

Investigating Attributes of Oil Source Rocks by Combining Geochemical Approaches and Basin Modelling (Central Gulf of Suez, Egypt)

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Table S1. Datasets of the TOC and Rock-Eval pyrolysis results of the studied samples from the Upper Cretaceous Brown Limestone Formation, October field, Central Gulf of Suez.

Well Name	Depth (ft)	TOC (wt%)	S1 (mg HC / g Rock)	S2 (mg HC / g Rock)	Tmax (°C)	HI (mg HC / g TOC)	OI (mg CO ₂ / g TOC)	PI (S1/(S1+S2))
A-4	8,760	2.42	0.36	18.01	426	744	61	0.02
	8,800	3.79	1.89	28.51	426	752	43	0.06
	8,840	2.99	1.05	21.09	428	706	58	0.05
	8,870	3.21	0.62	21.34	427	666	52	0.03
A-6	10,958.6	4.3	1.96	34.95	433	800	64	0.053
	10,959.4	4.1	2.72	34.31	434	840	61	0.073
	10,960.3	4.8	2.18	40.61	434	840	55	0.051
	10,962	4.7	1.88	40.39	430	850	44	0.044
	10,963.3	5.7	1.22	62.04	430	930	38	0.019
	10,964.6	5.2	2.07	47.37	433	900	24	0.042
	10,965.8	2.9	4.98	21.82	436	740	29	0.186
	10,966.7	2.7	2.93	20.48	437	760	25	0.125
	10,967.4	3.8	1.69	33.77	435	880	32	0.048
	10,967.8	3.3	3.29	28.82	434	870	32	0.102
	10,968.3	4.1	2.27	32.81	434	800	27	0.065
	10,968.7	3.6	2.67	30.96	435	860	32	0.079
	10,969.4	5	2.03	45.8	436	910	34	0.042
	10,970.3	4.3	3.33	37.47	436	870	49	0.082
	10,971.5	4.4	2.44	38.16	433	860	22	0.06
	10,972.3	5.7	1.76	51.25	438	900	32	0.033
	10,973.3	4.7	2.15	41.49	437	870	35	0.049
	10,974.1	4.5	2.42	37.82	436	840	32	0.06
	10,974.9	4.1	3.87	35.79	435	880	46	0.098
	10,975.7	4.6	2.35	39.87	436	860	38	0.056
	10,976.7	4.2	3.26	36.36	435	860	18	0.082
	10,977.9	4.5	2.74	39.68	435	870	33	0.065

