



Rialtas na hÉireann
Government of Ireland

APPENDIX E – GEOCHEMISTRY

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The following table (**Table A.E. 1**) lists all source intervals as identified in project IS16/01 (BeicipFranlab, 2017), comparing the ages used in project IS16/01 with the stratigraphy of the current project:

<i>Basin</i>	<i>Well</i>	<i>Top (m)</i>	<i>Base (m)</i>	<i>Project IS16/04 Stratigraphy (formation)</i>	<i>Project IS16/04 formation age</i>	<i>Previous Age from well reports used in IS16/01</i>	<i>IS16/01 source interval</i>
Rockall	12/02-1	2274.18	2627.75	Ventry and Killeany	Bartonian-Ypresian	Early Eocene	Pg2
Rockall	12/02-2	2458.52	2802.11	Ventry	Bartonian-Lutetian	Mid-Late Eocene	Pg3
Rockall	12/02-2	4101	4125	Valhall	Aptian-Berriasian	Barremian/Aptian	Klow1
Slyne	12/02-2	4264.7	4290.57	Dawros	Tithonian-Kimmeridgian	Tithonian	LateJ5
Slyne	12/02-2	4334.19	4347.45	Dawros	Tithonian-Kimmeridgian	Early Tithonian	Late J4
Slyne	18/20-1	2042.99	2102.59	Kestrel	Bajocian	Bajocian	MidJ
Slyne	18/20-1	2652.13	2706.86	Whitby Mudstone	Toarcian	Toarcian	LowJ2b
Slyne	18/20-1	2791.24	2866.49	Whitby Mudstone	Toarcian	Pliensbachian	LowJ2a
Slyne	18/20-1	3039.81	3216.16	Pabay Shale	Pliensbachian	Sinemurian	LowJ1
Slyne	19/08-1	988.372	1026.08	Sybil	Kimmeridgian-Oxfordian	Kimmeridgian	LateJ3
Slyne	19/08-1	1340	1440	Minard	Oxfordian	Bajocian	MidJ
Slyne	19/08-1	1740.69	1793.77	Whitby Mudstone	Toarcian	Toarcian	LowJ2b
Slyne	19/08-1	1833.11	1875.12	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a
Slyne	19/08-1	1116.84	1187.74	Sybil	Kimmeridgian-Oxfordian	Oxfordian	LateJ1
Slyne	19/11-1	1056.16	1160.93	Dawros	Tithonian-Kimmeridgian	Kimmeridgian	LateJ3
Slyne	19/11-1	3448.23	3491.34	Whitby Mudstone	Toarcian	Toarcian	LowJ2b
Slyne	19/11-1	3631.13	3698.26	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a
Slyne	27/04-1	944.208	973.581	Whitby Mudstone	Toarcian	Toarcian	LowJ2b
Slyne	27/04-1	995.518	1051.66	Whitby Mudstone and Pabay Shale	Toarcian-Pliensbachian	Pliensbachian	LowJ2a
Slyne	27/04-1Z	967.634	994.058	Whitby Mudstone and Pabay Shale	Toarcian-Pliensbachian	Toarcian	LowJ2b
Slyne	27/04-1Z	1014.16	1038.72	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a
Slyne	27/13-1	1215.44	1332.3	Minard	Oxfordian	Bajocian	MidJ
Slyne	27/13-1	2093.56	2117.43	Whitby Mudstone	Toarcian	Toarcian	LowJ2b
Slyne	27/13-1	2154.68	2173.69	Whitby Mudstone	Toarcian	Pliensbachian	LowJ2a
Slyne	27/13-1	2318.9	2413.97	Pabay Shale	Pliensbachian	Sinemurian	LowJ1
Porcupine	26/22-1A	1083.05	1139.17	Bradán (no data)	Albian-Aptian	Barremian/Aptian	Klow1
Porcupine	26/27-1B	733.47	775.949	Gweedore	Ypresian-Thanelian	Santonian-Campanian	Ksup1
Porcupine	26/27-1B	1951.15	1994.94	Dursey	Tithonian	Early Tithonian	Late J4
Porcupine	26/27-1B	2100.36	2139.97	Bolus	Kimmeridgian	Kimmeridgian	LateJ3
Porcupine	26/28-1	1989.95	2051.39	Dursey	Tithonian	Early Tithonian	Late J4
Porcupine	26/28-1	2288.88	2313.99	Minard	Oxfordian	Kimmeridgian	LateJ3
Porcupine	26/28-1	2501.41	2569.53	Minard	Oxfordian	Bathonian/Bajocian	MidJ
Porcupine	26/28-3	1902.93	1928.93	Dursey-Bolus	Tithonian - Oxfordian	Early Tithonian	Late J4
Porcupine	26/30-1	712.343	765.301	Dursey	Tithonian	Early Tithonian	Late J4
Porcupine	26/30-1	1053.97	1077.18	Bolus	Kimmeridgian-Oxfordian	Kimmeridgian	LateJ3
Porcupine	34/15-1	2827.48	2840.44	Bolus	Kimmeridgian-Oxfordian	Tithonian	LateJ5
Porcupine	34/15-1	2879.58	2939.83	Bolus	Kimmeridgian-Oxfordian	Early Tithonian	Late J4
Porcupine	34/15-1	3101.9	3130.99	Minard	Oxfordian	Kimmeridgian	LateJ3
Porcupine	34/15-1	3526.81	3570.44	Minard	Oxfordian	Bathonian/Bajocian	MidJ
<i>Basin</i>	<i>Well</i>	<i>Top (m)</i>	<i>Base (m)</i>	<i>Project IS16/04 Stratigraphy (formation)</i>	<i>Project IS16/04 formation age</i>	<i>Previous Age from well reports used in IS16/01</i>	<i>IS16/01 source interval</i>
Porcupine	35/02-1	2693.01	2713.92	Dursey (no data)	Tithonian	Tithonian	LateJ5



Porcupine	35/02-1	2864.87	2924.99	Bolus	Kimmeridgian-Oxfordian	Early Tithonian	Late J4
Porcupine	35/02-1	3236.68	3252.37	Minard	Oxfordian	Kimmeridgian	LateJ3
Porcupine	35/06-1	1153.8	1424.36	Tranarossan+Trawbreaga (no data)	Pribonian-Lutetian	Mid-Late Eocene	Pg3
Porcupine	35/06-1	1857.43	1901.46	Gweedore	Ypresian-Thanelian	Early Eocene	Pg2
Porcupine	35/06-1	3324.54	3381.71	Bradán	Albian-Aptian	Barremian/Aptian	Klow1
Porcupine	35/06-1	3631.05	3650.78	Minard	Oxfordian	Bathonian/Bajocian	MidJ
Porcupine	35/08-2	1697.71	1803.37	Gweedore (no data)	Ypresian-Thanelian	Early Eocene	Pg2
Porcupine	35/08-2	2280.91	2318.08	Gweedore	Ypresian-Thanelian	Late Paleocene	Pg1
Porcupine	35/08-2	2944.79	3004.16	Bradán	Albian-Aptian	Barremian/Aptian	Klow1
Porcupine	35/08-2	3865.02	3928.41	Dursey	Tithonian	Tithonian	LateJ5
Porcupine	35/08-2	4031	4121.17	Dursey	Tithonian	Early Tithonian	Late J4
Porcupine	35/08-2	4250.56	4292.38	Bolus	Kimmeridgian-Oxfordian	Kimmeridgian	LateJ3
Porcupine	35/08-2	4412.65	4445.32	Bolus	Kimmeridgian-Oxfordian	Oxfordian	LateJ1
Porcupine	35/18-1	2360.48	2639.59	Gweedore	Ypresian-Thanelian	Early Eocene	Pg2
Porcupine	35/19-1	2446.21	2593.05	Gweedore	Ypresian-Thanelian	Early Eocene	Pg2
Porcupine	35/19-1	4046.41	4099.75	Bradán	Albian-Aptian	Barremian/Aptian	Klow1
Porcupine	35/19-1	5131.14	5145.78	Dursey-Bolus (no data)	Tithonian - Oxfordian	Tithonian	LateJ5
Porcupine	35/30-1	4357.95	4382.14	Dursey-Bolus	Tithonian - Oxfordian	Tithonian	LateJ5
Porcupine	35/30-1	4581.94	4621.9	Dursey-Bolus	Tithonian - Oxfordian	Kimmeridgian	LateJ3
Porcupine	35/30-1	4781.74	4819.6	Minard	Oxfordian	Oxfordian	LateJ1
Porcupine	43/13-1	3165.17	3191.46	Dursey	Tithonian	Tithonian	LateJ5
Porcupine	43/13-1	3321.88	3403.91	Dursey	Tithonian	Early Tithonian	Late J4
Porcupine	43/13-1	3866.88	3888.97	Bolus	Kimmeridgian-Oxfordian	Kimmeridgian	LateJ3
Porcupine	43/13-1	4079.91	4161.97	Bolus	Kimmeridgian	Oxfordian	LateJ1
Porcupine	49/15-1	1077.4	1147.5	Perch and Pollan	Berriasian	Tithonian	LateJ5
Fastnet	56/18-1	1843.39	1897.59	Tacumshin	Aalenian-Toarcian	Toarcian	LowJ2b
Fastnet	56/18-1	2482.59	2537.48	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a
Fastnet	56/18-1	2914.41	3020.26	Glenbeg	Sinemurian	Sinemurian	LowJ1
Fastnet	56/21-1	1501.67	1552.17	Whitby Mudstone	Toarcian	Toarcian	LowJ2b
Fastnet	56/21-1	1815.89	1910.01	Whitby Mudstone	Toarcian	Pliensbachian	LowJ2a
Fastnet	56/21-1	2206.26	2297.57	Glenbeg	Sinemurian	Sinemurian	LowJ1
Fastnet	63/08-1	1504.57	1582.8	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a
Fastnet	63/08-1	1824.02	1874	Glenbeg and Currane	Sinemurian	Sinemurian	LowJ1
Fastnet	63/10-1	2010.84	2073.76	Tacumshin	Aalenian-Toarcian	Toarcian	LowJ2b
Fastnet	63/10-1	2219.13	2299.41	Tacumshin and Whitby Mudstone	Aalenian-Toarcian	Pliensbachian	LowJ2a
Fastnet	63/10-1	2888.07	2960.64	Glenbeg	Sinemurian	Sinemurian	LowJ1
Goban Spur	62/07-1	4348.44	4589.85	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a
Celtic Sea	47/29-1	856.014	951	Eel and Wealden	Aptian-Valanginian	Barremian/Aptian	Klow1
North Celtic Sea	47/29-1	2288.5	2327	Sparrowhawk to Tacumshin-Whitby Mudstone	Bajocian-Toarcian	Toarcian	LowJ2b
North Celtic Sea	47/29-1	2565.28	2612.2	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a
North Celtic Sea	47/29-1	2774.55	2809.48	Glenbeg	Sinemurian	Sinemurian	LowJ1
North Celtic Sea	48/19-1A	1966.65	2106.27	Pollan	Early Berriasian-Late Tithonian	Tithonian	LateJ5
North Celtic Sea	48/19-1A	3253.45	3357.8	Baginbun to Whitby Mudstone-Merlin	Oxfordian-Bajocian	Oxfordian	LateJ1
North Celtic Sea	48/30-1	1901.16	1944.76	Whitby Mudstone and Glenbeg	Toarcian-Sinemurian	Toarcian	LowJ2b
North Celtic Sea	48/30-1	1984	2012	Glenbeg	Sinemurian	Pliensbachian	LowJ2a
Basin	Well	Top (m)	Base (m)	Project IS16/04 Stratigraphy (formation)	Project IS16/04 formation age	Previous Age from well reports used in IS16/01	IS16/01 source interval
North Celtic Sea	49/09-1	1100.61	1268.53	Merlin to Sparrowhawk	Bathonian-Bajocian	Bathonian/Bajocian	MidJ
North Celtic Sea	49/09-1	2102.41	2390.57	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a
North Celtic Sea	49/09-1	2102.41	2390.57	Pabay Shale	Pliensbachian	Pliensbachian	LowJ2a



