DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE RAPPORT 2014/4

Kim Fjelde-1 core Well, GGU 517007, eastern Peary Land, North Greenland: Completion report

Anders Pilgaard

GEOLOGICAL SURVEY OF DENMARK AND GREENLAND
MINISTRY OF ENVIRONMENT AND ENERGY

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Confidential report

Copy No.

Released 01-07-2025

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G E U S

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2. General information

2.1 Borehole data

Country	Greenland / Denmark
Borehole number	GGU 517007
Borehole name	Kim Fjelde-1 (after the area Kim Fjelde)
Area	Eastern Kim Fjelde, eastern Peary Land, North Greenland
Operator	GEUS
Drilling operator	GEUS

Borehole Location

Altitude:	385 m above mean sea level.
Coordinates WGS 84:	Latitude: 82°37.053´ N, Longitude: 21°34.375´ W
UTM (wgs84):	9173805 N 491 871 E (UTM Zone 27)

Drill rig	Sandvik DE 130
Drilling contractor	GEUS
Casing diameter	64/57 mm
Casing depth	Casing 64/57 mm to 10.18 m
Borehole diameter	56 mm
Core diameter	42 mm
Total depth	142.11 m
Total core recovery	99%
Status	Top of casing closed with a steel cap.

Logistic history:

Drilling crew members arrive from previous drill site	July 31st 2102
Last equipment arrive	August 6th
Spud	August 6th
Drilling completed	August 10th
Demobilization and transportation to Station Nord	August 11th - August 13th
Effective drilling	5 days
Total days on drill location	14 days

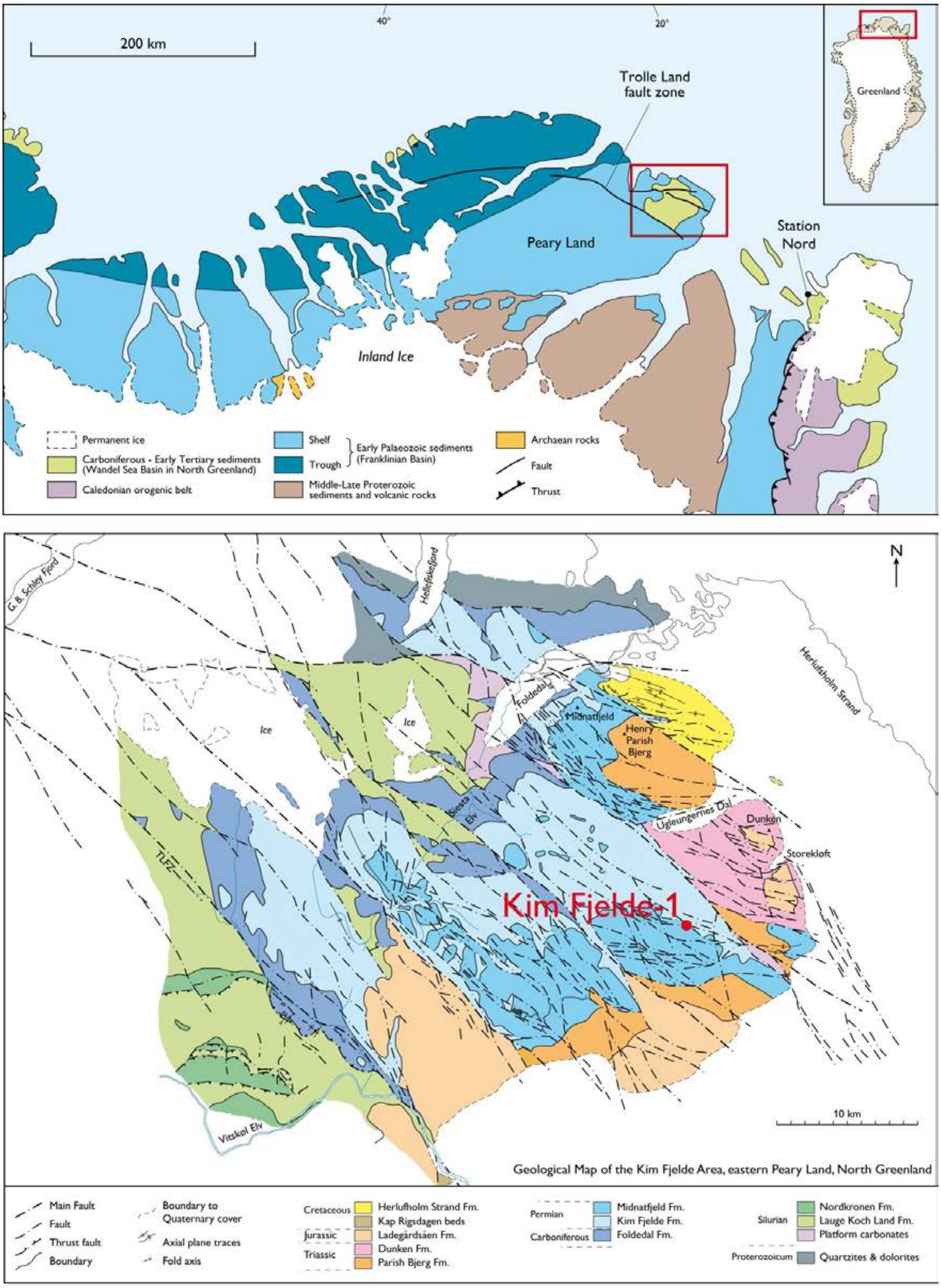
2.2 Borehole summary

Kim Fjelde-1, GGU 517007, was drilled during the summer of 2012 in eastern Kim Fjelde on eastern Peary Land, North Greenland, approximately 140 km NNW of Station Nord and 825 km from the North Pole (Figure 1-1). The name Kim Fjelde-1 is derived from the surrounding mountain area Kim Fjelde.
Kim Fjelde-1 is the seventh core hole in an onshore drilling program in East, North-East and North Greenland that began in 2008. The drilling program is part of a collaboration between GEUS and a number of oil companies regarding Petroleum Geological Studies, Services and Data in East, North-East and North Greenland. Up to the present the drilling programme includes following cores: Blokelv in central Jameson Land (2008); Rødryggen-1 on Wollaston Forland (2009); Store Koldewey-1 on Store Koldewey and Brorson Halvø-1 on Wollaston Forland (2010); and Nanok-1 on Hold with Hope (2011). The results of the 2012 drilling season were the Dunken-1, Dunken-2 and Kim Fjelde-1 core-holes in northern and eastern Kim Fjelde, and the cores are thus the first core data from the western continuations of the Barents Sea *i.e.* the Wandel Sea Basin.

The primary objective of Kim Fjelde-1 was to core the marine carbonates and claystones of the Permian Midnatsfjeld Formation, Mallemuk Mountain Group (erected by Håkansson, 1979), to obtain fresh unweathered and continuous samples for investigations of source rock potential and detailed stratigraphy on the mudstone- and claystone-prone succession.
However, organic geochemical screening data have shown the deposits to be organically lean and devoid of petroleum source potential.

The Kim Fjelde-1 borehole was spudded on August 6th 2012 and completed on August 10th 2012 at a total depth of 142.11 m, covering practically most of the thickest shallowing upward megacycle contained in the Midnatsfjeld Formation. The core recovery from the surface to TD was 99%. The core diameter is 42 mm and cores are stored in 22 core boxes of c. 25 kg each.
Drilled formations: Quaternary (0.0-1.5 m) Midnatsfjeld Formation (1.7-142.11 m). Depth measured below surface.

The borehole was abandoned and plugged at the top by a steel cap. The steel cap was perforated in order to enable the installation of a temperature-string down to 20 m for scientific purposes.



