

RELACIONES CROMATOGRÁFICAS APLICADAS AL DESARROLLO NO CONVENCIONAL DE LA FORMACION POZO D-129.

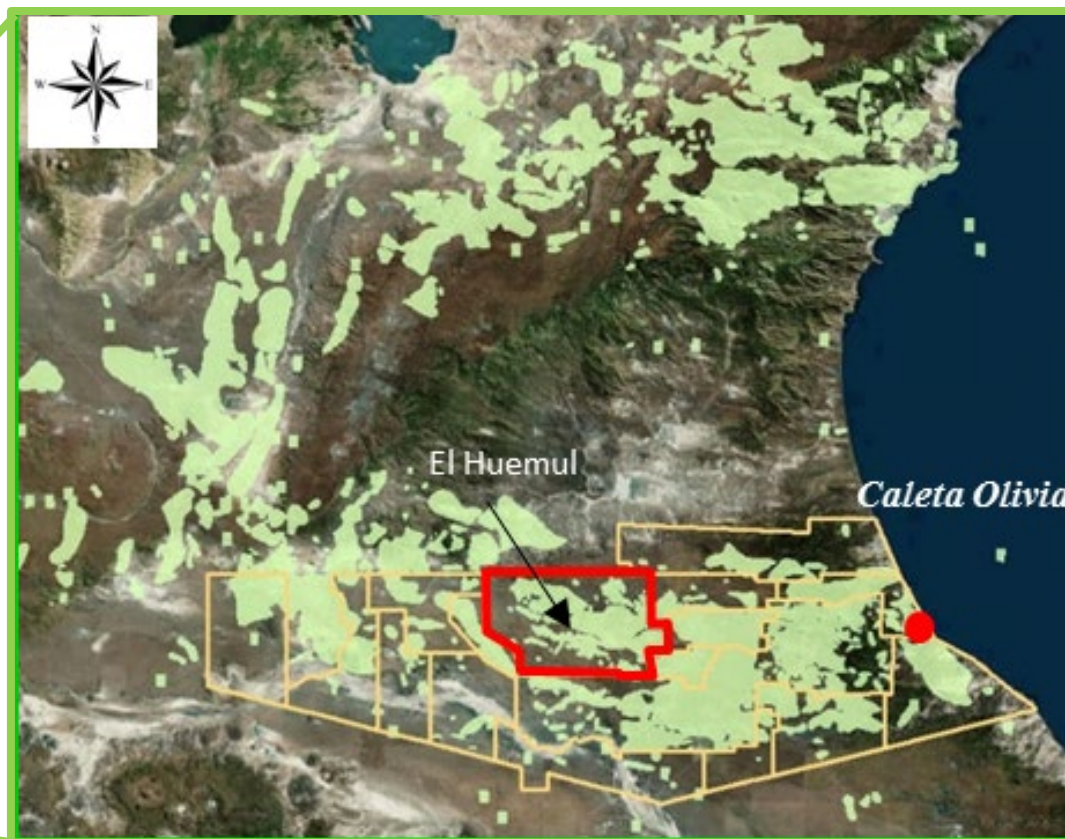
YACIMIENTO EL HUEMUL, CUENCA DEL GOLFO SAN JORGE

Autores

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UBICACIÓN



En 1985, Haworth *et al.* publicaron:

“Interpretation of Hydrocarbon Shows Using Light (C1-C5) Hydrocarbon Gases from Mud-Log Data”

$$GWR = \frac{C_2 + C_3 + C_4 + C_5}{C_1 + C_2 + C_3 + C_4 + C_5} \times 100$$

GWR (Gas wetness ratio) o

Wh (Hydrocarbon wetness ratio)

GWR < 0.5: Very dry gas

GWR 0.5-17.5: Gas

GWR 17.5-40: Oil

GWR > 40: Residual oil

$$LHR = \frac{C_1 + C_2}{C_3 + C_4 + C_5}$$

LHR (Light to heavy ratio) o

Bh (Balance ratio)

LHR > 100: Very dry gas

When plotted with GWR,
give fluid character

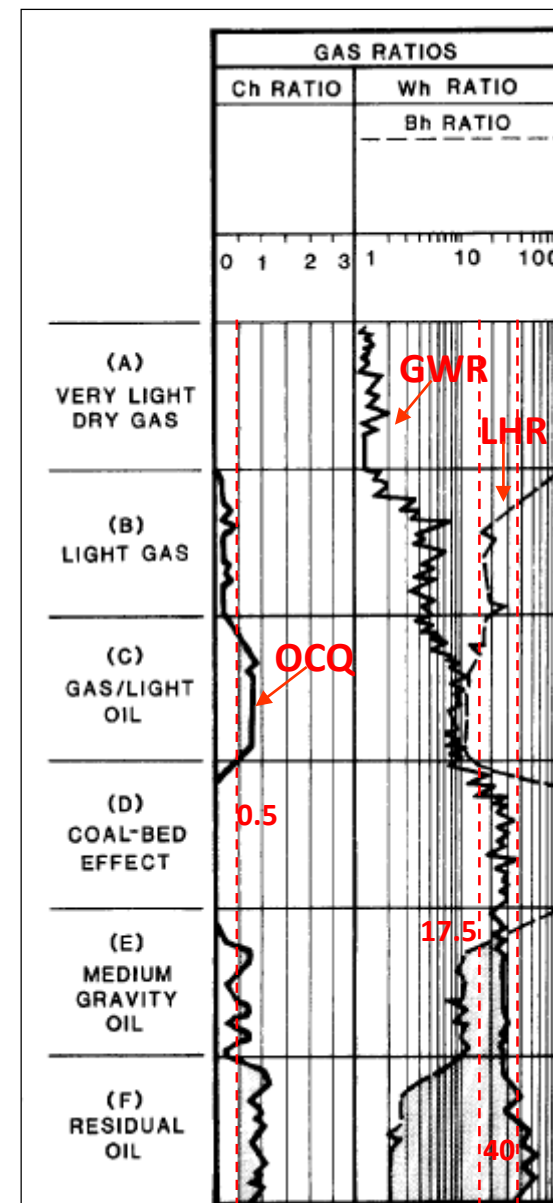
Coal beds: High C2

$$OCQ = \frac{C_4 + C_5}{C_3}$$

OCQ (Oil character qualifier) o

Ch (Character ratio)

OCQ > 0.5: Associated
with oil

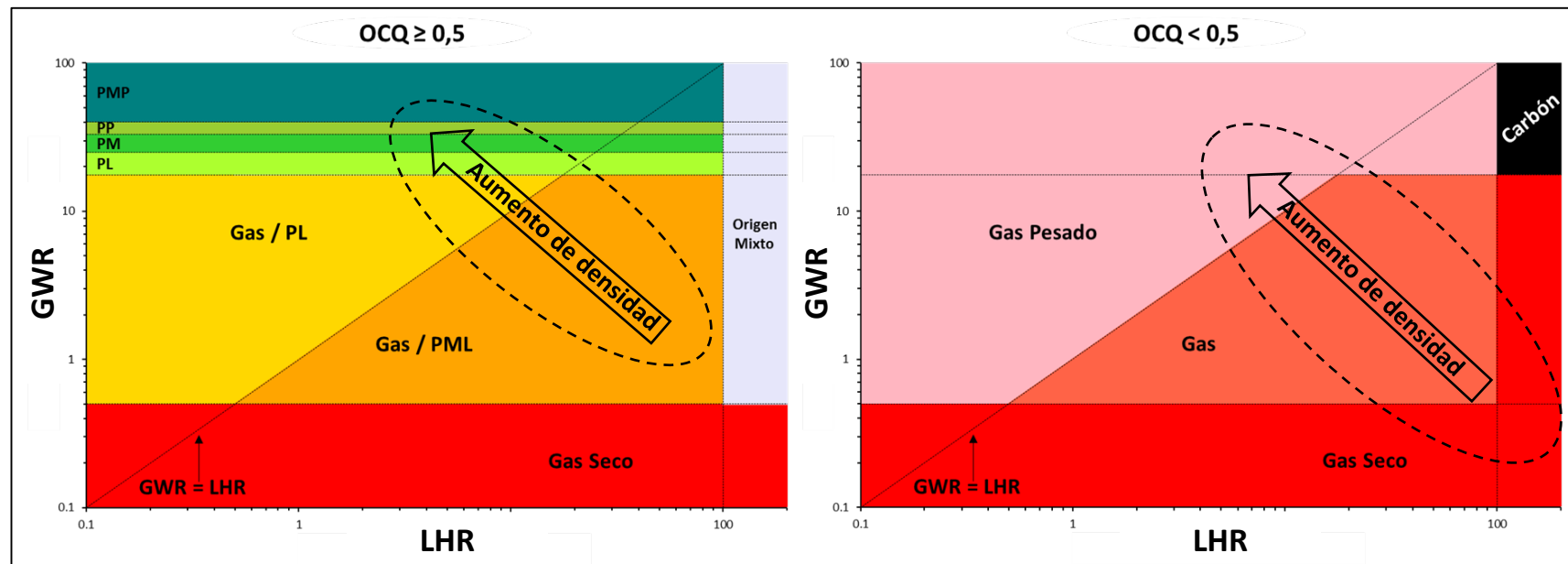




CONDICIONALES

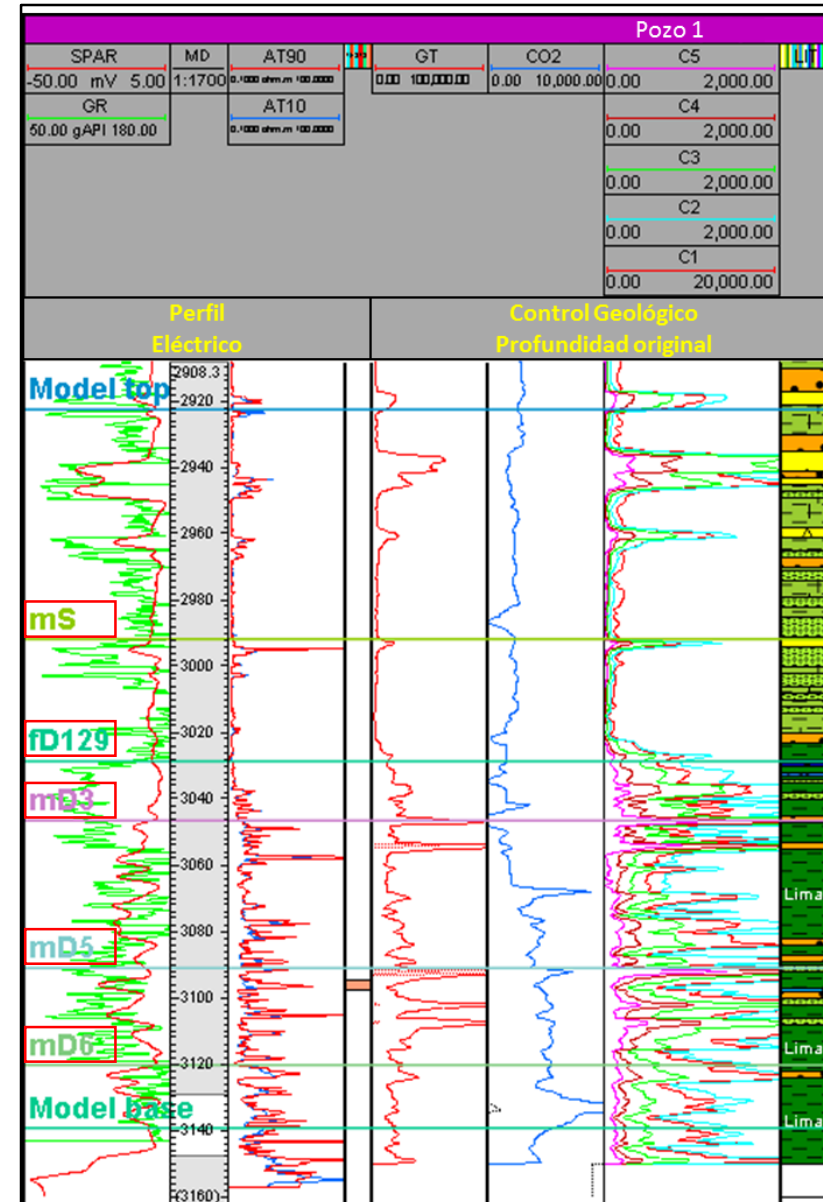
Condicionales para interpretación de hidrocarburos en reservorio, $OCQ \geq 0,5$								
Interpretación ->		Gas Seco	Gas / PML	Gas / PL	PL	PM	PP	Mixto
Parámetro	GWR	< 0,5	0,5 - 17,5	0,5 - 17,5	17,5 - 25	25 - 33	33 - 40	> 40
	LHR	> 0	≤ 100	≤ 100	≤ 100	≤ 100	≤ 100	> 100
	LHR-GWR	< 0 $\leq$	≥ 0	< 0	< 0 $\leq$	< 0 $\leq$	< 0 $\leq$	< 0 $\leq$

Condicionales para interpretación de hidrocarburos en reservorio, $OCQ < 0,5$						
Interpretación ->		Gas Seco		Gas	Gas Pesado	Carbón
Parámetro	GWR	< 0,5	0,5 - 17,5	0,5 - 17,5	0,5 - 17,5	> 17,5
	LHR	> 0	> 100	≤ 100	≤ 100	> 100
	LHR-GWR	< 0 $\leq$	> 0	≥ 0	< 0	< 0 $\leq$



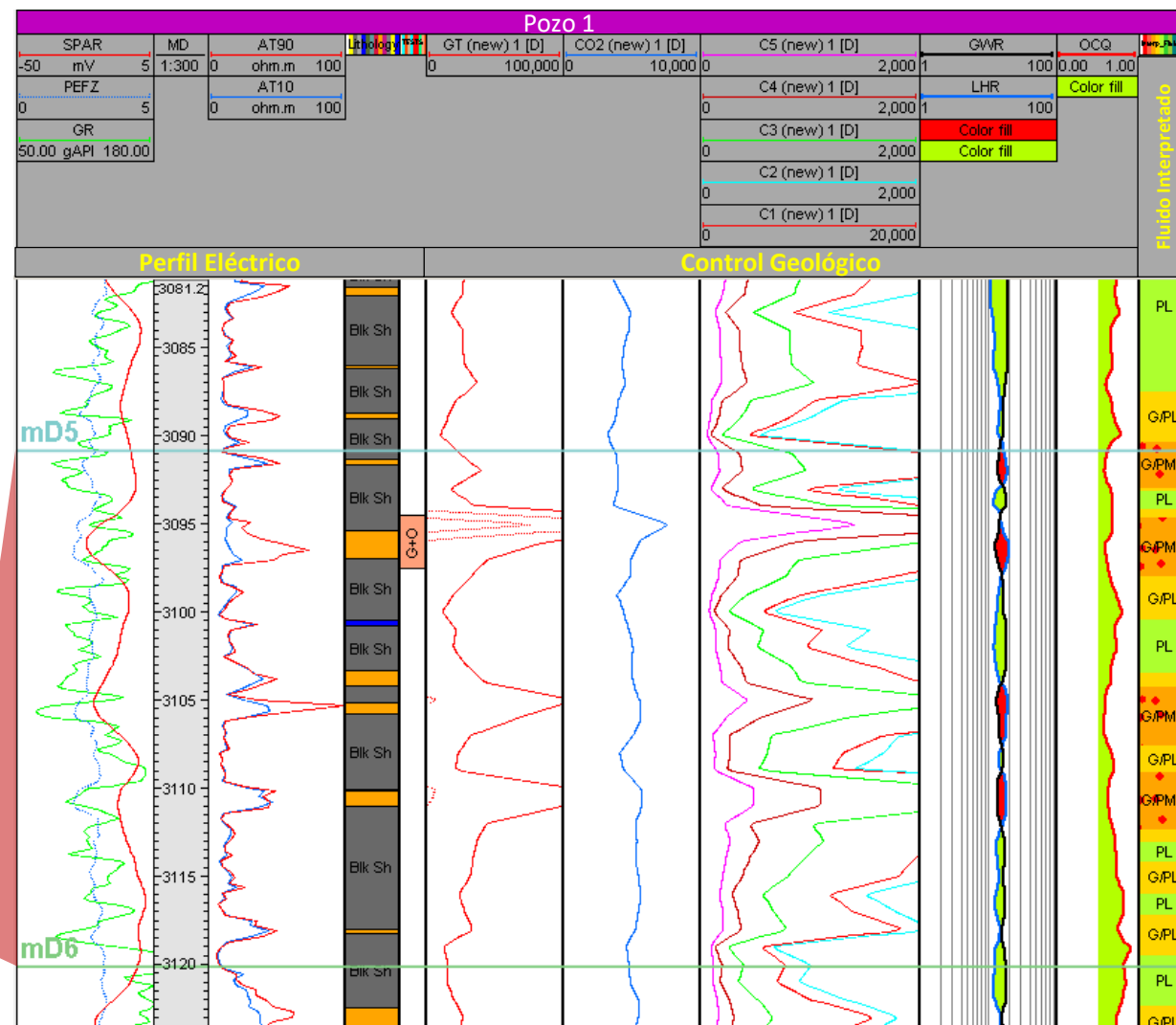
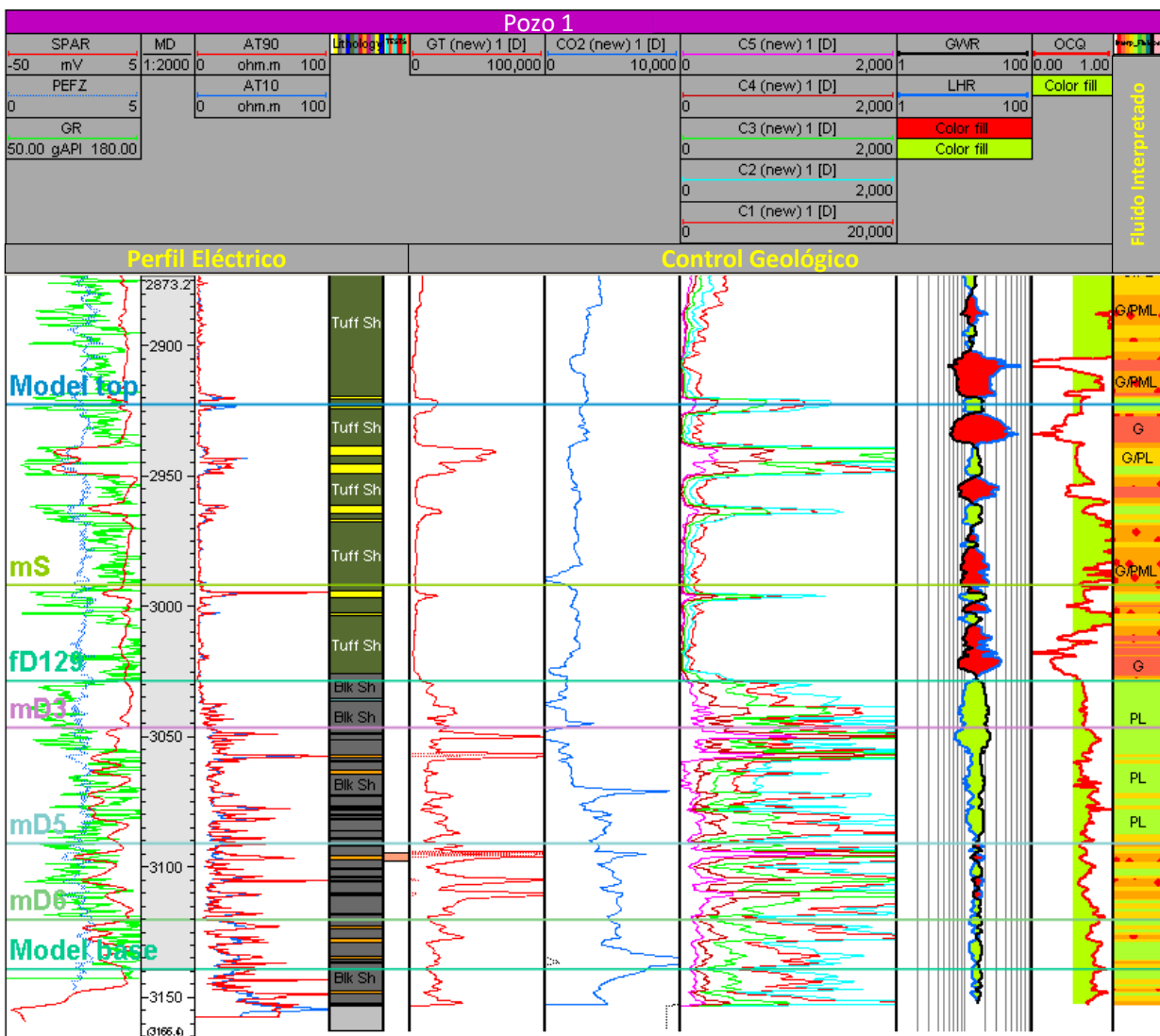
SECUENCIA DE TRABAJOS

1. CORRELACIÓN DE PERFILES ELÉCTRICOS
2. PUESTA EN PROFUNDIDAD
3. INTERPRETACIÓN LITOLÓGICA
4. APLICACIÓN DE ECUACIONES CONDICIONALES Y ANALISIS



