P-07-69

Oskarshamn site investigation

Geological single-hole interpretation of KLX11A

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Keywords: Geophysics, Rock unit, Borehole, Deformation zone, Fractures, Alteration.

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A pdf version of this document can be downloaded from www.skb.se.

Abstract

This report contains geological single-hole interpretation of the cored borehole KLX11A at Laxemar. The interpretation combines the geological core mapping, interpreted geophysical logs and borehole radar measurements to identify rock units and possible deformation zones in the borehole.

One rock unit is indicated in KLX11A (RU1). In general, borehole KLX11A is dominated by quartz monzodiorite (501036). Subordinate rock types comprise minor occurrences of fine-grained granite (511058), fine-grained diorite-gabbro (505102), pegmatite (501061), and very minor occurrences of diorite/gabbro (501033) and granite (501058). Eighteen possible deformation zones are identified in KLX11A (DZ1–DZ18).

Sammanfattning

Denna rapport behandlar geologisk enhålstolkning av kärnborrhål KLX11A i Laxemar. Den geologiska enhålstolkningen syftar till att utifrån den geologiska karteringen, tolkade geofysiska loggar och borrhålsradarmätningar identifiera olika litologiska enheters fördelning i borrhålet samt möjliga deformationszoners läge och utbredning.

En litologisk enhet (RU1) har identifierats i KLX11A. Generellt sett domineras borrhålet av kvartsmonzodiorit (501036). Finkornig granit (511058), finkornig diorit-gabbro (505102) och pegmatit (501061) förekommer som underordnade bergarter samt mycket små förekomster av diorit/gabbro (501033) och granit (501058). Arton möjliga deformationszoner har identifierats i KLX11A (DZ1–DZ18).

Contents

1 Introduction

Much of the primary geological and geophysical borehole data stored in the SKB database SICADA need to be integrated and synthesized before they can be used for modeling in the 3D-CAD system Rock Visualization System (RVS). The end result of this procedure is a geological single-hole interpretation, which consists of integrated series of different loggings and accompanying descriptive documents (SKB MD 810.003 v.3.0, SKB internal controlling document).

This document reports the results gained by the geological single-hole interpretation of borehole KLX11A at Laxemar (Figure 1-1), which is one of the activities performed within the site investigation at Oskarshamn. The work was carried out in accordance with activity plan AP PS 400-06-065. The controlling documents for performing this activity are listed in Table 1-1. Both activity plan and method description are SKB's internal controlling documents. Rock type nomenclature that has been used is shown in Table 1-2.

Table 1-1. Controlling documents for the performance of the activity.

Activity plan	Number	Version
Geologisk enhålstolkning av KLX11A	AP PS 400-06-065	1.0
Method description	**Number**	**Version**
Metodbeskrivning för geologisk enhålstolkning	SKB MD 810.003	3.0

Table 1-2. Rock type nomenclature for the site investigation at Oskarshamn.

Rock type	Rock code	Rock description
Dolerite	501027	Dolerite
Fine-grained Götemar granite	531058	Granite, fine- to medium-grained, ("Götemar granite")
Coarse-grained Götemar granite	521058	Granite, coarse-grained, ("Götemar granite")
Fine-grained granite	511058	Granite, fine- to medium-grained
Pegmatite	501061	Pegmatite
Granite	501058	Granite, medium- to coarse-grained
Ävrö granite	501044	Granite to quartz monzodiorite, generally porphyritic
Quartz monzodiorite	501036	Quartz monzonite to monzodiorite, equigranular to weakly porphyritic
Diorite/gabbro	501033	Diorite to gabbro
Fine-grained dioritoid	501030	Intermediate magmatic rock
Fine-grained diorite-gabbro	505102	Mafic rock, fine-grained
Sulphide mineralization	509010	Sulphide mineralization
Sandstone	506007	Sandstone

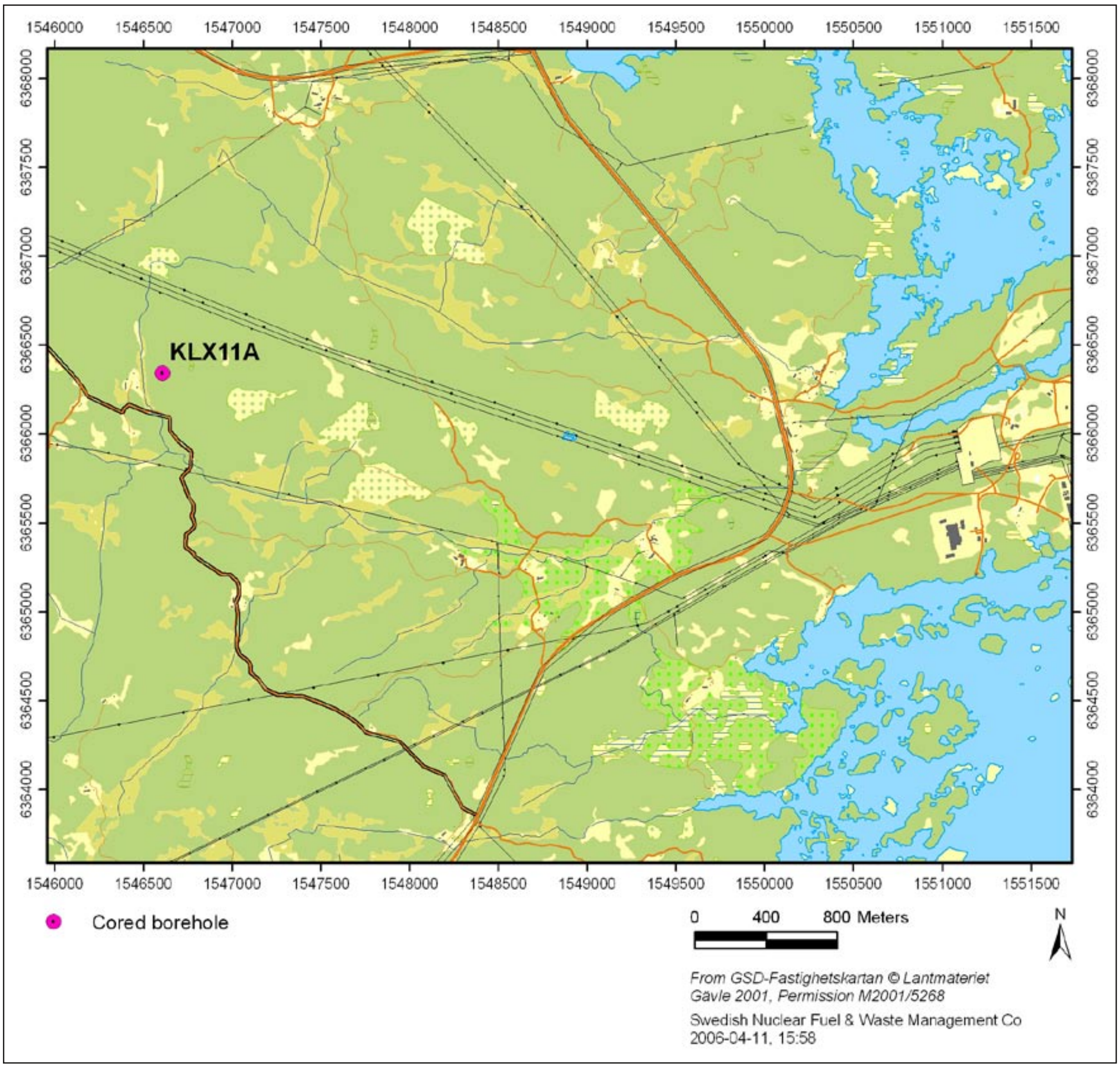

Figure 1-1. *Map showing the position of the cored borehole KLX11A.*

2 Objective and scope

A geological single-hole interpretation is carried out in order to identify and to describe briefly the characteristics of major rock units and possible deformation zones within a borehole. The work involves an integrated interpretation of data from the geological mapping of the borehole (Boremap), different borehole geophysical logs and borehole radar data. The geological mapping of the cored boreholes involves a documentation of the character of the bedrock in the drill core. This work component is carried out in combination with an inspection of the oriented image of the borehole walls that is obtained with the help of the Borehole Image Processing System (BIPS). The interpretations of the borehole geophysical and radar logs are available when the single-hole interpretation is performed. The result from the geological single-hole interpretation is presented in a WellCad plot. The work reported here concerns stage 1 in the single-hole interpretation, as defined in the method description.

