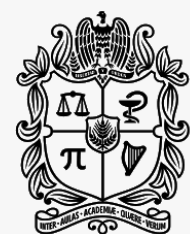


COLOMBIA ROUND 2021



GEOLOGICAL INTEGRATION, PETROLEUM SYSTEMS AND PROSPECTIVITY OF COLOMBIA'S FRONTIER BASINS: GUAJIRA & GUAJIRA OFFSHORE BASINS

MAY 7TH 2021

Guajira & Guajira Offshore Location

Stratigraphy

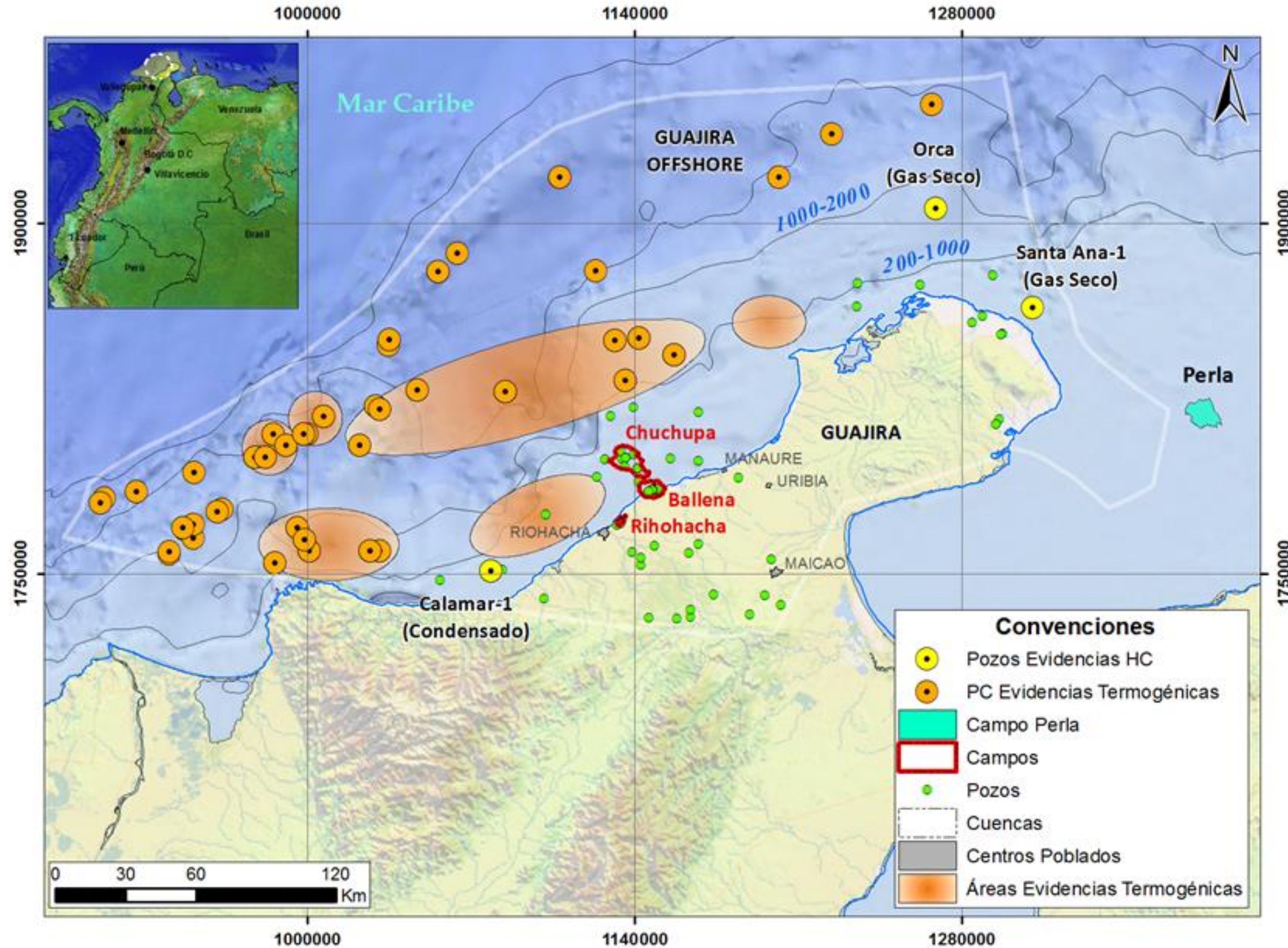
Seismic interpretation

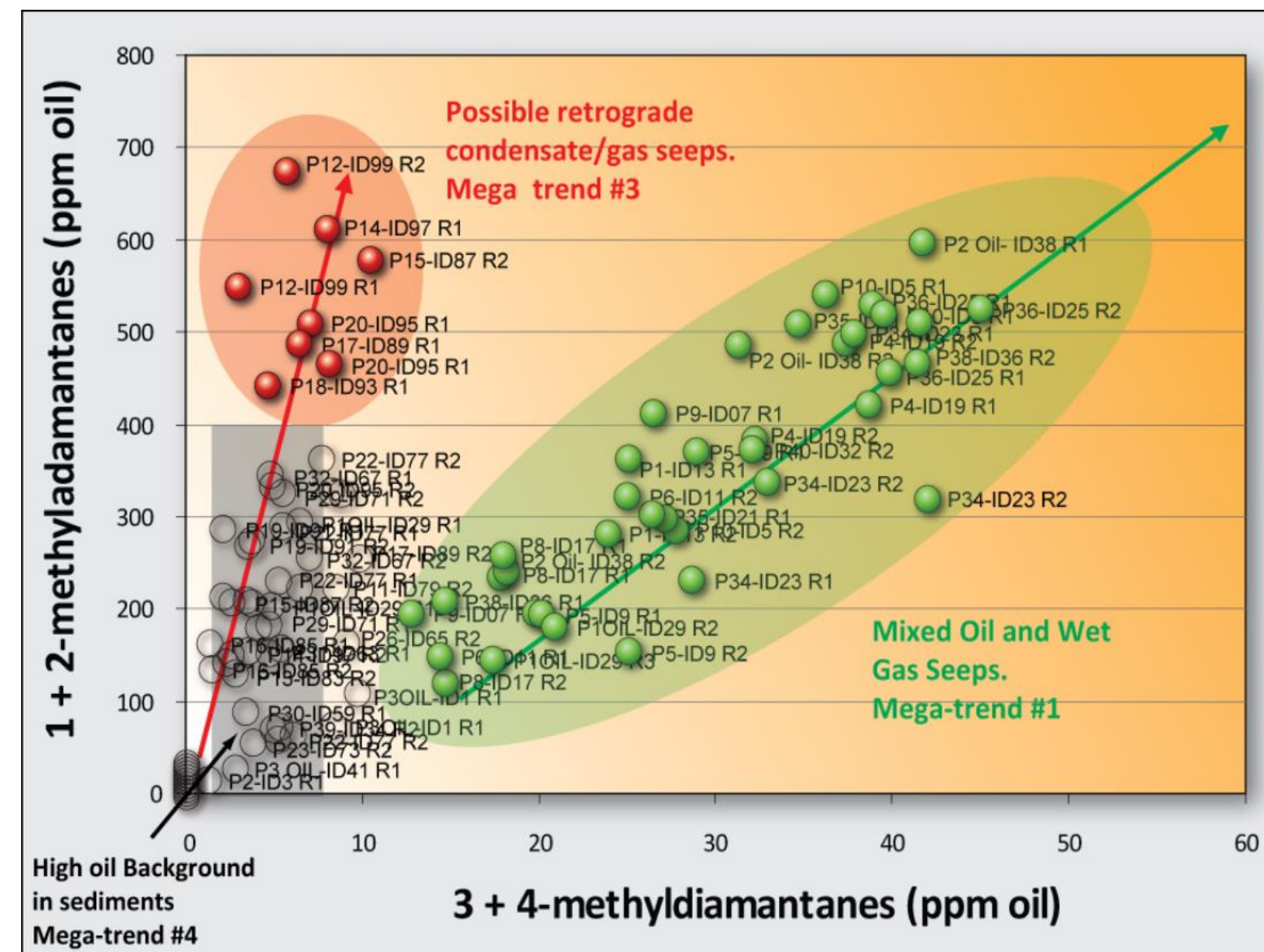
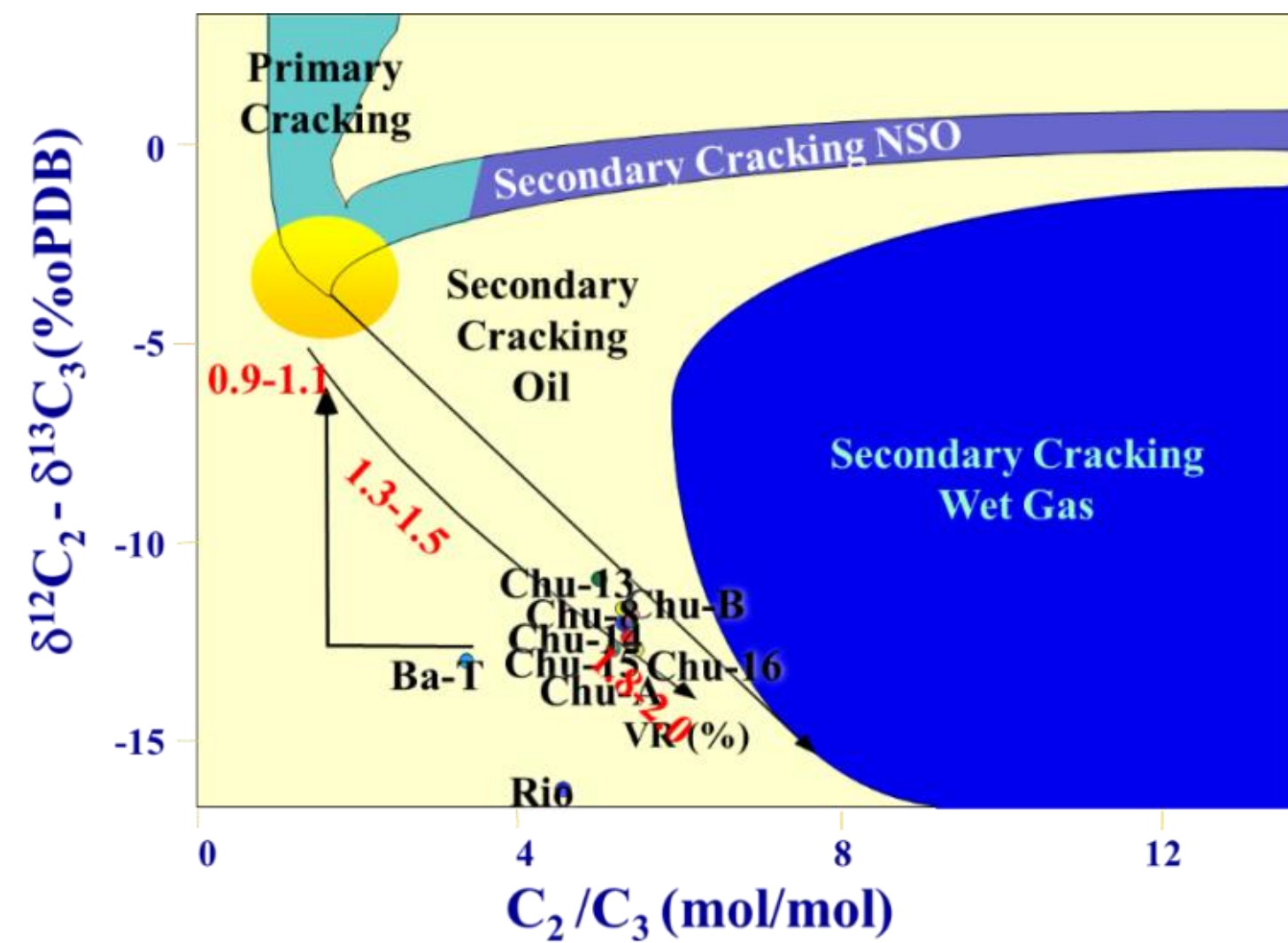
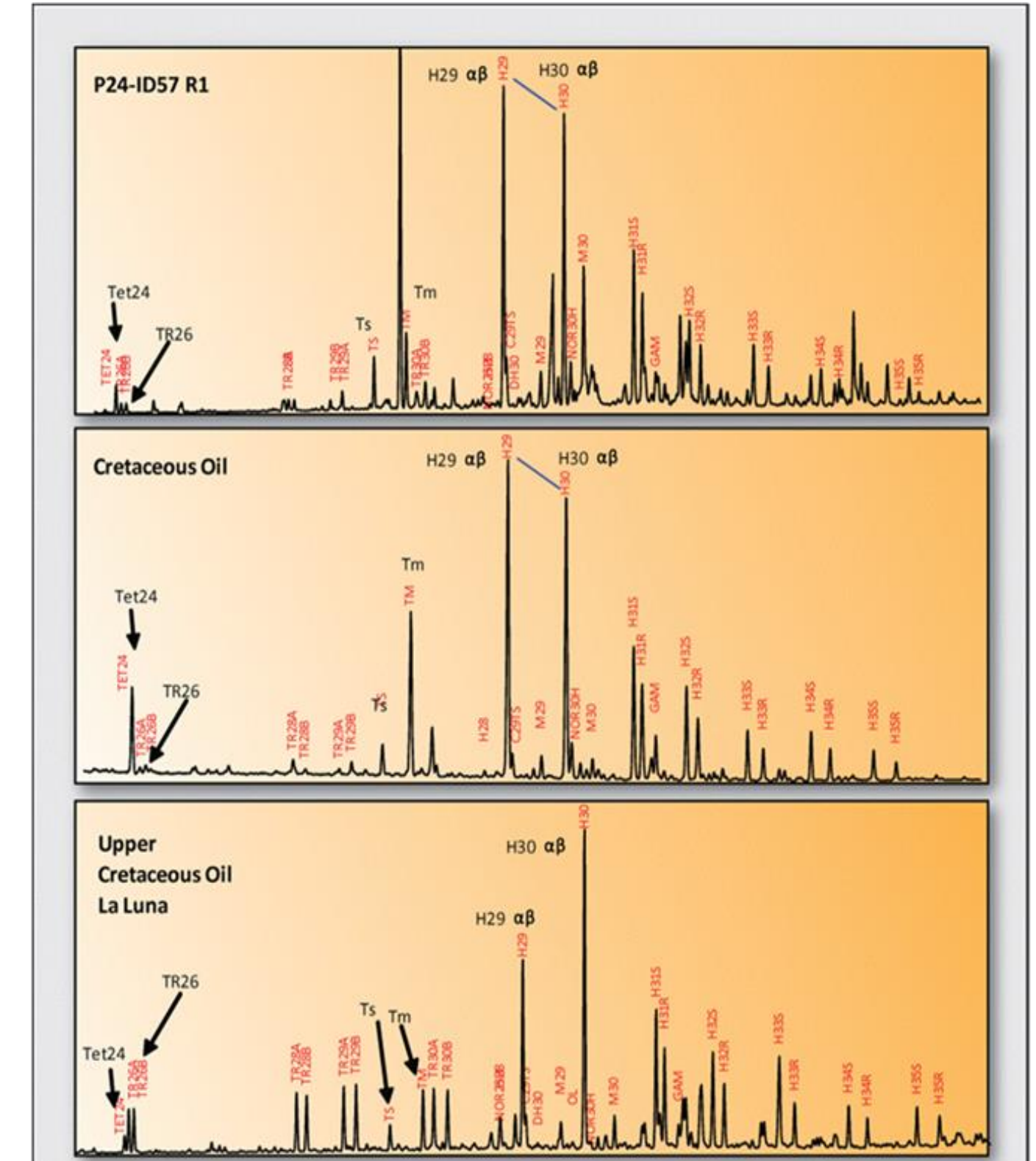
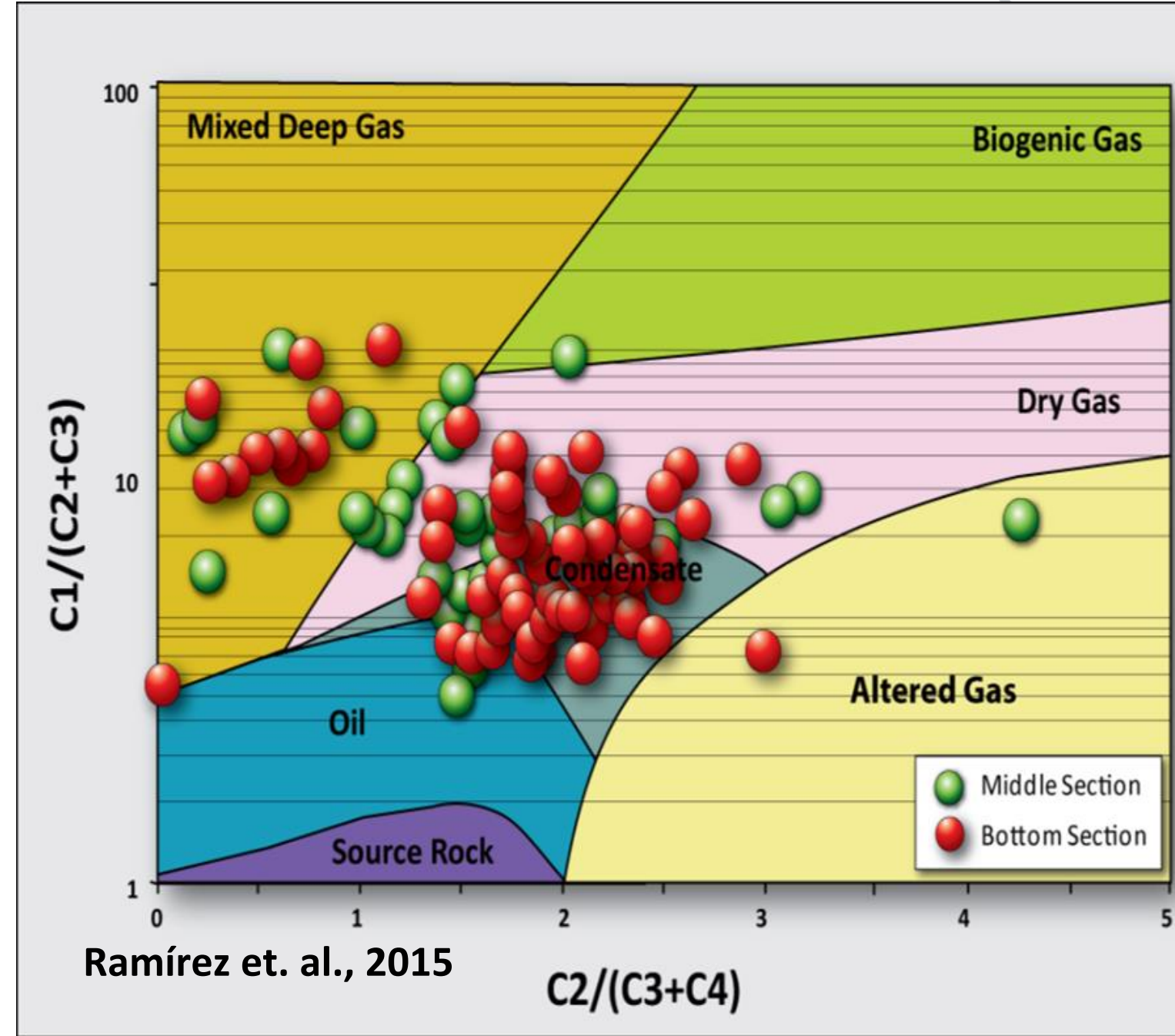
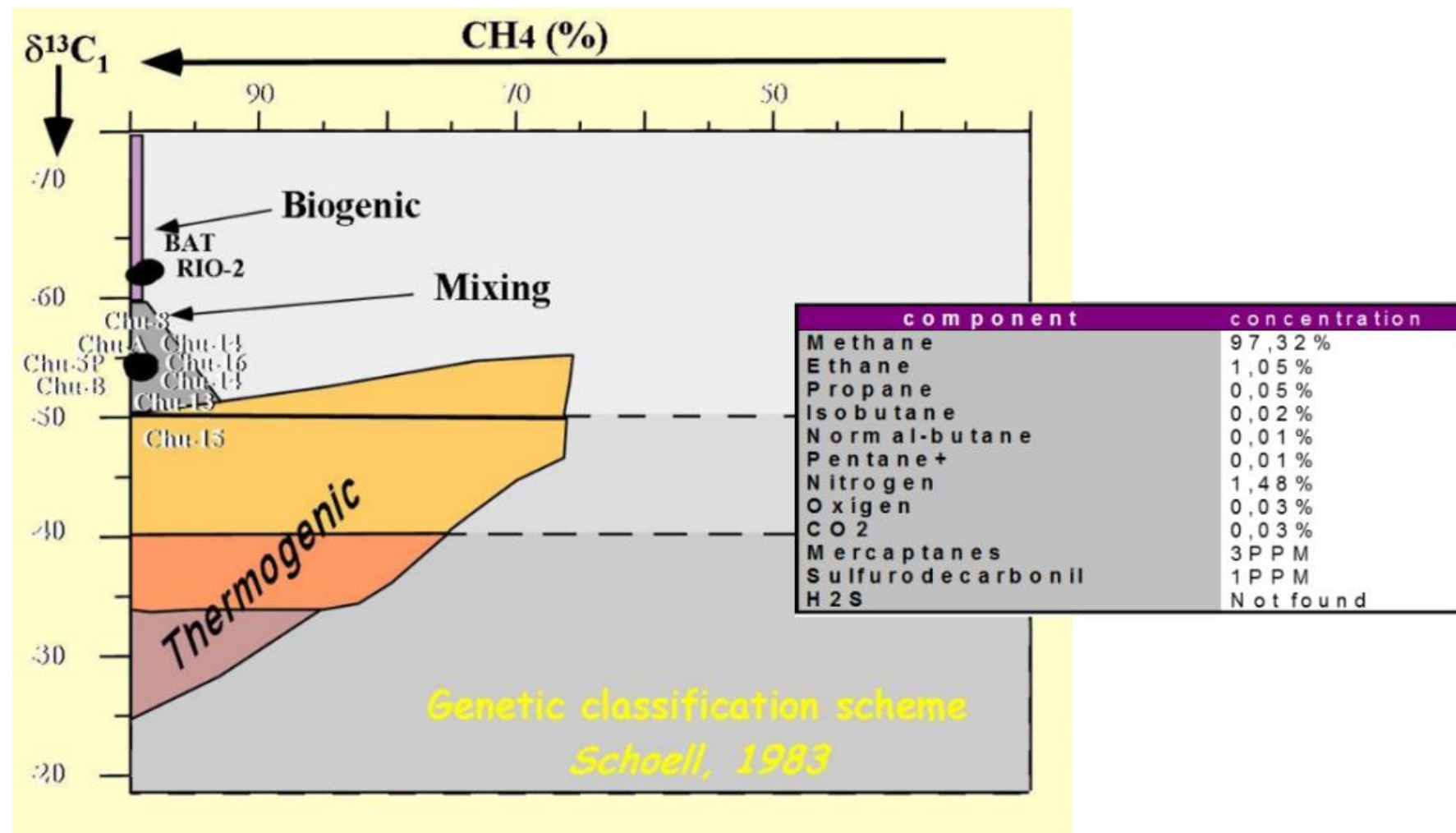
Paleoenvironments and paleogeography

