SUPPLEMENTARY FILES (GSA Data Repository)

Figure DR 1: Facies types of the Enkingen (SUBO 18) drill core. (A) Facies 1 clay-rich conglomeratic sandstone, 18.32-18.50 m depth. (B) Facies 2 argillaceous *Hydrobia*-limestone, thin section, 21.20 m depth. Gastropods (arrows) are cemented by sparry calcite. (C) Facies 3 laminated dolomite, thin section, 14.25 m depth. (D) Facies 3 laminated dolomite, thin section, 14.32 m depth. Note small peloids in lower part of the section (arrows). (E) Facies 4 bituminous shale, thin section, 17.60 m depth. (F) Facies 5 laminated claystone, 19.50 m depth. (G) Facies 6 stratified claystone, 5.47 m depth. (H) Facies 7 carbonaceous clay, 18.12 m depth. Note shell fragments of ostracodes (arrows).

Figure DR 2: Partial mass chromatogram of the F3 of the claystone sample from 8.46 m (analysed as BSTFA-derivatives). Mass spectra of the two archaeal compounds archaeol and C_{20}/C_{25}-archaeol are also shown. Compounds were identified from comparison with published mass spectra (Teixidor and Grimalt, 1992; Teixidor et al., 1993). TIC = total ion chromatogram.

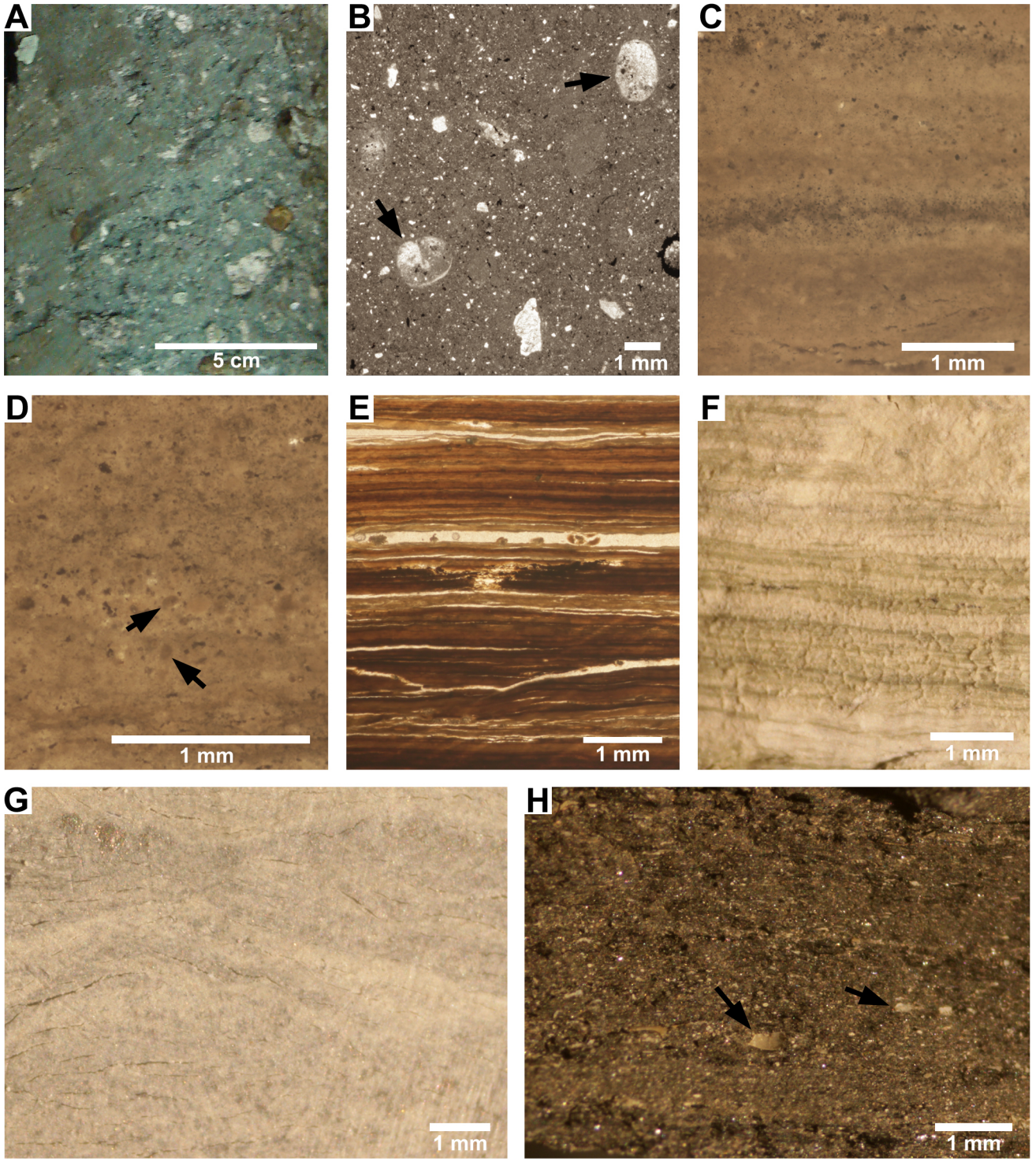
Table DR 1: Description of the lithologic succession encountered by the Enkingen (SUBO 18) drill core.