10,978.2	4.1	2.26	34.51	436	840	27	0.061
10,978.7	5.1	1.55	43.92	435	860	35	0.034
10,979.2	4	2.28	32.56	435	820	51	0.065
10,979.8	5.1	2.5	44.47	435	870	62	0.053
10,980.5	5.8	2.57	51.63	433	880	56	0.047
10,981.6	5.1	2.84	45.91	435	900	70	0.058
10,982.4	5.6	2.78	50.15	437	890	49	0.053
10,983	4.2	3.14	35.6	436	580	40	0.081
10,984.5	4.6	2.97	40.37	435	870	44	0.069
10,986.4	3.5	3.71	29.3	437	830	57	0.112
10,988.2	4.5	3.67	34.53	435	760	53	0.096
10,989.5	4.7	2.3	39.49	433	830	65	0.055
10,991.1	4.6	2.8	39.47	436	860	62	0.066
10,992.5	4.2	0.31	34.76	436	810	56	0.009
10,994.5	4.1	2.96	34.22	437	840	68	0.08
10,995.2	5.1	2.81	34.84	437	860	49	0.075
10,995.5	3.6	3.64	27.9	437	780	40	0.115
10,995.7	4	4.04	34.32	435	850	44	0.105
10,996.3	3.4	3.93	25.97	438	770	57	0.131
10,997.5	3.2	4.63	23.71	437	740	53	0.163
10,998.5	4.6	2.7	40.53	436	880	65	0.062
10,998.9	3.3	3.15	25.26	437	760	33	0.111
10,999.5	3.9	2.88	32.09	434	810	34	0.082
11,000.5	4	2.64	32.52	436	810	43	0.075
11,002.1	3.4	3.98	24.73	437	720	36	0.139
11,003.3	4.4	2.25	37.21	434	840	82	0.057
11,004	4.5	2.39	35.29	434	780	45	0.063
11,006.2	5	2.12	41.84	435	830	67	0.048
11,008	4	2.87	31.57	436	790	64	0.083
11,009.2	3.6	3.04	28.03	435	780	61	0.098
11,009.7	5.7	0.91	51.54	435	890	55	0.017
11,011.4	4.6	1.07	42.24	438	920	44	0.025
11,012.8	3.9	1.59	33.82	435	860	38	0.045
11,013	3.7	1.76	31.69	437	850	24	0.053
11,013.6	3.2	1.62	25.15	437	780	29	0.061
11,018.5	0.7	0.24	1.65	435	240	25	0.127
11,019.1	1.5	0.17	5.54	441	360	32	0.03
11,019.4	2.5	1.68	17	438	680	32	0.09
11,020.1	5.1	1.22	46.09	436	890	27	0.026
11,020.3	3.1	1.76	25.91	437	820	32	0.064
11,021.2	3	1.92	22.18	436	730	34	0.08
11,022.2	3.9	1.21	32.56	437	830	49	0.036
11,023	4.3	1.09	36.37	437	840	22	0.029
11,025.1	4.3	1.23	37.68	437	870	32	0.032
11,026.5	4.8	2.31	39.27	437	820	35	0.056
11,029.4	4	1.58	33.31	438	820	32	0.045
11,030.6	4.6	1.51	40.67	436	880	46	0.036
11,030.9	4.1	1.52	35.4	435	870	38	0.041
11,031.8	3.3	2.08	26.97	437	810	18	0.072
11,032.3	3.6	2.37	27.08	437	750	33	0.08
11,033.4	3.6	2.75	27.91	437	770	27	0.09
11,034.5	4.7	1.74	38.65	438	820	35	0.043
11,035.3	2.9	1.42	22.41	436	780	51	0.06
11,035.9	4.9	1.6	40.75	436	830	83	0.038
11,036.2	4.7	1.67	41.03	434	870	58	0.039
11,036.9	4.2	1.62	33.19	436	790	24	0.047