Petroleum system modeling

Play fair way maps

Yet to Find





HYDROCARBONS OCURENCE THERMOGENIC HC FROM PISTON CORE

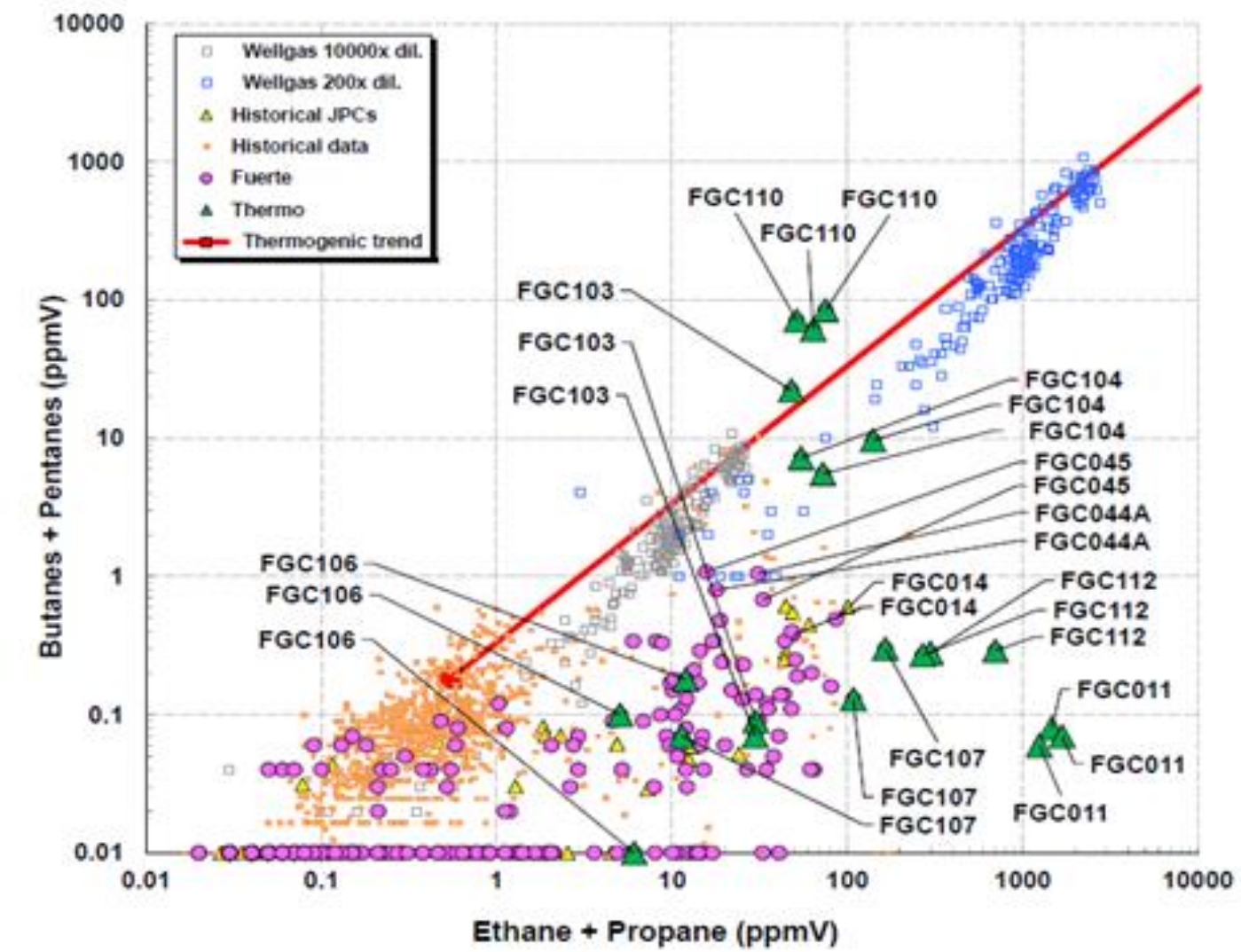
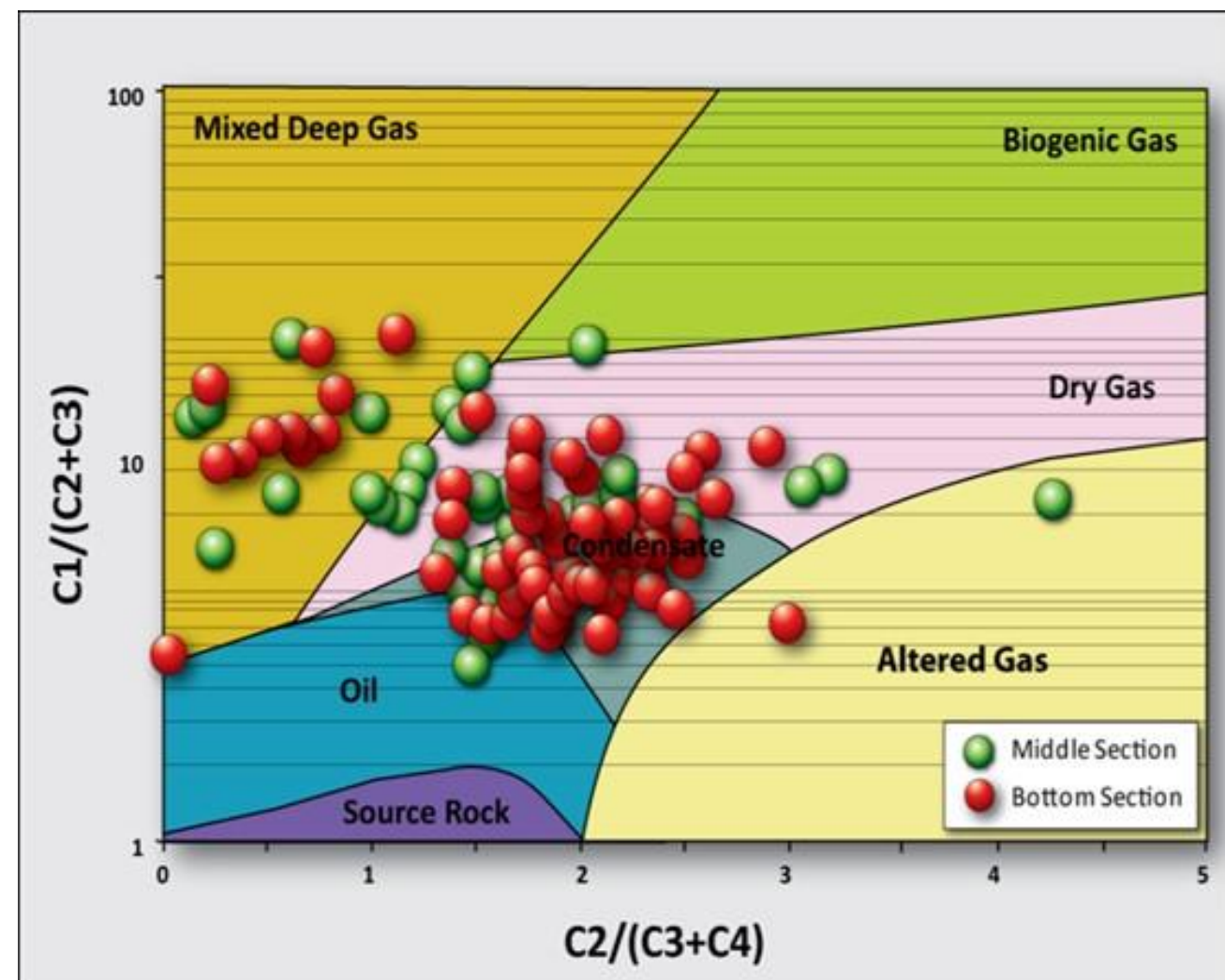
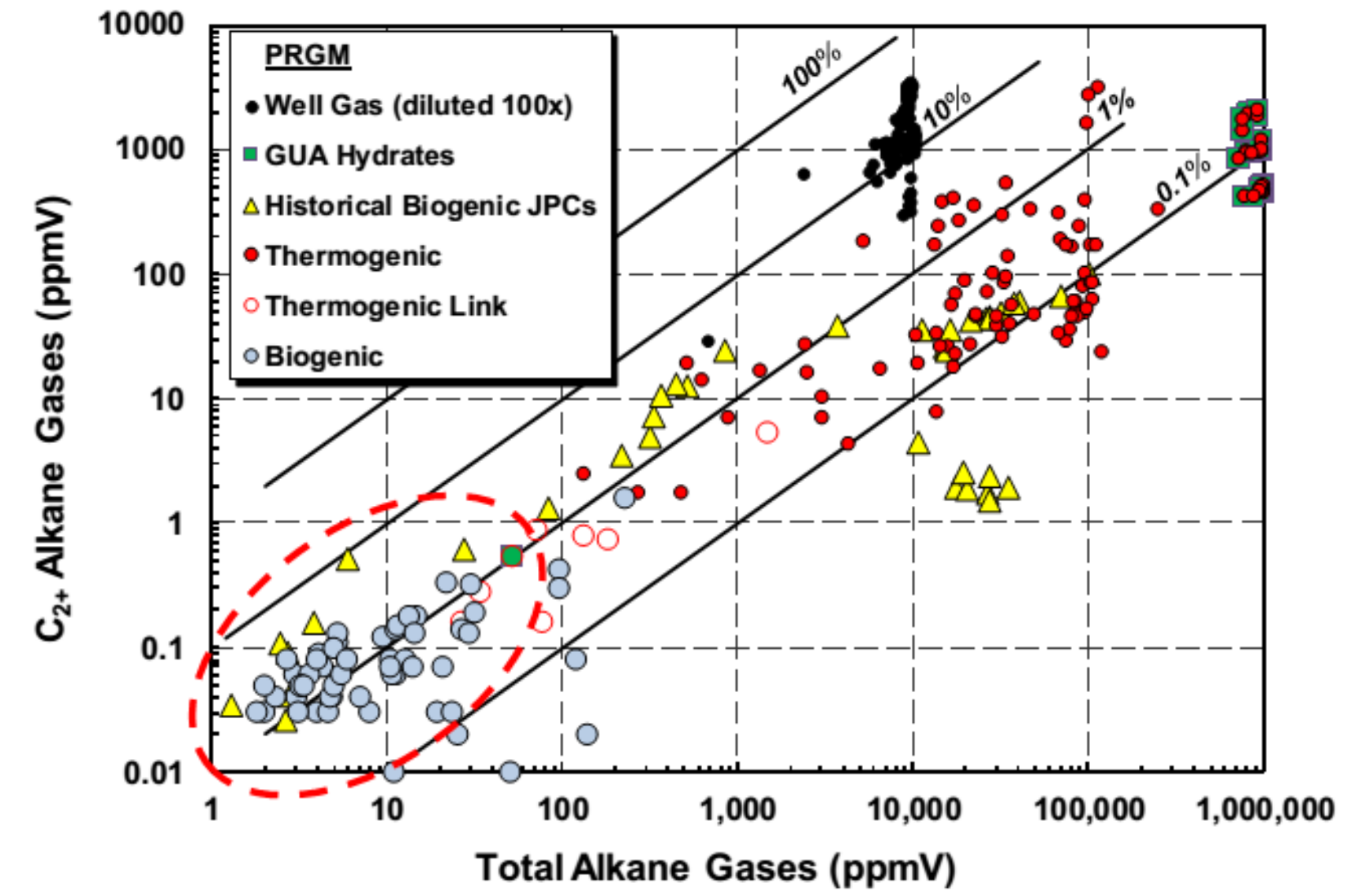
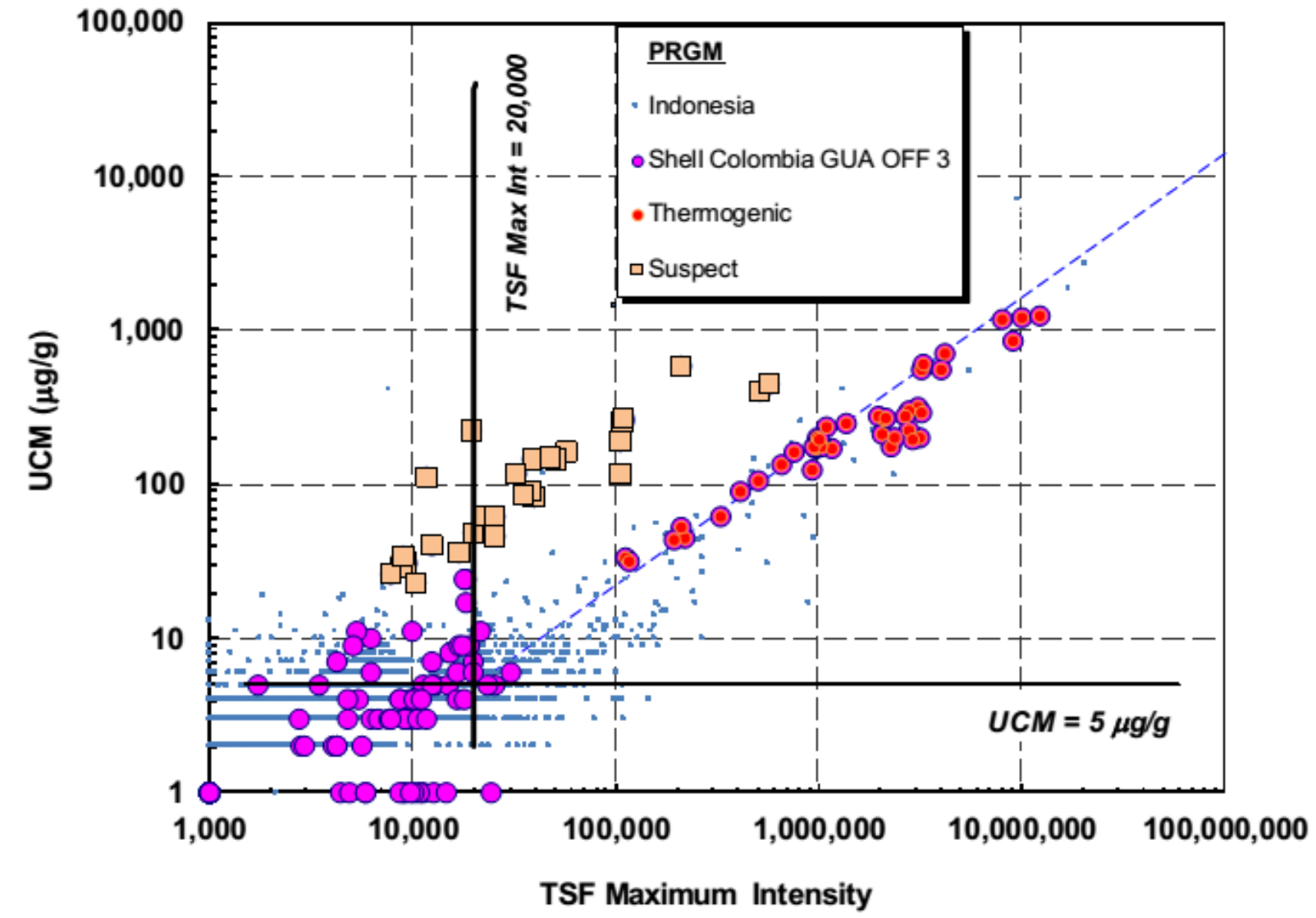
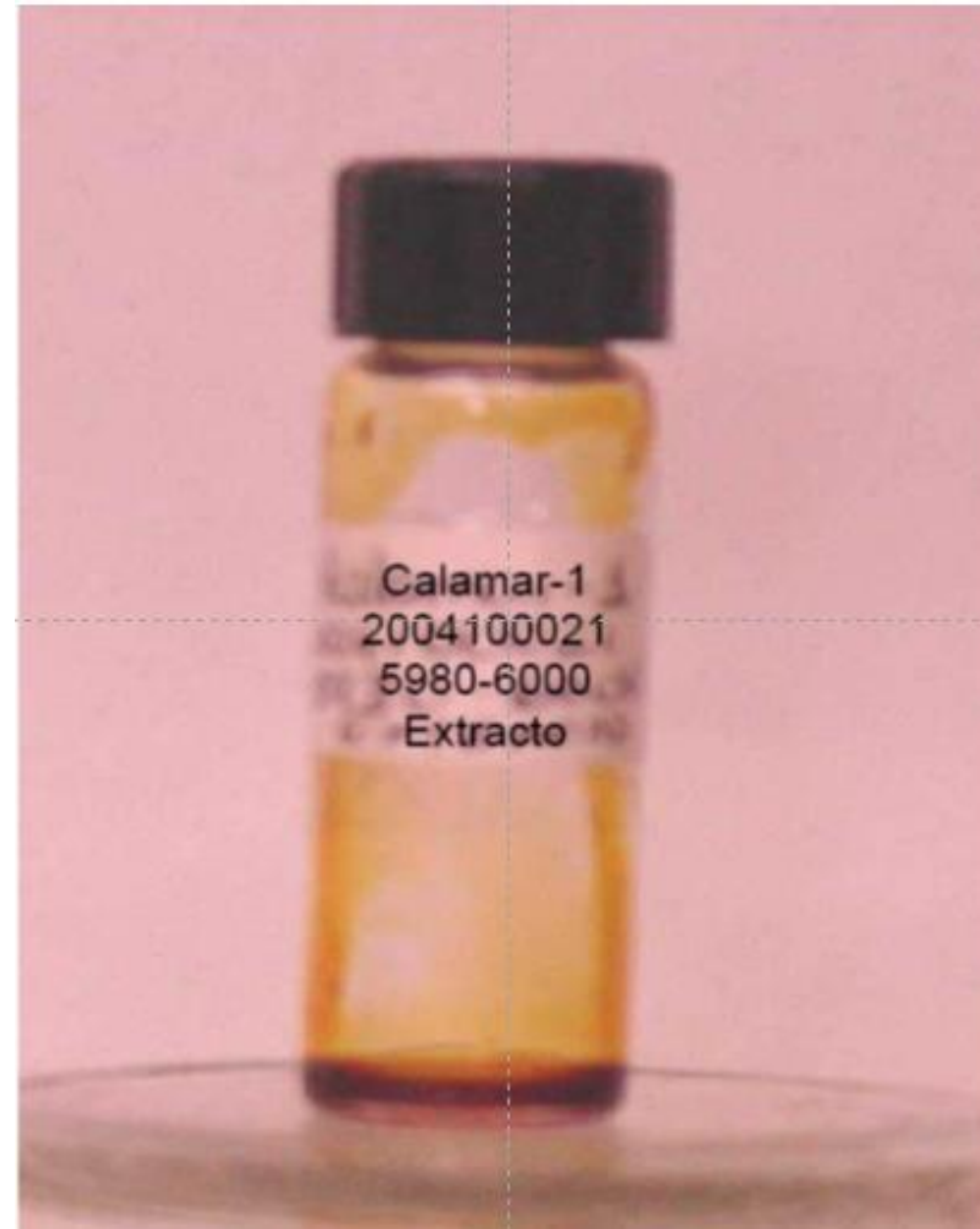
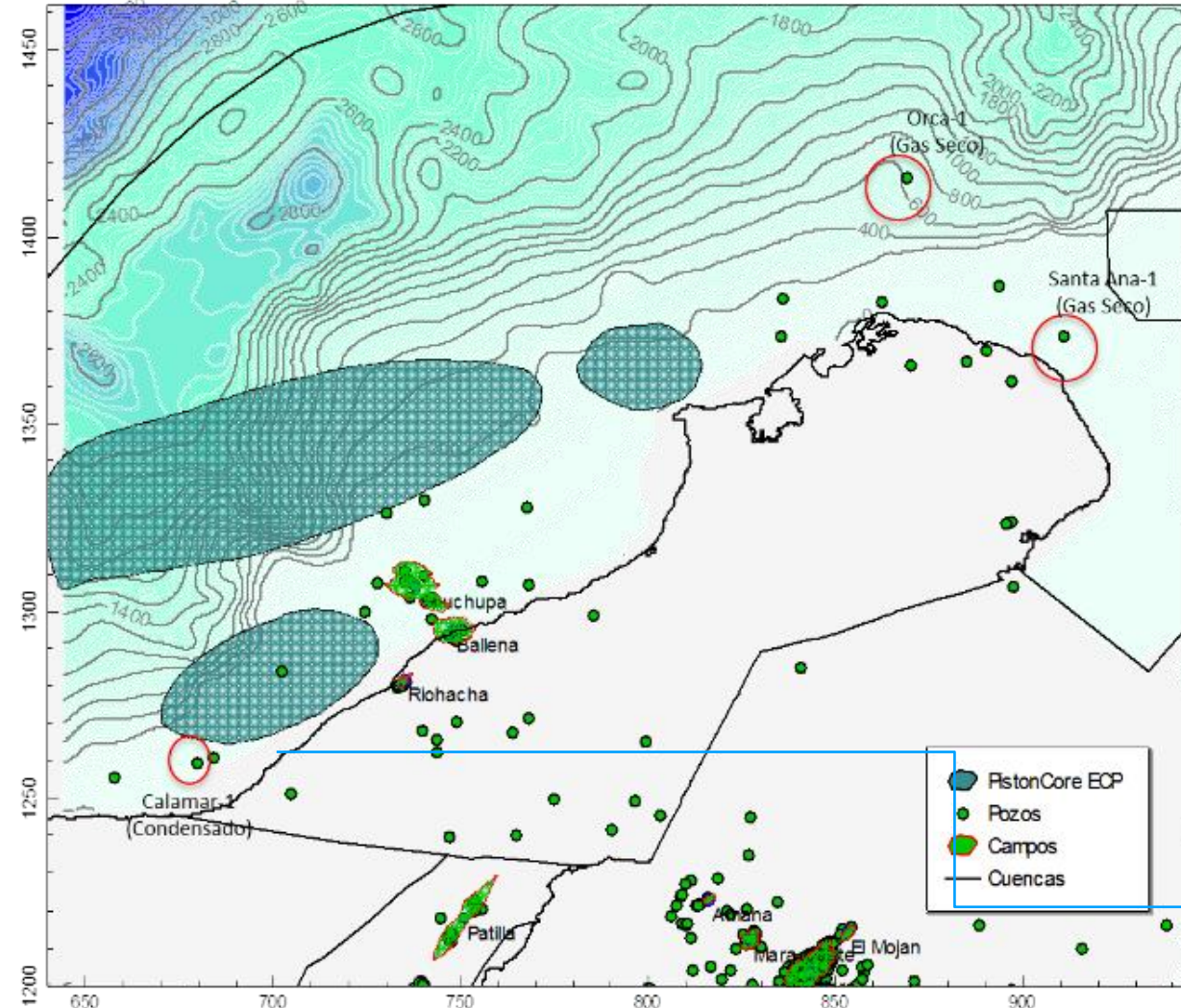
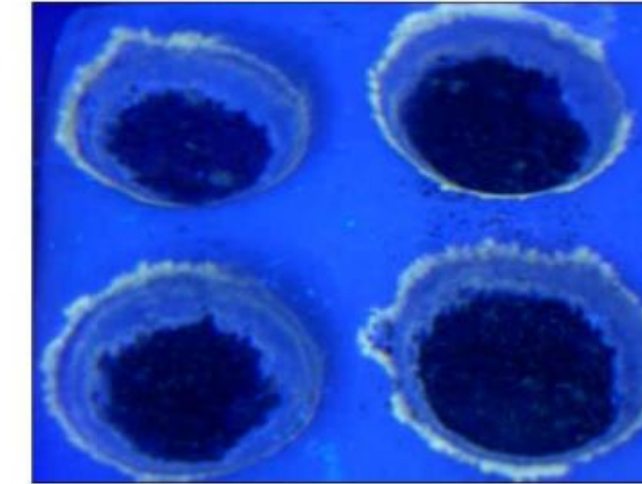


Figure 7-12. Sum of Butanes and Pentanes vs. Ethane and Propane in sediments and well gases.

HYDROCARBONS OCURENCE OIL SHOWS/ CALAMAR-1



Evidencias de aceite en el Pozo Calamar-1



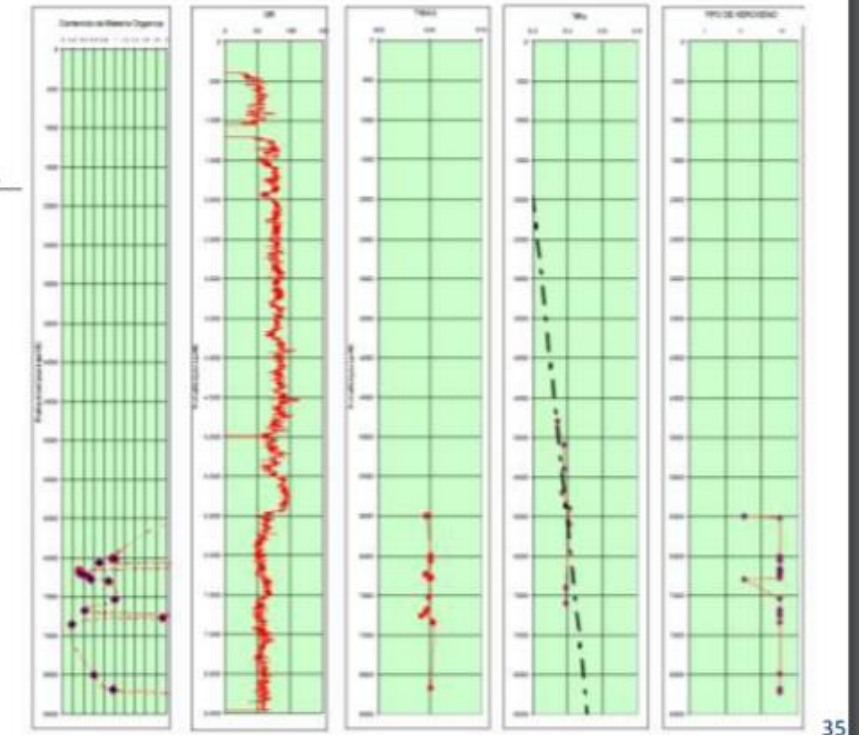
Pozo	Profundidad	% Bitumen	% Saturados	% Aromáticos	% NSO	Pr/Pi	n-C17/Pi	n-C18/Pi
Calamar-1	5900-20	0.0557	40	9.7	50.3	0.55	1.42	0.31
	5920-40	0.1419	54.5	10.5	35	0.6	2.66	0.24
	5940-60	0.1519	54.5	11.2	34.3	0.57	2.55	0.31
	5960-80	0.1704	59	10	31	0.56	2.8	0.26
	5980-6000	0.3365	56	9.5	34.4	0.58	1.79	0.06
	6000-20	0.1822	53	11.9	35.1	0.66	2.09	0.17
	6020-40	0.1267	55.9	9.9	34.2	0.71	2.16	0.19
	6040-60	0.192	53.2	14.7	32.1	0.6	2.45	0.15
	6060-80	0.1548	50.5	8.5	40.9	0.64	2.11	0.17
	6080-6100	0.1988	47.4	9.2	43.4	0.82	1.46	0.22
		0.17109	52.4	10.51	37.07	0.609	2.151	0.208

Tabla 6.1. Valores de los análisis de crudo extraído y separación SARA de diez muestras de rango perforadas por el pozo Calamar-1.

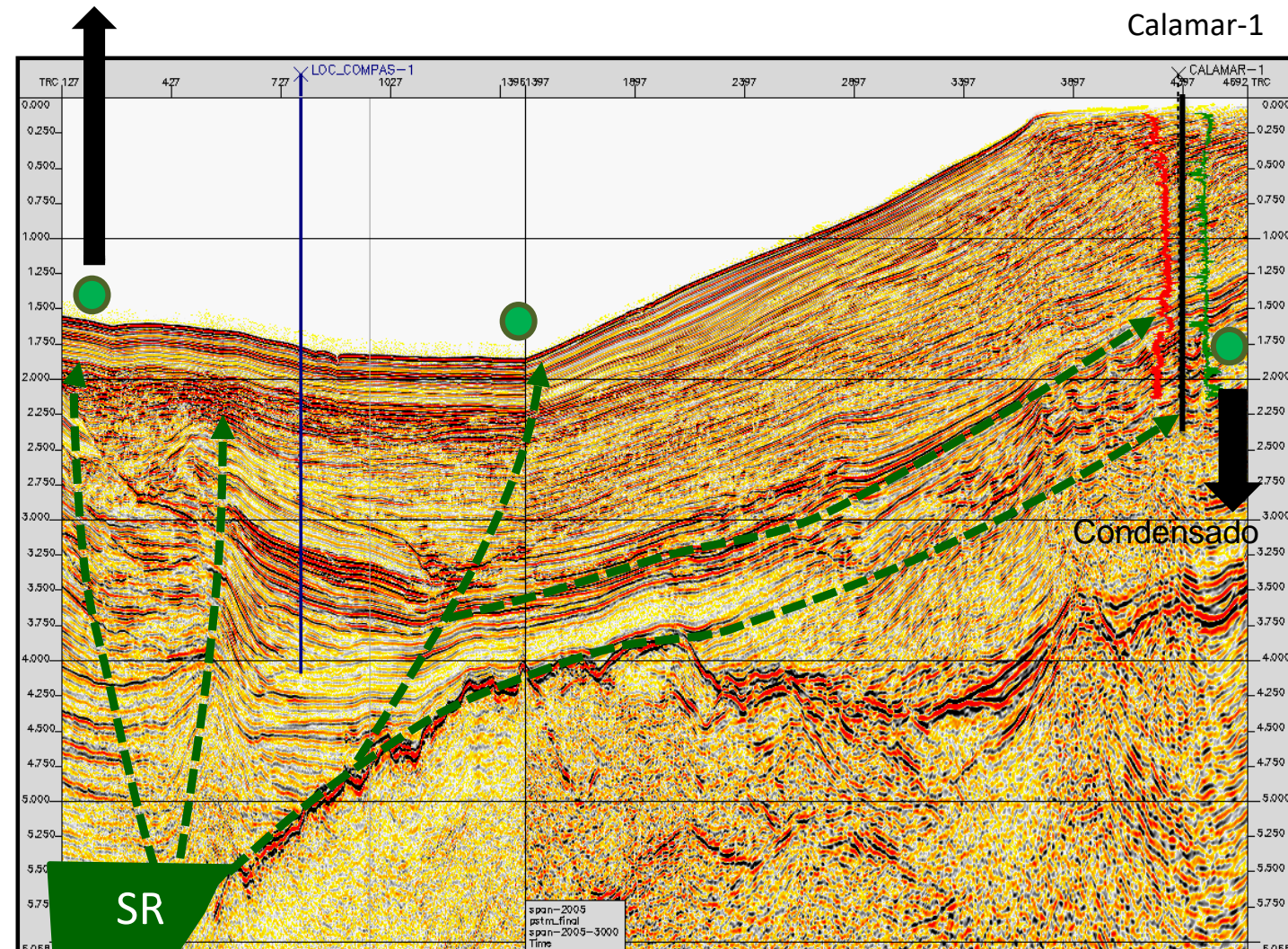
Figura 6.7. Show de aceite en la tectonosecuencia IIM del pozo Calamar-1 (6000'-6030').



