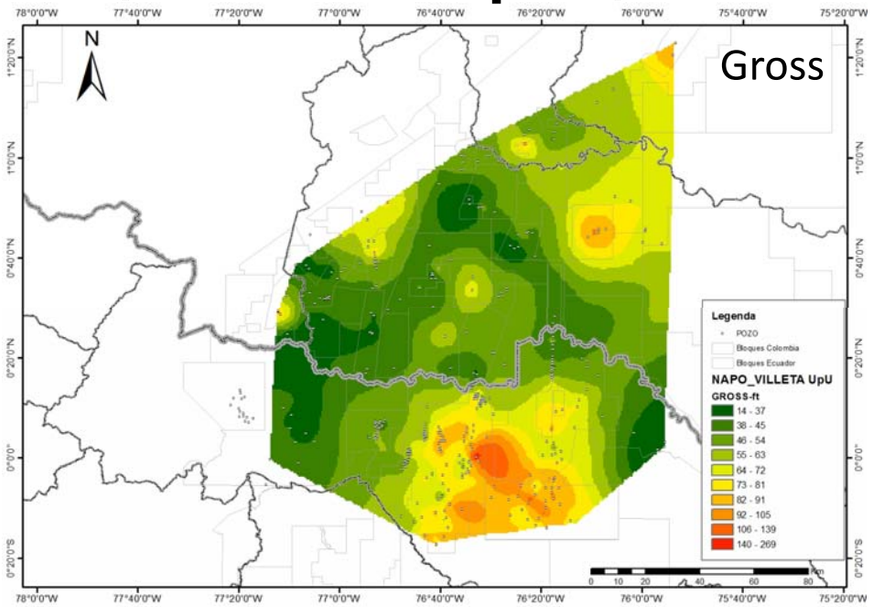


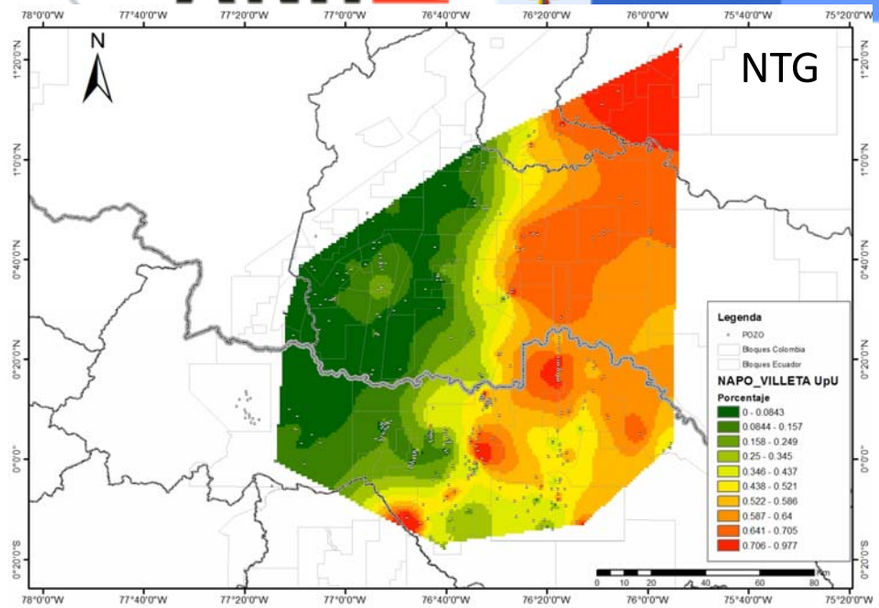
API



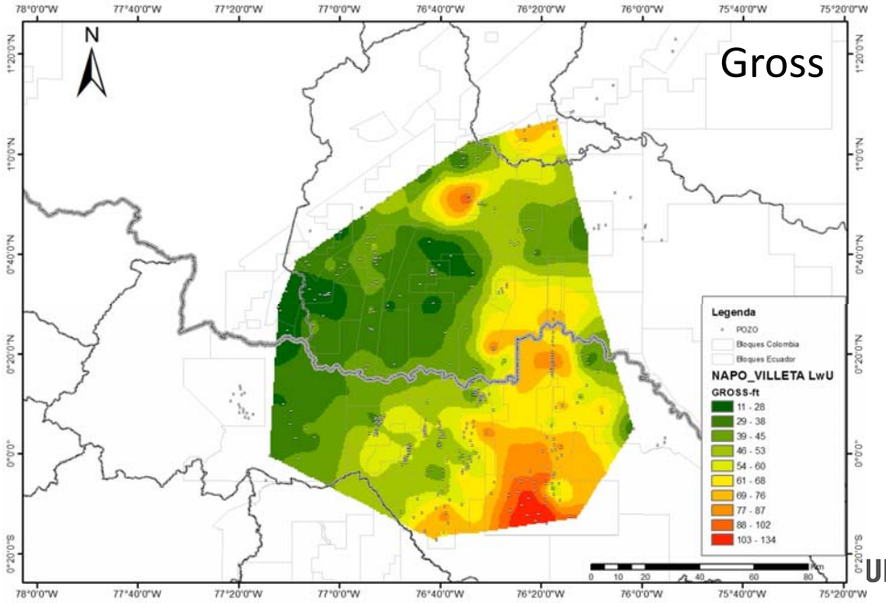
Reservoirs (Villeta U – Napo U)

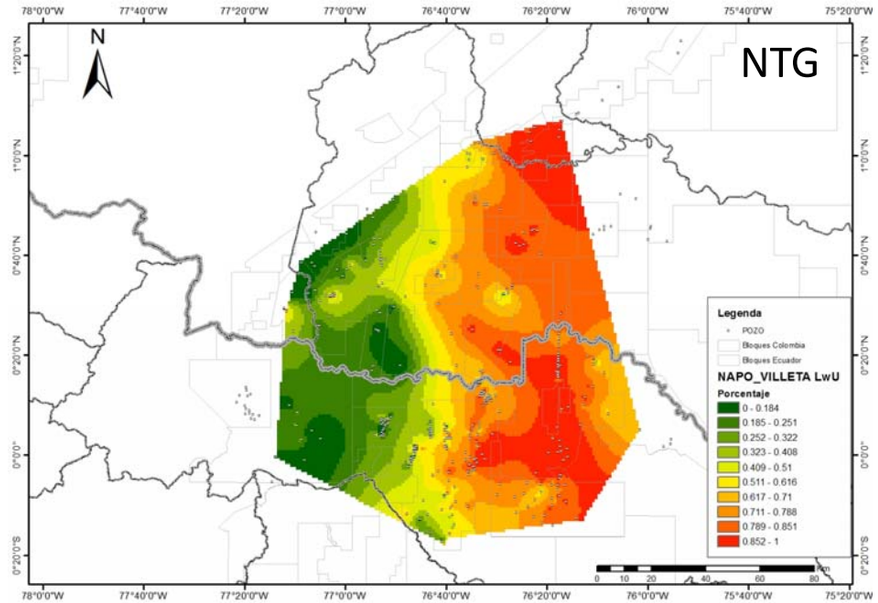
Upper U





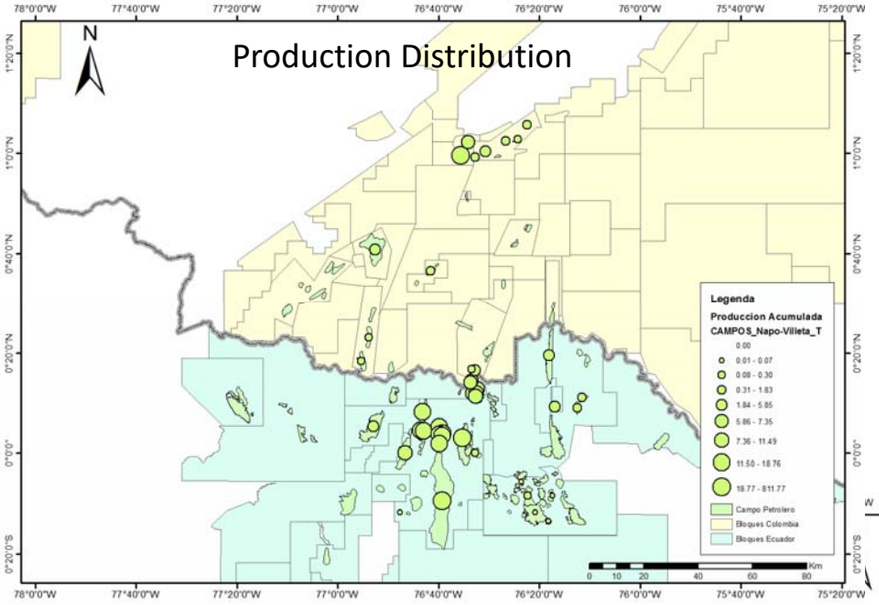
Lower U



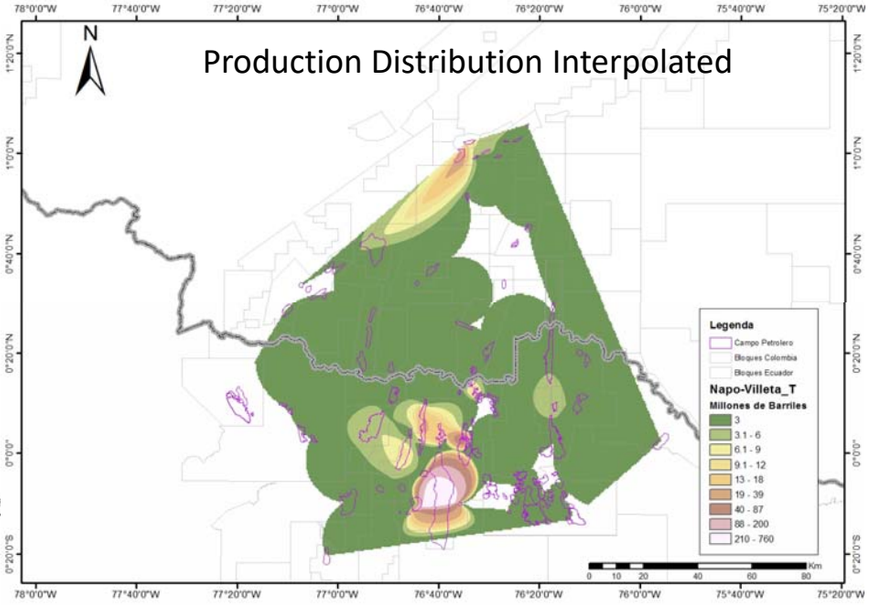


Reservoirs (Villeta T – Napo T inf)

