

COLOMBIA ROUND 2021

COLOMBIA ROUND 2021: MIDDLE MAGDALENA VALLEY BASIN AND SINU SAJN JACINTO UNDEVELOPED ALREADY DISCOVERED RESERVOIRS & INCORPORATED

Incorporated SSJS 1-3 (Floresanto)

Geological Framework Sinu – San Jacinto

Available Data

Seismic Interpretation

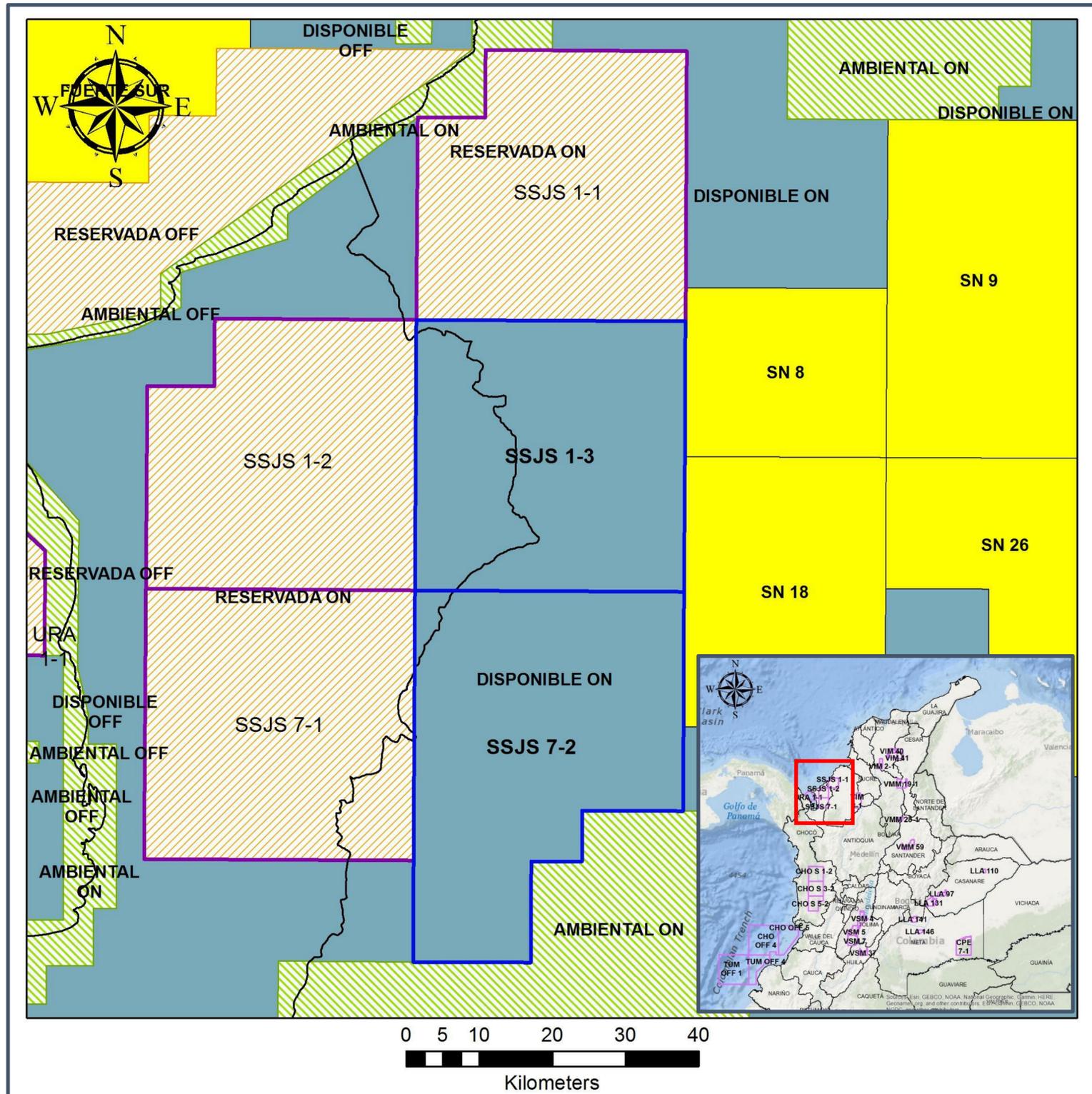
Incorporated VMM 55

Incorporated VMM 14-1

Incorporated VMM 65

Incorporated: SSJS 1-3 (Floresanto)

LOCATION SSJS 1-3

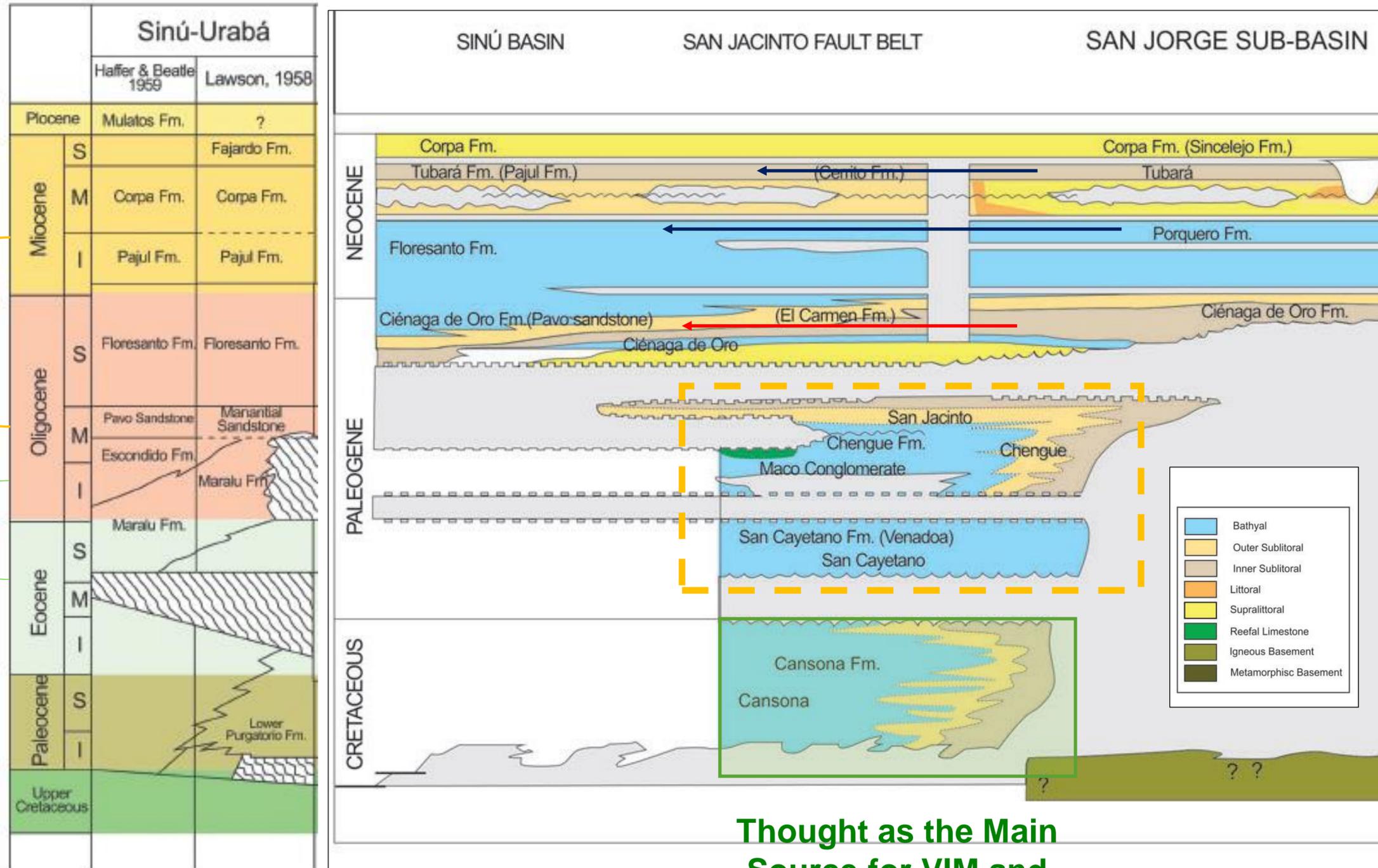


- **Block Areas**
- SSJS 1-3 (135,481 Ha)
- SSJS 7-2 (148,324 Ha)
- **Departments**
- Córdoba & Antioquia

GEOLOGICAL FRAMEWORK SINÚ – SAN JACINTO

STRATIGRAPHIC SETTING

Reservoir
Considered as Source
in Jaraguay

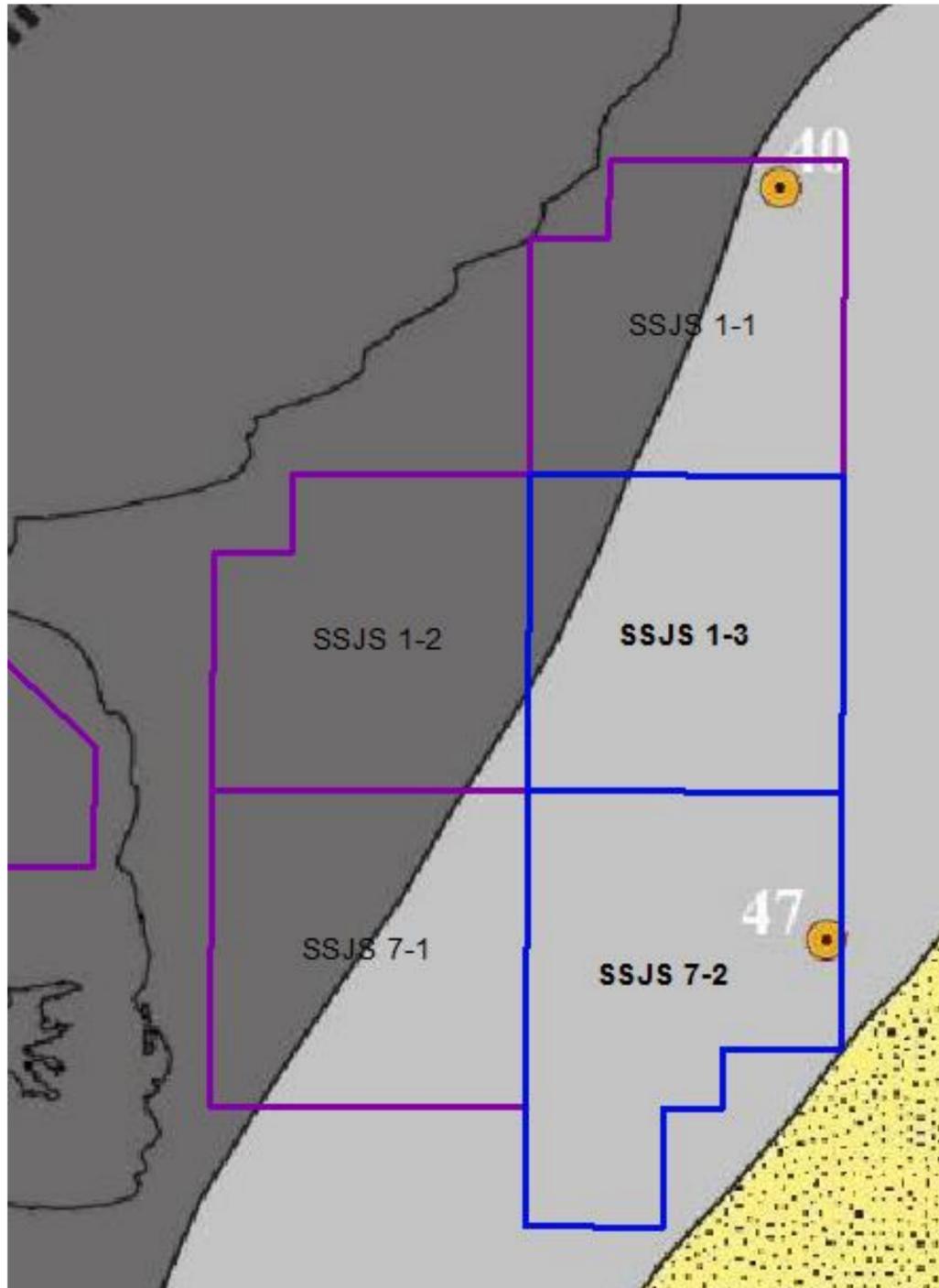


Thought as the Main Source for VIM and SSJ

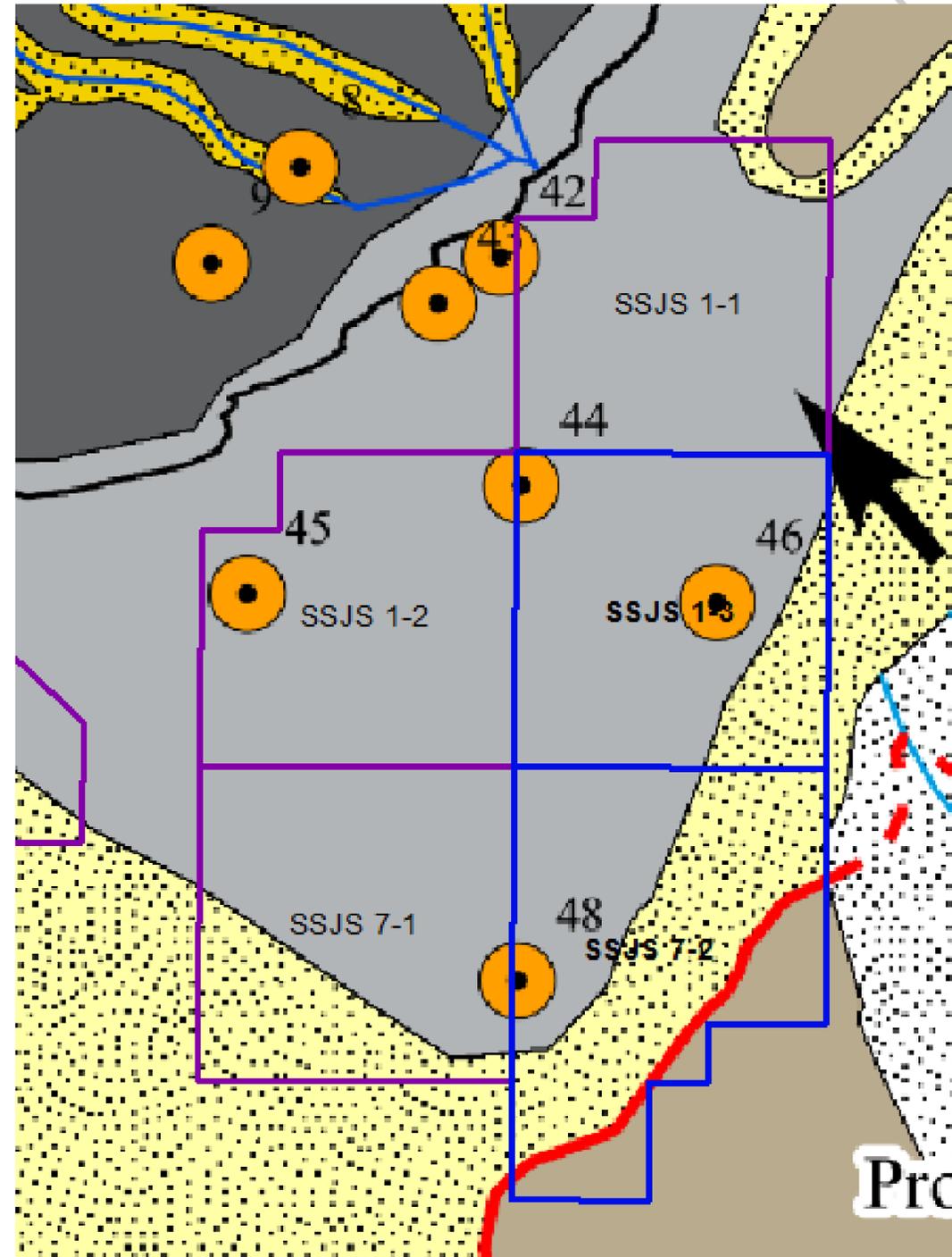
From Lower Magdalena to SSJ

- Fluvial facies of **Tubará Fm.** remains relatively the same (Jaraguay tested production at sandstones of this level)
- Deepest facies to the ones related to the **Porquero Fm.** will be found in the **Floresanto Fm** in the Sinu Basin
- Sandstones of deeper facies to the ones related to the Cienaga De Oro Fm. are known as **Pavo sandstones** in the Sinu basin