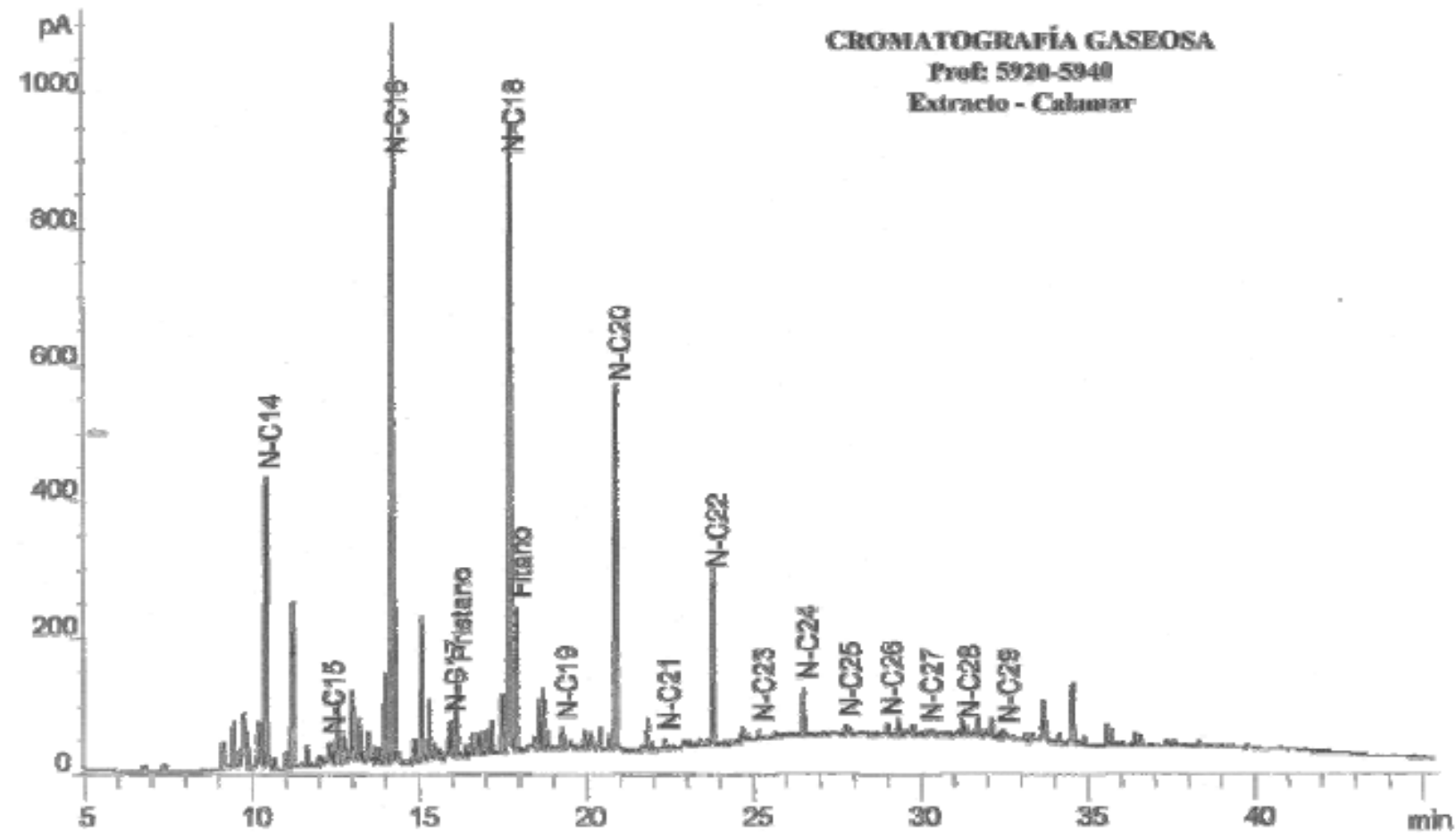
as del intervalo 5900-6100 del pozo Calamar-1.



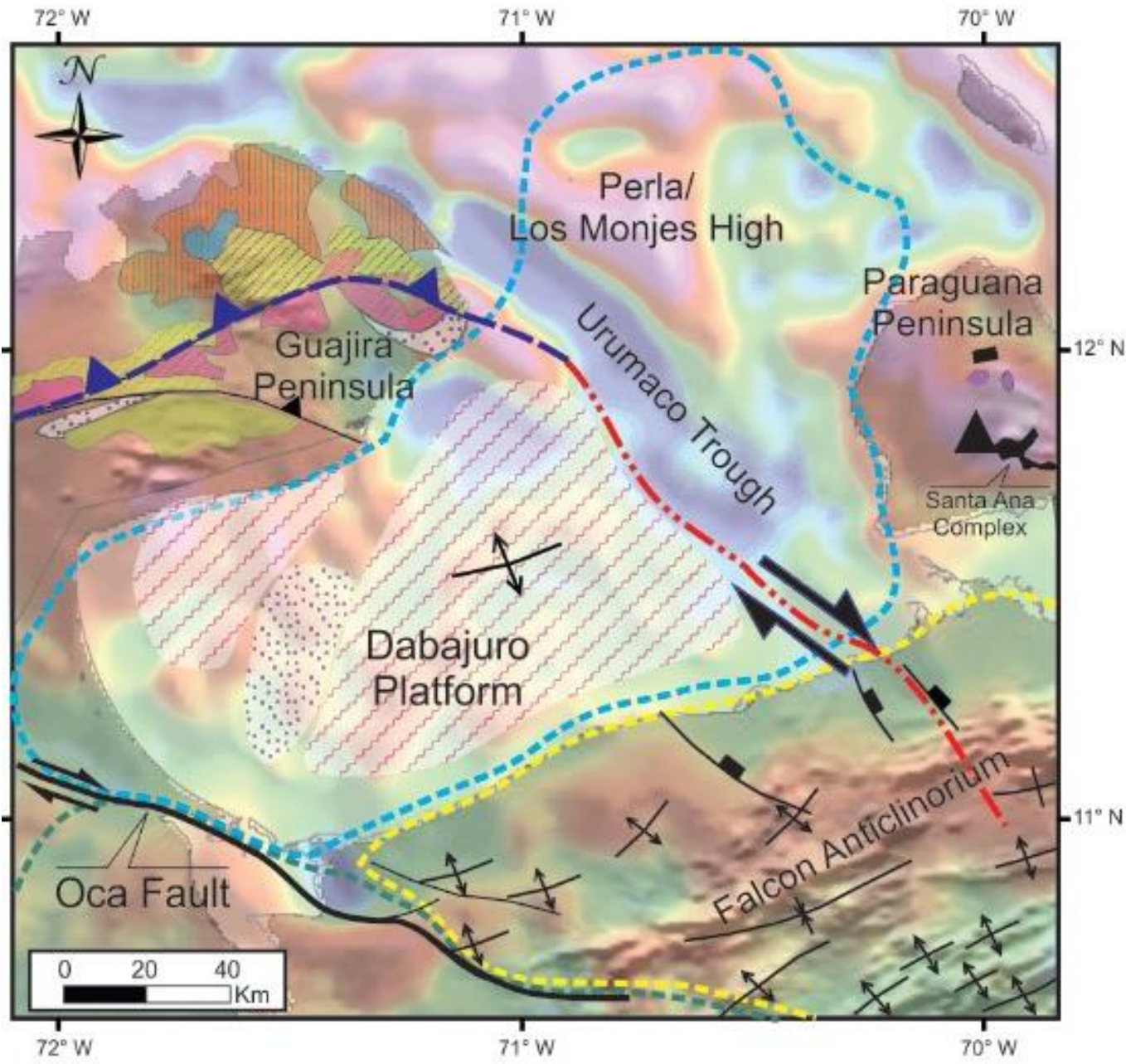
Gas Termogénico
Gas asociado a Condensado
Condensado e Hidrocarburo Líquido (Cretácico)



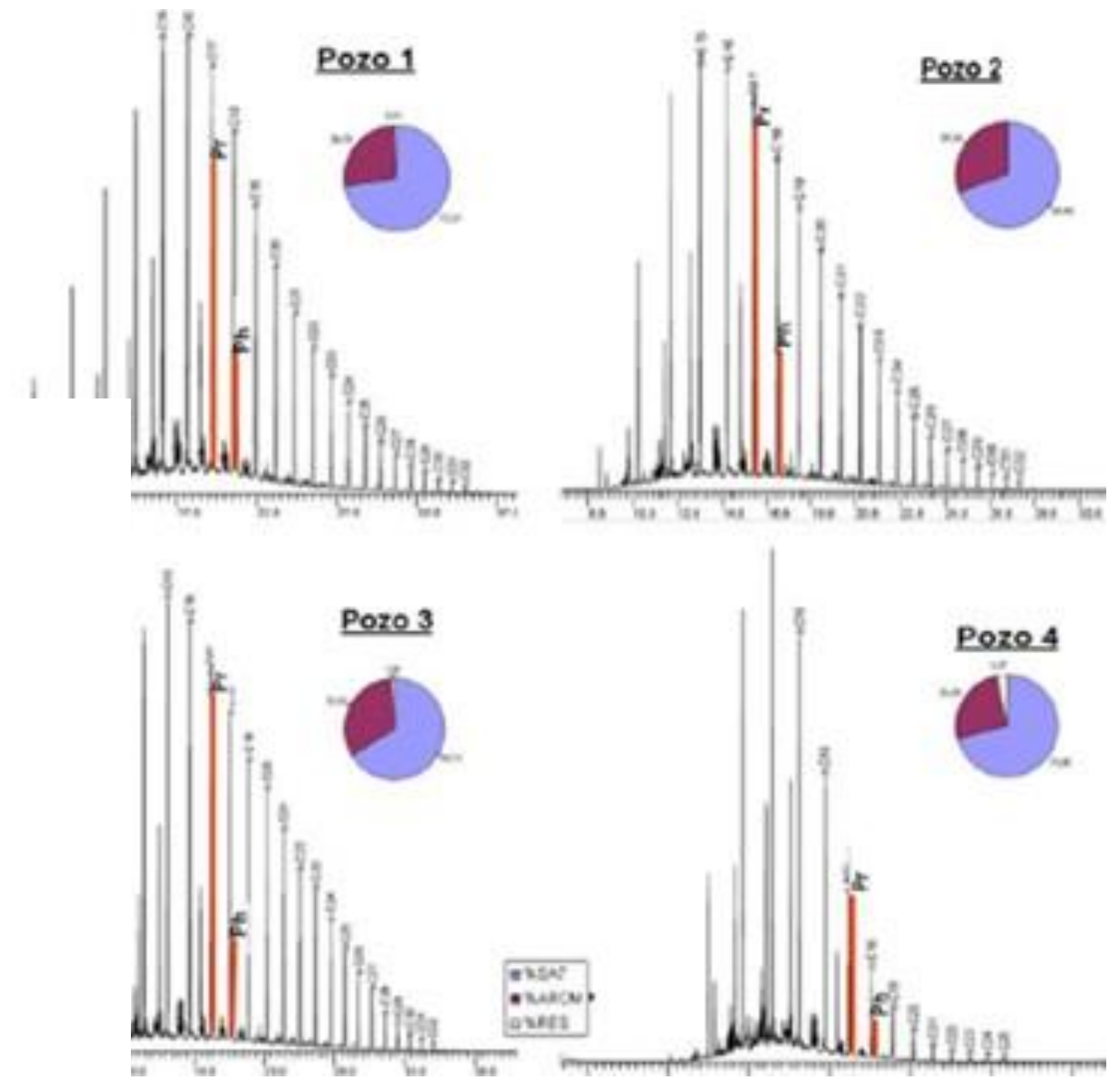
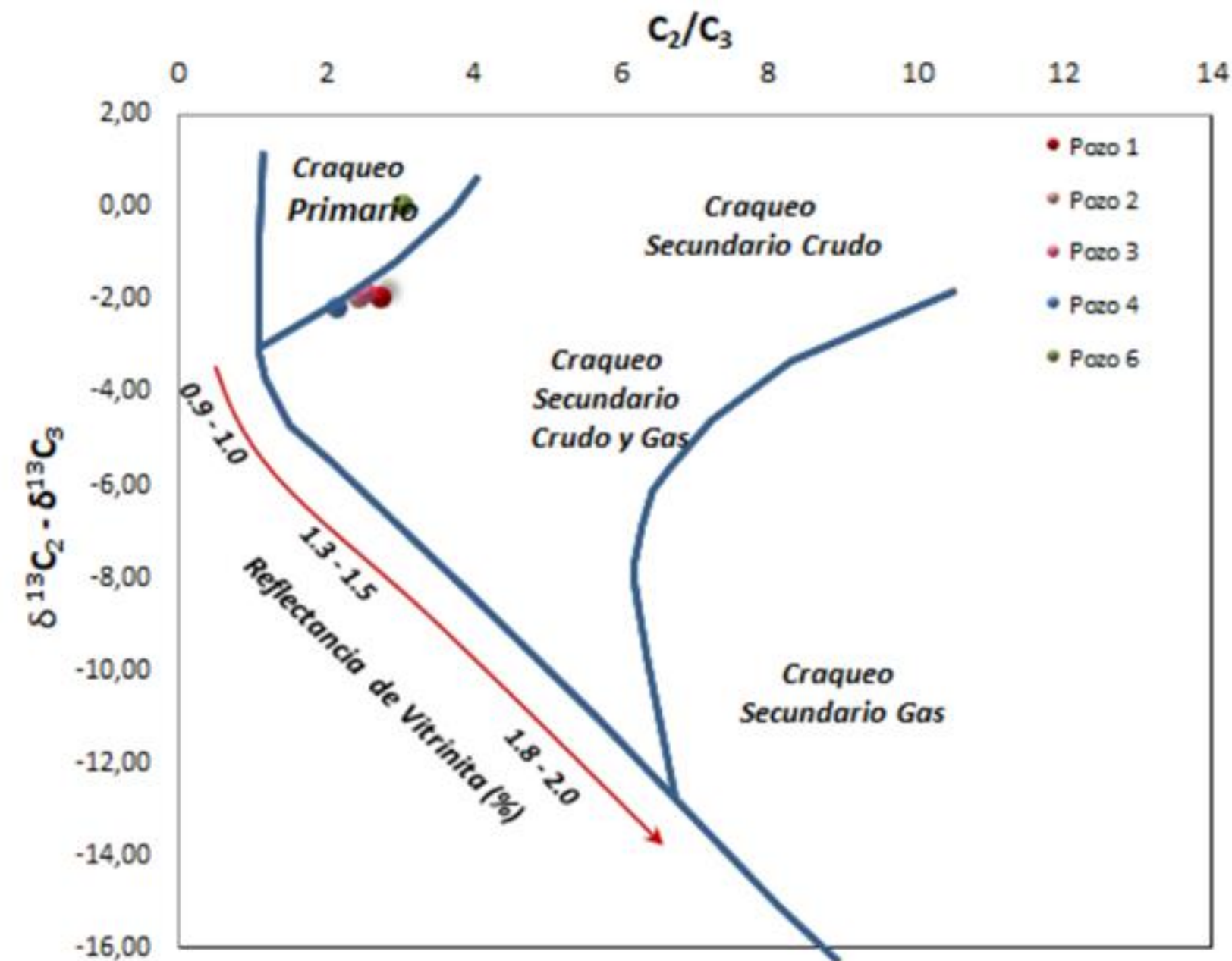
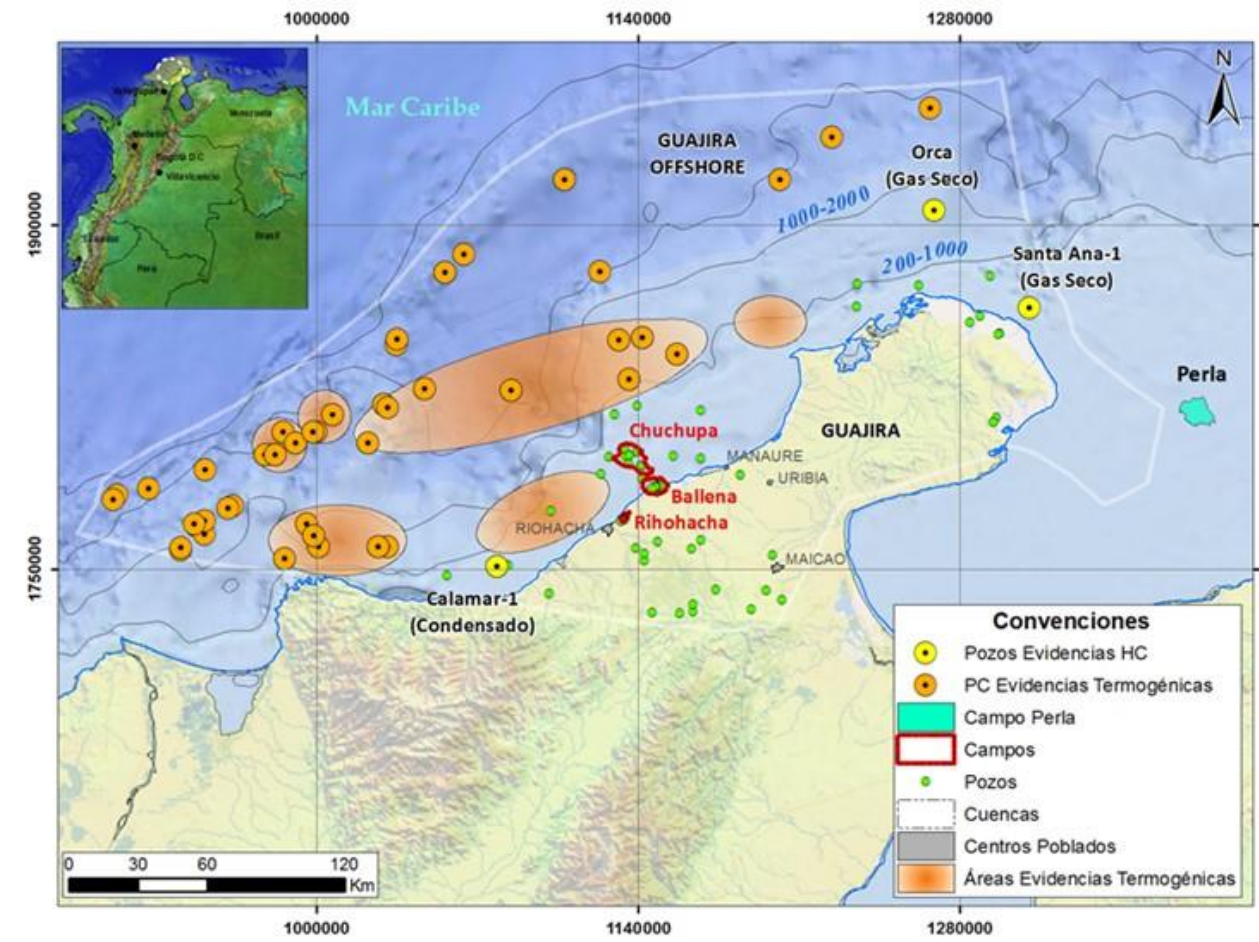
Mora y Ramirez, 2009



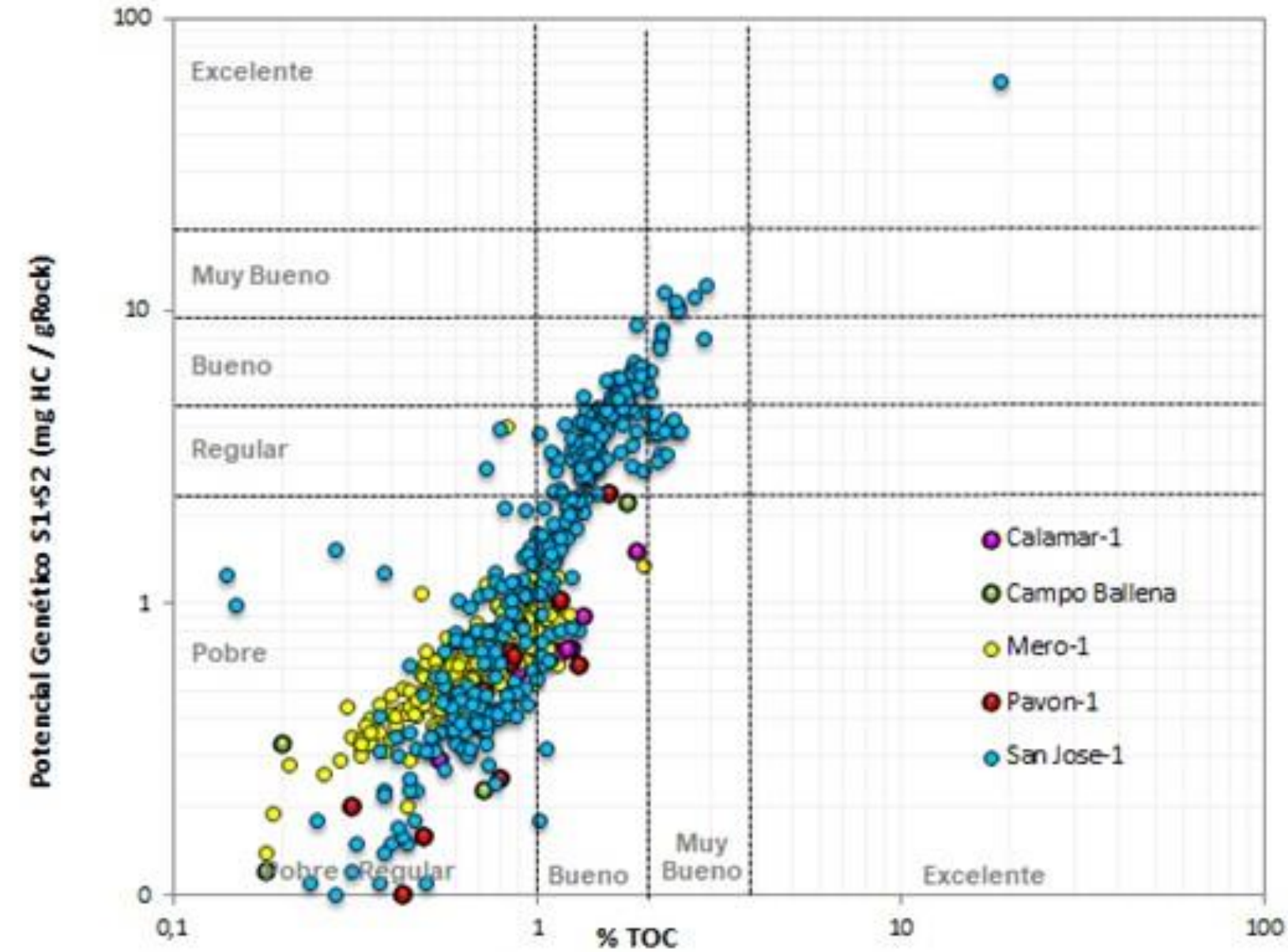
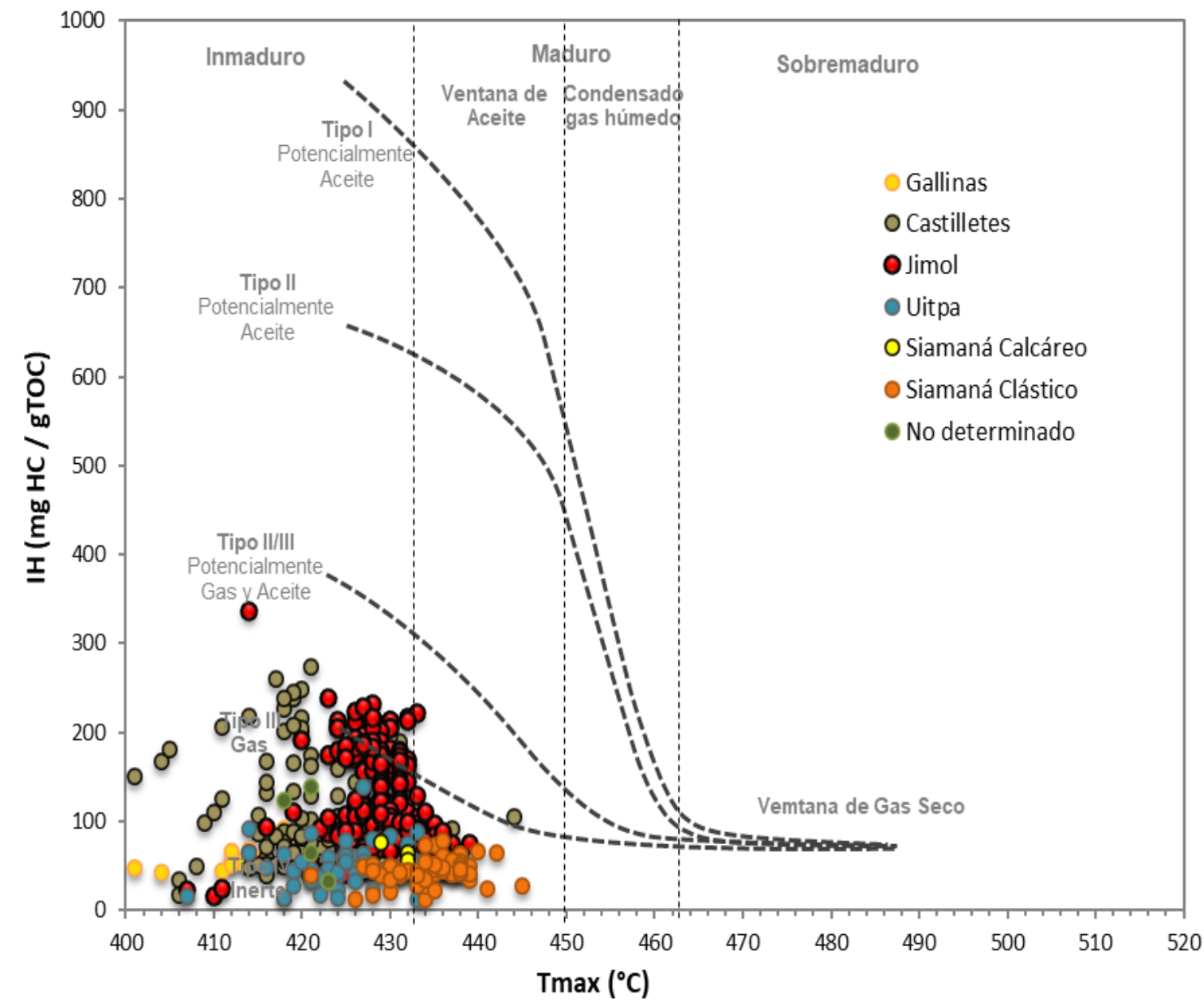
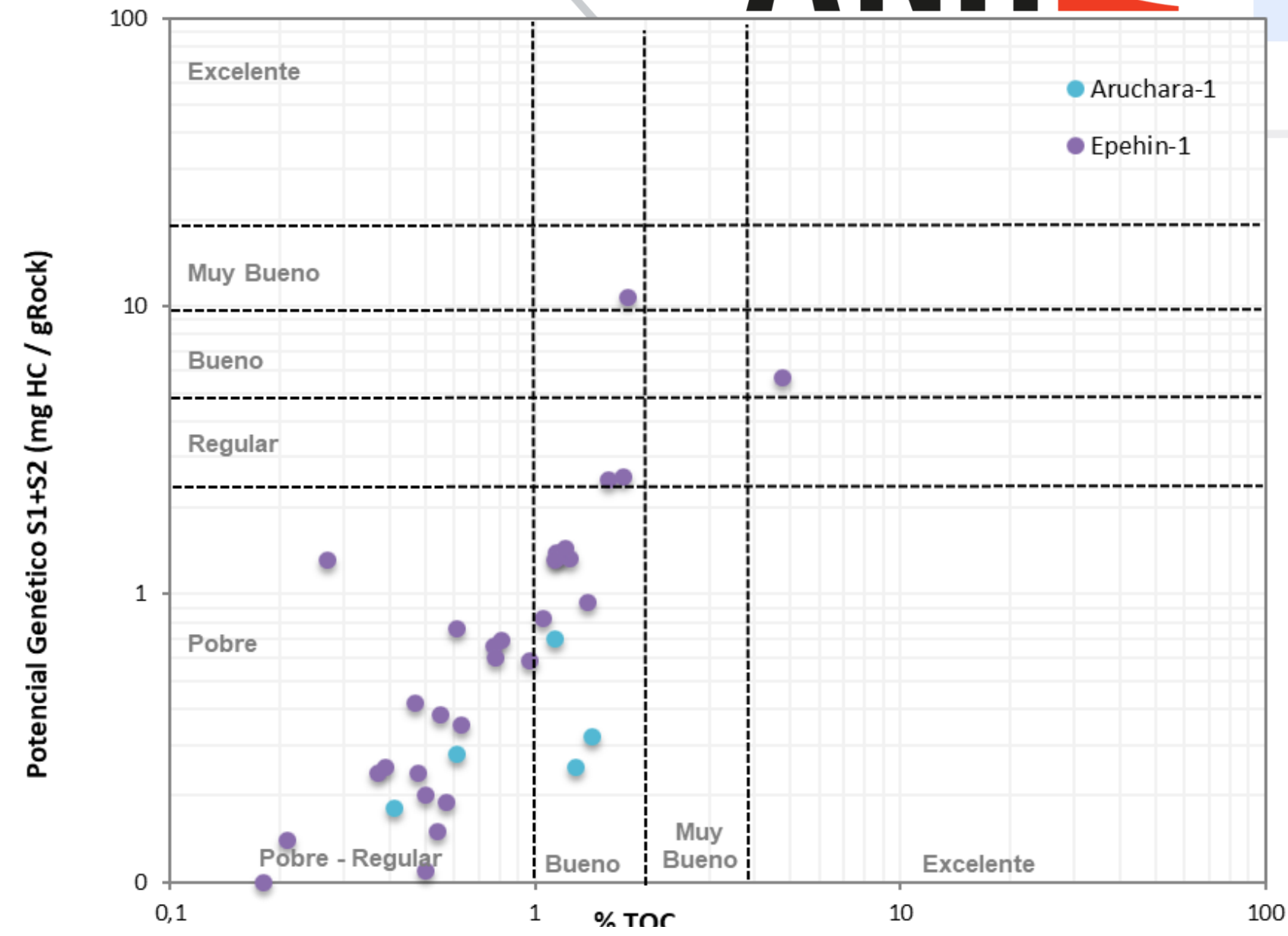
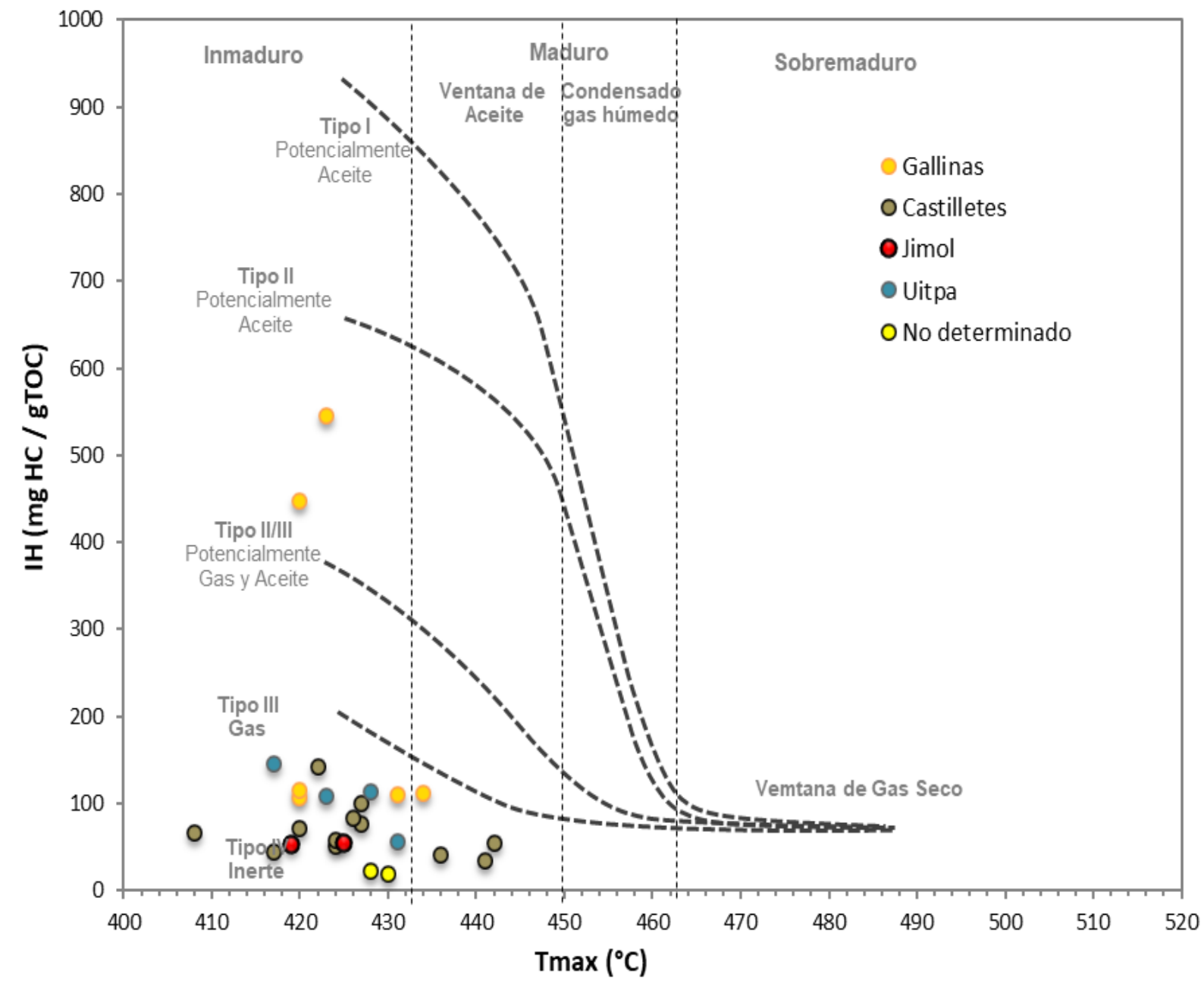
HYDROCARBONS OCURENCE PERLA FIELD (VENEZUELA)