Table DR 2: Compound-specific $\delta^{13}C$ values (‰ V-PDB) of biomarkers detected in samples of the drilling Enkingen (SUBO 18).

REFERENCES CITED

Teixidor, P., and Grimalt, J.O., 1992, Gas chromatographic determination of isoprenoid alkylglycerol diethers in archaebacterial cultures and environmental samples: Journal of Chromatography, v. 607, p. 253–259.

Teixidor, P., Grimalt, J.O., Pueyo, J.J., and Rodriguez-Valera, F., 1993, Isopranylglycerol diethers in non-alkaline evaporitic environments: Geochimica et Cosmochimica Acta, v. 57, p. 4479–4489.


A
5 cm
B
1 mm
C
1 mm
D
1 mm
E
1 mm
F
1 mm
G
1 mm
H
1 mm

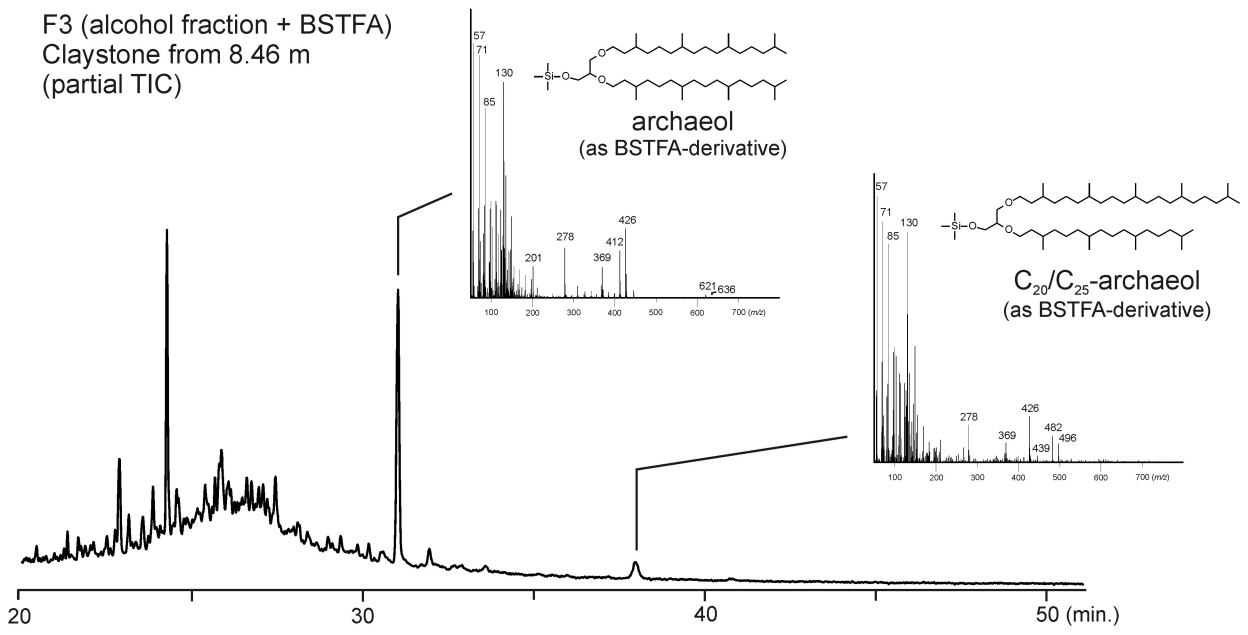

F3 (alcohol fraction + BSTFA)
Claystone from 8.46 m
(partial TIC)
archaeol
(as BSTFA-derivative)
C20/C25-archaeol
(as BSTFA-derivative)
20
30
40
50 (min.)