North Celtic Sea	49/09-1	2543.88	2620.01	Glenbeg	Sinemurian	Sinemurian	LowJ1
North Celtic Sea	49/13-2	858.6	910.8	Pollan and Baginbun	Berriasian - Kimmeridgian	Tithonian	LateJ5
North Celtic Sea	49/13-2	1114.9	1156.16	Galley	Oxfordian	Kimmeridgian	LateJ3
North Celtic Sea	49/15-1	1577.8	1609.2	Baginbun	Kimmeridgian	Kimmeridgian	LateJ3
North Celtic Sea	50/03-2	423.7	615.7	Pollan and Knockadoon	Berriasian - Tithonian	Tithonian	LateJ5
North Celtic Sea	50/03-2	937.5	982.8	Baginbun	Kimmeridgian	Kimmeridgian	LateJ3
North Celtic Sea	50/06-1	588.6	760.2	Pollan and Knockadoon	Berriasian - Tithonian	Tithonian	LateJ5
North Celtic Sea	50/06-1	2029.43	2189.5	Merlin	Bathonian-Bajocian	Bathonian/Bajocian	MidJ
North Celtic Sea	50/07-1	703.074	819.564	Knockadoon	Tithonian	Tithonian	LateJ5
North Celtic Sea	50/11-3	1308.12	1408.86	Perch and Pollan	Berriasian	Tithonian	LateJ5
North Celtic Sea	50/12-3	2135.4	2207.98	Baginbun-Galley	Kimmeridgian-Oxfordian	Kimmeridgian	LateJ3
North Celtic Sea	50/13-1	1102.75	1230.96	Pollan and Knockadoon	Berriasian - Tithonian	Tithonian	LateJ5
North Celtic Sea	50/13-1	1395.54	1511.76	Baginbun	Kimmeridgian	Kimmeridgian	LateJ3
North Celtic Sea	57/02-1	1008.76	1110.18	Eel	Late Aptian	Barremian/Aptian	Klow1
North Celtic Sea	57/02-1	2673.22	2755.83	Whitby Mudstone	Toarcian	Toarcian	LowJ2b
North Celtic Sea	57/02-1	3274.97	3362.27	Glenbeg	Sinemurian	Pliensbachian	LowJ2a
North Celtic Sea	57/02-1	3570.54	3614.19	Currane	Sinemurian	Sinemurian	LowJ1
North Celtic Sea	57/07-1	1565.74	1652.52	Tacumshin	Aalenian-Toarcian	Toarcian	LowJ2b
North Celtic Sea	57/07-1	2111.89	2197.59	Glenbeg	Sinemurian	Pliensbachian	LowJ2a
North Celtic Sea	57/07-1	2415.88	2452.8	Currane	Sinemurian	Sinemurian	LowJ1
South Celtic Sea	49/29-1	1512.83	1656.61	Whitby Mudstone and Pabay Shale	Toarcian-Pliensbachian	Toarcian	LowJ2b
South Celtic Sea	49/29-1	1706.77	1872.46	Glenbeg	Sinemurian	Pliensbachian	LowJ2a
South Celtic Sea	49/29-1	2054.78	2133.23	Currane and Leane	Sinemurian-Hettangian	Sinemurian	LowJ1

Table A.E. 1 Source intervals and ages identified in project IS16/01, compared with the stratigraphy of the current project.

The following pages show source rock characterisation plots for those formations with only limited source potential, where only very few samples show some hydrocarbon potential. As in the main section of the atlas, for each selected interval its source rock potential is shown by a TOC histogram, a TOC vs S2 cross plot, a pseudo-van Krevelen diagram, and a Hydrogen Index vs Tmax plot.

To illustrate the regional distribution of the intervals, bubble maps showing average TOC and HI values have also been included.

A brief description of the source potential has been included in the relevant chapter of each individual formation.

Source rock characterisation plots are shown below for the following formations:-

<i>Formation</i>	<i>Group</i>	<i>Age</i>
Eel	Wealden	Early Cretaceous, Aptian
Rainbow Claystone	Wealden	Early Cretaceous, Hauterivian
Sybil	Muckross	Late – Middle Jurassic
Galley	Hook	Late Jurassic, Oxfordian-Kimmeridgian
Kestrel	Kite	Middle Jurassic, Bajocian
Harrier	Kite	Middle Jurassic, Aalenian-Bajocian
Inagh	Lias	Early Jurassic, Late Sinemurian
Meelagh	Lias	Early Jurassic, Hettangian-Late Sin
Caragh	Lias	Early Jurassic, Hettangian
Ruacan	Muirín	Carboniferous, Mississippian



Eel Formation

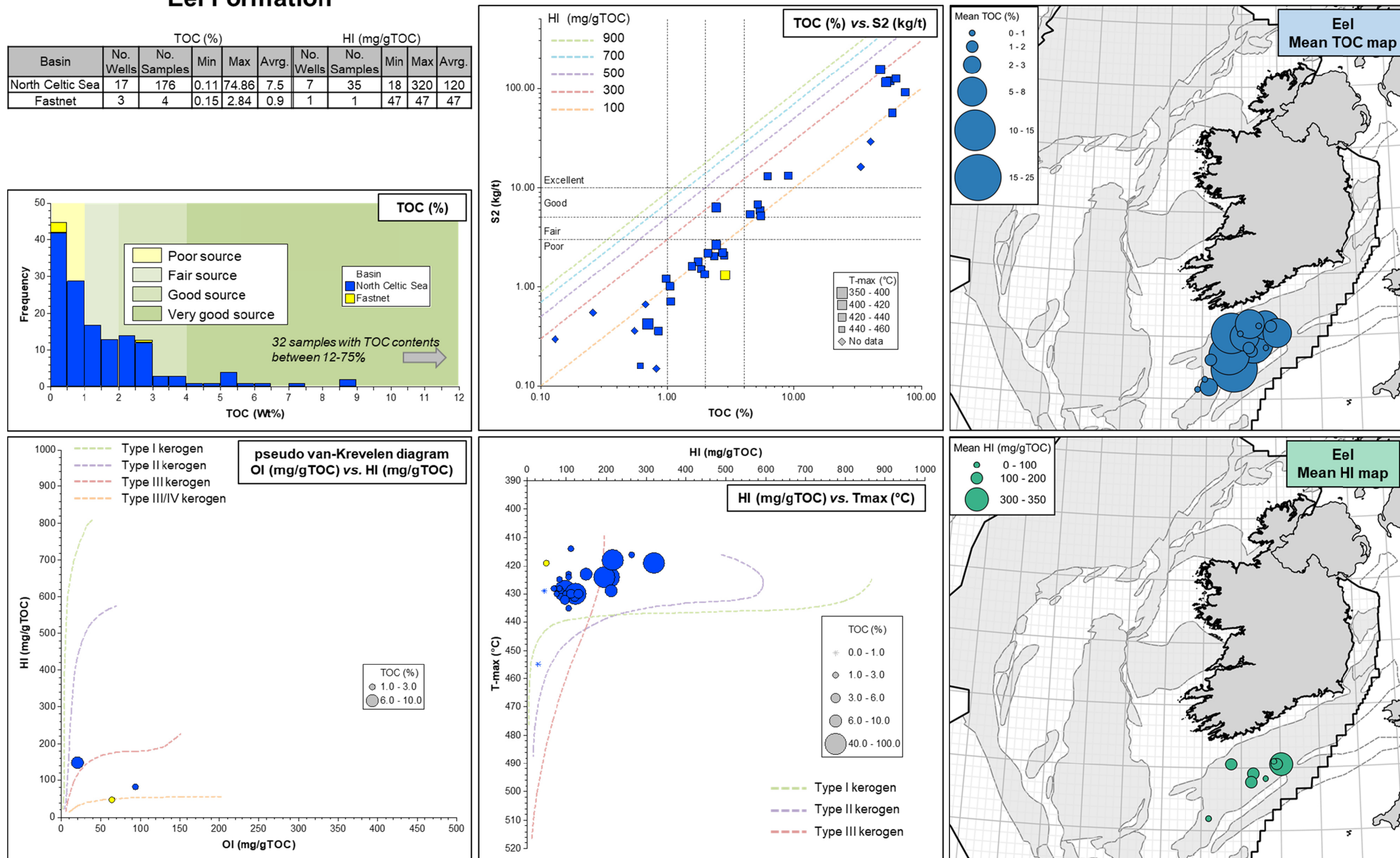


Figure A.E. 1. Eel Formation source rock characteristics, offshore Ireland.



Rainbow Claystone Formation

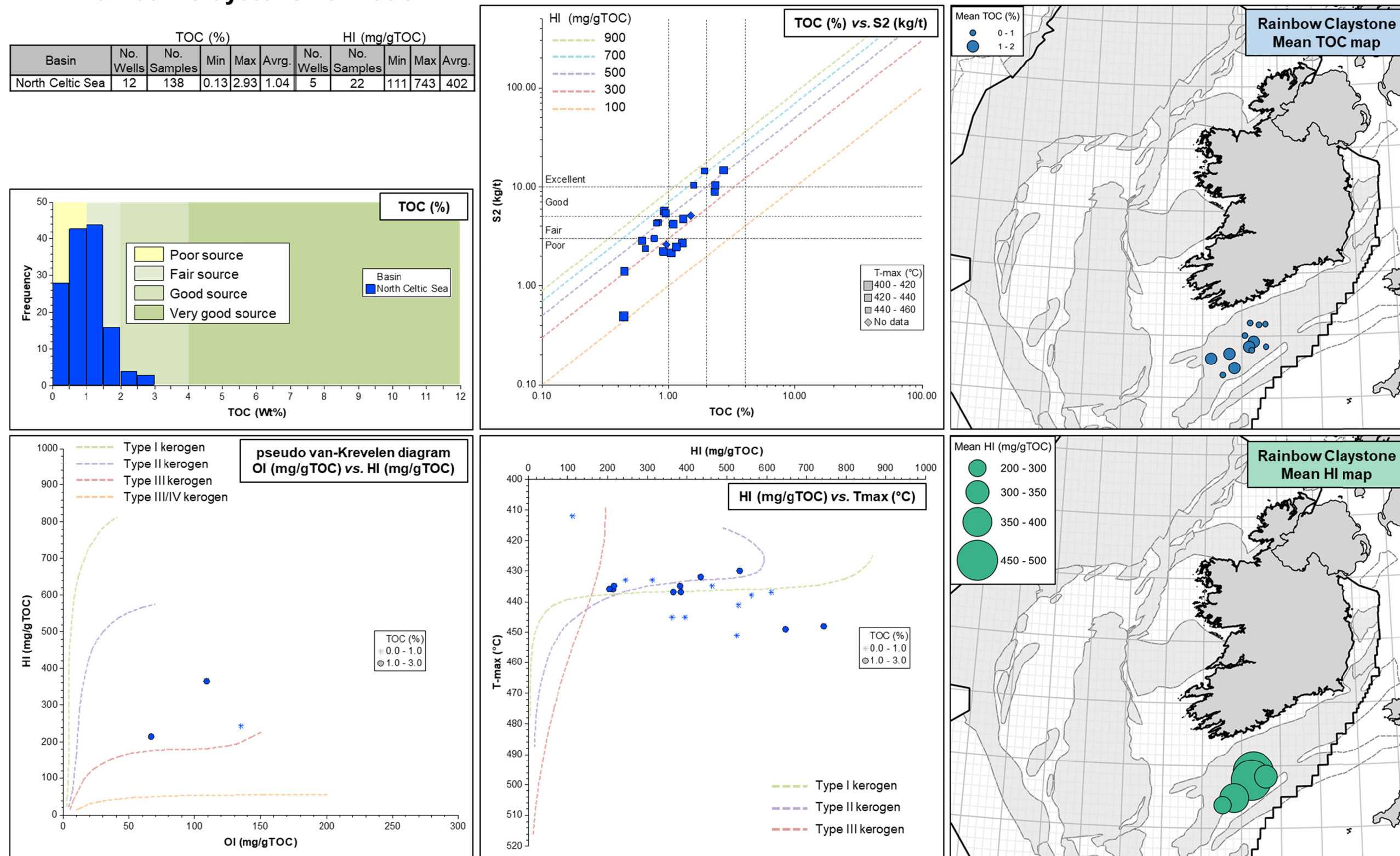


Figure A.E. 2 Rainbow Claystone Formation source rock characteristics, offshore Ireland.