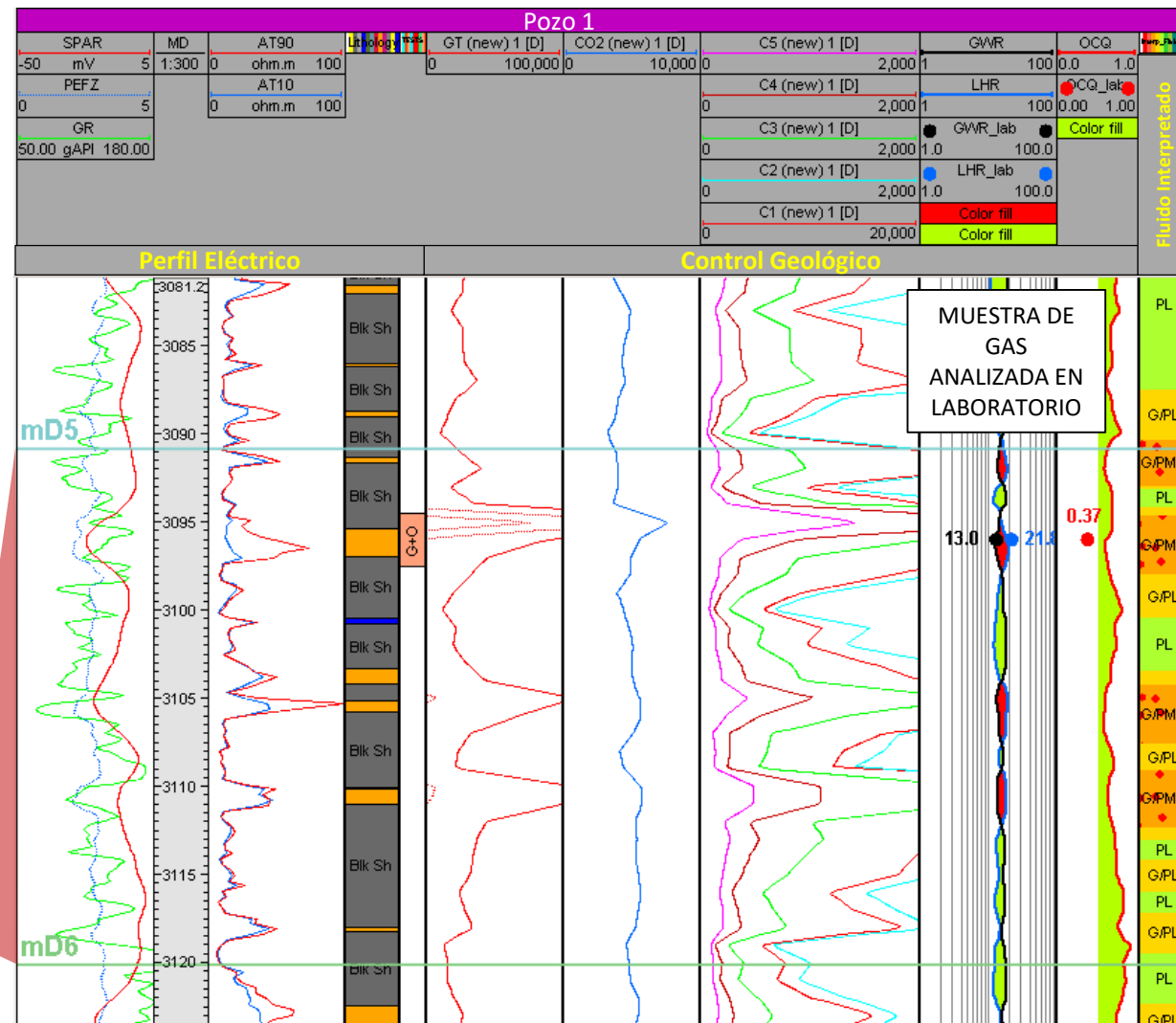
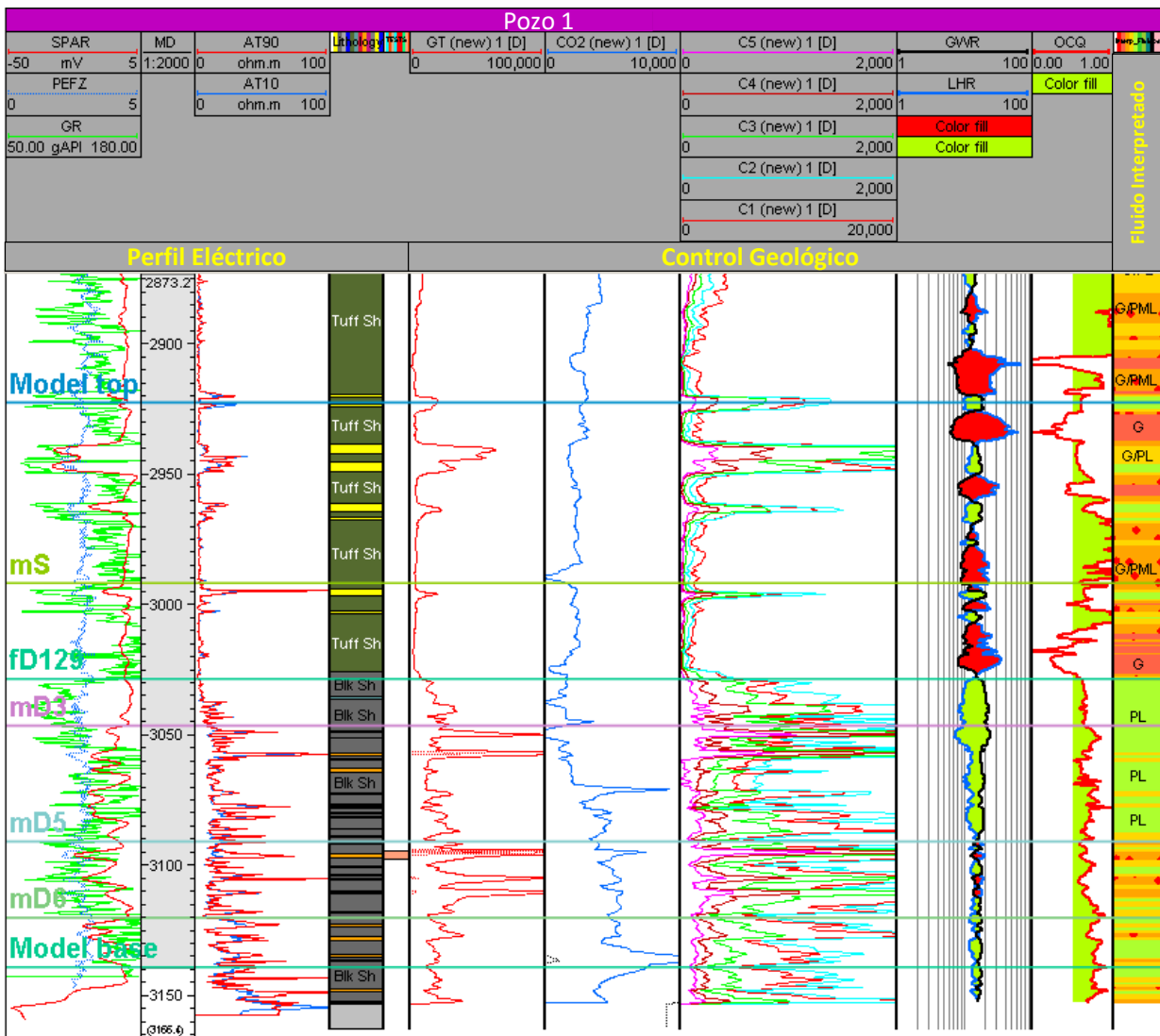


EJEMPLO 1



Ensayo 3094.5/97.5 m: GAS 32.000 m³/d, CO₂: 15%
-> FRAC: 292 bolsas-> Pleo surg. 1.160 l/h, CO₂: 15%, 62.7°API

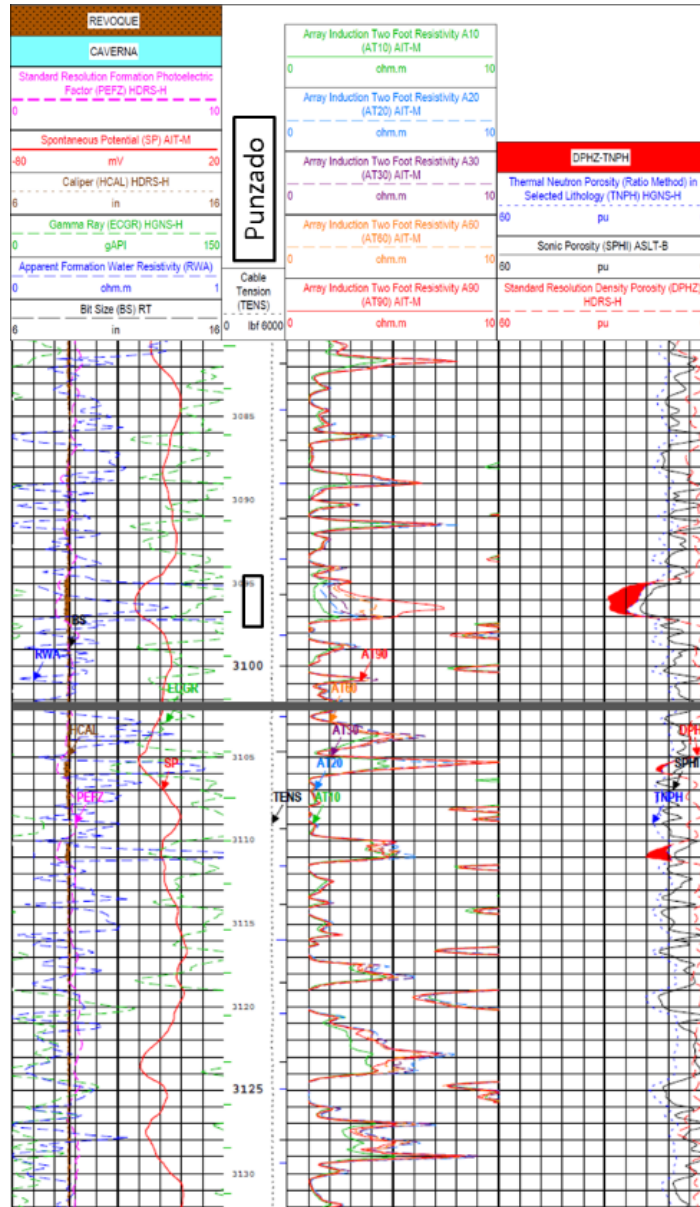
EJEMPLO 1



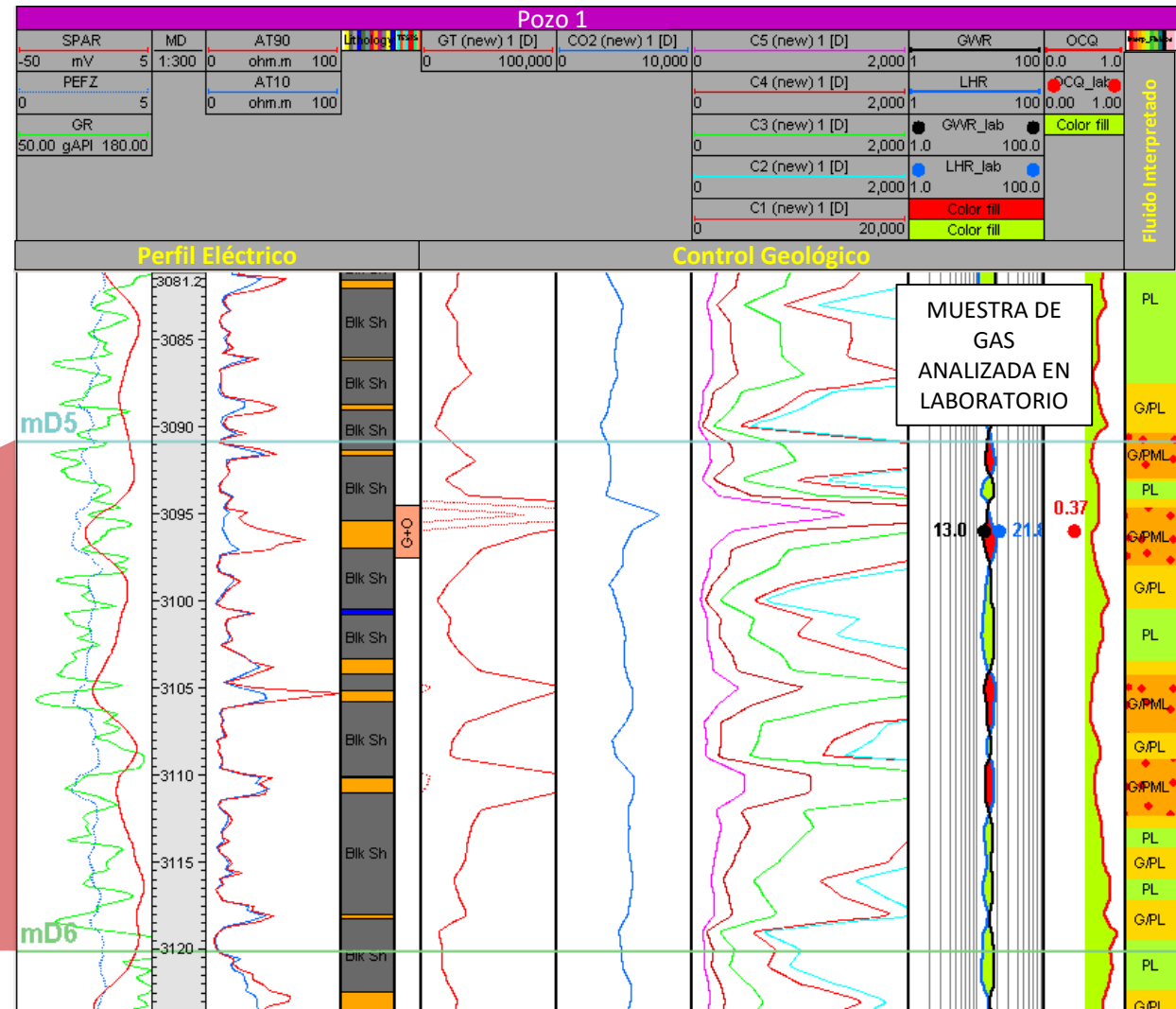
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EJEMPLO 1



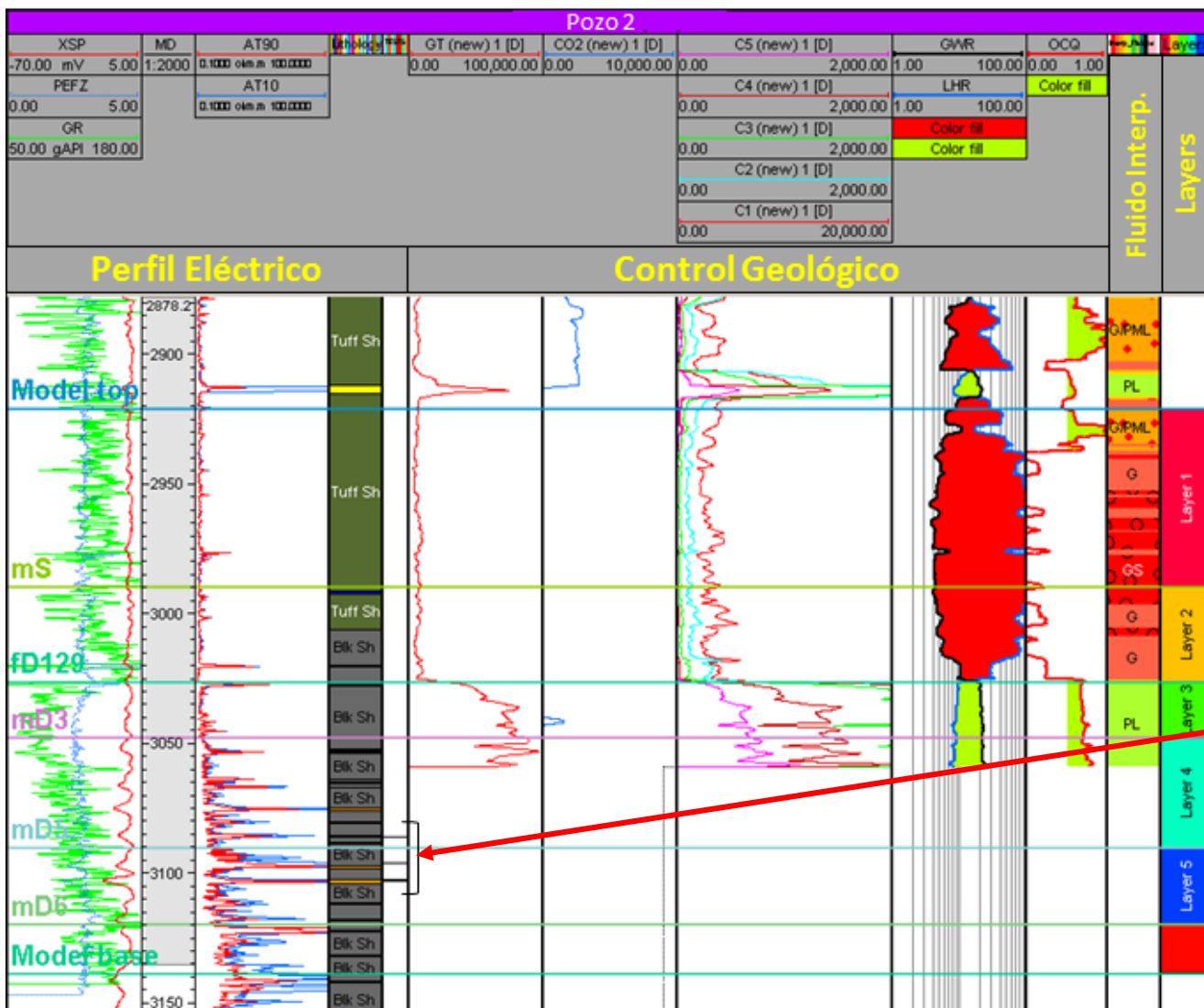
Puntos de presión
Movilidad:
3.9 y 4.8 mD/cP



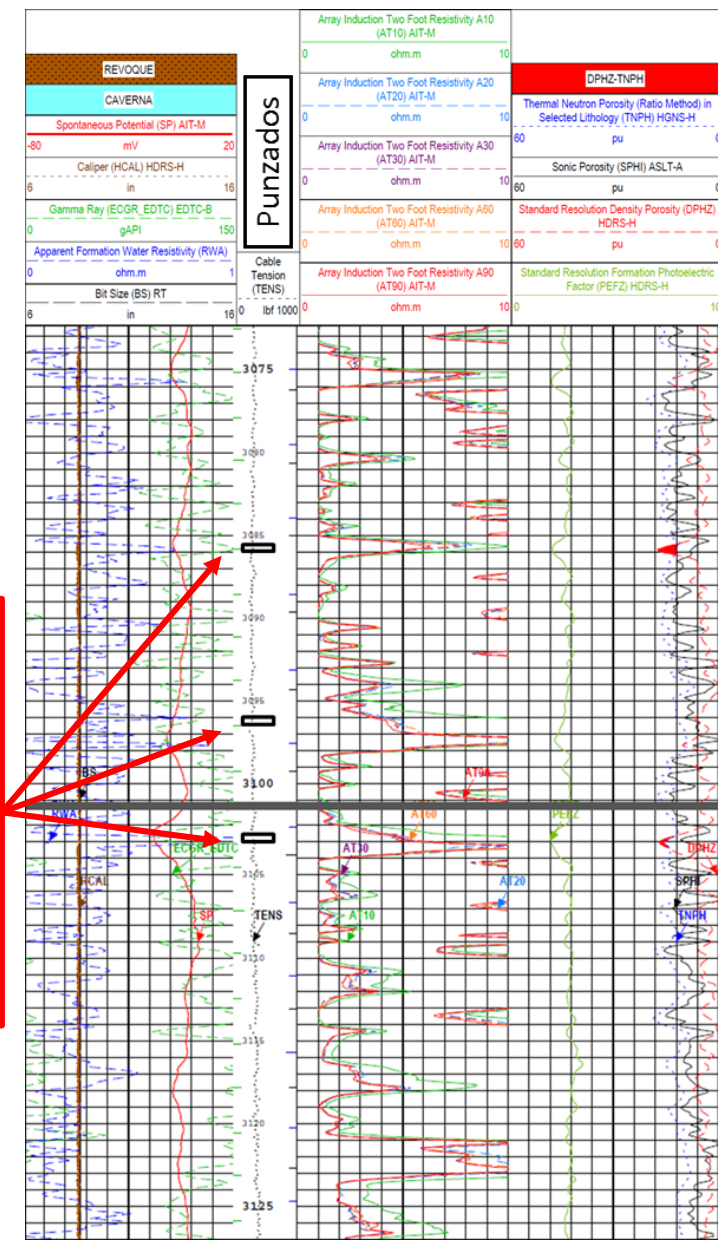
Ensayo 3094.5/97.5 m: GAS 32.000 m³/d, CO₂: 15%
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EJEMPLO 2



Intervalos punzados
Ensayo: Sin Entrada
Fracturó con 1.469
bolsas
Caudal inicial:
11 m³/d pleo. surg.
CO₂: 4%





COMPARACIÓN EJEMPLOS 1 y 2

CARACTERIZACIÓN GEOQUÍMICA DE PETRÓLEOS Y REFLECTANCIA DE VITRINITA

POZO 2: SHALE

41°API

Madurez: fase tardía de ventana de petróleo

Madurez fangolitas: Ro 1.05-1.16%

CO₂: 4%



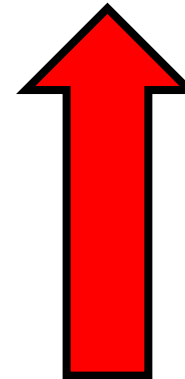
POZO 1: NIVEL PERMEABLE

62.7°API

Mayor madurez (cercano a VRE: 1.3%)

