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Magnetic susceptibility of sedimentary rocks from Bjørnøya

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Submission date: July 2012
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Summary

Magnetic susceptibility values are important in interpreting regional magnetic anomalies and in crustal modelling. In this study, magnetic susceptibility has been measured on 548 rock samples from the sedimentary succession of the island of Bjørnøya in the Barents Sea. In addition, magnetic remanence has been measured on most of the samples, which is equally important as the susceptibility.

Variations of susceptibility for the different formations as well as different lithologies have been analysed and compared in the study. Optical microscopy and scanning electron microscope (SEM) analysis was used to examine the mineral source of selected samples with higher susceptibility. The results revealed noticeable variations amongst the stratigraphic formations and members, although the susceptibilities were generally low. There was a clear trend that the fine-grained samples such as siltstones and shales had the highest susceptibilities compared to carbonates and the coarser-grained conglomerates and sandstones.

Siderite and pyrite was found to be the mineralogical source of the relative high susceptibilities, as samples rich in siderite gave the highest values. No Fe-bearing heavy minerals like magnetite or pyrrhotite was found in the scanning electron microscope analyses.

Acknowledgements

I will like first and foremost like to thank my supervisor Mai Britt Mørk for the help and guidance along the way of this thesis in addition to my co-supervisor Odleiv Olesen at the Geological Survey of Norway (NGU).

I would also like to thank Jörg Ebbing and the rest of the people at the Continental margin geophysics department at NGU and Melanie for help and instruction at the petrophysical/palaeomagnetic laboratory (PPL) during the measurements.

A huge thank goes also to Atle Mørk for help in preparation and information of the sample material from Bjørnøya and NGU for the funding of the sample transport and letting me use the petrophysical laboratory.

Last but not least I would like to thank my parents at home for supporting me during my study years at NTNU.

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1. Introduction

1.1 Objective

This study aims to examine lithological and stratigraphic variations in magnetic susceptibility from the Upper Devonian to the Upper Triassic sedimentary succession of Bjørnøya and to investigate the mineralogical source of the susceptibility.

Density is also measured, in addition to magnetic remanence. The relationship between induced and remanent magnetization can be examined by calculating the Koenigsberger ratios (Q-values) for different formations/members and lithologies. Knowledge of Q-values is important to determine if remanence contributes to regional magnetic anomalies.

1.2 Background

The western Barents Sea is dominated by a thick sedimentary succession and structural highs and lows (Faleide et al. 1993; Gabrielsen et al. 1990). Compaction in the deep sedimentary basins, resulting in a decrease in both acoustic impedance contrast and the signal-to-noise ratio because of densities close up to basement rocks are leading to large uncertainties estimating the top-basement in both seismic and gravity (Barrere 2009). The magnetization contrast between sedimentary and basement rocks is usually high and therefore an interpretation of the magnetic field is generally effective in basement studies (Marello et al. 2010). Due to the ambiguity in magnetic field interpretation, constraining data is needed.

Sedimentary magnetic studies have been done earlier of the quartz-bearing sandstones of the Brent Formation in the North Sea which revealed low susceptibilities (Hauger & van Veen 1995; Løvlie & van Veen 1995).

However, the OSRAM Project (Origin of Sediment-Related AeroMagnetics) documented that part of the offshore Mesozoic and Cenozoic sedimentary successions are magnetic (Mørk et al. 2002) and that finer clastic sediments have higher susceptibilities than the coarser-grained sandstones (Olesen et al. 2010). This also is compatible with the results from magnetic susceptibility study of the upper Triassic Lunde Formation in the northern North Sea done by Hounslow et al. (1995).

2. Approach

This study includes an overview of the geology and stratigraphy of Bjørnøya and the samples representing the different formations and members. The sample material used in the project was collected during fieldwork in 1984-86 as part of the Arctic Geo-Program launched by SINTEF Petroleum Research, former Continental Research Institute (IKU). 548 samples have been measured for density and susceptibility whereas 446 of these also have been measured for magnetic remanence. The measurements were done in the petrophysical/palaeomagnetic laboratory (PPL) of the Geological Survey of Norway, NGU. To fulfill the requirements to be stored in the national geophysical database the samples had to exceed 50 g and contain UTM coordinates (Olesen et al. 1993).

The practical work has included:

- Compile background data, and preparion of sample list (see Appendix A.1).
- Sample identification and sample preparation.
- Identification of UTM coordinates from location maps.
- Laboratory measurements of density, magnetic susceptibility and remanence.
- Analyses of selected samples by optical microscope ans scanning electron microscope (SEM) of polished thin sections.
- Plotting and interpretatation of data.

The analytical procedure of the different measurements described below is taken mainly from a report by Torsvik and Olesen (1988) and Puranen & Sulkanen (1985):

2.1 Density

Volume and density can be derived from measuring dry and wet weight of a sample according to the Archimedes's principle. However, the samples must be saturated in water at least 12 hours before measurements. A Precisa 4200C SCS weight connected to a PC is used at the laboratory with a resolution power of 0.1 gram.

Volume and density are calculated from the following formulas:

$$V = W_{dry} - W_{wet} \quad (cm^3) \qquad , \qquad \rho = \frac{m}{V} \cdot 1000 \quad (kg/m^3) \qquad where,$$

$V = Volume \quad (cm^3)$
$W_{dry} = dryweight \quad (cm/s^2)$
$W_{dry} = wetweight \quad (cm/s^2)$
$m = mass \quad (N)$
$\rho = density \quad (kg/m^3)$

After checking that the weight reads zero, the sample is placed on top of the weight for dry-weight measurements saturated with water. The sample is then put in the water container under the wet-weight measurements (underfloor weighting).

2.2 Susceptibility

Volume susceptibility measurements where performed using a frequency-oscillator and a frequency counter. The susceptibility of a sample is calculated from the frequency difference between empty coil and coil with inserted sample. The best suitable pick-up coil (32, 64 or 103 mm in diameter) is selected dependent on the size of the sample. The period of the coil rather than the frequency is measured.

A measurement of empty coil is done after pick-up coil is selected. A sample is then inserted in the coil and measured from the PC. The susceptibility is calculated from the following formula:

$$Sus_a = CFac \cdot \left(\frac{T1}{T0}\right)^{1/2} \cdot \frac{T1-T0}{V} \quad (1 \cdot 10^{-6}\, SI) \quad where,$$

$Sus_a = Apparent\ Susceptibility \quad (1 \cdot 10^{-6}\, SI)$
$CFac = Coil\ constant$
$T0 = Period\ of\ empty\ coil \quad (s)$
$T1 = Period\ of\ sample\ in\ coil \quad (s)$
$V = Volume\ of\ sample \quad (m^3)$

Corrected for demagnetization factor, susceptibility becomes:

$$True\ Sus = \frac{Sus_a \cdot 4 \cdot 3.14159}{(4 \cdot 3.14159 - 4.19 \cdot Sus_a)} \quad (1 \cdot 10^{-6}\, SI)$$

The NGU susceptibility system has been tested against a low field induction bridge KLY-2, which is one of the best susceptibility instruments available. The sensitivity of the NGU system is approximately $1 \cdot 10^{-5}$ SI, tested on the smallest 32 mm coil.

2.3 Remanence

The remanence measurements where done using a fixed Schonstedt fluxgate magnetometer, positioned within a two-layered μ-metal shield cylinder open in both ends. The fluxgate probe is monitored from the Schonstedt Digital magnetometer, and an analog signal is transferred to a Digital Voltmeter and then to a PC.

After the background field value is measured, the sample is inserted close to the probe (10 cm from center of sample to the probe) inside a sample holder and measured again. The remanence of the sample is then determined by varying sample positions according to Cartesian design and measuring corresponding field values.

The sample positions according to Cartesian design (see Fig. 2.1):

$$\begin{array}{rl} Pos\ 1 & Sample\ remanence\ in\ +X\ direction\ (X1) \\ 2 & Sample\ remanence\ in\ -X\ direction\ (X2) \\ 3 & Sample\ remanence\ in\ +Y\ direction\ (Y1) \\ 4 & Sample\ remanence\ in\ -Y\ direction\ (Y2) \\ 5 & Sample\ remanence\ in\ +Z\ direction\ (Z1) \\ 6 & Sample\ remanence\ in\ -Z\ direction\ (Z2) \end{array}$$

The total remanence (M) of the sample can be determined by the formula:

$$M = (Xm^2 + Ym^2 + Zm^2)^{1/2} \quad (mA/M) \qquad where,$$

$$Xm = \frac{(X1-X2)}{2} \qquad Ym = \frac{(Y1-Y2)}{2} \qquad Zm = \frac{(Z1-Z2)}{2}$$

The Schonstedt fluxgate magnetometer is calibrated against a molspin spinner magnetometer capable of measuring NRM intensities down to approximately 0.1 – 0.2 mA/M, approximately 1000 times more sensitive than with the Schonstedt Fluxgate Magnetometer. The sensitivity depends on the volume of the sample, approximately 50-100 mA/M for 200 cm^3 samples.

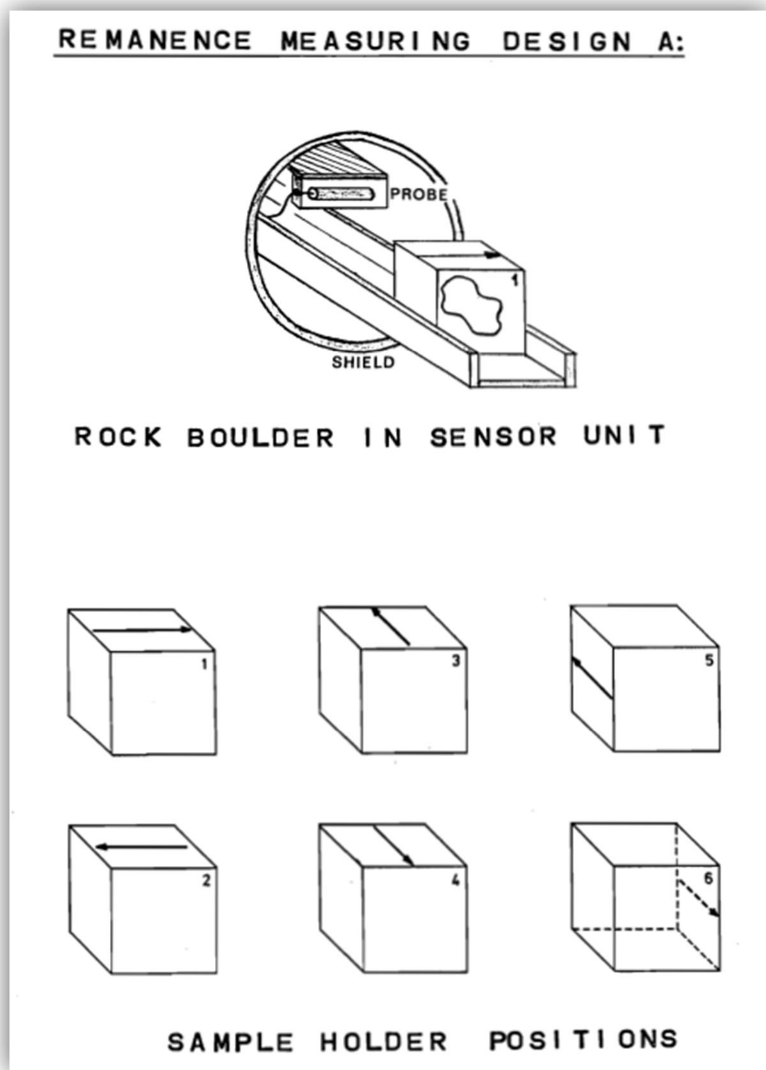

Fig. 2.1 Procedure for remanence measurements of handsamples (Puranen & Sulkanen, 1985).

3. Rock Magnetism

This chapter gives an overview of the main properties measured in the study based on selected literature (Hunt et al. 1995, Reynolds 1997, Lowrie 2007 and Dunlop & Özdemir 2007).

3.1 Magnetic Susceptibility

Magnetic susceptibility (MS) is an extremely important property and plays the same role as density does in gravity surveys.

MS is a measure of materials magnetic response to an external magnetic field. The volume susceptibility k (dimensionless units) is defined as the ratio of the material magnetization J (per unit volume) to the external magnetic field H:

$$J = kH.$$

The mass susceptibility χ (m^3kg^{-1}) is defined as the ratio of the material magnetization J (per unit mass) to the external magnetic field H:

$$J = \chi H.$$

On the basis of magnetic susceptibility, three classes of magnetic behavior can be distinguished: *diamagnetism, paramagnetism and ferromagnetism*.

3.1.1 Diamagnetism

In a diamagnetic material, all the electron shells are complete and so there are no unpaired electrons. When an external magnetic field is applied the electrons orbit opposes the applied field, producing a weak negative susceptibility, see Fig.3.1. The susceptibility of diamagnetic minerals has no temperature dependence and is often masked by stronger paramagnetic and ferromagnetic minerals. Common minerals in this group are quartz and calcite, see Table 1.

3.1.2 Paramagnetism

In paramagnetic materials, unpaired electrons produce unbalanced spin moments that align themselves toward the field direction when a magnetic field is applied. The susceptibility of paramagnetic materials is inversely proportional to the temperature given by the Curie-Weiss Law. Some examples of paramagnetic minerals are clay minerals as illite and montmorillonite, biotite, pyrite and siderite, see Table 1.

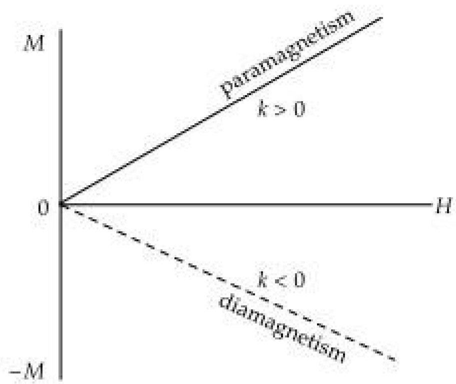

Fig.3.1 Variations of magnetic magnetization M in diamagnetic and paramagnetic materials with applied magnetic field (Lowrie 2007).

3.1.3 Ferromagnetism

In ferromagnetic materials, the spin moments of unpaired electrons are coupled due to very strong interaction between adjacent atoms and overlap of electron orbits. These small areas where magnetic coupling occurs, referred to as magnetic domains, give rise to a strong spontaneous magnetization that can exist without an external magnetic field.

This is the effect of hysteresis in ferromagnetic minerals, called remanence or isothermal remanent magnetization (M_{rs}) if first magnetized to saturation (M_s), see Fig. 3.3. For a given ferromagnetic mineral the ratio M_{rs}/M_s depends on grain size.

The magnetic coupling can result in aligned (either parallel or antiparallel) or canted moments and can be divided in four different types, a) ferromagnetism, b) antiferromagnetism, c) spin-canted antiferromagnetism or parasitic ferromagnetism and d) ferrimagnetism, see Fig.3.2.

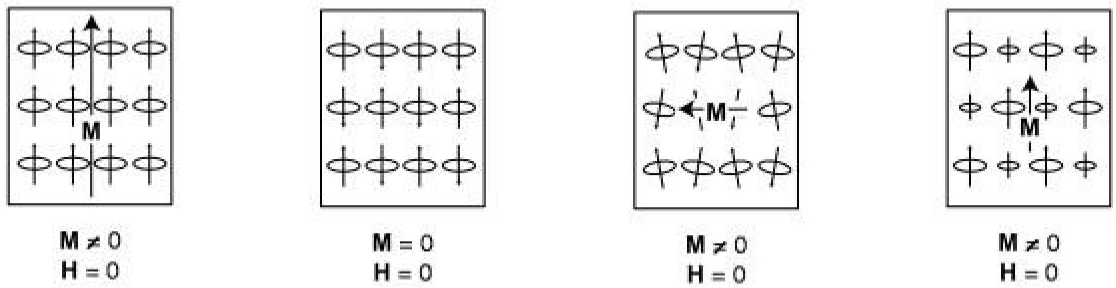

Fig.3.2 Schematic representations of the alignments of atomic moments in different ferromagnetic minerals (Modified from Lowrie 1997).

Ferromagnetism

Truly ferromagnetic minerals such as iron, nickel and cobolt have parallel alignments of moments and very high susceptibility, but only occur rarely in nature.

Antiferromagnetism

In certain minerals where the interaction between magnetic spins becomes possible, superexchange of electrons results in antiparallel directions of magnetic moments. Antiferromagnetic alignment breaks down at the Néel temperature T_N and remanent magnetization is not possible (see Fig.3.2). Ilmenite ($FeTiO_3$) and ulvöspinel (Fe_2TiO_4) are two antiferromagnetic minerals, see Table 1.

Parasitic ferromagnetism

Parasitic ferromagnetism is a result of antiferromagnetic imperfections or canting of the atomic moments and shows magnetic hysteresis and characteristic Néel temperature. An important example is hematite (αFe_2O_3), see Table 1.

Ferrimagnetism

Indirect exchange involving antiparallel and unequal magnetization of the sublattices result in net spontaneous magnetization. Above the Néel temperature or more commonly the Curie temperature the ferrimagnetic minerals behaves paramagnetic. Magnetite (Fe_3O_4) is the most important mineral in addition to but maghemite (γFe2O3), pyrrhotite (Fe_7S_8) and goethite (αFe00H), see Table 1.

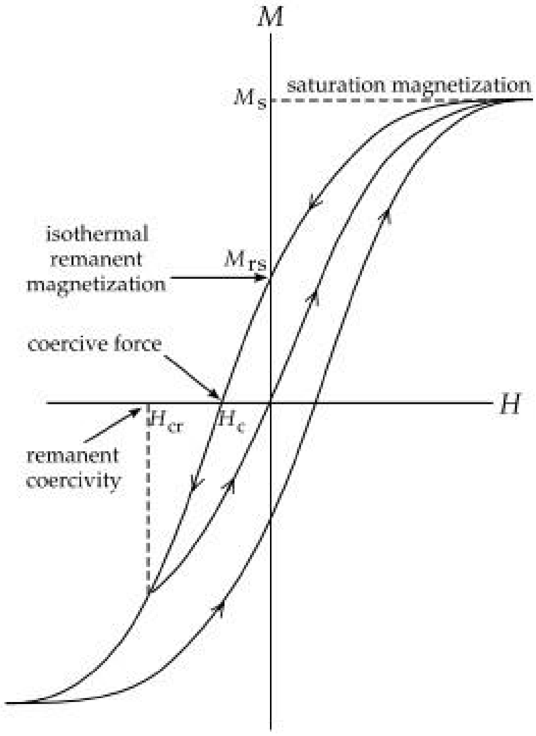

Fig. 3.3 Hysteresis loop illustrating a cycle of magnetization in a ferromagnetic mineral (Lowrie 2007).

Table 1 Susceptibilities of some common minerals.

Mineral	K (10^{-6} SI)	χ (10^{-8} m^3kg^{-1})
Diamagnetic		
Quartz (SiO_2)	-16.4	-0.62
Calcite)	-13.6	-0.48
Paramagnetic		
Troilite (FeS)	0.6-1.7 x 10^3	13-35
Pyrite (FeS_2)	1.5 x 10^3	30
Siderite ($FeCO_3$)	4.9 x 10^3	123
Biotites	0.5-1.15 x 10^3	17-38
Clay minerals (illite, montmorillonite)	0.33-041 x 10^3	13-15
Ferro,- Ferri,- Antiferromagnetic		
Pyrrhotite (Fe_7S_8)	3.2 x 10^6	6.9 x 10^4
(Fe_9S_{10})	0.17 x 10^6	0.38 x 10^4
Hematite (αFe_2O_3)	0.5-40 x 10^3	10-760
Maghemite, multidomain (γFe_2O_3)	2.0-2.5 x 10^6	4.0-5.0 x 10^4
Magnetite, multidomain (Fe_3O_4)	3.0 x 10^6	5.8 x 10^4
Ilmenite ($FeTiO_3$)	0.22-380 x 10^4	0.4-0.5 x 10^5
Ulvöspinel (Fe_2TiO_4)	4.8 x 10^3	100
Titanomagnetite (TM60)	0.13-0.62 x 10^6	0.25-1.2 x 10^4
Titanomaghemite	2.8 x 10^6	5.7 x 10^4
Goethite (αFe00H)	1.1-1.2 x10^3	25-280

Source: Hunt et al. 1995 Rock Physics and Phase Relations – A Handbook of Physical Constants and D. J. Dunlop and Ö. Özdemir 2007, Magnetizations in Rocks and Minerals.

3.2 Magnetic properties of rocks

Rocks containing ferromagnetic minerals like mafic and ultramafic rocks minerals normally have the highest susceptibilities while sedimentary rocks normally have the lowest values, see Fig. 3.4. However, the magnetic susceptibility is a result of all the minerals in a rock in comparison to the remanent magnetization where only ferromagnetic minerals contribute.

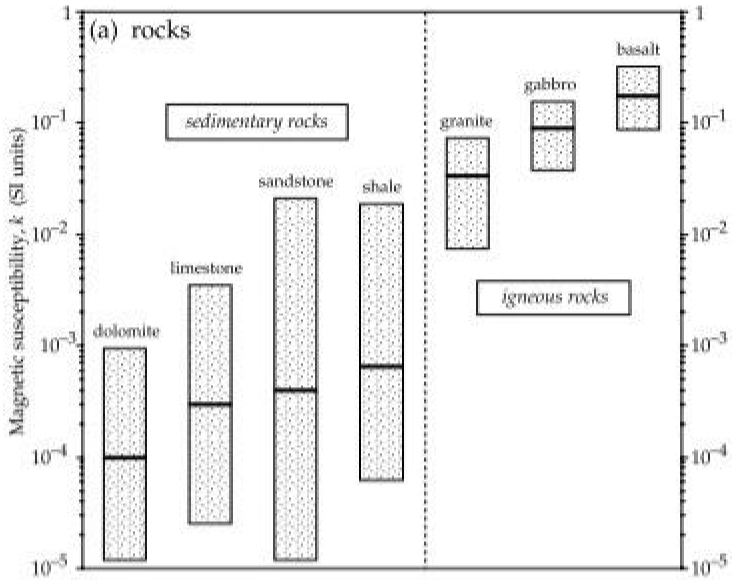

Fig. 3.4 Median susceptibility values and ranges of some common rock types (Lowrie 2007).

3.3 Remanent and Induced Magnetization

In addition to the induced magnetization, many rock and minerals exhibit a permanent or natural remanent manetization (NRM). The remanent magnetization or the intensity of this remanent magnetization (J_r) is still measurable in absence of an external field (H).Together with the intensity of the induced magnetization (J_i) they shape the resultant (J) by their directions and magnitudes, see Fig. 3.5.

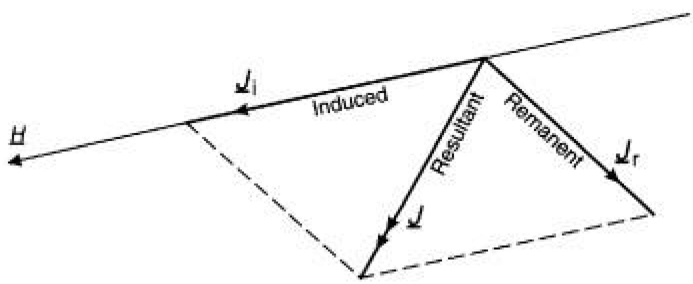

Fig. 3.5 Vectorial summation of induced and remanent magnetizations (Reynolds 1997).

The ratio between the two intensities J_r / J_i is called the Königsberger ratio (Q-ratio) and decribes the relationship between the induced and remanent magnetization.

$$Q = NRM \,/\, (k\ (\mathrm{SI}) * H\ (A/m))$$

$where,$

$NMR = Natural\ Remanent\ Magnetization\ \ (A/m)$
$k =\ volume\ susceptibility\ \ (dimensionless\ units, SI)$
$H = external\ magnetic\ field\ \ (A/m)$

If the value is over 1, the remanent magnetization has a significant importance in magnetic anomaly interpretations.

4. The Geology of Bjørnøya

The Geology of Bjørnøya consists of Devonian, Carboniferous, Permian and Triassic rocks overlying the Pre-Old Red Basement often referred to as "Hecla Hoek", see Fig. 4.1.

4.1 Hecla Hoek basement

The stratigraphic lowest Russehamna Formation consists of grey massive dolomites and local units of oolitic sandstones and stromatolites overlain by the approximately 150 m thick overlying Sørhamna Formation consisting of quartzitic sandstones and shales. The uppermost Ymerdalen Formation consists of a 400 m thick massive grey dolomite and limestone overlain by 240 m thick black limestone, see Table 2 (Braathen et al. 1999).

Table 2 Old and new terminology of the "Hecla Hoek" basement (Worsley et al. 2012).

Holtedahl (1920)		Krasilscikov & Livsic (1974)	
Unit	Min. thickness	Unit	Thickness
Tetradium Limestone Series	> 240 m	Ymerdalen Fm	> 450 m
Younger Dolomite Series	> 400 m		
Slate-Quartzite Series	> 175 m	Sørhamna Fm	ca 120 m
Older Dolomite Series	> 400 m	Russehamna Fm	> 500 m

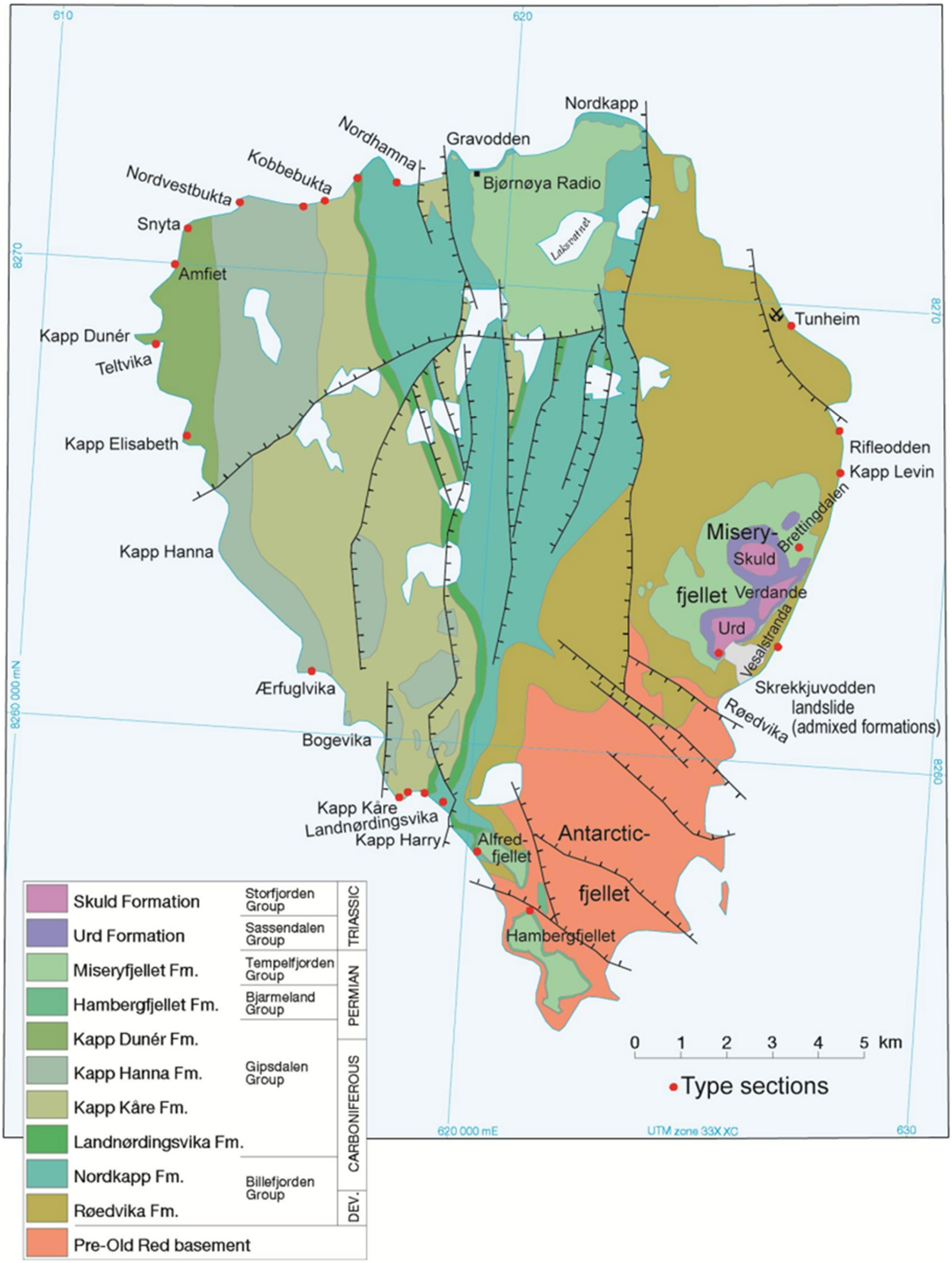

Fig. 4.1 Geological map of Bjørnøya with stratigraphic type sections (Dallmann 1999).

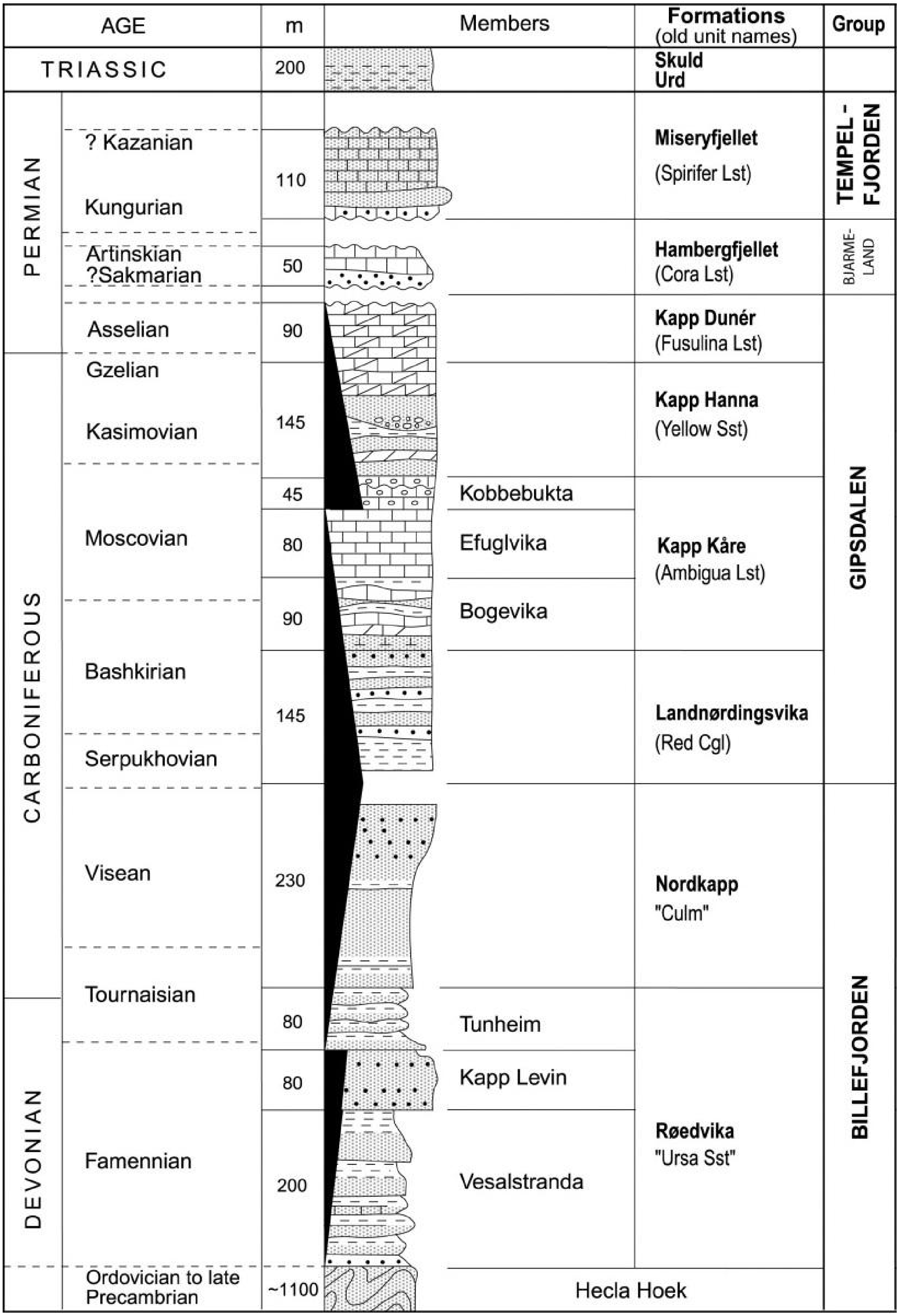

Fig. 4.2 Simplified stratigraphic column of Bjørnøya (Worsley et al. 2001).

4.2 Røedvika Formation

The lower coal and shale unit of the Ursa Sandstone was renamed to Røedvika Formation by Cutbill and Challinor (1965) and divided into three members by Worsley and Edwards (1976): Vesalstranda Member, Kapp Levin Member and Tunheim Member, see Fig. 4.2.

The thickness of the formation varies from about 360 m on the eastern coast to about 120 m on the southwestern coast over a distance of about 10 km. The variations are based both on available exposures and on borehole data (Worsley and Edwards 1980).

4.2.1 Vesalstranda Member

The Vesalstranda Member outcrops along Vesalstranda from Røedvika to just south of Kapp Levin on the southeast coast (see Fig. 4.1) and comprises the lower 200 meters of the formation (Worsley and Edward 1976).

The lowermost member of the Røedvika Formation consist largly of flood plain sediments deposited by northwest flowing meandering rivers, represented by grey and purple sandstones with subsidiary siltstones, mudstones and a few thin conglomerate beds see Fig. 4.4. Abundant of plant fossils, coal and black coaly shales occur in the fine-grained part of the member (Gjelberg 1978; Worsley and Gjelberg 1980).

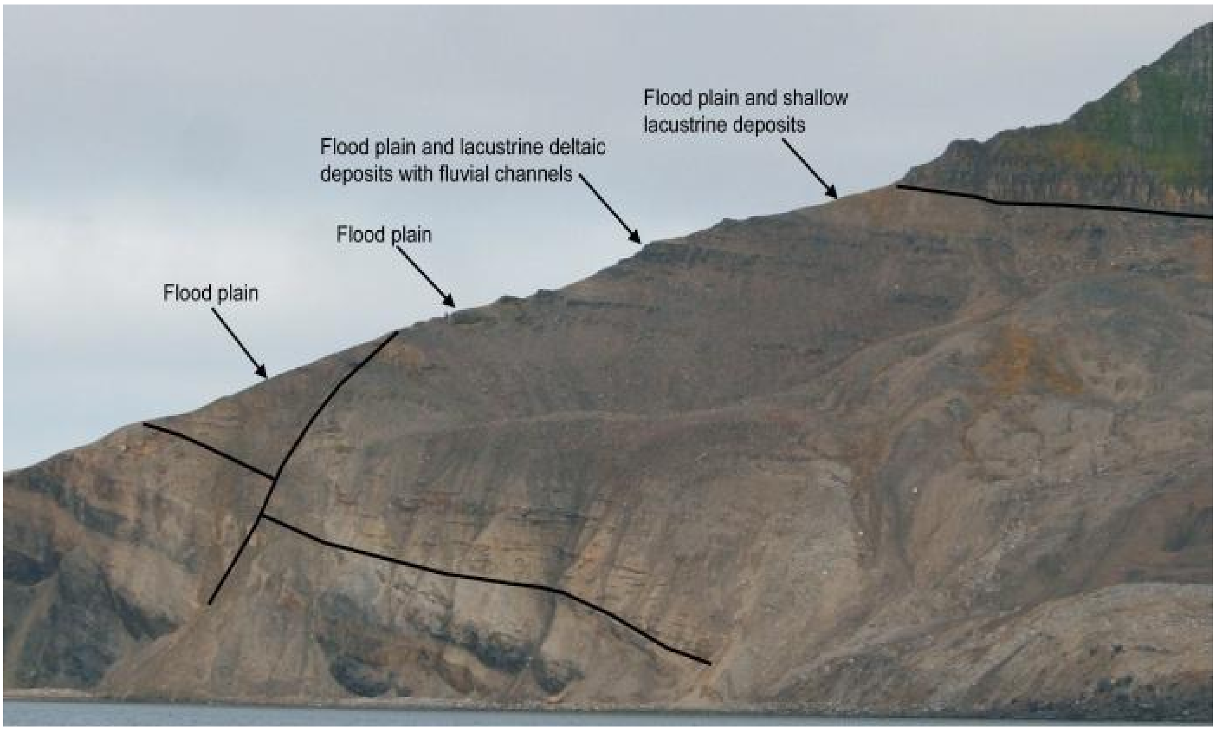

Fig. 4.3 Flood plain deposits from the lower Vesalstranda Member at the southern foot of Miseryfjellet at Vesalstranda (Worsley et al. 2012).

Worsley and Edward (1976) noticed that the member consisted of fining upward sequences deposited by meandering rivers. In addition, Gjelberg (1978) showed that small coarsening upward sequences occur and that lacustrine sub-environment also were important. Two depositional environments of Vesalstranda Member were recognized, floodplain environment and lacustrine deltaic environment, see Fig. 4.3.

4.2.2 Kapp Levin Member

Accessible complete sections of the Kapp Levin Member are exposed on the northeast side of Miseryfjellet on the southeast coast and north to Rifleodden (see Fig. 4.1) with a total thickness around 75 m.