FACIES MAPS



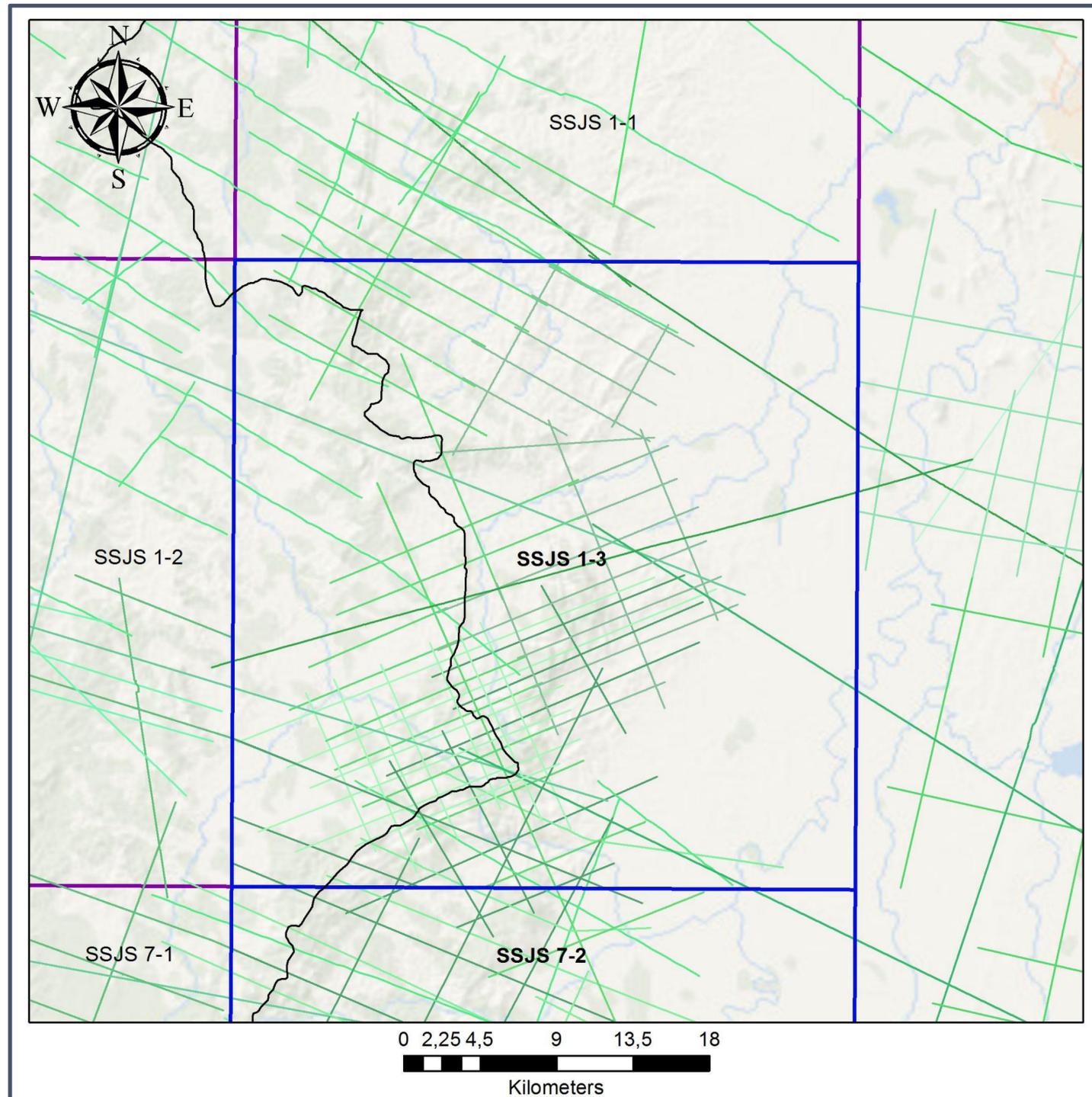
■ Oligocene



■ Late Miocene - Early Pliocene

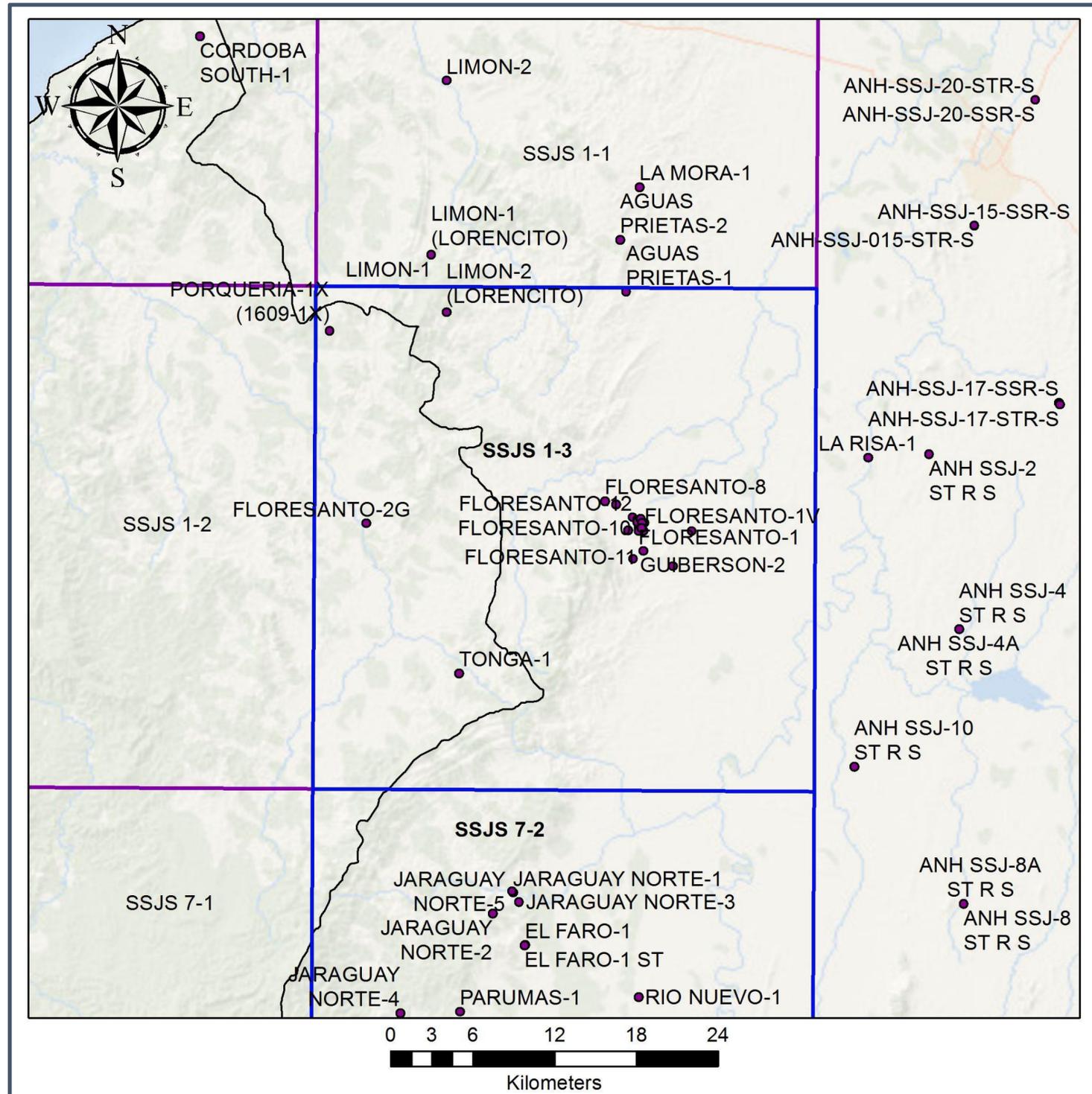
LEYENDA			
	Área emergida		Carbonatos
	Ambiente transicional (delta, llanuras mareales, foreshore y shoreface)		
	Ambiente marino somero (offshore-plataforma)		
	Ambiente marino profundo (talud-llanura abisal)		
	Abanicos deltaicos y submarinos		
	Abanicos aluviales, depósitos fluviales		Falla normal
	Límite área de estudio		Falla inversa
	Dirección de aporte de sedimentos		Falla inferida
	Drenajes		Patrones en Onlap a partir de sísmica

DATABASE SEISMIC: SSJS 1-3 FLORESANTO



- **SEISMIC**
- **2D Seismic Surveys:**
 - Sinú Sur 2D – 2008
 - Sinú San Jacinto Sur 2D - 2008
 - Cordoba Floresanto – 89
 - Floresanto 79
 - Urabá – 67
 - NW Colombia – 84
 - Sinú1 2D – 2014
 - Sinú3 2D - 2014
 - Sinú1 2D – 2015
 - Urabá Sinú – 80
- **Total Length (1,047 Km)**

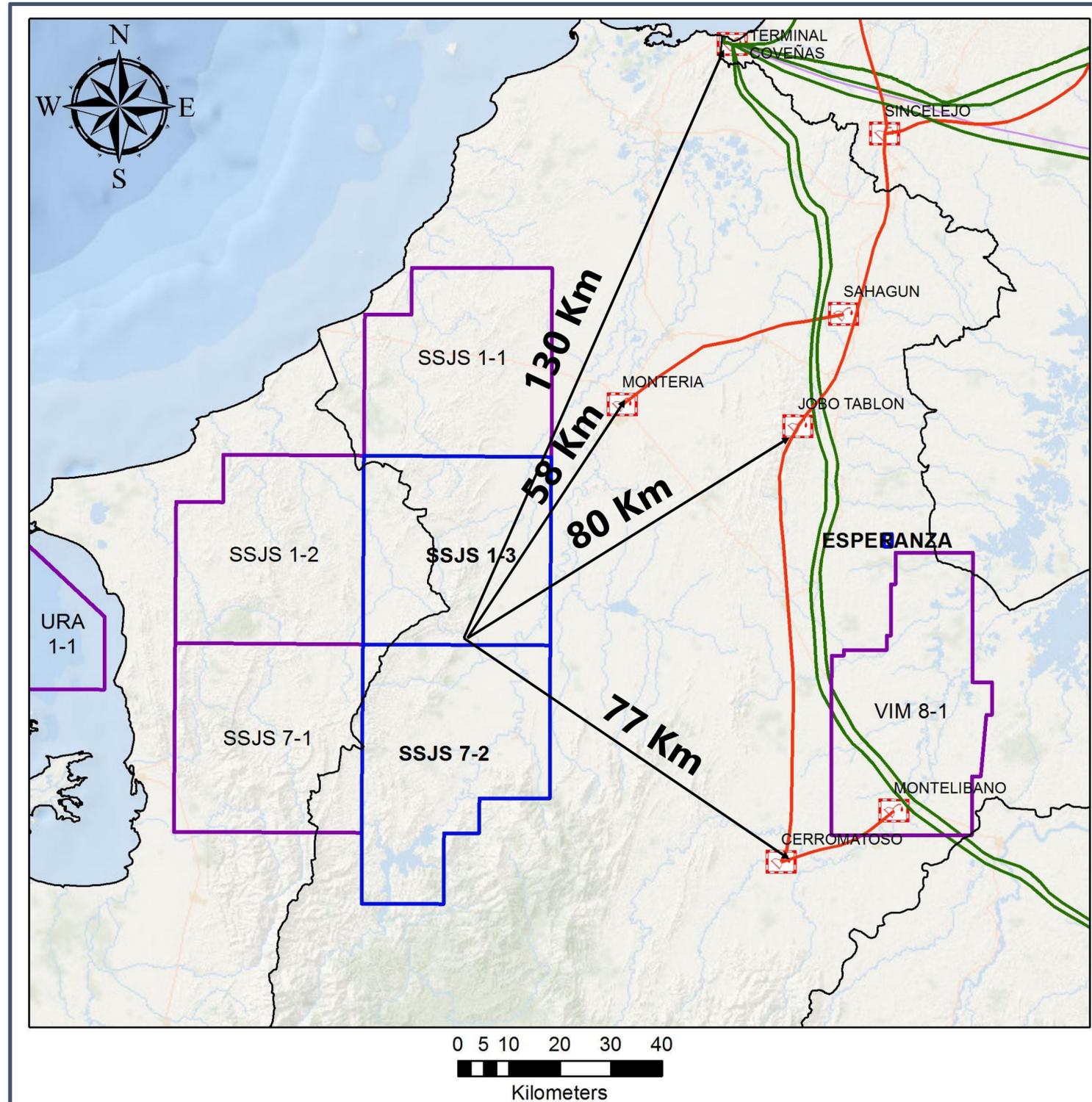
DATABASE WELLS SSJS 1-3



20 Wells

Well	Data Available	Year	TD (ft)
Tonga - 1	Yes	2018	7,910
Porquería 1X	Yes	1969	14,512
Limon - 1 (Lorencito)	No	Unknown	Unknown
Limon - 2 (Lorencito)	No	Unknown	Unknown
Delta - 2	No	1957	Unknown
Floresanto - 1	Yes	1944	6,938
Floresanto - 2	Yes	1945	1,985
Floresanto - 3	Yes	1945	2,065
Floresanto - 4	Yes	1945	1,504
Floresanto - 5	Yes	1945	1,330
Floresanto - 6	Yes	1946	1,505
Floresanto - 7	Yes	1946	2,217
Floresanto - 8	Yes	1946	2,175
Floresanto - 9	Yes	1946	1,203
Floresanto - 10	Yes	1947	10,876
Floresanto - 11	Yes	1946	1,813
Floresanto - 12	Yes	1946	1,675
Floresanto - 1G	No	1951	Unknown
Floresanto - 2G	No	1951	Unknown
Guiberson - 1	No	1951	Unknown