GN01_02_054_APIL_KimFjelde

Figure 2-1 Upper map. Map showing the present extension of the sediments from the Wandel Sea Basin in North Greenland, reprinted with modifications from Stemmerik *et al.* (1996) and Kragh *et al.* (1997). Lower map. The existing compiled detailed map from 1994 of the Kim Fjelde Area. Eastern Peary Land (Zinck-Jørgensen and Håkansson, 1994). Kim Fjelde-1 is marked with a red dot.

3. Drilling operation

The drilling camp personnel:

Senior technician John Boserup, GEUS
Driller Jan Varup, Varup Consult
Technician Anders Clausen, Dana Geo-Consult
Well site geologist Anders Pilgaard, GEUS
Driller's assistant Fredrik Sønderholm, GEUS

Drilling was carried out by a Sandvik DE 130 wire line rig. The borehole diameter is 56 mm, whereas the core diameter is 42 mm. The used casing diameter had an inner and outer casing diameter of 57 mm and 64 mm, respectively.
Water for drilling was meltwater supplied by a diesel-driven water pump through hoses into an inflatable 5000 ℓ basin, the water was headed to approximately 35°C before entering the drill hole and salt was dissolved in the water when necessarily. Permafrost was present from a few metres below terrain surface and down to TD.

The military Station Nord acted as official GEUS-Basecamp during the field season. Logistics were handled by GEUS in corporation with POLOG and for field support a helicopter from Air Greenland (Eurocopter AS-350) was chartered of Greenland Air for a full field season.

Drill rig and field equipment were flown from Aalborg to Station Nord with an ANTONOV-12 transport plane. From Station Nord the drill rig parts and equipment were transported in sling nets with helicopter to the Kim Fjelde area, a distance of c. 140 km. The helicopter was a Eurocopter AS-350, which has a maximum sling load of 1.3-1.4 tons (less actual load capacity with longer distances). After completion of the Dunken-2 well, the drilling operation continued at the Kim Fjelde-1 well c. 9 km to the west. After the season all equipment including drill rig and drill cores returned to Aalborg in an ANTONOV-12 transport plane.

Transportation to a new drill site requires breaking of the camp and partial dismantling of the drill rig, which were initiated July 31st and completed August 6th effectively delayed by helicopter engine problems and one day of heavy fog. The effective drilling took 5 days (Figure 2-3 and Appendix A). In Kim Fjelde-1 casing was drilled to 10.18 m, and drill core recovered to 142.11 m. Demobilisation and transport to basecamp at Station Nord took 3 days with one day spend in fog. All equipment and crew were flown to Station Nord during August 13th assisted by Twin Otter landing at Sletten, a valley in the Kim Fjelde area with a provisional gravel landing-strip.

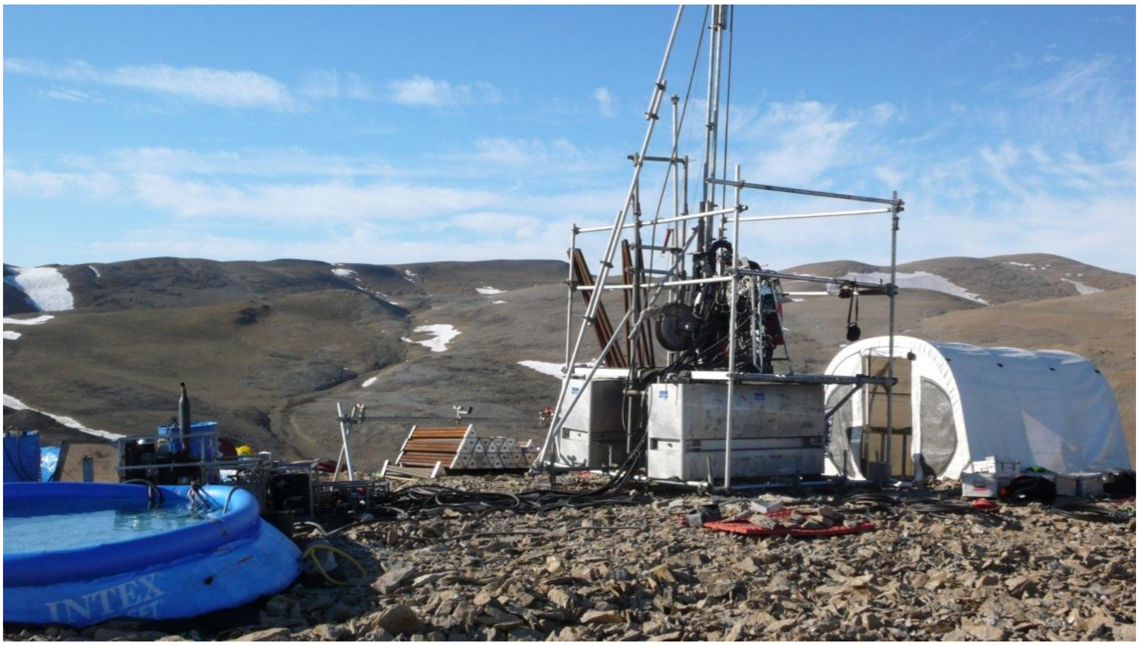


Figure 3-1 The drill rig at Kim Fjelde-1 with the inflatable blue basin in the front right and logger’s tent in the distant left.