The Kapp Levin Member is dominated by grey cross-stratified sandstones, conglomeratic sandstones, and conglomerates with a few lenticular units of shale and interlayered thin sandstones. A 15 m thick fine-grained, laterally extensive unit is present in the upper part of the member (Gjelberg 1981).

Palaeocurrent towards all but southwest is recorded with an average flow direction towards the east and northeast (Worsley & Edwards 1976, Worsley et al. 2001).

The overall change to coarser sediments from the underlying Vesalstranda Member is probably a result of increased palaeoslope with alluvial fan systems that built out from the southwestern uplifted footwall margin. Fine-grained sediments at the top of the member marks an abrupt change in depositional environment around the Famennian/Tournaisian, see Fig. 4.4 (Gjelberg 1981, Worsley et al. 2001).

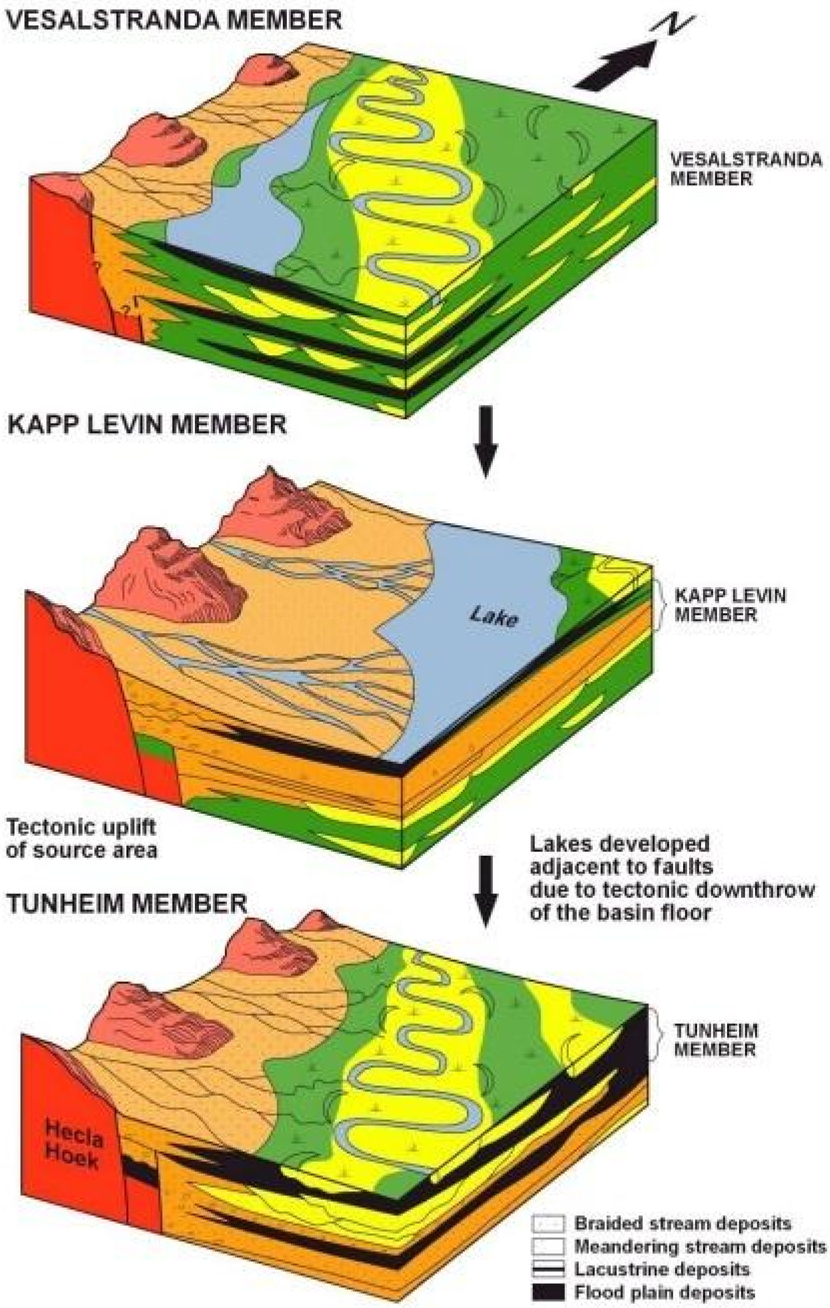

Fig. 4.4 Block diagram illustrating the development of the Røedvika Formation (From Gjelberg 1987).

4.2.3 Tunheim Member

The Tunheim Member is best and most accessibly exposed on the east/northeast coast of Bjørnøya from Rifleodden and northwards (see Fig. 4.1). However, a complete section is not available since the uppermost part of the member is not exposed.

The member is about 80 m thick and consists of grey sandstones and shales with local conglomerates and coal. Conglomerates are locally developed in the lower part of the member. As in the Vesalstranda Member, plant fossils are abundant in the shales and underclays are developed (Gjelberg 1981).

Cross-bedding indicates flow to the NW, N and NE representing re-establishment of floodplain environments with meandering streams flowing largely towards the northwet (see Fig. 4.4).

Lower Unit (Multistorey channel sandstones)

The more than 30 m thick lower sandstone unit below the A-coal is composed of 3-5 fining upward sandstone sequences which are eroding into the other (Gjelberg 1982).

Upper Unit (Mudstone – shale – sandstone and coal association)

Above the lower sandstone unit occurs a succession of interbedded mudstones/shales and sandstones, coals and coaly shales with highly variable thickness and lateral distribution. Two relative thick and laterally extensive sandstone sequences occur including a prominent sequence between the A- and the B-coal (Gjelberg 1982).

Above this prominent sandstone sequence occur a mudstone/siltstone unit which includes the B- and C-coal seams of Horn and Orvin (1928). Overlying these coal bearing intervals is a sandstone sequence of complex character.

4.3 Nordkapp Formation

The best exposure of the Nordkapp Formation is in Landnørdingsvika on the southwest coast (see Fig. 4.1) where the uppermost 120 m of the 230 m thick formation is exposed. Because of faulting of the formation in exposures on the north coast the true thickness is obscured.

The Nordkapp Formation represent a return to eastward flowing sandy braided streams, although streamflood and mass flow conglomerates formed on alluvial fan systems in the upper part. This uppermost part with association of conglomerates and black coaly shales contrast to the underlying monotonous quartzitic sandstones and probably marks the initiation of rifting in the area (Gjelberg and Steel 1981).

Since the uppermost part of the formation contains much more conglomerate and mudstone than the rest of the formation, it has been divided in a lower Kapp Harry Member and an upper Nordhamna Member, see Fig. 4.5

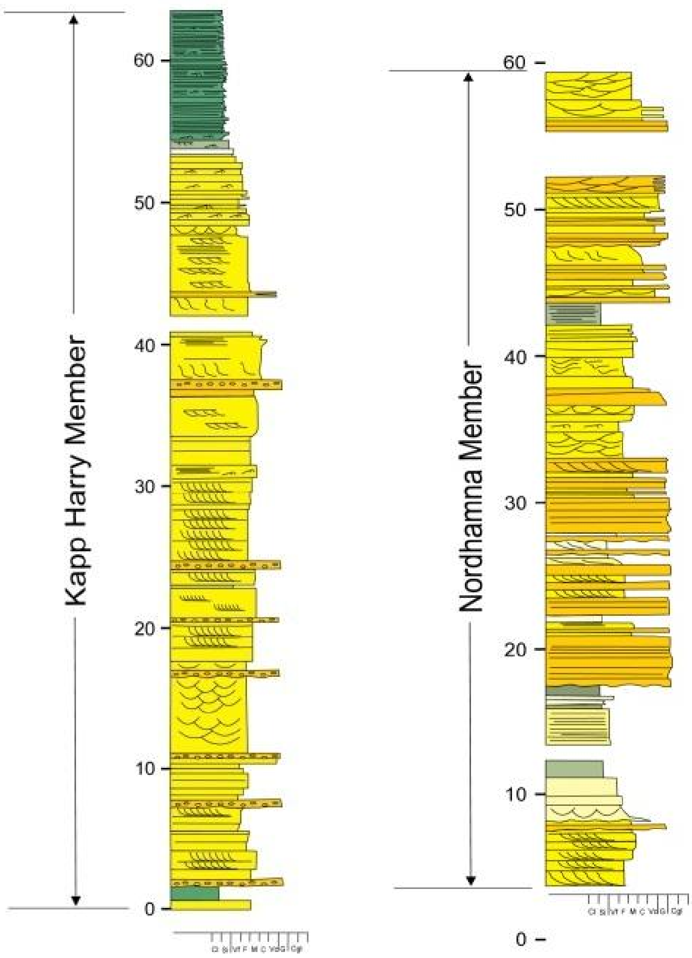

Fig. 4.5 Stratigraphic logs through the Kapp Harry Member and Nordhamna Member at Nordhamna (Worsley et al. 2012).

4.3.1 Kapp Harry Member

The Kapp Harry Member is exposed in Landnørdingsvika on the southwest coast and on the north coast around Nordkapp, Herwigshamna (Bjørnøya Radio), Gravodden and Nordhamna (see Fig. 4.1).

The member consists mainly of uniformly developed sandstone with occasional beds of prebbly sandstone and thin conglomerates. Beds of mudstone and siltstone are scarce. Beds are usually very lenticular and often bounded by curved erosion surfaces. Large scale, high angle planar cross-stratification dominates and are relative laterally extensive. Trough cross-stratification and low angle, nearly horizontal stratification is also common (Gjelberg 1981).

4.3.2 Nordhamna Member

The Nordhamna Member is exposed in Landnørdingsvika on the southwest coast in addition to Nordhamna and Kobbebukta on the north coast (see Fig. 4.1) where it is 65, 40 and 20 m thick respectively.

The dominating lithologies are sandstones, conglomerates and siltstones/mudstones where the conglomerates and siltstones/mudstones in Landnørdingsvika account for 24% and 19% of the succession respectively. Very complex and lenticular bedding type dominates and siltstones/mudstone horizons locally contain a lot of organic material with thin coals and coaly shales (Gjelberg 1981).

4.4 Landnørdingsvika Formation

The Landnørdingsvika Formation outcrops at Landnørdingsvika on the southwest coast, Raudnuten approximately 4 km north of Landnørdingsvika and Kobbebukta and Nordhamna on the north coast (see Fig. 4.1), with a complete section of 205 meter at Landnørdingsvika on the southwest coast.

With red beds now dominating, the Landnørdingsvika Formation represents a significant change in the sedimentary environment from moist climated floodplains with high water table to semi-arid or arid climate with well drained plains, see Fig. 4.6 (Gjelberg and Steel 1981).

Floodplain and coastal plain deposits dominates the lower part and fanglomerates interbedded with shallow marine clastics and carbonates dominates the upper part of the formation. The marine facies gradually increase in volume upwards before it culminates in the overlying Kapp Kåre Formation, see Fig. 4.7 (Gjelberg and Steel 1983).

The lithology on the north coast is different from Landnørdingsvika in the southwest coast with no conglomerate sequences and no obvious break in deposition between the Nordkapp and the Landnørdingsvika Formations, probably representing a more distal facies development (Gjelberg 1981).

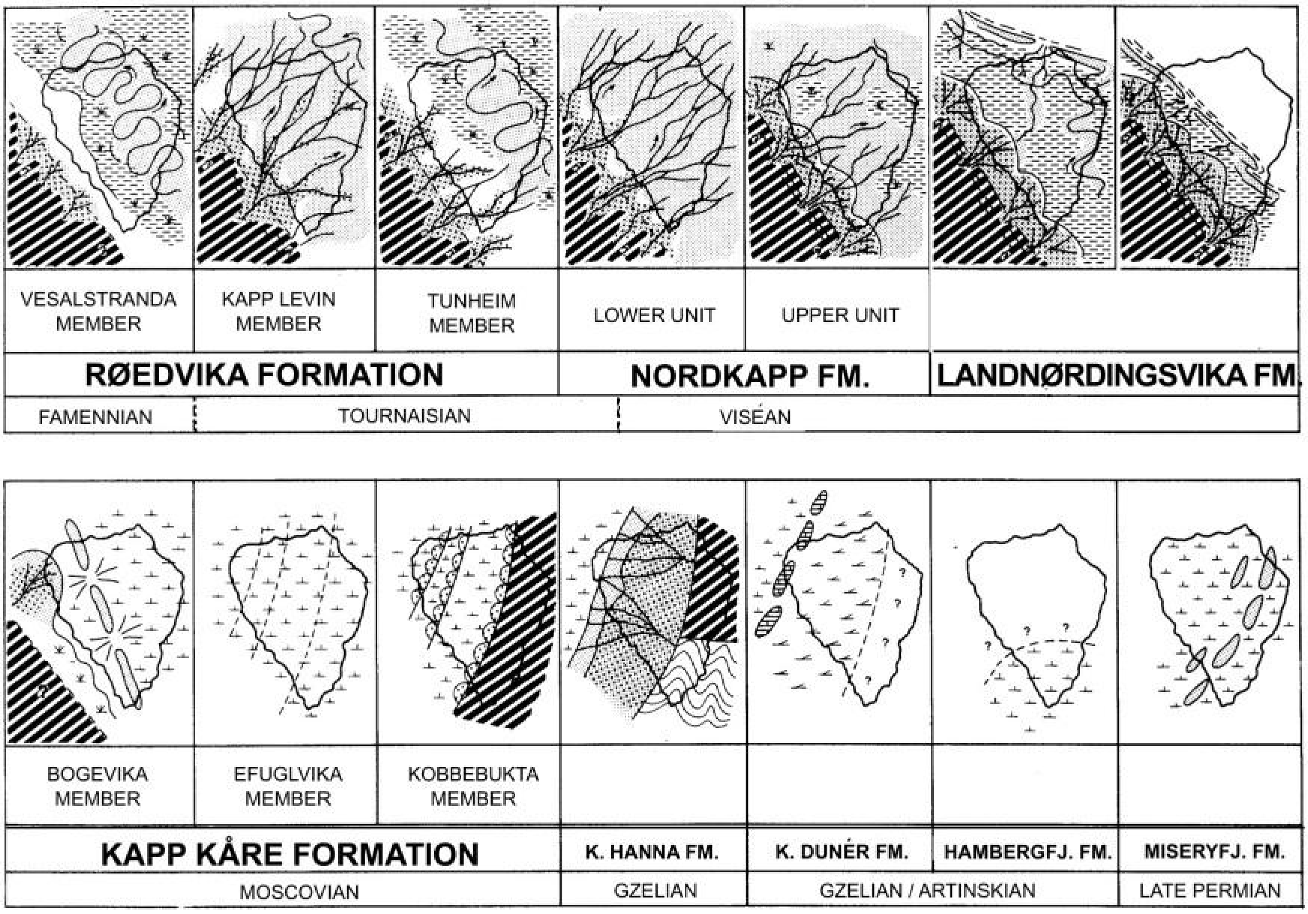

Fig. 4.6 Palaeogeographic summary maps for main late Palaeozoic depositional phases (Worsley et al. 2001).

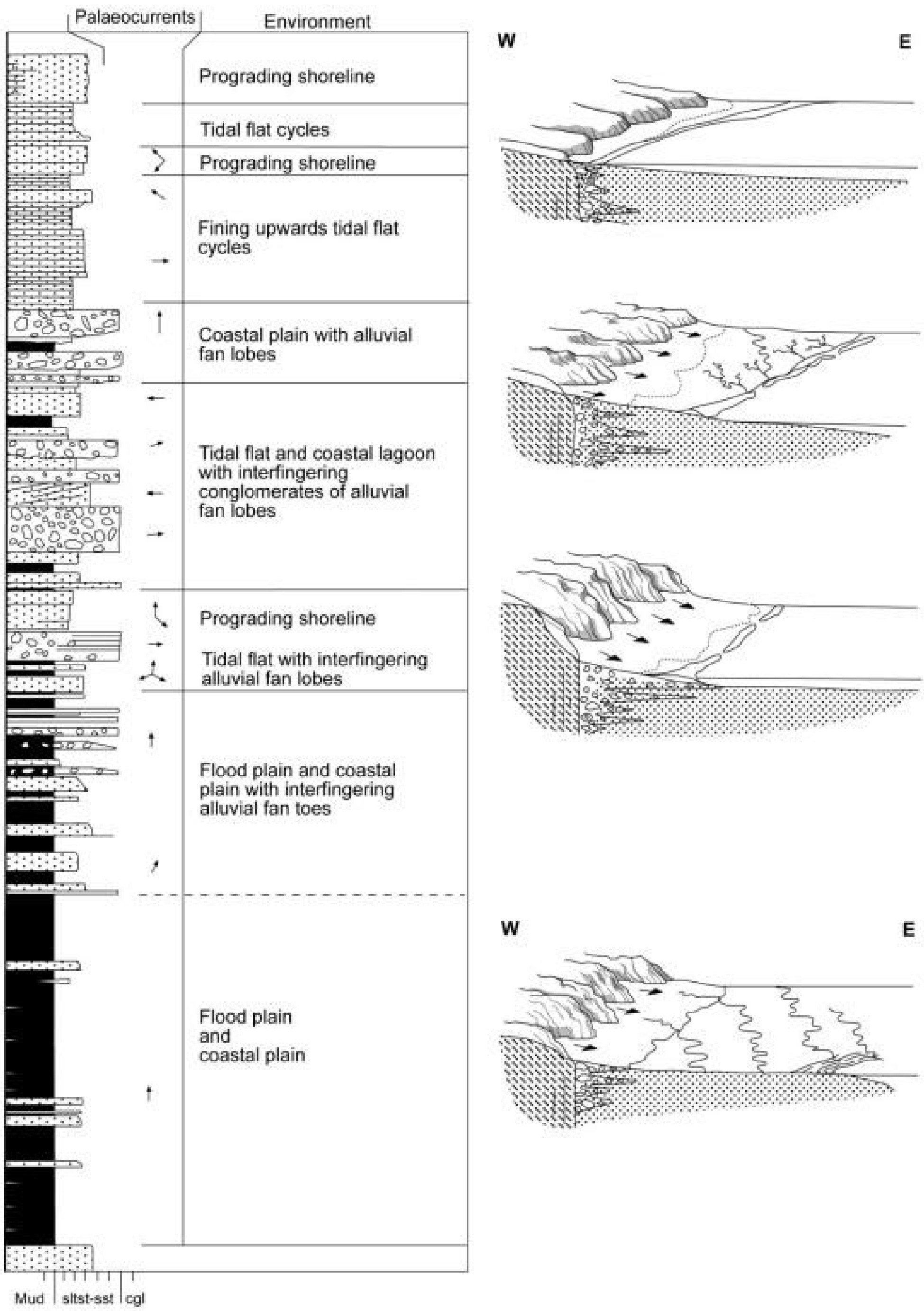

Fig. 4.7 Interpretative composite log through the Landnørdingsvika Formation, with schematic palaeogeographic reconstructions, based on Gjelberg and Steel (1983).

4.5 Kapp Kåre Formation

The 215 m thick Kapp Kåre Formation is defined by the disappearance of conglomerates and the development of mixed clastic and carbonate sequences. Isolated thin conglomerates do however occur in the lower part of the formation. The Kapp Kåre Formation is dated by fusulinids and the first fusulinids found near this transition have a late Bashkirian age.

The Kapp Kåre Formation was introduced by Worsley and Edwards (1976) and approximates to the "Ambigua Limestone" of Anderson (1900) and later workers and the Kobbebukta Formation introduced by Krasilscikov and Livsic (1974).

4.5.1 Bogevika Member

The Bogevika Member is exposed in Landnørdingsvika and Bogevika on the southwest coast and in Kobbebukta in the north coast (see Fig. 4.1) with significant different facies development, see Fig. 4.8.

The member consist of cyclically interbedded carbonates, sandstones and shales which is believed to reflect interplay between long and short term sea level fluctuations and local often tectonically controlled supply of siliciclastics (see Fig. 4.8). Sandstones become less common upwards with a gradual transition through limestone and shale interaction to the carbonate dominated Efuglivika Member.

The section in Bogevika, 2 km to the north of Landnørdingsvika represents the uppermost 30 m of the 95 m thick Bogevika Member and consist of 0.5-4 m thick stacked carbonate rich sandstones, shallow marine carbonates and red siltstone. Each cycle shows evidence of subarial exposure at the top in form of red siltstone with abundant caliche nodules, mud cracks and roots.

The approximately 45 m thick section in Kobbebukta is also suggested to represent the upper part of the member (Kirkemo 1979), but here the member is composed of more complicated silisiclastic dominated cycles. These cycles are 8.5-12 m thick, each consisting of 3-4 higher order subcycles, some of which resemble the cycles seen at Bogevika (Stemmerik and Worsley 2000).

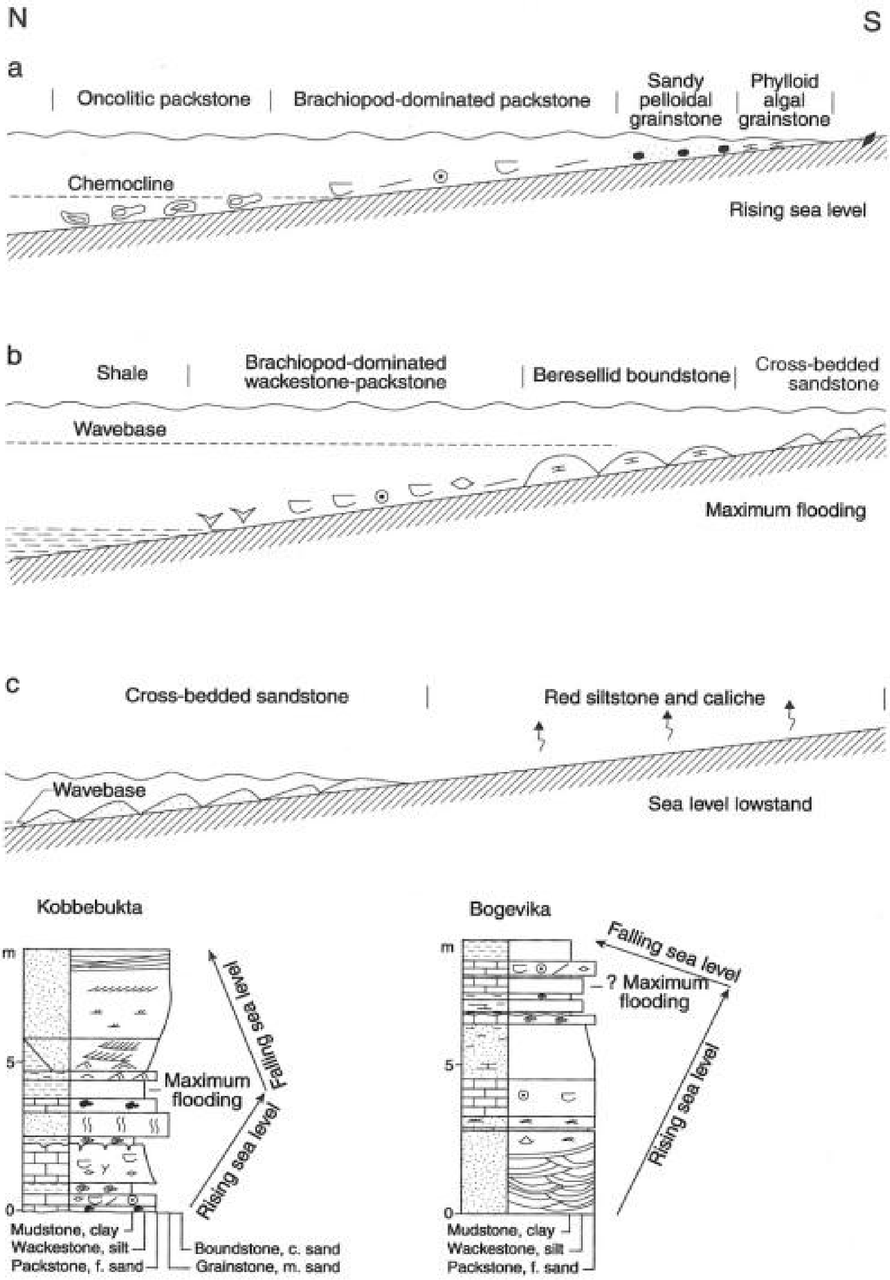

Fig. 4.8 Depositional model for the Bogevika Member showing facies distribution during (a) sea level rise, (b) maximum flooding and (c) sea level lowstand for one glacioeustatic sea level cycle (Stemmerik and Worsley 2000).

4.5.2 Efuglvika Member

The Efuglvika Member is fully exposed around Kapp Kåre, a promontory marking of the western limit of Landnørdingsvika on the southwest coast were it is 75 m thick (see Fig. 4.1), and is composed of cyclically interbedded limestones with abundant chert. Exposures show a series of typically 5-8 m thick shoaling upwards rhythms passing from 1.5-3.5 m thick bioturbated chert rich wackestone into chert free grainstones, sometimes with erosive or karstified tops.

Well developed prograding intertidal and supratidal deposition and absence of vertical facies gradation suggest that the Efuglvika Member cycles formed on a very broad and relatively deep shelf far from any land area (Stemmerik and Worsley 2000).

The member is also well exposed and has been studied in detail in the vicinity of Ærfuglvika (the formal approved name of Efuglvika) on the southwest coast. Variations in cycle stacking pattern like in the Bogevika Member are not apparent, and the member appears to be very uniform throughout the island.

4.5.3 Kobbebukta Member

The Kobbebukta Member introduced by Kirkemo (1979) is exposed around Kapp Kåre on the southwest coast and at Kobbebukta on the north coast (see Fig. 4.1), and consists of interbedded marine limestones, shales and conglomerates. The conglomerate clasts is mostly composed of intraformational chert and limestone (Worsley et al. 2001), see 4.10.

Deposition took place during differential subsidence of the study area related to active faulting where the northwestern part of the island was subsiding more rapidly than the southwestern part, and most of the eastern part of the island was uplifted above sea level.

The member is only 2-3 m to locally absent in the Bogevika-Landnørdingsvika area and thickens to approximately 20 m in Ærfuglvika where basal conglomerates are overlain by a few meters of bedded shelf carbonates followed by phylloid algal buildups. In the Kobbebukta area the member is approximately 30 m thick and consists of shelf carbonates which is adruptly intercalated vertically and laterally with thick subarial and submarine conglomerates (Stemmerik and Worsley 2000).

Syndepositional faulting uppermost in the Kobbebukta Member mark a change in tectonic activity which is followed by renewed and repeated tectonic activity in the late Carboniferous to Early-Permian, see Fig. 4.9

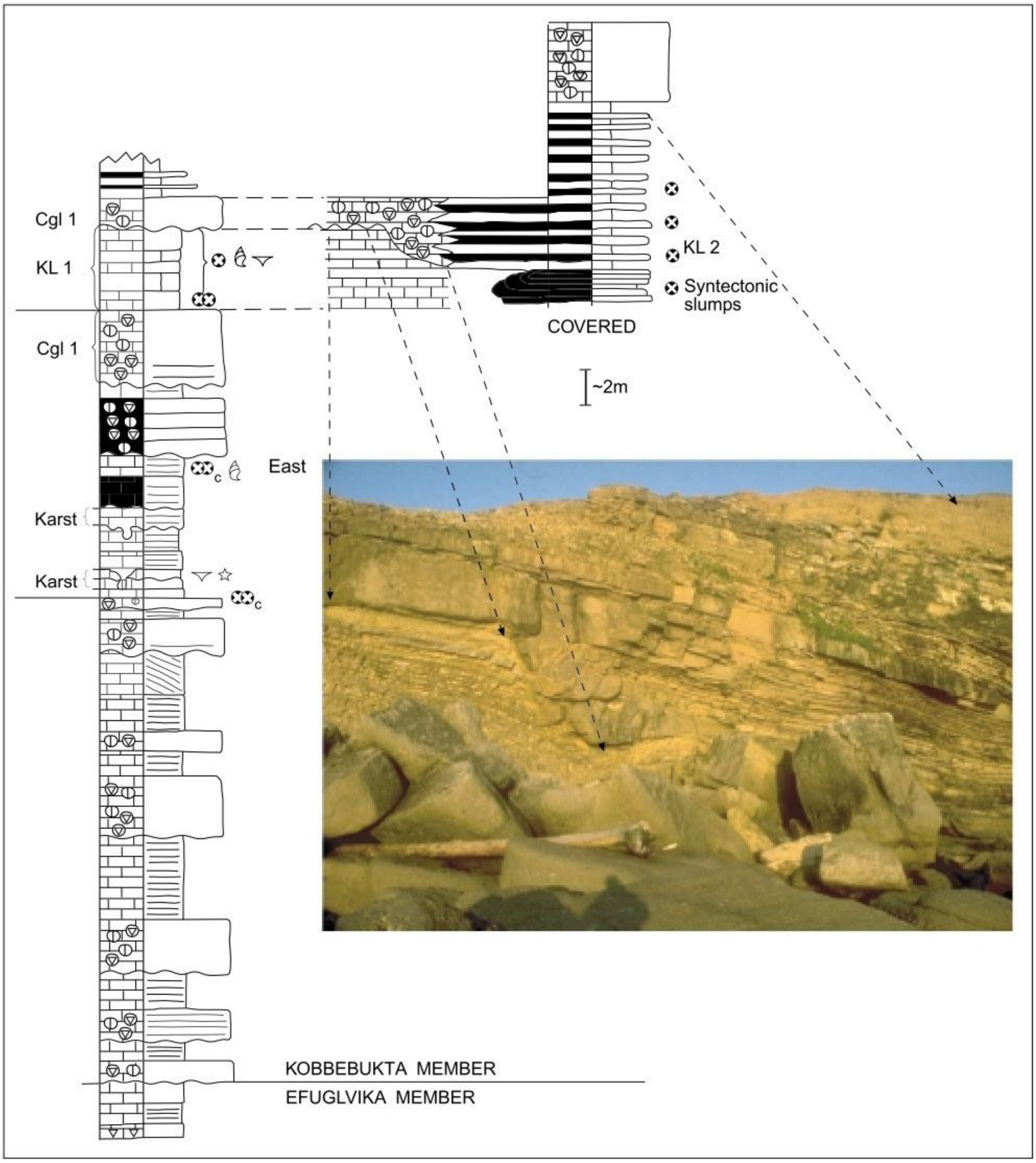

Fig. 4.9 Syndepositional fault with intraformational conglomerates in the Kobbebukta Member reflecting renewed tectonic activity, uppermost in the Kapp Kåre Formation (Worsley et al. 2001).

4.6 Kapp Hanna Formation

The "Yellow Sandstone" of Anderson (1900) and later workers outcrops for several kilometers along the north and west coast (see Fig. 4.1) and display alternations of conglomerates, sandstones, shales and dolomites.The base is defined by extraformational conglomerate with various underlying lithologies as a result of fault movements (Dallmann 1999).

Both fining and coarsening upward sequences are displayed, representing alluvial, coastal and marginal marine environments. Complex development with numerous small fault blocks makes lateral correlation difficult, but studies suggest a thickness around 145 m (Agdestein 1980), see Fig. 4.10.

A fining trend in the upper part of the formation reflects local tectonic stability and relative sea level rise in the mid-Gzelian with interbedded thin sandstones and dolomitic mudstones (Worsley et al. 2001).

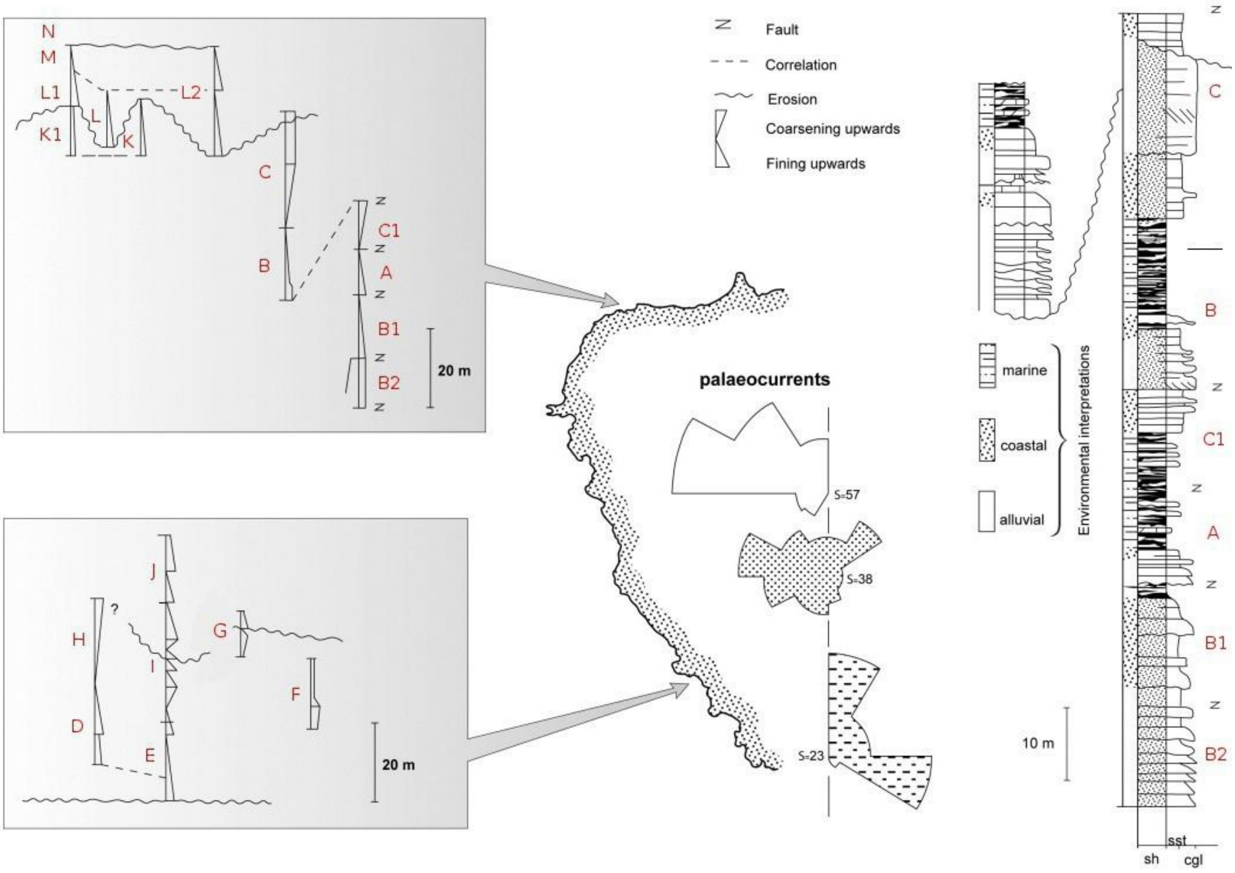

Fig. 4.10 Composited interpretative logs through the Kapp Hanna Formation, indicating complex local variations in facies developments (modified from Worsley et al. 2001).

4.7 Kapp Duner Formation

The formerly assigned "Fusulina Limestone" carbonates outcrops on the western coast of Bjørnøya (see Fig. 4.1) and is at least 90 m thick in the western and northwestern cliffs.

Three discrete depositional successions can be distinguished in the Kapp Duner Formation on Bjørnøya. Two lowermost tabular Palaeoplysina buildups are overlain by a karstic surface before deposition of 5-7 m thick NNE-SSW trending lenticular paleoaplysinid buildups.

The uppermost buildups are overlain by 40 m thick Late Asselian lagoonal to restricted bedded dolomites with small isolated Palaeoplysina mounds (see Fig. 4.11) marked by an another karstic surface. The major erosional surface in the middle of the formation is correlated with a regional relative fall in sea level in the Late Gzelian subsequent followed by a Asselian transgression that progressively onlapped the entire Bjørnøya area due to regional uplift (Worsley et al. 2001).

The Kapp Duner Formation consists of four facies types composed of Palaeoaplysina wackestone to boundstone buildups, biogenic wackestones and mudstones, fusulinid packstones and fine-grained silisiclastics (Stemmerik et al. 1994).

Fig. 4.11 Uppermost lagoonal-restricted shelf deposits with small Palaeoplysina mounds south of Kapp Duner on the west coast. The cliff is approximately 30 m high (Dallmann 1999).

4.8 Hambergfjellet Formation

The up to 60 m thick Hambergfjellet Formation is preserved only on the southernmost mountaintops (see Fig. 4.1) and wedges out rapidly north and eastwards with unconformable lower and upper boundaries see Fig. 4.12.

Fig. 4.12 Relationship between sedimentary units and the Hecla Hoek basement at the southwestern cliffs of Alfredfjellet (Worsley et al. 2001).

The Hambergfjellet Formation consist of basal fossiliferous sandstones that pass up into sandy packstones and grainstones with a rich and varied marine fauna of bryozoans, crinoids and brachiopods, see Fig. 4.2.

A new rapid transgression associated with a shift in depositional conditions towards coolwater carbonates took place during the earliest Artinskian in the Barents Sea. Maximum relative sea level occurred during the mid-Artinskian and the late Artinskian is dominated by bryozoans-crinoid grainstones in the outer shelf areas and brachiopod dominated packstones in inner shelf areas such as Bjørnøya (Stemmerik 2000).

Fauna similar to the upper parts of the Gipshuken Formation and the occurrence of conodonts belonging to the *Neostreptognathodus pequopensis* Zone (Nakrem 1991) associated with the fusulinid *Schwagerina jenkinsi* in the upper part, suggests a latest Sakmarian to late Artinskian age for the Hambergfjellet Formation (Stemmerik 1997; Worsley et al. 2001).