INFRASTRUCTURE SSJS 1-3



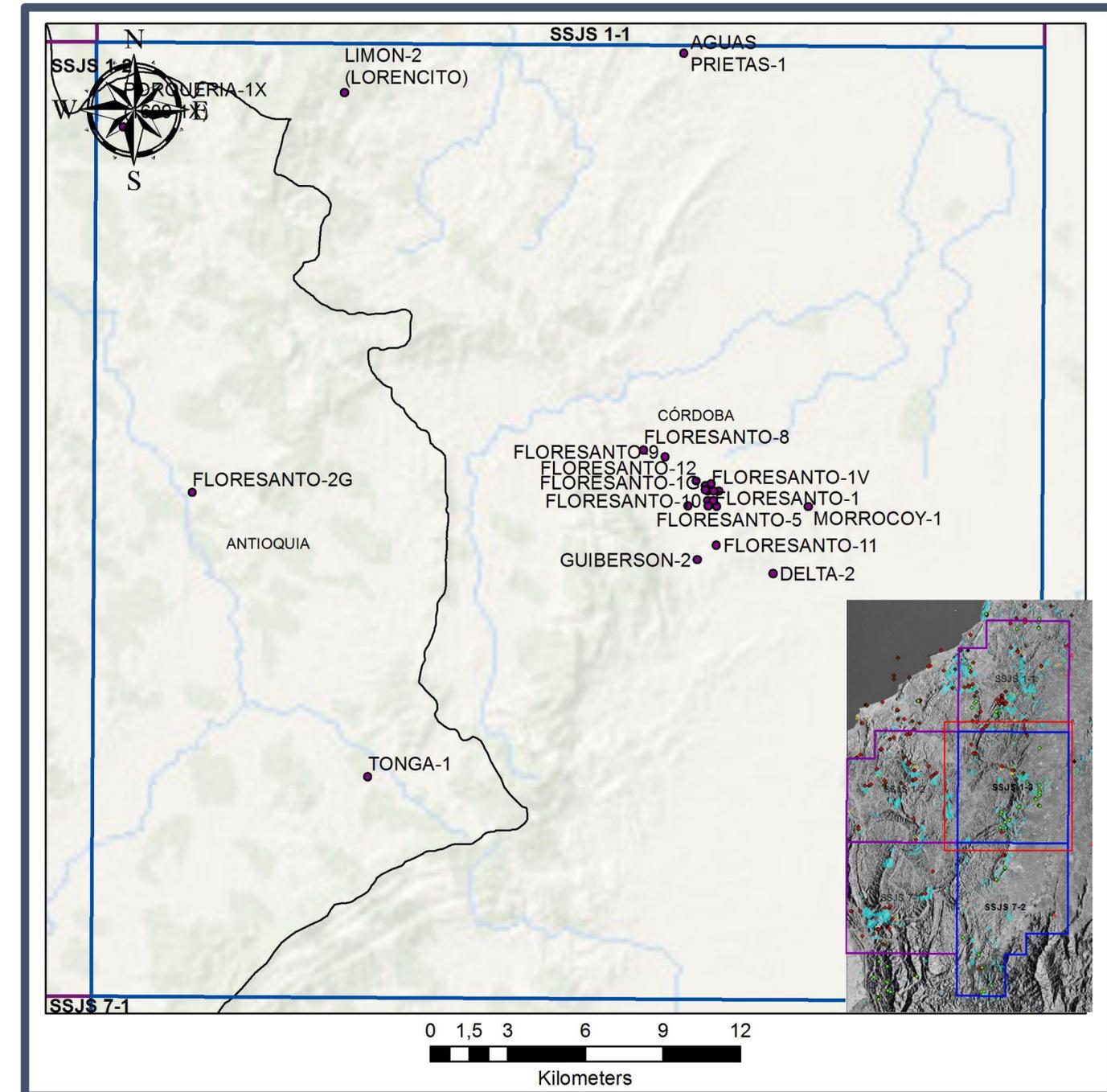
Main Infrastructure nearby

- **Oil Pipeline**
- Terminal Coveñas (130 Km)
- **Gas Pipeline**
- Monteria (58 Km)
- Jobo Tablón (80 Km)
- Cerromatoso (77 Km)

FLORESANTO: GENERALITIES

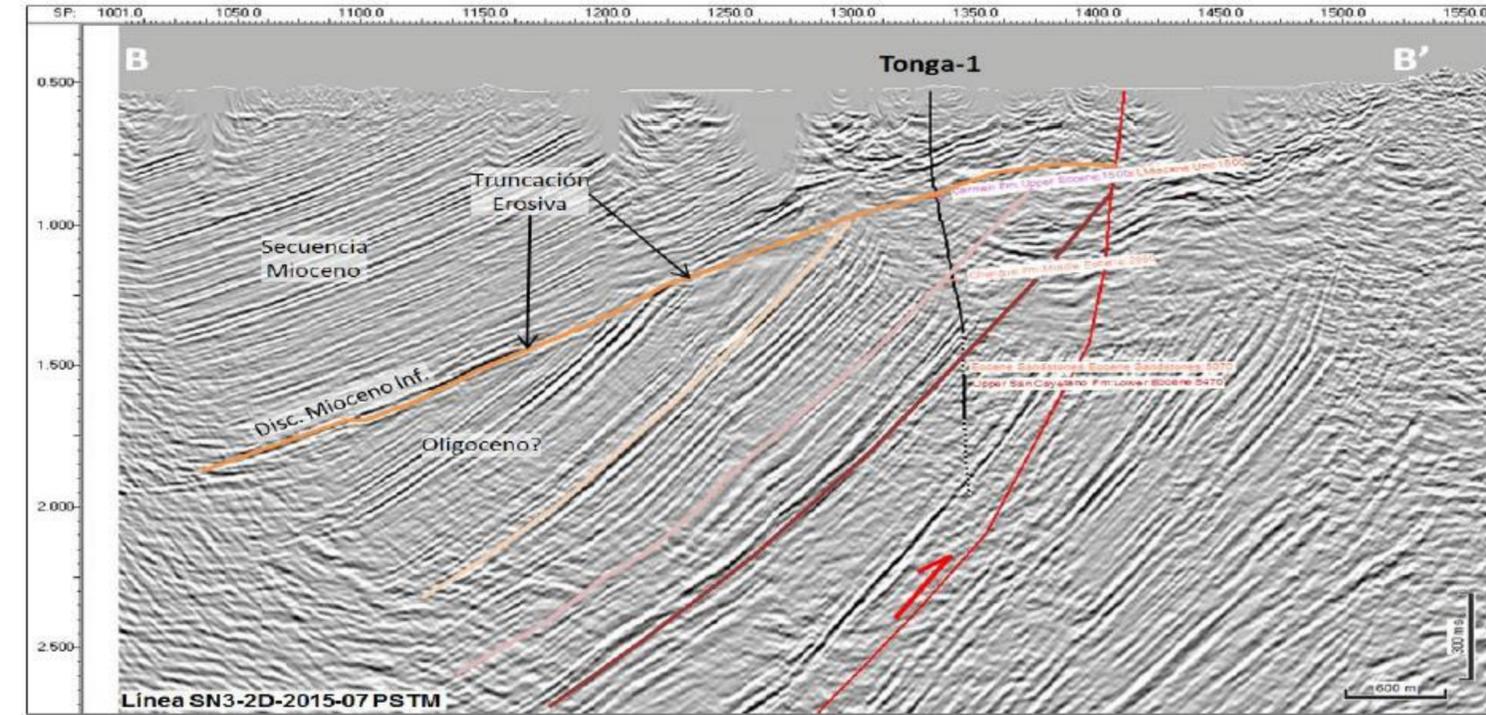
- Twelve (12) wells were drilled from May of 1945 to August of 1947.
- Most of them were drilled by Socony-Mobil and classified as producer wells. However, **formal production** was only declared in the wells **Floresanto 1** and **Floresanto 6**
- Ten (10) of the twelve (12) wells were shallow (an average of 1,541') and the other two (2): **Floresanto 1** and **Floresanto 10**, reached total depths of **6,936'** and **10,876'**, respectively.
- **Floresanto 1**: Oil production from of the Floresanto - Pajuil Fm. (694-614') started in december of 1944. At August of 1945, **28,730 bbls** were produced. (**51° API**)
- **Floresanto 6**: During tests the well produced **42 bbls** in 12 hours (**50° API**)

Taken from Ecopetrol (2000)



Tonga – 1

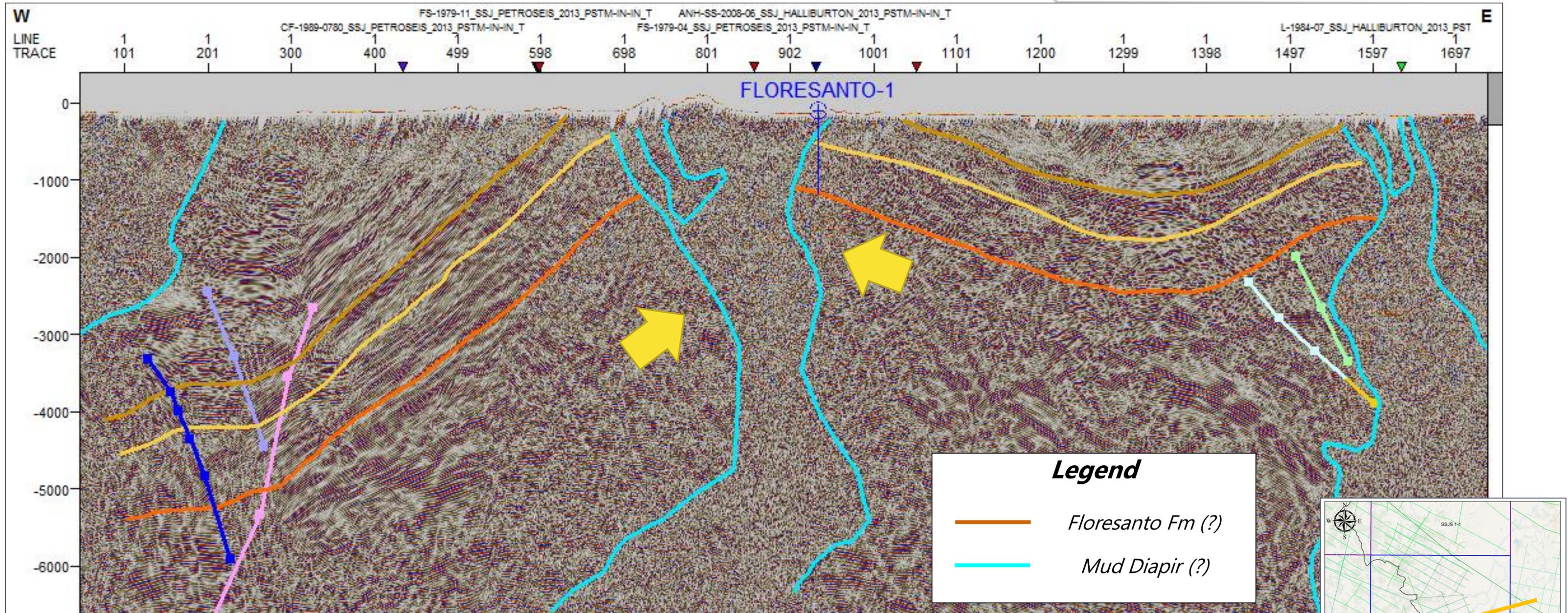
- The well Tonga – 1 was drilled by Gran Tierra Energy in **2018** with a TD of 8000’.
- The well tried to find presence of hydrocarbons in **Eocene sandstones** (Chengue Fm) and characterize units below Miocene discordance
- Despite of finding the reservoir, the shows were not economically viable.
- The well was plugged up and abandoned



FORMACIÓN	TOPES PROGNOSIS			TOPES TENTATIVOS POR MUESTRAS			DIFERENCIA ESTRUCT. (pies)	
	MD (pies)	(TVD) (pies)	TVDss (pies)	MD (pies)	(TVD) (pies)	TVDss (pies)	Mayor (H) TVD'ss	Menor (L) TVD'ss
MIOCENE (PAJUIL/FLORESANTO)	Surface	Surf	345	Surface	Surface	345	--	--
MIOCENO BASAL	941	941	-596	--	--	--	--	--
DISCORDANCIA MIOCENO INFERIOR	1521	1511	-1166	1500	1490	-1145	-21	--
EOCENO TARDÍO (CARMEN)	1521	1511	-1166	1500	1490	-1145	-21	--
EOCENO MEDIO(CHENGUE)	2213	2178	-1833	2980	2920	-2575	--	742
EOCENO INFERIOR (SAN CAYETANO SUPERIOR)	5070	4983	-4638	5470	5385	-5040	--	402
TD	6587	6500	-6155	8000	7910	-7565	--	--

GAS SHOWS		ppm										RATIO'S CALCULATIONS			
Interval (ft)	Lithology	Tot. %	B.G.G	Net %	C ₁	C ₂	C ₃	iC ₄	nC ₄	iC ₅	nC ₅	Wh	Bh	Ch	Type
FORMACIÓN PAJUIL/ FLORESANTO (MIOCENO)															
335 – 344	SST	0.21	0.04	0.17	2131	-	-	-	-	-	-	-	-	-	-
482 – 485	COAL	0.17	0.05	0.12	1709	-	-	-	-	-	-	-	-	-	-
665 – 670	SST	0.17	0.05	0.12	1685	-	-	-	-	-	-	-	-	-	-
707-712	COAL	0.36	0.04	0.32	3613	1	-	-	-	-	-	-	-	-	-
841' – 844'	COAL	0.19	0.15	0.04	1919	-	-	-	-	-	-	-	-	-	-
895' – 900'	SD	0.83	0.68	0.04	8385	-	-	-	-	-	-	-	-	-	-
900' – 1130'	-	-	0.08	-	4451	1	-	-	-	-	-	-	-	-	-
1392' – 1397'	SLTST	1.47	0.08	1.39	14789	45	6	1	1	-	-	-	-	-	-
FORMACIÓN CARMEN (EOCENO TARDÍO) - DISCORDANCIA (MIOCENO INFERIOR)															
1500 - 2980	-	-	0.04	-	4100	-	-	-	-	-	-	-	-	-	-
FORMACIÓN CHENGUE (EOCENO MEDIO)															
2980 - 3350	-	-	0.08	-	5621	20	9	9	2	7	1	-	-	-	-
3370 - 3510	-	-	0.92	-	9194	24	8	1	1	4	1	-	-	-	-
3520 - 3770	SLTST /SD	-	1.66	---	16588	38	8	5	1	2	1	-	-	-	-
3770 - 3940	SLTST/SD	-	0.5	---	5290	14	2	3	-	-	-	-	-	-	-
4001' – 4010	SST	2.0	0.5	1.5	20130	59	18	13	3	6	1	-	-	-	-
4067 – 4073	SST	2.4	0.5	1.9	24139	77	26	22	4	9	2	-	-	-	-
4210 – 4520	SLTST	-	0.96	-	9572	25	6	6	1	3	1	-	-	-	-
4530 – 4760	SST/SLTS T	-	0.86	-	8599	25	7	6	1	3	1	-	-	-	-
4760 – 5160	SLTST	-	0.97	-	9692	29	9	9	1	4	1	-	-	-	-
5293 - 5320	SST	2.43	0.44	1.99	24116	69	27	20	4	10	2	-	-	-	-
FORMACION SAN CAYETANO SUPERIOR (EOCENO INFERIOR)															
5704 - 5709	SST	1.6	0.6	1.0	16024	48	16	12	2	7	2	-	-	-	-
5776 - 5820	SST-SD	1.99	0.68	1.31	19816	55	19	15	3	7	4	-	-	-	-
5842 - 6020	SLTST	-	1.43	-	14195	42	14	11	2	6	1	-	-	-	-
6130 - 6220	SLTST	-	0.82	-	8110	25	9	8	2	5	1	-	-	-	-