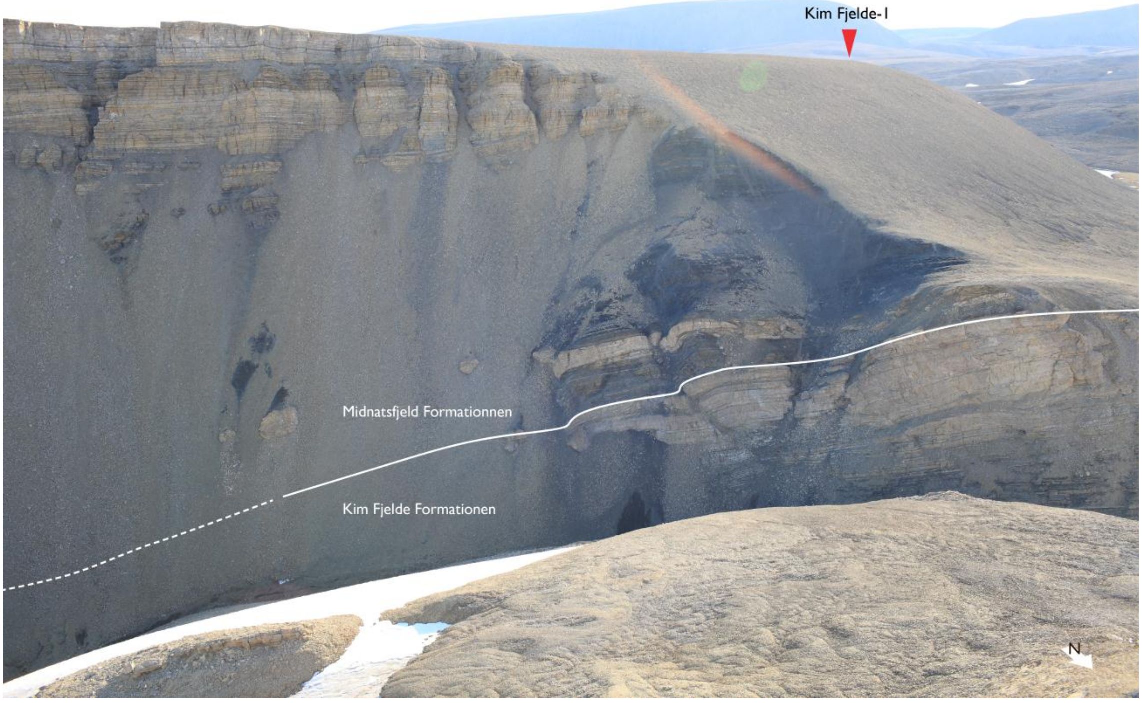
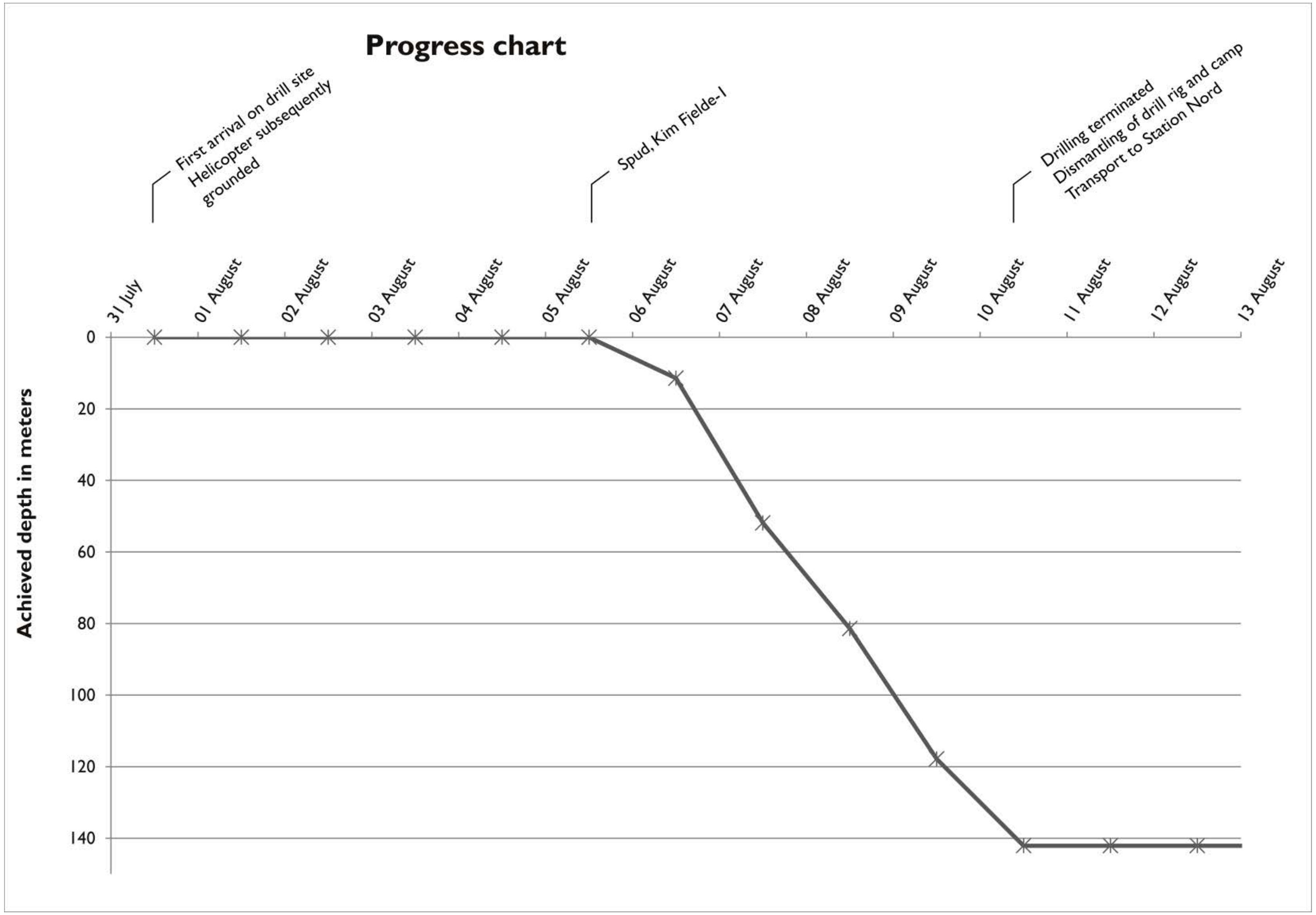


Figure 3-2 Near the Kim Fjelde-1 well a narrow fault-related canyon exposes the Midnatsfjeld Formation and the interpreted boundary to the Kim Fjelde Formation. The Midnatsfjeld Formation succession is two shallowing upward megacycles, uneven in size. Strata approximately strike 140° and dip 5°SW. Note: the boundary between Kim Fjelde Formation and Midnatsfjeld Formation is a major flooding surface that marks the change from chert-rich carbonates to prominently siliclastic sediments of Midnatsfjeld Formation (Stemmerik *et al.*, 1994).

Figure 3-3 Progress chart; achieved drilling depth in meters during presence at the Kim Fjelde drill site.See appendix A for detailed description.



4. Geological and geophysical data

The Kim Fjelde-1 borehole is located in the eastern part of Kim Fjelde, eastern Peary Land, North Greenland (Figure 1-1). The hinterlands of Peary Land is a landscape composed by gently S-SW dipping strata cut by fault-related canyons, and thus the drilled succession is fully exposed in a nearby canyon.

4.1 Objectives

The target of the well was the marine carbonates and claystones of the Permian Midnatsfjeld Formation, Mallemuk Mountain Group (erected by Håkansson, 1979; revised by Stemmerik *et al.* 1996. Mallemuk Mountain Group first erected as a Formation by Koch, 1929). At the drillsite the formation consists of at least one, possible two, shallowing upwards megacycles approximately 200 m in total, containing shaly claystone and biogenic carbonates both with chert-rich horizonts. The formation changes to a more siliclastic sand-rich formation towards Foldedal to the north (Stemmerik *et al.*, 1996a). The primary objective for the drilling programme was to investigate the source rock potential of the shaly claystone of Midnatsfjeld Formation. Secondary objectives included detailed sedimentological and stratigraphic studies.

