Mapped faults and fault blocks of the Traill Ø region

Faults and fault blocks are described from west to east, first across Traill Ø then across Geographical Society Ø. Each fault and fault block described has been numbered for ease of reference (Figures 5 & 6). All faults described below have normal slip vectors. Measurements are given as dip and dip direction. A summary of all fault plane orientations is given in Table 1. Regional fault block dips are determined from average bedding readings. A summary of all fault blocks is given in Table 2.

1. Faults

1.1. Fault 1: The Gauss Halvø Fault (Traill Ø)

The Gauss Halvø Fault (GHF) is the collective name for a system of fault segments that trend north-south between Scoresby Sund and north of Wollaston Forland (Peacock et al., 2000). Previously, this fault has been referred to as the Post-Devonian Main Fault (PDMF, Vischer, 1943), however, this name has since been abandoned as more recent authors have chosen to use the definition of Peacock et al. (2000). In the Traill Ø region the GHF forms the western-most major normal fault to span across the mapped areas of Traill Ø and Geographical Society Ø. The fault trace of the GHF was taken from the map of Koch and Haller (1971). Fault plane orientation is based on observations of the GHF made by CASP geologists (this study) at Karupelv, Traill Ø. This orientation is assumed to apply to the whole
of the GHF across Traill Ø. A fault plane dip of 50° is assumed from the amount of rotation that has occurred in the footwall and hanging wall.

The GHF is oriented ~50/120 and has a single fault trace with a west stepping en echelon offset in the centre of Traill Ø. Devonian strata are found in the footwall. Carboniferous strata are found in the hanging wall. Bütler (1955) estimated a throw of 2000-3000 m. There is no indication of any variation in displacement along the strike of the GHF. A series of meso-scale strike-slip faults and normal faults are recorded in the footwall and hanging wall strata, associated with movement on the GHF (this study).

The earliest evidence of movement on the GHF comes from spore-pollen assemblages in syn-rift strata in the hanging wall dated as earliest to Late Carboniferous (Stemmerik et al., 1991). However, the base of the syn-rift strata is not exposed and therefore, faulting may have actually initiated in the Devonian. Fault block rotation occurred in the footwall during the Devonian and in the hanging wall during the Carboniferous (Bütler, 1955). Bütler (1955) identified a number of Cenozoic dolerite sills on Traill Ø, some of which were offset by the GHF and others that cut through the GHF without being faulted, indicating that this fault was last active during the early Cenozoic. At Karupelv (Figure 2), sills are identified in the footwall of the GHF at an altitude of 800 m but are absent in the hanging wall, indicating a Cenozoic vertical throw of >800 m (this study).

1.2. Fault 2: The Rubjerg Knude Fault (Traill Ø)

The Rubjerg Knude Fault is approximately 5km east of the GHF. This previously unnamed fault runs roughly parallel to the GHF across Traill Ø into Geographical Society Ø. The fault trace of the Rubjerg Knude Fault was drawn from the map of Koch and Haller (1971).

Fault plane orientation of the Rubjerg Knude Fault is assumed to match the GHF (~50/120), due to a lack of structural data to say otherwise and as observations of footwall and hanging wall strata that suggest a fault block rotation of ~10-15°. The Rubjerg Knude Fault has a single fault trace. Carboniferous strata are found in the footwall and the hanging wall. The
amount of displacement on the Rubjerg Knude Fault is unknown. Displacement appears to increase northwards along the strike of the Rubjerg Knude Fault, as the age of strata in the hanging wall gets younger. Cross section construction indicates that the Rubjerg Knude Fault has a minimum vertical throw of 1000 m on Traill Ø.

There are no age constraints on the initial timing of movement on the Rubjerg Knude Fault. The latest movement on the Rubjerg Knude Fault post-dates deposition of the Late Cretaceous sediments of the Inoceramus lamarcki Beds as these are offset against Carboniferous sediments on northern Geographical Society Ø.

1.3. Faults 3a,b: The Bordbjerget North Strand Fault and the Bordbjerget South Strand Fault (Traill Ø)

Originally mapped as a single fault, the Bordbjerget North Strand Fault (Fault 3a) and the Bordbjerget South Strand Fault (Fault 3b) are identified in this study as two separate faults, that may link via a rely zone in central Traill Ø as inferred from the map of Koch and Haller (1971). The separation of these two faults is justified by the identification of two separate points of maximum fault displacement in the north at Månedal and the south in the Svinhufvud Bjerge (Figure 2). Had these two faults linked to become a single fault, maximum displacement would culminate at a single point in the centre of the fault (cf. Cowie et al., 2000). The new fault names still refer to the ‘Bordbjerget Fault’ in acknowledgement of the faults possibly having some interaction across a soft linkage in central Traill Ø.

1.3.1. Fault 3a: The Bordbjerget North Strand Fault

The fault trace of the Bordbjerget North Strand Fault was drawn from the map of Koch and Haller (1971) and Escher (2001) between central and north Traill Ø across Grønnebjerg and Rold Bjerge and over to Geographical Society Ø (Figure 5). We have identified meso-scale north dipping fault splays in the footwall at Grønnebjerg. A north dipping cross fault joining the Bordbjerget North Strand Fault (Fault 3a) with the Månedal Fault (Fault 5a) is identified by Koch and Haller (1971) on the south slopes of Grønnebjerg (Figure 2).
The Bordbjerget North Strand Fault has a single fault trace. Fault plane orientation of 50/090 on Rold Bjerge and 50/115 on Grønnebjerg was constrained from detailed mapping during this study with refinements made using CASP’s 3DPlanes Program. Carboniferous strata unconformably overlain by Permian and Triassic strata are found in the footwall. Triassic strata and a small outcrop of Permian strata are found in the hanging wall, north of the cross fault between Fault 3a and Fault 5a. South of this cross fault, Carboniferous strata unconformably overlain by a small outcrop of Permian and Triassic strata are found in the hanging wall of Bordbjerget North Strand Fault.

Bütler (1957) previously estimated a throw of ~500 m on the Bordbjerget North Strand Fault. Vertical throw measured from cross sections C and D is ~1050-1150 m respectively (Enclosure 2). It is not possible to determine the exact timing of movement on the Bordbjerget North Strand Fault although it is certainly post-Carboniferous and probably post-Early Triassic as there is no evidence of syn-tectonic sedimentation exposed in the hanging wall strata.

