Supplementary Table 1: Selected biomarker ratios and yields obtained from free saturate fractions of sediment cores and cuttings

Well ID	Min. Depth (m)	Strat.	TOC wt%	Lithology/Facies	S/H[a]	%C_{26} st[b]	%C_{29} st[c]	%C_{30} st[d]	ipc/npc[e]	ipc[e] ppm sats	26-mes[f] ppm sats	26-mes/ ipc[f]
MKS-2	1648	A6	n.d.	Shale band above A5C stringer	0.82	6.46	58	2.05	1.15	138.7	126.5	0.91
SAR-2	3838	A6*	n.d.	Silicilclastics above A5C stringer	0.21*	6.88*	69	6.69*	1.95	65.6	37.9	0.58
AJB-1	3588	A5C*	n.d.	Carbonate stringer-saline*	0.22*	9.96*	62	1.89*	0.95	13.0	4.7	0.36
OMR-1	2851	A5C	0.44	Carbonate stringer	0.85	6.62	69	1.93	1.55	23.5	10.8	0.46
OMR-1	2853	A5C	1.05	Carbonate stringer	0.82	4.81	69	2.02	1.67	17.7	6.5	0.37
BB-3	2928	A4C	1.06	Carbonate, sapropelic laminite	0.91	4.86	70	2.11	1.49	7.2	5.0	0.69
BB-3	2930	A4C	0.95	Carbonate stringer	1.05	6.26	68	2.45	1.36	11.6	7.8	0.67
BB-5	3009	A4C	1.92	Carbonate stringer	0.99	4.36	66	1.95	1.39	9.2	6.0	0.65
BB-2	2927	A3C	0.53	Carbonate stringer	0.96	4.73	75	2.10	1.49	13.5	8.4	0.62
BBN-1	3785	A3C	0.13	Carbonate stringer	0.79	5.92	70	2.02	1.38	49.0	16.7	0.34
BBN-1	3787	A3C	0.72	Carbonate stringer	0.87	12.7	69	2.31	1.46	11.8	7.1	0.61
BBN-1	3789	A3C	0.40	Carbonate stringer	0.78	5.36	71	2.10	1.66	23.9	10.0	0.42
BBN-1	3790	A3C	0.19	Carbonate stringer	0.82	3.92	70	2.10	1.67	25.5	12.5	0.49
DRR-1	2969	A3C	0.19	Carbonate, crinkly laminite	0.82	4.77	70	2.00	1.45	55.0	26.2	0.48
DRR-1	2990	A3C	0.46	Carbonate, crinkly laminite	0.78	4.56	70	2.07	1.60	62.5	32.4	0.52
BBN-1	4204	A2C	1.90	Carbonate stringer	0.96	6.03	75	2.13	1.52	9.5	5.3	0.55
RF-1	3547	A2C*	n.d.	Carbonate stringer- saline*	0.57	12.9*	70	3.56*	1.17	39.9	16.1	0.40
RF-1	3577	A2C*	n.d.	Carbonate stringer- saline*	0.59	10.1*	72	4.65*	1.48	57.7	28.8	0.50
SAB 1	2399	A2C	1.19	Carbonate stringer	0.93	4.46	75	1.90	1.69	11.9	5.3	0.45
SJT-1	5033	A2C	0.86	Carbonate, pustular laminite	0.72	4.94	52	2.84	1.26	27.4	7.8	0.29
SJT-1	5053	A2C	1.39	Carbonate, thrombolite	0.83	4.74	61	3.39	1.77	33.9	11.5	0.34
DHS-3	2997	A1C	1.22	Carbonate stringer	0.72	4.52	73	1.80	1.92	78.6	30.9	0.39
MIN-1	3400	A1C*	n.d.	Carbonate stringer-saline*	0.52*	9.88*	73	4.75*	1.42	59.4	24.8	0.42
MIN-1	3430	A1C*	n.d.	Carbonate stringer- saline *	0.54*	9.62*	71	5.20*	1.49	116.7	48.7	0.42
AMSE-1	2345-2375	Buah	1.6	Carbonate	0.76	4.07	73	1.66	0.86	5.8	5.4	0.93
SB-1	1569-1602	Buah	2.3	Marlstone?	0.74	8.04	72	1.33	0.77	10.9	11.0	1.01
TRF-2	4411	Buah	3.1	Marlstone	0.84	7.39	67	1.74	0.70	8.7	10.2	1.17
ATH-1	2016-2019	Buah	11.0	Organic-rich marlstone	1.06	9.16	64	1.82	0.55	21.3	27.6	1.29
ZFR-1	1905-1940	Shuram	3.4	Mudstone/siltstone	0.61	6.27	71	2.33	1.78	92.6	43.5	0.47
ATH-1	2379	Shuram	1.5	Mudstone/siltstone	0.56	3.02	77	2.01	0.81	109.1	49.6	0.45
ATH-1	2053-2121	Shuram	1.3	Mudstone/siltstone	0.96	3.81	68	2.12	0.92	14.0	10.1	0.72
ATH-1	2424.5-2447	Shuram	3.0	Mudstone/siltstone	0.66	2.86	70	2.19	1.10	6.8	6.2	0.91
ATH-1	2449-2452	Shuram	3.6	Mudstone/siltstone	0.70	6.68	65	2.50	1.41	8.0	4.5	0.57
TF-1	2247.5-2250	Shuram	n.d.	Mudstone/siltstone	1.06	6.17	65	1.87	1.07	34.3	31.2	0.91
TM-6	2350	Shuram	2.4	Mudstone/siltstone	1.00	5.63	70	2.18	0.92	35.6	28.8	0.81
TM-6	2685-2740	Shuram	3.9	Mudstone/siltstone	0.80	6.15	70	2.00	1.33	26.1	19.6	0.75
TM-6	2800	Shuram	9.2	Lower Shuram black shale	0.84	5.17	73	2.02	1.27	43.5	15.4	0.35
TM-6	2830	Khufai	3.2	Carbonate	0.49	6.02	72	3.34	1.43	72.3	41.3	0.57
RNB-1	3125-3143	Masirah B	1.7	Mudstone/siltstone	0.49	6.84	58	3.53	3.98	14.5	6.8	0.47
ZFR-1	2280-2295	Masirah B	3.8	Mudstone/siltstone	0.73	5.18	84	12.61	16.1	245.7	24.9	0.10
SRS -1	4230-4385	Masirah B	0.4	Mudstone/siltstone	0.70	5.70	64	2.25	1.49	6.1	3.1	0.51