4.2 Drilling results

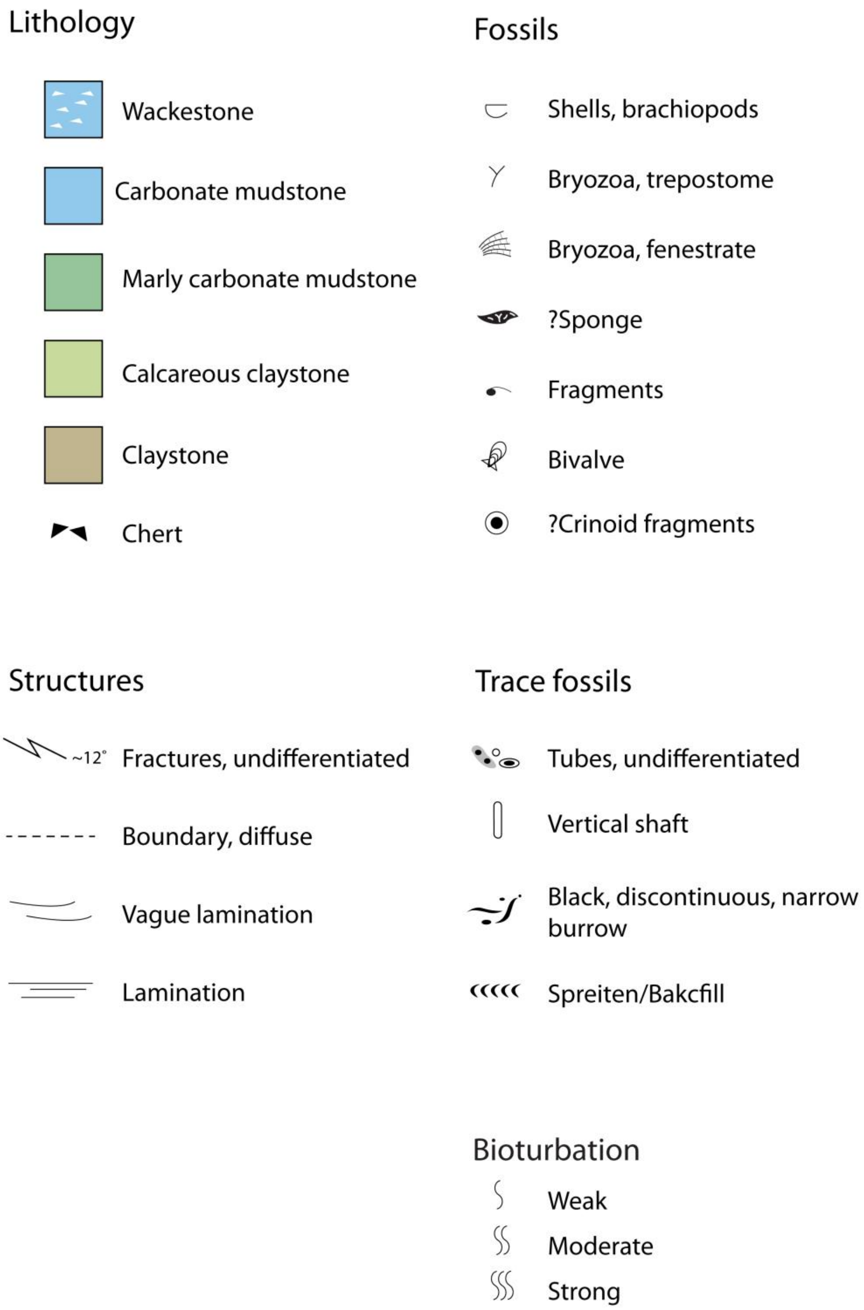
The Kim Fjelde-1 core penetrated a 142.11 m thick succession covering most of the upper shallowing upwards megacycle of the Midnatsfjeld Formation. The succession records and overall upward change from black, vitreous, homogeneous claystone to dark grey weakly bioturbated calcareous claystone ending with bioturbated, grey marly carbonate and carbonate mudstone with layers of wackestone and chert. Dominating fossils are brachiopods and bryozoans.

The base of Midnatsfjeld Formation was not reached.

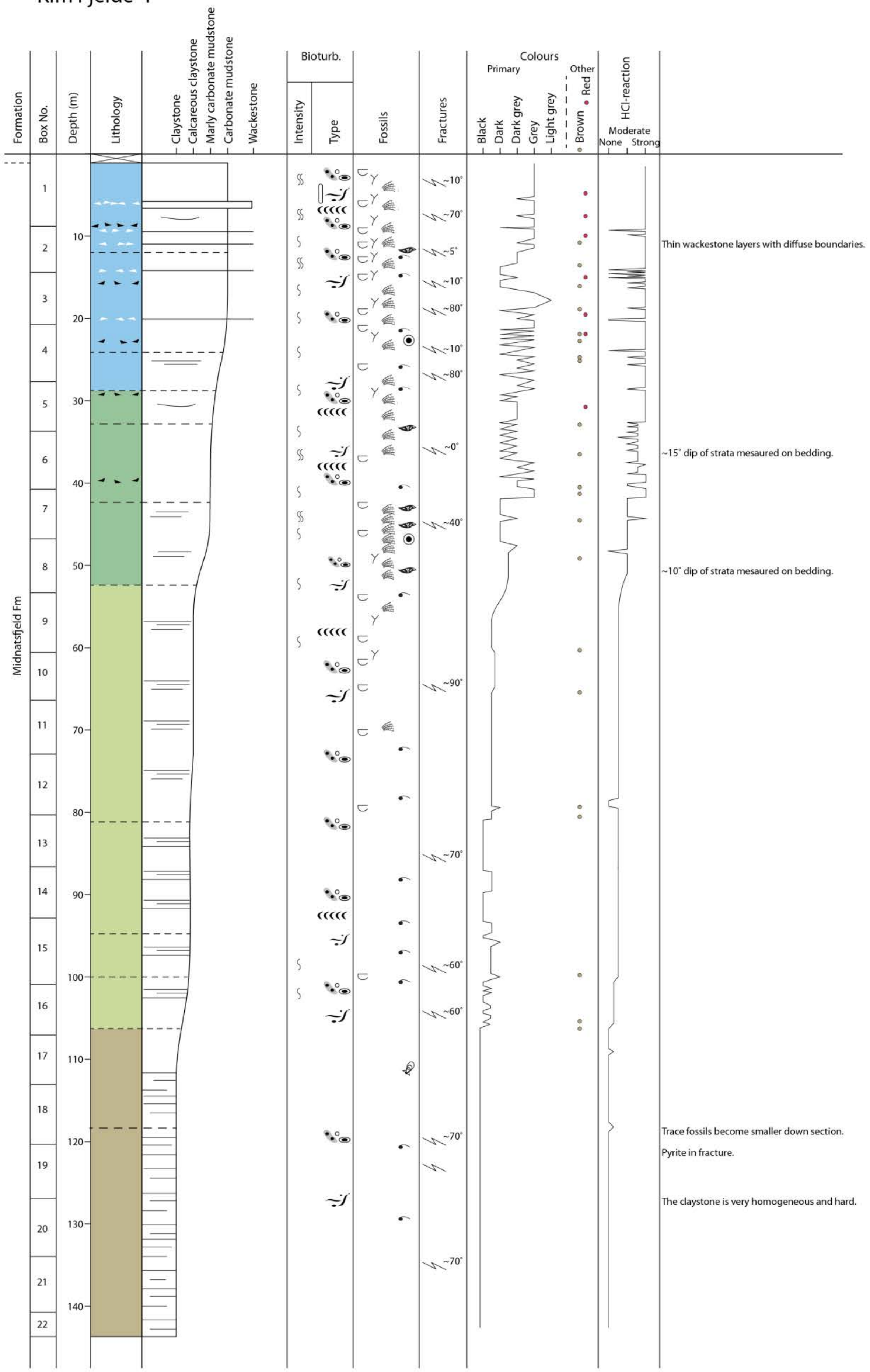
4.3 Coring

Conventional coring was performed from terrain surface to TD at 142.11 m. The total core recovery was 99%. The quality of the core is excellent. A preliminary sedimentological log of the pristine core was prepared on site (Figure 3-1, condensed sedimentological log).

Figure 4-1 This page. Legend for sedimentological log. Next page. Condensed preliminary sedimentological log of the Kim Fjelde-1 core. Kim Fjelde-1 was drilled in the Midnatsfjeld Formation.



Kim Fjelde-1


Formation
Box No.
Depth (m)
Lithology
Claystone
Calcareous claystone
Marly carbonate mudstone
Carbonate mudstone
Wackestone
Bioturb.
Intensity
Type
Fossils
Fractures
Colours
Primary
Other
Black
Dark
Dark grey
Grey
Light grey
Brown
Red
HCl-reaction
None
Moderate
Strong
Midnatsfjeld Fm
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
10
20
30
40
50
60
70
80
90
100
110
120
130
140
~10°
~70°
~5°
~10°
~80°
~10°
~80°
~0°
~40°
~90°
~70°
~60°
~60°
~70°
~70°
Thin wackestone layers with diffuse boundaries.
~15° dip of strata mesaured on bedding.
~10° dip of strata mesaured on bedding.
Trace fossils become smaller down section.
Pyrite in fracture.
The claystone is very homogeneous and hard.

4.4 Sampling programme at the drill site

A total of 13 whole core samples for gas analyses were straight away collected in the clay-ish interval of the recovered core for every 6 m in average. Samples are up to 10 cm long and were stored in sealed metal cans. 106 samples from the core were collected for Rock-Eval/TOC screening and biostratigraphic age identification . The latter will be based on palynomorphs and the taxonomical identification work is executed at GEUS. (See appendix C.). In addition, geologists over the years have sampled fieldsamples in the outcrops including samples for conodont-dating of carbonates.