Sybil Formation

Basin	No. Wells	TOC (%)			No. Wells	HI (mg/gTOC)		
		No. Samples	Min	Max		No. Samples	Min	Max
Slyne	3	36	0.40	3.65	1.74	3	26	75
Rockall	1	4	0.16	0.38	0.3	1	4	206

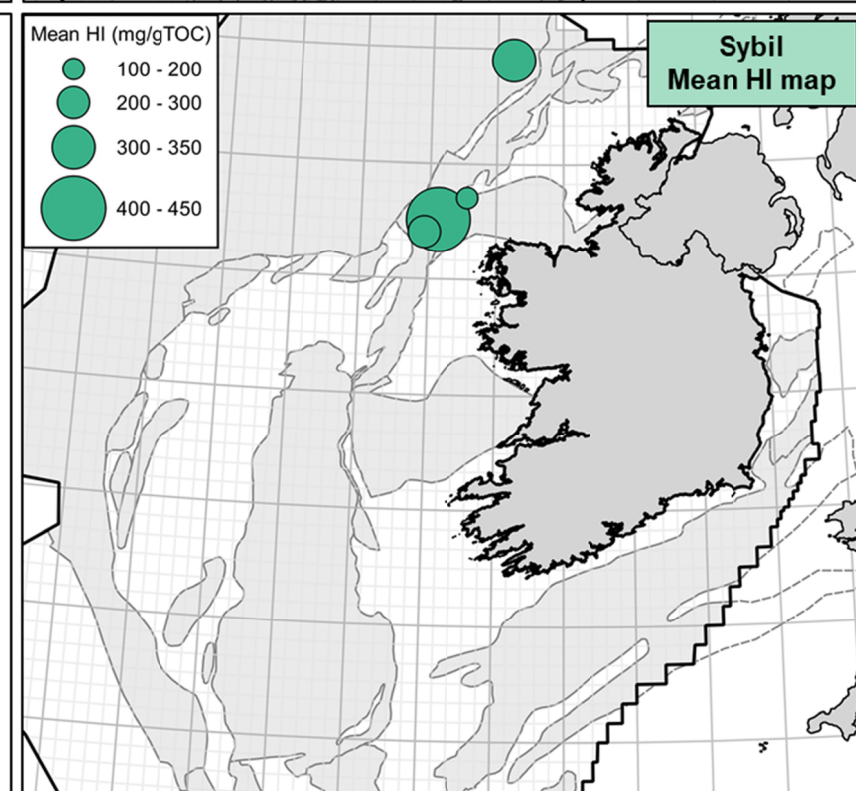
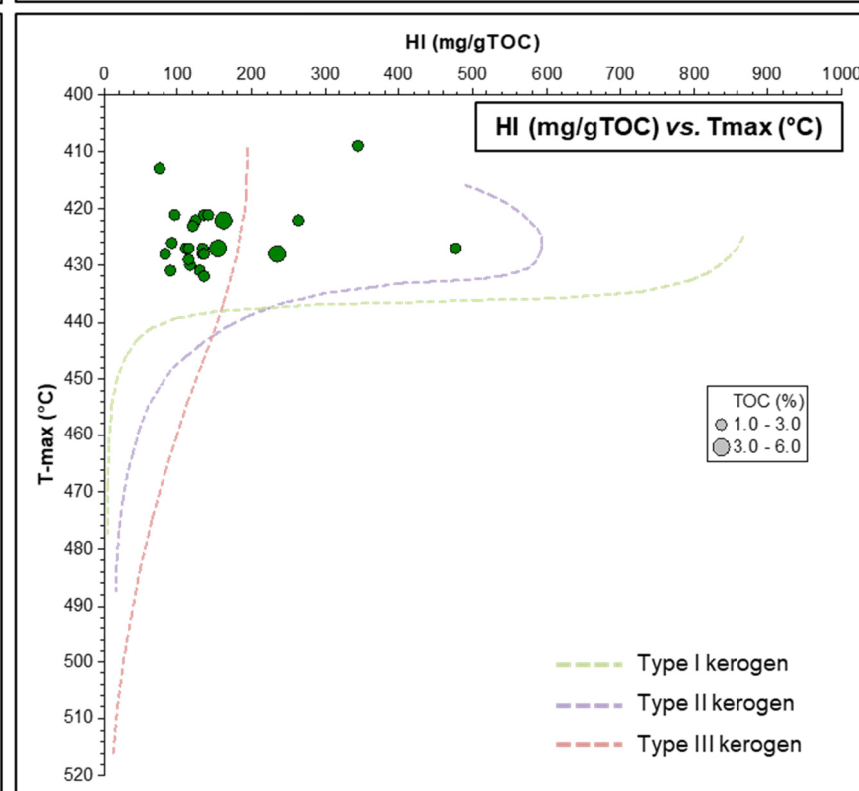
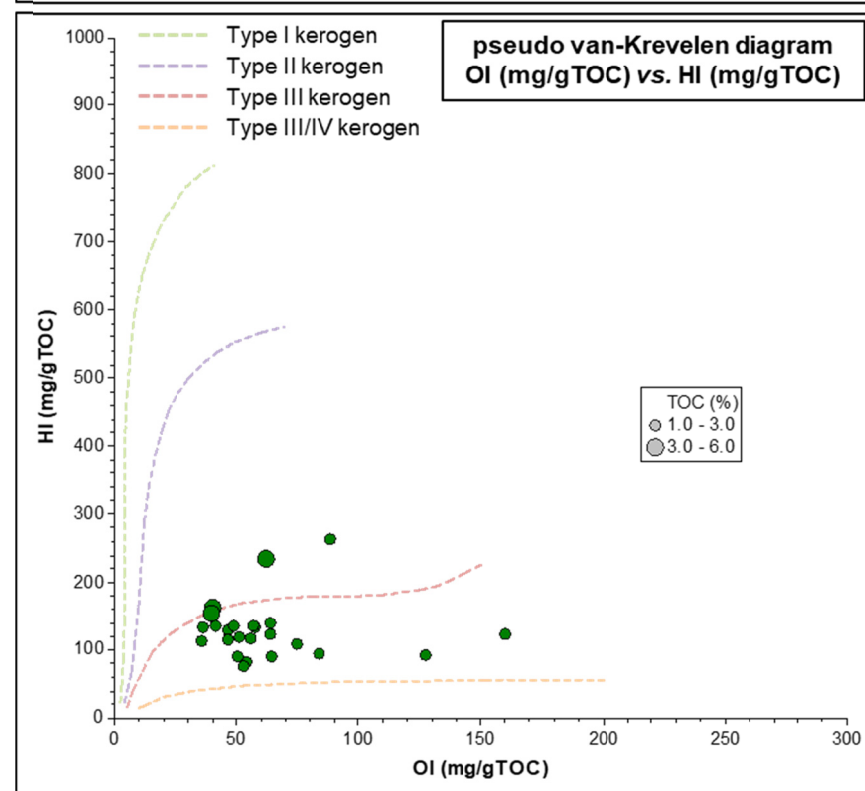
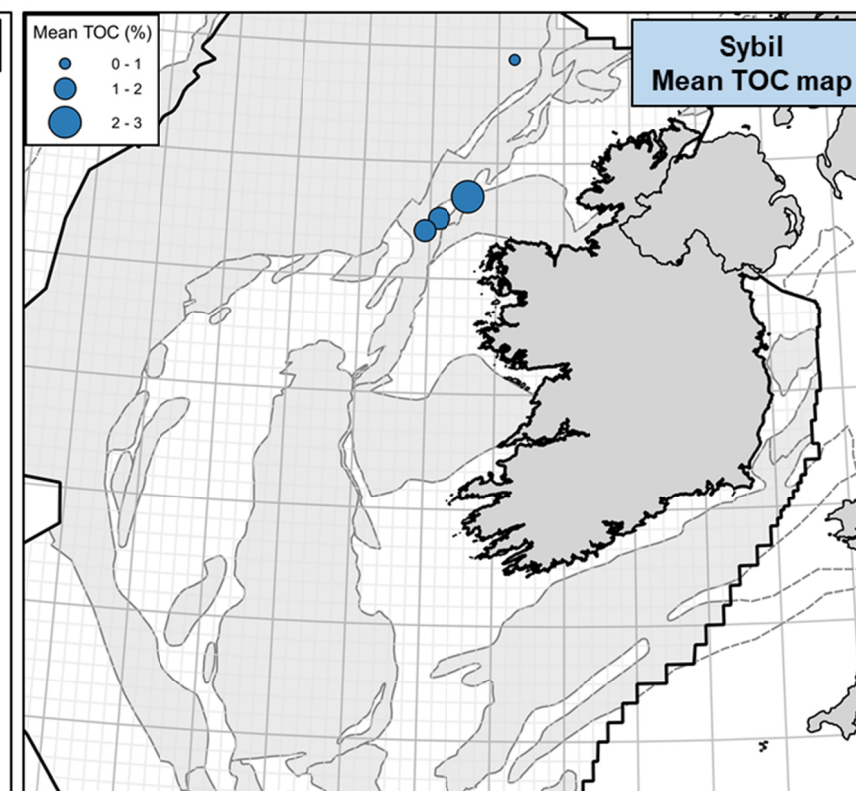
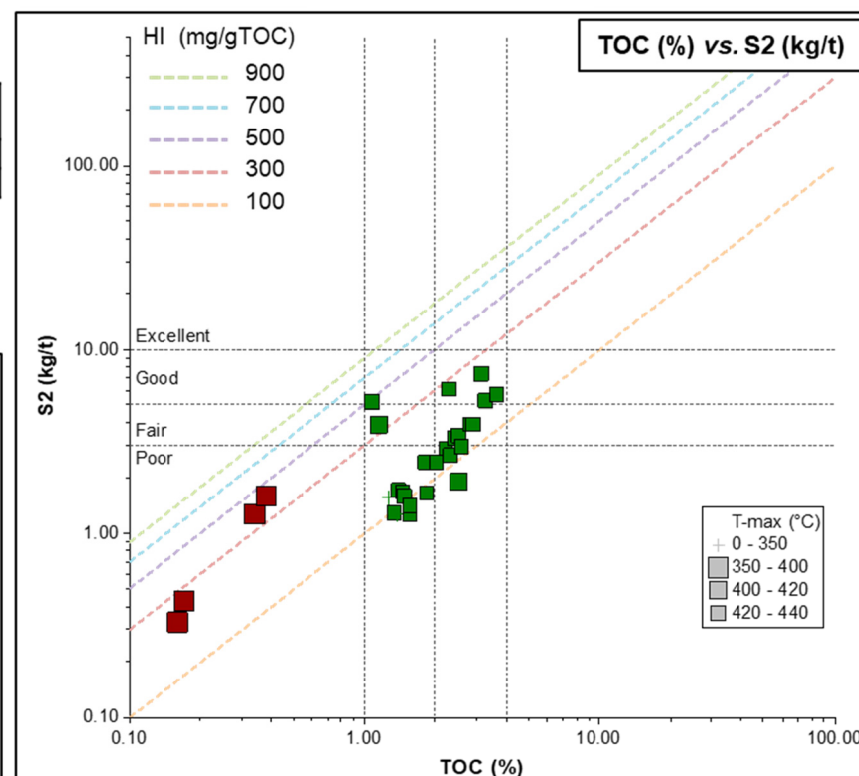
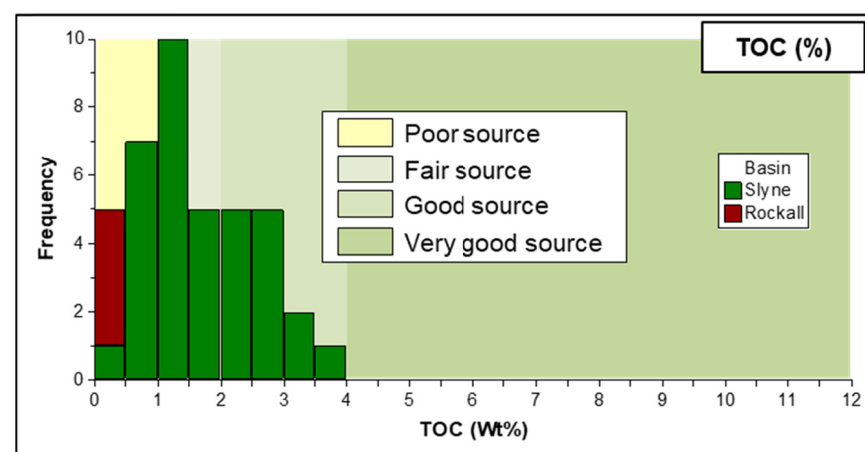


Figure A.E. 3 Sybil Formation source rock characteristics, offshore Ireland.