Madurez fangolitas adyacentes Ro: 1.12-1.14%

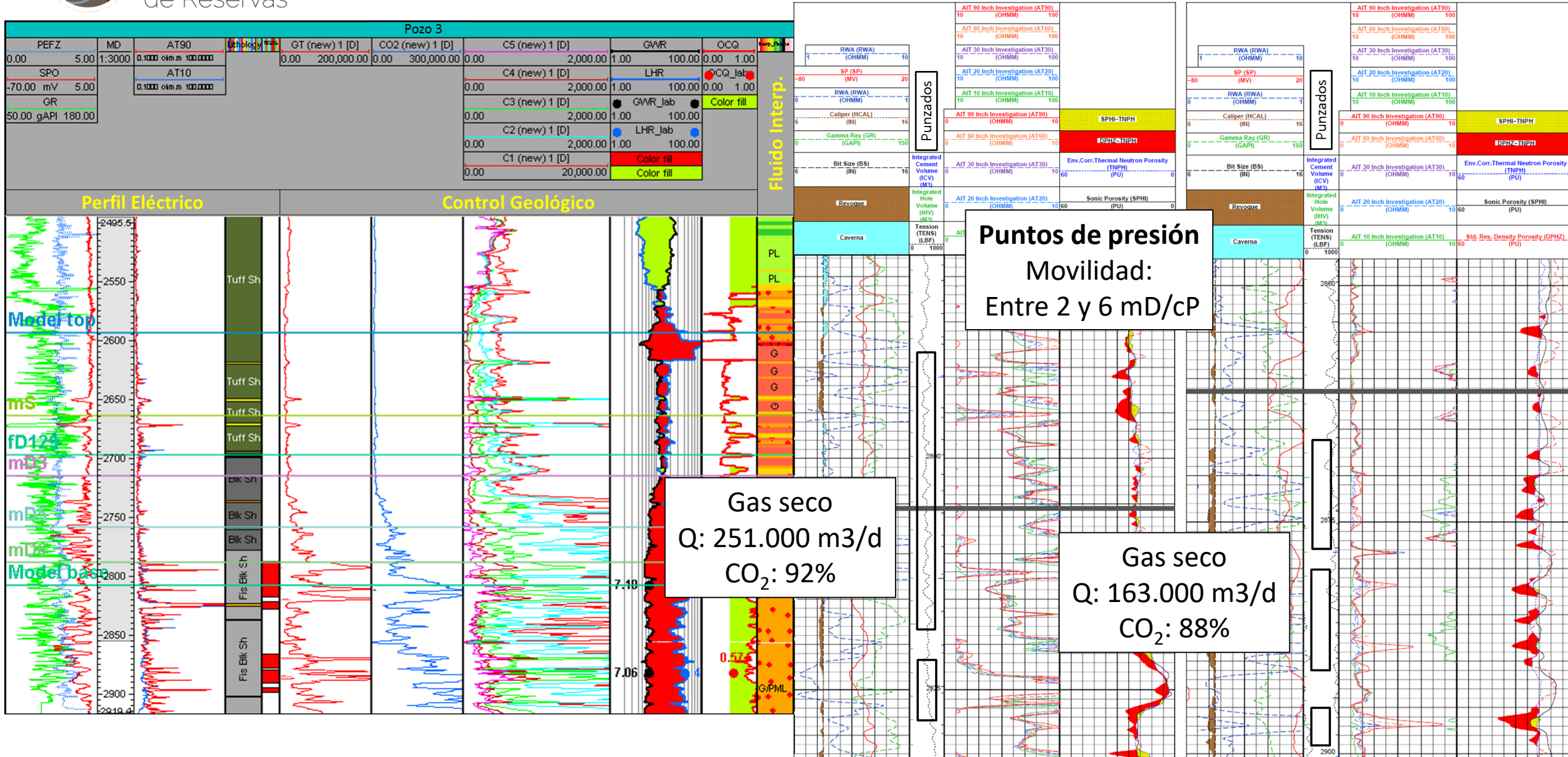
CO₂: 15%



**MIGRACIÓN DESDE
NIVELES DE MAYOR
MADUREZ**

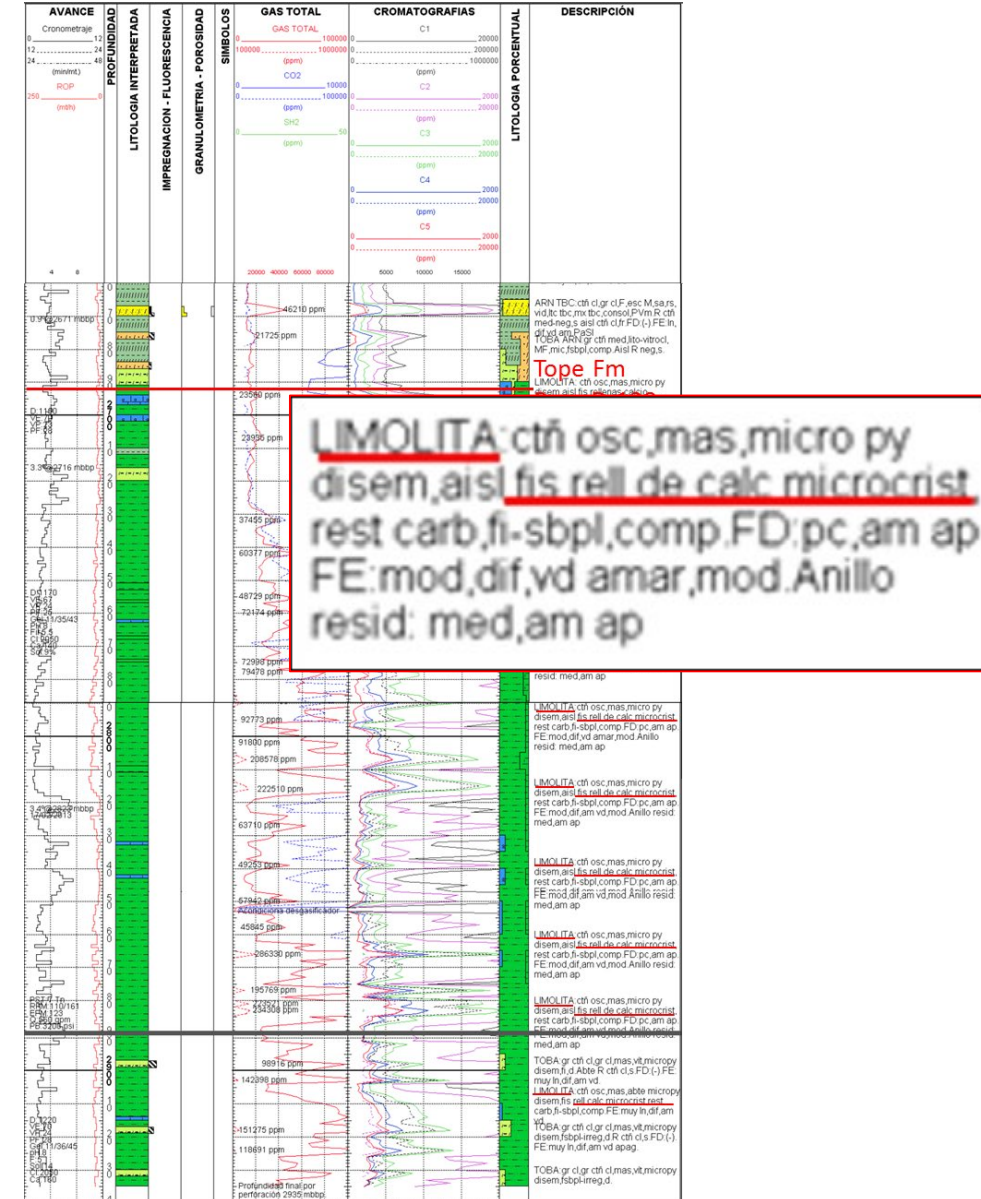
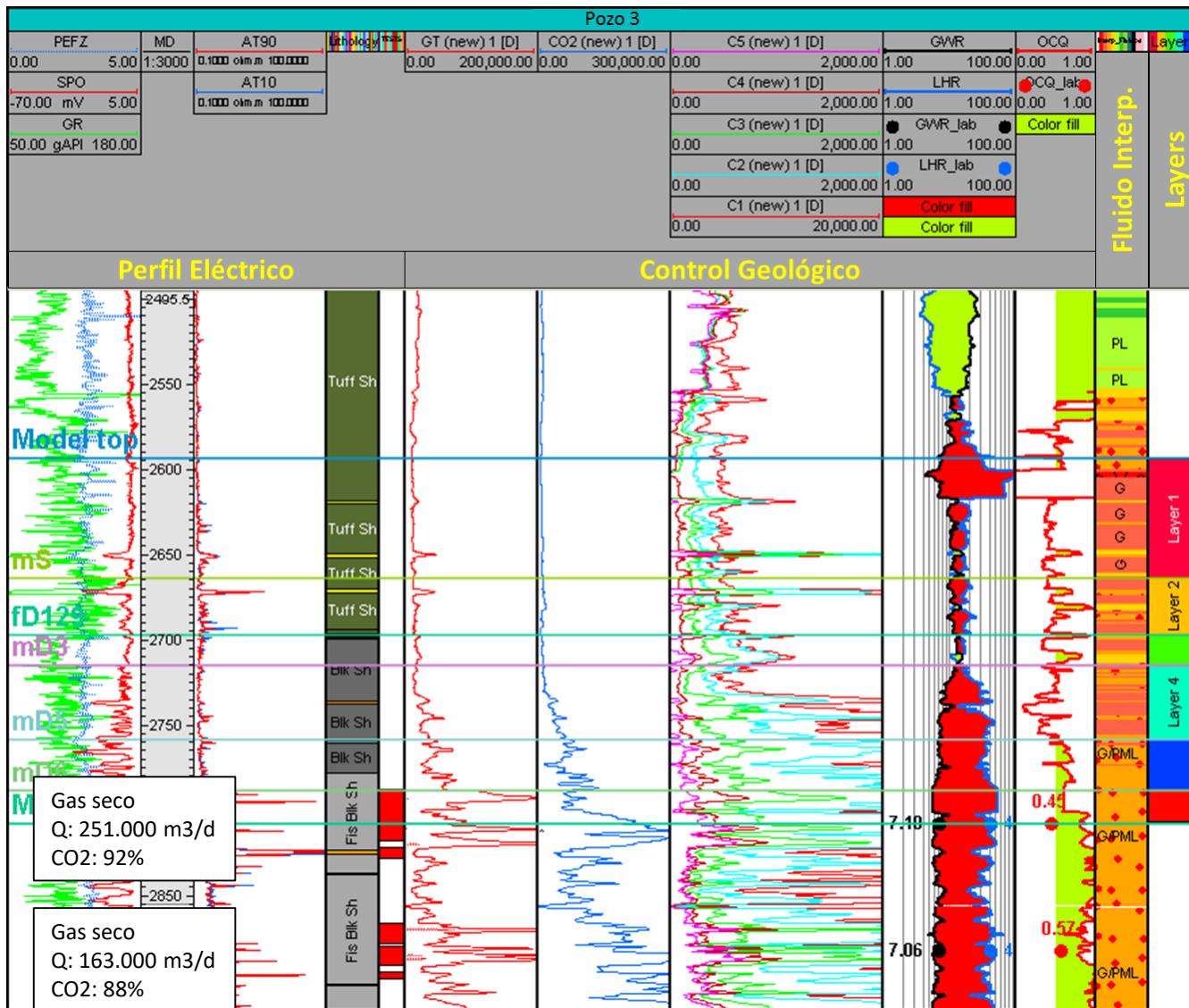