4.5 Total GR-log

A total GR-log in cps-units (counts per second) along with a spectral GR-log and bulk density-log were performed at GEUS's laboratory. The logs was done in two runs (tracks) due to technical problems and brought into agreement with one another. Only the total GR-log is depicted in this report (see Figure 4-2).
The changes in GR-log characteristics down through the Kim Fjelde-1 well core are well mirrored in the lithological changes, and mainly reflects the contents of clays and carbonates at different intervals.

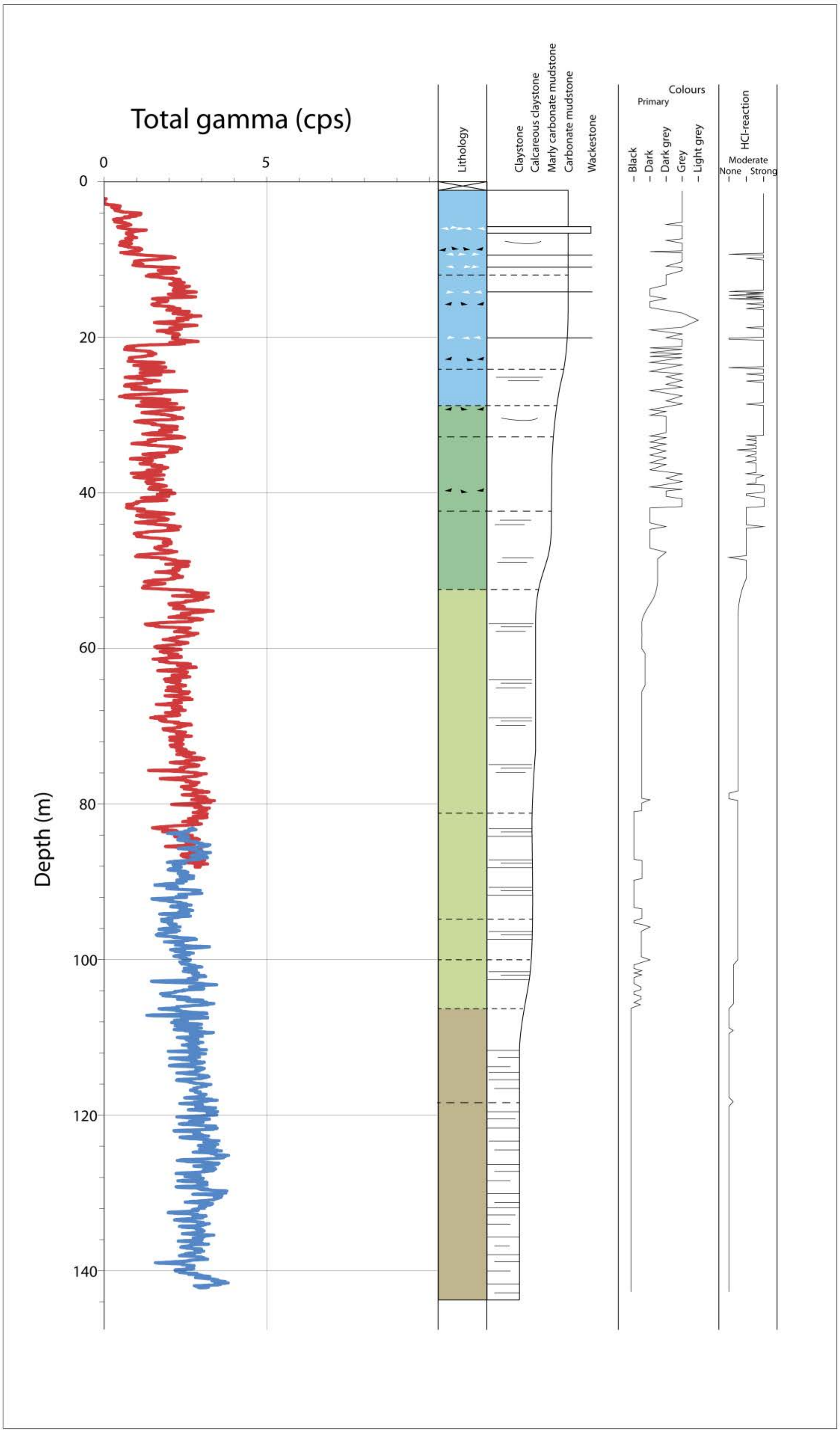


Figure 4-2 Total GR-log of the Kim Fjelde-1 well. The log was done at GEUS and is a composite log of two runs (tracks) due to technical problems.

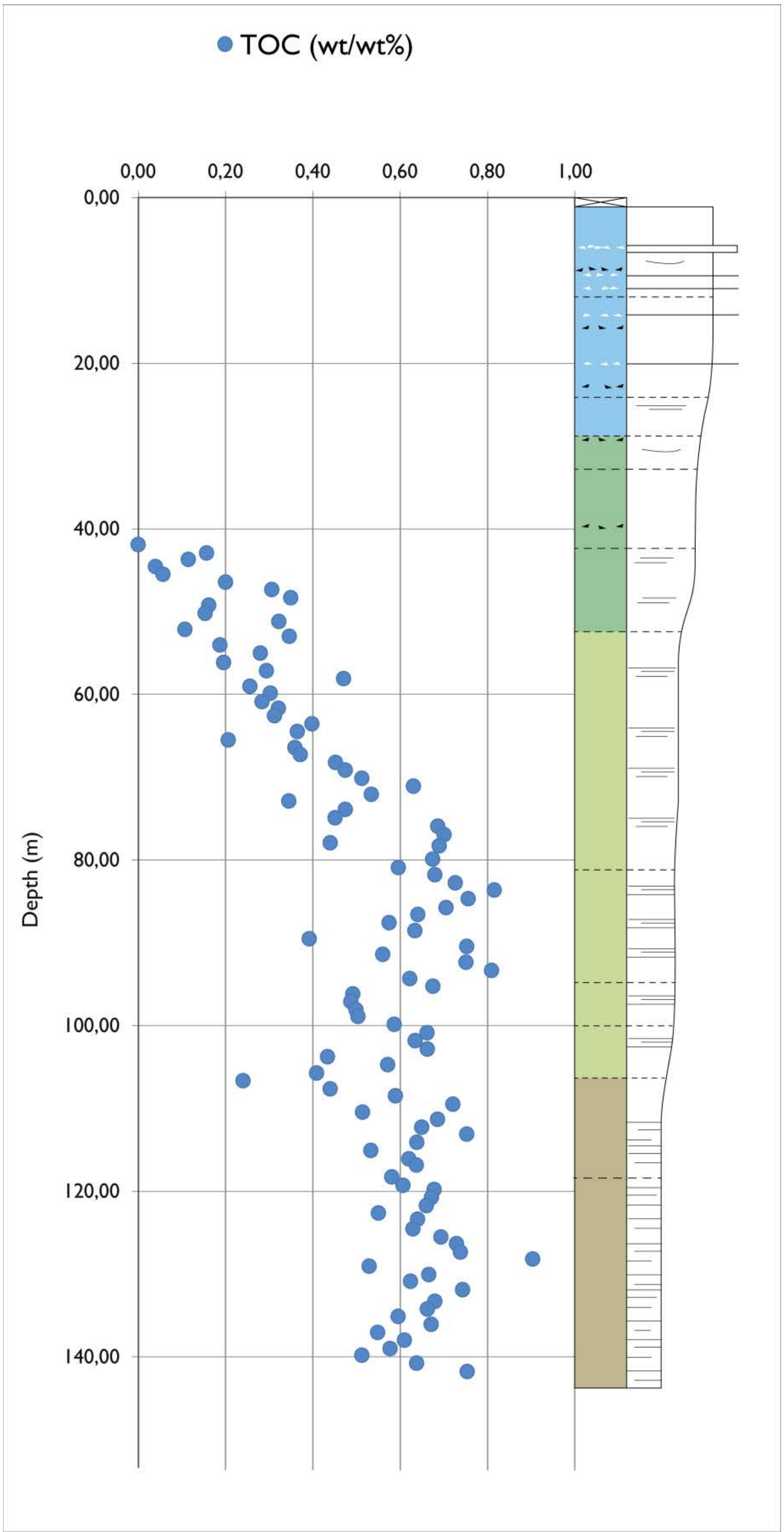


Figure 4-3 Total organic carbon (TOC) data on the Kim Fjelde-1 well from samples collected during drilling. No measurements were made above 40 meters.

