SKB R-21-08

ISSN 1402-3091

ID 1933404

January 2025

Reliability ranking of overcoring stress measurements at Forsmark

Jonny Sjöberg, Bruno Figueiredo
ITASCA Sweden

Matti Hakala
Stress Measurement Company Oy

Keywords: Overcoring stress measurements, Transient strain analysis, Stress reliability ranking

Abstract

A total of some 130 overcoring stress measurements have been conducted at Forsmark between the years of 1975 and 2006 utilizing the Borre probe. The results of the stress interpretation show a large variability in the magnitudes of the principal stresses mainly due to factors intrinsic to the overcoring technique such as variations in temperature during overcoring, glue issues, microcracking, core disking. Moreover, the stress measured would be affected by geological deformation zones.

In previous stress modelling at Forsmark no stringent and quantitative quality assurance and reliability assessment of the stress measurements have been conducted. For a more accurate representation of the stress data and to mitigate the associated uncertainties in deriving a new stress model, a quality control of the measurements was conducted. This involved the development and application of a system for ranking of the reliability of stress measurements supported by various criteria: (1) elastic constants, (2) transient strains, and (3) interpreted stress state.

The ranking of the reliability of the elastic constants was based on the linearity of the strain response during the biaxial tests, and the quantification of the variability of the Young's modulus. The ranking of the reliability of the transient strains included the analysis of the interpreted in situ stress, elastic constants, borehole orientation, orientation of the Borre probe in the borehole, applied coring loads (drill bit pressure, drill bit shear stress, and borehole water pressure), inverse solution for the in situ state of stress based on the transient strains for a given core advance, and calculated state of stress of the overcored rock core in order to estimate the potential for core disking. The reliability of the interpreted stresses was estimated through the quantification of the variability of the magnitude and orientation of the principal stresses by leaving one gauge at the time from the stress solution and calculating the standard deviation of the stress magnitudes and 95 % confidence intervals for the stress orientations.

The overall reliability was estimated through the consideration of the estimated reliability for the elastic modulus, transient strains and variability stress solution, respectively, and the selection of the worst case from any of these. This reliability was accessed separately for each magnitude and orientation of the principal stresses, magnitude and orientation of the horizontal stresses, and magnitude of the vertical stress component.

The following conclusions can be drawn:

- The conducted quality control and the developed and applied system to rank the reliability of the stress measurements enabled identifying the reliable data, ranked as *Good* or *Moderate*. However, the various ranking criteria and different sources of data were weighted equally, but the stress measurement data are not factored equally. The different criteria are addressed by including Data Set A, B, or C with the ranking value, to emphasize what ranked stress measurements include the transient strain data analysis.
- For Data Set A (with transient strain data available), most of the stress measurements were ranked as *Poor*, while for Data Set B, most of the measurements were ranked as *Good* and *Moderate*. For Data Set B, the ranking of the reliability is partial because the transient strain data are not available, and the Borre probe only enables to measure seven independent strain directions. For Data Set C, the reliability of the stress measurements was not ranked due to lack of strain data. The lack of strain data is the main reason for splitting the overall reliability by data sets. By considering only the variability of the interpreted stress state, 94 % of the magnitudes of the maximum principal stress in Data Set B were ranked as *Good*, while in Data Set A, this fraction is only 45 %.

- The elastic constants are generally reliable. However, it should be noted that even for this case, the strains measured during the overcoring can be unreliable, due to the factors intrinsic to overcoring, such as the temperature effects, glue issues, and potential microcracking and disking of the rock cores. In 23 stress measurements, the variability of the Young's modulus is quite significant (up to 41 % higher and 65 % lower than the average values for the rock type), which has a direct effect on the variability of the interpreted stresses.
- The reliability of the principal stresses and horizontal and vertical stresses does not need to be the same. As the difference of the plunge angles increases from 0 or 90°, the correlation between principal and horizontal/vertical stresses decreases.
- The water pressure (only possible to take into account in Data Sets A and B where strain data are available) results in an increase of the stress magnitudes, and the particular selection of the strain values from the elastic range may result in a considerable increase in the stress magnitude.

The following recommendations are given:

- Due to a significant number of unreliable stress measurement data (rank value equal to *Poor*), and no availability of strain data in Data Sets B and C, additional stress measurements using both the LVDT and the conventional overcoring techniques are recommended during the construction of both SFR and SFK. These measurements are suggested to be conducted at two levels: approximate depth of 500 m (depth of the repository) and 300 m (to characterise the stress gradient).
- The developed ranking system should be used for any future measurement, also including the ranking system developed for the LVDT gauge in Mattila et al (2022), and consideration of weights to factor differently the data provided by LVDT and overcoring techniques.
- Spatial variations in the geology should be assessed to better understand possible reasons for the observed stress rotation with depth in some of the measurement data.
- Re-analysis of selected measurements to account for possible influence from water pressure is recommended.

Sammanfattning

Totalt ca. 130 spänningsmätningar med överborrningsmetoden och med nyttjande av Borre-sonden har utförts i Forsmark under åren 1975 till 2006. Resultaten från spänningstolkningen visar en stor variation i magnitud på huvudspänningarna primärt orsakad av faktorer direkt hänförande till överborrningstekniken såsom variationer i temperatur under överborrning, limproblem, mikrouppsprickning, kärn-disking. Vidare så är uppmätta spänningar påverkade av geologiska deformationszoner.

I tidigare spänningsmodellering för Forsmark har ingen stringent eller kvantitativ kvalitetskontroll och bedömning av mätningarnas tillförlitlighet genomförts. För en bättre representation av spänningsdata och i syfte att begränsa effekter av tillhörande osäkerheter i framtagandet av en ny spänningsmodell har en kvalitetskontroll av spänningsmätningarna utförts. Detta innefattade utveckling och tillämpning av ett system för ranking av tillförlitligheten i spänningsmätningarna med hänsyn till olika kriterier: (i) elastiska konstanter, (ii) transienta töjningar och (iii) tolkat spänningstillstånd.

Ranking av tillförlitligheten av de elastiska konstanterna baserades på linjäriteten hos töjningsresponsen från biaxialtesterna och en kvantifiering av variabiliteten i bestämd elasticitetsmodul. Ranking av tillförlitligheten av de transienta töjningarna inkluderade analys av den tolkade in situ spänningen, elastiska konstanter, borrhålsorientering, orientering av Borre-sonden i borrhålet, applicerade belastningar på kärnan (tryck från borrkronan, skjuvspänning från borrkronan och vattentryck i borrhålet), inverslösning för in situ spänningstillståndet baserat på de transienta töjningarna för varje givet överborrningsläge, samt det beräknade spänningstillståndet för den överborrade kärnan i syfte att uppskatta potentialen för kärn-disking. Tillförlitligheten hos de tolkade spänningarna uppskattades genom kvantifiering av variabiliteten i storlek och orientering av huvudspänningarna genom att utesluta en töjningsgivare i taget från analysen och beräkna standardavvikelsen för spänningsmagnituderna och 95 % konfidensintervallet för spänningsorienteringarna.

Den övergripande tillförlitligheten uppskattades genom beaktande av den uppskattade tillförlitligheten för elasticitetsmodulen, transienta töjningar och variabiliteten i beräknade spänningar, samt val av det sämsta fallet från någon av dessa. Denna tillförlitlighet bedömdes separat för varje storlek och orientering av huvudspänningarna, storlek och orientering av de horisontella spänningarna och storleken på den vertikala spänningskomponenten.

Följande slutsatser kan dras:

- Den genomförda kvalitetskontrollen och det utvecklade och tillämpade systemet för att rangordna tillförlitligheten på spänningsmätningarna gjorde det möjligt att identifiera tillförlitliga data, rankade som *Good* eller *Moderate*. De olika rankingkriterierna och de olika datakällorna viktades dock lika, men data från mätningarna har olika inverkan. De olika kriterierna hanteras genom att inkludera datauppsättningarna A, B eller C med rankningsvärdet, för att understryka vilka rankade spänningsmätningar som inkluderar den transienta töjningsanalysen.
- För datauppsättning A (med tillgängliga transienta töjningsdata) rangordnades de flesta av spänningsmätningarna som *Poor* medan för datauppsättning B och C (utan tillgängliga transienta töjningsdata) rankades de flesta som *Good* eller *Moderate*. För datauppsättning B är ranking av tillförlitlighet endast partiell eftersom transienta töjningsdata inte är tillgängliga, och Borre-sonden endast medger mätning i sju oberoende töjningsriktningar. För datauppsättning C har tillförlitligheten inte rankats eftersom töjningsdata inte finns tillgängliga. Bristen av töjningsdata är den främsta anledningen till att dela upp övergripande tillförlitlighet efter datamängder. Genom att endast beakta variabiliteten för det tolkade spänningstillståndet rangordnas 94 % av data på magnitud på största huvudspänning som *Good* medan för datauppsättning A är motsvarande andel bara 45 %.

- De elastiska konstanterna är i allmänhet tillförlitliga. Det bör dock observeras att även för dessa fall kan de töjningar som uppmätts under kärnborrningen vara otillförlitliga, på grund av inneboende faktorer i överborrningsmätningar, såsom temperatureffekter, limproblem, potentiell mikrosprickbildning och kärn-disking. För 23 av spänningsmätningarna är variabiliteten i elasticitetsmodul relativt signifikant (upp till 41 % högre och 65 % lägre än medelvärdena för bergarten), vilket har en direkt effekt på variabiliteten i de tolkade spänningarna.
- Tillförlitligheten hos huvudspänningarna och de horisontella och vertikala spänningarna behöver inte vara densamma. När skillnaden mellan stupningen ökar från 0 till 90° minskar korrelationen mellan huvudspänningar och horisontella/vertikala spänningar
- Vattentrycket resulterar i en ökning av spänningsmagnituderna (möjligt för datauppsättningarna A och B där töjningsdata är tillgängliga). Valet av töjningsvärden från det elastiska området kan resultera i en markant ökning av spänningsmagnituderna.

Följande rekommendationer ges.

- På grund av ett betydande antal otillförlitliga spänningsmätningsdata (ranking *Poor*) och ingen tillgång till töjningsdata för datauppsättningarna B och C, rekommenderas ytterligare spänningsmätningar med både LVDT-metoden och konventionella överborrningsmätningar under anläggandet av både SFR och SFK. Dessa mätningar föreslås utföras på två nivåer: ungefärligt djup på 500 m (djup på förvaret) och 300 m (för att karakterisera spänningsgradienten).
- Det utvecklade rankingsystemet bör användas för alla framtida mätningar, inklusive motsvarande rankingsystem som utvecklats för LVDT-metoden i Mattila m.fl. (2022), med övervägande av förändrad viktning av faktorer för spänningsdata från LVDT- och överborrningsdata.
- En analys av spatiala variationer i geologi bör utföras för att bättre förstå tänkbara orsaker till observerade spänningsrotationer med ökat djup i mätdatat.
- En ny spänningsberäkning för att ta hänsyn till möjliga effekter från vattentryck rekommenderas för utvalda mätningar.

Content

1 Introduction

1.1 Background

The Forsmark site is the chosen location for the repository for spent nuclear fuel in Sweden. The currently planned repository will comprise a ramp down to the repository depth, where several deposition tunnels will be excavated. The canisters with spent fuel will be placed in vertical deposition holes, 1.75 m in diameter, in the tunnel floor, at an approximate depth below the ground surface of 450 m.

The rock mass is subjected to the initial (prior to any excavations) in situ stress state, which will be disturbed and redistributed by the excavation operations. The stress redistribution and resulting secondary stress state constitutes the main load during the construction of underground working. Hence, the orientation and magnitudes of the initial in situ stresses are considered important factors in the design and performance of the underground repository facility. For example, the orientation of the deposition tunnels is planned to be near parallel to the maximum horizontal stress at the site to minimize the maximum secondary stress on the excavation.

Stress measurements at the Forsmark site (Figure 1-1) have mainly been conducted utilizing overcoring, with some supplementary hydraulic fracturing measurements. The overcoring method involve coring a larger diameter borehole over a coaxial small-diameter pilot hole in which a strain-measuring instrument is located, recording the strains resulting from the stress relaxation. To determine the elastic constants of the overcored samples, they are placed inside a biaxial chamber in which a radial hydraulic pressure is applied. Several loading and unloading cycles are performed and the strains as a function of pressure through the biaxial tests are recorded. The stress state is determined from the strains measuring during overcoring, and the elastic constants determined from the biaxial tests (Sjöberg et al, 2003).

More than 130 overcoring stress measurements have been conducted between the years of 1975 and 2006 utilizing the Borre probe (Sjöberg and Klasson, 2003). The interpretation of the stress measurement results has proven to be challenging, because the results of the stress interpretation (Martin, 2007) show large variability in the magnitudes of the principal stresses. One of the sources of this variability is the heterogeneity of the rock mass. However, the variability is also related to factors intrinsic to the overcoring technique, e.g., variations in temperature during coring. Drilling induces heat and consequent thermal expansion, and potential reactivation of the epoxy glue used to bond the strain gauges to the borehole walls. This can result in high stresses, which can potentially damage the core. Also, high initial stresses acting perpendicular to the borehole axis can cause microcracking and/or disking of the overcored sample, thus violating the basic premises of the overcoring technique (continuous, homogeneous, linear-elastic rock behaviour).

Large pre-existing geological deformation zones may result in a rotation of the initial stresses as a function of depth and as well as a variation of the magnitudes. Numerical simulations have been conducted to understand the possible effect of the deformation zones on the rock stresses at Forsmark (Mas Ivars and Hakami, 2005; Hakami, 2006; Hakala et al, 2019; Valli et al, 2023). In these works, deterministic deformation zones were modelled explicitly, and under the glacial cycle the variation of the stress magnitude was found to be similar to the magnitude of the measured stress. However, the simulated variation of the trend of the maximum horizontal stress as a function of depth was found to be different from that obtained from the interpretation of the stress measurements.

In previous stress modelling at Forsmark no stringent and quantitative quality assurance and reliability assessment of the stress measurements have been conducted. For a more accurate representation of the stress data at Forsmark and to mitigate the associated uncertainties, it is important to assess and exclude the unreliable stress measurement data. This assessment will also serve as preparation for a successful future campaign of stress measurements using both LVDT (Hakala et al, 2013, Hakala et al, 2016) and conventional overcoring techniques.

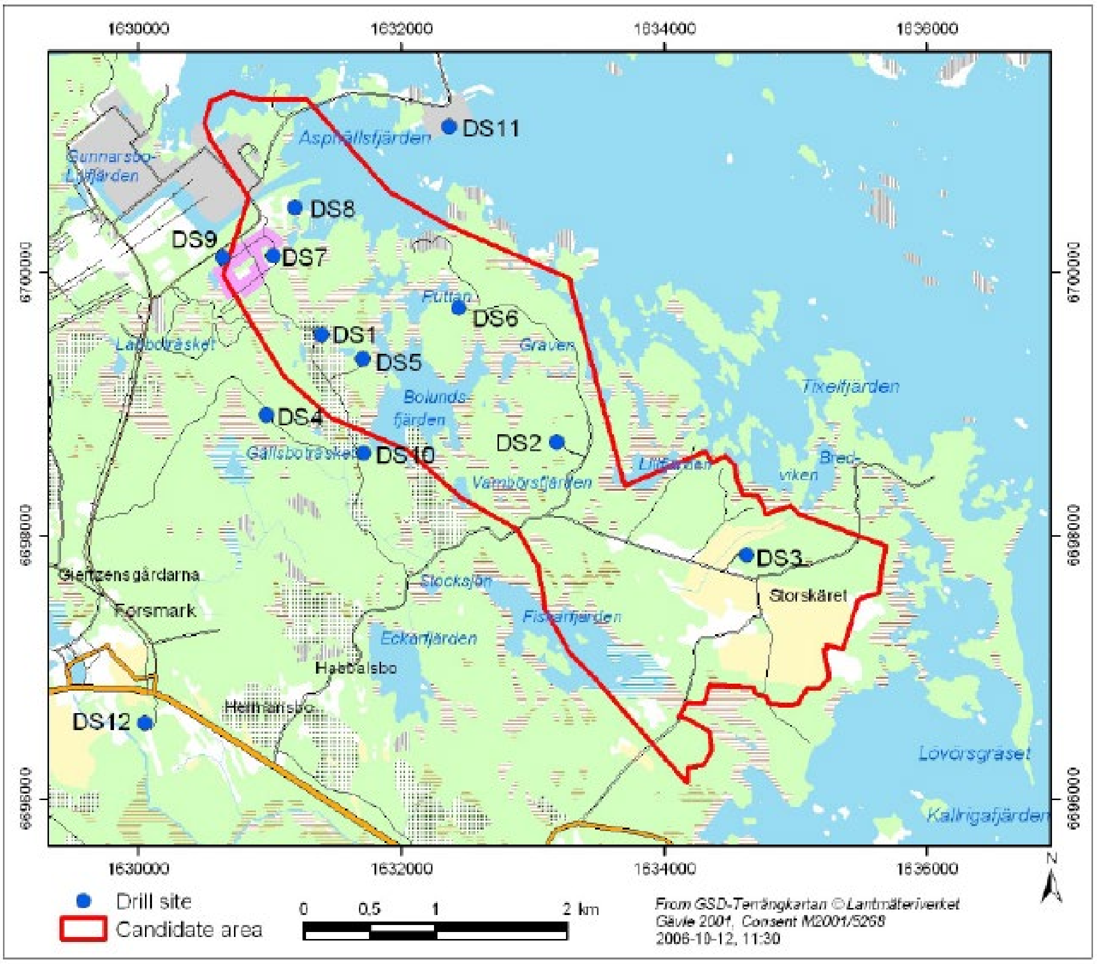


***Figure 1-1.** Forsmark area with major drilling sites (DS1 through DS11) indicated.*

1.2 Scope and objective

This work aims to conduct a quality control and reliability assessment of the overcoring stress measurement data available at Forsmark, through the presentation and application of a systematic ranking of the reliability of the stress measurements. The ranking is focused on three components:

(1) measured overcoring strain response,

(2) elastic constants obtained from biaxial testing, and

(3) interpreted stress state.

The strain response is studied by mean of the OCS-code developed to analyse the overcoring transient strain curves (Hakala, 2004). This code enables to calculate the transient strains developing during the overcoring process, based on a given initial in situ stress state, defined elastic constants, applied coring loads, and orientations of the probe and borehole. The measured and calculated strain curves are compared and the in-situ stress state based on the measured transient strains and a given core advance (i.e., position of the bottom drill bit relatively to the Borre probe strain gauge location), is determined. This code also evaluates the potential for core damage and disking through the comparison of the maximum borehole stress and the rock tensile strength.

The magnitude of the inferred stresses is also mainly affected by the value of the elastic (Young's) modulus because it has a one-to-one effect on all interpreted principal stress magnitudes.

The reliability of the interpreted stress state is ranked through the analysis of the internal error between the measured and calculated strains correspondent to the stress solution. The stress solution requires six independent measurements. The Borre probe used for overcoring at Forsmark has nine strain gauges in seven independent directions. This slight overdetermination is used to calculate different stress solutions and to quantify the uncertainty.

2 Overcoring stress measurements and factors influencing measurement reliability

2.1 Overcoring method

The overcoring method is based on coring a larger diameter borehole over a coaxial small-diameter pilot hole in which the strain-measuring instrument is located (Figure 2-1). The cylindrical core sample is relaxed from the stress field in the rock mass and the strains associated with the relaxation are measured. Data sampling may be analogue or digital, but generally, the digital sampling has a higher sampling frequency, which simplifies identification of malfunctioning strain gauges during analysis (Sjöberg et al, 2003).

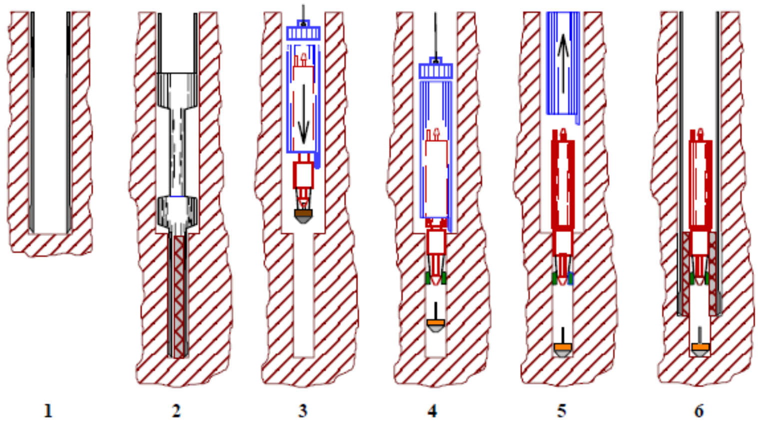


Figure 2-1. *Measurement procedure for the Borre probe: (1) advance ϕ76 mm main borehole to measurement depth; (2) drill ϕ 36 mm pilot hole and recover core for appraisal; (3) lower Borre probe in installation tool down-hole; (4) release Probe from installation tool. strain gauges bond to pilot-hole wall under pressure from the cone; (5) raise installation tool; probe/gauges bonded in place; and (6) overcore the Borre probe and recover to surface in core barrel (extracted from Ask, 2004).*

Several types of overcoring cells are available (Amadei and Stephansson, 1997). The cells developed at the Council of Scientific and Industrial Research (CSIR) and the Commonwealth Scientific and Industrial Research Organization (CSIRO) are two main types. CSIR- and CSIRO-type of devices include 9 or 12 strain gauges. The strain gauge configuration includes axial gauges, tangential gauges, and strain gauges inclined ±45 from the axial direction. The Borre probe (Sjöberg and Klasson, 2003) is a CSIR-type of cell. Another commonly used stress probe is the CSIRO HI (hollow inclusion) cell where strain gauges are embedded in an inclusion. Common to all cells is that pre- and post-overcoring strain readings should be taken at a stable point before and after the overcoring phase and the activation/termination of flush-water (Figure 2-2).

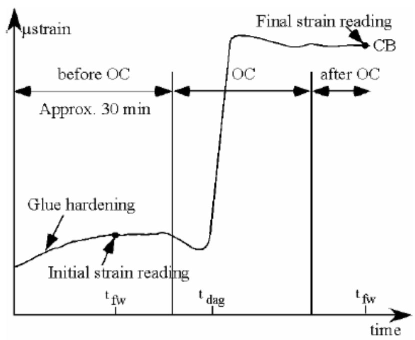


Figure 2-2. *Schematic response of a tangential strain gauge response versus time during overcoring. The strongest strain gauge response occurs at t_{dag}, i.e., when the drill bit is at the position of the strain gauge. The time interval before overcoring (30 min) is from the glue hardening process. t_{fw} and CB denote the time when flush-water is activated/terminated and core break, respectively (extracted from Ask, 2004).*

Following overcoring, the recovered overcore sample is usually placed in a biaxial test chamber to determine the elastic constants – Young's modulus, *E*, and Poisson's ratio, *ν*. During biaxial testing, the overcore sample is first subjected to a step-wise increase of applied pressure to the desired maximum pressure level, followed by a step-wise decrease to zero pressure while the resulting strains are measured (see e.g., Amadei and Stephansson, 1997). The loading and unloading thus allows examination of possible inelastic and anisotropic behaviour of the rock sample (Amadei, 1983a; 1983b). The results are plotted as strains versus applied pressure (Figure 2-3). In theory, the strain gauges within each group (i.e., axial, tangential, and inclined) should respond identically to loading/unloading.

The values of *E* and *ν* are normally taken as tangent or secant values, calculated from the strain data during the unloading of the core sample (Amadei and Stephansson, 1997), because the unloading mimics the overcoring process. The tangent modulus represents the slope of the stress-strain curve and thus requires relatively small increments of applied pressure. The secant modulus describes the slope of a straight line that joins a point on the stress-strain curve with the origin (Brady and Brown, 1985).

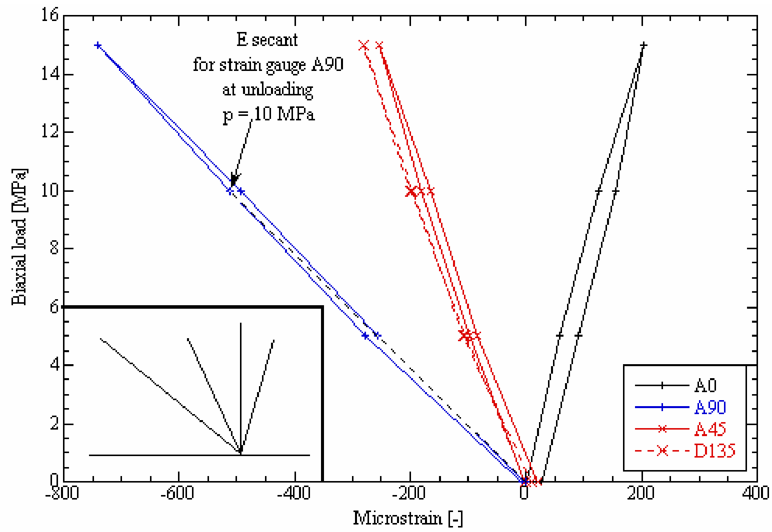


Figure 2-3. *Result from biaxial testing in borehole KA2198A, Äspö HRL, with description of the secant Young's modulus and hypothetical results from biaxial testing of an ideal elastic material in the lower left corner.*

2.2 Borre probe stress measurements and interpretation

Overcoring stress measurements have been conducted at Forsmark using the Borre probe (Figure 2-4), originally known as the SSPB triaxial strain cell (Hiltscher et al, 1979). The version used for most of the measurements at Forsmark was *Borre III*, described by Sjöberg and Klasson (2003). A later version, termed *Borre IV*, has since been developed with more strain gauges (18) and wireline drilling capacity, but this was not available for use at the time of the previously conducted measurements at Forsmark.

The Borre probe comprise three strain gauge rosettes, located 120° apart from each other, which measure the tangential, axial and inclined strains (at 45°) relative to the borehole axis. Temperature records are obtained by means of an electronic board, which is located approximately 30 cm over/before the section of the strain gauges (Figure 2-4). Because this board is not located inside the overcored cylinder, the measured temperature is only indicative: the recorded temperature is much lower than that at the strain gauge location. Also, changes in temperature are not directly related to the coring advance. The strain gauges and the temperature sensor are connected to a data logger placed inside the device, which records the data at pre-programmed time intervals. During the installation process, when the Borre probe reaches the test location, the consoles with the strain gauge rosettes are pressed against the walls of the pilot hole, gluing the strain gauges to the rock surface.

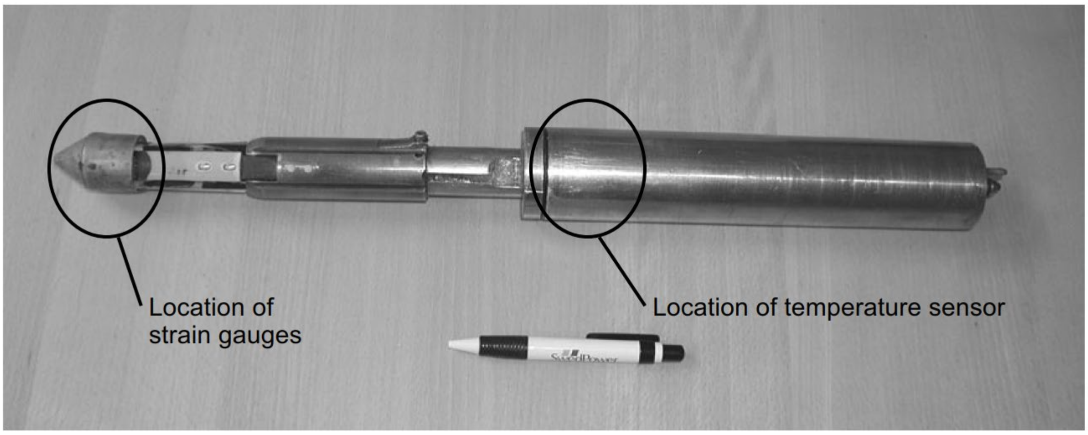


Figure 2-4. Borre-probe cell, location of the strain gauges and temperature sensor.

After the glue has hardened, the overcoring is carried out with a T76 drill bit. The outer diameter of the rock core is approximately 62 mm, and the diameter of the pilot hole is about 36 mm, which results in an approximate thickness of the wall of the overcored cylinder of 12 mm. Once the rock core is overcored, the readings from the data logger are transferred to a computer. Following recovery to the surface of the core barrel with the overcore and probe cell inside, biaxial tests are conducted on the overcored rock core to determine the elastic constants. The testing procedure is described in the suggested ISRM method (Sjöberg et al, 2003).

In theory, the strains measured by the three axial gauges should be equal before starting overcoring, as well as after completed overcoring, while the transient strain response can differ. Because of this redundancy in the axial direction, the Borre probe cell enables to measure seven independent strains (three tangential, three inclined, one axial). Because the solution for the stress tensor requires six independent strain measurements, the obtained solution is one degree overdetermined. To analyse the effect of this redundancy on the calculated stress solution, one tangential or inclined strain gauges can be discarded. However, because the stress solution is only one degree overdetermined, the variability in the calculated stresses is generally small. However, the error in the solution may be small even if anomalous strains are measured by one rosette. Neglecting one of the axial strain measurements may thus result in an unrealistic stress solution, but still with a small indicated error in the solution. Because discrepancies in the axial strain measurements are usually found, the mean axial strain can be used to analyse the stress variability.

Overcore drilling results in a high friction and consequently generated heat and thermally induced strains, which may influence the measurement results. The thin rock cylinder is also sensitive to the geological heterogeneities, and microcracking and/or core disking, all of which may affect the stress determination with the pre-requisite assumptions of the overcoring technique (continuous, homogeneous, linear-elastic rock behaviour) possibly being violated. Hence, all these factors should be considered in the evaluation and assessment of measurement reliability.

Overcoring stress measurements are usually conducted in boreholes filled with water. At the time of the installation of the Borre probe, the water pressure affects the bottom of the drilled hole and the walls of the pilot hole. After the overcoring, the water pressure also influences the outer surface of overcored cylinder. The applied analytical stress solutions do not consider the effect of water pressure in the boreholes on the measured strains. At shallow depths, the effect of the hydrostatic water pressure is small, but at depths of several hundred meters, the effect of the water pressure on the stress field solution should be considered in the determination of stress level.

As aforementioned, the interpretation of the stress measurements assumes that the rock response is linear-elastic during the overcoring. Under elastic regime, all the deformations are continuous and take place when the core advance is between -130 mm and +130 mm relative to the strain gauge location. Before and after the overcoring (until the overcored core is broken), the strain readings should be stable. Any strain readings outside this range are not due to the overcoring, but due to external factors, such as drilling induced heat, potential debonding of glue, reactivation of the glue, or core damage. An example of the measured transient strains from one hour before the overcoring until the core retrieval to the surface, is shown in Figure 2-5. Note that the strains are recorded as a function of time, rather than of core advance. The core advance is known exactly only at the beginning and end of overcoring, and between these two instants of time, only the time is recorded. A comparison between the measured and calculated strains is shown in Figure 2-6. In this example, practically all the measured strains occur within the elastic range. There is also good agreement between measured and calculated tangential transient strains, and moderate agreement for the other strain gauges. The factors that influence stress determination and measurement reliability are described in more detail in Section 2.3.

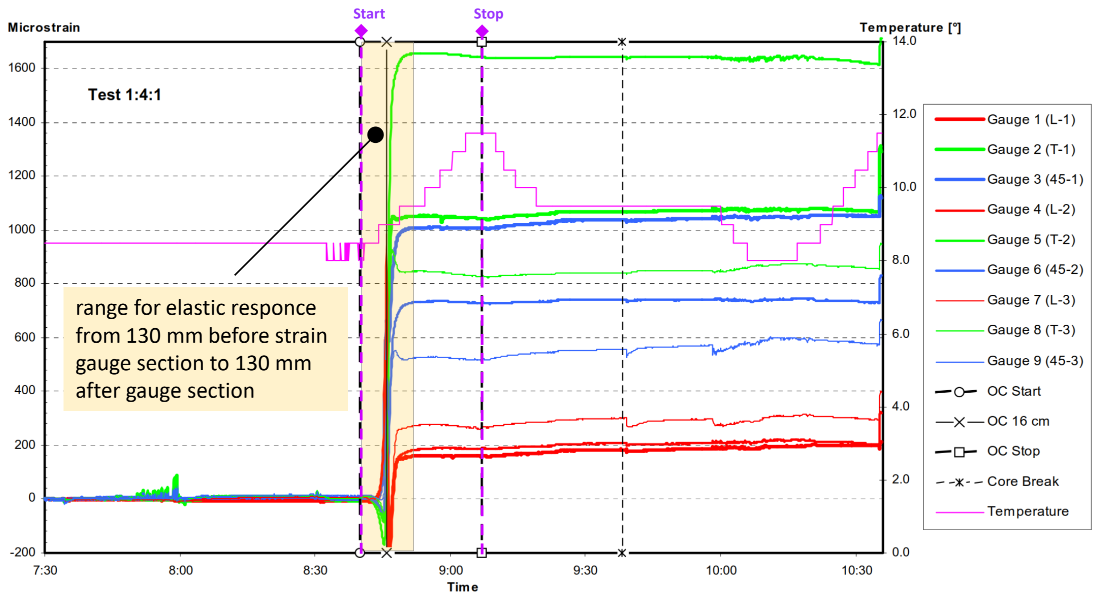


Figure 2-5. *Measured transient strains for stress measurement 1:4:1 conducted in borehole KFM01B at the vertical depth of 229.46 m.*

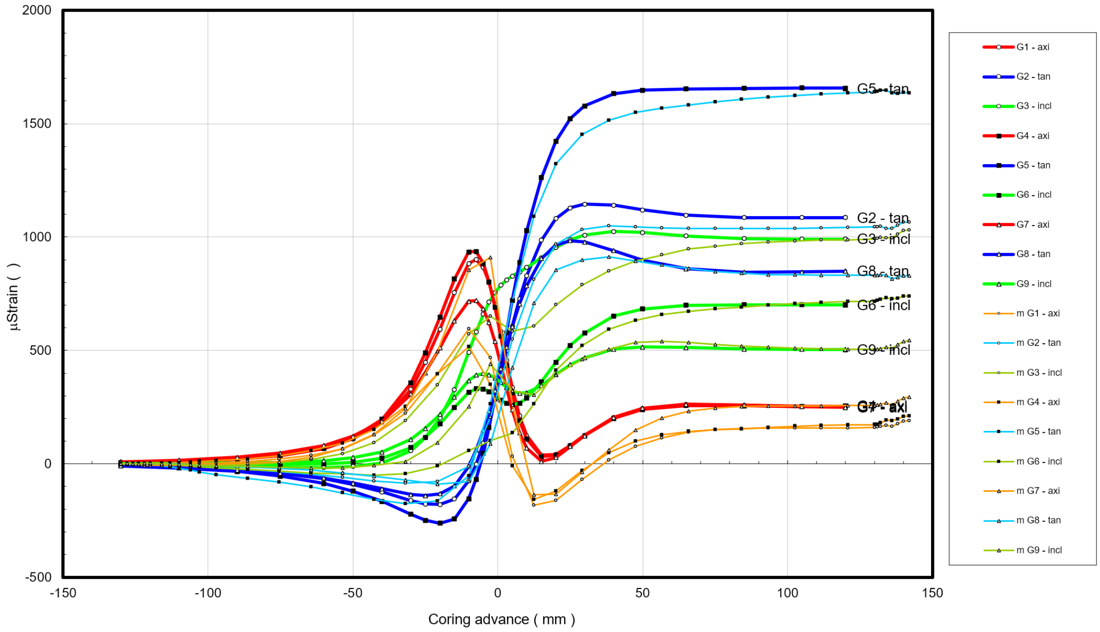


Figure 2-6. *Measured strains during overcoring ("m" in the legend; thin lines in the figure) and transient strains calculated (thick lines in the figure) with the OCS-code (Hakala, 2004) for stress measurement 1:4:1 conducted in borehole KFM01B at the depth of 229.46 m: G1, G2, G3 are the strain gauges from rosette 1; G4, G5, G6 are the strain gauges from rosette 2; G7, G8 and G9 are the strain gauges from rosette 3; axi, tan and incl are the axial, tangential and inclined strain gauges, respectively.*

The original SSPB cell (Hiltscher et al, 1979) did not enable to record the transient strains, but only the strains at the beginning and end of the overcoring. Hence, for the historic overcoring stress measurements conducted utilising this cell, it is not possible to rank the reliability of the transient strains. In this scenario, the biaxial test results are used to draw conclusions about the reliability of the strain gauges.

2.3 Factors influencing measurement reliability

2.3.1 Drilling induced heat

Drilling induces heat and "ski-hill" shaped excess strains (Figure 2-7). This phenomenon is mainly observed for deep stress measurements (Martin, 2007). A simple axisymmetric thermo-mechanical (TM) numerical simulation of drilling induced thermal effects during overcoring was conducted as shown in Figure 2-8. These simulations are based on the following assumptions: (1) temperature increase of 50°C at the interface between the drill bit and the rock interface; (2) velocity of the coring advance equal to 10 mm per 60 seconds; and (3) heat conduction in the rock through turbulent convection cooling the walls of the borehole with water flushing. The results for the in situ stress solutions obtained with and without consideration of the thermal strains from the numerical simulation and for the coring advances at points *a*, *b* and *c* are shown in Figure 2-9. The results show that, at the end of overcoring (coring advance at point *a*), thermal effects result in an increase of approximately 24%, 36% and 75%, for the magnitudes of the maximum, intermediate and minimum principal stresses, respectively. For the coring advance at point *b*, these increases are 34%, 58% and 100%, respectively. For the maximum principal stress, the difference in the bearing obtained with and without consideration of the thermal effects is within 1°, but the thermal effects result in a variation of the dip angle of 19°. Thermal effects result in similar magnitudes for the intermediate and minor principal stresses, so their orientations are not well defined.

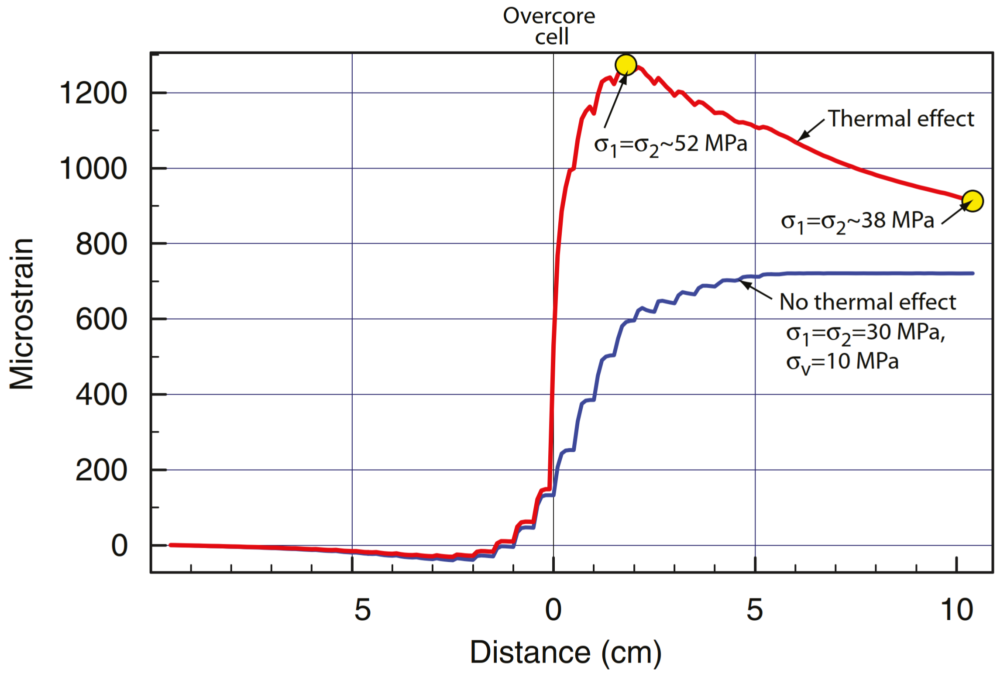


Figure 2-7. *Influence of drilling induced thermal effects on the strain response during overcoring (extracted from Martin, 2007).*

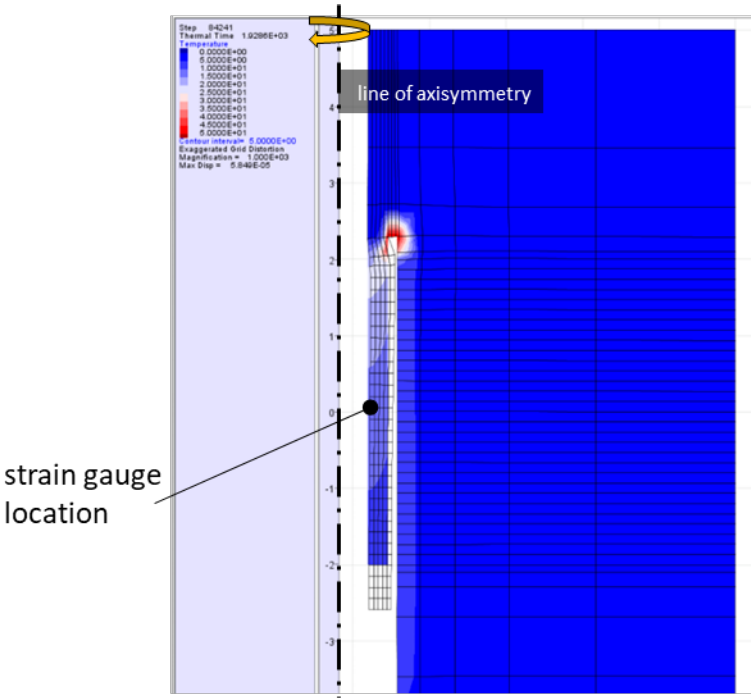
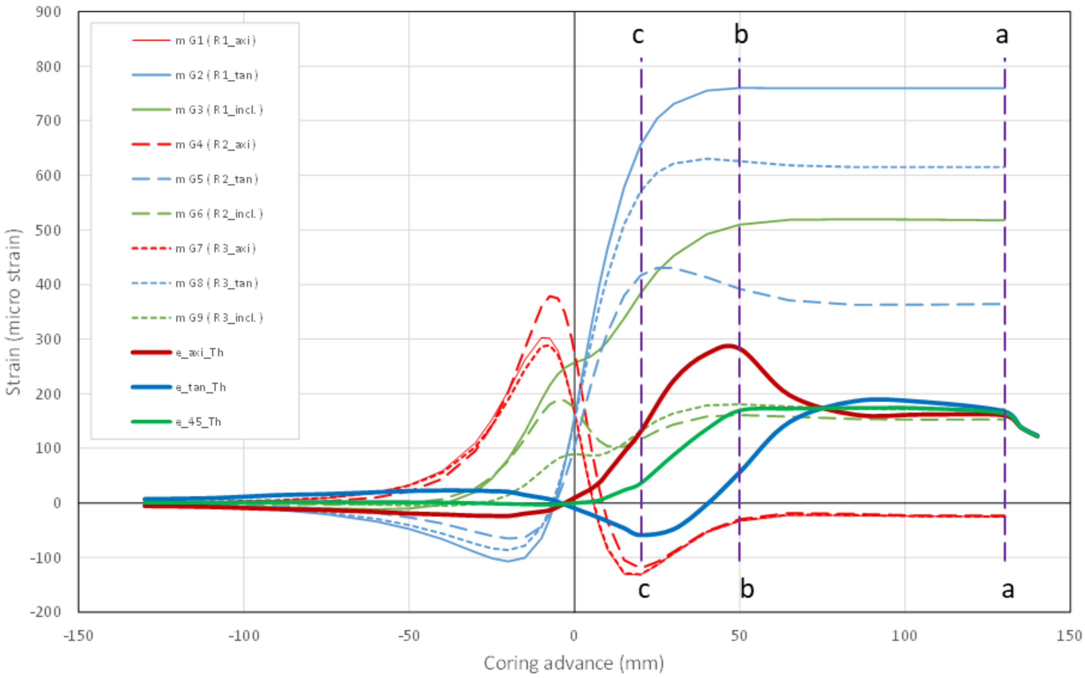


Figure 2-8. *Numerical modelling of drilling induced thermal effects during overcoring.*



Case	σ1			σ2			σ3		
	mag	bearing	dip	mag	bearing	dip	mag	bearing	dip
No thermal strains	**30.0**	**280**	**0**	**20.0**	**190**	**0**	**15.0**	**280**	**90**
coring adv **a** + th. strains	37.1	279	10	27.2	167	66	26.3	13	22
coring adv **b** + th. strains	40.4	279	13	31.5	141	73	30.0	12	11
coring adv **c** + th. strains	27.7	280	19	21.3	94	71	20.2	189	2

Figure 2-9. *Strains and principal stresses (magnitude, orientation) obtained from the numerical model, with and without consideration of the drilling induced thermal strains.*

2.3.2 Glue

The hardening of the epoxy glue used to bond strain gauges to the borehole rock surface is a chemical reaction, which depends on the curing time and the temperature. If the temperature after finishing the overcoring continues to increase high enough that the glue is softened, a high drift will be observed in the overcoring strain curves. This effect is not observed during the biaxial testing on the overcored rock core, because the glue has hardened again. In Lahaie et al (2010), an in situ study of the effect of curing time on the quality of overcoring stress measurements using CSIRO Hi cells, was conducted. The tests were conducted in an argillite rock at a temperature of 12 °C. The results of the experiments showed that the conventional curing time (16 hours) was insufficient and leads to anomalous response in strain readings during overcoring stress measurements (Figure 2-10). In low temperature near-surface environments, much longer times may be needed in order to ensure good quality stress measurements.

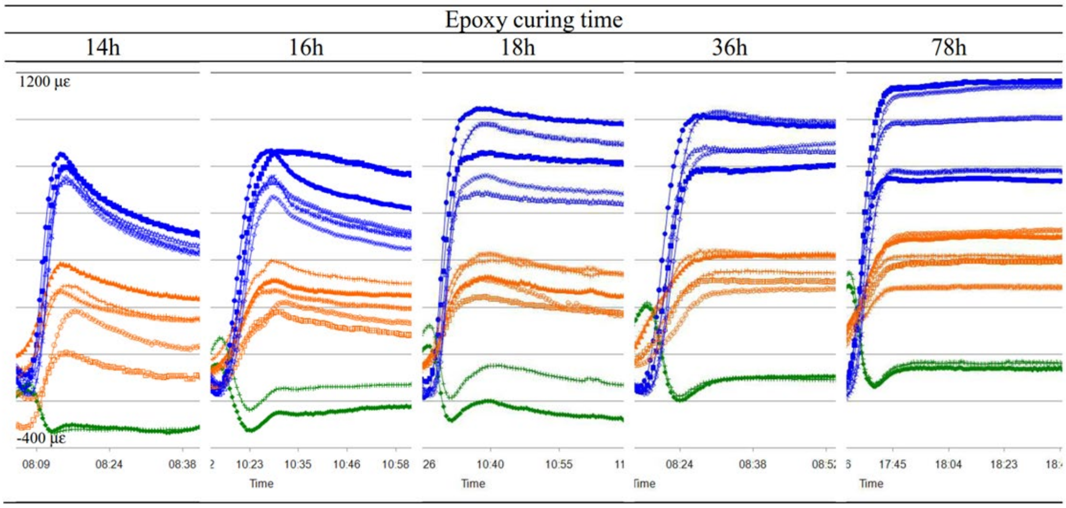


Figure 2-10. *Effect of the curing time of the glue on the strain curves during overcoring: from left to right, the strain responses of CSIRO Hi cells to overcoring are shown when the latter is performed at increasing curing times (extracted from Lahaie et al, 2010).*

Bertilsson (2007) reported laboratory tests conducted to determine the magnitude of the temperature dependence of the glue used for the Borre probe. In these experiments, the strain gauges were submerged in water that was heated while the Borre probe logger and the surroundings were kept at constant temperature. The equipment and laboratory set up are shown in Figure 2-11.

The test procedure comprised of first lacing strain gauges in a small cup of glue that after curing is heated and then by heating a lump of the cured glue in which a strain gauge rosette was mounted (Figure 2-12). Both the glue pot and the glue lump were allowed to cure under water, at room temperature (20–24°C) for three weeks before heating.

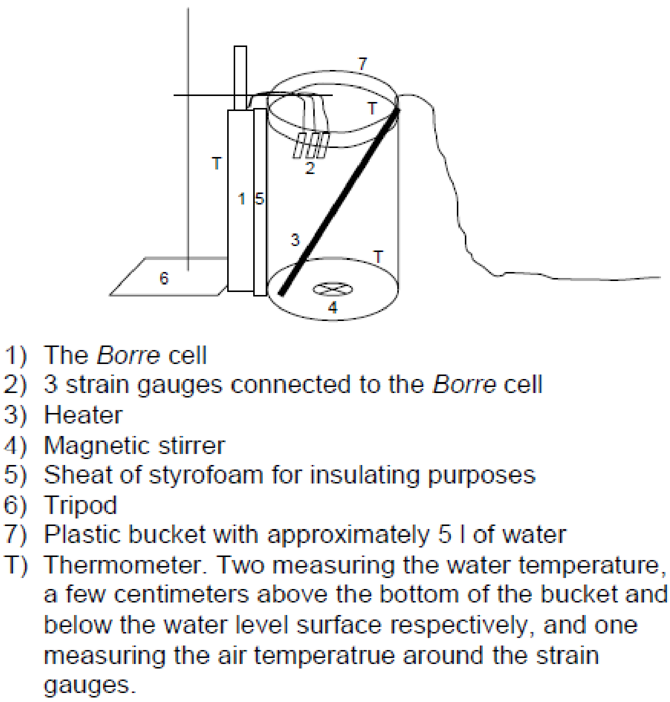


Figure 2-11. *Laboratory equipment and set up for testing the temperature dependence of the strain gauges (extracted from Bertilsson, 2007).*

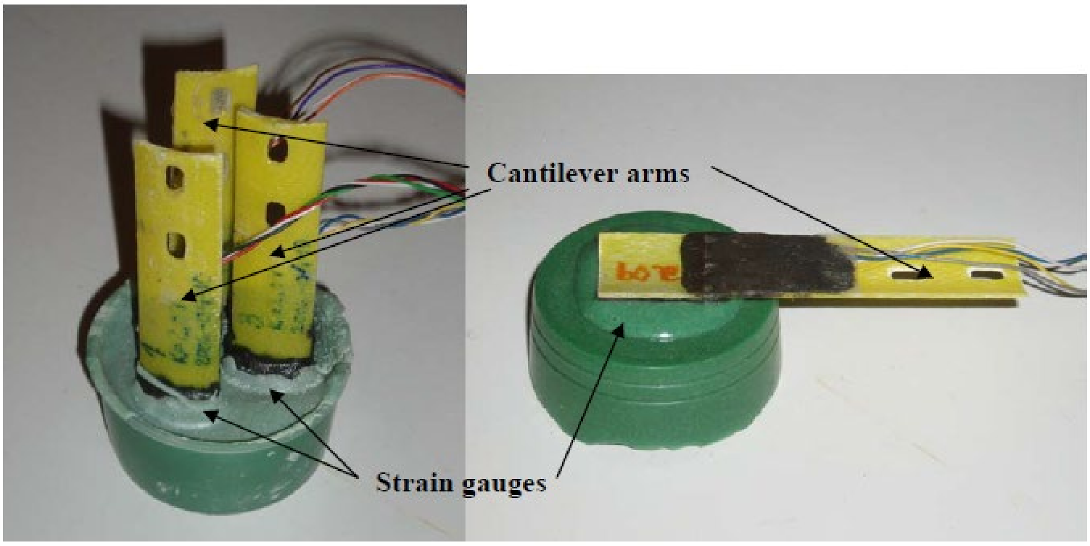


Figure 2-12. *Glue pot with three strain gauge rosettes (left) and glue lump with one strain gauge rosette (right) (extracted from Bertilsson, 2007).*

The tests showed that the glue might not be fully cured under field conditions in low water temperatures. When subjected to temperature increase, the curing of the glue is reactivated, causing shrinkage of the glue and affecting strain readings to be smaller in magnitude than the true value (Figure 2-13). Hence, this is opposite of heat-induced thermal expansion of a material. The longer time the glue is subjected to temperature increase, the more cross-links within the glue can be formed, resulting in additional shrinkage. If the glue is only subjected to a small temperature increase or if it is subjected to a high temperature increase but only for a short period of time, the reactivation of the glue might therefore not be detectable in the strain readings.

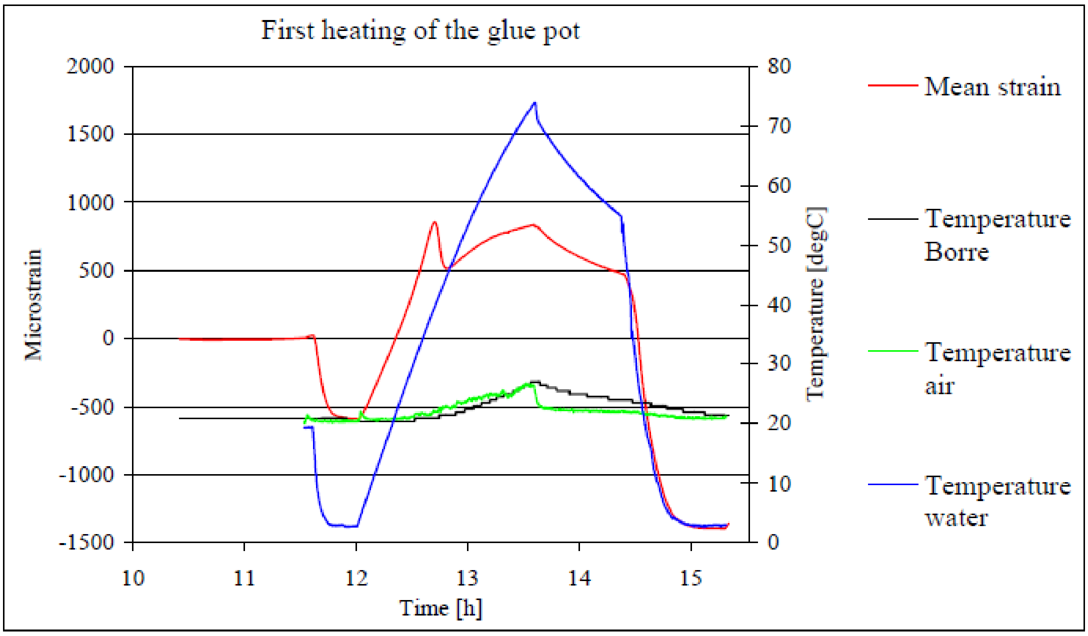
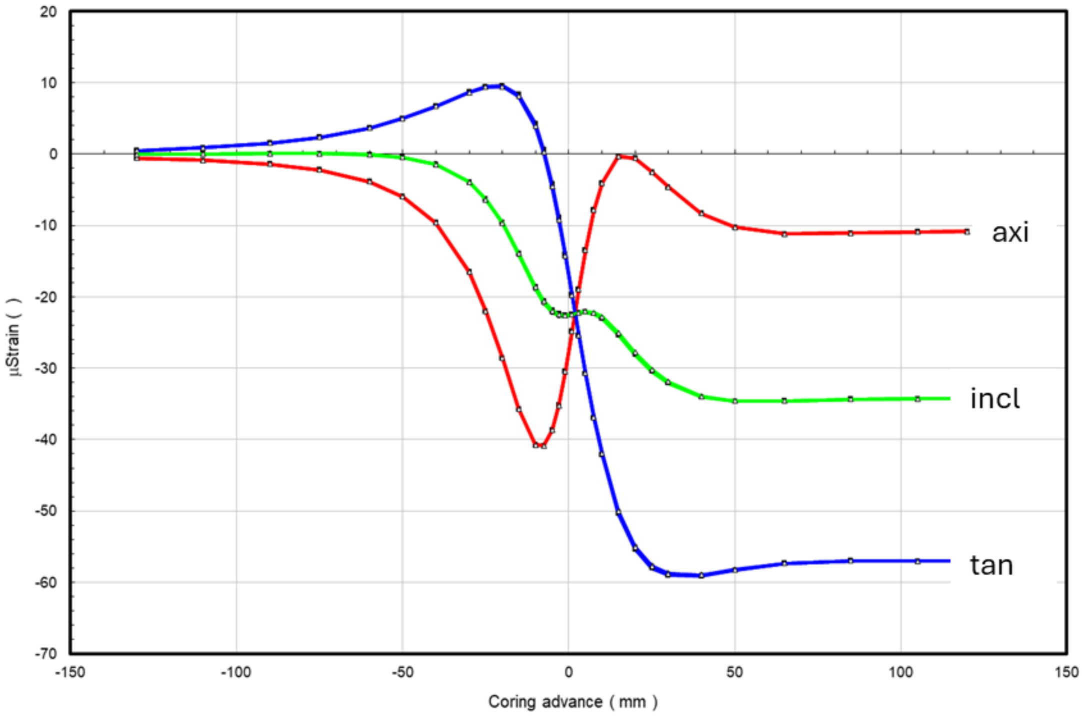


Figure 2-13. *Chart of recorded strains and temperature during heating and subsequent cooling of the glue plot. Note the difference in recorded mean strain at the end (after 15 hours) compared to the start of the experiment (from Bertilsson, 2007).*

2.3.3 Water pressure

The water pressure in the boreholes has an effect on the overcoring transient strains, which is the highest for the tangential strains. At the beginning of the overcoring, the water pressure affects the walls of the pilot hole and the top of the rock cylinder to be overcored. At the end of overcoring, the water pressure affects also the outer boundary of the overcored cylinder. Furthermore, if ring disking (due to high stresses acting perpendicular to the core axis) takes place, the water pressure also affects both disking fracture surfaces. This means that strain changes may be recorded even without any changes in stress or temperature. The rock is assumed to be non-porous for all cases.