EJEMPLO 3





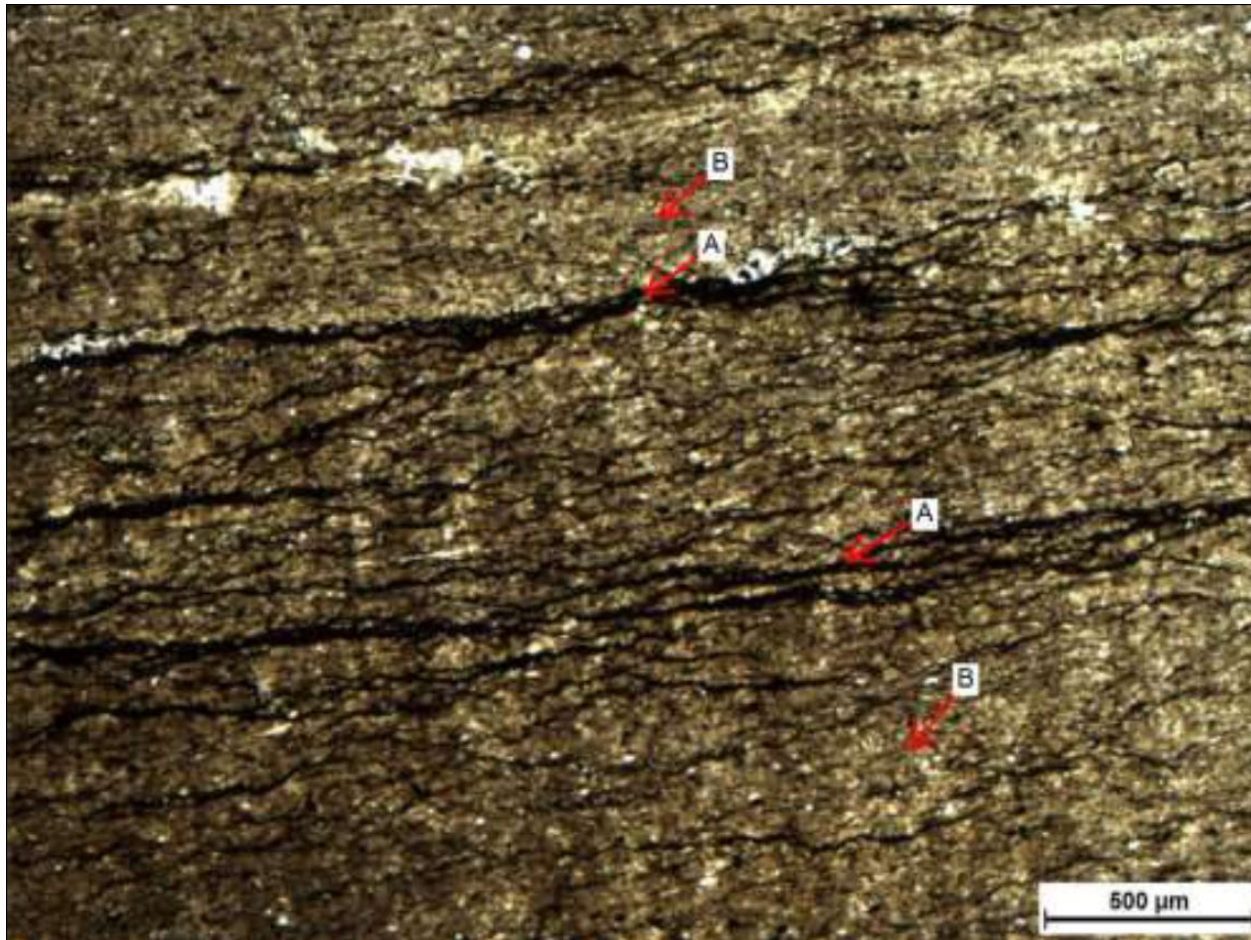
EJEMPLO 3



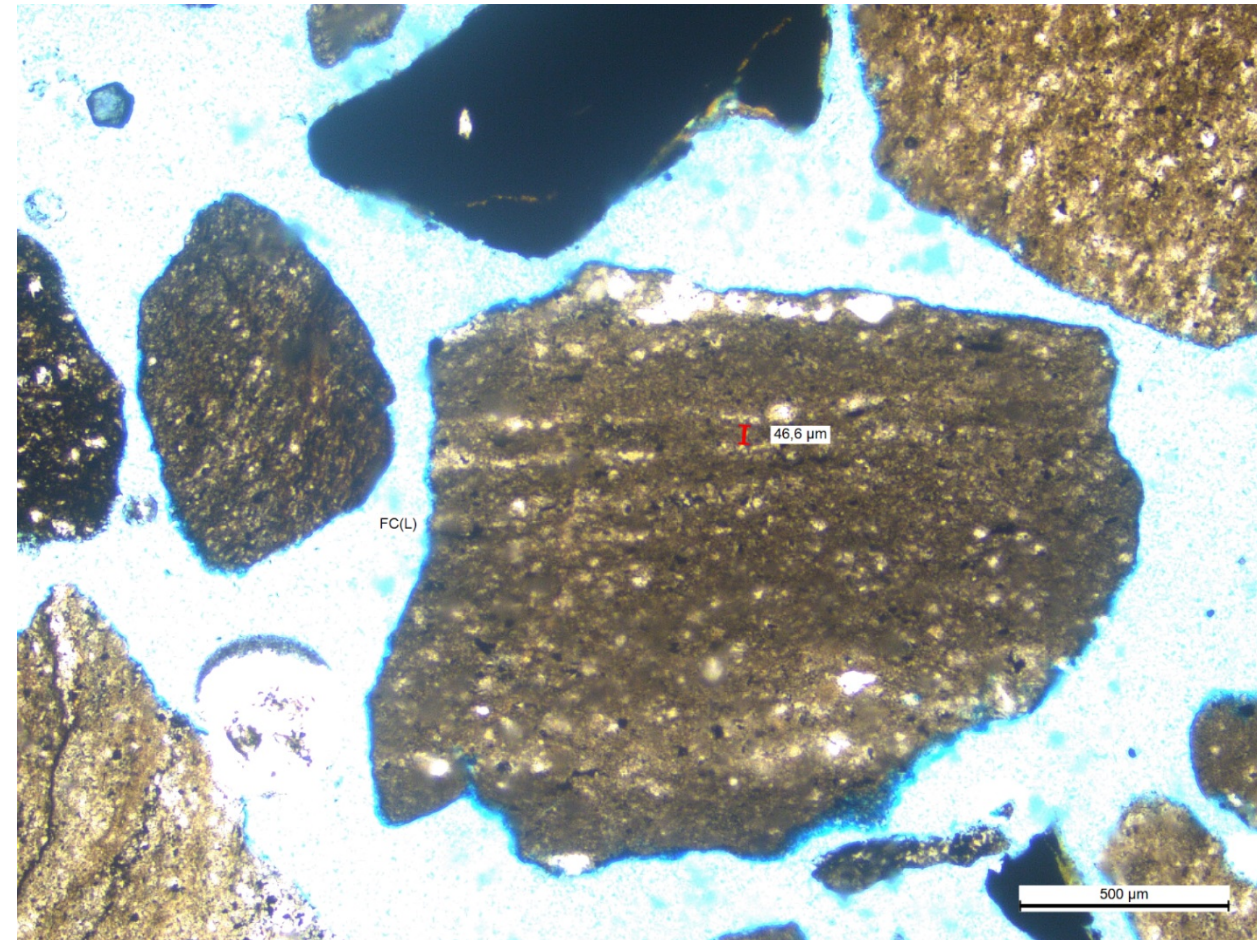


EJEMPLO 3

TESTIGO LATERAL ROTADO



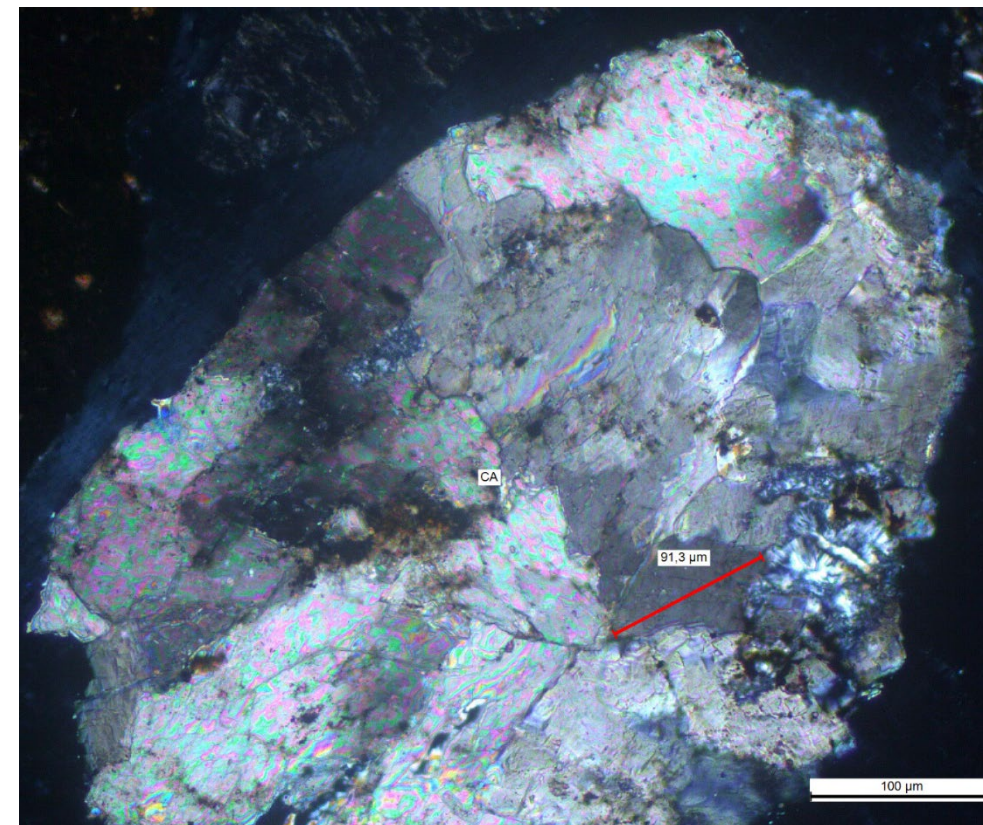
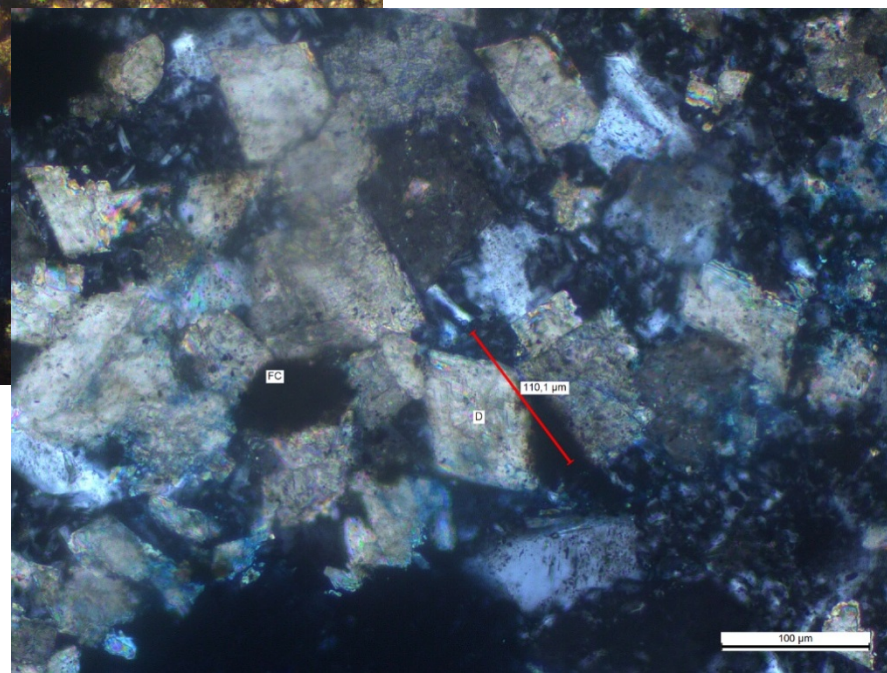
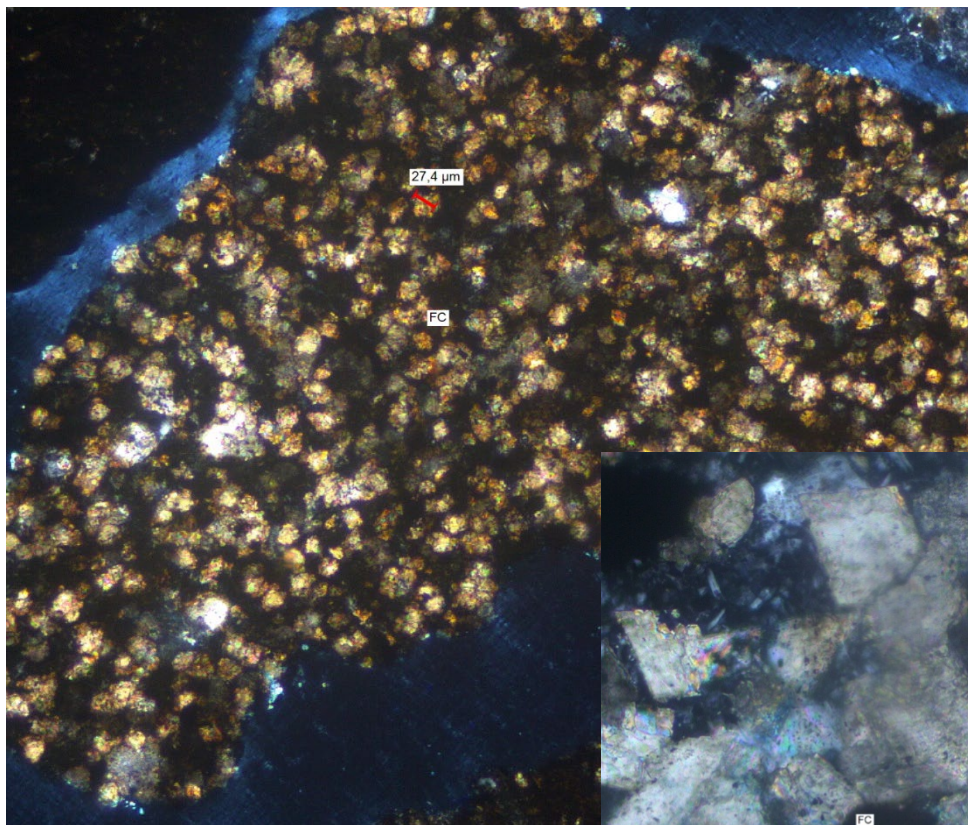
CUTTING





EJEMPLO 3

CUTTING





EJEMPLO 3

PERFILES ELÉCTRICOS: Alta porosidad, revoque, movilidad XPT.

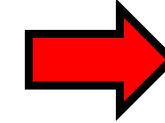
ENSAYOS: Altos caudales de gas

CONTROL GEOLÓGICO: Limolitas y cristales de calcita relleno de fisuras. Materia orgánica

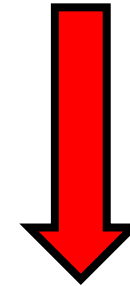
PETROGRAFÍA (Secciones delgadas)

CUTTING: Similar a CG. Calizas con textura esparítica. Cristales de dolomita

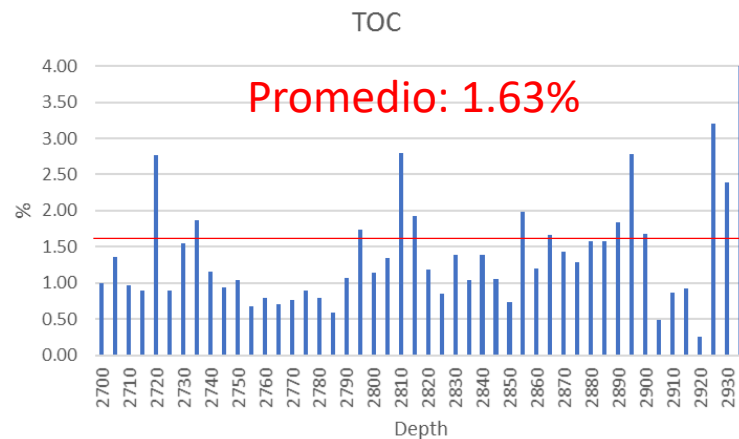
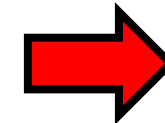
TESTIGOS LATERALES ROTADOS: Principalmente fangolitas arcillosas y limosas. Materia orgánica en láminas



Fangolitas con porosidad secundaria



**HC y CO₂
DEBIERON HABER
MIGRADO...**



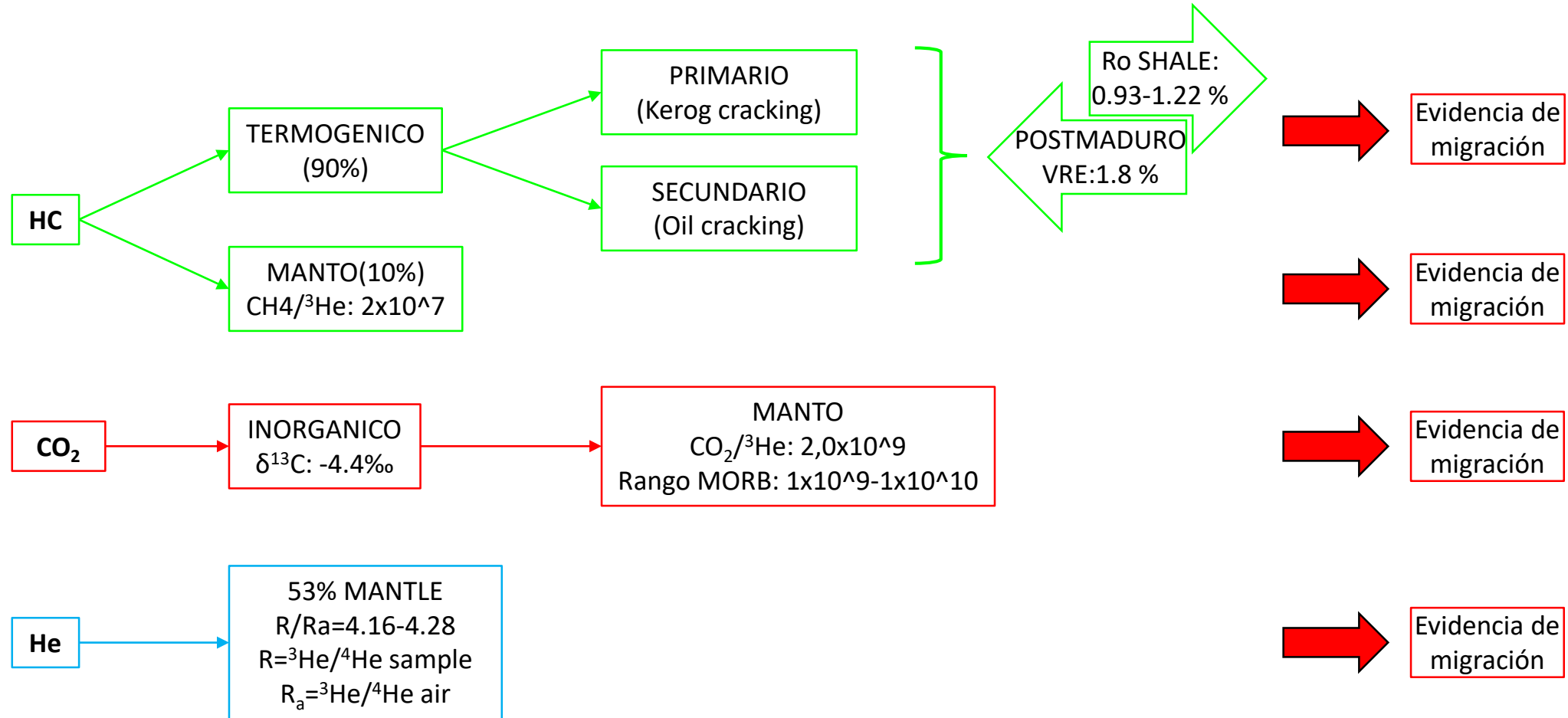
Reflectancia Vitrinita

Prof. (m)	Ro%
2725	0.93
2795	1.10
2855	1.03
2930	1.22



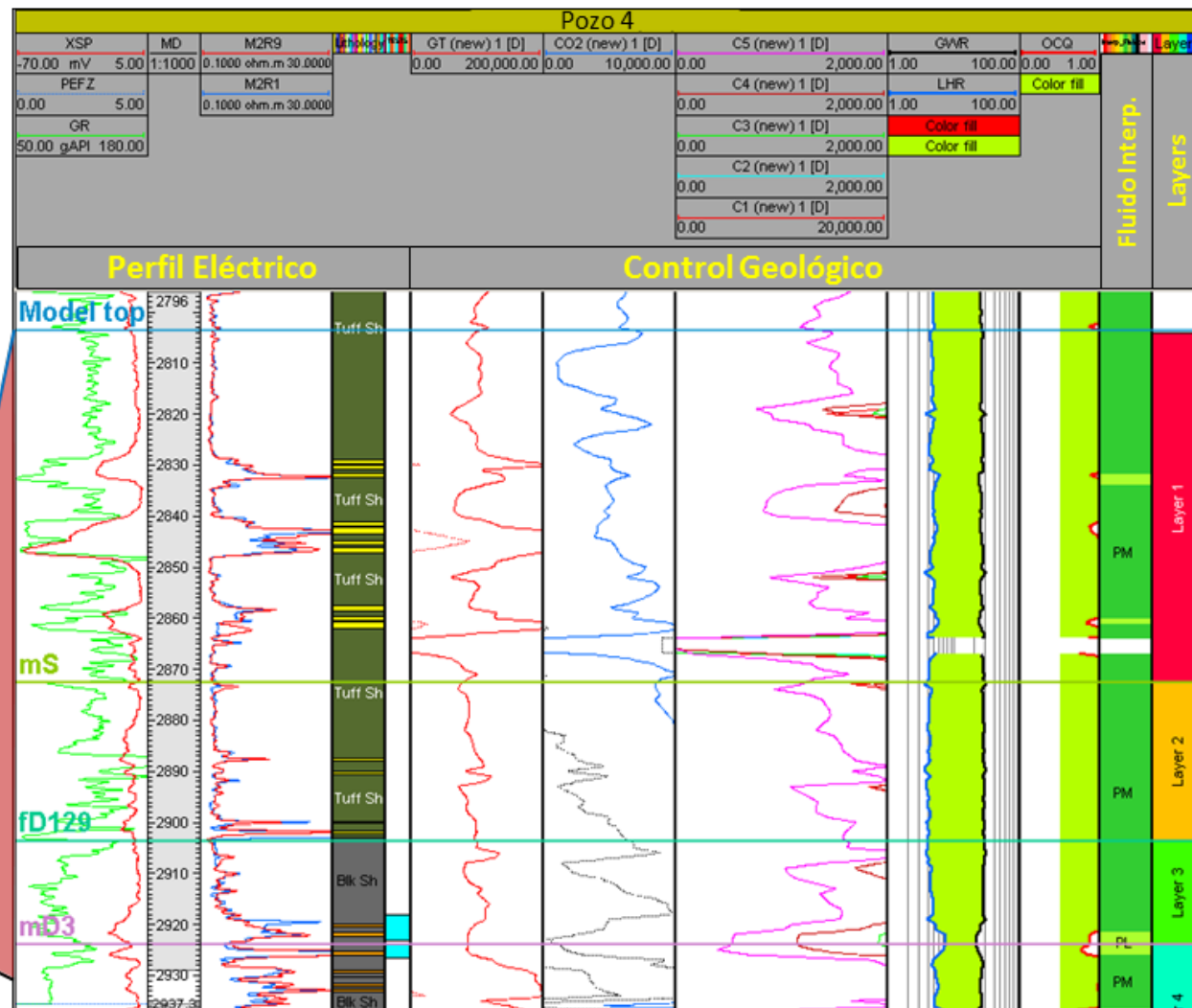
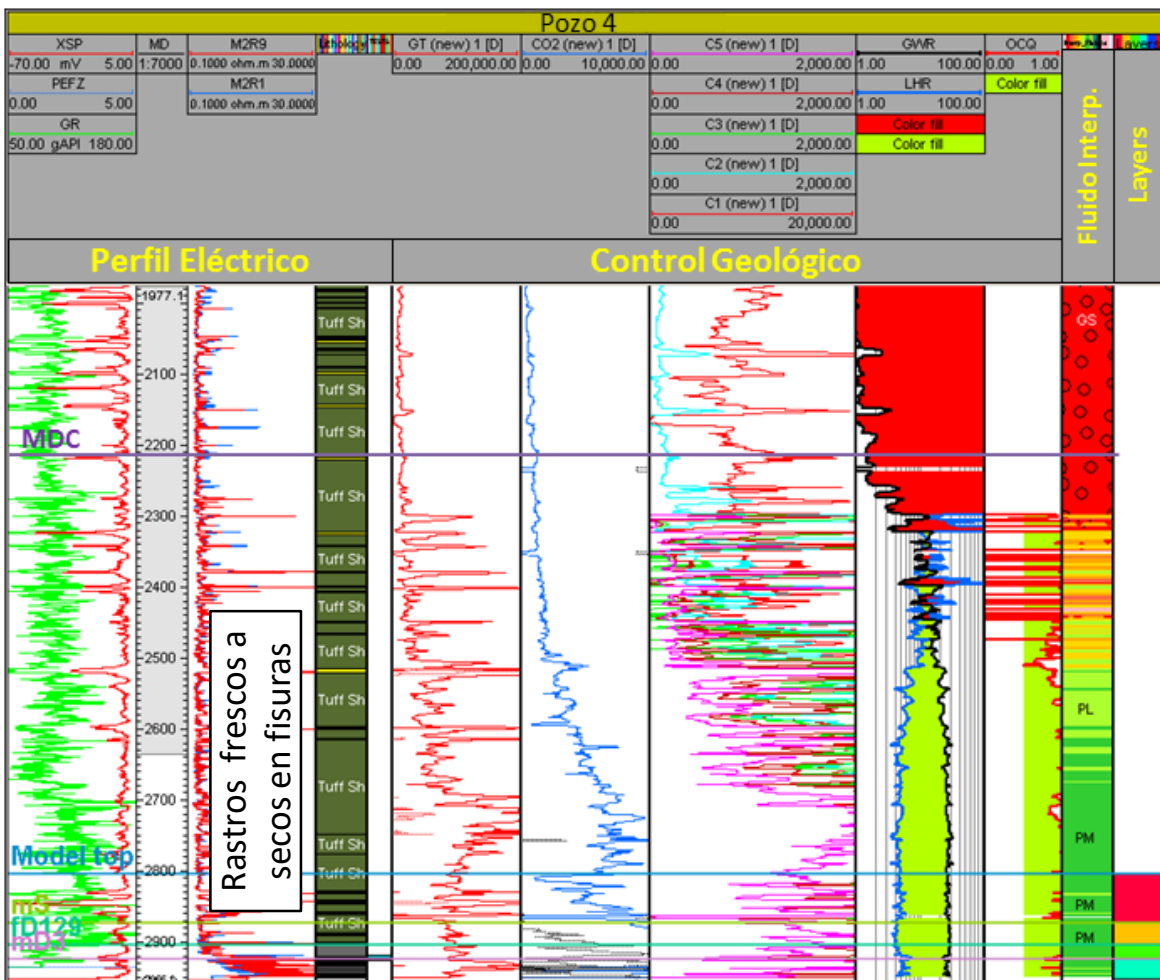
EJEMPLO 3

ANALISIS ISOTÓPICO - CONCLUSIONES Muestras de Gas (CO₂: 88% y 92%)