4.9 Miseryfjellet Formation

The Miseryfjellet Formations lower parts are exposed on the north coast and in the southwestern mountain areas and on the slopes of Miseryfjellet in the southeastern part of Bjørnøya where it is fully developed (see Fig. 4.1).

The 115 m thick formation consists of basal conglomerates and sandstones that pass into irregularly bedded sandy packstones and grainstones with distinctive silica cement (see Fig. 4.2). An up to 20 m thick sandstone unit interpreted as a shoal complex is developed in the middle of the formation.

Biofacies consisting of brachiopods, bryozoans and echinoderms suggests moderately shallow, high energy depositional environments in an open marine environment. The formation is regarded as Kungurian-Ufimian in age (Nakrem 1991).

The depositional areas of the Barents Sea region in the Kungurian-Ufimian became gradually deeper and coolwater carbonates, spiculites and shales were deposited throughout the area. Inner shelf brachiopod and bryozoan dominated packstones were deposited locally on Spitsbergen, Bjørnøya and along the margins of the Finnmark Platform (Stemmerik 2000).

Fig. 4.13 Siliceous rocks of the Miseryfjellet Formation in the southeastern part of Bjørnøya forming the steep wall in the middle of the mountain (Dallmann 1999).

4.10 Urd Formation

Preserved only on the highest peaks at the southeastern part of the island (see Fig. 4.1), the approximately 200 m thick shale dominated Triassic beds rests disconformably on the uppermost resistant limestones of the Miseryfjellet Formation (Mørk et al. 1990; Worsley et al. 2001).

The 65 m thick Urd Formation consists of shales and siltstones with sandstone beds at the base and with increasingly more common dolomite nodules and beds in the upper part of the formation. Poorly preserved ammonites throughout the formation suggest a Lower to Middle Triassic age (Mørk et al 1982, 1990).

The 20 cm thick Verdande Bed consisting of phosphate nodules represents the top of the formation (see Fig. 4.14).

4.11 Skuld Formation

The 135 m thick Skuld Formation, which is preserved on the uppermost mountain peaks of Miseryfjellet forms a major coarsening upward succession defined by several minor rhythms, see Fig. 4.14 (Mørk et al. 1990, 1992).

The basal beds of Late Ladinian age represent a shallowing upwards prodeltaic facies and consist of bluish-grey shales with purple weathering siderite nodules. Hummocky bedding, wave ripples and occasional marine fossils from the middle part of the formation indicate deposition in shallow shelf environments. The top of the formation consists of a 20 m thick sandstone unit of Carnian age preserved on the highest peaks of Miseryfjellet (Worsley et al. 2001).

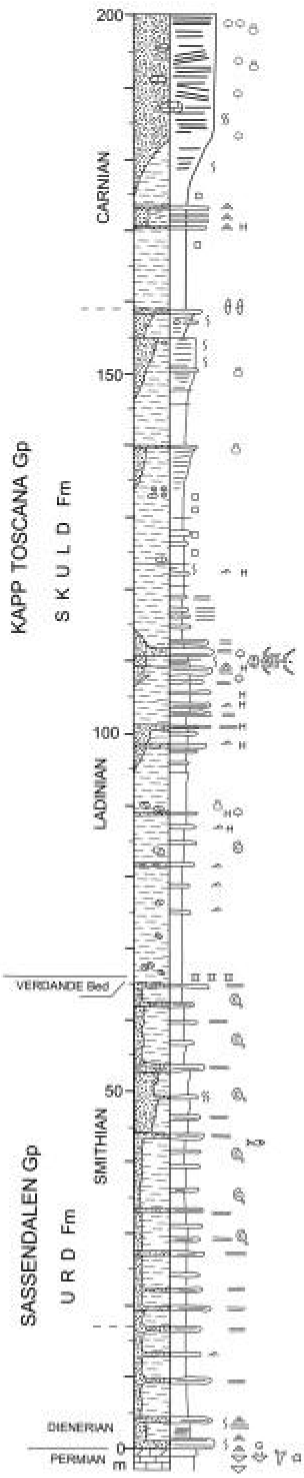

Fig. 4.14 The Triassic type section of the Urd and Skuld formations along the southern slope of Urd (Worsley et al. 2012).

5. Sample Material

Samples from the sedimentary succession on Bjørnøya were collected as part of the Arctic Geo-Program launched by SINTEF Petroleum Research (former IKU – Continental Shelf Institute) during fieldwork in 1984-86, many with a palynological purpose. 548 collected samples from these fieldtrips are described below, mainly collected from coastal exposures around the island.

5.1 Vesalstranda Member

The sample material from the Vesalstranda Member is collected from the southwestern part of Miseryfjellet and near Kapp Levin at the southeast and east coast of Bjørnøya (see Fig. 4.1), 24 samples in total.

Miseryfjellet SW/Vesalstranda

20 samples from the southwestern part of Miseryfjellet/Vesalstranda represent most of the samples from the Vesalstranda Member. The samples hold stratigraphic position covering the entire member, consisting of shales, claystones, siltstones and sandstones (6, 5, 4 and 5 samples respectively).

Fig. 5.1 The Vesalstranda Member below the cliff forming Miseryfjellet Formation (Worsley et al. 2012).

Kapp Levin

4 samples near Kapp Levin represent the lowermost 4 m of the Vesalstranda Member. All of the samples are coal samples, see Fig. 5.2.

Summary

The stratigraphic covering of the approximately 200 m thick Vesalstranda Member is good with samples from the entire member. The lithological representation is also considered to be good consisting of coals, underclays, shales, siltstones and sandstones.

Fig. 5.2 Vesalstranda and Kapp Levin members seen from Kapp Levin (Worsley et al. 2012).

5.2 Kapp Levin Member

The samples from the Kapp Levin Member are collected at Vesalstranda near Kapp Levin and at Kapp Levin on the eastern part of Bjørnøya (see Fig. 5.2). 4 samples are from Vesalstranda and 4 samples are from Kapp Levin.

Vesalstranda

The 4 samples from Vesalstranda are all shale samples without stratigraphic information believed to represent the lowermost or the upper part of the member.

Kapp Levin

All of the 4 samples from Kapp Levin hold stratigraphic position from 0 to 60 m above base. The three lowermost samples are all sandstone samples from 0 to 50 m above base, while the uppermost sample at 60 m is a shale sample.

Fig. 5.3 The Kapp Levin Member at Kapp Levin (Worsley et al. 2012).

Summary

Overall, the stratigraphic representation of the Kapp Levin Member is satisfactory with samples up to 60 m of the approximately 80 m thick member. Compared to the member lithological distribution of sandstones and shales, shale samples are over-represented with 5 samples of in total 8 samples from the member.

5.3 Tunheim Member

30 samples at the northeast and east coast of Bjørnøya at Kolbukta, Austervågen, Engelskelva, Tunheim, Framnes and Rifleodden (approximately 1 km south of Framnes) from north to south represent the sample material from the Tunheim Member (see Fig. 5.4).

Rifleodden and Framnes

1 shale sample at Rifleodden (b of Fig. 5.5) is collected above a conglomerate bed from the lower unit, probably in the lower part of the member or on top of the lower unit under the A-coal seam.

Also, 3 samples collected at Framnes (c, d of Fig. 5.5) represents the top of the lower unit and the A-coal seam consisting of siltstones, underclays and coals, approximately 1 km north of Rifleodden.

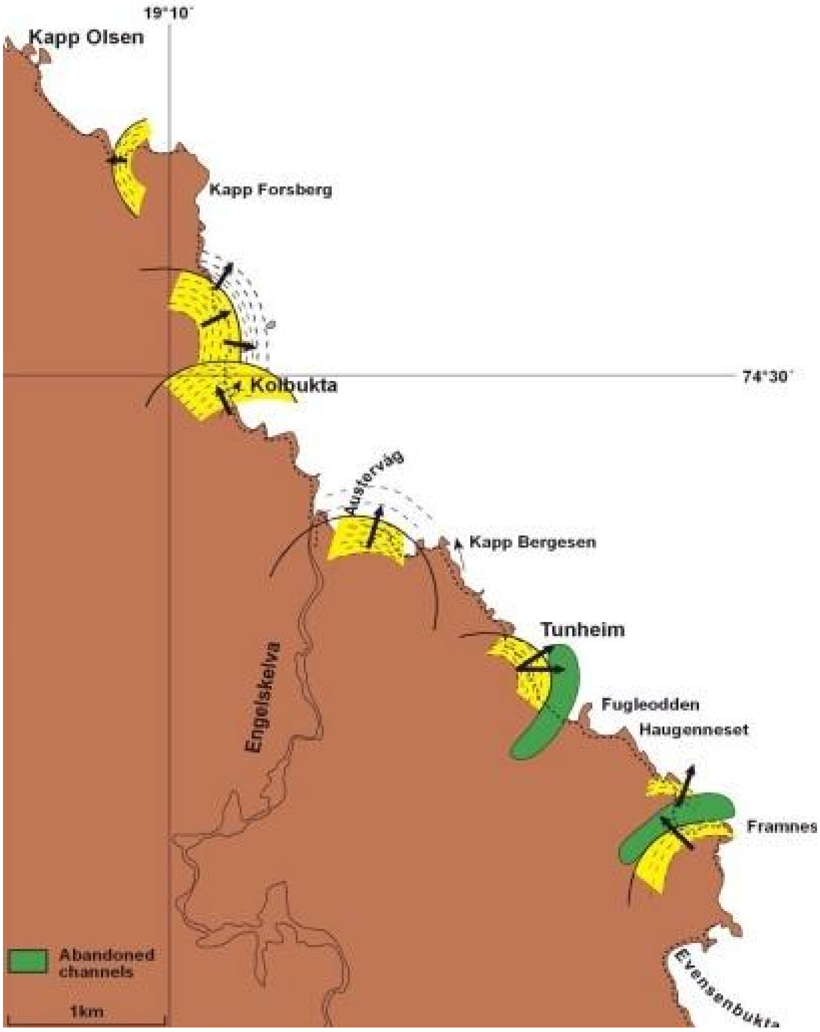

Fig. 5.4 Localities of the Tunheim Member at the east/northeast coast with point-bar growth directions between the A- and B-coal (Worsley et al. 2012).

Tunheim

9 samples from the area around Tunheim (d, e of Fig. 5.5) approximately 2 km to the northwest of Framnes represents both the lower and upper units of the Tunheim Member.

3 sandstone samples represent the lower unit below the A-coal while 1 sandstone sample has been collected over the C-coal. 2 samples are from the A-coal seam (including 1 coal and 1 underclay).

The 2 remaining samples without stratigraphic information from Tunheim are coal samples believed to represent the A-coal and the B- or/and C-coal seam, see Fig. 5.6.

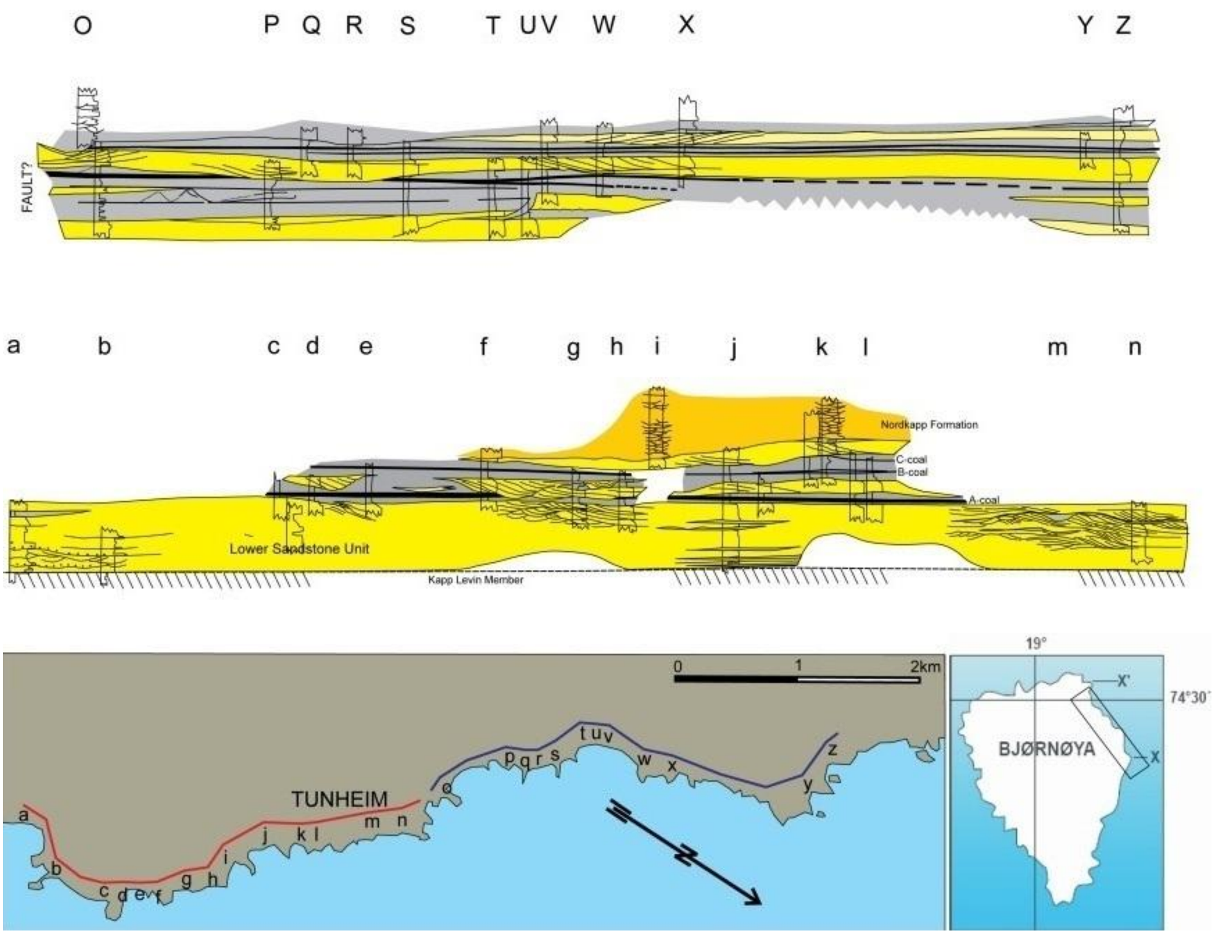

Fig. 5.5 Correlations of the Tunheim Member on the northeast coast of Bjørnøya (Worsley et al. 2012).

Austervågen and Engelskelva

Further northwest at Austervågen and Engelskelva (o of Fig. 5.5), 5 samples from Austervågen and 4 samples from Engelskelva have been collected, both from the upper unit.

The samples from Austervågen are collected north of the outlet of Engelskelva (see Fig. 5.4) and represent the top of the sandstone sequence between the A- and the B- coal seams and the B- coal seam. The Engelskelva section is believed to represent the section between the B- and C-coal seams including 1 coal sample from the B- or C-coal seam.

Fig. 5.6 Point-bar deposits between the A- and B-coal and B- and C-coal seams at Tunheim (Worsley et al. 2012).

Kolbukta

8 samples from Kolbukta furthest northwest (t, u and v of Fig. 5.5) are believed to represent the upper unit from the B-coal and upwards with 1 registered coal sample from the B-coal seam. The samples consist of 3 coal samples, 1 sandstone sample and 4 shale samples.

Summary

Overall, the stratigraphic representation of the Tunheim Member is satisfactory, with samples mainly from the upper unit, 23 compared to 7 from the lower unit. The lithological representation is good consisting of coals, sandstones, shales, claystones and siltstones.

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5.4 Kapp Harry Member

The sample material from the Kapp Harry Member is collected between Landørdingsvika and Kapp Harry (including Båtvika and the river and river mouth from Ellasjøen) at the southwest coast and Nordkapp on the north coast (see Fig. 4.1). 17 samples represent fairly coarse deposits and shales, mainly from the lower part of the member.

Båtvika

The 6 samples from Båtvika on the southwest coast are all sandstone samples and good representation of the composition of the lower unit, 1 m below to 45 m above base.

Fig. 5.7 Sandstones of the Kapp Harry Member at Båtvika (Worsley et al. 2012).

Ellasjøen

2 shale samples from the river Fossåa from Ellasjøen represent shales below the base of the member. 3 sandstone samples collected by the mouth of Fossåa represent the section above the basal sandstone.

Nordkapp

6 samples from the Nordkapp area are collected at two different locations, between Nordkapp and Padda and at Nordkapp. Padda is located a few hundred meters west of Nordkapp, see Fig. 4.1.

3 samples between Nordkapp and Padda represent the lowermost part of the member at Nordhamna, consisting of 1 conglomerate and 2 shale samples. The 3 remaining samples are sandstone samples from the section at Nordkapp and good lithological representation of the member, ranging from 5.5 to 24 m.

Summary

The lithological representation of the Kapp Harry Member is good consisting of 1 conglomerate sample, 12 sandstone samples and 4 shale samples. The stratigraphic representation is not fully satisfactory with most of the samples from the lower part of the member.

5.5 Nordhamna Member

Samples from the Nordhamna Member are collected at Landnørdingsvika and Båtvika between Kapp Harry and Landnørdingsvika on the southwest coast and Nordhamna on the north coast (see Fig. 4.1).

Landnørdingsvika

Only 1 sample is collected from the Nordhamna Member at Landnørdingsvika, consisting of 1 conglomerate representing the very uppermost part of the section.

Fig. 5.8 Sandstones, conglomerates and shales of the Nordhamna Member at Landnørdingsvika (Worsley et al. 2012).

Båtvika

2 sandstone samples from Båtvika represent the uppermost part of the Nordhamna Member. The samples are correlated from the Kapp Harry Member, 108 and 117 m above base.

Nordhamna

7 samples from the lower 23 m of the member, including 3 sandstones from the base of the member are collected at Nordhamna. All the samples are sandstones, except 1 shale sample.

Fig. 5.9 Miseryfjellet Formation angular unconformibly overlying the Nordkapp Formation on the north coast (Worsley et al. 2012).

Summary

The lithological distribution of the samples from the Nordhamna Member is satisfactory consisting of mainly sandstones in addition to a conglomerate and shale sample. The stratigraphic representation is also considered to be satisfactory.

5.6 Landnørdingsvika Formation

The sample material from the Landnørdingsvika Formation is entirely represented from Landnørdingsvika on the southwest coast and Nordhamna on the north coast (see Fig. 4.1).

Landnørdingsvika

16 samples from Landnørdingsvika represent the sample material from the southwest coast. 12 of these samples hold stratigraphic positions between 2 and 195 m of the 205 m thick type section, mainly from the lower part of the section. The different lithologies are conglomerates, carbonates, sandstones, siltstones and shales.

Fig. 5.10 View of the Landnørdingsvika Formation in its type area (Dallmann 1999).

Nordhamna

The sample material from the north coast is represented by 4 samples from the Nordhamna section (3 samples from Nordhamna and 1 sample at the river mouth of Lakselva). No samples hold stratigraphic position from the 70 meter thick succession in Nordhamna. On the basis of facies evolution and lithology it is suggested that this succession may be equivalent to the upper/middle part of the formation at Landnørdingsvika.

Summary

Overall, the lithological and stratigraphic representation of the Landnørdingsvika Formation is satisfactory with samples consisting of conglomerates, carbonates, sandstones, siltstones and shales (2, 4, 7, and 6 samples respectively) mostly from the lower part of the formation.

5.7 Bogevika Member

The sample material from the Bogevika Member is from Landnørdingsvika on the southwestern coast and in Kobbebukta on the northern coast (see Fig. 4.1), consisting of 11 and 37 samples respectively.

Landnørdingsvika

11 samples from Landnørdingsvika on the southwest coast consist mainly of carbonates, siltstones and shales ranging from 12 to 96 m above base.

The samples are mainly from upper part consisting of 5 carbonate samples, 2 sandstone samples, 3 siltstone samples and 1 shale sample, with only 1 sample collected from the lower 40 m of the member. However, the samples give a relatively good lithological representation of the member overall.

Kobbebukta

The 38 samples from Kobbebukta consist mainly of carbonates and shales with only a few sandstone samples which unfavour the lithological representation, 13, 19 and 4 samples respectively. However, the stratigraphical covering of the member in Kobbebukta is good, ranging from 0.8 to 50.6 m.

Fig. 5.11 The Bogevika Member in Kobbebukta on the north coast (Worsley et al. 2012).

Summary

Overall, the samples from the Bogevika Member consist mainly of carbonates and shales which unfavour the lithological representation. The stratigraphic representation is very good in Kobbebukta compared to Landnørdingsvika where mainly the upper part is represented.

5.8 Efuglvika Member

The sample material from the Efuglvika Member is collected at Landnørdingsvika and Ærfuglvika in the southwestern coast of Bjørnøya, in addition to Raudnuten in the southern inland approximately 4 km north of Landnørdingsvika (see Fig. 4.1), consisting of 10, 19 and 19 samples respectively.

Landnørdingsvika

All of the 10 samples from Landnørdingsvika hold their stratigraphic positions ranging from 4 to 45 m from the approximately 75 m thick succession. The samples from Landnørdingsvika are entirely composed of carbonates.

Ærfuglvika

All of the 19 samples from Ærfuglvika on the southwest coast also hold their stratigraphic position from the approximately 35 m thick section ranging from 0 to 22 m, entirely composed of carbonates.

Raudnuten

From the southwestern inland at Raudnuten the 19 samples are also entirely composed of carbonates, but with 8 samples lacking their stratigraphic positions. The 11 samples that hold stratigraphic position are ranging from 7.5 to 40 m of the 40 m thick section.

Summary

The lithological and stratigraphic representation of the Efuglvika Member from the southwestern coast and southern inland is very good, consisting of 48 samples in total.

5.9 Kobbebukta Member

Kobbebukta

The sample material from the Kobbebukta Member is entirely from Kobbebukta on the north coast (see Fig. 4.1) and is composed of carbonates and shales. 8 of the total 10 samples hold their stratigraphic positions from the approximately 10 m thick section in Kobbebukta, ranging from 2.1 to 10 m.

Summary

Sample covering of the Kobbebukta Member is not so extensive as the Bogevika and Efuglvika Members with only 10 samples. However, the lithological and stratigraphic representation of the member is satisfactory.

5.10 Kapp Hanna Formation

The sample material from the Kapp Hanna Formation is collected at the north/northwest and west/southwest coast of Bjørnøya in addition to 1 sample from Raudnuten in the southern inland.

North/Northwest Coast

Kobbebukta

28 samples from the north coast are entirely collected at Kobbebukta (see Fig. 4.1). 14 samples hold their stratigraphic position and belonging sections divided in B2, B1, A, C1, B and C after Agdesteins (1980) interpretations. The sections represent the approximately lower 108 m of the 150 m thick Kapp Hanna Formation (see Fig. 4.10).

The remaining 14 samples that lack stratigraphic position and/or their sections consist of conglomerates, sandstones, carbonates and shales, 1, 2, 6 and 5 samples respectively.

C section

3 samples are collected from the lowermost 3.5 m thick shale unit which is continuation of the upper shale unit in section B. In addition, 1 sandstone sample is collected from the lower 9 m thick sandstone unit above the lowermost shale unit of the approximately 31 m thick section.

B section

1 shale sample from the approximately 20 m thick section B is collected 13.0 m above base in the upper shale unit.

C1 section

1 shale sample 8.0 m above the fault bounded base of the approximately 15 m thick coarsening upward sequence represents section C1.

A section

1 shale sample is collected from the middle shale and sandstone unit of the section, 6.0 m above the base from the approximately 13 m thick section A.

B1 section

4 samples from the approximately 16.5 m thick section B1 hold their stratigraphic position ranging from 1.5 to 16.0 m, consisting of sandstone, conglomerate, dolomite and shale. 1 remaining sample without stratigraphic position is a carbonate sample.

B2 section

3 samples ranging from 3.0 to 13.0 m above base consisting of 2 conglomerates and 1 sandstone sample represent section B2.

Fig. 5.12 The shaly middle part of the Kapp Hanna Formation with green reduction of red shale below the sandstone (Worsley et al. 2012).

Nordvestbukta

1 conglomeratic sandstone sample is collected at Nordvestbukta on the northwest coast between Kobbebukta and Snyta (see Fig. 4.1).

The sample is believed to represent either sections M, L1, K1 or L (Agdestein 1980), which represents the upper part of the Kapp Hanna Formation. The sample does not hold stratigraphic position.

Snyta

5 samples from Snyta (see Fig. 4.1) represent the very uppermost section N after Agdestein (1980) and consist of 3 dolomite and 2 shale samples, ranging from 14 m to 24 m above base.

West/Southwest Coast

The sample material from the west-southwest is almost entirely collected at the bay Langbukta north of Kapp Hanna at the west coast and Ærfuglvika at the southwest coast of Bjørnøya (see Fig. 4.1).

In addition, 1 sample from Bendabukta, a small creek from the river Benda between Bogevika and Kapp Kåre at the southwest coast and Raudnuten in the southern inland approximately 4 km north of Landnørdingsvika have been collected (see Fig. 4.1).

Langbukta

The 15 samples from Langbukta represent section F (Agdestein 1980) and consist of shales and sandstones, 12 and 3 samples respectively.

7 of the 15 samples hold their stratigraphic position ranging from 7.5 to 15.0 m above base of the approximately 20 m thick section.

In addition, 1 sandstone sample from the river mouth of Langsiget represent section G. The sample is collected above a conglomeratic unit, probably at the start of the fining upward sequence between 4 and 9 m.

Ærfuglvika

4 samples are collected from Ærfuglvika on the southwest coast and represent 3 different sections after Agdestein (1980) interpretations, representing the lower and middle part of the formation.

Section I

1 sandstone and siltstone sample represents the approximately 33 m thick section I. The samples are from the very lowermost part of the section, 2.5 and 4.0 m above base respectively.

Section J

1 shale sample represents the approximately 18 m thick section J (Agdestein 1980) 37.0 m above base, measured from the lower 33 m thick I section.

Section D

The last samples from north of Ærfuglvika represents section D (Agdestein 1980). The limestone sample has no stratigraphic position but is believed to represent the uppermost carbonate unit in the section.

Bendabukta and Raudnuten

No information about belonging sections is given for sample from Bendabukta on the southwest coast and Raudnuten at the southern inland. The sample from Bendabukta is a conglomerate while the sample from Raudnuten is a sandstone rich carbonate.

Summary

With a total of 57 samples covering both the lower and upper part, the stratigraphic representation of the 145 m thick Kapp Hanna Formation is good. However, the lithological distribution is of the formation is not fully satisfactory because of the high amount of shale samples.

5.11 Kapp Duner Formation

The sample material from the Kapp Duner Formation is almost entirely represented from northwest and west coast with samples mainly from Amfiet on the northwest coast and Teltvika on the west coast (see Fig. 4.1), 50 and 59 samples respectively.

The samples from Amfiet and Teltvika represent Palaeoaplysina buildups complexes from different buildup levels in addition to lagoonal-restricted shelf deposits with Palaeoplysina mounds. Buildup level 1 and 2 represents the lowermost tabular complexes and level 3 to 7 represents the uppermost lenticular complexes (Stemmerik et al. 1994).

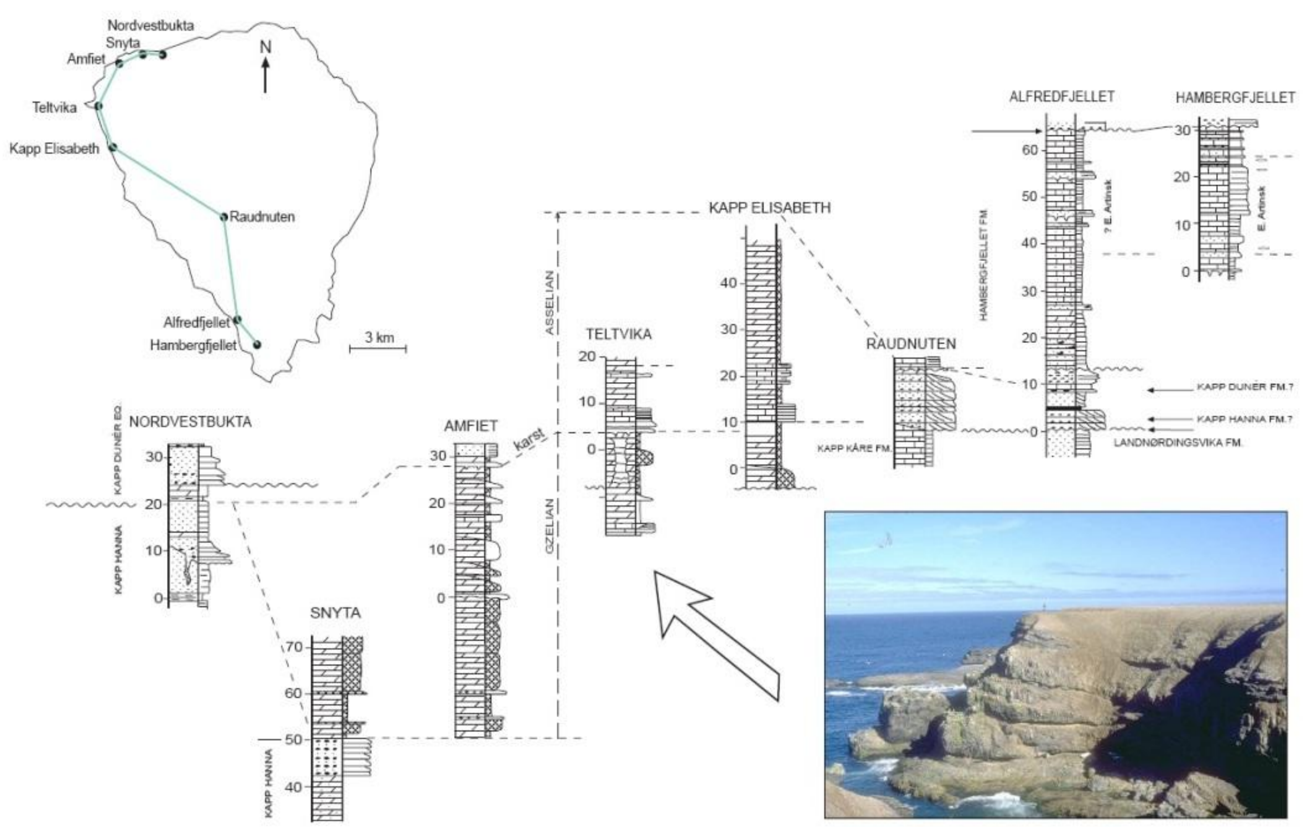

Fig. 5.13 Correlation of partial sections though the Kapp Duner Formation with (inset) an example of stacked Palaeoplysina buildups at Amfiet (Worsley et al. 2001).

Northwest Coast\Inland

Nordvestbukta W

4 samples from Nordvestbukta West on the northwest coast (see Fig. 4.1) hold stratigraphic position, ranging from 6.0 m to 19.0 m and are believed to represent the lowermost and the uppermost buildups. In addition, 1 bioherm sample without stratigraphic position most likely represents coral colonies from the basal part of the lowermost tabular buildups.

1 sandstone and dolomite sample ranging from 6.0 m to 7.5 m could represent an infilled palaeokarst surface at buildup level 1 and dolomitised biogenic wackestone or mudstone at the start of buildup level 2. The uppermost 2 limestones at level 16.0 and 19.0 are believed to represent the uppermost buildups at level 3 or 4.

Snyta

1 dolomite sample from Snyta between Nordvestbukta and Amfiet (see Fig. 4.1) hold stratigraphic information and is believed to represent the base of the formation below the lowermost buildups.

Amfiet

41 samples including 33 samples with stratigraphic information represent the sample material from Amfiet on the northwest coast, see Fig. 4.1.

23 samples hold stratigraphic position and are believed to represent both lower and upper buildup levels. In addition, 12 reef samples are believed to represent coral colonies at the basal part of the lowermost tabular buildups (Stemmerik et al. 1994). The sample lithologies are almost entirely carbonates including dolomites and a few shales, 35 and 5 samples respectively, in addition to 1 sandstone sample.

Amfiet North

The 5 fusulinid samples in addition to 1 dolomite sample without stratigraphic information represent the sample material from Amfiet North.

Amfiet South

The sample material from Amfiet South consists of 2 carbonate samples over and under fusulinids, in addition to a dolomite sample without stratigraphic information.

Kluftvann

7 samples from Kluftvann approximately 0.5 km east of Amfiet in the northwestern inland (see Fig. 4.1) have been collected with a fusulinid purpose from a 3.8 m long stratigraphic interval. The samples containing sandstones could represent a maximum flooding event with fusulinid packstones.

West Coast

Drangane

6 samples ranging from 0.9 m to 3.7 m, in addition to 3 dolomite sample without stratigraphic information represent the Kapp Duner Formation at Drangane midway between Amfiet and Teltvika (see Fig. 4.1). The samples consist of 4 carbonate samples including a fusulinid sample, 3 dolomite samples and 2 shale samples.

Teltvika

The 59 samples from Teltvika (see Fig. 4.1) probably represent level 3, 4 and 5 from the buildup complexes in addition to lagoonal-restricted shelf deposits.

48 samples hold stratigraphic position with several fusulinid samples, most likely fusulinid packstones in lagoonal-restricted shelf Palaeoplysina mounds or fusulinid wackstones between the buildups. The samples lithologies are almost entirely carbonates with a few sandstones and shales, 50, 3 and 6 samples respectively.

Kapp Elisabeth

10 samples from Kapp Elisabeth (see Fig. 4.1) on the west coast consist of 9 samples from Kapp Elisabeth and 1 sample from Kapp Elisabeth South. The samples are believed to represent the uppermost lagoonal-restricted shelf deposits consisting of 6 shale and 4 carbonate samples.

Summary

Overall, the lithological representation of the Kapp Duner Formation is very good consisting of 141 samples, represented from the west and northwest coast in addition to Kluftvann in the northwestern inland. The stratigraphic representation is also good with samples from both the lower and upper part of the formation.

5.12 Hambergfjellet Formation

The sample material from the Hambergfjellet Formation is represented by 24 samples collected from the southern mountain areas, including Alfredfjellet, Hambergfjellet and Fuglefjellet in addition to Avdalen on the western side of Alfredfjellet (see Fig. 4.1).

Fuglefjellet is the southernmost mountain located approximately 1.5 km southeast of Hambergfjellet in the extreme south of Bjørnøya (see Fig. 4.1).

Alfredfjellet

8 samples consisting of 2 samples from Alfredfjellet N and W and 6 samples from Alfredfjellet SE represent the base and the lower to middle/upper part of the formation respectively. The 2 samples from Alfredfjellet N and W are both limestone samples while the samples from Alfredfjellet SE consist of 4 carbonates and 1 sandstone and shale sample.

The 2 samples from Alfredfjellet SE are lacking stratigraphic information but are most likely from the middle and upper part of the section collected 235 and 250 m above the sea level. The 6 samples from Alfredfjellet SE consist of carbonates, sandstone and shale, 4, 1 and 1 respectively.

Avdalen

5 samples have been collected from the valley Avdalen on the western side of Alfredfjellet. All samples hold their stratigraphic positions. 2 shale samples are collected at the base of the formation under the basal sandstone, while the 3 other sandstone samples probably represent the basal sandstone and a sandstone unit in the middle of the formation.

Hambergfjellet

The 8 samples from Hambergfjellet are collected at two or three different locations and also hold their stratigraphic position representing the lower to upper part of the formation.

The HAM-1 section described by Nakrem (1991) is represented by 3 samples consisting of 2 basal sandstone samples in addition to 1 shale sample from the middle part of the section. The two other sections are lacking basal sandstone and consist of 3 carbonates and 2 shales representing the lower to upper part of the formation.

Fuglefjellet

The 3 samples from Fuglefjellet all hold their stratigraphic position and consist of 1 carbonate and 2 shale samples, representing the base and the middle and/or upper part of the formation respectively.

Fig. 5.17 Fuglefjellet southernmost on Bjørnøya with the small island Stappen on the right (Worsley et al. 2012).

Summary

Overall, the lithological and stratigraphic representation of the Hambergfjellet Formation is considered to be satisfactory consisting of 10 carbonates, 6 sandstones and 8 shales with samples from the lower and upper part of the formation.

5.13 Miseryfjellet Formation

The sample material from the Miseryfjellet Formation includes exposed areas from the north coast and southern mountain areas in addition to the slopes of Miseryfjellet where the formation is best developed (see Fig. 4.1), 89 samples in total.

North Coast

29 samples from Gravodden, Herwigshamna/Bjørnøya Radio and Kaffistigen/Nordkapp on the north coast all hold their stratigraphic position, representing the lower 16 m of the formation, consisting of carbonates and shales.

The meteorological station Bjørnøya Radio is located at the harbor Herwigshamna. Kaffistigen is located approximately 350 m west of Nordkapp, on the north coast (see Fig. 4.1).

Gravodden

3 samples at Gravodden on the north coast consisting of 1 siltstone sample and 2 carbonate samples represent the lowermost part of the formation from 1.0 m to 4.0 m.

Fig. 5.18 Angular unconformity between the Nordkapp and Miseryfjellet formations at Gravodden (Worsley et al. 2012).

Herwigshamna/Bjørnøya Radio

8 samples from Herwigshamna including Bjørnøya Radio have been collected, 5 and 3 samples respectively.