1.3.2. Fault 3b: The Bordbjerget South Strand Fault

The southern-most portion of the Bordbjerget South Strand Fault forms a fault zone, joined by a splay with significant displacement across it that links to the main fault strand by a number of cross faults. The fault trace of the Bordbjerget South Strand Fault was taken from the map of Koch and Haller (1971) between central and south Traill Ø at the western margin of the Svinhufvud Bjerge (Figure 5).

Fault plane orientations of 50/055 in the Svinhufvud Bjerge and 50/110 in central Traill Ø were constrained from mapping on the coastal cliffs of the Svinhufvud Bjerge (this study) and using CASP’s 3DPlanes Program for the area north of the Svinhufvud Bjerge. The Bordbjerget South Strand Fault forms a fault zone with multiple fault traces. Carboniferous strata are found in the footwall. Permian and Triassic strata, unconformably overlying Carboniferous strata are in the hanging wall in the Svinhufvud Bjerge.
Vertical throw of 1000-1250 m was measured across the Bordbjerget South Strand Fault from cross sections E and F (Enclosure 2).

It is not possible to determine the exact timing of movement on the Bordbjerget South Strand Fault although it is certainly post-Carboniferous and probably post-Early Triassic as there is no evidence of syn-tectonic sedimentation exposed in the hanging wall strata. Price et al. (1997) identified both ‘pre-magmatic’ and ‘post-magmatic’ components of fault heave corresponding to pre-54 Ma (probably Jurassic–Cretaceous) faulting and post-54 Ma faulting respectively.

1.4. Fault(s) 4: The Svinhufuvud Bjerne Faults

The well exposed cliff section between the Bordbjerget South Strand Fault (Fault 3b) and Månedal Fault A (Fault 5e) displays six faults with relatively small amounts of displacement, and a spacing of 500-2000 m (Figures 5, 10 and 11). These faults were mapped remotely during this study.

An average fault plane orientation of ~55/110, based on the recorded dips of the Bordbjerget South Strand Fault (Fault 3b) and Månedal Fault A (Fault 5e) is assumed for all six of the Svinhufuvud Bjerne Faults. Carboniferous strata unconformably overlain by Permian and Triassic strata are found in the footwalls and hanging walls.

Individual faults have vertical throws of ~10-300 m, measured from cross section F (Enclosure 2). A cumulative minimum vertical throw of 850 m was measured across all of the faults from cross section F. Kinematic indicators observed in the field and a low amplitude folded fault block observed in the Svinhufuvud Bjerne cliff section (Figures 10 and 11) indicate a period of compression and reverse slip on these faults (this study).

Initial movement on the Svinhufuvud Bjerne Faults is post-Permian as there is no evidence of syn-tectonic sedimentation exposed in the hanging wall or footwall strata. Price et al. (1997)
identified both ‘pre-magmatic’ and ‘post-magmatic’ components of fault heave corresponding to pre-54 Ma (probably Jurassic-Cretaceous) faulting and post-54 Ma faulting respectively.

1.5. Fault 5: The Månedal Fault (Traill Ø)

The Månedal Fault is traced across Traill Ø and Geographical Society Ø (Figure 5). On Traill Ø, the Månedal Fault is split into three sections; the Månedal Fault Zone (Faults 5a, 5b, 5c and 5d) in Månedal, Månedal Fault A (Fault 5e) in the central Svinhufvud Bjerge and Månedal Fault B (Fault 5f) in the eastern Svinhufvud Bjerge.

1.5.1. Faults 5a,b,c,d: The Månedal Fault Zone, Månedal

In the Månedal area of north Traill Ø, the Månedal Fault (Fault 5a) exists as a low-angle fault with three fault splays (Faults 5b, 5c and 5d) plus a number of cross faults. The fault trace of the Månedal Fault Zone is based on field mapping and fossil localities. CASP’s 3DPlanes Program was used alongside interpretations of aerial photographs to determine the orientations of individual fault splays. The 3DPlanes Program was also used to extrapolate the fault trace beyond the areas mapped on the field slips. The Månedal Fault (Fault 5a) has an orientation of 45/088 with a non-linear fault trace, which implies that the dip direction of the fault is variable and rotates towards ESE, south of Månedal. Fault splays 5b, 5c and 5d have orientations of ~50/095 and ~50/110 and ~50/110, respectively. These fault splays have not been identified previously. Fault 5d may be a southwards continuation of the Lysdal Fault (Fault 14) on Geographical Society Ø.

Triassic and Permian strata are found in the footwall of the Månedal Fault (Fault 5a). Cretaceous strata of the Buchia, I. aucella I. anglicus, I. crippsi, I. lamarcki and Sphenoceramus beds are found in its the hanging wall. Cretaceous strata are found in the footwalls and hanging walls of faults 5b, 5c and 5d. Late Cretaceous strata of the Sphenoceramus and Scaphites beds found in the hanging wall of Fault 5d are the youngest sediments on Traill Ø.
5500 m cumulative vertical throw was measured across Faults 5a to 5d from Cross Section C and D respectively (Enclosure 2). Individual faults have vertical throws of 2400 m (Fault 5a), 1950 m (Fault 5b), 500 m (Fault 5c) and 750 m (Fault 5d). Månedal is the point of Maximum vertical displacement along the Månedal Fault measured from the across Traill Ø region is recorded in the Månedal region (cross section B). The Månedal Fault (Fault 5a) initiated prior to Cenozoic rifting. The displacement of Late Jurassic–Early Cretaceous syn-rift strata suggests that Fault 5b, 5c and 5d formed after this rift event, probably during Cenozoic rifting.

1.5.2. Faults 5e,f: The Månedal faults A and B, Svinhufvud Bjerge

In the Svinhufvud Bjerge of south Traill Ø, the Månedal Fault splits into two main branches, Månedal Fault A (Fault 5e) and Månedal Fault B (Fault 5f) (Figure 5). Fault traces and fault plane orientations of Månedal Fault A and Månedal Fault B are based on detailed field mapping (this study), refined using CASP’s 3DPlanes Program. Fault 5e has an orientation of 48/105 in the northern Svinhufvud Bjerge and 55/105 in the southern Svinhufvud Bjerge and exists as three linked fault segments with a non-linear fault trace. Fault 5f has an orientation of 50/085 and has been mapped with a non-linear fault plane strike by the 3DPlanes Program, although exposure is poor along its length.