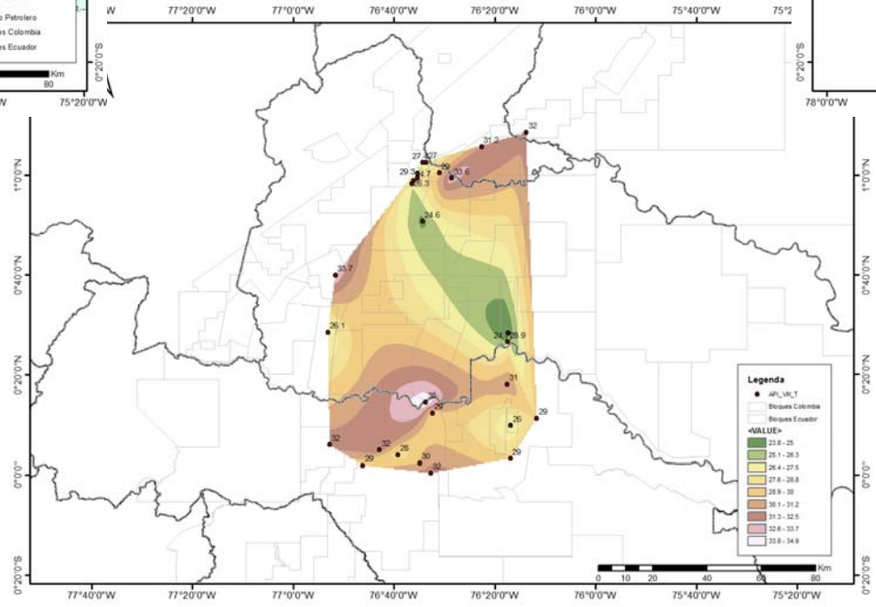
Production Distribution



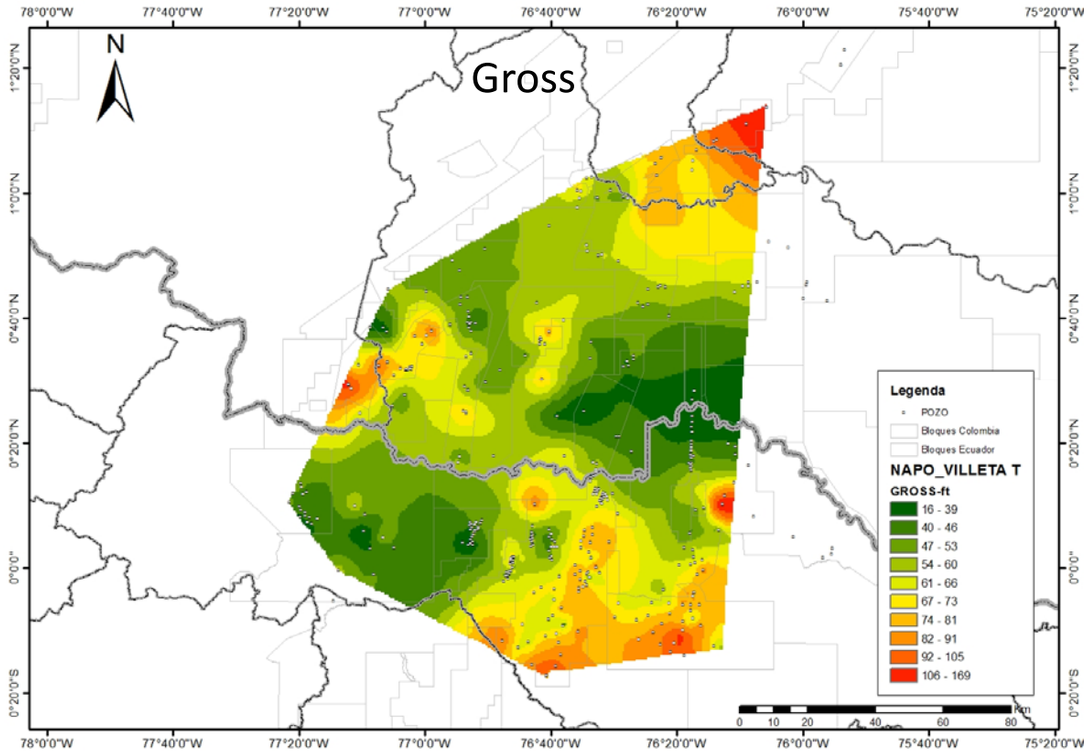
Production Distribution Interpolated

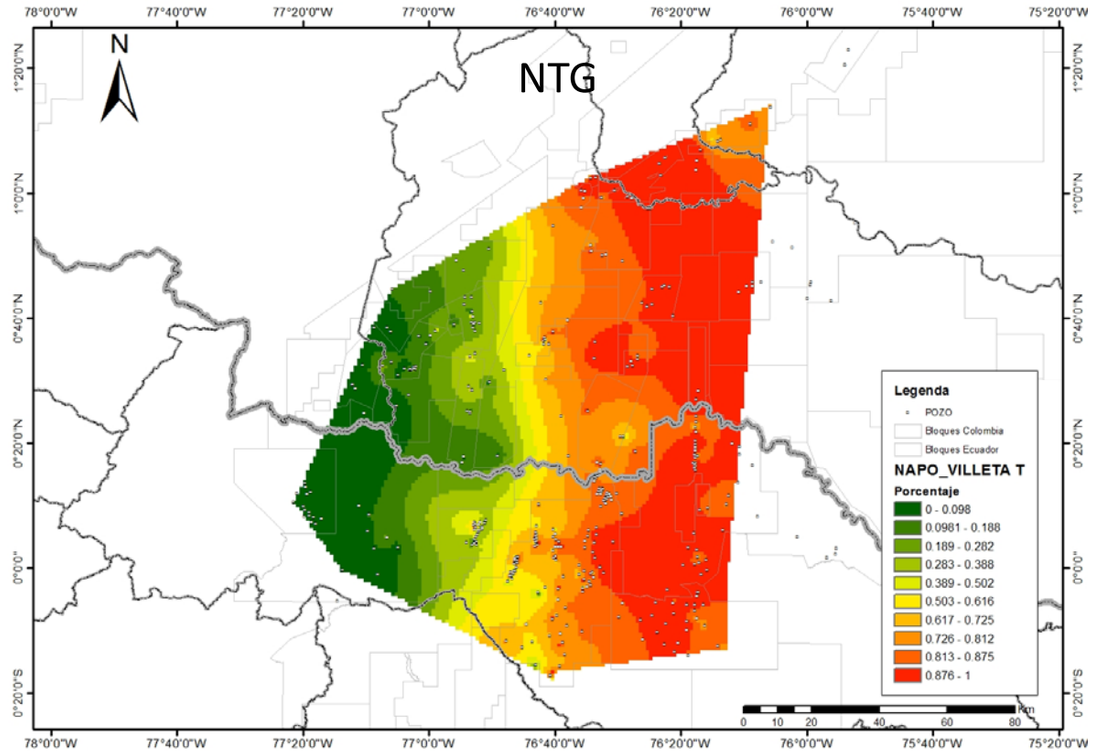


API



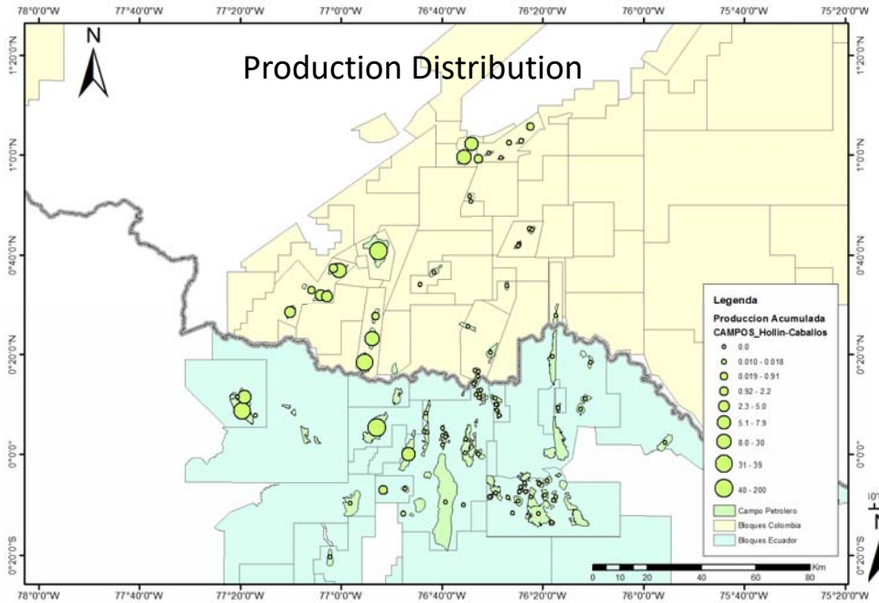
Reservoirs (Villeta T – Napo T inf)



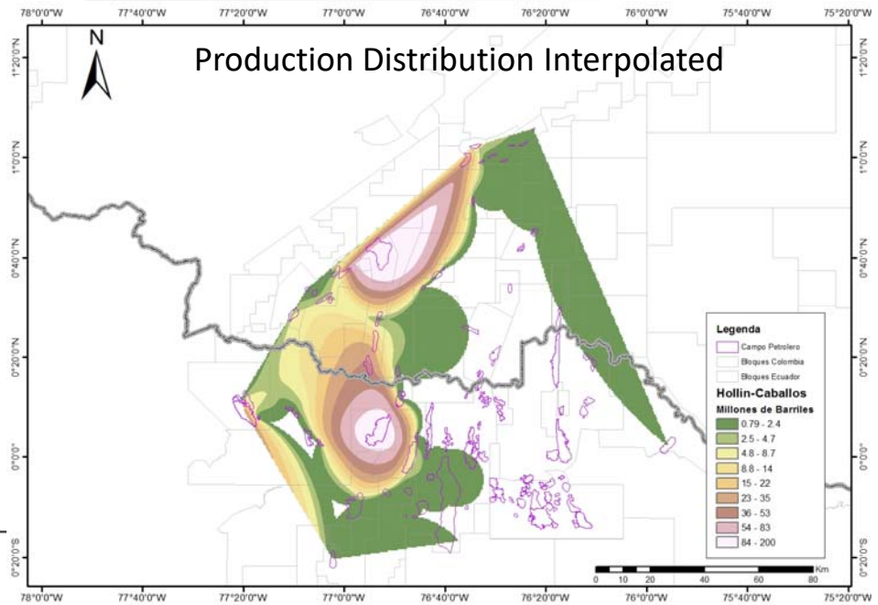


Reservoirs (Caballos – Hollín)

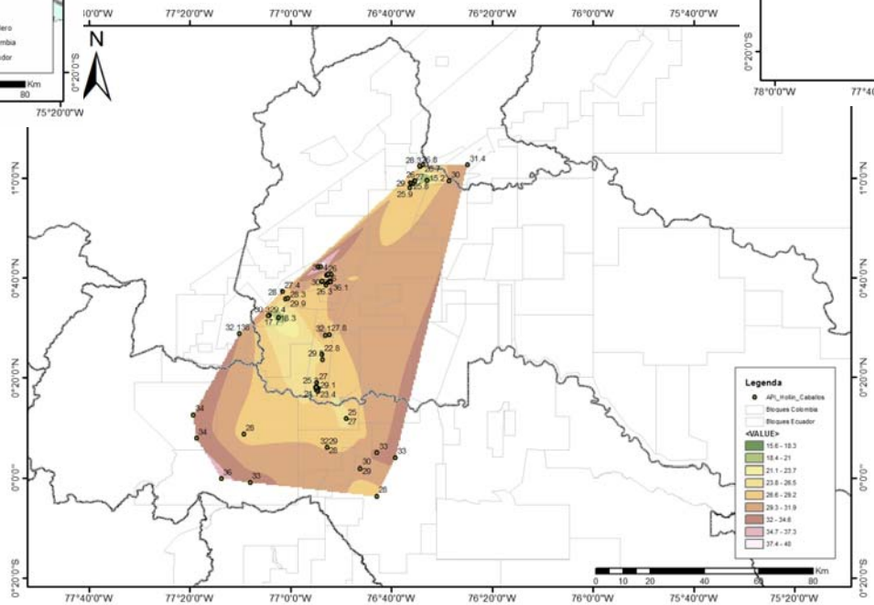
Production Distribution



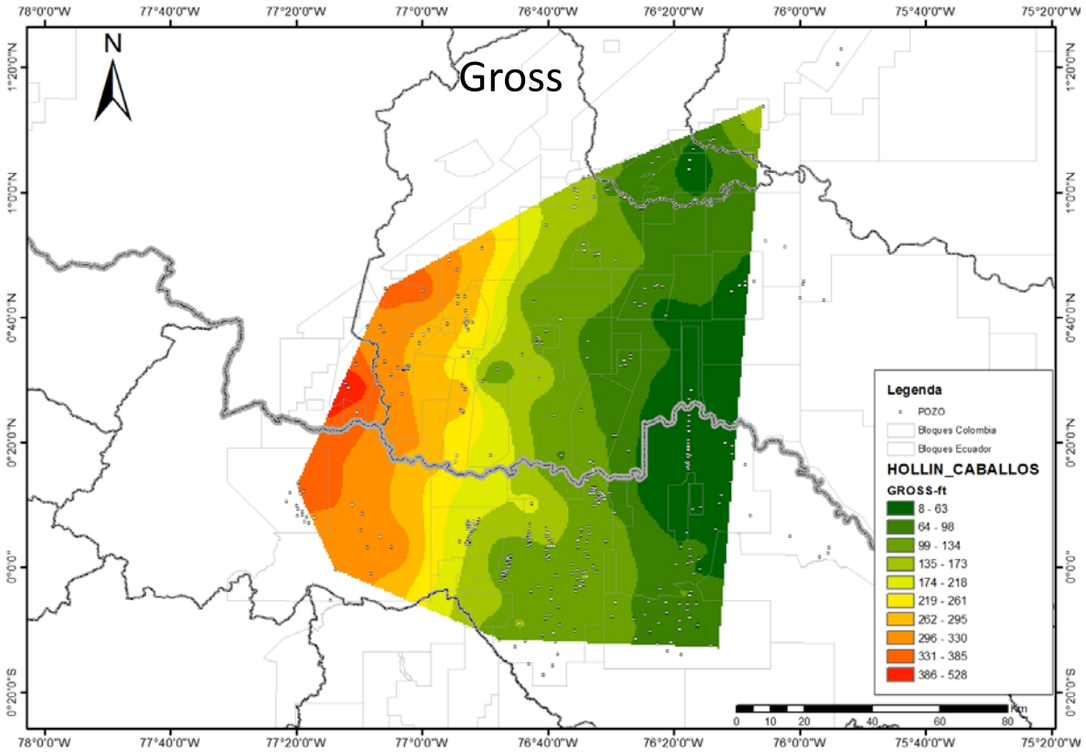
Production Distribution Interpolated

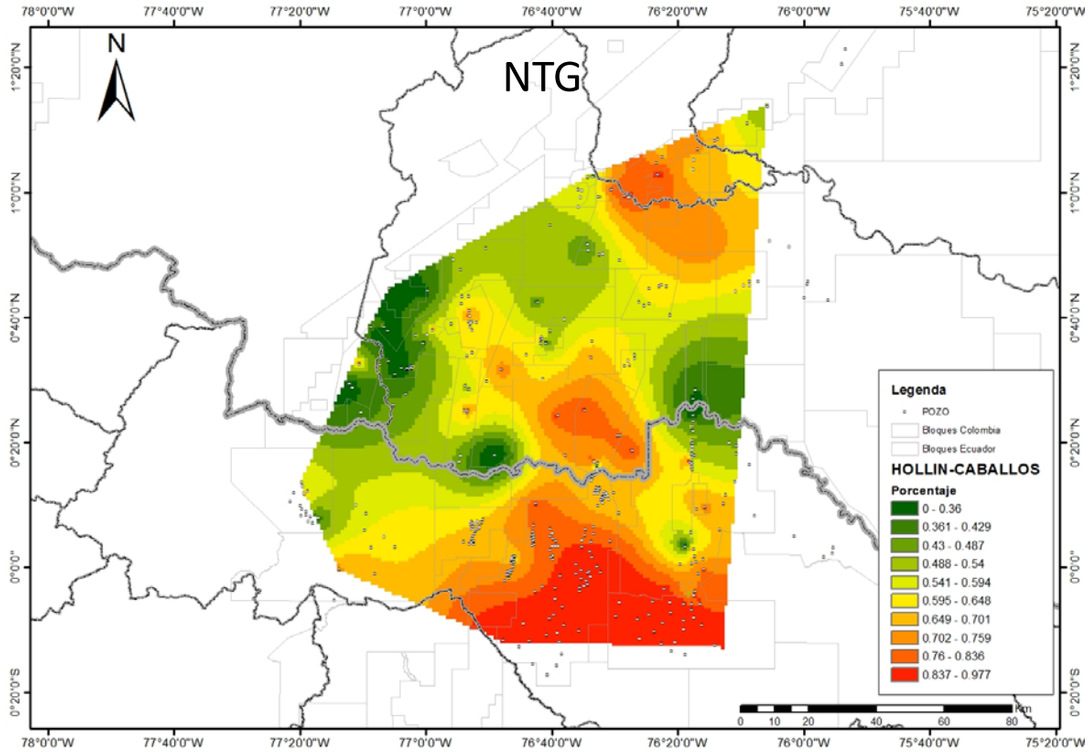


API



Reservoirs (Caballos – Hollín)





Conclusions

- The union of shared infrastructure geospatial information between the two nations would help in the planning of hydrocarbon transportation strategies for the cost reduction of the Midtream phase.
- The knowledge of the actors involved in border blocks will help a better collaboration between operators of both countries for the development of new infrastructure.
- The Oriente-Putumayo basin, in the study area has had a cumulative production of 3611 million barrels, where Shushufindi in Ecuador and Orito in Colombia have been the most prolific.
- With the knowledge of the accumulated production of all the fields by reservoir allows to know that the most important unit is the Villeta Formation (Napo) and the sublevel U as the best reservoir.
- In the Orito field it is presented as the only one in the basin that has production within the Pepino Formation (Tiyuyacu), being the upper member that has managed to produce 33 million barrels, with 60 wells.
- In the Villeta Formation, the 3 main reservoirs (N, U, T) present a homogeneous distribution for the entire basin with some areas which are more prospective for exploration, the M2 and A reservoirs, would have enough potential for future exploratory campaigns.
- Caballos Formation (Hollín) is the most productive unit in the Orito field and is the fundamental unit in production in the west of the basin.