The samples from Herwigshamna are all limestone samples and represent the lower 15 m of the formation while the samples from Bjørnøya radio represent the very lowermost of the formation consisting of 1 carbonate and 2 shale samples.

Kaffistigen/Nordkapp

14 samples from Kaffistigen near Nordkapp on the north coast represent the lower 10 m of the formation. The samples consist of 11 shales and 3 carbonates.

4 samples from Nordkapp easternmost on the North coast are all carbonate samples from the very lowermost part of the formation, except 1 sample from the lower part of the formation (16 m).

South

10 samples from the Alfredfjellet, Hambergfjellet and Fuglefjellet represent the Miseryfjellet Formation at the southern mountain areas, mainly from the lowermost part of the formation. As explained earlier, Fuglefjellet is located approximately 1.5 km southeast of Hambergfjellet (see Fig. 4.1).

Alfredfjellet

2 samples from Alfredfjellet represent the very lowermost of the formation, consisting of 1 conglomerate and shale sample. In addition, 2 shale samples are believed to represent the upper part of the Hamberfjellet Formation, 10 and 12 m below base.

Hambergfjellet

2 samples from Hamberfjellet N and 1 sample from Hambergfjellet represent the lower 6 m of the formation including 2 samples at the base from both locations.

Fuglefjellet

3 shale samples are collected at Fuglefjellet from the lower/middle part of the formation, ranging from 35 m to 45 m above base.

Southeast

50 samples from the slopes of Miseryfjellet represent the sample material at the southeastern part of Bjørnøya (see Fig. 4.1) from the Miseryfjellet Formation collected at Oppgangsdalen, Skrekkjuvet, Urd , Osten and Brettingsdalen (see Fig. 5.19).

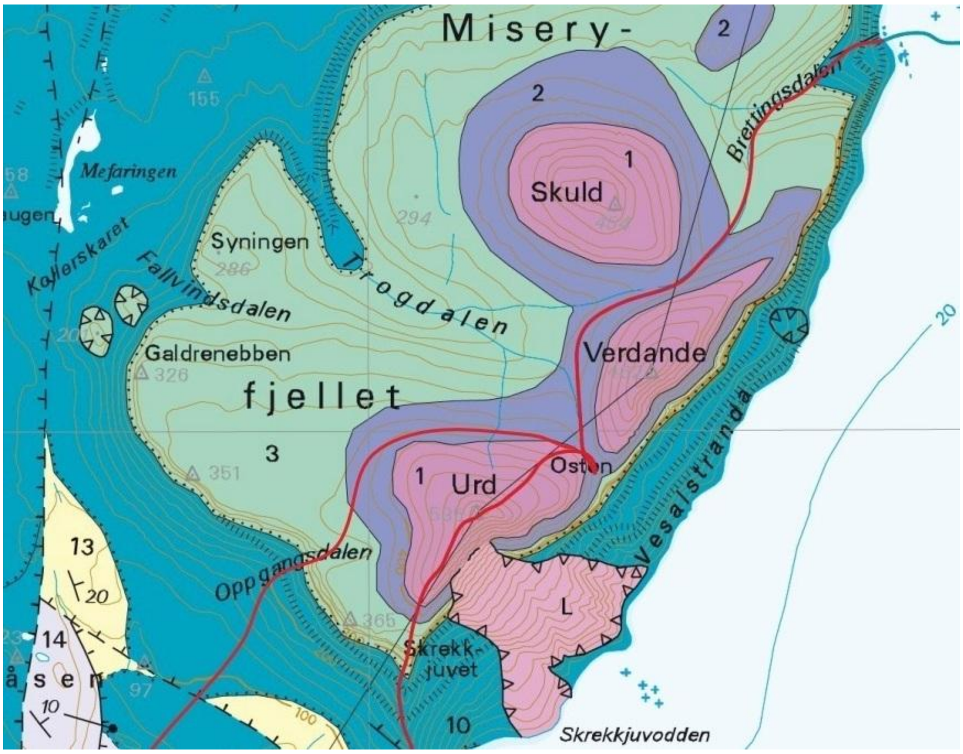

Fig. 5.19 Miseryfjellet at the southeastern part of Bjørnøya. The red line is part of a walking route from the Bjørnøya Fieldguide (Worsley et al. 2012).

Oppgangsdalen

1 limestone sample collected at the valley Oppgangsdalen at the southwestern slope of Miseryfjellet (Fig. 5.19) is believed to represent the uppermost part of the formation, 5 m below the Permian/Triassic boundary.

Skrekkjuvet

21 samples from Skrekkjuvet on the southern part of Miseryfjellet (Fig. 5.19) contain mostly samples from the lower part of the formation in addition to a few samples from the uppermost part of the formation. The lithologies are mainly carbonates with a few shales in addition to 1 sandstone sample 1 m below the base.

Fig. 5.20 Eastern slope of Miseryfjellet with the vertical cliff Skrekkjuvet (Worsley et al. 2012).

Urd

4 sandstone samples are collected in the area around Urd, the southernmost mountainpeak of Miseryfjellet (Fig. 5.19). 1 sample is from the basal sandstone and 2 samples from the middle sandstone unit.

Osten

2 limestones samples from Osten ("the cheese") at the crest above Vesalstranda between Urd and Verdande (Fig. 5.19) represent the top of the formation consisting of 1 grey and 1 red limestone sample.

Fig. 5.22 The limestone rock Osten ("the cheese") representing the top of the formation (Worsley et al. 2012).

Brettingsdalen

22 samples have been collected from the type area Brettingsdalen on the eastern side of Miseryfjellet (Fig. 5.19), ranging from 2 m to 80 m. The samples lithologies are carbonates and shales, 15 and 7 samples respectively.

Summary

The lithological representation of the Miseryfjellet Formation is considered to be good consisting of 54 carbonates, 6 conglomerates/sandstones and 29 siltstones/shales, collected at the north, southern mountain areas and the southeastern slopes around Miseryfjellet. The stratigraphic representation however is only satisfactory with most of the samples from the lower/middle part of the formation.

5.14 Urd Formation

11 samples collected from Skrekkjuvet and Oppgangsdalen (see Fig. 5.19) represent the sample material from the Urd Formation. The samples represents the very lowermost to the very uppermost of the formation, consisting of mainly shales, including 1 phosphate sample from the very uppermost 20 cm thick Verdande Bed, see Fig. 5.23.

Fig. 5.23 Phosphate nodules of the Verdanda Bed (Worsley et al. 2012).

Summary

The lithological and stratigraphic representation of Urd Formation is very good consisting of mainly shales (including 1 phosphate sample) from the very lowermost to the very uppermost of the 65 m thick formation.

5.15 Skuld Formation

10 samples collected at Oppgangsdalen (see Fig. 5.19) represent the sample material from the 135 m thick Skuld Formation, ranging from 74 m to 172 m above base, correlated from the 65 m thick Urd Formation. The samples are mainly shales, except 1 siltstone sample at 172 m.

Fig.5.24 Carnian sandstone from the top of the formation on the highest peak of Miseryfjellet (Worsley et al. 2012).

Summary

The lithological and stratigraphic representation of the Skuld Formation is also considered to be good with 10 samples from the lower to the upper part of the formation. The only missing is the 20 m thick sandstone of Carnian age preserved on the highest mountain peaks of Miseryfjellet, see Fig. 5.24.

6. Results

The result of this study is divided in 4 sections:

1) Susceptibility distribution for the different formations and members.
2) Stratigraphic susceptibility distributions.
3) Lithological susceptibility distributions.
4) Koeningsberger ratios (Q-values).

6.1 Susceptibility Distributions

6.1.1 Vesalstranda Member

The Vesalstranda Member hold some of the highest susceptibilities measured, including 3 samples above 400 (10^{-6} SI) from the middle/upper part of the member. 4 samples have been analysed in optical microscope and 2 of these in scanning electron microscope (SEM) to find the mineralogical source of the high susceptibilities. Average susceptibility of the Vesalstranda Member consisting mainly of siltstones and shales (including claystones) is 202 (10^{-6} SI). The coal samples have the lowest values while the sandstones and siltstones/shales have the highest values, up to 2171 (10^{-6} SI), see Fig. 6.1.

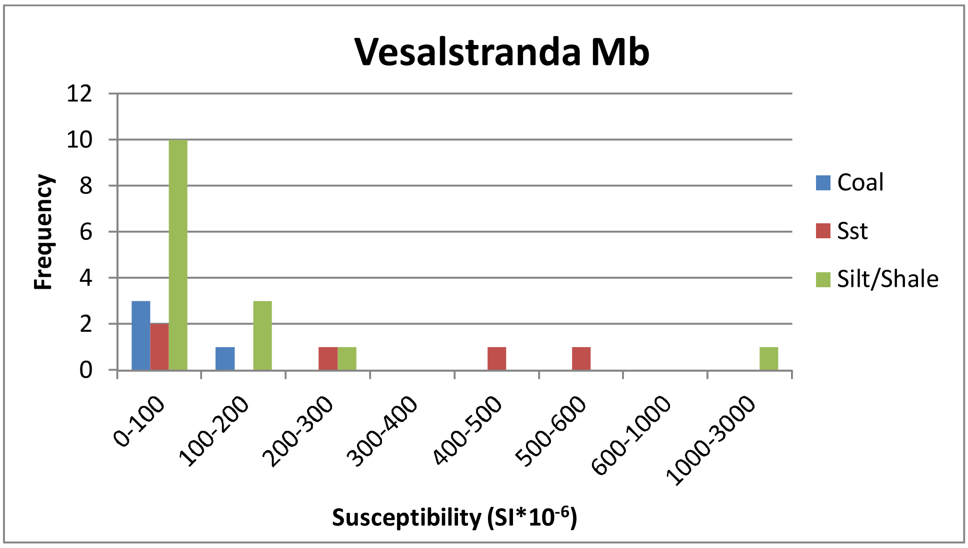

Fig. 6.1 Susceptibility distribution for the different lithologies of the Vesalstranda Member.

6.1.2 Kapp Levin Member

The susceptibilities from the Kapp Levin Member are considerably lower than the values from the Vesalstranda Member consisting of 6 shales and 2 sandstones, see Fig. 6.2. The sandstone samples have an average susceptibility of only 15 (10^{-6} SI) compared to 92 (10^{-6} SI) for the shales. Total average susceptibility of the Kapp Levin Member is 63 (10^{-6} SI).

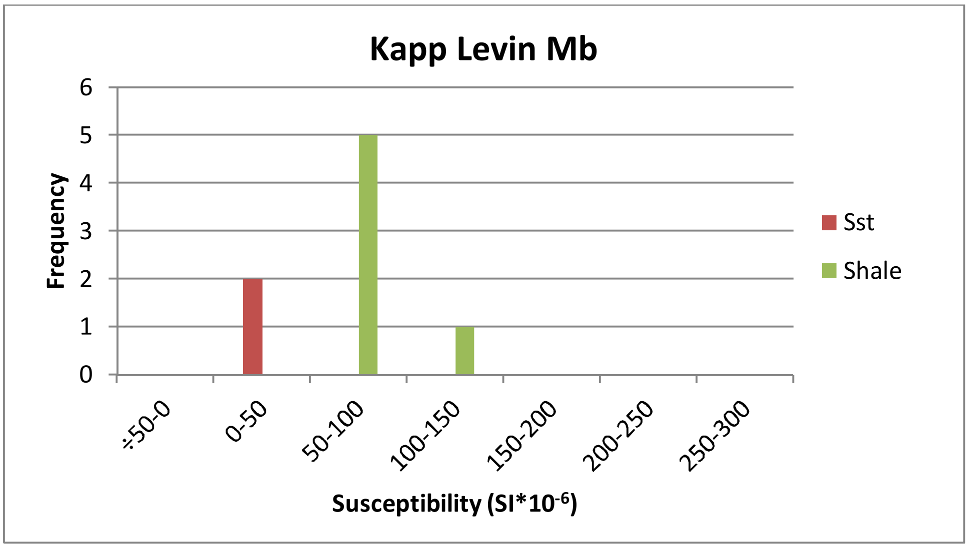

Fig. 6.2 Susceptibility distribution for sandstones and shales of the Kapp Levin Member.

6.1.3 Tunheim Member

Although the Tunheim Member very much lithological resembles the Vesalstranda Member, the susceptibility values are much lower, see Fig. 6.3. Average susceptibility of the sandstones, coals and siltstones/shales from the Tunheim Member is 4, 26 and 88 (10^{-6} SI) respectively with a total average susceptibility of 50 (10^{-6} SI).

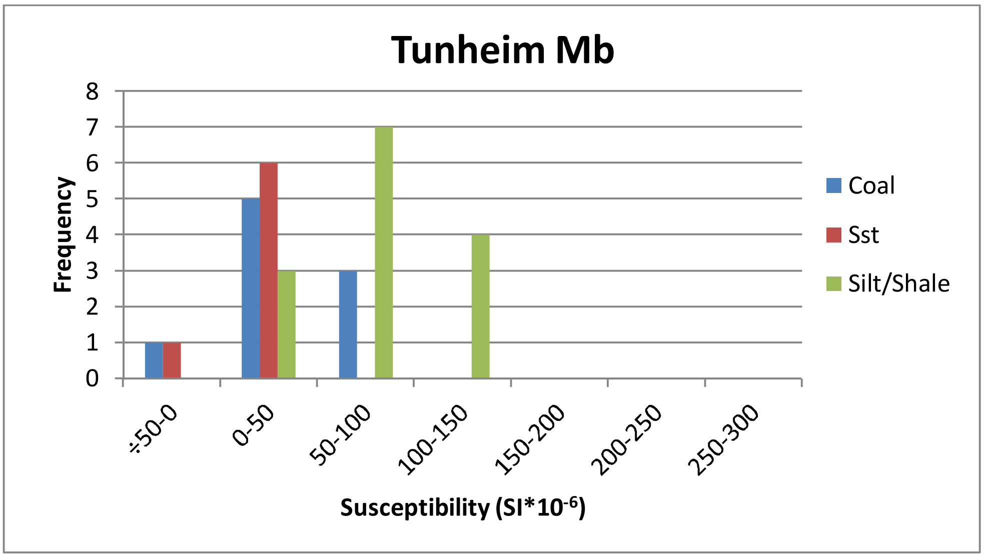

Fig. 6.3 Susceptibility distribution for the different lithologies of the Tunheim Member.

6.1.4 Nordkapp Formation

The average susceptibility of the Nordkapp Formation is very low with a value of only 27 (10^{-6} SI), consisting of 22 sandstone and 5 shale samples, see Fig. 6.4. Because of the over-representation of shales from the Kapp Harry Member and lack of shale samples from the Nordhamna Member, the average susceptibility of 36 and 12 ($SI*10^{-6}$) respectively for the members is probably misleading.

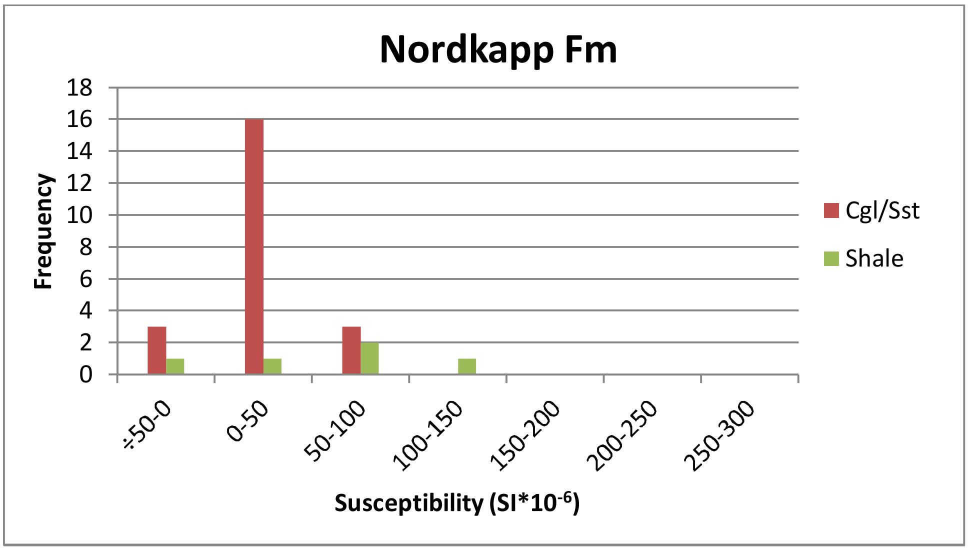

Fig. 6.4 Susceptibility distribution for the different lithologies of the Nordkapp Formation.

6.1.5 Landnørdingsvika Formation

The susceptibilities of the Landnørdingsvika Formation are higher than the underlying Nordkapp Formation with an average susceptibility of 77 (10^{-6} SI). The susceptibility values varies from -7 to 242 (10^{-6} SI) consisting of conglomerates/sandstones, siltstones/shales and carbonates, with carbonate samples having the lowest average susceptibility value of only 13 (10^{-6} SI), see Fig. 6.5.

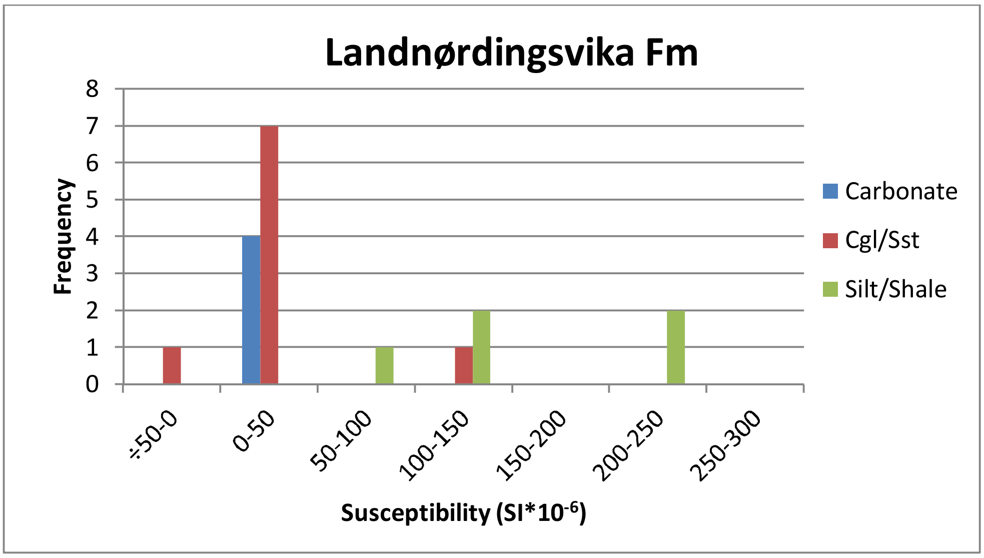

Fig. 6.5 Susceptibility distribution for the different lithologies of the Landnørdingvika Formation.

6.1.6 Bogevika Member

The susceptibility values of the Bogevika Member consisting of sandstones, carbonates and siltstones/shales are slightly higher than the Landnørdingsvika Formation, ranging from -25 to 273 (10^{-6} SI) with an average susceptibility of 102 (10^{-6} SI). Average susceptibility values for the siltstones and shales are 151 (10^{-6} SI) and only 51 (10^{-6} SI) for the carbonates, see Fig. 6.6 for distribution.

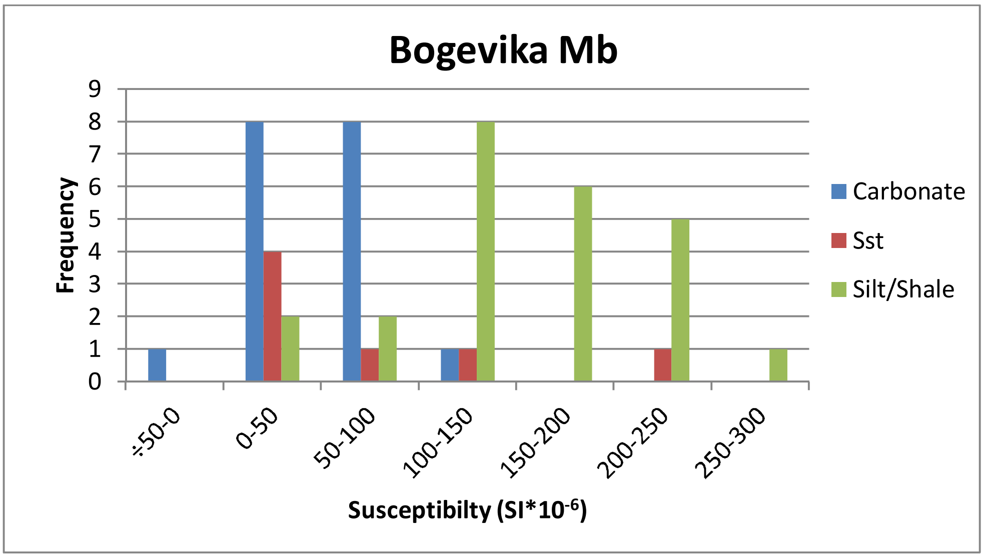

Fig. 6.6 Susceptibility distribution for the different lithologies of the Bogevika Member.

6.1.7 Efuglvika Member

Overall, the susceptibility values from the Efuglvika Member consisting entirely of carbonates are very low with an average value of only 24 (10^{-6} SI). Because of a sample from Raudnuten with a susceptibility of 537 (10^{-6} SI) the average susceptibility increases from 13 to 24 (10^{-6} SI).

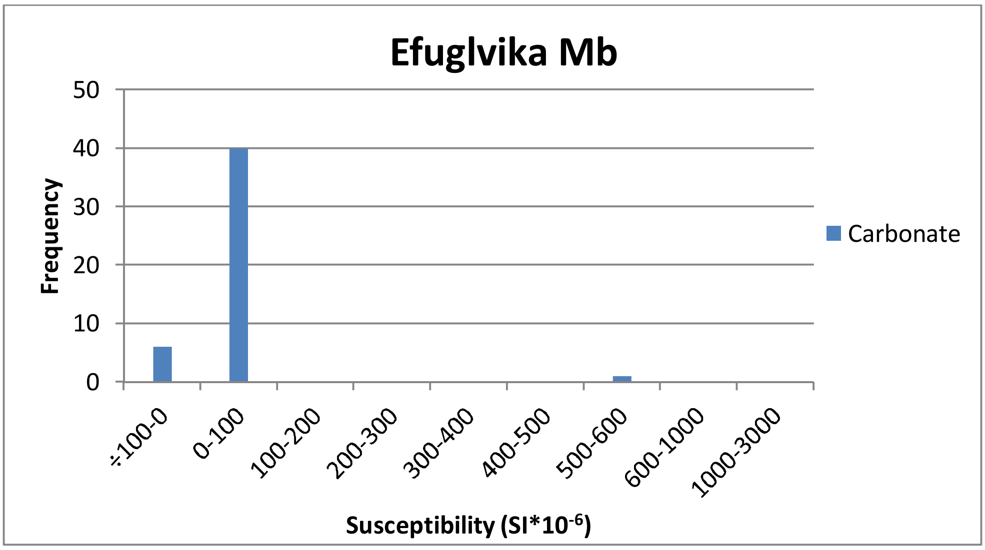

Fig. 6.7 Susceptibility distribution for the different lithologies of the Efuglvika Member.

6.1.8 Kobbebukta Member

The samples from the Kobbebukta Member consisting of carbonates and shales are slightly higher than the Bogevika Member with an average susceptibility of 114 (10^{-6} SI). The susceptibilities for the carbonates are also slightly higher compared to the Bogevika Member. Average susceptibility for the carbonates and shales are 83 and 150 (10^{-6} SI) respectively, see Fig. 6.8 for distribution.

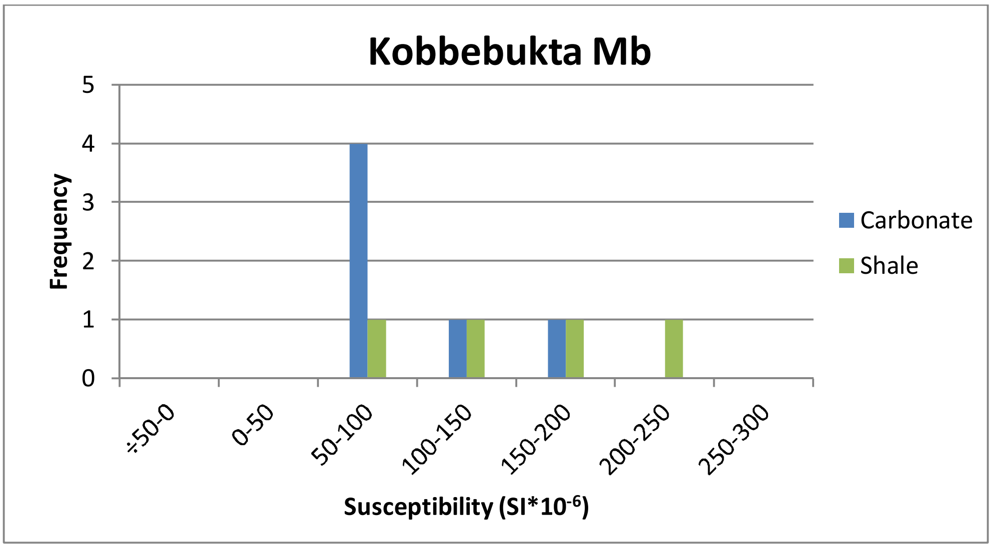

Fig. 6.8 Susceptibility distribution for the different lithologies of the Kobbebukta Member.

6.1.9 Kapp Hanna Formation

Analyses of sandstone mineralogy done by Agdestein (1980) show a marked dominance of Hecla Hoek clasts in southwestern exposures in contrast to Upper Devonian-Middle Carboniferous dominantly clast content of the northwest exposures (Agdestein 1980).

The susceptibilities from Kobbebukta on the north coast are slightly higher than the rest of sample exposures with an average susceptibility of 239 (10^{-6} SI), including 1 sample from section A at Kobbebukta with a value of 2913 (10^{-6} SI), see Fig. 6.9. The sample has been analysed in optical microscope and scanning electron microscope (SEM). Total average susceptibility of the Kapp Hanna Formation is 164 (10^{-6} SI).

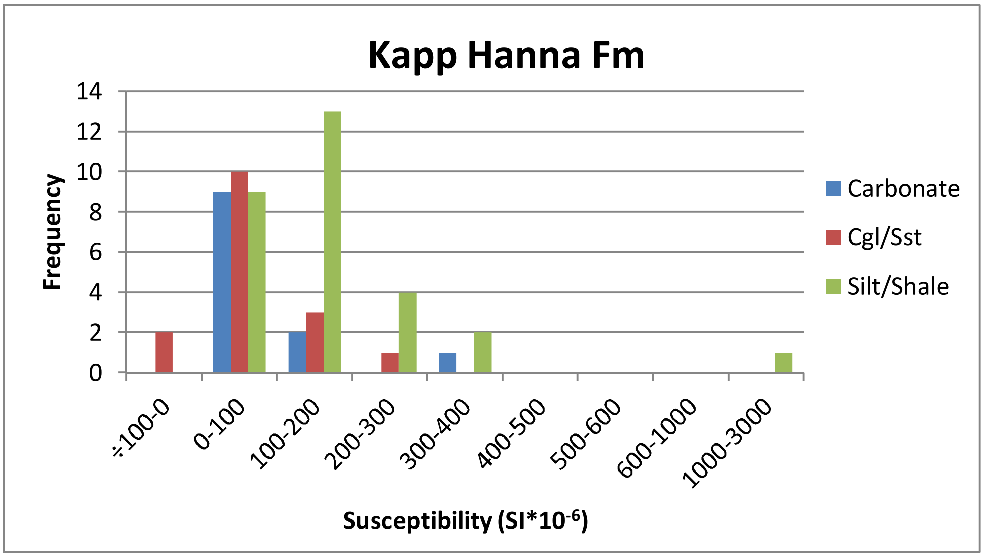

Fig. 6.9 Susceptibility distribution for the different lithologies of the Kapp Hanna Formation.

6.1.10 Kapp Duner Formation

The susceptibilities from the Kapp Duner Formation are generally very low and consist of mainly carbonates (including dolomites), in addition to a few sandstones and shales, see Fig. 6.10. 1 coral sample from Amfiet on the northwest coast had a relatively high susceptibility of 678 (10^{-6} SI). The total average susceptibility of the Kapp Duner Formation is 46 (10^{-6} SI).

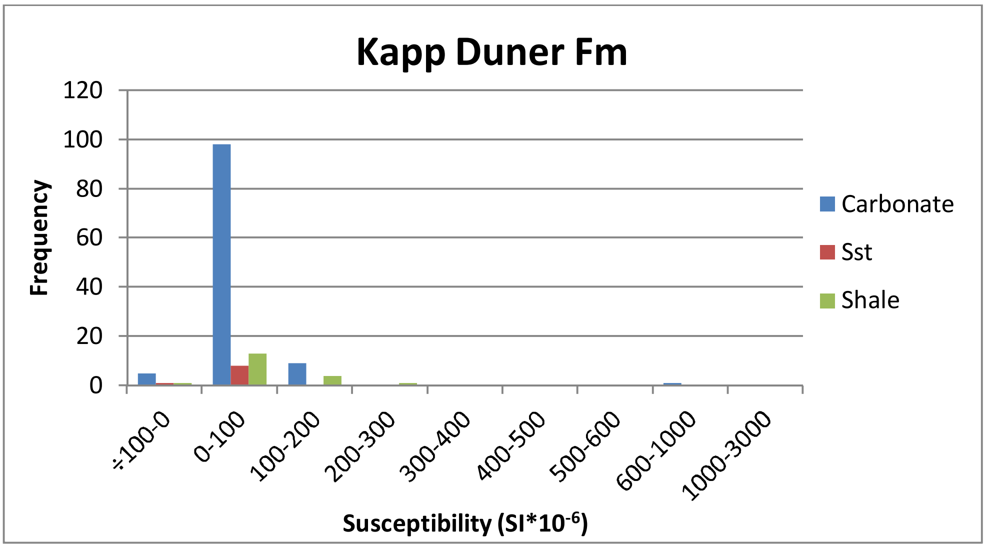

Fig. 6.10 Susceptibility distribution for the different lithologies of the Kapp Duner Formation.

6.1.11 Hambergfjellet Formation

The susceptibilities from the Hambergfjellet Formation are also very low, similar to the Kapp Duner Formation, consisting of carbonates, sandstones and shales with average susceptibilities of 28, 54 and 66 (10^{-6} SI) respectively, see Fig. 6.11 for distribution. Total average susceptibility for the Hambergfjellet Formation is 47 (10^{-6} SI).

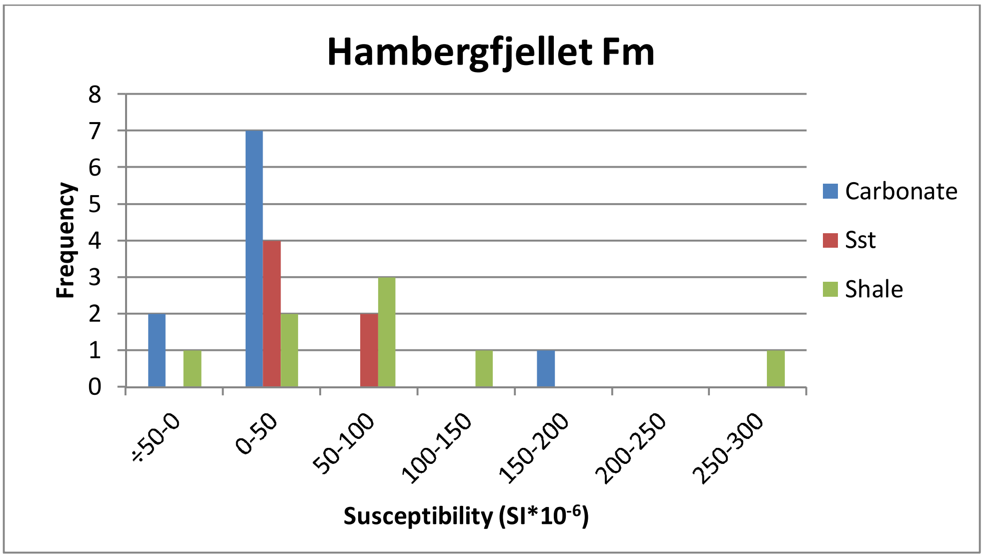

Fig. 6.11 Susceptibility distribution for the different lithologies of the Hambergfjellet Formation.

6.1.12 Miseryfjellet Formation

The susceptibility values for the Miseryfjellet Formation are also generally very low except for a few limestone samples, see Fig. 6.12 for distribution. 1 limestone samples collected at Osten from the very uppermost part of the formation with a susceptibility value of 495 (10^{-6} SI) has been analysed in optical microscope and scanning electron microscope (SEM) for mineralogical source. Total average susceptibility of the Miseryfjellet Formation is 56 (10^{-6} SI).

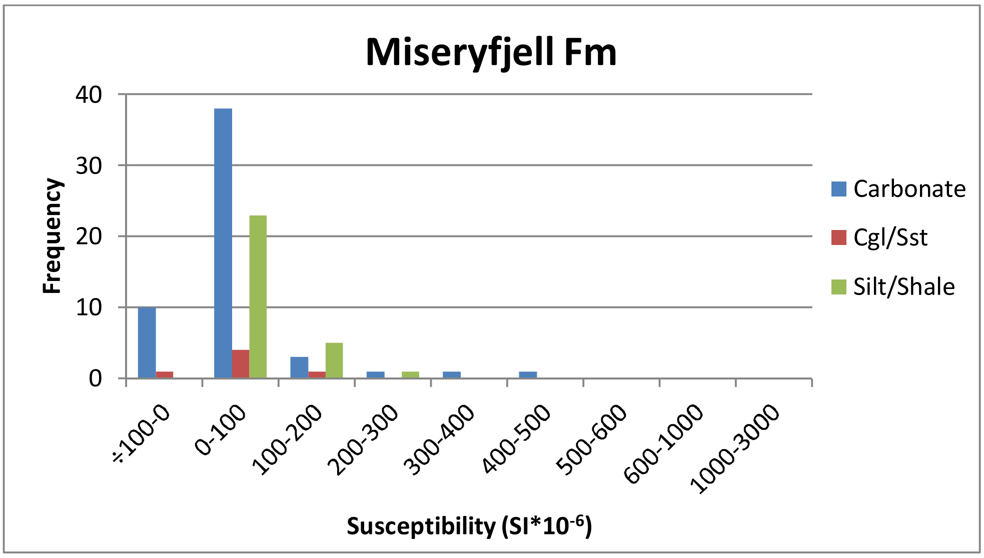

Fig. 6.12 Susceptibility distribution for the different lithologies of the Miseryfjellet Formation.

6.1.13 Urd and Skuld Formations

The shale dominated Urd and Skuld formations revealed relative high average susceptibility values of 166 and 261 (10^{-6} SI) respectively without any really high susceptibilities of single samples, see Fig. 6.13. The susceptibility difference between the two formations most likely reflects the higher clay content in the Skuld Formation than the Urd Formation. No mineralogical analyses have been done of the two formations but pyrite has been found in both formations, in addition to siderite nodules in the Skuld Formation (Mørk et al. 1990).

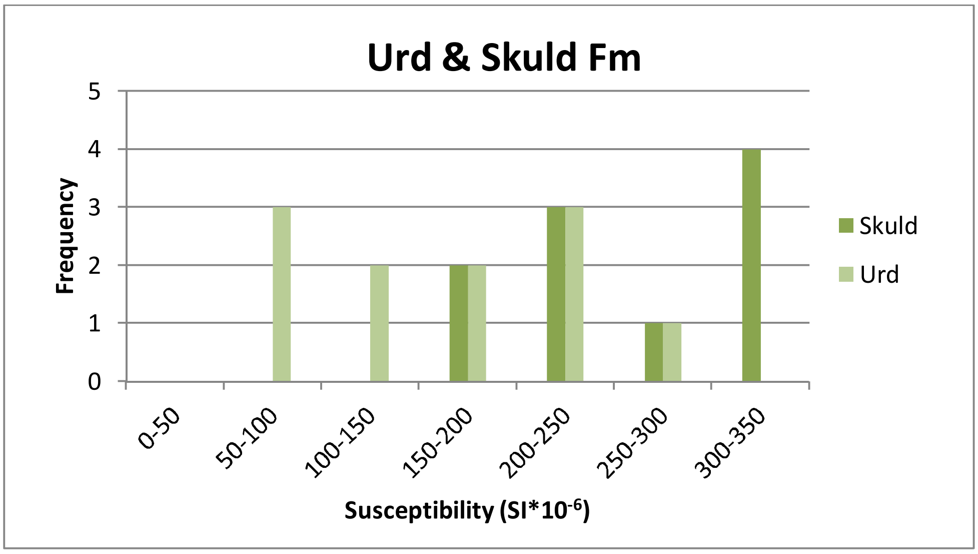

Fig. 6.13 Susceptibility distribution for the shale dominated Urd and Skuld formations.

6.2 Stratigraphic susceptibility variations

The stratigraphic results revealed that the Triassic formations consisting almost entirely of siltstones and shales had some of the highest average susceptibility values. The Vesalstranda Member had some of the highest single susceptibility values which also resulted in the second highest average susceptibility of 202 (10^{-6} SI), see Fig. 6.14.