Table DR1

Depth [m bsf]	Lithology
0.70	darkbrown clayey-sandy silt, humous and friable; scattered white-grey limestone pebbles up to 1.5 cm diameter;
1.60	middle- to darkbrown, sandy-silty clay, weakly humous, stiff, calcareous, scattered Jurassic limestone pebbles up to 1.0 cm diameter in basal parts;
2.35	grey-brown sand and gravel (Jurassic limestones and cherts) in clayey-silty groundmass;
2.60	darkgrey-brown sand and gravel, in humous clayey-silty groundmass;
3.55	ochre-grey, strongly silty-sandy gravel (Jurassic limestone pebbles up to 4.0 cm diameter) in strongly calcareous groundmass;
3.75	darkgrey-brown, strongly silty-sandy gravel (Jurassic limestone pebbles up to 4.0 cm diameter) in humous groundmass;
4.50	ochre-grey, strongly silty-sandy gravel (Jurassic limestone pebbles and cobbles up to 9.0 cm diameter);
5.72	olive-grey to white-grey claystone; stratification poorly visible (lithofacies 6);
6.15	olive-grey to white-grey claystone with white-grey marl patches; poorly stratified (lithofacies 6);
8.10	olive-grey claystone, stratification poorly visible (lithofacies 6), with disseminated iron sulfides and flat-oval iron sulfide concretions up to 1.5 cm in size; at -7.25 and -7.94 m depth a paper-thin micrite lamina each;
9.00	olive-grey laminated claystone (lithofacies 5) with iron sulfide concretions and layers; lamination due to dark organic-rich and light dolomitic layers; at -8.46 to -8.47 and -8.97 to -8.99 m depth black-brown carbonaceous clay (lithofacies 7);
10.30	olive-grey claystone, stratification poorly visible (lithofacies 6), with disseminated iron sulfides and flat-oval iron sulfide concretions up to 1.0 cm in size; few scattered flat FeS-rich lignite clasts with oxidation halo; slump fold at -9.80 m;
10.65	olive-grey laminated claystone (lithofacies 5) with iron sulfide concretions; lamination due to light dolomitic layers; few scattered flat FeS-rich lignite clasts with oxidation halo;
12.00	olive-grey bituminous shale with disseminated iron sulfide (lithofacies 4); lamination due to dark organic-rich and light dolomitic layers;
12.20	alternation of (1) olive-grey bituminous shale with white-grey dolomite laminae, and (2) dark-grey bituminous shale without carbonate laminae (lithofacies 4); slump folds;
12.80	dark-grey bituminous shale without carbonate laminae (lithofacies 4);
12.84	alternation of (1) olive-grey bituminous shale with white-grey dolomite laminae, and (2) dark-grey bituminous shale without carbonate laminae (lithofacies 4); slump folds;
13.00	dark-grey bituminous shale without carbonate laminae (lithofacies 4);
13.63	olive-grey bituminous shale with few white-grey dolomite laminae (lithofacies 4)
14.83	olive-grey laminated claystone with white-grey dolomite laminae (lithofacies 5); white-grey laminated dolomite layers (lithofacies 3) of 0.5 cm thickness at -14.25 m, -14.32 m, -14.39 m, -14.45 m and -14.68 m depth; sharp lower boundary;