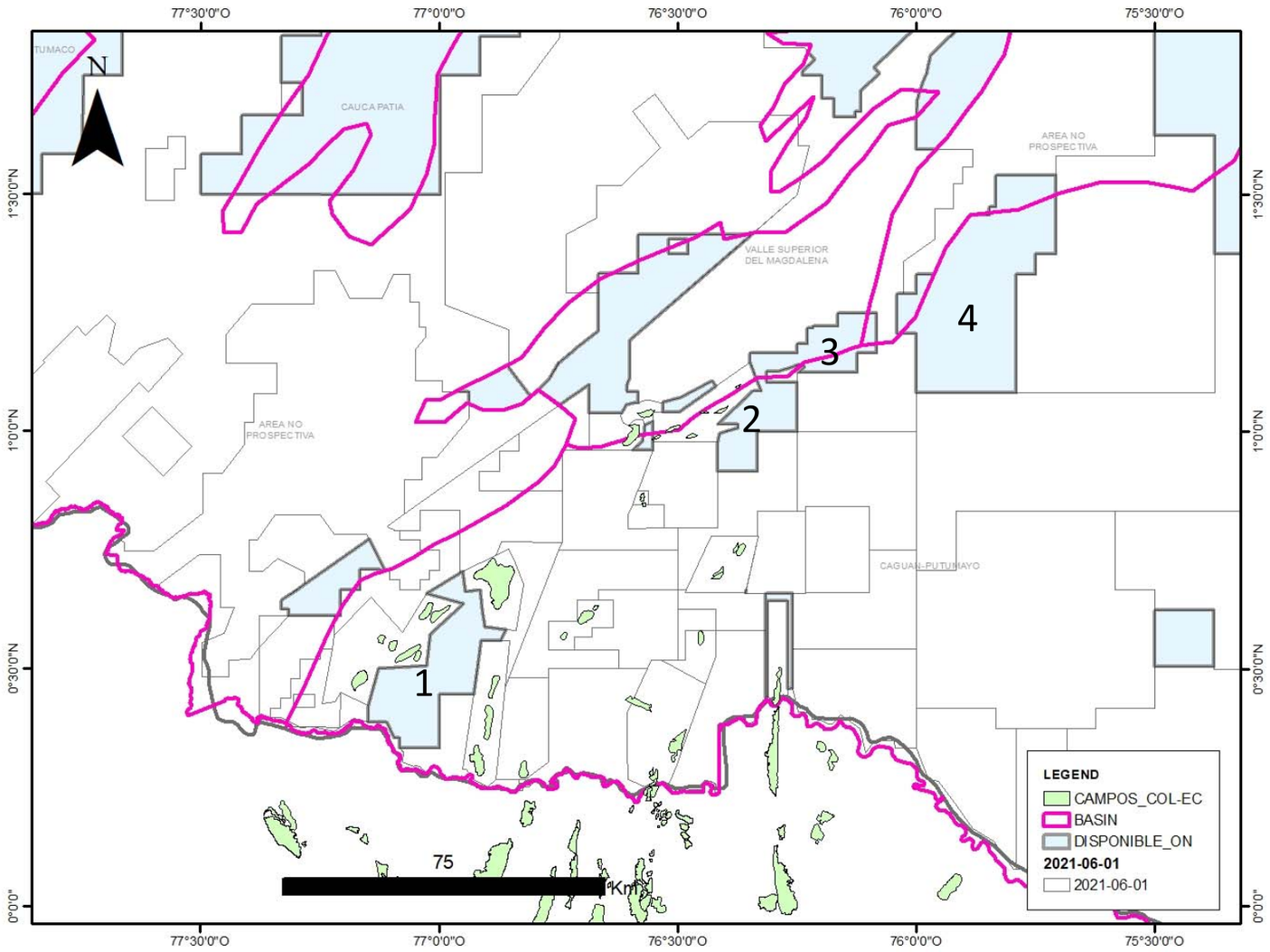
Prospectivity

RONDA COLOMBIA 2021

ANH AGENCIA NACIONAL DE HIDROCARBUROS

El futuro es de todos | Minenergía

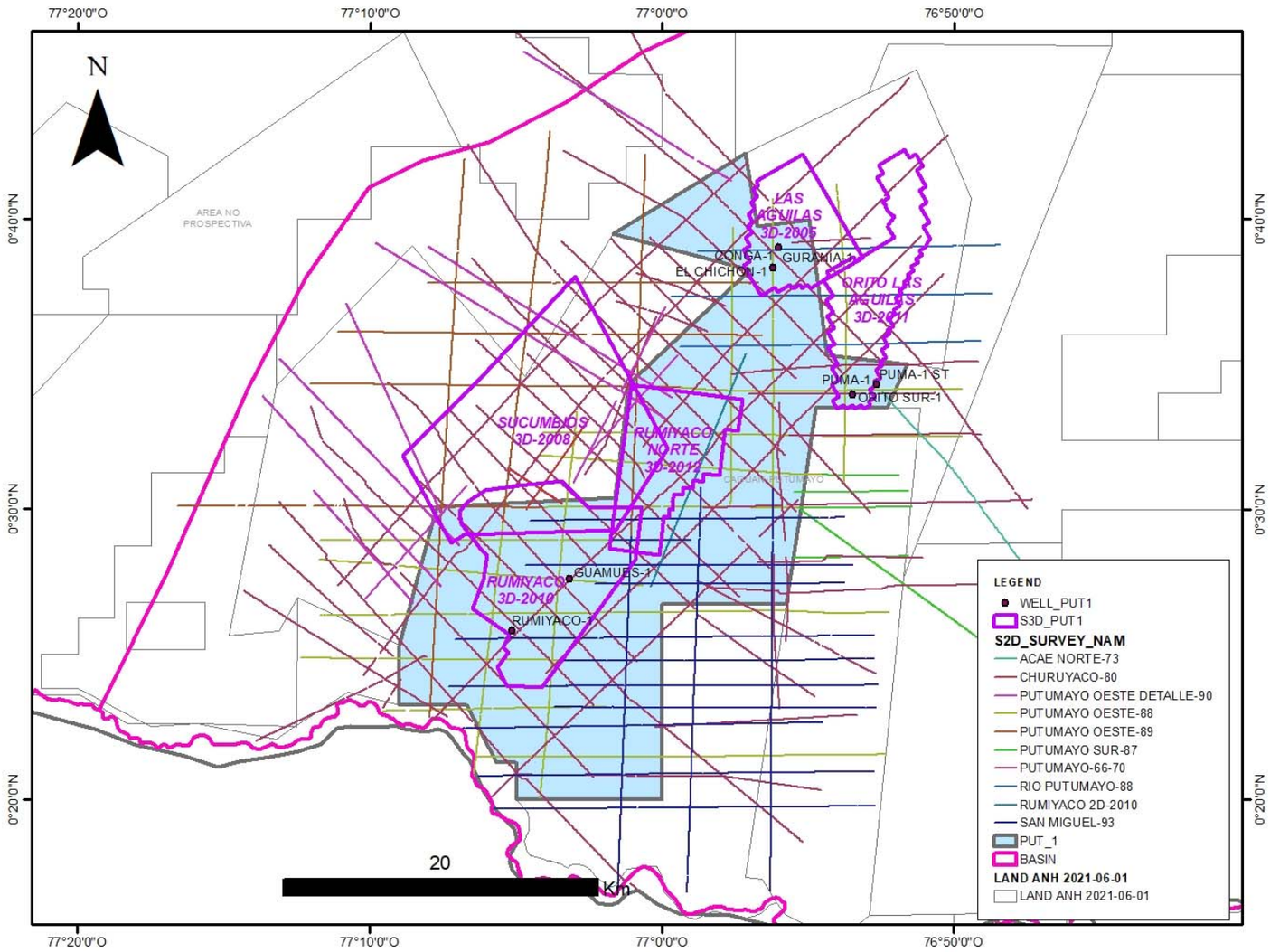
Available Areas



- Area 1 (53470 Ha)
- Area 2 (24477 Ha)
- Area 3 (24175 Ha)
- Area 4 (113552 Ha)

Areas 2 and 3 were evaluated in cycle 2
Areas 1 and 4 have not yet been formally evaluated by the ANH

AREA 1 - Database



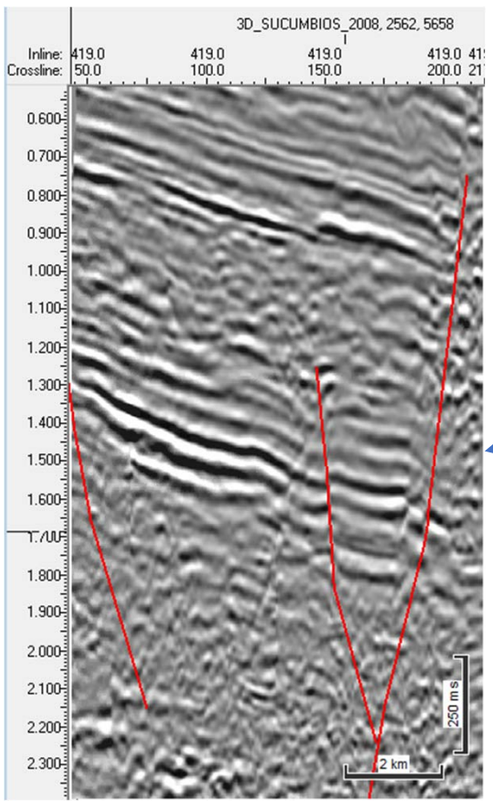
3D SURVEY	AREA_TOTAL	AREA_INSIDE
RUMIYACO 3D-2010	94.3	87.7
SUCUMBIOS 3D-2008	163.7	37.1
ORITO LAS AGUILAS 3D-2011	51.0	7.9
RUMIYACO NORTE 3D-2012	53.7	53.7
LAS AGUILAS 3D-2005	42.1	17.6
Total Inside		***167.22***

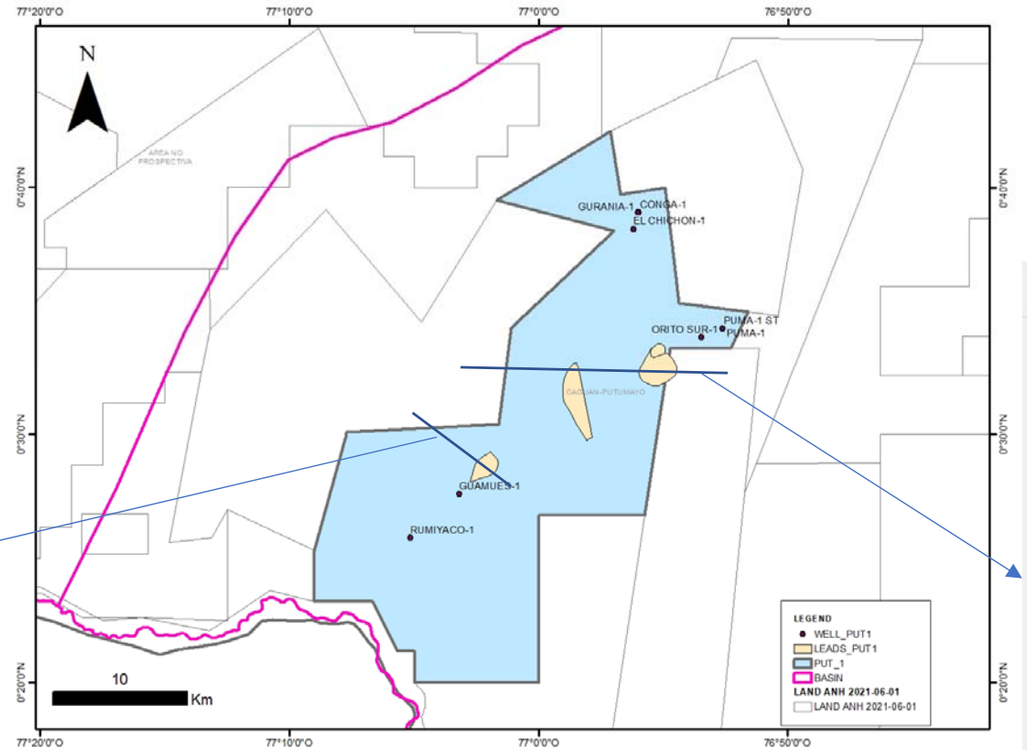
SURVEY	LINES	TOTAL LENGTH	LENGTH INSIDE
ACAE NORTE-73	1	16.5	0.8
CHURUYACO-80	2	11.2	1.0
PUTUMAYO OESTE DETALLE-90	9	129.4	17.8
PUTUMAYO OESTE-88	15	319.1	206.2
PUTUMAYO OESTE-89	7	177.9	42.9
PUTUMAYO SUR-87	4	28.3	1.3
PUTUMAYO-66-70	41	860.8	383.5
RIO PUTUMAYO-88	3	58.7	22.9
RUMIYACO 2D-2010	1	16.0	16.0
SAN MIGUEL-93	13	275.6	142.4
Total general	***96***	***1893.47***	***834.89***

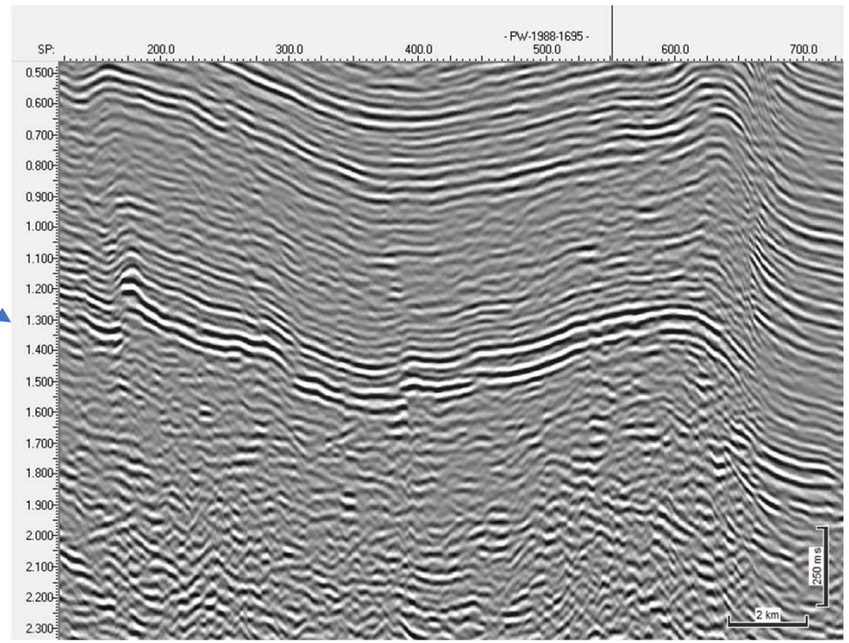
WELL_NAME	RTE	TD	WELL_SPUD
GUAMUES-1	1287	10605	24/10/1968
ORITO SUR-1	1361	9073	16/08/1969
EL CHICHON-1	1794	8471	06/05/2004
PUMA-1	1394	11280	01/04/2005
PUMA-1 ST	1388	12231	14/07/2005
CONGA-1	1790	7963	07/09/2007
RUMIYACO-1	1357	10648	09/10/2011
GURANIA-1	1795	8201	19/11/2012