All of the stress measurements conducted at Forsmark have been performed following the Method Description document of SKB, which in turn is largely based on the ISRM standard for overcoring measurements (Sjöberg et al, 2003; Christiansson and Hudson, 2003). These documents do not include suggestions to consider the possible effects of water pressure on the interpretation of the overcoring measurements. Hence, none of the interpretation of the stress measurements conducted at Forsmark has accounted for the effect of the water pressure on the strains and principal stresses. The OCS-code (Hakala, 2004) can be used to consider this effect of hydrostatic water pressure as an additional load (not effective stress). An example of the effect of the water pressure on the calculated principal stresses is shown in Figure 2-14. In this example, the overcoring strains are due to a column of water of 240 m in a borehole dipping 74°. If the water pressure is not considered in the stress solution, the magnitude of the principal stresses is decreased by the amount of the water pressure. Stress orientations are not affected by acting water pressure.



Case	σ1			σ2			σ3		
	mag	bearing	dip	mag	bearing	dip	mag	bearing	dip
240 m water pressure taken into account	**30.0**	**280**	**0**	**20.0**	**190**	**0**	**15.0**	**280**	**90**
Water pressure iqnored in solution	27.7	280	0	17.7	190	0	12.7	246	90

Figure 2-14. *Difference in calculated transient strains obtained with and without water pressure (top figure); lower strains without water pressure), and calculated principal stresses with and without water pressure (bottom).*

2.3.4 Core damage

Under high initial stresses acting perpendicular to the borehole axis, the overcore sample is susceptible to core damage in the form of microcracking in the rock or visible core disking of various kinds. Microfractures, without core disking, can result in changes in the axial and inclined strain gauges (Hakala and Sjöberg, 2006) without visible signs on the overcore sample (often requires thin section microscopy to identify with certainty). The initial signs of core disking may also be difficult to identify, but sudden significant changes in the strain curves from both axial and inclined strain gauges in the same direction, can indicate the occurrence of core disking (Figure 2-15). Moreover, for cases when all strain readings are unstable (as shown in Figure 2-16), this may be an indication of microcracking and incipient core disking. Core disking has an effect on the stress determination with the assumption of linear-elastic rock behaviour being violated, which lowers the ranked reliability of the measurement and potentially the measurement is rejected.

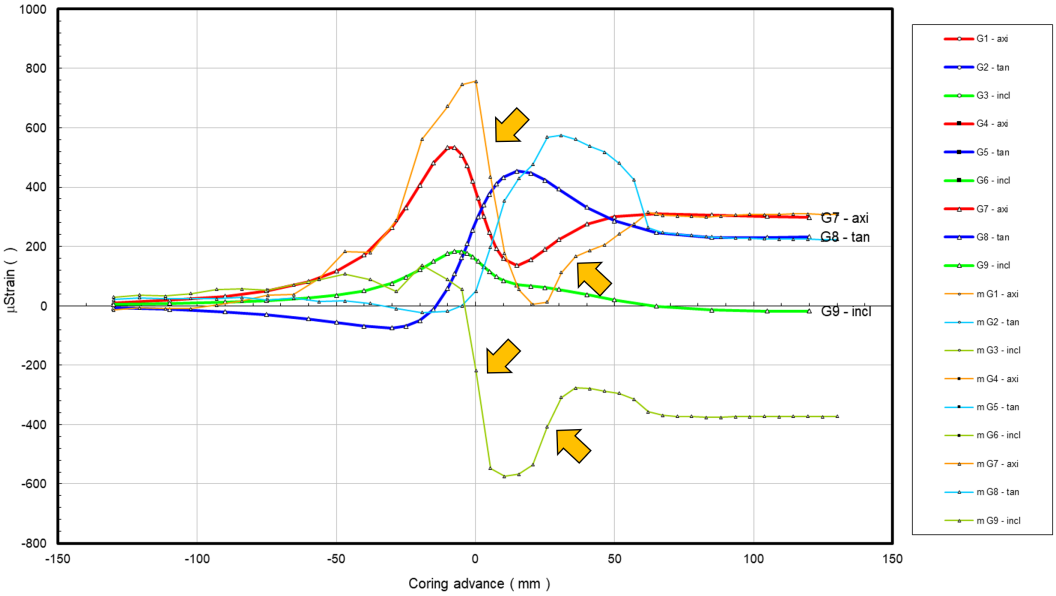


Figure 2-15. *Core disking indicated from the axial and inclined strain gauge readings: G1, G2, G3 are the strain gauges from rosette 1; G4, G5, G6 are the strain gauges from rosette 2; G7, G8 and G9 are the strain gauges from rosette 3; axi, tan and incl are the axial, tangential and inclined strain gauges, respectively.*

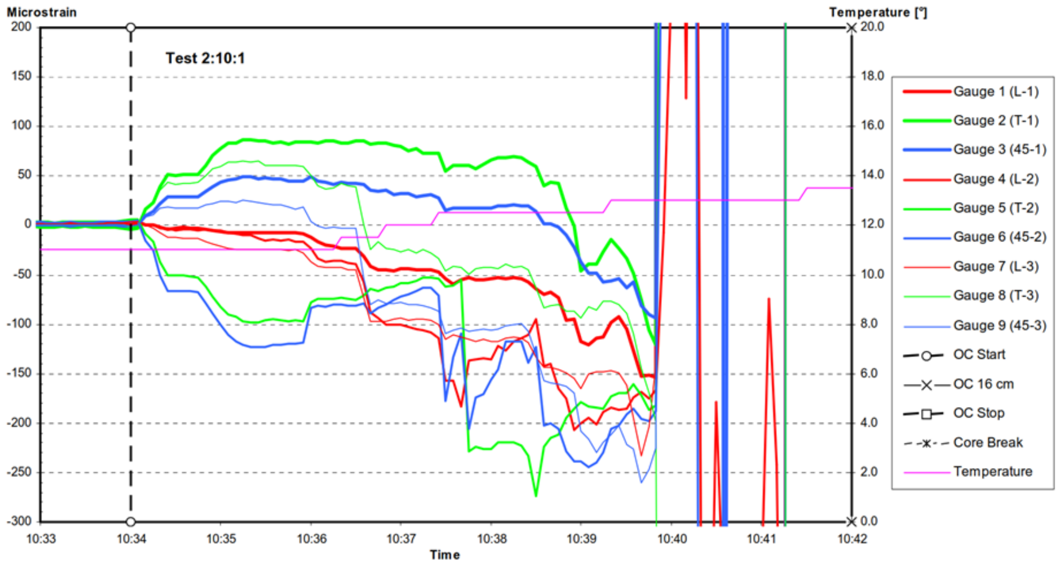


Figure 2-16. *Core disking indicated from the instability of all strain readings before the core advance passes through the section of the strain gauges.*

2.3.5 Elastic constants

The elastic modulus (Young's modulus) is of high importance because it affects directly the interpreted stress magnitudes. The stresses are directly proportional to the elastic modulus. The effect of the Poisson's ratio on the interpreted stresses is much smaller than that of the elastic modulus; an increase in Poisson's ratio by 25% results in an increase in the magnitudes of the maximum and intermediate principal stresses of 3% and 10% for the magnitude of the minimum principal stress.

For the case of a homogeneous rock mass, the elastic constants have practically no effect on the interpreted principal stress orientations. The anisotropy in the deformation defined by the ratio between the independent elastic moduli in two orthogonal directions, normal and parallel to the transversely isotropic plane, *E* and *E'*, needs to be greater than 1.14–1.33 to result in significant variations of the stress magnitudes (Amadei and Goodman, 1982). If the Saint-Venant principle is not valid, the transversely isotropic solution for the elastic constants cannot be obtained, since the shear modulus *G'* cannot be determined. Hence, the solution for the stress magnitudes and orientations is not accurate. At Forsmark, most of the rock is homogenous, but initial core disking can induce anisotropy in the elastic constants, thus influencing the interpreted stresses. So far, no anisotropic solutions have been applied to determine the transversely isotropic elastic constants and obtaining the corresponding stress solution.

For the isotropic solution, Young's modulus is determined from biaxial testing of the overcored sample. The secant modulus for the unloading phase (since this mimic the overcoring process) is used, and averaged for all three strain gauge rosettes, under the assumption of isotropic behaviour; i.e., the same value on *E* is used for all gauges in the stress calculation.

2.3.6 Tensile stresses

Tensile stresses may lead to core disking which results in a decrease of the stress measurements reliability. The OCS-code (Hakala, 2004) is used to calculate the trajectory of the maximum values for the maximum principal stress (*s1,MAX*), minimum principal stress (*s3,MAX*), and principal stress difference *(s1-s3)max*, as indicated in Figure 2-17. By considering the water pressure, the existence of tensile stresses is investigated through the comparison of the maximum tensile stress (green curve) with the tensile strength (18 MPa; SKB, 2008) for the rock at Forsmark. The interpreted stress state is most likely unreliable if the calculated tensile stresses are significantly higher than the tensile strength for the rock (Figure 2-17) and no signs of macroscopic core disking are visible.

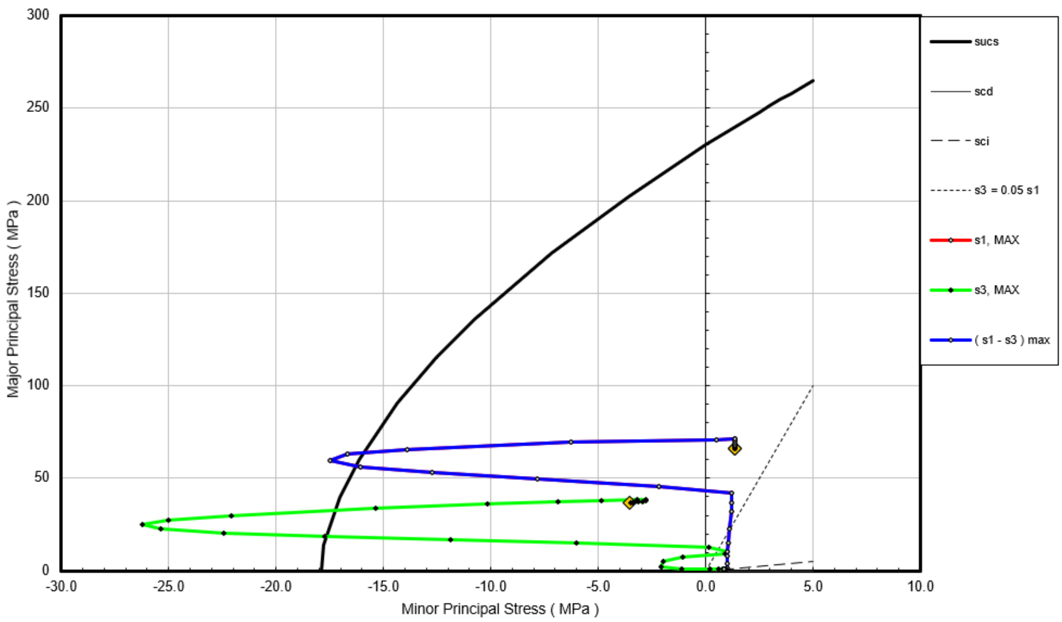


Figure 2-17. *Stress path for the maximum and minimum principal stresses during the overcoring and tensile strength envelope (results for the borehole KFM07C at the depth of 94.76 m); the curve for s1,MAX is coincident with the (s1-s3)max curve.*

3 Stress measurement ranking system

3.1 Ranking of the elastic constants

The reliability of the elastic constants is assessed by first subdividing the data into three data sets (A, B, C), according to the origin of the determined parameters.

- Data Set A: The elastic constants are determined at the location of the in situ stress measurements when the data from biaxial testing conducted on the overcored rock cores are available.
- Data Set B: The elastic constants are determined at the location of the in situ stress measurements, but no data from the biaxial testing on the overcored rock cores are available.
- Data Set C: The elastic constants are determined by averaging the elastic constants obtained from several biaxial tests conducted in rock specimens obtained at locations near the overcoring tests (the source of biaxial testing data is unknown, and the availability is irrelevant).

The ranking of the reliability is further based on two criteria: (1) linearity of the strain response during the biaxial tests, and (2) variability of the Young's modulus, assessed through the calculation of the standard deviation from laboratory test data for the same rock type (data from SKB, 2008). These criteria were applied as follows:

- Data Set A: Comparison of the values, for each strain rosette, to the average strains from all accepted rosettes.
- Data Set B: Comparison of the difference between the reported elastic modulus value and the mean and standard deviation values for the same rock type.
- Data Set C: Comparison of the difference between the reported elastic modulus value and the mean and standard deviation values for the same rock type, as done in case B.

Based on the calculated standard deviation for Young's modulus, the reliability of the elastic constants is assessed according to Table 3-1.

Table 3-1 Ranking of the reliability of the elastic constants from biaxial testing data.

Criteria	Description
Good	Standard deviation ≤ 15%
Moderate	15% < Standard deviation ≤ 25%
Poor	25% < Standard deviation ≤ 40%
Rejected	Standard deviation > 40%

3.2 Ranking of the transient strains

The reliability of the transient strains is assessed with the help of the OCS-code (Hakala, 2004). The transient elastic strains calculated with the OCS-code are based on the: (1) interpreted in situ stress, (2) elastic constants, (3) borehole orientation, (4) orientation of the Borre probe in the borehole, (5) applied coring loads (drill bit pressure, drill bit shear stress, and borehole water pressure), (6) inverse solution for the in situ state of stress based on the transient strains for a given core advance, and (7) calculated state of stress of the overcored rock core in order to estimate the potential for core disking.

From the 135 entries in the SICADA database for Forsmark, there are 133 conducted overcoring stress measurements (one entry with no data – KFM01B, 2:5:1, and one entry for an inverse stress solution not used – KFM01B, 1:4:1). Out of these, 41 measurements have no strain data, 50 measurements have strain data obtained only at the end of the overcoring, and 42 measurements have strain data obtained throughout the entire overcoring process. The stress measurements without strain data are historic measurements prior to the use of the Borre probe with data logger.

The overall reliability of the transient strains is assessed by considering several factors: (1) stability of the strain gauge readings before overcoring, (2) verification of the strains from overcoring within the range of the elastic transient strains, (3) reliability of the readings from the strain gauges, (4) stability of the inverse stress solution after passing gauges over a specific overcoring advance after which resulting magnitudes of the maximum, intermediate and minimum principal stresses should practically not change, (5) stability of the inverse stress solution after passing gauges over an overcoring advance after which resulting orientations of the maximum, intermediate and minimum principal stresses should practically not change, (6) reliability for the elastic stress conditions by considering the water pressure, and (7) core disking observed within ±130 mm from the section of the strain gauges.

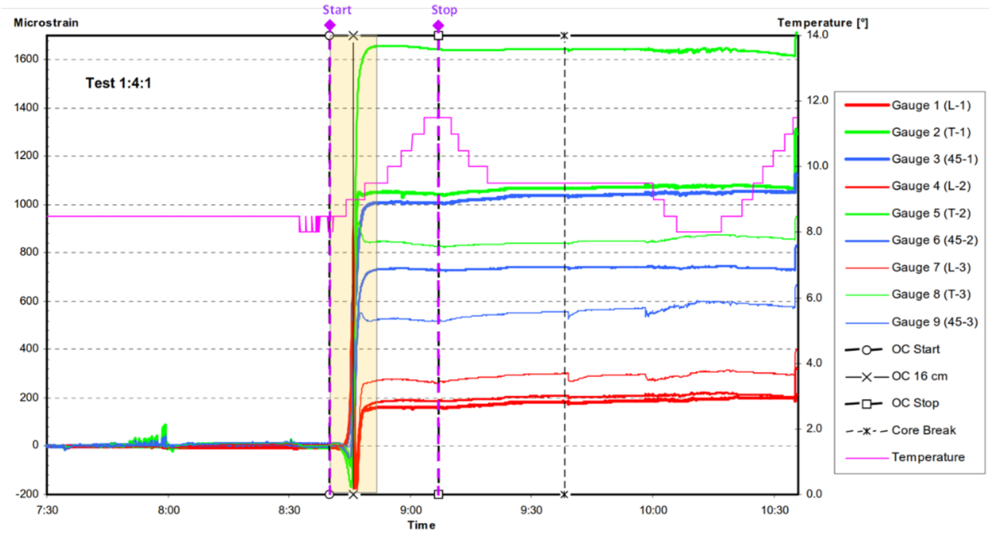
For (1), the number of strain gauge readings considered to be stable per total number of strain gauges, is evaluated. For (2), the number of strain gauge readings being stabilised within the elastic region per total number of strain gauges, is evaluated. For (3), a correlation between the number of good, moderate, and poor transient strain gauges, is made. For Data Set A, the ranking of the reliability of the transient strains is based on the overall shape of the measured strain curves and the difference between the measured strains and the transient strains calculated with the OCS-code for the reported stress states. For each strain gauge, these differences are calculated as the maximum ratio between the measured and calculated strains, during (transient curves) and end of overcoring. For the Data Set B, the ranking of the reliability is based on the difference between the final measured and calculated strains for the reported stress states. For the Data Set C, the reliability of the stress measurements is not estimated. The criteria for ranking the reliability of the transient strains are presented in Table 3-2.

Table 3-2 Criteria for the ranking of the reliability of the readings from strain gauges: the maximum relative difference is calculated as the maximum ratio between the measured and calculated strains, during (transient curves) and at the end of overcoring.

Criteria	Description
Good (<15%)	Maximum relative difference of one tangential or inclined strain gauges within 0.75-1.25 or all axial strain gauges strains within 0.5-2.0. General good agreement between the measured and calculated strain curves.
Moderate (<25%)	Maximum relative difference of one tangential or inclined strain gauges within 0.50-1.50 or axial strain gauges greater than 0.5-2.0. Measured and calculated strains agree moderately well, or the difference in the strains is ranked as *Good* but the measured and calculated strain curves do not agree.
Poor (>25%)	Maximum relative difference of one tangential or inclined strains greater than 0.5-1.5 or the difference between the measured and calculated strains for several tangential or inclined strain gauges is ranked as *Moderate*. The trend of the measured and calculated strain curves does not agree.
Rejected	Maximum relative difference of one or more tangential or inclined strain gauges is not within 0.5-2.0. The trend of the measured and calculated strain curves does not agree, or the strain curves are unstable.

For (4) and (5), the state of stress for a specific overcoring advance (0 mm is at strain gauge location), from which magnitudes should practically not change, is calculated. Rank values are for maximum, intermediate, and minimum principal stresses. The general rank value is for the maximum principal stress. For (6), the ratio between the maximum tensile strength *T* (18 MPa from SKB, 2008) for the rock type and the maximum value of the minimum principal stress (*s3,MAX*) of the overcored rock core obtained with the OCS-code, is calculated. The reliability is ranked as *Good* if the ratio is greater than 1.2, *Moderate* if the ratio is between 0.8 and 1.2, and *Poor* if the ratio is less than 0.8. For (7), the assessment of the occurrence of core disking is based on reports with the results of the stress measurements. The rank value is *Good* if no core disking is observed and *Poor* if it is observed.

Figure 3-1 shows an example of reliable strain curves obtained from overcoring. The figure shows that the effect of the temperature on the measured strains is fairly small. The final and initial temperatures are very similar, and the maximum increase in measured temperature during the overcoring is 3 °C (note that this is not measured at the strain gauge position, see Section 2.2). Figure 3-2 shows a comparison between the measured and calculated strains for the three rosettes.



Flushing start	03-10-02	08:30:00
Rotation start	03-10-02	08:40:00
Overcoring start	03-10-02	08:41:00
Overcoring 16 cm	03-10-02	08:46:00
Overcoring 30 cm	03-10-02	08:52:00
Overcoring stop	03-10-02	09:07:00
Flushing off	03-10-02	09:23:00
Core break	03-10-02	09:38:00
Core retrieval start	03-10-02	09:55:00
Core & probe on surface	03-10-02	10:20:00
End of strain registration	03-10-02	10:40:15
Calculation of strain difference: OC Start	03-10-02	08:40:00
Calculation of strain difference: OC Stop	03-10-02	09:07:00
Overcoring advance	Overcoring rate [cm/min]	
0 – 16 cm	3	
16 – 30 cm	3	
30 cm – overcoring stop	3	

Figure 3-1*. Variation as a function of time of the strains during overcoring.*

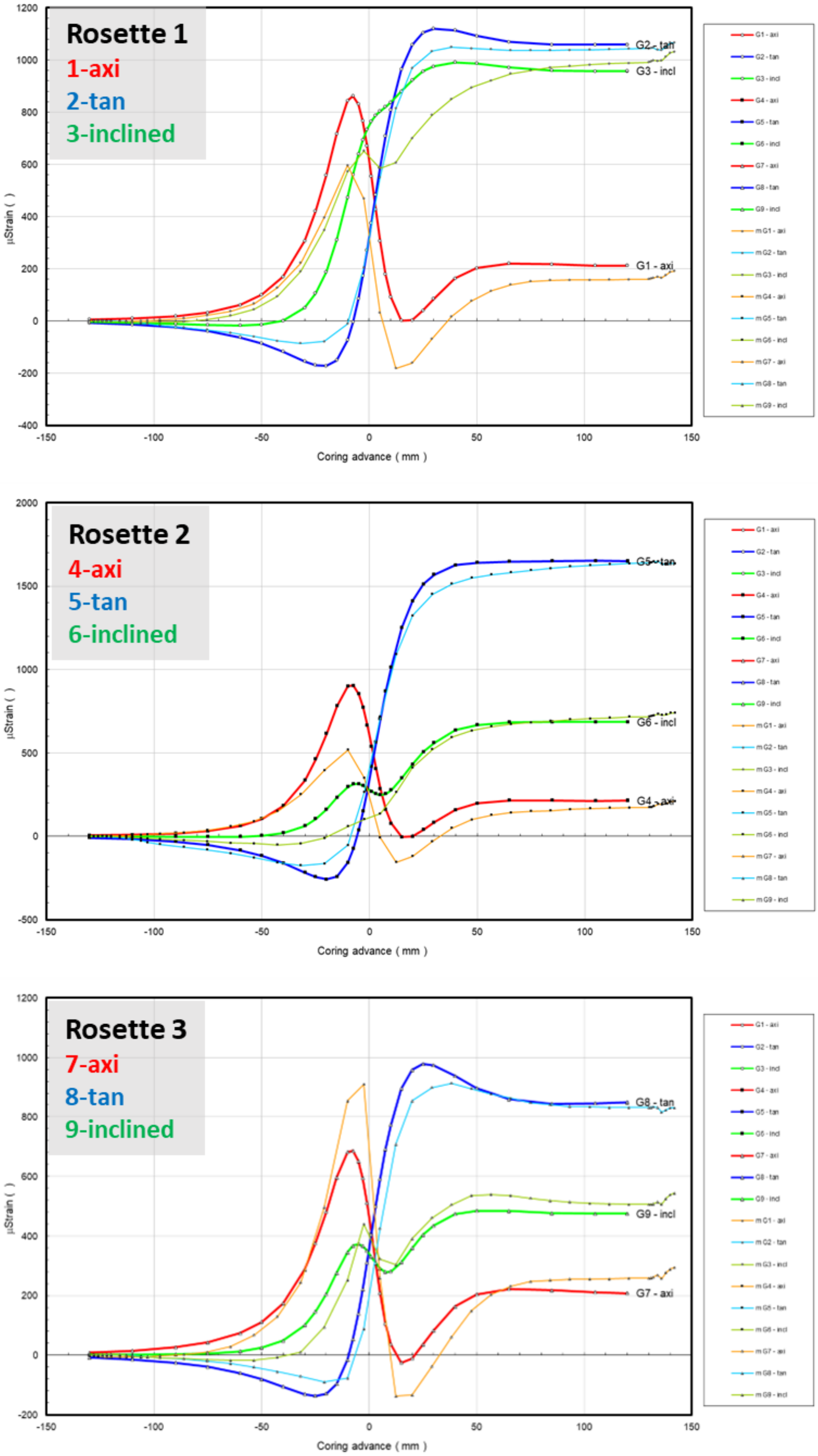


Figure 3-2. *Measured strains from overcoring and transient strains calculated with the OCS code in the three strain rosettes: G1, G2, G3 are the strain gauges from rosette 1; G4, G5, G6 are the strain gauges from rosette 2; G7, G8 and G9 are the strain gauges from rosette 3; axi, tan and incl are the axial, tangential and inclined strain gauges, respectively.*

The overcoring data are subdivided into three data sets (A, B, C), according to the origin of the data and the availability of the transient strains. Note that the same notation (A, B, C) was used for both overcoring and elastic constants data sets, although this corresponds to different data sets.

- Data Set A: stress measurements with transient strains data available;
- Data Set B: stress measurements without transient strains data available (only final strain readings are available); and
- Data Set C: stress measurements without transient strains data available (only the in situ stress state is determined and the overall reliability of the measurements cannot be estimated).

For Data Set A, the ranking of the reliability of the overcoring strain curves is based on the overall shape of the measured strain curves and the difference between the measured strains and calculated strains with the OCS-code for the reported stress states. For Data Set B, no ranking of the overall strain reliability was conducted, but only ranking of the elastic constants and variability of the stress solution. For Data Set C, the transient strains data are not available, and hence the reliability of the overcoring strain curves is not estimated.

For Data Set A, several key aspects are taken into consideration. Before and after the overcoring, the strain readings should be stable. No drift in the strain curves should be observed, although water flushing can result in a drift in the strain curves. If a drift is found, it should be compared with the magnitude of the final strains. Changes in temperature should have a minor effect during the flushing stage because the water does not circulate near the section of the strain gauges. The response of the strain gauges should be continuous from the start of the overcoring, which is always between 160 mm before and 130 mm (at least) after the section of the strain gauges. Usually, the total length of the overcored core is at least 300 mm, and quite often up to 1 m. After 130 mm of the section of the strain gauges, the curves of the measured strains should be stable until the overcored core is broken. The elastic response of the measured strains is found between 130 mm before and after the section of the strain gauges. The end of the overcoring and termination of flushing can induce a shift in the measured strain curves, but no drift. Any drift or shift in the measured strain curves, not caused by drilling, is related to an undesired disturbance, such as significant changes in temperature, core disking, and reactivation or debonding of the strain gauge glue.

3.3 Ranking of interpreted stress state

For Data Sets A and B, the reliability of the interpreted stresses is estimated through the quantification of the variability of the magnitude and orientation of the principal stresses. The variability is quantified by leaving one gauge at the time from the stress solution and calculating the standard deviation of the stress magnitudes and the 95% confidence intervals for the stress orientations. The criteria presented in Table 3-3 are applied.

Table 3-3 Criteria for the ranking of the reliability of the interpreted stress state.

Criteria	Standards deviation of magnitude	Deviation of orientation (95% confidence interval)
Good	≤ 15%	≤ 15°
Moderate	15% < … ≤ 25%	15° < … ≤ 25°
Poor	25% < … ≤ 45%	25° < … ≤ 45°
Rejected	> 40%	> 40°

3.4 Overall ranking

For each reliability criteria (elastic modulus, transient strains, variability of stress solution), the reliability of the measurement is ranked as follows:

- *G – Good* reliability
- *M – Moderate* reliability
- *P – Poor* reliability
- *R* – Rejected reliability

The overall reliability considering Data Sets A, B, and C is estimated through the combination of the estimated reliability for the elastic modulus, transient strains, and variability stress solution, and selection of the worst case from any of these. This is accessed separately for each magnitude and orientation of the principal stresses, magnitude and orientation of the horizontal stresses, and magnitude of the vertical stress component. An example of how the ranking system is applied is shown in Table 3-4 and Table 3-5. In the tables, the stress measurement results and the vertical depths for each measurement point are extracted from the SICADA database *SKBdata_24_047_01*.

Table 3-4 First part of the analysis – Applied ranking for stress measurement 1:4:1 conducted in borehole KFM01B at a vertical depth of 229.46 m: measurement data, reliability of Young's modulus, and reliability of recorded strains.

SICADA					s1			s2			s3						
ID order	BH	Test	Vertical depth (m)	Rock Type	Mag. [MPa]	Dip [°]	Bearing [°]	Mag. [MPa]	Dip [°]	Bearing [°]	Mag. [MPa]	Dip [°]	Bearing [°]	sH MPa	Bearing	sh MPa	sV MPa
59	KFM01B	1:4:1	229.46	Granite	50.5	42.4	101.6	37.4	38.9	324.0	29.6	22.8	214.2	44.1	112.5	31.3	42.2

ID order	Reliability of Young's modulus: E-data set	E_rep. GPa (Average)	E_rt GPa (Average)	E-E_rt (Average)	E-reliability	Reliability of recorded strains: OC-data set	Stability before overcoring	All strains take place within elastic region	Reliability of transient strains	Stability of transient stress magnitudes	Stability of transient stress orientations	Stress solution based on strains in the end of elastic	Reliability for elastic stress condition with water pressure	Core disking	**Overall Strain Reliability**
59	A	57	64	-12%	G	A	G	G	G	G	G	Y	P	N	**G/P**

Table 3-5 Second part of the analysis – Applied ranking for stress measurement 1:4:1 conducted in borehole KFM01B at a vertical depth of 229.46 m: variability of stress solution and overall reliability per data set.

SICADA				Variability of stress solution									
ID	BH	Test	Vertical depth (m)	s1		s2		s3		sH		sh	sV
				mag	ori	mag	ori	mag	ori	mag	ori	mag	mag
59	KFM01B	1:4:1	229.46	G	P	G	P	P	P	G	G	P	M

ID	Overall reliability: Data sets		s1		s2		s3		sH		sh	sV
	Y.m.	T.Strain	mag	ori	mag	ori	mag	ori	mag	ori	mag	mag
59	A	A	A-M	A-P	A-M	A-P	A-P	A-P	A-M	A-M	A-P	A-M

4 Ranking of Forsmark overcoring stress data

4.1 Included stress measurements

From 1975 to 2006, overcoring stress measurements have been conducted in 12 boreholes, between the depths of 4 and 500 m, as shown in Table 4-1. The number of stress interpretations made from each borehole ranges between 4 and 30. The stress interpretation is made in terms of principal stresses as well as horizontal and vertical stresses, with exception of boreholes KFK041 and TFKB12, where only the horizontal and vertical stresses are interpreted. Only Sicada data base reported test results are considered.

Table 4-1 Overcoring stress measurements conducted at Forsmark.

Borehole	Stress interpretations		Vertical depth range		Year	Reports
	Principal	Hor./Vert.	[m]	[m]		
KFK001 (DBT1)	30	30	11.48	499.38	1981	P-03-119 (Perman and Sjöberg, 2003) SSPB 5:1 (Swedish State Power Board, 1982)
KFK003 (DBT3)	20	20	19.17	245.44	1981	P-03-119 (Perman and Sjöberg, 2003), SSPB 5:1 (Swedish State Power Board, 1982)
KFK041	-	8	3.31	28.41	1976	SSPB 5:1 (Swedish State Power Board, 1982), Hiltscher and Strindell, 1976
KFM01B	5	5	229.46	453.04	2003	P-04-83 (Sjöberg, 2004) P-05-66 (Lindfors et al. 2005)
KFM02B	13	13	104.45	295.08	2006	P-07-205 (Lindfors et al. 2007a)
KFM07B	5	5	51.88	55.57	2005	P-06-93 (Lindfors, 2007)
KFM07C	16	16	94.76	314.56	2006	P-07-130 (Lindfors et al. 2007b)
KFR27	10	10	37.91	140.46	1991	-
KFR51	10	10	58.16	73.89	1981	-
KFR52	5	5	69.37	72.61	1981	-
KFR89	4	4	10.82	16.78	1984	-
TFKB12	-	4	72.34	74.96	1975	SSPB 5:1 (Swedish State Power Board, 1982)

4.2 Considerations in the transient strain analysis

Transient strain analysis has been carried out for all measurements where possible and reasonable. For the stress measurements where a drift in the strain curves during and after the elastic range is observed, determining the final strain readings is not straight forward. Two approaches have been used:

1) Pick the strain values from elastic response range after certain minimum or maximum transient strains;
2) Pick the strain values after the drift in the strain curves. However, if the drift is conclusively due to glue reactivation, the approach indicated in (1) should be used instead.

The approach indicated in (1) is used in the stress measurements conducted in borehole KFM01B. The approach indicated in (2) is used for almost all the stress measurements conducted in boreholes KFM02B, KFM07B and KFM07C.

If the drift in the overcoring strain curves is caused by temperature changes, the approach indicated in (1) can be more appropriate. The minimum and intermediate principal stresses are the components more susceptible to thermal effects. If the reason for the drift in the overcoring strain curves is unknown, the error in the stress solution is minimised by using early strains near the second local minimum or maximum, which makes the approach indicated in (1) more appropriate.

4.3 Stress measurement reliability ranking results

The results of the ranking of the transient strains are presented in Appendix 1. The ranking of the elastic constants, transient strains, interpreted stress state, and overall ranking is presented in Appendix 2. In the table presented in the Appendix 2, *E_rep* is the elastic modulus presented in the SICADA database, and *E_rt* is the average elastic modulus per rock type at the Forsmark site (SKB, 2008). The difference ratio (*E_rep - E_rt)/ E_rt* shows how much different (higher/lower) the modulus used in the stress interpretation is compared to the average values per rock type at the site. It should be noted that these two values do not necessarily need to agree. Local geological variations at the test scale may result in a higher or lower Young's modulus than the mean value for a particular rock type. Loading conditions are also different for these two values, with *E_rt* coming from uniaxial compressive tests in the laboratory and *E_rep* coming from biaxial tests.

Furthermore, it should be noted that the ranking of the reliability of the principal stresses and horizontal and vertical stresses does not need to be the same. As the difference of the plunge angles increases from 0 or 90°, the difference in magnitudes between the principal and horizontal/vertical stresses increases.

The summarised results for the ranked stress reliability are presented in Table 4-2. For these data, 33 of the stress measurements from Data Set B have Good reliability for the magnitude of the maximum principal stress (denoted B-G in Table 4-2), while for Data Set A, only one measurement has Good reliability (denoted A-G in Table 4-2). Considering that Data Set B does not have the transient strain data (which Data Set A have), and only seven independent strain directions are sampled, the reliability ranked as *Good* should not be regarded as satisfactory. The lack of the transient strain data does not, however, necessarily mean that these stress measurements are poor, incorrect, or unreliable. It was observed that by considering only the variability of the interpreted stress state, 94% of the magnitudes of the maximum principal stress in Data Set B were ranked as *Good*, while in Data Set A this fraction is only 45%.

Table 4-2 Summary of the results for the ranking of the elastic constants, transient strains, interpreted stress state and overall reliability.

	SICADA			Variability of stress solution										Overall reliability											
ID	BH	Test	Vertical depth (m)	s1		s2		s3		sH		sh	sV	Data sets		s1		s2		s3		sH		sh	sV
				mag	ori	mag	ori	mag	ori	mag	ori	mag	mag	Y.m.	T.Strain	mag	ori	mag	ori	mag	ori	mag	ori	mag	mag
1	KFK001	1.1	11.48	G	P	P	P	R	G	G	P	P	R	C	B	B-G	B-P	B-P	B-P	B-R	B-G	B-G	B-P	B-P	B-R
2	KFK001	1.2	28.97	M	M	M	P	R	G	M	M	P	R	C	B	B-M	B-M	B-M	B-P	B-R	B-G	B-M	B-M	B-P	B-R
3	KFK001	1.3	29.57	G	M	P	M	R	G	M	P	P	R	C	B	B-G	B-M	B-P	B-M	B-R	B-G	B-M	B-P	B-P	B-R
4	KFK001	1.4	47.98	M	M	M	M	R	M	M	M	R	R	C	B	B-M	B-M	B-M	B-M	B-R	B-M	B-M	B-M	B-R	B-R
5	KFK001	2.1	69.02	G	M	M	M	R	G	G	M	P	R	C	B	B-G	B-M	B-M	B-M	B-R	B-G	B-G	B-M	B-P	B-R
6	KFK001	2.2	87.61	M	M	P	M	R	G	P	M	R	R	C	B	B-M	B-M	B-P	B-M	B-R	B-G	B-P	B-M	B-R	B-R
7	KFK001	2.3	88.23	G	M	P	P	R	G	G	M	P	R	C	B	B-G	B-M	B-P	B-P	B-R	B-G	B-G	B-M	B-P	B-R
8	KFK001	3:1	131.22	G	R	M	R	R	P	G	P	P	M	B	B	B-M	B-R	B-M	B-R	B-R	B-P	B-M	B-P	B-P	B-M
9	KFK001	3:2	131.79	G	M	G	R	R	R	G	M	P	G	B	B	B-G	B-M	B-G	B-R	B-R	B-R	B-G	B-M	B-P	B-G
10	KFK001	3:3	132.35	G	P	M	P	R	P	G	P	P	G	B	B	B-M	B-P	B-M	B-P	B-R	B-P	B-M	B-P	B-P	B-M
11	KFK001	3:4	134.02	G	M	M	R	R	R	G	P	R	G	B	B	B-M	B-M	B-M	B-R	B-R	B-R	B-M	B-P	B-R	B-M
12	KFK001	4:1	163.15	G	R	M	R	R	R	G	P	R	M	B	B	B-M	B-R	B-M	B-R	B-R	B-R	B-M	B-P	B-R	B-M
13	KFK001	4:2	164.41	G	M	P	P	R	P	G	G	R	P	B	B	B-M	B-M	B-P	B-P	B-R	B-P	B-M	B-G	B-R	B-P
14	KFK001	5:1	192.38	G	M	M	P	R	P	G	M	R	M	B	B	B-G	B-M	B-M	B-P	B-R	B-P	B-G	B-M	B-R	B-M
15	KFK001	5:2	193.00	G	G	P	G	R	G	G	G	P	G	B	B	B-M	B-G	B-P	B-G	B-R	B-G	B-M	B-G	B-P	B-M
16	KFK001	6:1	216.51	G	M	P	R	R	M	G	P	R	M	B	B	B-M	B-M	B-P	B-R	B-R	B-M	B-M	B-P	B-R	B-M
17	KFK001	6:2	217.24	G	G	M	M	R	M	G	G	P	M	B	B	B-G	B-G	B-M	B-M	B-R	B-M	B-G	B-G	B-P	B-M
18	KFK001	6:3	244.55	G	R	G	R	R	R	G	G	P	M	B	B	B-M	B-R	B-M	B-R	B-R	B-R	B-M	B-G	B-P	B-M
19	KFK001	7:1	273.26	G	G	G	G	R	M	G	G	P	M	B	B	B-G	B-G	B-G	B-G	B-R	B-M	B-G	B-G	B-P	B-M
20	KFK001	7:2	273.93	G	G	G	M	R	R	G	G	P	M	B	B	B-G	B-G	B-G	B-M	B-R	B-R	B-G	B-G	B-P	B-M
21	KFK001	8:1	297.32	G	G	G	M	R	R	G	G	P	M	B	B	B-G	B-G	B-G	B-M	B-R	B-R	B-G	B-G	B-P	B-M
22	KFK001	8:2	297.95	G	G	M	M	R	P	G	P	M	G	B	B	B-G	B-G	B-M	B-M	B-R	B-P	B-G	B-P	B-M	B-G
23	KFK001	9.1	372.25	G	G	M	G	R	P	G	G	P	P	C	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-P
24	KFK001	9.2	374.99	G	G	M	G	R	P	G	G	P	P	C	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-P
25	KFK001	9.3	375.78	G	G	M	G	R	R	G	G	M	P	C	B	B-G	B-G	B-M	B-G	B-R	B-R	B-G	B-G	B-M	B-P
26	KFK001	10:1	420.20	G	G	M	G	R	P	G	G	P	M	C	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-M
27	KFK001	10:2	458.10	G	G	G	M	P	R	G	G	P	G	C	B	B-G	B-G	B-G	B-M	B-P	B-R	B-G	B-G	B-P	B-G
28	KFK001	11:1	483.34	G	G	M	M	P	P	G	G	P	M	C	B	B-G	B-G	B-M	B-M	B-P	B-P	B-G	B-G	B-P	B-M
29	KFK001	11:2	497.49	G	G	G	G	R	R	G	G	P	M	C	B	B-G	B-G	B-G	B-G	B-R	B-R	B-G	B-G	B-P	B-M
30	KFK001	11:3	499.38	G	G	M	G	R	P	G	G	P	M	C	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-M

Table 4-2 Summary of the results for the ranking of the elastic constants, transient strains, interpreted stress state and overall reliability (continued).

SICADA				Variability of stress solution										Overall reliability											
ID	BH	Test	Vertical depth (m)	s1		s2		s3		sH		sh	sV	Data sets		s1		s2		s3		sH		sh	sV
				mag	ori	mag	ori	mag	ori	mag	ori	mag	mag	Y.m.	T.Strain	mag	ori	mag	ori	mag	ori	mag	ori	mag	mag
31	KFK003	1:1	19.17	G	P	M	P	R	G	G	M	P	R	B	B	B-G	B-P	B-M	B-P	B-R	B-G	B-G	B-M	B-P	B-R
32	KFK003	1:2	19.78	G	M	M	P	R	M	G	P	P	M	B	B	B-G	B-M	B-M	B-P	B-R	B-M	B-G	B-P	B-P	B-M
33	KFK003	1:3	20.33	G	M	M	R	R	M	G	M	P	M	B	B	B-G	B-M	B-M	B-R	B-R	B-M	B-G	B-M	B-P	B-M
34	KFK003	3:1	70.14	G	P	M	P	R	M	G	M	P	M	B	B	B-M	B-P	B-M	B-P	B-R	B-M	B-M	B-M	B-P	B-M
35	KFK003	3:2	70.72	G	R	M	R	R	G	G	M	P	R	B	B	B-G	B-R	B-M	B-R	B-R	B-G	B-G	B-M	B-P	B-R
36	KFK003	4:1	100.54	G	G	M	G	R	R	G	G	P	P	B	B	B-G	B-G	B-M	B-G	B-R	B-R	B-G	B-G	B-P	B-P
37	KFK003	4:2	101.15	G	G	M	G	R	R	G	G	P	P	B	B	B-G	B-G	B-M	B-G	B-R	B-R	B-G	B-G	B-P	B-P
38	KFK003	4:3	101.75	G	G	G	G	R	P	G	G	P	P	B	B	B-G	B-G	B-G	B-G	B-R	B-P	B-G	B-G	B-P	B-P
39	KFK003	5:1	132.22	G	G	G	M	R	M	G	G	P	M	B	B	B-M	B-G	B-M	B-M	B-R	B-M	B-M	B-G	B-P	B-M
40	KFK003	5:2	132.83	G	M	M	R	R	R	M	M	R	P	B	B	B-M	B-M	B-M	B-R	B-R	B-R	B-M	B-M	B-R	B-P
41	KFK003	5:3	133.45	G	G	G	M	R	P	G	M	P	R	B	B	B-G	B-G	B-G	B-M	B-R	B-P	B-G	B-M	B-P	B-R
42	KFK003	6:1	151.30	G	M	G	G	R	M	M	P	P	M	B	B	B-P	B-M	B-P	B-G	B-R	B-M	B-P	B-P	B-P	B-P
43	KFK003	6:2	151.90	G	M	G	M	R	R	G	G	P	G	B	B	B-M	B-M	B-M	B-M	B-R	B-R	B-M	B-G	B-P	B-M
44	KFK003	7:1	183.92	G	G	G	M	R	P	G	G	P	G	B	B	B-G	B-G	B-G	B-M	B-R	B-P	B-G	B-G	B-P	B-G
45	KFK003	7:2	184.97	G	G	G	M	R	P	G	G	P	M	B	B	B-M	B-G	B-M	B-M	B-R	B-P	B-M	B-G	B-P	B-M
46	KFK003	8:1	214.76	G	G	G	M	R	R	G	G	P	G	B	B	B-G	B-G	B-G	B-M	B-R	B-R	B-G	B-G	B-P	B-G
47	KFK003	8:2	215.37	G	G	M	G	R	P	G	G	P	M	B	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-M
48	KFK003	8:3	215.97	G	M	M	P	R	P	G	M	P	M	B	B	B-G	B-M	B-M	B-P	B-R	B-P	B-G	B-M	B-P	B-M
49	KFK003	9:1	244.75	G	G	M	G	G	P	G	G	P	G	B	B	B-G	B-G	B-M	B-G	B-G	B-P	B-G	B-G	B-P	B-G
50	KFK003	9:2	245.44	G	M	M	M	R	P	G	M	P	M	B	B	B-G	B-M	B-M	B-M	B-R	B-P	B-G	B-M	B-P	B-M
51	KFK041		3.31											C	C										
52	KFK041		4.42											C	C										
53	KFK041		12.82											C	C										
54	KFK041		13.21											C	C										
55	KFK041		13.91											C	C										
56	KFK041		20.62											C	C										
57	KFK041		28.82											C	C										
58	KFK041		28.41											C	C										

Table 4-2 Summary of the results for the ranking of the elastic constants, transient strains, interpreted stress state and overall reliability (continued).

SICADA				Variability of stress solution										Overall reliability											
ID	BH	Test	Vertical depth (m)	s1 mag	s1 ori	s2 mag	s2 ori	s3 mag	s3 ori	sH mag	sH ori	sh mag	sV mag	Data sets Y.m.	T.Strain	s1 mag	s1 ori	s2 mag	s2 ori	s3 mag	s3 ori	sH mag	sH ori	sh mag	sV mag
59	KFM01B	1:4:1	229.46	G	P	G	P	P	P	G	G	P	M	A	A	A-M	A-P	A-M	A-P	A-P	A-P	A-M	A-M	A-P	A-M
60	KFM01B	1:4:1	229.46																						
61	KFM01B	1:5:1	230.49	M	M	M	P	R	R	M	P	P	M	B	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P
62	KFM01B	1:7:1	232.46	G	P	M	P	R	R	G	R	P	M	A	A	A-M	A-P	A-M	A-P	A-R	A-R	A-M	A-R	A-P	A-M
63	KFM01B	2:1:3	390.27	G	G	M	M	R	M	G	G	P	M	B	A	A-M	A-M	A-M	A-M	A-R	A-M	A-M	A-M	A-P	A-M
64	KFM01B	2:3:1	395.86	G	M	M	P	R	M	G	G	R	P	A	A	A-M	A-M	A-M	A-P	A-R	A-M	A-M	A-M	A-R	A-P
65	KFM01B	2:5:1																							
66	KFM01B	2:8:2	451.82	M	G	P	P	R	M	M	G	P	P	B	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P
67	KFM01B	2:9:1	453.04	M	G	P	P	R	P	P	P	R	R	A	A	A-M	A-M	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-R
68	KFM02B	1:7:1	104.45	G	M	G	M	R	P	G	M	P	R	A	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-R
69	KFM02B	1:13:3	126.22	P	M	R	M	M	M	R	G	R	G	B	A	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P	A-R	A-P
70	KFM02B	1:17:2	134.48	M	M	M	M	R	R	P	M	R	R	B	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-R	A-R
71	KFM02B	2:1:3	146.86	P	P	M	P	R	M	M	P	R	P	A	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P
72	KFM02B	2:3:4	154.14	R	G	P	M	R	M	R	P	R	G	B	A	A-R	A-P	A-P	A-P	A-R	A-P	A-R	A-P	A-R	A-P
73	KFM02B	2:6:2	167.88	M	M	R	M	R	M	M	G	R	R	B	A	A-P	A-P	A-R	A-P	A-R	A-P	A-P	A-P	A-R	A-R
74	KFM02B	2:7:2	169.69	M	G	M	G	R	P	M	G	P	R	B	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-R
75	KFM02B	3:18:1	241.62	G	M	M	P	R	R	G	M	P	M	A	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P
76	KFM02B	3:19:1	242.55	G	P	G	P	R	R	G	G	P	R	A	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-R
77	KFM02B	3:21:1	244.87	G	M	P	M	R	P	G	M	P	R	A	A	A-M	A-M	A-P	A-M	A-R	A-P	A-M	A-M	A-P	A-R
78	KFM02B	4:3:1	290.42	M	M	M	M	R	R	M	P	P	M	A	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P
79	KFM02B	4:7:1	294.23	M	M	M	R	R	P	M	M	P	P	B	A	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P	A-P
80	KFM02B	4:8:1	295.08	G	G	G	M	R	P	G	G	M	P	A	A	A-M	A-M	A-M	A-M	A-R	A-P	A-M	A-M	A-M	A-P
81	KFM07B	1:1:1	51.88	M	M	P	P	R	M	P	G	R	M	B	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P
82	KFM07B	1:2:1	52.72	R	G	M	P	R	G	P	G	R	M	B	A	A-R	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P
83	KFM07B	1:3:1	53.66	R	G	R	R	R	G	P	G	R	R	B	A	A-R	A-P	A-R	A-R	A-R	A-P	A-P	A-P	A-R	A-R
84	KFM07B	1:4:1	54.40	G	M	P	P	R	P	P	R	R	P	A	A	A-M	A-M	A-P	A-P	A-R	A-P	A-P	A-R	A-R	A-P
85	KFM07B	1:5:1	55.57	M	G	P	P	R	P	M	G	G	M	B	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P

Table 4-2 Summary of the results for the ranking of the elastic constants, transient strains, interpreted stress state and overall reliability (continued).

	SICADA			Variability of stress solution										Overall reliability											
ID	BH	Test	Vertical depth (m)	s1		s2		s3		sH		sh	sV	Data sets		s1		s2		s3		sH		sh	sV
				mag	ori	mag	ori	mag	ori	mag	ori	mag	mag	Y.m.	T.Strain	mag	ori	mag	ori	mag	ori	mag	ori	mag	mag
86	KFM07C	1:1:5	94.76	G	G	P	G	R	P	G	G	P	R	B	A	A-G	A-G	A-P	A-G	A-R	A-P	A-G	A-G	A-P	A-R
87	KFM07C	1:2:4	100.49	G	R	P	P	R	R	G	P	P	R	A	A	A-M	A-R	A-P	A-P	A-R	A-R	A-M	A-P	A-P	A-R
88	KFM07C	2:8:1	170.15	G	M	G	G	R	R	G	M	P	R	A	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-R
89	KFM07C	2:9:1	171.17	R	M	R	M	R	P	R	M	R	R	A	A	A-R	A-P	A-R	A-P	A-R	A-P	A-R	A-P	A-R	A-R
90	KFM07C	2:10:1	172.19	M	G	G	G	R	M	M	G	P	P	A	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P
91	KFM07C	1:4:1	104.36	G	G	M	G	R	P	G	G	P	G	A	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P
92	KFM07C	2:1:3	153.93	P	G	P	G	R	P	P	G	R	G	A	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P
93	KFM07C	2:3:1	156.00	R	M	R	G	M	R	M	G	G	M	A	A	A-R	A-P	A-R	A-P	A-P	A-R	A-P	A-P	A-P	A-P
94	KFM07C	2:4:1	158.31	G	M	M	G	R	P	G	M	P	M	A	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P
95	KFM07C	2:11:1	173.18	G	G	M	G	R	P	G	G	P	R	A	A	A-M	A-M	A-M	A-M	A-R	A-P	A-M	A-M	A-P	A-R
96	KFM07C	3:1:1	187.92	P	P	R	R	R	R	P	P	R	R	A	A	A-P	A-P	A-R	A-R	A-R	A-R	A-P	A-P	A-R	A-R
97	KFM07C	3:4:1	190.74	G	M	G	P	R	R	G	M	P	P	A	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P
98	KFM07C	3:6:1	192.70	M	G	G	M	R	P	M	G	M	M	A	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P
99	KFM07C	4:1:2	233.24	P	M	M	G	R	R	P	M	P	R	B	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-R
100	KFM07C	4:2:3	237.87	G	M	P	M	R	R	M	P	P	R	A	A	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-R
101	KFM07C	4:4:2	253.81	G	G	M	G	R	P	G	G	P	M	A	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P
102	KFM07C	5:3:4	314.56	P	G	P	G	R	P	P	G	P	G	B	A	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P
103	KFR27		37.91											B	C										
104	KFR27		38.56											C	C										
105	KFR27		66.75											B	C										
106	KFR27		67.43											C	C										
107	KFR27		96.92											B	C										
108	KFR27		97.58											C	C										
109	KFR27		98.29											B	C										
110	KFR27		139.12											B	C										
111	KFR27		139.78											C	C										
112	KFR27		140.46											C	C										

Table 4-2 Summary of the results for the ranking of the elastic constants, transient strains, interpreted stress state and overall reliability (completed).