3 Data used for the geological single-hole interpretation

The following data have been used in the single-hole interpretation of borehole KLX11A.

- Boremap data (including BIPS and geological mapping data) /2/.
- Generalized geophysical logs and their interpretation /3/.
- Radar data and their interpretation /4/.

As a basis for the geological single-hole interpretation a combined WellCad plot consisting of the above mentioned data sets were used. An example of a WellCad plot used during the geological single-hole interpretation is shown in Figure 3-1. The plot consists of nine main columns and several subordinate columns. These include nine main:

1: Length along the borehole

2: Boremap data
  2.1: Rock type
  2.2: Rock type < 1 m
  2.3: Rock type structure
  2.4: Rock structure intensity
  2.5: Rock type texture
  2.6: Rock type grain size
  2.7: Structure orientation
  2.8: Rock alteration
  2.9: Rock alteration intensity
  2.10: Crush

3: Generalized geophysical data
  3.1: Silicate density
  3.2: Magnetic susceptibility
  3.3: Natural gamma radiation
  3.4: Estimated fracture frequency

4: Unbroken fractures
  4.1: Primary mineral
  4.2: Secondary mineral
  4.3: Third mineral
  4.4: Fourth mineral
  4.5: Alteration, dip direction

5: Broken fractures
  5.1: Primary mineral
  5.2: Secondary mineral
  5.3: Third mineral
  5.4: Fourth mineral
  5.5: Aperture (mm)

    5.6: Roughness
    5.7: Surface
    5.8: Slickenside
    5.9: Alteration, dip direction
6: Crush zones
    6.1: Piece (mm)
    6.2: Sealed network
    6.3: Core loss
7: Fracture frequency
    7.1: Sealed fractures
    7.2: Open fractures
8: BIPS
9: Length along the borehole

The geophysical logs are described below:

Magnetic susceptibility: The rock has been classified into sections of low, medium, high, and very high magnetic susceptibility. The susceptibility is strongly connected to the magnetite content in the different rock types.

Natural gamma radiation: The rock has been classified into sections of low, medium, and high natural gamma radiation. Low radiation may indicate mafic rock types and high radiation may indicate younger, fine-grained granite or pegmatite.

Possible alteration: This parameter has not been used in the geological single-hole interpretation in the area.

Silicate density: This parameter indicates the density of the rock after subtraction of the magnetic component. It provides general information on the mineral composition of the rock types, and serves as a support during classification of rock types.

Estimated fracture frequency: This parameter provides an estimate of the fracture frequency along 5 m sections, calculated from short and long normal resistivity, SPR, P-wave velocity as well as focused resistivity 140 and 300. The estimated fracture frequency is based on a statistical connection after a comparison has been made between the geophysical logs and the mapped fracture frequency. The log provides an indication of sections with low and high fracture frequencies.

Close inspection of the borehole radar data was carried out during the interpretation process, especially during the identification of possible deformation zones. The occurrence and orientation of radar anomalies within the possible deformation zones are commented upon in the text that describes these zones.

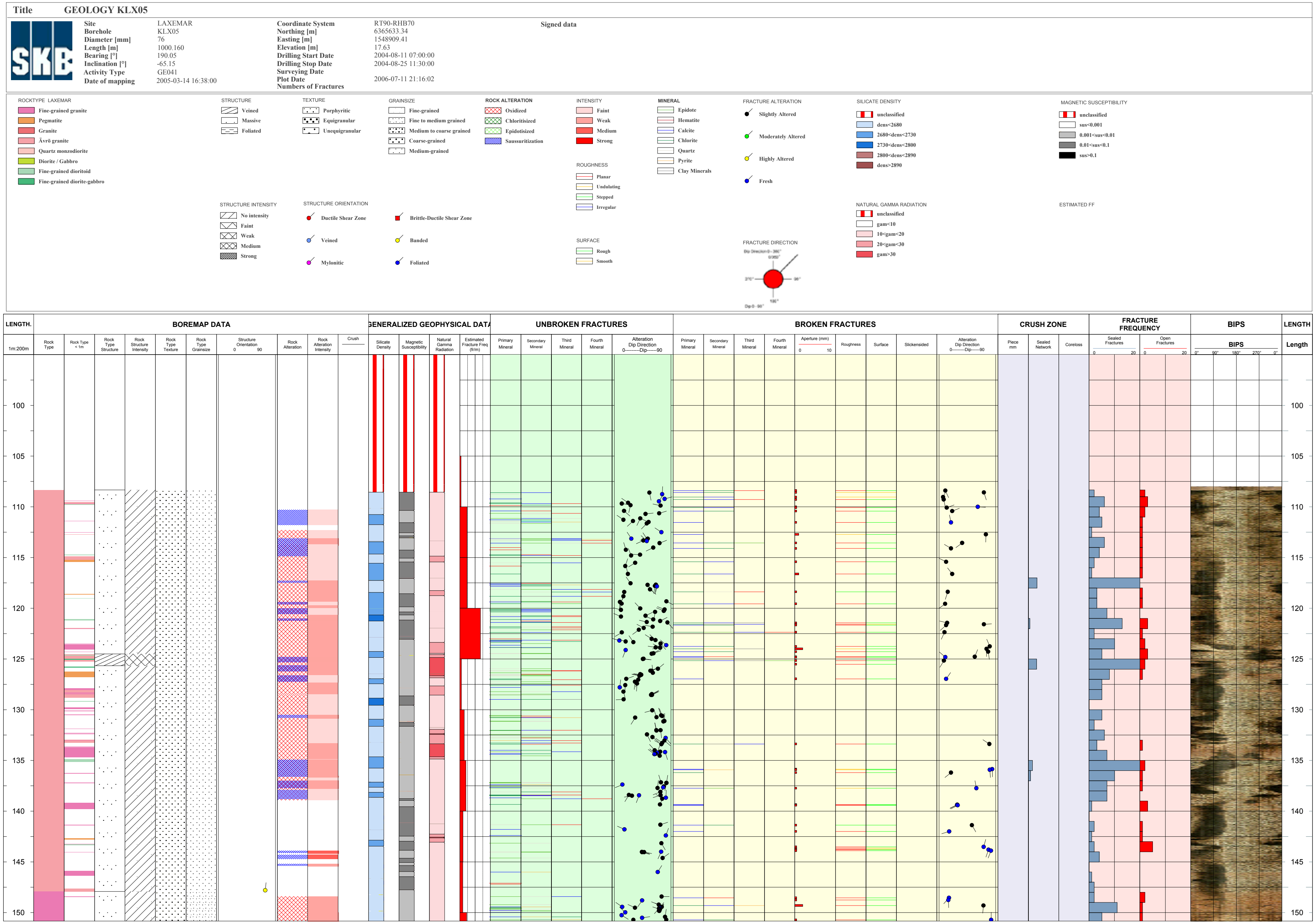

Figure 3-1. Example of WellCad plot (from borehole KLX05 in Laxemar) used as a basis for the single-hole interpretation.

4 Execution

4.1 General

The geological single-hole interpretation has been carried out by a group of geoscientists consisting of both geologists and geophysicists. All data to be used (see Chapter 3) are visualized side by side in a borehole document extracted from the software WellCad. The working procedure is summarized in Figure 4-1 and in the text below.

The first step in the working procedure is to study all types of data (rock type, rock alteration, silicate density, natural gamma radiation, etc) related to the character of the rock type and to merge sections of similar rock types, or sections where one rock type is very dominant, into rock units (minimum length of c. 5 m). Each rock unit is defined in terms of the borehole length interval and provided with a brief description for inclusion in the WellCad plot. This includes a brief description of the rock types affected by the possible deformation zone. The confidence in the interpretation of a rock unit is made on the following basis: 3 = high, 2 = medium and 1 = low.