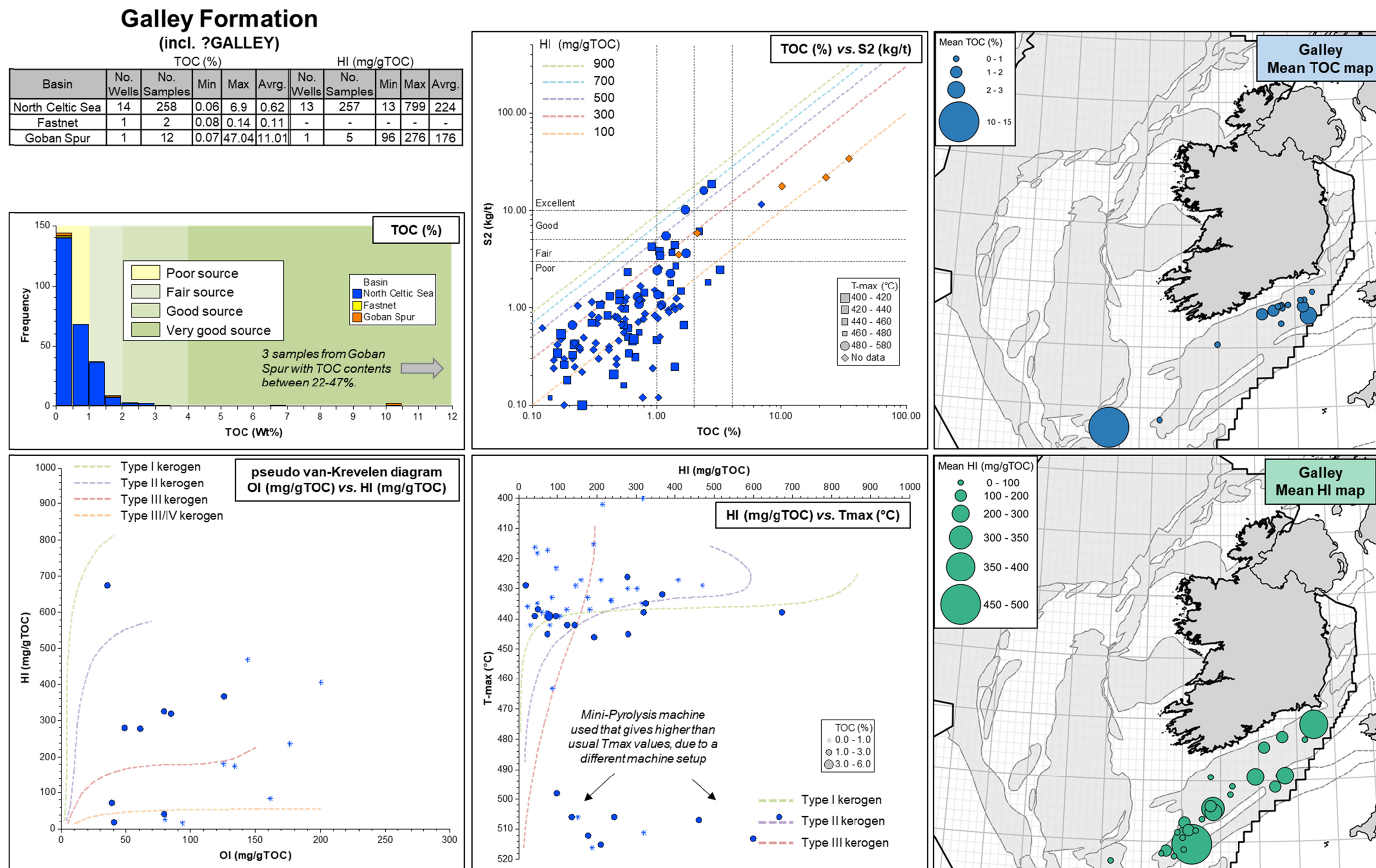


Figure A.E. 4 Galley Formation source rock characteristics, offshore Ireland.



Kestrel Formation

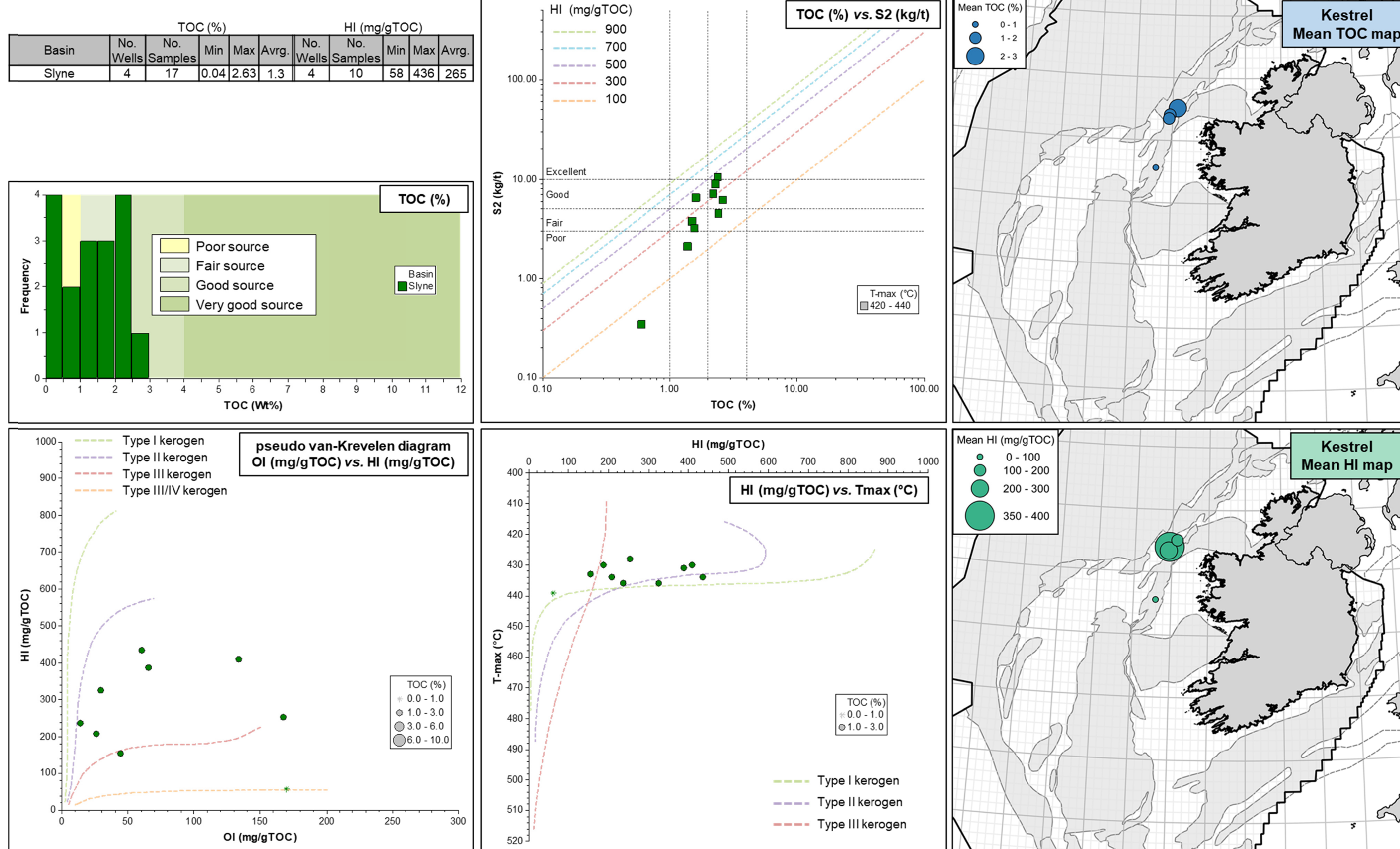


Figure A.E. 5 Kestrel Formation source rock characteristics, offshore Ireland.



Harrier Formation

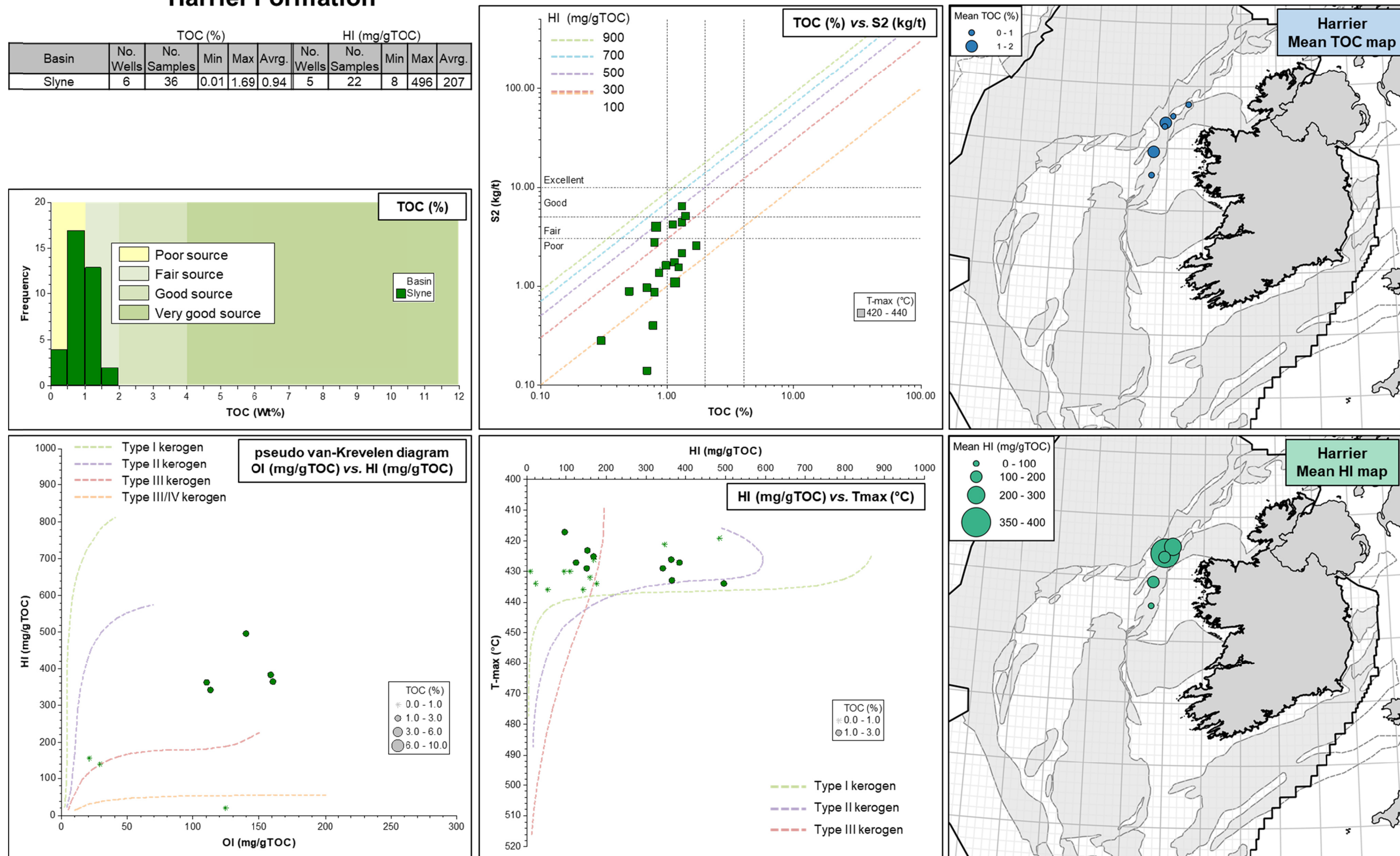


Figure A.E. 6 Harrier Formation source rock characteristics, offshore Ireland.