Figure 4-4 A picture from the fault-related canyon east of the drill site showing the bottom of the canyon with a small hidden stream covert by ice and debris.

4.6 TOC screening

Samples taken during the drilling operation for TOC screening were analyzed at GEUS. The results are shown in figure 3-3. (No measurements were made above 40 m.)
The TOC-values increase in the interval from 40 m down to app. 80 m where after the TOC-values remain stable down section to TD (average 80m-TD: 0.62 wt%). The simple average of the TOC screening results are 0.51wt%.
It can be concluded that the cored interval has no source rock potential.

4.7 Biostratigraphy of the cored succession

Dating the carbonate prone Mallemuk Mountain Group is a challenge, requiring a multi-disciplinary approach. Midnatsfjeld Formation was originally dated by Håkansson (1979) to either Upper or Lower Permian with reference to Dawes (1976). Based on small foraminifera and palynomorphs Stemmerik *et al.* (1996) dated the Midnatsfjeld Formation as essentially Kazanian in age, possible lower parts latest Kungurian, missing precise conodont dating of the carbonates. Age classification of the core based on macrofossils, palynomorphs and new conodont samples from the carbonates will be attempted.

4.8 Description of lithology

The Kim Fjelde-1 core is preliminary divided into intervals according to overall similar lithology, disregarding sequence stratigraphy, biostratigraphy etc.

0.0-1.5 m
Quarternary cover.

1.5-29 m
The upper interval is the most fossil-rich and carbonate-rich part of the core and consists of carbonate mudstone with secondary wackestone layers.
CARBONATE MUDSTONE, dark – light grey, some diffuse laminations are visible but structures are otherwise only generated by bioturbation.
Dominating fossils are: a) Brachiopod shells of various size and different orientation; most noticeable are brachiopods with a thick shell and a distinct bilobate shape (possibly *Productus* sp.). Other abundant faunal elements are b) Bryozoans can be divede into two different morfotyped due to two distinct growth habits, characterized by either a round solid structure from which center the zooids radiate (trepostomes) or a network structure with small gaps between the branches (fenestrates). Secondary c) Possible complete sponges (porifera) are visible as round clusters of white, narrow, spicule-like objects. d) Crinoid fragments are present as columnals (at least one example with synostosial articulation).
Trace fossils can roughly be divided into four toponomic simple groups: a) Horizontal tube burrows with different size and twisting, some without a rim, some with white big centers and delicate black rims, other with small black centers and thick white round rims. These trace fossils are left undifferentiated and belong to more than one ichnotaxa. b) One example of a 1.5 cm thick vertical shaft was found without any internal pattern. c) Black, discontinuous, narrow (1mm) burrows, no more than 1 cm long and often bended slightly into a curve (?*Helminthopsis*). d) White horizontal trace fossils with dark, delicate, half-moon-shaped spreiten or backfill (?*Zoophycos/?Taenidium)*.
WACKSTONE, grey, no more than 40 cm thick beds with diffuse boundaries, brachiopod dominated. The fossils are often with a red or pink luster, possibly related to chertification.

Fractures are most common in this upper core interval; with or without calcite and clay infill. A few sharp constrained, thin (2 cm), light and dark chert layers are present.

29-52 m
MARLY CARBONATE MUDSTONE, dark – grey, none to distinct lamination. Dominating fossils are fenestrae bryozoans but brachiopod shells, trepostome bryozoans, ?sponges and ?crinoid fragments are also present. The degree of bioturbation varies from weak to strong. The interval contains the highest concentration of trace fossils with spreiten/backfill structures. A few sharp constrained, thin (2 cm), light and dark chert layers are present

along with a number of fissures filled with a somewhat transparent mineral (unidentified). Calcite filled fractures and brownish colours are also present.
Between 52 m and 44 m the core is dark and highly dominated by flat lying fenestrate bryozoans and at depth c. 32 m the core up section becomes generally more reactive to HCl indicating an increase in carbonate content. The flat lying fenestrate bryozoans dip approximately 10°.

52-107 m

CALCAREOUS CLAYSTONE, black – dark grey, some lamination, in places very hard and vitreous. Shells and shell fragments are common along with fewer bryozoans (not *in situ*). The degree of bioturbation is sparse and trace fossils decreases in size downwards. Overall the colour of the interval becomes lighter upwards. From 107 to 81 m the core is characterized by meter thick intervals with some variation in colour and degree of bioturbation separated by poorly defined boundaries. From 81 to 52 m the core shows less distinct bedding and contains more unfragmented fossils.

107-142.11 m

CLAYSTONE, black, homogeneous – possible highly laminated to shaly, very hard and vitreous (possibly related to chertification). One well-preserved bivalve were observed on partings (4-5 cm in diameter, and with prolonged hinges creating auricles on both sides of the umbo), additional observations were restrained to some fossil fragments and scattered very small trace fossils.
In the interval TD to c.118 m the core shows no reaction on HCl, and at depth 121 m pyrite is present in a fracture. Dip of strata could not be determined with certainty.

Figure 4-5 Next page. Four examples of core box photos from the Kim Fjelde-1 core. The cores are dry and stratigraphic up is in the top left corner and stratigraphic down is in the lower right corner of the boxes.