The second step in the working procedure is to identify possible deformation zones by visual inspection of the results of the geological mapping (fracture frequency, fracture mineral, aperture, alteration, etc) in combination with the geophysical logging and radar data. The section of each identified deformation zone is defined in terms of the borehole length interval and provided with a brief description for inclusion in the WellCad plot. The confidence in the interpretation of a possible deformation zone is made on the following basis: 3 = high, 2 = medium and 1 = low.

Inspection of BIPS images is carried out whenever it is judged necessary during the working procedure. Furthermore, following definition of rock units and deformation zones, with their respective confidence estimates, the drill cores are inspected in order to check the selection of the boundaries between these geological entities. If judged necessary, the location of these boundaries is adjusted.

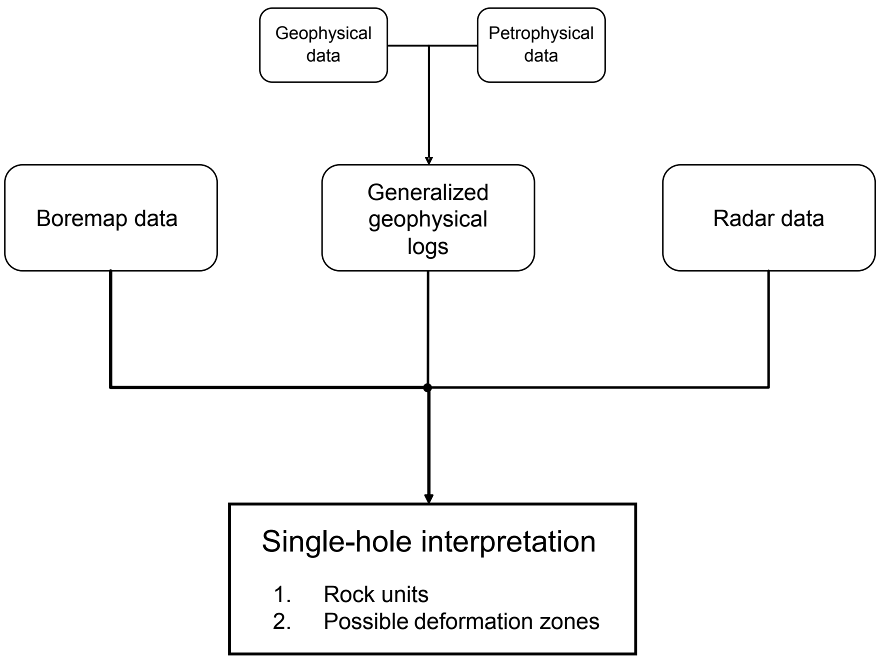

Figure 4-1. *Schematic block-scheme of single-hole interpretation.*

Possible deformation zones that are ductile or brittle in character have been identified primarily on the basis of occurrence of protomylonitic to mylonitic foliation and the frequency of fractures, respectively, according to the recommendations in /1/. Both the transitional parts and the core part have been included in each zone (Figures 4-2 to 4-4). The fracture/m values in Figure 4-4 may serve only as examples. The frequencies of open and sealed fractures have been assessed in the identification procedure, and the character of the zone has been described accordingly. Partly open fractures are included together with open fractures in the brief description of each zone. The presence of bedrock alteration, the occurrence and, locally, inferred orientation of radar reflectors, the resistivity, SPR, P-wave velocity, caliper and magnetic susceptibility logs have all assisted in the identification of primarily the brittle structures.

Since the frequency of fractures is of key importance for the definition of the possible deformation zones, a moving average plot for this parameter is shown for the cored borehole KLX11A (Figure 4-5). A 5 m window and 1 m steps have been used in the calculation procedure. The moving averages for open fractures alone, the total number of open fractures (open, partly open and crush), the sealed fractures alone, and the total number of sealed fractures (sealed and sealed fracture network) are shown in a diagram.

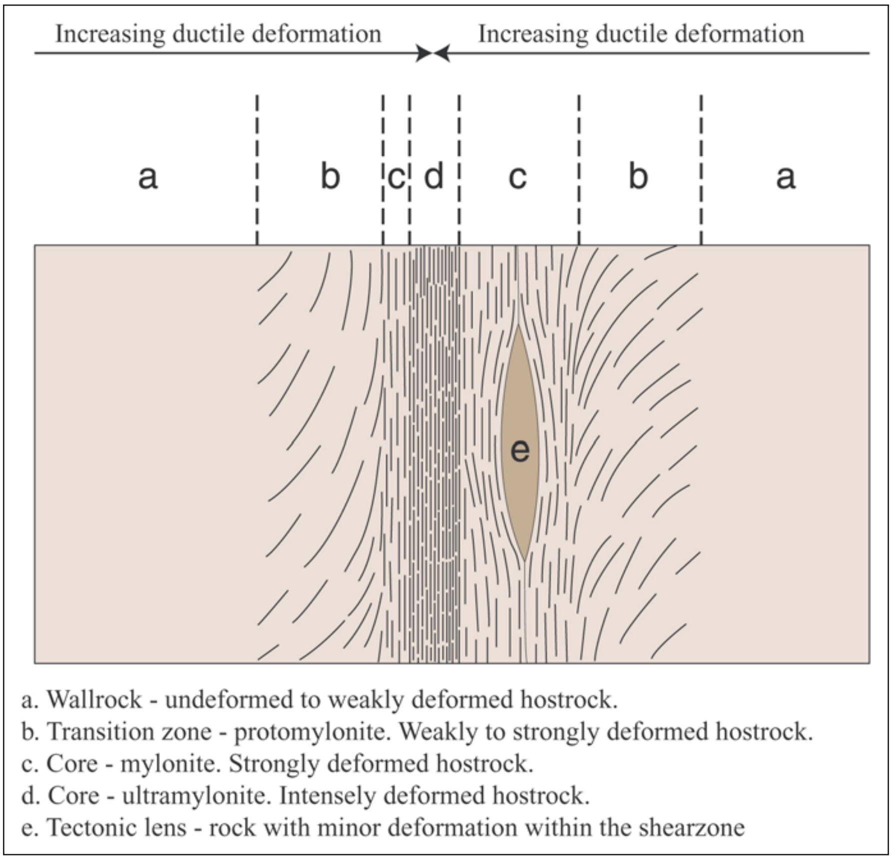

Figure 4-2. *Schematic example of a ductile shear zone. Homogeneous rock which is deformed under low- to medium-grade metamorphic conditions (after /1/).*