Triassic, Permian and Carboniferous strata are found in the footwall of Fault 5e. The Early to Late Cretaceous I. anglicus and I. crippsi beds on-lap the Pelion and the Olympen formations in the hanging wall of Fault 5e and footwall of Fault 5f. Late Cretaceous strata of the I. crippsi Beds are found in the hanging wall of Fault 5f.

1600-2600 m and ≥500 m vertical throw is measured on Faults 5e and 5f, respectively (Cross Sections E and F, Enclosure 2). The earliest known movement on Månedal Fault A occurred during the Mid Jurassic–Early Cretaceous rift event as determined from the Late Jurassic degraded footwall slope in the Svinhufvud Bjerge cliff section (Figure 11). In this cliff section two subsequent periods of movement are identified from offset Cenozoic dolerite
dykes between the Late Cretaceous and Palaeocene and the late Oligocene (Price et al., 1997a). It is not clear when Månedal Fault B (Fault 5f) initiated.

1.6. Fault 6: The Skelhøje Fault

The Skelhøje Fault (Fault 6) is found on Traill Ø between Månedal and Mols Bjerge and is traced from Skelhøje on central Traill Ø, northwards to Vega Sund (Figure 5). This is a newly identified fault determined from aerial photographs, topographic datasets and the distribution of macrofossils. The orientation (50/110) of the Skelhøje Fault is based on the orientation Månedal Fault Splay 3 (Fault 5d) which lies ~5 km to the west. This fault is yet to be identified in the field.

Early to Late Cretaceous strata are found in both the footwall and hanging wall. 200-400 m vertical throw on the Skelhøje Fault is determined from cross sections C and D. There is no direct evidence to determine the exact timing initiation of the Skelhøje Fault, however, the small displacement on the fault and its proximity to the Månedal fault splays suggest that the Skelhøje Fault formed contemporaneously with the Månedal fault splays, after the Cretaceous.

1.7. Faults 7a,b: The Mols Bjerge Fault

The Mols Bjerge Fault consists of two fault segments; a north segment (Fault 7a) and a south segment (Fault 7b) (Figure 5). Fault traces and orientation were constrained from detailed field mapping (this study), orientated at 36/090 (Fault 7a) and 50/097 (Fault 7b). These segments are connected by a relay zone. Triassic strata are found in the footwall and Late Cretaceous strata of the I. crippsi Beds are found in the hanging wall of both fault segments.

≥2100 m vertical throw is measured on Fault 6a from cross section D (Enclosure 2). Sediment-structure interactions observed in the field (this study) indicate that the earliest period of movement on the Mols Bjerge Fault occurred between the Early Kimmeridgian and
Mid Albian. Shearing of Cenozoic intrusions indicates a period of movement during the Cenozoic.

1.7. Fault 8a,b,c: The Vælddal Fault

The Vælddal Fault is unique on Traill Ø for its westward dip (Figure 5). At its southern end, the Vælddal Fault splits into two closely aligned parallel faults that run over the northwest and southwest faces of Morris Bjerg (Fault 8a). These are joined by a sub-parallel fault splay that runs along the valley floor of Vælddal (Fault 8b). The Vælddal Fault continues north over Lycett Bjerg as a single fault strand (Fault 8c). The fault trace of Faults 8a and 8c are based on field mapping conducted during this study, with refinements made based on the location of different macrofauna identified by this study and Donovan (1953). The fault trace of Fault 8b was based on the location of different macrofauna identified by Donovan (1953), although the surface expression of this fault has not been identified in the field. North of Vælddal, the trace of Fault 8c is identified from aerial photographs over central Traill Ø. Fault plane orientation were determined using CASP’s 3DPlanes Program. Fault 8a has an orientation of 60/305 on the south face of Morris Bjerg and 60/270 on the northwest face of Morris Bjerg. Fault 8b is orientated 60/260, although the dip direction is likely to rotate ~5-10° clockwise, northwards along the length of the fault in order to intersect Fault 8c. Fault 8c has an orientation of 60/275 across the western slopes of Vælddal and 55/295 across central Traill Ø.

Early to Late Cretaceous strata of the Buchia, I. anglicus, and I. crippsii beds are present in the western-most hanging wall of Fault 8a. The Bernbjerg Formation is found between the two fault segments of Fault 8a. Triassic strata and the Pelion Formation, unconformably overlain by the Buchia Bed are found in the eastern-most footwall of Fault 8a. Fault 8b juxtaposes Early to Late Cretaceous strata of the Buchia, I. anglicus and I. crippsii beds in its footwall, against the I. crippsii Bed in its hanging wall. Fault 8c contains Pelion Formation and
Olympen Formation unconformably overlain by the *I. anglicus* and *I. cripsi* beds in its the footwall. The *I. cripsi* Beds are found in its hanging wall.

A vertical throw of $\geq 1650$ m was measured across Fault 8a on cross section F (Enclosure 2). This is the point of maximum displacement on the exposed Vælddal Fault. A vertical throw of $\geq 300$ m and $\geq 550$ m are measured on faults 8b and 8c from cross sections E and F. The earliest evidence for activity on the Vælddal Fault is Jurassic (Vosgerau *et al*., 2004). Cenozoic reactivation is indicated by sheared dolerite intrusions.

**1.8. Fault 9: The Gauss Halvø Fault (Geographical Society Ø)**

No structural data has been collected from the GHF on Geographical Society Ø (Figure 5). The curved fault trace for the GHF across Geographical Society Ø was mapped by Koch and Haller (1971) and suggests that the strike of the fault varies along its length. On cross sections A and B, the fault trace is roughly parallel to that observed along Traill Ø (Fault 1). At these positions, fault plane orientation is assumed to match that measured on Traill Ø (50/120).

**1.9. Fault 10: The Rubjerg Knude Fault (Geographical Society Ø)**

Fault 10 is the northwards continuation of the Rubjerg Knude Fault on Traill Ø (Fault 2). The fault trace of the Rubjerg Knude Fault was drawn from the maps of Koch and Haller (1971), and Escher (2001), with refinements made from field mapping (this study). Fault plane orientations of $\sim 50/150$ in south Geographical Society Ø, 50/127 in central Geographical Society Ø and 50/103 in north Geographical Society Ø were determined using CASP’s 3DPlanes Program. Carboniferous strata are found in the footwall. Triassic and Jurassic strata unconformably overlain by the *I. cripsi* and *I. lamarcki* beds are found in the hanging wall.