	SICADA			Variability of stress solution										Overall reliability											
ID	BH	Test	Vertical depth (m)	s1		s2		s3		sH		sh	sV	Data sets		s1		s2		s3		sH		sh	sV
				mag	ori	mag	ori	mag	ori	mag	ori	mag	mag	Y.m.	T.Strain	mag	ori	mag	ori	mag	ori	mag	ori	mag	mag
113	KFR51		58.16											C	C										
114	KFR51		58.45											B	C										
115	KFR51		61.67											B	C										
116	KFR51		62.02											B	C										
117	KFR51		67.09											B	C										
118	KFR51		67.84											B	C										
119	KFR51		68.12											B	C										
120	KFR51		72.59											B	C										
121	KFR51		73.50											B	C										
122	KFR51		73.89											B	C										
123	KFR52		69.37											B	C										
124	KFR52		69.55											B	C										
125	KFR52		71.68											B	C										
126	KFR52		72.48											C	C										
127	KFR52		72.61											B	C										
128	KFR89		10.82											B	C										
129	KFR89		11.39											C	C										
130	KFR89		16.14											B	C										
131	KFR89		16.78											B	C										
132	TFKB12		72.34											C	C										
133	TFKB12		72.42											C	C										
134	TFKB12		73.99											C	C										
135	TFKB12		74.96											C	C										

5 Discussion

The presented ranking system enabled to divide the overcoring rock stress measurement data in Forsmark into reliable and unreliable data, and potentially use only the reliable stress data to derive a stress model for Forsmark. A similar ranking system has been used for the Olkiluoto site in Finland and proven to be effective for this purpose (Figueiredo et al, 2022; Mattila et al, 2022). A major disadvantage with the system is that the various ranking criteria and the different sources of data are factored equally. However, the stress measurement data are not factored equally. The different criteria are addressed by including Data Set A, B, or C with the ranking value, to emphasize what ranked stress measurements have (or have not) the transient strains analysed.

The determination of the elastic constants for the conducted measurements at Forsmark is generally reliable. For Data Set A, when the reliability of the elastic constants is ranked as *Poor*; the typical biaxial test results either show different Young's modulus for each strain gauge, or two strain gauges are found unreliable and the resulting Young's modulus only based on one strain gauge. For Data Sets B and C, when the reliability of the elastic constants is ranked as *Poor*, the same mean values for the elastic constants were used for sequential measurements with a large difference compared to the standard deviation for the same rock type at the site. For 13 of the stress measurements, the elastic constants used in the stress interpretation are 20% to 41% higher than the average values per rock type at the site. For another 10 stress measurements, the used elastic constants are 21% to 65% lower than these average values. Since the interpreted stresses are directly proportional to the Young's modulus, a significant stress variability results from this. From these 23 stress measurements, the reliability of the elastic constants was ranked as *Good*, *Moderate* and *Poor* for 1, 16 and 6 measurements, respectively. Considering that the ranking of reliability of the elastic constants constrains the overall ranking reliability, these stress measurements will adopt the ranked reliability for the elastic constants at best.

The reliability of the transient strains was only assessed for the stress measurements in Data Set A. For Data Set B, without transient strain data available, only the variability of the resulting stress state was studied. In this data set, 12 stress measurements are missing, and hence, the final strains were obtained from old scanned documents. For Data Set C, due to lack of strain data, the reliability was not estimated.

Per the Method Description developed by SKB and the ISRM suggested method for overcoring stress measurements (Sjöberg et al, 2003; Christiansson and Hudson, 2003), the water pressure was not taken into account in the reported stress interpretation. Hence, it can only be considered in the interpretation of the stress measurements included in Data Sets A and B. By considering that the water pressure results in an increase of the stress magnitudes (stress measurements in Data Sets A and B), the pick of the strain values from the elastic range would result in a considerable increase in the stress magnitudes.

For the deeper stress measurements conducted in the boreholes KFM2B and KFM7C between the depths of 100 and 300 m, the effect of the water pressure would result in a significant increase in the stress magnitudes. However, none of the previous stress interpretations at Formark has considered water pressure in the analysis.

For many boreholes, measurements show stress rotation with depth. The rotation may be due to spatial variations in the geology, or that the intermediate and minimum principal stresses are close in magnitude. However, significant stress rotation may also indicate unreliable measurements, which needs to be considered.

The existence of high stresses at Forsmark site is possible, with similar stress magnitudes (of around 50 MPa) being inferred from measurements at several sites in Central and Northern Sweden, as well as in mid and Northern Finland, although at larger depths (around 1000 m). At Olkiluoto, at the depth of 400 m, the stresses are approximately 25 MPa (Mattila et al, 2022). With the Forsmark site being within the lens bounded by large-scale faults, thrust fault stress environment is both possible and likely, as shown in previous modelling work (Mas Ivars and Hakami, 2005; Hakami, 2006; Hakala et al, 2019; Martin, 2007; Valli et al, 2023), with stresses of around 40–50 MPa at depths of 400–500 m, see also (Sjöberg et al, 2005).

6 Conclusion and recommendations

The following conclusions can be drawn:

- A quality control of the stress measurements data available at Forsmark was conducted by developing and applying a system to rank the reliability of the stress measurements. This ranking system enabled identifying the reliable data, ranked as *Good* or *Moderate*. The various ranking criteria and different sources of data were weighted equally, but the stress measurement data are not factored equally. The different criteria are addressed by including Data Set A, B, or C with the ranking value, to emphasize what ranked stress measurements include the transient strain data analysis.
- For Data Set A (with transient strain data available), most of the stress measurements were ranked as *Poor*, while for Data Set B (without transient strain data available), most of the measurements were ranked as *Good* and *Moderate*. For Data Set B, the ranking of the reliability is partial because the transient strain data are not available, and the Borre probe only enables to measure seven independent strain directions. For Data Set C, the reliability of the stress measurements was not ranked due to lack of strain data. The lack of strain data is the main reason for splitting the overall reliability by data sets. By considering only the variability of the interpreted stress state, 94% of the magnitudes of the maximum principal stress in Data Set B were ranked as *Good*, while in Data Set A, this fraction is only 45%.
- The elastic constants are generally reliable. In 23 stress measurements, the variability of the Young's modulus is quite significant (up to 41% higher and 65% lower than the average values for the rock type), which has a direct effect on the variability of the interpreted stresses. From these 23 stress measurements, the reliability of the elastic constants was ranked as *Good*, *Moderate* and *Poor* for 1, 16 and 6 measurements, respectively. Considering that the ranking of reliability of the elastic constants constrains the overall ranking reliability, these stress measurements will adopt the ranked reliability for the elastic constants at best. It should be noted that even for this case, the strains measured during the overcoring can be unreliable, due to the factors intrinsic to overcoring, such as the temperature effects, glue issues, and potential microcracking and disking of the rock cores. These factors are addressed in the ranking reliability system utilized in this study.
- The reliability of the principal stresses and horizontal and vertical stresses does not need to be the same. As the difference of the plunge angles increases from 0 or 90°, the correlation between principal and horizontal/vertical stresses decreases.
- The water pressure (only possible to take into account in Data Sets A and B where strain data are available) results in an increase of the stress magnitudes, and the particular selection of the strain values from the elastic range may result in a considerable increase in the stress magnitude.

The following recommendations are given:

- Due to a significant number of unreliable stress measurement data (rank value equal to *Poor*), and no availability of transient strain data in Data Sets B and C, additional stress measurements using both the LVDT and the conventional overcoring techniques are recommended during the construction of both SFR and SFK. These measurements are suggested to be conducted at two levels: approximate depth of 500 m (depth of the repository) and 300 m (to characterise the stress gradient).
- The developed ranking system should be used for any future measurement, also including the ranking system developed for the LVDT gauge in Mattila et al (2022), and consideration of weights to factor differently the data provided by LVDT and overcoring techniques.

- Spatial variations in the geology should be assessed to better understand possible reasons for the observed stress rotation with depth in some of the measurement data.
- Re-analysis of selected measurements to account for possible influence from water pressure is recommended.

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Appendix 1. Ranking of the transient strains

Contents

Explanations for applied ranking

The overcoring data are subdivided into three data sets (A, B, C), according to the origin of the data and the availability of the transient strains.

- Data Set A: stress measurements with transient strains data available;
- Data Set B: stress measurements without transient strains data available (only final strain readings are available); and
- Data Set C: stress measurements without transient strains data available (only the *in situ* stress state is interpreted and the reliability of the measurements cannot be estimated).

For Data Set A, the ranking of the reliability of the transient strains is based on the overall shape of the measured strain curves and the difference between the measured strains and the transient strains calculated with the OCS-code for the reported stress states. For Data Set B, the ranking of the reliability is based on the difference between the final measured and calculated strains for the reported stress states. For Data Set C, the reliability of the stress measurements is not estimated. The criteria for ranking the reliability of the transient strains are presented in Table 1.

Table 1. Criteria for the ranking of the reliability of the transient strains: the maximum relative difference is calculated as the maximum ratio between the measured and calculated strains, during and end of overcoring.

Criteria	Description
Good (<15%)	Maximum relative difference of one tangential or inclined strain gauges within 0.75-1.25 or all axial* strain gauges strains within 0.5-2.0.
	General good agreement between the measured and calculated strain curves.
Moderate (<25%)	Maximum relative difference of one tangential or inclined strain gauges within 0.50-1.50 or axial strain* gauges greater than 0.5-2.0.
	Measured and calculated strains agree moderately well, or the difference in the strains is ranked as *Good* but the measured and calculated strain curves do not agree.
Poor (>25%)	Maximum relative difference of one tangential or inclined strains greater than 0.5-1.5 or the difference between the measured and calculated strains for several tangential or inclined strain gauges is ranked as *Moderate*.
	The trend of the measured and calculated strain curves does not agree.
Rejected	Maximum relative difference of one or more tangential or inclined strain gauges is not within 0.5-2.0. The trend of the measured and calculated strain curves does not agree, or the strain curves are unstable.

*Measurement boreholes are sub-vertical resulting that axial strains affect mainly on vertical stress

The limits indicated above correlate with the limits for the ranking of the interpreted stress state presented in Table 3. The reliability of the strain readings given by the axial gauges is lower than the readings from the other strain gauges because it has mainly effect on the vertical stress in case of nearly vertical boreholes.

Table 2. Transient strain ranking summary for every measurement.

G	9/9	Strains stable before overcoring
G	9/9	Strains are within the elastic transient strain range (yellow shade)
G	6,3,0	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation
G	G,G,G	Stability of inverse stress solution after passing gauges section over a specific overcoring advance for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over a specific overcoring advance for s1, s2 and s3 orientations
Y		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/30 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Looks OK, but very high tensile stresses indicate core disking. Interpreted stresses strongly rotated indicating anomaly or unreliability. Vertical stress 6.8 times gravitational.
G/P		***Overall strain reliability***

Explanation for Table 2:

Overcoring strain curves stable before overcoring:

- number of strain gauges considered to give stable readings per total number of strain gauges. Rank value is mean or dominant considering the interpretated horizontal stresses.

Strains are within within the elastic transient strain range (yellow shade):

- number of strain gauges considered to give stable readings within the elastic range per total number of strain gauges. Rank value is mean or dominant considering the interpretated horizontal stresses.

Reliability of the transient strains given by the correlation between the number of *Good*, *Moderate* and *Poor* transient strains:

- presentation of the figures with the variation of the strains as a function of core advance for the three strain gauge rosettes, and use of the criteria shown in Table 1. The general trend of the strain curves is also considered: poor agreement between measured and calculated strain curves results in a rank value of *Poor.*

Stability of the inverse stress solution after passing the section of the strain gauges over a specific core advance of for the magnitudes of the maximum (s1), intermediate (s2) and minimum (s3) principal stresses:

- The specific core advance is the position in mm (0 mm is at strain gauge location) after which resulting stress magnitudes should practically not change. Rank values are for the magnitudes of the maximum (s1), intermediate (s2), and minimum (s3) principal stresses according to the limits indicated in Table 3. Generally, the rank value is for the maximum principal stress (s1).

Stability of the inverse stress solution after passing the section of the strain gauges over a specific core advance for the orientations of the maximum (s1), intermediate (s2) and minimum (s3) principal stresses:

- The specific core advance is the position in mm after which resulting stress magnitudes should practically not change (0 mm is at strain gauge location). Rank values are for the orientations of the maximum (s1), intermediate (s2), and minimum (s3) principal stresses according to the limits indicated in Table 3. Generally, the rank value is for the maximum principal stress (s1).

Reliability for elastic stress condition by considering water pressure, based on the ratio between the average tensile strength *T* and the maximum tensile stress (*s3,max*):

- The ratio between the average tensile strength *T* of the rock at Forsmark (18 MPa) and the maximum tensile stress (*s3,max*) of the overcored rock core is calculated. The rank value is *Good* if the ratio is greater than 1.2, *Moderate* if the ratio is near 1.0, and *Poor* if the ratio is smaller than 0.8.

Core disking observed within ±130 mm from the section of the strain gauges:

- Ranking conducted based on the reports with the results of the stress measurements. Rank value is *Good* if no disking is observed and *Poor* if core disking is observed.

Text sections:

- Description of the negative issues affecting the reliability of the stress measurements.

Overall strain reliability:

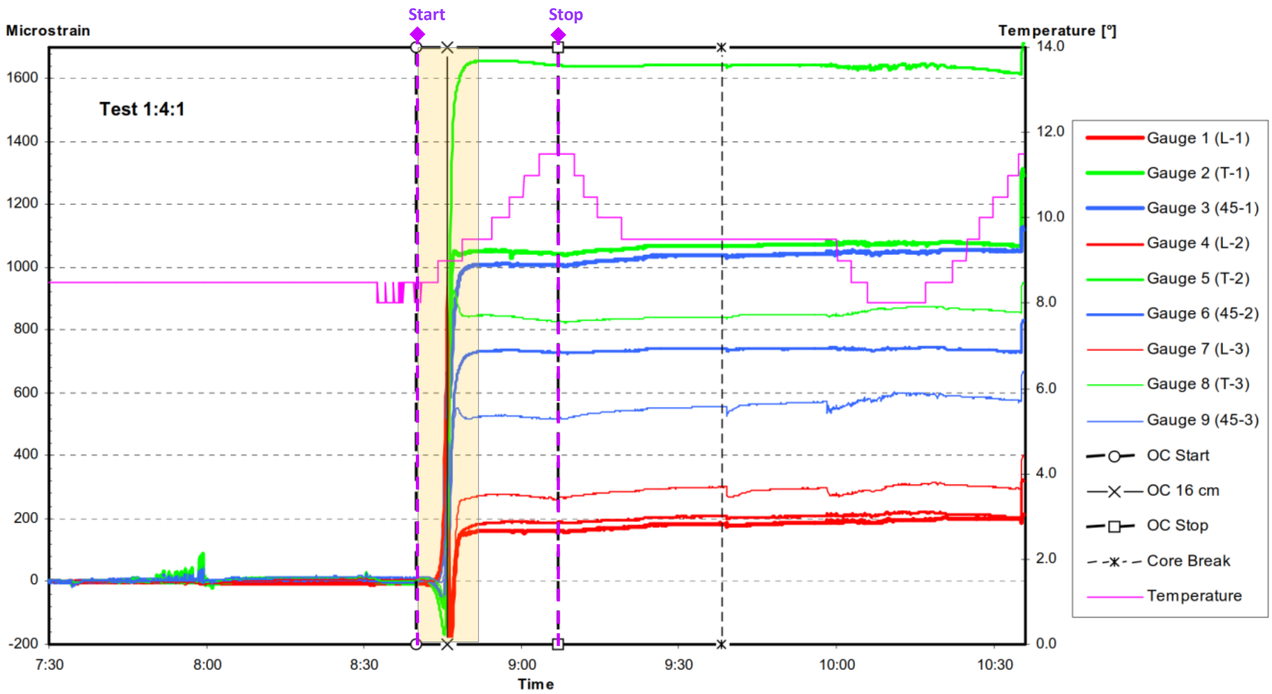
- Overall ranking of the transient strain data by considering the criteria listed above.

Table 3. Ranking of the interpreted stress state (OCS-code).

	Deviation of magnitude	Deviation of orientation
Good	<= 15%	<= 15°
Moderate	15% < ... <= 25%	15° < ... <= 25°
Poor	25% < ... <= 40%	25° < ... <= 40°
Rejected	>40%	>40°

KFM01B: 1:4:1, depth: 229.46 m

G	9/9	Strains stable before overcoring
G	9/9	Strains are within within the elastic transient strain range (yellow shade)
G	6,3,0	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,G,G	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 orientations
Y		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/30 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Looks OK, but very high tensile stresses indicate core disking. Interpreted stresses strongly rotated indicating anomaly or unreliability. Vertical stress is 6.8 times the gravitational stress.
G/P		***Overall strain reliability***



Overcoring record:

Flushing start	03-10-02	08:30:00
Rotation start	03-10-02	08:40:00
Overcoring start	03-10-02	08:41:00
Overcoring 16 cm	03-10-02	08:46:00
Overcoring 30 cm	03-10-02	08:52:00
Overcoring stop	03-10-02	09:07:00
Flushing off	03-10-02	09:23:00
Core break	03-10-02	09:38:00
Core retrieval start	03-10-02	09:55:00
Core & probe on surface	03-10-02	10:20:00
End of strain registration	03-10-02	10:40:15
Calculation of strain difference: OC Start	03-10-02	08:40:00
Calculation of strain difference: OC Stop	03-10-02	09:07:00

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	3
16 – 30 cm	3
30 cm – overcoring stop	3

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

Rosette 1

G1,axi

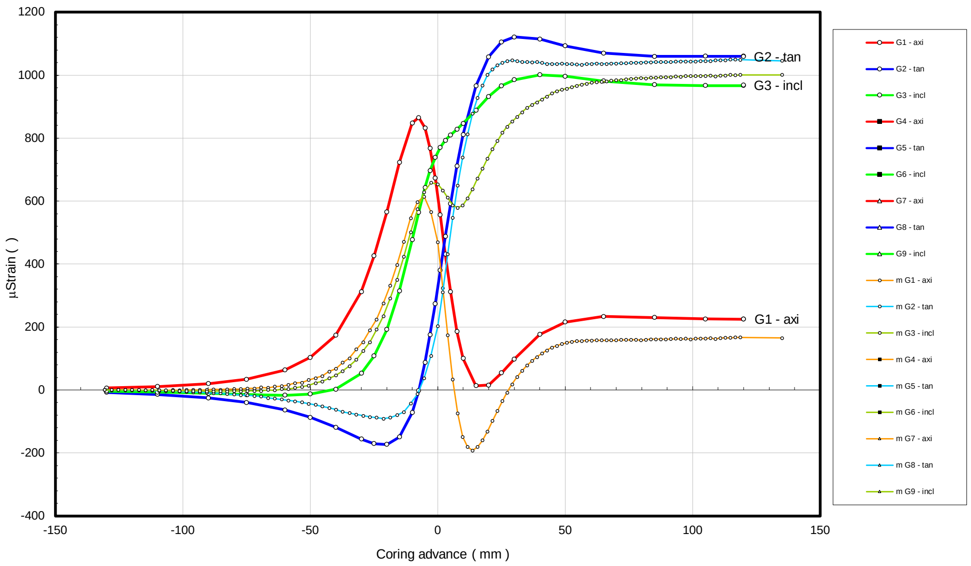
0.73	0.74	*G*

G2,tan

0.52/1.1	0.99	*G*

G3,incl

-	1.0	*M*



Rosette 2

G4,axi

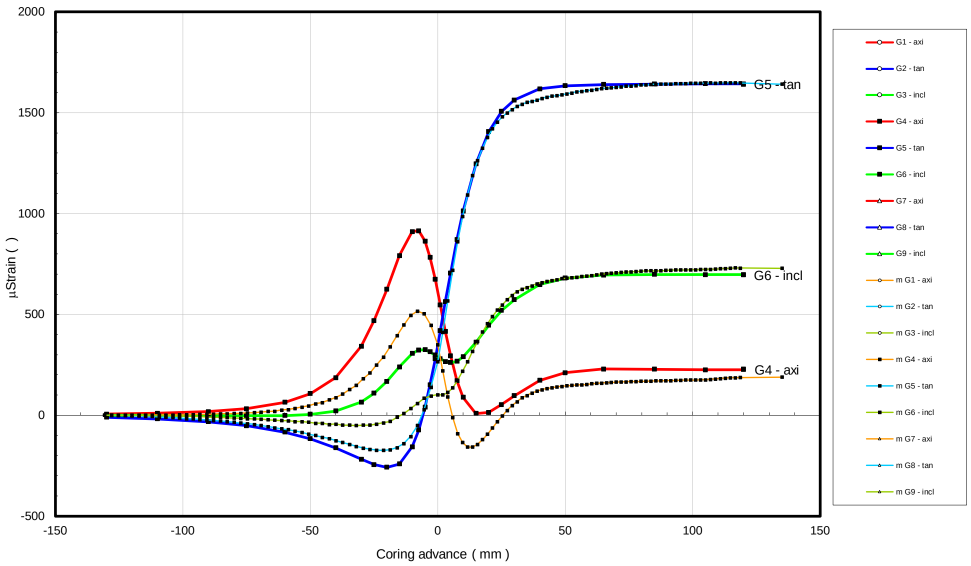
0.56/17	0.84	*M*

G5,tan

0.67	1.0	*G*

G6,incl

0.31	1.0	*M*



Rosette 3

G7,axi

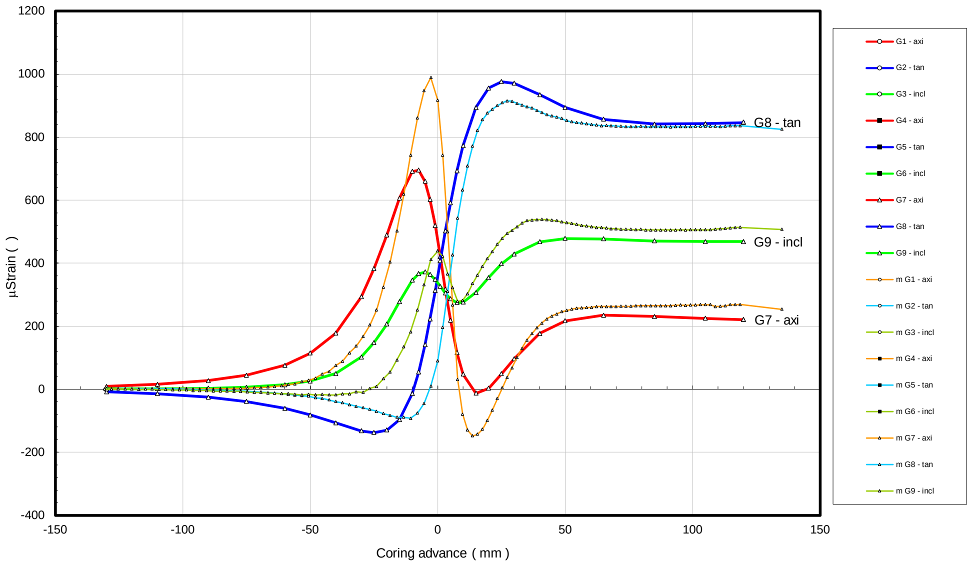
1.4	1.3	*G*

G8,tan

0.67	0.93	*G*

G9,incl

1.2	1.1	*G*



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

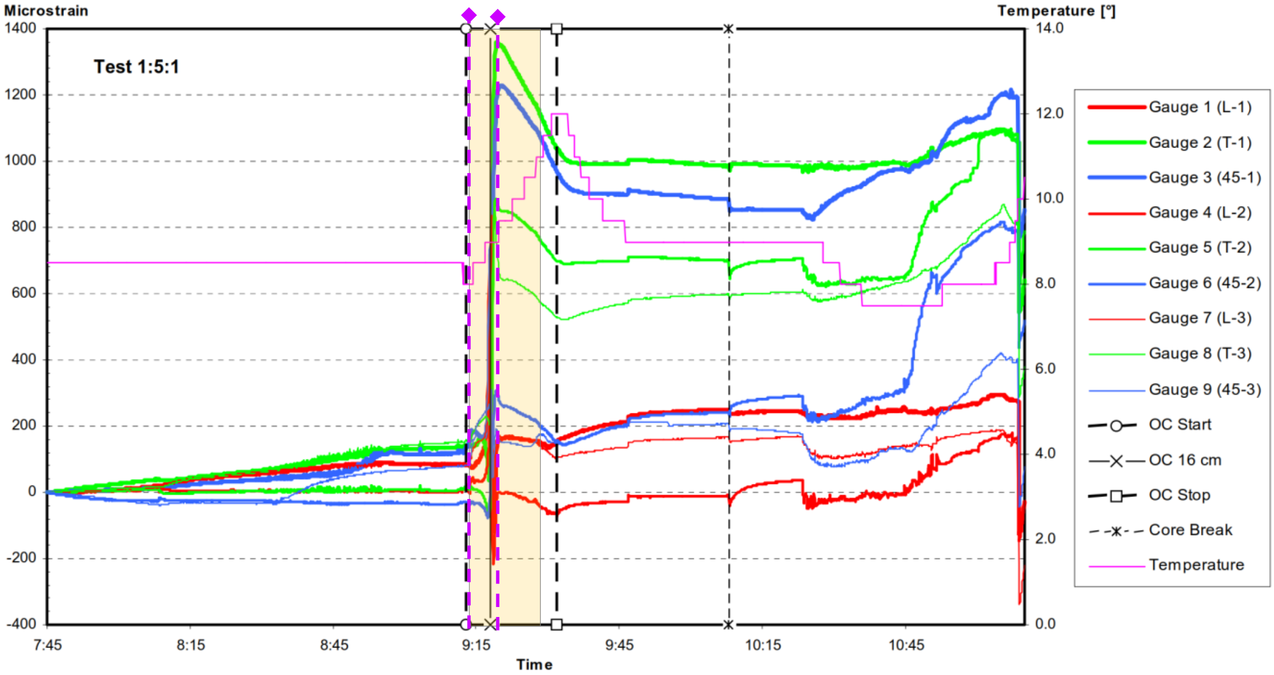
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	165	1046	1001	189	1642	729	254	825	507
@60mm	157	1036	976	156	1612	693	260	840	516
@119mm	167	1049	1001	187	1648	730	269	836	514

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**Mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	50.5	102	42	37.4	325	39	29.6	214	23	44.1	113	31.3	42.2	*5 %*
@60mm	52.0	103	41	38.1	327	40	31.3	216	24	45.6	113	32.9	42.9	
@119mm	53.4	102	42	39.8	324	39	32.2	214	23	46.8	112	33.9	44.8	

KFM01B: 1:5:1, depth: 230.49 m

G	8/9	Strains stable before overcoring
P	3/9	Strains are within the elastic transient strain range (yellow shade)
M	5,3,1	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,P,G	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 magnitudes
G	G,G,M	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/29 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Almost all strain gauges drift (ski hill effect), drift is not related to temperature because it is different for equally oriented strain gauges. Calculation values selected at peak, differently than generally. Strains before the core break would result in magnitudes of the principal stresses of 29.2, 17.2 and 12.1 MPa. High risk for core disking. Interpreted vertical stress is 2.8 times the gravitational stress.
P		***Overall strain reliability***



Overcoring record:

Flushing start	03-10-07	08:56:00
Rotation start	03-10-07	09:12:00
Overcoring start	03-10-07	09:13:00
Overcoring 16 cm	03-10-07	09:18:00
Overcoring 30 cm	03-10-07	09:22:00
Overcoring stop	03-10-07	09:32:00
Flushing off	03-10-07	09:47:00
Core break	03-10-07	10:08:00
Core retrieval start	03-10-07	10:23:00
Core & probe on surface	03-10-07	10:47:00
End of strain registration	03-10-07	11:14:40
Calculation of strain difference: OC Start	03-10-07	09:12:00
Calculation of strain difference: OC Stop	03-10-07	09:21:00
Overcoring advance	Overcoring rate [cm/min]	
0 – 16 cm	3	
16 – 30 cm	3	
30 cm – overcoring stop	6	

OCS

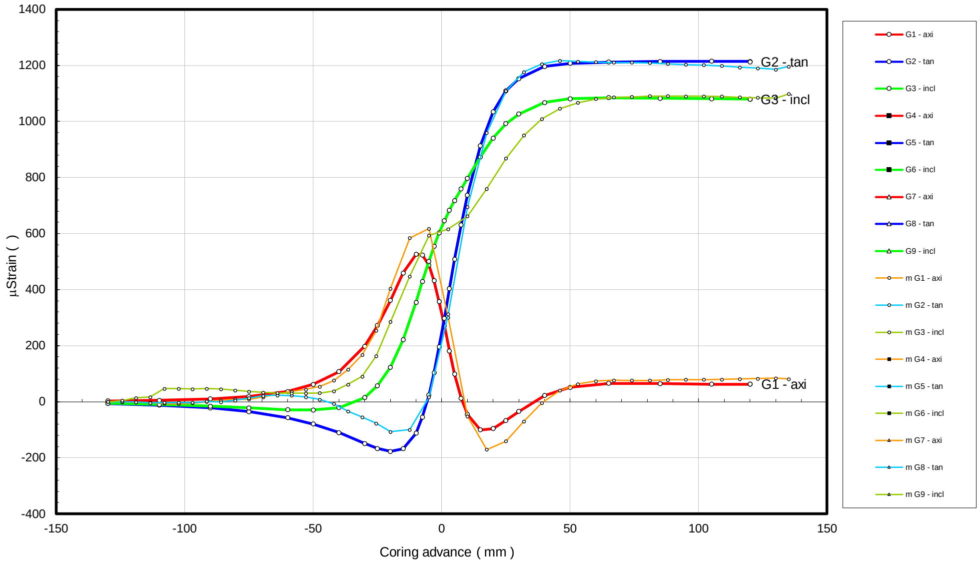
Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 150 mm are just before core break

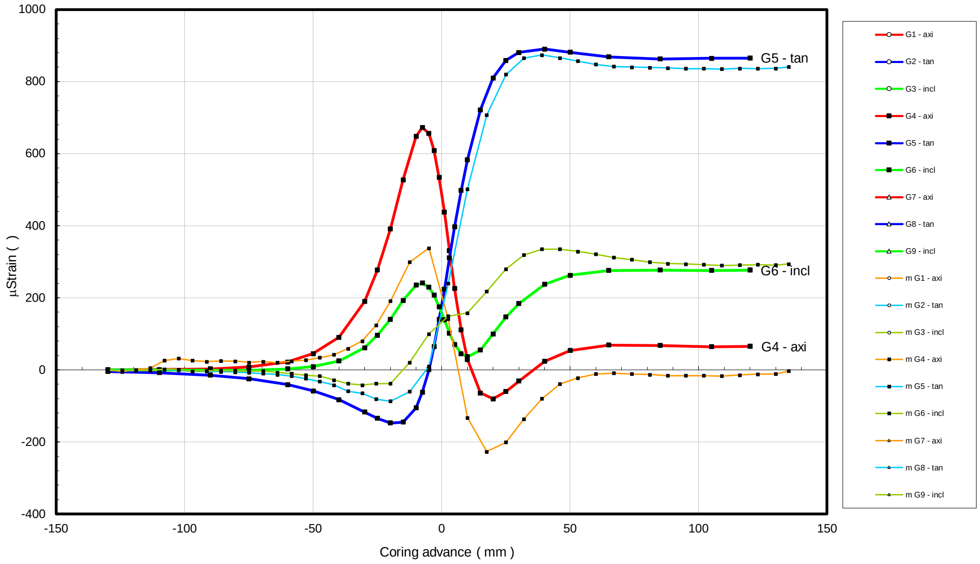
Rosette 1

G1,axi		
1.2	1.3	*G*
G2,tan		
0.60	0.98	*G*
G3,incl		
-	1.0	*G*



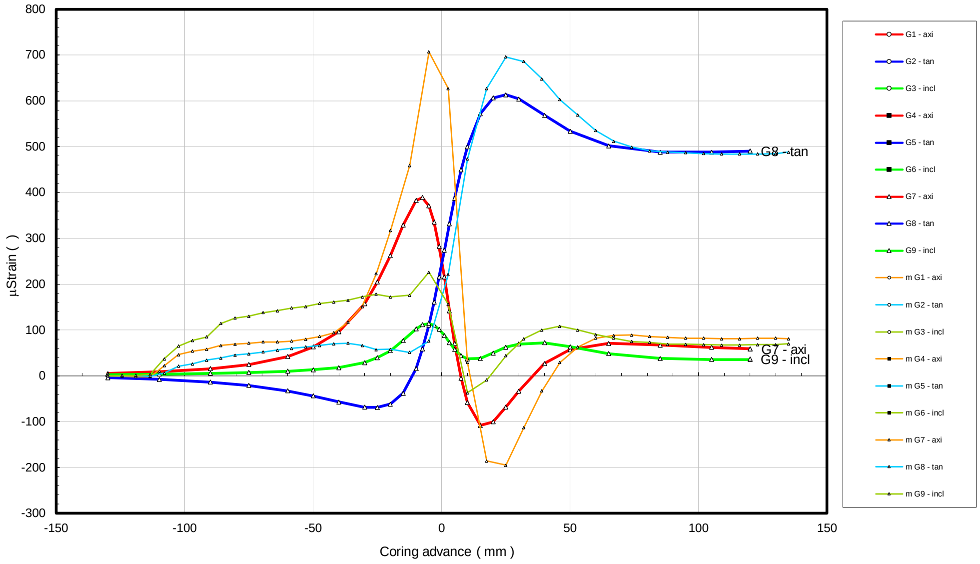
Rosette 2

G4,axi		
2.0/2.8	-0.17	*M*
G5,tan		
1.7	0.97	*G*
G6,incl		
-0.16/1.2	1.0	*M*



Rosette 3

G7,axi		
1.8/2.0	1.4	*G*
G8,tan		
-1.0/1.1	0.99	*M*
G9,incl		
2.0	1.9	*P*



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

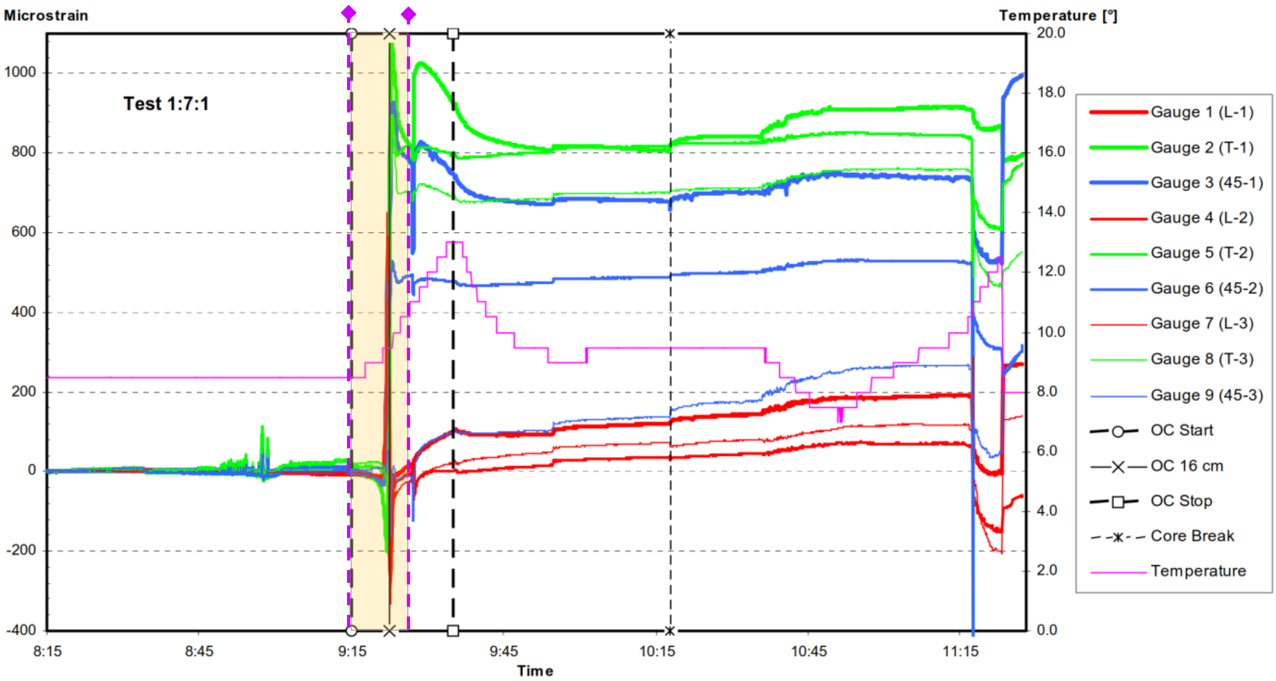
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	81	1196	1098	-3	841	294	81	488	70
@60mm	74	1212	1080	-11	848	321	82	535	90
@130mm	84	1186	1083	-11	837	291	82	485	68

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**Mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	38.7	282	12	22.3	187	19	15.6	43	67	37.7	103	21.6	17.4	*12 %*
@60mm	35.7	276	4	23.8	185	17	12.3	17	72	35.6	97	22.8	13.5	
@130mm	31.1	287	11	19.0	195	8	13.3	71	76	30.4	108	18.9	14.1	

KFM01B: 1:7:1, depth: 232.46 m

G	9/9	Strains stable before overcoring.
G	7/9	Strains are within the elastic transient strain range (yellow shade)
G	7,2,0	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,G,G	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 orientations
Y		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/27 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Gauges number 2 and 3 show shift and drift after elastic range, drift is not related to temperature because it has different trend for equally oriented gauges. High risk for core disking. Interpreted vertical stress is 3.4 times the gravitational stress which indicates poor reliability.
M		***Overall strain reliability***



Overcoring record:

Flushing start	03-10-09	08:50:00
Rotation start	03-10-09	09:14:30
Overcoring start	03-10-09	09:15:00
Overcoring 16 cm	03-10-09	09:21:30
Overcoring 30 cm	03-10-09	09:26:40
Overcoring stop	03-10-09	09:35:10
Flushing off	03-10-09	09:54:40
Core break	03-10-09	10:17:40
Core retrieval start	03-10-09	10:35:15
Core & probe on surface	03-10-09	10:53:30
End of strain registration	03-10-09	11:27:15
Calculation of strain difference: OC Start	03-10-09	09:15:00
Calculation of strain difference: OC Stop	03-10-09	09:28:45
Overcoring advance	Overcoring rate [cm/min]	
0 – 16 cm	2.7	
16 – 30 cm	2.7	

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 135 mm are for original Sicada reported solution

Rosette 1

G1,axi

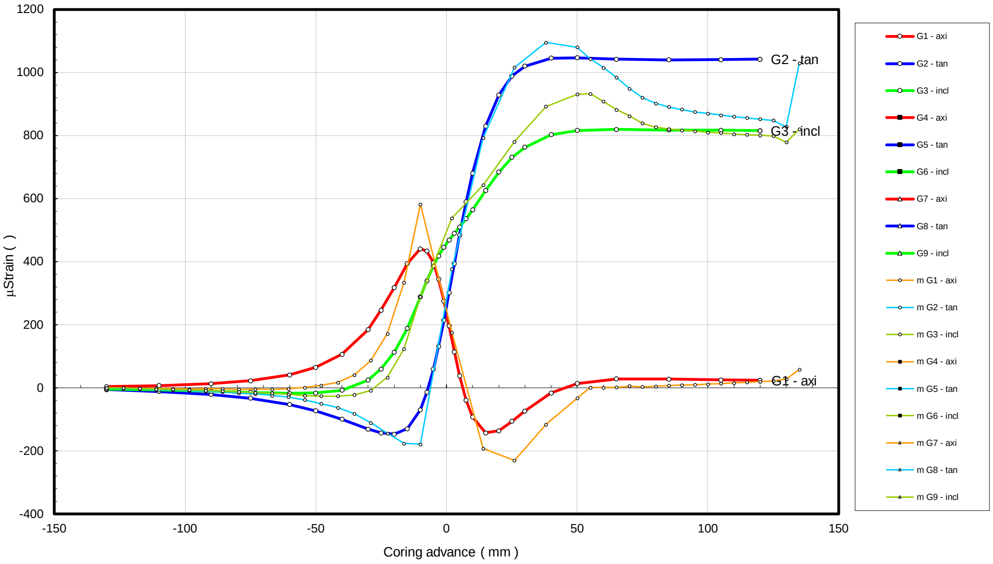
1.3/1.6	2.9	*G*

G2,tan

1.05	0.77/1.0	*M*

G3,incl

1.1	1.0	*G*



Rosette 2

G4,axi

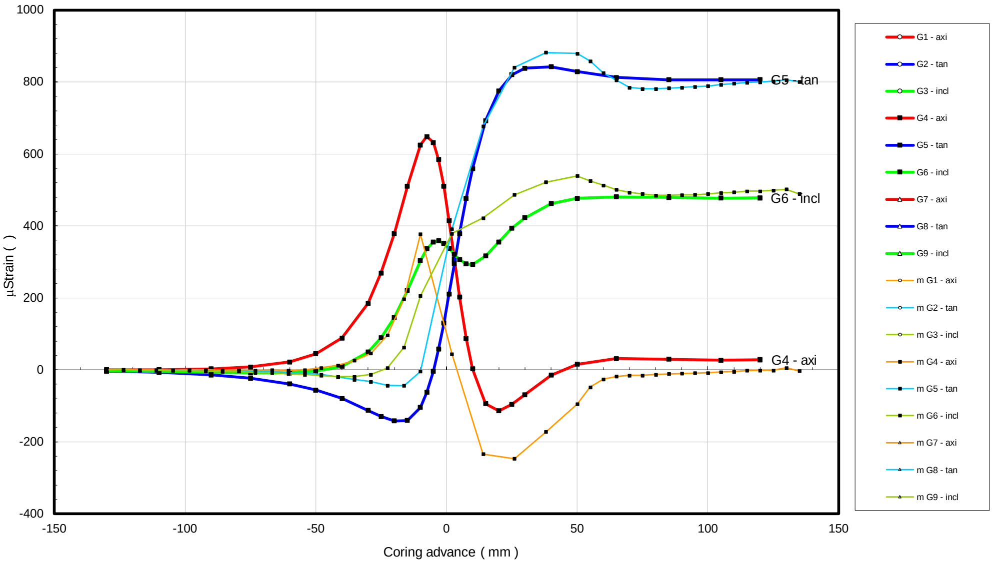
0.58/2.1	-	*G*

G5,tan

0.31/	1.05	*G*

G6,incl

1.1	1.0	*G*



Rosette 3

G7,axi

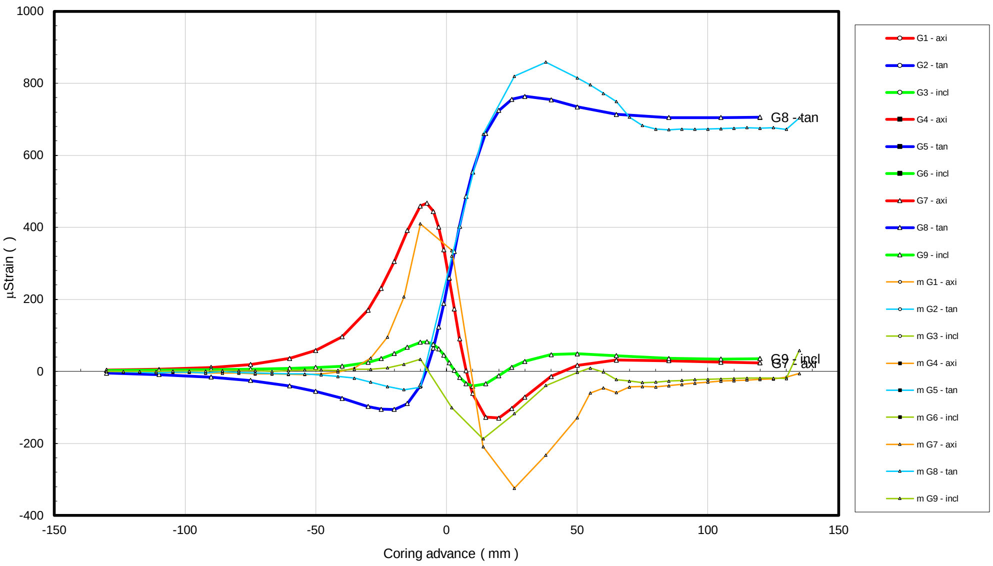
2.5	-0.17	*G*

G8,tan

1.1	0.95/1.0	*G*

G9,incl

5.5	-0.5/1.6	*M*



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

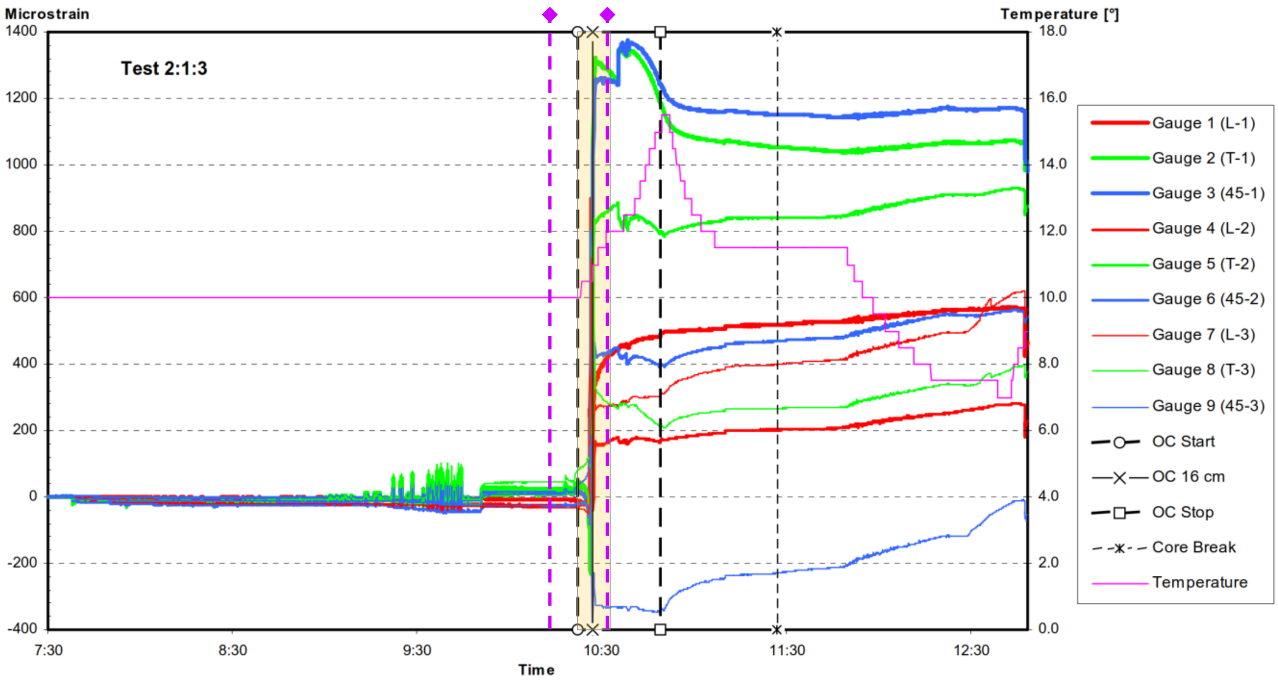
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	58	1029	820	-3	801	489	-6	704	58
@50mm	28	828	779	6	806	502	-16	672	-20
@130mm	-33	1080	931	-95	879	539	-129	815	-3

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**Mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	40.2	289	12	32.4	195	17	19.0	53	69	39.4	114	31.1	21.1	*11 %*
@50mm	44.9	284	11	36.7	192	11	16.6	56	74	44.0	109	35.80	44.9	
@130mm	39.1	276	19	33.8	183	9	17.0	69	69	37.1	109	33.12	39.1	

KFM01B: 2:1:3, depth: 390.27 m

G	9/9	Strains stable before overcoring.
G	8/9	Strains are within the elastic transient strain range (yellow shade)
G	6,2,1	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,G,M	Stability of inverse stress solution after passing gauges section over 57 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 57 mm for s1, s2 and s3 orientations
Y		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/37 MPa
Y		Core disking observed within ±130 mm from the section of the strain gauges
		Rosette number 1 shows probably core disking. Entire overcore heavily disked. Interpreted stress state highly rotated, intermediate principal stress plunges 5 degrees and vertical stress is 4.0 times the stress. These (core disking and magnitude of vertical stress) indicate poor reliability.
M		***Overall strain reliability***



Overcoring record:

Flushing start	03-10-30	09:50:20
Rotation start	03-10-30	10:20:00
Overcoring start	03-10-30	10:22:30
Overcoring 16 cm	03-10-30	10:27:00
Overcorign 50 cm	03-10-30	10:37:00
Overcoring stop	03-10-30	10:49:15
Flushing off	03-10-30	11:10:15
Core break	03-10-30	11:27:05
Core retrieval start	03-10-30	11:46:35
Core & probe on surface	03-10-30	12:26:00
End of strain registration	03-10-30	12:52:45
Calculation of strain difference: OC Start	03-10-30	10:16:30
Calculation of strain difference: OC Stop	03-10-30	10:35:00

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	3.5
16 – 30 cm	3.5

OCS

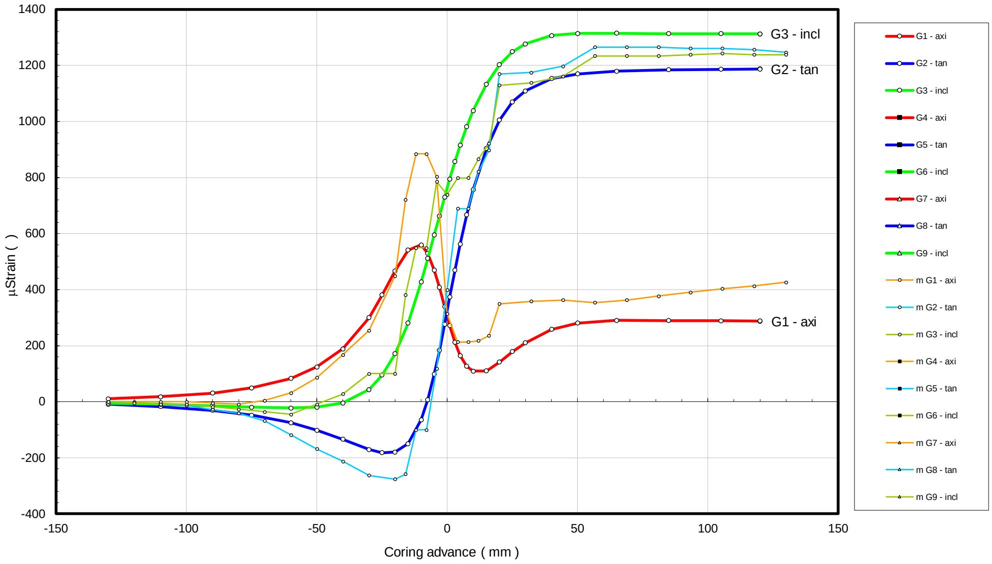
Transient strain comparison and reliability ranking

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 135 mm are for original solution

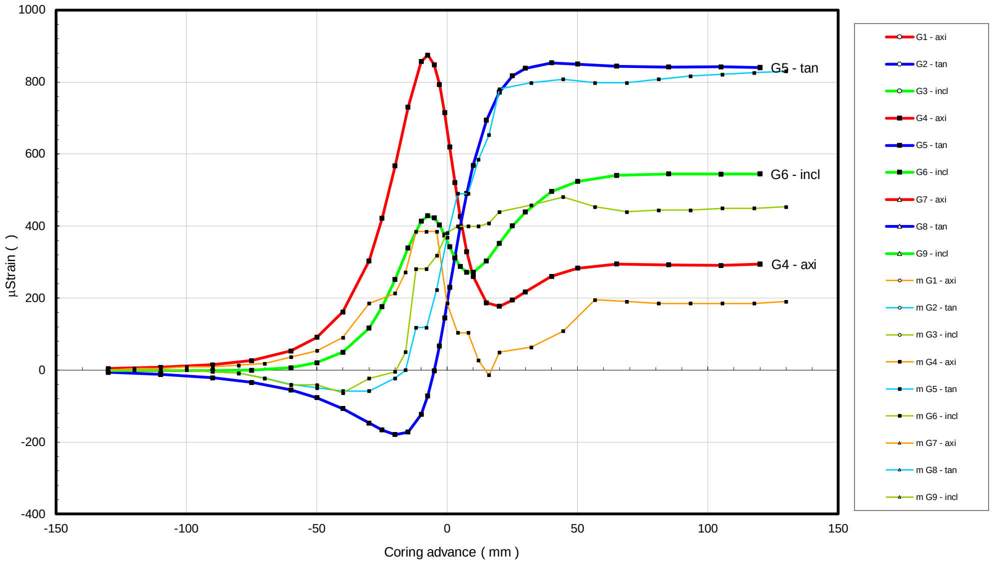
Rosette 1

G1,axi	1.6/1.9	1.5	*G*
G2,tan	1.5	1.05	*G*
G3,incl	-	0.95	*G*



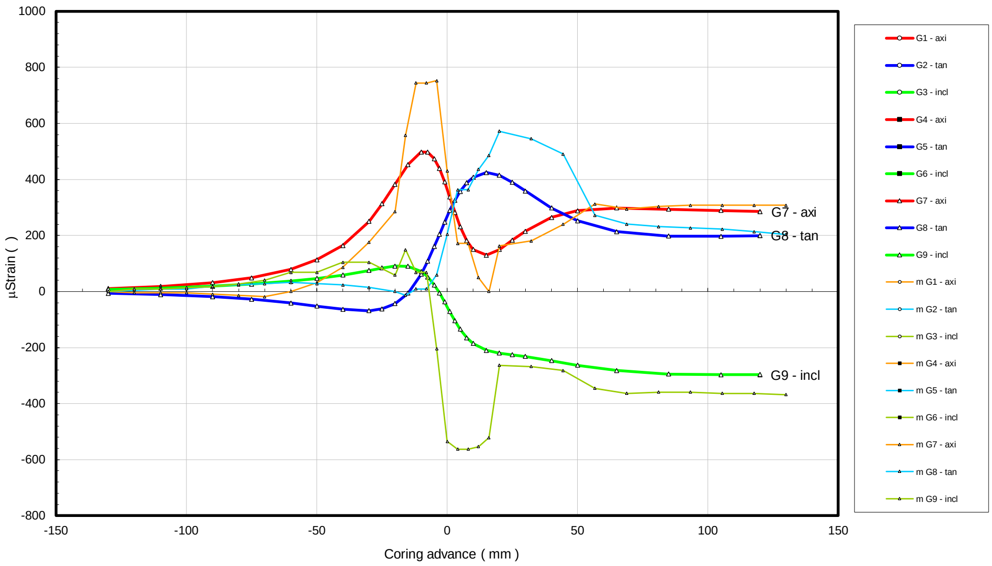
Rosette 2

G4,axi	2.3	0.6	*M*
G5,tan	0.33	1.0	*G*
G6,incl	-	0.81	*G*



Rosette 3

G7,axi	1.5	1.0	*G*
G8,tan	1.3	1.1	*M*
G9,incl	2,6	1,2	*P*



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

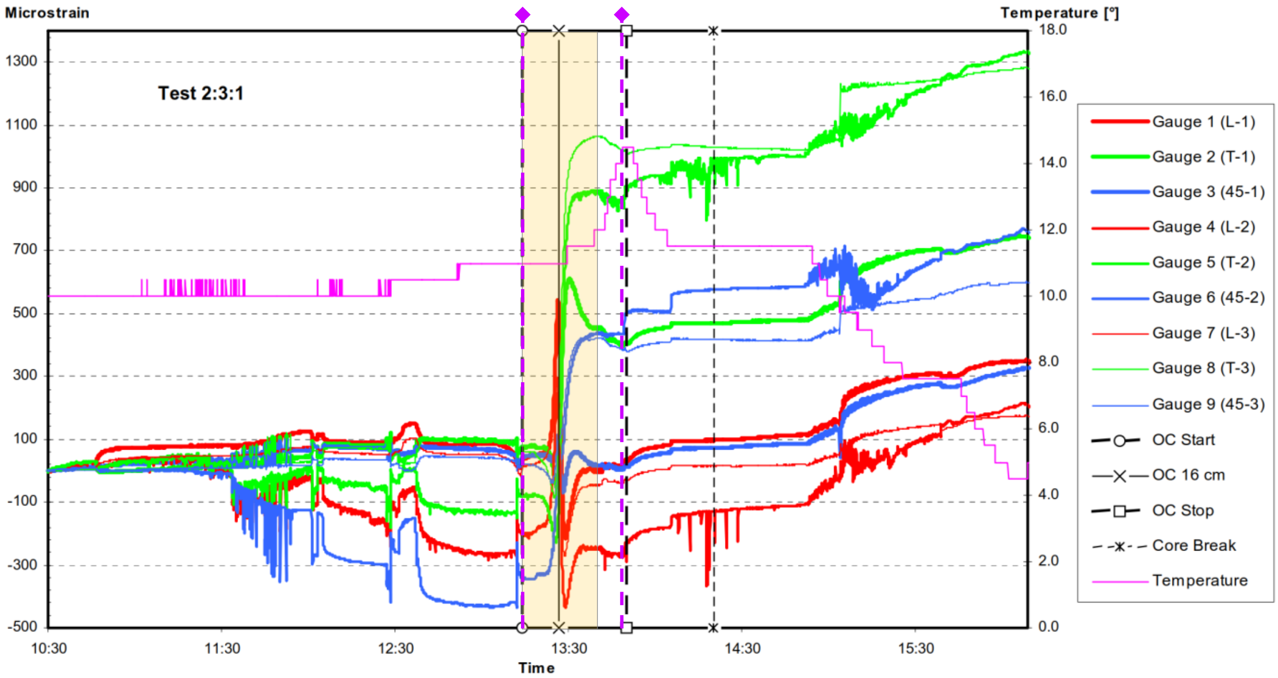
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	450	1236	1238	202	873	475	308	225	-342
@57mm	354	1265	1234	195	798	454	312	272	-345
@130mm	426	1246	1238	191	830	454	308	204	-368