Inagh Formation

Basin	TOC (%)					HI (mg/gTOC)				
	No. Wells	No. Samples	Min	Max	Avrg.	No. Wells	No. Samples	Min	Max	Avrg.
Slyne	7	16	0.24	46.19	4.97	5	910	42	439	176

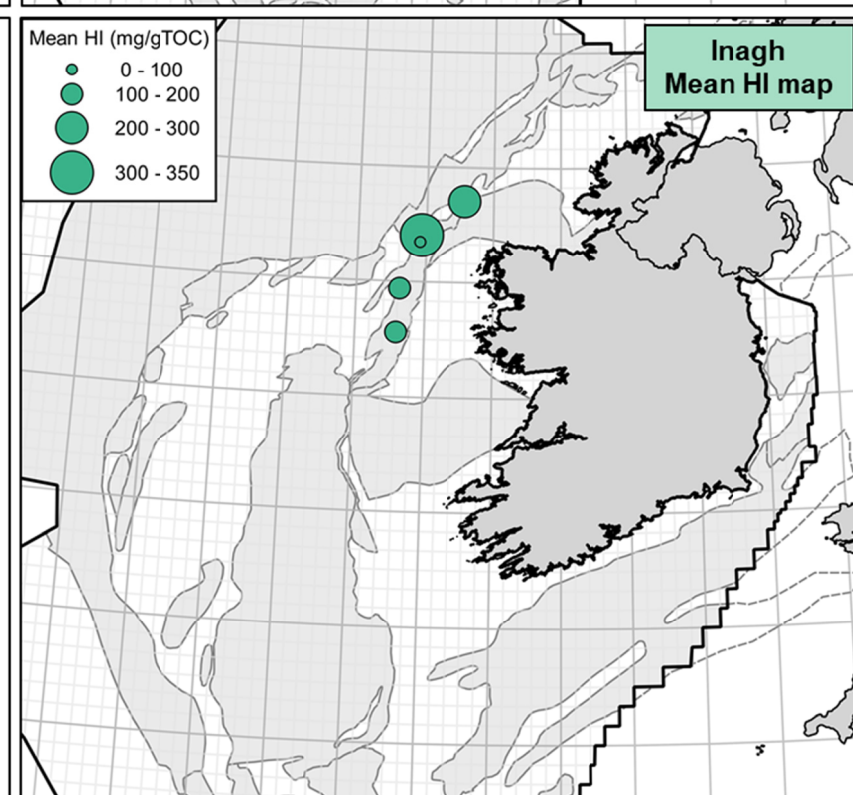
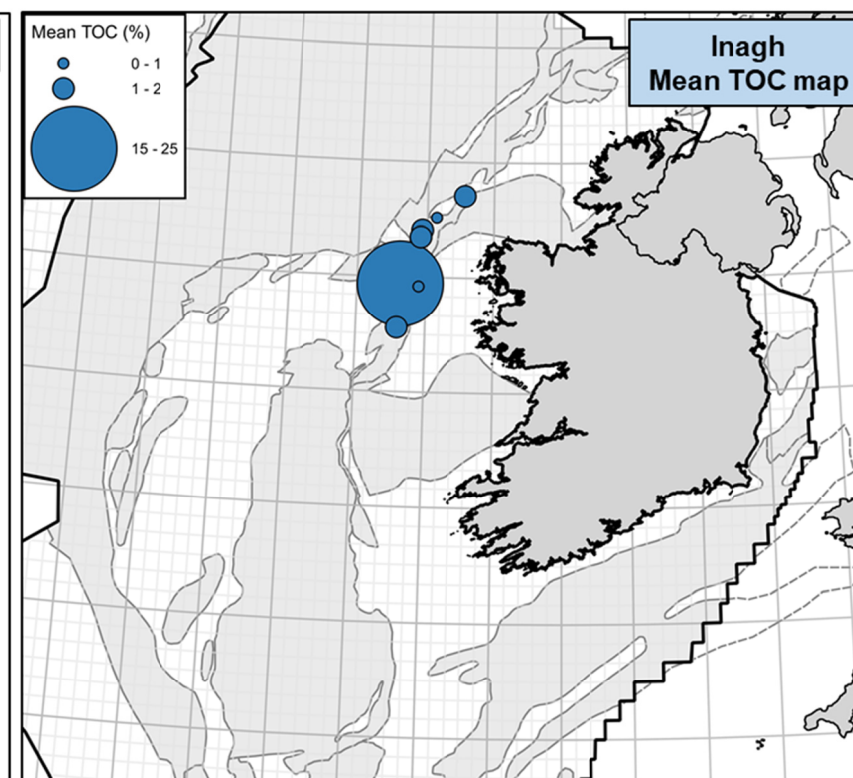
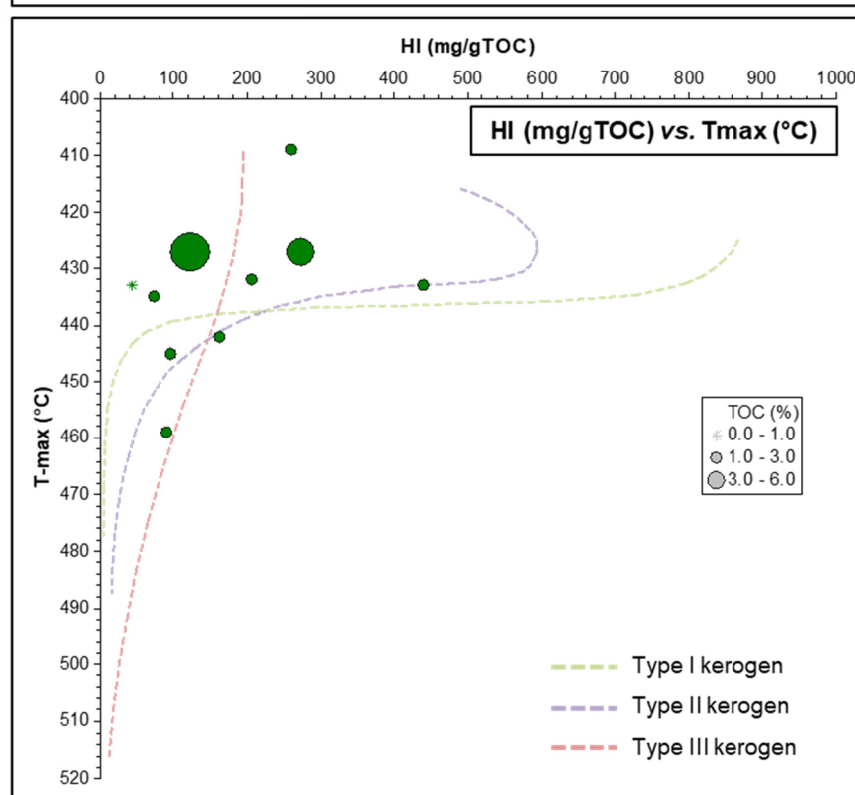
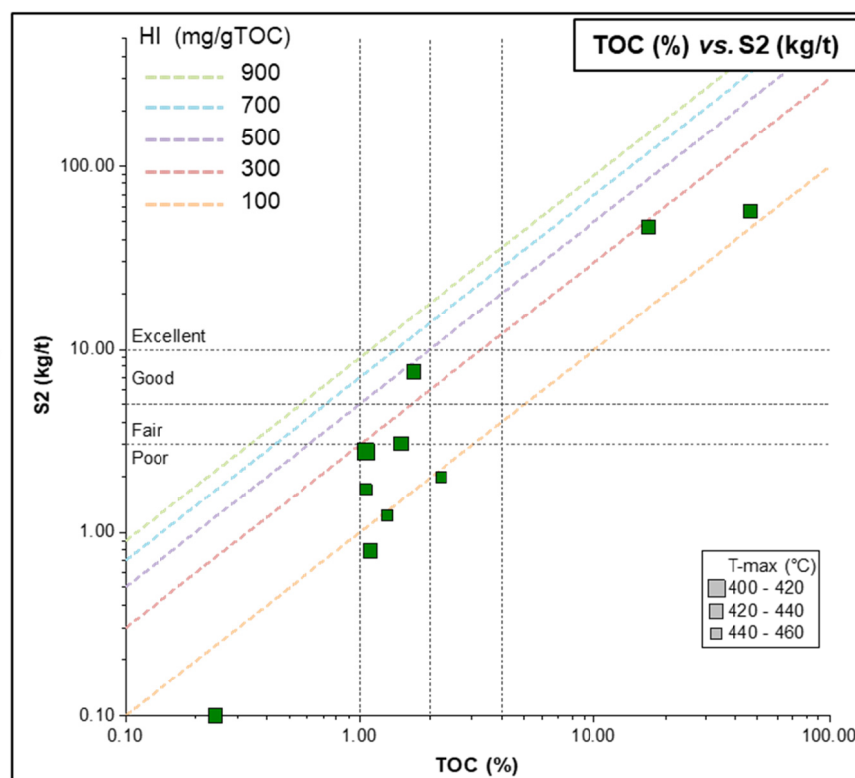
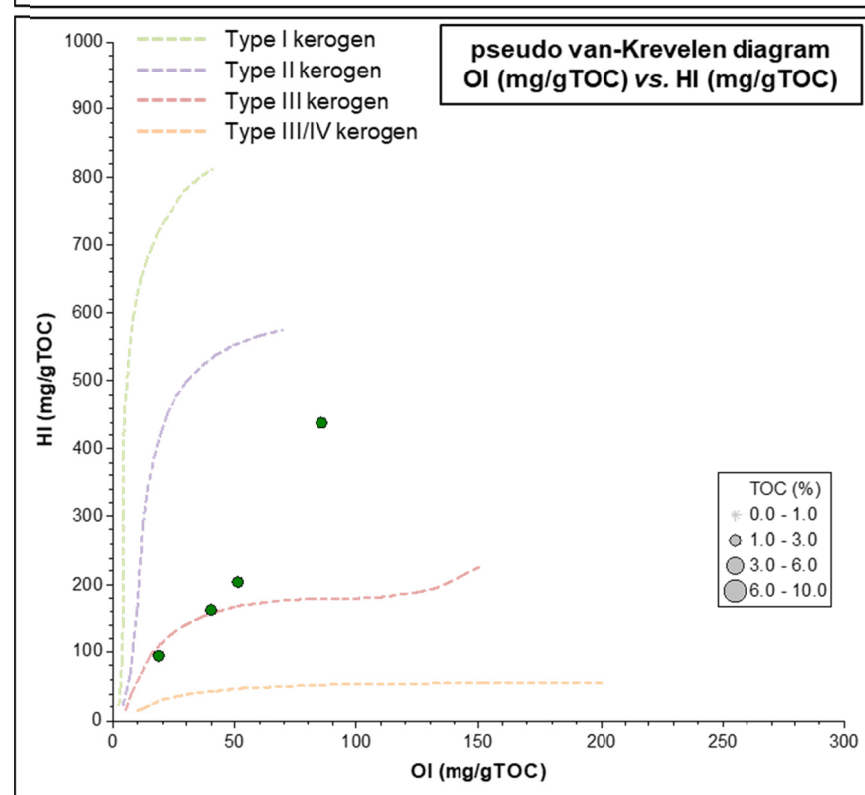
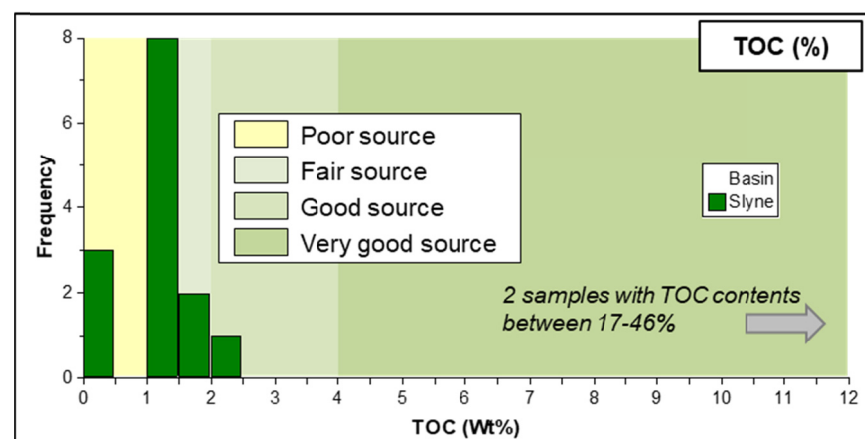


Figure A.E. 7 Inagh Formation source rock characteristics, offshore Ireland.