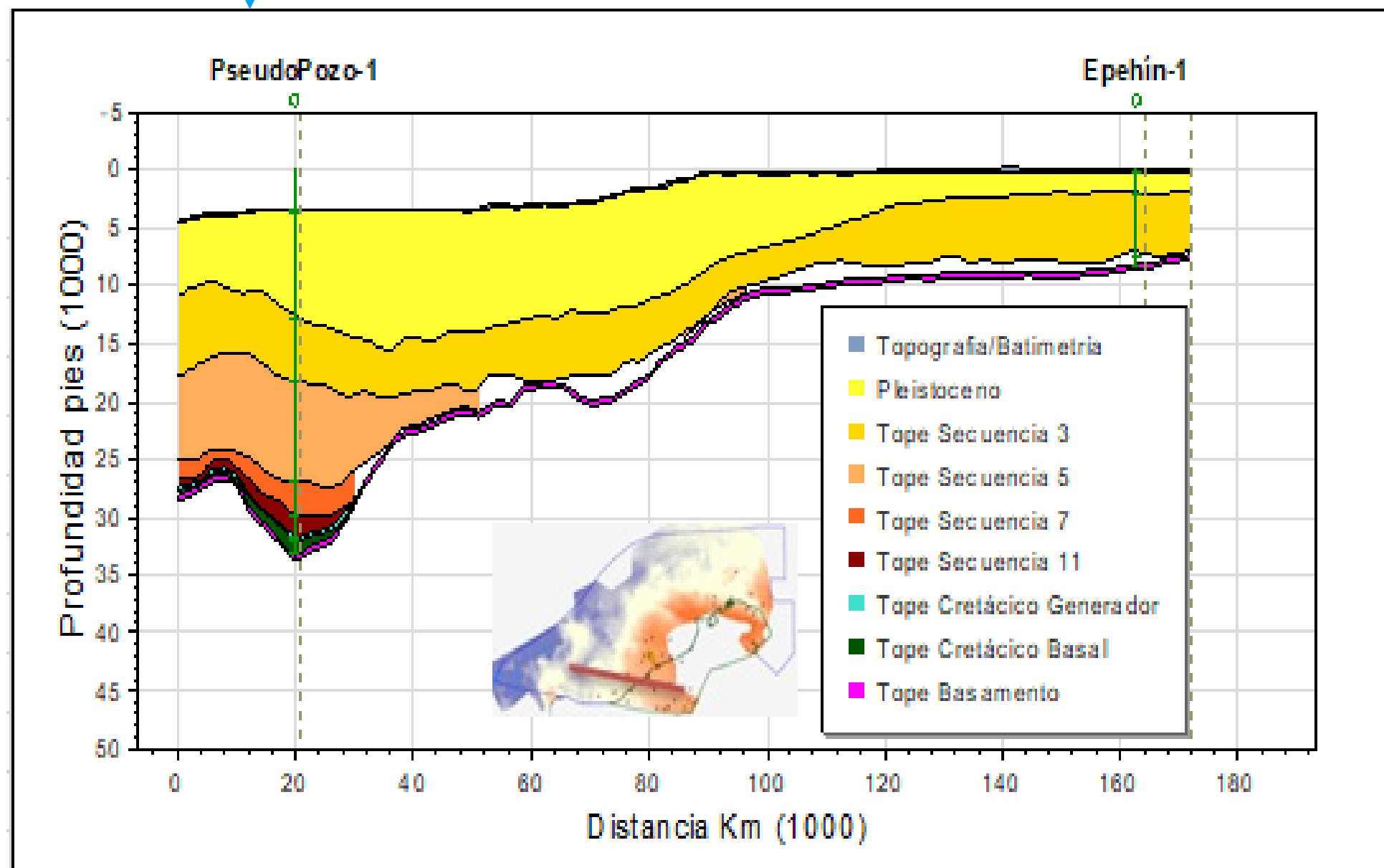
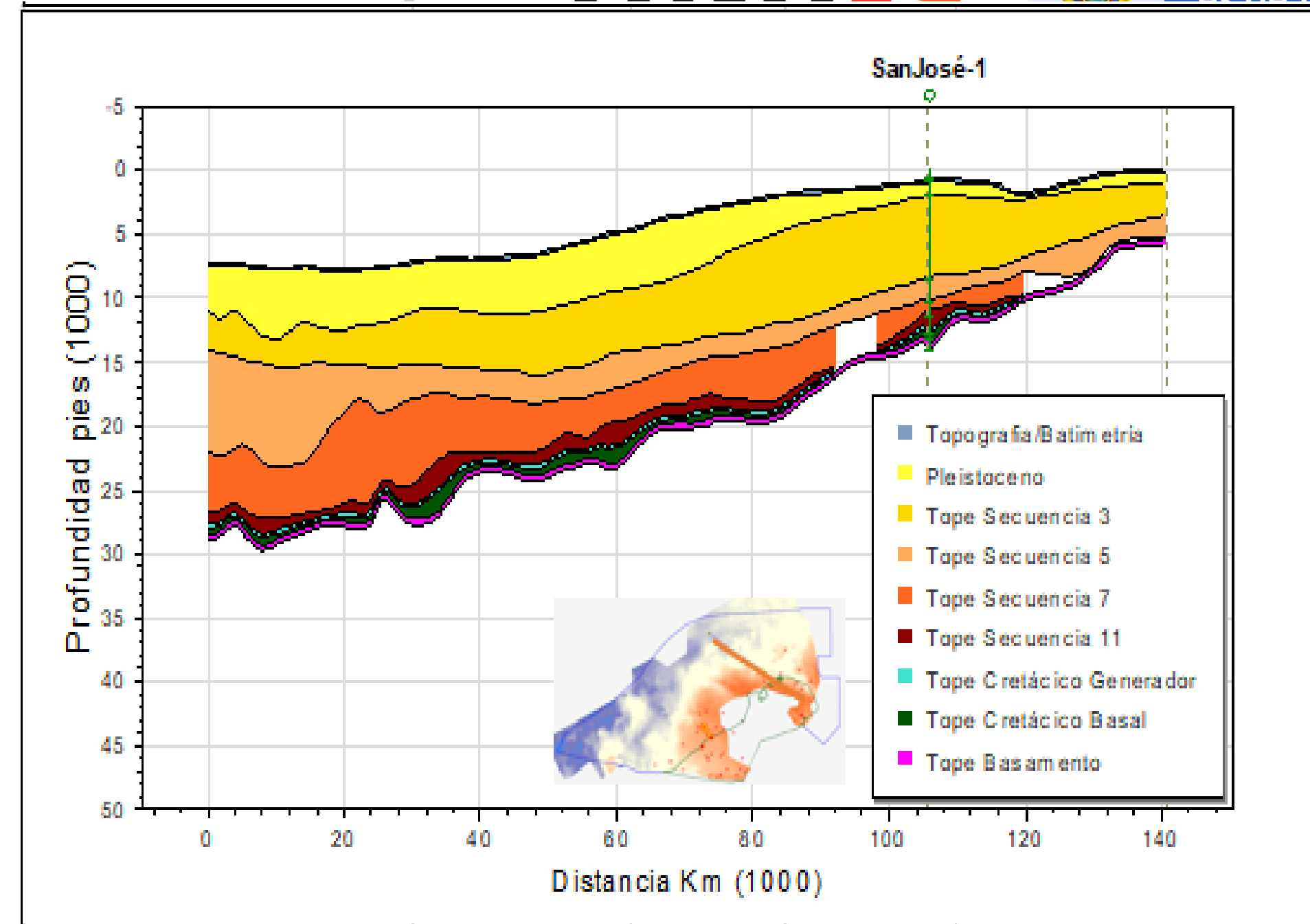
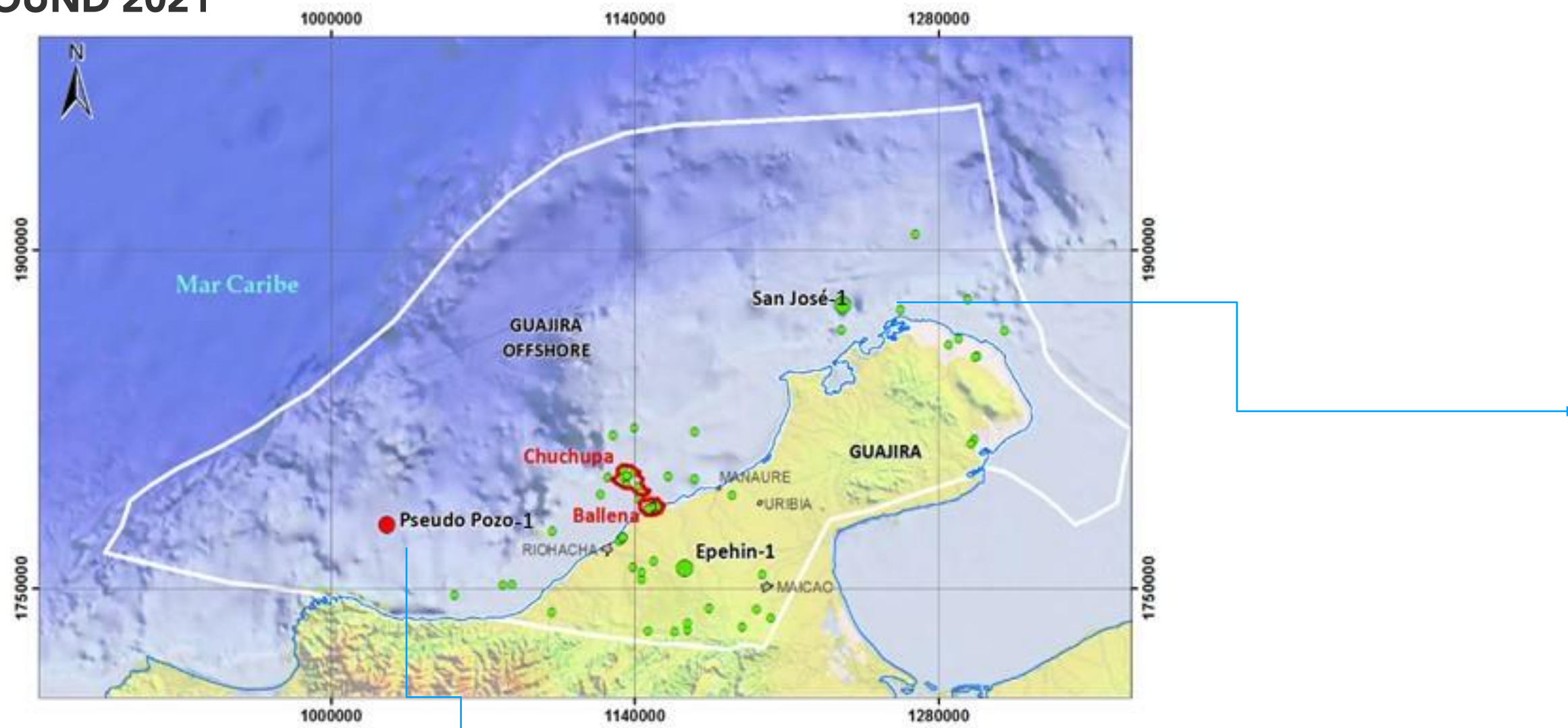


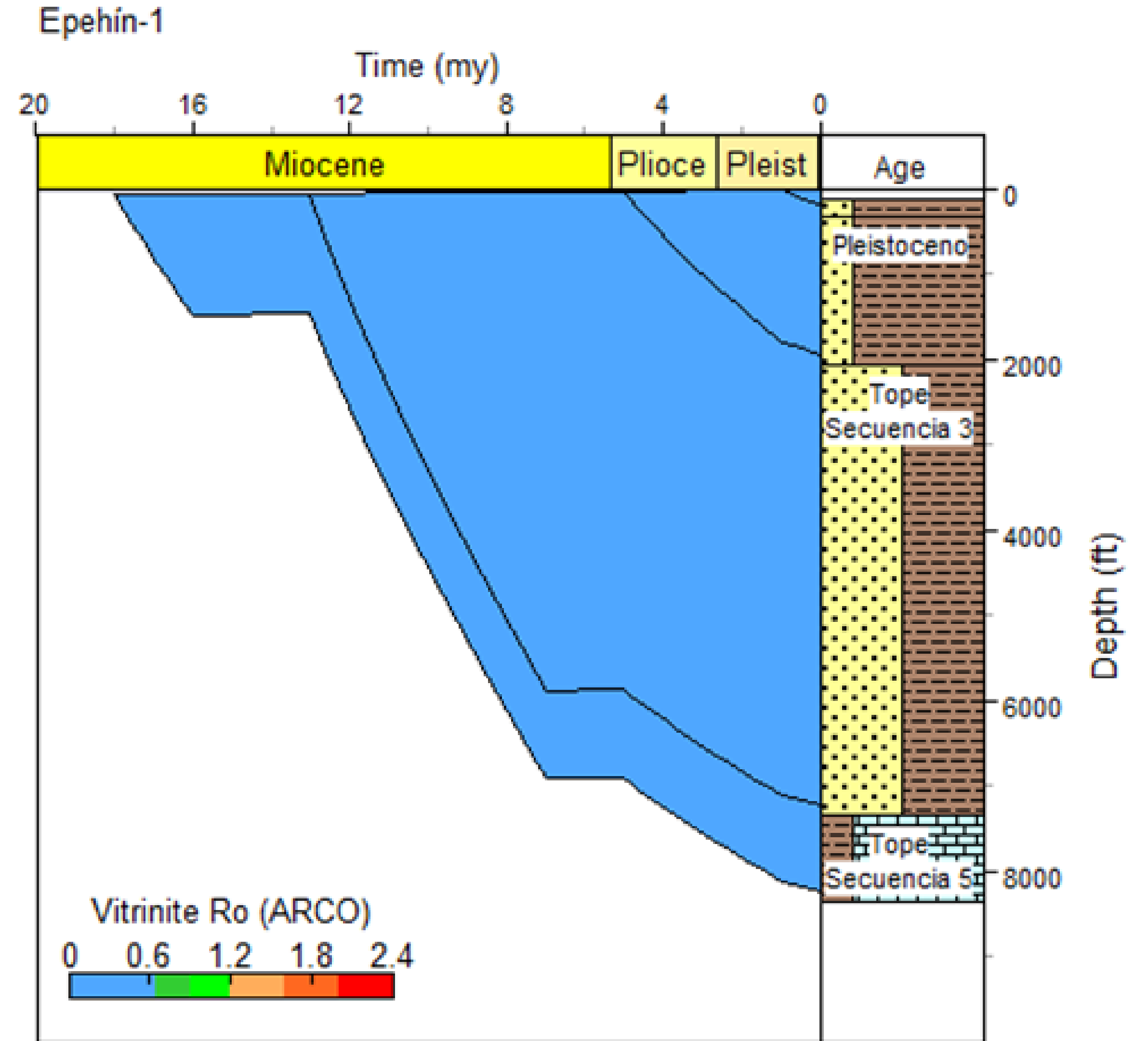
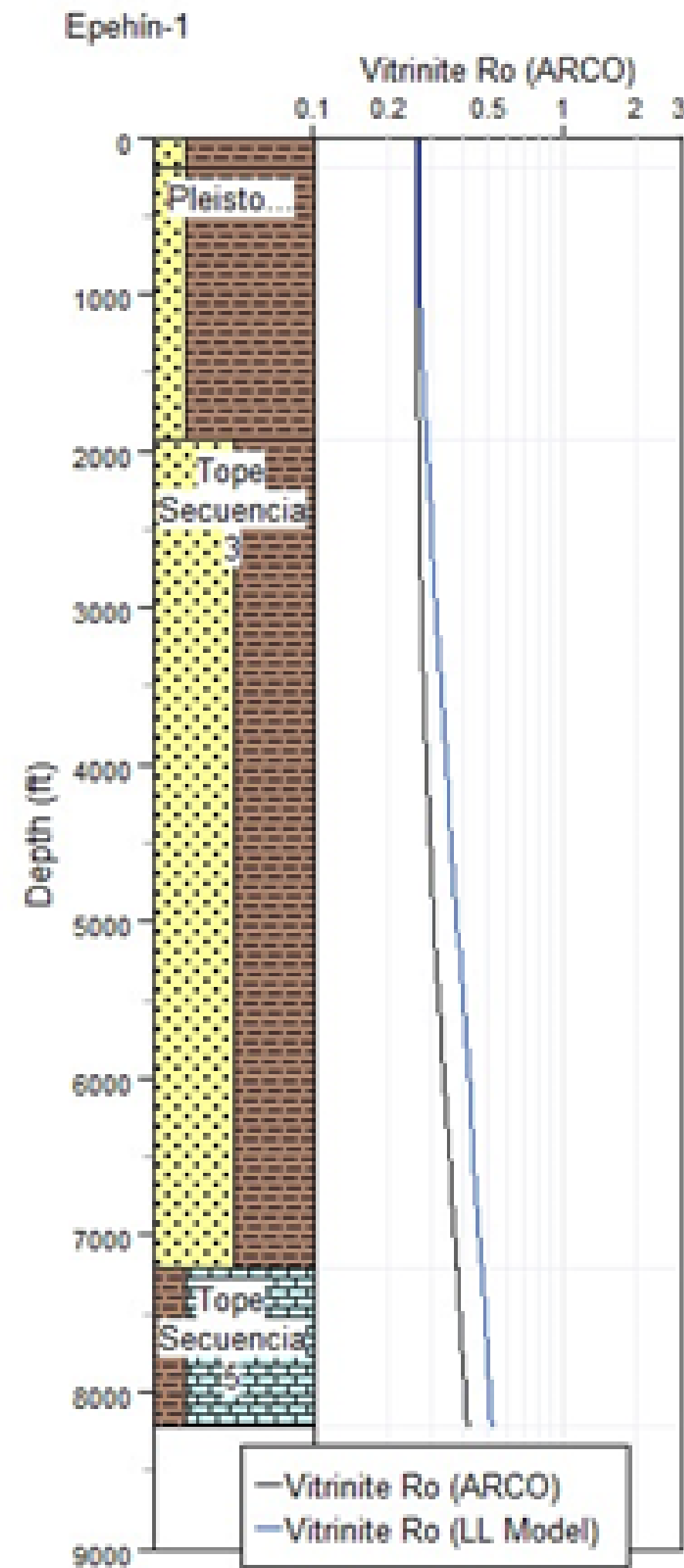
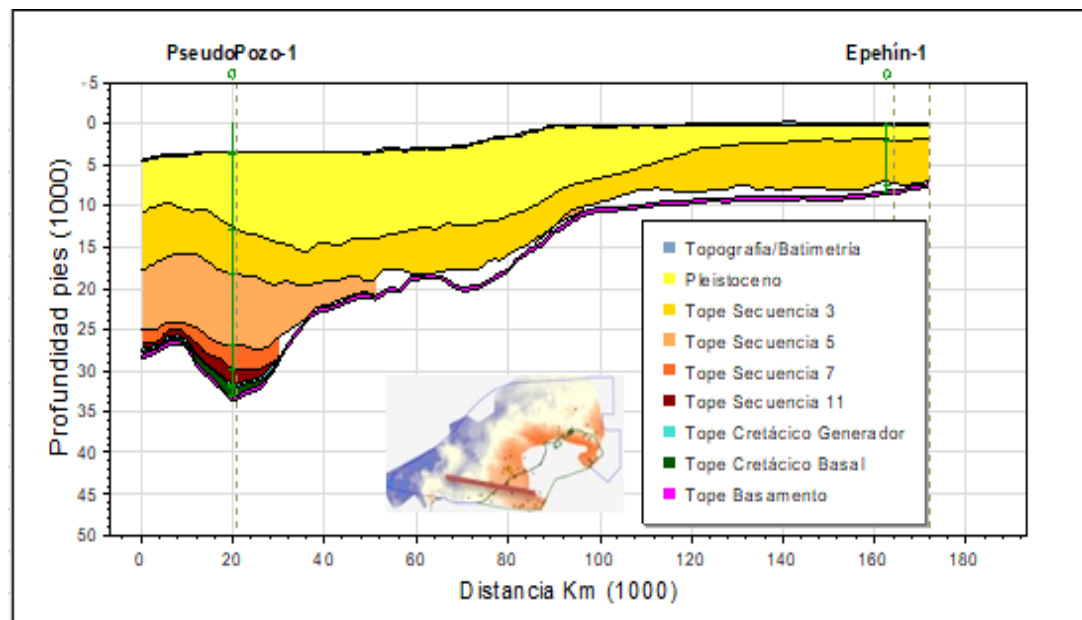
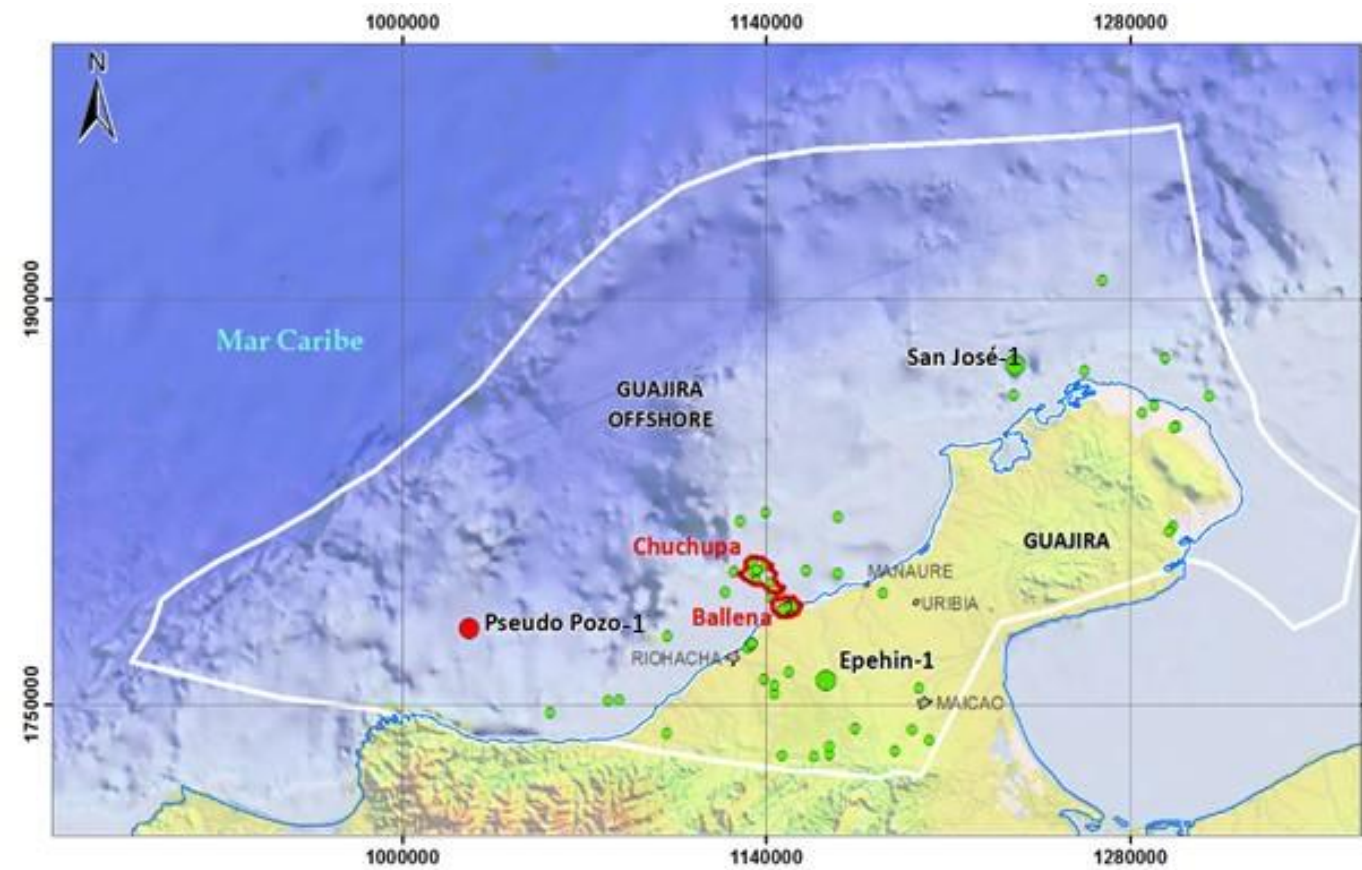
Tomado de Castro et al., 2017