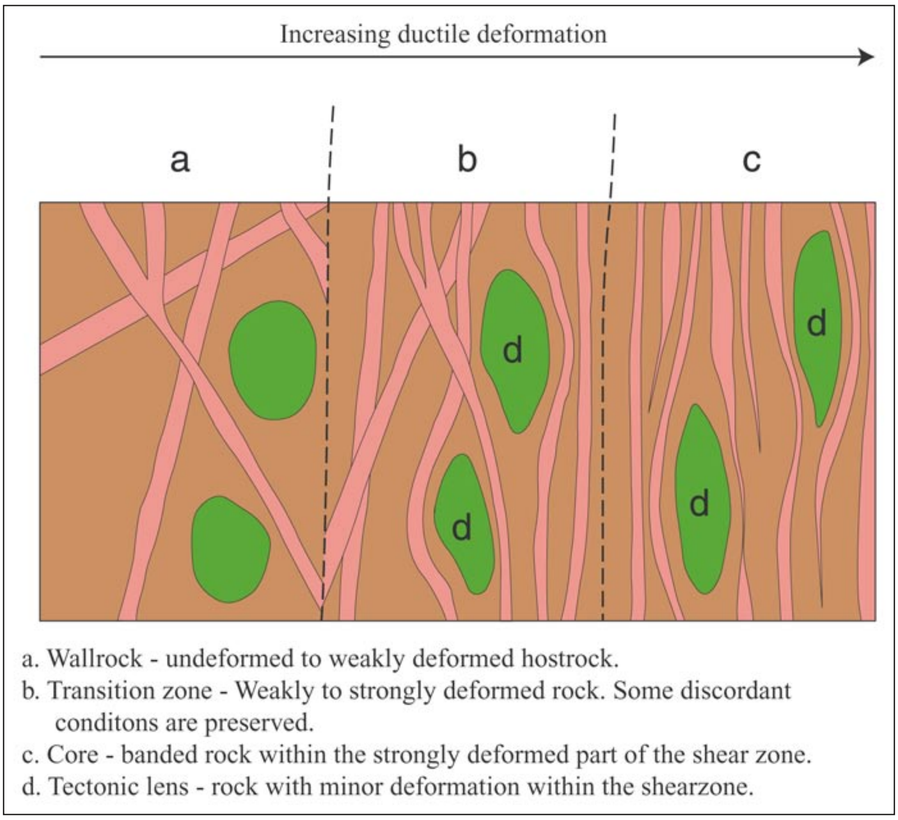

Figure 4-3. *Schematic example of a ductile shear zone. Heterogeneous rock which is deformed under low- to high-grade metamorphic conditions (after /1/).*

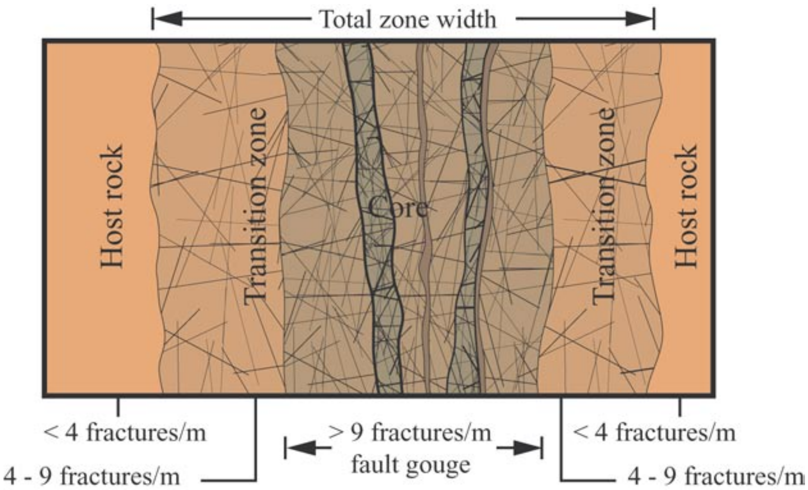

Figure 4-4. *Schematic example of a brittle deformation zone (after /1/).*

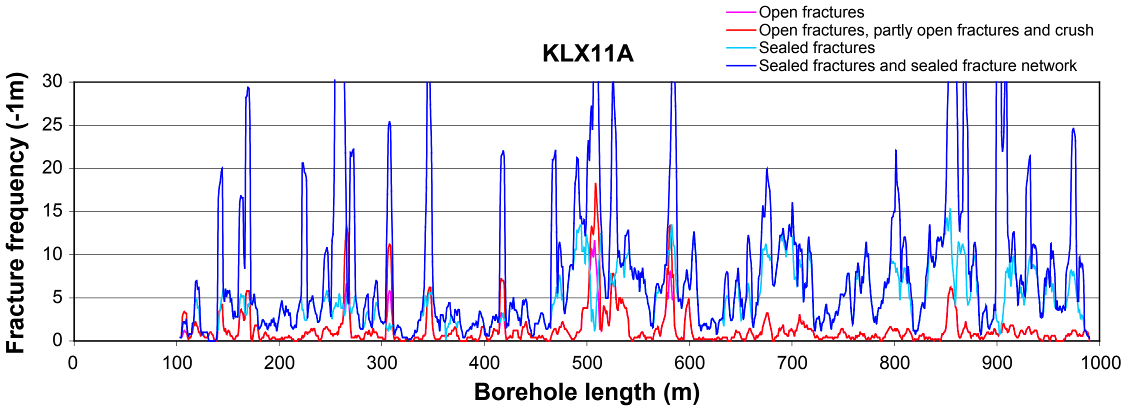

Figure 4-5. *Fracture frequency plot for KLX11A. Moving average with a 5 m window and 1 m steps.*

The occurrence and orientation of radar anomalies within these possible deformation zones are used during the identification of zones. Overview of the borehole radar measurement in KLX11A is shown in Figure 4-6. In some cases, alternative orientations for oriented radar reflectors are presented. One of the alternatives is considered to be correct, but due to uncertainty in the interpretation of radar data, a decision concerning which of the alternatives that represent the true orientation cannot be made.

Orientations from directional radar are presented as strike/dip using the right-hand-rule method, e.g. 040/80 corresponds to a strike of N40°E and a dip of 80° to the SE.

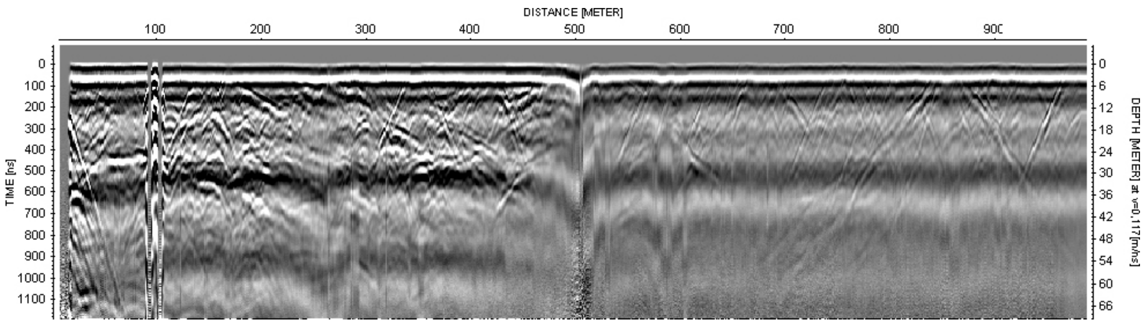

Figure 4-6. *Overview (20 MHz data) of the borehole radar measurement in KLX11A.*

5 Results

The detailed result of the single-hole interpretation is presented as print-out from the software WellCad (Appendix 1 for KLX11A).

5.1 KLX11A

Rock units

The borehole consists of one rock unit (RU1).

100.87–990.15 m

RU1: Totally dominated by quartz monzodiorite (501036). Subordinate rock types comprise minor occurrences of fine-grained granite (511058), fine-grained diorite-gabbro (505102), pegmatite (501061), and very minor occurrences of diorite/gabbro (501033) and granite (501058). The fine-grained diorite-gabbro constitutes composite intrusions together with fine- to medium-grained granite. The fine-grained granite primarily occurs as thin sections < 1 m in length. Scattered sections are foliated, particularly c. 473–542 m, 640–700 m, 815–836 m and 878–945 m. The foliation is mainly faint to weak in character. The quartz monzodiorite (501036) has a density in the range 2,750–2,790 kg/m^3 in the section 100–487 m and 2,770–2,810 kg/m^3 in the section 510–990 m. The magnetic susceptibility in the quartz monzodiorite is high (0.01–0.1 SI) and the natural gamma radiation is low (< 10 μR/h). Strong radar reflectors that are subparallel and do not intersect the borehole can be observed along borehole length 130 m to 250 m and 425 m to 480 m. Confidence level = 3.

Possible deformation zones

Eighteen possible deformation zones have been recognised in KLX11A.

142.25–142.90 m

DZ1: Minor low grade ductile shear zone. Increased frequency of open fractures and sealed fractures. Low P-wave velocity, low resistivity and low magnetic susceptibility. One non-oriented radar reflector at 142.2 m with the angle 70° to borehole axis. The host rock is dominated by quartz monzodiorite (501036). Confidence level = 3.