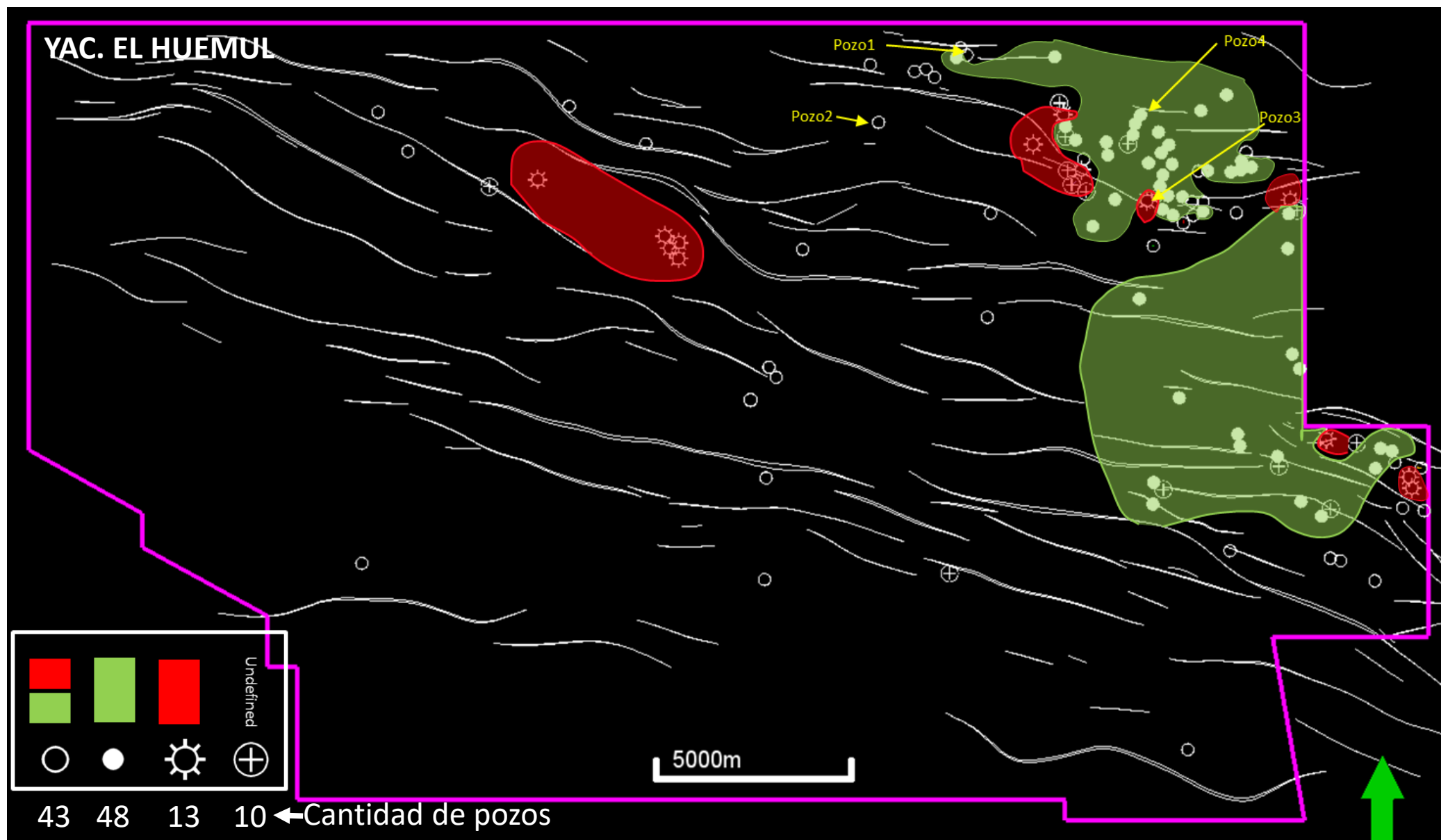
EJEMPLO 4



Test: WLR-Dry



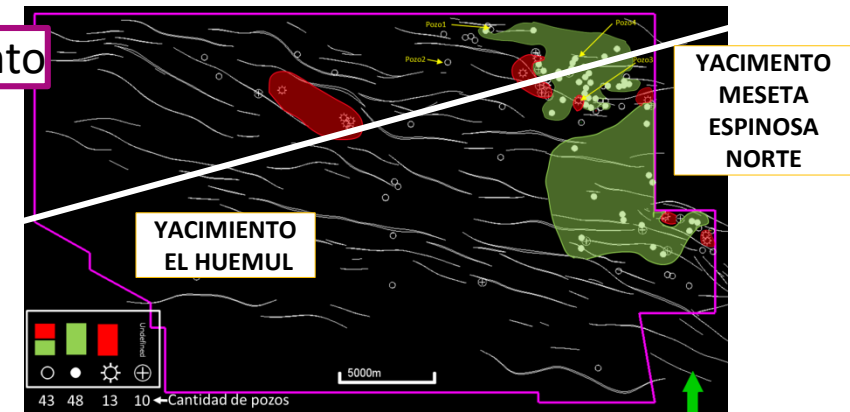
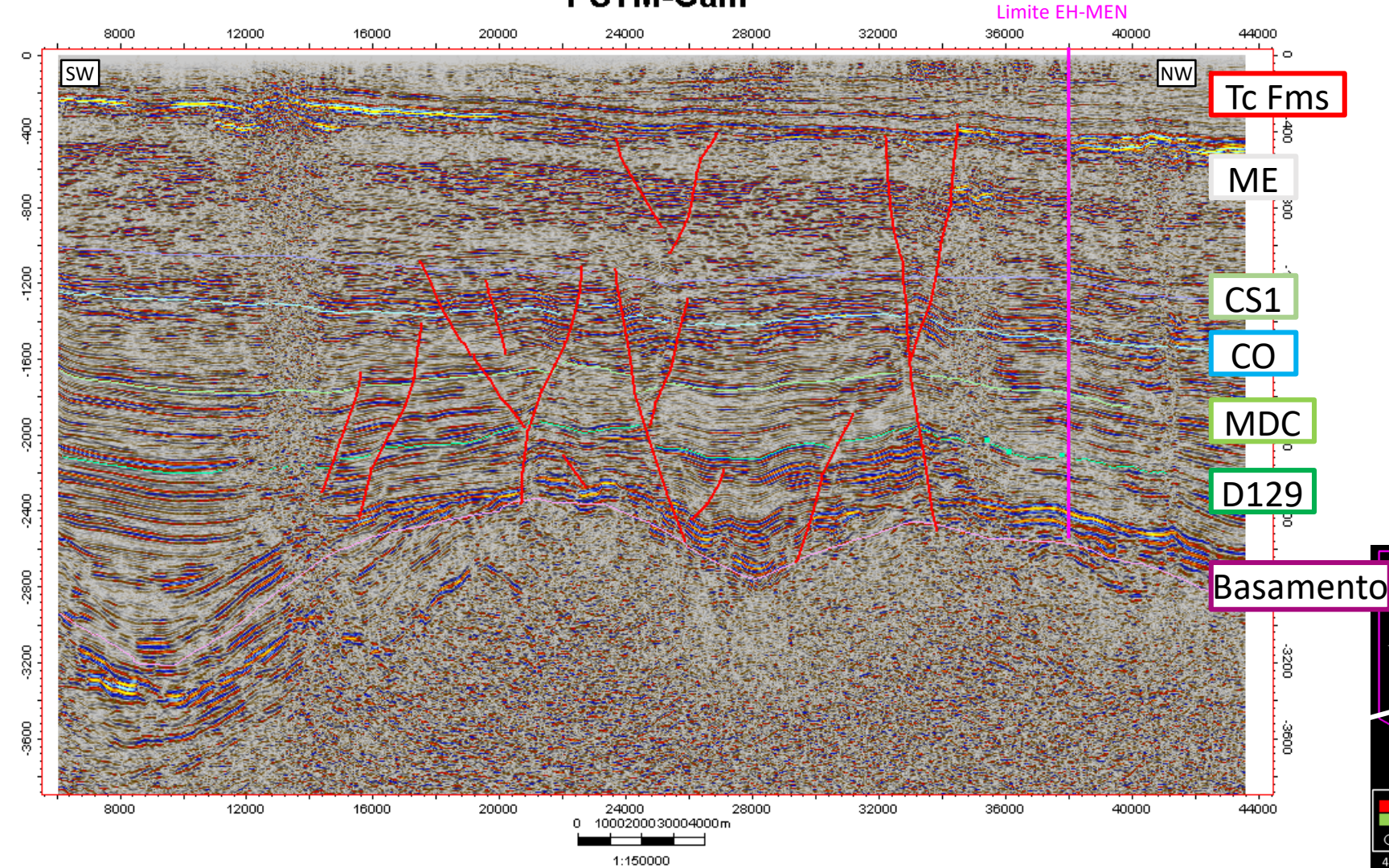
PATRONES CROMATOGRÁFICOS. DISTRIBUCIÓN AREAL





VÍAS DE MIGRACIÓN

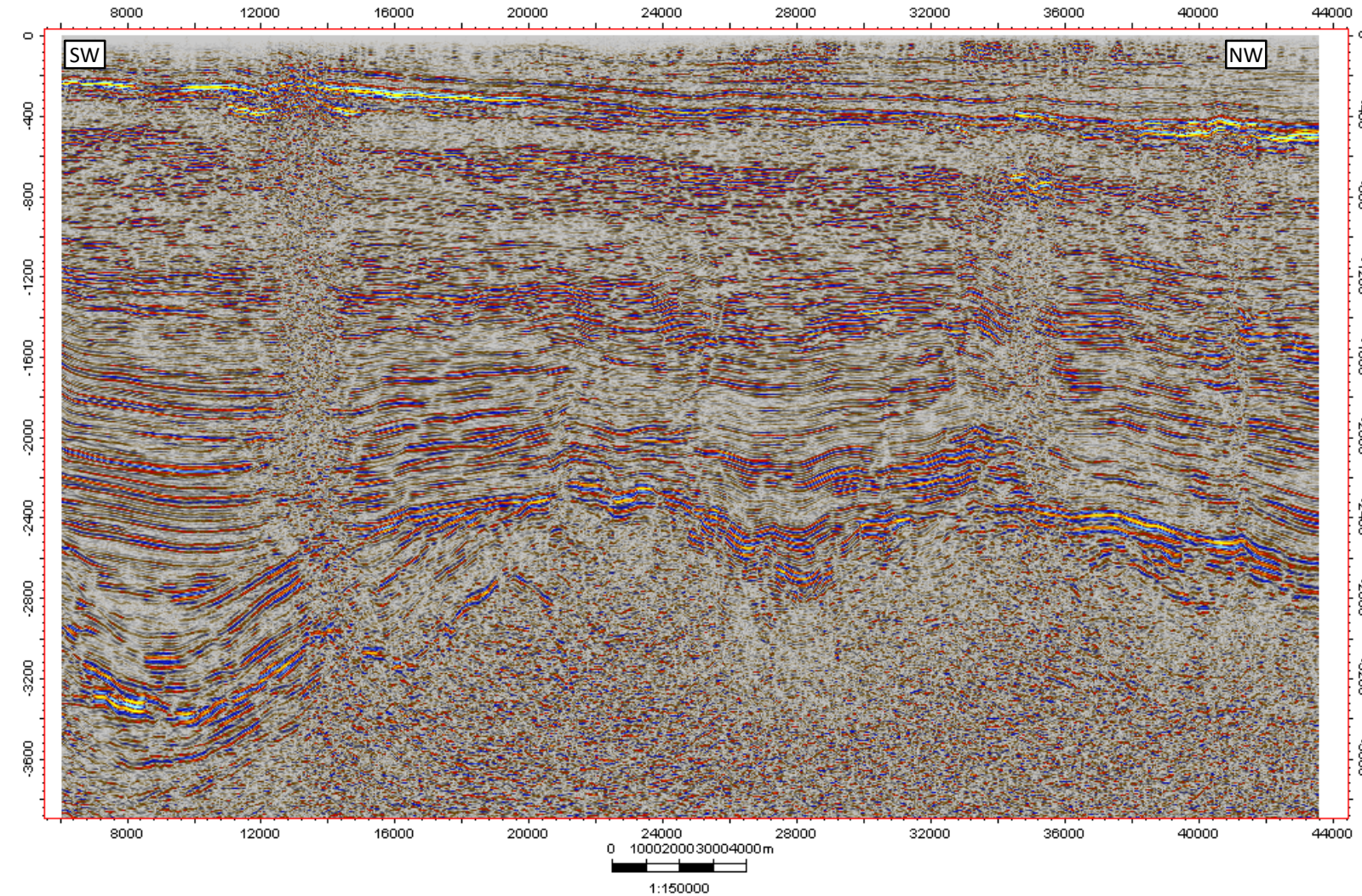
PSTM-Gain





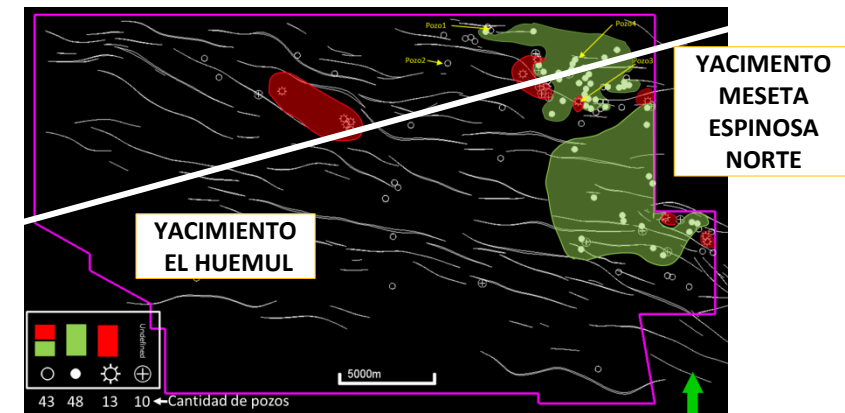
VÍAS DE MIGRACIÓN

PSTM-Gain



Chimeneas de gas (Gas chimneys)

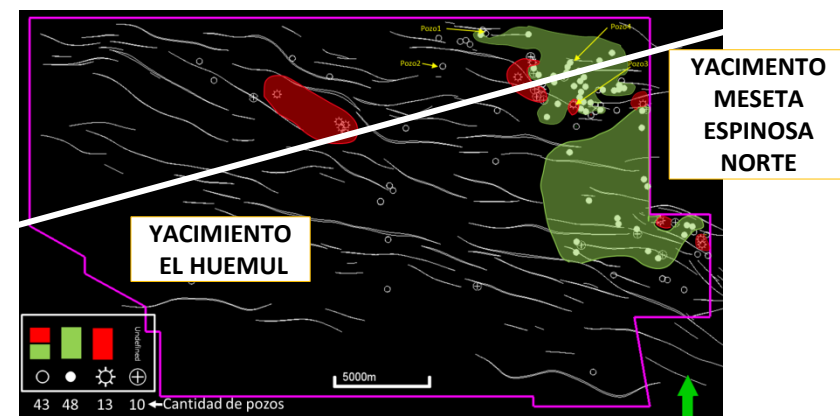
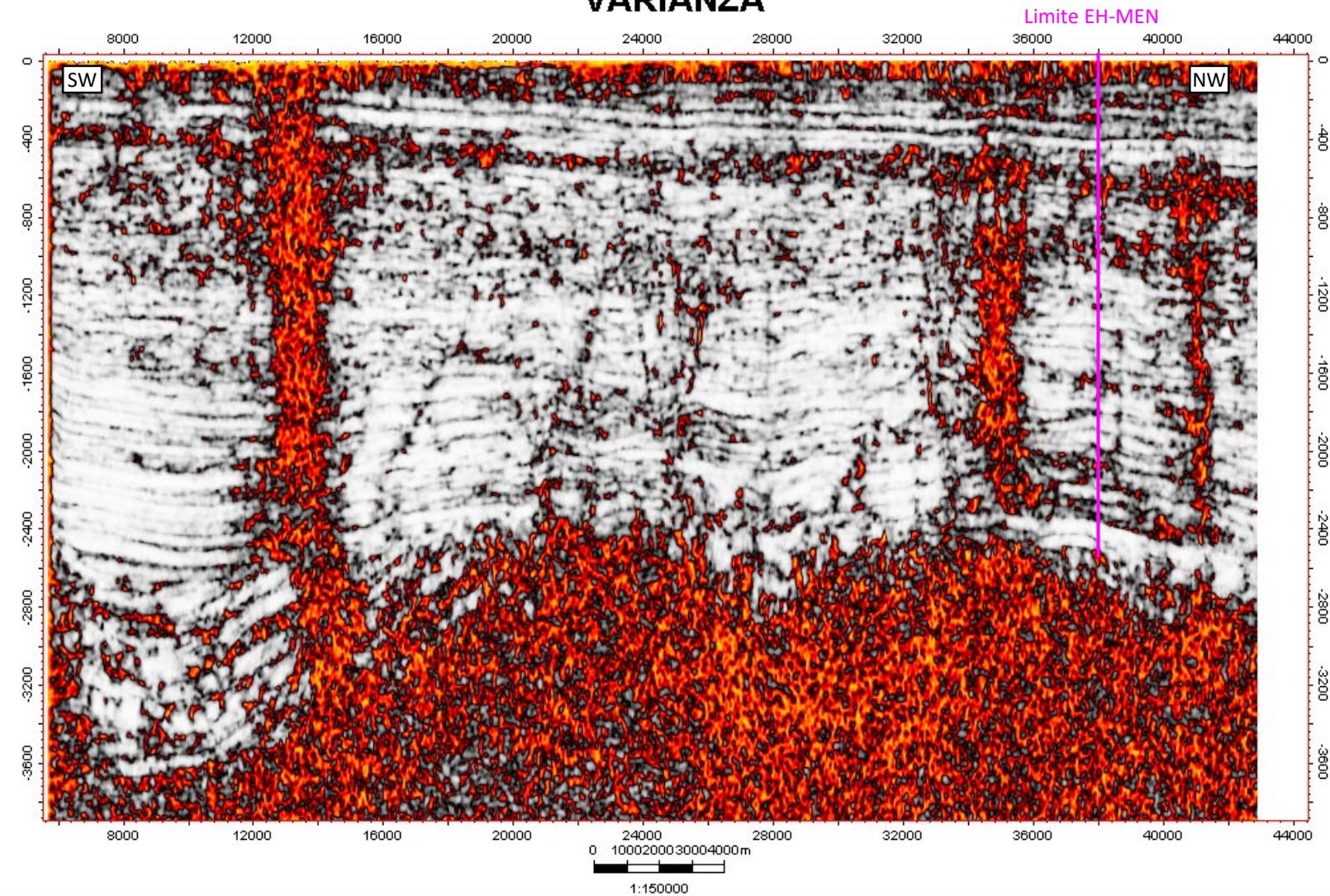
-Zonas subverticales de baja coherencia sísmica, donde generalmente se reduce la amplitud.





VÍAS DE MIGRACIÓN

VARIANZA

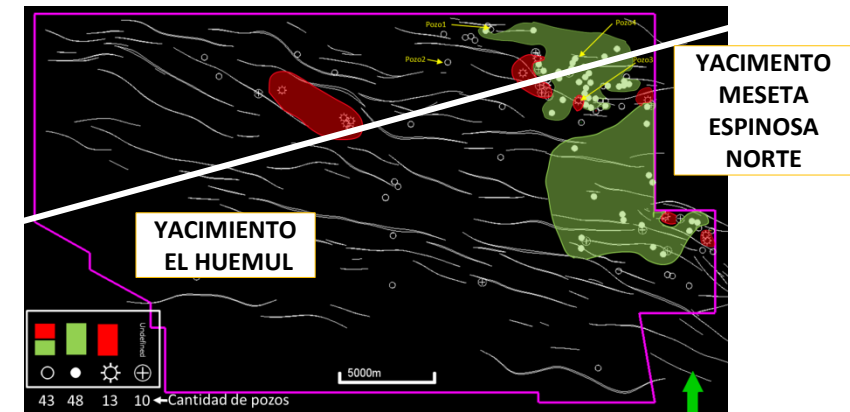
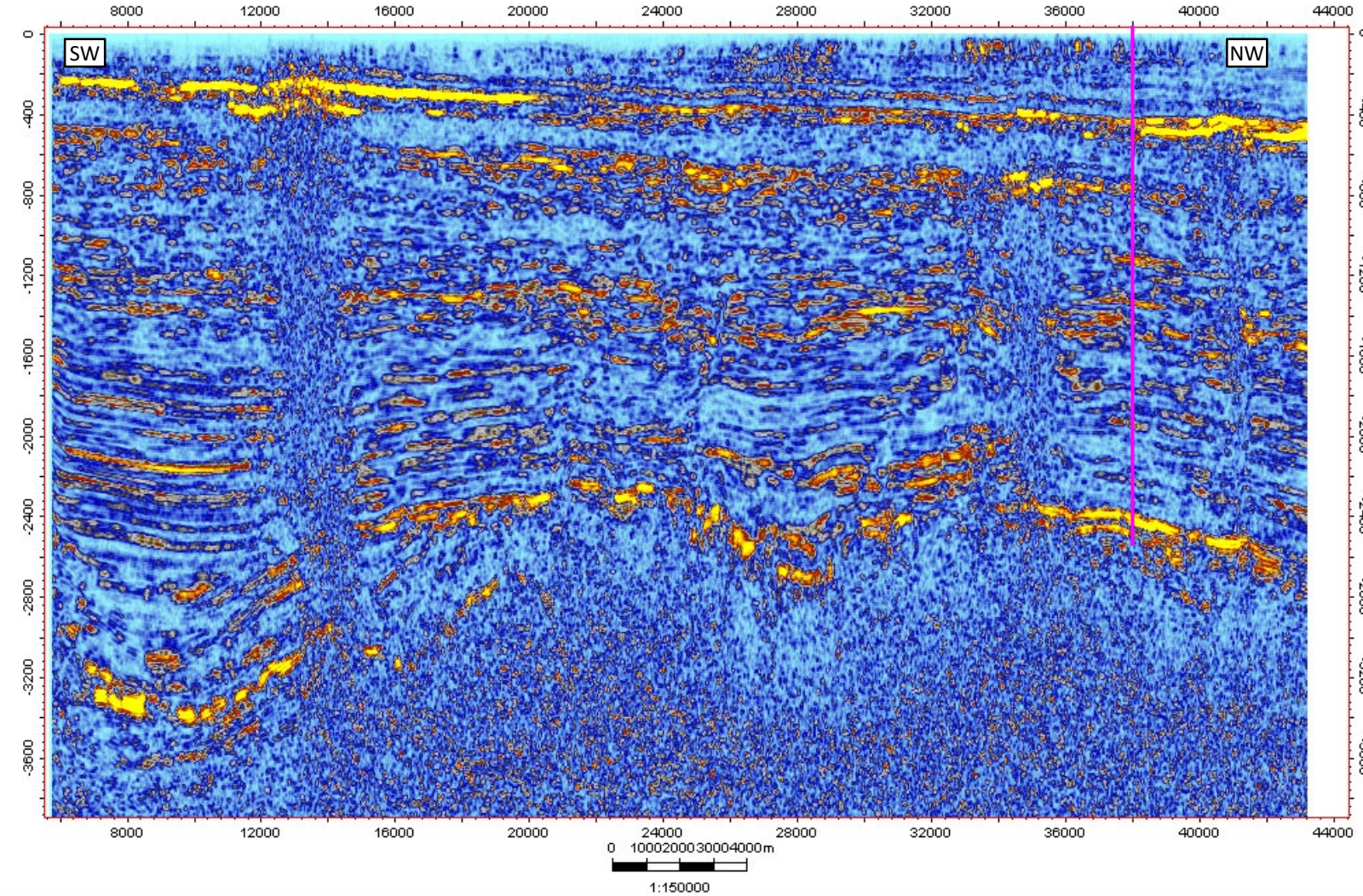