- Seismic 3D (5 Programs, 167 Km2)
- Seismic 2D (96 Lines, 835 Km)
- Wells 7

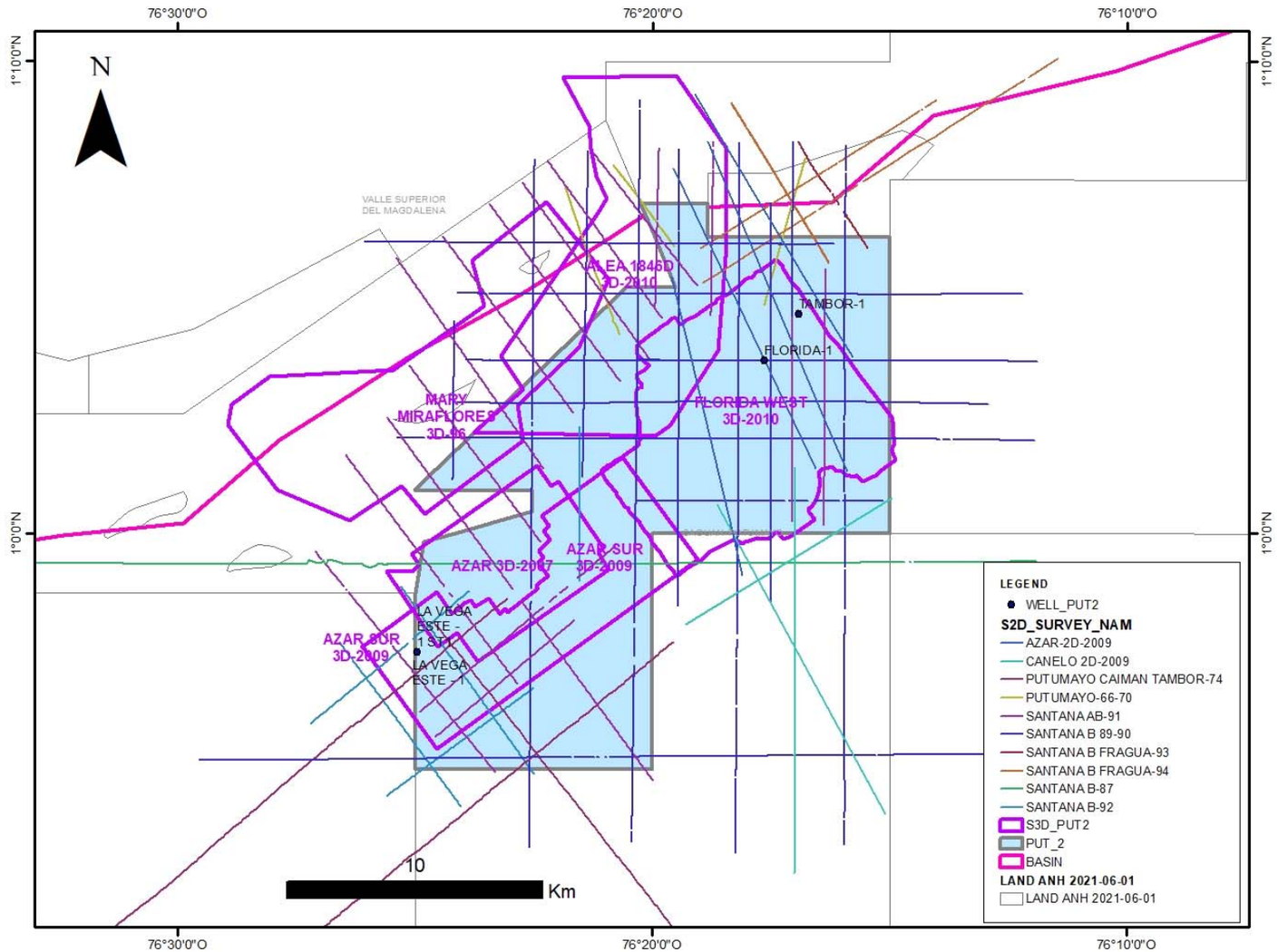
AREA 1 - Prospectivity







AREA 2 - Database



3D SURVEY	AREA_TOTAL	AREA_INSIDE
FLORIDA WEST 3D-2010	81.1	77.4
AZAR 3D-2007	34.9	30.9
AZAR SUR 3D-2009	54.4	47.3
ALEA 1846D 3D-2010	86.1	42.2
MARY MIRAFLORES 3D-96	79.4	7.3
Total Inside		***174.06***

SURVEY	LINES	TOTAL LENGTH	LENGTH INSIDE
AZAR-2D-2009	4	51.0	36.9
CANELO 2D-2009	3	39.0	6.4
PUTUMAYO CAIMAN TAMBOR-7	3	92.1	18.7
PUTUMAYO-66-70	3	16.2	6.2
SANTANA AB-91	16	143.3	79.9
SANTANA B 89-90	20	331.0	184.0
SANTANA B FRAGUA-93	1	4.6	0.5
SANTANA B FRAGUA-94	3	33.3	5.2
SANTANA B-87	2	55.4	9.0
SANTANA B-92	5	37.7	22.8
Total general	***60***	***803.67***	***369.64***

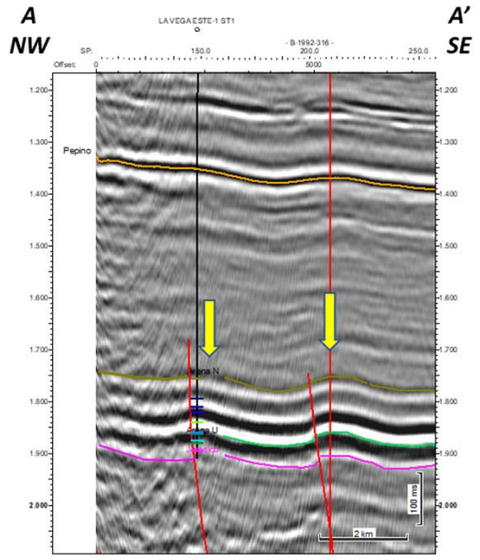
WELL_NAME	RTE	TD	WELL_SPUD
TAMBOR-1	938	9203	23/04/1965
FLORIDA-1	865	9450	11/01/1992
LA VEGA ESTE - 1	926.3	8575	24/06/2012
LA VEGA ESTE - 1 ST1	926.3	11384	26/08/2012

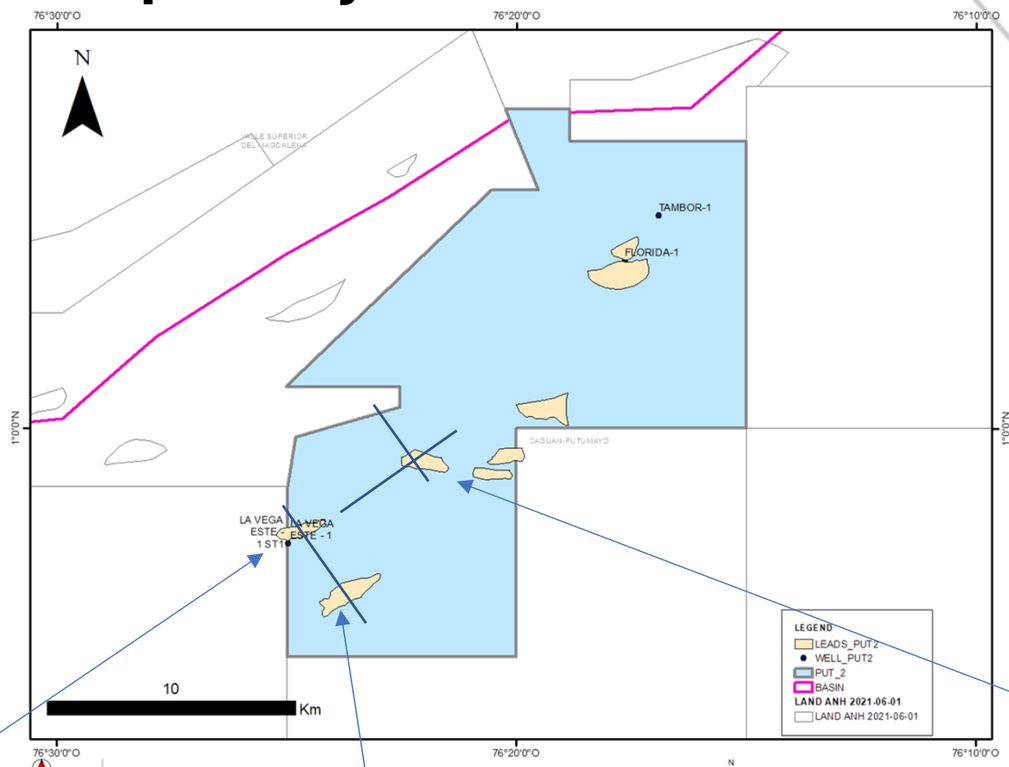
- Seismic 3D (5 Programs, 174 Km2)
- Seismic 2D (60 Lines, 370 Km)
- Wells 3

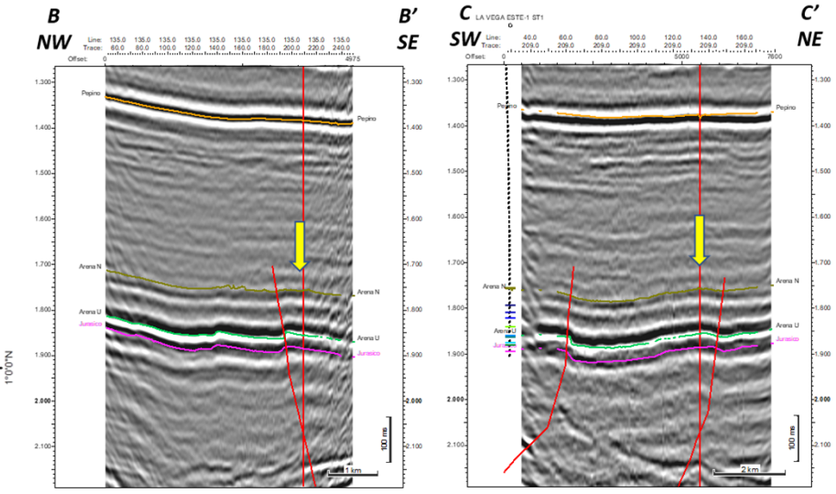
RONDA COLOMBIA 2021 — AREA 2 - Prospectivity