Box 2
8.04 m -14.65 m

Box 7
41.01 m -47.34 m

Box 16
100.85 m -107.6 m

Box 20
127.24 m -134.20 m

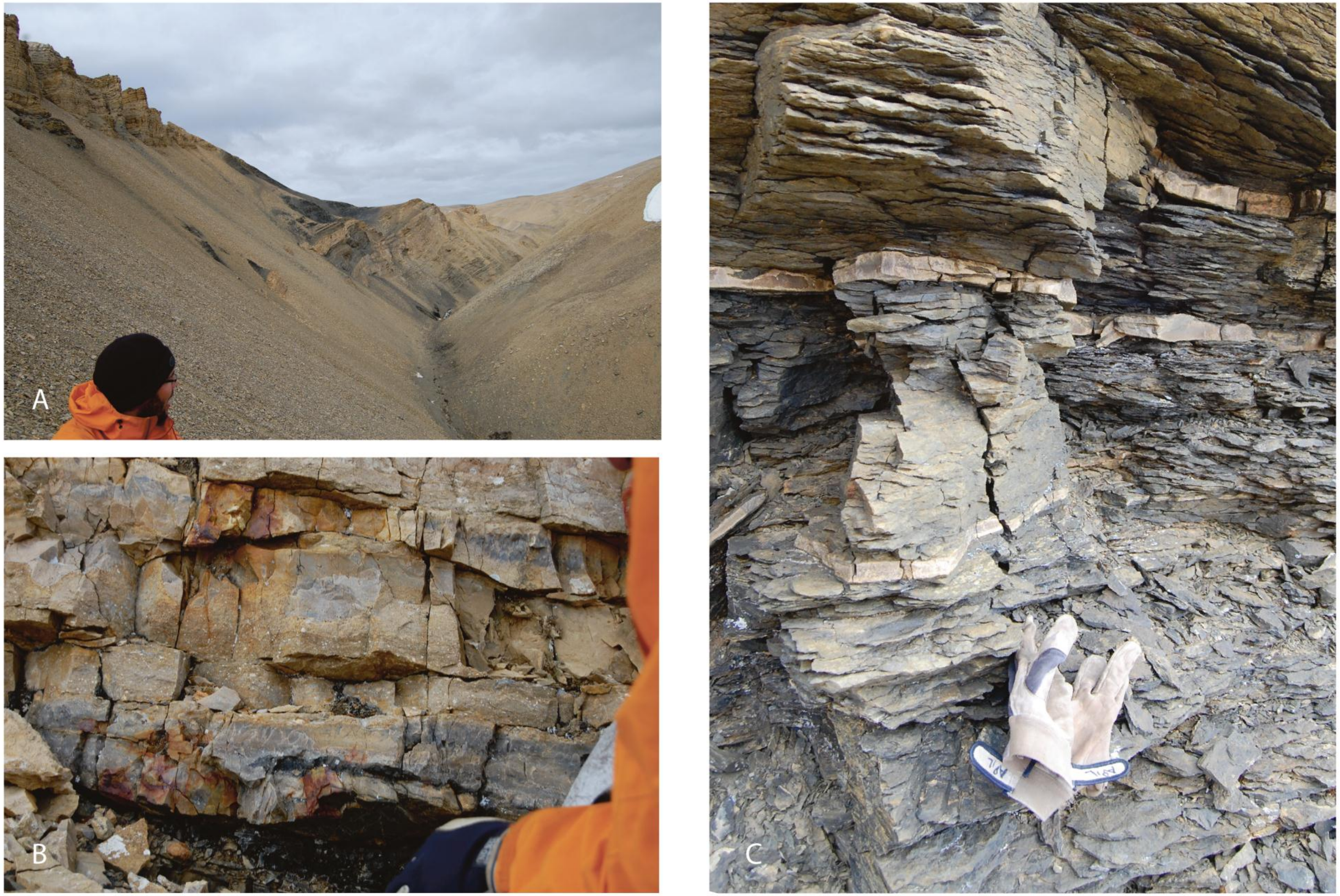
4.9 Relation to nearby outcrops

The canyon at the drill site is one of the known outcrops of the Kim Fjelde Formation and the Midnatsfjeld Formation (e.g. Stemmerik *et al.* 1996). The Kim Fjelde-1 drill site is located near the top of the carbonates of the Midnatsfjeld Formation (see Figure 4-6).

At the surface near the drill site, yellowish weathering of the carbonates has uncovered a range of fossils, dominantly brachiopods and bryozoans. The bryozoans can be divided into two morfotypes; a) An erected, radial, solid, and bifurcated bryozoans (trepostomes); and b) fan-shaped bryozoans with extrazooecioal skeletal connections (fenestrates) (Hageman *et al.*, 1998). The brachiopods are generally characterized by strong bilateral symmetry, for instance some are plano-convex brachiopods with a big, prolonged (bilobate and “scoope”-shaped) mantle body cavity (?*Productus*), and others are biconvex brachiopods with a long hinge line. Rugosa corals were observed in situ. Distinct trace fossils are *Zoophycos* isp. and an abnormal big vertical homogenous tube trace. One example of *in situ* bryozoan boundstone was encountered.

On the slopes, the yellow-weathered carbonates are easily recognized and show signs of big scale dynamic sedimentation (?clinoforms). The carbonates contain horizons of pinching and swelling chert and some wackstone (see Figure 4-6, B). Underneath the upper carbonate-unit a downward transition to less resistant black shaly claystones, in which the drilling terminated, are observed (see Figure 4-6, C). The lithology underlying the cored succession is c. 5-10 meter thick yellowish weathered carbonate mudstones with slumping followed by black, chert-rich claystone c. 20 m thick. The boundary to Kim Fjelde Formation is a major flooding surface that stratigraphal downwards marks the change to exclusively carbonate sediments and chert (Stemmerik *et al.*, 1994). The exact position of the boundary is in some areas uncertain.

Figure 4-6 Well exposed outcrops of the Minatsfjeld Fm. in the canyon just east of the Kim Fjelde-1 drill site. A. View of the canyon. B. Detailed photo of yellow weathering, partly chertified carbonate mudstone. Arm of person for scale. C. Detailed photo of bedded shaly mudstone and carbonate mudstone.



5. Future investigations

As a result of the absence of petroleum generation potential exhibited by the mudrocks of the Kim Fjelde-1, it has been decided that the core cannot support a full detailed core study in the framework of the Petroleum Geological Studies, Services and Data in East, North-East and North Greenland. Publication of the Kim Fjelde-1 corehole data is planned.

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7. APPENDIX

Appendix A: Daily drilling activities for Kim Fjelde drill site.
Appendix B: Kim Fjelde-1, GGU 517007, Core Box Depths.
Appendix C : Kim Fjelde-1, GGU 517007. Core Samples Depths.

Appendix A: Daily drilling activities for Kim Fjelde drill site.

Date	Cored (m)	Remarks
31/07-04/08 2012		Drilling crew members arrived from previous drill site the 31st of July but essential drilling equipment failed transportation due to helicopter engine problems. The helicopter was grounded for five days and subsequently drilling was delayed. Establishment of drill rig and camp.
05/08 2012		Fog preventing any helicopter services to the camp.
06/08 2012	11.42	Kim Fjelde-1 well spudded. Casing drilling 10.02 m (64/57) and core drilling 0-11.42 m with >99% core recovery from 1.75 m.
07/08 2012	40.47	Casing drilling 10.02-10.18 m (64/57). Core drilling 11.42-51.89 m with >99% core recovery.
08/08 2012	29.50	Core drilling 51.89-81.39 m with >99% core recovery. Minor problems with inner drill core rod.
09/08 2012	26.48	Core drilling 81.39-117.87 m with >99 core recovery.
10/08 2012	39.00	Core drilling 117.87-142.11 m with >99% core recovery. Minor permafrost problems. Drilling terminated and drill rods recovered to surface.
11/08 2012		Dismantling of drill rig.
12/08 2012		Fog disrupting any helicopter services to the camp.
13/08 2012		Dismantling of camp and flying all equipment and crew to Station Nord with help from helicopter and Twin Otter, landing at Sletten.

Appendix B: Kim Fjelde-1, GGU 517007, Core box depths.

Box	Box marked	Box top (m)	Box bottom (m)	Box cover-ing (m)
Box 1	Kim Fjelde-1	0.00	7.97	7.97
Box 2	Kim Fjelde-1	8.04	14.65	6.61
Box 3	Kim Fjelde-1	14.65	21.27	6.62
Box 4	Kim Fjelde-1	21.26	27.79	6.53
Box 5	Kim Fjelde-1	27.74	35.28	7.54
Box 6	Kim Fjelde-1	34.31	40.88	6.57
Box 7	Kim Fjelde-1	41.01	47.34	6.33
Box 8	Kim Fjelde-1	47.27	53.99	6.72
Box 9	Kim Fjelde-1	54.07	60.82	6.75
Box 10	Kim Fjelde-1	60.75	67.25	6.50
Box 11	Kim Fjelde-1	67.22	73.88	6.66
Box 12	Kim Fjelde-1	73.95	80.88	6.93
Box 13	Kim Fjelde-1	80.83	87.56	6.73
Box 14	Kim Fjelde-1	87.52	94.30	6.78
Box 15	Kim Fjelde-1	94.31	100.83	6.52
Box 16	Kim Fjelde-1	100.85	107.60	6.75
Box 17	Kim Fjelde-1	107.53	114.03	6.50
Box 18	Kim Fjelde-1	114.13	120.72	6.59
Box 19	Kim Fjelde-1	120.66	127.32	6.66
Box 20	Kim Fjelde-1	127.24	134.20	6.96
Box 21	Kim Fjelde-1	134.17	140.75	6.47
Box 22	Kim Fjelde-1	140.81	142.11	1.47

Appendix C : Dunken-2, GGU 517006. Core Samples Depths (sampled in the field).