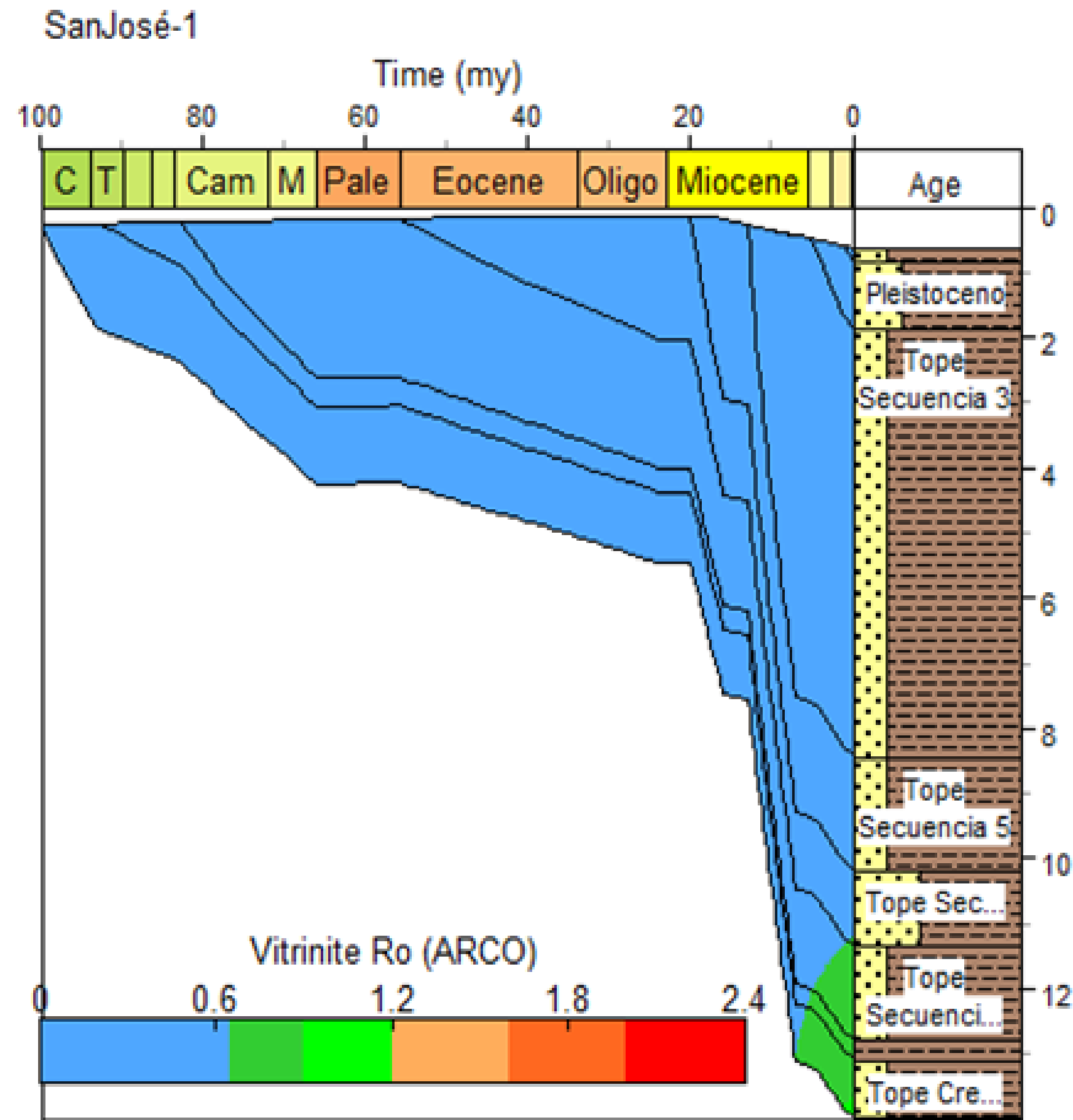
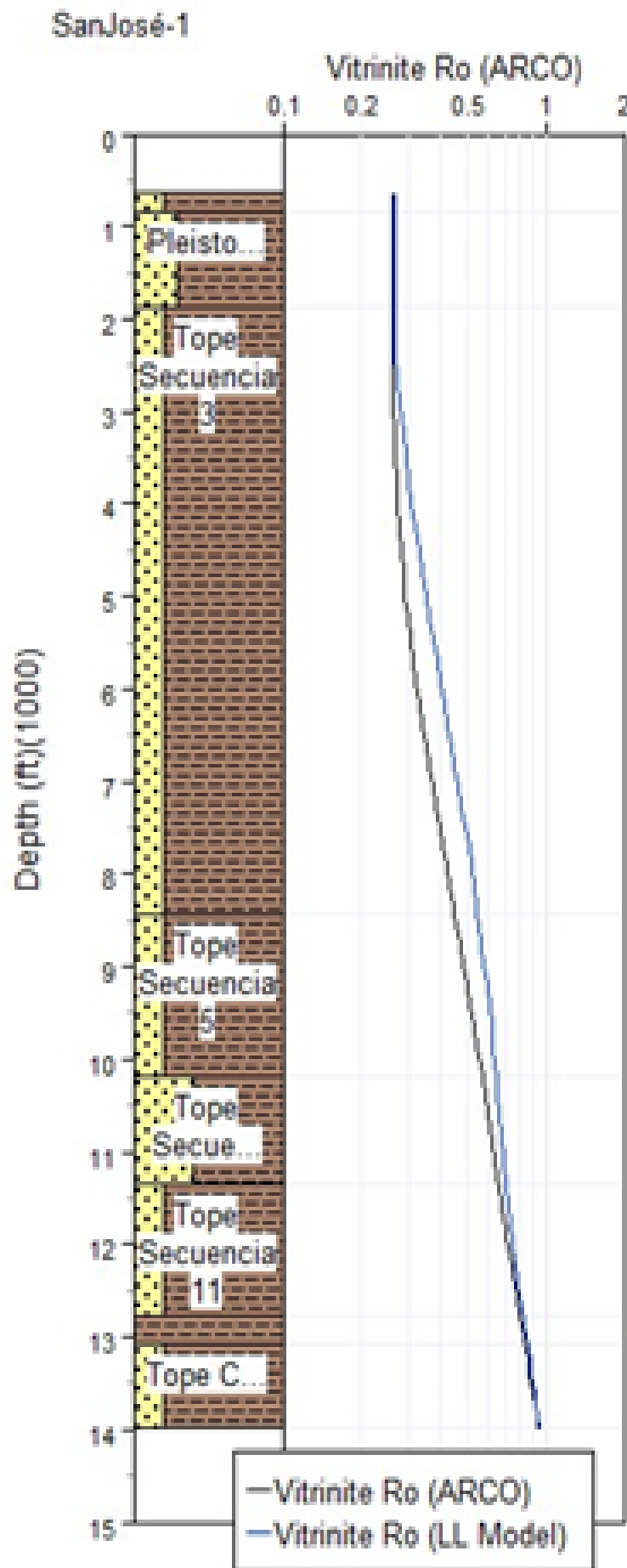
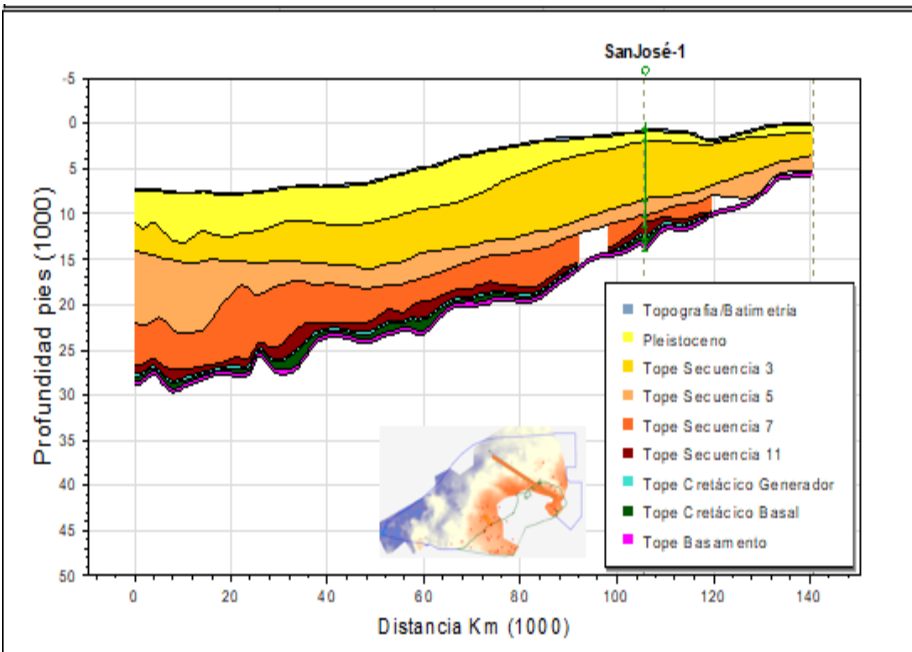
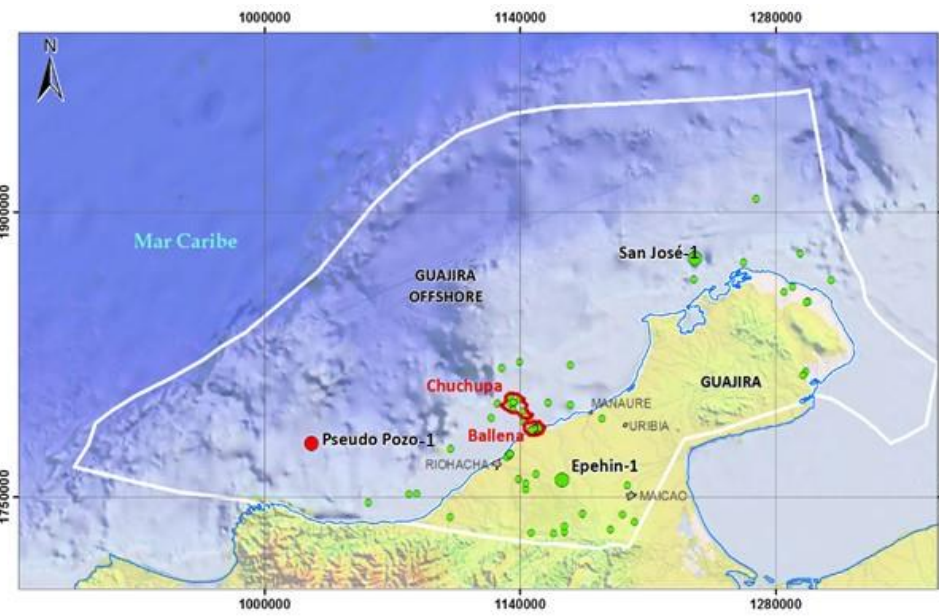


Tomado de Pirella, 2017

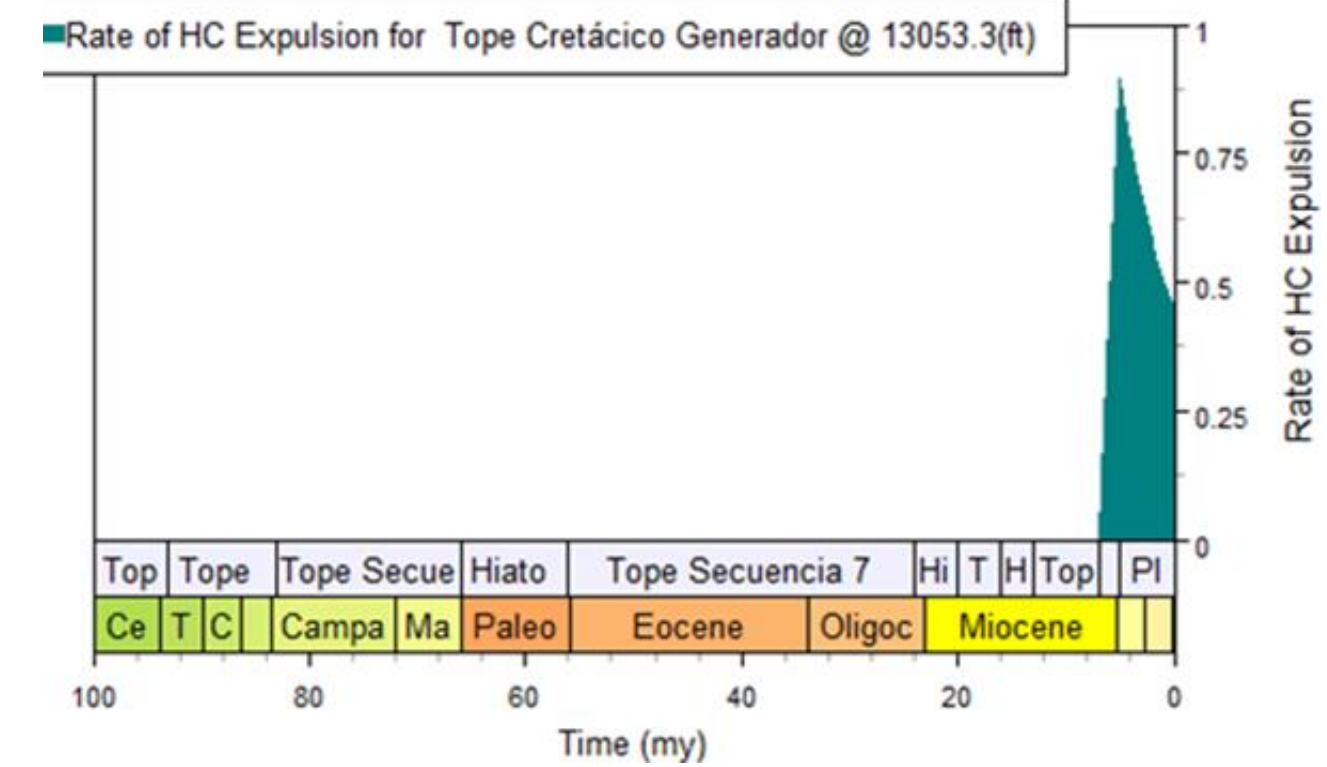
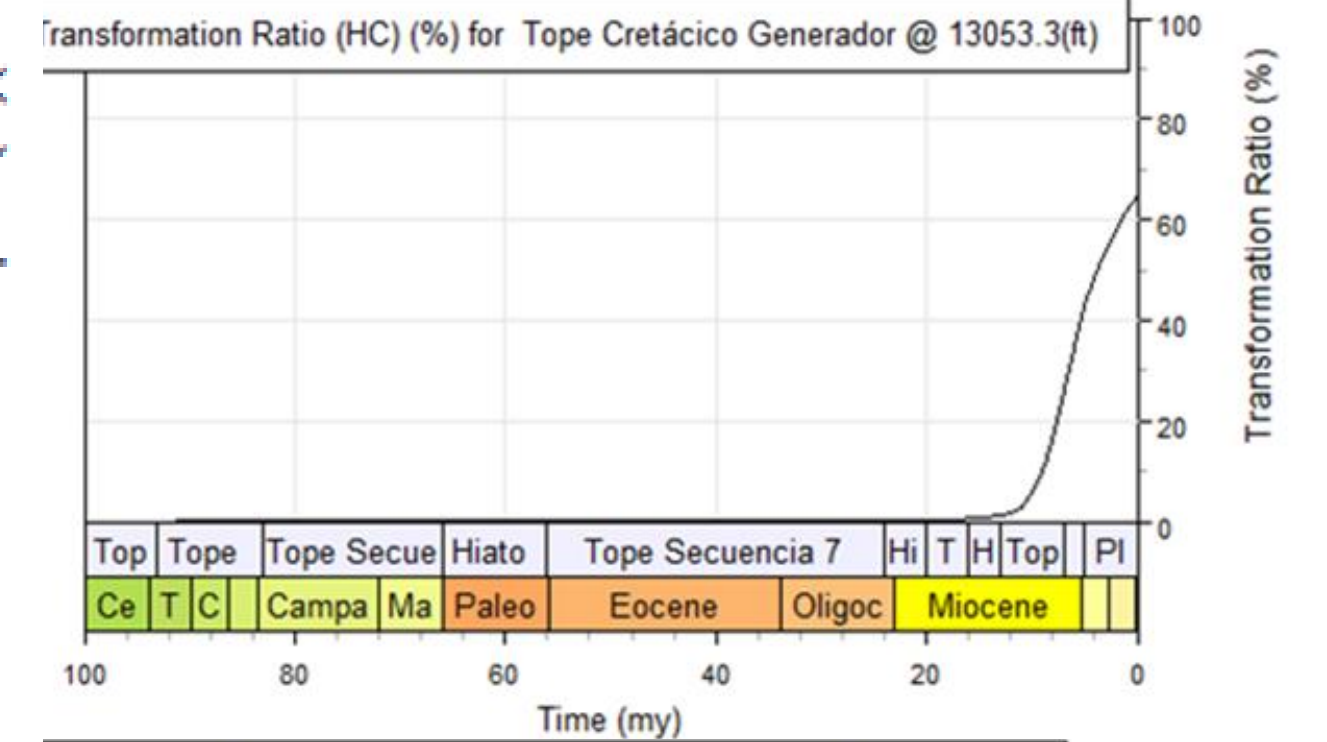
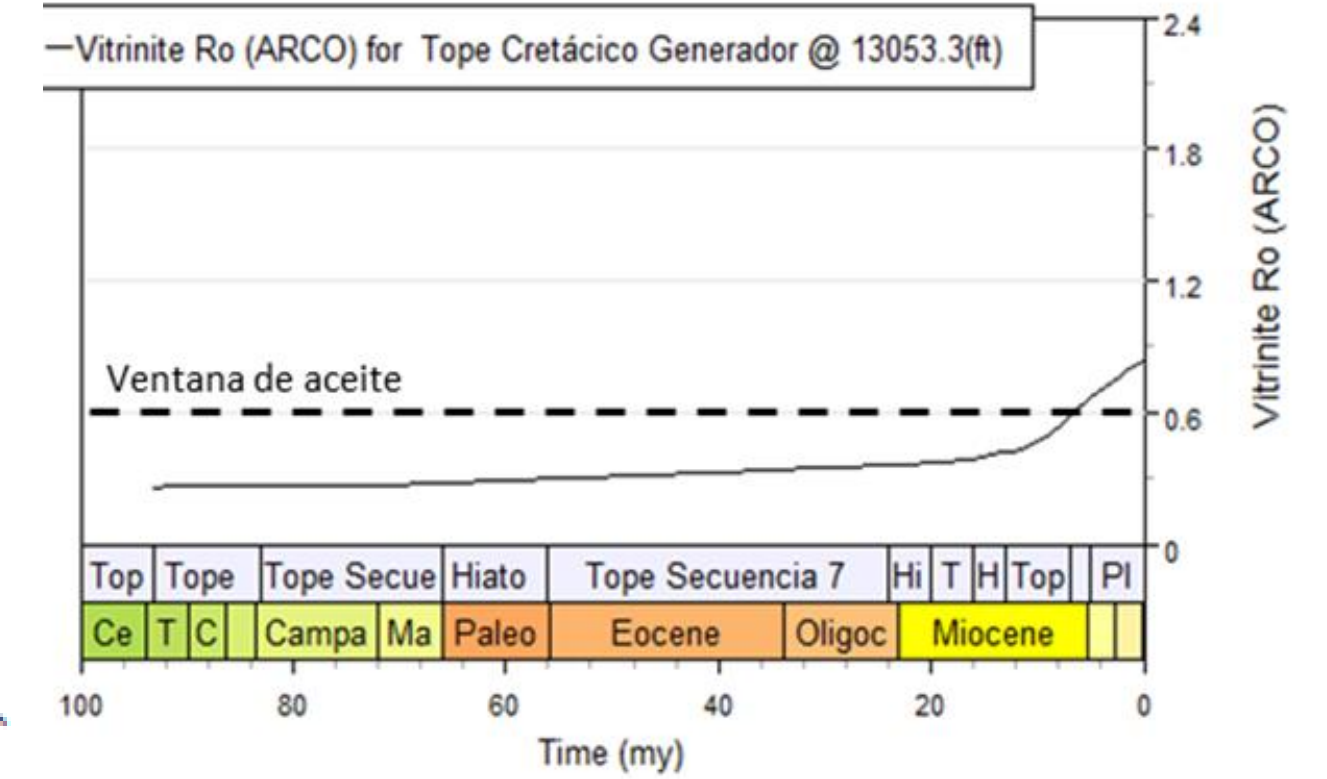