SEISMIC INTERPRETATION: FLORESANTO (Dip Line)

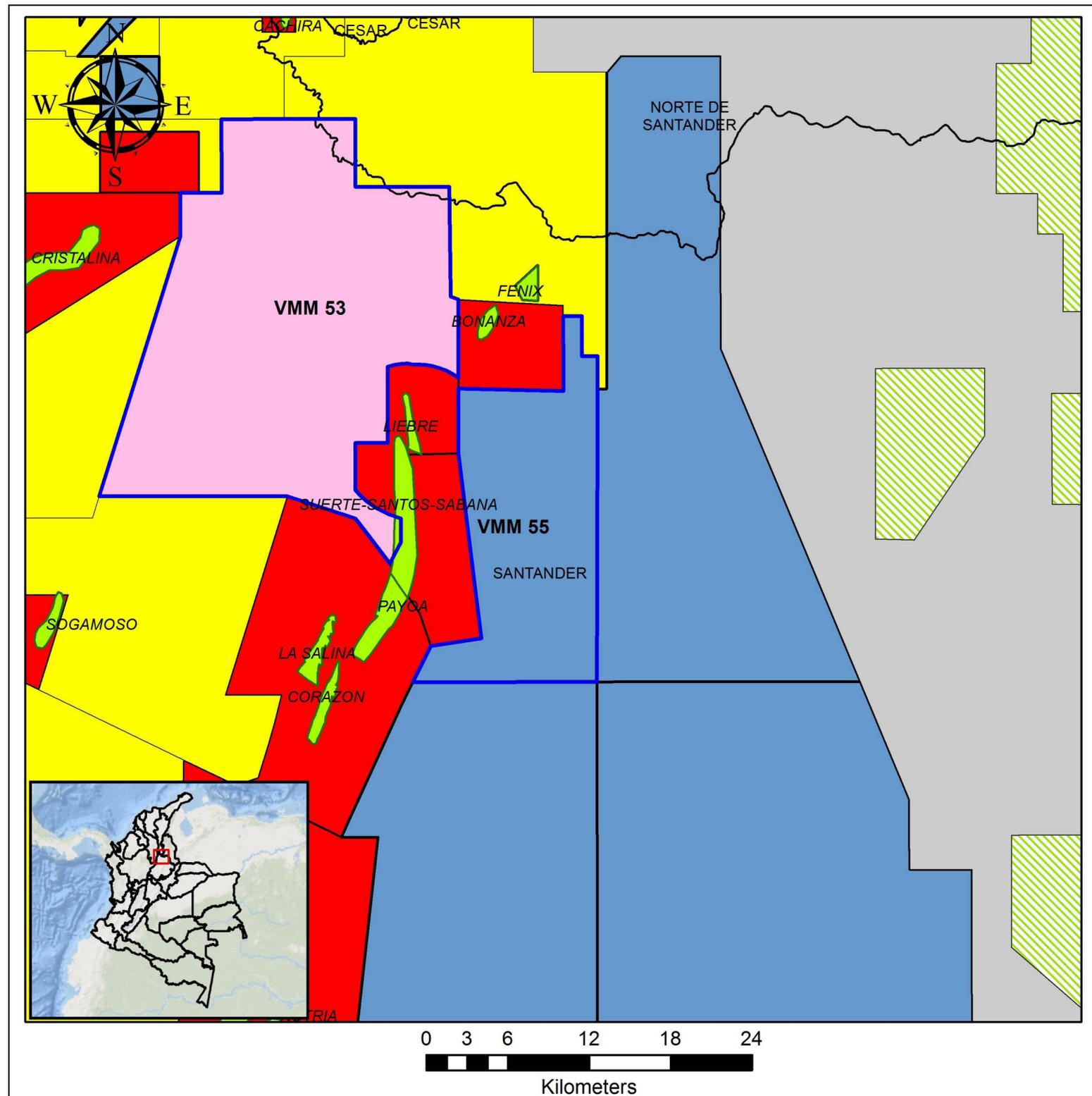


Seismic Dip Line L-1984-09-SSJ

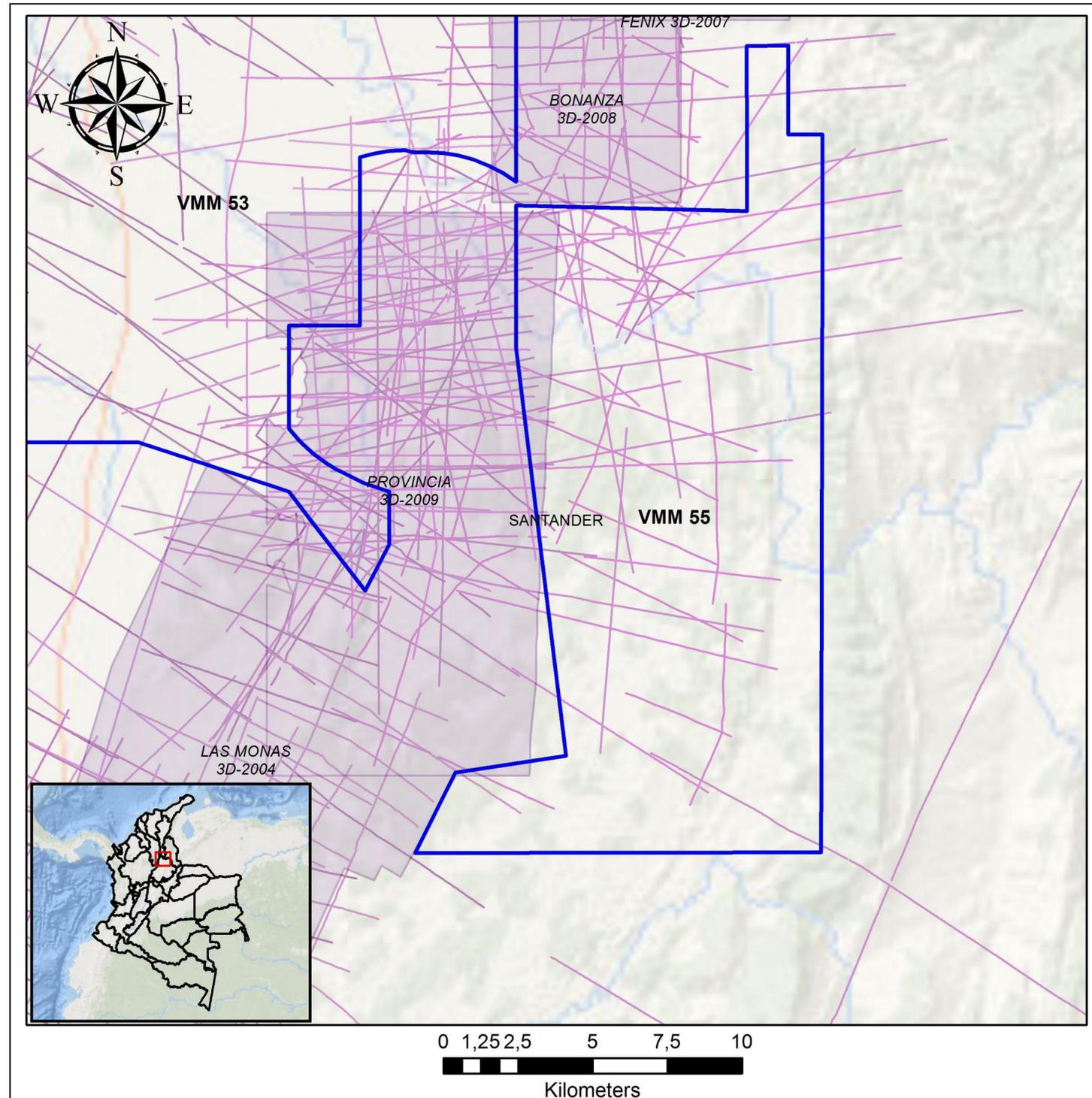


Incorporated: VMM-55

LOCATION VMM-55



- **Block Areas**
- VMM-55 (22,616 Ha)
- **Departments**
- Santander
- **Fields Nearby**
- Fenix
- Bonanza
- Liebre
- Suerte – Santos – Sabana
- Payoa
- La Salina
- Corazón



SEISMIC

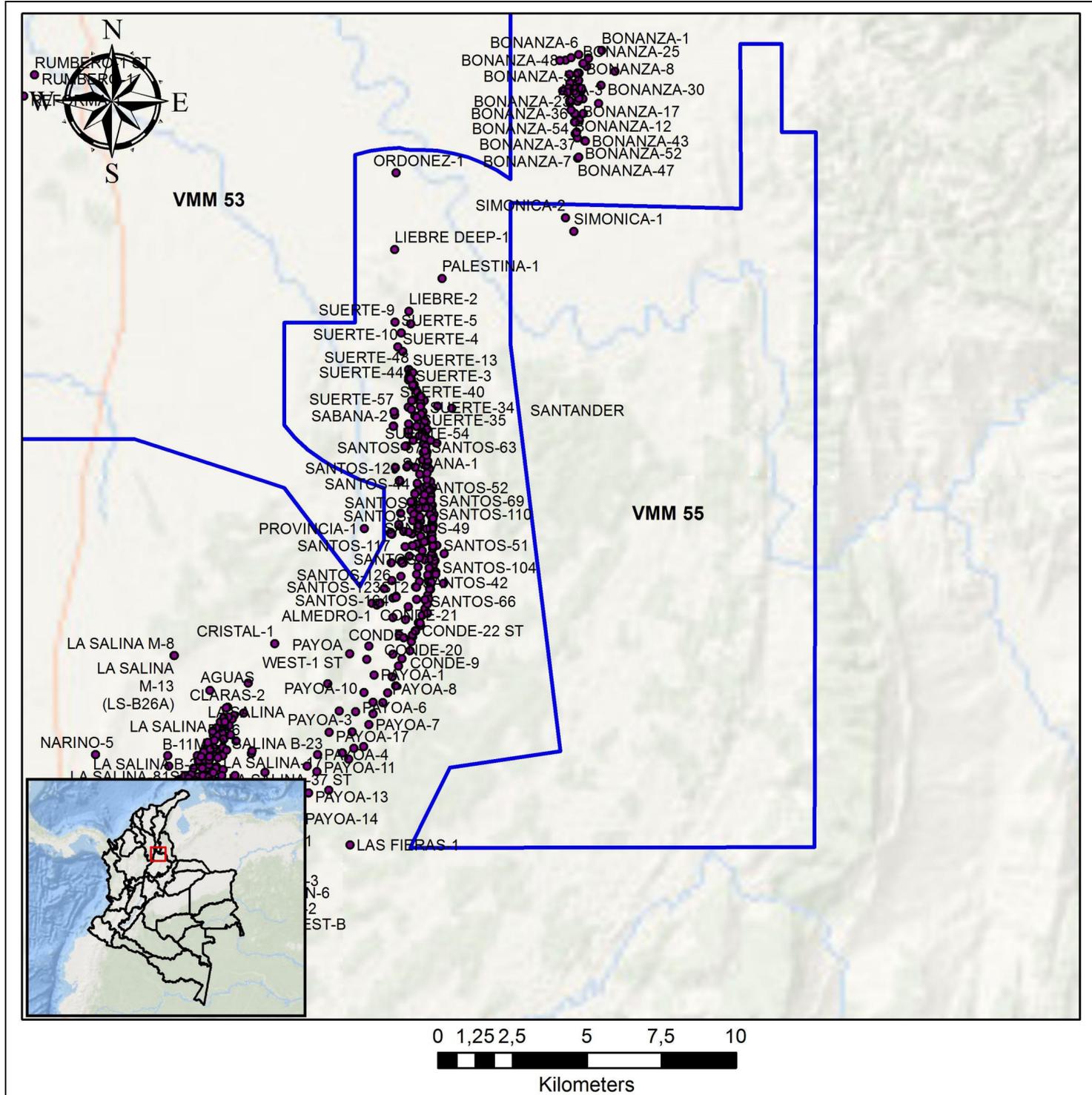
2D Seismic Surveys:

- Provincia Este – 79
- Fenix 2D – 2012
- Provincia – 55
- Provincia – 60
- Liebre Provincia – 93
- Provincia – 77
- Bonanza – 78
- Playon Provincia – 97
- Provincia - 68

3D Seismic Surveys:

- Provincia 3D - 2008

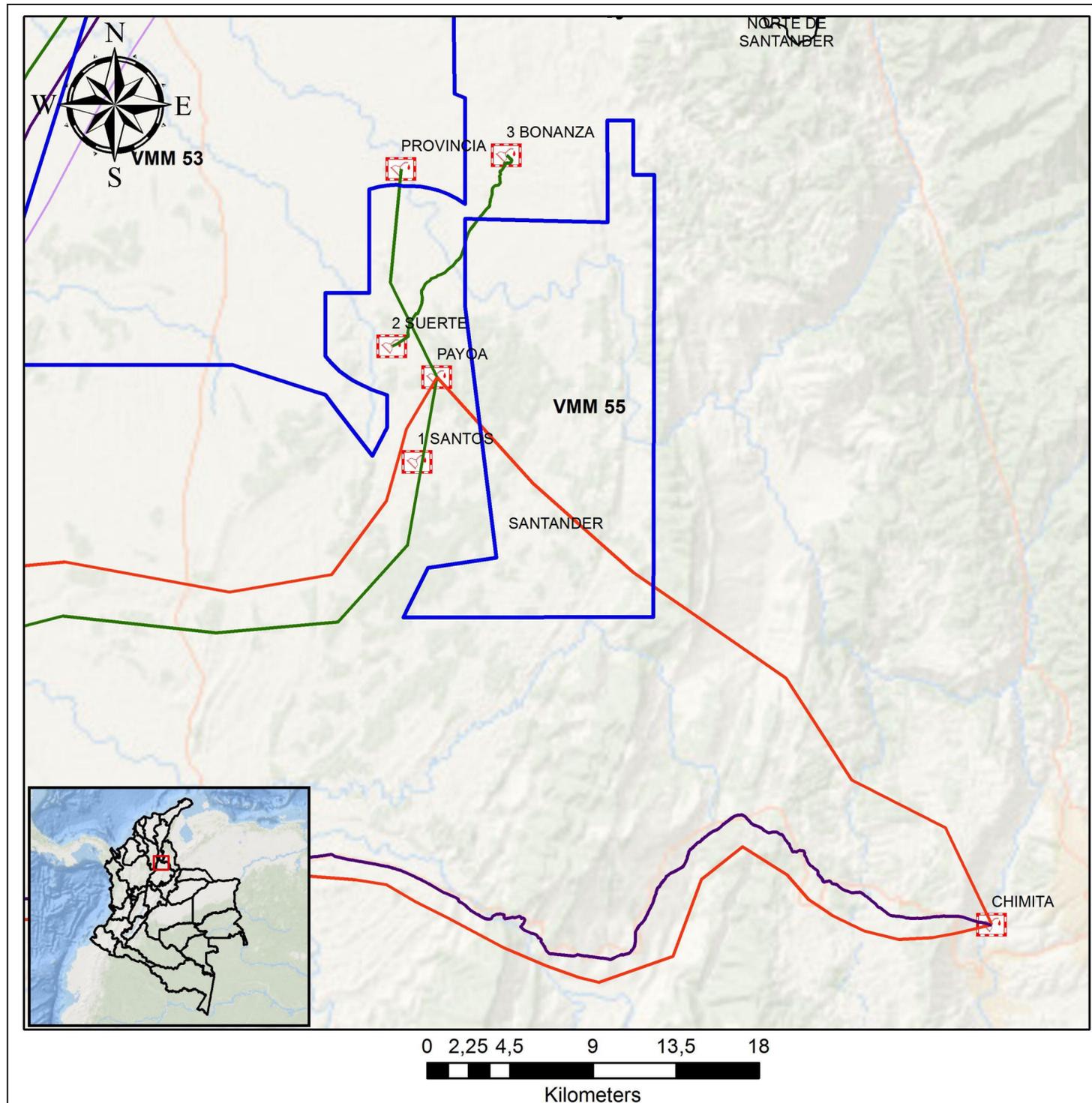
DATABASE WELLS VMM-55



2 Wells

Well	Data Available	Year	TD (ft)
Simonica - 1	Yes	1972	10,890
Simonica - 2	Yes	1972	11,546

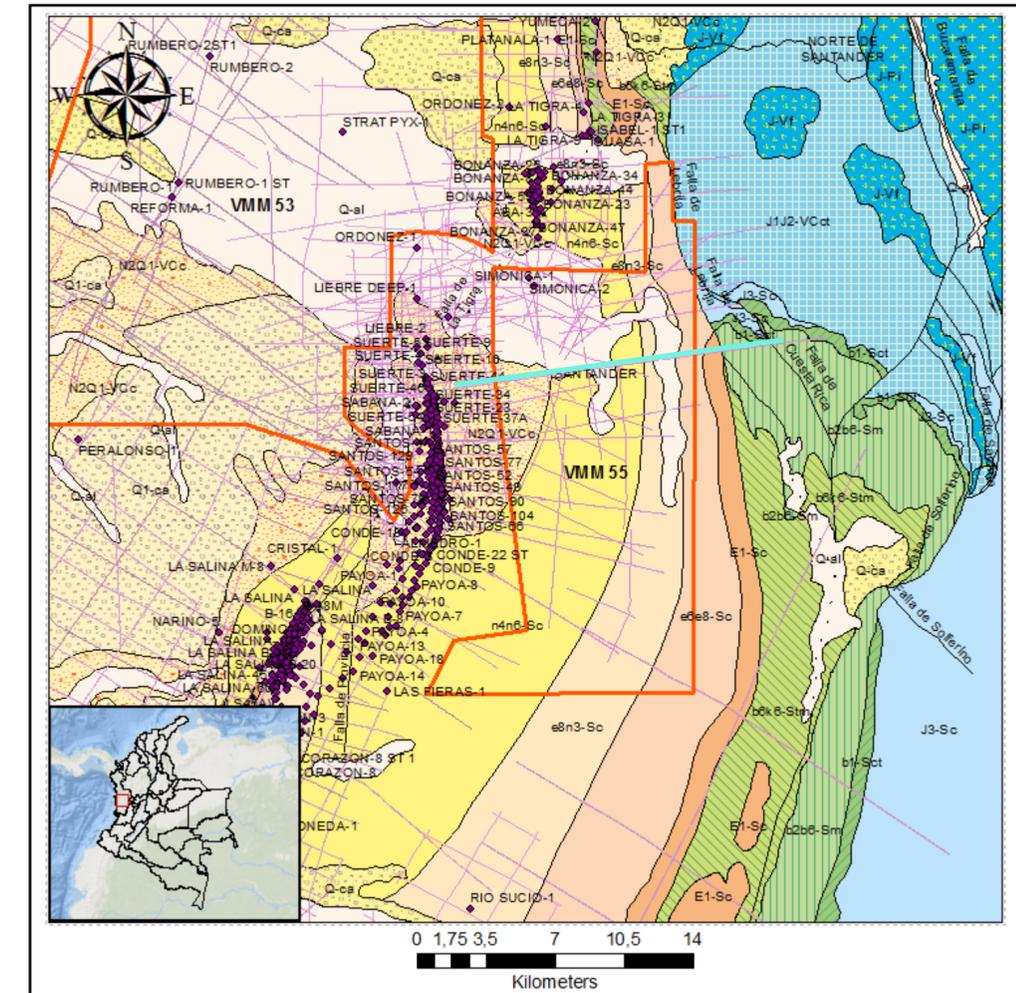
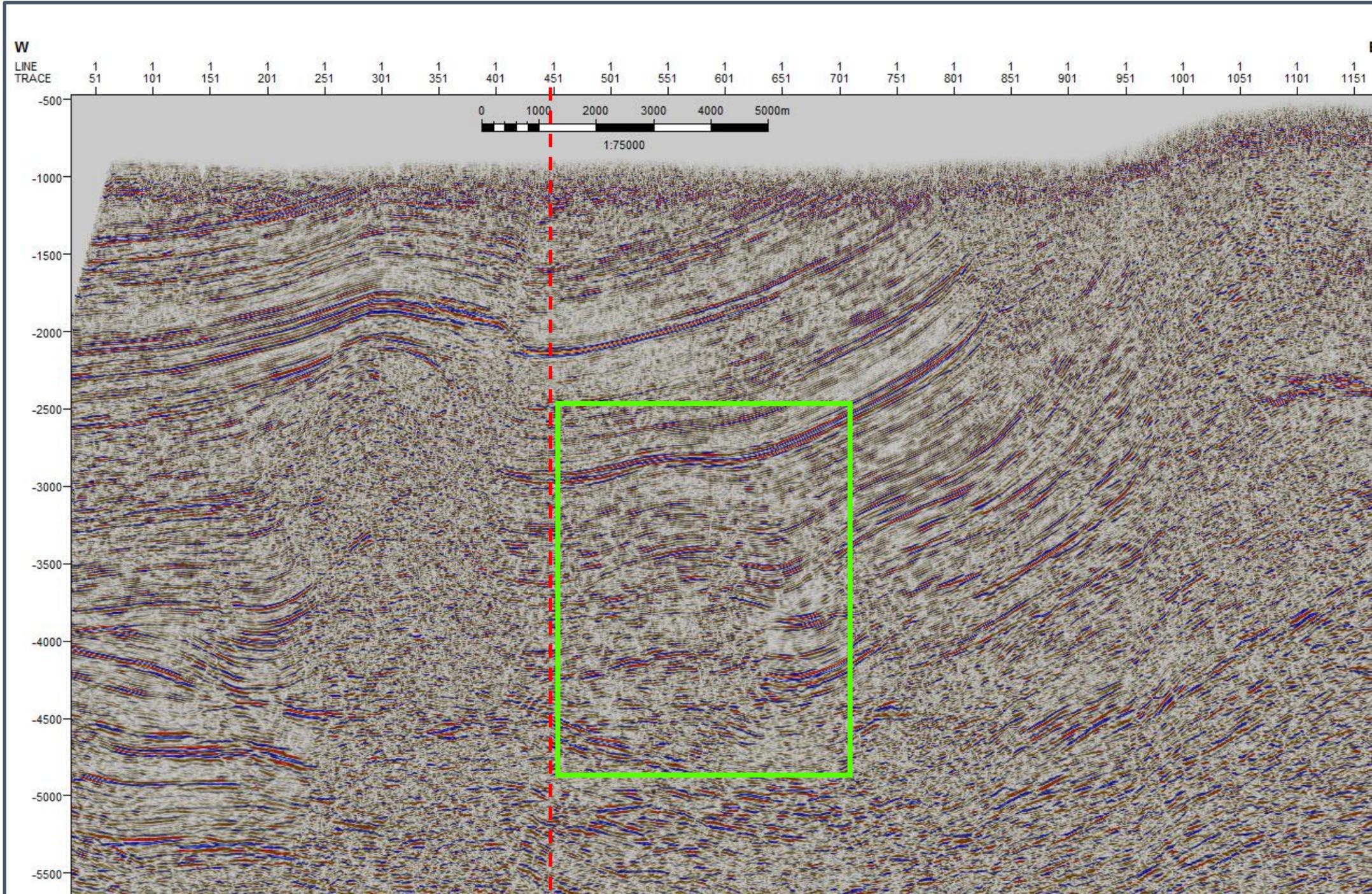
INFRASTRUCTURE VMM 55



Main Infrastructure nearby

- **Oil Pipeline**
- Provincia (4,4 Km)
- Bonanza (4,1 Km)
- Suerte (4,2 Km)
- Santos (3,7 Km)
- **Gas Pipeline**
- Payoa (2,6 Km)
- Chimita (24 Km)

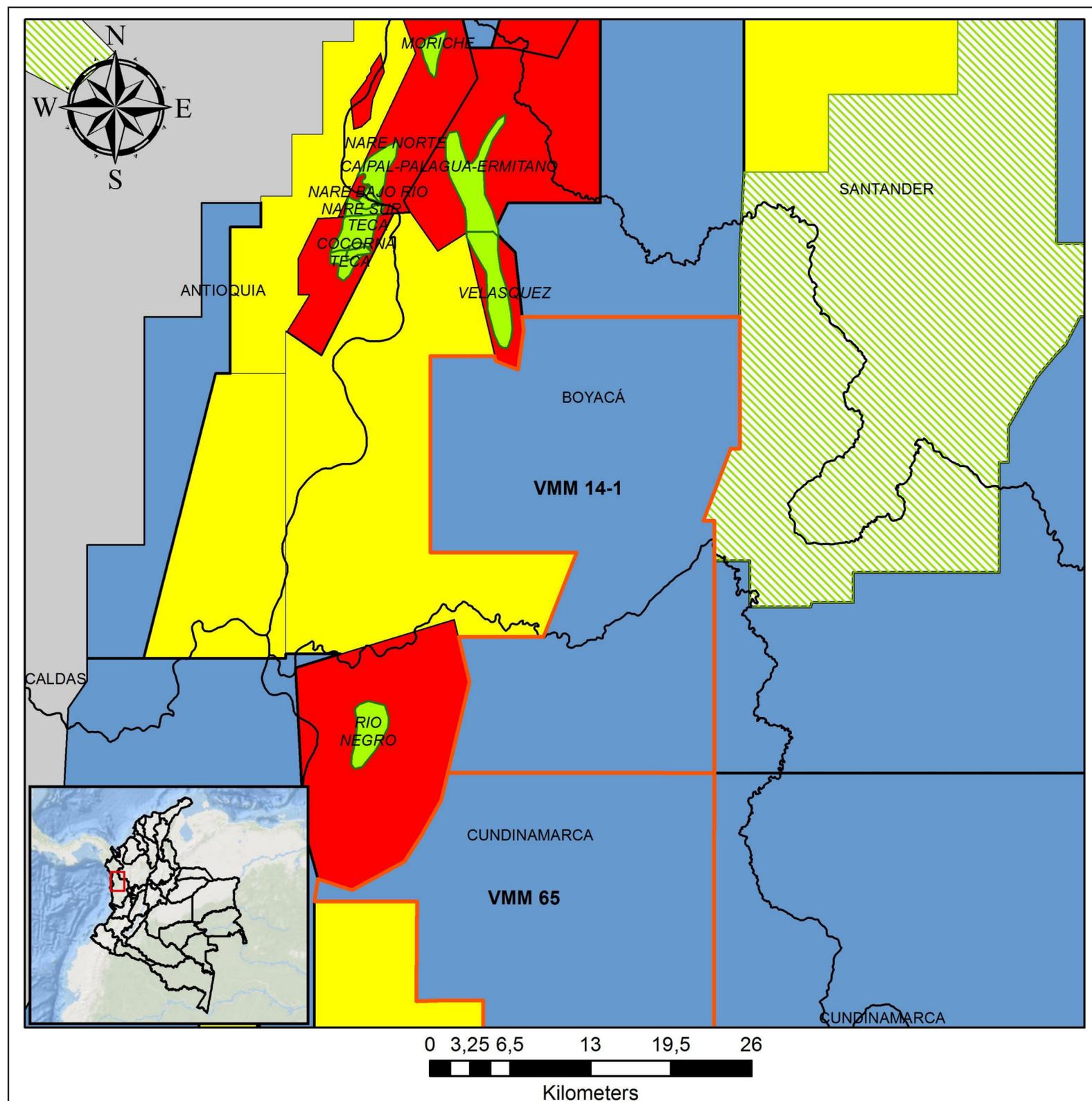
VMM 55: DIP SEISMIC LINE AND POSSIBLE TRAP



SPR-1997-1290 (Provincia – 97)