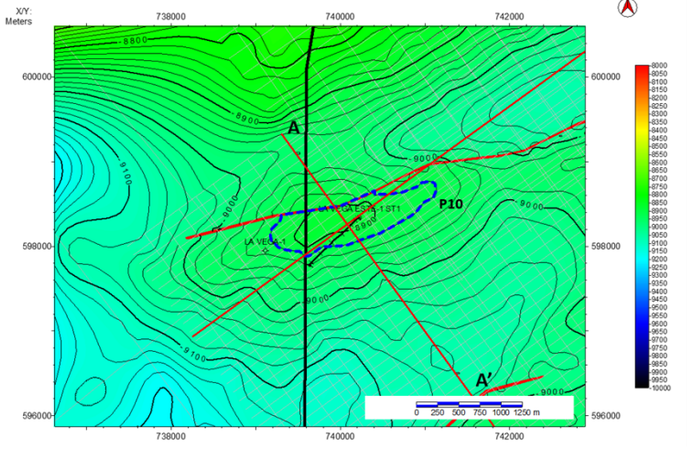
ANH AGENCIA NACIONAL DE HIDROCARBUROS

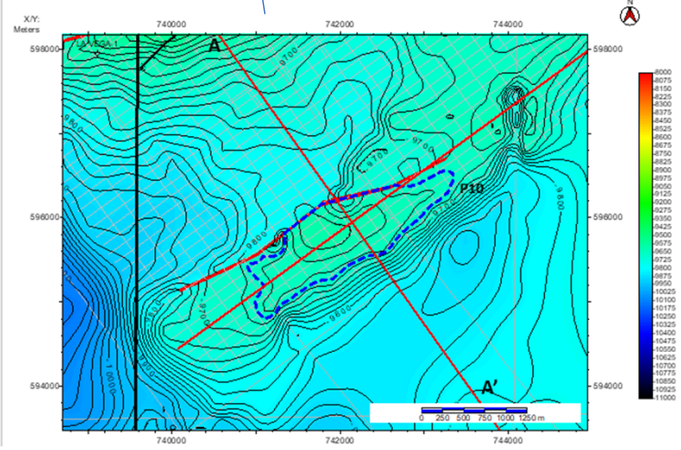
El futuro es de todos — Minenergía

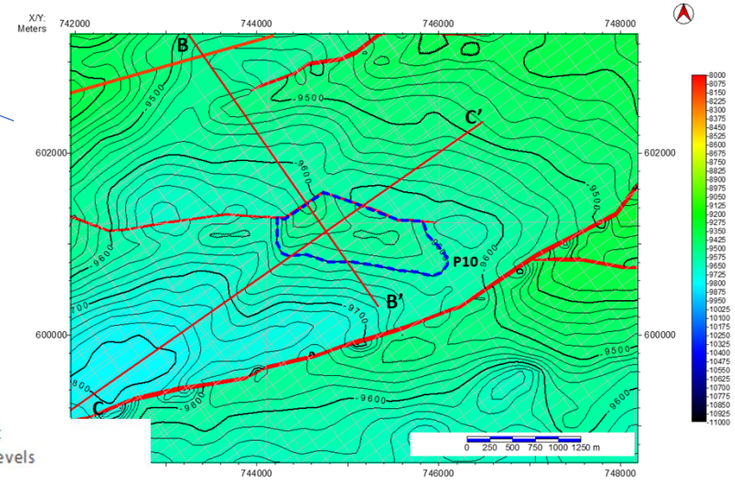








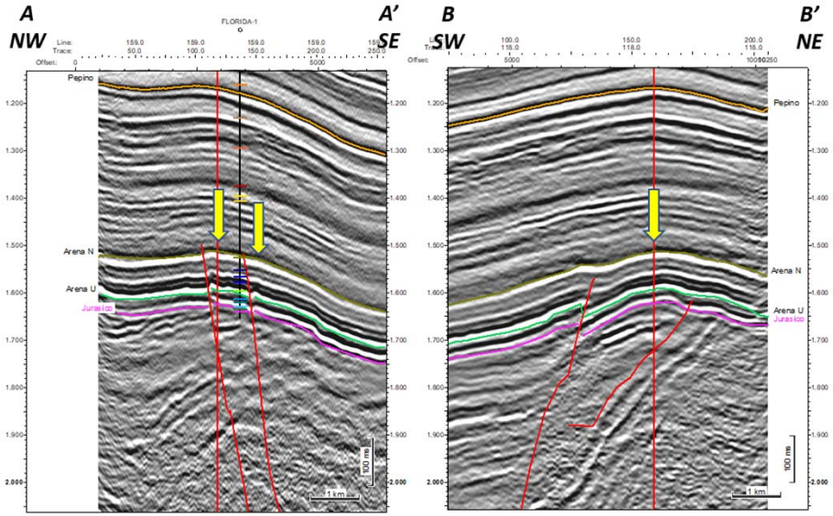


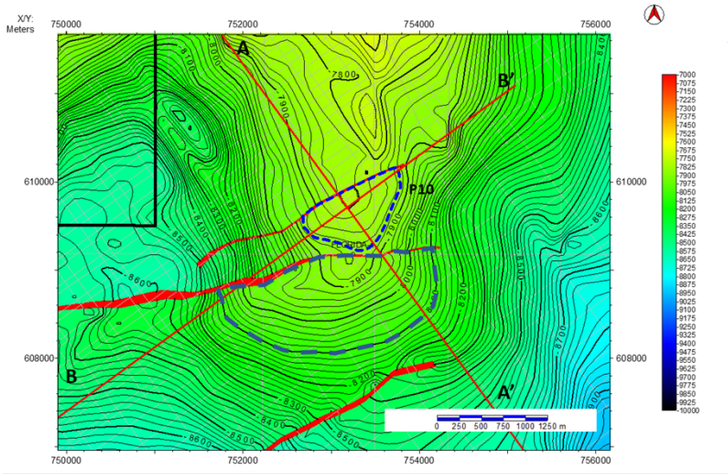


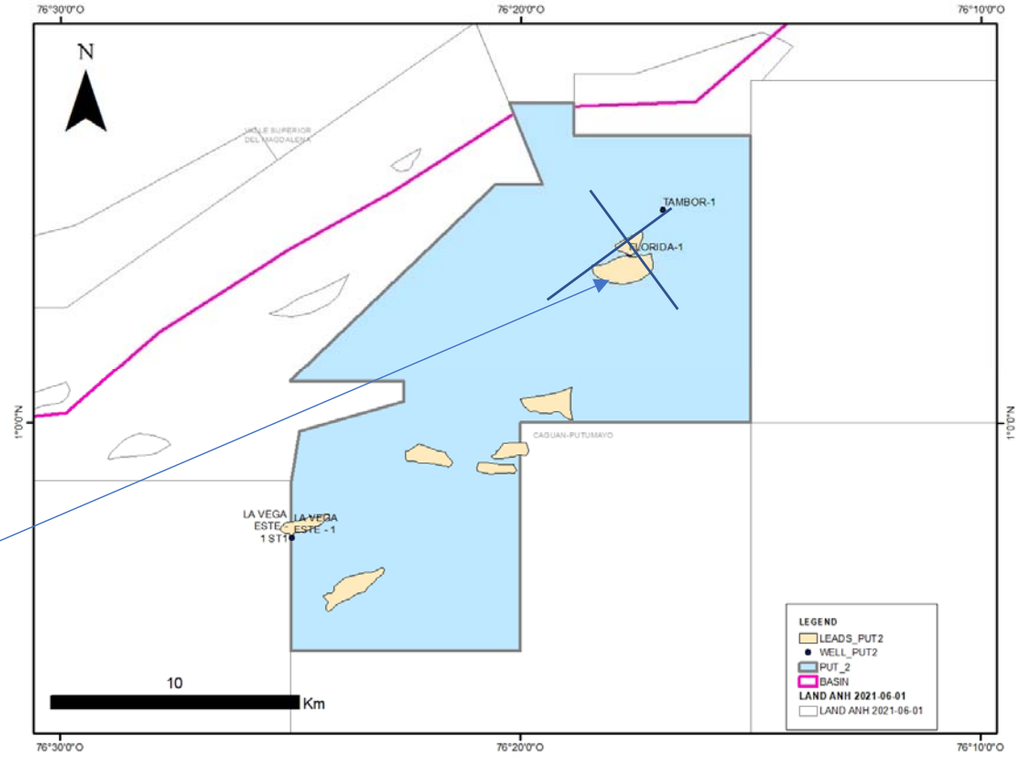
TRAP: anticline against reverse fault
LATERAL SEAL: Juxtaposition shale levels Villeta Fm. and Rumiyaco Fm.
VERTICAL SEAL: Shale levels Villeta Fm., Rumiyaco Fm.
SOURCE: M1, M2, A, B, C levels Villeta Formation.
MAIN RISK: lateral seal

RBUROS

AREA 2 - Prospectivity

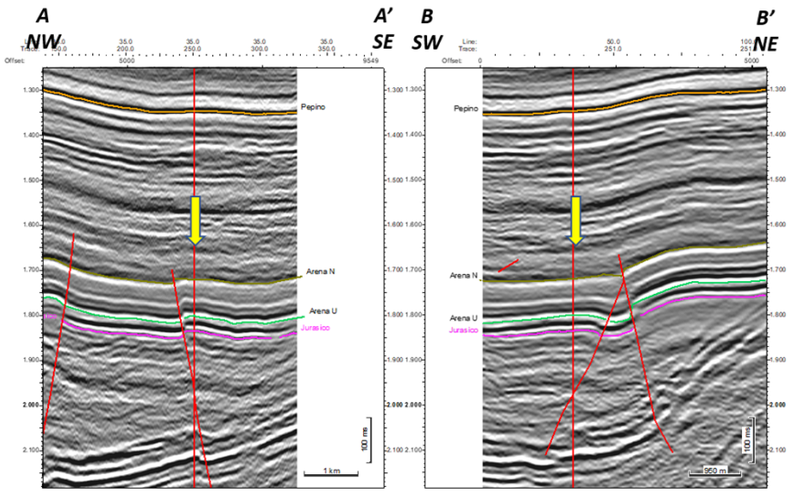


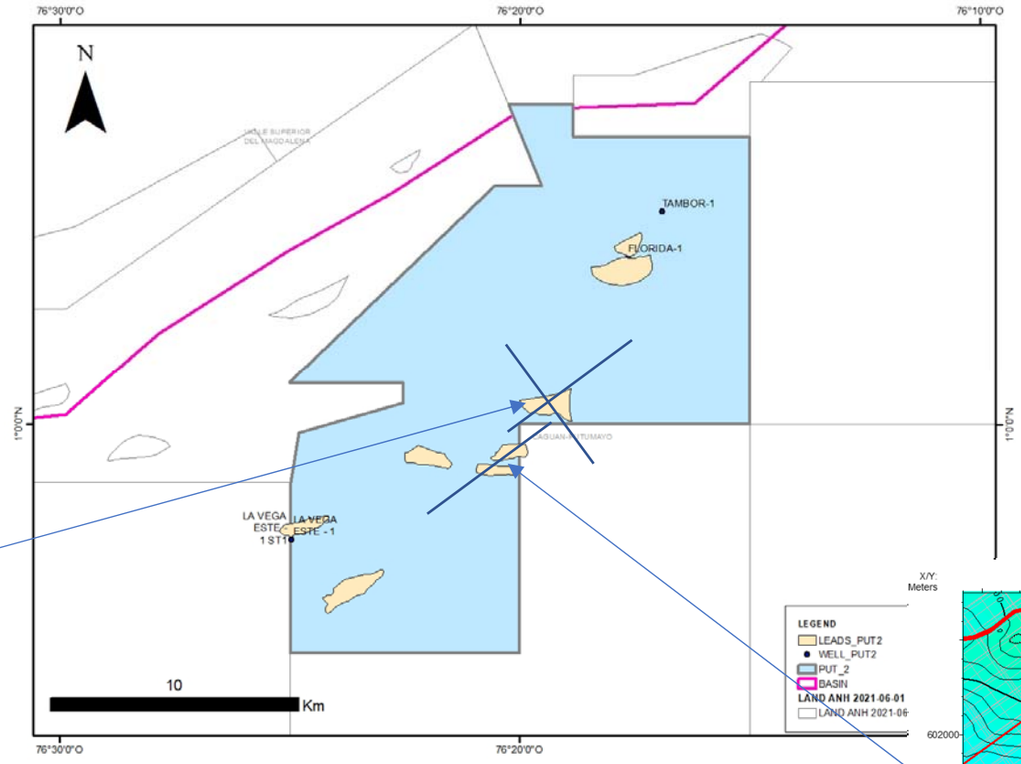


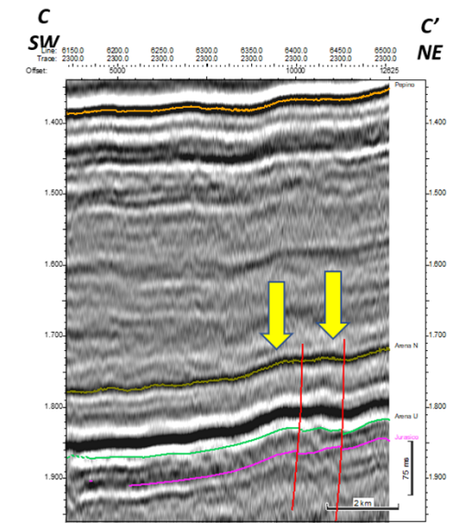


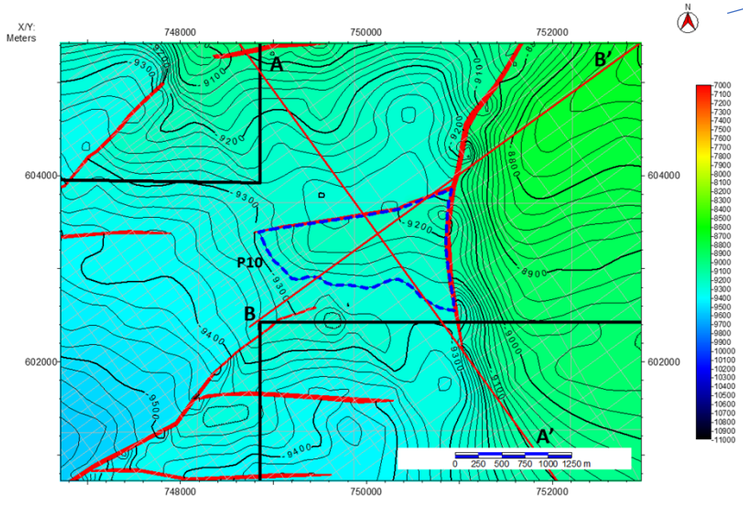
TRAP: anticline against reverse fault
LATERAL SEAL: Juxtaposition shale levels Villeta Fm. and Rumiyaco Fm.
VERTICAL SEAL: Shale levels Villeta Fm., Rumiyaco Fm.
SOURCE: M1, M2, A, B, C levels Villeta Formation.
MAIN RISK: lateral seal

AREA 2 - Prospectivity

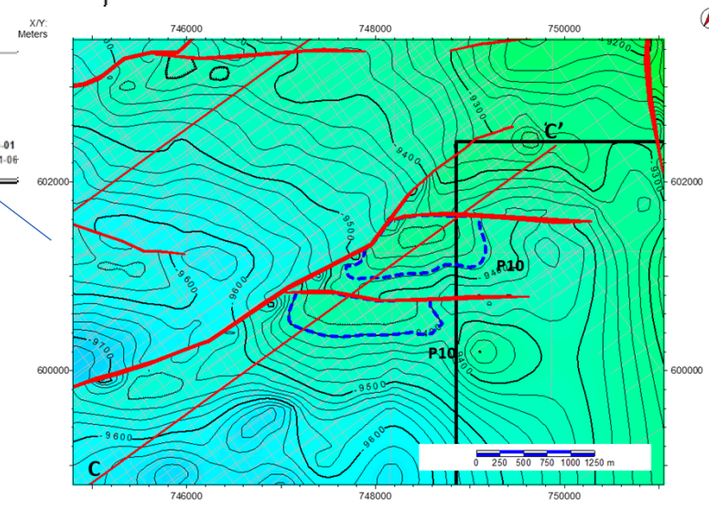






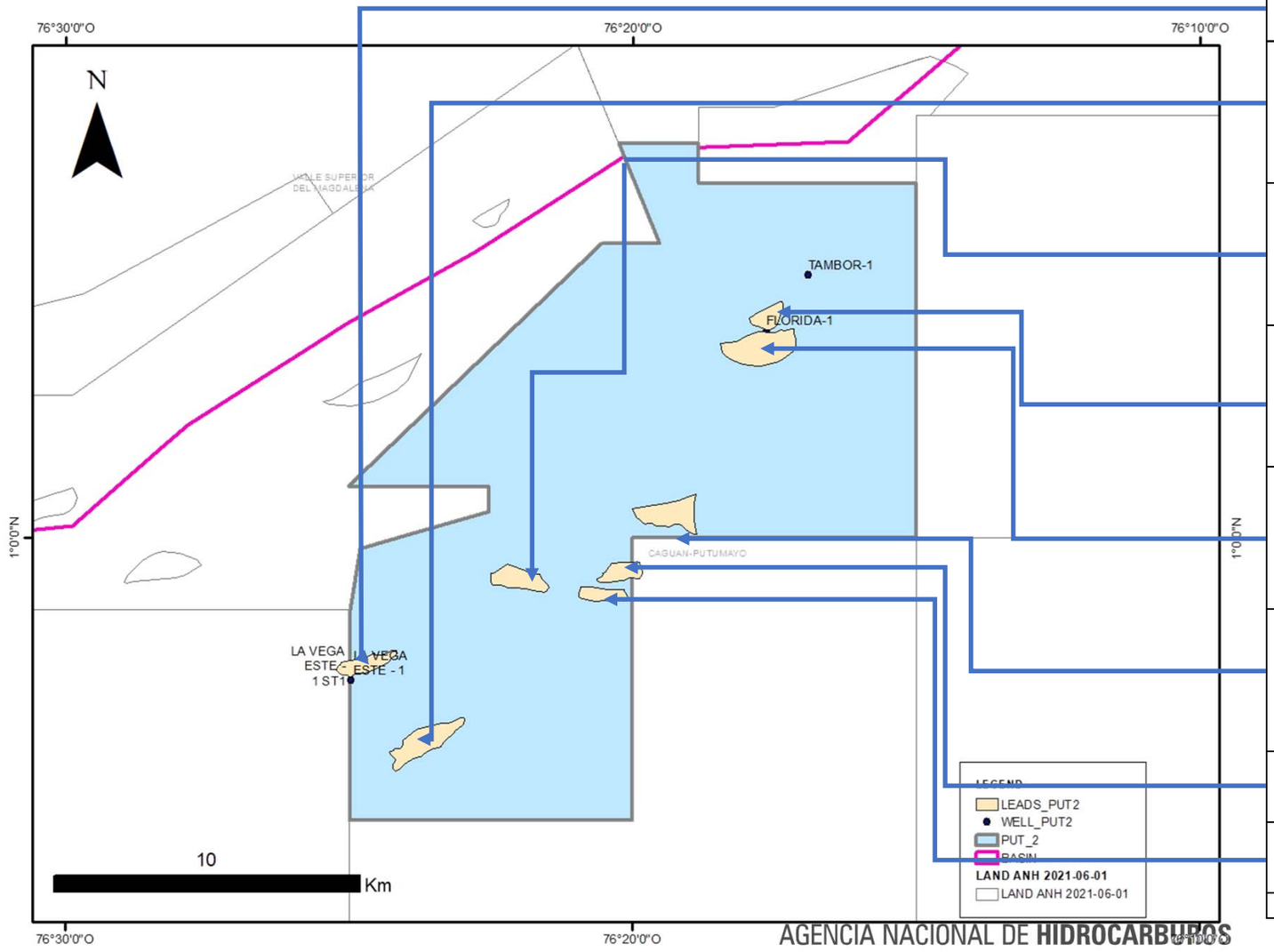


TRAP: monocline against reverse fault
LATERAL SEAL: Juxtaposition shale levels Villeta Fm. and Rumiyaco Fm.
VERTICAL SEAL: Shale levels Villeta Fm., Rumiyaco Fm.
SOURCE: M1, M2, A, B, C levels Villeta Formation.
MAIN RISK: lateral seal