Meelagh Formation

Basin	TOC (%)					HI (mg/gTOC)				
	No. Wells	No. Samples	Min	Max	Avrg.	No. Wells	No. Samples	Min	Max	Avrg.
Porcupine	2	10	0.06	1.23	0.32	-	-	-	-	-
Slyne	6	54	0.14	3.10	0.74	5	16	28	316	169
Erris	1	2	0.67	1.51	1.09	-	-	-	-	-

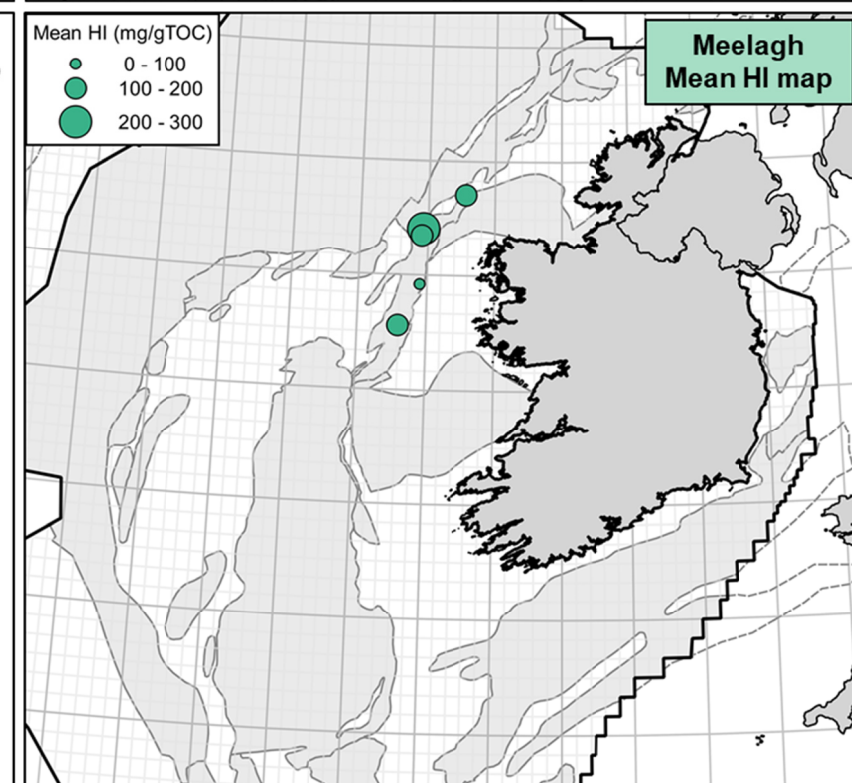
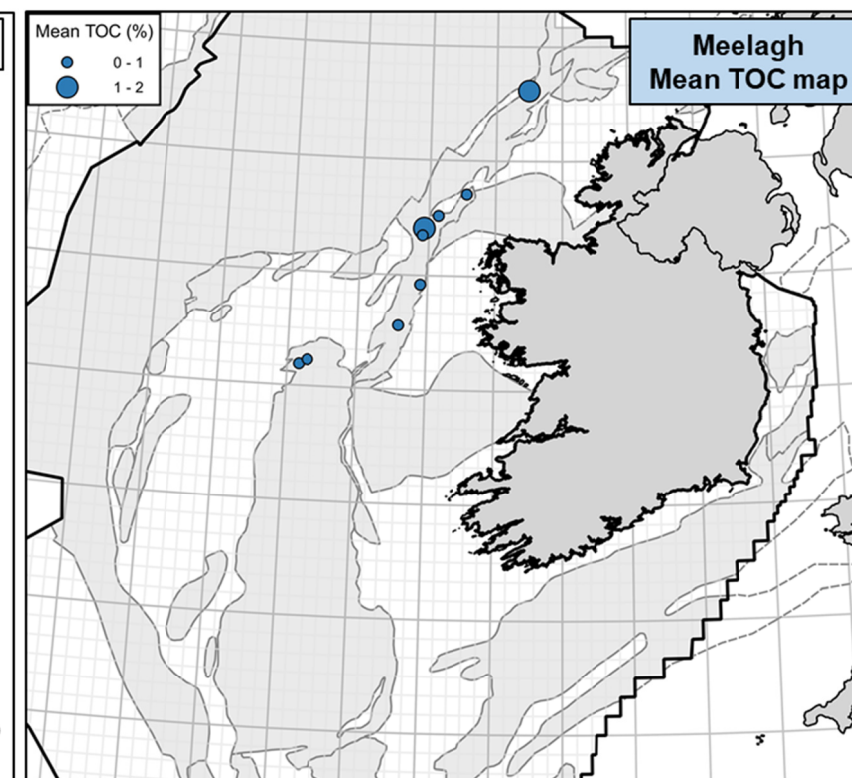
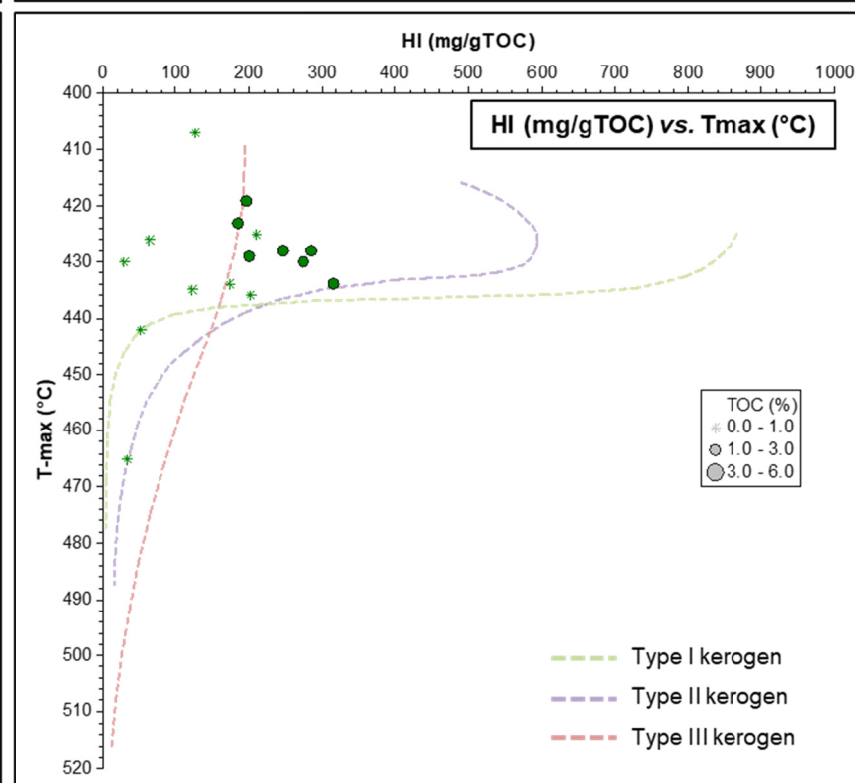
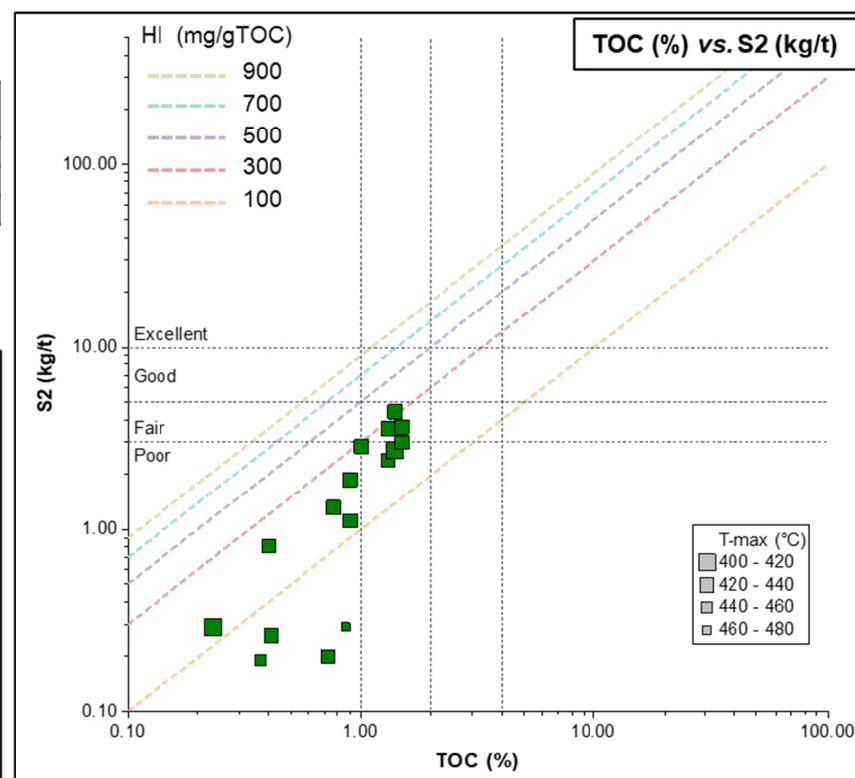
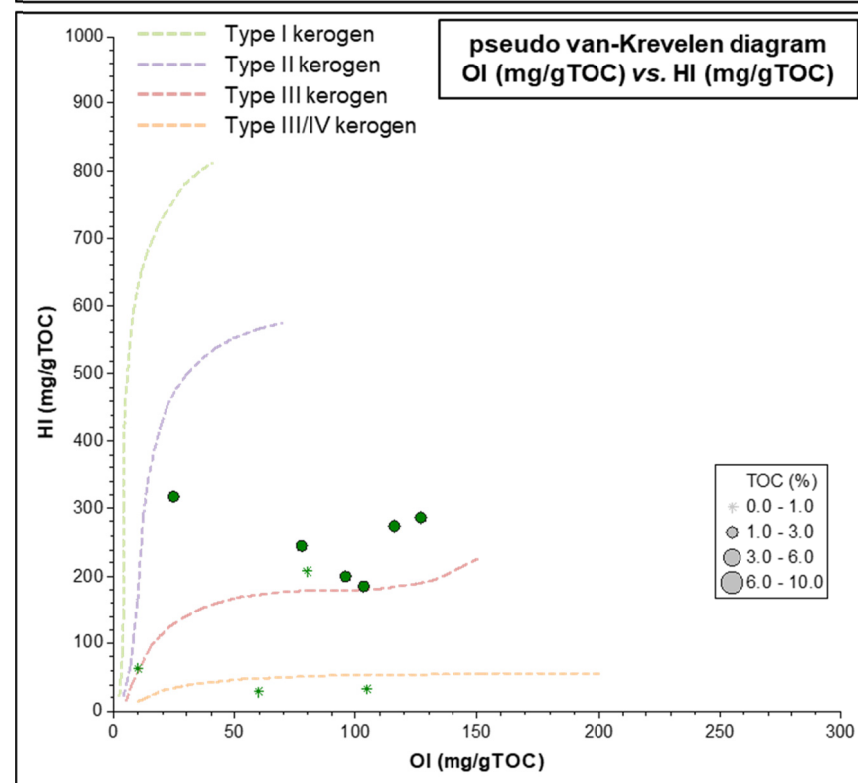
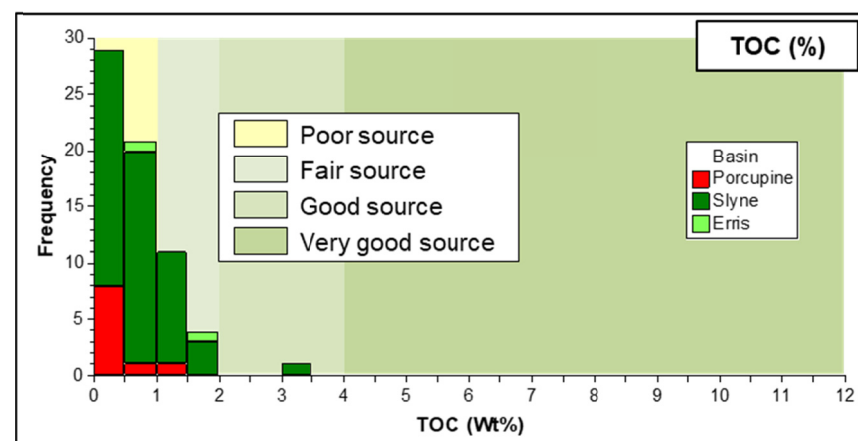


Figure A.E. 8 Meelagh Formation source rock characteristics, offshore Ireland.