Sub nr	Marker (m)	Marker to sample top (m)	Sample length (cm)	Core box	Purpose	Mean depth (m)
1	65.76	0.00	10	10	Head	65.81
2	72.29	0.00	10	11	Head	72.34
3	77.97	0.00	10	12	Head	78.02
4	83.07	0.00	10	13	Head	83.12
5	89.75	0.00	10	14	Head	89.80
6	96.42	0.00	10	15	Head	96.47
7	102.95	0.00	10	16	Head	103.00
8	109.57	0.00	10	17	Head	109.62
9	116.16	0.00	10	18	Head	116.21
10	122.37	0.00	9	19	Head	122.42
11	128.94	0.00	10	20	Head	128.99
12	135.99	0.20	10	21	Head	136.24
13	140.99	0.70	10	22	Head	141.74

Sub nr.	Marker (m)	Marker to sample top (m)	Sample length (cm)	Core-box	Purpose	Mean depth (m)
51	41.87	0.00	5	7	Screening	41.90
52	41.87	1.00	7	7	Screening	42.91
53	43.46	0.19	7	7	Screening	43.69
54	43.46	1.07	6	7	Screening	44.56
55	45.17	0.29	6	7	Screening	45.49
56	45.17	1.26	5	7	Screening	46.46
57	46.87	0.46	4	8	Screening	47.35
58	46.87	1.45	4	8	Screening	48.34
59	48.52	0.70	4	8	Screening	49.24
60	50.19	0.00	5	8	Screening	50.22
61	50.19	1.00	4	8	Screening	51.21
62	51.89	0.23	5	8	Screening	52.15
63	52.52	0.46	4	8	Screening	53.00
64	52.52	1.47	7	9	Screening	54.03
65	54.30	0.68	5	9	Screening	55.01
66	56.02	0.11	5	9	Screening	56.16
67	56.02	1.08	6	9	Screening	57.13
68	57.67	0.39	5	9	Screening	58.09
69	57.67	1.33	6	9	Screening	59.03
70	59.22	0.61	5	9	Screening	59.86

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Sub nr.	Marker (m)	Marker to sample top (m)	Sample length (cm)	Core-box	Purpose	Mean depth (m)
71	59.22	1.62	6	10	Screening	60.87
72	60.80	0.86	6	10	Screening	61.69
73	62.42	0.13	3	10	Screening	62.57
74	62.42	1.13	4	10	Screening	63.57
75	64.07	0.38	5	10	Screening	64.48
76	64.07	1.41	5	10	Screening	65.51
77	65.76	0.65	5	10	Screening	66.44
78	67.25	0.00	5	11	Screening	67.28
79	67.20	0.98	5	11	Screening	68.21
80	68.92	0.22	4	11	Screening	69.16
81	68.92	1.19	6	11	Screening	70.14
82	70.61	0.45	4	11	Screening	71.08
83	70.61	1.45	3	11	Screening	72.08
84	72.87	0.00	4	11	Screening	72.89
85	72.87	1.00	3	12	Screening	73.89
86	74.62	0.26	7	12	Screening	74.92
87	74.62	1.28	5	12	Screening	75.93
88	76.30	0.61	3	12	Screening	76.93
89	76.30	1.59	5	12	Screening	77.92
90	77.47	0.79	7	12	Screening	78.30
91	79.72	0.16	6	12	Screening	79.91
92	79.72	1.16	5	13	Screening	80.91
93	81.39	0.36	4	13	Screening	81.77
94	81.39	1.36	6	13	Screening	82.78
95	83.07	0.54	5	13	Screening	83.64
96	83.07	1.56	7	13	Screening	84.67
97	84.85	0.86	6	13	Screening	85.74
98	86.42	0.14	4	13	Screening	86.58
99	86.42	1.14	6	14	Screening	87.59
100	88.07	0.42	5	14	Screening	88.52
101	88.07	1.42	6	14	Screening	89.52
102	89.75	0.65	5	14	Screening	90.43
103	89.75	1.62	7	14	Screening	91.41
104	91.42	0.90	5	14	Screening	92.35
105	93.09	0.22	5	14	Screening	93.34
106	93.09	1.22	5	15	Screening	94.34
107	94.76	0.47	5	15	Screening	95.26
108	94.76	1.40	6	15	Screening	96.19

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Sub nr.	Mark-er (m)	Marker to sample top (m)	Sample length (cm)	Core-box	Purpose	Mean depth (m)
109	96.42	0.66	4	15	Screening	97.10
110	96.42	1.65	5	15	Screening	98.10
111	97.97	0.90	6	15	Screening	98.90
112	99.64	0.18	4	15	Screening	99.84
113	99.64	1.19	5	16	Screening	100.86
114	101.34	0.46	4	16	Screening	101.82
115	101.34	1.48	5	16	Screening	102.85
116	102.95	0.76	7	16	Screening	103.75
117	104.63	0.06	5	16	Screening	104.72
118	104.63	1.08	5	16	Screening	105.74
119	106.30	0.32	5	16	Screening	106.65
120	106.30	1.32	5	17	Screening	107.65
121	107.90	0.56	5	17	Screening	108.49
122	107.90	1.56	5	17	Screening	109.49
123	109.57	0.84	6	17	Screening	110.44
124	111.23	0.06	6	17	Screening	111.32
125	111.23	1.02	7	17	Screening	112.29
126	112.91	0.17	5	17	Screening	113.11
127	112.91	1.16	4	18	Screening	114.09
128	114.59	0.47	6	18	Screening	115.09
129	114.59	1.49	5	18	Screening	116.11
130	116.16	0.68	4	18	Screening	116.86
131	117.87	0.37	5	18	Screening	118.27
132	117.87	1.40	6	18	Screening	119.30
133	119.09	0.70	4	18	Screening	119.81
134	120.72	0.00	5	19	Screening	120.75
135	120.72	1.00	5	19	Screening	121.75
136	122.37	0.25	4	19	Screening	122.64
137	122.37	1.00	5	19	Screening	123.40
138	124.07	0.45	3	19	Screening	124.54
139	124.07	1.43	6	19	Screening	125.53
140	125.67	0.63	6	19	Screening	126.33
141	125.67	1.65	5	20	Screening	127.35
142	127.29	0.87	4	20	Screening	128.18
143	128.94	0.10	4	20	Screening	129.06
144	128.94	1.11	4	20	Screening	130.07
145	130.62	0.24	5	20	Screening	130.89
146	130.62	1.25	5	20	Screening	131.90

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Sub nr.	Mark-er (m)	Marker to sample top (m)	Sample length (cm)	Core-box	Purpose	Mean depth (m)
147	132.62	0.65	5	20	Screening	133.30
148	132.62	1.56	8	21	Screening	134.22
149	134.29	0.80	5	21	Screening	135.12
150	135.99	0.05	5	21	Screening	136.07
151	135.99	1.06	4	21	Screening	137.07
152	137.66	0.30	6	21	Screening	137.99
153	137.66	1.30	7	21	Screening	139.00
154	139.34	0.45	6	21	Screening	139.82
155	139.34	1.40	4	22	Screening	140.76
156	140.99	0.78	3	22	Screening	141.79