The lowest values were registered in the carbonate dominated formations and members like the Efuglvika Member and the Kapp Duner, Hambergfjellet and Miseryfjellet formations, in addition to sandstone rich formations like the Nordkapp Formation. The absolute lowest values of these were registered by carbonate and chert dominated Efuglvika Member and the sandstone dominated Nordkapp Formation with average susceptibility values of 24 and 27 (10^{-6} SI) respectively.

The mixed carbonate and clastic Bogevika and Kobbebukta members of the Kapp Kåre Formation in addition to the Kapp Hanna Formation revealed moderately high susceptibility values of 102, 114 and 164 (10^{-6} SI) respectively, see Fig. 6.14.

Since the number of samples (Qty) valid for calculating the Q-values are less than the number of measured samples for density and susceptibility, two different sample numbers (Qty) in Table 3 and 4 are given.

Table 3 Average density, susceptibility and Q-values for different formations and members.

Formation/Member	Qty	Density (kg/ m^3)	Susceptibility (SI * 10^{-6})	Q-value
Vesalstranda Mb	24/23	2466	202	2.82
Kapp Levin Mb	8/2	2519	63	0.92
Tunheim Mb	30/21	2240	50	2.42
Nordkapp Fm	27/21	2469	27	4.61
Landnørdingsvika Fm	20/14	2623	77	5.62
Bogevika Mb	49/32	2624	102	2.44
Efuglvika Mb	48/37	2681	24	1.74
Kobbebukta Mb	10/10	2709	114	2.14
Kapp Hanna Fm	57/43	2676	164	2.46
Kapp Duner Fm	141/106	2716	46	5.00
Hambergfjellet Fm	24/17	2620	47	2.02
Miseryfjellet Fm	89/62	2602	56	3.08
Urd Fm	11/9	2501	166	1.42
Skuld Fm	10/8	2527	261	0.83

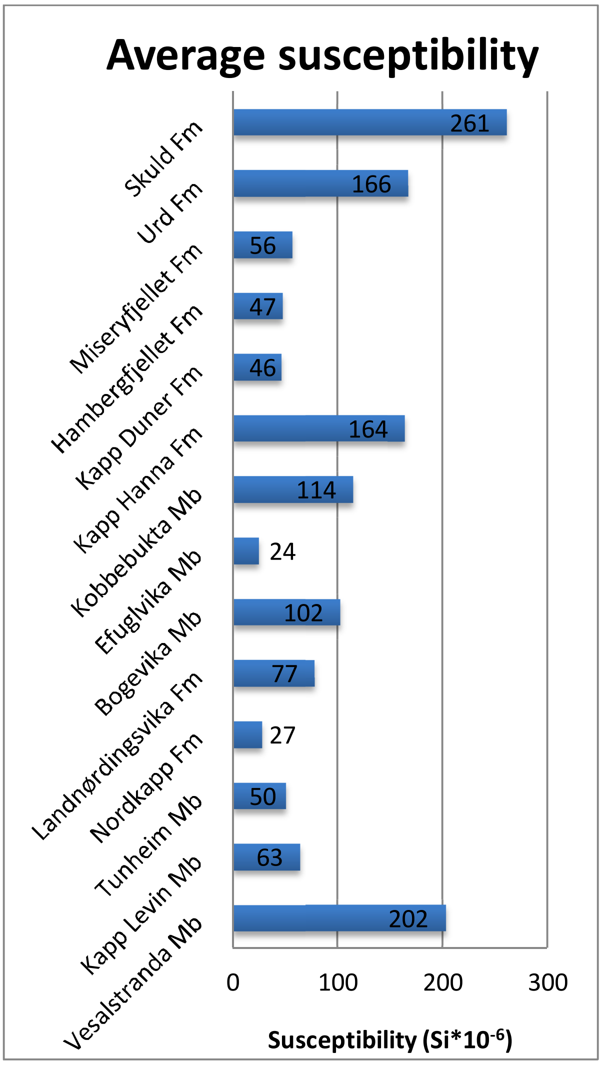

Fig. 6.14 Average stratigraphic susceptibility values of the sedimentary succession of Bjørnøya.

6.3 Lithological susceptibility variations

The lithological variations revealed that the siltstones and shales (including claystones) have the highest susceptibilities (see Fig. 6.15) with an average susceptibility of 150 (10^{-6} SI) compared to the coals, conglomerates/sandstones and carbonates with average susceptibilities of only 40, 41 and 45 (10^{-6} SI) respectively, see Table 4.

Table 4 Average density, susceptibility and Q-values for different lithologies.

Lithology	Qty	Density (kg/ m^3)	Susceptibility (SI * 10^{-6})	Q-value
Cgl /Sst	92/79	2575	41	3.02
Conglomerate	10/9	2657	35	2.57
Sandstone	82/70	2560	42	3.10
Carbonate	265/206	2690	45	3.63
Dolomite	47/36	2762	40	5.61
Limestone	31/10	2633	55	1.63
Silt/Shale/Claystone	177/112	2586	150	3.11
Siltstone	15/11	2639	272	5.33
Shale	139/80	2575	139	3.27
Claystone	23/21	2613	135	1.41
Coal	13/8	1749	40	1.21

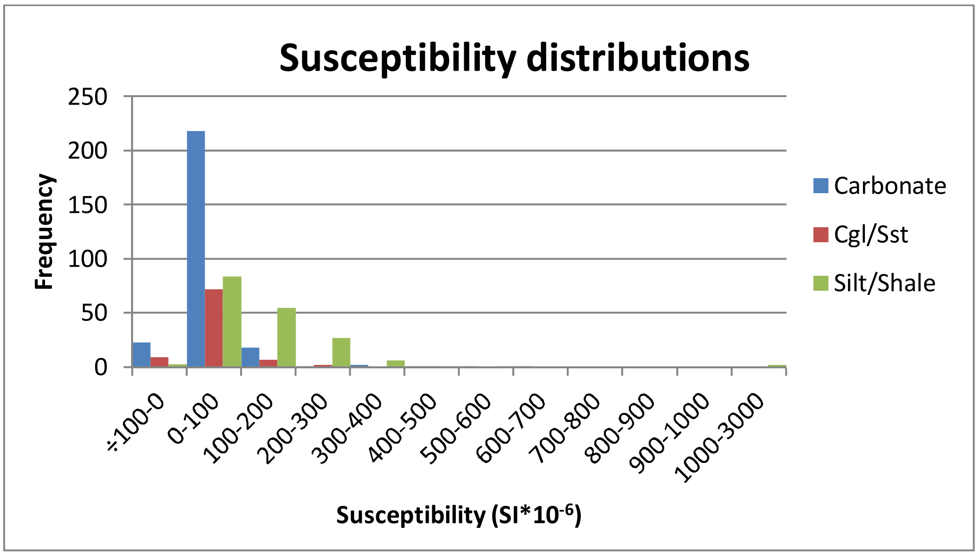

Fig.6.15 Total susceptibility distribution of different lithologies.

6.4 Koeningsberger ratios (Q-values)

The Koenigsberger ratio values (Q-values) has been calculated to see variations in both formations/members and different lithologies. The geomagnetic field (B) is set to 54000 nT which give us a value of 42.97 A/m of the induced magnetization (H) and the formula:

$$Q = \frac{Mr\ (A/M)}{(k\ (\mathrm{SI}) * H\ (A/m))} = NRM\ /(\ k * 42.97\ )$$

6.4.1 Stratigraphic Q-value variations

Calculation of the Koeningsberger ratio (Q-ratio) revealed very high values and large variation between the formations and members (see Table 3 and Fig. 6.16).

The Landnørdingvika and Kapp Duner Formation had the highest values of 5.6 and 5.0 respectively while the Skuld Formation and Kapp Levin Member had the lowest values of less than 1.

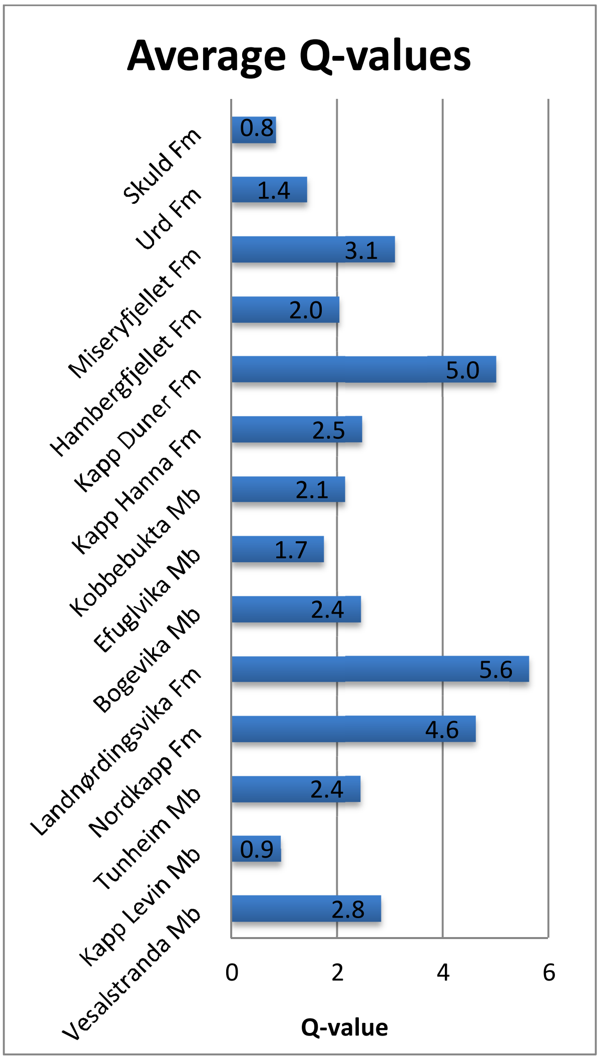

Fig. 6.16 Average stratigraphic Q- values of the sedimentary succession of Bjørnøya.

6.4.2 Lithological Q-value variations

The Q-values for the different lithologies also revealed very high values and variations. The largest average values were registered in dolomites and siltstones with an average value of 5.6 and 5.3 respectively, while the lowest were registered in coals, claystones and limestones with values of 1.2, 1.4 and 1.6 respectively (see Table 4).

7. Mineralogical Analyses

To find the mineralogical source of the relative high susceptibilities, 8 samples have been analysed in optical microscope and 4 of these in scanning electron microscope (SEM). Energy dispersive spectra (EDS) used in the mineral identification are enclosed in Appendix A.2.

Siderite and pyrite were found to the mineralogical cause of the relative high susceptibility values. No other magnetic heavy mineral like magnetite or pyrrhotite was found in the SEM-analyses. Samples with mainly pyrite seem to have lower susceptibility values than with siderite.

7.1 Vesalstranda Member

4 samples from the Vesalstranda Member with susceptibilities from 297 to 2171 (10^{-6} SI) revealed that siderite was the main cause of the high values in addition to what was thought to be pyrite. The siderite occurs most as cement in addition to partial dissolution/inclusions in quartz grains, Fig. 7.1 and 7.2. Scanning electron microscope (SEM) revealed no other magnetic heavy mineral like magnetite and pyrrhotite but non-magnetic minerals like zircon and barite was present, see Fig. 7.7. Pyrite was also present in some of samples, see Fig. 7.5.

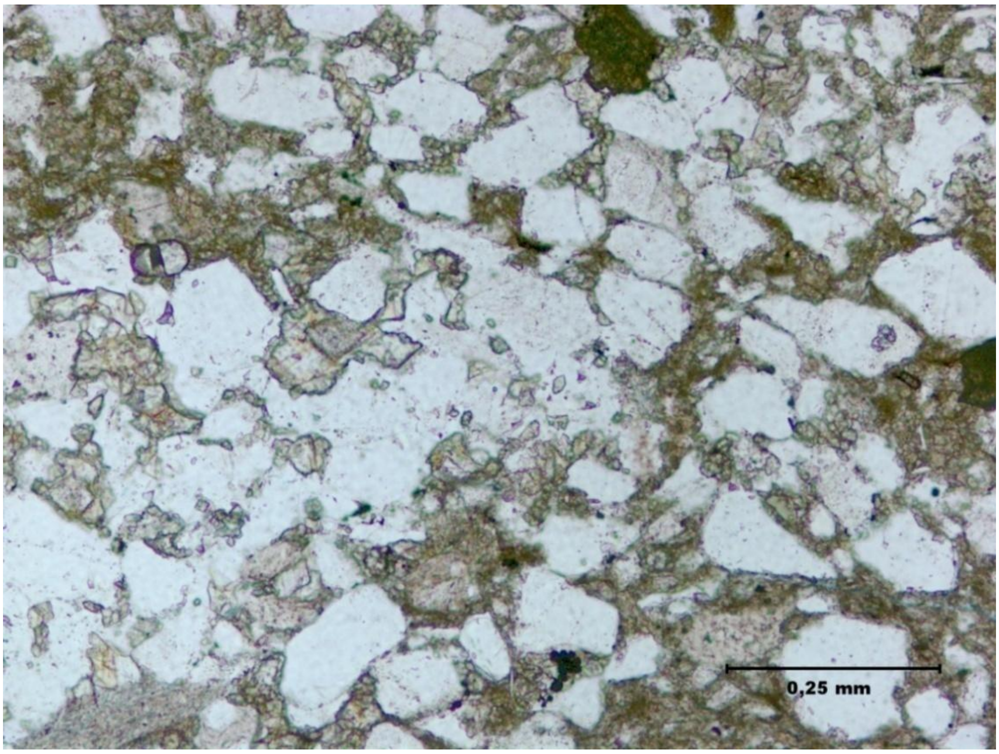

Fig. 7.1 Optical micrograph (parallel polars) of sandstone, sample S4502. The picture shows light brown calcite and brown siderite between the quartz grains.

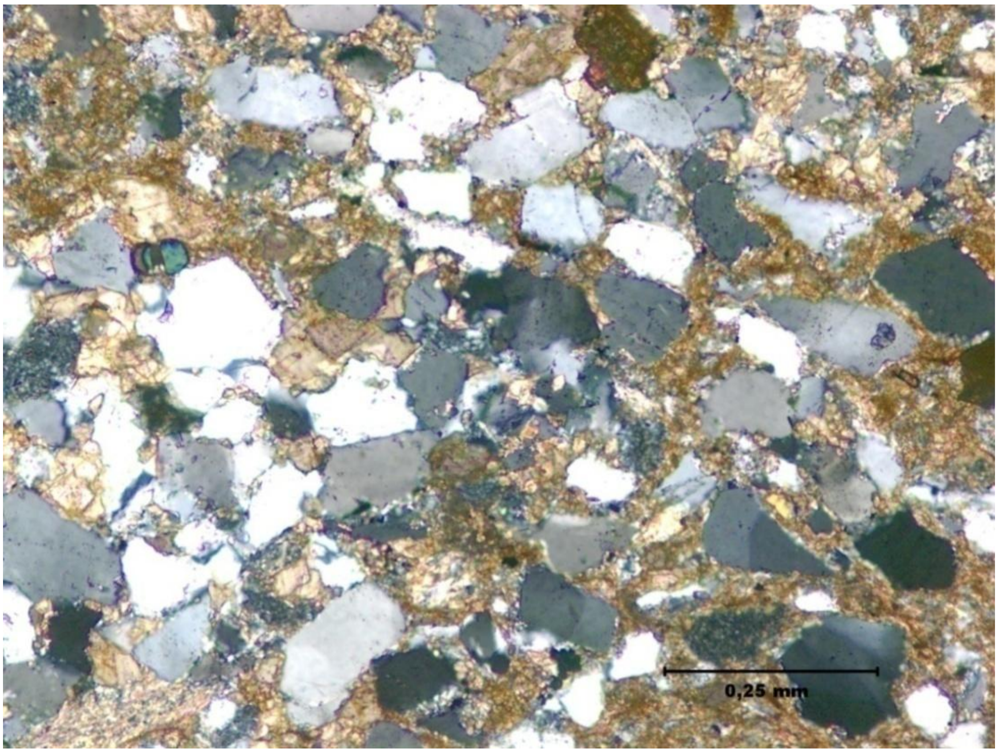

Fig. 7.2 Optical micrograph (crossed polars) of sandstone, sample S4502. Partial dissolution of quartz grains with calcite and siderite in the pore space in addition signs of physical compaction (concavo-convex and long contacts) in the middle of the picture.

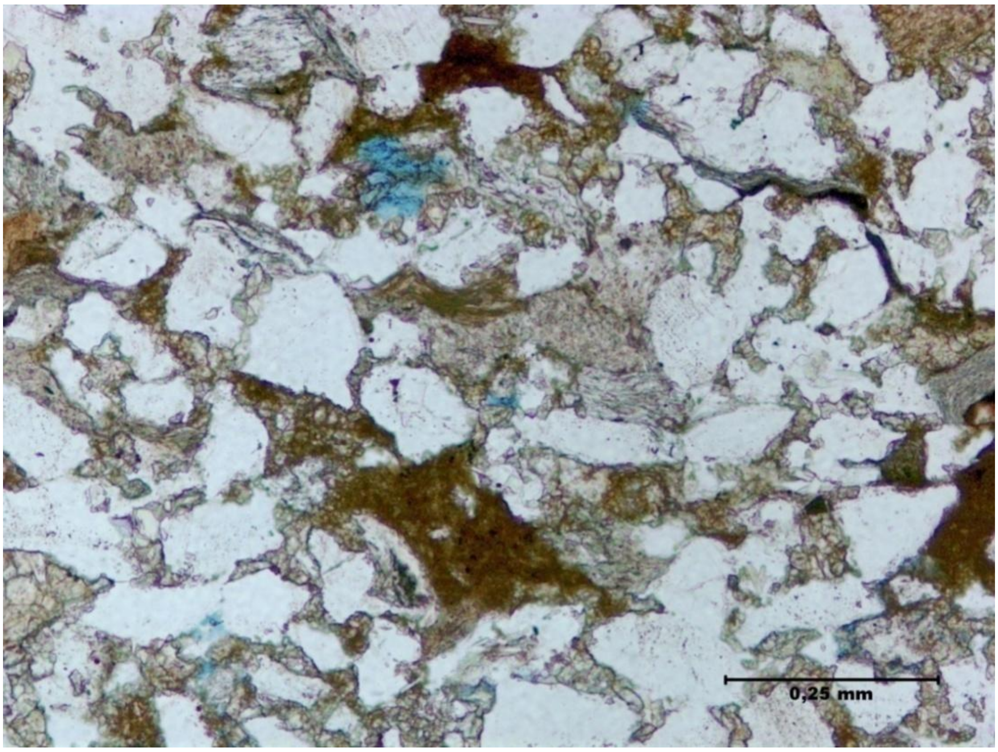

Fig. 7.3 Optical micrograph (parallel polars) of sandstone, sample S4504. Another sample also with calcite and siderite in addition to deformed muscovite grains in the pore space. The brown "cloud" in the middle/lower and right side of the picture is due to oxidized siderite.

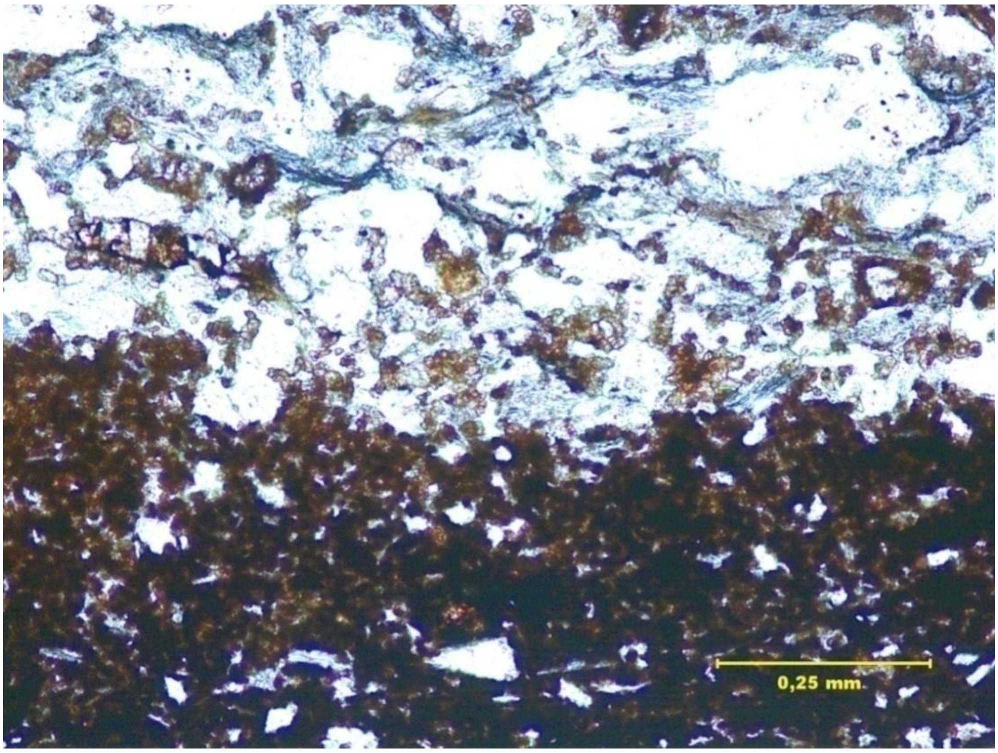

Fig. 7.4 Optical micrograph (parallel polars) of sandstone, sample S4506. Lower half of the picture shows abundant precipitated siderite crystals along a permeable crack.

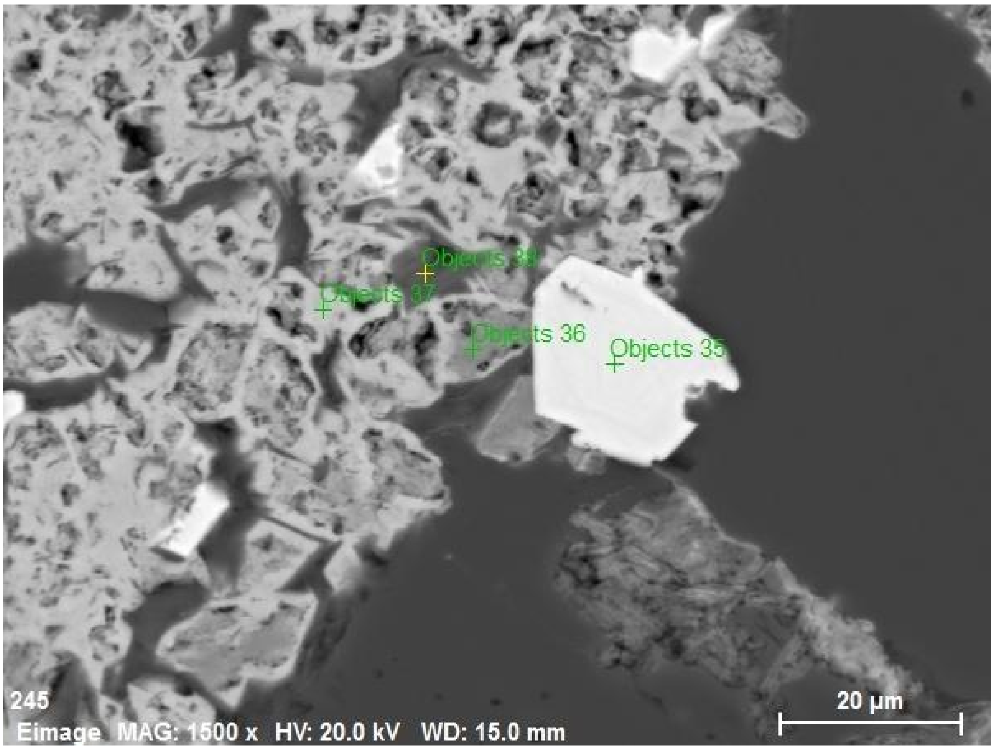

Fig. 7.5 Electron scanning microscope (SEM backscattered electron image) of sandstone, sample S4506. Example of carbonate zonation with outermost light grey siderite and a white pyrite grain in the middle of the picture. Object 38 at the yellow cross is a muscovite.

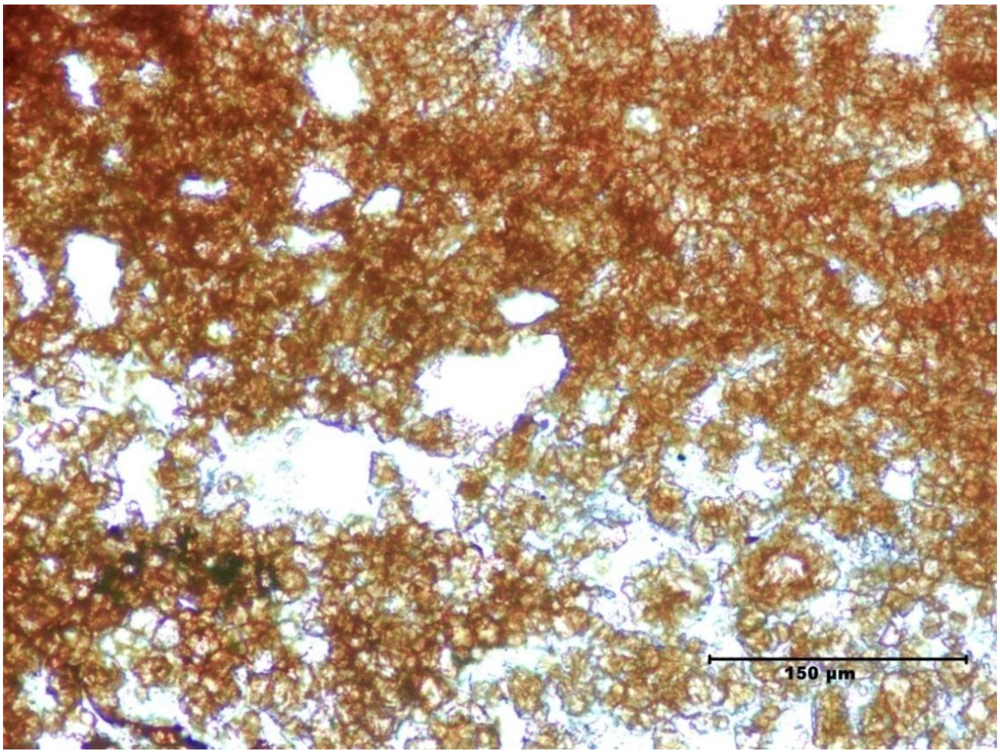

Fig. 7.6 Optical micrograph (parallel polars) of siltstone, sample S4508. The sample with the highest susceptibility value registered from the Vesalstranda Member with abundant of brown siderite.

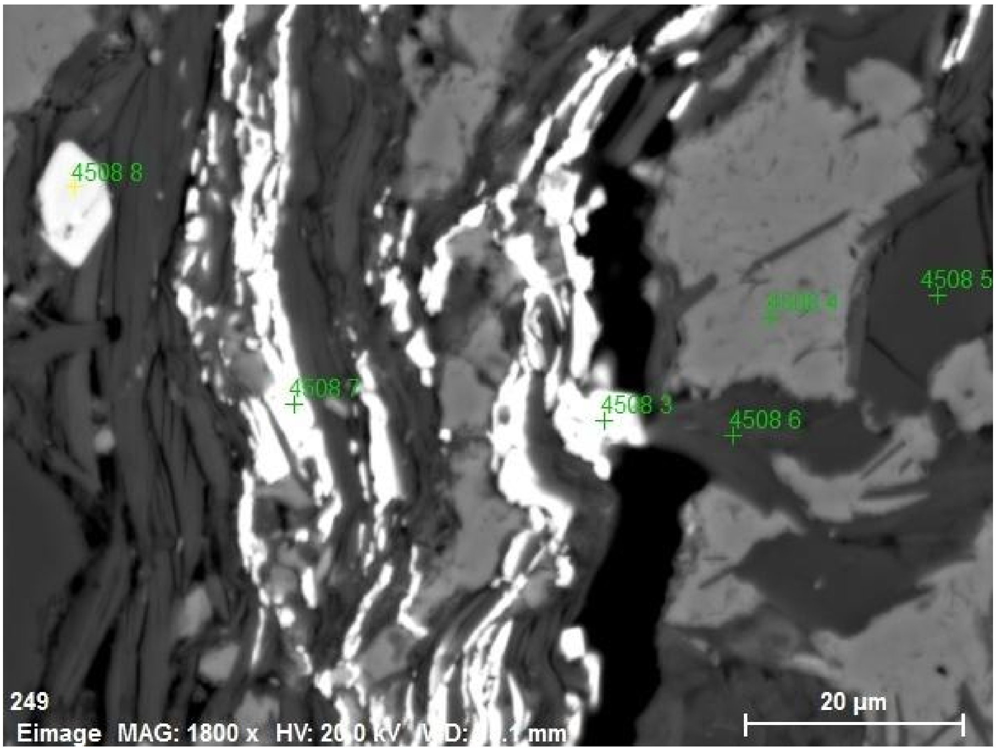

Fig. 7.7 Electron scanning microscope (SEM backscattered electron image) of siltstone, sample S4508. Two white non-magnetic heavy minerals, zircon with the characteristic shape to the left and barite in permeable cracks. The other two recognized minerals are quartz and calcite (4508 4 and 4508 5/4508 6 respectively).

7.2 Efuglvika Member

1 chertified carbonate sample (rugose coral) from Raudnuten on the southern inland of Bjørnøya revealed that pyrite and small amounts of siderite was the mineralogical cause for the relatively high susceptibility of 537 (10^{-6} SI). Pyrite, chalcedony and quartz in the sample could be an indicator of fluctuating hypersaline and fresh water conditions (Folk & Siedlecka 1974).

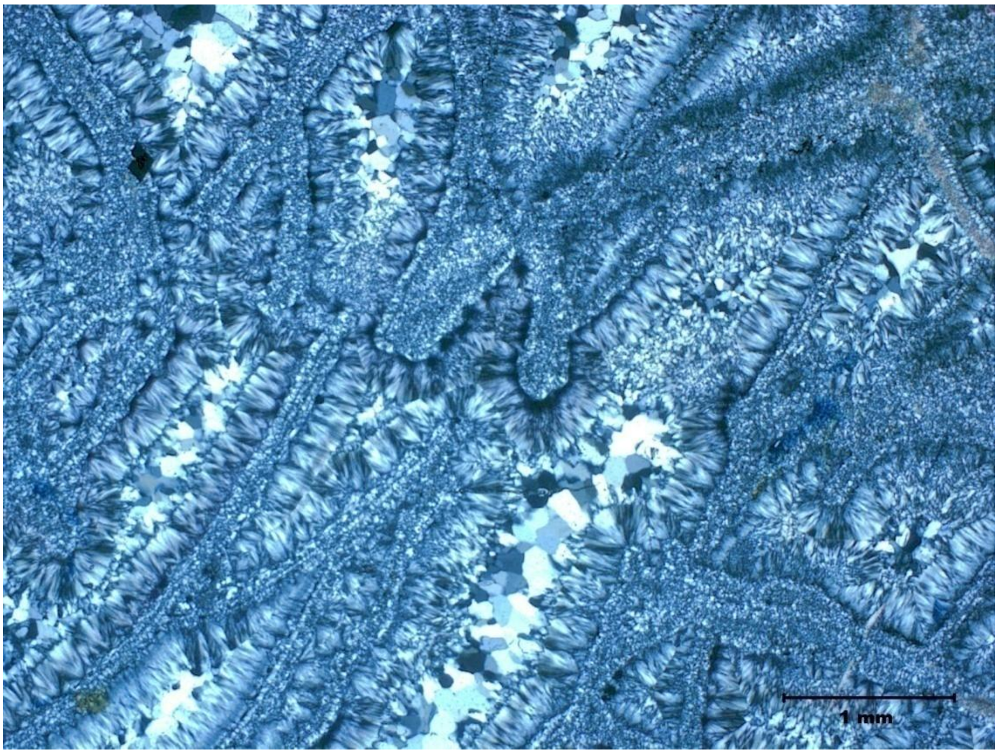

Fig. 7.8 Optical micrograph (crossed polars) of silicified carbonate, sample S4421. Chertified rugose coral with fibrous chalcedony and large quartz crystals in the pore space.

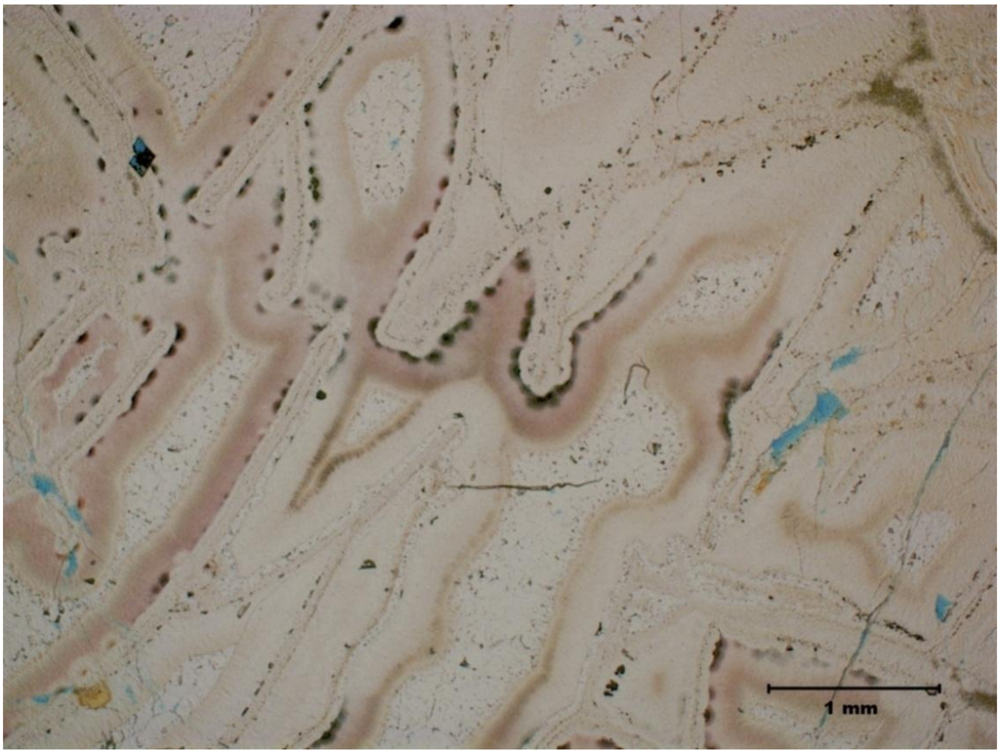

Fig. 7.9 Optical micrograph (parallel polars) of silicified carbonate, sample S4421. Dark spots of contamination along the coral structure in addition to green calcite in upper right corner. The crystal upper left in the picture is thought to be pyrite.

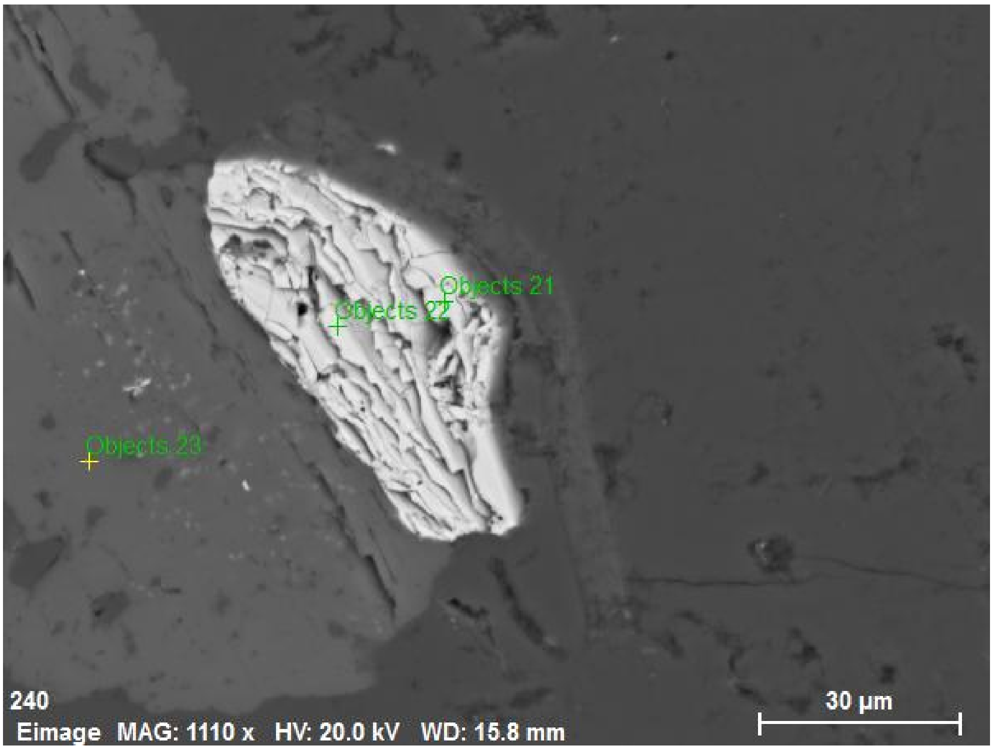

Fig. 7.10 Electron scanning microscope (SEM backscattered electron image) of silicified carbonate, sample S4421. White sheetlike pyrite grain in the middle of the picture surrounded by calcite, quartz and an unidentified deformed mineral to the right.