162.75–163.26 m

DZ2: Minor low grade ductile shear zone, overprinted by sealed fractures. Low P-wave velocity, low resistivity and low magnetic susceptibility. One non-oriented radar reflector at 162.5 m (just outside DZ2) with the angle 84° to borehole axis. The host rock is dominated by fine-grained diorite-gabbro (505102). Confidence level = 3.

168.70–169.90 m

DZ3: Inhomogeneous, minor low-grade ductile shear zone, with overprint of brittle shear zone. Increased frequency of sealed and open fractures, foliation and mylonites. Low P-wave velocity, low resistivity, caliper anomaly and low magnetic susceptibility. One strong, non-oriented radar reflector at 169.4 m with the angle 78° to borehole axis. The host rock is dominated by quartz monzodiorite (501036). Subordinate rock types are granite (501058) and pegmatite (501061). Confidence level = 3.

247.67–272.00 m

DZ4: Brittle deformation zone, with a central core (263.82–267.70 m) of a low-grade ductile shear zone. The central part consists of fine-grained diorite-gabbro (505102), with granite veins. The brittle upper part is dominated by one single fracture along the core, which contains sealed network, with prehnite- and quartz-sealed breccias. Low P-wave velocity, low resistivity, caliper anomaly and low magnetic susceptibility. Several non-oriented radar reflectors with angle to borehole axis between 8° and 73° occur within the deformation zone. Also, two oriented radar reflectors occur at 254.3 m with the orientation 095/86 and at 267.7 m with the orientation 185/33 or 102/10.The host rock is dominated by quartz monzodiorite (501036). Subordinate rock types are fine-grained granite (511058), fine-grained diorite-gabbro (505102) and pegmatite (501061). Confidence level = 3.

285.40–286.40 m

DZ5: Low-grade ductile shear zone (judged from core). Increased frequency of sealed fractures. Saussuritization occurs in the section. Low P-wave velocity and low resistivity. One non-oriented radar reflector occurs at 285.2 m (just outside DZ5) with the angle 31° to borehole axis. The host rock is dominated by fine-grained diorite-gabbro (505102). Subordinate rock type is quartz monzodiorite (501036). Confidence level = 3.

306.22–308.78 m

DZ6: Low-grade ductile shear zone, with brittle overprinting. Increased frequency of open and sealed fractures. Low P-wave velocity, low resistivity and low magnetic susceptibility. The host rock is dominated by quartz monzodiorite (501036). Subordinate rock types are fine-grained granite (511058) and granite (501058). Confidence level = 3.

345.30–348.03 m

DZ7: Brittle deformation zone, with a central ductile part (346.43–346.72 m), dominated by a sealed breccia. Transition zone is dominated by red staining, breccia and sealed fractures. Low P-wave velocity, low resistivity and low magnetic susceptibility. One non-oriented radar reflector occurs at 346.5 m with the angle 48° to borehole axis, and one rather strong oriented reflector occurs at 345.4 m with the orientation 256/52.The host rock is dominated by quartz monzodiorite (501036). Confidence level = 3.

417.26–418.10 m

DZ8: Brittle deformation zone, with crush, sealed network and red staining. Low resistivity and caliper anomaly. One oriented radar reflector occurs at 418.3 m (outside DZ8) with the orientation 110/38 or 235/35. The host rock is dominated by quartz monzodiorite (501036). Confidence level = 3.

430.56–432.20 m

DZ9: Low-grade ductile shear zone (judged from core) composed of foliated fine-grained diorite-gabbro (505102). Low magnetic susceptibility. One non-oriented radar reflector occurs at 431.2 m with the angle 73° to borehole axis. Subordinate rock type is quartz monzodiorite (501036). Confidence level = 3.

473.62–475.70 m

DZ10: Low-grade ductile shear zone, dominated by an altered quartz monzodiorite (501036) at 474.47–475.10 m. Low P-wave velocity, low resistivity and low magnetic susceptibility. One non-oriented radar reflector occurs at 473.8 m with the angle 79° to borehole axis. The host rock is dominated by quartz monzodiorite (501036). Subordinate rock types are fine-grained granite (511058) and fine-grained diorite-gabbro (505102). Confidence level = 3.

486.10–513.15 m

DZ11: Inhomogeneous brittle deformation zone, with red staining, crush, large apertures and gouge. Scattered sections with sealed network and breccias. Low P-wave velocity, low resistivity, caliper anomaly and low magnetic susceptibility. One non-oriented radar reflector occurs at 510.1 m with the angle 66° to borehole axis. The host rock is dominated by quartz monzodiorite (501036). Subordinate rock type is fine-grained granite (511058). Confidence level = 3.

522.85–528.66 m

DZ12: Low-grade ductile shear zone, except for the central brittle part (525.29–525.60 m), which is dominated by crush, gouge and large apertures. Low P-wave velocity, low resistivity, caliper anomaly and low magnetic susceptibility. Two non-oriented radar reflectors occur at 523.4 m and 525.8 m with the angle 19° and 55° to borehole axis, respectively. The host rock is dominated by fine-grained diorite-gabbro (505102). Subordinate rock types are fine-grained granite (511058) and quartz monzodiorite (501036). Confidence level = 3.

577.90–586.16 m

DZ13: Inhomogeneous brittle deformation zone, with scattered minor cataclasites. Two more intensely deformed sections at 579.66–579.89 m and 582.65–583.10 m, which contains crush. Low P-wave velocity, low resistivity and low magnetic susceptibility. Four non-oriented radar reflectors occur with angles between 48° and 63° to borehole axis. Also, one oriented rather strong radar reflector occurs at 578.9 m with the orientation 081/31 or 213/46. The host rock is dominated by quartz monzodiorite (501036). Subordinate rock types are fine-grained granite (511058), granite (501058) and pegmatite (501061). Confidence level = 3.

593.90–602.27 m

DZ14: Low-grade ductile shear zone, particularly developed in fine-grained diorite to gabbro (505102) in the interval 597.70–602.27 m. The quartz monzodiorite (501036) is not affected by the deformation. Low P-wave velocity and low resistivity. Two oriented radar reflectors occur, one strong at 598.6 m with the orientation 200/22 or 137/22, and one at 602.7 m (outside DZ14) with the orientation 030/22 or 186/57. Also, one non-oriented radar reflector occurs at 602.0 m with the angle 59° to borehole axis. The host rock is dominated by fine-grained diorite-gabbro (505102). Subordinate rock types are quartz monzodiorite (501036) and fine-grained granite (511058). Confidence level = 3

689.06–689.86 m

DZ15: Minor brittle deformation zone, dominated by a central part (689.62–689.69 m) with red staining, sealed fractures and breccia. Low resistivity. One non-oriented radar reflector occurs at 690.1 m (outside DZ15) with the angle 65° to borehole axis. The host rock is dominated by quartz monzodiorite (501036). Confidence level = 3.

853.00–860.00 m

DZ16: Scattered sections of brittle/ductile deformation zones with red staining, cataclasites and breccias. Increased frequency of sealed and open fractures. Low resistivity and low magnetic susceptibility. Two oriented radar reflectors occur, one at 854.7 m with the orientation 199/47 or 080/15, and one strong at 855.0 m with the orientation 108/67. Also, four non-oriented radar reflectors occur with angles between 24° and 47° to borehole axis. The host rock is dominated by quartz monzodiorite (501036). Confidence level = 3.

906.84–907.60 m

DZ17: Low-grade ductile shear zone (judged from core). Central brittle part (907.00–907.04 m) with breccia and sealed network. Low resistivity. Two oriented radar reflectors occur, one at 907.3 m with the orientation 054/45, and one at the same borehole length 907.3 m with the orientation 197/63 or 041/24. The host rock is dominated by quartz monzodiorite (501036). Subordinate rock type is fine-grained granite (511058). Confidence level = 3.