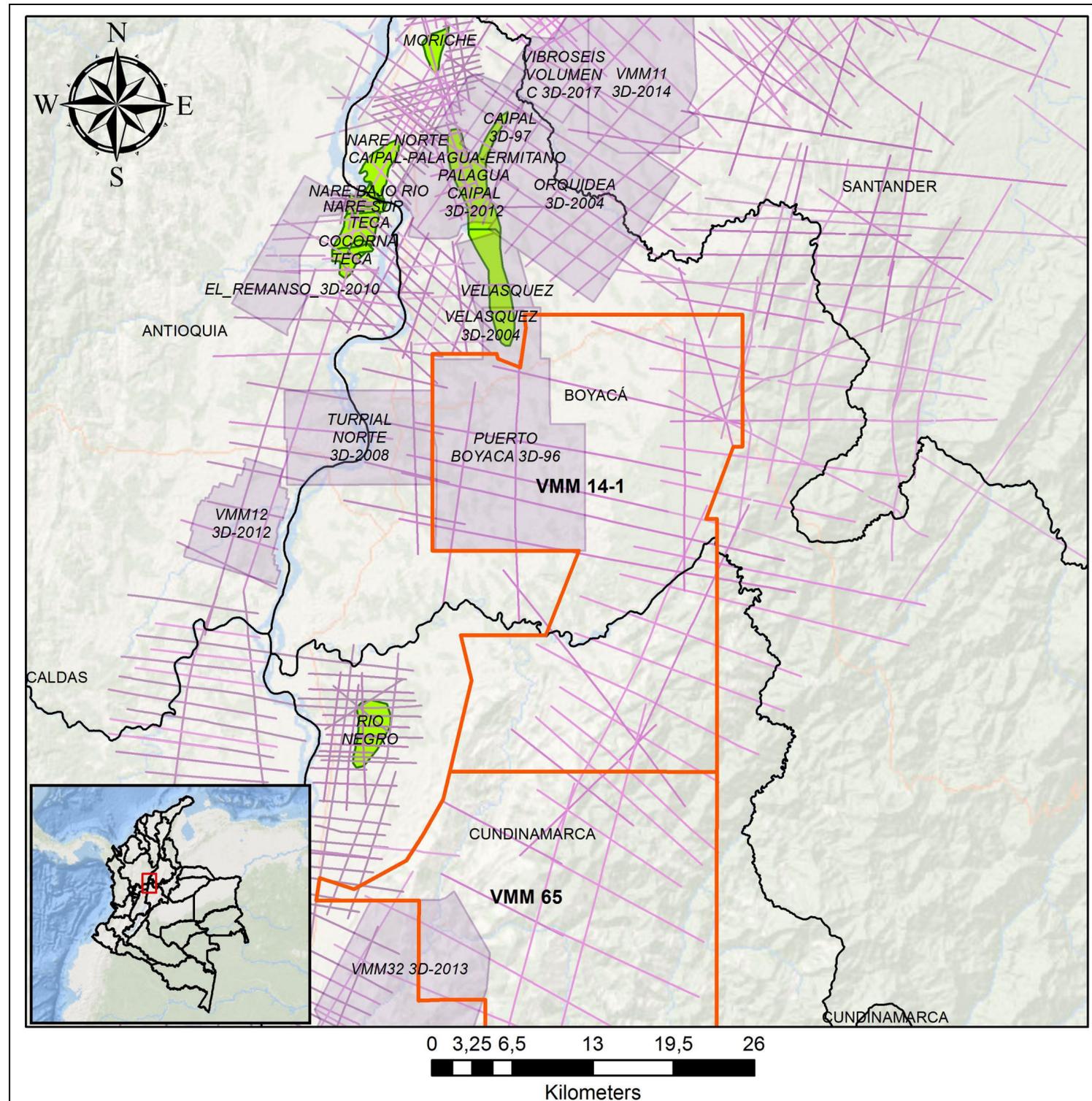
Incorporated: VMM-14-1

LOCATION VMM 14-1



- **Block Area**
- VMM 14-1 (83,972 Ha)
- **Fields Nearby**
- Velasquez
- Cocorna
- Teca
- Rionegro
- **Departments**
- Boyacá & Cundinamarca

DATABASE SEISMIC VMM 14-1



SEISMIC

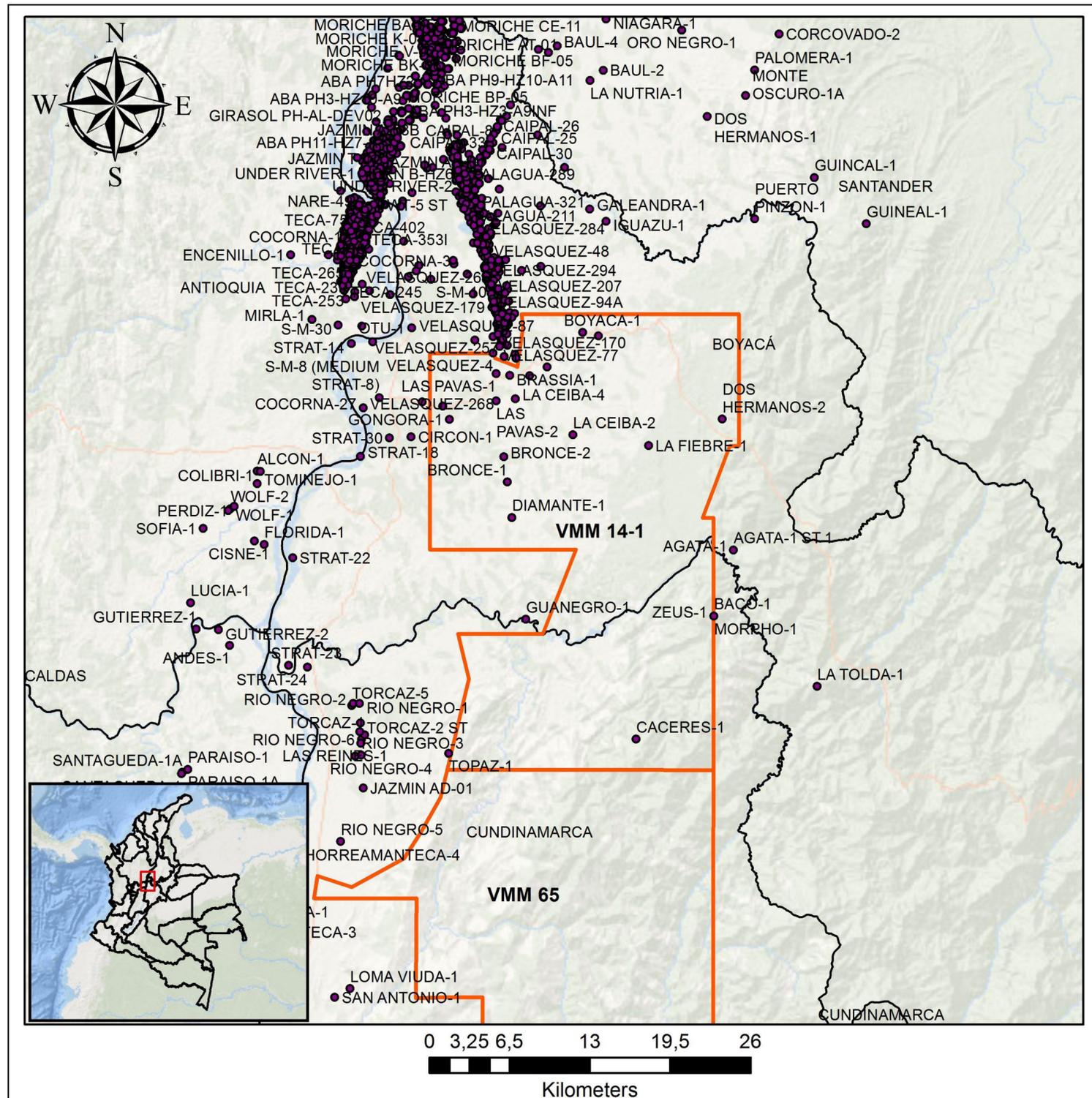
2D Seismic Surveys:

- La India – 84
- La India – 90
- Diamante 2D – 2001
- Puerto Boyaca Rio Minero – 95
- R Min Puerto Boyaca Gua – 97
- Rio Minero - 94

3D Seismic Surveys:

- Puerto Boyaca 3D - 96

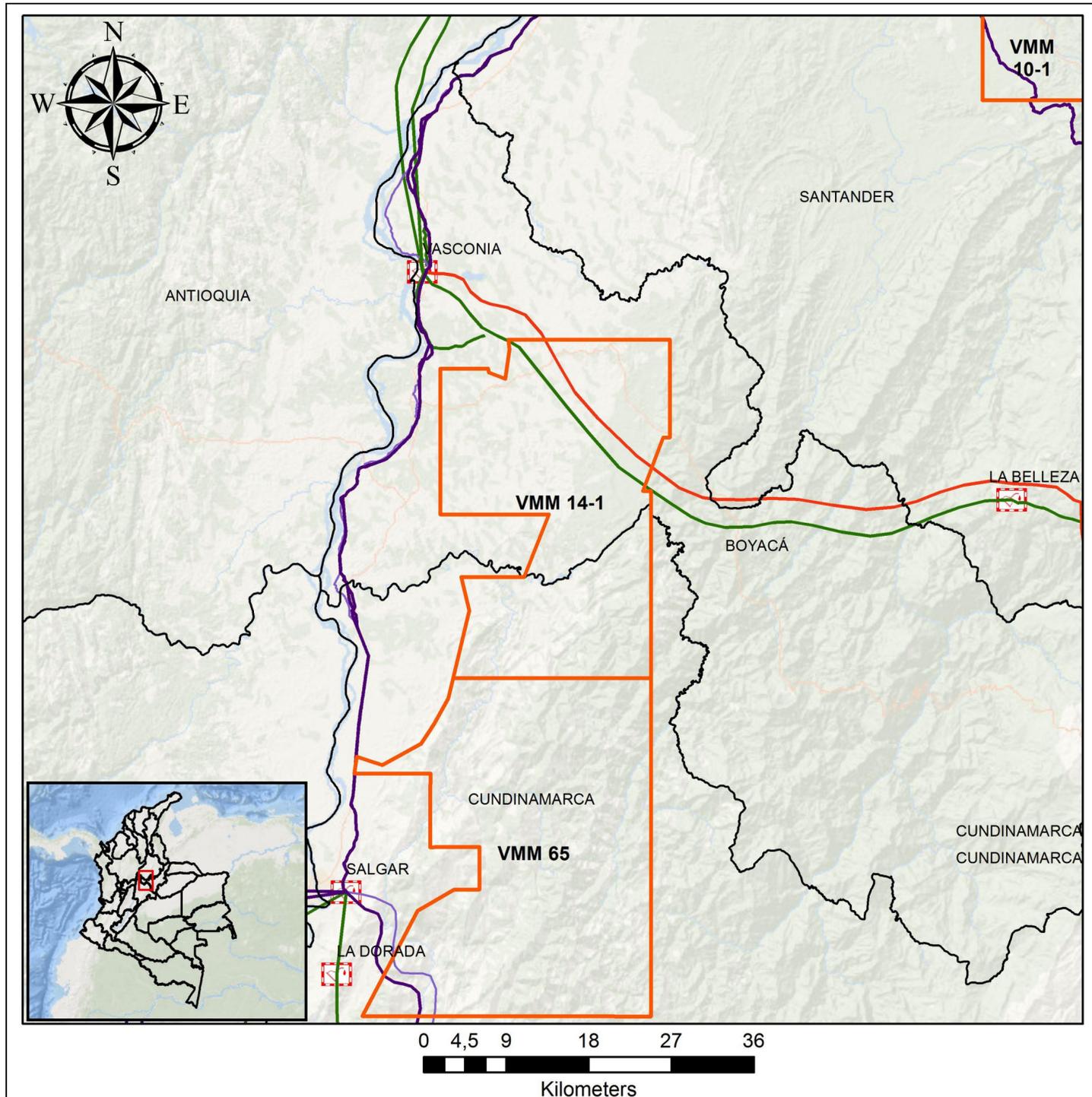
DATABASE WELLS VMM 14-1



21 Wells

Well	Year	TD (ft)
Baco - 1	2010	12,641
Boyaca - 1	1952	9,486
Boyaca - 2	1953	11,896
Caceres - 1	1971	7,587
Dos Hermanos - 2	1961	12,896
La Ceiba - 1	1953	Unknown
La Ceiba - 2	1954	Unknown
La Ceiba - 3	1954	Unknown
La Ceiba - 4	1962	Unknown
La Fiebre - 1	1954	Unknown
Morpho - 1	2009	6,739
Zeus - 1	2007	17,000
Brassia - 1	2008	9,365
Bronce - 1	1998	11030
Bronce - 2	1998	10,489
Diamante - 1	1964	Unknown
Gongora - 1	2007	7,638
Las Pavas - 1	1953	Unknown
Las Pavas - 2	1955	Unknown
Matadero - 2	1957	Unknown
Topaz - 1	1961	13,185