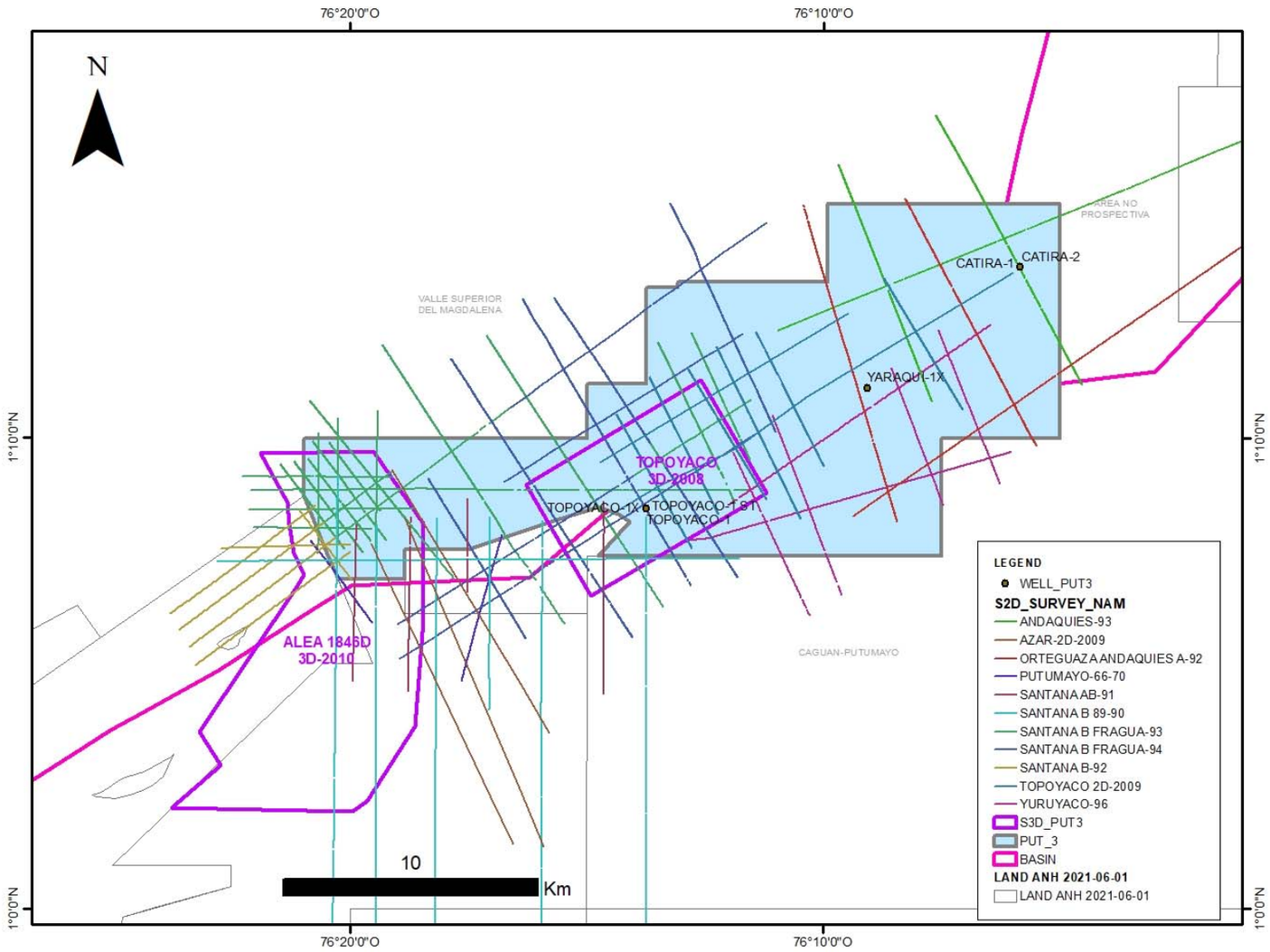
RONDA COLOMBIA 2021

Resources



LEAD NAME	TRAP TYPE	UNIT	PETROPHYSICAL PARAMETERS						º API	RESOURCES (MMbl/BCF)
				AREA (Acres)	Ø	NET PAY	So	Bo		TOTAL
La Vega E	Anticline against reverse fault	Villeta N	P90	23.7	0.1	8	0.70	1.11	15°API	0.093
			P50	109.8	0.14	10	0.75	1.11		0.806
			P10	197.6	0.16	12	0.79	1.11		2.095
La Vega S	Anticline against reverse fault	Villeta N	P90	42.8	0.1	8	0.70	1.11	15°API	0.168
			P50	214.1	0.14	10	0.75	1.11		1.571
			P10	385.4	0.16	12	0.79	1.11		4.086
		Villeta U	P90	43.5	0.12	35	0.65	1.08	27°API	0.853
			P50	216.7	0.14	40	0.70	1.08		6.102
			P10	390	0.18	45	0.75	1.08		17.019
La Vega NE	Anticline against reverse fault	Villeta N	P90	34.1	0.1	8	0.70	1.11	15°API	0.133
			P50	122	0.14	10	0.75	1.11		0.895
			P10	219.6	0.16	12	0.79	1.11		2.328
		Villeta U	P90	34.1	0.12	35	0.65	1.08	27°API	0.669
			P50	141.8	0.14	40	0.70	1.08		3.993
			P10	255.2	0.18	45	0.75	1.08		11.137
Florida	Anticline against reverse fault	Villeta N	P90	22.7	0.1	8	0.70	1.11	15°API	0.089
			P50	89.1	0.14	10	0.75	1.11		0.654
			P10	160.4	0.16	12	0.79	1.11		1.700
		Villeta U	P90	19.3	0.12	35	0.65	1.08	27°API	0.378
			P50	81.5	0.14	40	0.70	1.08		2.295
			P10	146.8	0.18	45	0.75	1.08		6.406
Florida S	Anticline against reverse fault	Villeta N	P90	55	0.1	8	0.70	1.11	15°API	0.215
			P50	197.9	0.14	10	0.75	1.11		1.452
			P10	356.1	0.16	12	0.79	1.11		3.775
		Villeta U	P90	54.4	0.12	35	0.65	1.08	27°API	1.067
			P50	282.7	0.14	40	0.70	1.08		7.960
			P10	508.9	0.18	45	0.75	1.08		22.208
Florida SW	Anticline against reverse fault	Villeta N	P90	22.2	0.1	8	0.70	1.11	15°API	0.009
			P50	108	0.14	10	0.75	1.11		0.793
			P10	194.4	0.16	12	0.79	1.11		2.061
		Villeta U	P90	40.6	0.12	35	0.65	1.08	27°API	0.796
			P50	202.4	0.14	40	0.70	1.08		5.699
			P10	364.4	0.18	45	0.75	1.08		15.902
El Trebol N	Anticline against reverse fault	Villeta U	P90	21.4	0.12	35	0.65	1.08	27°API	0.420
			P50	95.3	0.14	40	0.70	1.08		2.684
			P10	171.5	0.18	45	0.75	1.08		7.484
El Trebol S	Anticline against reverse fault	Villeta U	P90	22.3	0.12	35	0.65	1.08	27°API	0.437
			P50	81.2	0.14	40	0.70	1.08		2.286
			P10	146.2	0.18	45	0.75	1.08		6.380
										37.191

AREA 3 - Database



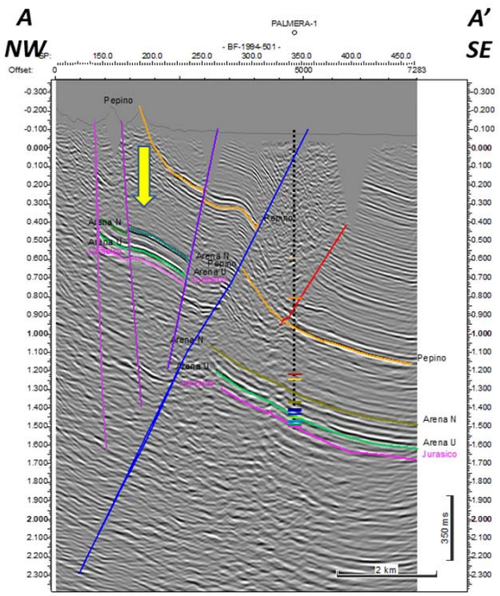
3D SURVEY	AREA_TOTAL	AREA_INSIDE
ALEA 1846D 3D-2010	86.1	17.7
TOPOYACO 3D-2008	40.8	34.0
Total Inside		***51.68***

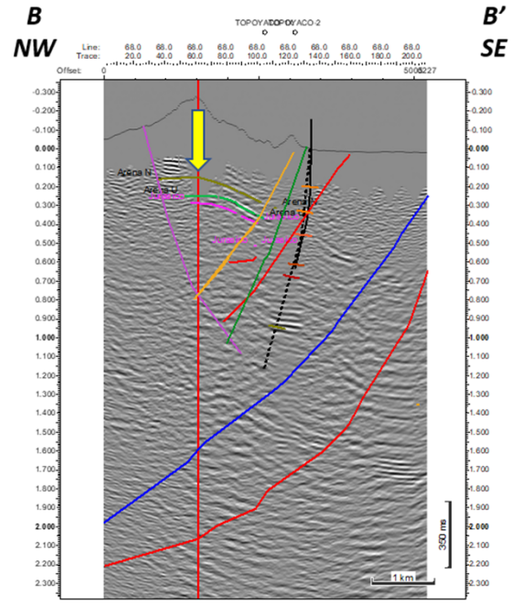
SURVEY	LINES	TOTAL LENGTH	LENGTH INSIDE
ANDAQUIES-93	3	44.8	24.9
AZAR-2D-2009	3	39.0	6.5
ORTEGUAZA ANDAQUIES A-92	3	67.1	28.6
PUTUMAYO-66-70	2	10.0	0.5
SANTANA AB-91	4	23.6	5.7
SANTANA B 89-90	8	157.6	14.7
SANTANA B FRAGUA-93	24	148.1	108.7
SANTANA B FRAGUA-94	10	103.7	47.0
SANTANA B-92	6	37.5	5.1
TOPOYACO 2D-2009	9	73.3	73.0
YURUYACO-96	6	51.6	42.8
Total general	***78***	***756.38***	***357.48***

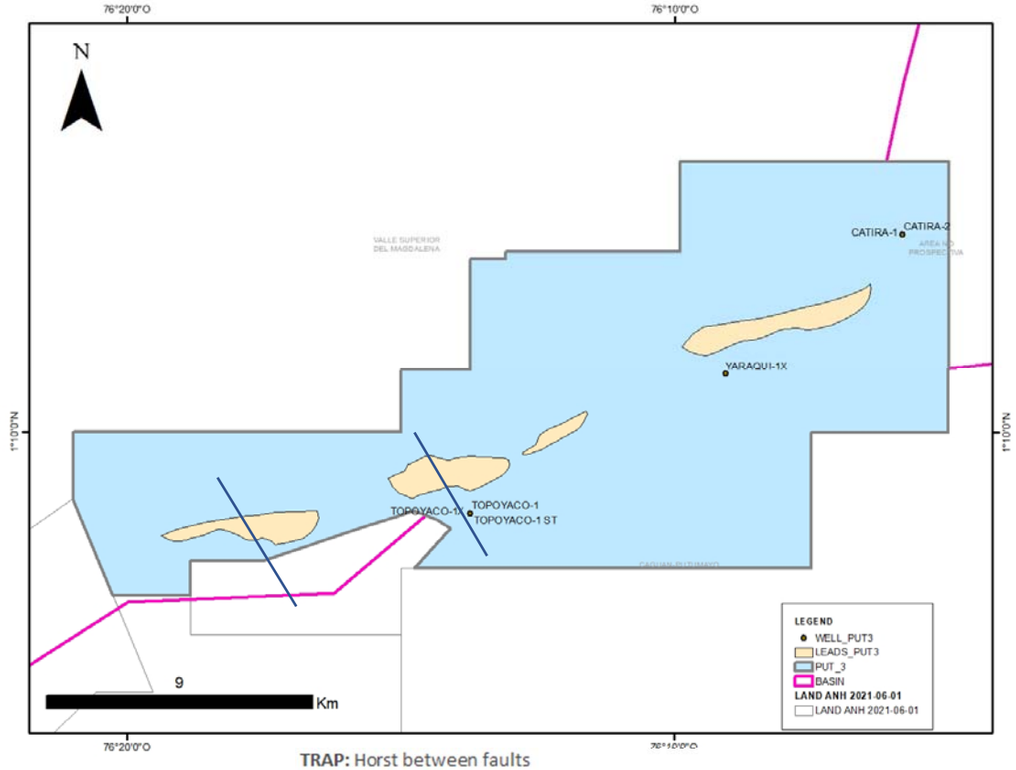
WELL_NAME	RTE	TD	WELL_SPUD
CATIRA-1	905	5327	22/10/1993
CATIRA-2	905	5120	17/02/1994
TOPOYACO-1X	1048.7	6156	02/08/2010
TOPOYACO-1	1047	6308	02/08/2010
TOPOYACO-1 ST	1047.7	6738	23/10/2010
YARAQUI-1X	922	10651	31/08/2011