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**Mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	56.0	222	35	36.5	74	56	15.7	324	16	49.1	49	17.7	41.4	*6 %*
@57mm	58.1	220	33	39.4	72	53	18.6	320	16	52.4	46	20.36	43.4	
@130 mm	58.7	222	34	39.3	73	52	18.7	322	15	52.5	48	20.37	43.9	

KFM01B: 2:3:1, depth: 395.86 m

M	6/9	Strains stable before overcoring.
G	9/9	Strains are within the elastic transient strain range (yellow shade)
G	7,2,0	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,M,P	Stability of inverse stress solution after passing gauges section over 65 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 65 mm for s1, s2 and s3 orientations
Y		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/33 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Rosette 1 unstable before and after measurement. All principal stresses rotated 28 – 47 from horizontal/vertical alignment, interpreted vertical stress 2.0 times gravitational – all indicating low reliability.
M/P		***Overall strain reliability***



Overcoring record:

Flushing start	03-11-11	11:55:00
Rotation start	03-11-11	13:13:07
Overcoring start	03-11-11	13:14:00
Overcoring 16 cm	03-11-11	13:26:55
Overcoring 18 cm	03-11-11	13:29:20
Overcoring 20 cm	03-11-11	13:32:15
Overcoring 23 cm	03-11-11	13:36:20
Overcoring 25 cm	03-11-11	13:37:10
Overcoring 30 cm	03-11-11	13:40:15
Overcoring stop	03-11-11	13:50:15
Flushing off	03-11-11	14:05:00
Core break	03-11-11	14:20:00
Core retrieval start	03-11-11	14:40:00
Core & probe on surface	03-11-11	15:40:00
End of strain registration	03-11-11	16:14:10
Calculation of strain difference: OC Start	03-11-11	13:14:30
Calculation of strain difference: OC Stop	03-11-11	13:48:15

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	1.1
16 – 30 cm	1.1
30 cm – overcoring stop	6

OCS

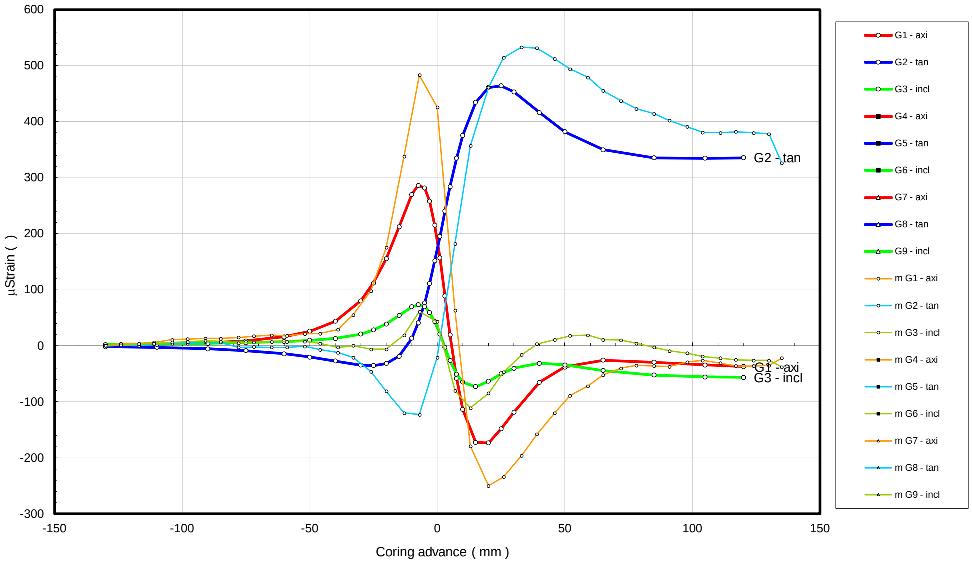
Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains after 130 mm are for original Sicada reported solution

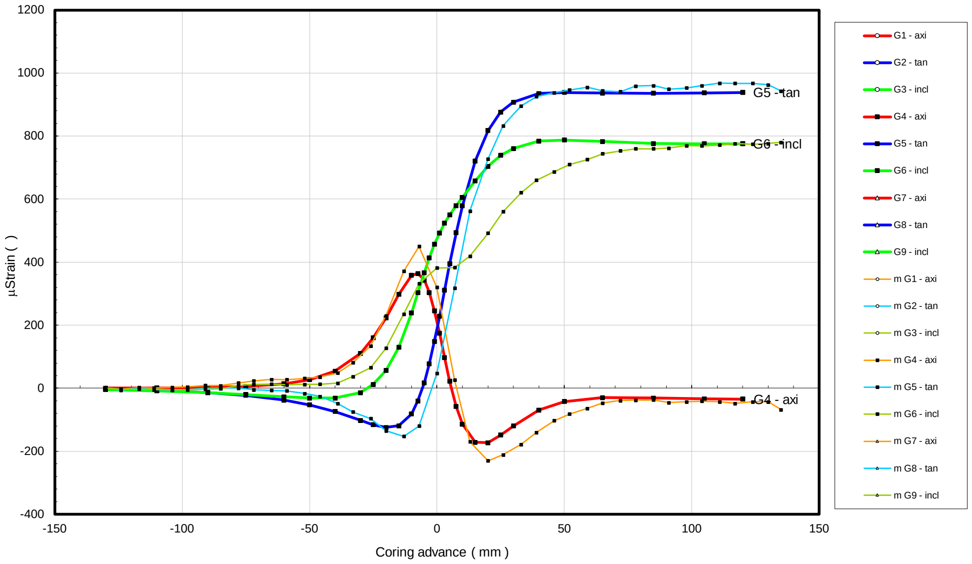
Rosette 1

G1,axi	1.7	0.99	*G*
G2,tan	3.8/1.15	1.1/1.0	*G*
G3,incl	1.5	0.46	*M*



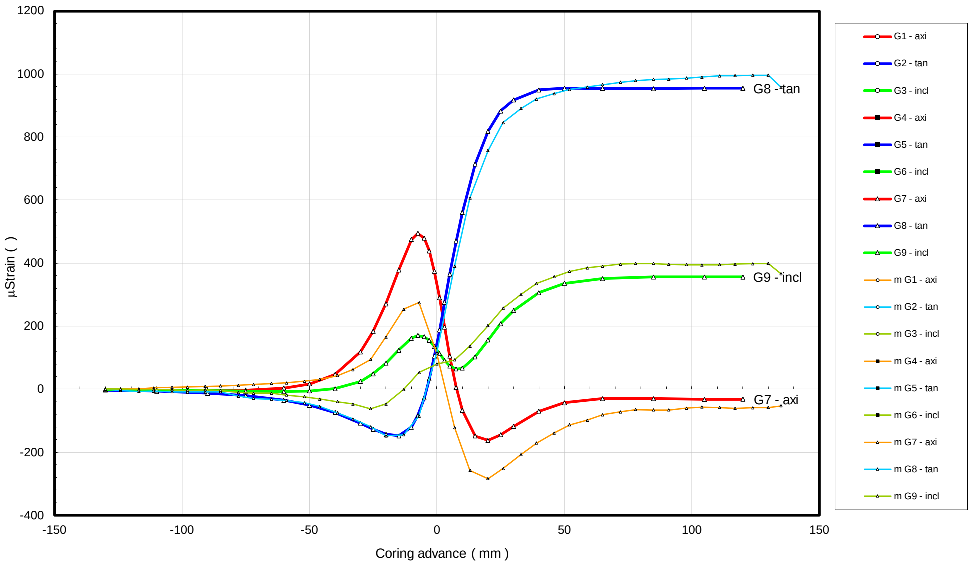
Rosette 2

G4,axi	1.3	1.0	*G*
G5,tan	1.2	1.0	*G*
G6,incl	-	1.0	*G*



Rosette 3

G7,axi	0.55/1.7	1.6	*G*
G8,tan	-	1.0	*G*
G9,incl	-0.36	1.1/1.0	M



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

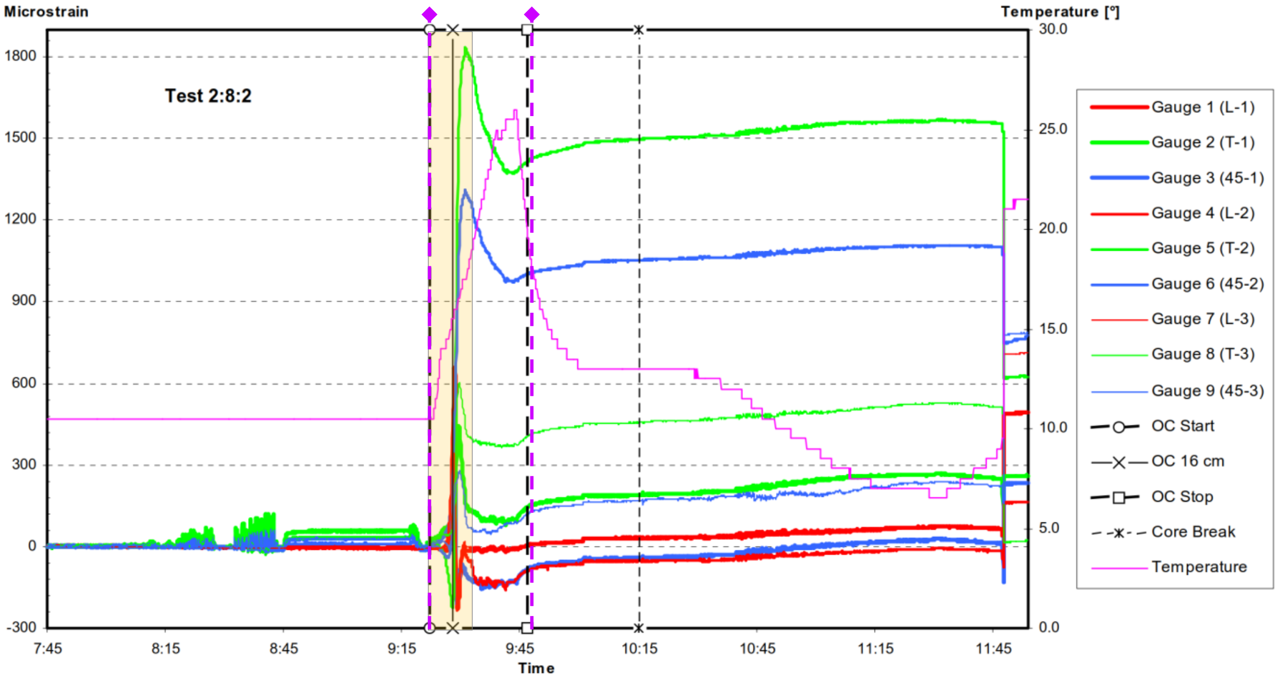
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-22	326	-38	-68	943	780	-53	958	366
@65mm	-52	455	11	-47	944	744	-81	966	390
@130mm	-35	378	-26	-43	963	776	-58	996	399

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	Trend	Plunge	mag	Trend	Plunge	mag	Trend	Plunge	mag	Trend	mag	mag	
original	42.3	141	28	25.5	30	34	10.3	261	43	37.2	152	18.6	21.9	*6 %*
@65mm	45.7	140	25	31.6	34	31	14.3	262	49	41.8	153	25.39	24.4	
@130mm	47.3	141	26	30.8	32	33	15.2	261	45	42.8	152	24.29	26.1	

KFM01B: 2:8:2, depth: 451.82 m

G	9/9	Strains stable before overcoring.
M	7/9	Strains are within the elastic transient strain range (yellow shade)
M	2,5,2	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 63 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 63 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/40 MPa
Y		Core disking observed within ±130 mm from the section of the strain gauges
		High drifting of most strained gauges in rosette number 2, drift not temperature related because it is different for equally oriented gauges. Temperature monitoring indicate a high temperature increase. Intermediate principal stress has the highest plunge (mostly vertical) and the interpreted vertical stress is 1.8 times the gravitational stress. Both factors (temperature, vertical stress) indicate low reliability.
P		***Overall strain reliability***



Overcoring record:

Flushing start	03-12-11	08:45:00
Rotation start	03-12-11	09:20:00
Overcoring start	03-12-11	09:22:00
Overcoring 16 cm	03-12-11	09:28:00
Overcoring 30 cm	03-12-11	09:33:00
Overcoring stop	03-12-11	09:47:00
Flushing off	03-12-11	09:59:00
Core break	03-12-11	10:15:00
Core retrieval start	03-12-11	10:30:00
Core & probe on surface	03-12-11	11:28:00
End of strain registration	03-12-11	11:53:50
Calculation of strain difference: OC Start	03-12-11	09:22:00
Calculation of strain difference: OC Stop	03-12-11	09:47:00

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.7
16 – 30 cm	2.8
30 cm – overcoring stop	5.0

OCS

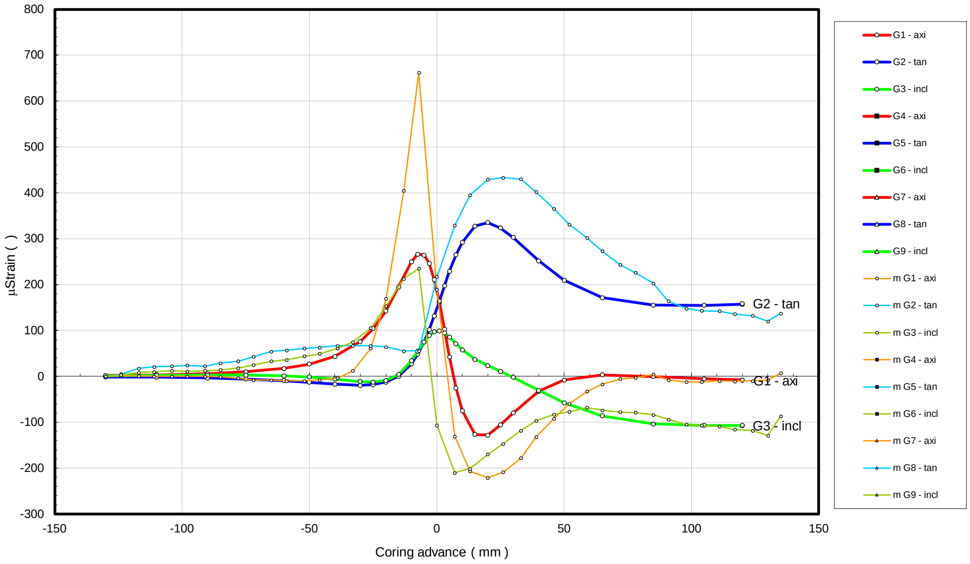
Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 130 mm are for original solution

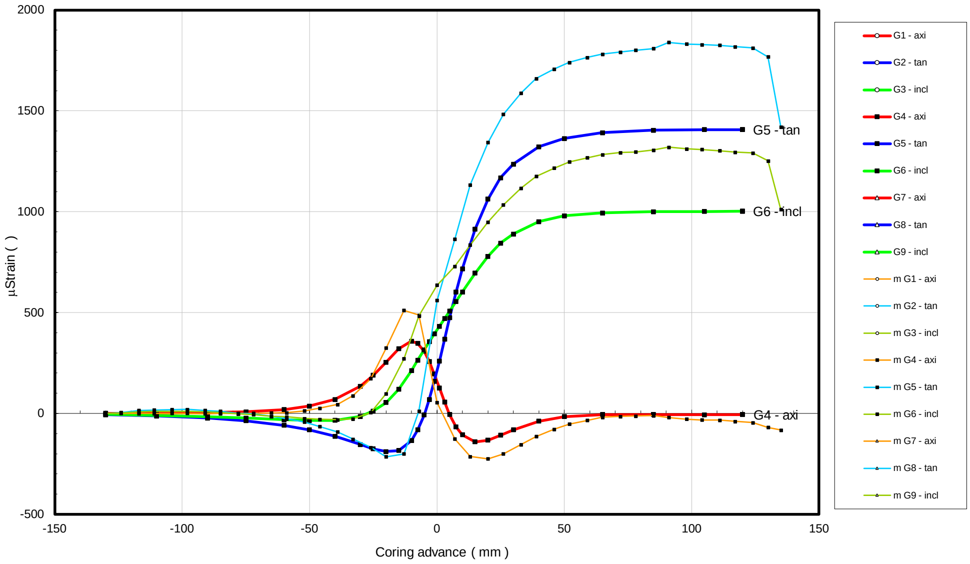
Rosette 1

G1,axi		
2.4	1.0	*M*
G2,tan		
-3	0.87	*M*
G3,incl		
2.3	1.05/0.87	*P*



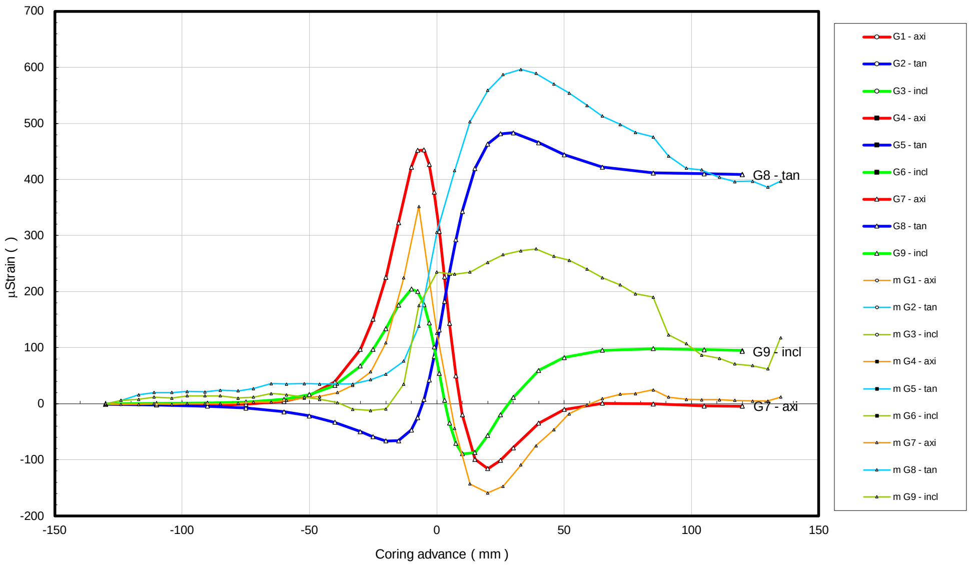
Rosette 2

G4,axi		
1.4	-	*G*
G5,tan		
1.3	1.0	*M*
G6,incl		
1.3	1.0	*M*



Rosette 3

G7,axi		
1.2	-0.67	*G*
G8,tan		
-0.8/1.2	0.97	*M*
G9,incl		
-3.2	0.71/1.2	*P*



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

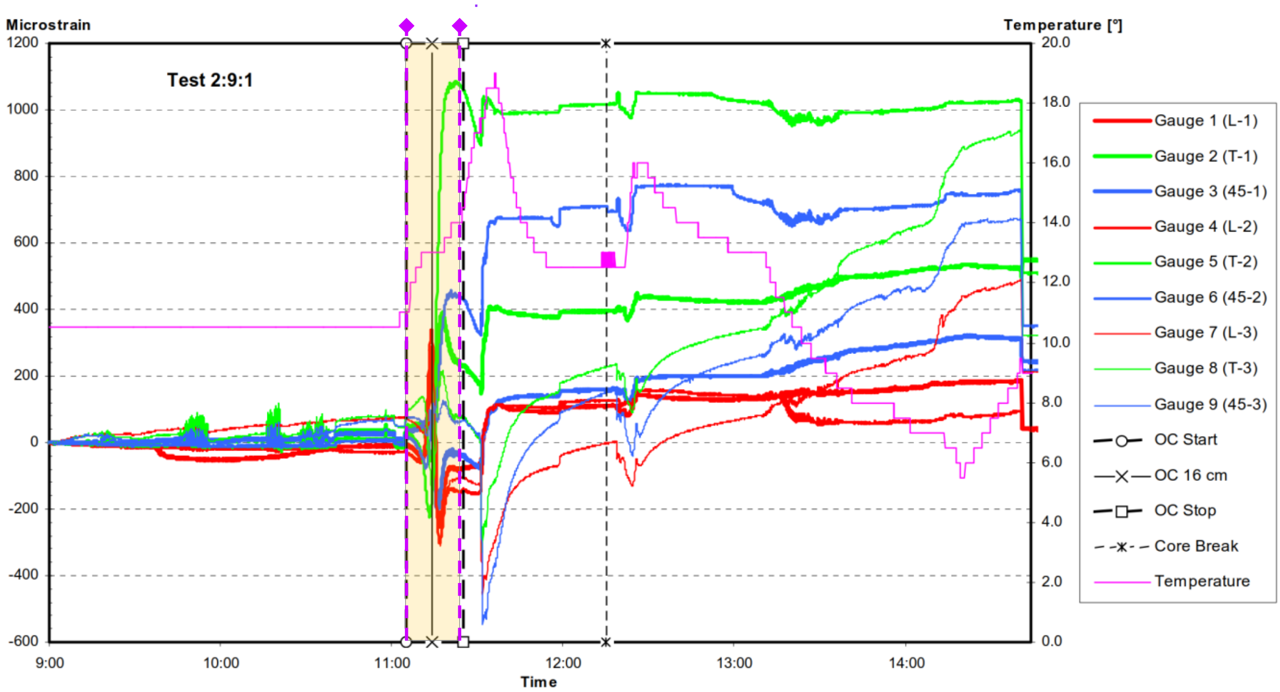
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	7	137	-87	-83	1420	1011	12	397	118
@63mm	-17	273	-74	-19	1781	1283	9	513	225
@130mm	-8	120	-129	-69	1768	1252	5	386	62

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	Trend	Plunge	mag	Trend	Plunge	mag	Trend	Plunge	mag	Trend	mag	mag	
original	46.8	156	23	14.5	11	62	10.3	252	14	37.2	152	18.6	21.9	*6 %*
@65mm	64.7	154	23	26.2	16	60	17.9	252	18	58.8	155	18.80	31.3	
@130 mm	61.6	155	23	19.8	336	67	14.4	245	1	55.4	155	14.42	26.0	

KFM01B 2:9:1, depth: 453.04 m

G	9/9	Strains stable before overcoring.
G	9/9	Strains are within the elastic transient strain range (yellow shade)
M	2,5,2	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	M,P,P	Stability of inverse stress solution after passing gauges section over 63 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 63 mm for s1, s2 and s3 orientations
Y		Stress solution is based on the strains at the end of the elastic range
M		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/22 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Minor drift within elastic range. Sudden non-elastic response soon after elastic range causes rosette number 3 to become unstable, but solution values could be still ok. Interpreted vertical stress is zero, even with water pressure it would be 50% of weight of overburden. Intermediate and minimum principal stress 35 degrees rotated around the maximum one. Temperature monitoring indicate high temperature increase.
M		***Overall strain reliability***



Overcoring record:

Flushing start	03-12-16	10:40:00
Rotation start	03-12-16	11:04:00
Overcoring start	03-12-16	11:05:00
Overcoring 16 cm	03-12-16	11:14:00
Overcoring 30 cm	03-12-16	11:23:00
Overcoring stop	03-12-16	11:25:00
Flushing off	03-12-16	11:55:00
Core break	03-12-16	12:15:00
Core retrieval start	03-12-16	-
Core & probe on surface	03-12-16	14:20:00
End of strain registration	03-12-16	15:14:50
Calculation of strain difference: OC Start	03-12-16	11:05:00
Calculation of strain difference: OC Stop	03-12-16	11:25:00
Overcoring advance	Overcoring rate [cm/min]	
0 – 16 cm	1.8	
16 – 30 cm	1.8	

OCS

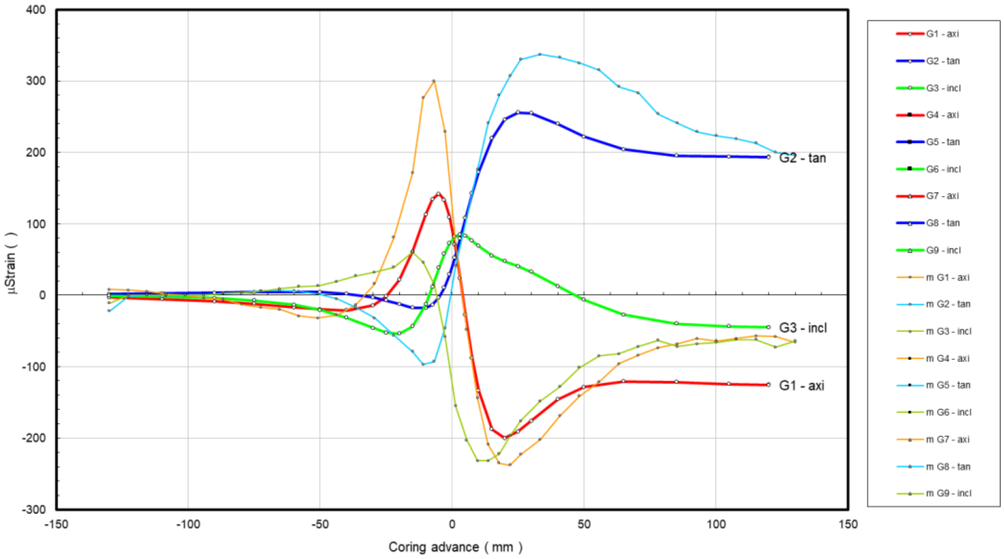
Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 130 mm are for original Sicada reported solution

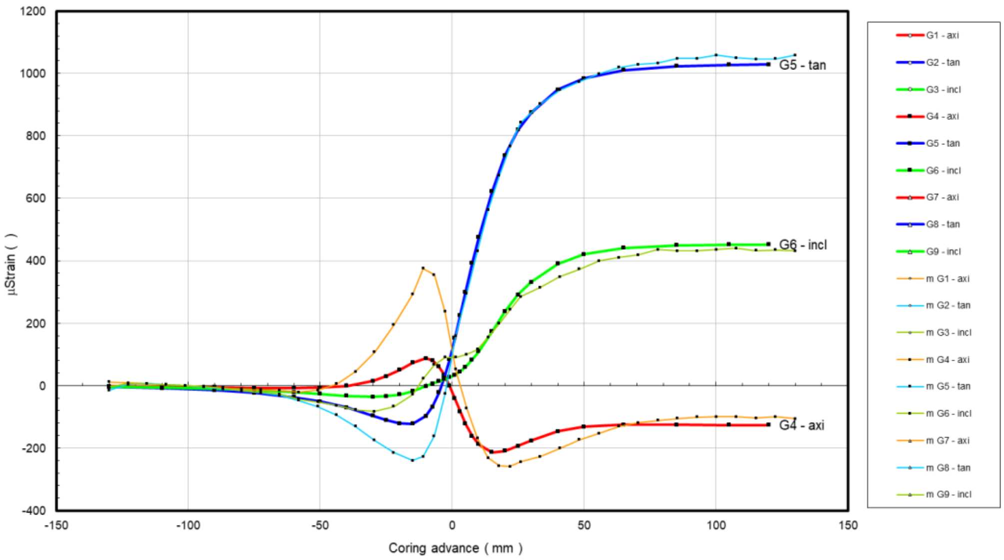
Rosette 1

G1,axi	2.1	0.46	*M*
G2,tan	1.3	1.0	*M*
G3,incl	-2.1	1.4	*P*



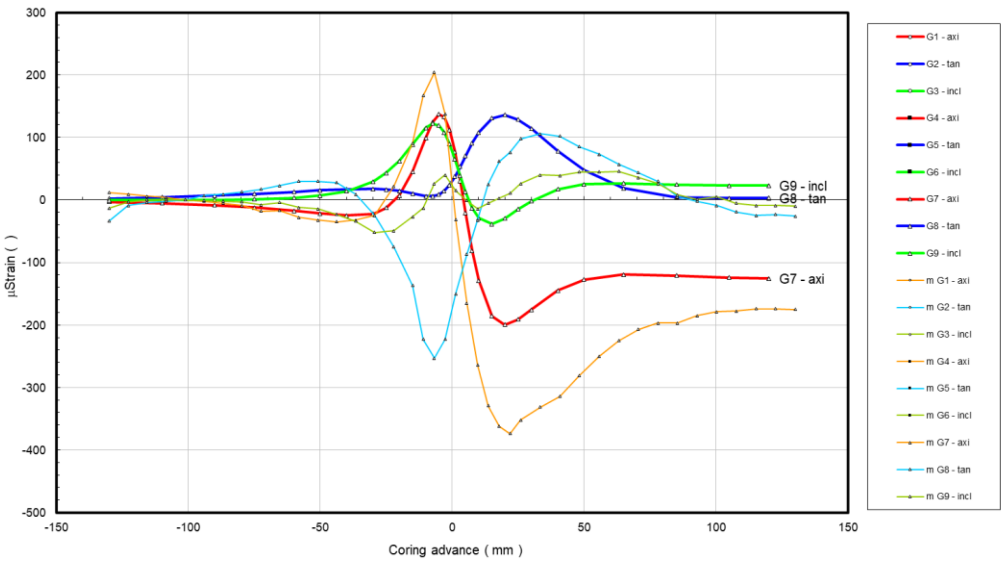
Rosette 2

G4,axi	2.1	0.79	*M*
G5,tan	0.5	1.0	*G*
G6,incl	-	0.96	*G*



Rosette 3

G7,axi	1.9	1.4	*M*
G8,tan	>10	-7	*P*
G9,incl	3.0	-0.4	*M*



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

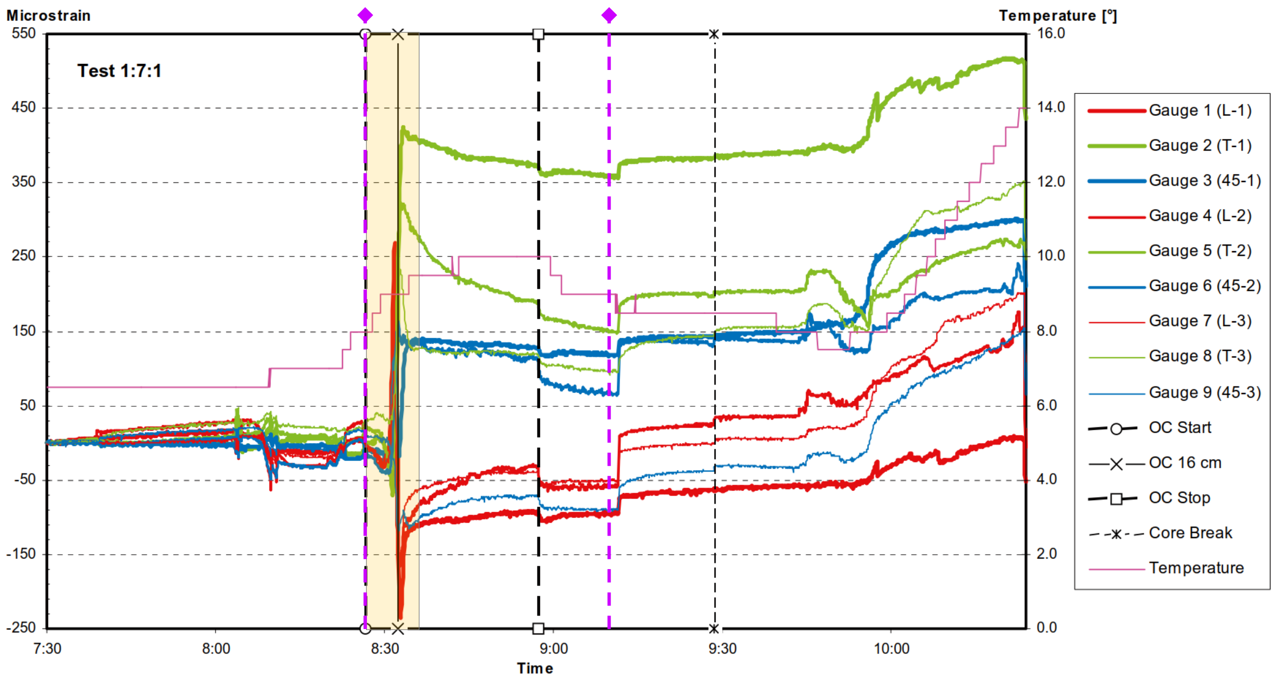
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-69	203	-63	-115	1056	427	-180	7	6
@63mm	-66	196	-64	-106	1058	432	-175	-26	-10
@130mm	-96	292	-82	-131	1019	410	-225	57	46

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	Trend	Plunge	mag	Trend	Plunge	mag	Trend	Plunge	mag	Trend	mag	mag	
original	19.5	132	14	2.6	32	34	-3.1	240	52	18.4	134	0.7	0	*28%*
@63 mm	19.6	128	19	4.1	24	34	-9.9	242	49	17.2	135	0	-2.2	
@130 mm	24.2	131	13	6.6	31	37	1.2	238	50	23.1	133	4.5	4.4	

KFM02B: 1:7:1, depth: 104.45 m

G	9/9	Strains stable before overcoring.
M	5/9	Strains are within the elastic transient strain range (yellow shade)
P	1,3,5	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,M,M	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 11 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift of strain gauges number 4 and 5. Drifting is not caused by temperature because it is different for equally oriented gauges. Vertical stress is tensile. Two healed fractures in the measurement section.
P		***Overall strain reliability***



Overcoring record:

Flushing start	2006-08-30	08:06:20
Rotation start	2006-08-30	08:26:10
Overcoring start	2006-08-30	08:26:40
Overcoring 4 cm	2006-08-30	08:28:05
Overcoring 8 cm	2006-08-30	08:29:35
Overcoring 12 cm	2006-08-30	08:08:31
Overcoring 16 cm	2006-08-30	08:32:25
Overcoring 20 cm	2006-08-30	08:33:45
Overcoring 24 cm	2006-08-30	08:35:05
Overcoring 28 cm	2006-08-30	08:36:20
Overcoring 32 cm	2006-08-30	08:37:45

Overcoring stop (90 cm)	2006-08-30	08:57:20
Flushing off	2006-08-30	09:12:30
Core break	2006-08-30	09:28:30
Core retrieval start	2006-08-30	09:43:45
Core and probe on surface	2006-08-30	10:01:00
End of strain registration	2006-08-30	10:24:10
Calculation of strain difference: OC Start	2006-08-30	08:15:40
Calculation of strain difference: OC Stop	2006-08-30	09:10:20

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains after 130 mm are for 9:10:02 strains used for original stress solution

Rosette 1

G1,axi

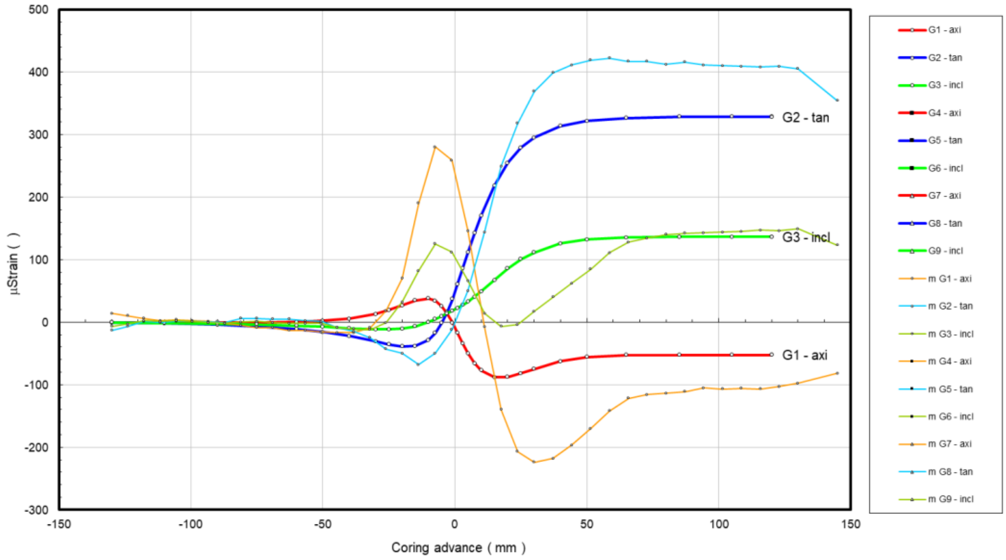
7.9	1.9/1.5	*P*

G2,tan

1.3	1.2/1.2	*G*

G3,incl

-	1.1/1.0	*P*



Rosette 2

G4,axi

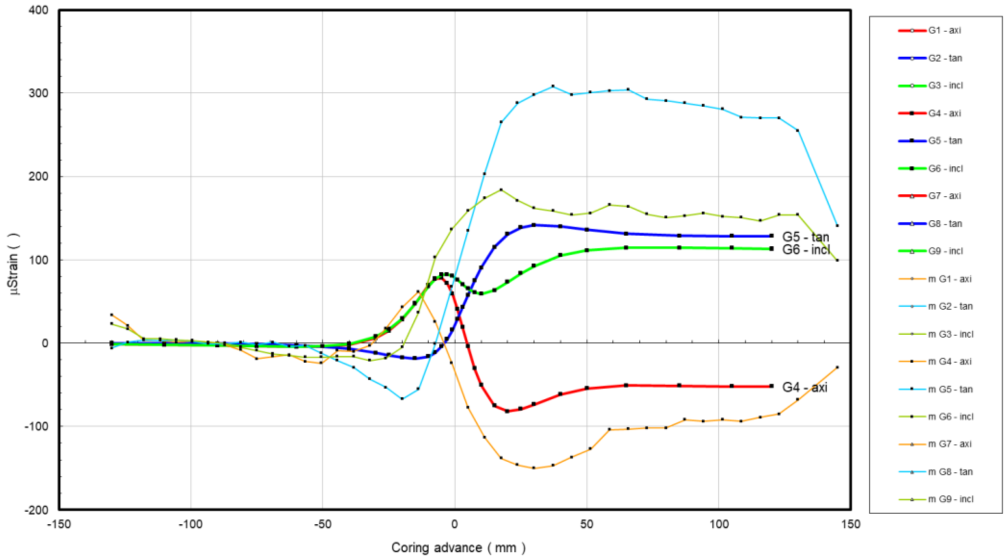
1.9	1.3/0.56	*M*

G5,tan

2.2	2.1/1.1	*P*

G6,incl

2.2	1.1/0.8	*M*



Rosette 3

G7,axi

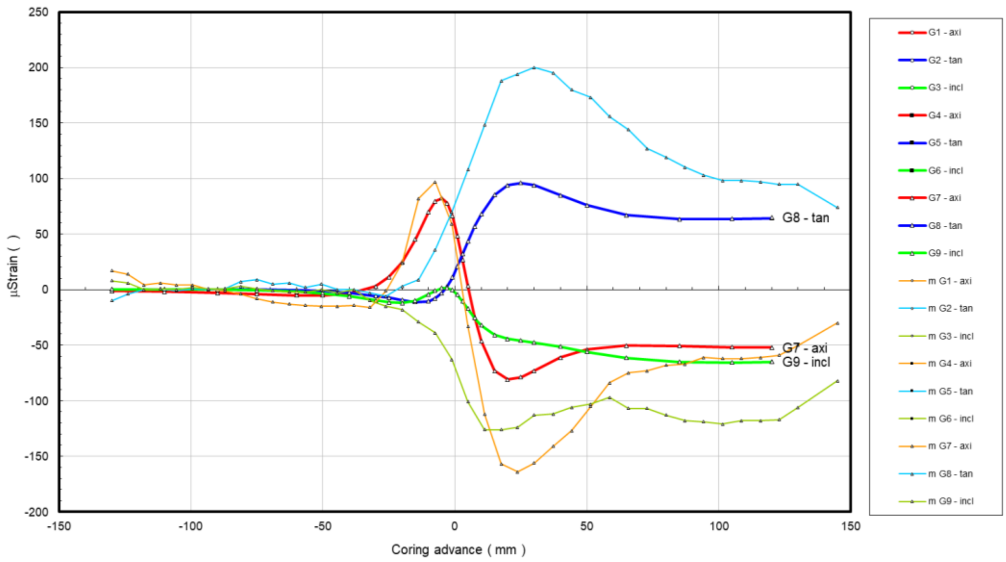
2.1	1.1/0.58	*M*

G8,tan

2.1	1.5/1.2	*P*

G9,incl

1.9	1.8/1.3	*P*



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

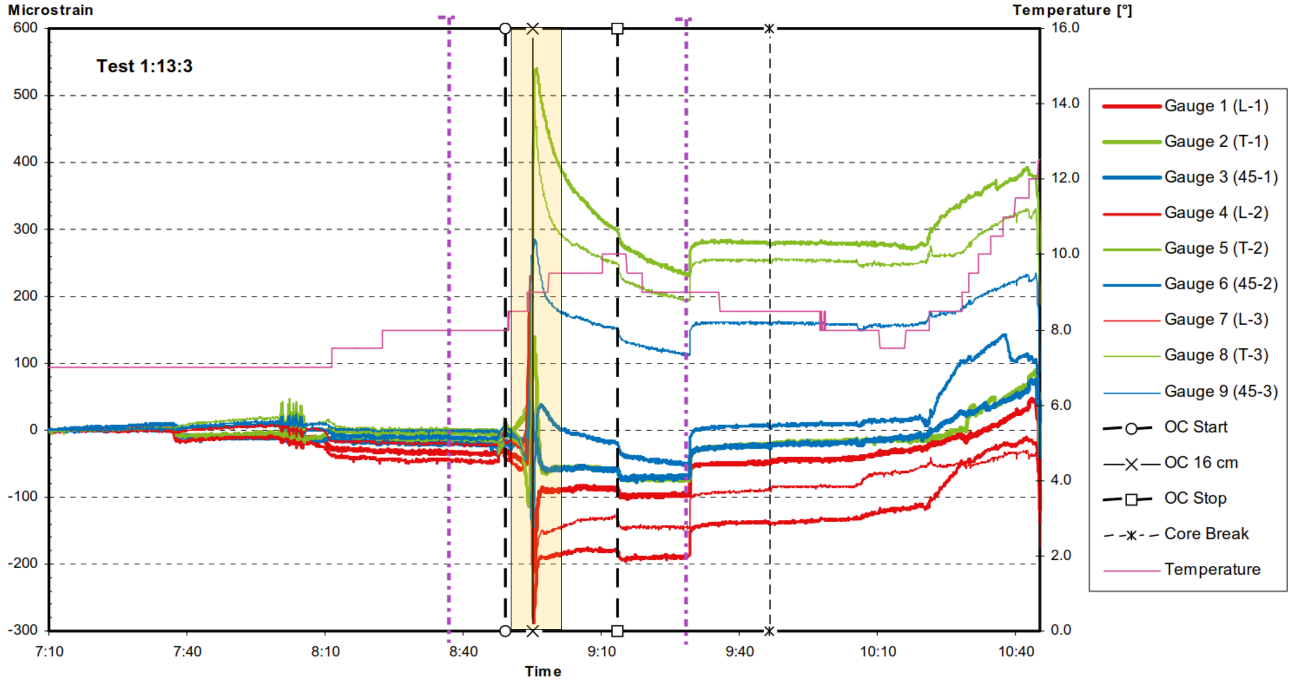
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-82	354	123	-29	141	99	-30	74	-82
@53mm	-170	419	85	-127	301	156	-105	173	-103
@120mm	-98	405	149	-68	255	154	-50	95	-106

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	Trend	Plunge	mag	Trend	Plunge	mag	Trend	Plunge	mag	Trend	mag	mag	
original	10.8	114	6	4.8	21	26	-1.0	216	63	10.7	116	3.7	0.2	*15%*
@53mm	15.8	125	4	9.1	34	14	-2.6	231	75	15.7	126	8.4	-1.8	
@130mm	14.0	123	6	7.0	30	21	-1.4	228	68	13.9	125	5.9	-0.2	

KFM02B: 1:13:3, depth: 126.22m

G	9/9	Strains stable before overcoring.
P	4/9	Strains are within the elastic transient strain range (yellow shade)
P	0,0,9	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 14 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift of most strain gauges number 2, 5 and 6. Drifting is not caused by temperature because it is different for equally oriented gauges. Vertical stress is tensile.
P		***Overall strain reliability***



Overcoring record:

Table A2. Key measurement data for test no. 1:13:3, 135.80 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-09-10	17:45:00
Mixing of glue	2006-09-10	18:18:00
Application of glue to gauges	2006-09-10	18:22:00
Probe installation in pilot hole	2006-09-10	18:27:00
Start time for dense sampling (5 s interval)	2006-09-11	06:30:00
Adapter retrieved	2006-09-11	07:37:10
Adapter on surface	2006-09-11	07:39:55
Drill string fed down the hole	2006-09-11	07:48:10
Drill string in place	2006-09-11	08:07:40
Flushing start	2006-09-11	08:08:10
Rotation start	2006-09-11	08:49:05
Overcoring start	2006-09-11	08:49:20
Overcoring 4 cm	2006-09-11	08:50:55
Overcoring 8 cm	2006-09-11	08:52:20
Overcoring 12 cm	2006-09-11	08:53:40
Overcoring 16 cm	2006-09-11	08:55:00
Overcoring 20 cm	2006-09-11	08.56:20
Overcoring 24 cm	2006-09-11	08:57:35
Overcoring 28 cm	2006-09-11	08:59:00
Overcoring 32 cm	2006-09-11	09:00:20
Overcoring stop (70 cm)	2006-09-11	09:13:30
Flushing off	2006-09-11	09:29:10
Core break	2006-09-11	09:46:30
Core retrieval start	2006-09-11	10:05:25
Core and probe on surface	2006-09-11	10:28:00
End of strain registration	2006-09-11	10:45:30
Calculation of strain difference: OC Start	2006-09-11	08:36:20
Calculation of strain difference: OC Stop	2006-09-11	09:27:30

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.0
32 cm – overcoring stop	2.9

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported stress solution

<u>Rosette 1</u>

G1,axi

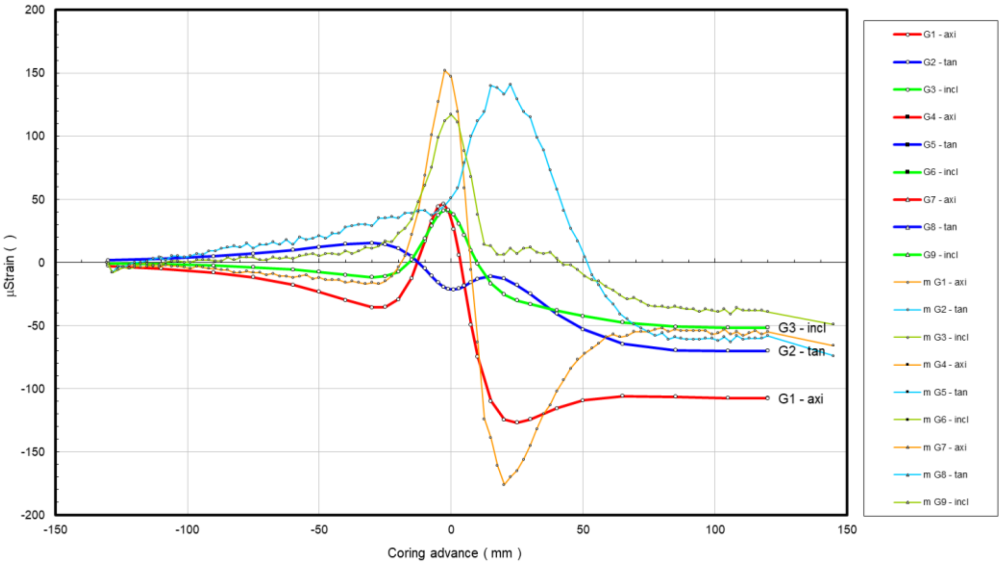
3.4	0.53/0.61	**P**

G2,tan

-9	0.86/1.1	**P**

G3,incl

2.8	0.74/1.0	**P**



<u>Rosette 2</u>

G4,axi

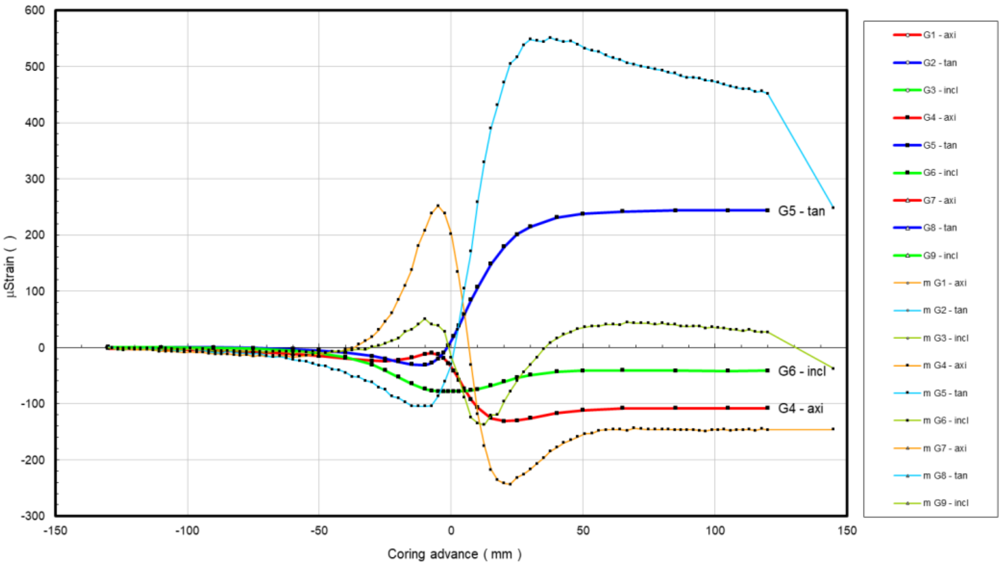
1.8	1.9/1.0	**P**

G5,tan

2.3	1.9/1.0	**P**

G6,incl

1.8	-0.65/0.9	**P**



<u>Rosette 3</u>

G7,axi

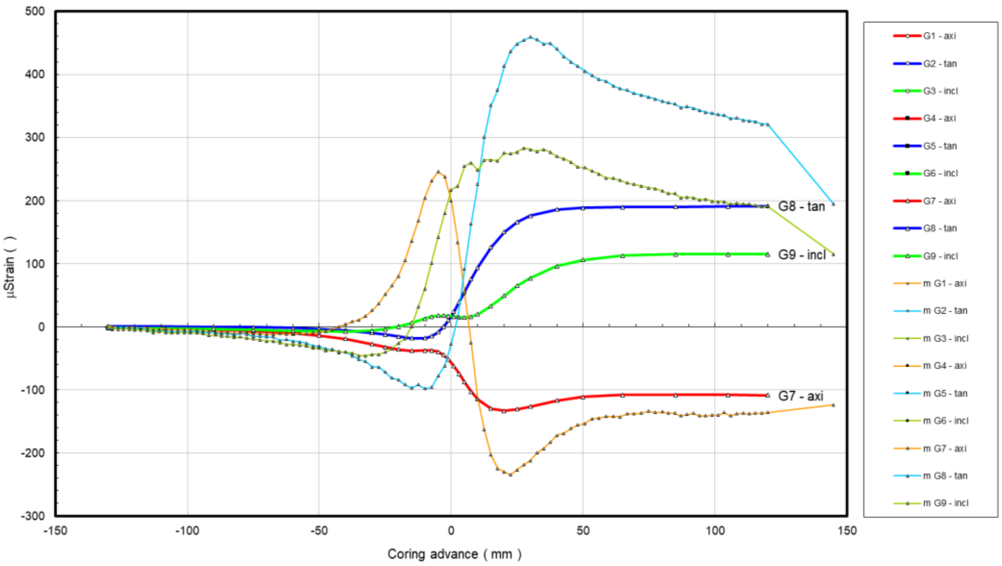
1.8	1.3	**P**

G8,tan

2.4	1.7/1.0	**P**

G9,incl

2.5	1.7/1.0	**P**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

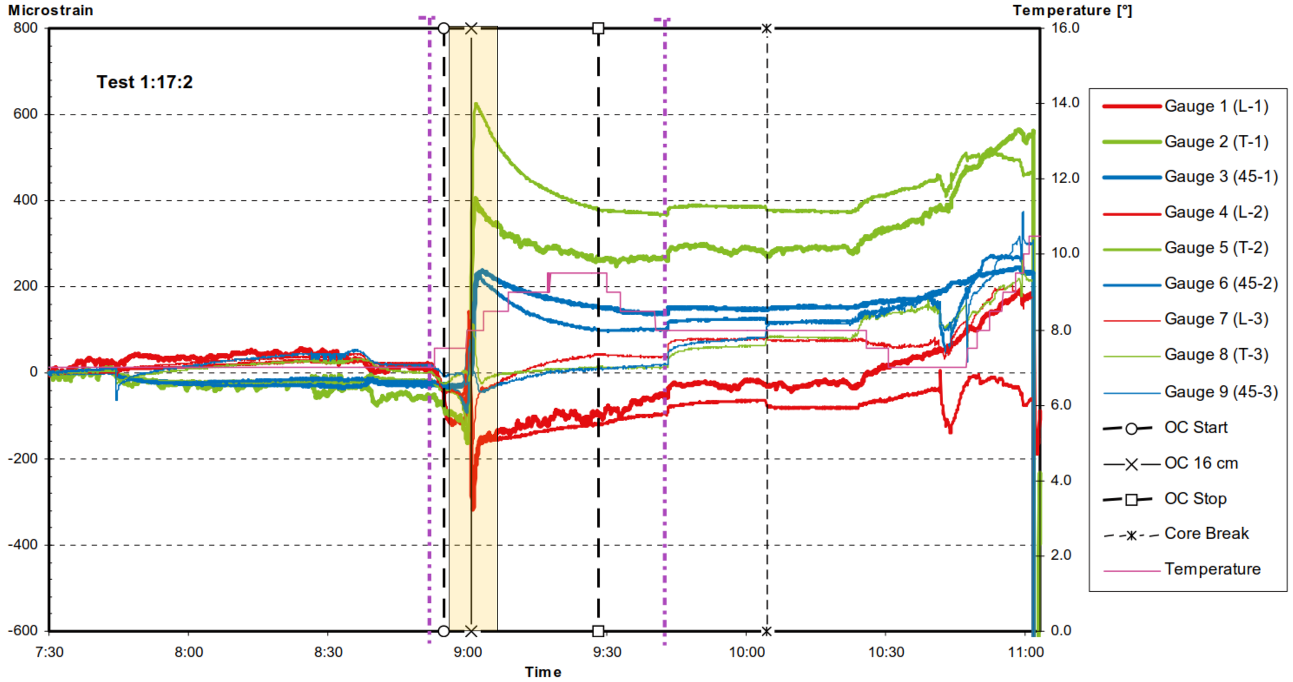
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-66	-74	-49	-146	248	-38	-124	194	115
@53mm	-68	-10	-14	-153	528	38	-146	398	247
@120mm	-55	-58	-39	-147	452	27	-136	321	191