974.10–975.20 m

DZ18: Low grade ductile shear zone overprinted by brittle epidote-breccia and sealed fractures. Pegmatite dominates the central part. Low P-wave velocity and low magnetic susceptibility. One oriented radar reflector occurs at 975.1 m with the orientation 047/29 or 202/65. The host rock is dominated by quartz monzodiorite (501036). Subordinate rock type is pegmatite (501061). Confidence level = 3.

6 Comments

The result from the geological single-hole interpretation of KLX11A is presented in a WellCad plot (Appendix 1). The WellCad plot consists of the following columns.

In data Boremap	1:	Depth (length along the borehole)
	2:	Rock type
	3:	Rock alteration
	4:	Frequency of sealed fractures
	5:	Frequency of open and partly open fractures
	6:	Crush zones
In data Geophysics	7:	Silicate density
	8:	Magnetic susceptibility
	9:	Natural gamma radiation
	10:	Estimated fracture frequency
Interpretations	11:	Description: Rock unit
	12:	Stereogram for sealed fractures in rock unit (blue symbols)
	13:	Stereogram for open and partly open fractures in rock unit (red symbols)
	14:	Description: Possible deformation zone
	15:	Stereogram for sealed fractures in possible deformation zone (blue symbols)
	16:	Stereogram for open and partly open fractures in possible deformation zone (red symbols)

7 References

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Geological single-hole interpretation of KLX11A

Title	**SINGLE HOLE INTERPRETATION KLX11A**						
Site	LAXEMAR	**Inclination [°]**	-76.76	**Elevation [m.a.s.l.]**	27.12	**Signed data**	
Borehole	KLX11A	**Date of mapping**	2006-05-04 10:49:00	**Drilling Start Date**	2005-11-01 07:00:00		
Diameter [mm]	76	**Coordinate System**	RT90-RHB70	**Drilling Stop Date**	2005-11-08 10:30:00		
Length [m]	992.290	**Northing [m]**	6822.85	**Surveying Date**			
Bearing [°]	101.66	**Easting [m]**	-2882.99	**Plot Date**	2007-10-14 22:03:05		

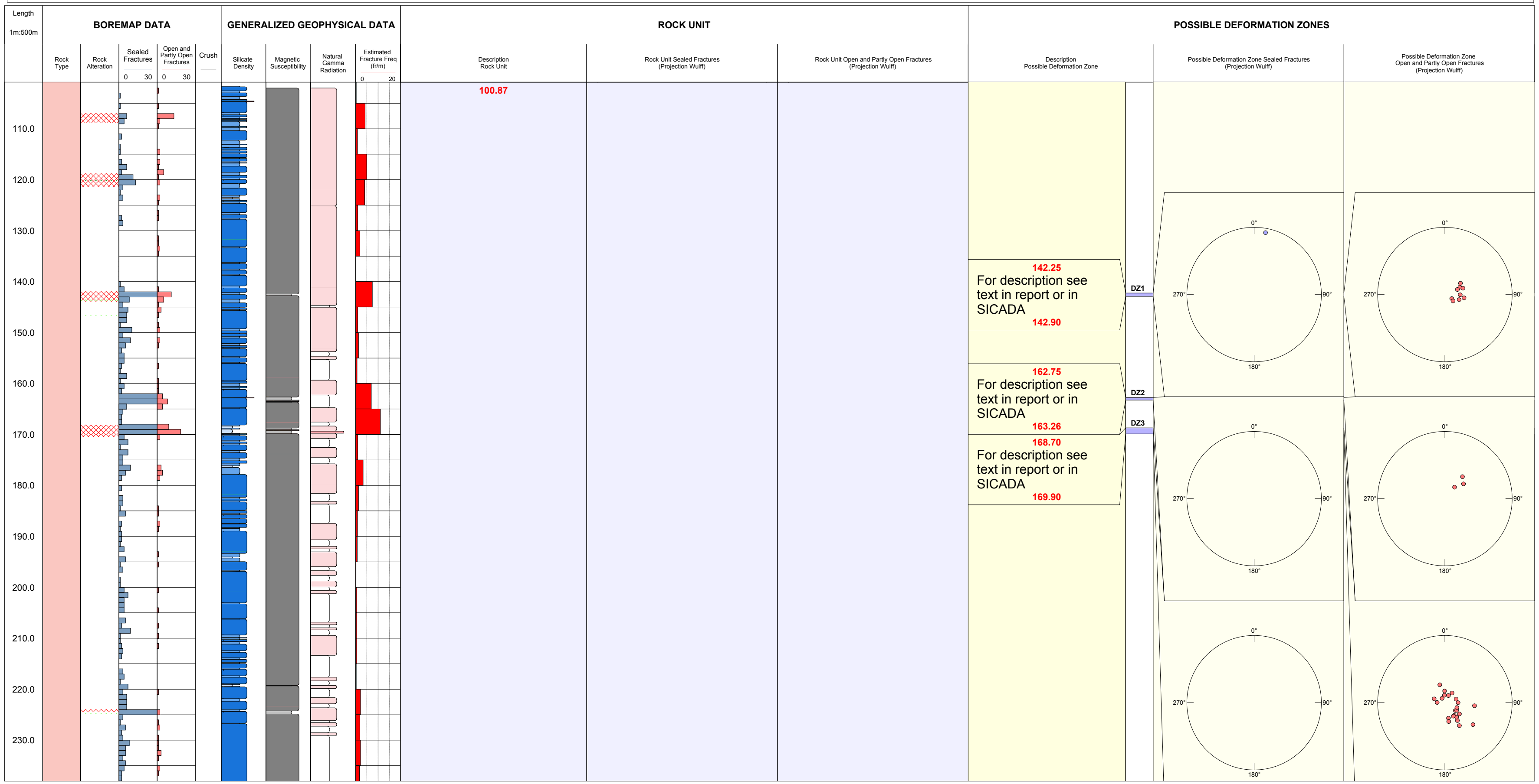
ROCKTYPE LAXEMAR
- Fine-grained granite
- Pegmatite
- Quartz monzodiorite
- Fine-grained diorite-gabbro

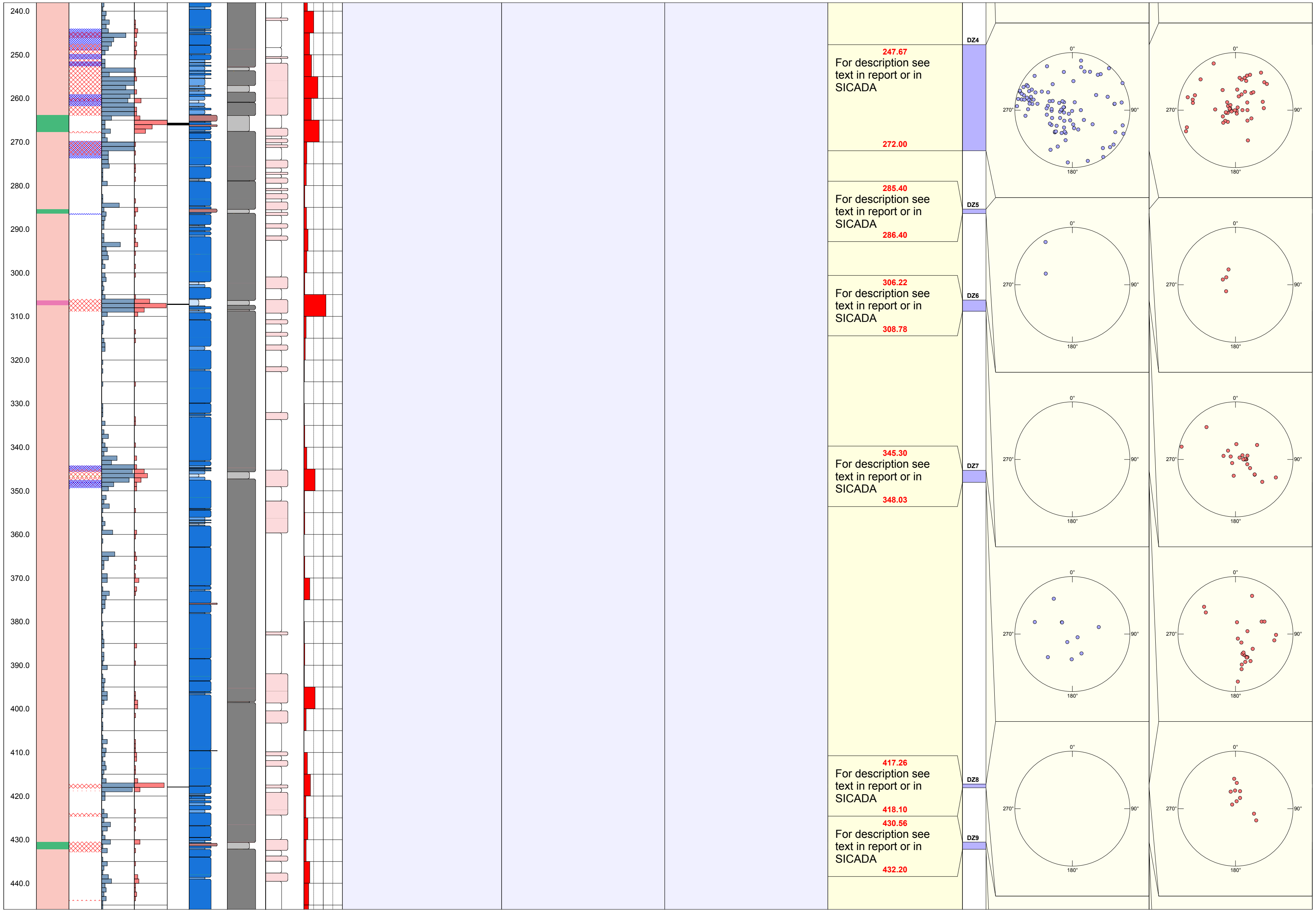
ROCK ALTERATION
- Oxidized
- Chloritisized
- Epidotisized
- Silicification
- Saussuritization