Caragh Formation

Basin	No. Wells	TOC (%)			No. Wells	HI (mg/gTOC)		
		No. Samples	Min	Max		No. Samples	Min	Max
North Celtic Sea	8	35	0.02	3.03	1.05	6	16	37
South Celtic Sea	1	4	0.22	2.03	1.33	1	3	167
Fastnet	2	4	0.30	0.92	0.53	-	-	-

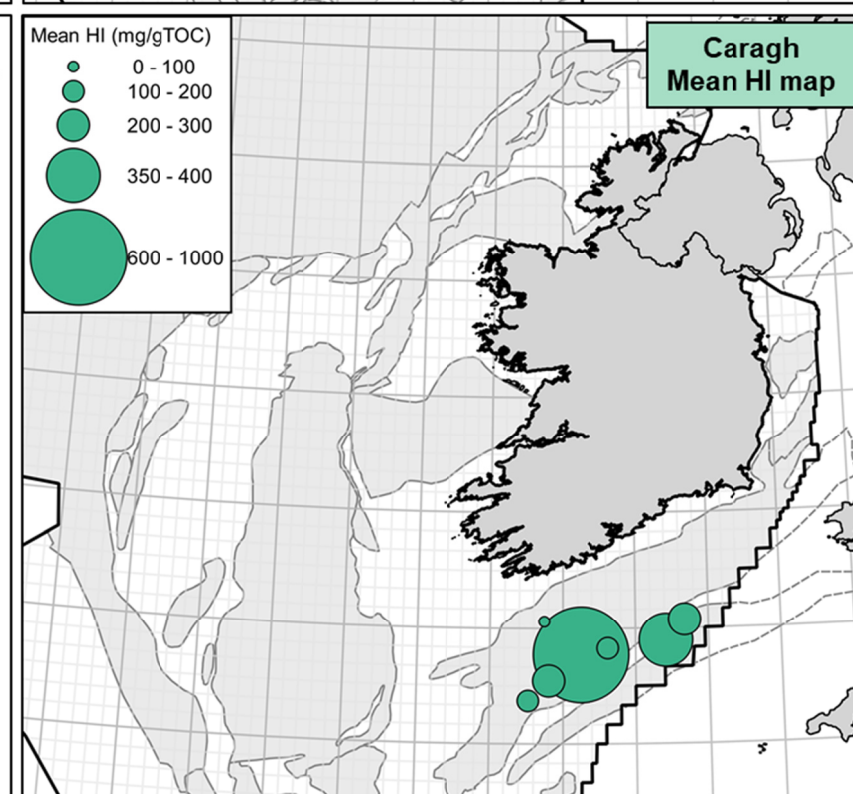
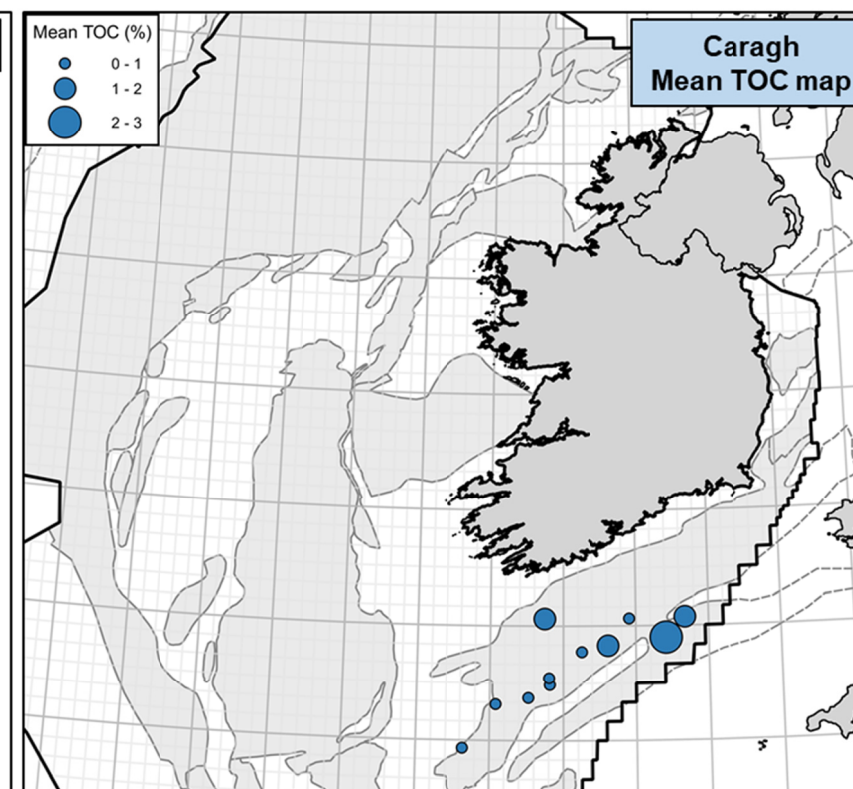
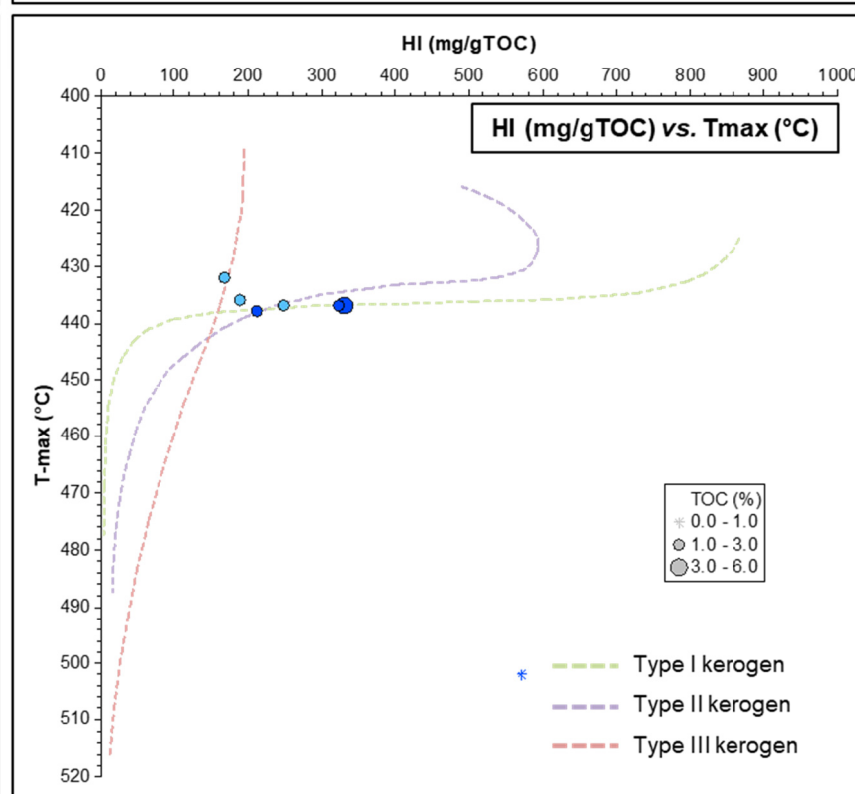
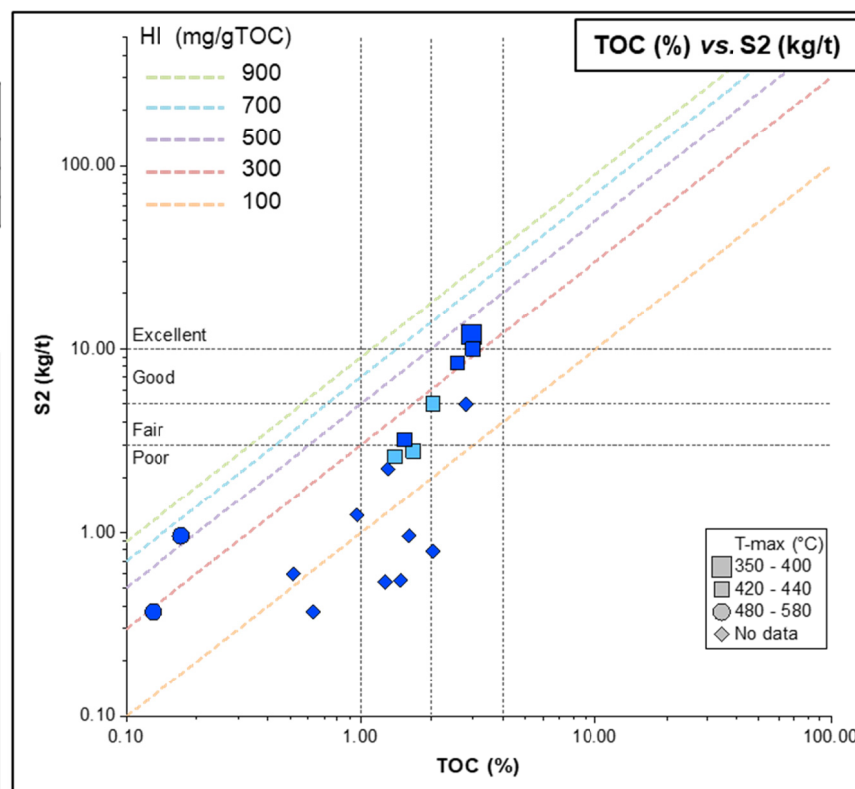
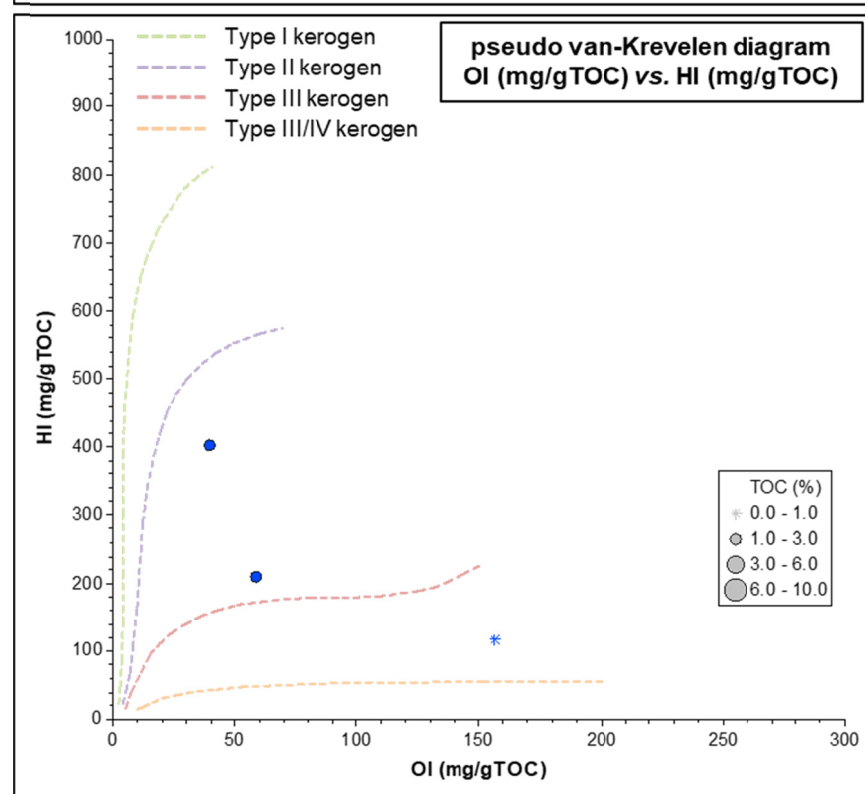
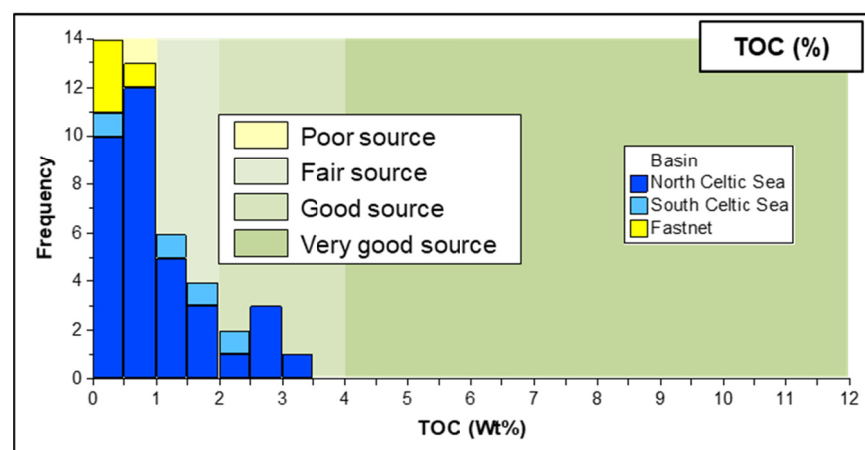


Figure A.E. 9 Caragh Formation source rock characteristics, offshore Ireland.