15.00	light-grey to white-grey, fine- to medium-grained laminated calcareous sandstone to arenaceous limestone (lithofacies 2);
15.35	olive-grey claystone, stratification poorly visible (lithofacies 6); white-grey arenaceous limestone layers (lithofacies 2) at -15.05 m, -15.18 m; -15.20 m, -15.21 m and -15.30 m depth;
17.83	olive-grey bituminous shale with white-grey dolomite laminae (lithofacies 4); at -17.08 m depth one cm-sized lignite clast;
18.03	light-grey to white-grey, fine- to medium-grained laminated arenaceous limestone to calcareous sandstone (lithofacies 2);
18.20	olive-grey marly polymict conglomeratic sandstone with suevit pebbles (lithofacies 1); at -18.12 m to -18.13 m depth intercalated layer of black-brown carbonaceous clay with quartz grains and ostracode shell debris (lithofacies 7);
18.26	white-grey unstratified calcareous marlstone with coarse quartz grains and mm-sized shells (thin ostracod valves and one poorly preserved *Hydrobia* shell) (lithofacies 2); lower boundary diffuse;
18.32	olive-grey stratified claystone (lithofacies 6);
18.50	olive-grey, clayey-sandy marlstone with polymict pebbles composed of poorly rounded suevite- and peloidal limestone-clasts (lithofacies 1);
20.16	olive-grey laminated claystone (lithofacies 5); at -19.24 m depth lignite clasts; at -18.55 m to -18.60 m, -19.59 m to -19.62 m, -19.91 m to -19.93 m and -20.13 m to 20.16 m depth white-grey calcareous marlstone layers (micrite);
21.06	grey clayey polymict conglomeratic sandstone with cm-sized suevit pebbles (lithofacies 1); cm- to dm-scale stratification, from 20.42 to 20.55 m and 20.80 to 20.90 accumulation of coarse pebbles;
21.19	grey, argillaceous dolomitic limestone with fine-grained quartz, peloids and *Hydrobia* shells (lithofacies 2); lower bedding plane with suevite pebbles;
23.00	grey clayey polymict conglomeratic sandstone with cm-sized alterated crystalline rock fragments floating in fine-grained matrix (lithofacies 1); patches of iron sulfides with with oxidation halo; at 21.80 m depth white gastropod shell fragments; lower boundary poorly defined;
25.00	grey suevite poor in glass bombs and rich in crystalline rock fragments; high clay content due to *in situ* alteration;
100.00	suevite and impact melt agglomerates (Pohl et al. 2010; Reimold et al. 2010)
	[end-of-hole]

Table DR2

Sample	lithofacies	octacosa-noic acid	β,β-C32-hopanoic acid	tocopherol (vitam. E)	dinosterol	isoprenoidal thiophenes (HCs)	C38:2-alkenone (Me)	archaeol	C25/C20-archaeol
5.47 m	6	-28.9	-30.5	—	—	—	—	-22.6	—
8.47 m	7	-27.1	-28.6	—	—	—	-25.9	-22.9	-21.1
12.01 m	4	-28.0	—	-28.5	-26.7	—	-25.4	-27.1	—
17.60 m	4	—	-27.6	-26.1	-28.3	-27.0	-25.8	-28.1	—
18.22 m	2	—	—	—	—	—	—	-27.5	—