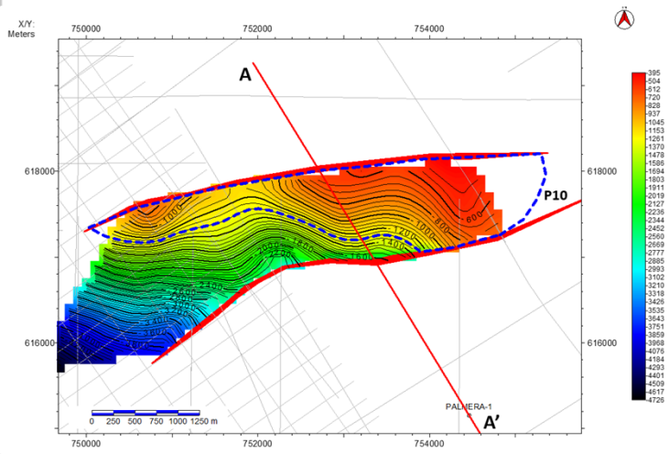
- Seismic 3D (2 Programs, 52 Km2)
- Seismic 2D (78 Lines, 357 Km)
- Wells 5

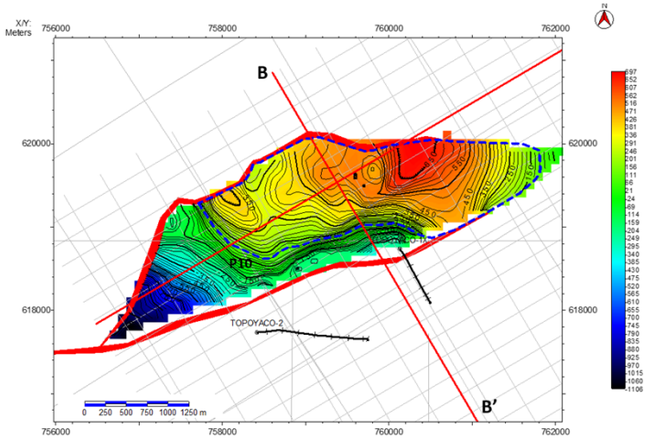
AREA 3 - Prospectivity





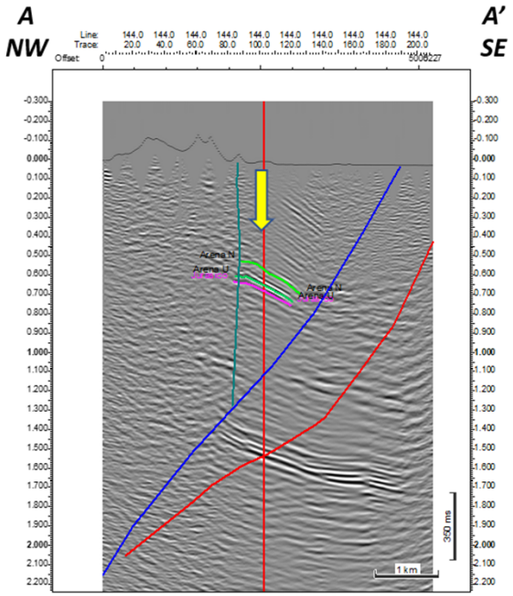


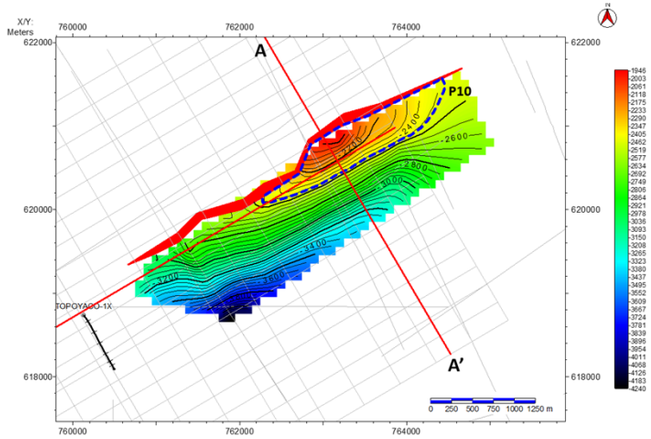


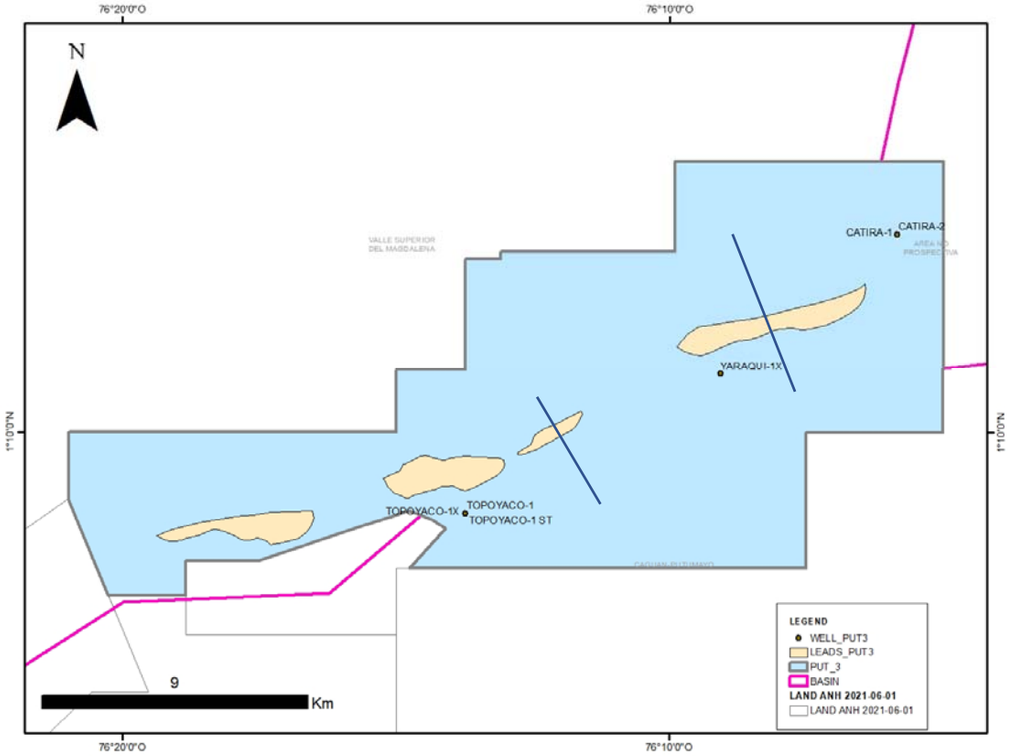


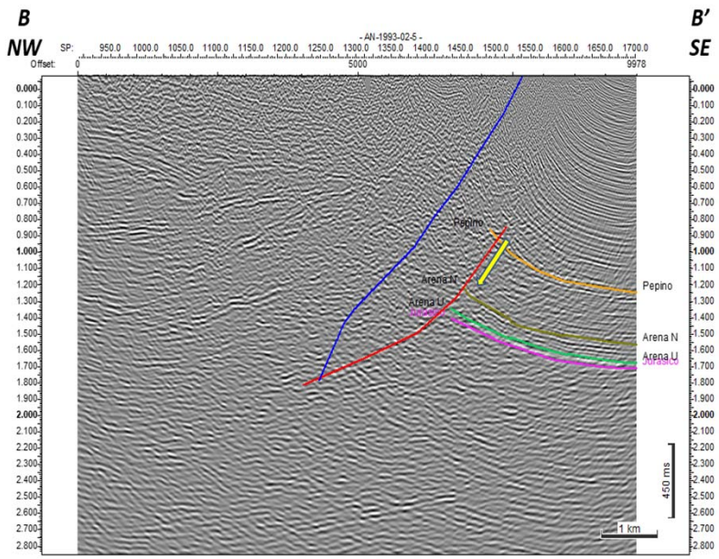
TRAP: Horst between faults
LATERAL SEAL: Juxtaposition shale levels Villeta Fm., Rumiyaco Fm.
VERTICAL SEAL: Shale levels Villeta Fm., Rumiyaco Fm.
SOURCE: M1, M2, A, B, C levels Villeta Formation.
MAIN RISK: Biodegradation

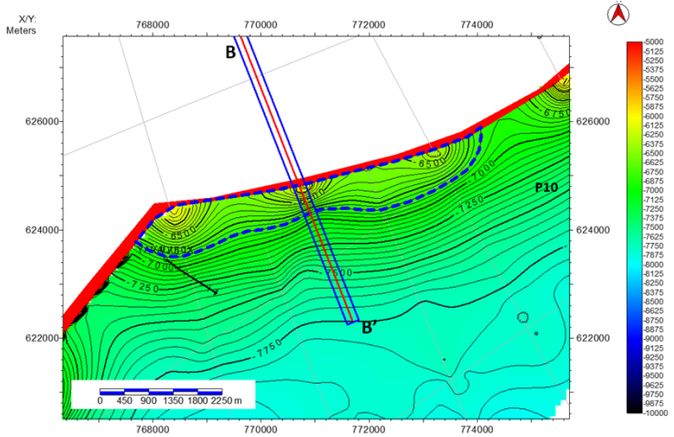
AREA 3 - Prospectivity







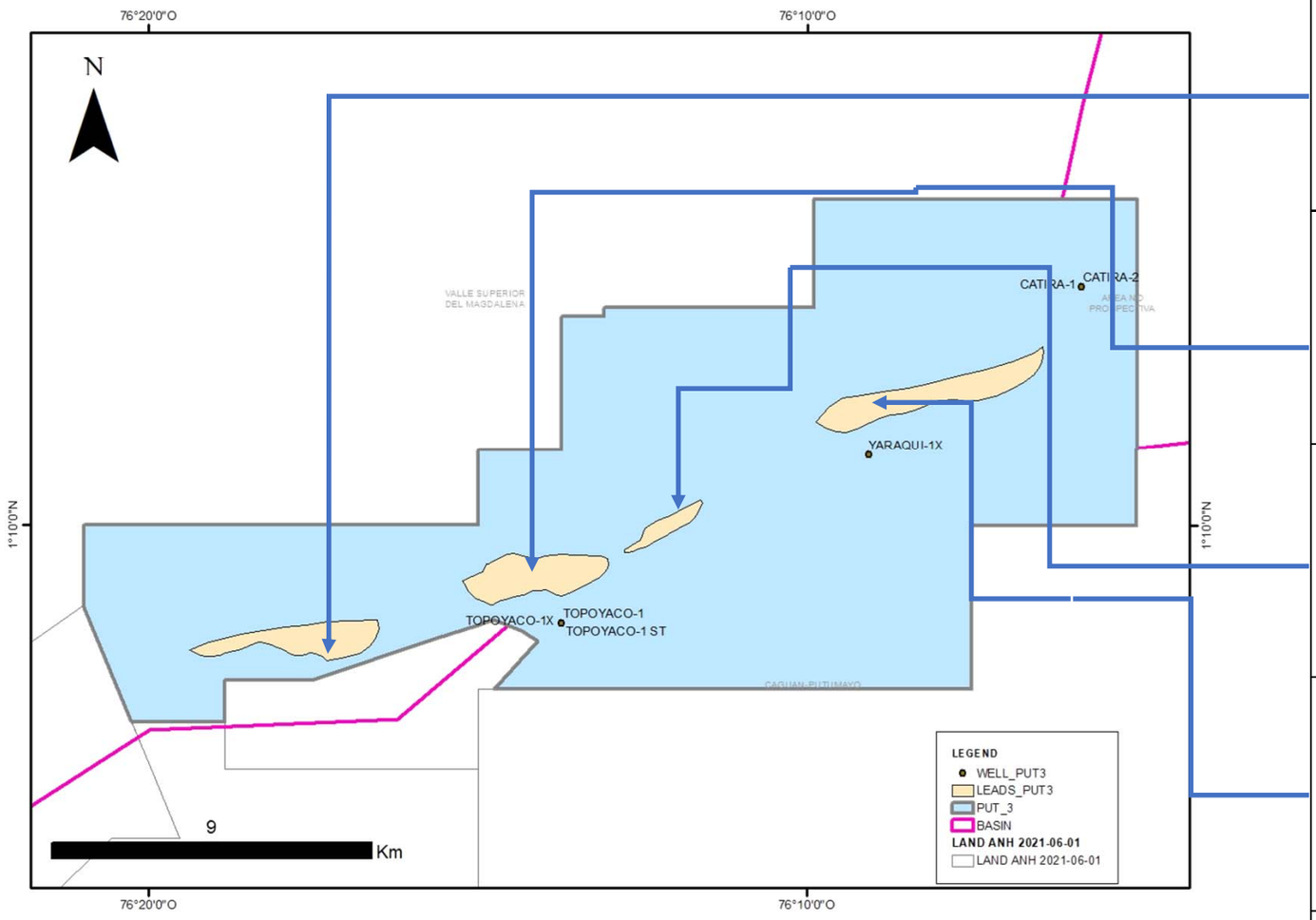




TRAP: Horst between faults
LATERAL SEAL: Juxtaposition shale levels Villeta Fm., Rumiyaco Fm.
VERTICAL SEAL: Shale levels Villeta Fm., Rumiyaco Fm.
SOURCE: M1, M2, A, B, C levels Villeta Formation.
MAIN RISK: Biodegradation