	11,037.4	3.3	2.44	26.97	436	800	37	0.083
	11,037.9	3.2	2.87	25.53	437	800	37	0.101
	11,039.5	3.6	2.36	30.02	438	840	78	0.073
	11,042	2.9	2.88	21.11	435	730	77	0.12
	11,043	3	3.22	23.61	436	780	33	0.12
	11,044.1	4.7	2.98	40.29	435	860	61	0.069
	11,045.4	1.5	0.74	7.33	438	500	89	0.092
	11,046.1	1.8	1.4	11.03	438	610	35	0.113
	11,046.7	3.7	2.68	28.33	438	770	32	0.086
	11,047.3	3	2.62	23.04	436	760	46	0.102
	11,047.5	2.7	2.2	18.69	436	690	38	0.105
	11,049.5	1.7	1.44	11.26	435	650	18	0.113
	11,049.9	2	1.83	13.11	435	650	33	0.122
	11,050.1	2.1	1.94	13.99	436	670	27	0.122
	11,050.6	3.2	2.84	25.12	436	770	35	0.102
	11,052.5	4	3.03	33.19	437	830	51	0.084
	11,054.3	4.2	2.82	35.51	436	840	62	0.074
	11,055.3	2.4	2.3	16.99	436	710	56	0.119
	11,056.2	2.8	1.82	19.75	438	710	67	0.084
	11,056.6	1.7	1.51	10.44	437	620	49	0.126
	11,057.2	1.4	1.06	8.46	435	600	40	0.111
	11,057.7	1.8	1.38	11.32	436	610	44	0.109
	11,058.2	1.8	1.59	11.6	436	640	57	0.121
	11,058.6	3.6	2	28.19	436	780	53	0.066
	11,059.1	1.9	1.55	12.47	435	660	56	0.111
	11,059.6	2.7	2.03	20.7	435	760	53	0.089
	11,060.3	1.8	1.42	11.36	436	630	42	0.111
	11,060.8	4.2	2.4	35.18	434	840	38	0.064
	11,061.3	2.9	1.56	19.23	436	670	39	0.075
	11,061.9	1.6	1.08	9.16	438	580	37	0.105
	11,062.8	2.2	1.61	14.99	436	670	47	0.097
	11,063.6	1.6	1.24	9.4	435	580	61	0.117
	11,064.5	1.6	1.39	11.01	438	670	81	0.112
	11,064.9	1.8	1.61	12.09	437	670	72	0.118
	11,065.5	1.7	1.52	11.03	436	640	34	0.121
	11,066.2	4	2.82	32.38	433	810	83	0.08
	11,066.7	2.2	2.11	15.28	436	710	58	0.121
	11,067.3	1.8	1.85	12.18	437	680	24	0.132
	11,068.9	5.3	4.05	44.23	437	830	37	0.084
	11,069.5	3.9	4.59	33.43	437	840	37	0.121
	11,070.7	3.9	4.61	32.13	436	830	82	0.125
	11,071.5	2.6	3.52	21.16	435	600	45	0.143
	11,072.7	2.5	2.91	17.27	435	690	67	0.144
	11,073	4.2	2.95	29.62	436	710	22	0.091
	11,073.3	4	4.22	34.84	435	860	32	0.108
	11,073.9	2.6	4.12	20.52	434	780	35	0.167
	11,075	0.9	0.97	4.9	433	550	32	0.165
A-8	11,650	3.17	1.86	16.04	430	506	46	0.1
	11,700	2.25	1.41	12.18	435	541	36	0.1
	11,750	2.62	1.64	14.03	438	535	26	0.1
A-5	15,150	1.56	0.05	1.67	443	107	24	0.03
	15,200	1.26	0.05	1.26	442	100	37	0.04
	15,264	0.9	0.03	0.79	438	88	37	0.04

Table S2. Datasets of the TOC and Rock-Eval pyrolysis results of the studied samples from the Eocene Thebes Formation, October field, Central Gulf of Suez.

Well Name	Depth (ft)	TOC (wt%)	S1 (mg HC/g Rock)	S2 (mg HC/g Rock)	Tmax (°C)	HI (mg HC/g TOC)	OI (mg CO ₂ /g TOC)	PI (S1/(S1+S2))
A-2	7,660	3.5	9.18	15.1	424	431	37	0.38
	7,669	4.26	12.59	25.81	428	606	23	0.33
	7,672	4.44	12.96	26.07	428	587	22	0.33
	7,678	3.24	14.27	16.75	429	517	23	0.46
	7,684	2.33	7.3	12.13	429	521	31	0.38
	7,687	4.18	13.56	24.08	430	576	20	0.36
	7,691	1.98	1.6	12.6	425	636	47	0.11
	7,696	1.84	2.38	8.11	425	441	50	0.23
	7,720	1.09	0.14	2.29	431	210	80	0.06
	7,740	1.35	0.24	4.25	426	315	69	0.05
	7,770	3.06	3.65	16.7	426	546	56	0.18
	7,800	3.11	2.96	18.1	422	582	51	0.14
	7,830	3.42	1.93	19.8	425	579	45	0.09
	7,836	1.12	1.49	2.64	430	236	262	0.36
	7,840	2.03	1.63	11.1	422	546	64	0.13
	7,860	3.73	3.46	23.42	425	628	47	0.13
	7,890	3.26	3.13	20.88	426	640	58	0.13
	7,890	2.47	0.65	13.96	423	564	64	0.04
	7,920	3.57	3.52	23.36	421	654	48	0.13
	7,950	3.45	6.23	20.51	426	594	38	0.23
	7,950	3.94	3.58	24.64	429	625	47	0.13
A-3	7,950	2.64	1.41	16.98	422	644	57	0.08
	7,970	4.32	2.08	29.67	428	687	29	0.07
	7,977	3.25	3.67	18.64	427	574	27	0.16
	7,980	3.38	3.18	20.61	430	610	50	0.13
	8,000	3.6	2.31	23.73	426	659	47	0.09
	8,010	3.92	4.04	24.15	429	616	40	0.14
	8,040	3.2	2.64	18.76	428	586	52	0.12
	8,050	2.43	0.98	14.59	423	599	67	0.06
	8,054	2.26	1.92	13.05	421	577	27	0.13
	8,055	1.04	0.97	5	426	481	52	0.16
	8,064	1.7	1.51	9.6	427	565	34	0.14
	8,067	2.03	1.4	11.11	428	547	33	0.11
	8,070	1.16	1.39	6.87	423	592	194	0.17
	8,073	1.71	1.62	9.38	423	549	35	0.15
	8,083	3.19	4.06	19.24	426	603	21	0.17
	8,086	2.94	1.54	18.14	429	617	21	0.08
	8,100	2.04	2.29	13.77	428	675	72	0.14
	8,100	1.89	1.03	9.98	424	529	83	0.09
	8,130	2.12	2.4	13.96	428	658	68	0.15
	8,140	1.37	0.61	7.15	423	520	113	0.08
	8,160	2.11	2.39	13.29	428	630	66	0.15
	8,190	1.2	1.41	7.15	426	596	108	0.16
	8,250	1.33	0.91	6.81	429	512	114	0.12
	8,250	2.4	0.69	13.91	421	580	76	0.05
	8,255	2.05	1.5	11.62	429	567	42	0.11
	8,280	1.28	1.18	7.42	426	580	112	0.14
	8,290	3.13	1.03	20.01	423	639	64	0.05
	8,430	1.37	0.95	7.87	425	574	93	0.11
	8,510	1.2	0.96	6.55	426	546	143	0.13
	8,570	1.85	1.35	12.04	428	651	66	0.1
	8,600	1.47	1.1	9.38	428	638	100	0.1