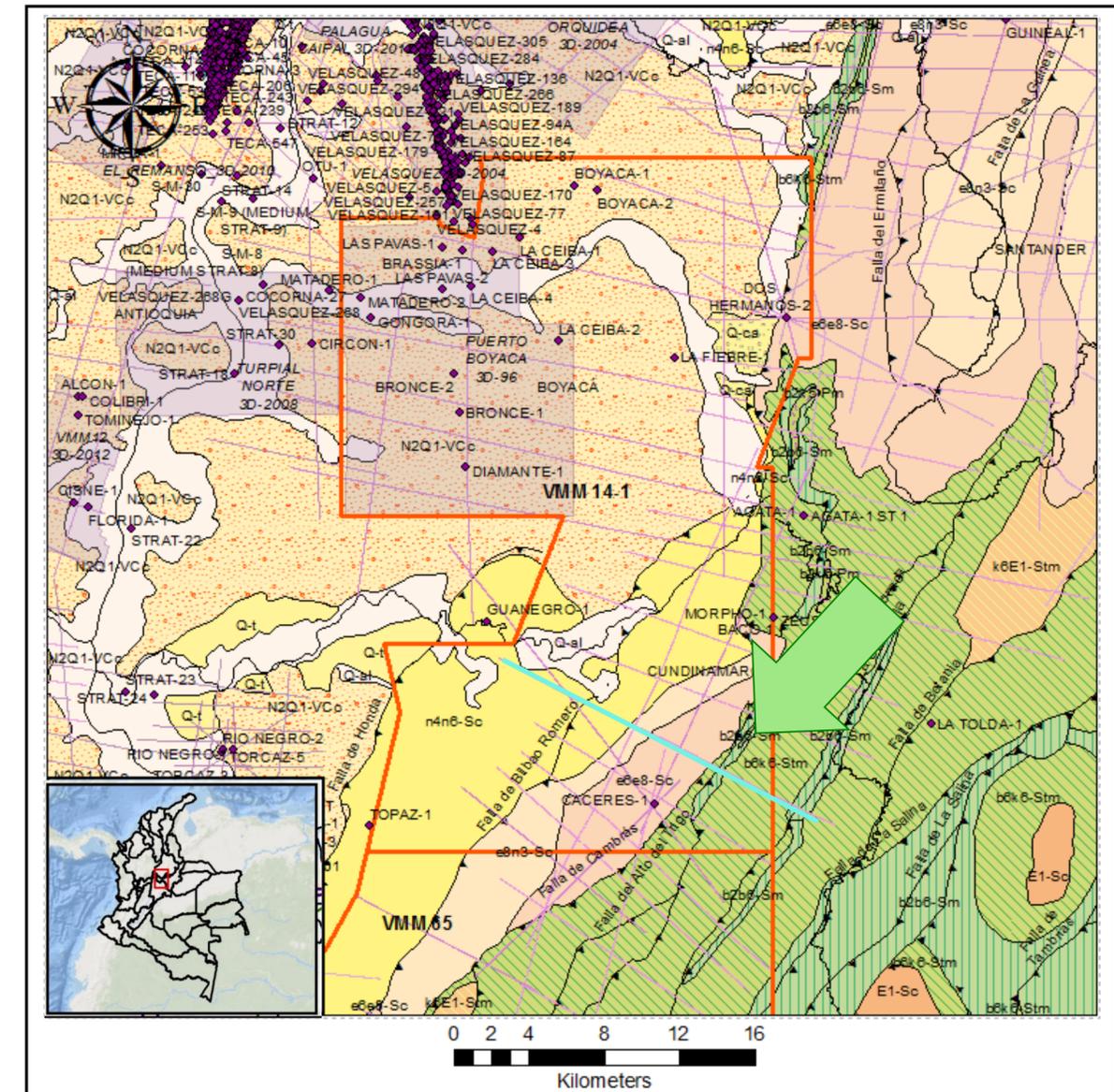
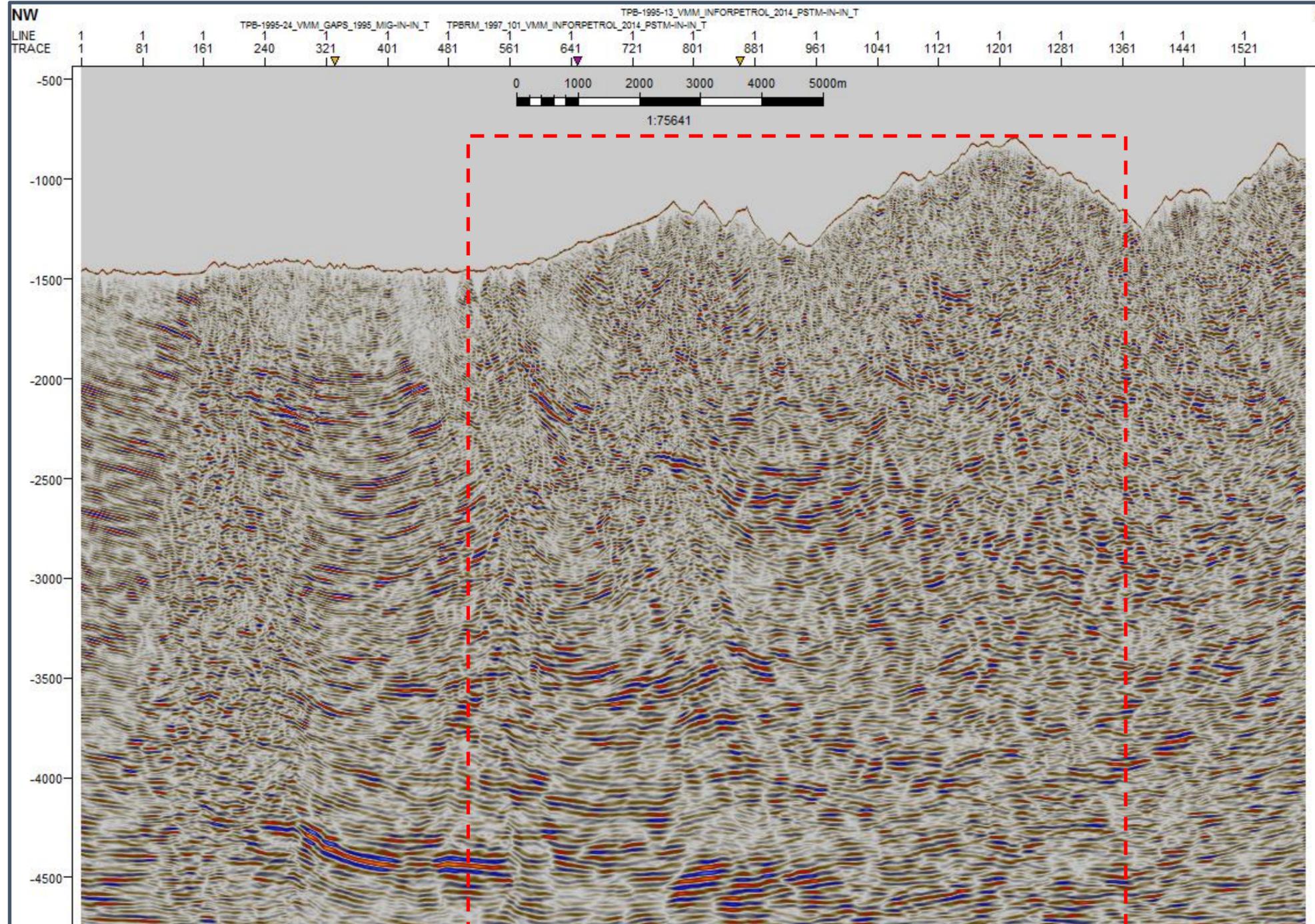
INFRASTRUCTURE FLORESANTO AND JARAGUAY



Main Infrastructure nearby

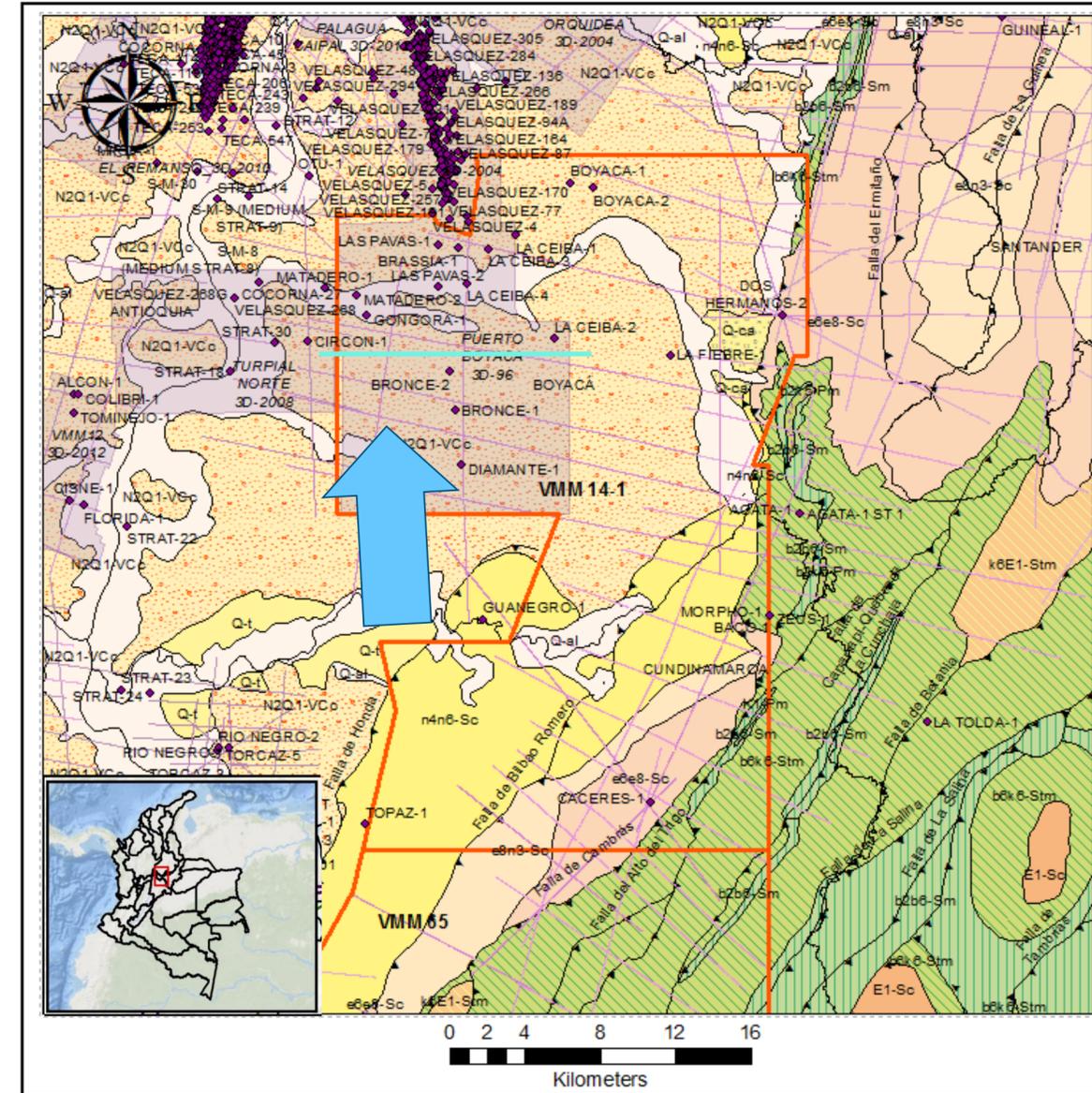
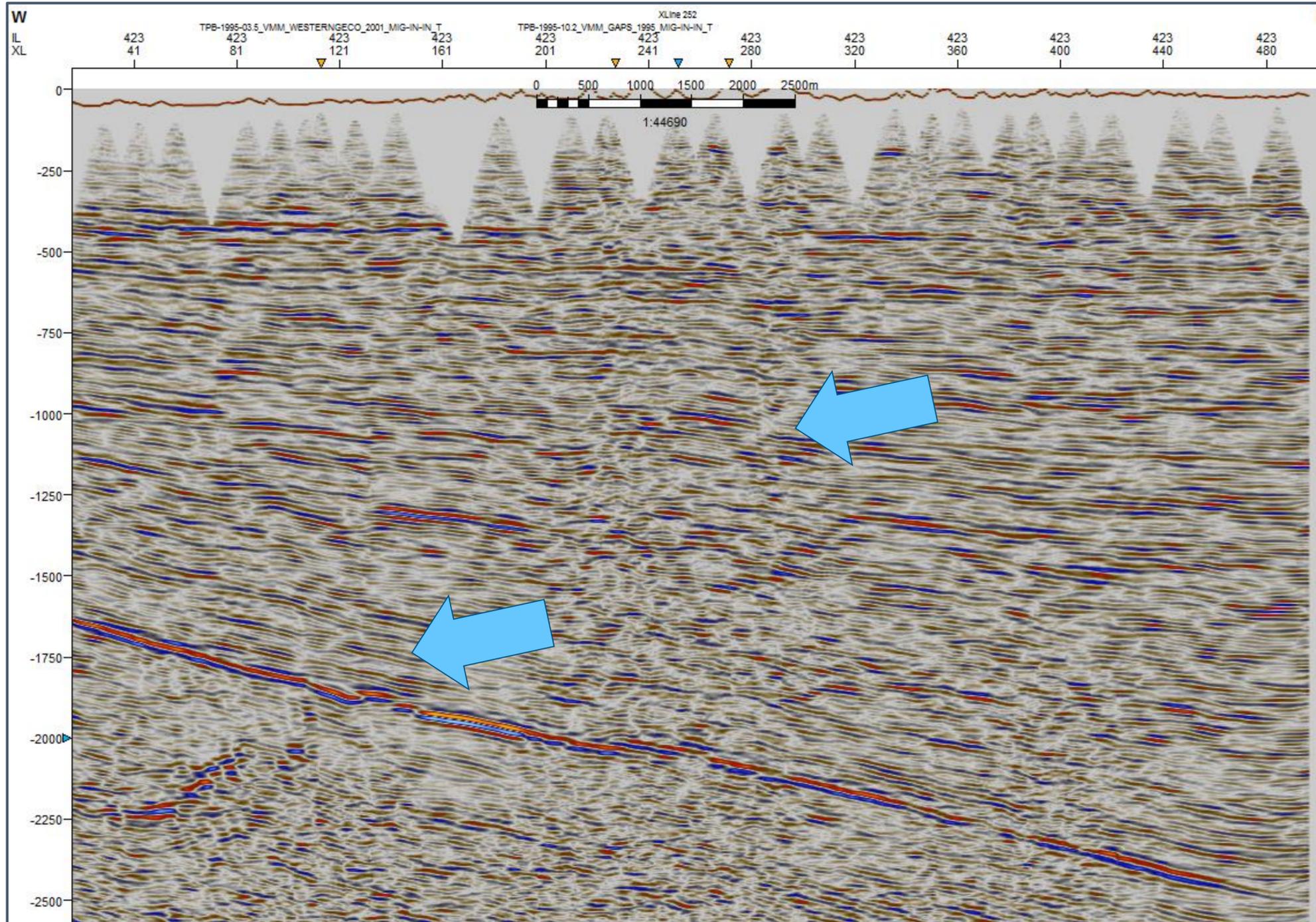
- **Oil Pipeline**
- Terminal Coveñas (130 Km)
- **Gas Pipeline**
- Montería (58 Km)
- Jobo Tablón (80 Km)
- Cerromatoso (77 Km)

VMM 14-1: DIP SEISMIC LINE (SOUTH)