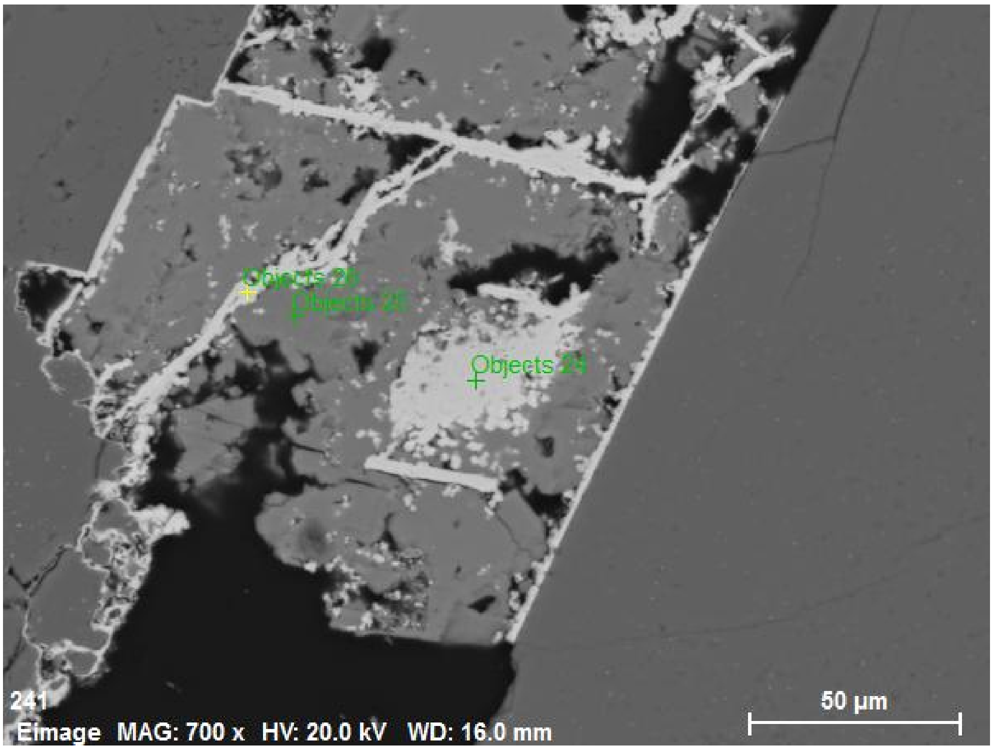

Fig. 7.11 Electron scanning microscope (SEM backscattered electron image) of silicified carbonate, sample S4421. Picture showing a small grey calcite grain surrounded by lighter grey siderite.

7.3 Kapp Hanna Formation

1 sample with a relative high susceptibility of 2913 (10^{-6} SI) showed pyrite as the main cause of the susceptibilities and possibly iron-rich carbonate see Fig. 7.12 and 7.13. However, the susceptibility value was suspiciously high since only pyrite was the contributor and no other Fe-bearing heavy minerals like magnetite were present.

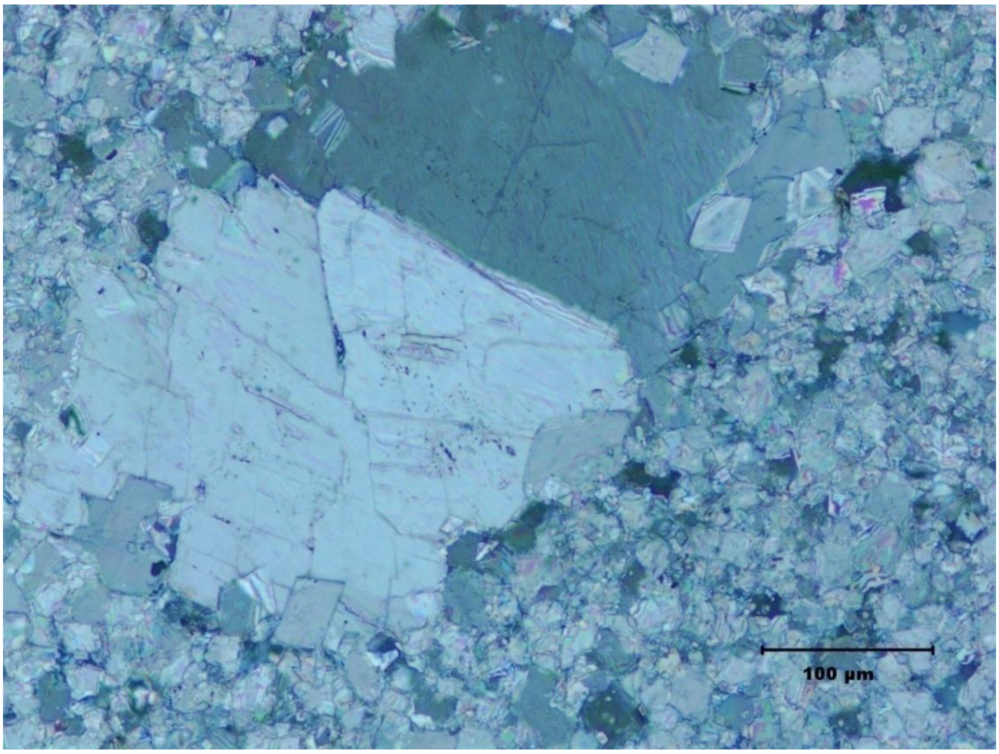

Fig. 7.12 Optical micrograph (crossed polars) of shale, sample S4239. Picture showing a calcite grain and smaller carbonate rhombes which turned out to be iron-rich carbonate.

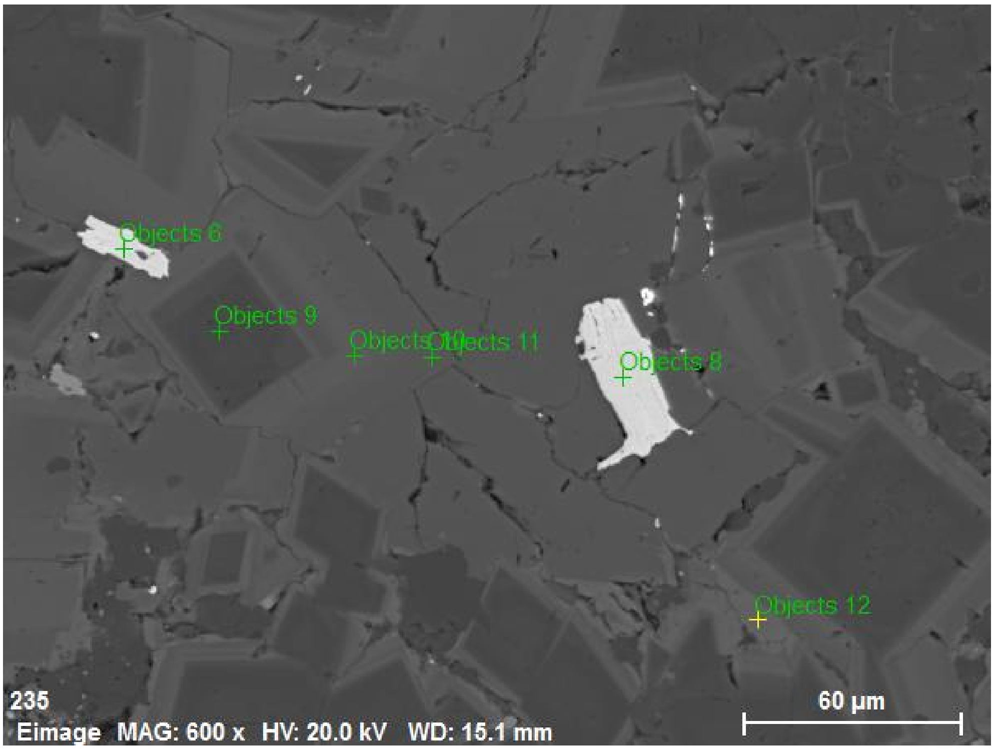

Fig. 7.13 Scanning electron microscope (SEM) of shale, sample S4239. Carbonate zonation with outermost iron-rich carbonate and two white pyrite grains.

7.4 Kapp Duner Formation

Siderite was thought to be the mineralogical source of the relative high susceptibility (678 10^{-6} SI) of the rugose coral sample collected at Amfiet on the northwest coast, see Fig. 7.14 and 7.15.

Fig. 7.14 Optical micrograph (parallel polars) of coral limestone, sample S7308. The framework of a rugose coral with small carbonate rhombes on the inner structure walls of the coral.

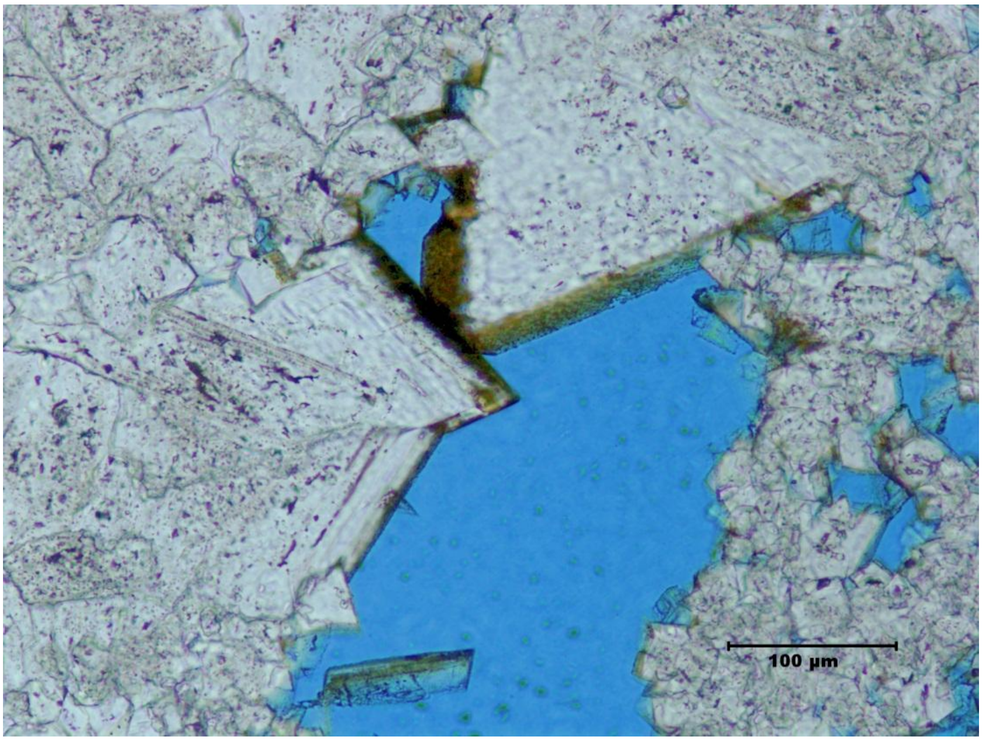

Fig. 7.15 Optical micrograph (parallel polars) of coral limestone, sample S7308. Calcite rhombes with what was thought to be brown siderite.

7.5 Miseryfjellet Formaton

1 red limestone sample collected at Osten representing the uppermost part of the Miseryfjellet Formation revealed that pyrite was the main cause of susceptibility in addition to small amounts of siderite, see Fig. 7.16.

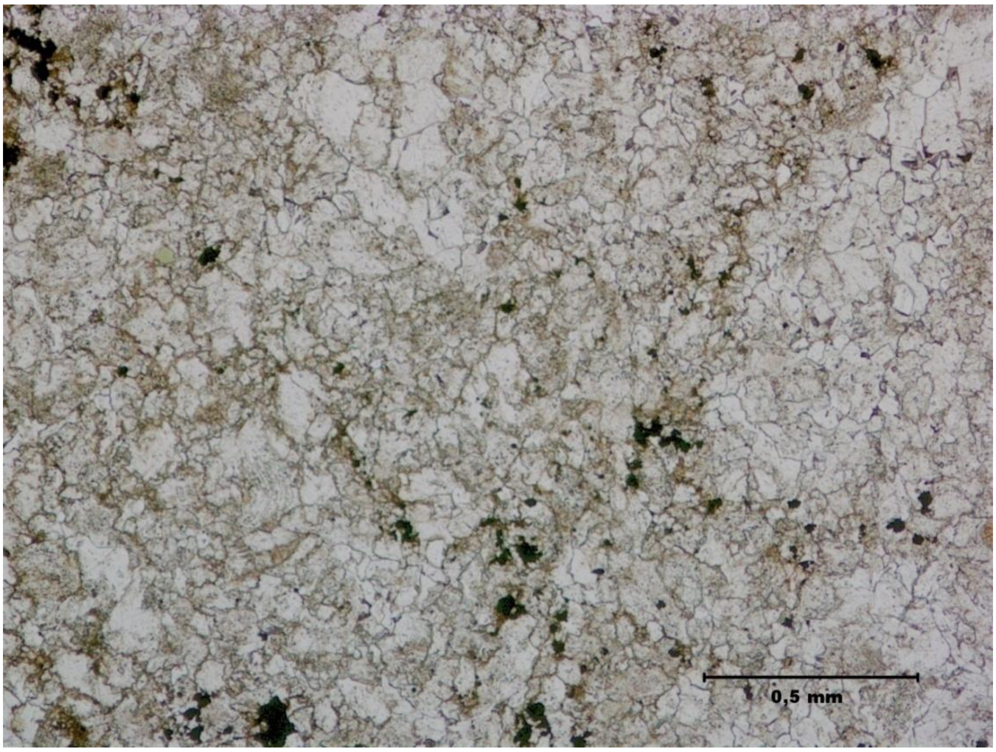

Fig. 7.16 Optical micrograph (parallel polars) of limestone, sample S5095. Picture showing abundance of calcite with black pyrite scattered around the sample.

8. Summary and Discussion

The Vesalstranda Member contained samples with relatively high susceptibilities, including two fine-grained sandstone samples around 500 (10^{-6} SI) and a siltstone sample with a value of over 2000 (10^{-6} SI). The remaining 4 samples with relatively high susceptibility values around 500 (10^{-6} SI) and upwards is from different formations and members.

Analyses in optical microscope and scanning electron microscope (SEM) revealed that siderite in addition to pyrite is the the mineralogical source of the relatively high susceptibilities. No other Fe-bearing heavy minerals like magnetite or pyrrhotite was found in scanning electron microscope (SEM) analyses.

There is a clear trend that the fine-grained sediments generally have higher susceptibilities than coarser-grained sediments like conglomerates and sandstones which agrees with earlier studies done by Hounslow et al. (1995) and Mørk et al. (2002). This is also true for the carbonates, including dolomites and limestones which also generally have low susceptibility values. The average susceptibility for the siltstones, shales and claystones are 150 (10^{-6} SI) compared to the carbonates and coarser-grained conglomerates and sandstones with values of only 45 and 41 (10^{-6} SI) respectively.

This trend is also seen in the different formations and members which are dominated by mainly one lithology. Although missing samples with relatively high susceptibilities the shale dominated Skuld Formation has the highest average susceptibility value of 261 (10^{-6} SI) with many samples above 300 (10^{-6} SI). The lowest values were registered by the carbonate and chert dominated Efuglvika Member and the sandstone dominated Nordkapp Formation with average susceptibility values of only 24 and 27 (10^{-6} SI) respectively.

The Q-ratio values for the different lithologies revealed that the average values is over 3 for the coarser-grained conglomerates and sandstones, carbonates (including dolomite and limestone) and the finer-grained siltstones, shales and claystones. The different formations and members also had high values in addition to large variations with values ranging from less than 1 to 5.6.

9. Conclusion

Noticeable variations of susceptibilities were discovered in the different formations and member although the susceptibilies were generally low.

The siltstones, shales and claystones generally had the highest susceptibilities while the carbonates and coarser-grained conglomerates and sandstones had the lowest values.

Siderite in addition to pyrite was found to be the mineralogical cause of the relative high susceptibilities. No other Fe-bearing heavy minerals like magnetite were found in scanning electron microscope (SEM).

Calculation of Koenigsberger-ratios revealed high values for the lithologies in addition to the formations and members which is an indicator that remanence is important for magnetic anomaly interpretations.

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Appendix

A.1 Sample list

A.2 Electron Dispersive Spectra (EDS)

Sample	Level (m)	Locality	Group	Formation	Member	Zone	UTM X	UTM Y	Litho	Density	Suscept	Rem	Q-value
S4514	250.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Shale	2475	13.9000	6.2000	10.3803
S4512	240.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Clayst	2546	63.6000	6.7000	2.4516
S4513	240.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Shale	2205	52.2000	5.5000	2.4520
S4511	237.5	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Shale	2207	125.5000	7.9000	1.4649
S4510	236.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Shale	2263	56.4000	0.0000	0.0000
S4509	234.5	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Clayst	2576	45.0000	0.0000	0.0000
S4508	223.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Silt	3249	2170.8999	2.2000	0.0236
S4507	201.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Silt	2566	48.5000	7.6000	3.6468
S4506	184.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Sst	2767	490.7000	8.8000	0.4174
S4505	135.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Shale	2663	257.1000	0.0000	0.0000
S4504	125.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Sst	2760	524.3000	0.0000	0.0000
S4503	79.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Clayst	2674	171.5000	10.8000	1.4655
S4502	78.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Sst	2721	297.4000	2.7000	0.2113
S4501	35.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Shale	2633	43.5000	9.2000	4.9219
S4500	10.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Silt	2564	35.2000	26.4000	17.4540
S4499	7.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Silt	2569	110.6000	-	-
S4498	4.1	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Clayst	2621	26.3000	0.0000	0.0000
S4497	4.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Clayst	2617	0.0000	0.0000	0.0000
S4496	0.1	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Silt Sst	2591	16.1000	8.8000	12.7201
S4495	0.0	Miseryfj SW	Billefjorden	Rødvika	Vesalstranda	33N	623418.255	8262579.429	Silt Sst	2623	21.4000	3.4000	3.6974
S7264	4.0	K.Levin	Billefjorden	Rødvika	Vesalstranda	33N	627456.000	8266186.000	Coal	1731	151.6000	0.0000	0.0000
S7263	3.0	K.Levin	Billefjorden	Rødvika	Vesalstranda	33N	625770.000	8269789.000	Coal	2471	97.3000	15.3000	3.6594
S7262	2.0	K.Levin	Billefjorden	Rødvika	Vesalstranda	33N	627456.000	8266186.000	Coal	1543	0.0000	0.0000	0.0000
S7261	1.0	K.Levin	Billefjorden	Rødvika	Vesalstranda	33N	627456.000	8266186.000	Coal	1554	33.9000	0.0000	0.0000
S7629		Vesalstranda	Billefjorden	Rødvika	K.Levin	33N	626374.000	8262620.000	Shale	2541	95.4000	-	-
S7625		Vesalstranda	Billefjorden	Rødvika	K.Levin	33N	626374.000	8262620.000	Shale	2609	116.5000	-	-
S7808		Vesalstranda	Billefjorden	Rødvika	K.Levin	33N	626374.000	8262620.000	Shale	2532	80.5000	-	-

S7807		Vesalstranda	Billefjorden	Røedvika	K.Levin	33N	626374.000	8262620.000	Shale	2605	82.4000	-	-
S7250	60.0	K.Levin	Billefjorden	Røedvika	K.Levin	33N	627456.000	8266186.000	Shale	2622	84.7000	0.0000	0.0000
S7329	50.0	K.Levin	Billefjorden	Røedvika	K.Levin	33N	627456.000	8266186.000	Sst	2442	0.0000	2.7000	-
S7328	20.0	K.Levin	Billefjorden	Røedvika	K.Levin	33N	627456.000	8266186.000	Sst	2400	0.0000	1.8000	-
S7330	0	K.Levin	Billefjorden	Røedvika	K.Levin	33N	627456.000	8266186.000	Sst	2397	45.5000	3.6000	1.8413
S4465	5.08	Kolbukta	Billefjorden	Røedvika	Tunheim	33N	624216.000	8271274.000	Silt Shale	2379	62.4000	13.9000	5.1840
S4464	3.28	Kolbukta	Billefjorden	Røedvika	Tunheim	33N	624216.000	8271274.000	Coal	1410	-10.1000	2.2000	-5.0692
S4461	1.98	Kolbukta	Billefjorden	Røedvika	Tunheim	33N	624216.000	8271274.000	Shale	2558	149.9000	-	-
S4460	1.13	Kolbukta	Billefjorden	Røedvika	Tunheim	33N	624216.000	8271274.000	Coal	1396	0.0000	8.5000	-
S4458	1.01	Kolbukta	Billefjorden	Røedvika	Tunheim	33N	624216.000	8271274.000	Sst	2629	26.0000	4.1000	3.6698
S4457	0.97	Kolbukta	Billefjorden	Røedvika	Tunheim	33N	624216.000	8271274.000	Shale	2623	119.6000	29.9000	5.8180
S4455	0.45	Kolbukta	Billefjorden	Røedvika	Tunheim	33N	624216.000	8271274.000	Coal Shale	2102	89.9000	0.0000	0.0000
S4452		Kolbukta	Billefjorden	Røedvika	Tunheim	33N	624216.000	8271274.000	Coal	1646	19.7000	4.4000	5.1978
S4471		Austervågen	Billefjorden	Røedvika	Tunheim	33N	624880.000	8270487.000	Coal	2060	61.8000	3.2000	1.2050
S4470		Austervågen	Billefjorden	Røedvika	Tunheim	33N	624880.000	8270487.000	Clayst	2267	55.8000	2.5000	1.0427
S4469		Austervågen	Billefjorden	Røedvika	Tunheim	33N	624880.000	8270487.000	Sst	2310	0.0000	3.9000	-
S4468		Austervågen	Billefjorden	Røedvika	Tunheim	33N	624880.000	8270487.000	Clayst	2580	39.5000	4.1000	2.4156
S4466		Austervågen	Billefjorden	Røedvika	Tunheim	33N	624880.000	8270487.000	Shale	2559	40.4000	0.0000	0.0000
S4476		Engelskelva	Billefjorden	Røedvika	Tunheim	33N	624652.000	8269681.000	Coal	2589	89.9000	-	-
S4475		Engelskelva	Billefjorden	Røedvika	Tunheim	33N	624652.000	8269681.000	Shale	2536	95.9000	7.6000	1.8443
S4474		Engelskelva	Billefjorden	Røedvika	Tunheim	33N	624652.000	8269681.000	Clayst	2581	88.8000	-	-
S4472		Engelskelva	Billefjorden	Røedvika	Tunheim	33N	624652.000	8269681.000	Clayst	1999	97.5000	0.0000	0.0000
S4480		Framnes	Billefjorden	Røedvika	Tunheim	33N	627435.000	8268525.000	Silt	2509	28.7000	15.7000	12.7307
S4479		Framnes	Billefjorden	Røedvika	Tunheim	33N	627435.000	8268525.000	Coal	1841	18.1000	-	-
S4478		Framnes	Billefjorden	Røedvika	Tunheim	33N	627435.000	8268525.000	Clayst	2633	126.3000	0.0000	0.0000
S7356	2.0	Tunheim	Billefjorden	Røedvika	Tunheim	33N	625770.000	8269789.000	Sst	2450	-13.9000	3.1000	-5.1902
S7355	1.0	Tunheim	Billefjorden	Røedvika	Tunheim	33N	625770.000	8269789.000	Sst	2535	9.3000	2.9000	7.2569
S7357	0.0	Tunheim	Billefjorden	Røedvika	Tunheim	33N	625770.000	8269789.000	Sst	2417	0.0000	2.3000	-
S7369		Tunheim	Billefjorden	Røedvika	Tunheim	33N	625770.000	8269789.000	Coal	1339	57.0000	8.5000	3.4704

S7368		Tunheim	Billefjorden	Rødvika	Tunheim	33N	625770.000	8269789.000	Coal	1508	0.0000	15.3000	-
S4486		Tunheim cliff	Billefjorden	Rødvika	Tunheim	33N	625962.123	8269806.953	Clayst	2582	152.9000	9.6000	1.4612
S4485		Tunheim cliff	Billefjorden	Rødvika	Tunheim	33N	625962.123	8269806.953	Coal	1651	0.0000	4.4000	-
S4484		Tunheim	Billefjorden	Rødvika	Tunheim	33N	625770.000	8269789.000	Sst	2512	6.4000	2.0000	7.2725
S4483		Tunheim	Billefjorden	Rødvika	Tunheim	33N	625770.000	8269789.000	Sst	2426	0.0000	0.0000	-
S4477		Rifleodden	Billefjorden	Rødvika	Tunheim	33N	627470.000	8266871.000	Shale	2580	83.7000	0.0000	0.0000
S7322	117.0	Båtvika	Billefjorden	Nordkapp	Kapp Harry	33N	619210.000	8257982.000	Sst	2447	15.6000	2.5000	3.7295
S7321	108.0	Båtvika	Billefjorden	Nordkapp	Kapp Harry	33N	619210.000	8257982.000	Sst	2496	22.0000	2.3000	2.4330
S5952	45.0	Båtvika	Billefjorden	Nordkapp	Kapp Harry	33N	619210.000	8257982.000	Sst	2475	0.0000	20.1000	-
S5949	30.0	Båtvika	Billefjorden	Nordkapp	Kapp Harry	33N	619210.000	8257982.000	Sst	2395	40.0000	17.8000	10.3561
S5948	24.0	Båtvika	Billefjorden	Nordkapp	Kapp Harry	33N	619210.000	8257982.000	Sst	2467	13.5000	14.3000	24.6511
S5945	15.0	Båtvika	Billefjorden	Nordkapp	Kapp Harry	33N	619210.000	8257982.000	Sst	2450	0.0000	0.0000	0.0000
S5944	-1.0	Båtvika	Billefjorden	Nordkapp	Kapp Harry	33N	619210.000	8257982.000	Sst	2499	19.0000	6.0000	7.3491
S5943	-2.0	Båtvika	Billefjorden	Nordkapp	Kapp Harry	33N	619210.000	8257982.000	Sst	2419	41.5000	22.6000	12.6735
S4439	5.0	Ellasjøen	Billefjorden	Nordkapp	Kapp Harry	33N	620575.000	8258905.000	Sst	2428	0.0000	0.0000	0.0000
S4438	1.5	Ellasjøen	Billefjorden	Nordkapp	Kapp Harry	33N	620575.000	8258905.000	Sst	2457	58.0000	-	-
S4437	1.0	Ellasjøen	Billefjorden	Nordkapp	Kapp Harry	33N	620575.000	8258905.000	Sst	2443	0.0000	0.0000	0.0000
S4436	-0.1	Ellasjøen	Billefjorden	Nordkapp	Kapp Harry	33N	620575.000	8258905.000	Shale	2581	64.9000	23.0000	8.2474
S4433	-1.5	Ellasjøen	Billefjorden	Nordkapp	Kapp Harry	33N	620575.000	8258905.000	Shale	2652	124.9000	65.3000	12.1671
S4445	24.0	Nordkapp	Billefjorden	Nordkapp	Kapp Harry	33N	621767.000	8273638.000	Sst	2573	63.9000	-	-
S4443	9.5	Nordkapp	Billefjorden	Nordkapp	Kapp Harry	33N	621767.000	8273638.000	Sst	2487	-24.4000	25.9000	24.7027
S4440	5.5	Nordkapp	Billefjorden	Nordkapp	Kapp Harry	33N	621767.000	8273638.000	Sst	2457	21.9000	23.2000	24.6535
S4449	4.0	Nordkapp	Billefjorden	Nordkapp	Kapp Harry	33N	621767.000	8273638.000	Cgl	2705	92.3000	27.7000	6.9841
S4448	3.0	Nordkapp	Billefjorden	Nordkapp	Kapp Harry	33N	621767.000	8273638.000	Shale	2607	90.2000	-	-
S4446	1.0	Nordkapp	Billefjorden	Nordkapp	Kapp Harry	33N	621767.000	8273638.000	Shale	1311	13.3000	-	-
S7351	23.0	Nordhamna	Billefjorden	Nordkapp	Nordhamna	33N	617638.000	8272214.000	Sst	2639	35.0000	1.6000	1.0639
S7350	20.0	Nordhamna	Billefjorden	Nordkapp	Nordhamna	33N	617638.000	8272214.000	Sst	2602	48.6000	2.2000	1.0535
S7349	18.0	Nordhamna	Billefjorden	Nordkapp	Nordhamna	33N	617638.000	8272214.000	Sst	2648	22.3000	2.3000	2.4003
S7353	2.0	Nordhamna	Billefjorden	Nordkapp	Nordhamna	33N	617638.000	8272214.000	Shale	2553	-15.8000	2.3000	-3.3877

S7347	0.0	Nordhamna	Billefjorden	Nordkapp	Nordhamna	33N	617638.000	8272214.000	Sst	2495	-18.8000	2.0000	-2.4758
S7346	0.0	Nordhamna	Billefjorden	Nordkapp	Nordhamna	33N	617638.000	8272214.000	Sst	2515	7.8000	3.5000	10.4426
S7348	0.0	Nordhamna	Billefjorden	Nordkapp	Nordhamna	33N	617638.000	8272214.000	Sst	2484	-5.9000	0.0000	0.0000
S4429	0.0	Landnørdin	Billefjorden	Nordkapp	Nordhamna	33N	618785.000	8258322.000	Cgl	2372	11.4000	1.8000	3.6745
S7345	195.0	Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Sst	2645	16.7000	3.7000	5.1561
S7344	190.0	Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Carb	2640	0.0000	3.3000	-
S4432	93.0	Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Cgl	2675	34.5000	3.8000	2.5633
S7343	55.0	Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Sst	2632	-7.2000	2.3000	-7.4341
S4431	52.0	Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Sst	2572	14.4000	3.9000	6.3028
S4428	46.0	Landnørdin	Gipsdalen	Landnørdin		33N	615544.000	8271644.000	Sst	2505	23.3000	17.5000	17.4790
S4427	37.0	Landnørdin	Gipsdalen	Landnørdin		33N	615544.000	8271644.000	Sst	2532	31.8000	3.3000	2.4150
S4426	25.0	Landnørdin	Gipsdalen	Landnørdin		33N	615544.000	8271644.000	Sst	2551	16.6000	2.6000	3.6450
S4425	5.5	Landnørdin	Gipsdalen	Landnørdin		33N	615544.000	8271644.000	Shale	2447	61.4000	-	-
S7648	4.0	Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Carb	2687	0.0000	15.7000	-
S4430	2.0	Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Silt	2677	216.8000	11.8000	1.2667
S4333	0.0	Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Carb Cgl	2702	45.9000	2.9000	1.4703
S7656		Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Carb	2712	34.9000	9.3000	6.2014
S7514		Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Red Shale	2645	128.0000	7.5000	1.3636
S7516		Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Carb Shale	2629	241.9000	-	-
S7524		Landnørdin	Gipsdalen	Landnørdin		33N	618785.000	8258322.000	Sst	2638	126.5000	2.6000	0.4783
S7522		Nordhamna	Gipsdalen	Landnørdin		33N	617638.000	8272214.000	Red Shale	2673	238.8000	-	-
S7519		Nordhamna	Gipsdalen	Landnørdin		33N	617638.000	8272214.000	Shale	2559	124.4000	-	-
S7518		Utløp Lakselva	Gipsdalen	Landnørdin		33N	618412.406	8272045.465	Carb	2688	17.5000	26.3000	34.9746
S7517		Nordhamna	Gipsdalen	Landnørdin		33N	617638.000	8272214.000	Sst	2652	177.9000	21.0000	2.7471
S4314	50.6	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2700	64.8000	4.1000	1.4725
S7611	50.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2697	67.9000	8.0000	2.7419
S4312	43.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2719	98.2000	2.8000	0.6636
S4311	42.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2505	119.7000	-	-
S4310	41.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Sst	2650	10.5000	3.3000	7.3141

S4309	38.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2498	109.3000	0.0000	0.0000
S4382	33.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2398	189.6000	-	-
S4383	33.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2474	146.1000	-	-
S4307	32.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2663	145.4000	0.0000	0.0000
S4306	31.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2489	206.3000	0.0000	0.0000
S4386	28.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2478	23.2000	0.0000	0.0000
S4305	27.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2696	97.8000	0.0000	0.0000
S7610	27.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2709	53.9000	5.9000	2.5474
S4388	24.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2463	87.1000	-	-
S4304	22.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2571	139.7000	-	-
S4303	21.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2502	182.2000	8.1000	1.0346
S4302	21.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2434	157.1000	12.4000	1.8369
S4301	20.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2632	133.0000	23.5000	4.1120
S4300	20.3	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2730	91.6000	9.7000	2.4644
S4404	14.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2526	159.8000	-	-
S4405	13.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2537	63.7000	-	-
S4406	13.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2559	222.6000	-	-
S7631	10.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2436	28.1000	-	-
S4410	9.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2653	202.9000	-	-
S4319	9.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale	2597	181.3000	-	-
S4296	8.9	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb Onc	2690	140.8000	17.8000	2.9421
S4295	8.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb Sst	2687	58.2000	8.6000	3.4388
S7609	8.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2686	24.1000	25.6000	24.7205
S4294	7.7	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Shale Silt	2573	111.3000	-	-
S4323	6.1	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Sst	2668	117.8000	11.1000	2.1929
S4293	6.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2701	14.9000	4.7000	7.3408
S4292	4.7	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb Sst	2689	0.0000	6.5000	-
S7608	4.5	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2694	15.3000	4.8000	7.3010
S4315	4.3	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2694	28.0000	15.3000	12.7165

S4316	1.6	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Silt	2653	123.0000	18.7000	3.5381
S4317	1.0	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2796	94.9000	0.0000	0.0000
S4321	0.8	Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Carb	2702	12.5000	2.0000	3.7235
S7806		Kobbebukta	Gipsdalen	K.Kåre	Bogevika	33N	615544.000	8271644.000	Sst	2613	223.7000	3.1000	0.3225
S4374	96.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Sst	2650	21.3000	3.2000	3.4963
S4373	90.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Silt	2714	215.0000	-	-
S4372	78.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Carb Sst	2700	11.6000	6.1000	12.2379
S4371	73.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Silt	2644	178.1000	38.2000	4.9915
S4370	72.5	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Carb	2675	-25.3000	65.8000	60.5257
S4369	66.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Shale	2587	232.2000	-	-
S4368	60.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Silt	2651	272.9000	45.5000	3.8801
S4367	59.5	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Carb	2698	0.0000	-	-
S4366	52.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Carb	2680	40.5000	30.4000	17.4684
S4364	42.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Carb	2737	0.0000	7.4000	-
S4362	12.0	Landnørdin	Gipsdalen	K.Kåre	Bogevika	33N	618785.000	8258322.000	Carb	2691	93.9000	16.6000	4.1141
S4361	45.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2693	0.0000	16.6000	-
S4359	43.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2692	17.1000	0.0000	0.0000
S4358	42.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2677	-9.7000	14.6000	35.0280
S4357	36.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2704	10.9000	2.4000	5.1241
S4356	31.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2708	9.4000	2.9000	7.1797
S5207	25.5	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Limestone	2695	49.9000	-	-
S5206	20.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2687	-22.6000	58.9000	60.6515
S4355	14.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2706	27.1000	2.8000	2.4045
S4354	13.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2698	26.4000	9.3000	8.1981
S4353	4.0	Landnørdin	Gipsdalen	K.Kåre	Efuglvika	33N	618785.000	8258322.000	Carb	2707	0.0000	9.2000	-
S4422	40.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2689	-17.9000	19.0000	24.7022
S4423	38.5	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2704	0.0000	0.0000	0.0000
S4421	38.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2613	536.5000	4.7000	0.2039
S4419	34.5	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2689	0.0000	25.8000	-

S4418	27.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2688	-19.3000	14.5000	17.4842
S4417	25.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2670	0.0000	0.0000	0.0000
S4416	23.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2681	39.6000	21.0000	12.3412
S4415	20.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2692	-38.7000	-	-
S4414	20.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2693	0.0000	17.0000	-
S4413	16.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2700	19.0000	0.0000	0.0000
S4412	7.5	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2697	32.8000	10.4000	7.3789
S7354-7	0.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2575	21.8000	3.2000	3.4161
S7354-6	0.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2557	0.0000	0.0000	0.0000
S7354-5	0.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2333	22.9000	5.1000	5.1829
S7354-4	0.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2584	17.4000	0.0000	0.0000
S7354-3	0.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2689	0.0000	0.0000	0.0000
S7354-2	0.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2687	9.8000	4.4000	10.4487
S7354-1	0.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2638	25.7000	8.1000	7.3348
S7354	0.0	Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2583	11.6000	2.6000	5.2161
S7646		Raudnuten	Gipsdalen	K.Kåre	Efuglvika	33N	619300.000	8262576.000	Carb	2700	93.3000	6.9000	1.7211
S4351	22.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2698	34.7000	26.0000	17.4373
S4350	20.1	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2708	19.7000	6.2000	7.3242
S4349	20.05	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2742	27.4000	4.3000	3.6522
S4352	19.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2776	16.4000	2.6000	3.6895
S7688	18.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2698	25.1000	0.0000	0.0000
S4346	16.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2696	0.0000	72.5000	-
S4345	15.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2700	0.0000	41.2000	-
S7811	15.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Limestone	2734	22.7000	8.0000	8.2016
S7810	15.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Limestone	2820	21.7000	2.3000	2.4666
S7813	14.5	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2707	25.6000	27.1000	24.6356
S4343	12.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2671	0.0000	13.9000	-
S4342	11.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2697	11.8000	12.6000	24.8498
S4341	9.5	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2715	50.2000	18.8000	8.7154