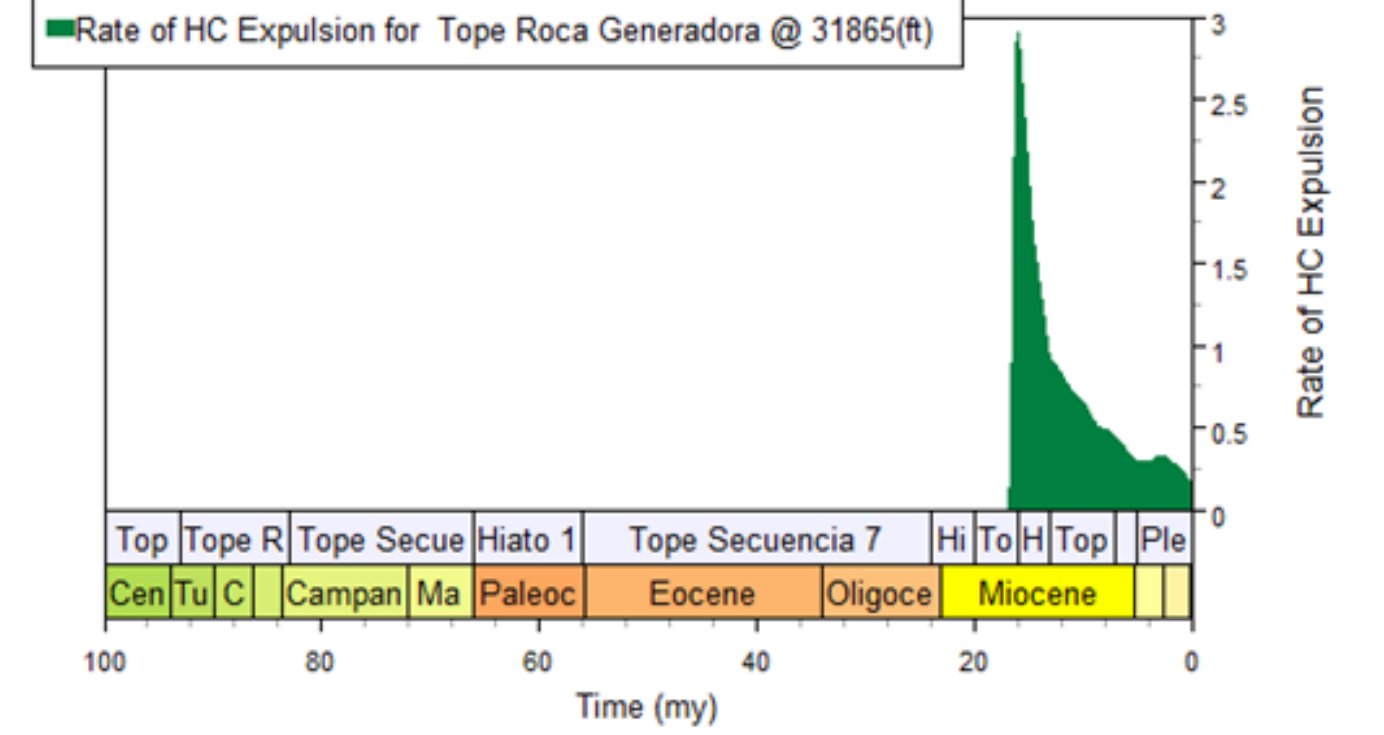
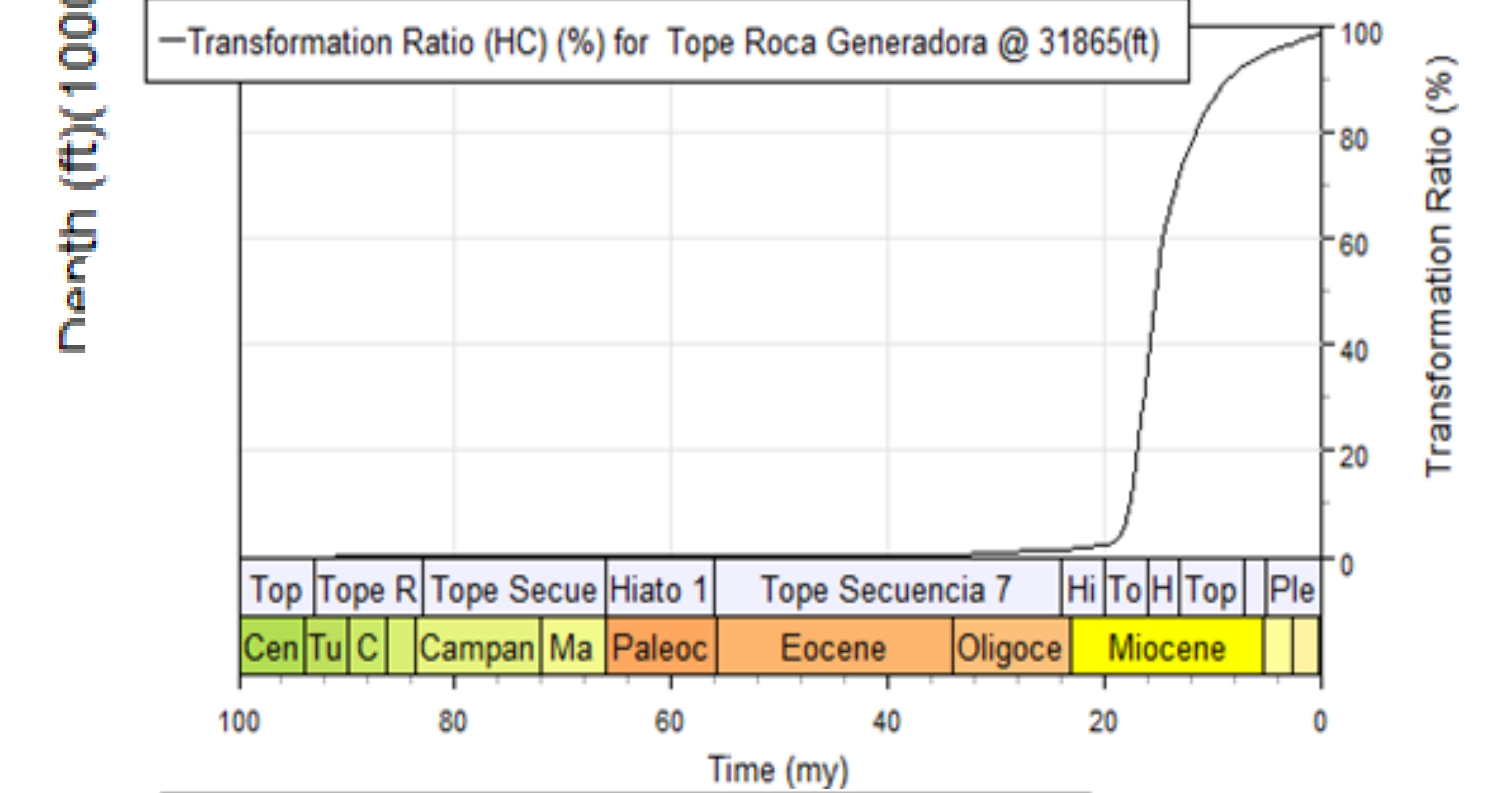
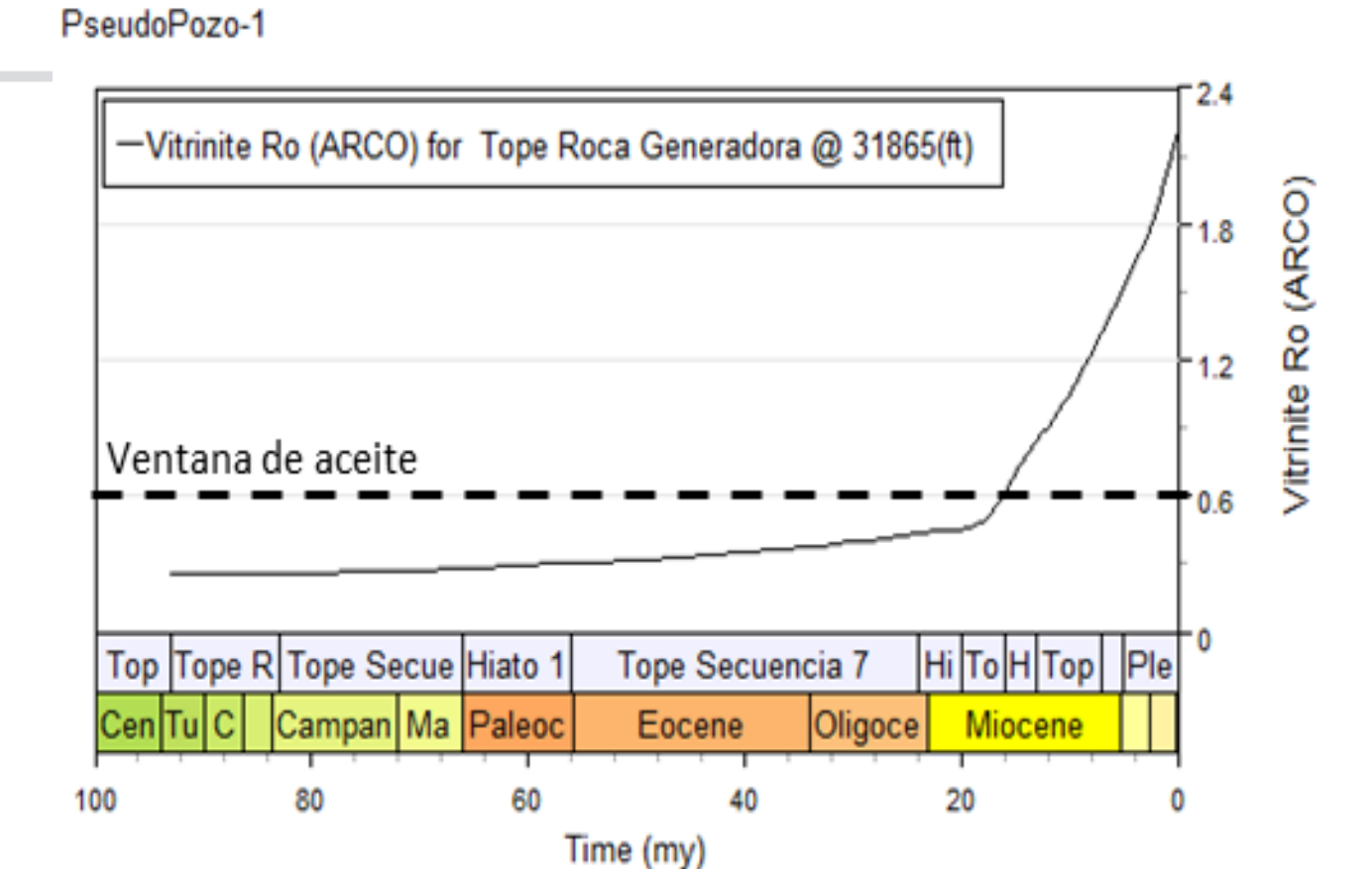
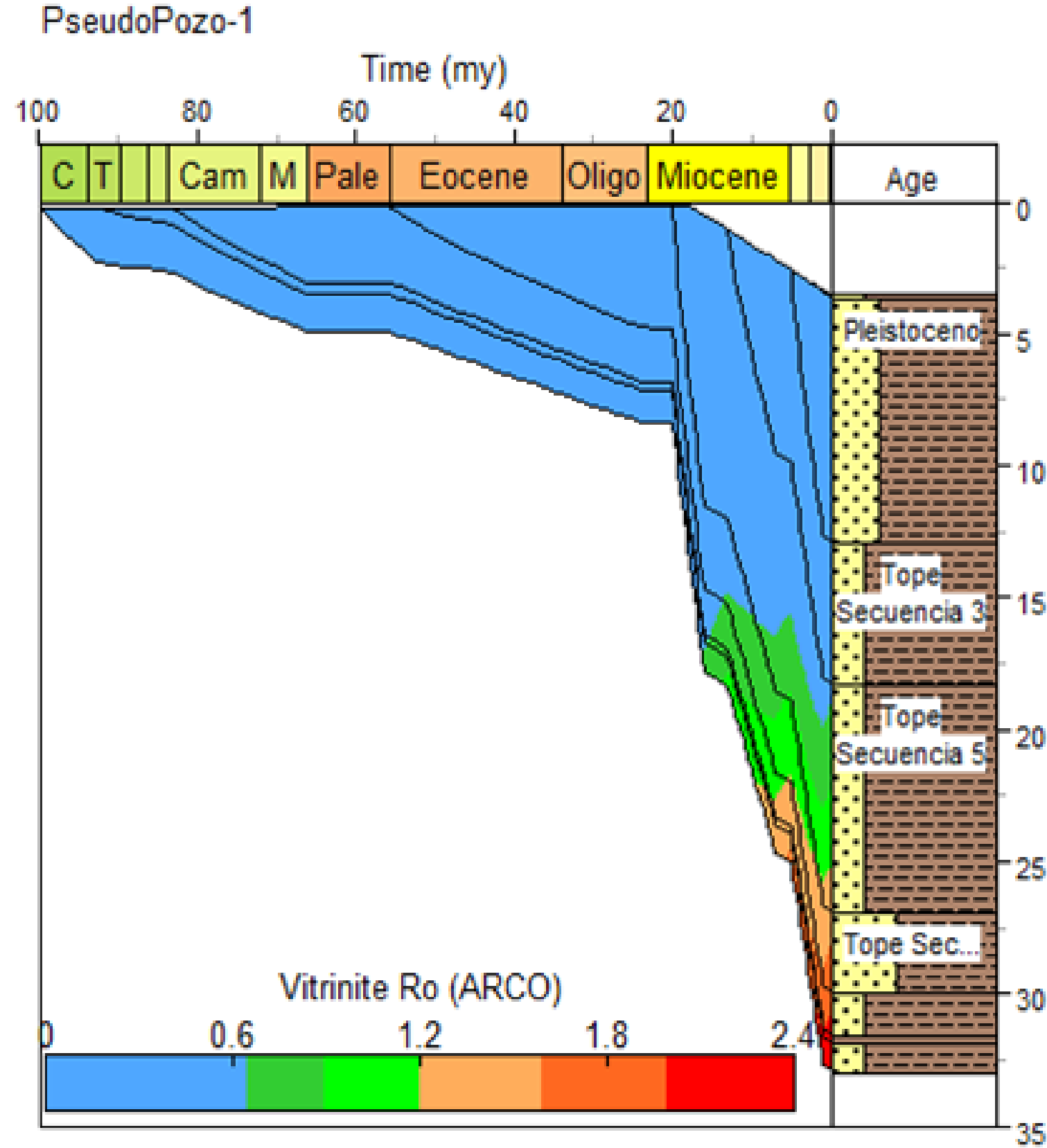
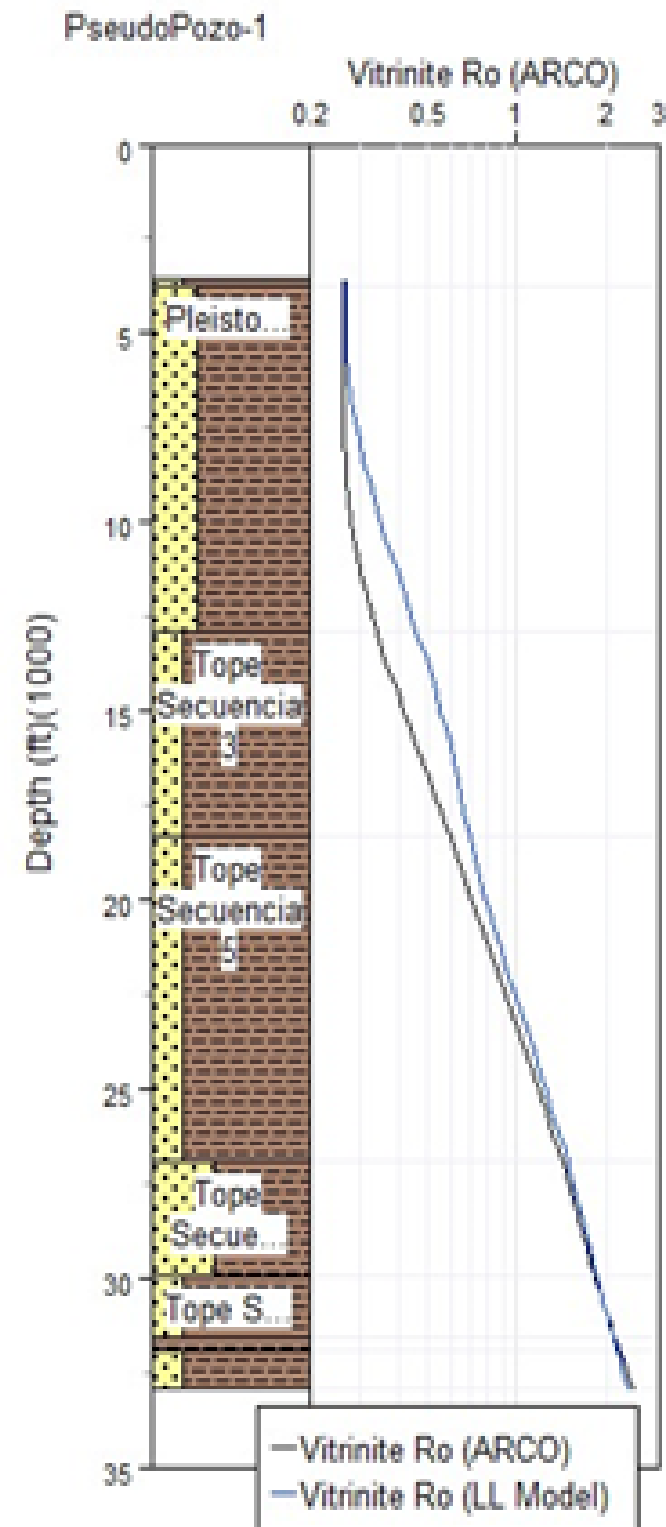
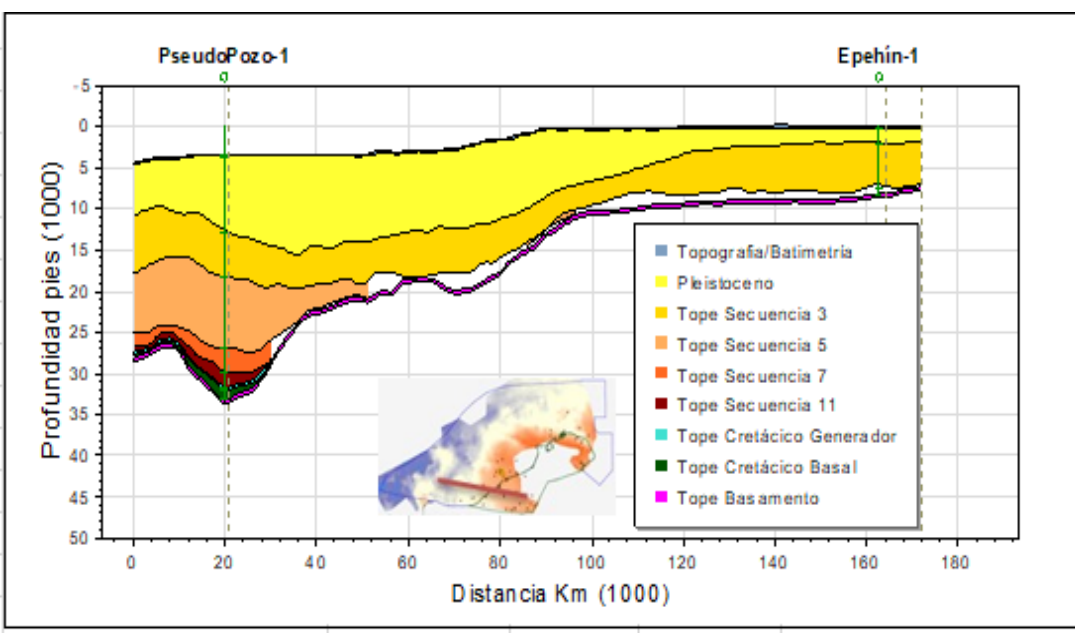
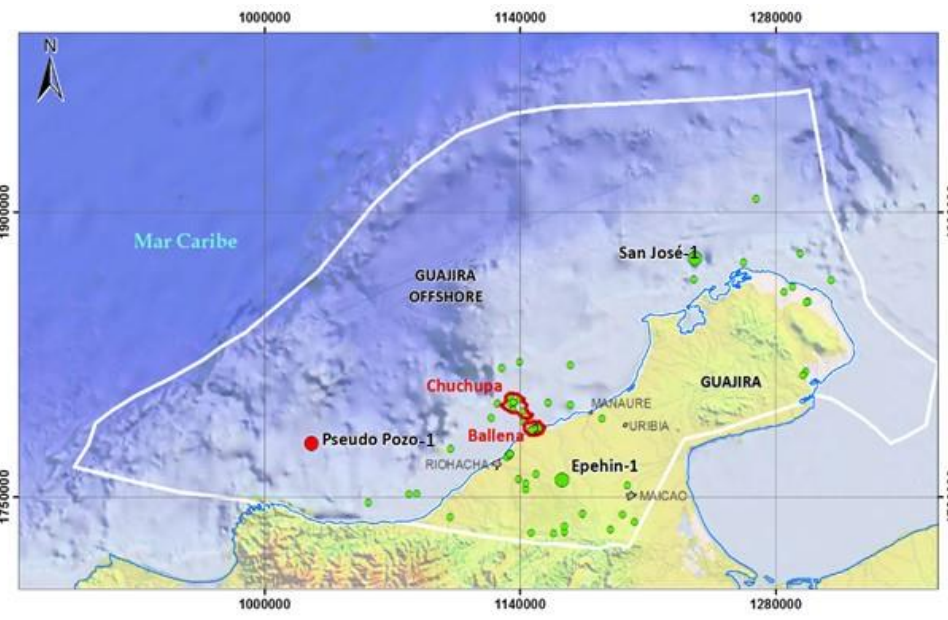