A vertical throw of $\geq 2000$ m is calculated from cross sections A and B (Enclosure 2). These are minimum values as the full thickness of the Carboniferous strata in the footwall is
unknown. Displacement appears to increase northwards along the strike of the Rubjerg Knude Fault with the greatest displacement occurring on northern Geographical Society Ø. There are no age constraints on the initial timing of movement of the Rubjerg Knude Fault. The latest movement on the Rubjerg Knude fault post-dates deposition of Late Cretaceous sediments of the *I. lamarcki* Beds, which are offset against Carboniferous sediments on northern Geographical Society Ø. Faulted dolerite intrusions indicate the latest period of movement occurred during the Cenozoic.

1.10. Fault 11: The Bordbjerget North Strand Fault (Geographical Society Ø)

Only the tip of the Bordbjerget North Strand Fault is present on Geographical Society Ø, which terminates against the Rubjerg Knude Fault (Fault 10) on the west slopes of Tværdal (Figure 5). The fault trace of the Bordbjerget North Strand Fault on Geographical Society Ø was drawn from the map of Koch and Haller (1971) and Escher (2001). Fault plane orientation of 50/096 was determined using CASP’s 3DPlanes Program. Triassic strata are found in the footwall and the hanging wall.

The amount of displacement on the Bordbjerget North Strand Fault on Geographical Society Ø is unknown, although comparison of footwall and hanging wall strata indicates that amounts of displacement are less here, than on Traill Ø (Fault 3a). It is not possible to determine the exact timing of movement on the Bordbjerget North Strand Fault although it is certainly post-Carboniferous and probably post-Early Triassic based on the lack of evidence for syn-tectonic sedimentation in the exposed footwall and hanging wall strata.

1.11. Fault 12: The Månedal Fault (Geographical Society Ø)

The Månedal Fault can be traced from Vega Sund along Tværdal to the north side of Tørverstakken on central Geographical Society Ø (Figure 5). Detailed field mapping indicates that north of this position the Månedal Fault is buried beneath Cretaceous sediments as presented on cross section A. From this central location, the Månedal Fault North Splay (Fault 13) branches northward from the mapped fault trace of the Månedal Fault
(Fault 12). A degraded footwall slope belonging to the northern tip of the Månedal Fault is exposed in Tværdal. The surface trace of the Fault 12 was taken from the map of Koch and Haller (1971) with refinements made from field mapping, macro fauna localities and digital photographs (this study).

Fault plane orientation of 45/116 was determined using CASP’s 3DPlanes Program. Triassic strata unconformably overlain by the *I. anglicus* and *I. crippsi* beds are found in the footwall. *I. anglicus*, *I. crippsi* and *I. lamarcki* beds are found in the hanging wall.

A vertical throw of 3100 m and 2100 m was determined from cross sections B and A respectively, conforming to a northward decrease in extension along the fault from Månedal on Traill Ø. The thinning of the Pelion Formation onto the footwall of the Månedal Fault (cross section A) and correlation with the southern portions of the fault on Traill Ø (Fault 5) suggests that the earliest period of movement occurred during the Mid Jurassic. Sheared dolerite sills indicate further movement occurred during the Cenozoic.


The Månedal Fault North Splay (Fault 13) branched from the Månedal Fault (Fault 12) on the northern slopes of Tørverstakken (Figure 5) Fault trace is determined from the map of Koch and Haller (1971) with refinements made from field mapping, macro fauna localities and digital photographs (this study).

A fault plane orientation of 50/100 is determined from the mapped fault trace with an assumed fault plane dip of 50° based on the orientation of footwall and hanging wall strata. 500 m vertical throw is measured on cross section A. It is not clear exactly when the Månedal Fault North Splay (Fault 13) initiated, however consideration of total fault and fault block rotations and similarities between this fault and other splays from the Månedal Fault suggest that Fault 13 initiated after the Cretaceous. Sheared intrusions observed along the fault in Tværdal indicate fault motion during the Cenozoic.
1.12. Fault 14: The Lysdal Fault

The Lysdal Fault is a previously unrecognised fault and consists of two linked fault segments that run across the west slopes of Lysdal. It is possible that the southern extension of the Lysdal Fault is a splay of the Månedal Fault Zone (Fault 5d) on Traill Ø. The fault trace of the Fault 14 was determined from field observations, macrofauna localities and aerial photographs. A fault plane orientation of 50/100 on the south segment and 50/080 on the north segment was determined using CASP’s 3DPlanes Program. Fault plane dip of 50° was assumed from the measured orientation of footwall and hanging wall strata. The *Buchia, I. aucella, I. anglicus* and *I. cripsi* beds are found in the footwall juxtaposed against *I. cripsi* beds in the hanging wall of the south segment. *I. lamarcki* and *Sphenoceramus* beds are found in the hanging wall of the north segment.

A vertical throw of 750 m on the south segment and ~1000 m on the northern segment of Fault 14 is measured on cross sections B and A, respectively (Enclosure 2). The amount of displacement increases northwards across the linkage between the fault segments. The earliest evidence for movement on Fault 14, is post-Cretaceous, which is supported by its the relatively small displacement and fault rotation that is commonly observed on other post-Cretaceous faults.

1.13. Fault 15: The Lysdal East Branch Fault

The Lysdal East Branch Fault is another previously unidentified fault. Its mapped fault trace indicates that interaction with the Lysdal Fault is possible, hence its name. The location of Fault 15 was constrained by the observed and predicted locations of the *I. cripsi* Beds and *Sphenoceramus* Beds based on extrapolation of unit thicknesses. Fault 15’s surface trace and orientation was determined using aerial photographs and CASP’s 3DPlanes Program. Fault 15 has an orientation of 50/090 in south Geographical Society Ø and 50/080 in central Geographical Society Ø. A non-linear fault trace indicates a small anticlockwise rotation of
dip direction northwards along the fault. The *I. crippsi* Beds are found in the footwall juxtaposed against *I. lamarcki* and *Sphenoceramus* beds in the hanging wall.

A vertical throw of 950 m was measured on cross section B (Enclosure 2). Displacement along the fault decreases southwards and it is unclear whether this fault is present on Traill Ø. There is no evidence to determine the exact timing initiation, however, similarities with the surrounding faults, which have a post-Cretaceous age of initiation (e.g. Fault 14, Fault 16), suggest that Fault 15 was formed after the Cretaceous.