S4340	9.1	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2706	-13.5000	20.2000	34.8219
S4338	5.5	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2702	0.0000	20.5000	-
S4337	2.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2699	8.5000	12.8000	35.0450
S4336	0.5	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Carb	2699	25.1000	26.7000	24.7555
S5156	0.0	Ærfuglvika	Gipsdalen	K.Kåre	Efuglvika	33N	616599.000	8260779.000	Dolo	2705	25.0000	-	-
S4331	10.0	Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Carb	2720	76.9000	2.4000	0.7263
S4330	8.0	Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Carb	2716	124.2000	22.6000	4.2347
S4335	5.0	Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Carb	2761	78.0000	0.0000	0.0000
S4328	5.0	Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Shale	2701	81.7000	12.4000	3.5321
S7612	4.0	Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Carb	2714	76.6000	12.1000	3.6761
S4327	3.3	Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Shale	2687	161.1000	0.0000	0.0000
S4334	2.1	Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Shale	2721	208.5000	55.0000	6.1389
S4332	0.0	Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Carb	2700	58.3000	6.3000	2.5148
S7340		Kobbebukta	Gipsdalen	K.Kåre	Kobbebukta	33N	615544.000	8271644.000	Carb	2730	189.1000	0.0000	0.0000
S7338		Kobbebukta	Gipsdalen	K.Kåre	Kobbabukta	33N	615544.000	8271644.000	Sst	2642	87.0000	2.3000	0.6152
S4263	28.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Sst	2703	96.8000	17.6000	4.2313
S4254	23.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Clayst	2670	136.0000	8.5000	1.4545
S4253	22.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Clayst	2750	140.9000	24.9000	4.1127
S4252	20.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Clayst	2708	262.7000	25.4000	2.2501
S7506	17.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Shale	2658	199.5000	-	-
S4247	16.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Shale	2470	182.6000	-	-
S4250	13.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Cgl	2634	41.3000	0.0000	0.0000
S4241	13.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Clayst Sst	2742	163.5000	0.0000	0.0000
S4249	11.5	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Sst	2661	45.9000	5.0000	2.5351
S4255	8.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Clayst	2631	242.2000	0.0000	0.0000
S7605	7.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Carb	2690	92.6000	16.3000	4.0965
S4239	6.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Shale	2798	2913.3999	35.1000	0.2804
S4246	5.5	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Dolo	2709	87.7000	4.6000	1.2207
S4244	3.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Cgl	2650	0.0000	31.0000	-

S4251	3.0	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Cgl	2718	171.6000	3.2000	0.4340
S4248	1.5	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Cgl	2726	-53.8000	8.2000	-3.5470
S4243	1.5	Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Sst	2675	104.1000	6.6000	1.4755
S7801		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Carb	2830	124.7000	3.7000	0.6905
S7800		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Carb	2846	143.3000	0.0000	0.0000
S7613		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Carb	2726	324.7000	12.7000	0.9102
S7606		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Carb	2698	37.7000	13.9000	8.5804
S7515		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Sst	2548	70.8000	26.6000	8.7435
S7509		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Red Shale	2706	348.1000	-	-
S7508		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Shale	2757	137.6000	24.3000	4.1098
S7507		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Shale	2746	364.4000	39.1000	2.4971
S7365		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Carb	2637	66.2000	9.3000	3.2693
S7510-2		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Shale	2744	148.4000	26.3000	4.1244
S7510-1		Kobbebukta	Gipsdalen	K.Hanna		33N	615544.000	8271644.000	Sst	2669	111.0000	12.4000	2.5998
S7352	0.0	Nordvestbukta	Gipsdalen	K.Hanna		33N	613901.000	8271120.000	Cgl Sst	2666	36.6000	1.6000	1.0174
S5133	24.0	Snyta	Gipsdalen	K.Hanna		33N	612949.000	8270599.000	Dolo	2726	86.1000	-	-
S4051	-0.2	Snyta	Gipsdalen	K.Hanna		33N	612949.000	8270599.000	Dolomite	2667	0.0000	5.7000	-
S4049	-3.0	Snyta	Gipsdalen	K.Hanna		33N	612949.000	8270599.000	Clayst	2677	83.5000	-	-
S4048	-4.5	Snyta	Gipsdalen	K.Hanna		33N	612949.000	8270599.000	Shale	2797	34.3000	18.2000	12.3484
S4047	-9.5	Snyta	Gipsdalen	K.Hanna		33N	612949.000	8270599.000	Dolo	2810	46.8000	3.7000	1.8399
S4274	15.0	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Sst	2670	54.9000	10.0000	4.2390
S4275-2	14.0	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Silt Sst	2838	219.3000	29.9000	3.1730
S4275	14.0	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Silt Sst	2735	-36.6000	8.2000	-5.2140
S4278	11.5	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Clayst	2685	115.6000	34.7000	6.9856
S4270	11.5	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Clayst	2724	164.1000	12.3000	1.7443
S4280	10.1	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Clayst	2681	177.6000	0.0000	0.0000
S4281	9.6	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Clayst	2695	207.7000	10.9000	1.2213
S4282	9.0	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Clayst	2695	178.6000	11.3000	1.4724
S6732	-7.0	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Shale	2636	79.2000	0.0000	0.0000

S6731	-7.5	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Shale	2585	88.4000	-	-
S6730	-9.5	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Shale	2605	91.1000	-	-
S6729	-11.0	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Shale	2661	46.2000	-	-
S6728	-12.0	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Shale	2651	115.9000	18.3000	3.6745
S6726	-14.8	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Shale	2599	57.5000	-	-
S6723	-20.4	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Shale	2576	76.6000	-	-
S6720	-24.0	Langbukta	Gipsdalen	K.Hanna		33N	614074.000	8264346.000	Shale	2584	92.0000	-	-
S7504		Utløp Langsiget	Gipsdalen	K.Hanna		33N	614226.198	8264044.985	Sst	2622	59.0000	15.6000	6.1533
S7804		Ærfuglvika N	Gipsdalen	K.Hanna		33N	616427.210	8260983.772	Limestone	2723	66.3000	14.2000	4.9844
S4289	37.0	Ærfuglvika	Gipsdalen	K.Hanna		33N	616599.000	8260779.000	Clayst	2646	210.1000	24.8000	2.7470
S4286	4.0	Ærfuglvika	Gipsdalen	K.Hanna		33N	616599.000	8260779.000	Sst	2489	34.9000	3.9000	2.6006
S4285	2.5	Ærfuglvika	Gipsdalen	K.Hanna		33N	616599.000	8260779.000	Silt	2584	193.9000	-	-
S4411	10.0	Raudnuten	Gipsdalen	K.Hanna		33N	619300.000	8262576.000	Sst Carb	2382	10.9000	0.0000	0.0000
S7689		Bendabukta	Gipsdalen	K.Hanna		33N	618062.663	8259127.911	Cgl	2609	29.7000	3.3000	2.5858
S7654	19.0	Nordvestbukta W	Gipsdalen	K.Duner		33N	613755.536	8271081.948	Limestone	2807	24.2000	12.8000	12.3092
S7653	16.0	Nordvestbukta W	Gipsdalen	K.Duner		33N	613755.536	8271081.948	Limestone	2811	66.4000	11.7000	4.1006
S7652	7.5	Nordvestbukta W	Gipsdalen	K.Duner		33N	613755.536	8271081.948	Dolo	2822	48.8000	25.9000	12.3514
S7651	6.0-7.0	Nordvestbukta W	Gipsdalen	K.Duner		33N	613755.536	8271081.948	Sst	2833	0.0000	9.0000	-
S7607		Nordvestbukta W	Gipsdalen	K.Duner		33N	613755.536	8271081.948	Bioherm	2744	40.3000	0.0000	0.0000
S4050	0.5	Snyta	Gipsdalen	K.Duner		33N	612949.000	8270599.000	Dolomite	2750	0.0000	3.7000	-
S4097	22.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2749	117.0000	35.1000	6.9816
S7227	21.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Shale	2801	0.0000	-	-
S4098	20.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2821	54.6000	0.0000	0.0000
S4099	19.5	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2815	68.0000	18.0000	6.1602
S4100	19.2	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2708	26.8000	40.3000	34.9949
S4101	19.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2702	0.0000	-	-
S4103	18.6	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2700	78.1000	8.2000	2.4434
S4104	18.3	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2706	55.8000	0.0000	0.0000
S4106	18.2	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2700	49.9000	0.0000	0.0000

S4107	18.1	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2681	63.3000	-	-
S4061	18.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolo Sh	2702	-84.5000	13.3000	-3.6629
S7226	18.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Shale	2672	98.3000	-	-
S7319	15.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2540	6.0000	2.7000	10.4724
S4060	13.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2699	24.7000	13.1000	12.3427
S4110	13.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2764	0.0000	7.0000	-
S4111	10.8	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2816	0.0000	4.9000	-
S4112	10.5	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Shale	2756	25.0000	-	-
S7224	10.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Shale	2709	252.3000	0.0000	0.0000
S7318	10.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Sst	2602	13.5000	2.1000	3.6201
S4113	9.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2829	20.0000	4.5000	5.2362
S4114	8.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2803	28.4000	-	-
S4115	5.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2693	55.3000	19.6000	8.2483
S4117	1.5	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2810	16.3000	5.1000	7.2814
S7312	1.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Bioherm	2709	6.9000	2.2000	7.4201
S7639	-0.1	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolo	2798	41.0000	-	-
S7320	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2707	0.0000	2.4000	-
S7317	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2752	-20.5000	3.0000	-3.4057
S7316	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2654	52.5000	0.0000	0.0000
S7315	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2669	40.7000	2.6000	1.4867
S7314	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2701	11.3000	1.8000	3.7071
S7313	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2778	26.1000	1.6000	1.4266
S7311-2	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Bioherm	2694	40.1000	0.0000	0.0000
S7311-1	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Bioherm	2768	19.4000	2.0000	2.3992
S7310	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2709	23.4000	1.8000	1.7902
S7309	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2727	13.2000	2.1000	3.7024
S7308	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2544	678.2000	1.8000	0.0618
S4121	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2780	47.5000	35.7000	17.4908
S4120	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2653	47.2000	0.0000	0.0000

S4119	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2766	29.1000	-	-
S4118	0.0	Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolomite	2720	19.1000	3.0000	3.6553
S7671		Amfi	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Dolo	2834	-32.1000	10.1000	-7.3224
S4096-1	0.9	Amfi N	Gipsdalen	K.Duner		33N	612786.000	8269557.000	Carb	2669	56.3000	17.7000	7.3164
S4096-2	0.9	Amfi N	Gipsdalen	K.Duner		33N	612855.539	8269649.300	Carb	2700	0.0000	0.0000	0.0000
S4095	0.7	Amfi N	Gipsdalen	K.Duner		33N	612855.539	8269649.300	Carb	2691	46.2000	-	-
S4094	0.3	Amfi N	Gipsdalen	K.Duner		33N	612855.539	8269649.300	Carb	2656	50.7000	-	-
S4093	0.1	Amfi N	Gipsdalen	K.Duner		33N	612855.539	8269649.300	Carb	2793	0.0000	24.2000	-
S7672		Amfi N	Gipsdalen	K.Duner		33N	612855.539	8269649.300	Dolo	2809	17.0000	3.8000	5.2020
S4078	18.1	Amfi S	Gipsdalen	K.Duner		33N	612720.846	8269496.240	Carb	2657	103.9000	-	-
S4079	17.9	Amfi S	Gipsdalen	K.Duner		33N	612720.846	8269496.240	Carb	2793	13.6000	6.0000	10.2671
S7500		Amfi S	Gipsdalen	K.Duner		33N	612720.846	8269496.240	Dolomite	2783	0.0000	0.0000	0.0000
S7337	3.5	Kluftvann	Gipsdalen	K.Duner		33N	613292.000	8269587.000	Sst	2607	12.5000	2.8000	5.2129
S7336	3.0	Kluftvann	Gipsdalen	K.Duner		33N	613292.000	8269587.000	Sst	2602	6.2000	0.0000	0.0000
S7335	2.5	Kluftvann	Gipsdalen	K.Duner		33N	613292.000	8269587.000	Sst	2556	10.7000	3.4000	7.3949
S7334	2.0	Kluftvann	Gipsdalen	K.Duner		33N	613292.000	8269587.000	Carb	2702	31.6000	2.0000	1.4729
S7333	1.0	Kluftvann	Gipsdalen	K.Duner		33N	613292.000	8269587.000	Carb	2771	6.2000	2.8000	10.5100
S7332	0.0	Kluftvann	Gipsdalen	K.Duner		33N	613292.000	8269587.000	Sst	2723	16.4000	0.0000	0.0000
S7331	-0.3	Kluftvann	Gipsdalen	K.Duner		33N	613292.000	8269587.000	Dolo	2818	0.0000	12.3000	-
S4080	3.7	Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Carb	2683	-24.8000	-	-
S4081	3.5	Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Carb	2703	24.2000	7.6000	7.3086
S4082	3.1	Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Carb	2670	0.0000	19.3000	-
S4083	2.8	Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Carb	2650	24.9000	-	-
S4085	2.2	Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Shale	2594	0.0000	-	-
S7234	2.0	Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Dolo	2811	26.8000	8.5000	7.3811
S4090	0.9	Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Shale	2669	32.8000	-	-
S7232	0.0	Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Dolomite	2634	25.7000	0.0000	0.0000
S7674		Drangane	Gipsdalen	K.Duner		33N	612282.000	8269284.000	Dolo	2819	0.0000	15.3000	-
S4073	17.1	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Shale	2722	77.0000	0.0000	0.0000

S5132	16.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2716	60.8000	32.3000	12.3633
S5131	13.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Limestone	2709	79.7000	-	-
S4139	12.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2806	54.4000	9.6000	4.1068
S4140	11.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2749	53.2000	8.4000	3.6745
S7622	10.5	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2812	8.4000	2.6000	7.2033
S4141	10.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2728	38.1000	4.0000	2.4433
S5128	8.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Limestone	2681	23.2000	-	-
S4143	7.3	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2659	16.7000	0.0000	0.0000
S4144	7.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2688	44.9000	6.7000	3.4727
S4146	6.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb Sh	2369	132.3000	5.2000	0.9147
S7623	6.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2698	43.0000	0.0000	0.0000
S5127	6.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Limestone	2674	53.4000	-	-
S4071	5.9	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb Sh	2813	35.9000	3.8000	2.4633
S4070	5.5	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb Sh	2649	120.1000	18.9000	3.6623
S7620	5.5	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2367	88.0000	44.1000	11.6625
S7619	5.5	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2778	19.9000	9.9000	11.5776
S4148	5.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2678	25.5000	8.0000	7.3010
S7614	5.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Sst	2536	-8.7000	9.2000	24.6095
S4069	4.8	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Sst	2608	21.8000	2.3000	2.4553
S4149	4.4	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Sh Dolo	2805	48.6000	29.8000	14.2697
S4132	4.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2696	21.8000	0.0000	0.0000
S4150	4.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Sh Dolo	2803	124.2000	0.0000	0.0000
S4122	4.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2694	22.5000	23.9000	24.7201
S4123	3.6	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2699	38.4000	11.5000	6.9695
S4151	3.5	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Sh Dolo	2643	68.9000	4.3000	1.4524
S4067	3.3	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Shale	2754	39.7000	6.3000	3.6930
S4124	3.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2700	37.8000	6.0000	3.6940
S4152	2.9	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Sh Dolo	2777	101.5000	0.0000	0.0000
S4133	2.7	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2695	45.5000	16.1000	8.2347

S4066	2.6	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo Sh	2648	52.8000	28.1000	12.3853
S4125	2.5	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2693	45.7000	6.8000	3.4628
S4134	2.3	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2694	46.7000	0.0000	0.0000
S4126	2.1	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2703	107.0000	19.5000	4.2412
S4154	2.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2803	53.6000	28.5000	12.3741
S4155	1.7	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2823	-18.4000	8.2000	10.3712
S4127	1.6	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2704	35.2000	18.7000	12.3633
S4136	1.4	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2681	13.8000	14.6000	24.6212
S4156	1.4	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolomite	2782	182.4000	12.1000	1.5438
S4128	1.2	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2799	34.6000	17.3000	11.6360
S4129	1.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2705	58.8000	15.6000	6.1742
S5126	1.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Limestone	2721	46.0000	-	-
S4157	0.9	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolomite	2618	10.4000	15.6000	34.9081
S4137	0.7	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2672	106.9000	0.0000	0.0000
S4130	0.6	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2707	52.7000	28.0000	12.3647
S4158	0.4	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolomite	2758	47.7000	10.1000	4.9276
S4131	0.2	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2807	43.6000	0.0000	0.0000
S4138	0.2	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2710	38.6000	13.6000	8.1995
S4159	0.1	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolomite	2710	130.4000	17.3000	3.0875
S7616	0.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2815	55.4000	11.9000	4.9989
S5125	0.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Limestone	2715	198.4000	-	-
S4065	-1.0	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolomite	2827	29.8000	0.0000	0.0000
S7615	-3.5	Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2775	28.8000	15.3000	12.3633
S7814		Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Sst	2531	0.0000	49.7000	-
S7675		Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2697	15.6000	23.4000	34.9081
S7621		Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2814	12.4000	0.0000	0.0000
S7618		Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2807	61.2000	9.1000	3.4604
S7603-2		Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Dolo	2700	51.6000	7.7000	3.4728
S7603-1		Teltvika	Gipsdalen	K.Duner		33N	612630.000	8267879.000	Carb	2699	34.4000	5.4000	3.6532

S6741	17.0	K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Carb Shale	2672	60.2000	0.0000	0.0000
S6739	7.9	K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Carb Shale	2638	60.0000	-	-
S6738	6.2	K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Shale	2751	65.9000	-	-
S6737	3.7	K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Shale	2656	81.4000	-	-
S7802	3.5	K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Carb	2700	24.6000	2.6000	2.4596
S6736	3.0	K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Shale	2689	124.0000	-	-
S6733	1.7	K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Shale	2753	188.6000	-	-
S7599		K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Carb	2704	-12.7000	5.7000	10.4449
S7596		K. Elisabeth	Gipsdalen	K.Duner		33N	613217.000	8265913.000	Carb	2813	15.0000	0.0000	0.0000
S7601		K. Elisabeth S	Gipsdalen	K.Duner		33N	613391.252	8265807.478	Carb	2720	69.4000	10.9000	3.6551
S5001	0.0	Alfredfj N	Bjarmeland	Hambergfj		33N	621095.618	8257638.022	Limestone	2666	0.0000	-	-
S5000	0.0	Alfredfj W	Bjarmeland	Hambergfj		33N	620638.673	8257011.083	Limestone	2651	-17.6000	0.0000	0.0000
S7636	25.0	Alfredfj SE	Bjarmeland	Hambergfj		33N	621382.043	8256717.704	Carb	2599	0.0000	4.3000	-
S7635	12.0	Alfredfj SE	Bjarmeland	Hambergfj		33N	621382.043	8256717.704	Carb	2671	34.0000	18.6000	12.7312
S7634	4.5	Alfredfj SE	Bjarmeland	Hambergfj		33N	621382.043	8256717.704	Sst	2646	27.3000	8.6000	7.3311
S7633	2.0	Alfredfj SE	Bjarmeland	Hambergfj		33N	621382.043	8256717.704	Carb	2680	166.3000	10.5000	1.4694
S7638		Alfredfj SE	Bjarmeland	Hambergfj		33N	621382.043	8256717.704	Carb	2685	26.6000	10.0000	8.7489
S7637		Alfredfj SE	Bjarmeland	Hambergfj		33N	621382.043	8256717.704	Carb Shale	2674	0.0000	35.7000	-
S7230	28.0	Avdalen	Bjarmeland	Hambergfj		33N	620210.104	8257188.633	Sst	2568	49.1000	0.0000	0.0000
S7307	7.0	Avdalen	Bjarmeland	Hambergfj		33N	620210.104	8257188.633	Sst	2595	90.5000	1.8000	0.4629
S7306	1.5	Avdalen	Bjarmeland	Hambergfj		33N	620210.104	8257188.633	Sst	2561	97.3000	2.3000	0.5501
S7221	0.0	Avdalen	Bjarmeland	Hambergfj		33N	620210.104	8257188.633	Shale	2559	58.5000	0.0000	0.0000
S7220	0.0	Avdalen	Bjarmeland	Hambergfj		33N	620210.104	8257188.633	Shale	2539	100.6000	0.0000	0.0000
S7327	30.5	Hambergfj	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Carb	2660	15.3000	0.0000	0.0000
S7326	20.0	Hambergfj	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Carb	2665	44.2000	2.8000	1.4742
S6744	17.3	Hambergfj	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Shale	2647	-42.8000	-	-
S5602	8.0	Hambergfj	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Shale	2428	265.1000	-	-
S6742	8.0	Hambergfj	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Sst	2654	34.8000	12.3000	8.2255
S5599	6.3	Hambergfj	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Carb Shale	2537	51.1000	-	-

S7325	3.7	Hambergfj	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Shale Carb	2634	46.6000	0.0000	0.0000
S5141	0.0	Hambergfj	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Sst	2673	26.4000	-	-
S7240	26.0	Fuglefjellet	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Shale	2603	55.8000	8.8000	3.6701
S7239	21.0	Fuglefjellet	Bjarmeland	Hambergfj		33N	621311.000	8255649.000	Shale	2618	38.1000	0.0000	0.0000
S7367	0.0	Fuglefjellet	Bjarmeland	Hambergfj		33N	622061.000	8254728.000	Carb	2676	-38.5000	17.2000	10.3969
S4031	4.0	Gravodden	Tempelfjo	Miseryfj		33N	618606.000	8272600.000	Carb	2641	43.5000	11.6000	6.2059
S4029	1.5	Gravodden	Tempelfjo	Miseryfj		33N	618606.000	8272600.000	Carb	2650	199.8000	12.6000	1.4676
S4028	1.0	Gravodden	Tempelfjo	Miseryfj		33N	618606.000	8272600.000	Shale Silt	2589	77.1000	28.9000	8.7232
S5124	15.0	Herwigshamna	Tempelfjo	Miseryfj		33N	619230.000	8272580.000	Limestone	2560	-19.7000	20.9000	24.6896
S5122	10.0	Herwigshamna	Tempelfjo	Miseryfj		33N	619230.000	8272580.000	Limestone	2430	28.2000	-	-
S5121	8.0	Herwigshamna	Tempelfjo	Miseryfj		33N	612630.000	8267879.000	Limestone	2587	29.7000	-	-
S5119	5.0	Herwigshamna	Tempelfjo	Miseryfj		33N	619230.000	8272580.000	Limestone	2624	103.2000	36.5000	8.2309
S5115	1.5	Herwigshamna	Tempelfjo	Miseryfj		33N	619230.000	8272580.000	Limestone	2533	26.4000	-	-
S4026	1.3	Radiostasj.	Tempelfjo	Miseryfj		33N	619111.000	8272228.000	Carb	2660	76.3000	38.2000	11.6513
S4025	0.8	Radiostasj.	Tempelfjo	Miseryfj		33N	619111.000	8272228.000	Shale	2563	89.3000	-	-
S7252	0.5	Radiostasj.	Tempelfjo	Miseryfj		33N	619111.000	8272228.000	Shale	2601	152.7000	-	-
S4004	10.0	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Carb	2685	47.1000	21.6000	10.6725
S7249	7.0	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2621	91.7000	-	-
S4003	6.5	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Carb	2672	59.3000	0.0000	0.0000
S4002-2	5.0	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Carb Shale	2683	82.5000	21.9000	6.1777
S4002	5.0	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Carb Shale	2627	57.5000	3.6000	1.4570
S7248	5.0	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2660	105.8000	-	-
S7247	4.5	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2645	50.6000	-	-
S7246	3.5	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2638	157.7000	-	-
S4001	3.0	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Carb	2661	72.9000	-	-
S7245	2.5	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2644	133.0000	28.3000	4.9519
S7244	2.0	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2632	136.7000	-	-
S7242	0.8	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2608	210.5000	0.0000	0.0000
S7241	0.5	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2516	60.4000	32.1000	12.3681

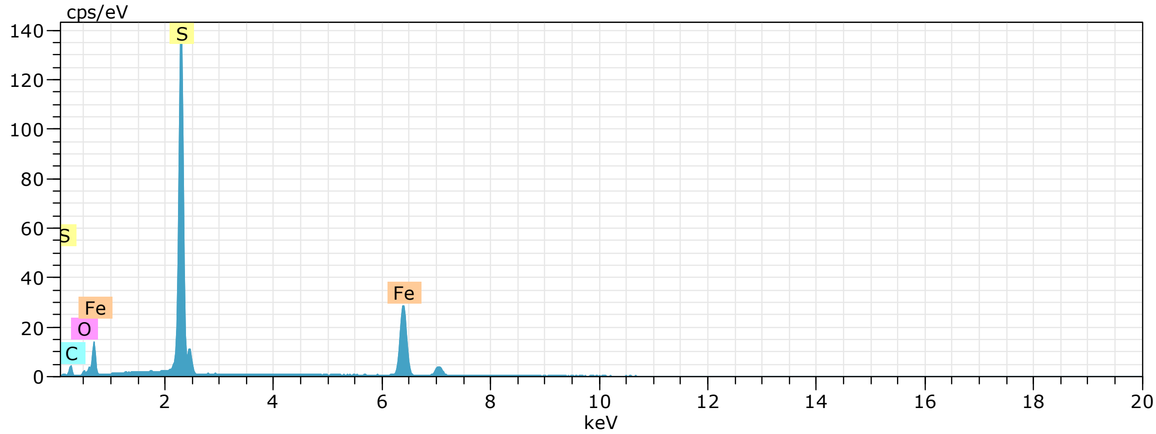
S4000	0.2	Kaffistigen	Tempelfjo	Miseryfj		33N	621480.000	8273518.000	Shale	2557	36.1000	6.6000	4.2547
S5113	16.0	Nordkapp	Tempelfjo	Miseryfj		33N	621767.000	8273638.000	Carb	2571	67.0000	35.6000	12.3654
S5103	1.0	Nordkapp	Tempelfjo	Miseryfj		33N	621767.000	8273638.000	Limestone	2504	90.1000	-	-
S4023	1.0	Nordkapp	Tempelfjo	Miseryfj		33N	621767.000	8273638.000	Carb	2703	68.2000	14.6000	4.9820
S4022	0.1	Nordkapp	Tempelfjo	Miseryfj		33N	621767.000	8273638.000	Carb	2665	43.6000	15.4000	8.2199
S4035	0.0	Alfredfj	Tempelfjo	Miseryfj		33N	621183.569	8256723.329	Cgl	2662	16.4000	0.0000	0.0000
S4036	0.1	Alfredfj	Tempelfjo	Miseryfj		33N	621183.569	8256723.329	Shale	2642	74.5000	7.8000	2.4365
S7222	-10.0	Alfredfj	Tempelfjo	Miseryfj		33N	621183.569	8256723.329	Shale	2618	40.9000	21.7000	12.3473
S7223	-12.0	Alfredfj	Tempelfjo	Miseryfj		33N	621183.569	8256723.329	Shale	2645	69.3000	30.9000	10.3767
S4034	6.0	Hambergfj N	Tempelfjo	Miseryfj		33N	621364.181	8256098.841	Carb	2757	102.4000	8.1000	1.8409
S4033	0.0	Hambergfj N	Tempelfjo	Miseryfj		33N	621364.181	8256098.841	Carb	2691	41.1000	0.0000	0.0000
S5150	0.0	Hambergfj	Tempelfjo	Miseryfj		33N	621311.000	8255649.000	Carb	2643	0.0000	41.3000	-
S7237	45.0	Fuglefjellet	Tempelfjo	Miseryfj		33N	622061.000	8254728.000	Shale	2560	38.8000	12.2000	7.3175
S7236	40.0	Fuglefjellet	Tempelfjo	Miseryfj		33N	622061.000	8254728.000	Shale	2669	0.0000	18.1000	-
S7235	35.0	Fuglefjellet	Tempelfjo	Miseryfj		33N	622061.000	8254728.000	Shale	2568	72.2000	0.0000	0.0000
S5099	-5.0	Oppgangsdalen	Tempelfjo	Miseryfj		33N	624413.000	8262241.000	Limestone	2601	0.0000	63.4000	-
S5092	112.5	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Limestone	2593	56.9000	-	-
S5090	112.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Limestone	2616	0.0000	-	-
S4037	35.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2597	217.0000	5.7000	0.6113
S4038	31.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2656	23.1000	7.3000	7.3544
S4039	25.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2657	15.2000	4.8000	7.3491
S5076	24.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Limestone	2350	51.4000	-	-
S4040	20.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2662	23.1000	7.3000	7.3544
S5074	18.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Limestone	2352	0.0000	-	-
S4041	15.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2671	0.0000	0.0000	0.0000
S5072	12.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Limestone	2485	82.5000	-	-
S4042	11.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2672	17.3000	2.7000	3.6321
S7256	10.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Shale Carb	2527	43.1000	0.0000	0.0000
S5069	6.5	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Limestone	2606	-33.1000	-	-

S7255	5.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Shale	2515	0.0000	10.8000	-
S4043	5.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2669	-55.2000	12.3000	-5.1856
S7254	2.5	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Shale	2570	65.5000	34.8000	12.3644
S4044	2.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2673	16.4000	5.2000	7.3789
S5065	2.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Limestone	2491	52.8000	-	-
S5063	0.1	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Limestone	2607	27.8000	-	-
S4178	0.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Carb	2686	300.7000	0.0000	0.0000
S4045	-1.0	Skrekkjuvet	Tempelfjo	Miseryfj		33N	625061.000	8261842.000	Sst	2471	10.1000	4.5000	10.3687
S7658		Urd	Tempelfjo	Miseryfj		33N	625360.000	8262570.000	Sst	2609	128.2000	59.0000	10.7102
S7360		Urd	Tempelfjo	Miseryfj		33N	625360.000	8262570.000	Sst	2372	0.0000	1.9000	-
S7359		Urd	Tempelfjo	Miseryfj		33N	625360.000	8262570.000	Sst	2553	27.0000	2.8000	2.4134
S7358		Urd	Tempelfjo	Miseryfj		33N	625360.000	8262570.000	Sst	2502	-9.2000	4.1000	10.3712
S5097	-0.1	Osten	Tempelfjo	Miseryfj		33N	625944.000	8262868.000	Grey Lime	2639	26.7000	0.0000	0.0000
S5095	-0.1	Osten	Tempelfjo	Miseryfj		33N	625944.000	8262868.000	Red Lime	2847	494.8000	15.0000	0.7055
S4021	80.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2641	-12.5000	6.9000	12.8462
S4020	78.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2636	26.2000	19.7000	17.4985
S4019	70.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2666	-16.4000	7.3000	10.3589
S5060	67.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Limestone	2641	-26.9000	-	-
S4018	59.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2689	-5.8000	4.5000	18.0559
S4017	54.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2582	40.4000	2.5000	1.4401
S4016	46.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2371	18.9000	3.0000	3.6940
S4015	41.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2595	8.6000	0.0000	0.0000
S4014	36.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2546	32.2000	3.4000	2.4573
S4013	34.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2564	-27.8000	8.8000	-7.3667
S4012	32.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2525	26.7000	0.0000	0.0000
S7342	30.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2671	82.7000	6.5000	1.8291
S4011	25.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2580	74.3000	13.5000	4.2284
S4010	20.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Shale	2600	30.3000	4.8000	3.6867
S4009	17.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Shale	2606	58.9000	6.2000	2.4497

S6755	15.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb Shale	2605	59.9000	13.3000	5.1672
S6754	12.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb Shale	2560	91.5000	0.0000	0.0000
S4008	11.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2636	-25.5000	8.1000	-7.3923
S4007	6.5	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Shale	2606	43.5000	20.0000	10.6998
S4006	5.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Carb	2656	0.0000	6.0000	0.0000
S7231	5.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Shale	2548	32.8000	34.8000	24.6911
S4005	2.0	Brettingsdalen	Tempelfjo	Miseryfj		33N	626909.000	8264893.000	Shale	2599	62.8000	16.7000	6.1886
S4203	65.0	Oppgangsdalen	Sassendalen	Urd	Verdande	33N	624413.000	8262241.000	Phos	2670	62.8000	0.0000	0.0000
S4187	64.0	Oppgangsdalen	Sassendalen	Urd		33N	624413.000	8262241.000	Shale	2403	172.9000	9.1000	1.2248
S4188	59.0	Oppgangsdalen	Sassendalen	Urd		33N	624413.000	8262241.000	Shale	2432	107.0000	-	-
S4189	49.0	Oppgangsdalen	Sassendalen	Urd		33N	624413.000	8262241.000	Shale	2458	239.6000	-	-
S4190	39.0	Oppgangsdalen	Sassendalen	Urd		33N	624413.000	8262241.000	Shale	2541	193.2000	6.2000	0.7468
S4191	29.0	Oppgangsdalen	Sassendalen	Urd		33N	624413.000	8262241.000	Shale	2487	202.4000	22.6000	2.5986
S4192	18.0	Oppgangsdalen	Sassendalen	Urd		33N	624413.000	8262241.000	Shale	2561	282.1000	11.1000	0.9157
S4193	6.0	Oppgangsdalen	Sassendalen	Urd		33N	624413.000	8262241.000	Shale	2616	247.4000	18.4000	1.7308
S4194	2.0	Oppgangsdalen	Sassendalen	Urd		33N	624413.000	8262241.000	Shale	2412	134.6000	23.8000	4.1150
S4202	1.2	Skrekkjuvet	Sassendalen	Urd		33N	625061.000	8261842.000	Silt Sst	2417	97.2000	0.0000	0.0000
S4200	0.05	Skrekkjuvet	Sassendalen	Urd		33N	625061.000	8261842.000	Silt	2510	91.5000	5.8000	1.4752
S4210	172.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Silt	2533	203.5000	8.2000	0.9377
S4212	167.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2499	235.1000	-	-
S4213	158.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2510	334.8000	-	-
S4214	143.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2532	319.3000	12.6000	0.9183
S4216	126.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2547	293.7000	9.3000	0.7369
S4217	115.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2522	315.5000	11.0000	0.8114
S4218	102.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2556	184.7000	0.0000	0.0000
S4219	93.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2562	206.6000	6.5000	0.7322
S4220	84.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2516	191.8000	0.0000	0.0000
S4221	74.0	Oppgangsdalen	Kapp Toscana	Skuld		33N	624413.000	8262241.000	Shale	2497	322.2000	34.2000	2.4702

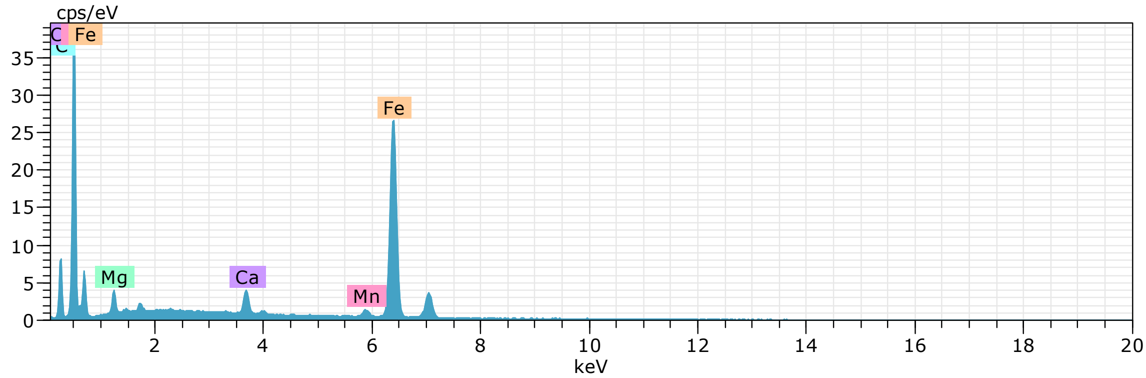
A.2.1 Vesalstranda Member

S4506:



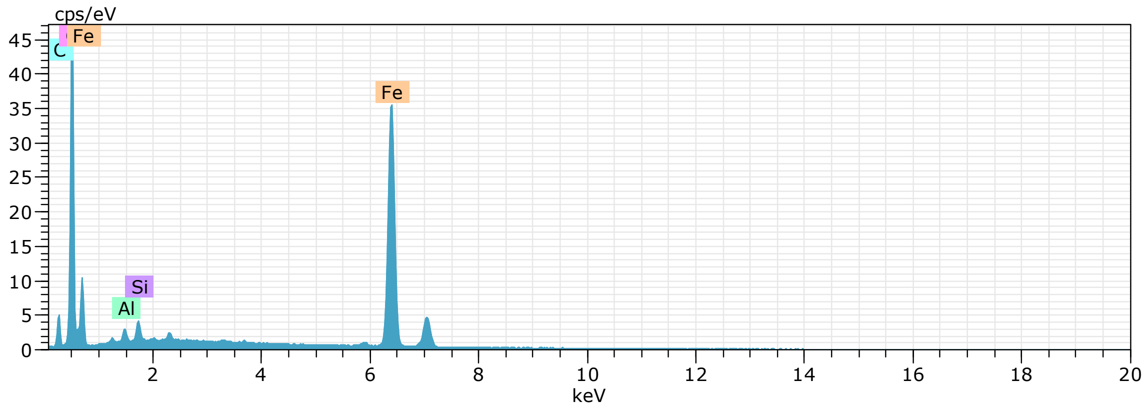
Objects 35 Date:23.05.2012 11:18:37 HV:20,0kV Puls th.:31,02kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	17,35	19,23	44,23	2,93
O	8	K-series	2,07	2,30	3,97	0,46
S	16	K-series	31,95	35,43	30,52	1,17
Fe	26	K-series	38,81	43,04	21,28	1,07
		Total:	90,19	100,00	100,00	