Ruacan Formation

Basin	No. Wells	TOC (%)				No. Wells	HI (mg/gTOC)			
		No. Samples	Min	Max	Avg.		No. Samples	Min	Max	Avg.
Porcupine	1	1	2.7	2.7	2.70	-	-	-	-	
Erris	1	18	0.90	52.09	7.17	1	16	14	679	118

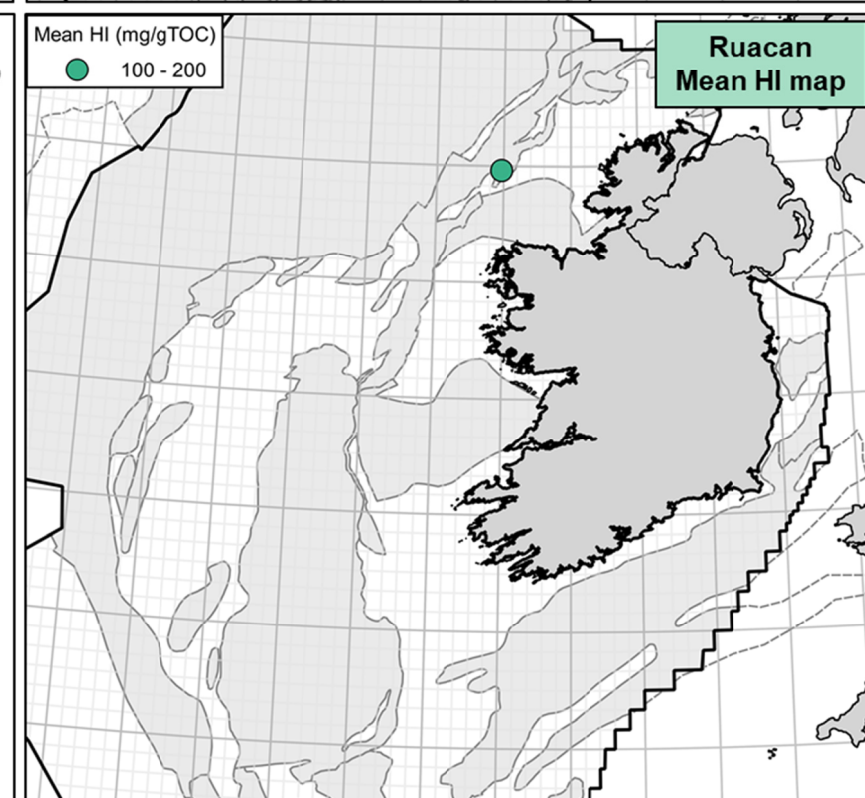
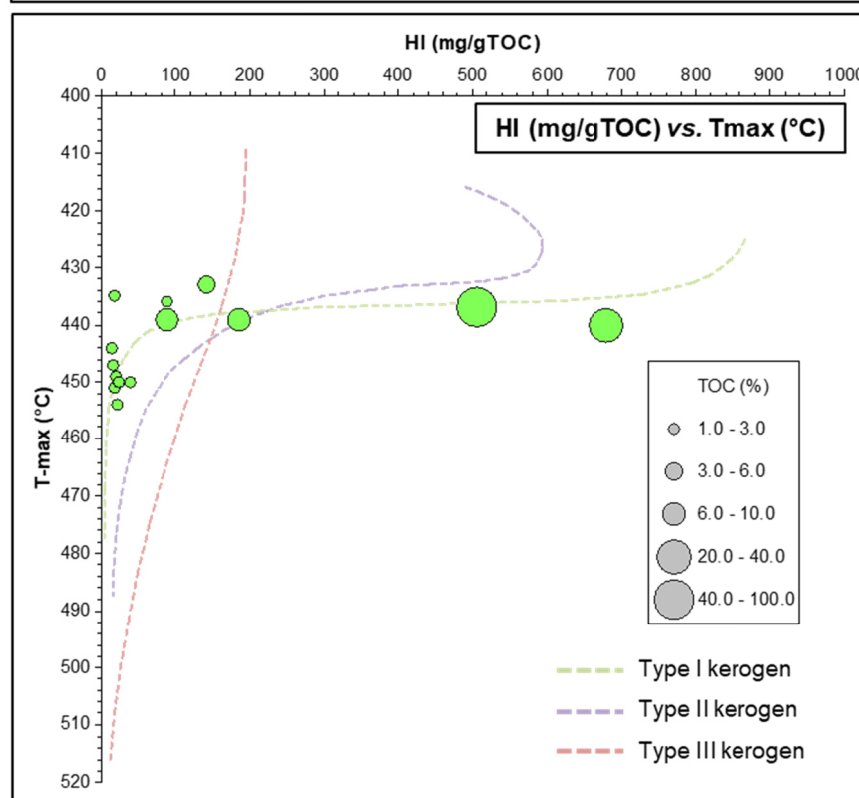
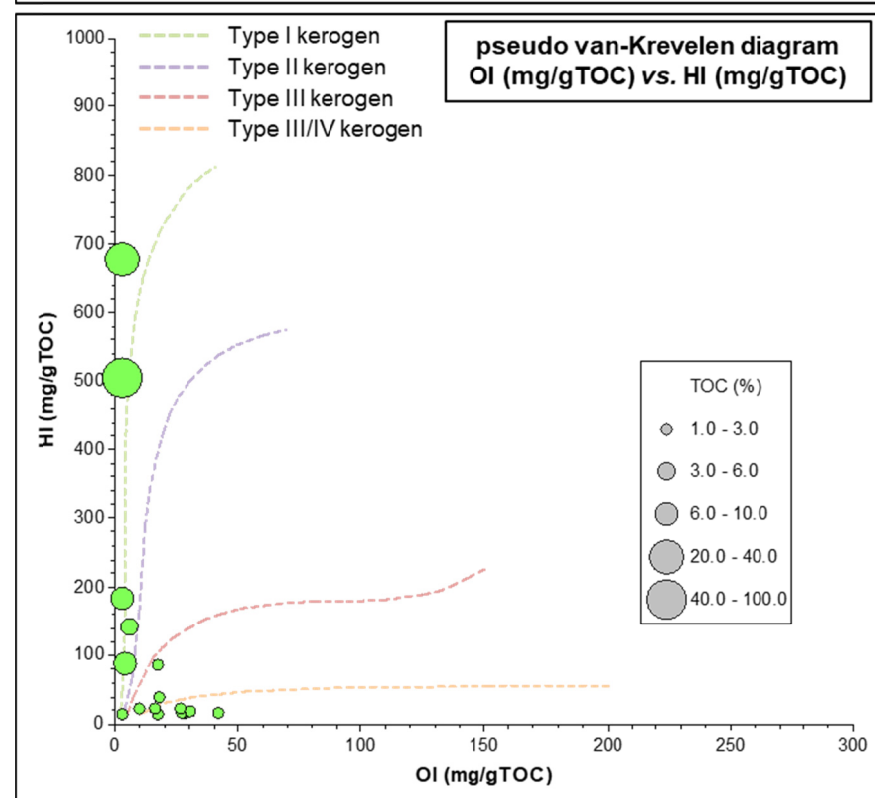
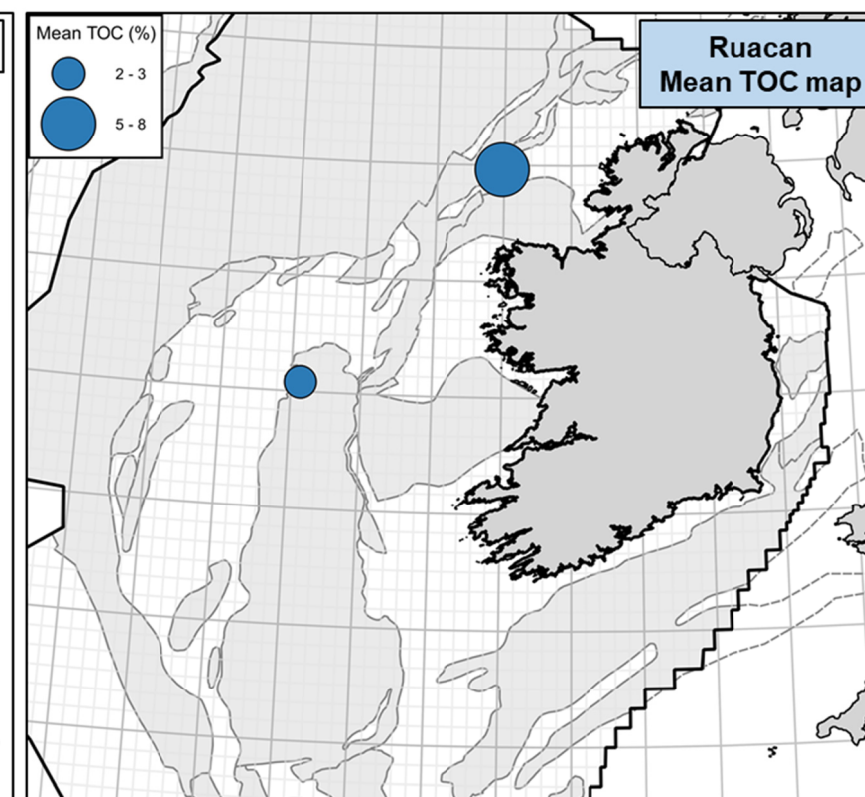
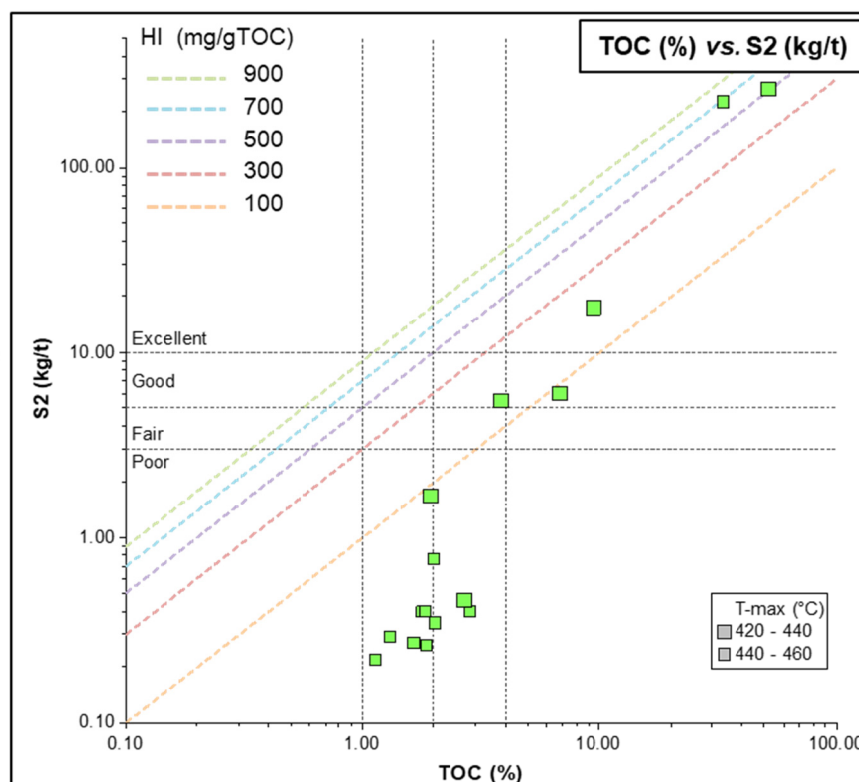
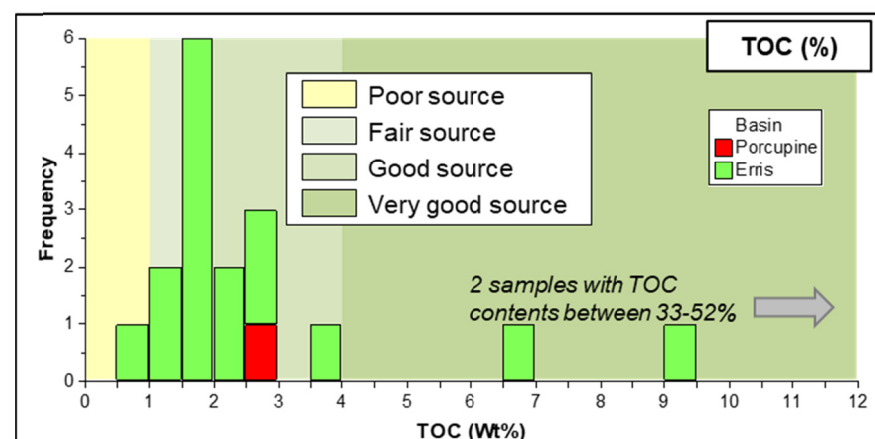


Figure A.E. 10 Ruacan Formation source rock characteristics, offshore Ireland.