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	8.8	167	20	-0.4	73	13	-6.9	312	66	7.1	171	-0.8	-4.8	*49 %*
@53mm	21.6	166	20	5.2	71	13	-2.0	311	66	18.8	168	4.8	1.2	
@120mm	16.5	165	19	2.2	70	14	-4.3	307	66	14.2	167	1.7	-1.7	

KFM02B: 1:17:2, depth: 134.48 m

G	8/9	Strains stable before overcoring.
P	1/9	Strains are within the elastic transient strain range (yellow shade)
P	0,5,4	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 magnitudes
P	G,G,G	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 14 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in most strained gauges number 2 and 5 also other except 8 and 9 drift. Drifting is not caused by temperature because it is different for similarly oriented gauges. Vertical stress is close to the overburden weight.
P		***Overall strain reliability***



Overcoring record:

Table A3. Key measurement data for test no. 1:17:2, 144.17 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-09-15	18:45:00
Mixing of glue	2006-09-15	18:59:00
Application of glue to gauges	2006-09-15	19:03:00
Probe installation in pilot hole	2006-09-15	19:10:05
Start time for dense sampling (5 s interval)	2006-09-16	07:00:00
Adapter retrieved	2006-09-16	07:44:30
Adapter on surface	2006-09-16	07:48:10
Drill string fed down the hole	2006-09-16	08:13:50
Drill string in place	2006-09-16	08:35:50
Flushing start	2006-09-16	08:36:00
Rotation start	2006-09-16	08:54:35
Overcoring start	2006-09-16	08:54:55
Overcoring 4 cm	2006-09-16	08:55:55
Overcoring 8 cm	2006-09-16	08:57:20
Overcoring 12 cm	2006-09-16	08:58:20
Overcoring 16 cm	2006-09-16	09:01:00
Overcoring 20 cm	2006-09-16	09:01:20
Overcoring 24 cm	2006-09-16	09:02:40
Overcoring 28 cm	2006-09-16	09:04:00
Overcoring 32 cm	2006-09-16	09:05:20
Overcoring stop (95 cm)	2006-09-16	09:28:15
Flushing off	2006-09-16	09:43:10
Core break	2006-09-16	10:04:20
Core retrieval start	2006-09-16	10:22:45
Core and probe on surface	2006-09-16	10:50:00
End of strain registration	2006-09-16	11:03:00
Calculation of strain difference: OC Start	2006-09-16	08:50:55
Calculation of strain difference: OC Stop	2006-09-16	09:42:15

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	3.1
16 – 32 cm	3.0
32 cm – overcoring stop	2.9

OCS

Transient strain comparison and reliability ranking

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

<u>Rosette 1</u>

G1,axi

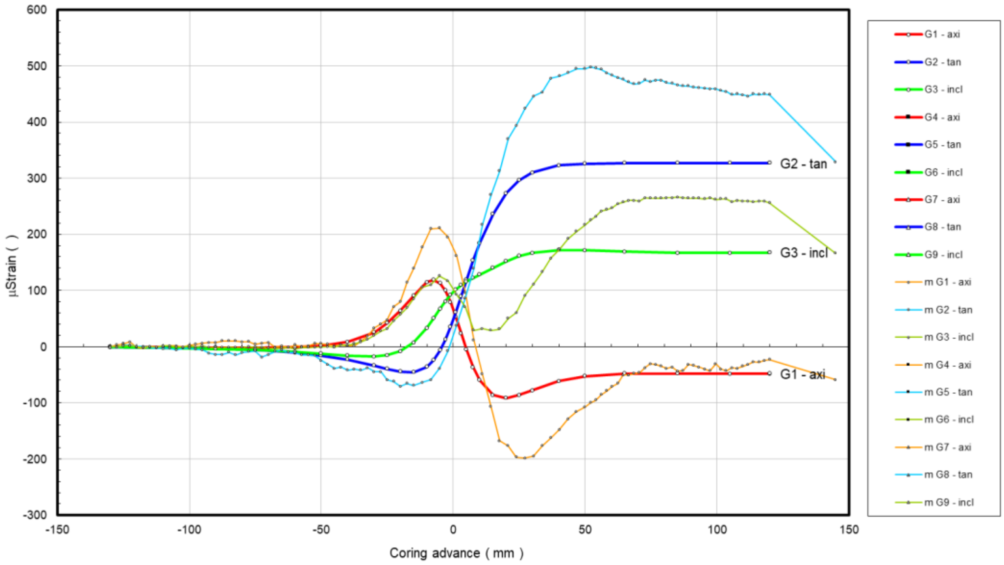
2.2	0.5/1.3	M

G2,tan

1.6	1.4/1.0	M

G3,incl

1.6	1.5/1.0	P



<u>Rosette 2</u>

G4,axi

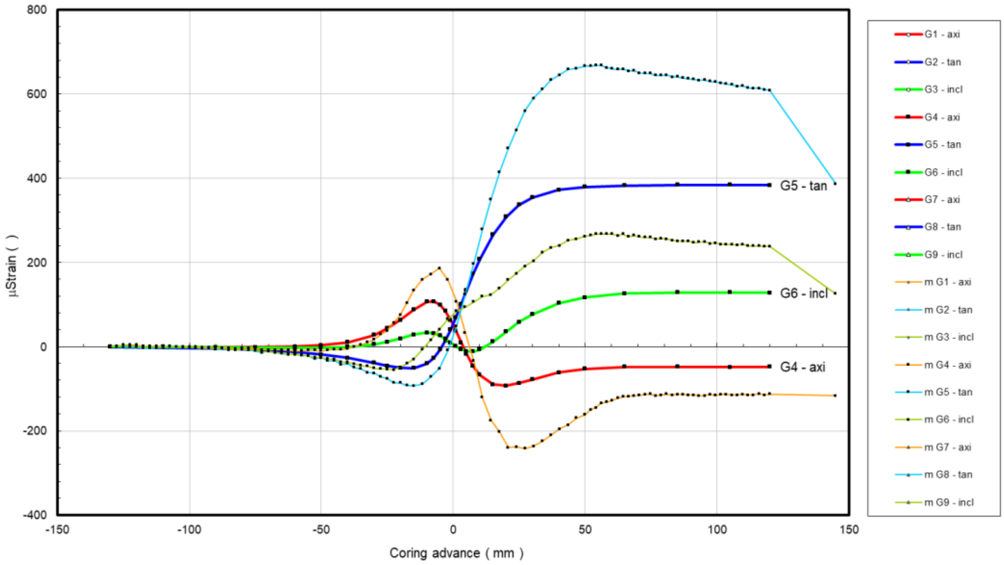
2.6	1.4	M

G5,tan

1.9	1.6/1.0	P

G6,incl

2.1	1.9/1.0	P



<u>Rosette 3</u>

G7,axi

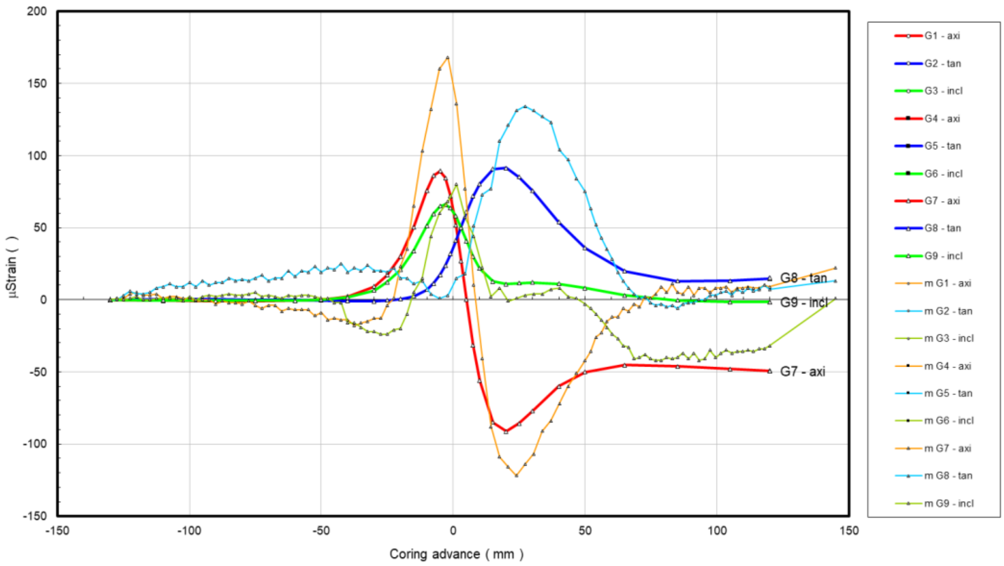
1.9	-0.1/-0.5	P

G8,tan

1.5	0.5/0.95	M

G9,incl

1.2	>10/1.0	M



OCS

Original Sicada reported and other semi-stable stress solutions:
--Sicada reported solution without water pressure
--other solutions with water pressure

Transient strains:

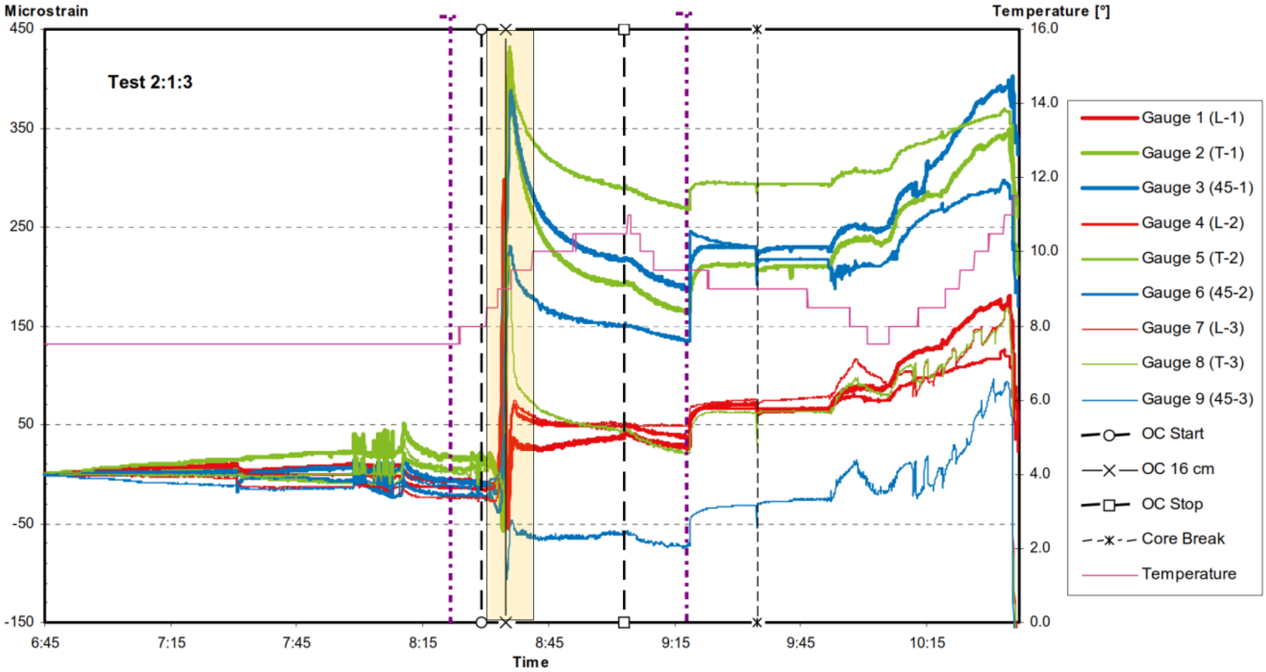
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-59	329	166	-117	386	125	22	13	1
@50mm	-108	495	217	-162	666	262	-42	75	-3
@130mm	-23	449	256	-113	609	238	9	7	-32

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	15.1	126	15	4.9	219	11	2.3	343	72	14.2	125	4.8	3.2	*55 %*
@50mm	26.1	130	11	9.4	221	4	4.1	332	79	25.3	130	9.3	4.9	
@120mm	24.4	129	67	8.4	34	17	7.2	258	67	23.2	129	8.3	8.5	

KFM02B: 2:1:3, depth: 146.86 m

G	9/9	Strains stable before overcoring.
P	4/9	Strains are within the elastic transient strain range (yellow shade)
P	2,2,5	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 63 mm for s1, s2 and s3 magnitudes
M	M,G,M	Stability of inverse stress solution after passing gauges section over 63 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 10 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift of most strain gauges, drift is not related to temperature because varies within equally oriented gauges. Lifting probe up to the surface results in very high strains, which continue on surface. Maximum principal stresses highly rotated and the vertical stress is 3.0 times the gravitational stress. Measurement section has several healed fractures.
P		***Overall strain reliability***



Overcoring record:

Table A4. Key measurement data for test no. 2:1:3, 156.72 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-09-19	12:45:00
Mixing of glue	2006-09-19	14:22:00
Application of glue to gauges	2006-09-19	14:24:00
Probe installation in pilot hole	2006-09-19	14:32:00
Start time for dense sampling (5 s interval)	2006-09-20	06:30:00
Adapter retrieved	2006-09-20	07:30:50
Adapter on surface	2006-09-20	07:33:40
Drill string fed down the hole	2006-09-20	07:45:15
Drill string in place	2006-09-20	08:08:15
Flushing start	2006-09-20	08:08:20
Rotation start	2006-09-20	08:28:20
Overcoring start	2006-09-20	08:29:05
Overcoring 4 cm	2006-09-20	08:30:30
Overcoring 8 cm	2006-09-20	08:31:50
Overcoring 12 cm	2006-09-20	08:33:10
Overcoring 16 cm	2006-09-20	08:34:55
Overcoring 20 cm	2006-09-20	08:35:55
Overcoring 24 cm	2006-09-20	08:37:15
Overcoring 28 cm	2006-09-20	08:38:35
Overcoring 32 cm	2006-09-20	08:40:00
Overcoring stop (100 cm)	2006-09-20	09:02:55
Flushing off	2006-09-20	09:18:40
Core break	2006-09-20	09:34:30
Core retrieval start	2006-09-20	09:51:35
Core and probe on surface	2006-09-20	10:17:30
End of strain registration	2006-09-20	10:36:55
Calculation of strain difference: OC Start	2006-09-20	08:21:05
Calculation of strain difference: OC Stop	2006-09-20	09:17:55

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.7
16 – 32 cm	3.1
32 cm – overcoring stop	3.0

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

Rosette 1

G1,axi

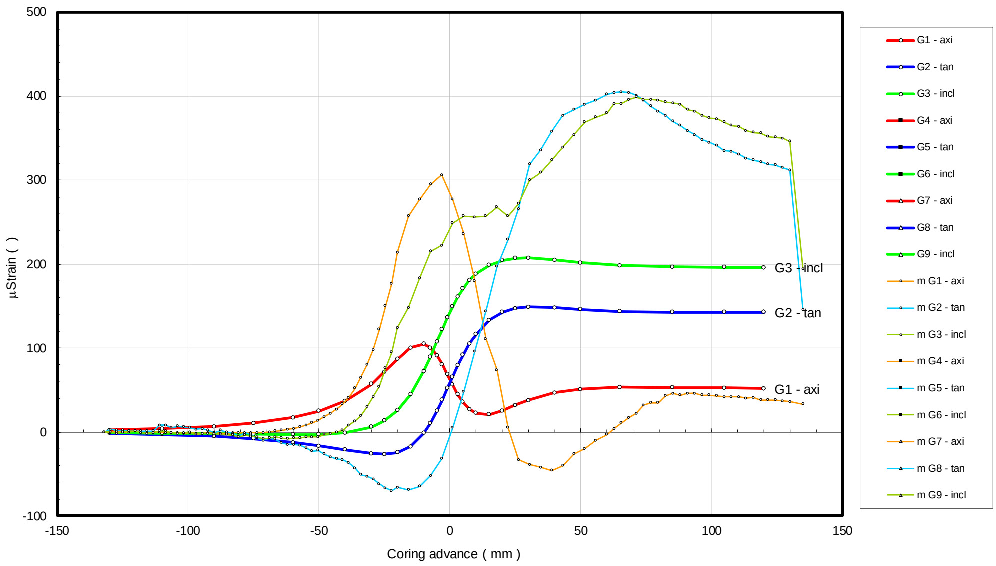
3.0	0.73/0.6	P

G2,tan

2.7	2.2/1.0	P

G3,incl

1.9	1.8/1.0	P



Rosette 2

G4,axi

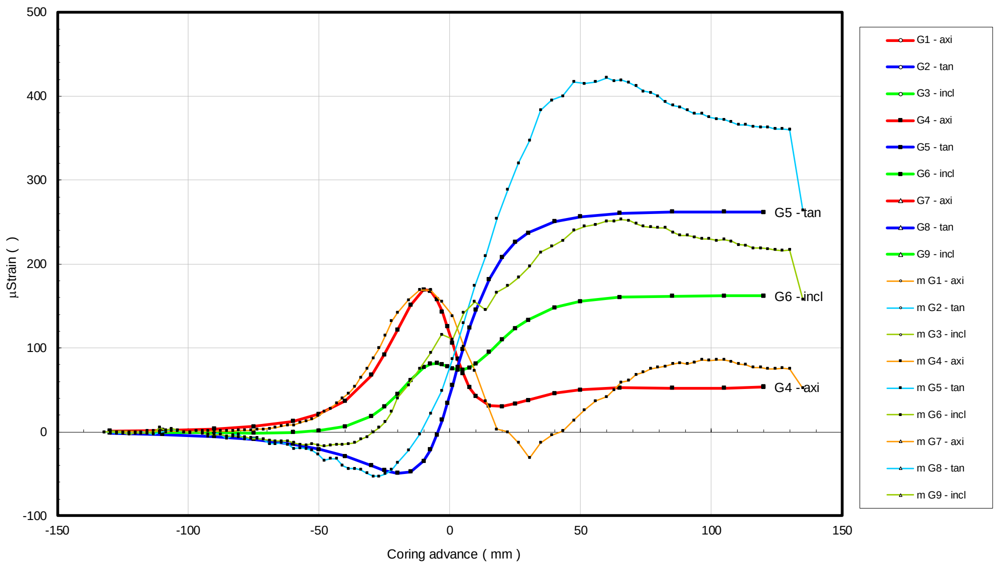
-0.81	1.4/1.0	G

G5,tan

1.6	1.4/1.0	M

G6,incl

1.6	1.3/1.0	M



Rosette 3

G7,axi

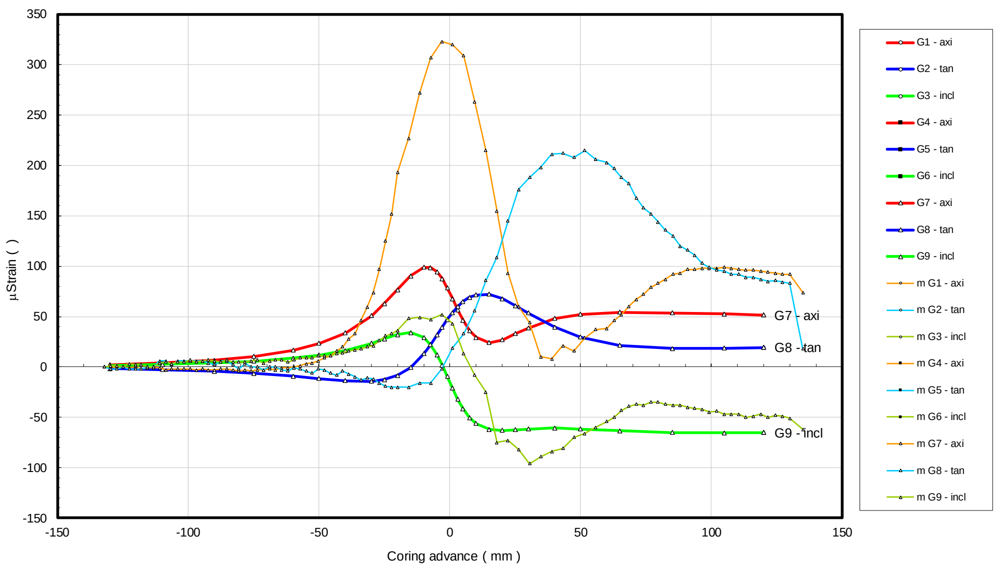
3.3	1.8/1.4	P

G8,tan

3.3	4.4/1.0	P

G9,incl

1.5	0.75/1.0	G



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

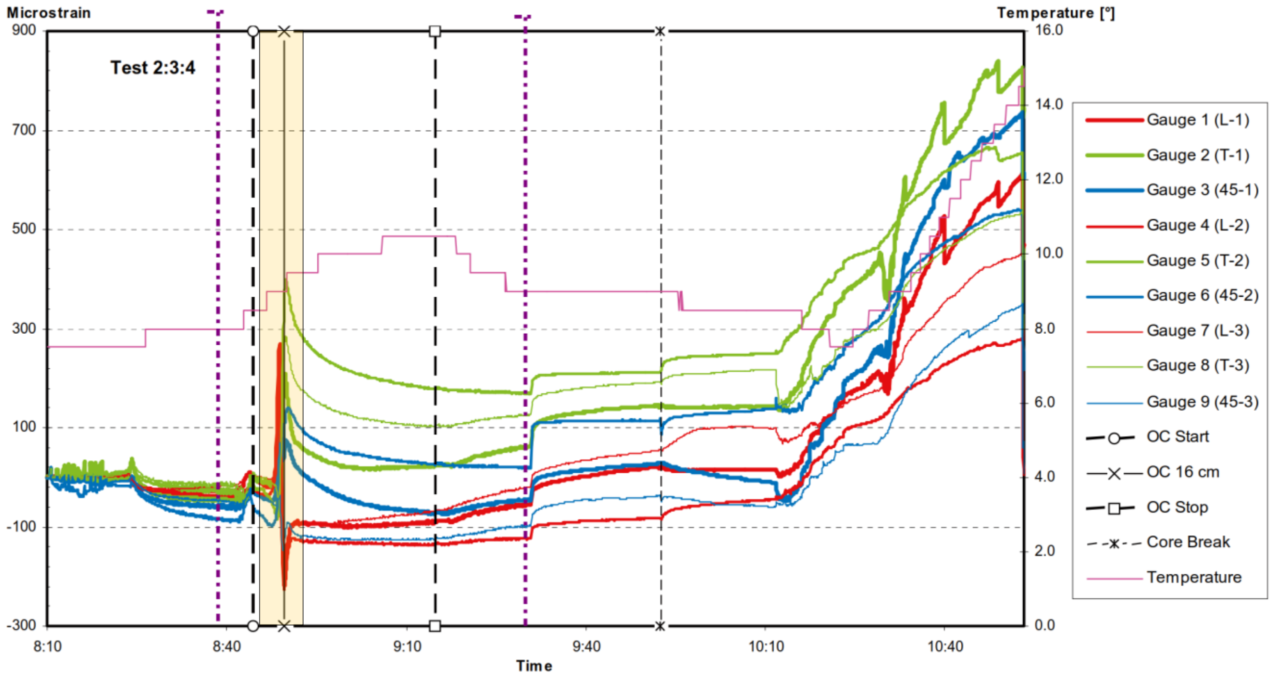
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	33	145	194	52	264	158	74	18	-62
@63mm	4	404	391	50	418	251	46	197	-50
@130mm	36	312	346	75	360	217	92	83	-51

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	13.7	138	59	11.9	358	25	3.4	260	17	12.2	168	4.3	12.5	*47 %*
@63mm	26.1	128	44	22.1	7	29	12.1	256	33	23.6	158	15.6	21.1	
@130mm	22.4	133	54	17.9	355	28	8.4	253	20	19.1	159	9.9	19.8	

KFM02B: 2:3:4, depth: 154.14m

G	8/9	Strains stable before overcoring.
P	4/9	Strains are within the elastic transient strain range (yellow shade)
P	0,0,9	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 61 mm for s1, s2 and s3 magnitudes
P	P,P,P	Stability of inverse stress solution after passing gauges section over 61 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 10 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Drift in the most strain gauges, drift is not related to temperature because varies within equally oriented gauges. Lifting probe up to the surface results in extremely high strains, which continues till the surface. Principal stresses are highly rotated and the vertical stress is 0.4 times the gravitational stress. The measurement section has several partly open healed fractures.
P		***Overall strain reliability***



Overcoring record:

Table A5. Key measurement data for test no. 2:3:4, 164.10 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-09-23	14:00:00
Mixing of glue	2006-09-23	15:51:00
Application of glue to gauges	2006-09-23	15:52:00
Probe installation in pilot hole	2006-09-23	16:02:00
Start time for dense sampling (5 s interval)	2006-09-24	06:30:00
Adapter retrieved	2006-09-24	07:44:50
Adapter on surface	2006-09-24	07:50:00
Drill string fed down the hole	2006-09-24	07:59:25
Drill string in place	2006-09-24	08:22:35
Flushing start	2006-09-24	08:22:45
Rotation start	2006-09-24	08:44:10
Overcoring start	2006-09-24	08:44:25
Overcoring 4 cm	2006-09-24	08:45:25
Overcoring 8 cm	2006-09-24	08:46:50
Overcoring 12 cm	2006-09-24	08:48:10
Overcoring 16 cm	2006-09-24	08:49:30
Overcoring 20 cm	2006-09-24	08:50:50
Overcoring 24 cm	2006-09-24	08:52:10
Overcoring 28 cm	2006-09-24	08:53:30
Overcoring 32 cm	2006-09-24	08:54:50
Overcoring stop (90 cm)	2006-09-24	09:14:45
Flushing off	2006-09-24	09:30:50
Core break	2006-09-24	09:52:30
Core retrieval start	2006-09-24	10:11:40
Core and probe on surface	2006-09-24	10:35:20
End of strain registration	2006-09-24	10:53:15
Calculation of strain difference: OC Start	2006-09-24	08:40:50
Calculation of strain difference: OC Stop	2006-09-24	09:29:40

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	3.1
16 – 32 cm	3.0
32 cm – overcoring stop	2.9

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains after 130 mm are for end of coring and original Sicada reported solution

Rosette 1

G1,axi

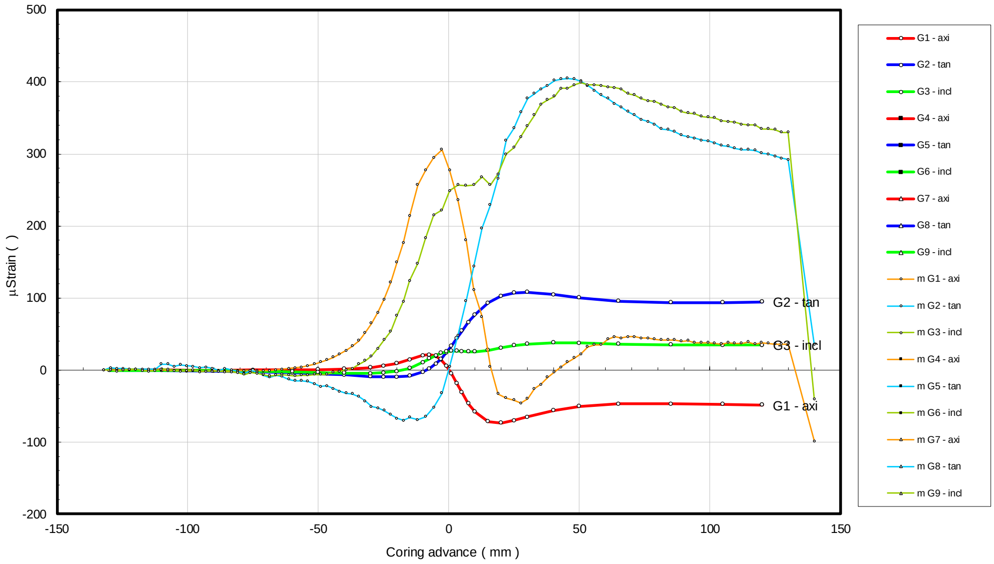
10.2	-0.75	P

G2,tan

3.7	3.1/0.36	P

G3,incl

10.4	9.5/-1.1	P



Rosette 2

G4,axi

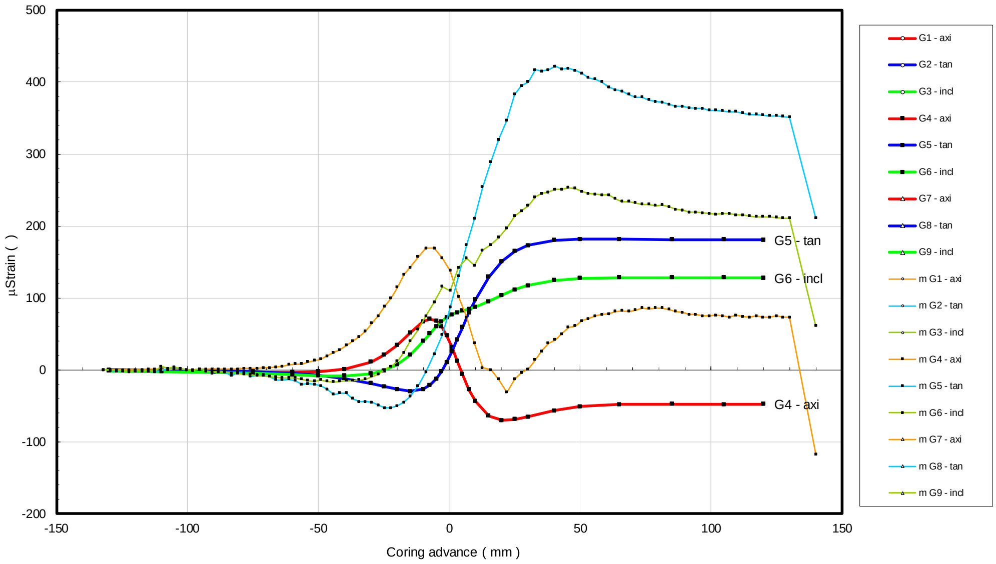
2.4	-1.5/2.5	P

G5,tan

2.3	1.9/1.2	P

G6,incl

2.0	1.6/0.47	P



Rosette 3

G7,axi

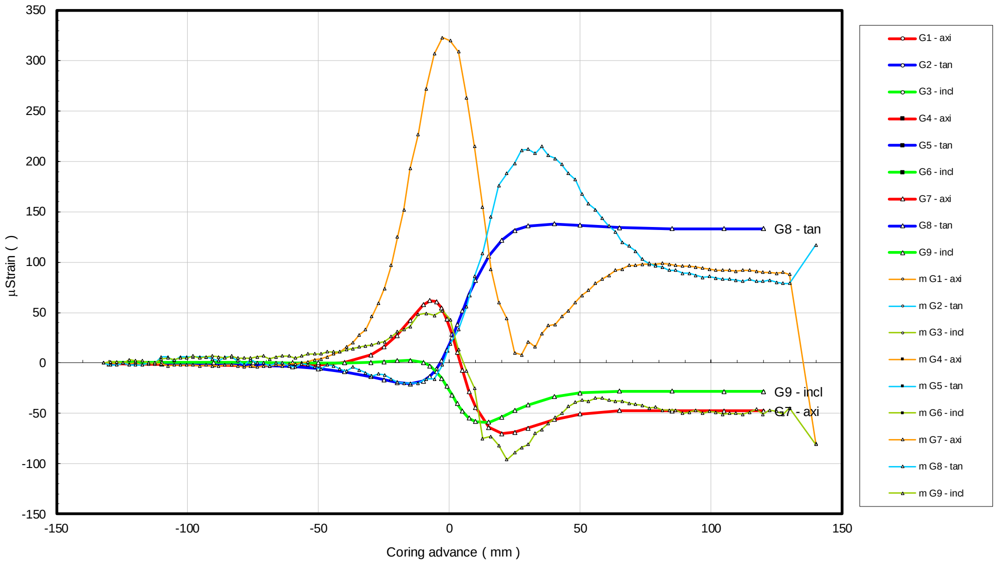
5.3	-1.9/1.7	P

G8,tan

1.6	0.6/0.88	P

G9,incl

1.6	1.8/2.9	P



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

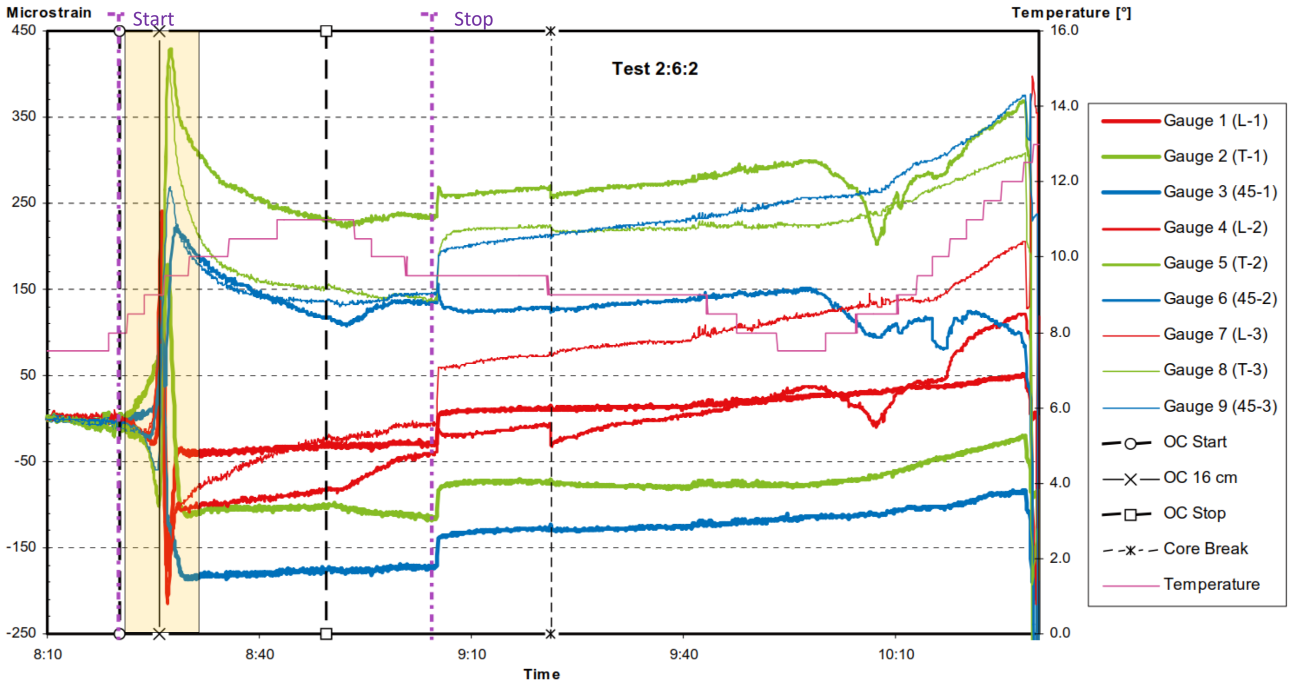
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-99	35	-41	-117	211	61	-80	117	-81
@61mm	43	377	393	78	393	243	87	136	-37
@130mm	36	292	330	73	351	211	88	79	-45

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	8.3	132	26	5.1	226	9	-0.2	333	62	6.8	120	4.9	1.6	*58 %*
@61mm	26.9	250	40	22.0	109	43	12.3	359	20	24.7	84	13.69	22.8	
@130mm	23.2	255	41	18.9	111	44	9.7	2	19	21.2	88	10.8	19.8	

KFM02B: 2:6:2, depth: 167.88 m

G	9/9	Strains stable before overcoring.
P	4/9	Strains are within the elastic transient strain range (yellow shade)
P	0,1,8	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 64 mm for s1, s2 and s3 magnitudes
G	G,P,P	Stability of inverse stress solution after passing gauges section over 64 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
M		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 19 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Drift in most strain gauges, drift is not related to temperature because varies within equally oriented strain gauges. Intermediate and minimum principal stresses highly rotated, the minimum stress in tensile and the vertical stress is 0.4 times the overburden weight. These factors indicate low reliability. Healed fractures observed at the first quarter of the measurement section.
P		***Overall strain reliability***



Overcoring record:

Table A6. Key measurement data for test no. 2:6:2, 178.03 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-09-28	14:00:00
Mixing of glue	2006-09-28	14:36:00
Application of glue to gauges	2006-09-28	14:41:00
Probe installation in pilot hole	2006-09-28	14:47:00
Start time for dense sampling (5 s interval)	2006-09-29	06:30:00
Adapter retrieved	2006-09-29	07:20:10
Adapter on surface	2006-09-29	07:23:20
Drill string fed down the hole	2006-09-29	07:32:50
Drill string in place	2006-09-29	08:01:05
Flushing start	2006-09-29	08:01:10
Rotation start	2006-09-29	08:19:35
Overcoring start	2006-09-29	08:20:20
Overcoring 4 cm	2006-09-29	08:21:40
Overcoring 8 cm	2006-09-29	08:23:05
Overcoring 12 cm	2006-09-29	08:24:30
Overcoring 16 cm	2006-09-29	08:25:50
Overcoring 20 cm	2006-09-29	08:27:10
Overcoring 24 cm	2006-09-29	08:28:30
Overcoring 28 cm	2006-09-29	08:29:55
Overcoring 32 cm	2006-09-29	08:31:15
Overcoring stop (86 cm)	2006-09-29	08:49:30
Flushing off	2006-09-29	09:05:15
Core break	2006-09-29	09:21:10
Core retrieval start	2006-09-29	09:41:15
Core and probe on surface	2006-09-29	10:13:00
End of strain registration	2006-09-29	10:30:15
Calculation of strain difference: OC Start	2006-09-29	08:20:20
Calculation of strain difference: OC Stop	2006-09-29	09:04:20

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.9
16 – 32 cm	3.0
32 cm – overcoring stop	3.0

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains after 130 mm are for original Sicada reported solution and at core break

<u>Rosette 1</u>

G1,axi

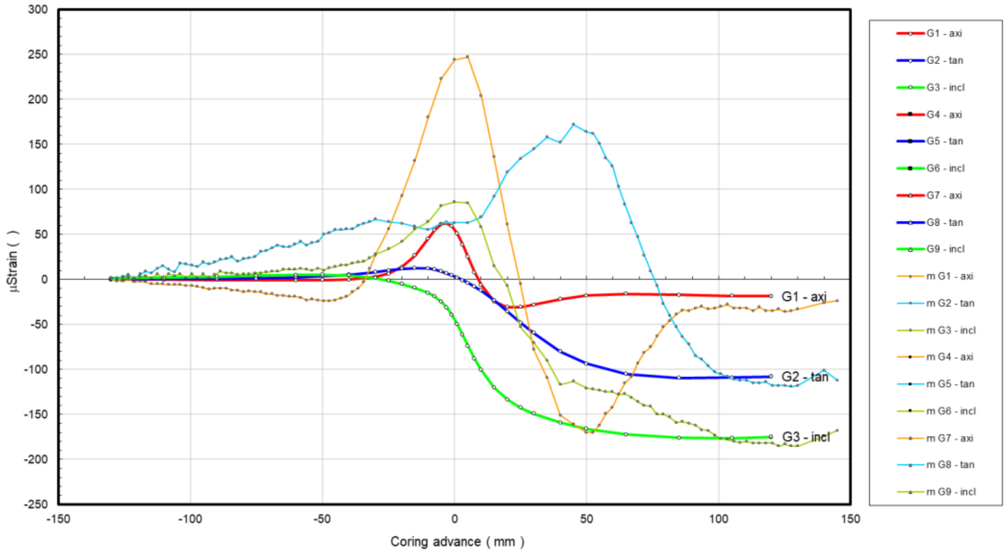
5.4	1.9/1.2	**P**

G2,tan

13.5	1.1/1.0	**P**

G3,incl

-1.6	1.0/0.96	**P**



<u>Rosette 2</u>

G4,axi

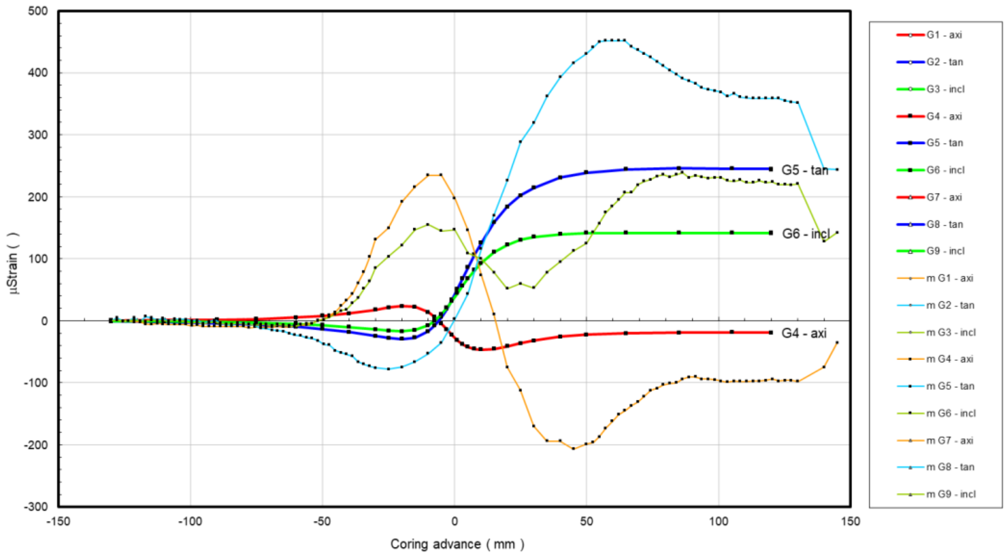
9.8	5/1.8	**P**

G5,tan

2.0	1.5/1.0	**P**

G6,incl

-9.1	1.5/1.0	**P**



<u>Rosette 3</u>

G7,axi

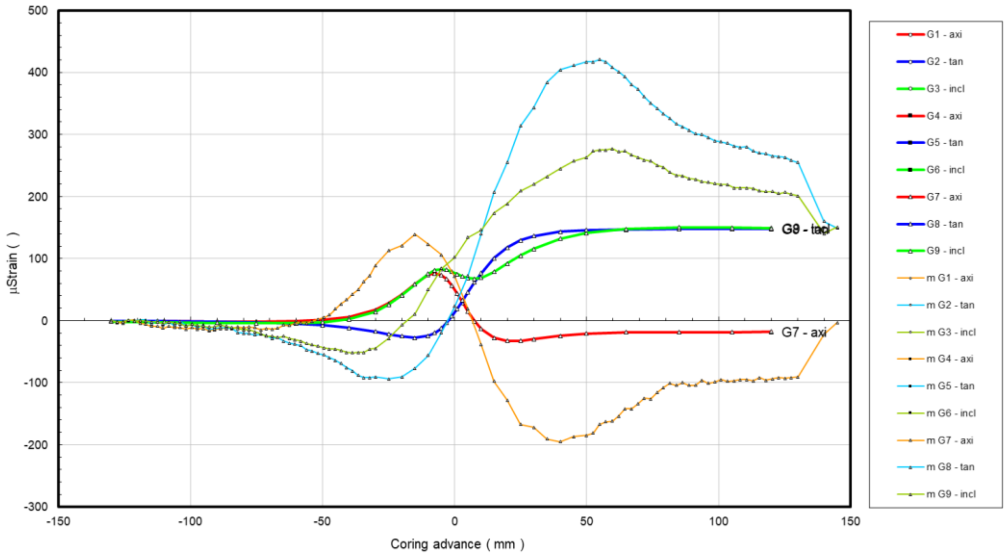
6.0	5.1/-	**P**

G8,tan

3.4	1.75/1.0	**P**

G9,incl

1.8	1.4/1.0	**M**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

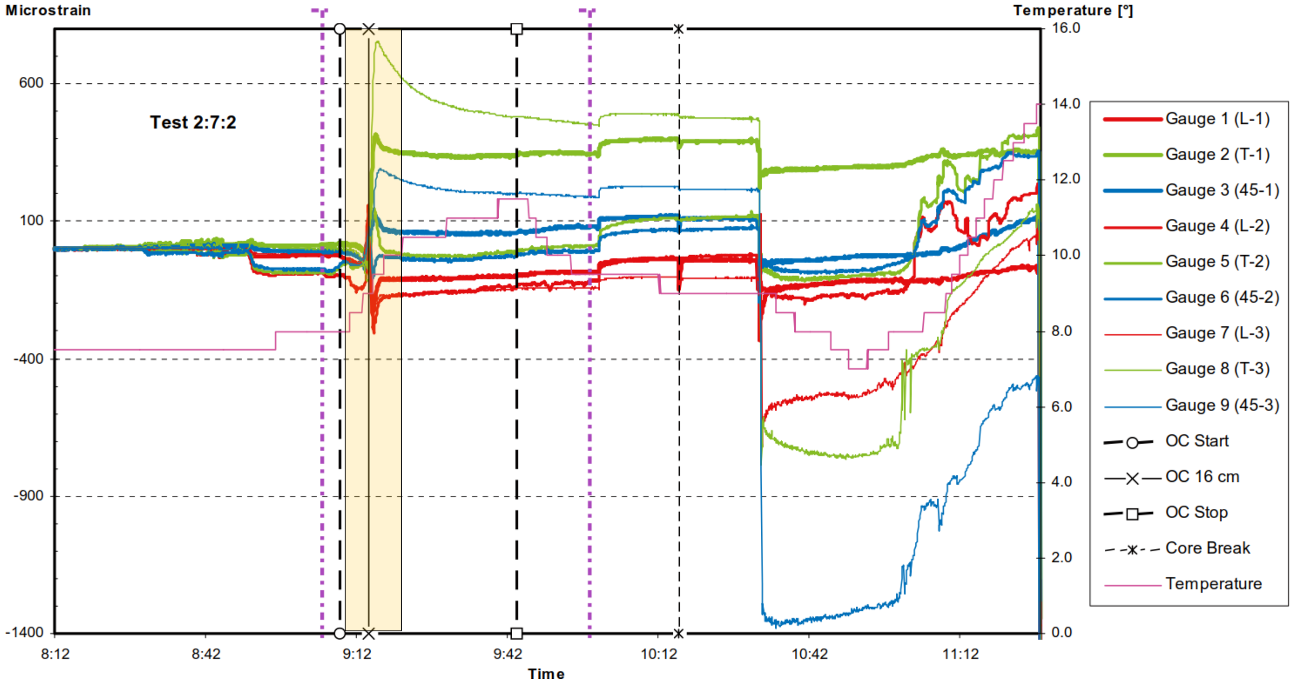
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-24	-112	-168	-35	244	142	-3	149	151
@64mm	-115	83	-127	-145	452	207	-142	393	273
@130mm	-33	-118	-185	-98	352	221	-91	255	201

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	10.4	155	14	4.3	263	50	-3.3	54	36	9.9	150	-0.6	2.0	*38 %*
@64mm	20.2	166	17	10.4	258	7	-3.6	10	72	18.2	162	10.1	-1.4	-
@130mm	17.3	155	10	5.8	255	41	-1.7	54	47	16.8	153	2.4	2.2	-

KFM02B: 2:7:2, depth: 169.69 m

G	8/9	Strains stable before overcoring.
G	8/9	Strains are within the elastic transient strain range (yellow shade)
P	2,4,3	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,G,P	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 magnitudes
G	G,G,M	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
M		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 18 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Drift in the strain gauges number 8 and 9. The drift not related to temperature. Rosette number 3 unstable when the probe is lifted to the surface. The measurement section has two healed fractures.
P		***Overall strain reliability***



Overcoring record:

Table A7. Key measurement data for test no. 2:7:2, 179.87 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-09-30	12:00:00
Mixing of glue	2006-09-30	12:39:00
Application of glue to gauges	2006-09-30	12:44:00
Probe installation in pilot hole	2006-09-30	12:50:00
Start time for dense sampling (5 s interval)	2006-10-01	06:30:00
Adapter retrieved	2006-10-01	07:40:10
Adapter on surface	2006-10-01	07:43:30
Drill string fed down the hole	2006-10-01	08:15:30
Drill string in place	2006-10-01	08:50:45
Flushing start	2006-10-01	08:50:50
Rotation start	2006-10-01	09:08:00
Overcoring start	2006-10-01	09:08:50
Overcoring 4 cm	2006-10-01	09:10:20
Overcoring 8 cm	2006-10-01	09:11:45
Overcoring 12 cm	2006-10-01	09:13:05
Overcoring 16 cm	2006-10-01	09:14:25
Overcoring 20 cm	2006-10-01	09:15:45
Overcoring 24 cm	2006-10-01	09:17:10
Overcoring 28 cm	2006-10-01	09:18:25
Overcoring 32 cm	2006-10-01	09:19:50
Overcoring stop (101 cm)	2006-10-01	09:44:00
Flushing off	2006-10-01	10:00:20
Core break	2006-10-01	10:16:10
Core retrieval start	2006-10-01	10:30:40
Core and probe on surface	2006-10-01	11:10:20
End of strain registration	2006-10-01	11:28:05
Calculation of strain difference: OC Start	2006-10-01	09:00:50
Calculation of strain difference: OC Stop	2006-10-01	09:59:30

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.9
16 – 32 cm	3.0
32 cm – overcoring stop	2.9

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

Rosette 1

G1,axi

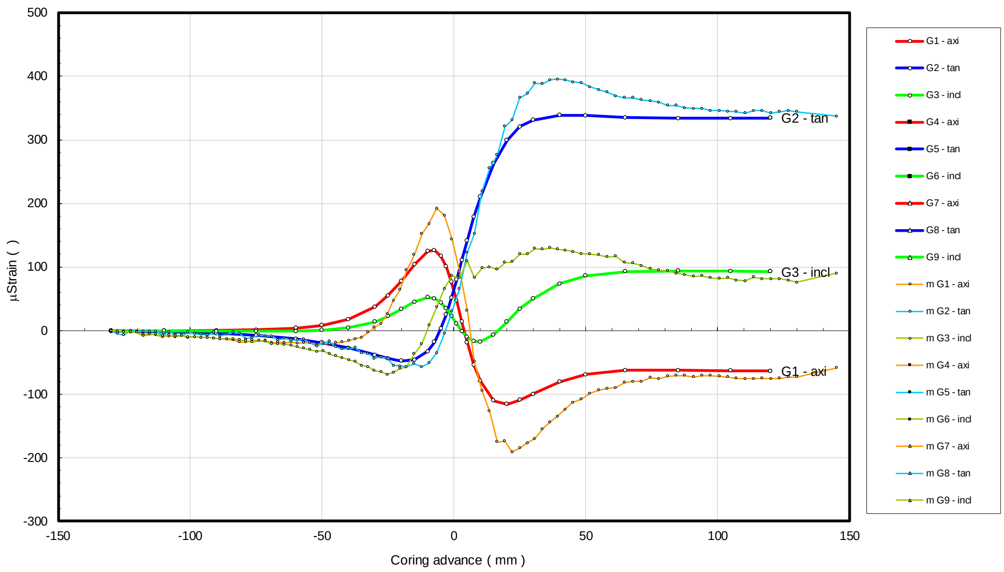
1.7	1.2/0.95	**G**

G2,tan

1.2	1.02/1.0	**G**

G3,incl

1.4	0.9/1.0	**M**



Rosette 2

G4,axi

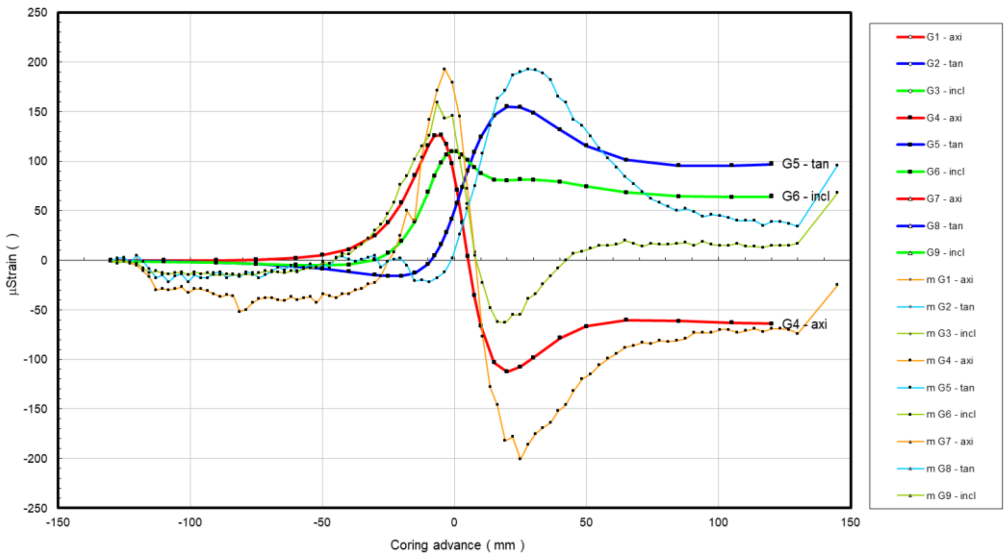
1.8	1.1/0.39	**M**

G5,tan

1.3	0.4/1.0	**P**

G6,incl

-0.76	0.23/1.05	**P**



Rosette 3

G7,axi

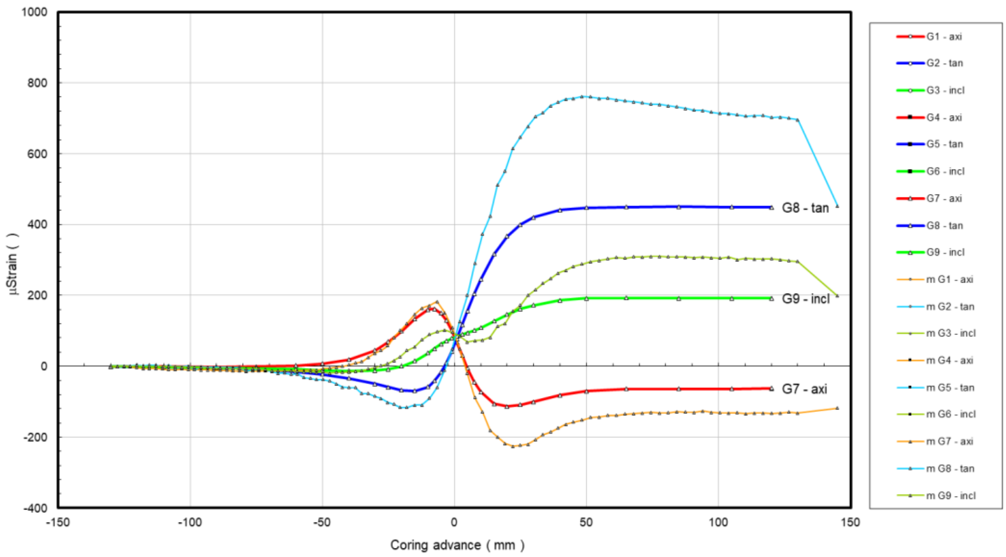
2.0	2.1	**M**

G8,tan

1.7	1.6/1.0	**P**

G9,incl

-	1.6/1.0	**M**



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

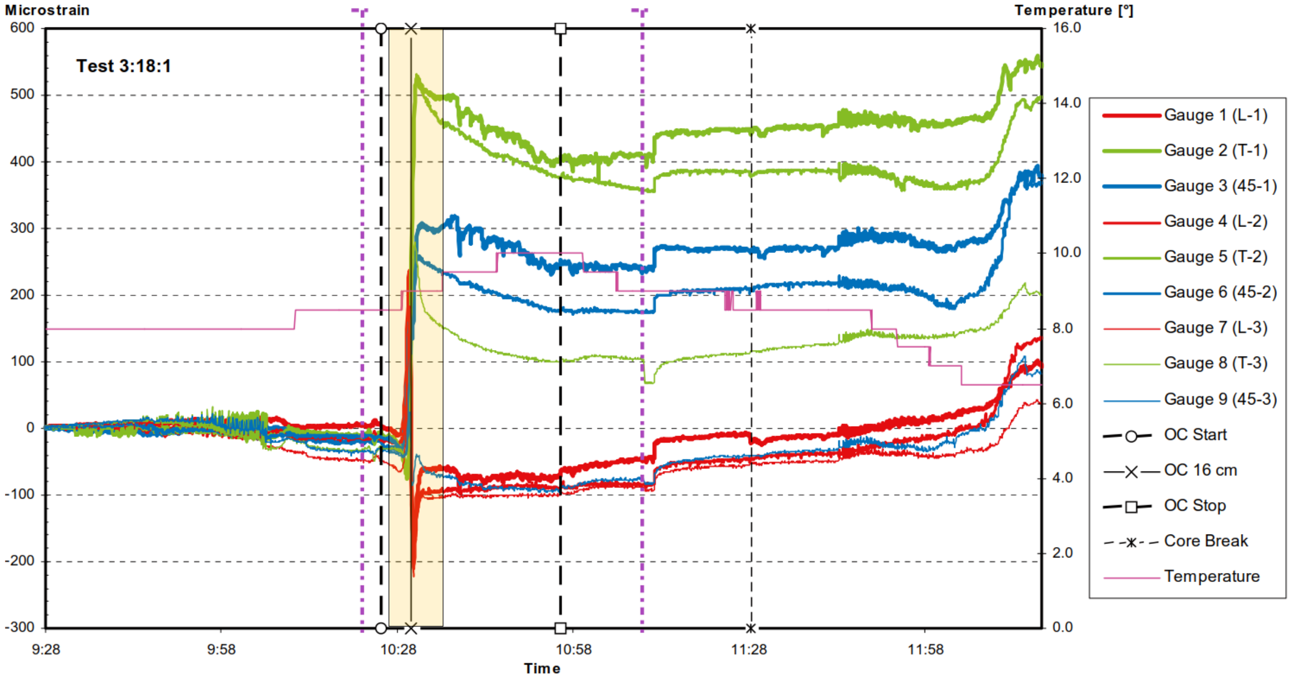
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-59	337	90	-25	96	68	-118	452	198
@60mm	-90	369	117	-94	94	16	-139	752	307
@130mm	-73	344	76	-74	34	17	-132	696	296