R Min Pto Boy Gua-1997_110

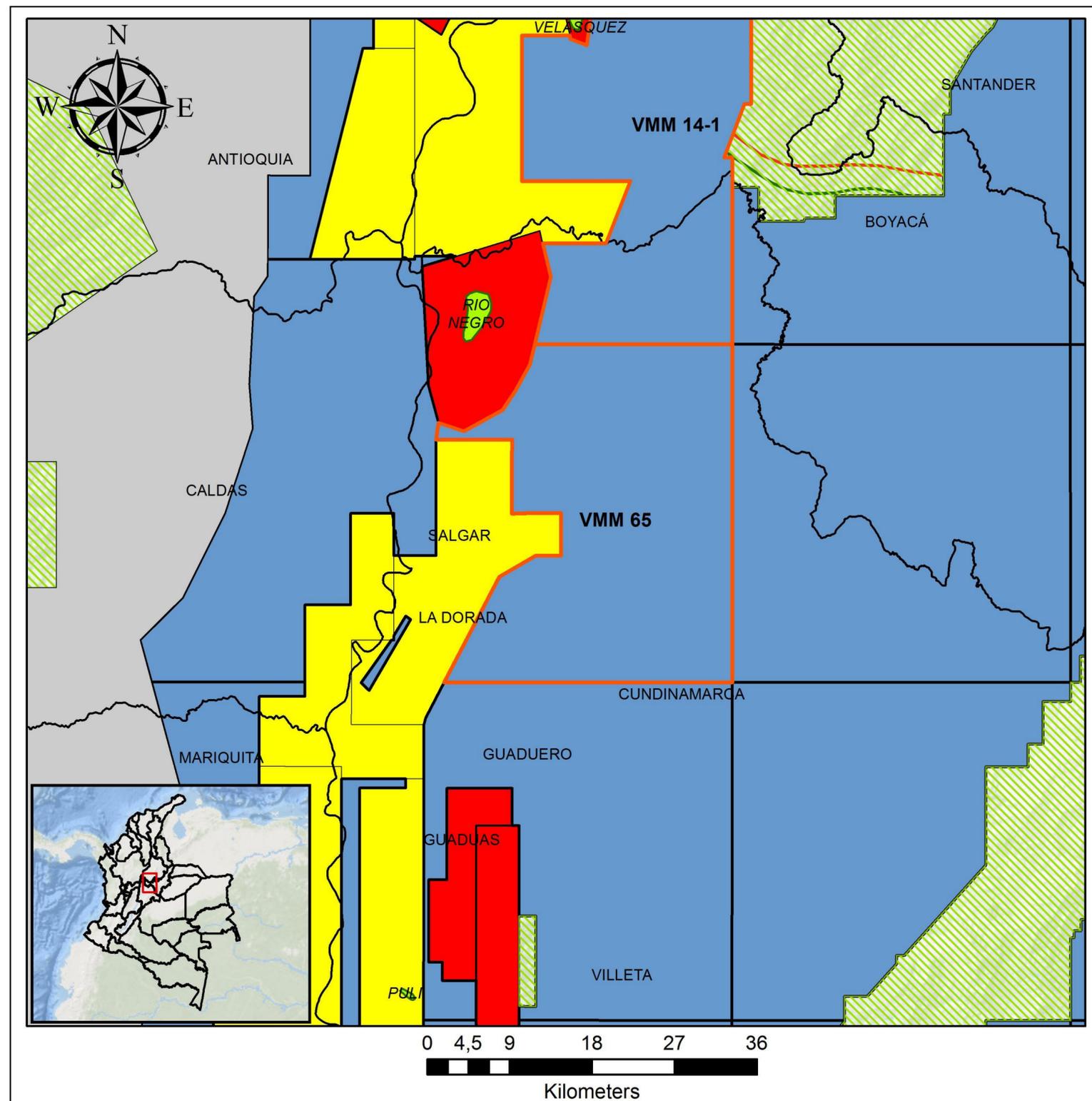
VMM 14-1: PUERTO BOYACA 3D - 96



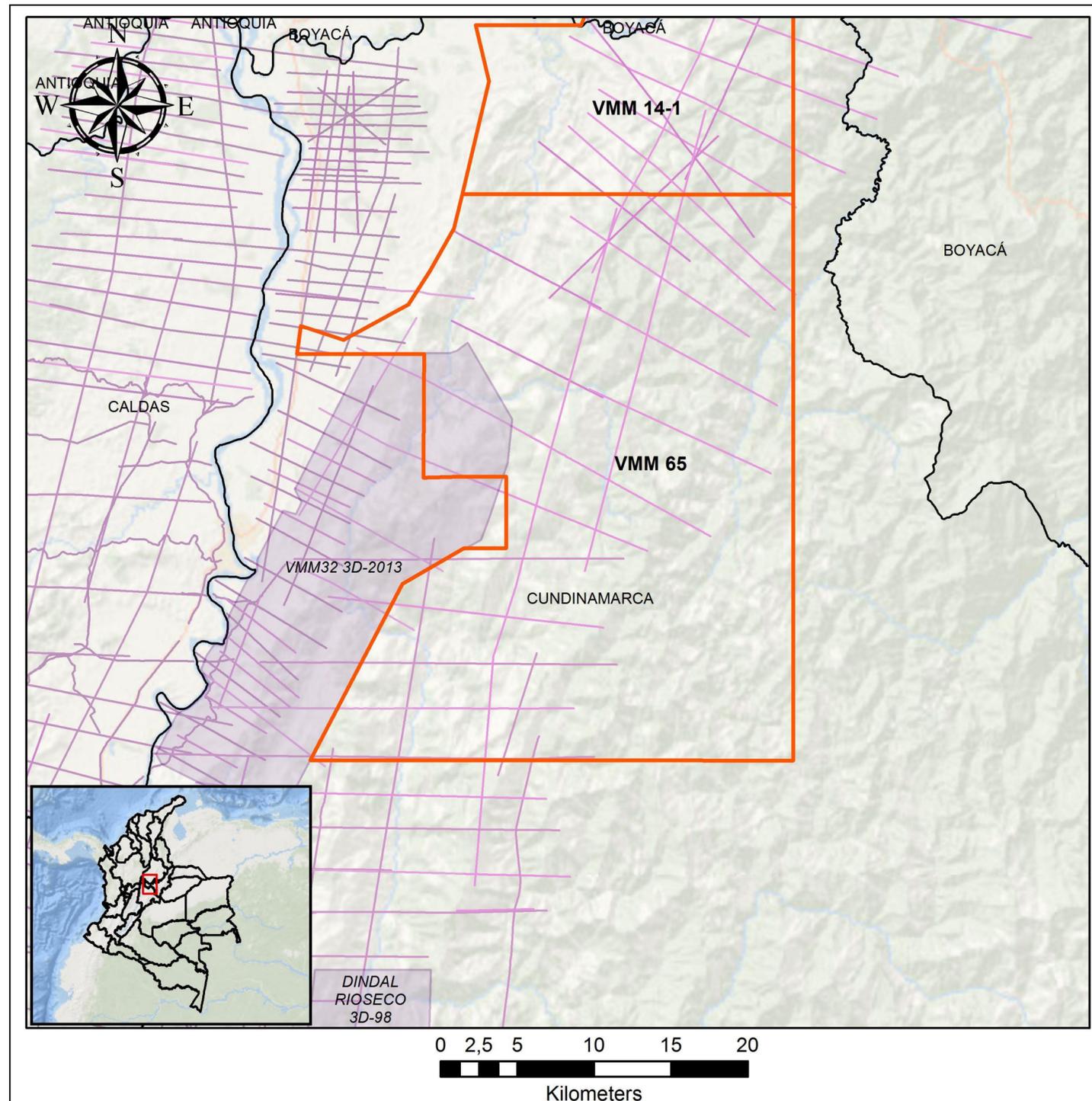
Puerto Boyacá 3D – 96 (Inline 423))

Incorporated: VMM-65

LOCATION VMM 65



- **Block Area**
- VMM-65 (91,895 Ha)
- **Fields Nearby**
- Rio Negro
- Poli
- **Departments**
- Cundinamarca

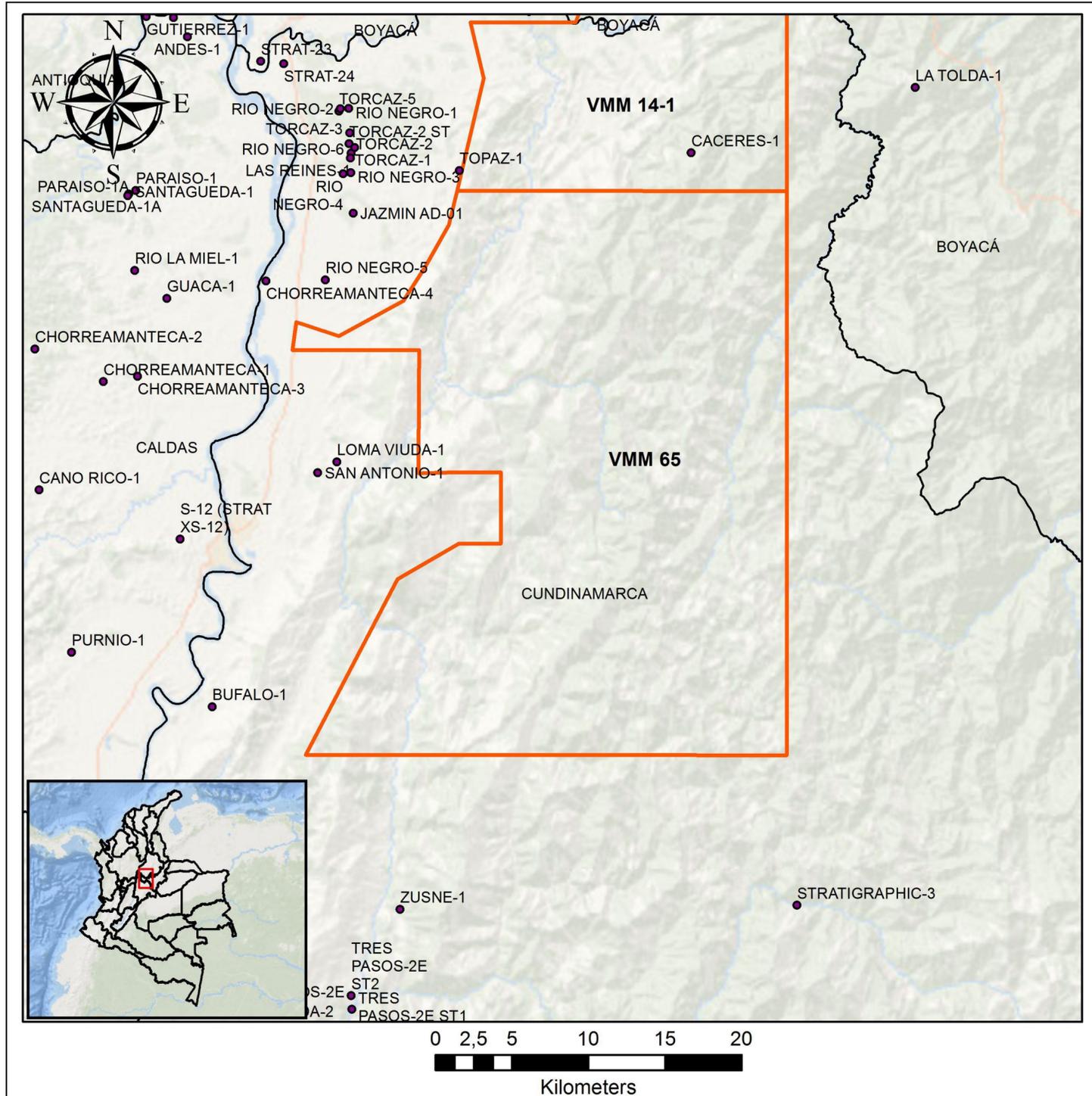


- **SEISMIC**

- **2D Seismic Surveys:**

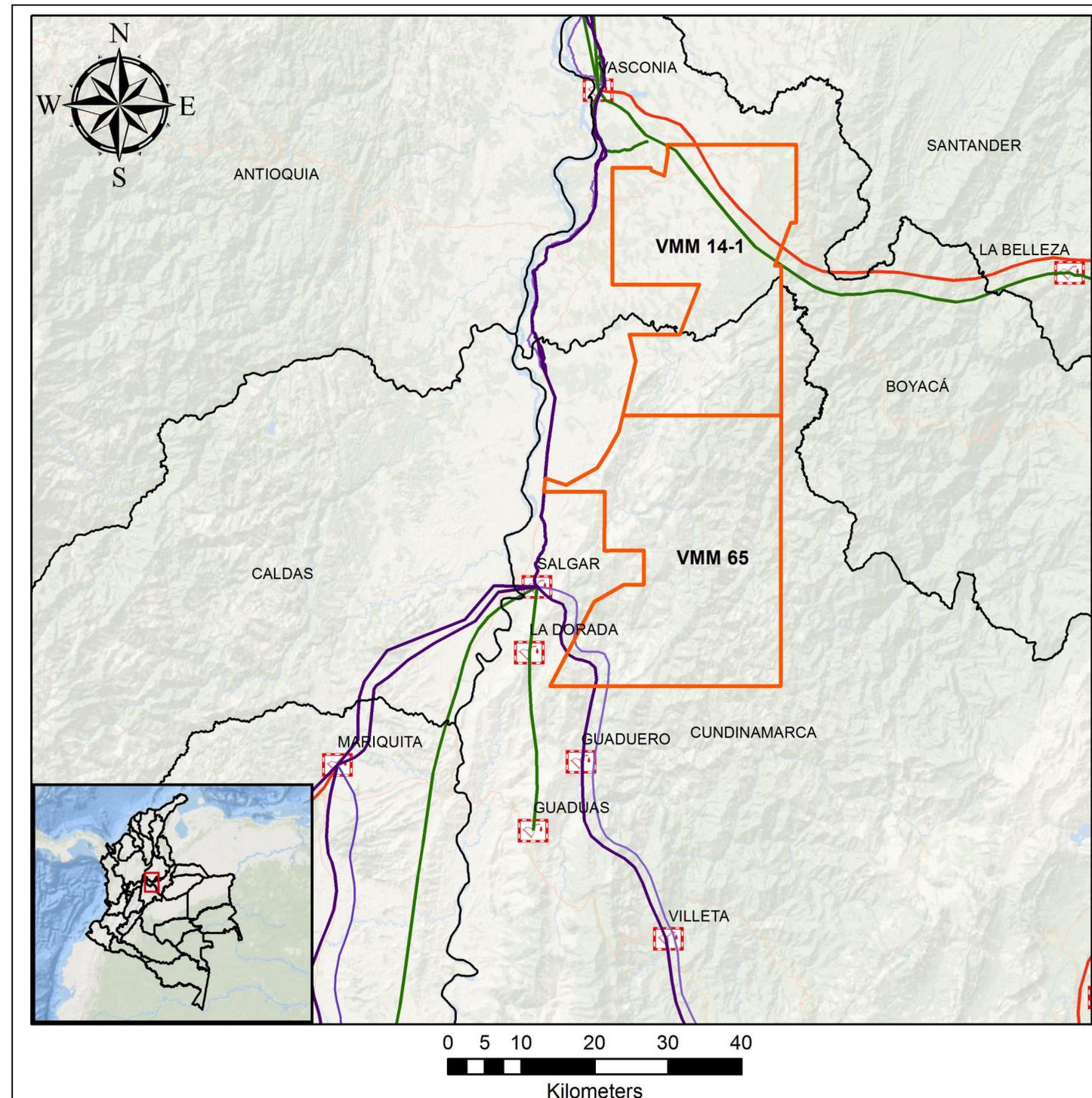
- Honda Guaduas – 78
- Bocachico – 97
- R Min Pto Boy Gua – 97
- Pto Boyaca R Minero – 95

DATABASE WELLS VMM-65



- No wells have been drilled in the area

INFRASTRUCTURE VMM-65



Main Infrastructure nearby

■ Oil Pipeline

- Salgar (14,5 km)
- La Dorada (5,2 km)
- Guaduas (19,7 km)
- Guadero (11 km)

■ Gas Pipeline

- Mariquita (31 km)

CONCLUSIONS

- The Floresanto and Jaraguay areas have an structural dominance by **mud diapirism** that could be trapping hydrocarbons at the Floresanto Fm and El Pavo Sandstone. At the moment of drilling, this concept was not taken into account
- **Floresanto has a proven petroleum system** with two producer wells: Floresanto –1 that produced a total of 28,730 bbls with 51° API and Floresanto 6 that produced 42 bbls during tests with 50° API in 12 hours
- An incorporated area into the Floresanto area has been proposed by the industry: SSJS 1-3
- In the Middle Magdalena Valley **three new areas have been incorporated into the Round 2021**: VMM 55, VMM 14-1 and VMM 65
- In the VMM 55 just two wells have been drilled Simonica – 1 & Simonica 2 with total depths around 11,000'
- The **VMM 14-1 is the area with the best seismic coverage and the higher amount of wells drilled** of the ones incorporated. It has available 6 seismic 2D surveys, the full area of the Puerto Boyaca 3D-95 survey and 21 wells have been drilled in the area since 1952
- Despite the fact of not having any well drilled, **the VMM-65 could have a petroleum potential** into complex structures of high angle inverse faults involving the upper Cretaceous sequence

Thanks

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