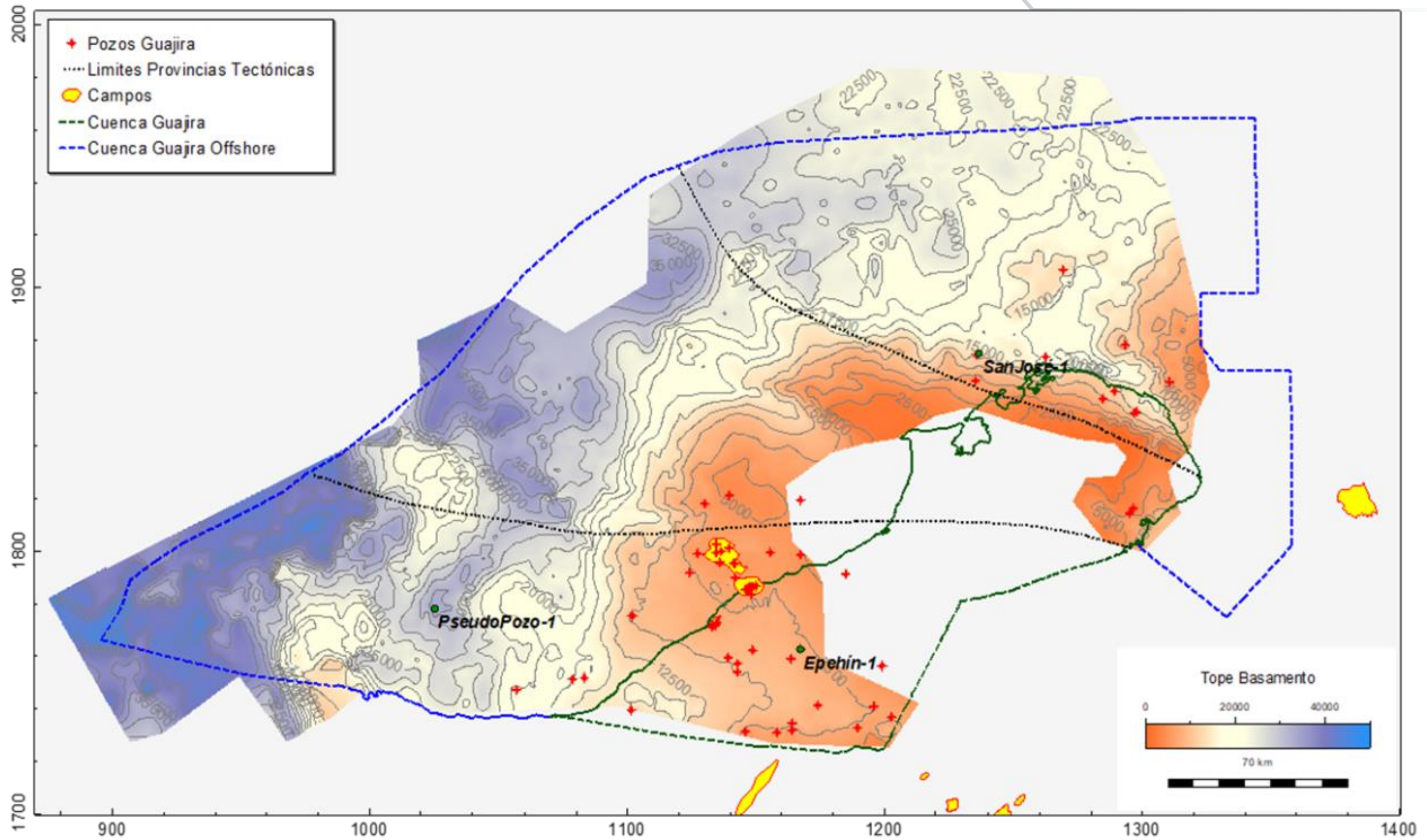


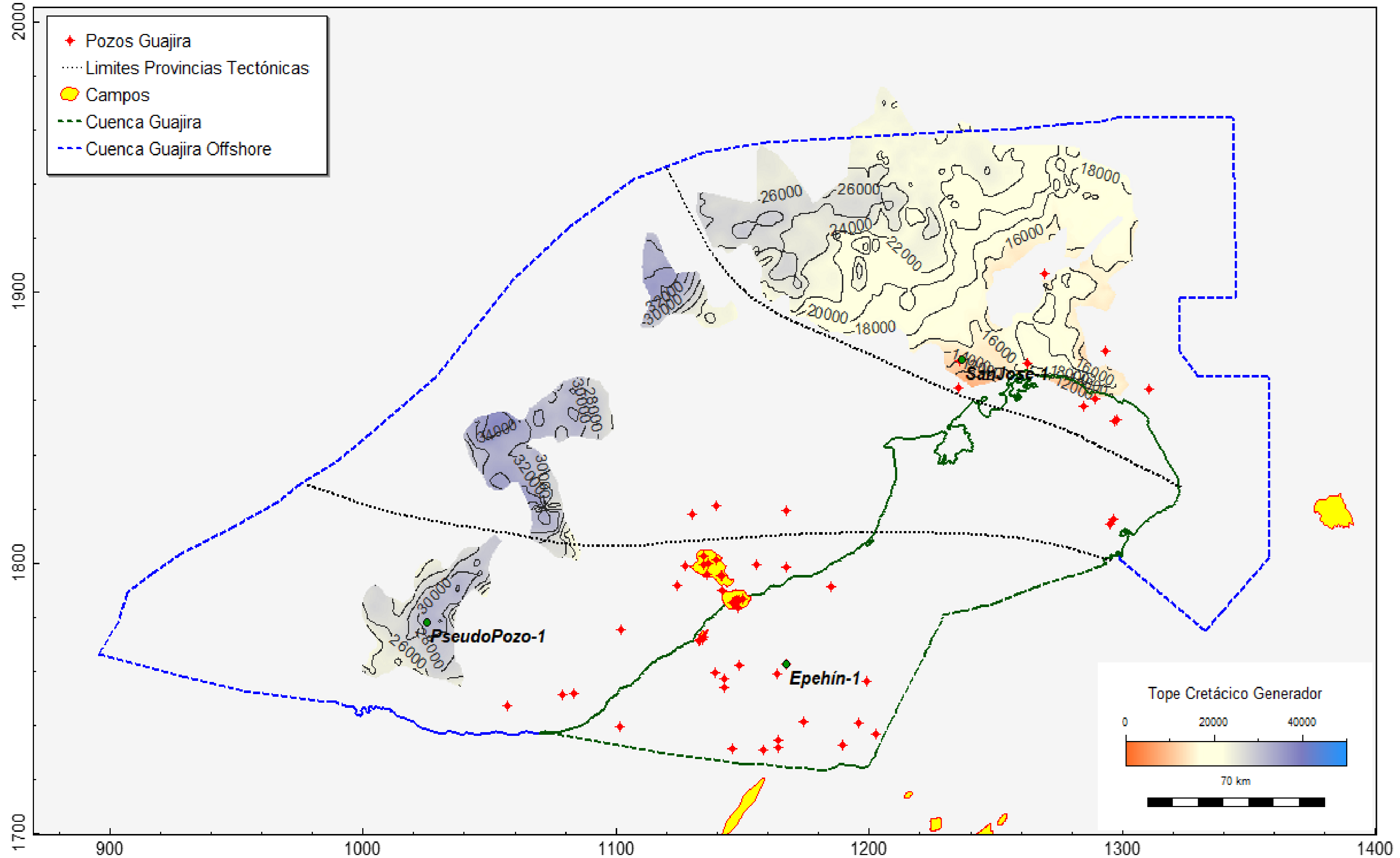


San José-1

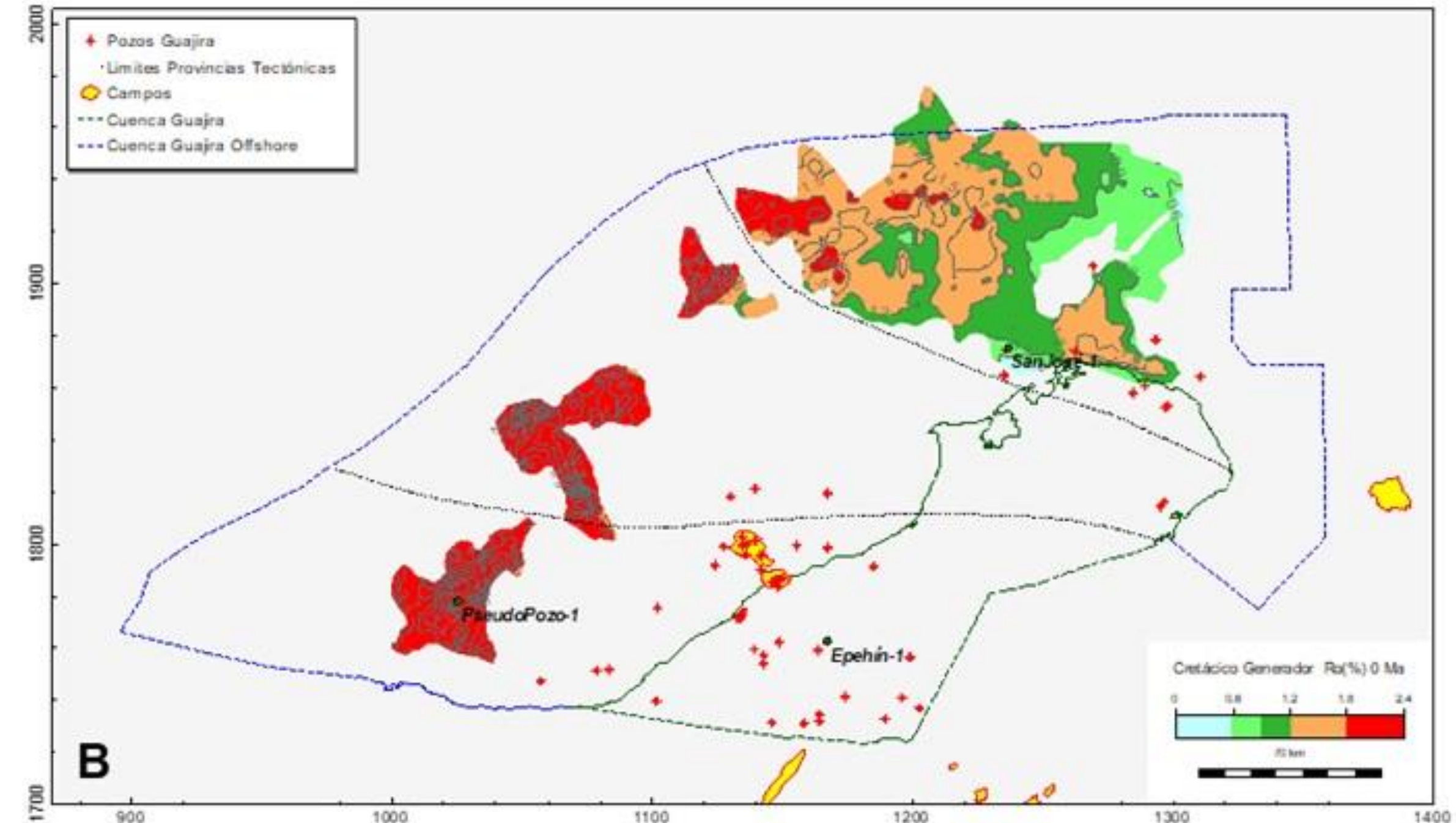
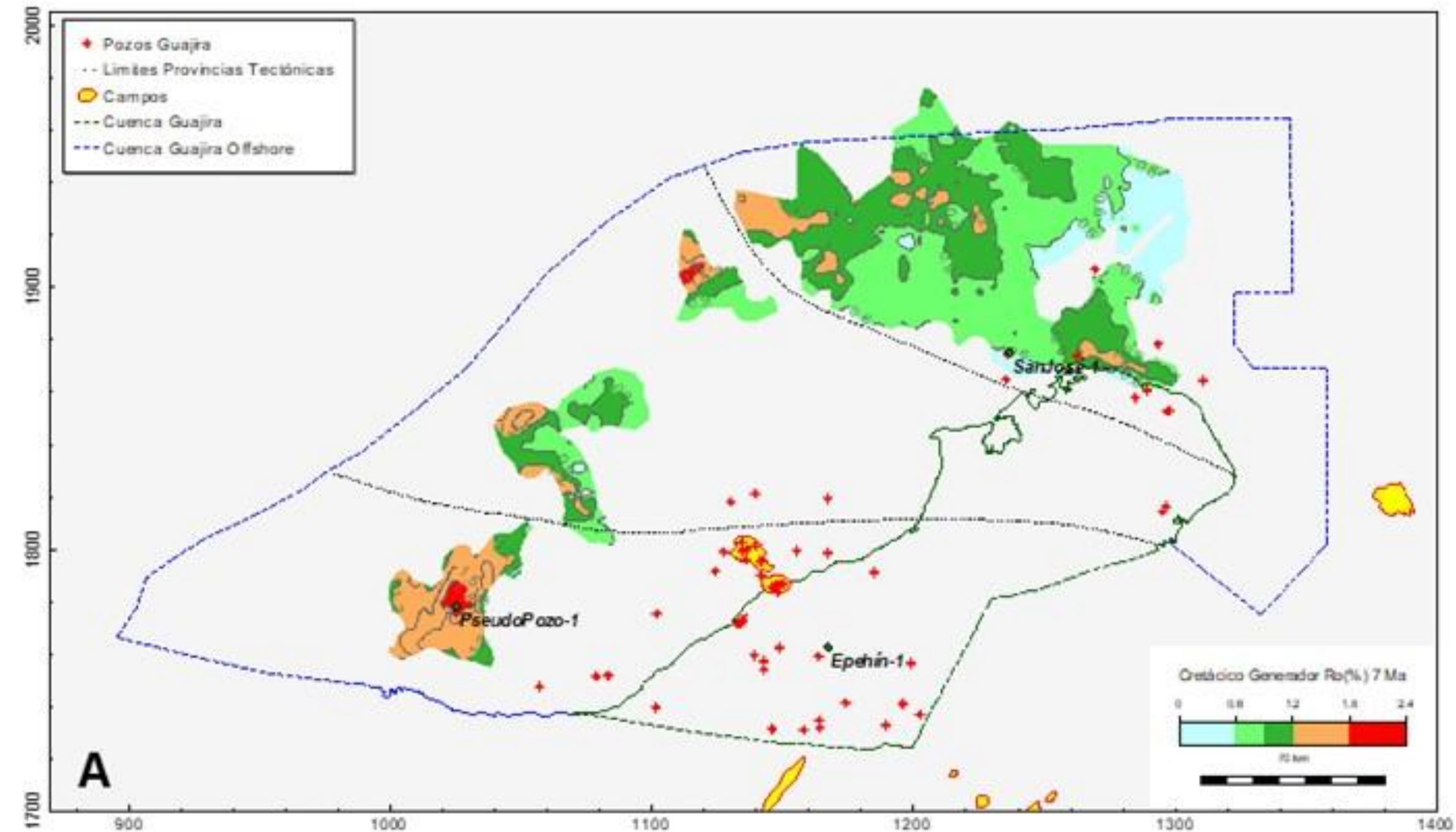
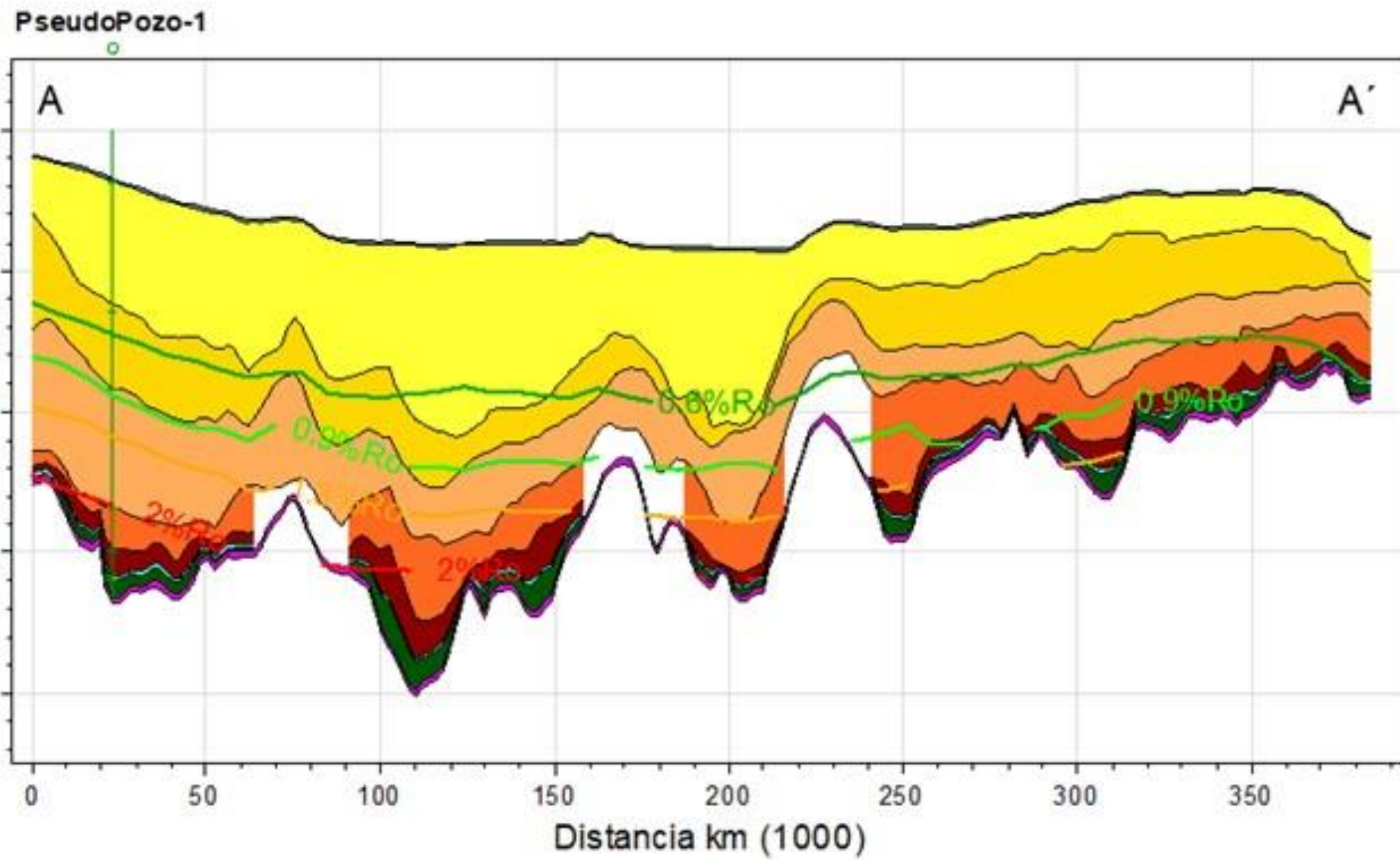
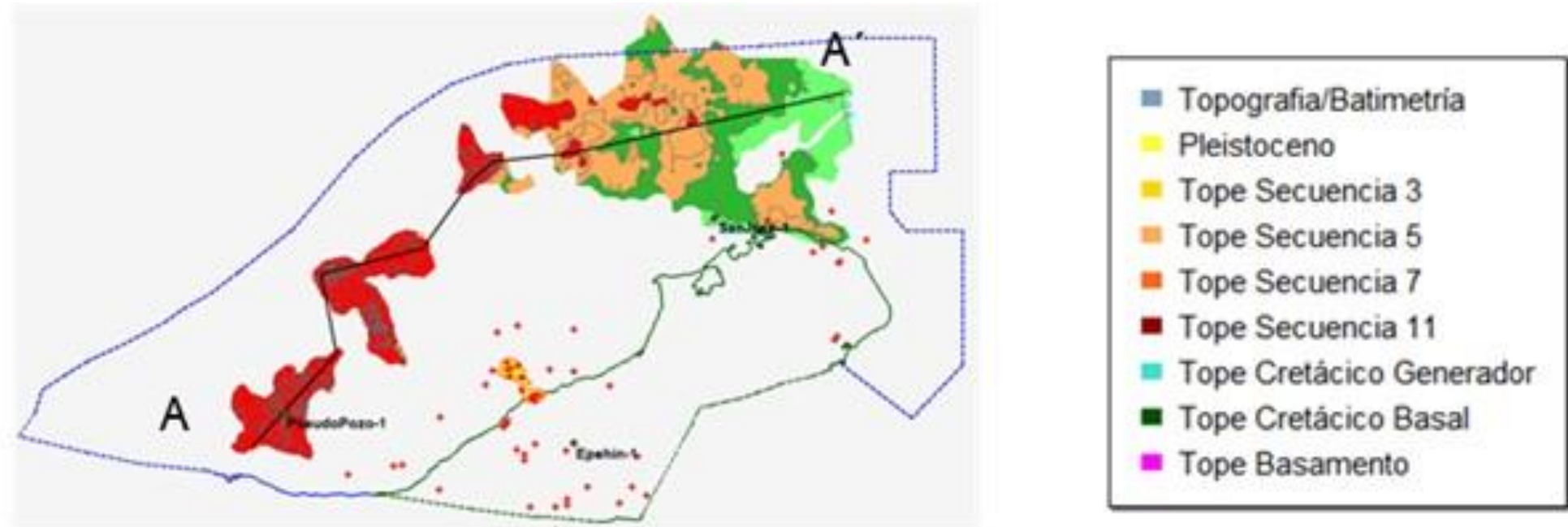