Transient stress solutions:

	σ_1 mag	**Trend**	**Plunge**	**σ_2 mag**	**Trend**	**Plunge**	**σ_3 mag**	**Trend**	**Plunge**	**σ_H mag**	**Trend**	**σ_h mag**	**σ_v mag**	**U.Err**
original	21.3	128	5	11.8	220	30	5.4	30	59	21.2	127	10.1	7.1	*20%*
@60mm	31.3	134	8	21.9	227	21	10.8	25	67	31.0	131	20.4	12.6	-
@130mm	29.8	130	5	20.0	222	28	11.0	30	61	29.7	128	18.0	13.1	-

KFM02B: 3:18:1, depth: 241.62m

G	9/9	Strains stable before overcoring.
P	4/9	Strains are within the elastic transient strain range (yellow shade)
M	4,4,1	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 62 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 62 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
M		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 17 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in most strained gauges. Drift not related to elastic thermal expansion because drift of equally oriented gauges is different. Intermediate and minimum principal stress rotated 30 degrees around the maximum one. Vertical stress close to gravitational.
P		***Overall strain reliability***



Overcoring record:

Table A8. Key measurement data for test no. 3:18:1, 252.83 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-11-15	14:00:00
Mixing of glue	2006-11-15	15:05:00
Application of glue to gauges	2006-11-15	15:08:00
Probe installation in pilot hole	2006-11-15	03:36:00
Start time for dense sampling (5 s interval)	2006-11-16	06:30:00
Adapter retrieved	2006-11-16	09:19:55
Adapter on surface	2006-11-16	09:23:40
Drill string fed down the hole	2006-11-16	09:30:50
Drill string in place	2006-11-16	10:06:50
Flushing start	2006-11-16	10:07:00
Rotation start	2006-11-16	10:24:45
Overcoring start	2006-11-16	10:25:15
Overcoring 4 cm	2006-11-16	10:26:20
Overcoring 8 cm	2006-11-16	10:27:40
Overcoring 12 cm	2006-11-16	10:29:00
Overcoring 16 cm	2006-11-16	10:30:25
Overcoring 20 cm	2006-11-16	10:31:45
Overcoring 24 cm	2006-11-16	10:33:10
Overcoring 28 cm	2006-11-16	10:34:30
Overcoring 32 cm	2006-11-16	10:35:50
Overcoring stop (93 cm)	2006-11-16	10:55:55
Flushing off	2006-11-16	11:11:50
Core break	2006-11-16	11:28:20
Core retrieval start	2006-11-16	11:43:20
Core and probe on surface	2006-11-16	12:17:30
End of strain registration	2006-11-16	12:34:15
Calculation of strain difference: OC Start	2006-11-16	10:21:15
Calculation of strain difference: OC Stop	2006-11-16	11:10:55

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	3.1
16 – 32 cm	3.0
32 cm – overcoring stop	3.0

OCS

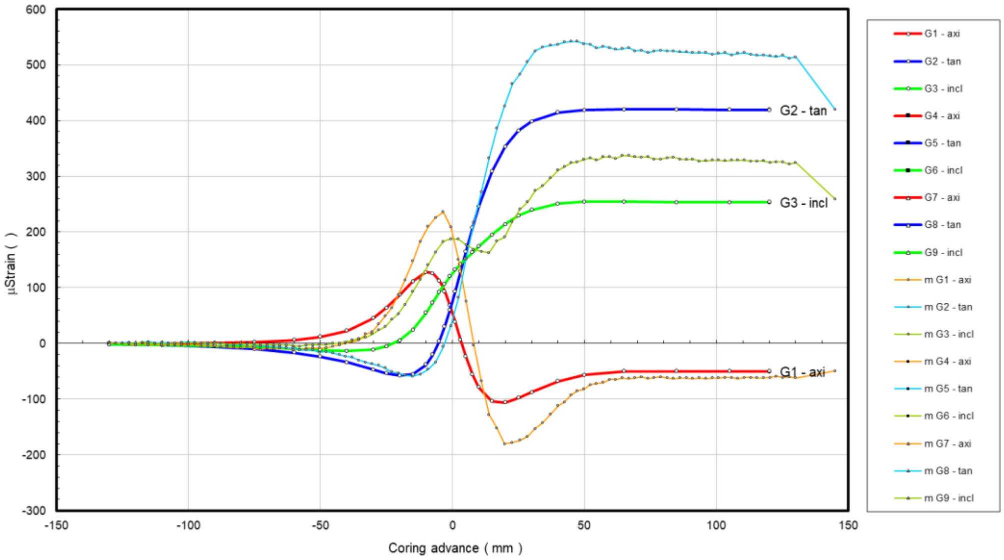
Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

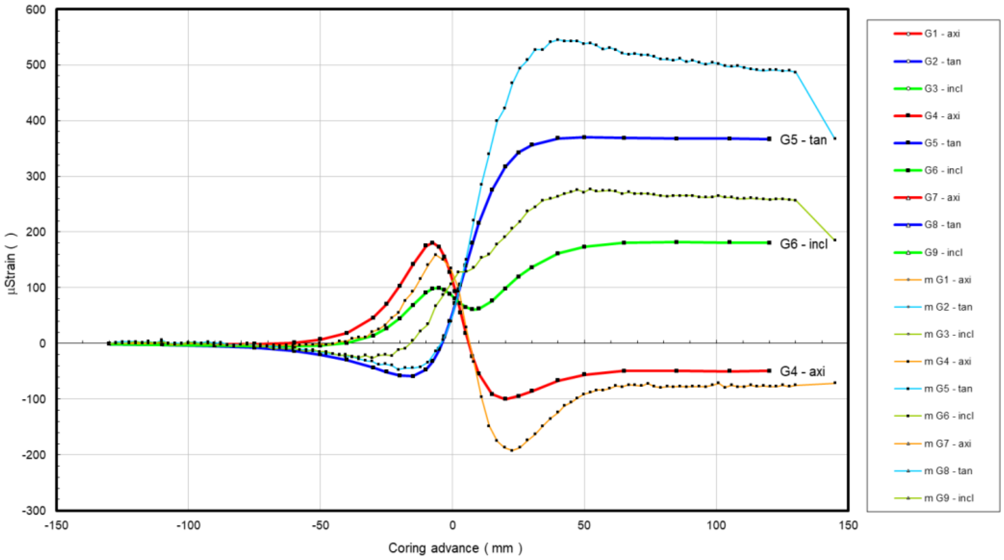
Rosette 1

G1,axi	1.9	1.2/1.0	G
G2,tan	1.3	1.2/1.0	G
G3,incl	1.3	1.3/1.0	M



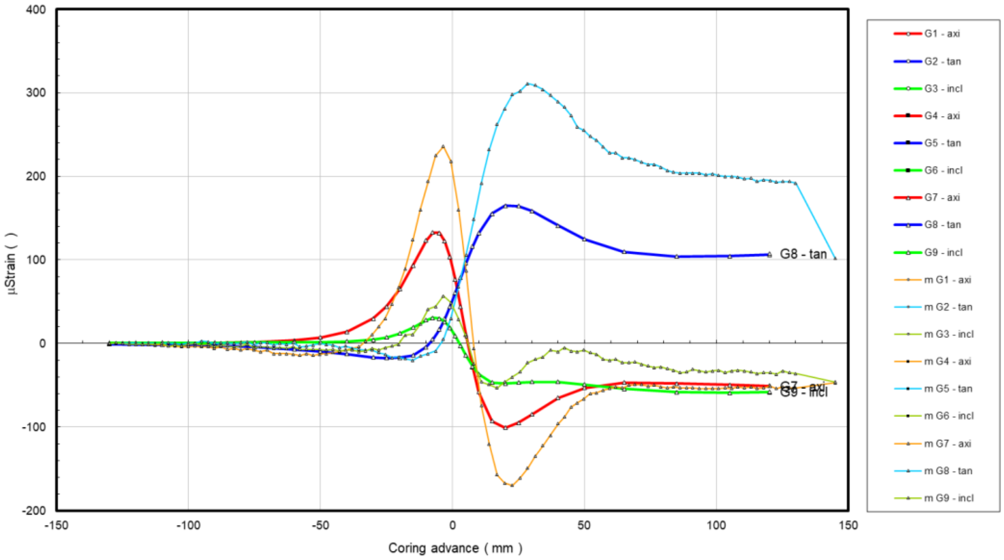
Rosette 2

G4,axi	1.9	1.6/1.4	G
G5,tan	1.5	1.3/1.0	M
G6,incl	1.5	1.4/1.0	M



Rosette 3

G7,axi	1.8	1	G
G8,tan	1.9	1.3/1.0	P
G9,incl	1.9	0.6/0.85	M



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

Transient strains:

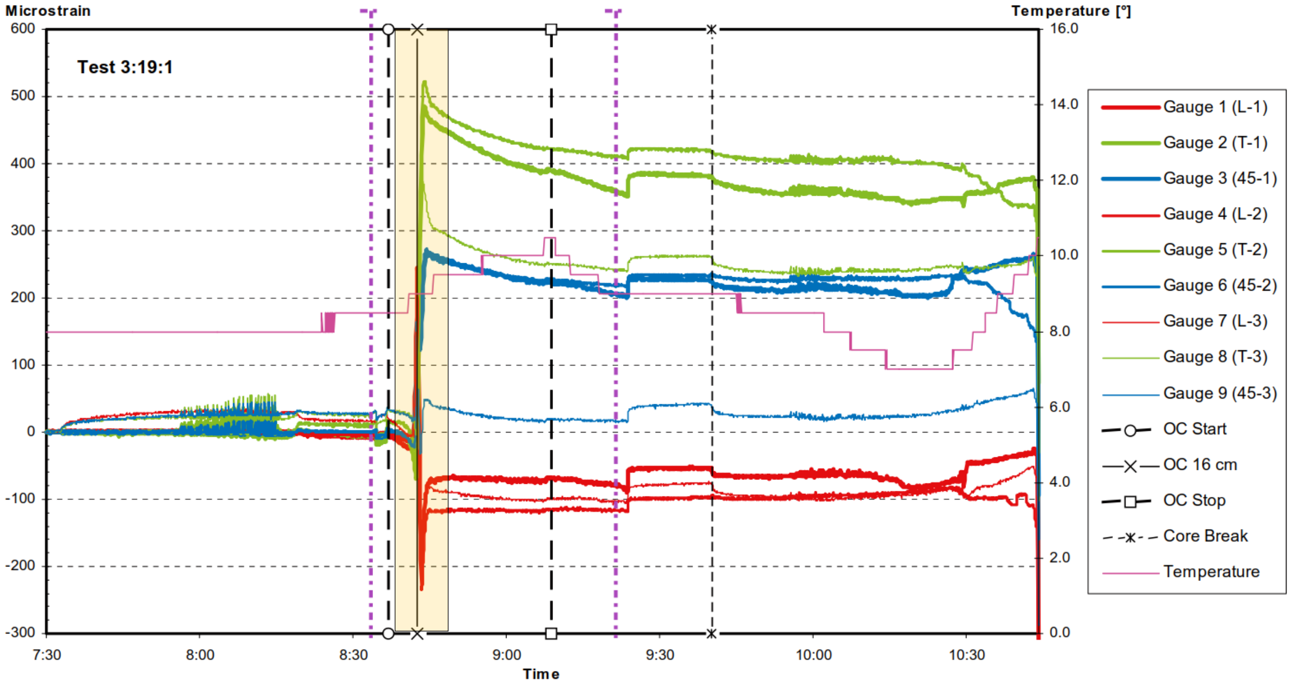
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-49	420	259	-71	367	185	-47	102	-46
@62mm	-65	528	332	-76	527	273	-52	228	-19
@130mm	-62	514	325	-75	487	257	-53	192	-36

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	21.3	128	5	11.8	220	30	5.4	30	59	21.2	127	10.1	7.1	*4%*
@62mm	31.3	134	8	21.9	227	21	10.8	25	67	31.0	131	20.4	12.6	
@130mm	29.8	130	5	20.0	222	28	11.0	30	61	29.7	128	18.0	13.1	

KFM02B: 3:19:1, depth: 242.55 m

G	9/9	Strains stable before overcoring.
M	4/9	Strains are within the elastic transient strain range (yellow shade)
M	6,3,0	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 61 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 61 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 11 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Moderate drift of most strain gauges. The drift is not related to elastic thermal expansion because it is different in equally oriented strain gauges. The vertical stress is 0.32 times the gravitational stress.
P		***Overall strain reliability***



Overcoring record:

Table A9. Key measurement data for test no. 3:19:1, 253.77 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-11-17	13:15:00
Mixing of glue	2006-11-17	13:59:00
Application of glue to gauges	2006-11-17	14:03:00
Probe installation in pilot hole	2006-11-17	14:11:00
Start time for dense sampling (5 s interval)	2006-11-18	06:30:00
Adapter retrieved	2006-11-18	07:32:45
Adapter on surface	2006-11-18	07:37:10
Drill string fed down the hole	2006-11-18	07:44:30
Drill string in place	2006-11-18	08:17:00
Flushing start	2006-11-18	08:17:15
Rotation start	2006-11-18	08:36:40
Overcoring start	2006-11-18	08:36:50
Overcoring 4 cm	2006-11-18	08:38:25
Overcoring 8 cm	2006-11-18	08:39:50
Overcoring 12 cm	2006-11-18	08:41:10
Overcoring 16 cm	2006-11-18	08:42:30
Overcoring 20 cm	2006-11-18	08:43:55
Overcoring 24 cm	2006-11-18	08:45:15
Overcoring 28 cm	2006-11-18	08:46:40
Overcoring 32 cm	2006-11-18	08:48:00
Overcoring stop (91 cm)	2006-11-18	09:08:40
Flushing off	2006-11-18	09:24:40
Core break	2006-11-18	09:40:05
Core retrieval start	2006-11-18	09:56:15
Core and probe on surface	2006-11-18	10:27:40
End of strain registration	2006-11-18	10:44:10
Calculation of strain difference: OC Start	2006-11-18	08:33:50
Calculation of strain difference: OC Stop	2006-11-18	09:22:40

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	2.9
32 cm – overcoring stop	2.9

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

Rosette 1

G1,axi

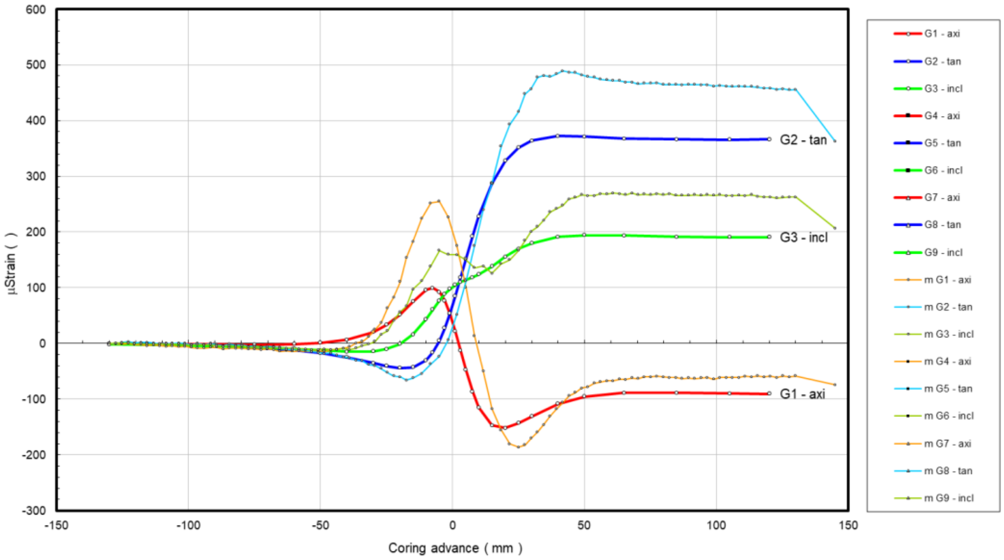
2.6	0.66/0.85	G

G2,tan

1.3	1.2/1.0	G

G3,incl

1.4	1.4/1.1	M



Rosette 2

G4,axi

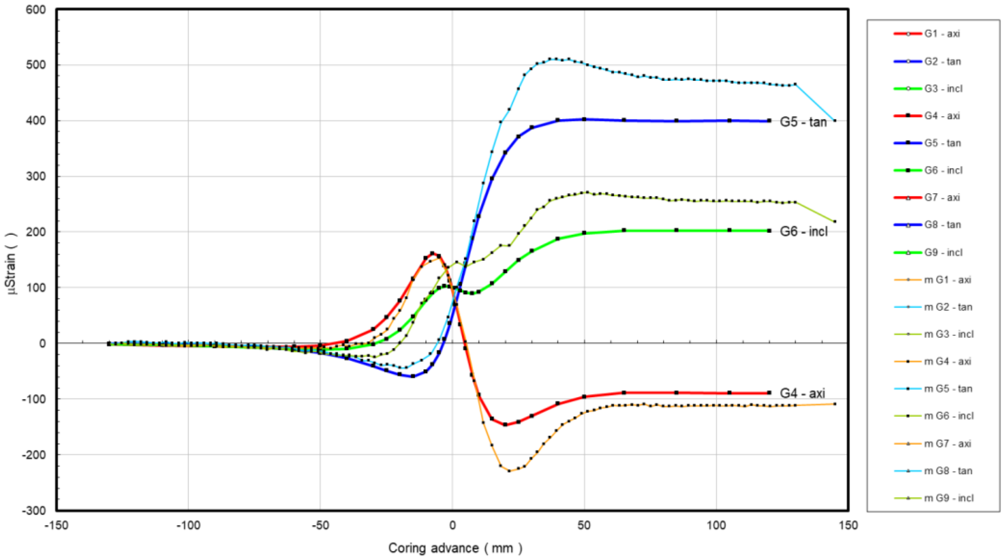
1.6	1.3	G

G5,tan

1.3	1.2/1.0	M

G6,incl

1.3	1.3/1.1	M



Rosette 3

G7,axi

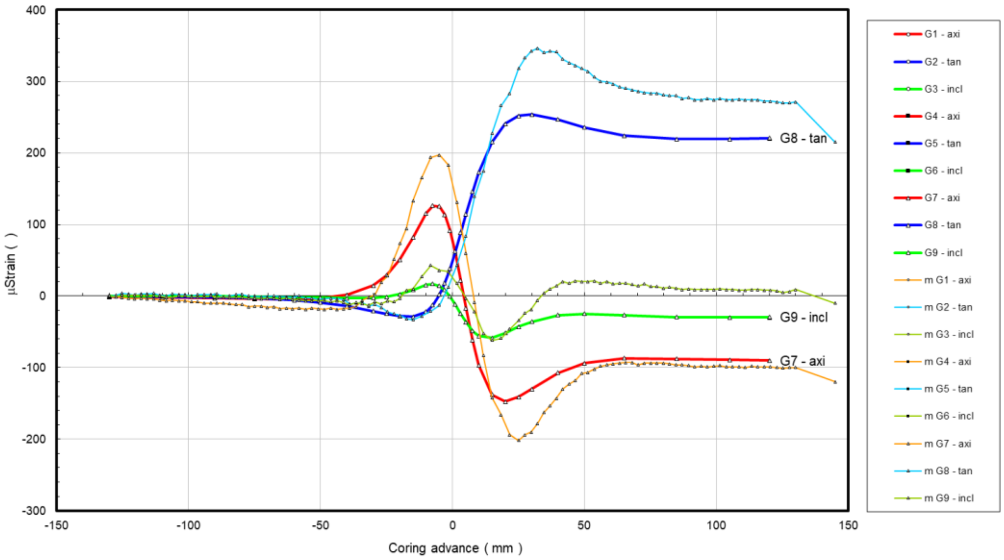
1.6	1.1/1.3	G

G8,tan

1.4	1.2/1.0	G

G9,incl

2.6	-0.2/0.3	G



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

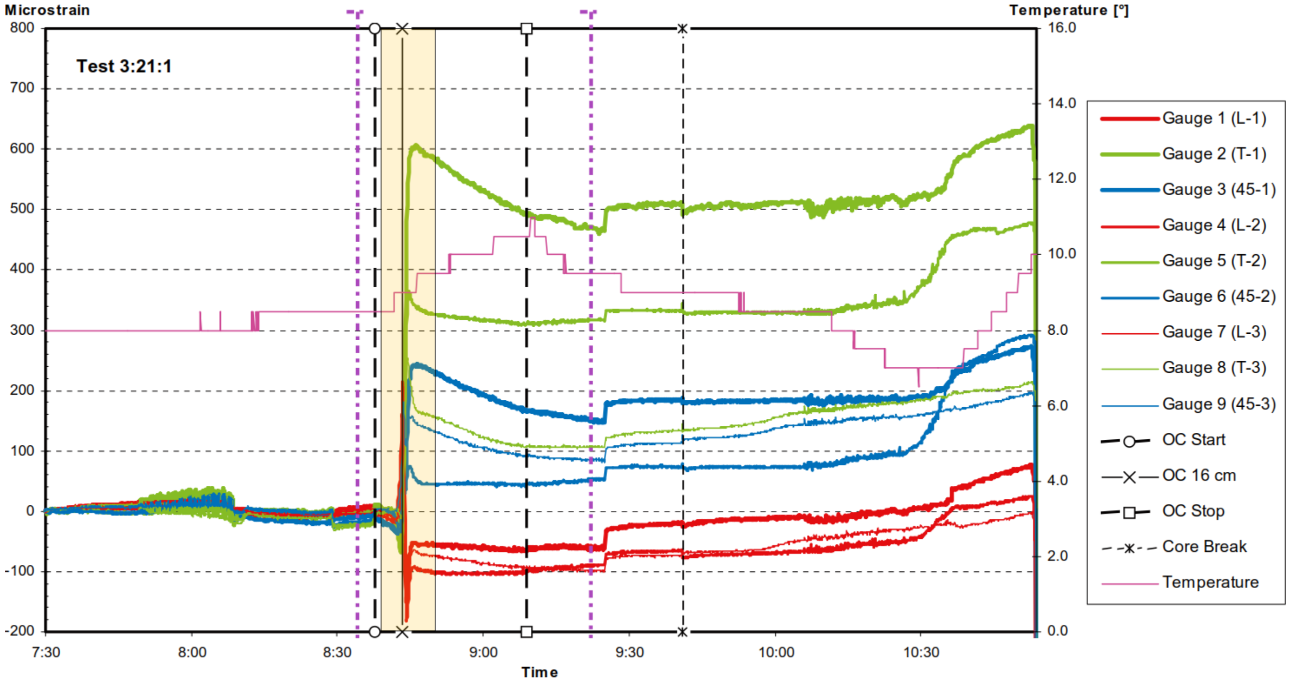
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-74	363	207	-109	399	218	-120	215	-10
@61mm	-67	472	270	-111	487	266	-95	296	17
@130mm	-58	456	263	-111	465	253	-100	271	9

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	15.9	139	10	11.7	232	14	1.1	15	72	15.5	133	11.0	2.2	*8%*
@61mm	20.4	135	9	15.6	228	15	4.2	15	72	20.1	130	14.75	5.5	
@130mm	19.8	134	9	14.9	227	16	3.9	16	72	19.4	129	14.0	5.1	

KFM02B: 3:21:1, depth: 244.87 m

G	9/9	Strains stable before overcoring.
M	5/9	Strains are within the elastic transient strain range (yellow shade)
M	5/4/0	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,M,P	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 13 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Moderate drift in the strain gauges number 2,3,7,8 and 9. The drift is not related to elastic thermal expansion because it different in equally oriented strain gauges. The vertical stress is 0.33 times the gravitational stress.
M		***Overall strain reliability***



Overcoring record:

Table A10. Key measurement data for test no. 3:21:1, 256.13 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-11-21	13:15:00
Mixing of glue	2006-11-21	13:35:00
Application of glue to gauges	2006-11-21	13:39:00
Probe installation in pilot hole	2006-11-21	13:46:00
Start time for dense sampling (5 s interval)	2006-11-22	06:30:00
Adapter retrieved	2006-11-22	07:19:25
Adapter on surface	2006-11-22	07:23:50
Drill string fed down the hole	2006-11-22	07:31:00
Drill string in place	2006-11-22	08:09:35
Flushing start	2006-11-22	08:09:40
Rotation start	2006-11-22	08:37:35
Overcoring start	2006-11-22	08:37:50
Overcoring 4 cm	2006-11-22	08:39:20
Overcoring 8 cm	2006-11-22	08:40:46
Overcoring 12 cm	2006-11-22	08:42:10
Overcoring 16 cm	2006-11-22	08:43:30
Overcoring 20 cm	2006-11-22	08:44:50
Overcoring 24 cm	2006-11-22	08:46:10
Overcoring 28 cm	2006-11-22	08:47:30
Overcoring 32 cm	2006-11-22	08:47:50
Overcoring stop (92 cm)	2006-11-22	09:25:20
Flushing off	2006-11-22	09:25:05
Core break	2006-11-22	09:40:55
Core retrieval start	2006-11-22	10:06:10
Core and probe on surface	2006-11-22	10:37:30
End of strain registration	2006-11-22	10:53:50
Calculation of strain difference: OC Start	2006-11-22	08:34:50
Calculation of strain difference: OC Stop	2006-11-22	09:23:05

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.7
32 cm – overcoring stop	2.8

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

Rosette 1

G1,axi

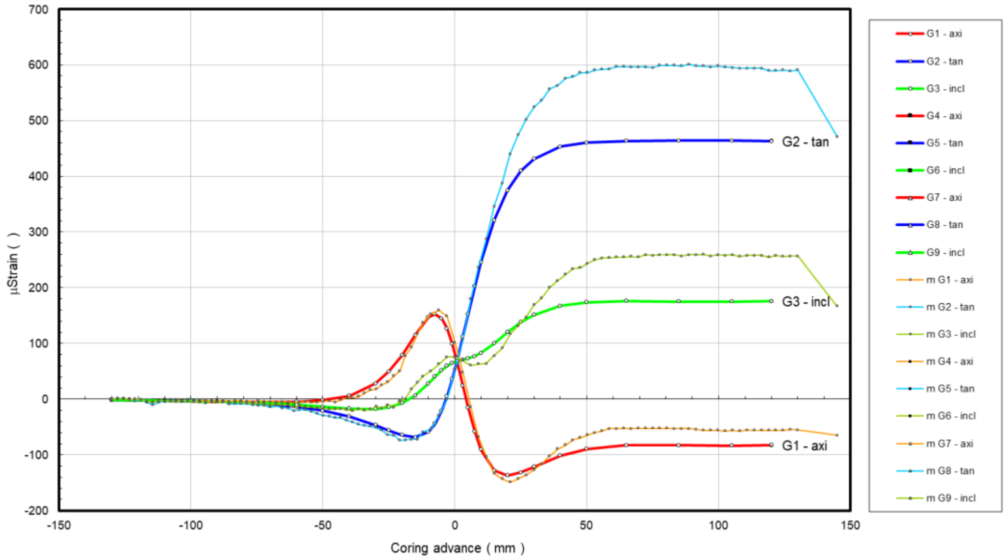
0.65	0.70	G

G2,tan

1.3	1.05	M

G3,incl

1.5	1.0	G



Rosette 2

G4,axi

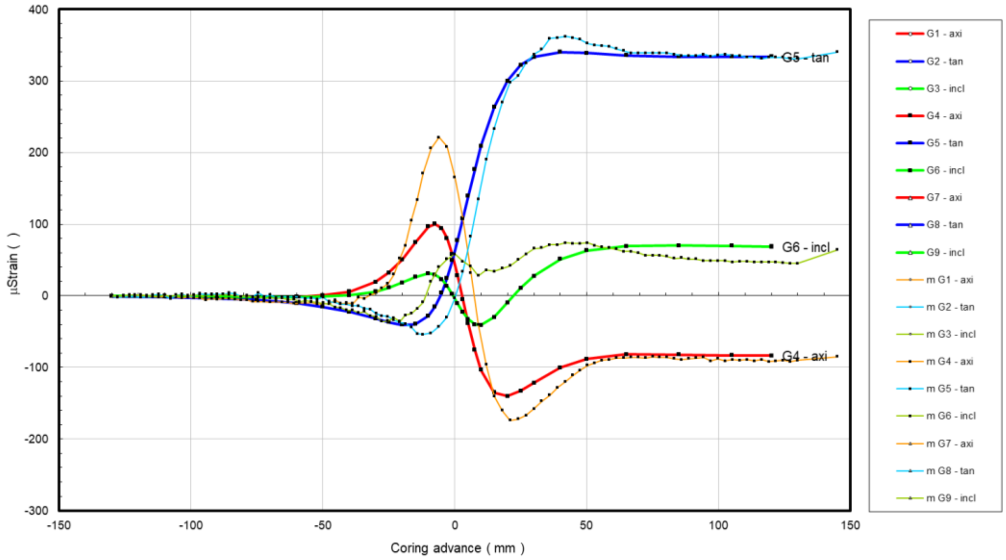
2.3	1.0	G

G5,tan

1.3	1.0	G

G6,incl

-1.5	0.65	M



Rosette 3

G7,axi

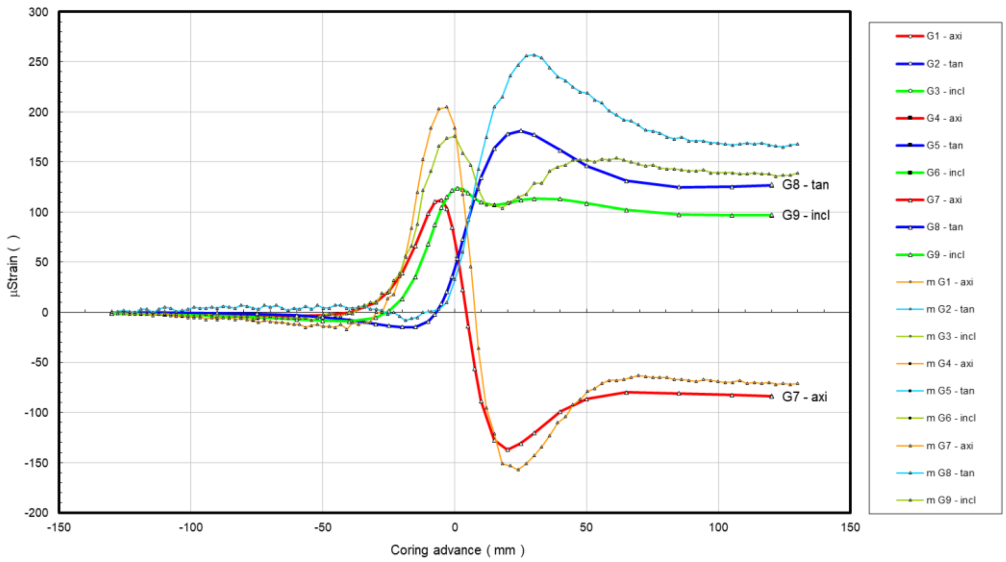
1.8	0.9	G

G8,tan

1.4	1.3	M

G9,incl

1.4	1.4	M



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

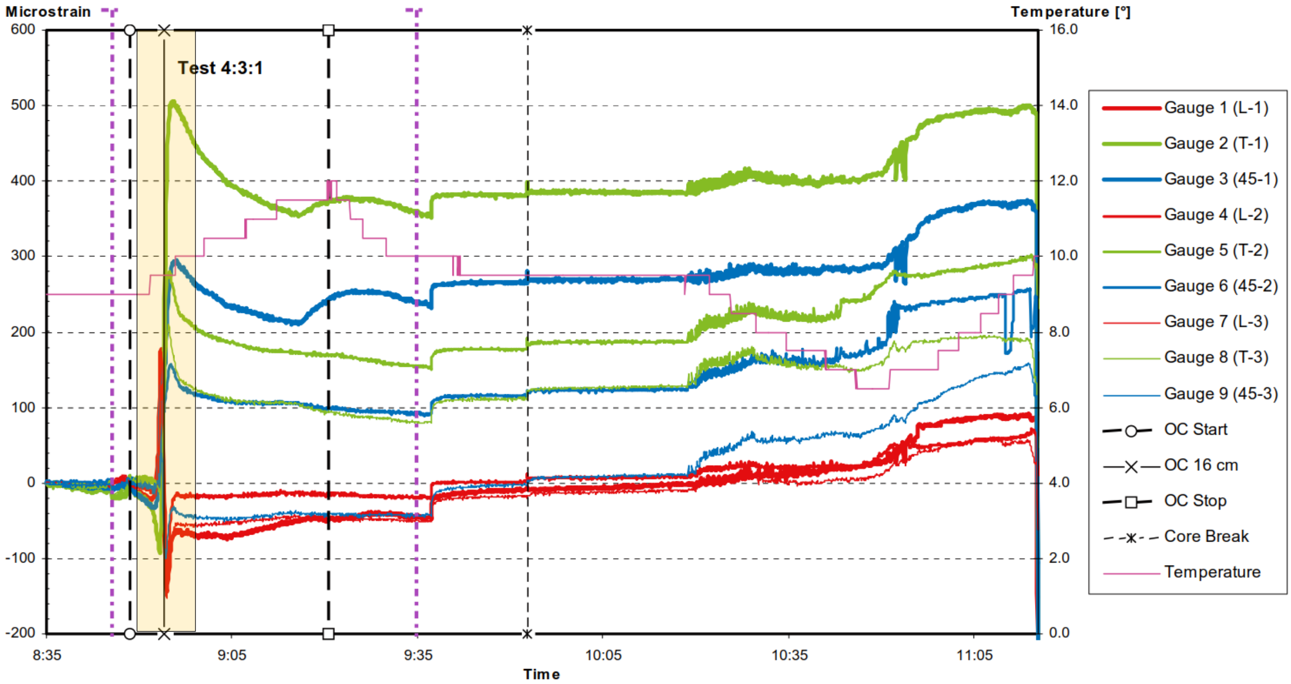
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-65	471	167	-85	340	64	-100	131	92
@60mm	-53	597	255	-87	345	65	-68	197	154
@130mm	-55	591	257	-90	331	45	-71	168	139

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	16.6	130	10	8.7	224	18	1.0	12	69	16.2	127	7.9	2.3	*5%*
@60mm	20.5	121	9	11.2	215	20	3.8	9	67	20.2	119	10.2	5.2	
@130mm	20.3	122	11	10.8	218	26	3.0	12	62	19.8	119	9.2	5.1	

KFM02B: 4:3:1, depth: 290.42 m

G	9/9	Strains stable before overcoring.
P	4/5	Strains are within the elastic transient strain range (yellow shade)
P	2/3/4	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 14 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in the strain gauge number 2 and moderate drift in the strain gauge number 3,5 and 8. Unexpected change in the strain gauge number 2 and 3, drift sign around 9:15. The drift is not related to elastic thermal expansion because it is different in equally oriented strain gauges. The vertical stress is 0.72 times the gravitational stress.
P		***Overall strain reliability***



Overcoring record:

Table A11. Key measurement data for test no. 4:3:1, 302.33 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-11-30	13:15:00
Mixing of glue	2006-11-30	14:03:00
Application of glue to gauges	2006-11-30	14:07:00
Probe installation in pilot hole	2006-11-30	14:15:00
Start time for dense sampling (5 s interval)	2006-12-01	06:30:00
Adapter retrieved	2006-12-01	07:41:40
Adapter on surface	2006-12-01	07:46:05
Drill string fed down the hole	2006-12-01	07:52:40
Drill string in place	2006-12-01	08:29:35
Flushing start	2006-12-01	08:29:40
Rotation start	2006-12-01	08:48:15
Overcoring start	2006-12-01	08:48:25
Overcoring 4 cm	2006-12-01	08:49:45
Overcoring 8 cm	2006-12-01	08:51:15
Overcoring 12 cm	2006-12-01	08:52:40
Overcoring 16 cm	2006-12-01	08:54:00
Overcoring 20 cm	2006-12-01	08:55:20
Overcoring 24 cm	2006-12-01	08:56:40
Overcoring 28 cm	2006-12-01	08:58:00
Overcoring 32 cm	2006-12-01	08:59:25
Overcoring stop (95 cm)	2006-12-01	09:20:35
Flushing off	2006-12-01	09:37:20
Core break	2006-12-01	09:52:40
Core retrieval start	2006-12-01	10:18:50
Core and probe on surface	2006-12-01	10:57:50
End of strain registration	2006-12-01	11:15:25
Calculation of strain difference: OC Start	2006-12-01	08:44:25
Calculation of strain difference: OC Stop	2006-12-01	09:35:35

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.9
16 – 32 cm	3.0
32 cm – overcoring stop	3.0

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

Rosette 1

G1,axi

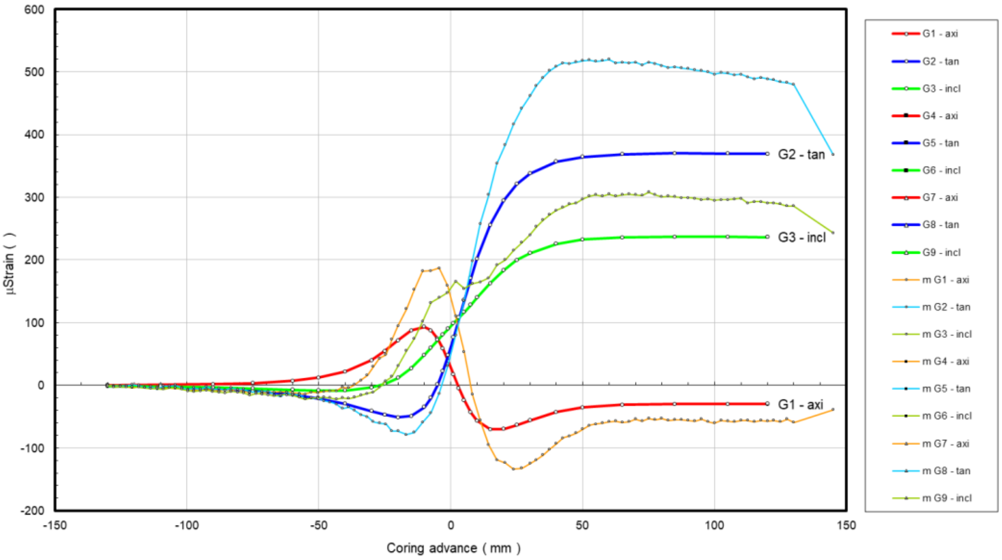
2.0	1.8/1.0	G

G2,tan

1.6	1.3/1.0	P

G3,incl

1.3	1.2/1.1	M



Rosette 2

G4,axi

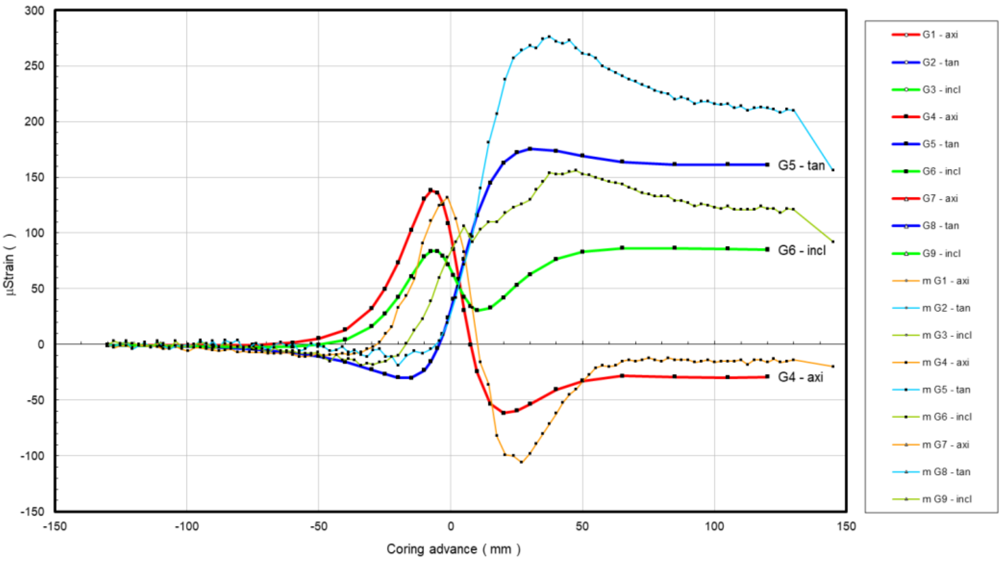
1.7	0.5/0.6	G

G5,tan

1.6	1.3/0.95	P

G6,incl

1.8	1.4/1.1	P



Rosette 3

G7,axi

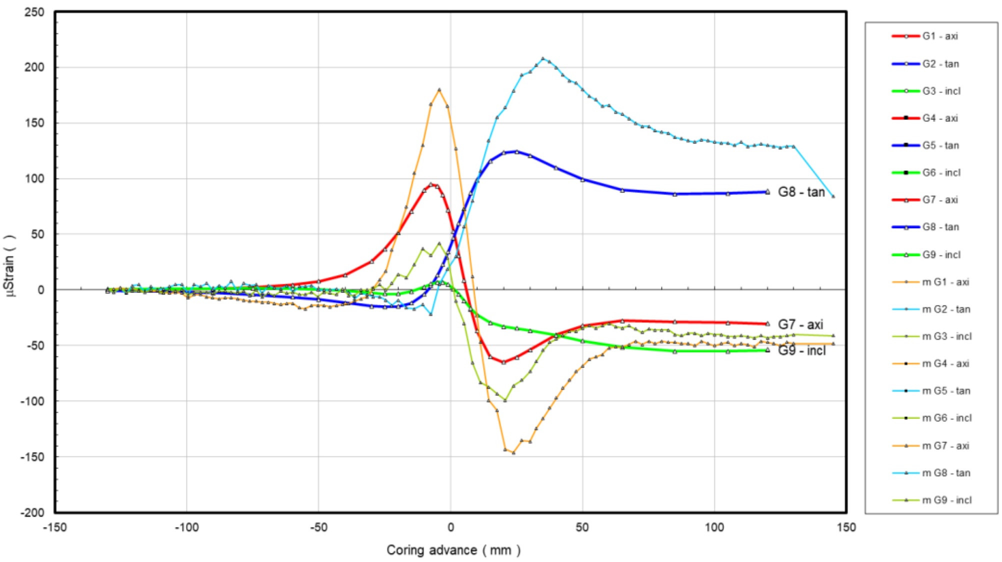
2.3	1.6	M

G8,tan

1.7	1.5	P

G9,incl

1.8	0.8	M



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

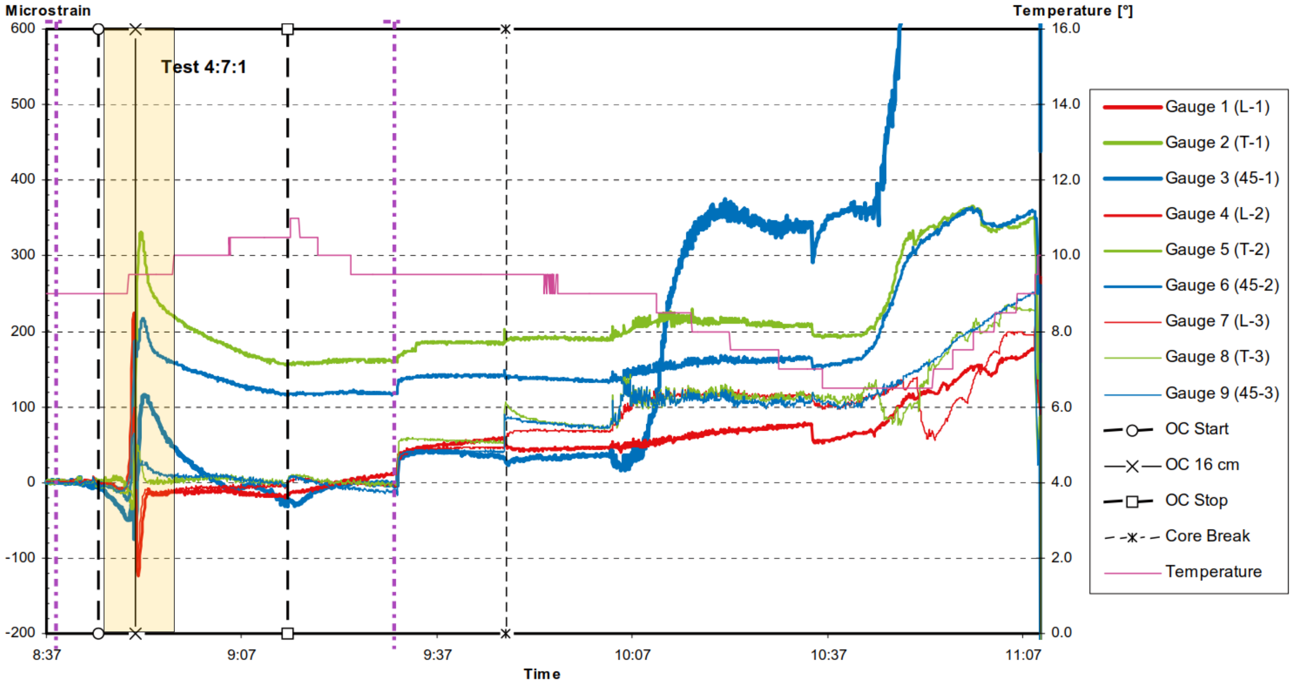
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	4	313	73	9	158	118	-2	2	-14
@60mm	-135	573	130	-43	315	219	-15	16	30
@130mm	-128	466	86	-15	230	168	-10	10	17

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	16.3	296	2	8.1	205	43	3.8	28	47	16.3	116	6.1	5.8	*25 %*
@60mm	25.9	116	4	15.8	208	35	7.7	20	55	25.8	115	13.2	10.4	
@130mm	24.1	116	2	13.7	207	43	8.8	24	47	24.1	116	11.4	11.1	

KFM02B: 4:7:1, depth: 294.23 m

G	9/9	Strains stable before overcoring.
P	6/9	Strains are within the elastic transient strain range (yellow shade)
P	1/2/6	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,M,P	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
M		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 16 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in most of the strain gauges. The drift is not related to elastic thermal expansion because it is different in equally oriented strain gauges. The vertical stress is 0.71 times the gravitational stress. Rosette number 1 is unstable when the core is lifted to the surface (gauges number 1 and 2 not visible in the figure below).
P		***Overall strain reliability***



Overcoring record:

Table A12. Key measurement data for test no. 4:7:1, 306.20 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-12-10	13:30:00
Mixing of glue	2006-12-10	13:50:00
Application of glue to gauges	2006-12-10	13:55:00
Probe installation in pilot hole	2006-12-10	14:04:00
Start time for dense sampling (5 s interval)	2006-12-11	06:30:00
Adapter retrieved	2006-12-11	07:13:00
Adapter on surface	2006-12-11	07:17:00
Drill string fed down the hole	2006-12-11	07:41:10
Drill string in place	2006-12-11	08:24:50
Flushing start	2006-12-11	08:25:00
Rotation start	2006-12-11	08:44:25
Overcoring start	2006-12-11	08:45:05
Overcoring 4 cm	2006-12-11	08:46:40
Overcoring 8 cm	2006-12-11	08:48:00
Overcoring 12 cm	2006-12-11	08:49:25
Overcoring 16 cm	2006-12-11	08:50:45
Overcoring 20 cm	2006-12-11	08:52:10
Overcoring 24 cm	2006-12-11	08:53:30
Overcoring 28 cm	2006-12-11	08:54:50
Overcoring 32 cm	2006-12-11	08:56:10
Overcoring stop (96 cm)	2006-12-11	09:14:15
Flushing off	2006-12-11	09:31:05
Core break	2006-12-11	09:47:35
Core retrieval start	2006-12-11	10:03:50
Core and probe on surface	2006-12-11	10:53:00
End of strain registration	2006-12-11	11:09:50
Calculation of strain difference: OC Start	2006-11-27	08:38:05
Calculation of strain difference: OC Stop	2006-11-27	09:30:15

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.0
32 cm – overcoring stop	2.8

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

Rosette 1

G1,axi

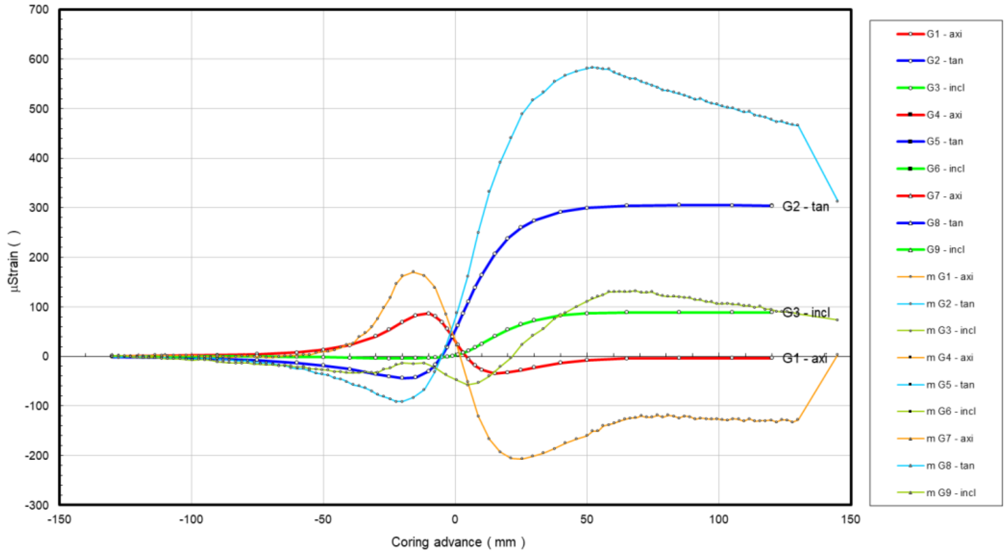
6.1	>10,-0.4	**P**

G2,tan

2.2	1.5	**P**

G3,incl

1.5	1.0	**M**



Rosette 2

G4,axi

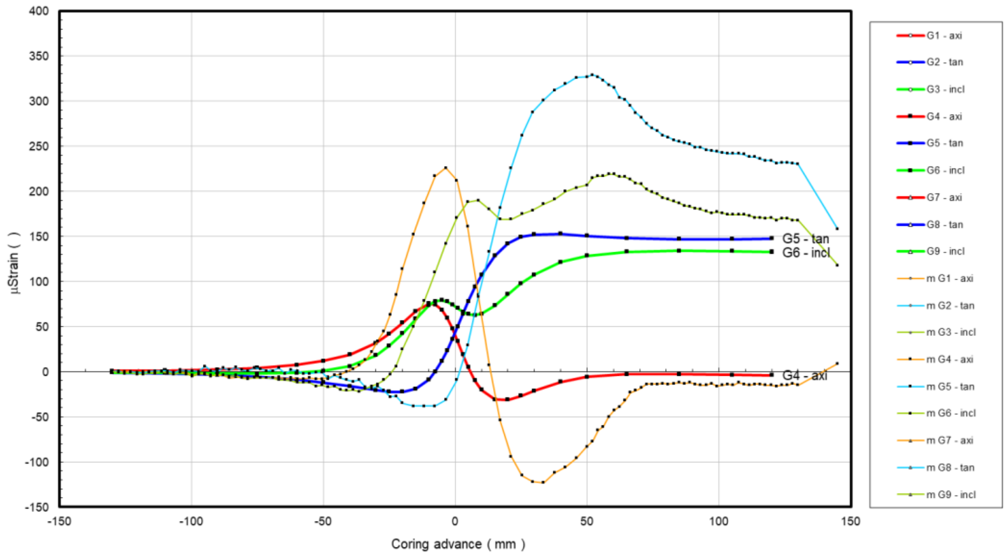
4.0	1.5/-0.9	**P**

G5,tan

2.2	1.6/1.07	**P**

G6,incl

2.4	1.3/0.89	**P**



Rosette 3

G7,axi

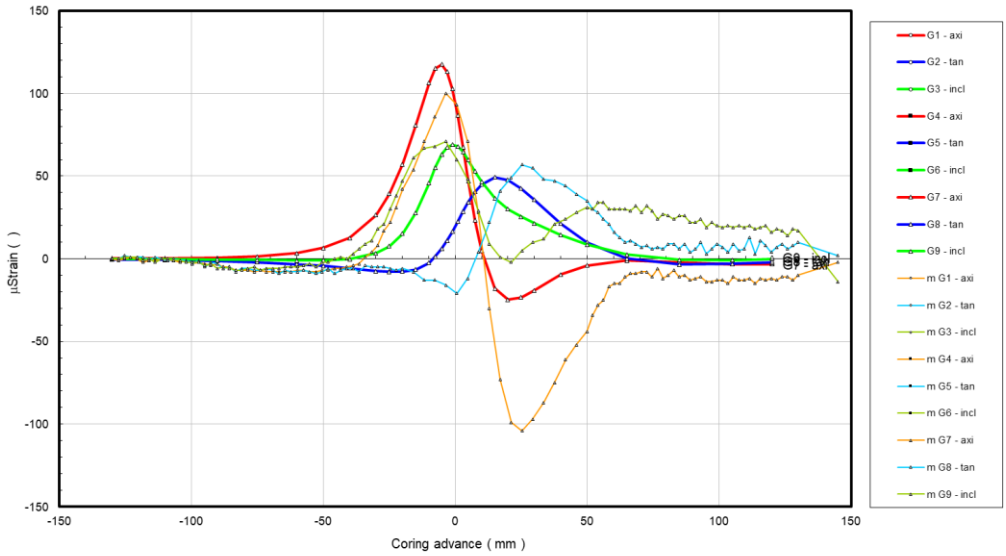
4.3	-	**P**

G8,tan

1.2	-	**G**

G9,incl

1.0	-	**M**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

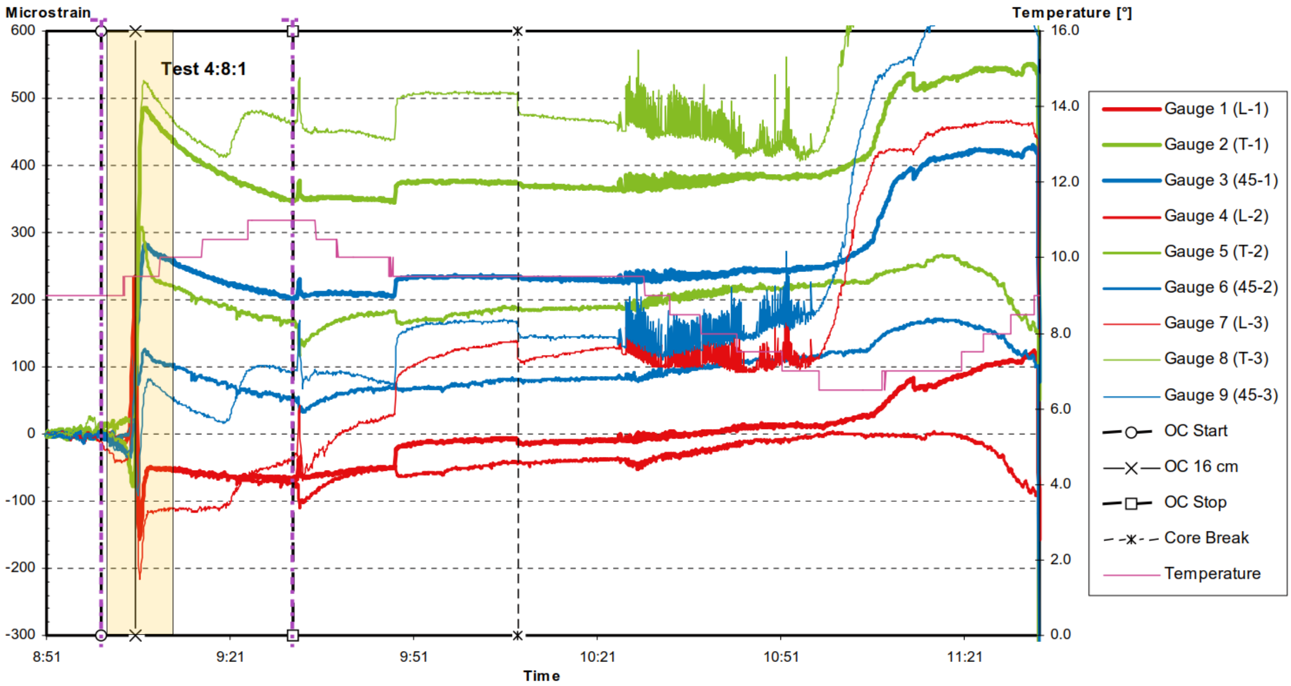
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	4	313	73	9	158	118	-2	2	-14
@60mm	29		-202	517	42	-122	288	179	-97
@130mm	-128	466	86	-15	230	168	-10	10	17