SILICATE DENSITY
- unclassified
- dens<2680
- 2680<dens<2730
- 2730<dens<2800
- 2800<dens<2890
- dens>2890

SUSCEPTIBILITET
- unclassified
- 0.001<sus<0.01
- 0.01<sus<0.1

NATURAL GAMMA
- unclassified
- gam<10
- 10<gam<20
- 20<gam<30
- gam>30

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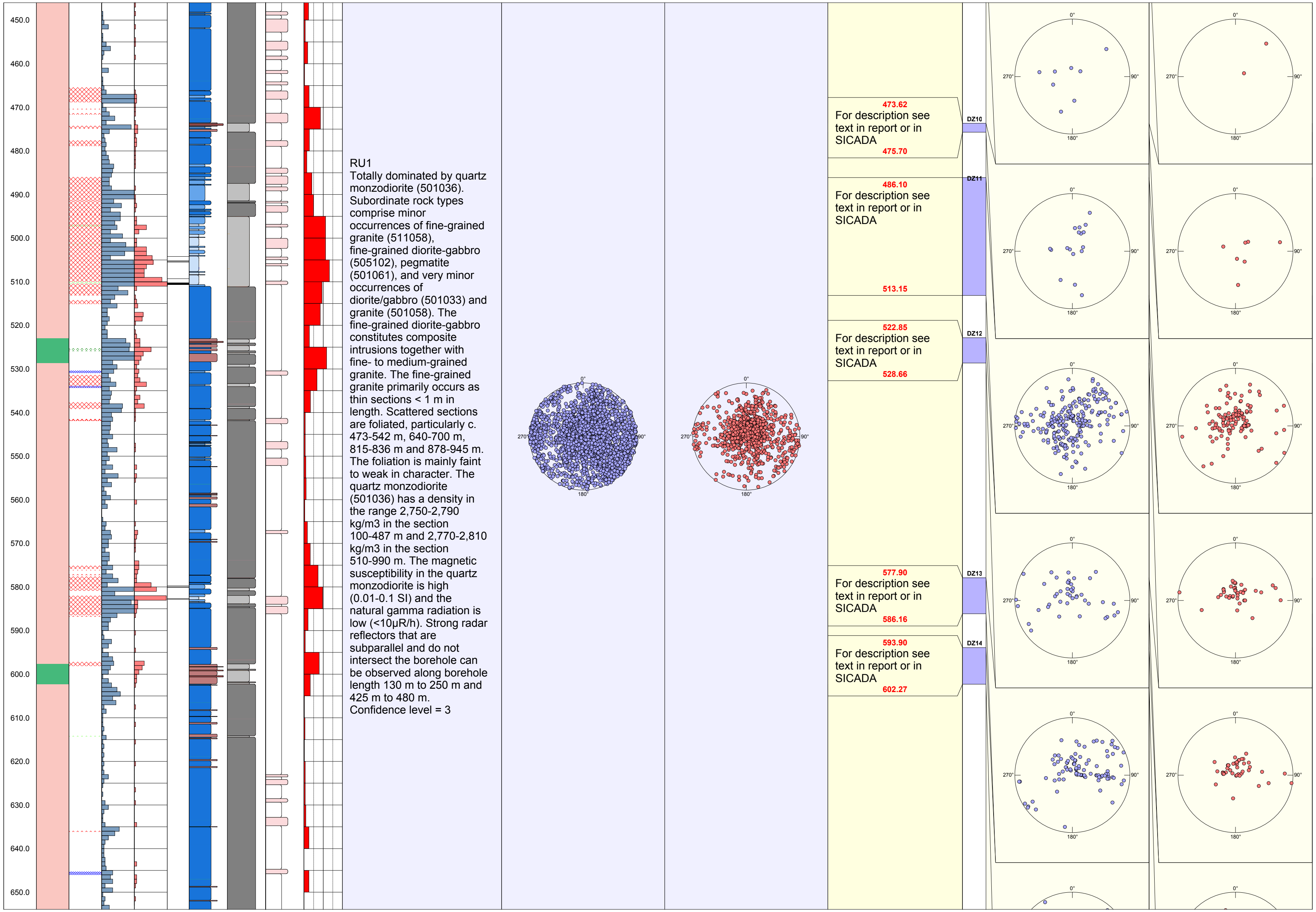
370.0
380.0
390.0
400.0
410.0
420.0
430.0
440.0
247.67
For description see text in report or in SICADA
272.00
285.40
For description see text in report or in SICADA
286.40
306.22
For description see text in report or in SICADA
308.78
345.30
For description see text in report or in SICADA
348.03
417.26
For description see text in report or in SICADA
418.10
430.56
For description see text in report or in SICADA
432.20
DZ4
DZ5
DZ6
DZ7
DZ8
DZ9
0°
90°
180°
270°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510.0
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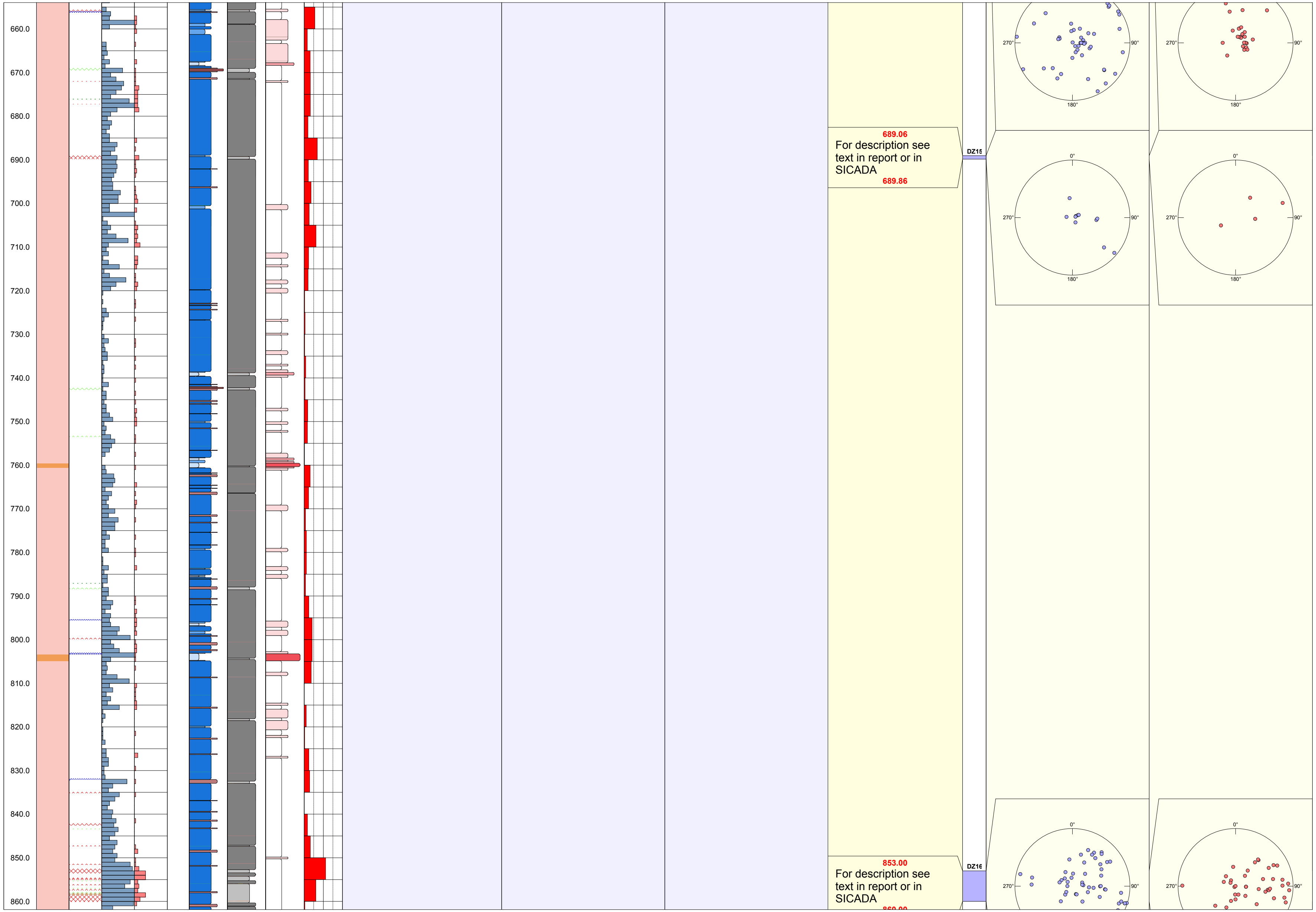
580.0
590.0
600.0
610.0
620.0
630.0
640.0
650.0
RU1
Totally dominated by quartz monzodiorite (501036). Subordinate rock types comprise minor occurrences of fine-grained granite (511058), fine-grained diorite-gabbro (505102), pegmatite (501061), and very minor occurrences of diorite/gabbro (501033) and granite (501058). The fine-grained diorite-gabbro constitutes composite intrusions together with fine- to medium-grained granite. The fine-grained granite primarily occurs as thin sections < 1 m in length. Scattered sections are