VÍAS DE MIGRACIÓN

RMS AMPL

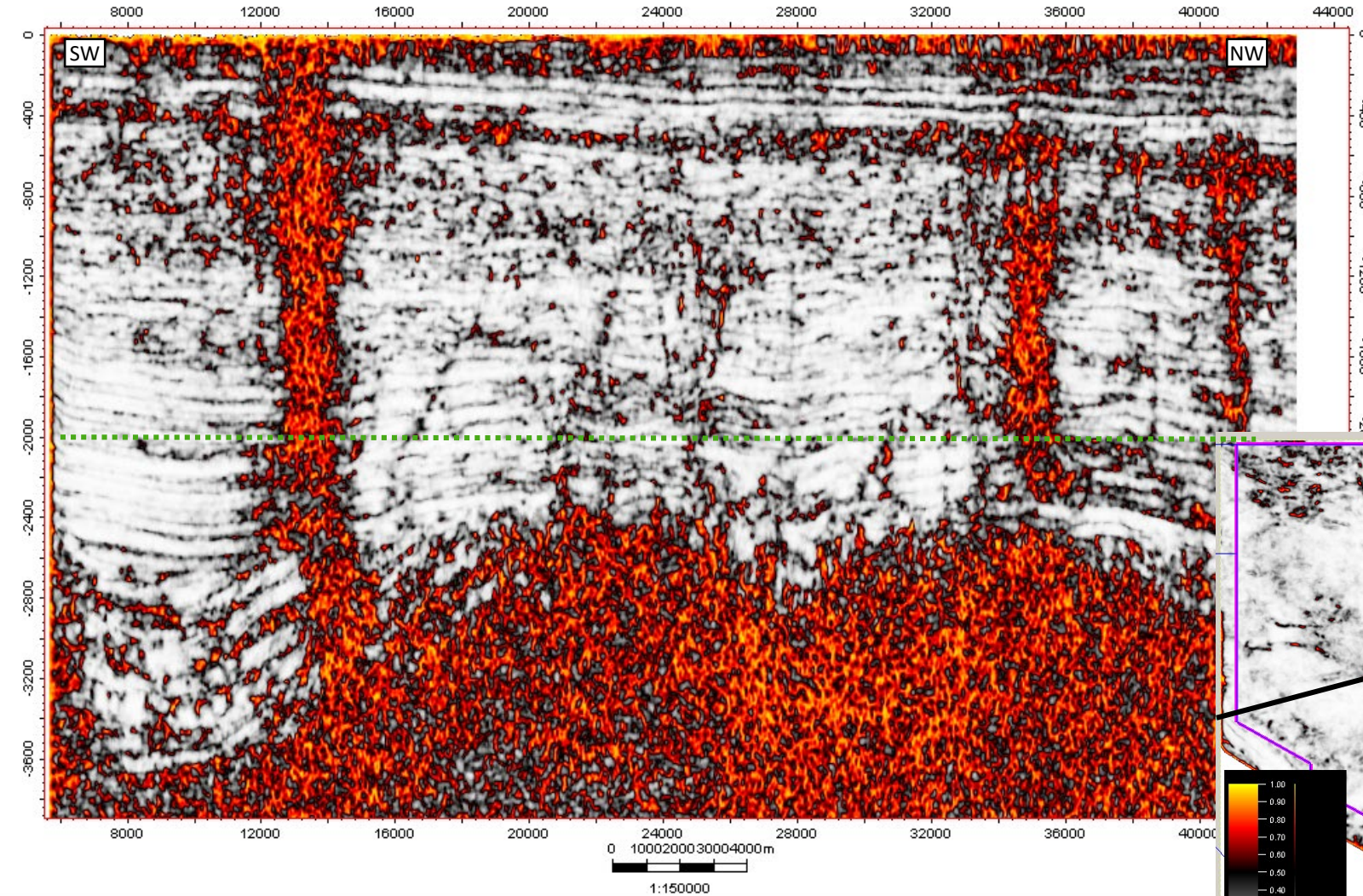
Limite EH-MEN



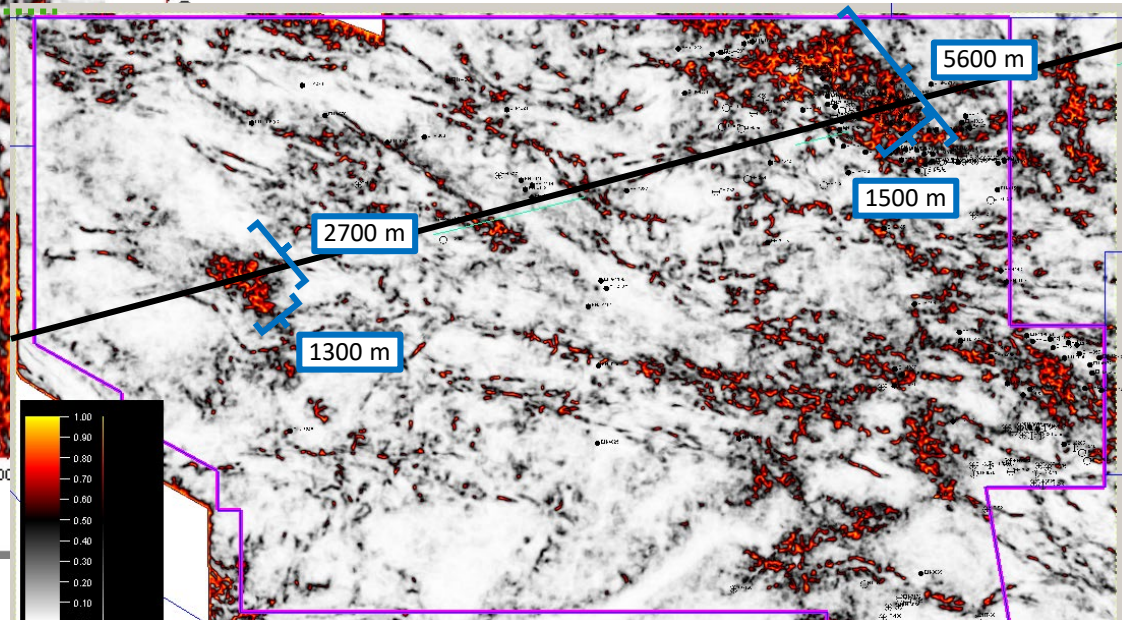


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VARIANZA

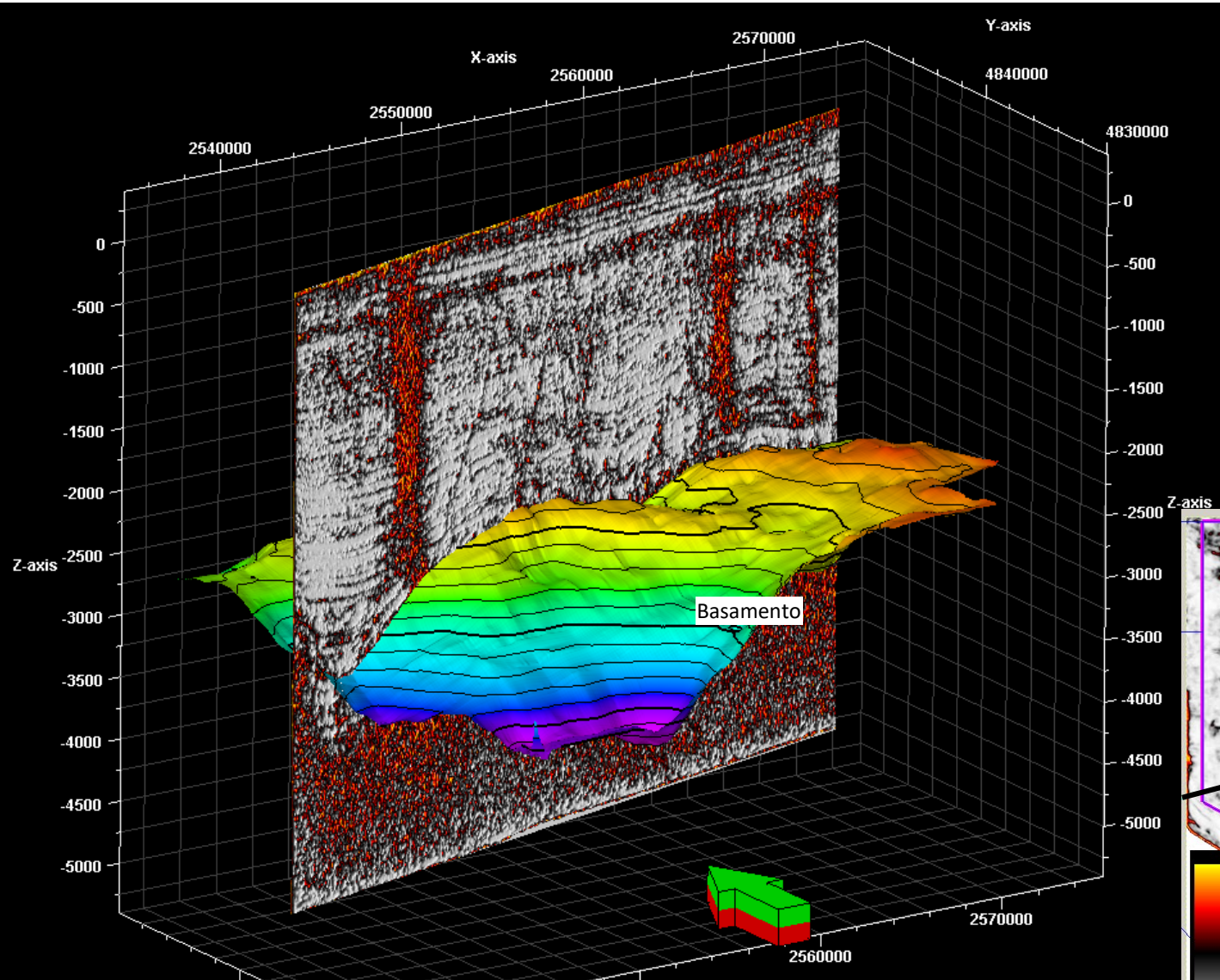


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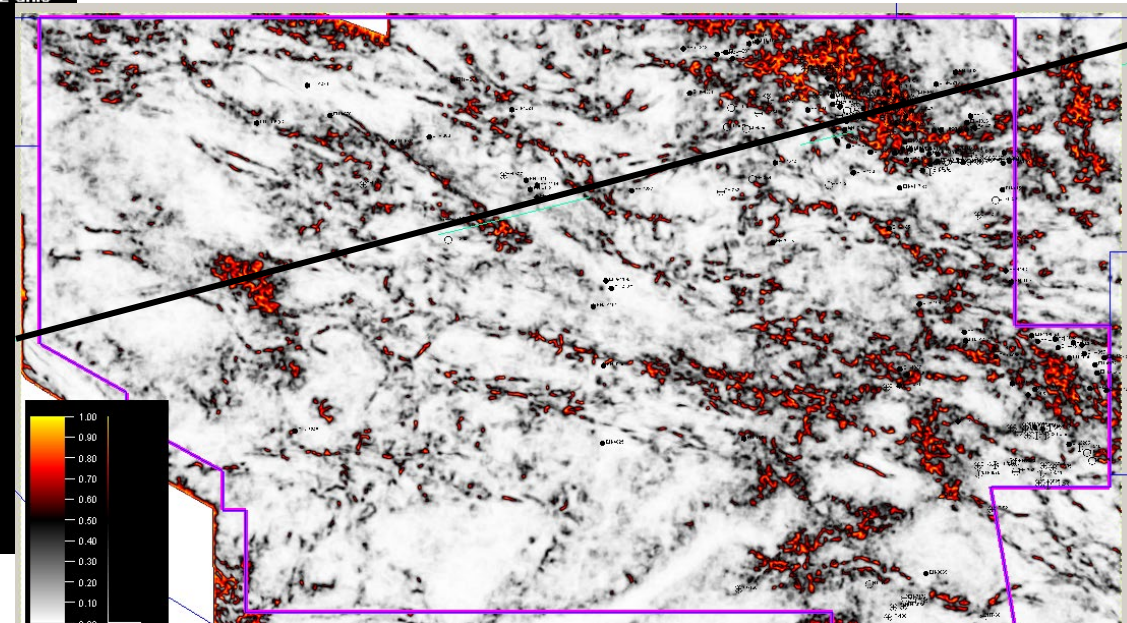




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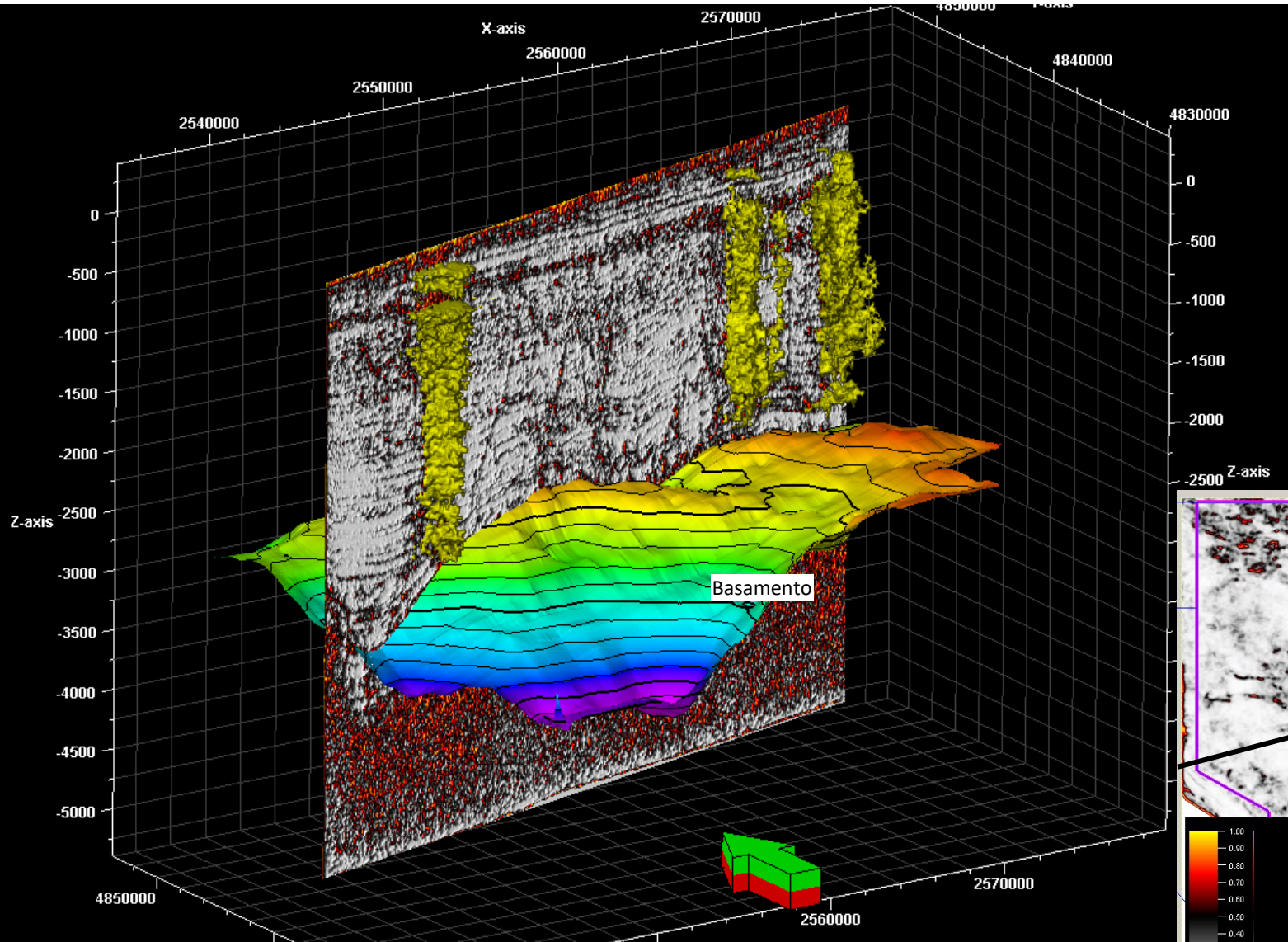


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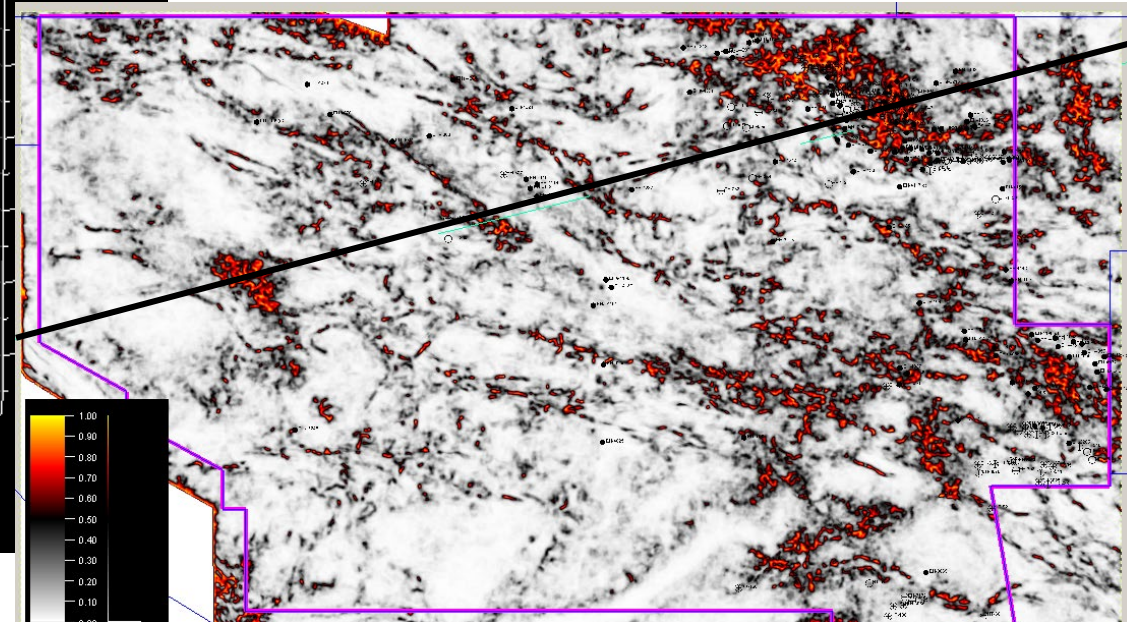




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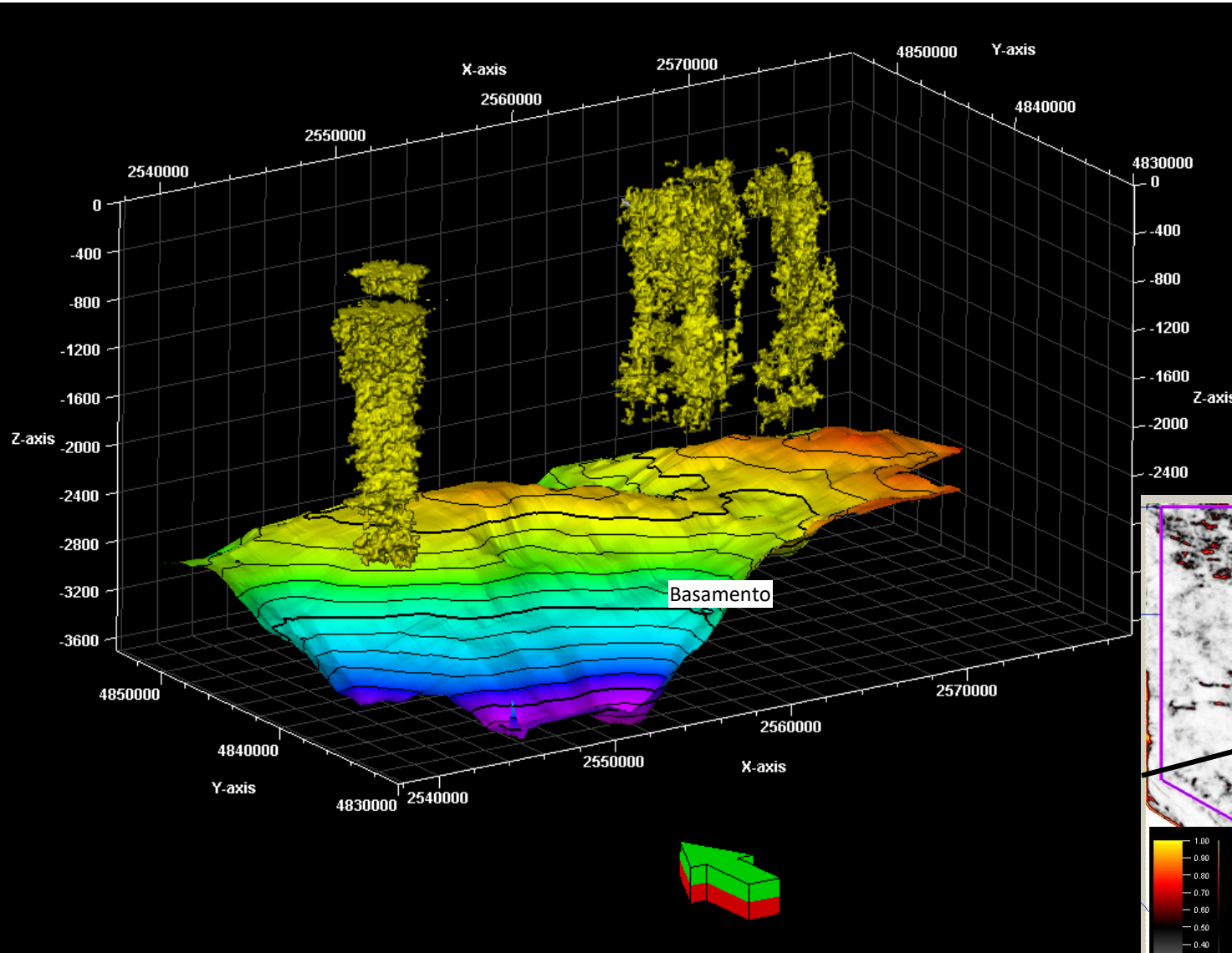


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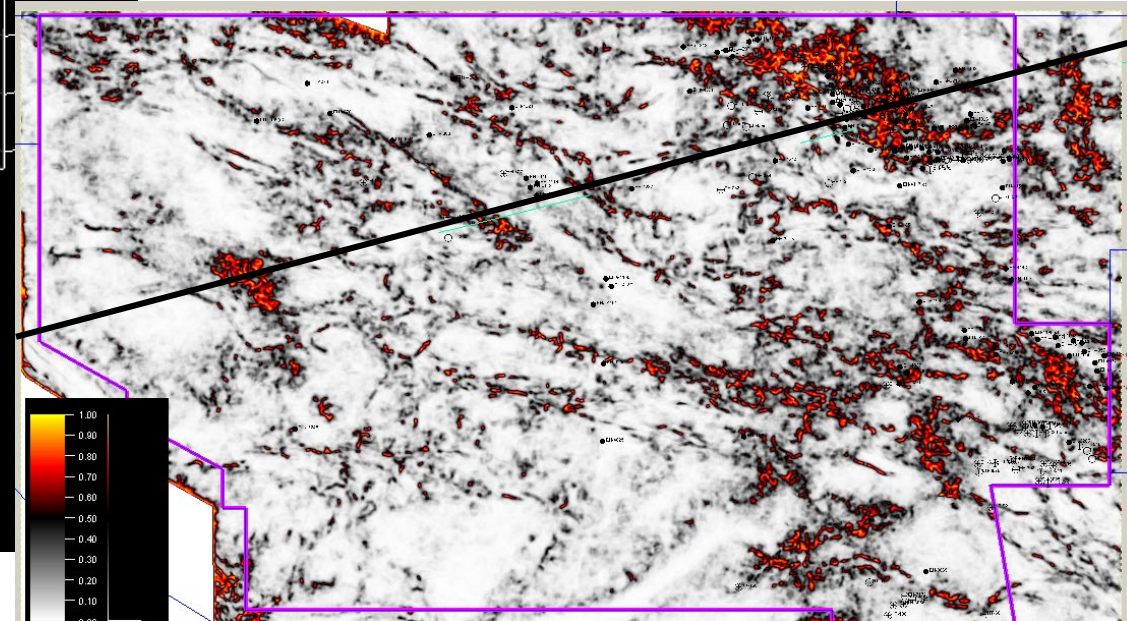