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	14.3	324	7	5.8	94	79	3.3	233	9	14.2	144	3.3	5.9	*13%*
@60mm	26.4	325	4	6.5	233	27	5.2	62	63	26.3	145	6.3	5.6	
@130mm	20.9	323	5	4.7	232	15	3.5	71	74	20.8	143	4.7	3.7	

KFM02B: 4:8:1, depth: 295.08 m

G	9/9	Strains stable before overcoring.
P	3/9	Strains are within the elastic transient strain range (yellow shade)
M/P	1,6,2	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 65 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 65 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 10 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift of all tangential and inclined strain gauges. Drifting can be related to temperature because it is equal in equally oriented strain gauges. Rosette number 3 becomes unstable after 9:20, drifting ignored in the final strains. The vertical stress is 0.1 times the gravitational stress.
M/P		***Overall strain reliability***



Overcoring record:

Table A13. Key measurement data for test no. 4:8:1, 307.06 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-12-12	14:30:00
Mixing of glue	2006-12-12	15:00:00
Application of glue to gauges	2006-12-12	15:05:00
Probe installation in pilot hole	2006-12-12	15:14:00
Start time for dense sampling (5 s interval)	2006-12-13	06:30:00
Adapter retrieved	2006-12-13	07:17:25
Adapter on surface	2006-12-13	07:23:45
Drill string fed down the hole	2006-12-13	07:57:10
Drill string in place	2006-12-13	08:41:05
Flushing start	2006-12-13	08:41:10
Rotation start	2006-12-13	08:59:10
Overcoring start	2006-12-13	08:59:55
Overcoring 4 cm	2006-12-13	09:01:25
Overcoring 8 cm	2006-12-13	09:02:50
Overcoring 12 cm	2006-12-13	09:04:10
Overcoring 16 cm	2006-12-13	09:05:35
Overcoring 20 cm	2006-12-13	09:06:55
Overcoring 24 cm	2006-12-13	09:08:15
Overcoring 28 cm	2006-12-13	09:09:35
Overcoring 32 cm	2006-12-13	09:10:55
Overcoring stop (91 cm)	2006-12-13	09:31:25
Flushing off	2006-12-13	09:48:20
Core break	2006-12-13	10:08:05
Core retrieval start	2006-12-13	10:25:10
Core and probe on surface	2006-12-13	11:17:00
End of strain registration	2006-12-13	11:33:25
Calculation of strain difference: OC Start	2006-12-13	08:59:55
Calculation of strain difference: OC Stop	2006-12-13	09:31:25

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.0
32 cm – overcoring stop	2.9

OCS

Transient strain comparison and reliability ranking:

– maximum relative difference for intermediate max or min and at the end of the elastic range

– strains at 145 mm are for original Sicada reported solution

<u>Rosette 1</u>

G1,axi

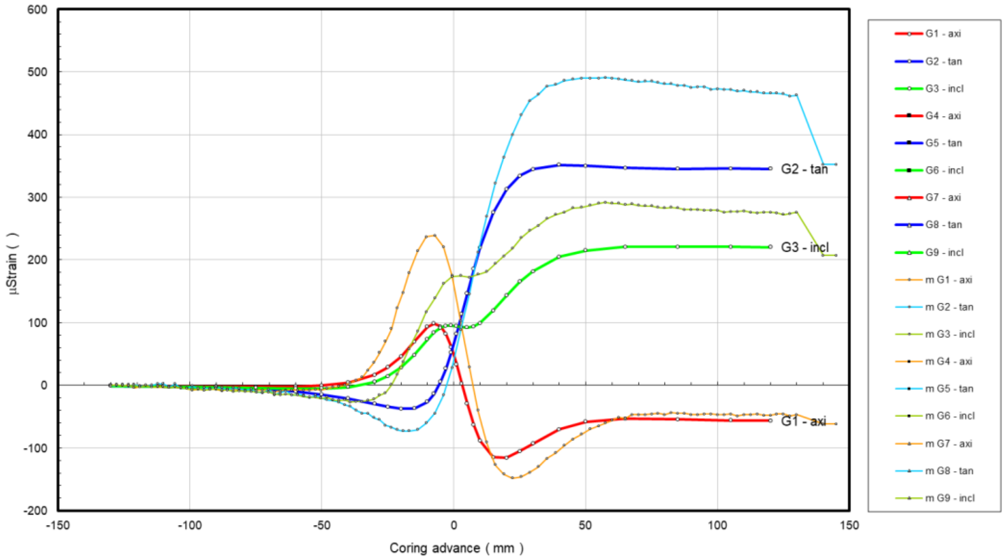
2.4	0.9	**M**

G2,tan

1.4	1.05	**M**

G3,incl

1.8	0.95	**M**



<u>Rosette 2</u>

G4,axi

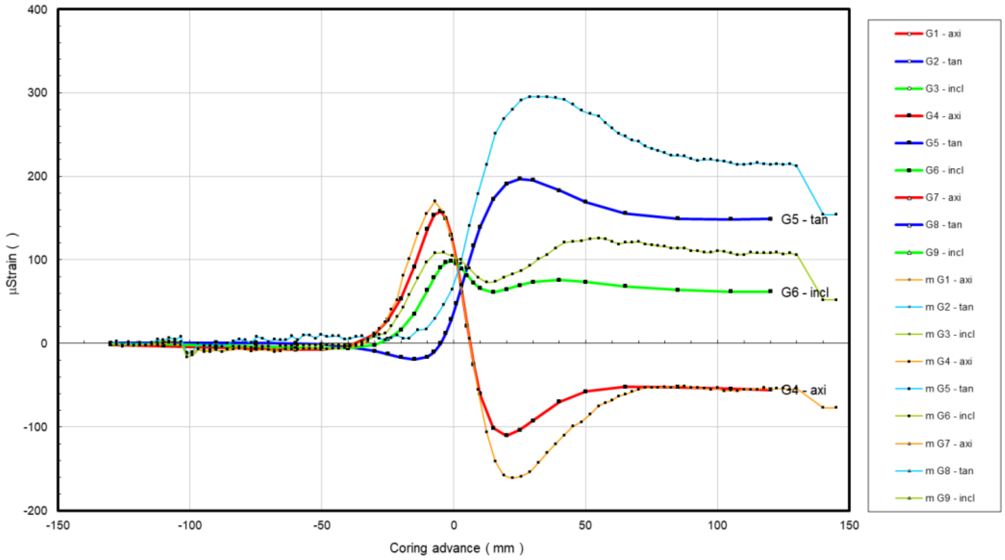
1.5	1.6	**G**

G5,tan

1.5	1.0	**P**

G6,incl

1.7	0.95	**P**



<u>Rosette 3</u>

G7,axi

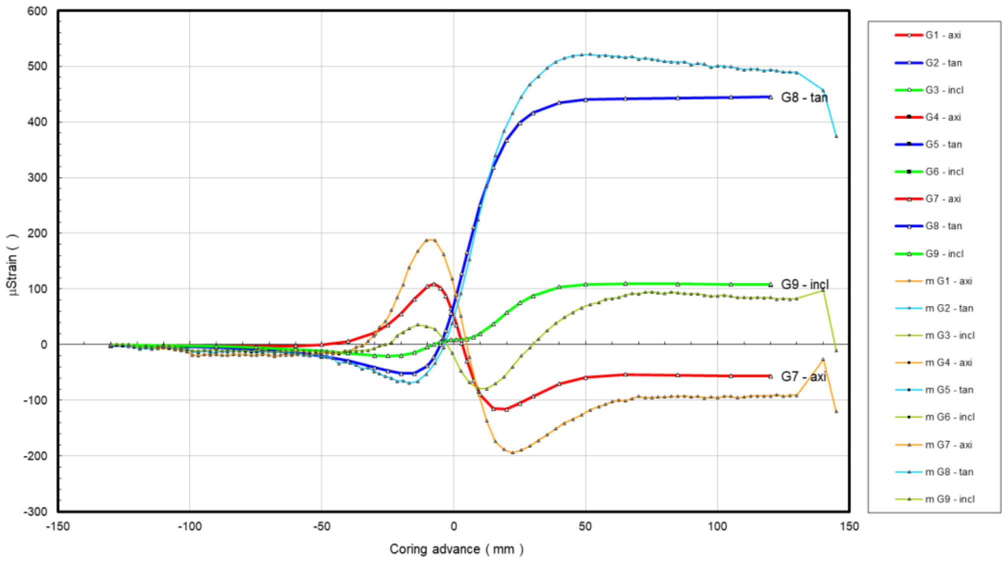
1.7	2.4	**M**

G8,tan

1.2	0.82	**M**

G9,incl

-1.8	0.9	**M**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported original solution without water pressure

– other solutions with water pressure

Transient strains:

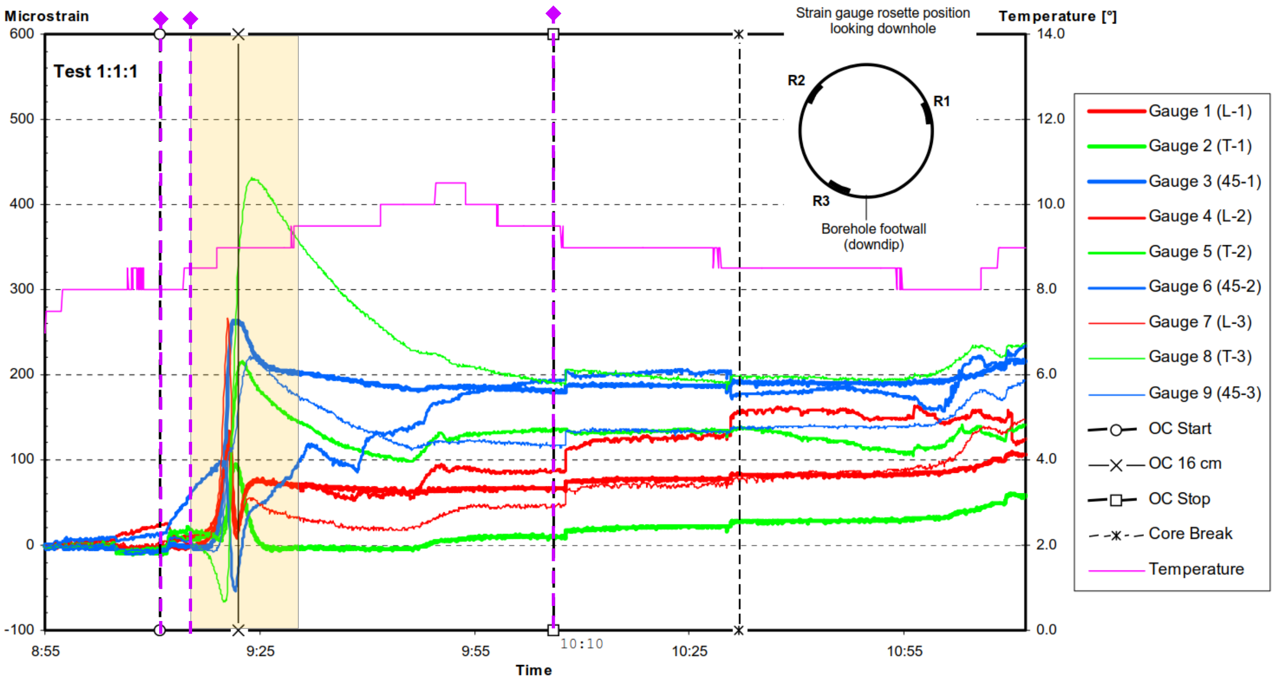
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-62	352	207	-77	154	52	-26	457	98
@65mm	-53	487	288	-61	248	121	-101	516	89
@130mm	-48	466	276	-55	214	108	-92	494	85

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	14.4	281	3	7.6	190	5	0.7	39	84	14.4	101	7.5	0.8	*23%*
@65mm	21.0	286	3	14.0	195	9	3.5	34	80	20.9	106	13.8	3.8	
@130mm	20.1	286	3	13.2	196	10	3.9	34	79	20.1	107	12.9	4.2	

KFM07B 1:1:1, depth: 51.88 m

G	8/9	Strains stable before overcoring.
P	4/9	Strains are within the elastic transient strain range (yellow shade)
P	3,0,6	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 51 mm for s1, s2 and s3 magnitudes
P	P,P,M	Stability of inverse stress solution after passing gauges section over 51 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 3 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High to minor drift in most of the strain gauges, not associated with temperature because it is uneven for equally oriented gauges. Gauge number 6 is unstable. The plunge of the maximum and intermediate principal stresses ranges between 40 and 50 degrees and the minimum principal stress horizontal and the vertical stress are 3.7 times the overburden weight. These factors indicate low reliability.
P		***Overall strain reliability***



Overcoring record:

Table A-1. Key measurement data for test no. 1:1:1, 67.91 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Flushing start	05-08-10	08:49:00
Rotation start	05-08-10	09:14:00
Overcoring start	05-08-10	09:15:00
Overcoring 4 cm	05-08-10	09:16:00
Overcoring 8 cm	05-08-10	09:18:00
Overcoring 12 cm	05-08-10	09:20:00
Overcoring 16 cm	05-08-10	09:22:00
Overcoring 20 cm	05-08-10	09:24:00
Overcoring 24 cm	05-08-10	09:27:00
Overcoring 28 cm	05-08-10	09:29:00
Overcoring 32 cm	05-08-10	09:31:00
Overcoring stop (100 cm)	05-08-10	09:52:00
Flushing off	05-08-10	10:09:00
Core break	05-08-10	10:32:00
Core retrieval start	05-08-10	10:57:00
Core and probe on surface	05-08-10	11:12:00
End of strain registration	05-08-10	12:34:00
Calculation of strain difference: OC Start	05-08-10	09:11:00
Calculation of strain difference: OC Stop	05-08-10	10:06:00

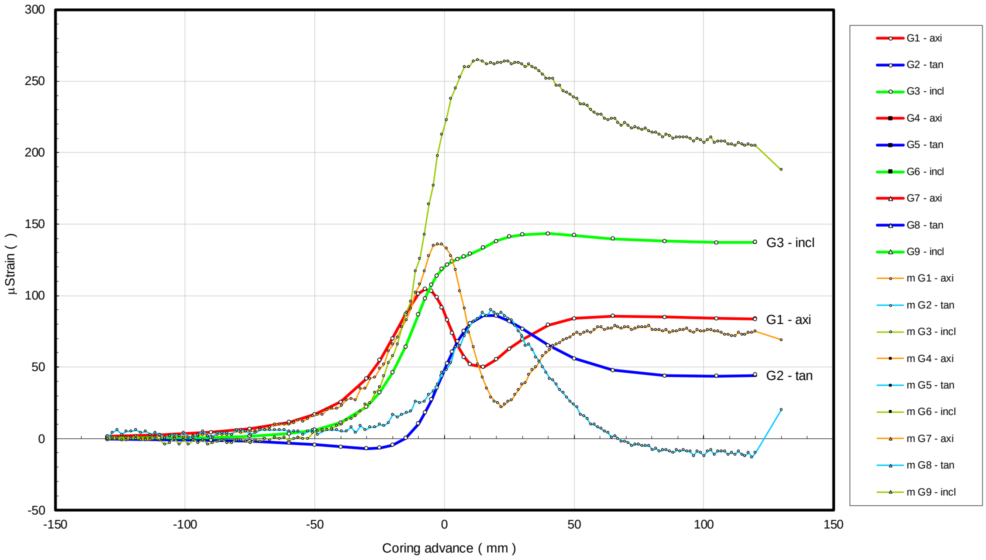
Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 120 mm are for original solution

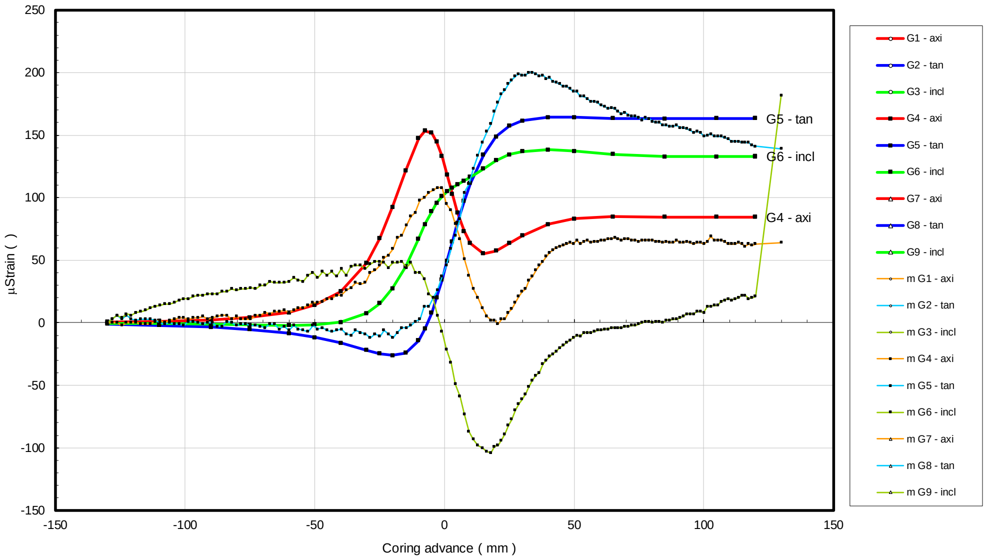
Rosette 1

G1,axi		
1.3	0.89	G
G2,tan		
1.1	0.45	P
G3,incl		
1.8	1.5	P



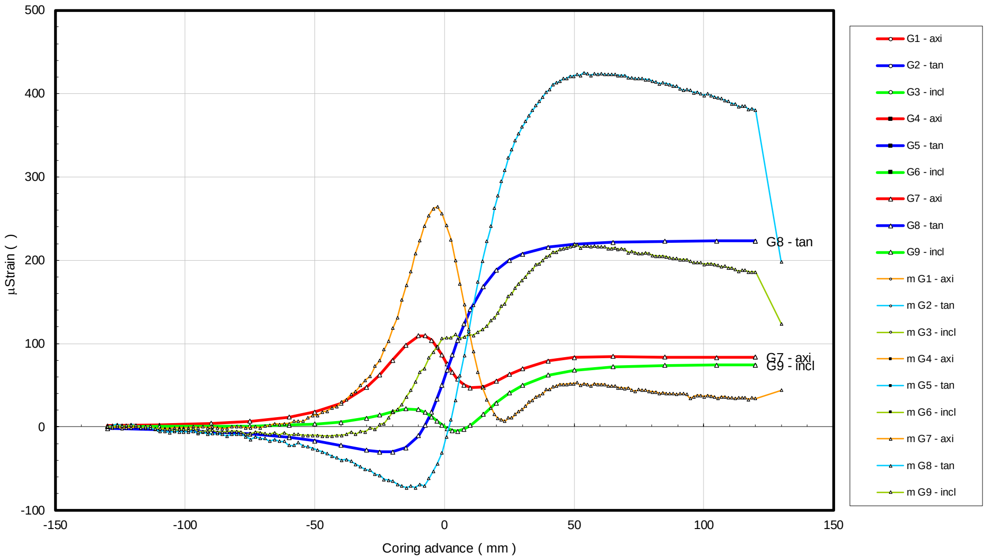
Rosette 2

G4,axi		
1.4	0.75	G
G5,tan		
1.2	0.87	G
G6,incl		
3.0	1.4	P



Rosette 3

G7,axi		
2.5	0.42	P
G8,tan		
2.4	0.90	P
G9,incl		
2.9	1.7	P



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

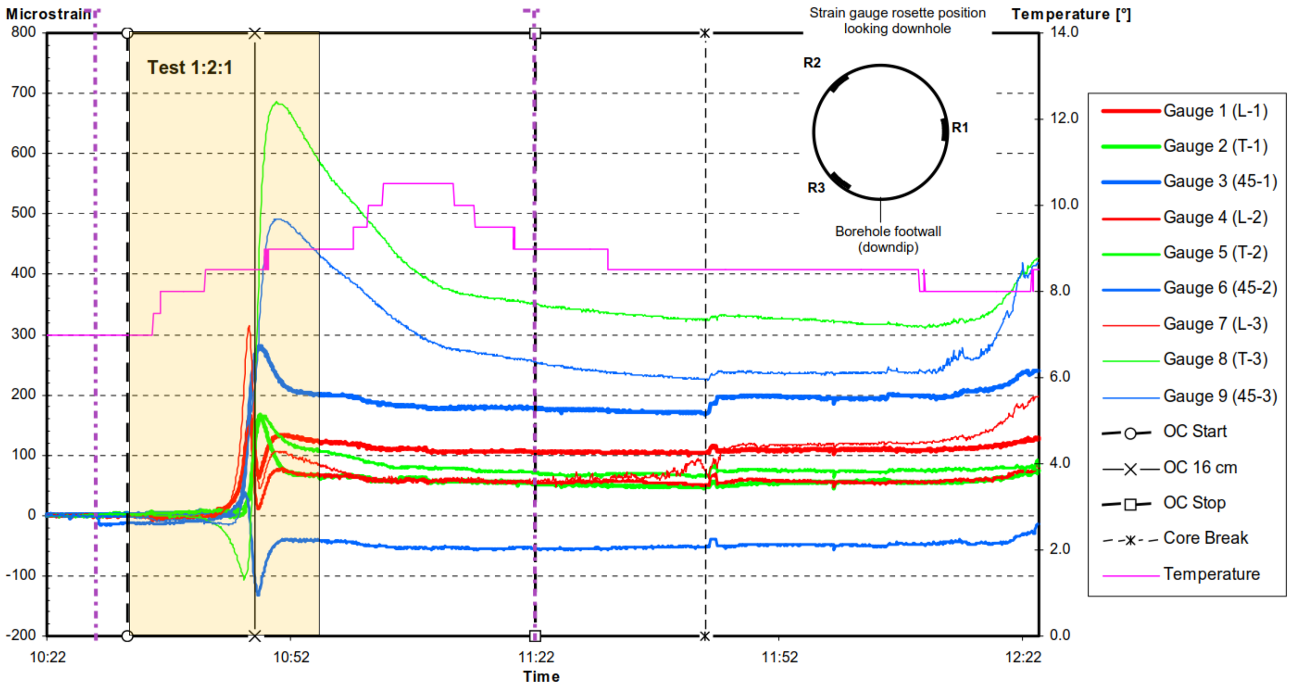
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	69	20	188	64	139	182	44	198	124
@51mm	73	24	239	63	185	-12	52	421	217
@120mm	75	-10	205	63	141	21	34	380	186

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	7.3	204	47	4.6	44	41	2.0	305	10	5.8	31	2.1	6.0	*59 %*
@51mm	11.0	232	1	10.3	345	87	0.5	142	2	11.0	52	0.5	10.3	
@120mm	10.1	230	32	8.7	50	58	1.1	140	0	9.7	50	1.1	9.1	

KFM07B 1:2:1, depth: 52.72 m

G	9/9	Strains stable before overcoring.
P	5/9	Strains are within the elastic transient strain range (yellow shade)
P	2,0,7	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 52 mm for s1, s2 and s3 magnitudes
M	M,M,G	Stability of inverse stress solution after passing gauges section over 52 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 7 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift lasting over the elastic transient strain range. After flush stops, minor strains take place. The transient strains do not match with the strain from original interpreted stress solution and given the orientations of the strain gauges.
P		***Overall strain reliability***



Overcoring record:

Table A-2. Key measurement data for test no. 1:2:1, 68.94 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	05-08-10	16:08:00
Mixing of glue	05-08-10	16:23:00
Application of glue to gauges	05-08-10	16:27:00
Probe installation in pilot hole	05-08-10	16:37:00
Start time for dense sampling (5 s interval)	05-08-11	07:00:00
Adapter retrieved	05-08-11	08:00:00
Adapter on surface	05-08-11	08:07:00
Drill string fed down the hole	05-08-11	08:41:00
Drill string in place	05-08-11	08:58:00
Flushing start	05-08-11	10:15:00
Rotation start	05-08-11	10:36:00
Overcoring start	05-08-11	10:38:00
Overcoring 4 cm	05-08-11	10:40:00
Overcoring 8 cm	05-08-11	10:42:30
Overcoring 12 cm	05-08-11	10:45:00
Overcoring 16 cm	05-08-11	10:47:30
Overcoring 20 cm	05-08-11	10:49:30
Overcoring 24 cm	05-08-11	10:51:00
Overcoring 28 cm	05-08-11	10:54:00
Overcoring 32 cm	05-08-11	10:56:00
Overcoring stop (100 cm)	05-08-11	11:09:00
Flushing off	05-08-11	11:26:00
Core break	05-08-11	11:43:00
Core retrieval start	05-08-11	12:00:00
Core and probe on surface	05-08-11	12:24:00
End of strain registration	05-08-11	12:43:00
Calculation of strain difference: OC Start	05-08-11	10:32:00
Calculation of strain difference: OC Stop	05-08-11	11:22:00

Overcoring advance	Overcoring rate [cm/min]
0–16 cm	1.7
16–32 cm	1.9
32 cm – overcoring stop	5.2

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 120 mm are for original solution

Rosette 1

G1,axi

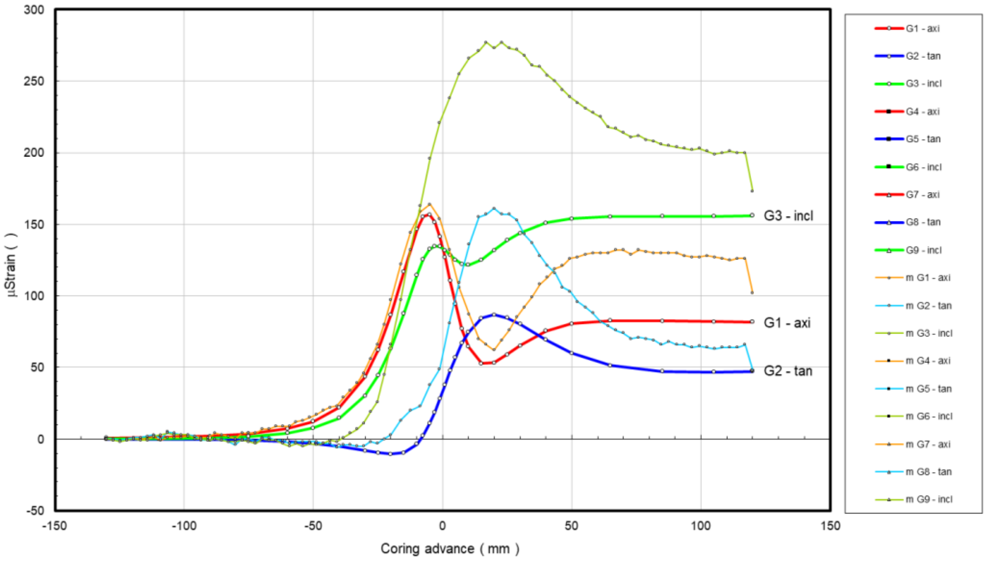
1.7	1.3	G

G2,tan

1.9	1.0	P

G3,incl

2.03	1.1	P



Rosette 2

G4,axi

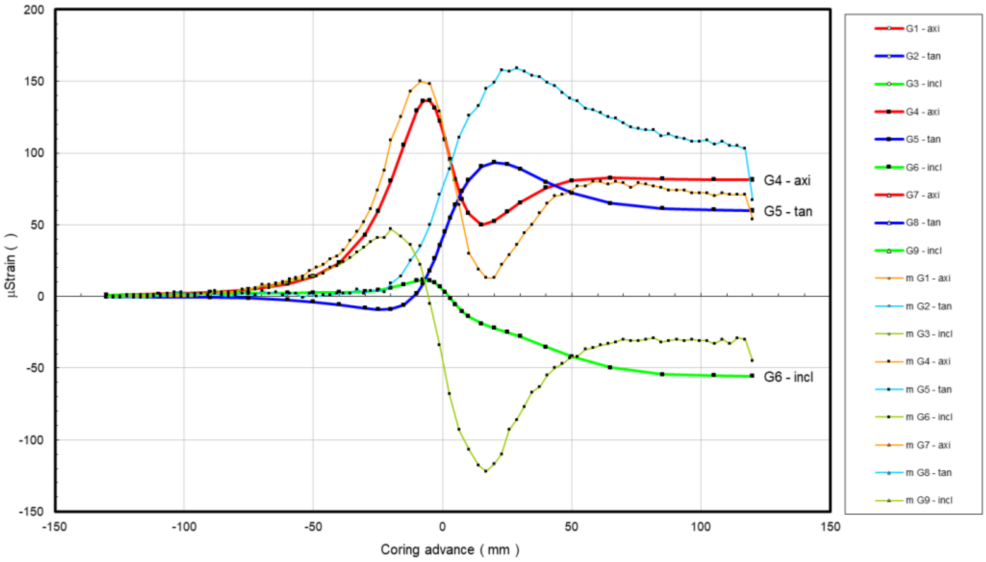
0.34	0.87	G

G5,tan

1.7	1.2	P

G6,incl

0.34	0.81	P



Rosette 3

G7,axi

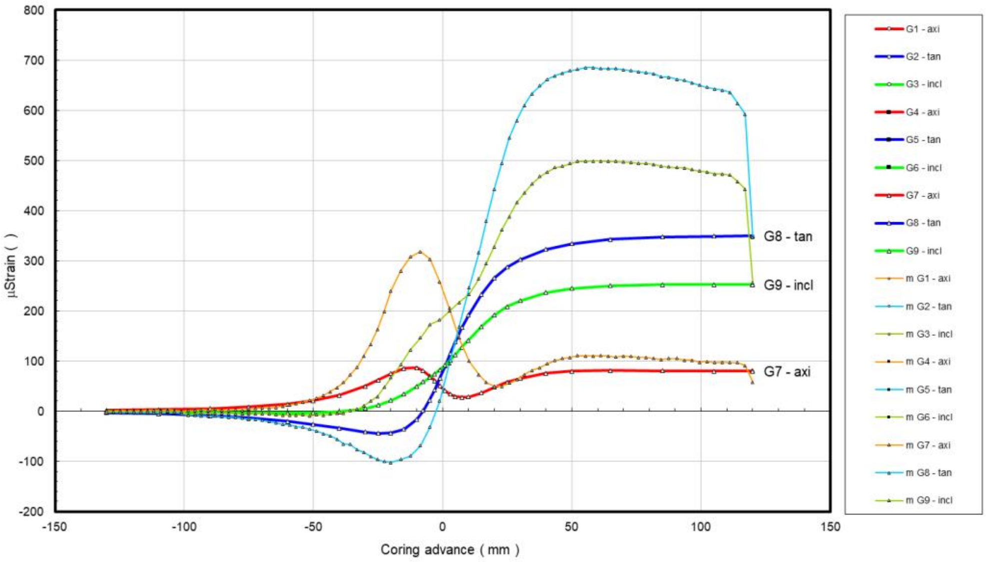
3.7	0.75	P

G8,tan

1.9	1.0	P

G9,incl

2.0	1.0	P



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

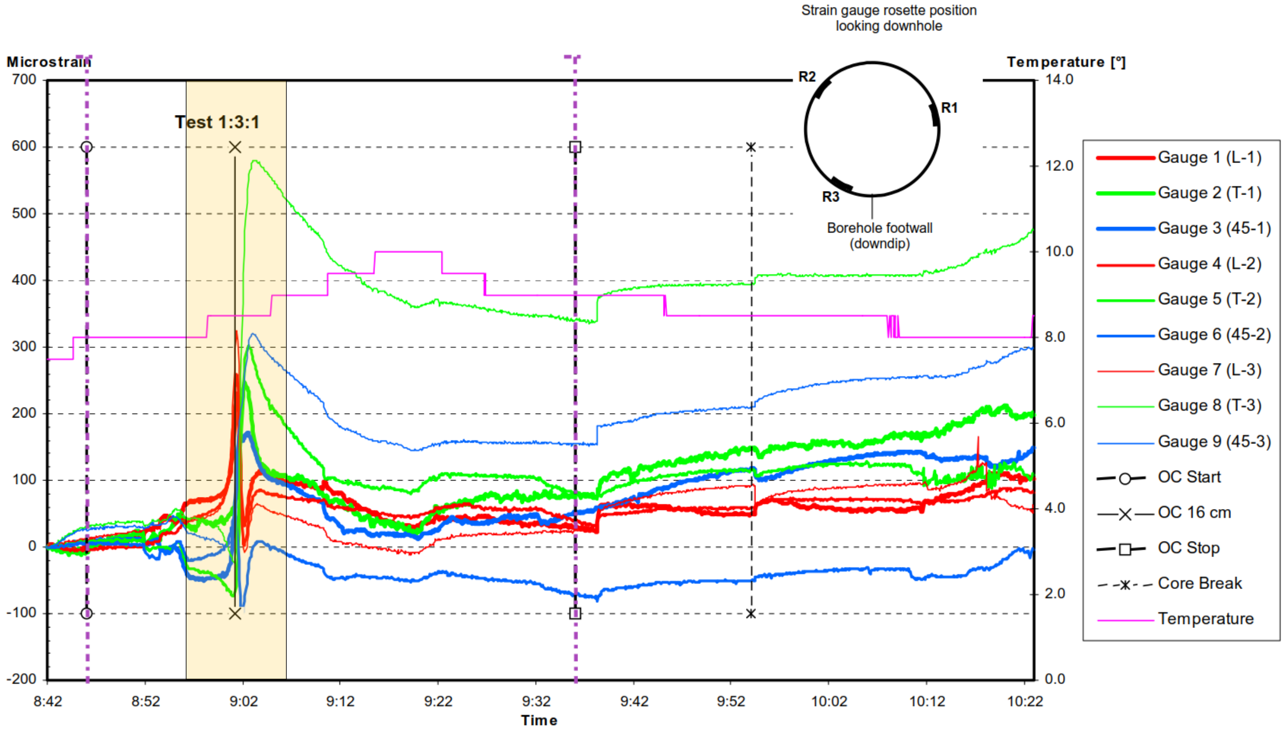
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	102	48	173	54	67	-45	58	347	256
@60mm	127	92	234	77	134	-38	109	682	497
@120mm	124	63	199	70	105	-32	98	624	462

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	7.8	74	26	6.4	250	64	0.1	343	1	7.6	73	0.1	6.7	*9 %*
@60mm	14.9	73	3	10.1	243	87	0.8	343	1	14.8	73	0.8	10.1	
@120mm	13.3	74	4	8.8	217	85	1.1	343	3	13.3	73	1.1	8.8	

KFM07B 1:3:1, depth: 53.66 m

G	9/9	Strains stable before overcoring.
P	0/9	Strains are within the elastic transient strain range (yellow shade)
P	0,0,9	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 52 mm for s1, s2 and s3 magnitudes
G	G,P,G	Stability of inverse stress solution after passing gauges section over 52 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 4 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in most of the strain gauges, not associated with the temperature because it is uneven for equally oriented strain gauges. Intermediate principal stress almost vertical and the minimum horizontal stress is zero.
P		***Overall strain reliability***



Overcoring record:

Table A-3. Key measurement data for test no. 1:3:1, 70.09 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	05-08-11	16:29:00
Mixing of glue	05-08-11	16:46:00
Application of glue to gauges	05-08-11	16:50:00
Probe installation in pilot hole	05-08-11	17:04:00
Start time for dense sampling (5 s interval)	05-08-12	07:00:00
Adapter retrieved	05-08-12	07:53:00
Adapter on surface	05-08-12	07:56:00
Drill string fed down the hole	05-08-12	08:15:00
Drill string in place	05-08-12	08:34:00
Flushing start	05-08-12	08:35:00
Rotation start	05-08-12	08:54:00
Overcoring start	05-08-12	08:56:00
Overcoring 4 cm	05-08-12	08:57:15
Overcoring 8 cm	05-08-12	08:58:30
Overcoring 12 cm	05-08-12	08:59:45
Overcoring 16 cm	05-08-12	09:01:15
Overcoring 20 cm	05-08-12	09:02:30
Overcoring 24 cm	05-08-12	09:03:45
Overcoring 28 cm	05-08-12	09:05:15
Overcoring 32 cm	05-08-12	09:06:30
Overcoring stop (100 cm)	05-08-12	09:18:45
Flushing off	05-08-12	09:38:00
Core break	05-08-12	09:54:00
Core retrieval start	05-08-12	10:10:00
Core and probe on surface	05-08-12	10:23:00
End of strain registration	05-08-12	10:45:00
Calculation of strain difference: OC Start	05-08-12	08:46:00
Calculation of strain difference: OC Stop	05-08-12	09:36:00

Overcoring advance	Overcoring rate [cm/min]
0–16 cm	3.0
16–32cm	3.0
32 cm – overcoring stop	5.6

Reinterpretation

Ranking of the strain response per gauge rosette

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

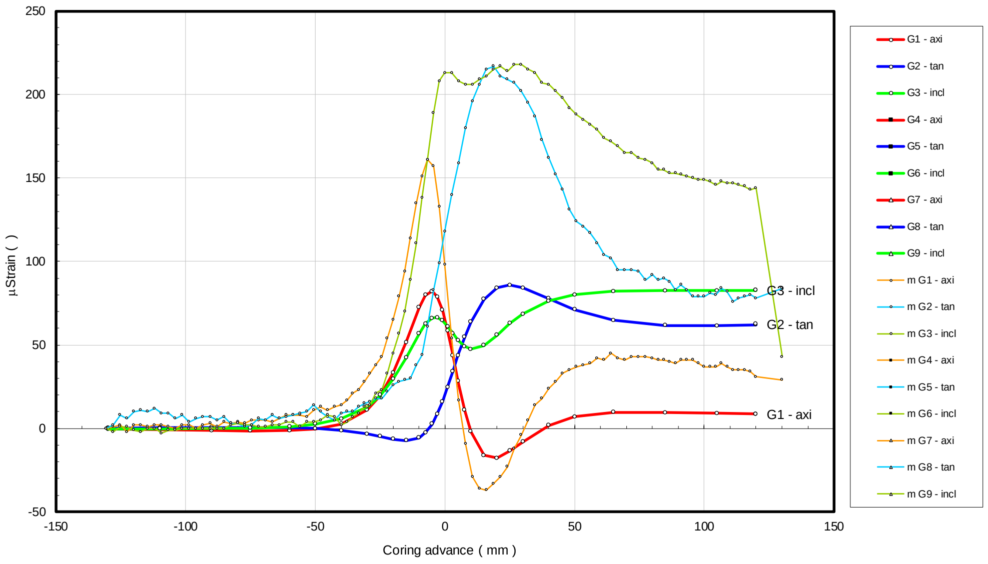
2.1	3.5	P

G2,tan

2.5	1.3	P

G3,incl

2.6	0.59	P



Rosette 2

G4,axi

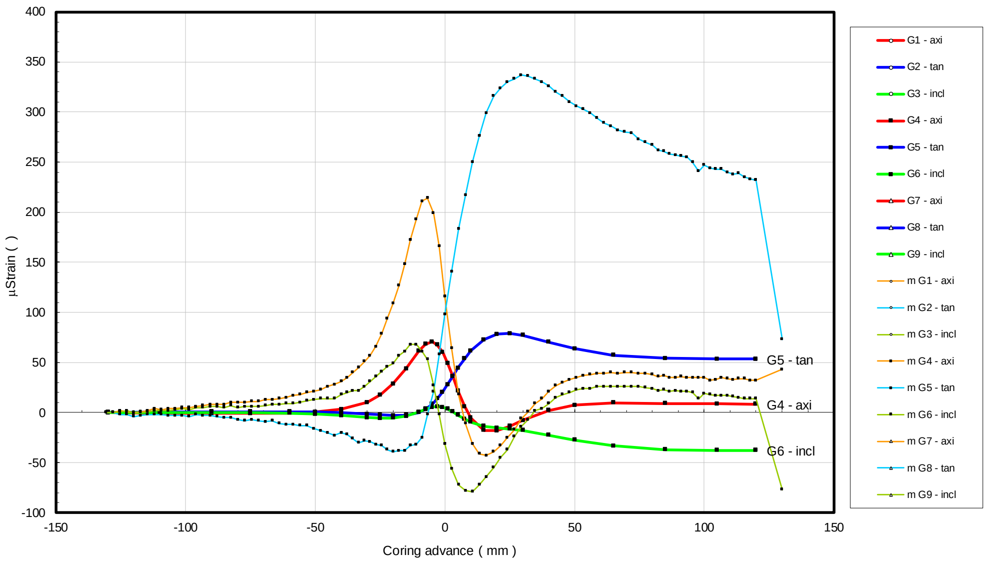
2.4	3.7	P

G5,tan

13	1.4	P

G6,incl

-34	2.0	P



Rosette 3

G7,axi

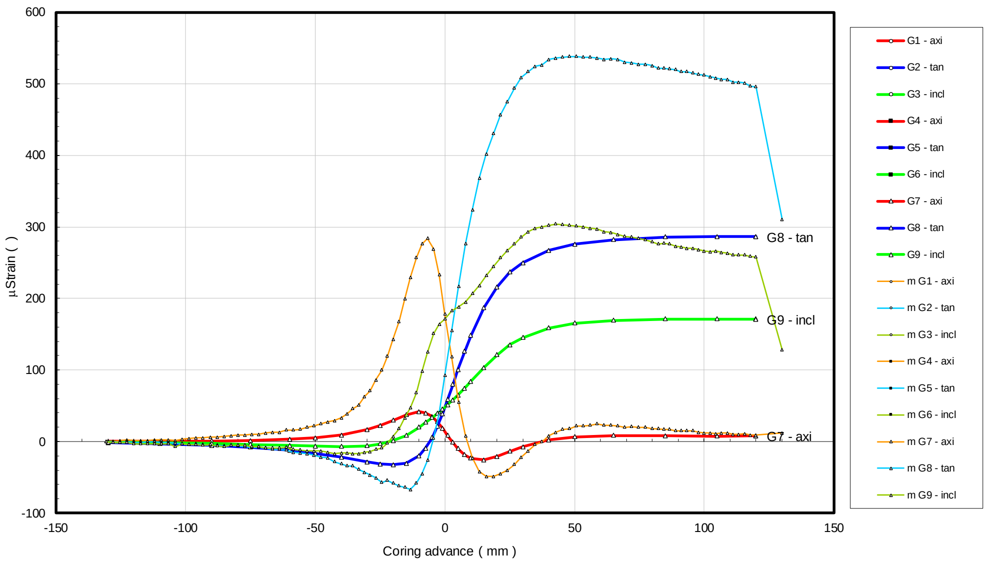
6.9	1.1	P

G8,tan

1.9	1.1	P

G9,incl

1.9	0.72	P



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

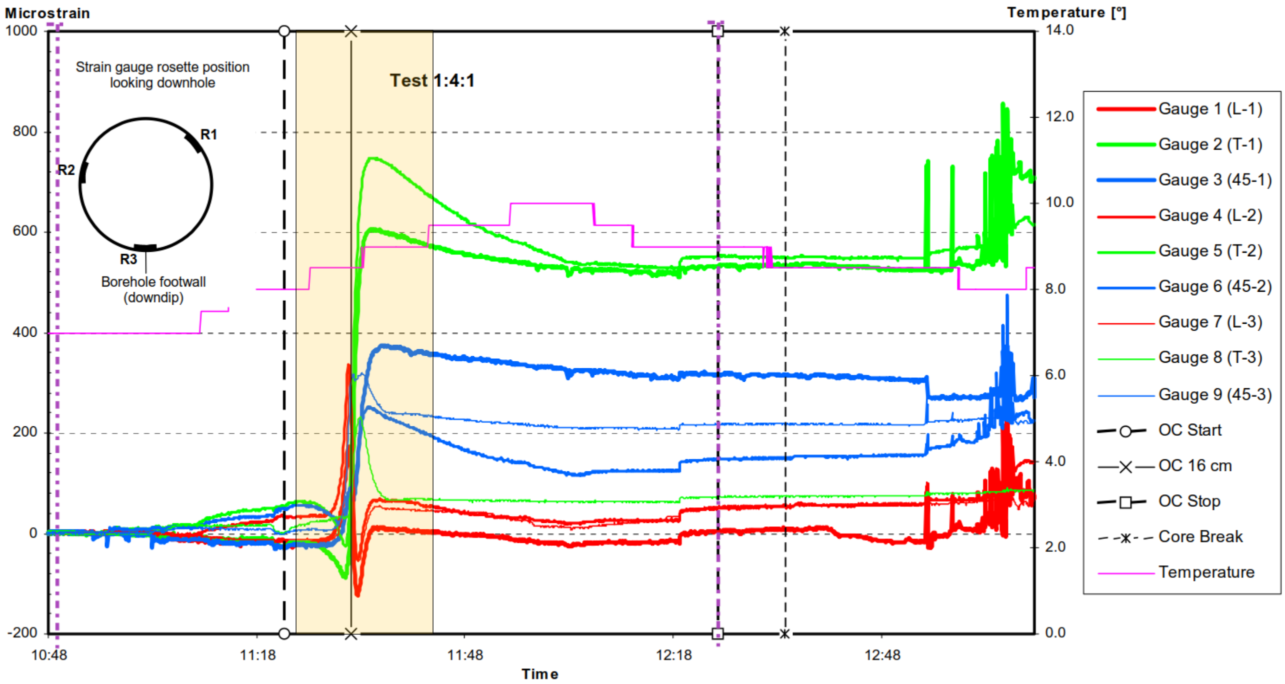
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	29	84	43	43	73	-77	12	310	128
@52mm	35	131	192	33	310	20	18	538	302
@120mm	29	84	43	43	73	-77	12	310	128

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	5.8	241	3	3.0	346	78	-0.1	150	12	5.8	60	0.0	2.9	*34 %*
@52mm	13.2	49	11	8.6	286	70	1.5	142	17	13.0	51	2.1	8.2	
@120mm	6.5	240	4	3.7	347	75	0.6	149	14	6.5	59	0.8	3.5	

KFM07B 1:4:1, depth: 54.40 m

G	9/9	Strains stable before overcoring.
P	6/9	Strains are within the elastic transient strain range (yellow shade)
M	5,3,1	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
M	M,G,P	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 60 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 11 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High to moderate drift in most of the strain gauges, not associated with temperature because it is uneven for equally oriented strain gauges. Maximum principal stress has high plunge of 51 degrees and the vertical stress is 5.6 times the overburden weight. These factors indicate low reliability.
P/M		***Overall strain reliability***



Overcoring record:

Table A-4. Key measurement data for test no. 1:4:1, 71.00 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	05-08-12	17:18:00
Mixing of glue	05-08-12	17:30:00
Application of glue to gauges	05-08-12	17:33:00:
Probe installation in pilot hole	05-08-12	17:40:00
Start time for dense sampling (5 s interval)	05-08-13	07:00:00
Adapter retrieved	05-08-13	08:12:00
Adapter on surface	05-08-13	08:17:00
Drill string fed down the hole	05-08-13	08:58:00
Drill string in place	05-08-13	10:23:00
Flushing start	05-08-13	11:05:00
Rotation start	05-08-13	11:21:30
Overcoring start	05-08-13	11:22:00
Overcoring 4 cm	05-08-13	11:24:50
Overcoring 8 cm	05-08-13	11:27:10
Overcoring 12 cm	05-08-13	11:29:20
Overcoring 16 cm	05-08-13	11:31:40
Overcoring 20 cm	05-08-13	11:33:50
Overcoring 24 cm	05-08-13	11:36:05
Overcoring 28 cm	05-08-13	11:38:25
Overcoring 32 cm	05-08-13	11:40:40
Overcoring stop (70 m)	05-08-13	12:02:30
Flushing off	05-08-13	12:18:00
Core break	05-08-13	12:34:00
Core retrieval start	05-08-13	12:54:00
Core and probe on surface	05-08-13	13:10:00
End of strain registration	05-08-13	13:30:00
Calculation of strain difference: OC Start	05-08-13	10:50:50
Calculation of strain difference: OC Stop	05-08-13	12:24:30

Overcoring advance	Overcoring rate [cm/min]
0–16 cm	1.7
16–32 cm	1.8
32 cm – overcoring stop	1.7

Reinterpretation

Ranking of the strain response per gauge rosette
– strains after 120 mm are for original solution