1.14. Fault 16: The Langbjerg Fault

The Langbjerg Fault is previously unrecognised and consists of at least three parallel fault segments. On south Geographical Society Ø, the Langbjerg Fault comes within close proximity of the Lysdal Brach Fault (Fault 15). Here, a number of parallel linear topographic features are identified and it is possible that these mark a zone of faulting, similar to that seen on the coastal cliff section of the Svinhufvud Bjerge (Fault(s) 4). The presence of Fault 16 is required by the geometrical constraints of unit thicknesses on either side of it. The fault trace of Fault 16 was constrained using observations from aerial photographs, where a series of linear topographic features are clearly visible. Fault plane orientation of 50/085 was determined using CASP’s 3DPlanes Program. Cretaceous strata of the *I. crippsi*, *I. lamarcki* and *Sphenoceramus* beds are found in both the footwall and hanging wall.

A vertical throw of 100 m and 250 m is measured on cross sections A and B, respectively (Enclosure 2). Displacement appears to vary slightly along the strike of Fault 16, which may reflect the independent pre-fault linkage movements of each fault segment. The low amount of vertical throw recorded on Fault 16 may be due to the near-by presence of other unmapped faults that distribute extension over a wider area, much like the Svinhufvud Bjerge Faults (Fault(s) 4) on Traill Ø. The relatively small amount of displacement of Cretaceous strata on Fault 16 suggests it formed after the Cretaceous.

1.15. Fault 17: The Laplace Bjerg Fault
The Laplace Bjerg Fault (Fault 17) runs along the eastern face of Laplace Bjerg and extends south to Leitch Bjerg. Between Laplace Bjerg and Leitch Bjerg, the Laplace Bjerg Fault forms a fault zone ~1200 m wide. South of Leitch Bjerg, Fault 17 has a single planar fault trace. At Laplace Bjerg, the fault trace was determined from detailed field mapping (this study). South of Leitch Bjerg, the position of the fault trace was determined using CASP’s 3DPlanes Program. Fault plane orientations of 54/103 for the Laplace Bjerg Fault Zone and 50/090 for the Laplace Bjerg Fault, south of Leitch Bjerg, were determined using CASP’s 3DPlanes Program, based on amounts of fault block rotation and the orientation of the Laplace Bjerg Branch Fault (Fault 18), which shares the footwall of Fault 17 so as to form a horst. Within the fault zone, more faults may be present as much of the fault zone structure appears chaotic with steeply dipping discordant beds found cross cut by many dolerite dykes.

At Laplace Bjerg, Triassic strata are found in the western-most footwall of the Laplace Bjerg Fault Zone. Late Cretaceous strata of the *I. crippsi* and *I. lamarcki* beds are present within the fault zone. In the eastern-most hanging wall of the fault zone, Late Cretaceous strata of the *Scaphites* Beds are found. At Leitch Bjerg, the *I. crippsi* Beds are found in the western-most footwall. The *Scaphites* Beds are found within the fault zone. In the hanging wall, the *Scaphites* Beds are unconformably overlain by the Thanetian Sub-basaltic Marine Beds and Ypresian Plateau basalts. South of Leitch Bjerg, the *I. crippsi* and *I. lamarcki* beds are found in the footwall and *I. lamarcki* and *Sphenoceramus* beds are found in the hanging wall.

≥2050 m vertical throw is measured across the Laplace Bjerg Fault Zone on cross sections A (Enclosure 2). The Laplace Bjerg Fault Zone at Laplace Bjerg marks the point of maximum displacement on the fault. It is unclear whether the Laplace Bjerg Fault is present on Traill Ø, though if it is present, it must display relatively small amounts of displacement. The earliest movement on the Laplace Bjerg Fault was during the Mid Jurassic–Early Cretaceous rift event, with the development of degraded footwall slopes of Triassic and Jurassic strata,
onlapped by Late Cretaceous mudstones in the footwall of the fault. Sheared dolerite dykes within the fault zone indicate further periods of movement during the Cenozoic.

1.16. Fault 18: The Laplace Bjerg Branch Fault

The Laplace Bjerg Branch Fault is a south west dipping fault that runs along the south western face of Laplace Bjerg and forms a horst between this fault (Fault 18) and the Laplace Bjerg Fault (Fault 17). A number of meso-scale fault splays branch off Fault 18 within its footwall. The fault trace was determined from field observations with refinements from aerial photograph interpretations. CASP’s 3DPlanes Program was used to determine a fault plane orientation of 58/225, based on a 2° eastward dip of Cretaceous strata atop of the horst. Triassic and Jurassic strata, unconformably overlain by the *I. anglicus* and *I. crippsi* beds are found in the footwall. Cretaceous strata of the *I. crippsi* and *I. lamarcki* beds are found in the hanging wall.

≥450 m vertical throw was measured across Fault 18 on cross section A (Enclosure 2). Displacement decreases northwards along the fault. The steepness of the fault, plus the opposite dip sense to other faults on Geographical Society Ø indicates a post-Cretaceous age of fault initiation.

1.17. Fault 19: The Cambridge Bugt South Fault

The Cambridge Bugt South Fault is a segmented fault of at least two segments. It is possible that the Cambridge Bugt South Fault is the northern continuation of the Mols Bjerge Fault. The position of the fault trace was defined using information on field mapping and aerial photographs. CASP’s 3DPlanes Program was used to determine a fault plane orientation of 50/105. The *I. crippsi* Beds are found in the footwall and the *Sphenoceramus* Beds are found in the hanging wall.

A vertical throw of ≥1200 m was measured across Fault 19, based on unit thicknesses of footwall and hanging wall strata. This is a minimum estimate as the base of the
Sphenoceramus Beds in the hanging wall is not seen. The earliest evidence for movement on Fault 19 is post-Cretaceous.

1.18. Fault 20: The Cambridge Bugt North Fault

It is possible that the Cambridge Bugt North Fault (Fault 20) and the Cambridge Bugt South Fault (Fault 19) have interacted to some extent, maybe even to the point of fault linkage. The position of the fault trace was defined using information on field mapping and aerial photographs. CASP’s 3DPlanes Program was used to determine a fault plane orientation of 50/115. The I. cripsii Beds are found in the footwall. The Scaphites Beds are found in the hanging wall.

A vertical throw of ≥1200 m is measured across Fault 20, based on unit thicknesses of footwall and hanging wall strata. This is a minimum estimate as the base of the Scaphites Beds are not seen in the hanging wall strata. Fault 20 initiated after the Cretaceous.