	8,630	1.14	0.99	6.93	426	608	168	0.13
	8,660	1.7	1.26	10.28	429	605	105	0.11
	8,690	1.18	0.58	6.42	425	544	111	0.08
	8,750	1.13	0.87	6.42	424	568	189	0.12
	8,810	1.96	1.57	12.08	428	616	115	0.12
A-8	10,250	1.41	0.87	6.77	425	480	81	0.11
	10,300	1.18	0.62	5.27	428	447	86	0.11
	10,350	1.21	0.76	5.62	428	464	126	0.12
	10,400	1.9	0.71	7.93	432	417	61	0.08
	10,450	3.31	1.72	15.48	423	468	61	0.1
	10,500	2.48	0.77	10.93	424	441	73	0.07
	10,550	3.73	1.88	18.86	425	506	38	0.09
	10,600	4.05	2.34	21.22	427	524	32	0.1
	10,650	3.35	1.55	16.16	431	482	31	0.09
	10,700	1.5	1.7	11.99	428	480	58	0.12
	10,750	2.86	1.87	14.52	429	508	42	0.11
	10,800	2.62	2.22	12.04	432	460	38	0.16
	10,850	1.93	2.21	9.11	430	472	63	0.2
	10,900	2.13	1.92	10.53	432	494	52	0.15
	10,950	1.86	2.17	8.59	431	462	56	0.2
	11,000	1.8	2.04	8.99	432	499	46	0.18
	11,050	1.62	2.07	7.25	429	448	60	0.22
	11,100	1.76	1.88	8.11	430	461	61	0.19
	11,150	1.62	2.26	8.19	430	506	77	0.22
	11,200	2.37	2.6	10.87	433	459	41	0.19
	11,250	1.67	1.45	7.85	432	470	64	0.16
A-1	10,550	1.08	0.12	2.92	427	270	62	0.04
	10,600	1.09	0.12	3.63	428	294	107	0.04
	10,650	1.18	0.14	3.47	428	294	107	0.04
	10,700	1.71	0.12	6.12	427	358	49	0.02
	10,750	1.64	0.1	5.7	427	348	40	0.02
	10,800	1.49	0.11	4.15	430	279	44	0.03
	10,850	1.36	0.12	4.37	426	321	57	0.03
	10,900	1.37	0.13	4.68	426	342	53	0.03
	10,950	1.06	0.1	3.34	427	315	65	0.03
A-7	11,000	1.81	0.83	4.24	433	234	71	0.16
	11,150	2.56	1.8	4.24	436	166	83	0.03
	11,250	1.41	0.52	2.75	439	195	109	0.16
	11,300	1.05	0.15	2.78	435	265	70	0.05
	11,350	1.58	0.21	5.02	429	318	54	0.04
	11,400	1.16	0.1	2.58	433	222	66	0.04
	13,860	1.38	0.51	1.69	439	122	170	0.23
	13,890	1.89	0.79	2.94	442	156	122	0.21
	13,920	1.45	0.69	2.73	439	188	104	0.2
A-5	13,550	1.23	0.03	2.42	436	197	24	0.01
	13,600	1.19	0.04	1.69	440	142	29	0.02
	13,650	1.32	0.04	1.49	438	113	25	0.02
	13,700	1	0.04	0.91	439	91	32	0.04
	13,850	1.32	0.05	1.32	444	100	27	0.04
	13,900	1.16	0.04	1.3	443	112	24	0.03
	13,950	1	0.05	0.84	439	84	49	0.06
	14,000	1.16	0.05	1.21	443	104	22	0.04
	14,050	1.1	0.04	0.87	444	79	32	0.04