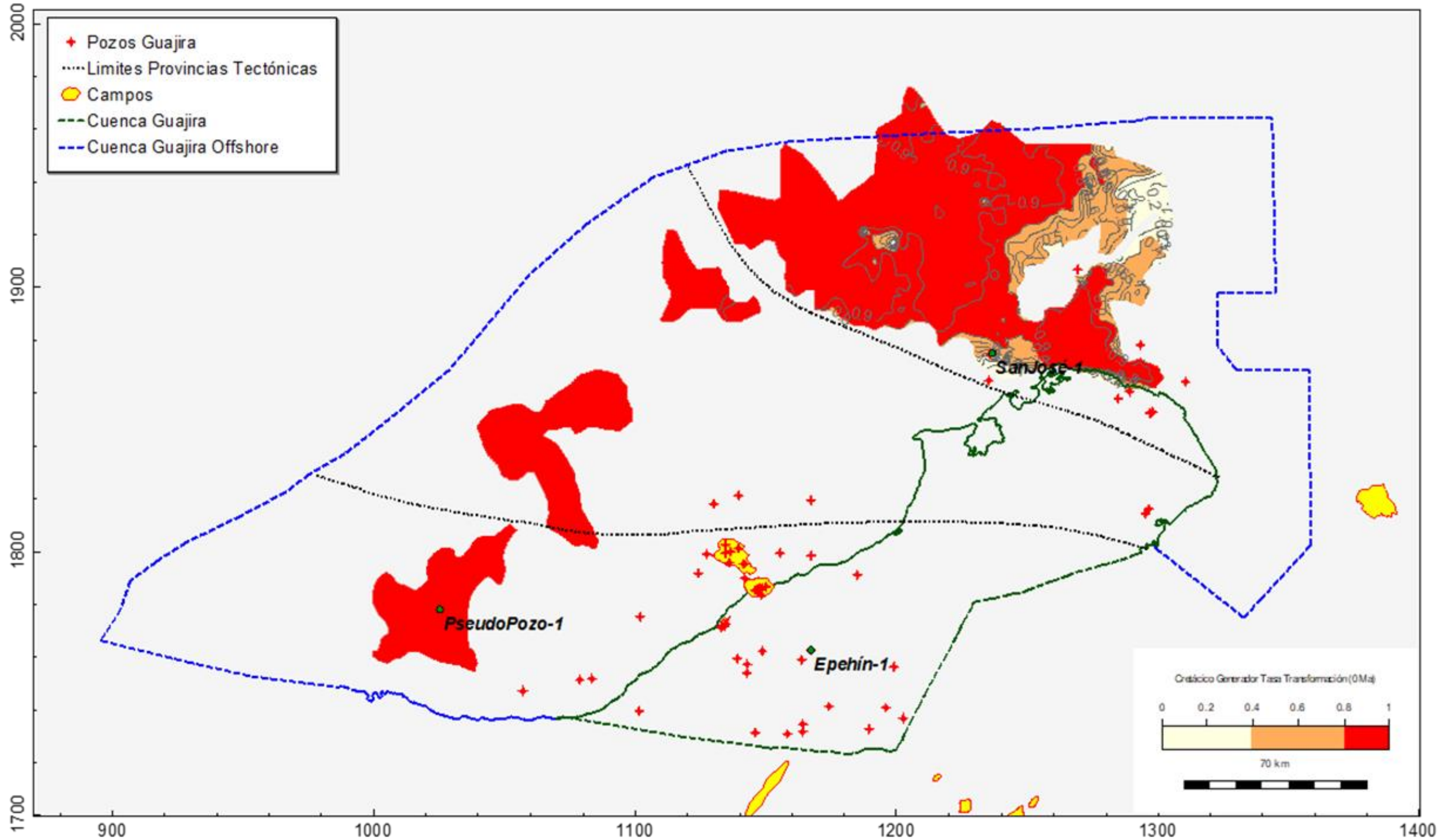


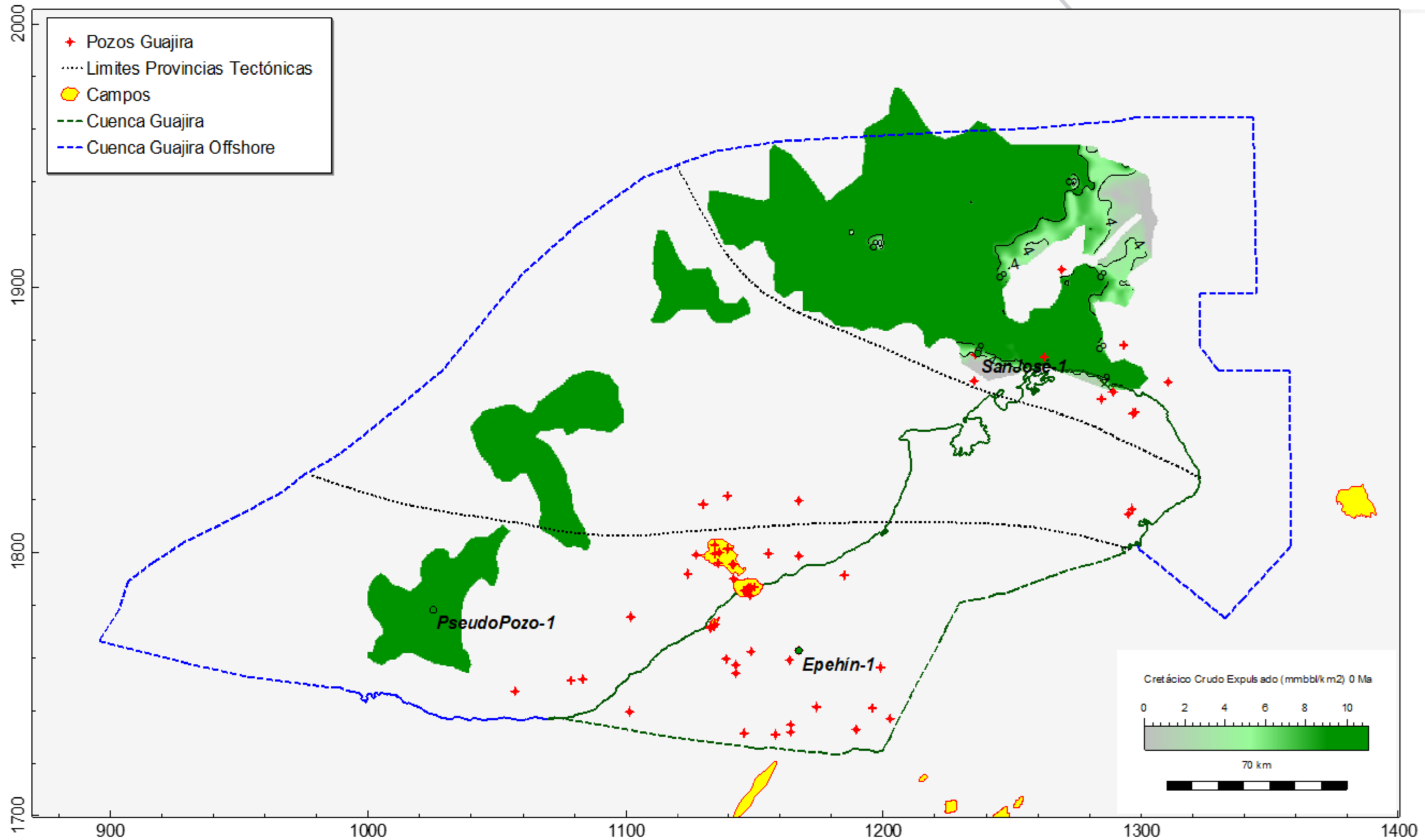


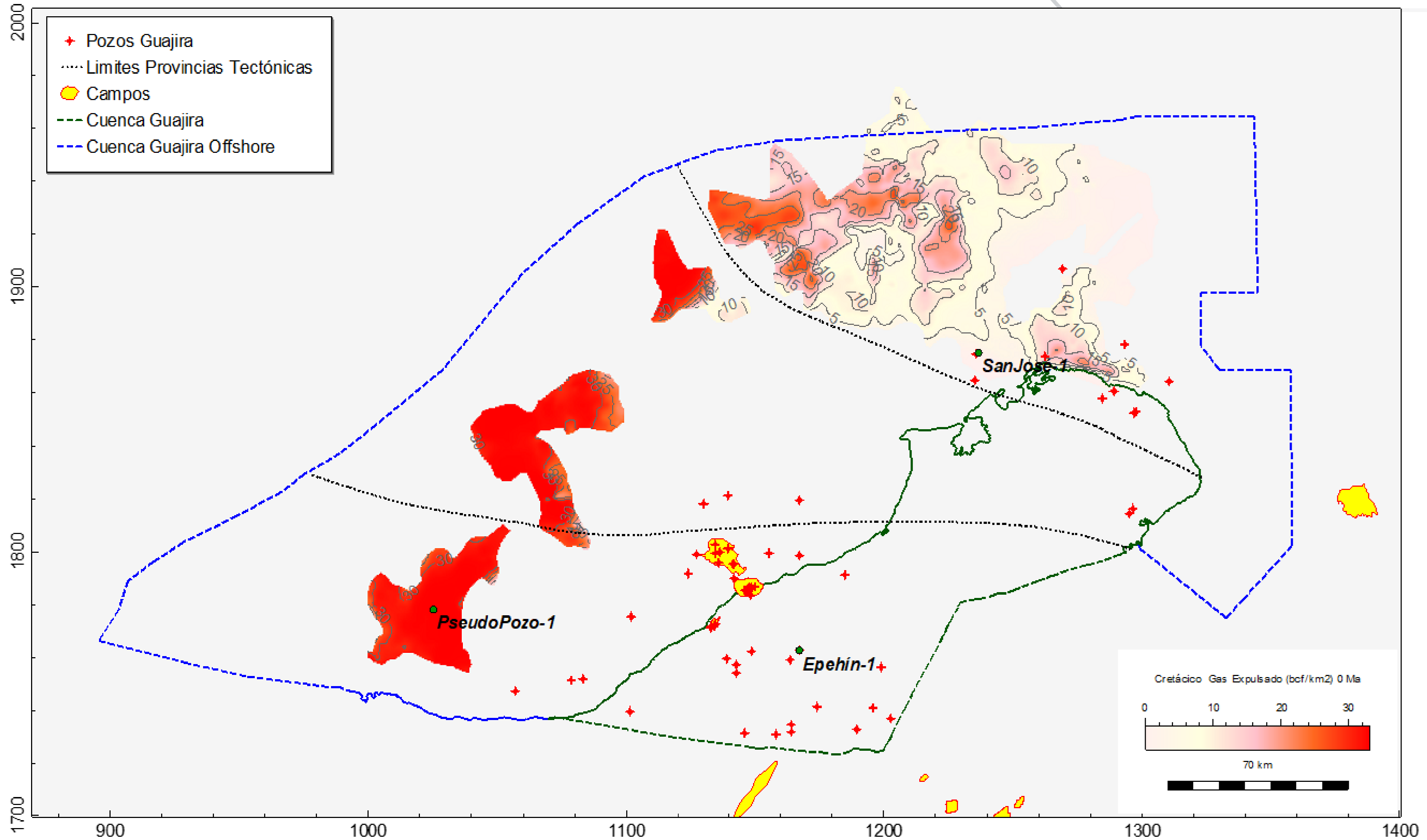


PETROLEUM SYSTEM MODELING

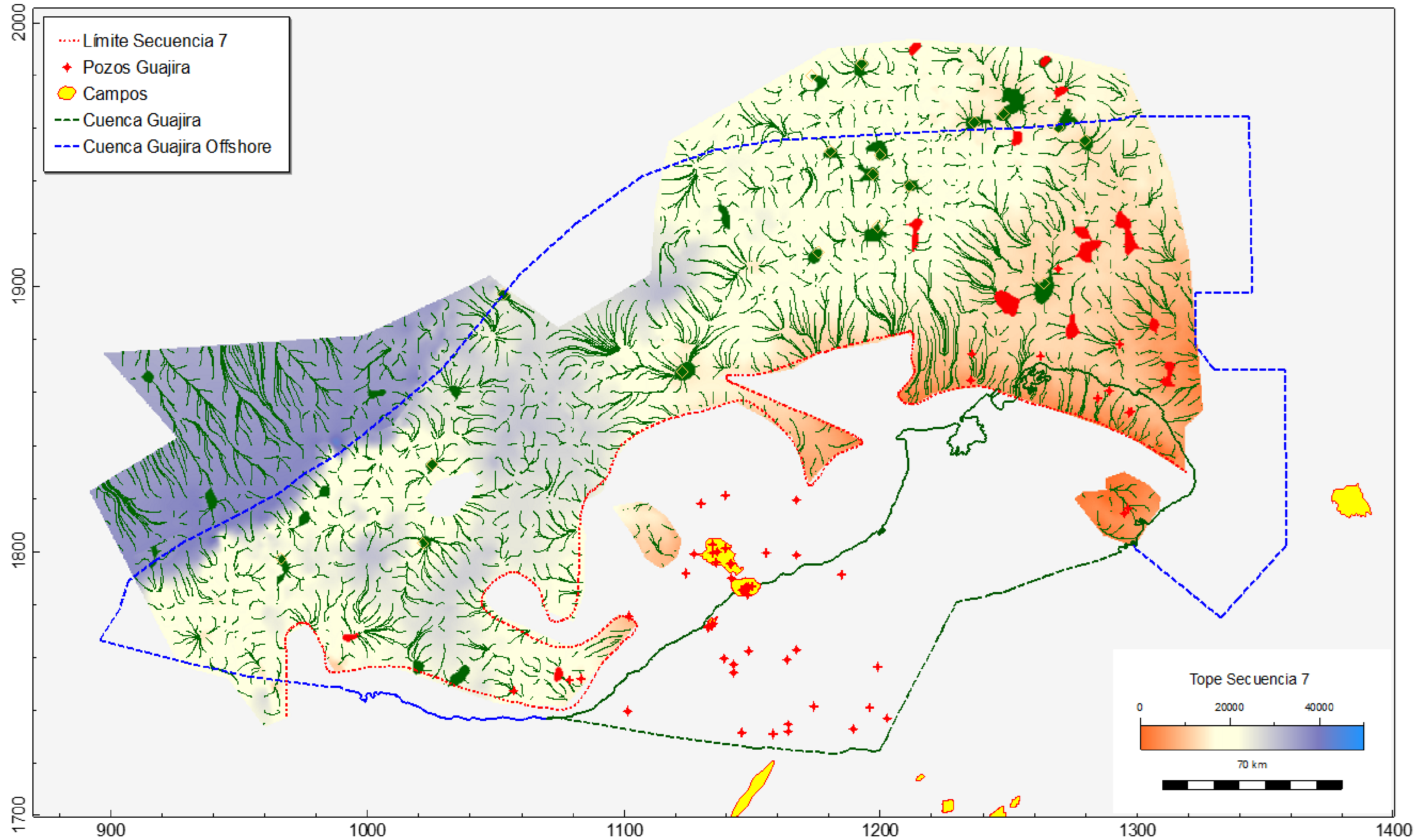


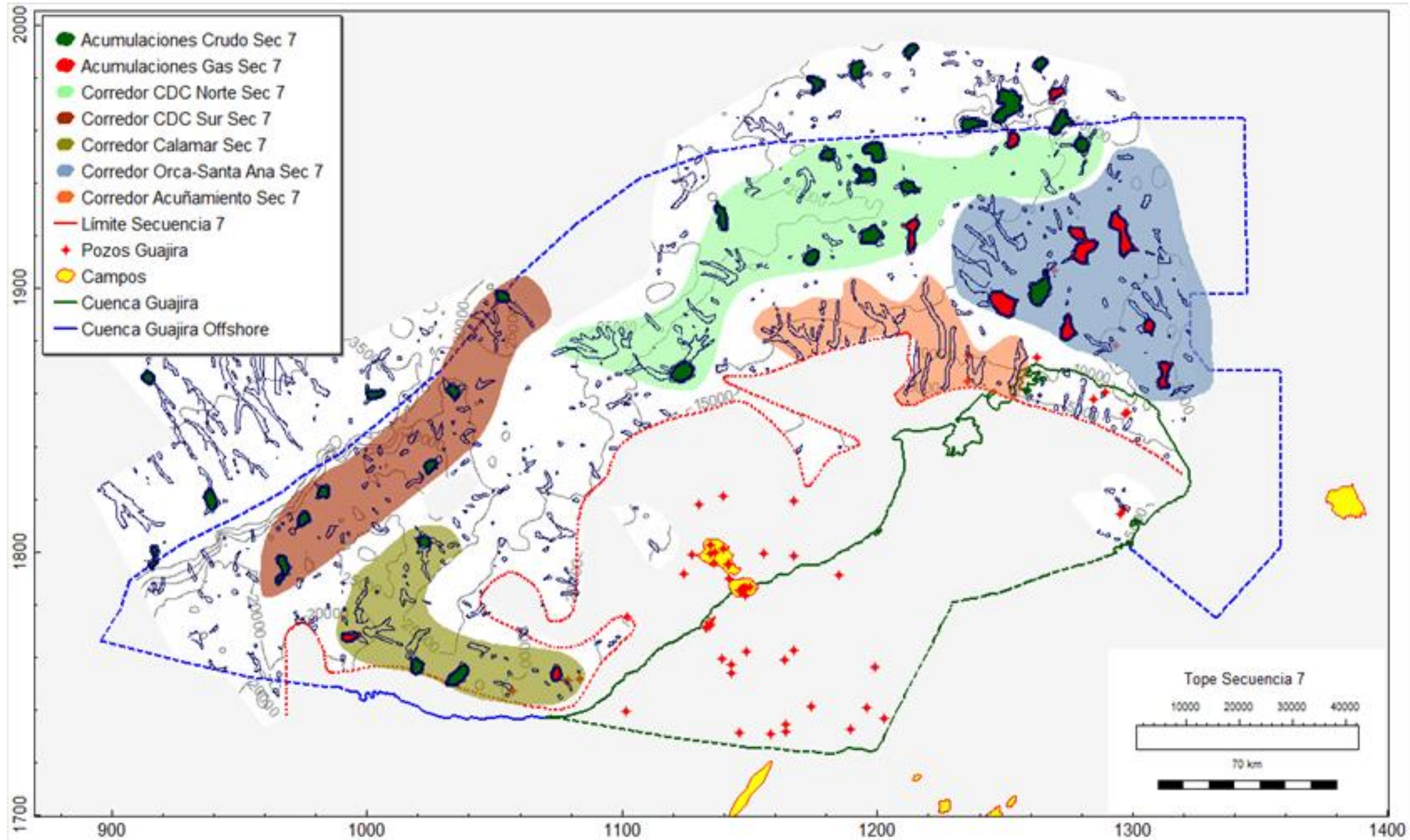




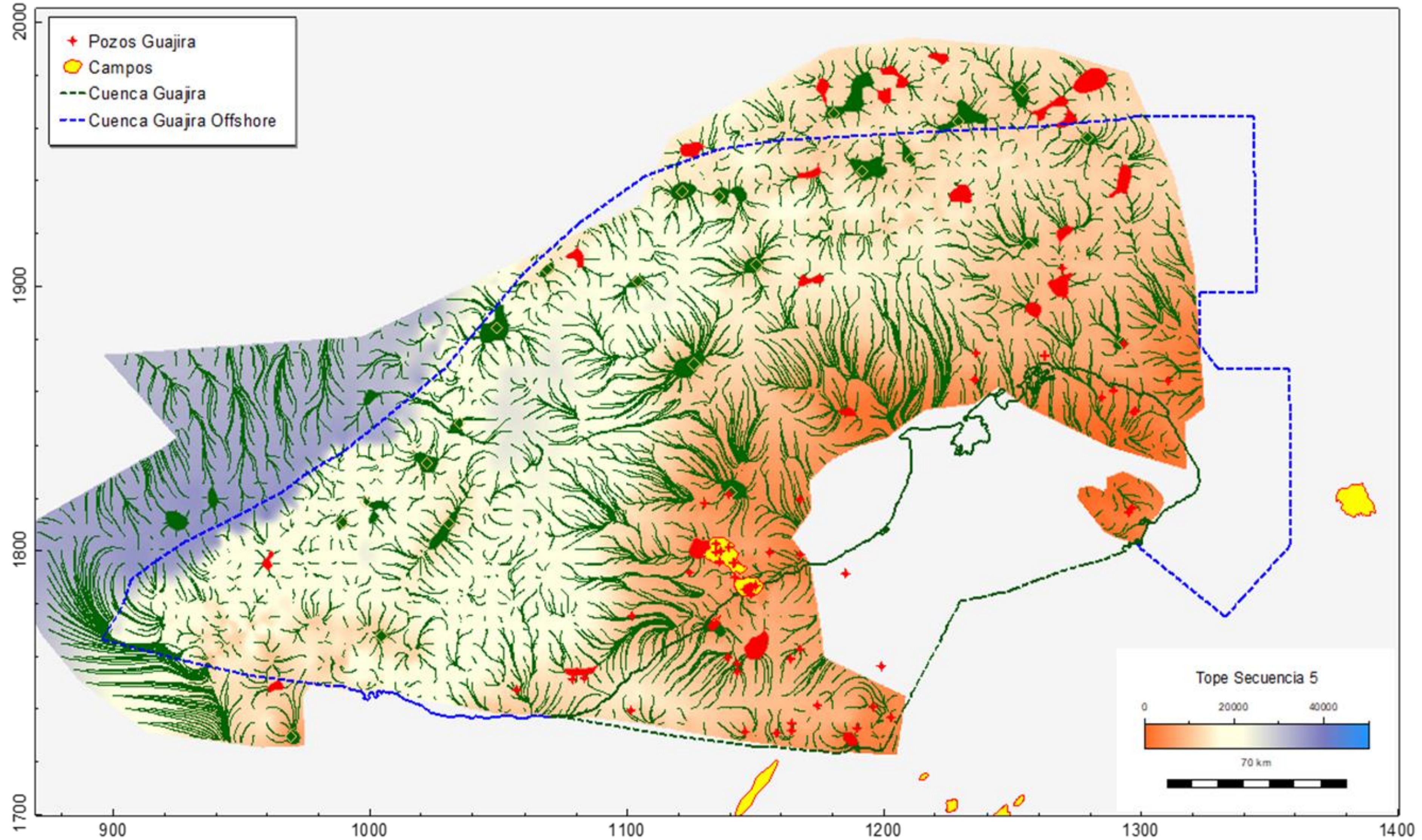


PETROLEUM SYSTEM MODELING MIGRATION HC CHARGE SEQ 7

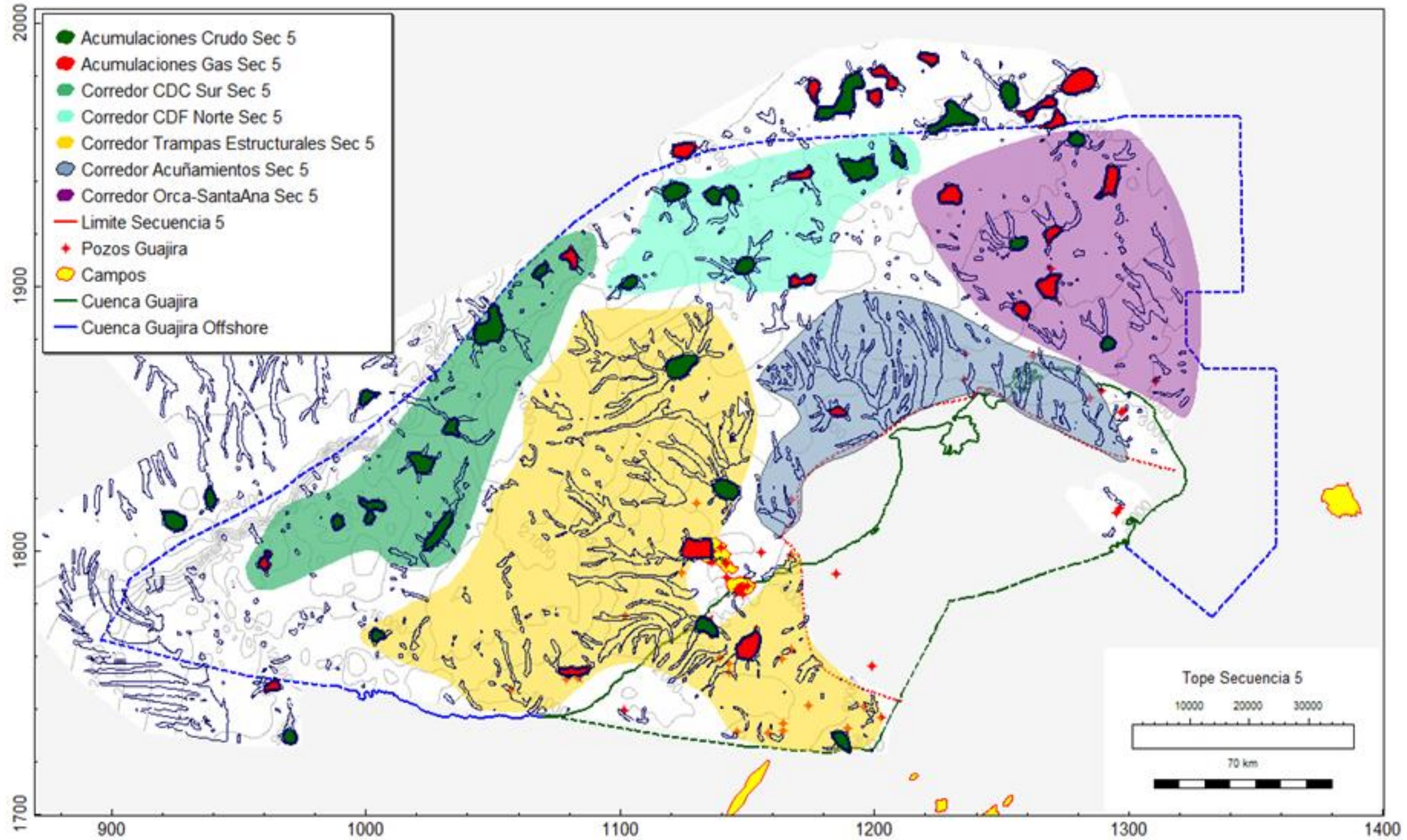


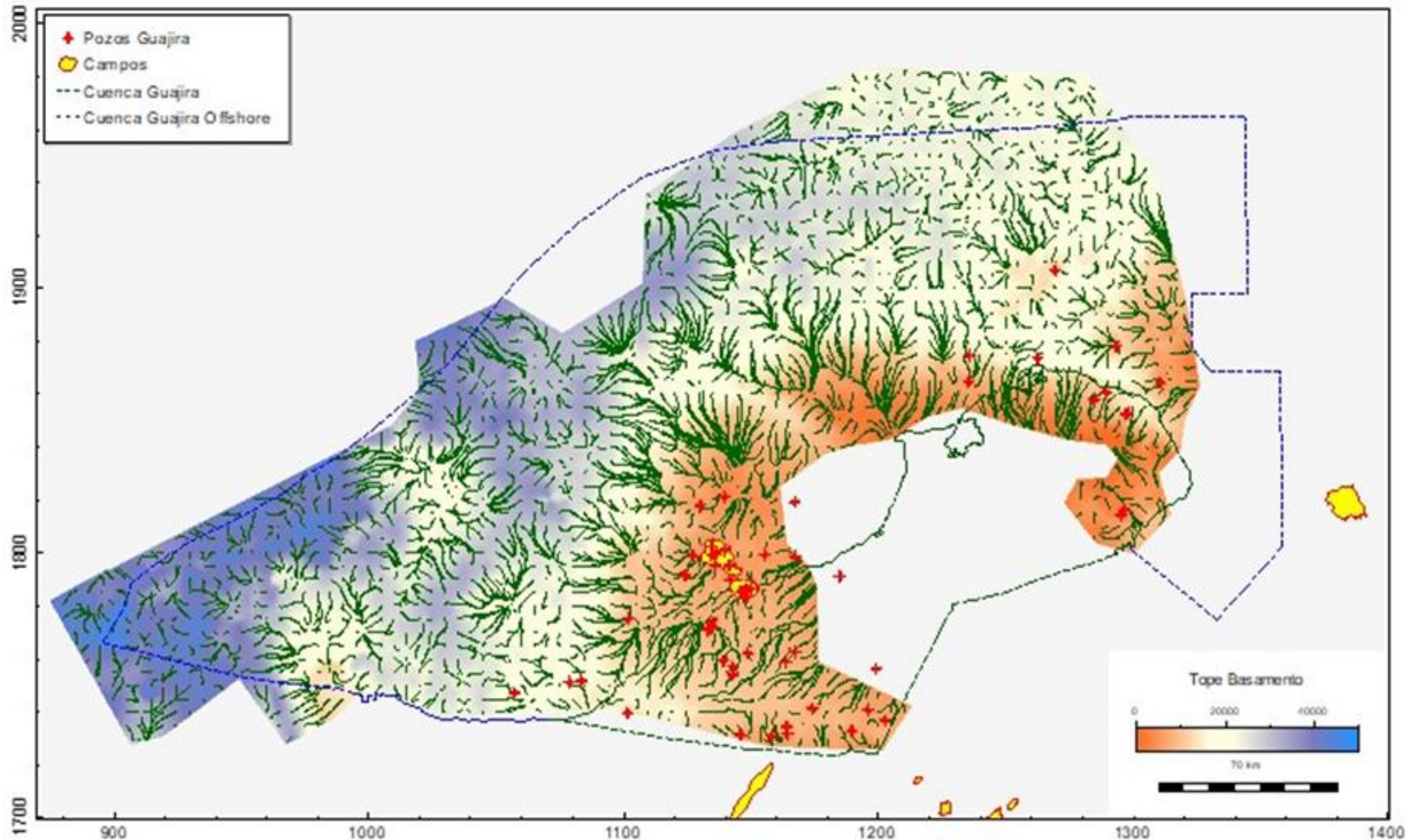


PETROLEUM SYSTEM MODELING MIGRATION HC CHARGE SEQ 5



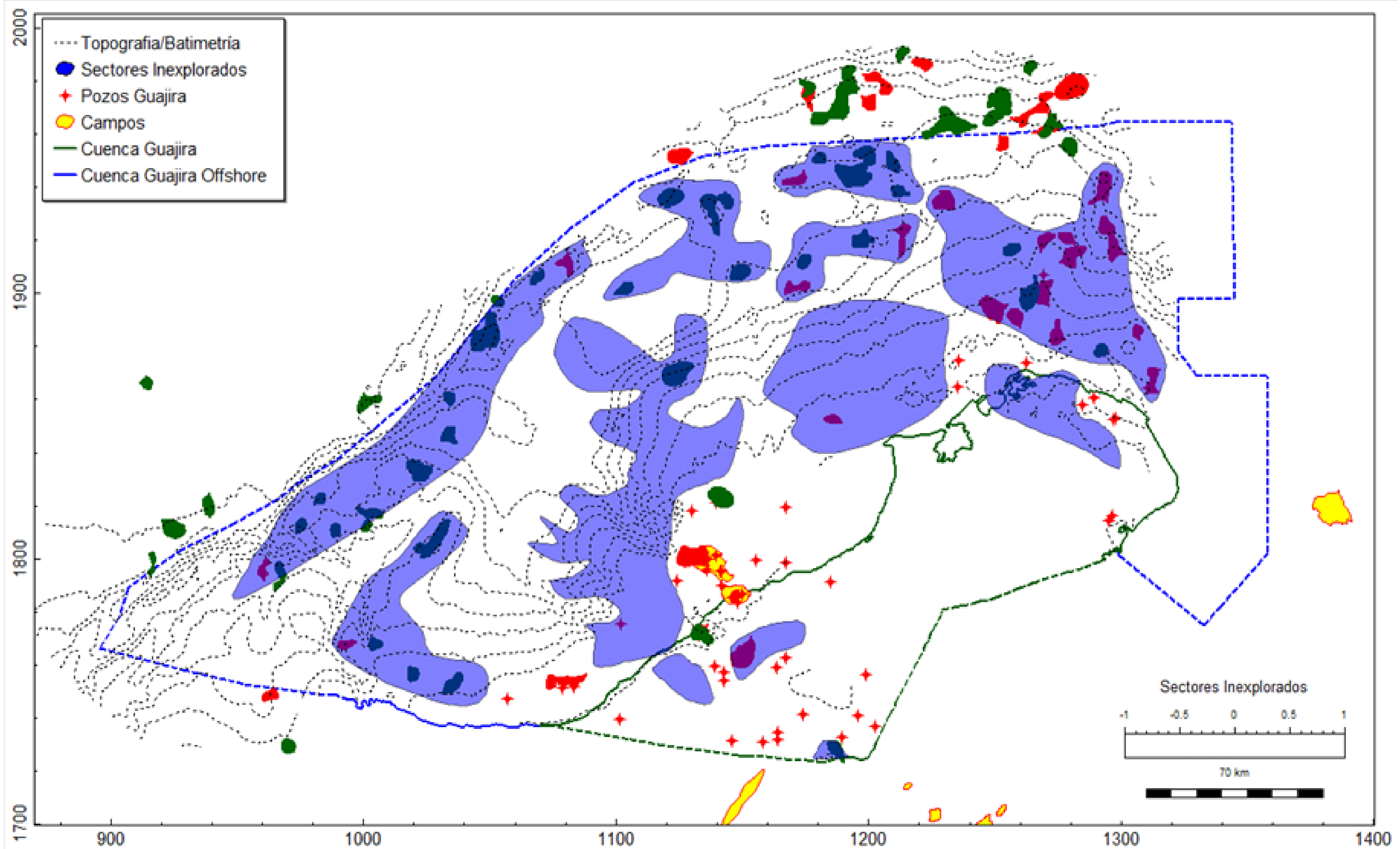
PETROLEUM SYSTEM MODELING PLAY FAIRWAY SEQ 5

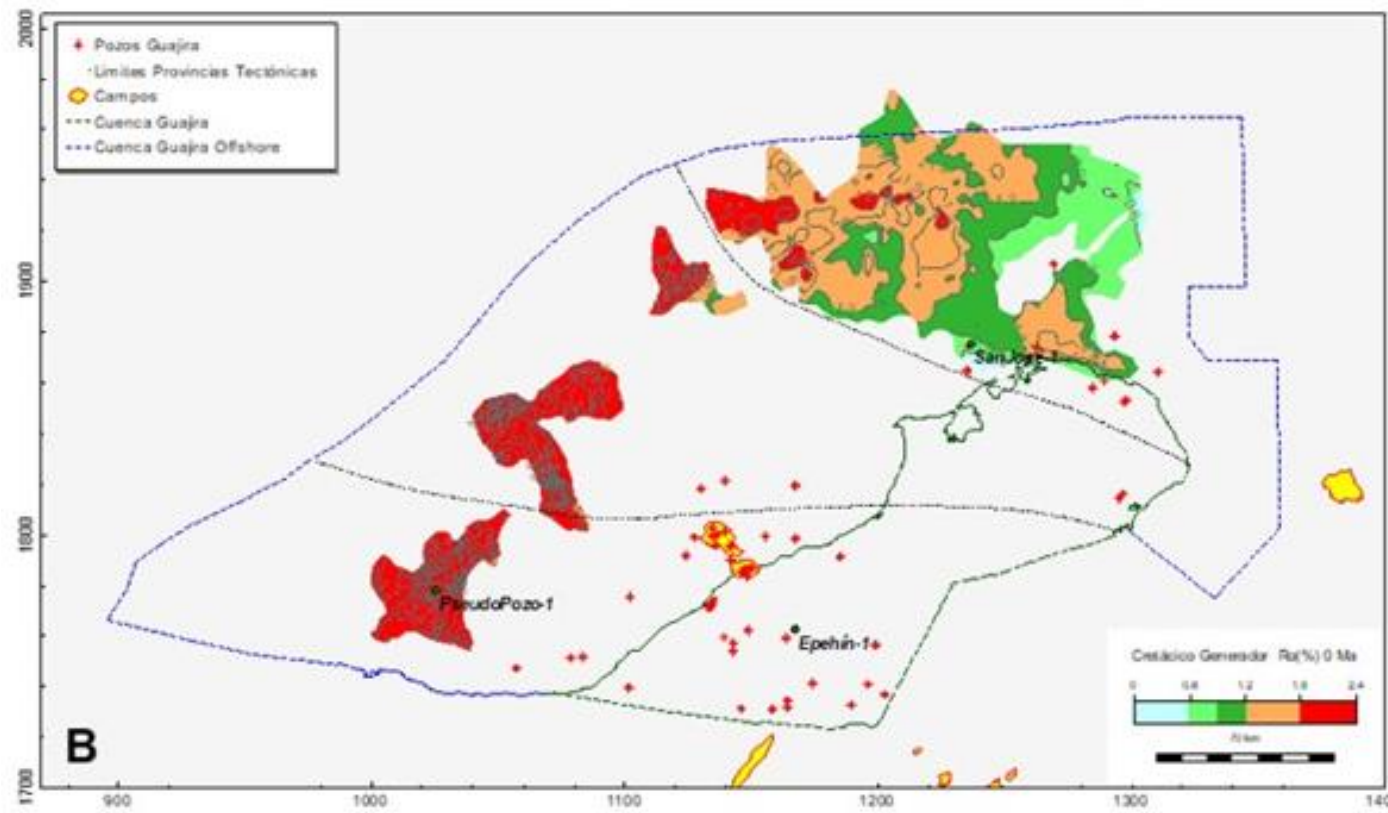




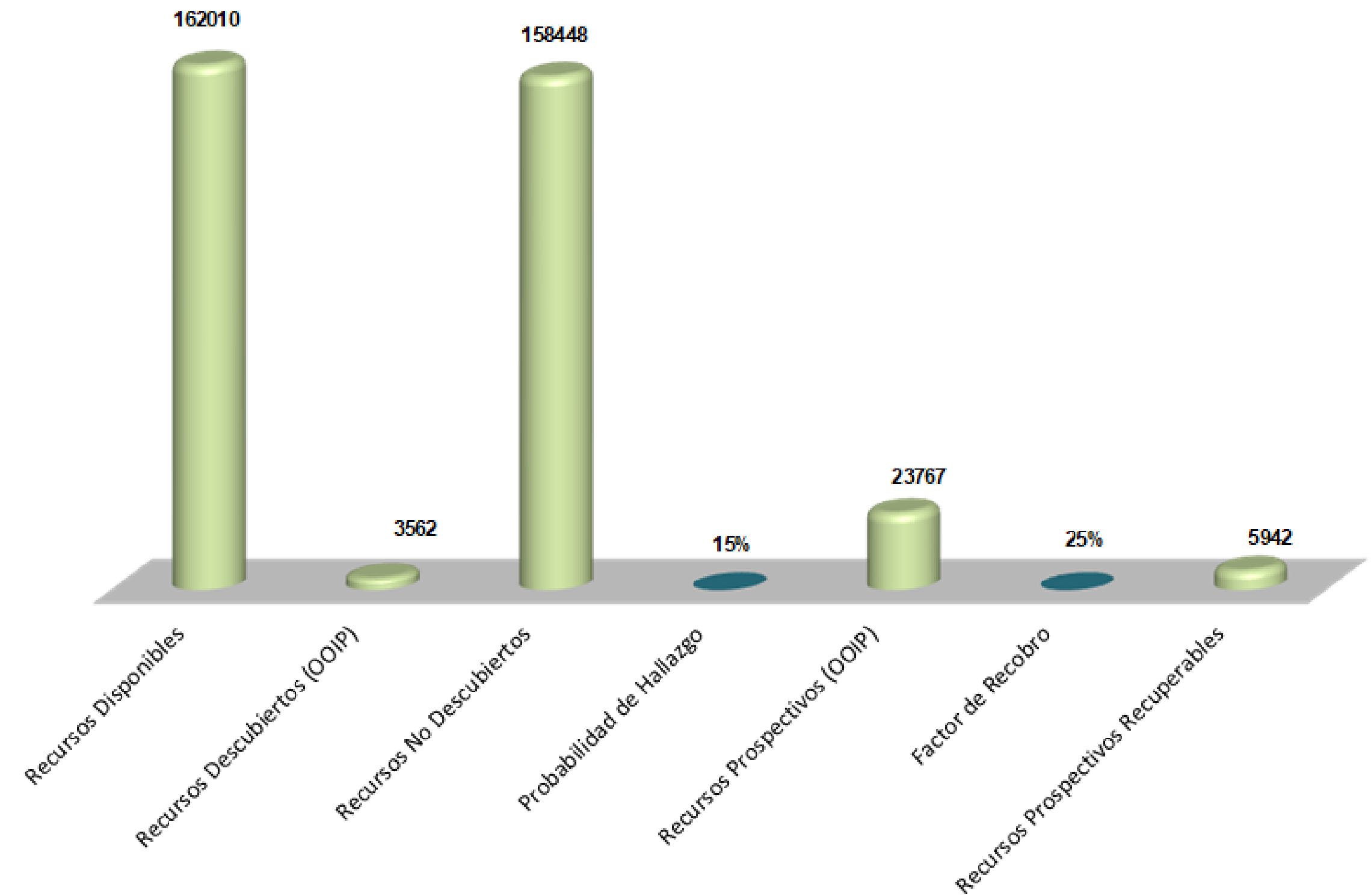
The simulation results show that the Carpintero High structure significantly concentrates migration.

PETROLEUM SYSTEM MODELING UNEXPLORED SECTORS





Balance de Masas Cuenca Guajira Offshore-Onshore (MMbpe)



PARÁMETROS	UNIDADES	Provincia Chirrinche	Provincia Tairona	Provincia Chimare - Urumaco	TOTAL
HC's Generados Cretácico	MMbpe	63984	101687	516474	682146
HC's Disponibles Cretácico	MMbpe	15196	24151	122663	162010
Total HC's Generados	MMbpe	63984	101687	516474	682146
Recursos Disponibles	MMbpe	15196	24151	122663	162010
Recursos Descubiertos (OOIP)	MMbpe	1247		2315	3562
Recursos No Descubiertos	MMbpe	13949	24151	120348	158448
Probabilidad de Hallazgo	%	15%	15%	15%	15%
Recursos Prospectivos (OOIP)	MMbpe	2092	3623	18052	23767
Factor de Recobro	%	25%	25%	25%	25%
Recursos Prospectivos Recuperables	MMbpe	523	906	4513	5942

*FG= Foco Generador

Prospective Resources = 23.7 Bboe

A model based on a Cretaceous (Coniacian-Santonian) source rocks interval was constructed. Although this sequence has not been drilled by any well in the area, its presence is hypothetically proposed based on three main aspects; the need to explain the crudes recovered in piston core samples, the presence of a Cretaceous source rock to the north in the Colombia basin and the presence of a Cretaceous source rock to the south in the Sinú-San Jacinto and Cesar-Ranchería basins.

The modeling results indicate that the Cretaceous source rocks reached hydrocarbon generation and expulsion only in the Guajira Offshore basin. The maturity range varies between early oil generation and late gas window (%Ro between 0.65 and 4). The expulsion peaks of the Cretaceous source rock within the oil and/or gas window were reached in the late Miocene period and have decreased as a function of source rock depletion during the last 2 m.y.

The modeling results explain the hydrocarbons found in the Chuchupa-Ballena field, the Orca-1, Santa Ana-1 and Calamar-1 wells and the thermogenic hydrocarbon shows reported in different piston core surveys, which include thermogenic gas and crude oil. Four pod active of source rock were identified. Distribution of the thermal maturity of the source rock indicates that there is a higher probability of finding liquid hydrocarbons north of the Guajira Offshore basin, associated with the Chimare and Urumaco depocenters

Migration modeling at the level of Sequences 7 and 5 (main potential reservoirs) allowed identifying a significant number of traps charged with crude oil and gas. Five Play Fairways were identified at the level of Sequences 7 and 5. A total of 109 hydrocarbon traps were identified in these areas, with a total OOIP of more than 13 Bboe.

Yet to find assessment indicates that the total volume of hydrocarbons generated in the basin is 682,146 MMboe, of which 162,010 MMboe would be available for trapping. Considering that a total of 3562 MMboe have been discovered, the Undiscovered Resources would correspond to 158.448 MMboe. These resources affected by a 15% probability of discovery indicate that there are Prospective Resources of 23.7 Bboe.

Thank you
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