At Kap Mackenzie, the Ypresian Plateau basalts with a westward dip of 15-25° are juxtaposed to the east of the Campanian Scaphites Beds which dips north-westward at 6° (Donovan, 1955; Hald, 1996). The Kap Mackenzie Fault has been inferred to explain the juxtaposition of these units. This is a previously unrecognised fault that has not been identified in the field. Consequently, the fault trace and fault plane orientation can only be assumed to be parallel to the Cambridge Bugt North Fault (45/115, Fault 19), bounding the most eastern margin of the Ypresian Plateau basalts (which are mapped from Koch & Haller, 1971). The Scaphites Beds are found in the footwall. Ypresian Plateau basalts are found in the hanging wall. It is not possible to determine the amount of throw on this fault and there is no evidence to determine the timing of initiation of Fault 21. The latest movement occurred after emplacement of the Ypresian Plateau basalts.

1.20. Vega Sund Cross Faults (Faults 22a-e)
The exposed stratigraphy along the north coast of Traill Ø and south coast of Geographical Society Ø appears to be discordant (i.e. stratigraphy does not match up) and suggests that the two islands are separated by some form of structural discontinuity. To account for this discordance, a subsidiary set of NW-SE and E-W striking cross faults are postulated in the subsurface geology beneath Vega Sund (Fault 20a-e, Figure 5). The exact positioning of these faults and their geometries are poorly constrained and it is possible that some of these structures may also accommodate E-W strike-slip motion, perhaps associated with ocean ridge transforms faults, as well as N-S normal sense motion. Equivalent structural discontinuities have been proposed by previous authors along Vega Sund and along Kong Oscar Fjord, south of Traill Ø and Kejser Franz Joseph Fjord, north of Geographical Society Ø (Surlyk et al., 1973; Surlyk, 1977, 1990; Schlindwein & Jokat, 1999). It is beyond the scope of this study to assess the true nature of the structures beneath Vega Sund, however, the variation in outcrop pattern between the two island necessitates their existence in one form or another.

Faults 20a, 20c and 20e were inferred from the presence of different stratigraphic units on either side of Vega Sund. Fault 20b was inferred to account for the southward and northward dips recorded on the south coast of Traill Ø and north coast of Geographical Society Ø respectively. Fault 20e was inferred from the presence of an island of dolerite sill off the north coast of the Mols Bjerge (see Enclosure 1). Typically, dolerite sills are most common in the Cretaceous strata, but particularly towards the base Cretaceous unconformity. The presence of Fault 20d puts this island of dolerite within the hanging wall succession of the Mols Bjerge Fault which is most likely to comprise Cretaceous strata.

1.21. **Topographic lineaments**

A number of linear topographic features have been identified using aerial photographs, satellite imagery and topographic datasets. These are mapped as dashed blue lines (Enclosure 1). It is often difficult to distinguish between faults and sills on aerial photographs.
so faults have only been mapped if; (a) they are recorded in the field by geologists, or; (b) they are required to ensure that geometric constraints of unit thickness and regional dip are adhered to. Lineaments that do not satisfy these criteria but appear to highlighting the presence of potentially unidentified faults are marked on the map for further investigation.

2. Fault blocks

2.1. Fault Block 1: The Rubjerg Knude Block

The Rubjerg Knude Block is bound by the Gauss Halvø Fault (Fault 1) to the west and the Rubjerg Knude Fault (Fault 2) to the east and consists entirely of Carboniferous strata (Figure 6). Structural readings from field mapping (this study) of the Rubjerg Knude Block produce define a regional fault block dip of 16/305.

2.2. Fault Block 2: The Bordbjerget Block

The Bordbjerget Block is bound by the Rubjerg Knude Fault to the west (Fault 2) and the Bordbjerget North Strand Fault (Fault 3a) and Bordbjerget South Strand Fault (Fault 3b) to the east (Figure 6). The Bordbjerget Block contains Carboniferous strata that in some places, are unconformably overlain by Permian and Triassic strata. Field mapping (this study) indicates that in the Rold Bjerger area, that Permian and Triassic sediments are sub-horizontal, whilst Carboniferous strata dip at 12/340. In the south of Traill Ø at Karupelv, Permian and Triassic strata are gently inclined to 06/317, whilst the dip of Carboniferous strata is roughly unchanged at 10/34.

2.3. Fault Block 3: The Månedal Block (Traill Ø)

The Månedal Block is bound by the Bordbjerget North Strand Fault (Fault 3a) and Bordbjerget South Strand Fault (Fault 3b) to the west and the Månedal Fault (Fault 5a and 5e) to the east (Figure 6). The Månedal Block largely consists of Triassic strata, with some Permian and Carboniferous strata found in the centre of Traill Ø and the coastal cliff section of the Svinhufvud Bjerge (Figure 2). Field mapping in Månedal, indicates Triassic and
Permian strata have a regional dip of 06/240. In the south of Traill Ø in the Svinhufvud Bjerge, a regional dip of 06/317 is calculated for Permian and Triassic strata whilst Carboniferous strata dip at 10/243. Differences in block rotation between the north and south of the Månedal Block can be explained by the presence of a cross fault that cuts through the fault block close to Grønnebjerg (Figure 6). In the Svinhufvud Bjerge coastal cliff section a low amplitude anticline approximately 2km wide is seen in one of the small fault blocks between the Svinhufvud Bjerge Faults (Fault(s) 4). This can be seen on cross section F, Enclosure 2.

2.4. Fault Block 4: The Svinhufvud Bjerge Block

The Svinhufvud Bjerge Block is found on south Traill Ø bound by the Månedal Fault A (Fault 5e) to the west and the Månedal Fault B (Fault 5f) to the east (Figure 6). This block contains Triassic and Jurassic strata unconformably overlain by the Early to Late Cretaceous *I. anglicus* and *I. crippsi* beds. On the coastal cliff section of the Svinhufvud Bjerge, these Cretaceous strata on-lap a degraded footwall slope of Jurassic and Triassic strata (Figure 11). Glide blocks of Jurassic strata are seen amongst the on-lapping Cretaceous strata (Figure 11). Structural readings from the north and south Svinhufvud Bjerge show the Svinhufvud Bjerge Block has been folded into a low amplitude, open syncline that plunges towards the south east. Jurassic strata have a regional dip of 29/078 on the west limb and 12/215 on the east limb. Cretaceous strata dip 12/065 on the west limb and 15/246 on the east limb. The dip of Cretaceous strata close to the southern end of the Månedal Fault B (Fault 5f) flattens to sub-horizontal.