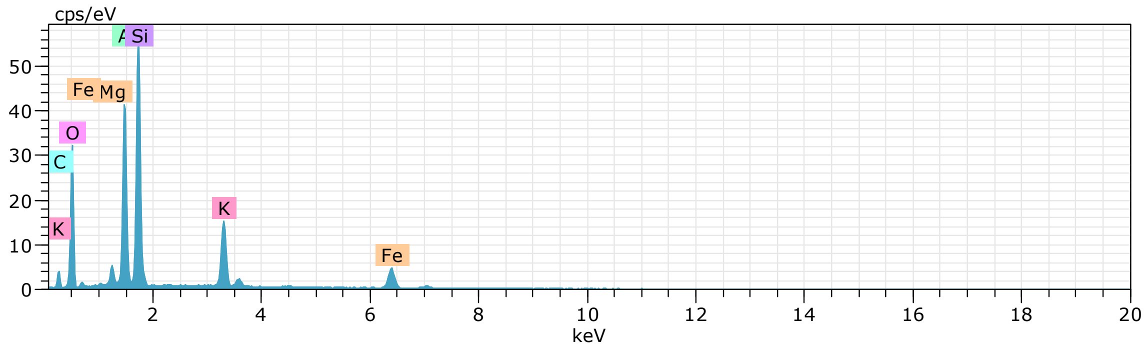
Objects 36 Date:23.05.2012 11:18:53 HV:20,0kV Puls th.:17,94kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	14,87	15,06	27,45	2,25
O	8	K-series	38,63	39,12	53,55	4,69
Mg	12	K-series	1,45	1,47	1,32	0,11
Ca	20	K-series	1,76	1,78	0,97	0,08
Mn	25	K-series	1,06	1,07	0,43	0,06
Fe	26	K-series	40,99	41,51	16,28	1,12
		Total:	98,75	100,00	100,00	



Objects 37 Date:23.05.2012 11:19:09 HV:20,0kV Puls th.:20,50kcps

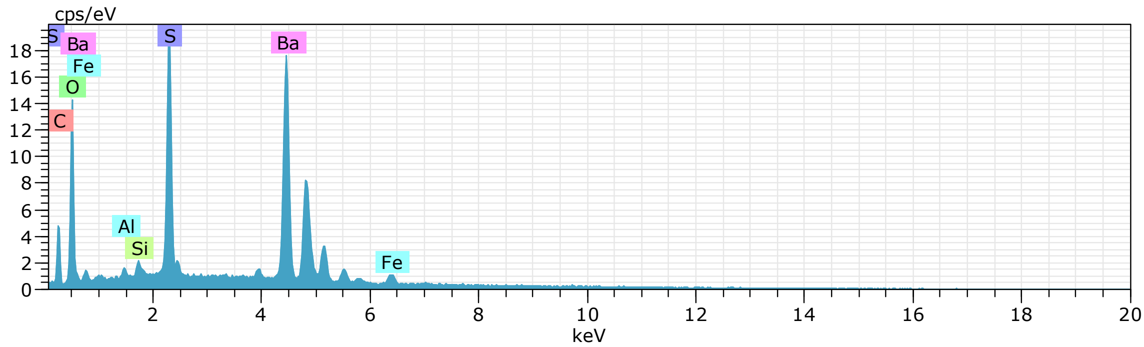
El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	9,32	9,12	18,65	1,57
O	8	K-series	37,96	37,13	57,03	4,54
Al	13	K-series	0,71	0,69	0,63	0,07
Si	14	K-series	0,81	0,80	0,70	0,06
Fe	26	K-series	53,43	52,26	22,99	1,45
		Total:	102,23	100,00	100,00	



Objects 38 Date:23.05.2012 11:19:25 HV:20,0kV Puls th.:21,09kcps

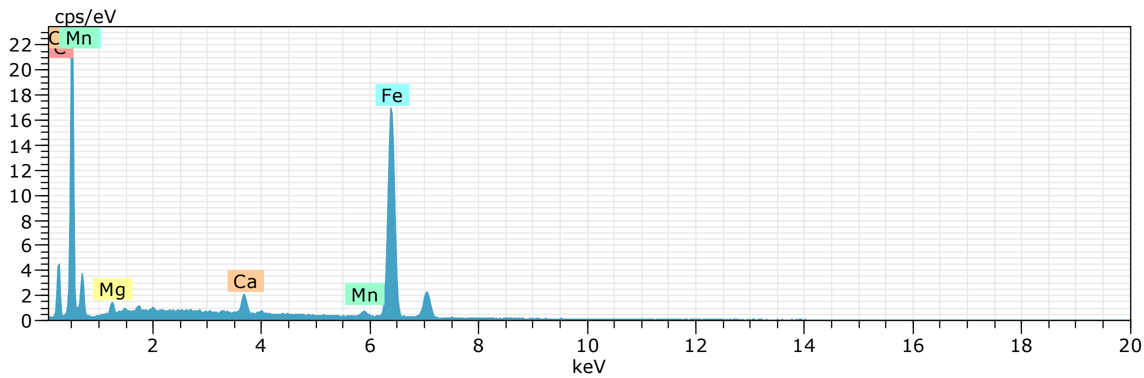
El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	11,32	11,90	19,66	2,00
O	8	K-series	38,55	40,53	50,26	4,80
Mg	12	K-series	1,38	1,45	1,18	0,11
Al	13	K-series	12,57	13,22	9,72	0,63
Si	14	K-series	17,21	18,10	12,78	0,76
K	19	K-series	7,14	7,51	3,81	0,25
Fe	26	K-series	6,93	7,29	2,59	0,22
		Total:	95,10	100,00	100,00	

S4508:



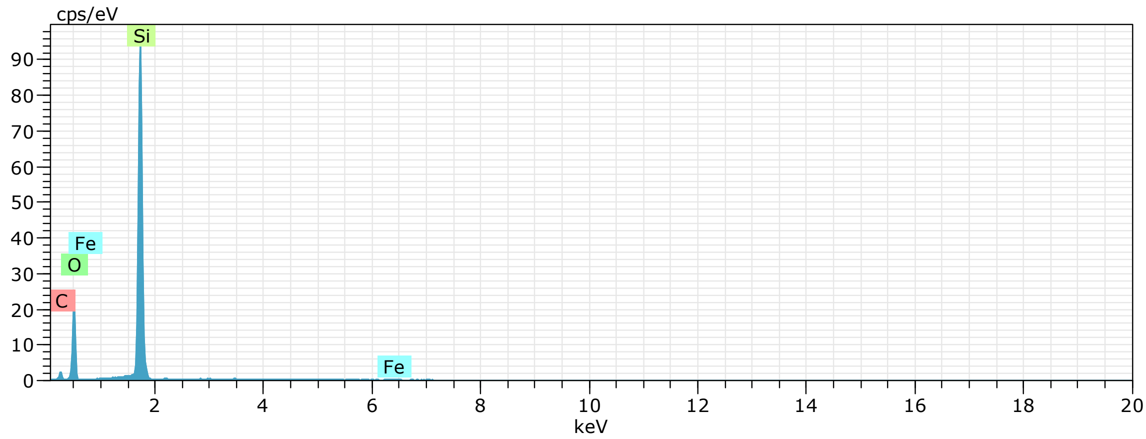
4508 3 Date:24.05.2012 08:45:23 HV:20,0kV Puls th.:15,94kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	12,08	13,59	35,65	2,01
O	8	K-series	17,08	19,21	37,84	2,36
Al	13	K-series	0,57	0,64	0,75	0,06
Si	14	K-series	0,66	0,74	0,83	0,06
S	16	K-series	10,74	12,09	11,88	0,42
Fe	26	K-series	1,90	2,14	1,21	0,10
Ba	56	L-series	45,88	51,60	11,84	1,30
		Total:	88,91	100,00	100,00	



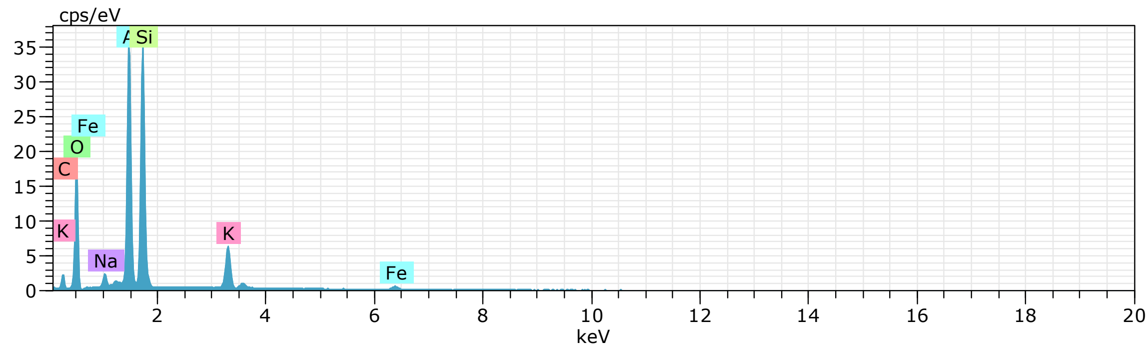
4508 4 Date:24.05.2012 08:45:39 HV:20,0kV Puls th.:11,39kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	13,86	14,17	26,63	2,35
O	8	K-series	36,94	37,76	53,29	4,72
Mg	12	K-series	0,79	0,81	0,75	0,08
Ca	20	K-series	1,29	1,32	0,74	0,07
Mn	25	K-series	0,88	0,90	0,37	0,06
Fe	26	K-series	44,07	45,05	18,21	1,22
		Total:	97,83	100,00	100,00	



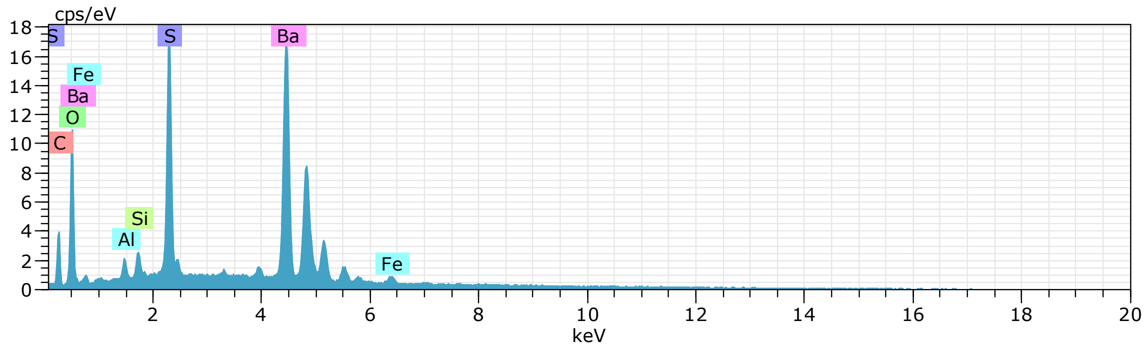
4508 5 Date:24.05.2012 08:45:54 HV:20,0kV Puls th.:14,89kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	9,79	15,32	23,49	1,89
O	8	K-series	27,40	42,90	49,37	3,54
Si	14	K-series	26,18	40,99	26,88	1,14
Fe	26	K-series	0,50	0,79	0,26	0,05
		Total:	63,86	100,00	100,00	



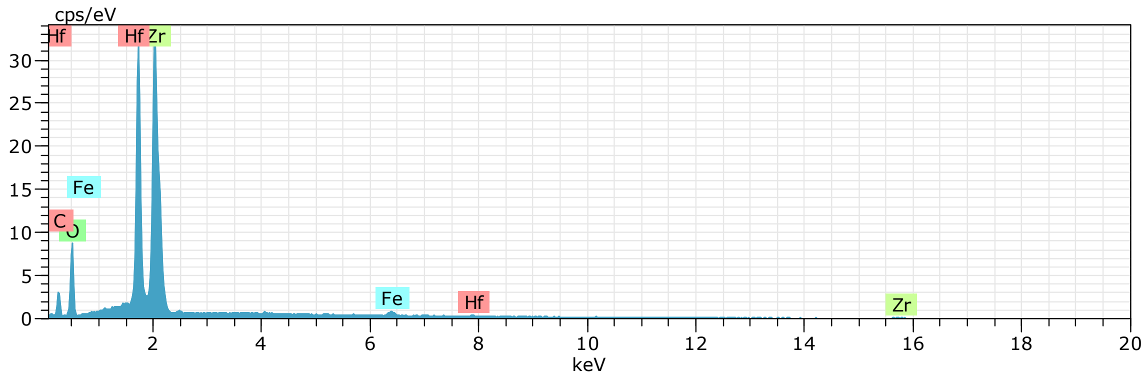
4508 6 Date:24.05.2012 08:46:10 HV:20,0kV Puls th.:13,22kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	10,82	11,81	18,96	2,24
O	8	K-series	37,56	41,00	49,40	4,96
Na	11	K-series	1,35	1,48	1,24	0,13
Al	13	K-series	17,48	19,08	13,63	0,87
Si	14	K-series	18,17	19,83	13,62	0,81
K	19	K-series	4,98	5,43	2,68	0,19
Fe	26	K-series	1,26	1,37	0,47	0,08
		Total:	91,62	100,00	100,00	



4508 7 Date:24.05.2012 08:46:26 HV:20,0kV Puls th.:15,24kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	9,52	10,79	32,01	1,70
O	8	K-series	13,95	15,81	35,21	2,00
Al	13	K-series	1,29	1,46	1,93	0,10
Si	14	K-series	1,26	1,43	1,81	0,09
S	16	K-series	10,54	11,95	13,28	0,41
Fe	26	K-series	1,34	1,52	0,97	0,08
Ba	56	L-series	50,36	57,06	14,80	1,42
		Total:	88,27	100,00	100,00	

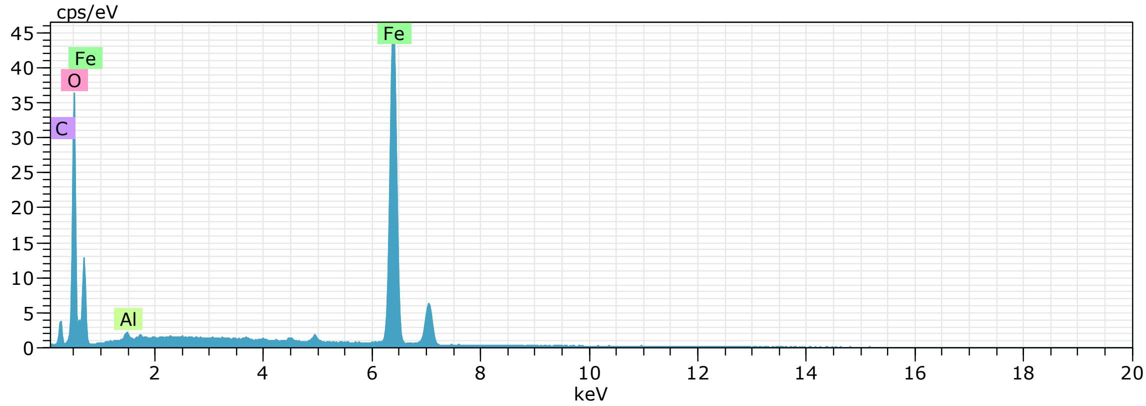


4508 8 Date:24.05.2012 08:46:41 HV:20,0kV Puls th.:15,70kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	15,56	17,08	36,83	2,81
O	8	K-series	21,82	23,94	38,77	3,22
Si	14	K-series	10,87	11,93	11,00	0,49
Fe	26	K-series	0,99	1,09	0,51	0,07
Zr	40	L-series	40,84	44,82	12,73	1,59
Hf	72	L-series	1,04	1,14	0,17	0,08
		Total:	91,12	100,00	100,00	

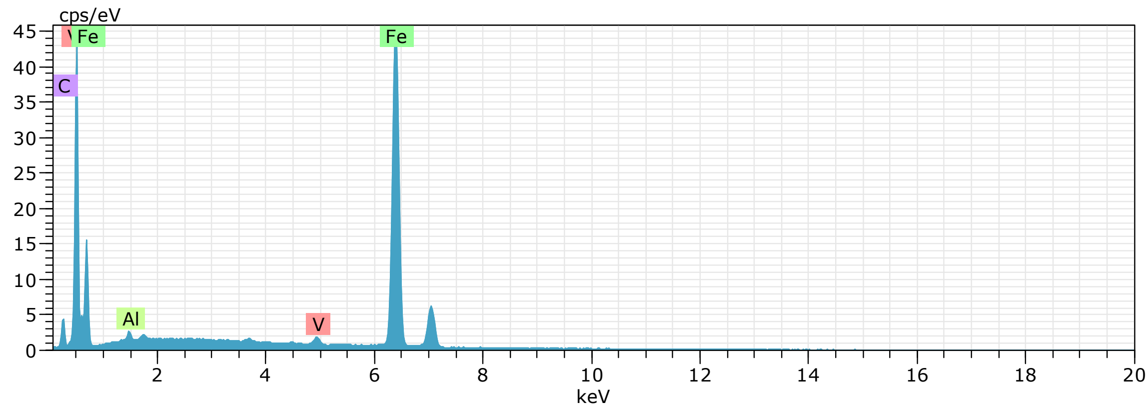
A.2.2 Efuglvika Member

S4421:



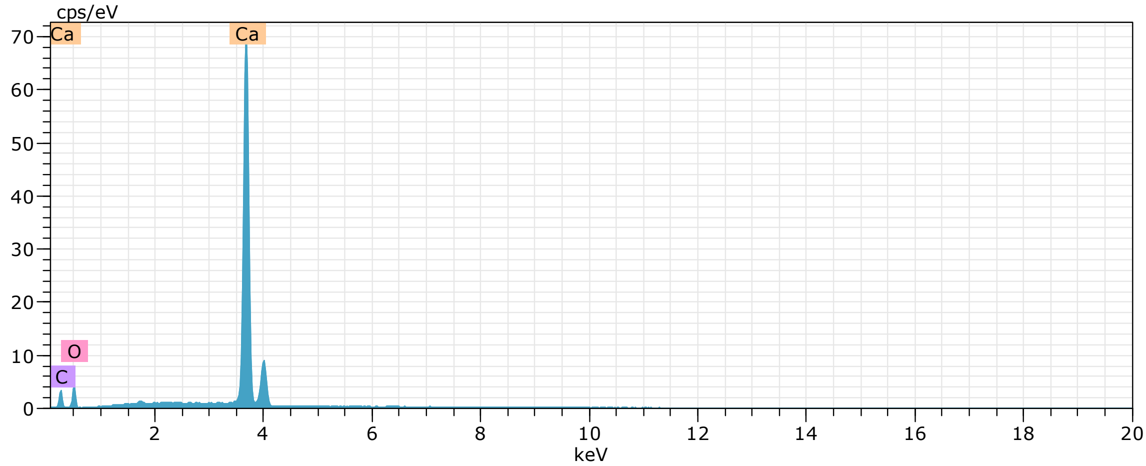
Objects 21 Date:23.05.2012 10:09:22 HV:20,0kV Puls th.:23,68kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	6,58	7,23	17,77	1,18
O	8	K-series	22,69	24,94	46,01	2,83
Al	13	K-series	0,55	0,60	0,66	0,06
V	23	K-series	0,59	0,65	0,38	0,05
Fe	26	K-series	60,58	66,58	35,19	1,64
		Total:	91,00	100,00	100,00	



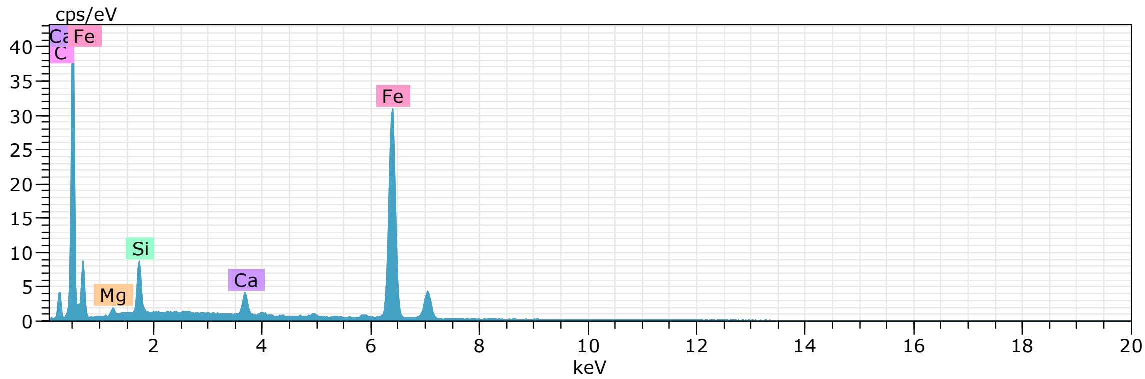
Objects 22 Date:23.05.2012 10:09:38 HV:20,0kV Puls th.:24,73kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	7,22	7,86	18,28	1,25
O	8	K-series	26,03	28,33	49,48	3,19
Al	13	K-series	0,49	0,53	0,55	0,05
V	23	K-series	0,61	0,66	0,36	0,05
Fe	26	K-series	57,53	62,62	31,33	1,56
		Total:	91,87	100,00	100,00	



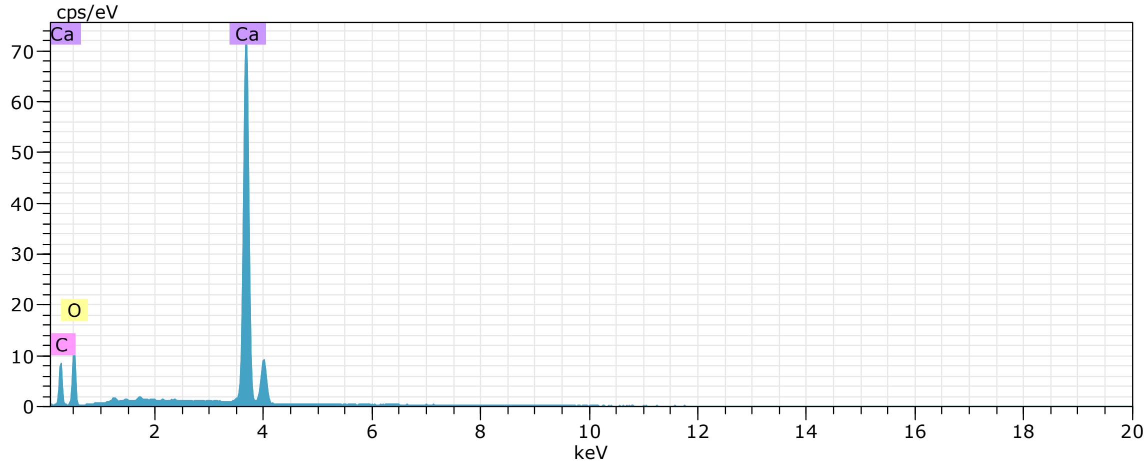
Objects 23 Date:23.05.2012 10:09:54 HV:20,0kV Puls th.:18,18kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	6,39	6,82	14,70	1,18
O	8	K-series	24,13	25,74	41,69	4,02
Ca	20	K-series	63,20	67,44	43,60	1,88
		Total:	93,72	100,00	100,00	



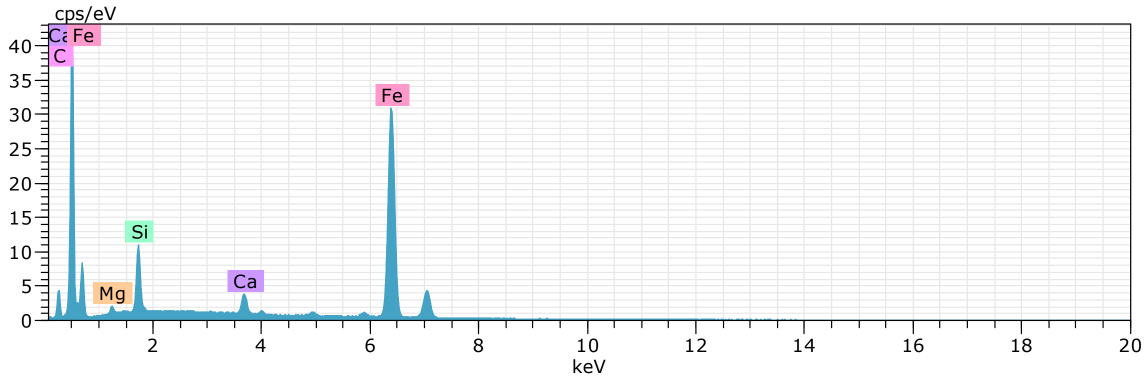
Objects 24 Date:23.05.2012 10:18:59 HV:20,0kV Puls th.:20,00kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	8,68	8,63	17,62	1,51
O	8	K-series	37,26	37,04	56,77	4,52
Mg	12	K-series	0,60	0,60	0,60	0,07
Si	14	K-series	2,54	2,52	2,20	0,14
Ca	20	K-series	1,81	1,80	1,10	0,08
Fe	26	K-series	49,72	49,42	21,70	1,36
		Total:	100,60	100,00	100,00	



Objects 25 Date:23.05.2012 10:19:15 HV:20,0kV Puls th.:19,48kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	11,97	11,95	21,20	1,82
O	8	K-series	40,04	39,98	53,24	5,59
Ca	20	K-series	48,15	48,07	25,56	1,44
		Total:	100,15	100,00	100,00	

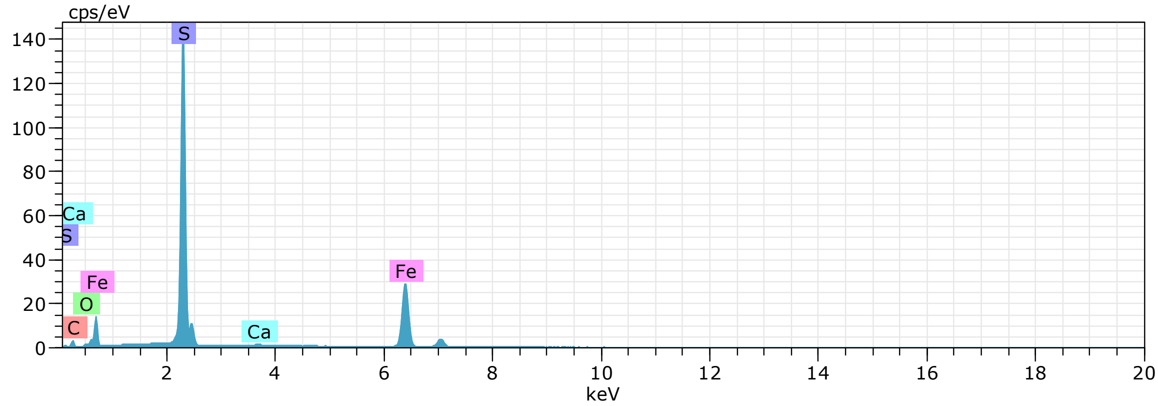


Objects 26 Date:23.05.2012 10:19:31 HV:20,0kV Puls th.:20,61kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	8,63	9,07	18,42	1,48
O	8	K-series	34,81	36,60	55,82	4,23
Mg	12	K-series	0,57	0,60	0,60	0,07
Si	14	K-series	3,07	3,22	2,80	0,16
Ca	20	K-series	1,59	1,67	1,02	0,08
Fe	26	K-series	46,45	48,84	21,34	1,27
		Total:	95,12	100,00	100,00	

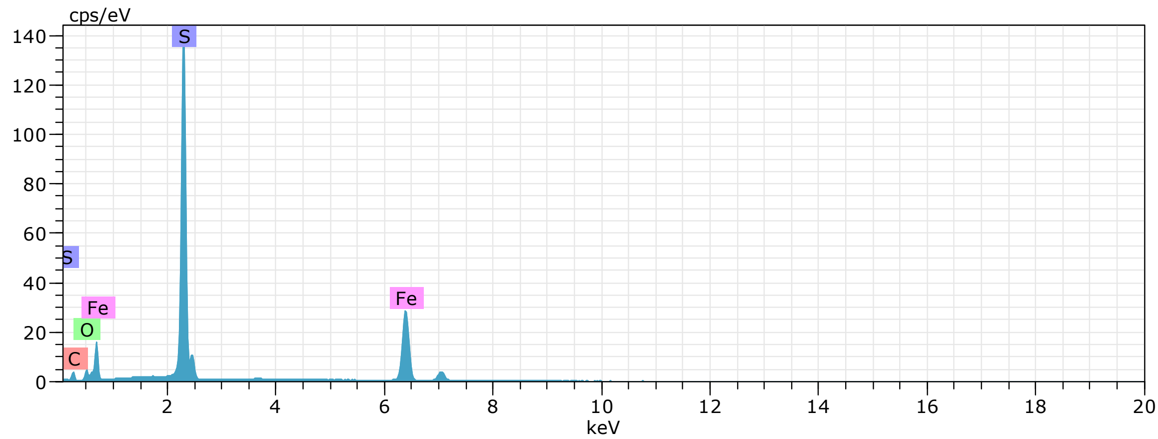
A.2.3 Kapp Hanna Formation

S4439:



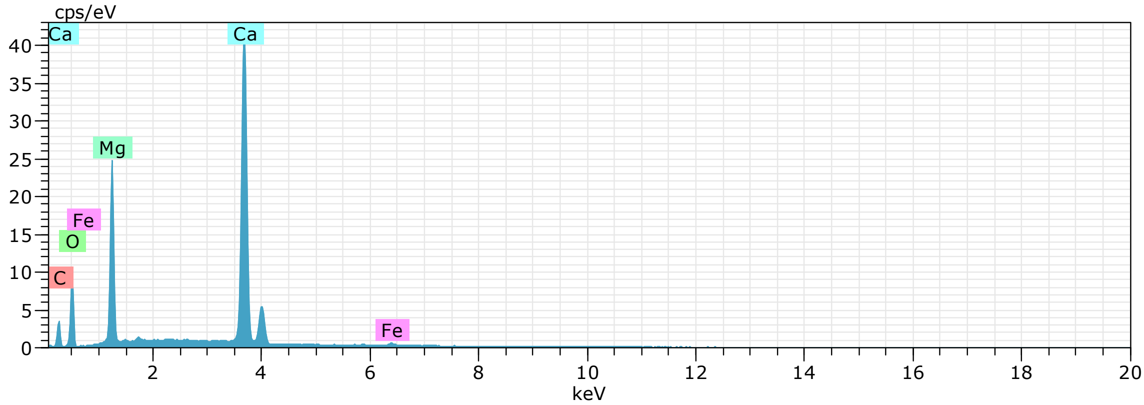
Objects 6 Date:23.05.2012 09:06:37 HV:20,0kV Puls th.:31,18kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	12,91	14,18	35,84	2,06
O	8	K-series	1,38	1,52	2,88	0,30
S	16	K-series	34,68	38,09	36,05	1,27
Ca	20	K-series	0,48	0,52	0,40	0,04
Fe	26	K-series	41,60	45,69	24,83	1,13
		Total:	91,04	100,00	100,00	



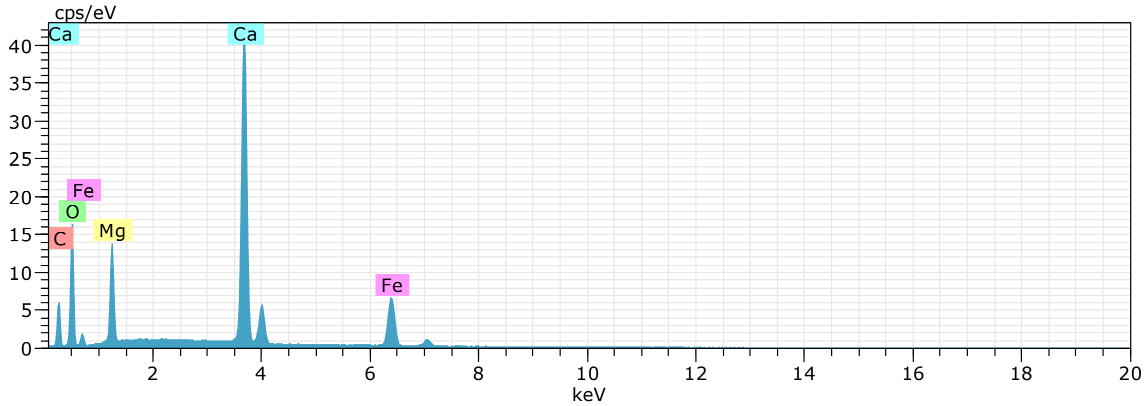
Objects 8 Date:23.05.2012 09:07:08 HV:20,0kV Puls th.:31,03kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	14,74	15,93	37,15	2,27
O	8	K-series	5,43	5,87	10,28	0,83
S	16	K-series	33,19	35,88	31,34	1,21
Fe	26	K-series	39,15	42,32	21,22	1,07
		Total:	92,51	100,00	100,00	



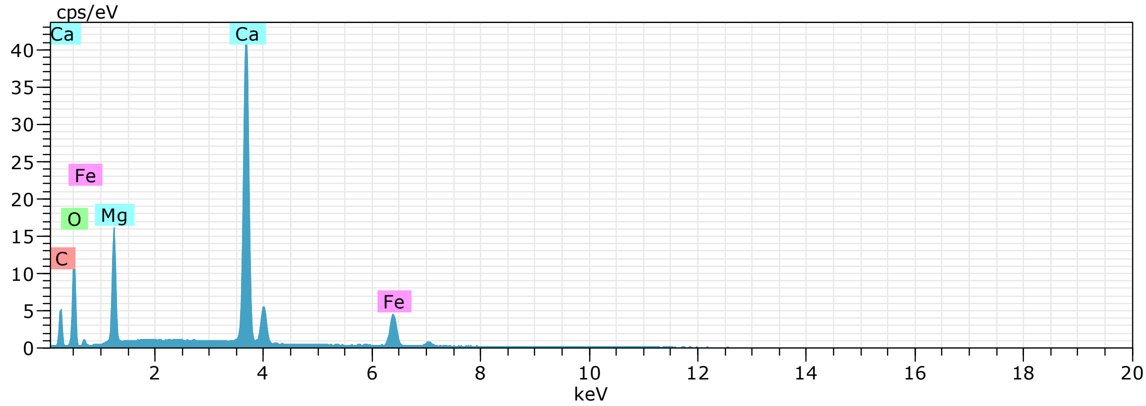
Objects 9 Date:23.05.2012 09:07:39 HV:20,0kV Puls th.:14,64kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	6,88	9,28	16,45	1,10
O	8	K-series	27,86	37,57	49,99	3,68
Mg	12	K-series	11,69	15,76	13,81	0,67
Ca	20	K-series	27,19	36,66	19,48	0,82
Fe	26	K-series	0,54	0,72	0,28	0,05
		Total:	74,15	100,00	100,00	



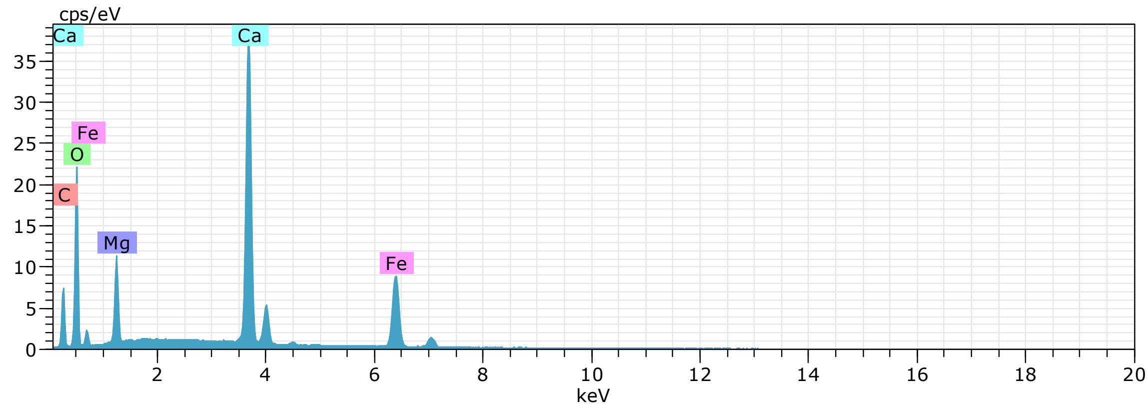
Objects 10 Date:23.05.2012 09:08:1 HV:20,0kV Puls th.:16,22kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	10,61	11,65	20,67	1,53
O	8	K-series	36,26	39,82	53,03	4,52
Mg	12	K-series	6,59	7,23	6,34	0,39
Ca	20	K-series	25,46	27,96	14,86	0,77
Fe	26	K-series	12,15	13,34	5,09	0,36
		Total:	91,08	100,00	100,00	



Objects 11 Date:23.05.2012 09:08:41 HV:20,0kV Puls th.:15,49kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	9,69	11,38	20,27	1,43
O	8	K-series	32,38	38,02	50,84	4,13
Mg	12	K-series	8,16	9,59	8,44	0,48
Ca	20	K-series	26,76	31,42	16,77	0,81
Fe	26	K-series	8,17	9,59	3,67	0,25
		Total:	85,16	100,00	100,00	



Objects 12 Date:23.05.2012 09:09:12 HV:20,0kV Puls th.:16,72kcps

El	AN	Series	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Error (1 Sigma) [wt.%]
C	6	K-series	12,03	12,84	22,13	1,68
O	8	K-series	40,14	42,85	55,46	4,87
Mg	12	K-series	5,02	5,36	4,57	0,31
Ca	20	K-series	21,86	23,34	12,06	0,67
Fe	26	K-series	14,62	15,60	5,78	0,42
		Total:	93,67	100,00	100,00	