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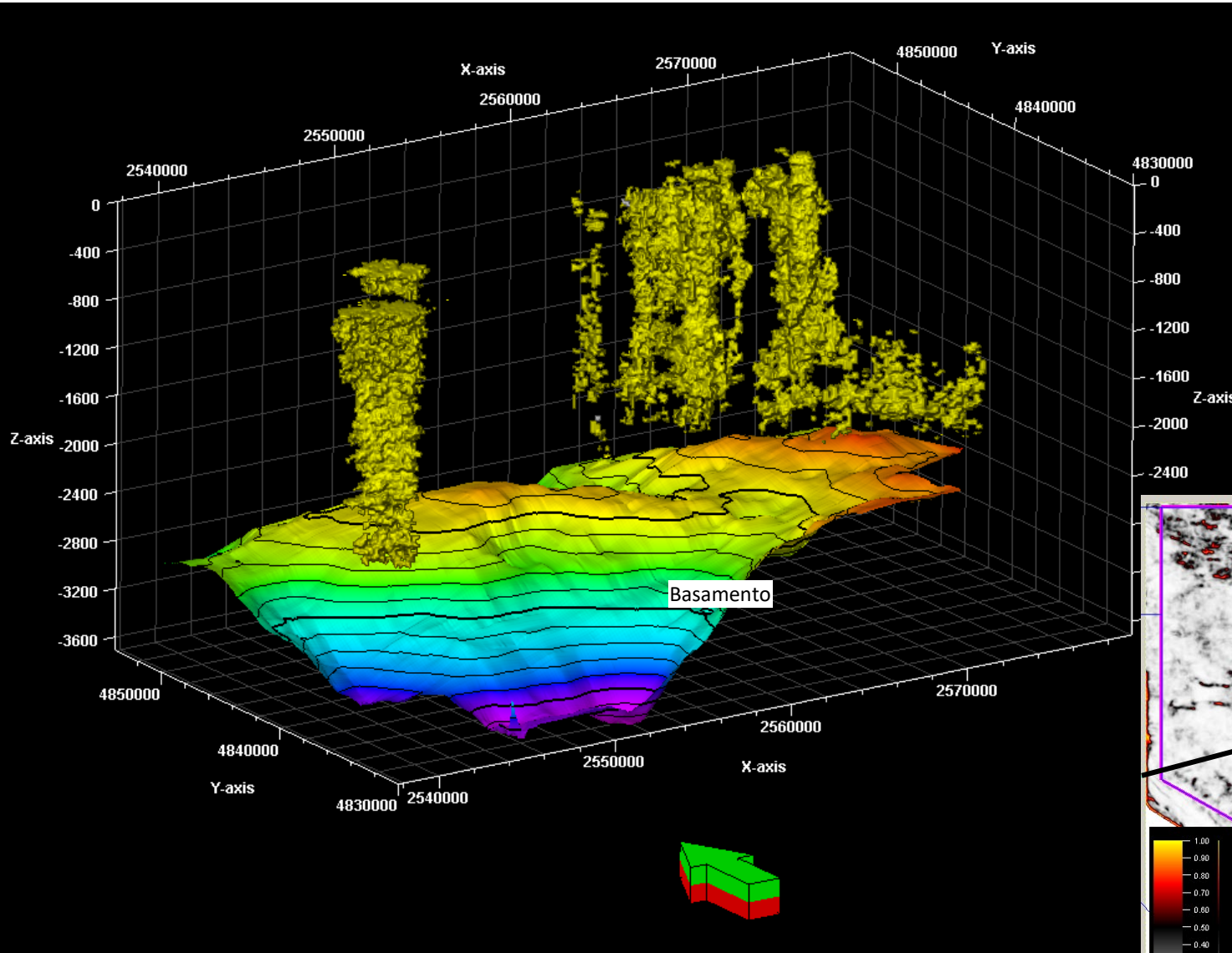


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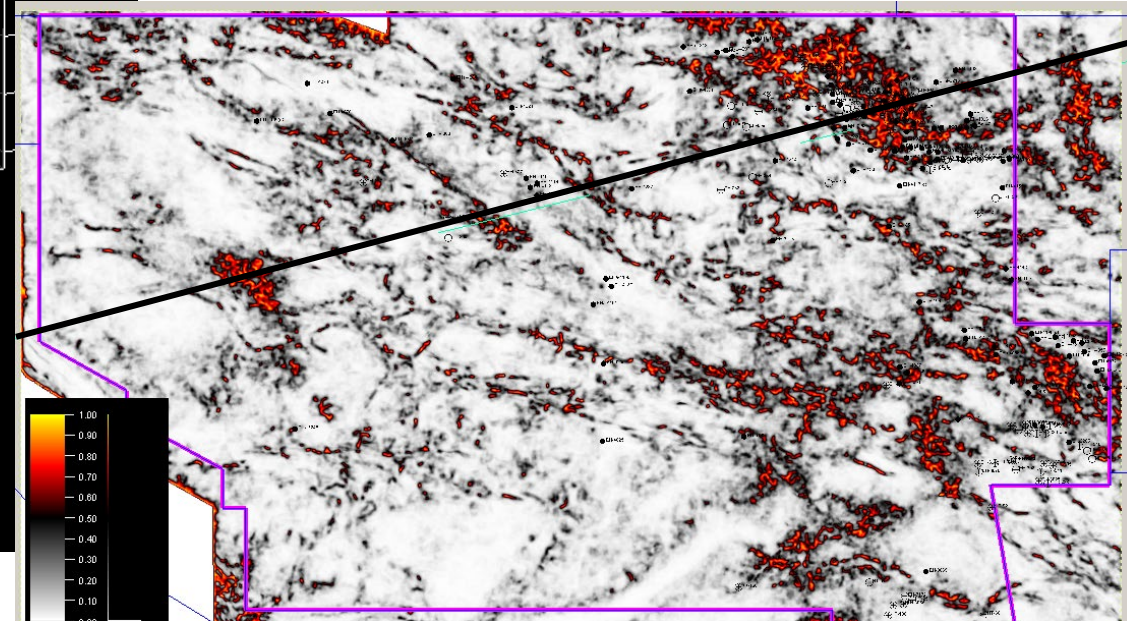




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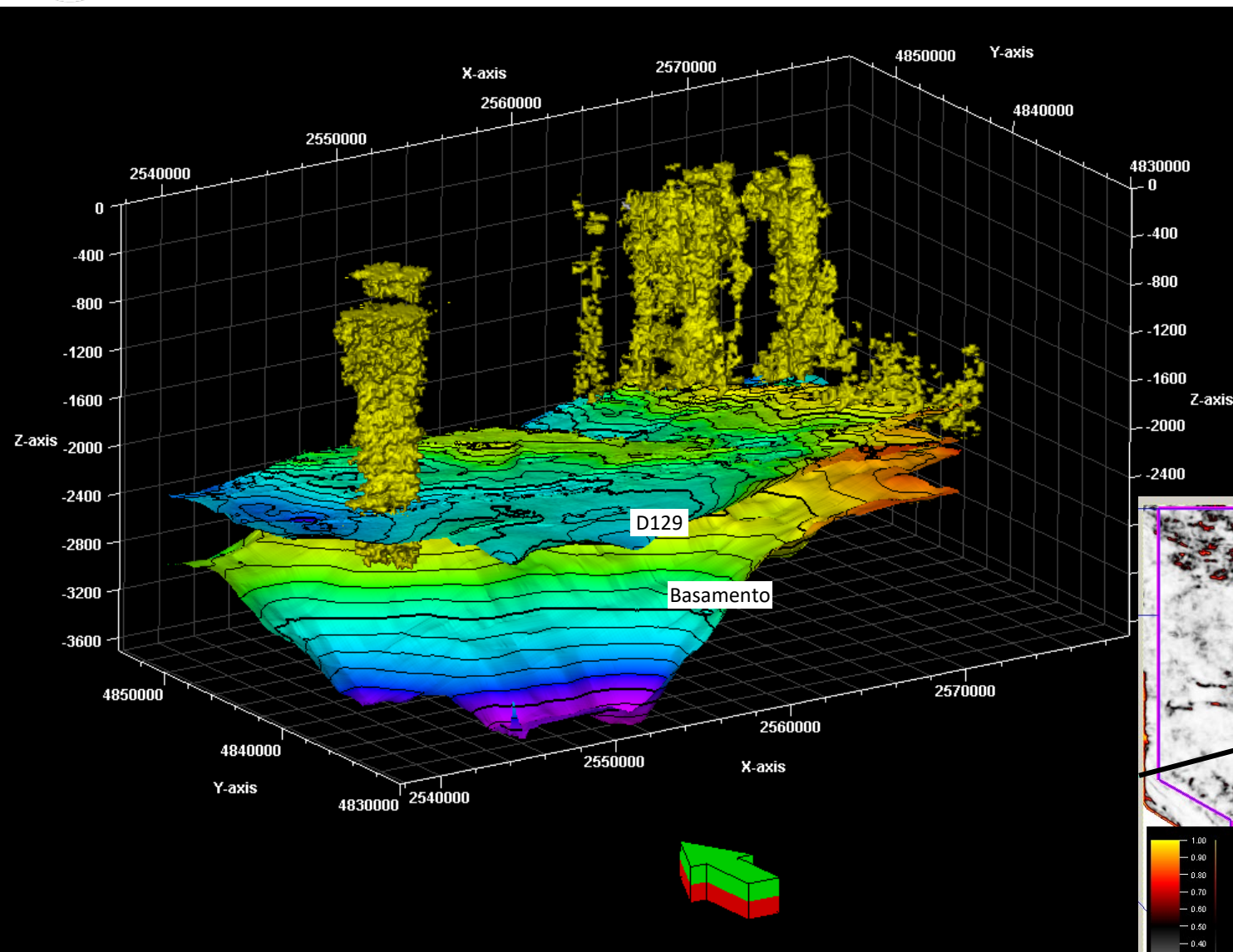


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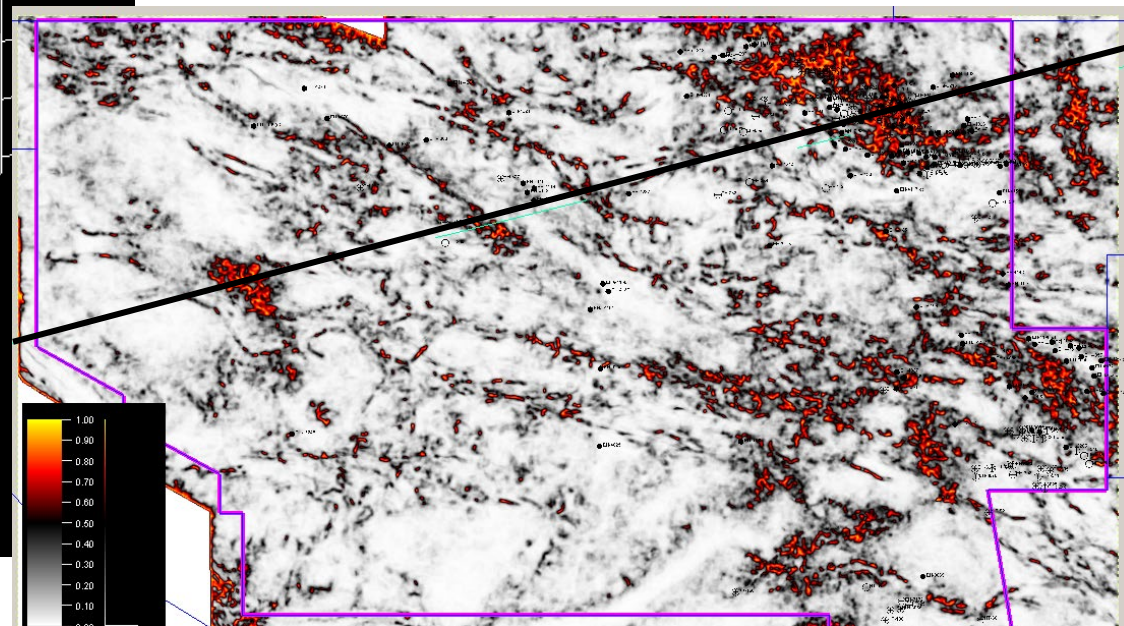




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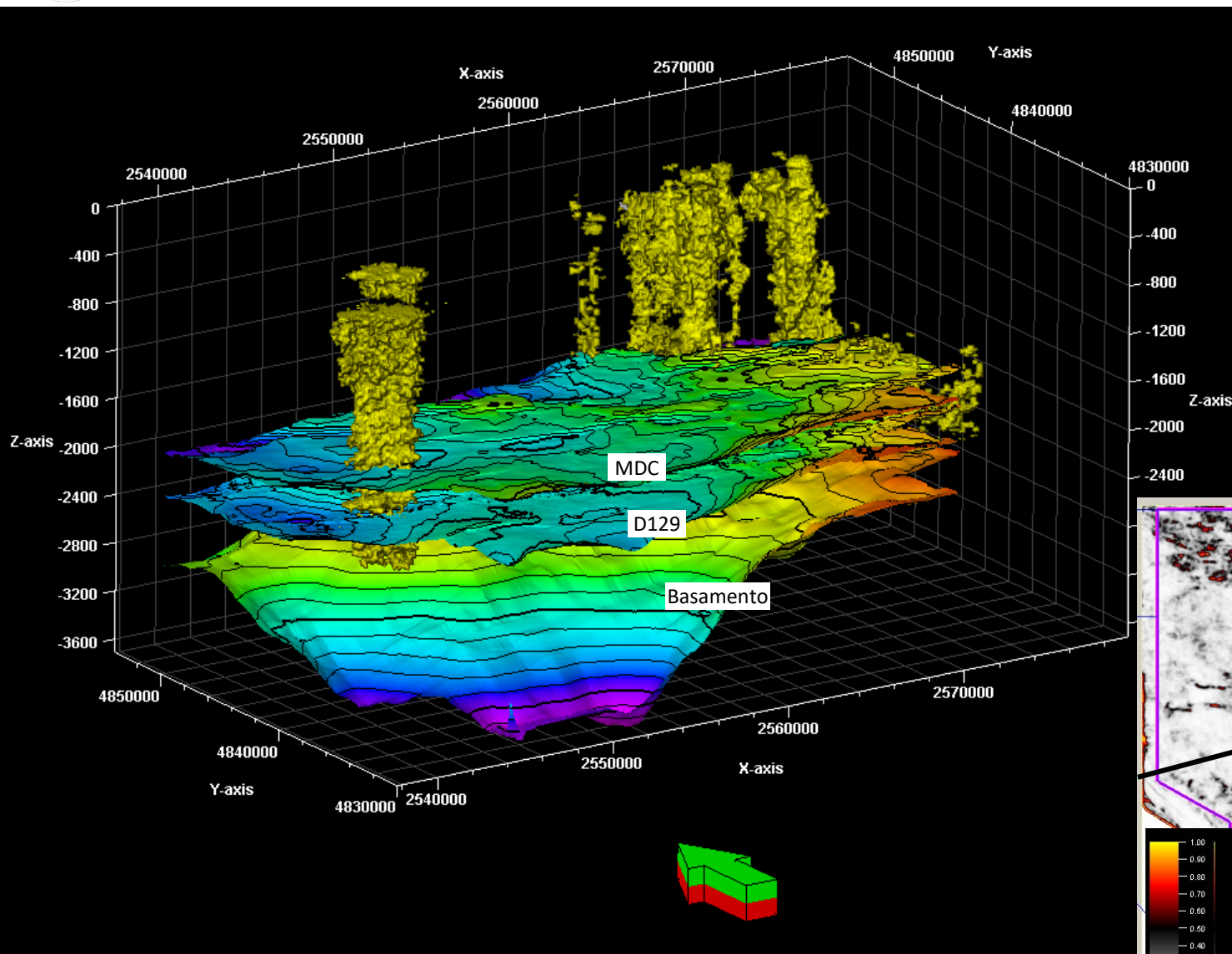


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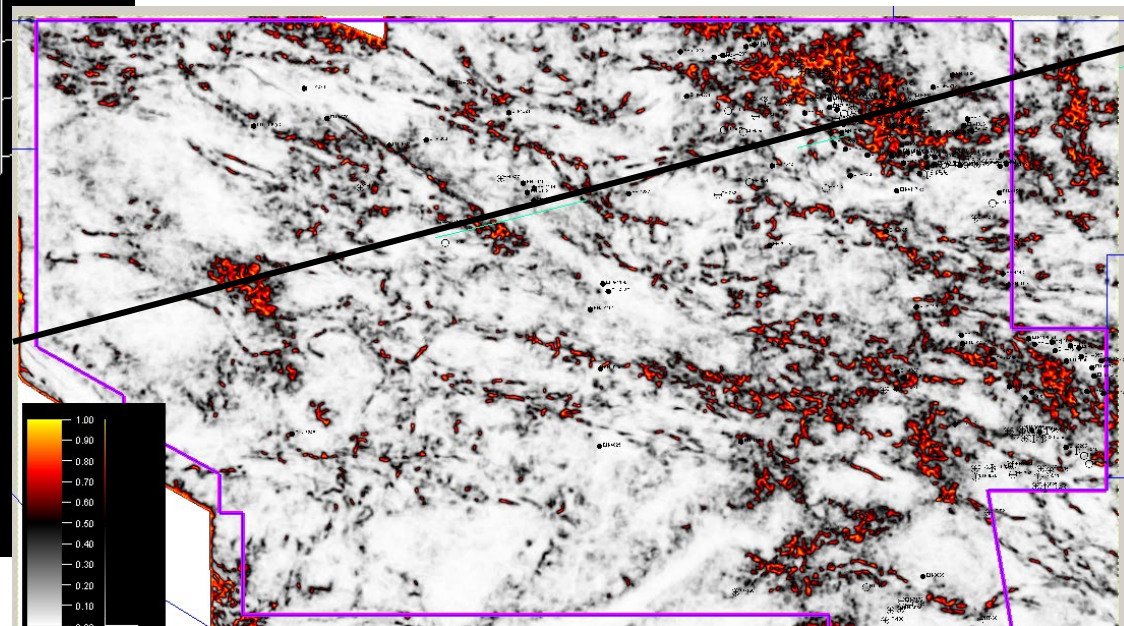




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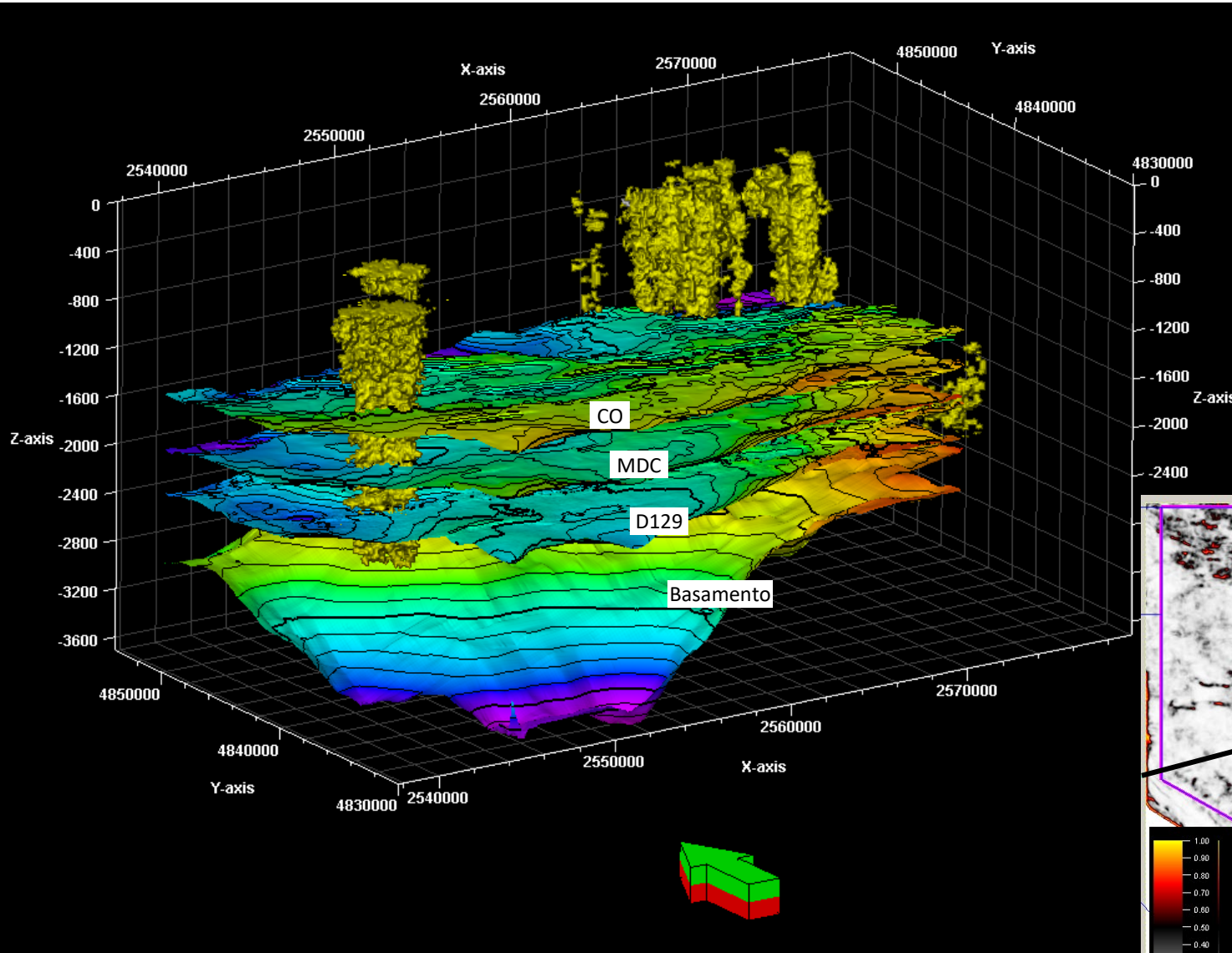