Table S3. Input data needed for construction of 1D basin modeling of one representative well: A-5. Sh: shale, S.st: sandstone, L.st: Limestone, Anh: Anhydrite.

Age (Ma)	Formation	Depth (Ft)	Thick-ness (Ft)	Event Type	Ero-sion (Ft)	Lithology
0	Post Zeit	0	4858	Deposition		50% Anh, 20% Salt, 20% Sh & 10% Sst
5.2	3rd Rifting Phase	4,858	0	Erosion	-500	
6	Zeit Fm	4,858	2072	Deposition	500	40% Anh, 40% Sh & 20% Salt
7.1	S. Gharib Fm	6,930	926	Deposition		40% Anh, 40% Salt, 15% Sh & 5% Sst
10.5	Post Belayim Unconformity	7,856	0	Erosion	-50	
11	Belayim_ HF	7,856	430	Deposition	50	90% Sh & 10% Lst
11.9	Belayim_ F	8,286	309	Deposition		50% Anh & 50% Sh
12.5	Belayim_ S	8,595	264	Deposition		80% Sh & 20% Lst
13.5	Belayim_ B	8,859	161	Deposition		Anhydrite
14	Post Kareem Unconformity	9,020	0	Erosion	-50	
14.5	Kareem Fm	9,020	1045	Deposition	50	95% Sh & 5% L.st
14.8	Post Asl Unconformity	10,065	0	Erosion	-50	
15.5	U. Rudeis (ASL Mbr.)	10,065	1390	Deposition	50	50% Sh & 50% Lst
16.5	Mid Clysmic Event	11,455	0	Erosion	-200	
17	L. Rudeis (Meherrat Mbr.)	11,455	1781	Deposition	200	60% Lst & 40% Sh
19	2nd Rifting Phase	13,236	0	Erosion	-2000	
21	Major unconformity	13,236	0	Erosion	-1000	
50	Thebes Fm	13,236	1251	Deposition	3000	Limestone (organic rich - typical)
56.5	Esna Shale	14,487	132	Deposition		Limestone (shaly)
65	Erosion Paleocene	14,619	0	Erosion	-50	
69.1	Sudr Fm	14,619	393	Deposition	50	Limestone (chalk, typical)
77	Brown Limestone (Duwi Fm)	15,012	143	Deposition		Limestone (organic rich - 1-2% TOC)
83	Syrian Arc Phase	15,155	0	Erosion	-100	
84	Matulla Fm	15,155	761	Deposition	100	Limestone (shaly)
88.5	Early Syrian Arc Phase	15,916	0	Erosion	-100	
89.3	Top Raha	15,916	784	Deposition	100	70% Sst, 20% Sh & 10% Lst
97	Raha	16,700				