foliated, particularly c. 473-542 m, 640-700 m, 815-836 m and 878-945 m. The foliation is mainly faint to weak in character. The quartz monzodiorite (501036) has a density in the range 2,750-2,790 kg/m3 in the section 100-487 m and 2,770-2,810 kg/m3 in the section 510-990 m. The magnetic susceptibility in the quartz monzodiorite is high (0.01-0.1 SI) and the natural gamma radiation is low (<10µR/h). Strong radar reflectors that are subparallel and do not intersect the borehole can be observed along borehole length 130 m to 250 m and 425 m to 480 m.
Confidence level = 3
473.62
For description see text in report or in SICADA
475.70
DZ10
486.10
For description see text in report or in SICADA
513.15
DZ11
522.85
For description see text in report or in SICADA
528.66
DZ12
577.90
For description see text in report or in SICADA
586.16
DZ13
593.90
For description see text in report or in SICADA
602.27
DZ14
0°
90°
180°
270°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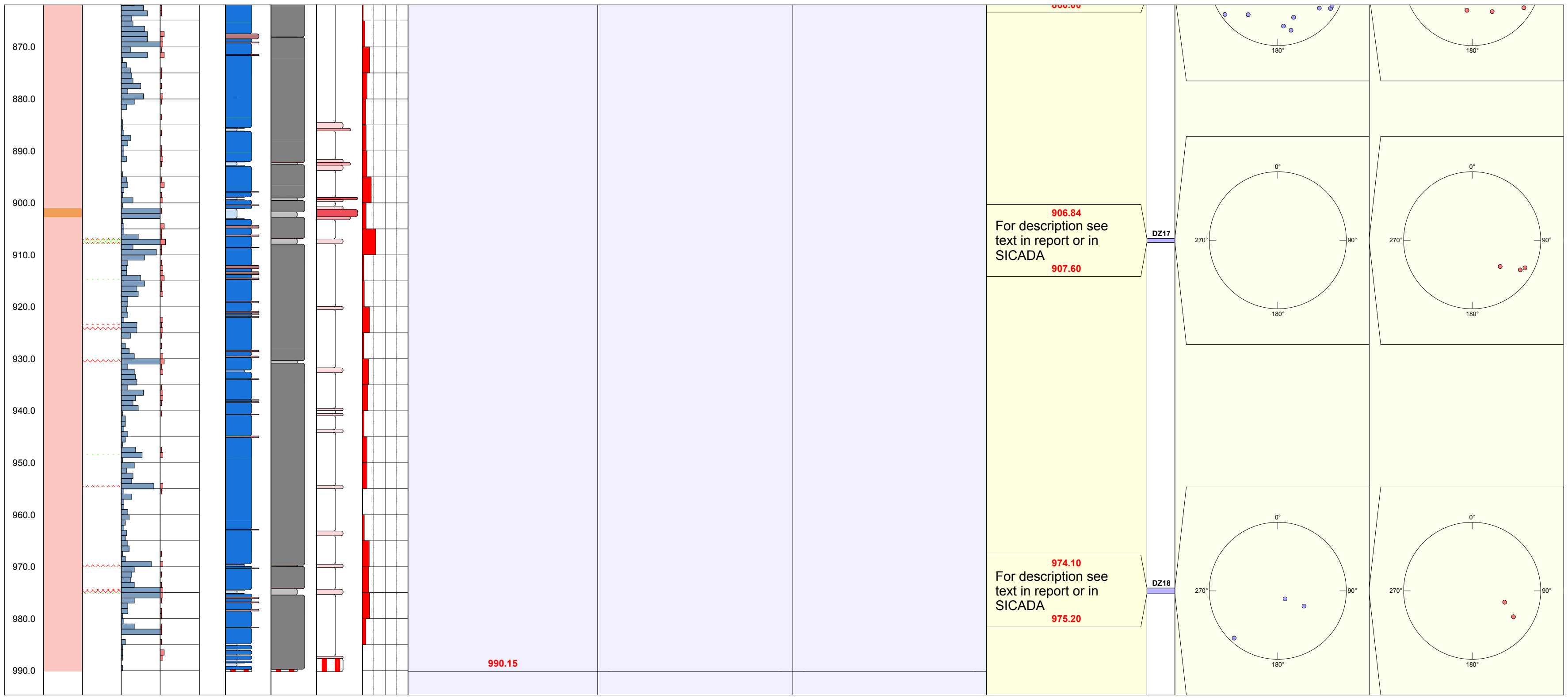
680.0
690.0
700.0
710.0
720.0
730.0
740.0
750.0
760.0
770.0
780.0
790.0
800.0
810.0
820.0
830.0
840.0
850.0
860.0
689.06
For description see text in report or in SICADA
689.86
853.00
For description see text in report or in SICADA
DZ15
DZ16
0°
90°
180°
270°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990.0
990.15
906.84
For description see text in report or in SICADA
907.60
DZ17
974.10
For description see text in report or in SICADA
975.20
DZ18
0°
90°
180°
270°