2.5. Fault Block 5: The Flakkebjerger Block

The Flakkebjerger Block (Fault Block 5) forms the southern extent of the larger Mols Bjerge Block (Fault Block 7a). Whether these two blocks are, in fact, part of the same structure is unclear, but a small number of field observations indicate that the regional dip of this area differs significantly from that of the north. For this reason, the Flakkebjerger Block is
recognised as an independent block to distinguish it from the Mols Bjerge Block (Fault Block 7a). The Flakkebjerg Block forms a graben bound by the footwalls of the Månedal Fault B (Fault 5f) to the west and the Væl ddl Fault (Faults 8a-c) to the east. Structural readings suggest that the regional dip of the Flakkebjerg Block flattens from 07/251 in west towards sub-horizontal in the east. Only strata from the *I. crippsi* Beds are recognised at the surface of the Flakkebjerg Block. In the centre of the Flakkebjerg, Koch and Haller (1971) and Escher (2001) have mapped a small intrusive body of syenite 3km x 1.5km in area.

### 2.6. Fault Block 6a,b,c: The Vælddlal Block

The Vælddlal block contains Triassic and Jurassic strata unconformably overlain by Cretaceous strata. The Vælddlal Fault (Fault 8a and 8c) bounds this block to the west (Figure 6). Exactly how far east this block extends is unclear due to the intrusion of the large Kap Simpson syenite pluton that dominates the geology of the south east promontory of Traill Ø. Towards the south coast of Vælddlal, the Vælddlal Block contains two fault slices of Early to Late Cretaceous and Late Jurassic strata. The individual dips of these slices (Fault Blocks 6b and 6c) are given in Table 2. The Triassic and Jurassic strata of the main Vælddlal Block (Fault Block 6a) have a dip of 15/100 in Vælddlal and 12/093 in Bjørnedal. The unconformably overlying Early to Late Cretaceous strata of the *I. anglicus* and *I. crippsi* beds dip at ~02/115. South east of Morris Bjerg, the regional dip of the Jurassic and Triassic strata flattens to 06/090 at the end of cross section E and to 02/090 beyond this.

### 2.7. Fault Block 7a,b,c,d,e: The Mols Bjerge Block

The Mols Bjerge Block is the widest fault block on Traill Ø (Figure 6). It is bound to the west by the Månedal Fault (Fault 5a) and to the east by the Mols Bjerge Fault (Fault 7). The Mols Bjerge Block comprises Triassic and Jurassic strata unconformably overlain by a complete sequence of latest Ryazanian to Campanian mudstones. In the east, in Månedal, the Mols Bjerge Block is cut by the Månedal Fault Zone (Faults 5a, 5b, 5c, 5d) and the Skelhøje Fault (Fault 6) into a number of small fault slices (Fault Blocks 7b, 7c, 7d, 7e). The individual fault
block orientations of these fault slices (Fault Blocks 7b and 7c) are displayed in Table 2. The main blocks of Cretaceous sediments in the Mols Bjerige Block (Fault Blocks 7a) near the Månedal Fault has a regional dip of 12/284. This is slightly different to the average dip of 10/274 recorded from Cretaceous sediments of the Mols Bjerge Block in the eastern Mols Bjerge. The eastern margin of the Mols Bjerge Block contains Triassic and Jurassic strata that form a degraded footwall slope overlain by Early to Late Cretaceous strata. In the southern Mols Bjerge, a number of eastward trending palaeovalleys are identified, infilled by the *I. anglicus* Beds (Figure 12). These palaeovalleys were formed during deposition of syn-rift deposits during Mid Jurassic–Early Cretaceous rifting. The Jurassic and Triassic strata have an average dip of 14/274. The Early to Late Cretaceous strata dip at 10/274. The Jurassic–Triassic/Cretaceous discordance indicates an Upper Jurassic–Early Cretaceous fault block rotation of 4° and post-Campanian fault block rotation of 10°. By extrapolating this discordance towards the Månedal Fault (Fault 5), it is possible to estimate the thickness of the syn-rift wedge buried in the hanging wall succession of the Månedal Fault. It should be noted that as central Traill Ø has not been fully explored, the Mols Bjerge Block could be divided into several smaller fault blocks by a number of unidentified faults.

2.8. Fault Block 8: The Ellemandsbjerge Block

The Ellemandsbjerge Block is bound to the west by the Mols Bjerige Fault (Faults 7a and 7b) and contains Late Cretaceous strata of the *I. crippsi* Beds (Figure 6). It is not clear how far east this fault block extends. Structural data from the area give a regional dip of 11/231. This dip may have been affected by the intrusion of the Kap Parry syenite pluton found on the eastern half of the Ellemandsbjerge Block.

2.9. Fault Block 9: The Månedal Block (Geographical Society Ø)

On Geographical Society Ø, the Månedal Block is bound by the Rubbjerg Knude Fault (Fault 10) to the west and the Månedal Fault (Fault 12) and Månedal Fault North Splay (Fault 13) to the east (Figure 6). Here, the Månedal Block contains a sequence of *I. anglicus, I. crippsi*
and *I. lamarcki* beds with a regional dip of 11/349 in the north east and 12/340 in the south west. These strata unconformably overly a degraded footwall slope composed of Triassic and Jurassic strata. Triassic and Jurassic strata have a regional dip of 18/335. This footwall slope is exposed on the north side of Tørverstakken with a fault scarp slope dip of 40/065. The Triassic-Jurassic strata of the Månedal Block are folded into a low amplitude syncline that plunges 13° towards 010 (Cross section B, Enclosure 2).

### 2.10. Fault Block 10: The Lysdal Block

The Lysdal Block (Figure 6) is bound to the west by the Månedal Fault (Fault 12) and Månedal Fault North Splay (Fault 13) and to the east by the Lysdal Fault (Fault 14). Few structural data have been collected across the Lysdal Block and so the fault block dip has been determined largely from the position of macrofauna localities on the south side of Geographical Society Ø. Here, a sequence of the *I. aucella, I. anglicus* and *I. cripsi* beds is seen. A regional dip of 12/010 at the south west edge of the Lysdal Block was calculated using CASP’s 3DPlanes program. The south east edge of the fault block has a regional dip of 12/280. This dip is unusual for a fault block of the Traill Ø region as most blocks predominantly dip towards the east due to an east-west direction of extension. This north to north easterly dip may be explained by footwall uplift of a south dipping cross fault (Fault 22b) inferred along the southern edge of the Lysdal Block in Vega Sund, separating it from the Månedal Fault Slices (Fault Blocks 7b, 7c, 7d) on Traill Ø. Assuming that estimated stratigraphic thicknesses are correct, one would also expect to find the *Buchia* Beds at the south east corner of the Lysdal Block, though as yet, there is no field data to confirm this. At the northwest edge of the Lysdal Block on the eastern slopes of Tværdal, the *I. lamarcki* Beds are found. Again, this area lacks structural data, though a regional dip of 12/320 was estimated using CASP’s 3DPlane Program, based on the juxtaposition of macrofauna localities.