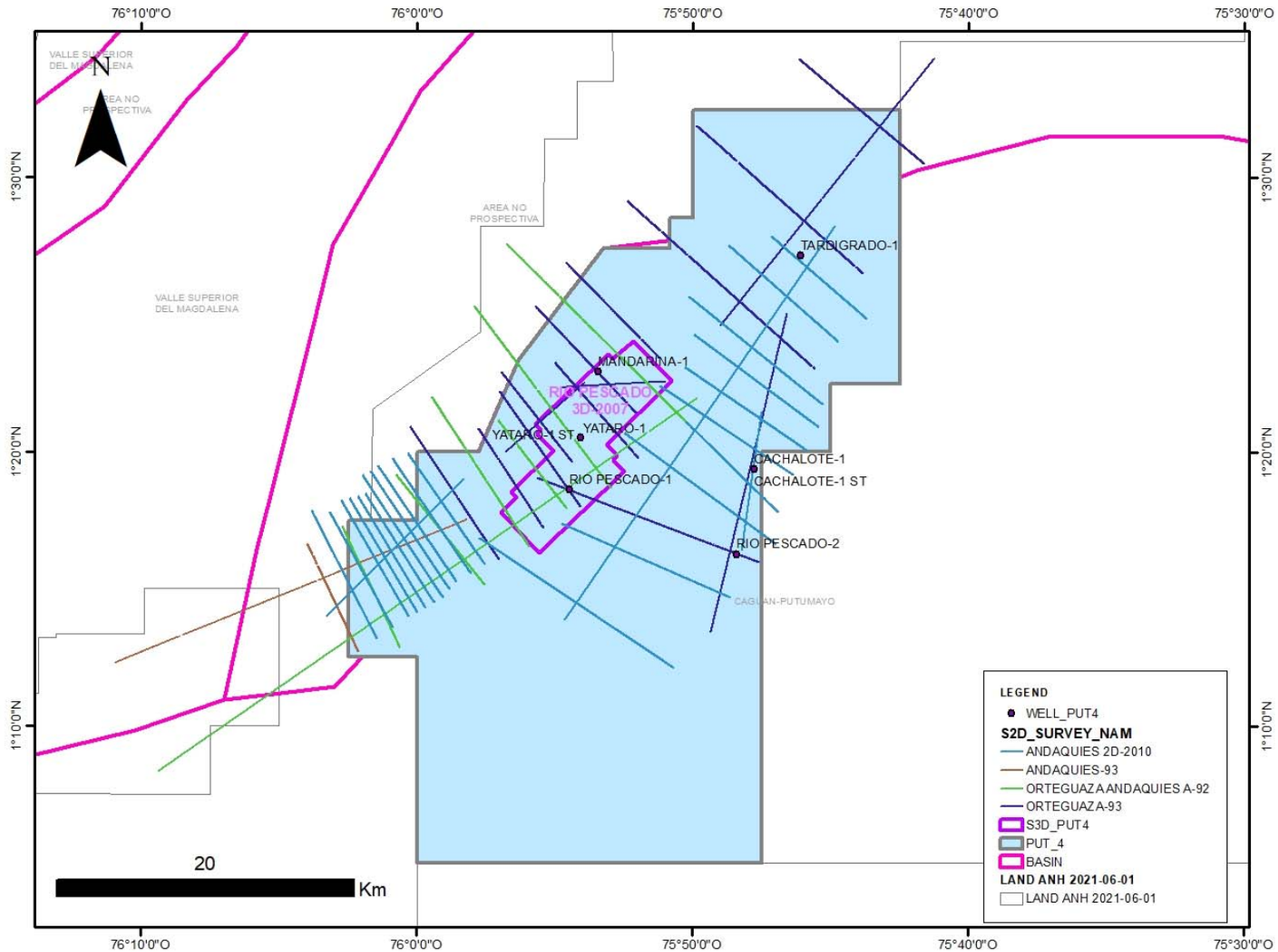
TRAP: Monocline against reverse fault
LATERAL SEAL: Juxtaposition shale levels Villeta Fm. and Precretaceos rocks
VERTICAL SEAL: Shale levels Villeta Fm., Rumiyaco Fm.
SOURCE: M1, M2, A, B, C levels Villeta Formation.
MAIN RISK: Trap Presence

Resources



LEAD NAME	TRAP TYPE	UNIT	PETROPHYSICAL PARAMETERS						º API	RESOURCES (MMbl/BCF)
				AREA (Acres)	Ø	NET PAY	So	Bo		TOTAL
Topoyaco A	Horst among faults	Villeta N	P90	91.7	0.1	8	0.70	1.11	15°API	0.359
			P50	458.4	0.14	10	0.75	1.11		3.364
			P10	825.2	0.16	12	0.79	1.11		8.748
		Villeta U	P90	73.9	0.12	35	0.65	1.08	27°API	1.449
			P50	369.7	0.14	40	0.70	1.08		10.410
			P10	665.6	0.18	45	0.75	1.08		29.046
		Caballos	P90	60.2	0.12	40	0.65	1.05	27°API	1.388
			P50	301.3	0.14	45	0.70	1.05		9.817
			P10	542.3	0.16	55	0.75	1.05		26.445
Topoyaco B	Horst among faults	Villeta N	P90	103.6	8	0.7	1.11	1.11	15°API	0.405
			P50	518.4	10	0.75	1.11	1.11		3.804
			P10	933.1	12	0.79	1.11	1.11		9.892
		Villeta U	P90	112.2	35	0.65	1.08	1.08	27°API	2.200
			P50	560.9	40	0.7	1.08	1.08		15.794
			P10	1009.7	45	0.75	1.08	1.08		44.062
		Caballos	P90	63.4	40	0.65	1.05	1.08	27°API	1.462
			P50	317.1	45	0.7	1.05	1.08		10.332
			P10	570.7	55	0.75	1.05	1.08		27.830
Topoyaco C	Horst among faults	Villeta N	P90	24.7	0.1	8	0.70	1.11	15°API	0.097
			P50	123.7	0.14	10	0.75	1.11		0.908
			P10	222.6	0.16	12	0.79	1.11		2.360
		Villeta U	P90	20.8	0.12	35	0.65	1.08	27°API	0.408
			P50	104.4	0.14	40	0.70	1.08		2.940
			P10	188	0.18	45	0.75	1.08		8.204
		Caballos	P90	20	0.12	40	0.65	1.05	27°API	0.461
			P50	100.3	0.14	45	0.70	1.05		3.268
			P10	180.6	0.16	55	0.75	1.05		8.807
Topoyaco D	monocline against reverse fault	Villeta N	P90	124.2	0.1	8	0.70	1.11	15°API	0.486
			P50	621	0.14	10	0.75	1.11		4.557
			P10	1117.8	0.16	12	0.79	1.11		11.850
		Villeta U	P90	65.1	0.12	35	0.65	1.08	27°API	1.277
			P50	325.7	0.14	40	0.70	1.08		9.171
			P10	586.3	0.18	45	0.75	1.08		25.585
		Caballos	P90	46.3	0.12	40	0.65	1.05	27°API	1.067
			P50	231.5	0.14	45	0.70	1.05		7.543
			P10	416.8	0.16	55	0.75	1.05		20.325
										81.910

AREA 4 - Database



3D SURVEY	AREA_TOTAL
RIO PESCADO 3D-2007	65.4

SURVEY	LINES	TOTAL LENGTH	LENGTH INSIDE
ANDAQUIES 2D-2010	24	266.8	227.8
ANDAQUIES-93	2	31.3	9.6
ORTEGUAZA ANDAQUIES A-92	7	113.3	80.5
ORTEGUAZA-93	15	178.5	156.5
Total general	***48***	***589.87***	***474.43***

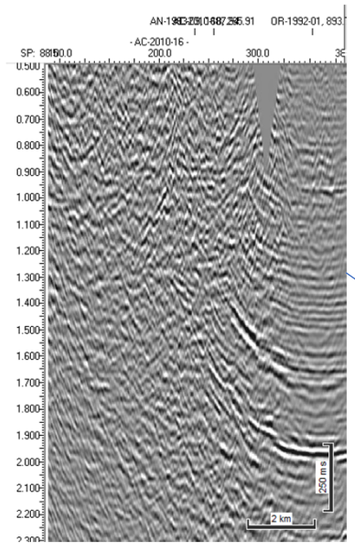
WELL_NAME	RTE	TD	WELL_SPUD
RIO PESCADO-1	959	7286	23/06/1967
RIO PESCADO-2	863	5664	02/08/1967
MANDARINA-1	1048	3892	26/05/2006
YATARO-1	928	6640	25/06/2008
YATARO-1 ST	928	6714	02/08/2008
CACHALOTE-1	846	5945	21/12/2011
CACHALOTE-1 ST	846	6133	04/01/2012
TARDIGRADO-1	851.3	4594	22/02/2012

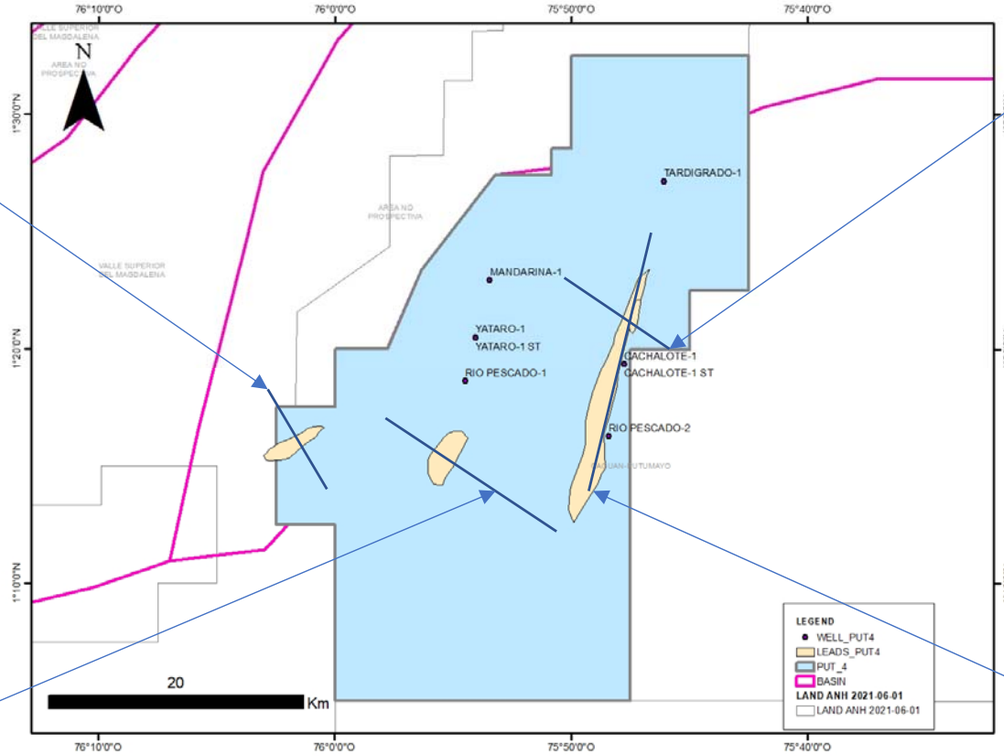
- Seismic 3D (1 Program, 65 Km2)
- Seismic 2D (48 Lines, 474 Km)
- Wells 6

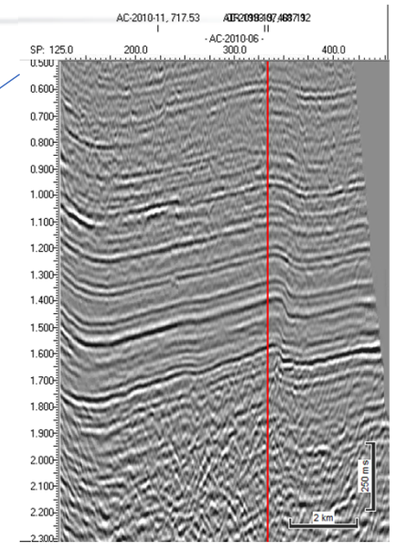
RONDA COLOMBIA 2021 AREA 4 - Prospectivity

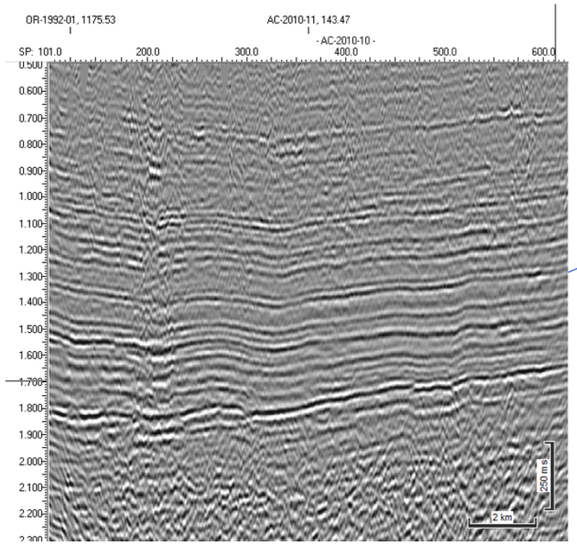
ANH AGENCIA NACIONAL DE HIDROCARBUROS

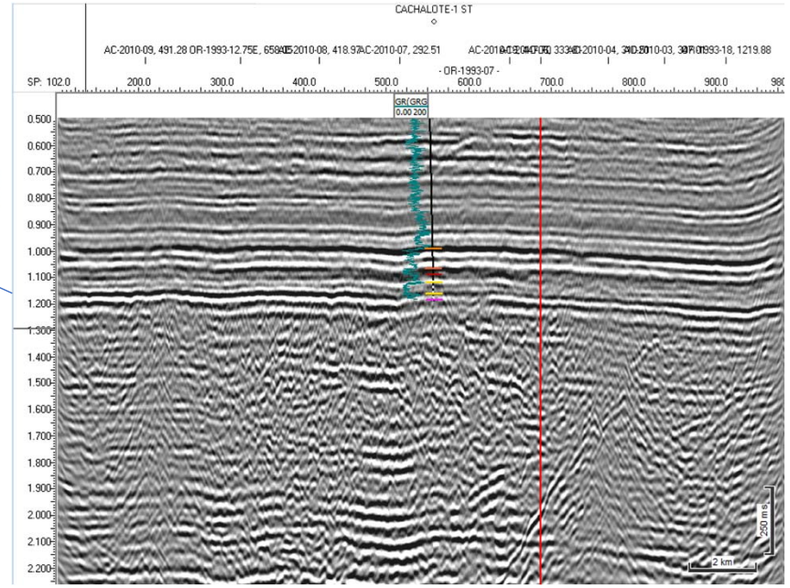
El futuro es de todos | Minenergía











Conclusions

- Four blocks remain within the Putumayo basin to be taken in this competitive process.
- In areas 2 and 3 that have already been analyzed there are a total of one hundred and ten and nine million barrels OOIP
- Area 1 can be evaluated taking as analogous the discovery of Lumbaqui block in Ecuador
- Area 4 has possibilities of traps in the foothill section with Villeta and Caballos as possible reservoirs and in anticlines within the foreland section with Rumiyaco Neme sandstone as main reservoir.

Thanks You