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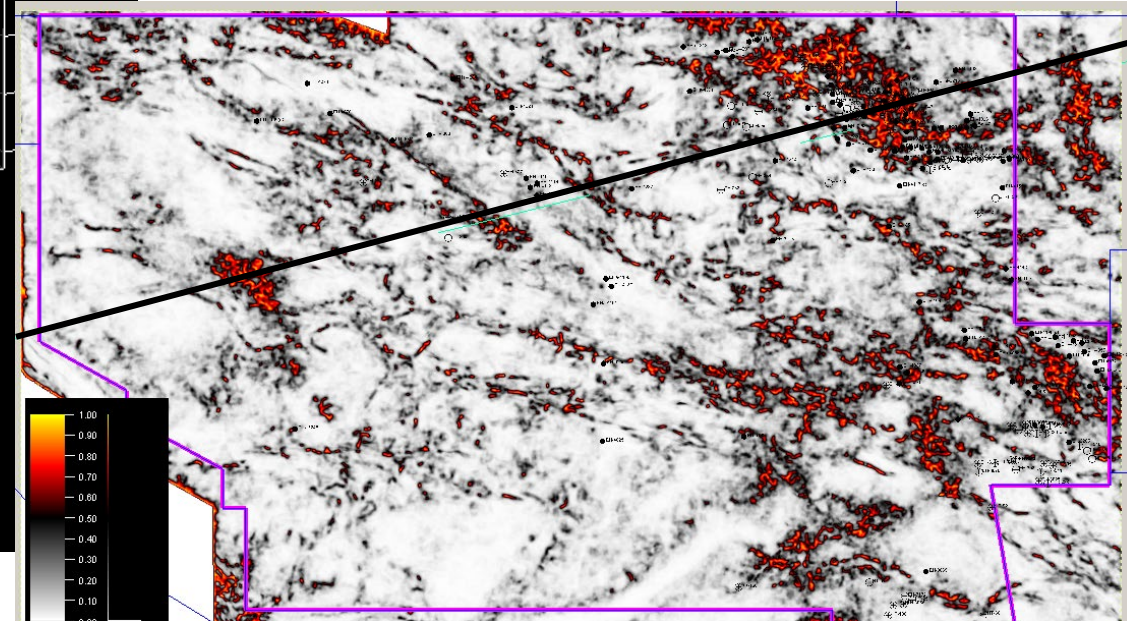




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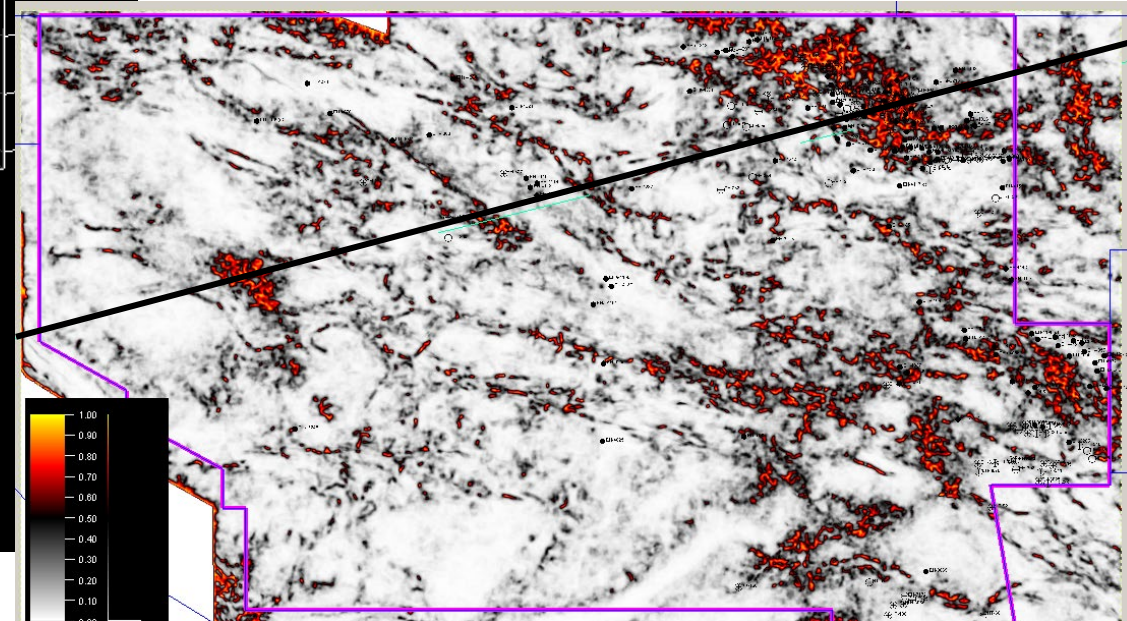
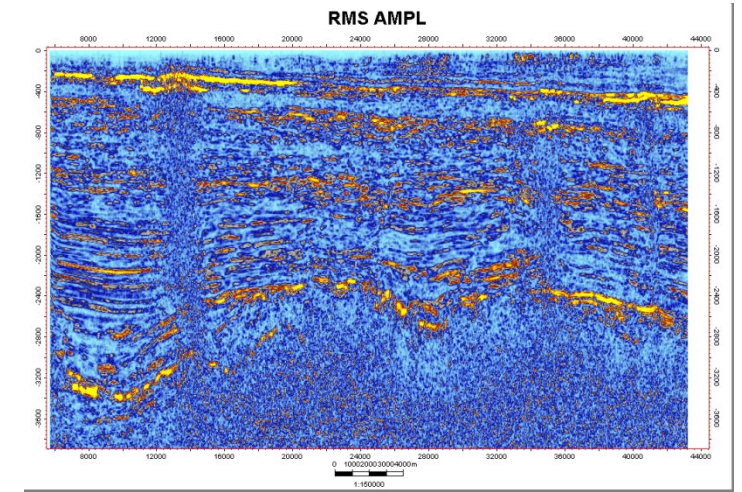
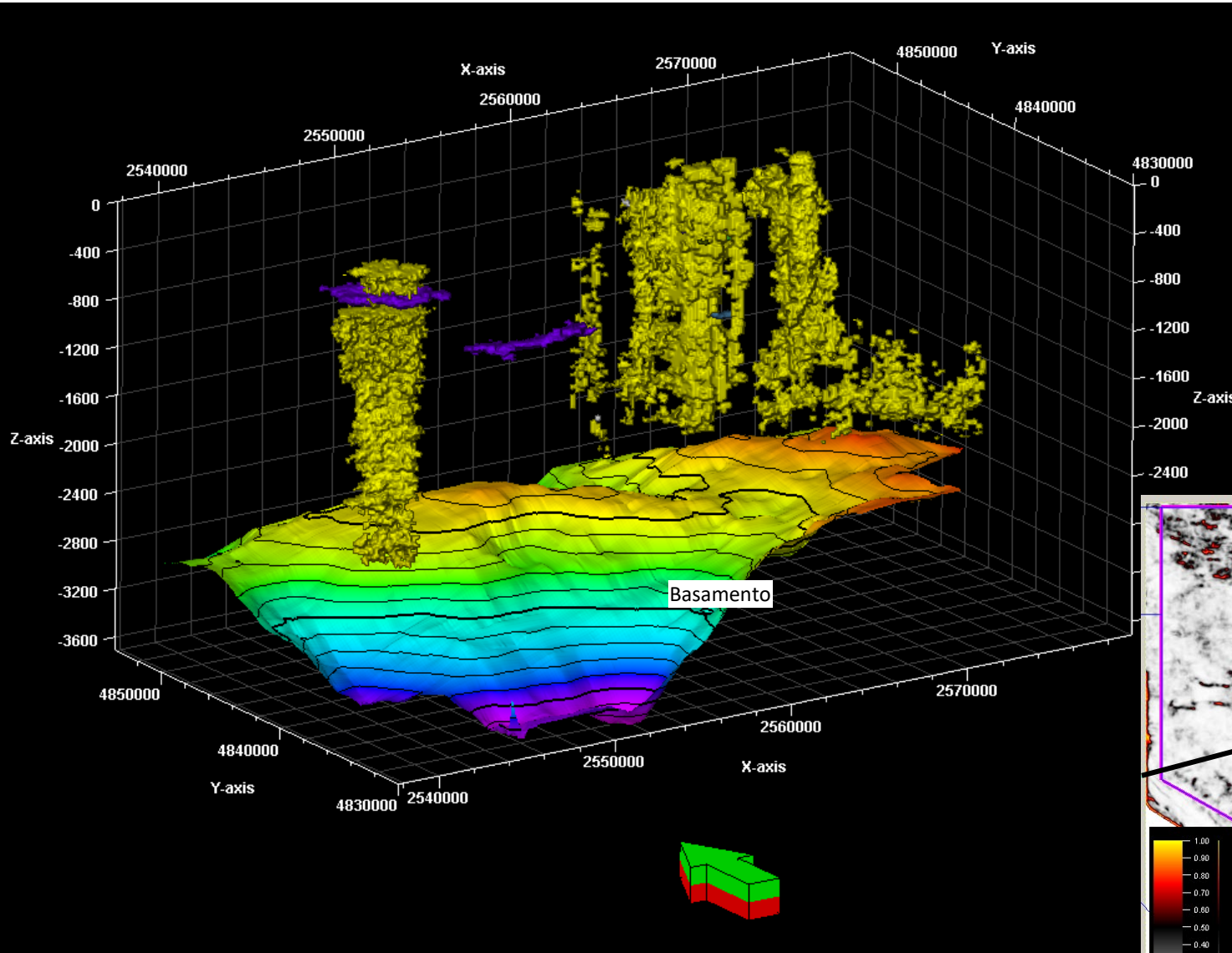


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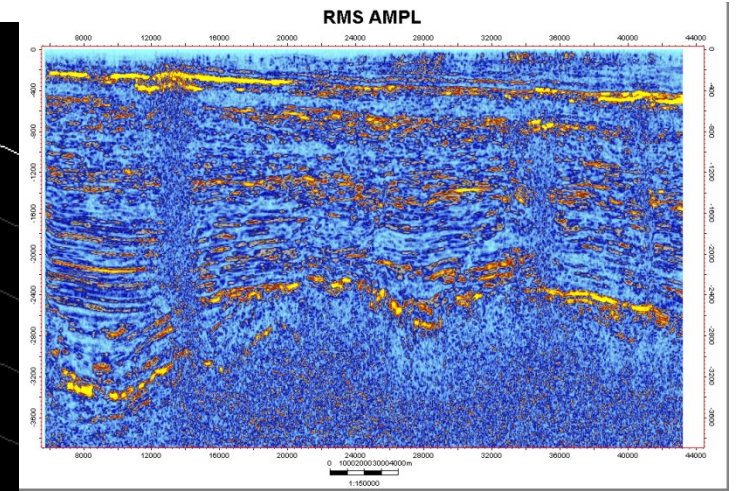
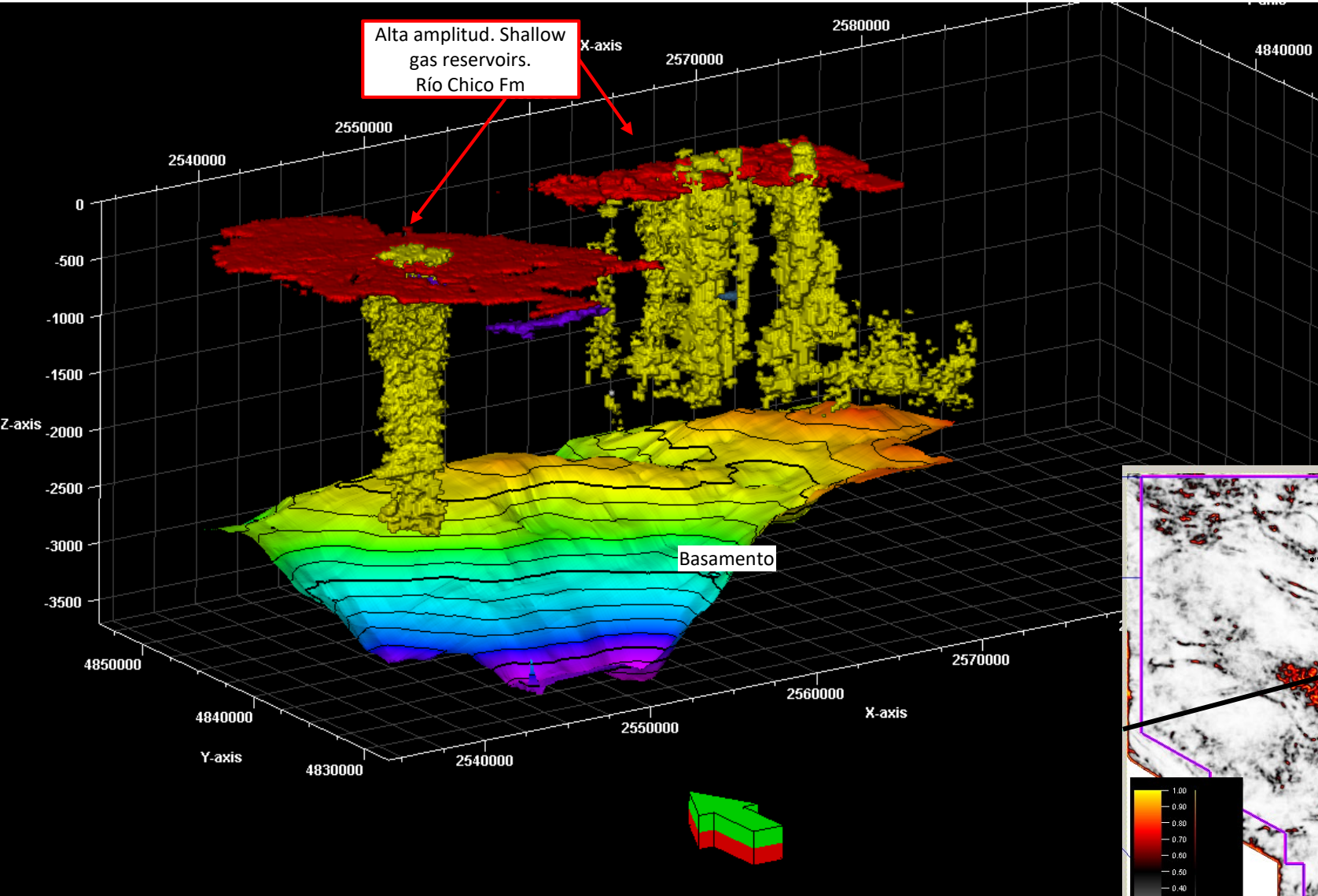


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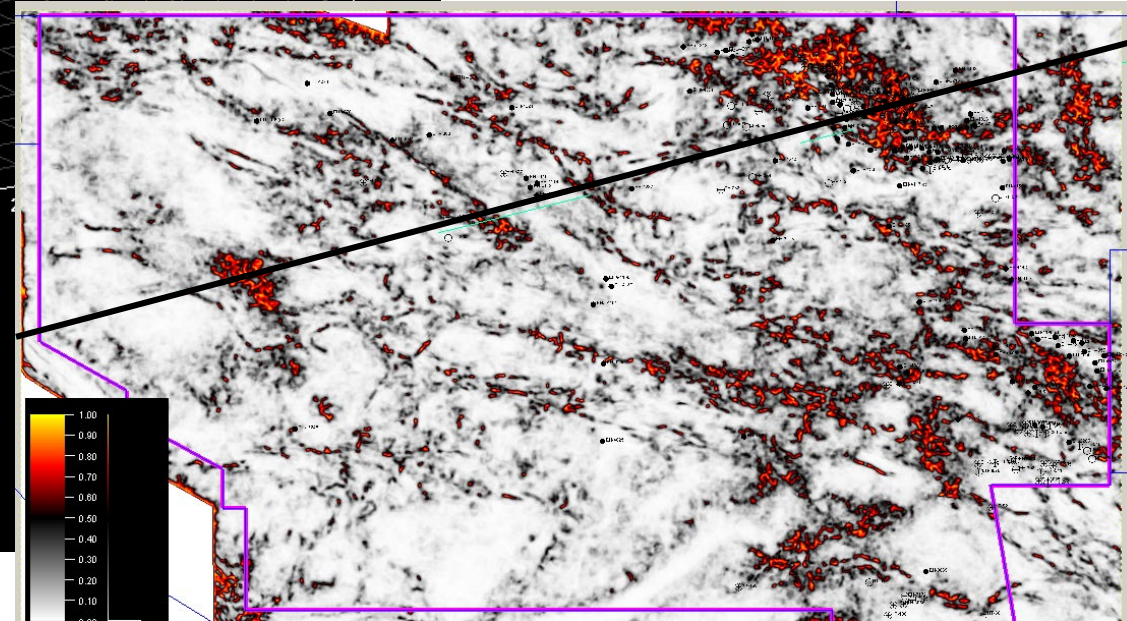




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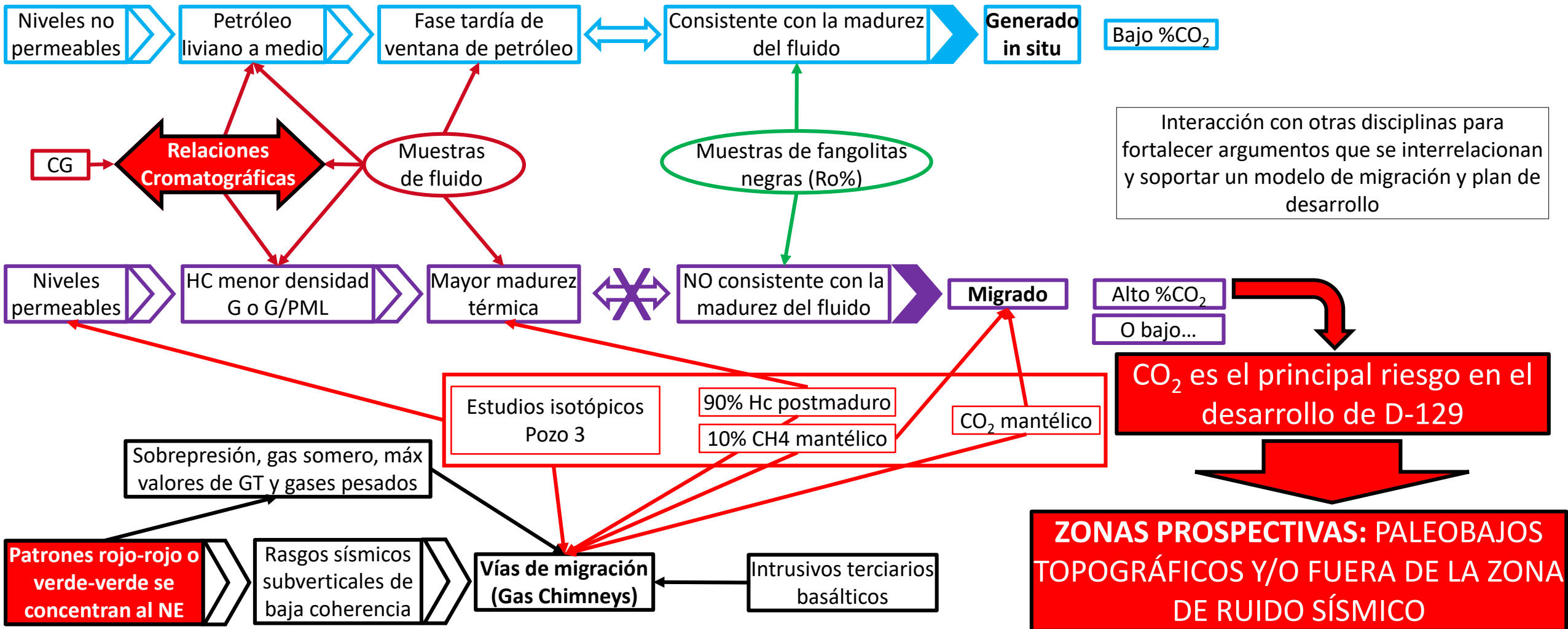
Time slice 2000 ms





CONCLUSIONES

Los patrones tipo Rojo-Verde muestran el pase a la Fm. Pozo D-129 en el cruce GWR-LHR





7° CONGRESO **IAPEG**
Producción
y Desarrollo
de Reservas

5 – 8 de Noviembre 2019
Mar del Plata, Argentina

IAPEG INSTITUTO ARGENTINO
DEL PETROLEO Y DEL GAS

GRACIAS!!!!