### 2.11. Fault Block(s) 11a,b,c: The Mid Geographical Society Ø Blocks
Mid Geographical Society Ø is largely unexplored and structural and macrofauna data are limited here (Figure 6). A number of faults have been predicted through this area (Faults 15 and 16) due to the distribution of macrofauna localities and bedding data. Between these faults, Cretaceous strata from the *I. anglicus, I. crippsi, I. lamarcki* and *Sphenoceramus* beds are identified in some areas and predicted in others. These data, combined with estimated dips of large sills calculated from photographs, topographic data and LandSat imagery suggest an estimated fault block dip of 10/260 for this whole area (Fault Blocks 11a-11c).

**2.12. Fault Block 12: The Laplace Bjerg Horst**

The Laplace Bjerg Horst (Figure 6) is bound to the west by the Laplace Bjerg Branch Fault (Fault 18) and to the east by the Laplace Bjerg Fault Zone (Fault 17). The horst is largely composed of Triassic strata. A degraded footwall slope controlled by the Laplace Bjerg Fault is developed in the horst which is unconformably overlain by Cretaceous sediments of the *I. anglicus* and *I. crippsi* beds. A large amount of structural data has been collected from the Triassic strata on the eastern slope of Laplace Bjerg, however, this area is above the Laplace Bjerg Fault Zone and intruded by dolerite dykes. Many of these structural measurements are, therefore, unrepresentative of the regional dip of the horst. Instead, the regional dip of the Laplace Bjerg Horst has been inferred mainly from photographs and the geometric constraints of the cross sections. Across Laplace Bjerg, the Triassic and Jurassic strata have an estimated regional dip of 06/298. The Cretaceous strata on Laplace Bjerg are sub-horizontal. An 8° discordance between the Triassic–Jurassic strata and the Cretaceous strata is required, in order to balance cross section A, which runs through Laplace Bjerg. From this discordance, an estimated regional dip of 02/118 is determined for the Cretaceous strata. Photographic images of Laplace Bjerg, show that an incised valley has developed in the Triassic footwall that is infilled by Cretaceous strata (Figure 12b). Similar palaeovalleys exist in the footwall of the Mols Bjerge Fault (Fault 7) (Figure 12a). On the northern coast of Geographical Society Ø, the Triassic strata have a regional dip of approximately 24/270,
whilst the Cretaceous strata here have an approximate dip of 16/270. This maintains the 8° discordance estimated on Laplace Bjerg.

2.13. Fault Block 13: The Cambridge Bugt Block

The Cambridge Bugt Block is the largest fault block on Geographical Society Ø (Figure 6). It is bound by the Laplace Bjerg Fault (Fault 17) to the west and the Cambridge Bugt North Fault (Fault 18) and Cambridge Bugt South Fault (Fault 20) to the east. Along the south coast of Geographical Society Ø, the Cambridge Bugt Block is bound by a north dipping cross fault (Fault 22e), as suggested by the juxtaposition of Late Cretaceous and Jurassic sediments on Nordenskjöld Ø against Late Cretaceous sediments on south Geographical Society Ø. The Cambridge Bugt Block contains a complete sequence of Late Cretaceous strata from the *I. cripsi* Beds to the *Scaphites* Beds. Structural readings and macrofauna localities are used to determine the regional dip of the fault block which appears to rotate from 10/290 in the Freycinet Bjerg region in south Geographical Society Ø to 06/300 north of Adam af Bremen Dal. In the centre of the fault block on Leitch Bjerg, Late Cretaceous sediments are unconformably overlain by Thanetian Sub-basaltic Marine Beds and Ypresian Plateau basalts. The dip of the Sub-basaltic Marine Beds is poorly constrained at ~02/300. This creates Cretaceous-Palaeocene discordance of ~4°. These rocks are the youngest known sediments in the whole of the Traill Ø region.

2.14. Fault Block(s) 14a, 14b: The Kap Mackenzie Block & the Kap MacClintock Block

These blocks form the southern-most end of Geographical Society Ø (Figure 6). Listed here together, it is unclear whether these blocks are separate from each other or whether they connect. The Kap Mackenzie Block (Fault Block 14a) forms the north east headland of Geographical Society Ø, bound to the west by the Cambridge Bugt North Fault (Fault 20). The Kap Mackenzie Block is at least partially bound to the east by the Kap Mackenzie Fault (Fault 21) although whether this fault bounds the whole of the eastern margin of this block is unknown. Only the Late Cretaceous strata of the *Scaphites* Beds are identified in the Kap
Mackenzie Block and a complete absence of structural data from the area means that it is not possible to determine the regional dip of the Kap Mackenzie Block.

The Kap MacClintock Block (Fault Block 14b) forms the south eastern headland of Geographical Society Ø and is bound to the west by the Cambridge Bugt South Fault (Fault 19). The eastern limit of the fault block is unknown. Late Cretaceous strata of the Sphenoceramus Beds are found along the western edge of the fault block. It is unclear how far east these strata exist, though the identification Inoceramus sp. on the south eastern tip of Geographical Society Ø implies that this fault block contains only Late Cretaceous strata at its surface. Limited structural data from the west of the Kap MacClintock Block produces a regional dip of ~14/293.

2.15. Fault Block 15

Due to its small size, Fault Block 15 has not been named. Fault Block 15 is bound to the west by the inferred Kap Mackenzie Fault (Fault 21). Seawards, the eastern extent of Fault Block 15 is unknown, although buried volcanic rocks appear widespread on the sea shelf (Hald, 1996). Only Ypresian Plateau basalts are identified on Fault Block 15. These have a regional dip of 15-25° to the west (Donovan, 1955; Hald, 1996). A number of smaller faults are recorded within Fault Block 15 by Donovan (1955).