TM-6	2895-2910	Masirah B	4.9	Mudstone/siltstone	0.70	4.49	69	3.16	1.35	12.1	6.9	0.57
MWB-1	2628-2724	Masirah B	n.d.	Mudstone/siltstone	0.73	4.86	60	2.44	1.52	16.5	8.2	0.50
GM-1	2420-2446	Ghad. Manquil	0.59	Laminated lime mudstone	0.90	7.18	72	2.65	3.26	61.0	25.3	0.41
MQR-1	4370	Ghad. Manquil	n.d.	Siltstone	0.43	4.32#	56#	3.72#	0.52#	n.d.	n.d.	0.16
Athel Group												
AML-9	1731	Thuleilat	2.2	Black shale	0.95	11.4	60	2.78	1.34	79.3	41.6	0.52
ATH-1	1000-1102	Thuleilat	8.0	Black shale	0.62	5.74	67	3.34	1.36	18.3	16.1	0.88
MAR-248	2068-2084	Thuleilat	10.4	Mudstone/silicylite transitional	1.29	5.41	71	1.91	1.37	34.8	25.0	0.72
TLT-2	1417.5-1483	Thuleilat	6.4	Black shale	0.81	4.86	71	2.23	1.35	24.9	24.9	1.00
TLT-2	1520-1547	Thuleilat	2.5	Mudstone	0.91	5.16	73	2.27	1.56	35.4	31.5	0.89
ATH-1	1198-1425	Silicylite	3.4	Finely laminated quartz	0.79	4.06	74	1.85	1.39	62.6	37.6	0.60
MAR-248	2104-2120	Silicylite	3.4	Upper silicylite- laminated quartz	1.50	4.78	72	1.93	1.42	28.6	18.3	0.64
MAR-248	2240-2352	Silicylite	2.3	Lower silicylite- laminated quartz	1.02	4.93	76	1.84	1.87	61.0	25.5	0.42
TLT-2	1551-1602	Silicylite	4.3	Finely laminated quartz	1.21	6.11	74	2.41	2.13	90.0	35.6	0.40
TLT-2	1628-1742	Silicylite	2.6	Finely laminated quartz	0.87	21.4	75	2.25	2.44	103.5	38.9	0.38
ATH-1	1425-1527	U shale	3.5	Black shale	0.85	7.73	66	2.37	1.11	17.2	12.2	0.71
ATH-1	1527	U shale	4.9	Black shale	1.00	4.69	61	2.64	0.93	10.0	8.9	0.89
ATH-1	1773-1872	U shale	5.7	Black shale	0.91	19.7	61	2.63	0.78	4.3	3.3	0.77
MAR-248	2420-2460	U shale	6.4	Black shale	0.79	7.24	60	2.90	1.35	8.7	5.4	0.62
TLT-2	1751-1833	U shale	4.0	Black shale	0.89	9.87	65	2.20	1.41	27.9	15.7	0.56

a: ratio of (C_{27}-C_{29} steranes)/ (C_{27}+ $C_{29\text{-}35}$ hopanes)
b: ratio of (21-nor- +27-norcholestanes)/Σ(C_{26}-C_{29} steranes), for C_{26} desmethylsteranes (C_{27}-C_{29} 21-norsteranes peak areas were not included)
c: ratio of C_{29} steranes to the total sum of C_{27}-C_{29} steranes
d: ratio of (24-*n*-propylcholestanes +24-isopropylcholestanes)/Σ(C_{27}-C_{30} steranes), for C_{30} desmethylsteranes
e: ratios and compound yields were calculated from summing peak areas of all 4 regular isomers of each compound ($\alpha\alpha\alpha$S, $\alpha\beta\beta$R, $\alpha\beta\beta$S, $\alpha\alpha\alpha$R)
f: ratios and compound yields for 26-methylstigamstane were calculated from the peak area of the $\alpha\alpha\alpha$R isomer
#: affected by contamination from marine Phanerozoic-sourced petroleum drilling fluids, hence the lower ratios of %C_{29} sterane and iso-C_{30}/n-C_{30} sterane
*: saline marine facies, hence lower sterane/hopane ratio and apparently higher %C_{26} and %C_{30} steranes (as C_{28} and C_{29} 21-norsteranes, prominent at higher salinity, are not included in the calculation)
n.d. not determined
Analytical errors for absolute yields of 27-norcholestanes and 24-isopropylcholestanes absolute yields are estimated at ± 30%. Average uncertainties in hopane and sterane biomarker ratios are ± 8% as calculated from multiple analyses of a saturated hydrocarbon fraction prepared from an AGSO standard oil (n = 30 MRM analyses).
Rock-Eval pyrolysis data for these samples is given in Grosjean et al., (2009).