Rosette 1

G1,axi

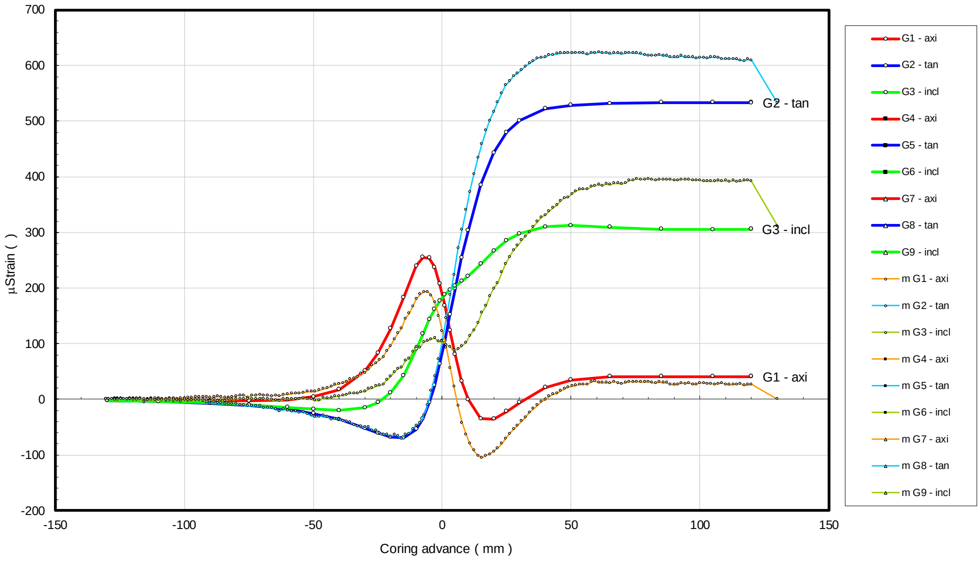
2.5	-	G

G2,tan

1.2	1.0	G

G3,incl

1.27	1.0	M



Rosette 2

G4,axi

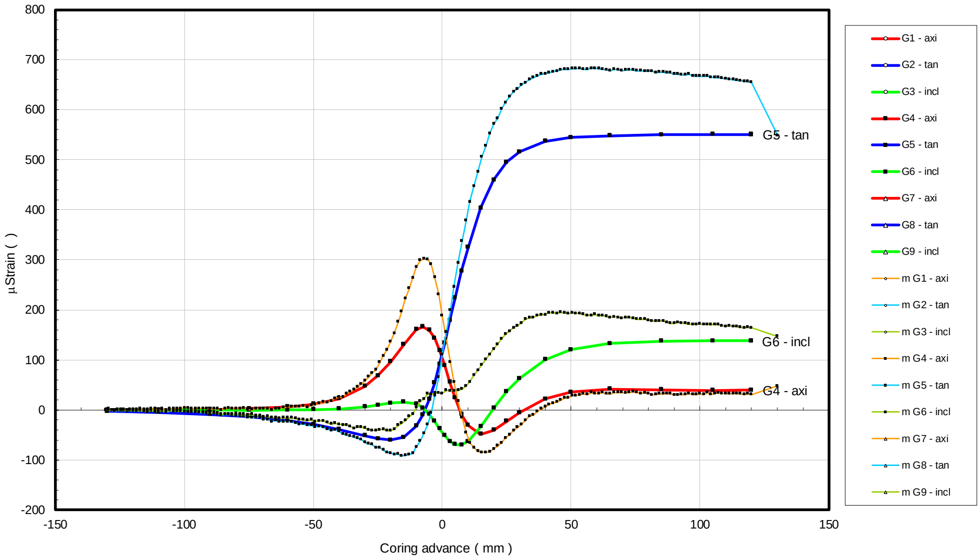
1.9	1.1	G

G5,tan

1.2	1.0	G

G6,incl

-2.0	1.07	M



Rosette 3

G7,axi

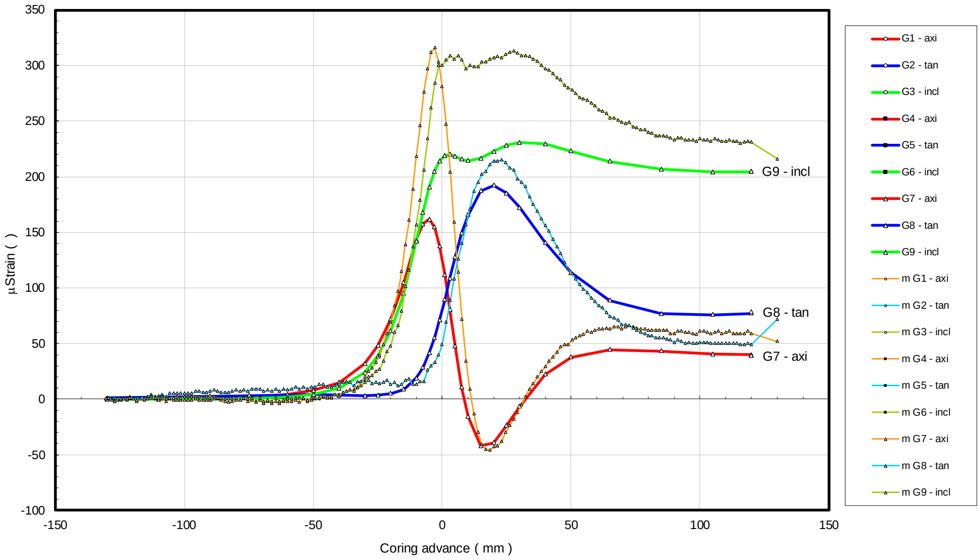
2.1	1.2	M

G8,tan

1.1	0.83	G

G9,incl

1.26	1.1	P



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

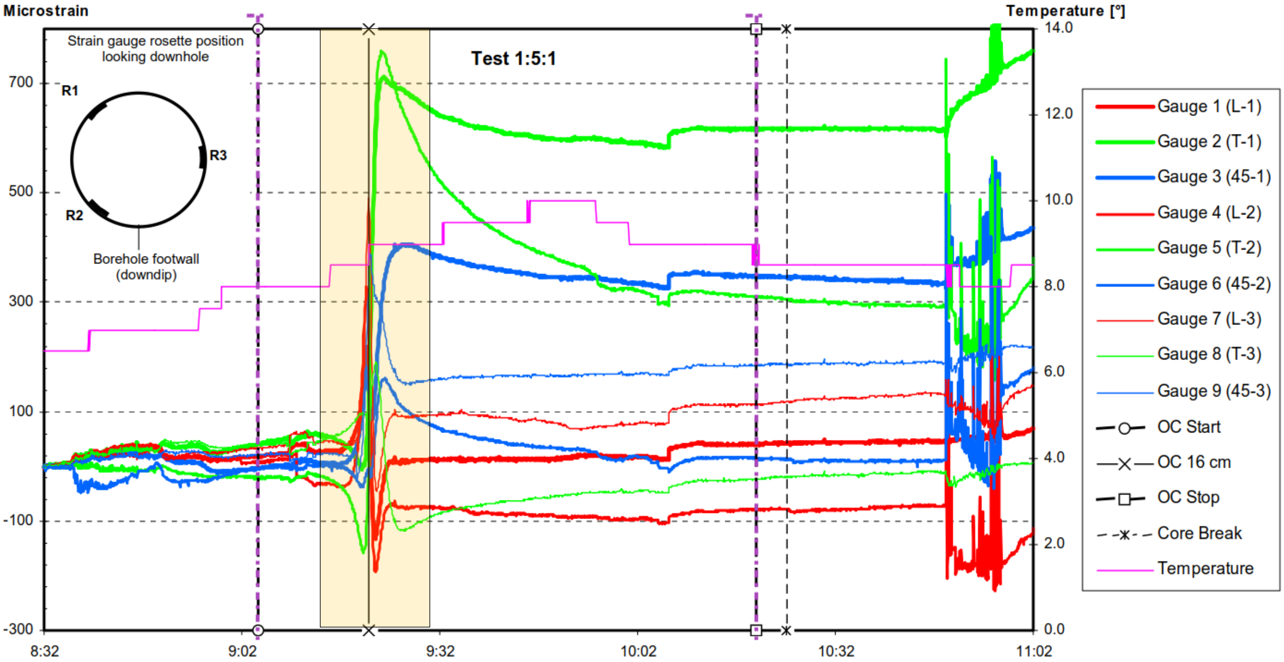
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	0	532	311	48	549	147	52	72	216
@60mm	24	622	369	29	682	194	53	113	278
@120mm	27	609	392	31	655	164	59	49	231

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	15.5	326	51	8.8	79	18	1.8	181	33	10.0	107	5.3	10.7	*5 %*
@60mm	19.0	326	49	10.2	79	19	2.2	183	35	12.3	293	6.6	12.6	
@120mm	19.3	327	51	10.3	79	17	2.5	181	34	12.0	291	6.7	13.3	

KFM07B 1:5:1, depth: 55.57 m

G	9/9	Strains stable before overcoring.
P	4/9	Strains are within the elastic transient strain range (yellow shade)
P	2,1,6	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,G,P	Stability of inverse stress solution after passing gauges section over 65 mm for s1, s2 and s3 magnitudes
G	G,M,G	Stability of inverse stress solution after passing gauges section over 65 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 12 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High to moderate drift in most of the strain gauges, not associated with temperature because it is uneven for equally oriented strain gauges. The minimum horizontal stress is tensile and the vertical stress is 3.4 times the overburden weight.
P		***Overall strain reliability***



Overcoring record:

Table A-5. Key measurement data for test no. 1:5:1, 72.45 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	05-08-13	19:03:00
Mixing of glue	05-08-13	19:21:00
Application of glue to gauges	05-08-13	19:24:00
Probe installation in pilot hole	05-08-13	19:31:00
Start time for dense sampling (5 s interval)	05-08-14	07:00:00
Adapter retrieved	05-08-14	08:21:20
Adapter on surface	05-08-14	08:24:30
Drill string fed down the hole	05-08-14	08:27:00
Drill string in place	05-08-14	08:47:00
Flushing start	05-08-14	08:48:00
Rotation start	05-08-14	09:10:55
Overcoring start	05-08-14	09:12:30
Overcoring 4 cm	05-08-14	09:14:40
Overcoring 8 cm	05-08-14	09:16:45
Overcoring 12 cm	05-08-14	09:19:05
Overcoring 16 cm	05-08-14	09:21:20
Overcoring 20 cm	05-08-14	09:23:40
Overcoring 24 cm	05-08-14	09:25:50
Overcoring 28 cm	05-08-14	09:28:10
Overcoring 32 cm	05-08-14	09:30:25
Overcoring stop (70 cm)	05-08-14	09:51:55
Flushing off	05-08-14	10:06:00
Core break	05-08-14	10:24:30
Core retrieval start	05-08-14	10:48:00
Core and probe on surface	05-08-14	11:02:00
End of strain registration	05-08-14	11:18:05
Calculation of strain difference: OC Start	05-08-14	09:04:30
Calculation of strain difference: OC Stop	05-08-14	10:19:55

Overcoring advance	Overcoring rate [cm/min]
0–16 cm	1.8
16–32 cm	1.8
32 cm – overcoring stop	1.8

Reinterpretation

Ranking of the strain response per gauge rosette

– strains after 120 mm are replaced by strains for original solution

Rosette 1

G1,axi

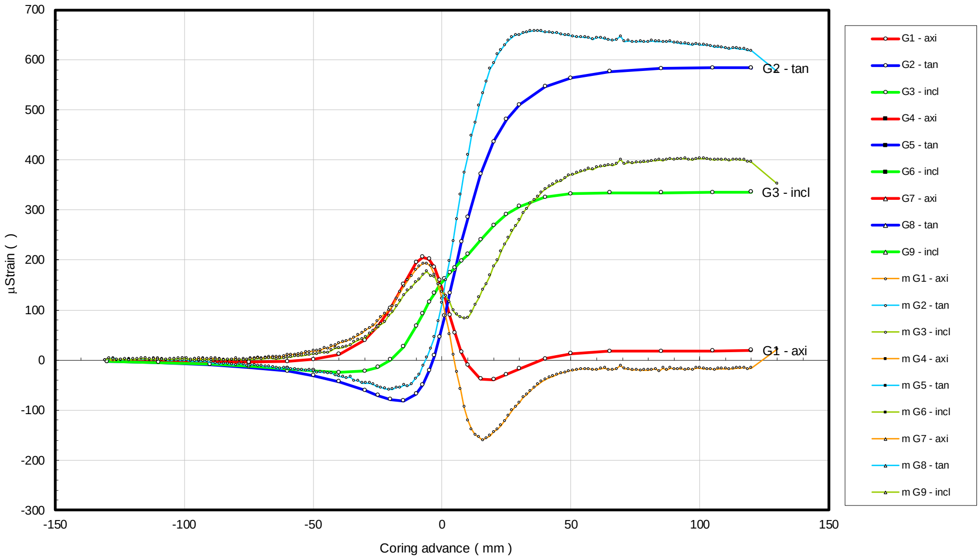
3.7	-0.86	G

G2,tan

-	1.1	G

G3,incl

-	1.2	M



Rosette 2

G4,axi

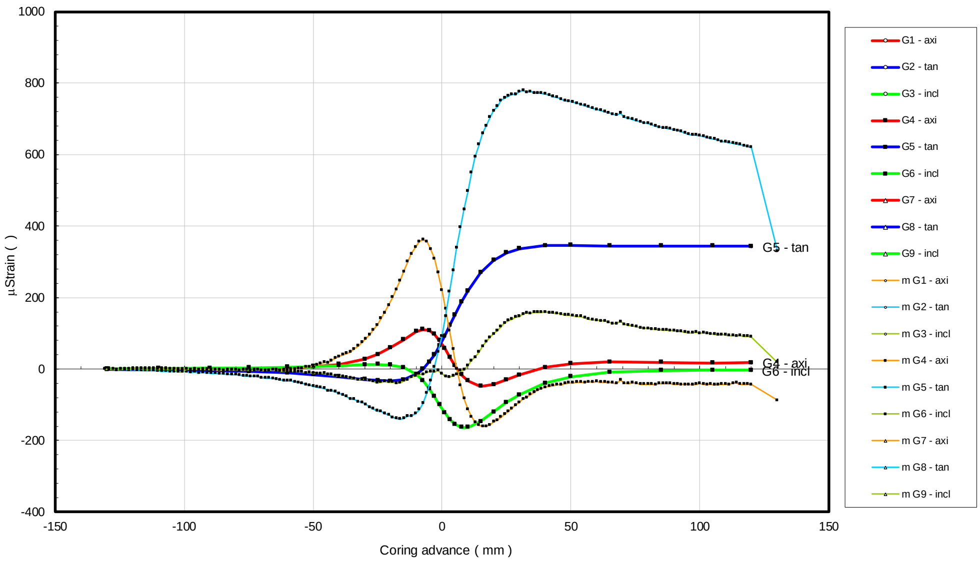
3.4	-2.4	P

G5,tan

2.2	1.8	P

G6,incl

0.1	-	P



Rosette 3

G7,axi

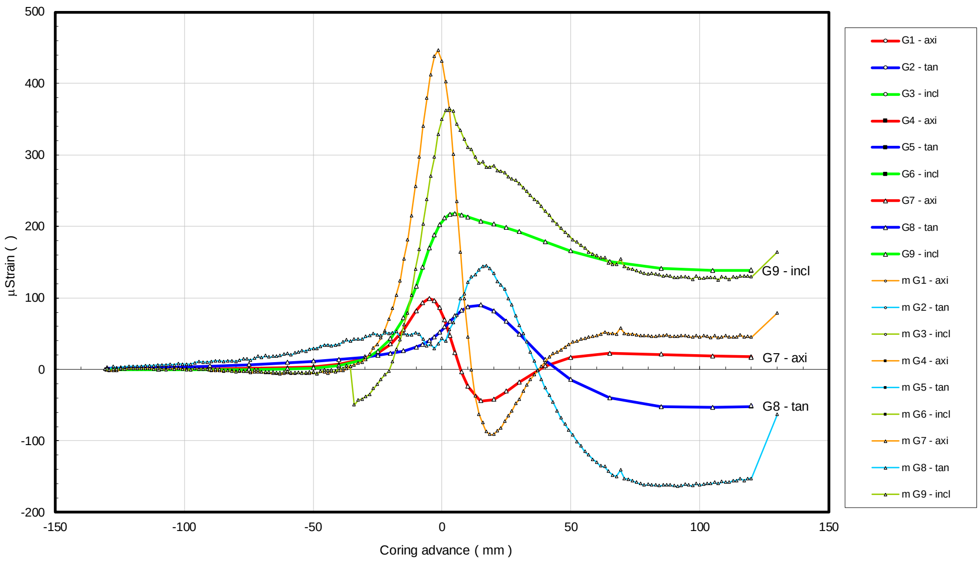
4.5	2.7	P

G8,tan

1.8	2.9	P

G9,incl

1.7	0.9	P



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

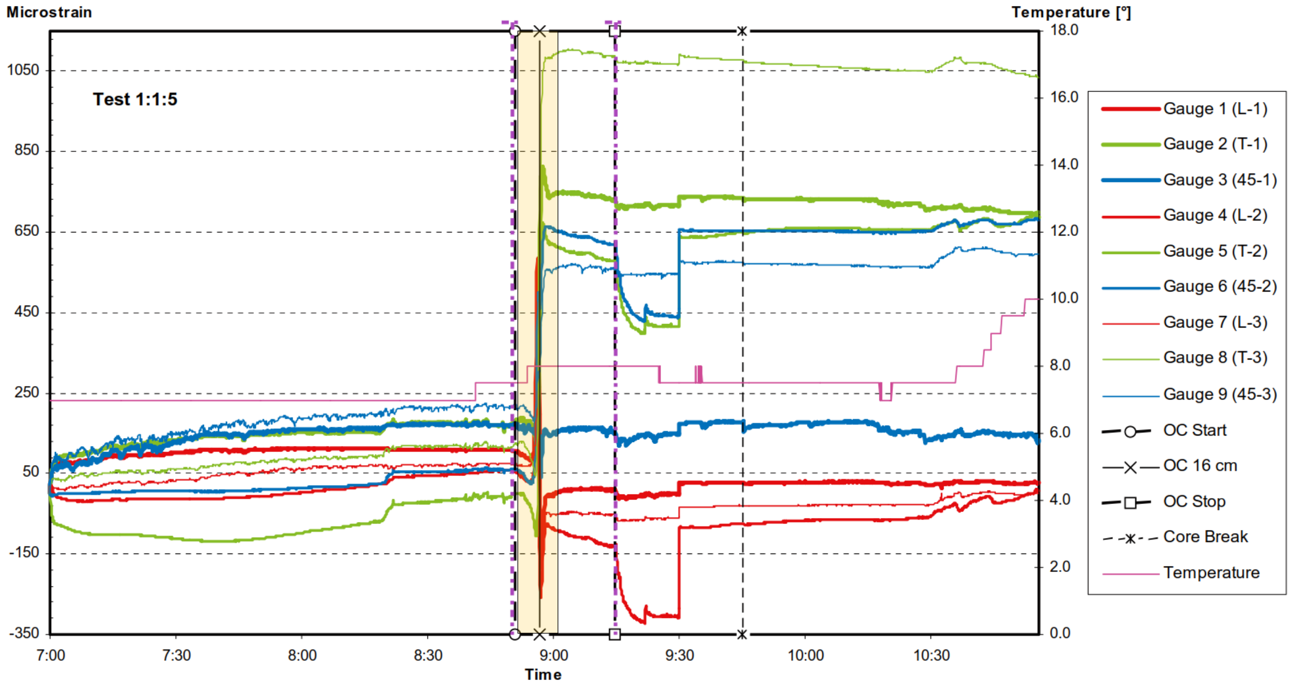
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	22	576	352	-87	330	19	79	-63	164
@65mm	-19	640	390	-38	717	131	50	-143	149
@120mm	-16	618	396	-43	620	90	45	-153	129

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	13.5	213	7	6.8	337	78	-1.4	122	10	13.4	32	-1.1	6.6	
@65mm	19.8	222	15	7.2	359	69	-2.0	128	14	18.9	40	0.0	7.6	
@120mm	18.9	220	16	7.3	356	69	-1.4	125	14	18.0	38	0.0	7.7	

KFM07C 1:1:5, depth: 94.76 m

G	9/9	Strains stable before overcoring.
G	6/9	Strains are within the elastic transient strain range (yellow shade)
G	7,2,0	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,G,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 26 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Minor drift after elastic range in the rosette number 2. Rosette number 2 shows a high permanent shift at the end of overcoring and flush-off.
G		***Overall strain reliability***



Overcoring record:

Table A-1. Key measurement data for test no. 1:1:5, 98.76 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-04-03	16:02:00
Mixing of glue	2006-04-03	16:27:00
Application of glue to gauges	2006-04-03	16:32:00
Probe installation in pilot hole	2006-04-03	16:41:00
Start time for dense sampling (5 s interval)	2006-04-04	07:00:00
Adapter retrieved	2006-04-04	07:41:30
Adapter on surface	2006-04-04	07:46:00
Drill string fed down the hole	2006-04-04	08:00:00
Drill string in place	2006-04-04	08:20:00
Flushing start	2006-04-04	08:21:00
Rotation start	2006-04-04	08:50:00
Overcoring start	2006-04-04	08:51:00
Overcoring 4 cm	2006-04-04	08:52:20
Overcoring 8 cm	2006-04-04	08:53:45
Overcoring 12 cm	2006-04-04	08:55:05
Overcoring 16 cm	2006-04-04	08:56:30
Overcoring 20 cm	2006-04-04	08:57:45
Overcoring 24 cm	2006-04-04	08:59:05
Overcoring 28 cm	2006-04-04	09:00:30
Overcoring 32 cm	2006-04-04	09:01:45
Overcoring stop (71 cm)	2006-04-04	09:14:50
Flushing off	2006-04-04	09:30:00
Core break	2006-04-04	09:45:15
Core retrieval start	2006-04-04	10:15:00
Core & probe on surface	2006-04-04	10:23:00
End of strain registration	2006-04-04	10:56:05
Calculation of strain difference: OC Start	2006-04-04	08:50:55
Calculation of strain difference: OC Stop	2006-04-04	09:15:00

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.9
16 – 32 cm	3.0
32 cm – overcoring stop	3.0

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

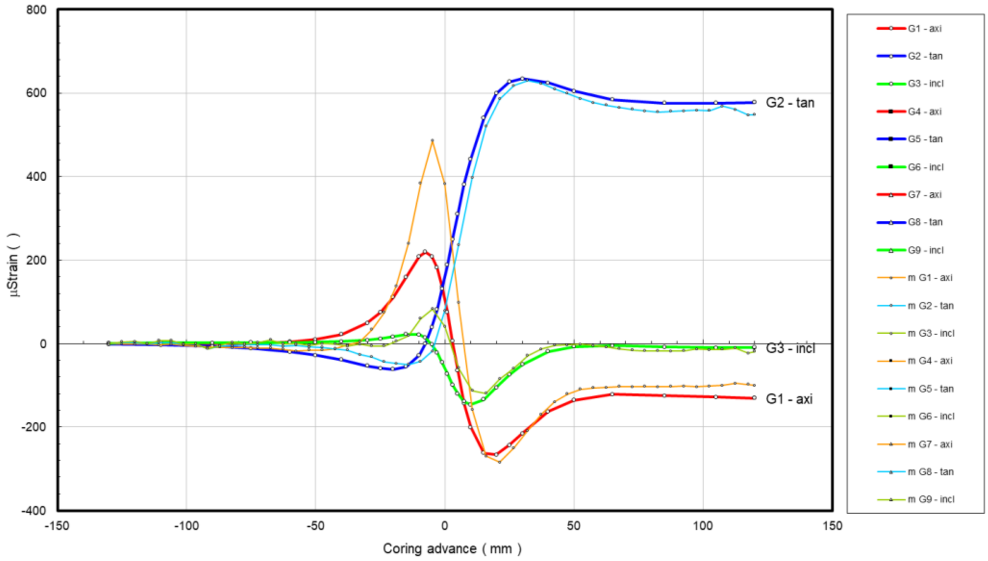
2.3	0.76	M

G2,tan

1.0	0.95	G

G3,incl

0.80	-	G



Rosette 2

G4,axi

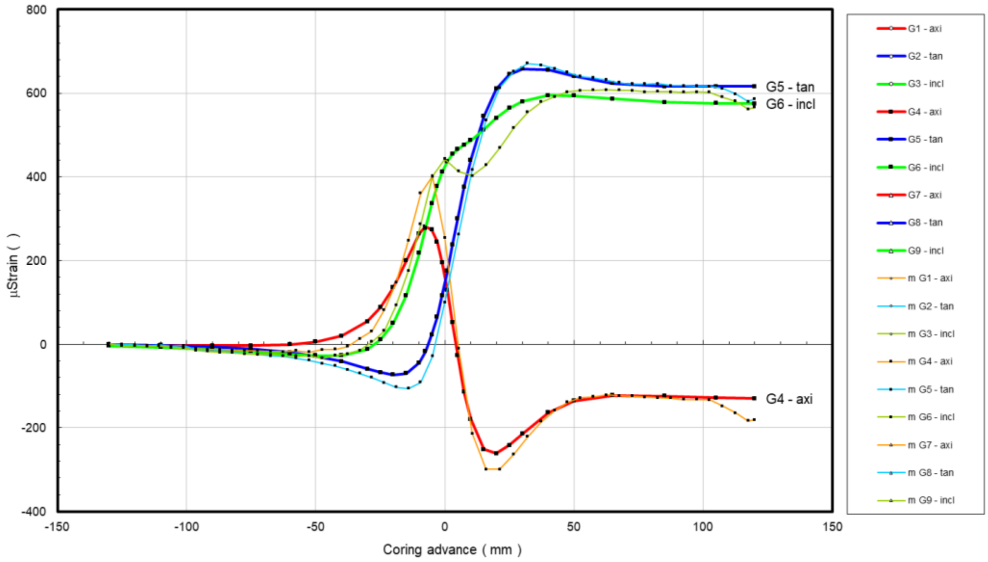
1.5	-1.4	G

G5,tan

1.05	0.94	G

G6,incl

-	0.95	G



Rosette 3

G7,axi

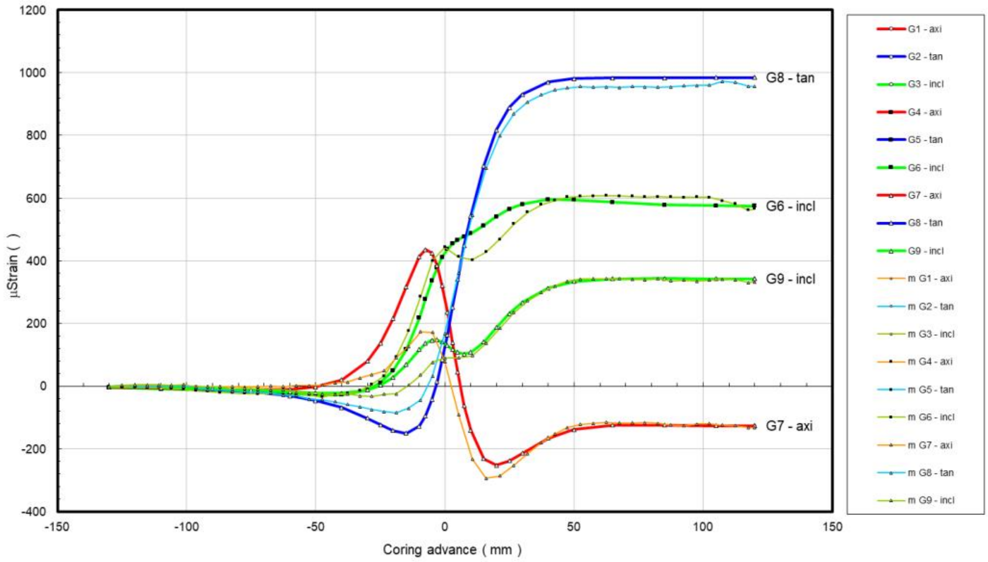
0.50	1.0	M

G8,tan

0.99	0.97	G

G9,incl

0.71	0.97	G



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

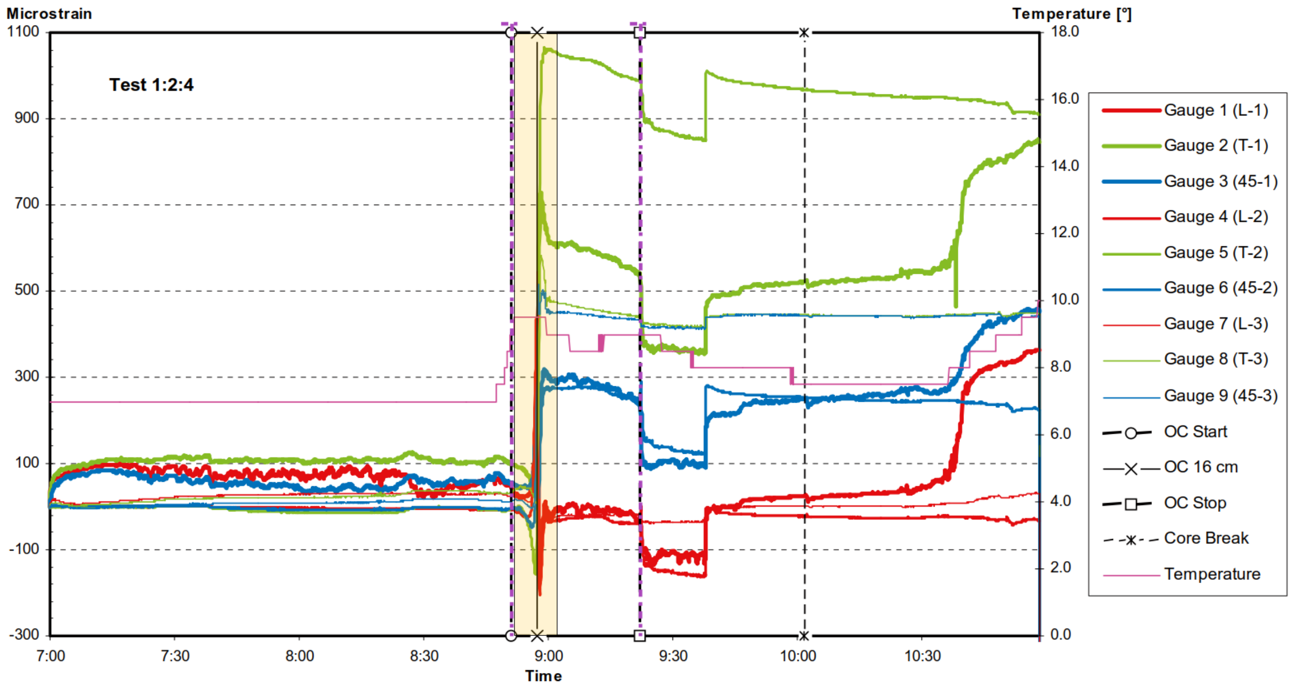
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-100	548	-19	-181	587	566	-133	956	333
@53mm	-109	587	-2	-128	640	606	-122	956	341
@120mm	-100	548	-19	-181	587	566	-133	956	333

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	28.0	175	3	22.0	84	21	1.5	272	68	27.9	177	19.2	4.3	*5 %*
@53mm	29.7	173	4	24.0	82	22	4.0	272	68	29.6	176	21.2	6.8	
@120mm	29.1	176	3	22.9	85	21	2.2	273	69	29.0	178	20.2	4.9	

KFM07C 1:2:4, depth: 100.49 m

G	6/9	Strains stable before overcoring.
M	6/9	Strains are within the elastic transient strain range (yellow shade)
M	4,1,4	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
M	M,P,P	Stability of inverse stress solution after passing gauges section over 52 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 52 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 25 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Moderate drift in most of the strain gauges, could be associated with temperature because it is similar on all equally oriented strain gauges (considered in the ranking of the reliability of the transient strains as moderate). At the end of overcoring and flush-off, a high permanent shift in strain rosettes number 1 and 2 is found. The magnitude of the vertical stress is approximately equal to the overburden weight.
M		***Overall strain reliability***



Overcoring record:

Table A-2. Key measurement data for test no. 1:2:4, 104.53 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-04-05	16:15:00
Mixing of glue	2006-04-05	16:20:00
Application of glue to gauges	2006-04-05	16:24:00
Probe installation in pilot hole	2006-04-05	16:33:00
Start time for dense sampling (5 s interval)	2006-04-06	07:00:00
Adapter retrieved	2006-04-06	07:37:30
Adapter on surface	2006-04-06	07:40:00
Drill string fed down the hole	2006-04-06	08:01:00
Drill string in place	2006-04-06	08:21:30
Flushing start	2006-04-06	08:22:30
Rotation start	2006-04-06	08:28:15
Overcoring start	2006-04-06	08:51:20
Overcoring 4 cm	2006-04-06	08:52:50
Overcoring 8 cm	2006-04-06	08:54:20
Overcoring 12 cm	2006-04-06	08:55:40
Overcoring 16 cm	2006-04-06	08:57:00
Overcoring 20 cm	2006-04-06	08:58:20
Overcoring 24 cm	2006-04-06	08:59:45
Overcoring 28 cm	2006-04-06	09:01:05
Overcoring 32 cm	2006-04-06	09:02:25
Overcoring stop (100 cm)	2006-04-06	09:22:20
Flushing off	2006-04-06	09:38:00
Core break	2006-04-06	10:02:35
Core retrieval start	2006-04-06	10:25:00
Core & probe on surface	2006-04-06	10:44:00
End of strain registration	2006-04-06	10:58:40
Calculation of strain difference: OC Start	2006-04-06	08:51:20
Calculation of strain difference: OC Stop	2006-04-06	09:22:55

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.0
32 cm – overcoring stop	3.4

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

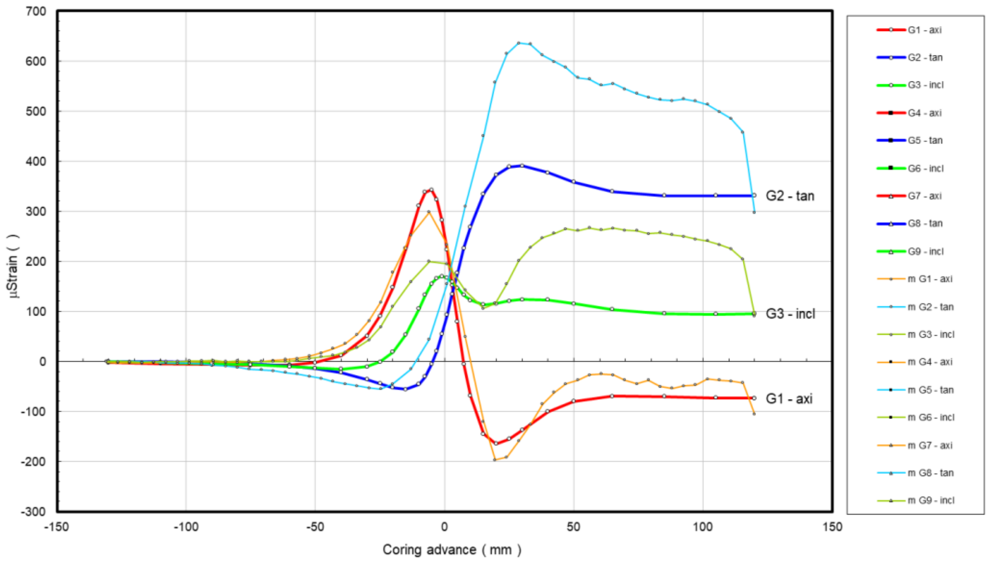
1.2	1.8	G

G2,tan

1.6	0.84	P

G3,incl

1.6	1.0	P



Rosette 2

G4,axi

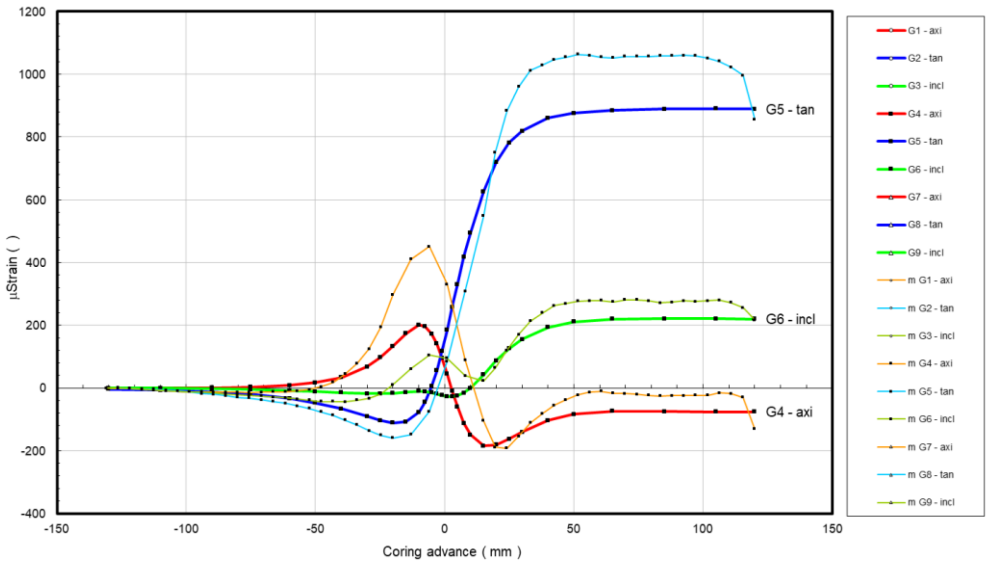
2.3	0.39	M

G5,tan

1.4	1.2	G

G6,incl

-	1.2	G



Rosette 3

G7,axi

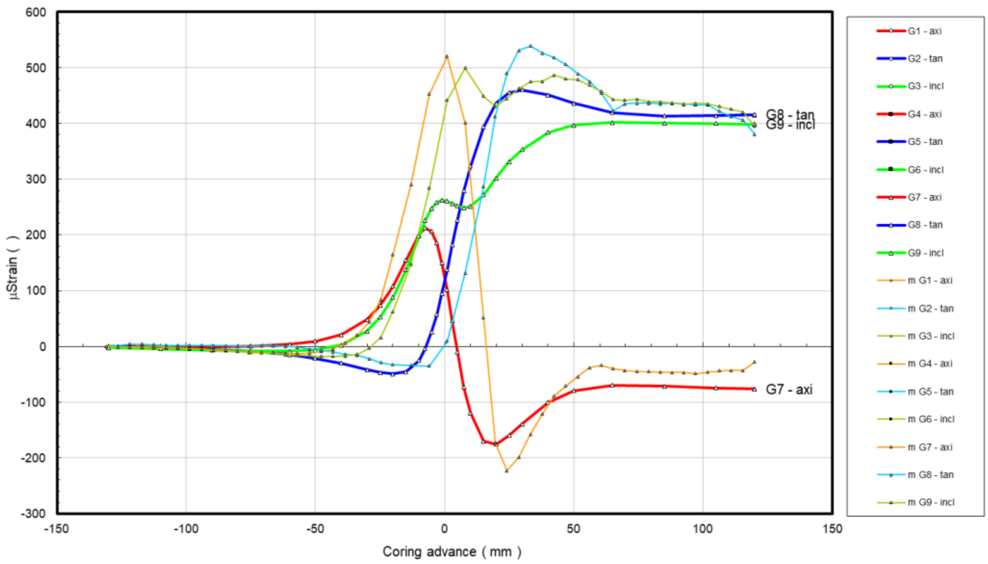
2.5	0.57	P

G8,tan

1.2	0.87	G

G9,incl

2.1	1.1	P



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Strain solution:

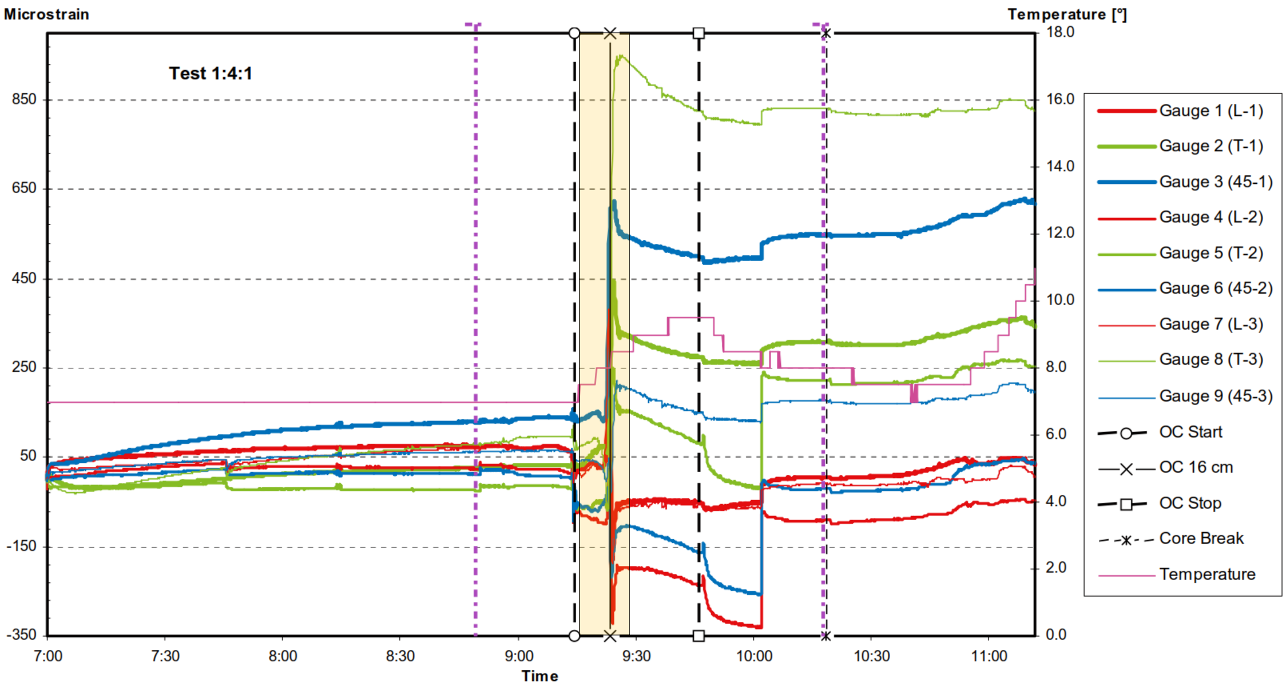
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-146	287	51	-91	936	196	-63	391	405
@52mm	-37	567	261	-22	1063	277	-54	489	479
@120mm	-106	297	91	-131	856	216	-28	381	395

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	26.2	170	9	12.1	263	22	1.3	59	66	25.7	168	10.5	3.4	*34%*
@52mm	33.2	163	10	20.0	258	25	9.5	53	63	32.6	160	18.0	12.1	
@120mm	25.6	169	9	13.2	263	21	3.5	58	67	25.2	167	11.9	5.2	

KFM07C 1:4:1, depth: 104.36 m

G	9/9	Strains stable before overcoring.
M	4/9	Strains are within the elastic transient strain range (yellow shade)
P	3,2,4	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
M	M,M,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 30 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Selection of stress calculation the strains is weird – 9:46 would have been more reliable. Moderate drift of almost all strain gauges could be associated with temperature effects because it is similar on all equally oriented strain gauges. At flush-off high permanent shift in rosette number 2 (debonded). The vertical stress magnitude is close to the overburden weight.
M/P		***Overall strain reliability***



Overcoring record:

Table A-3. Key measurement data for test no. 1:4:1, 108.42 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-04-08	17:21:00
Mixing of glue	2006-04-08	17:36:00
Application of glue to gauges	2006-04-08	17:39:00
Probe installation in pilot hole	2006-04-08	17:47:00
Start time for dense sampling (5 s interval)	2006-04-09	07:00:00
Adapter retrieved	2006-04-09	07:45:00
Adapter on surface	2006-04-09	07:47:20
Drill string fed down the hole	2006-04-09	08:00:00
Drill string in place	2006-04-09	08:13:45
Flushing start	2006-04-09	08:54:00
Rotation start	2006-04-09	09:14:20
Overcoring start	2006-04-09	09:14:25
Overcoring 4 cm	2006-04-09	09:16:20
Overcoring 8 cm	2006-04-09	09:17:50
Overcoring 12 cm	2006-04-09	09:19:25
Overcoring 16 cm	2006-04-09	09:21:40
Overcoring 20 cm	2006-04-09	09:23:05
Overcoring 24 cm	2006-04-09	09:24:25
Overcoring 28 cm	2006-04-09	09:26:00
Overcoring 32 cm	2006-04-09	09:27:20
Overcoring stop (90 cm)	2006-04-09	09:46:15
Flushing off	2006-04-09	10:01:00
Core break	2006-04-09	10:18:35
Core retrieval start	2006-04-09	10:19:50
Core & probe on surface	2006-04-09	10:55:00
End of strain registration	2006-04-09	11:12:10
Calculation of strain difference: OC Start	2006-04-09	08:48:25
Calculation of strain difference: OC Stop	2006-04-09	10:17:30

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.2
16 – 32 cm	2.8
32 cm – overcoring stop	3.1

Reinterpretation

Ranking of the strain response per gauge rosette

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

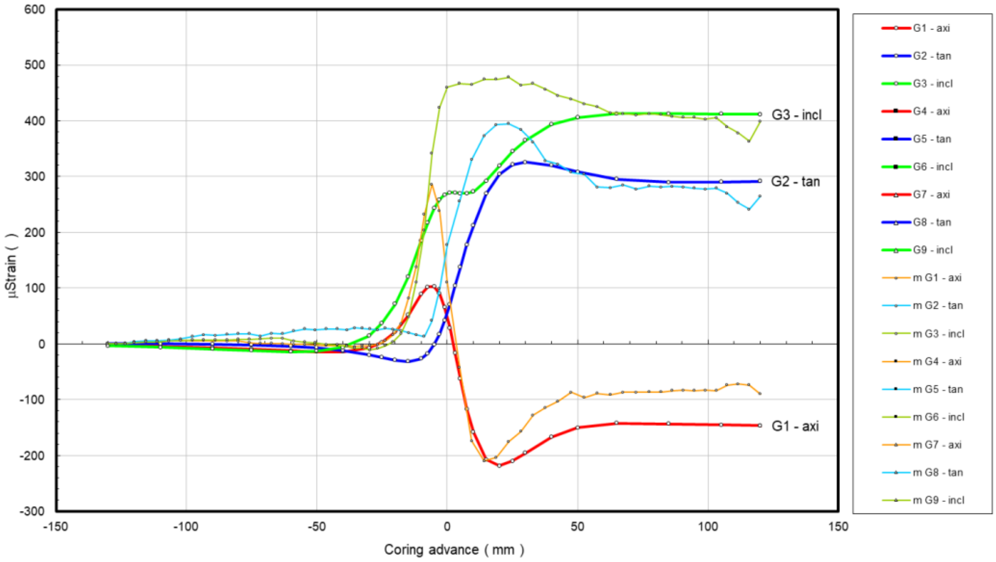
2.8	0.51	**M**

G2,tan

1.2	0.93	**G**

G3,incl

2.1	0.97	**P**



Rosette 2

G4,axi

0.44	0.82	**M**

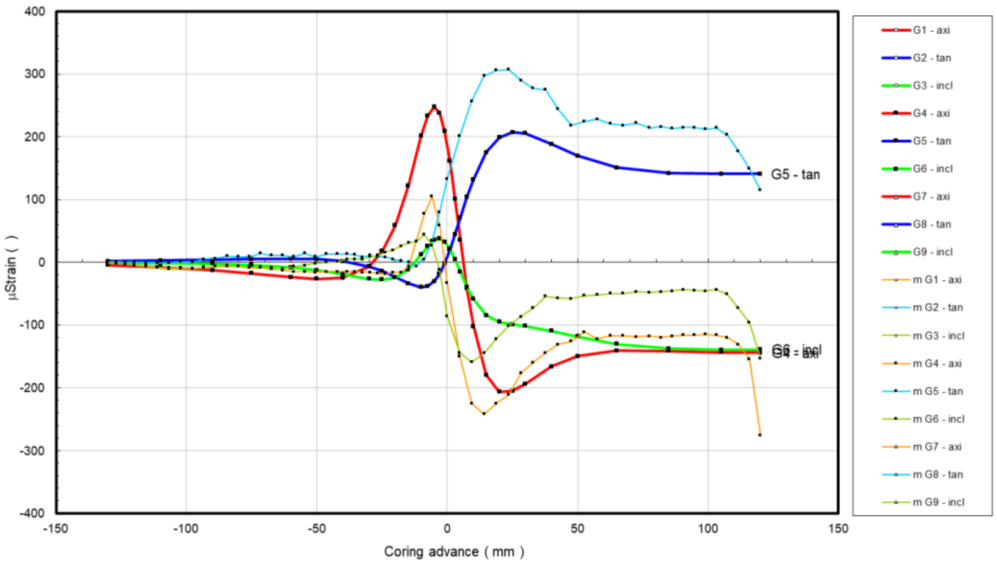
G5,tan

1.5	1.6	**P**

G6,incl

1.6	0.32	**P**

**) second ratio base on original strains*



Rosette 3

G7,axi

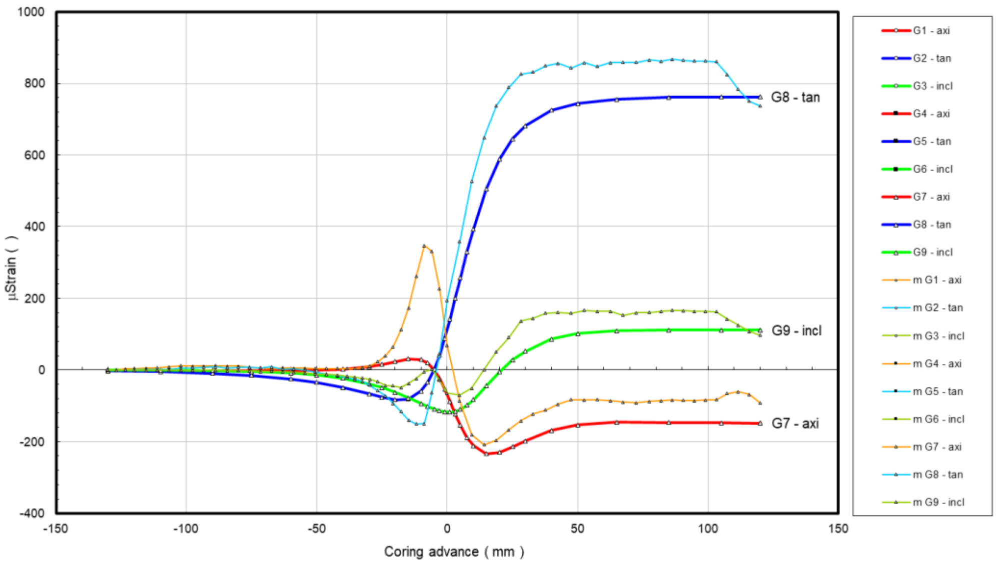
9.2	-0.46	**P**

G8,tan

1.1	0.98	**G**

G9,incl

0.67	0.96	**G**



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

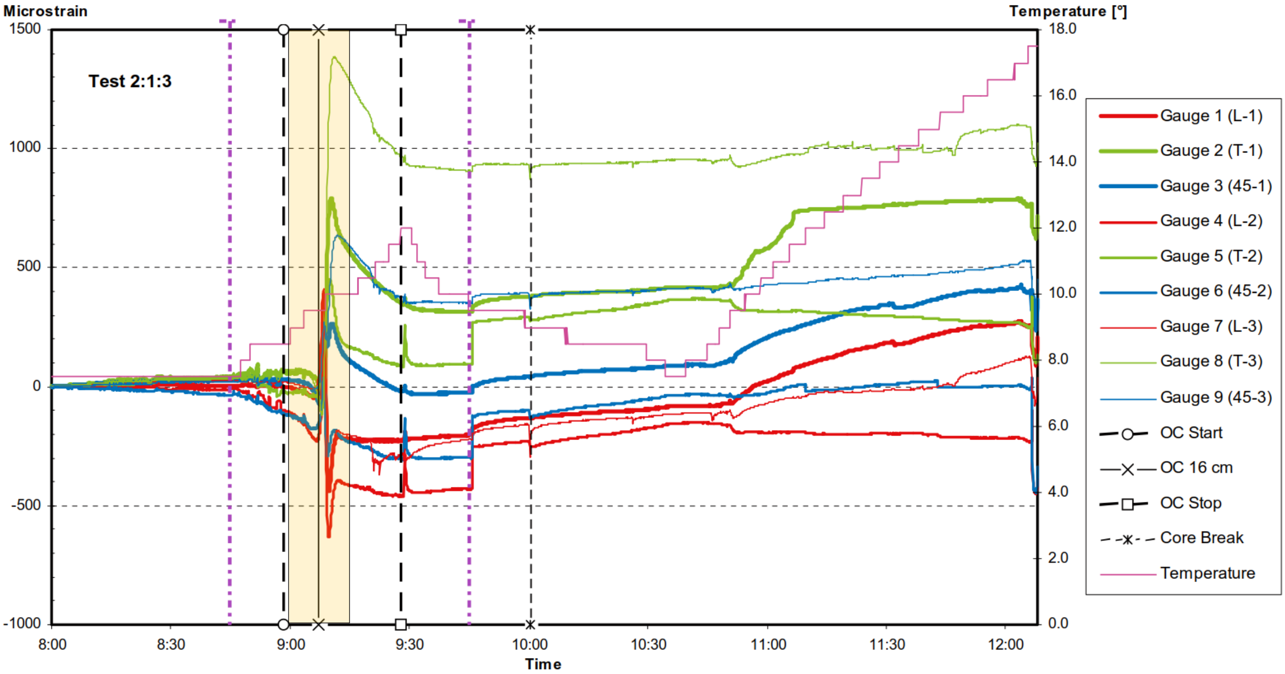
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-73	283	418	-116	245	-33	-78	752	117
@53mm	-96	304	430	-111	224	-53	-84	858	166
@120mm	-90	265	399	-276	115	-153	-93	737	97

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	24.5	10	24	12.8	109	21	-2.4	237	58	21.1	178	10.1	3.8	*13 %*
@53mm	28.7	9	22	13.4	109	24	-1.7	242	57	25.3	0	10.2	4.9	
@120mm	23.7	13	20	9.7	110	19	-7.2	239	62	20.4	4	7.5	-1.7	

KFM07C 2:1:3, depth: 153.93 m

G	7/9	Strains stable before overcoring.
P	2/9	Strains are within the elastic transient strain range (yellow shade)
P	0,0,9	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 28 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in most of the strain gauges, not associated with temperature effects because it is uneven for equally oriented strain gauges. Observed drift in rosette number 2 before the overcoring and shift at flush-off. Non uniform strain response during the core retrieval. The vertical stress is 0.6 times the overburden weight.
P		***Overall strain reliability***



Overcoring record:

Table A-4. Key measurement data for test no. 2:1:3, 158.28 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-04-22	15:30:00
Mixing of glue	2006-04-22	15:58:00
Application of glue to gauges	2006-04-22	16:02:00
Probe installation in pilot hole	2006-04-22	16:15:05
Start time for dense sampling (5 s interval)	2006-04-23	07:00:00
Adapter retrieved	2006-04-23	07:43:40
Adapter on surface	2006-04-23	07:48:40
Drill string fed down the hole	2006-04-23	07:56:30
Drill string in place	2006-04-23	08:25:45
Flushing start	2006-04-23	08:26:05
Rotation start	2006-04-23	08:51:00
Overcoring start	2006-04-23	08:58:20
Overcoring 4 cm	2006-04-23	09:00:15
Overcoring 8 cm	2006-04-23	09:02:35
Overcoring 12 cm	2006-04-23	09:04:55
Overcoring 16 cm	2006-04-23	09:07:10
Overcoring 20 cm	2006-04-23	09:09:30
Overcoring 24 cm	2006-04-23	09:11:15
Overcoring 28 cm	2006-04-23	09:13:55
Overcoring 32 cm	2006-04-23	09:16:10
Overcoring stop (98 cm)	2006-04-23	09:27:45
Flushing off	2006-04-23	09:46:00
Core break	2006-04-23	10:00:20
Core retrieval start	2006-04-23	10:23:15
Core & probe on surface	2006-04-23	10:50:00
End of strain registration	2006-04-23	12:08:20
Calculation of strain difference: OC Start	2006-04-23	08:44:20
Calculation of strain difference: OC Stop	2006-04-23	09:44:45

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	1.8
16 – 32 cm	1.8
32 cm – overcoring stop	5.7

Reinterpretation

Ranking of the strain response per gauge rosette

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

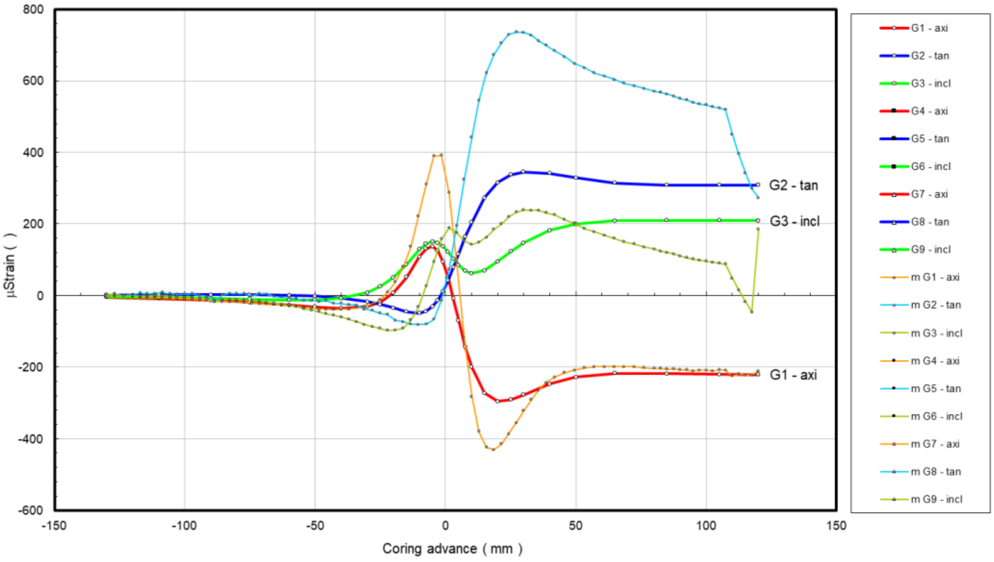
2.7	1.0	**P**

G2,tan

2.1	0.97	**P**

G3,incl

-0.53	0.90	**P**



Rosette 2

G4,axi

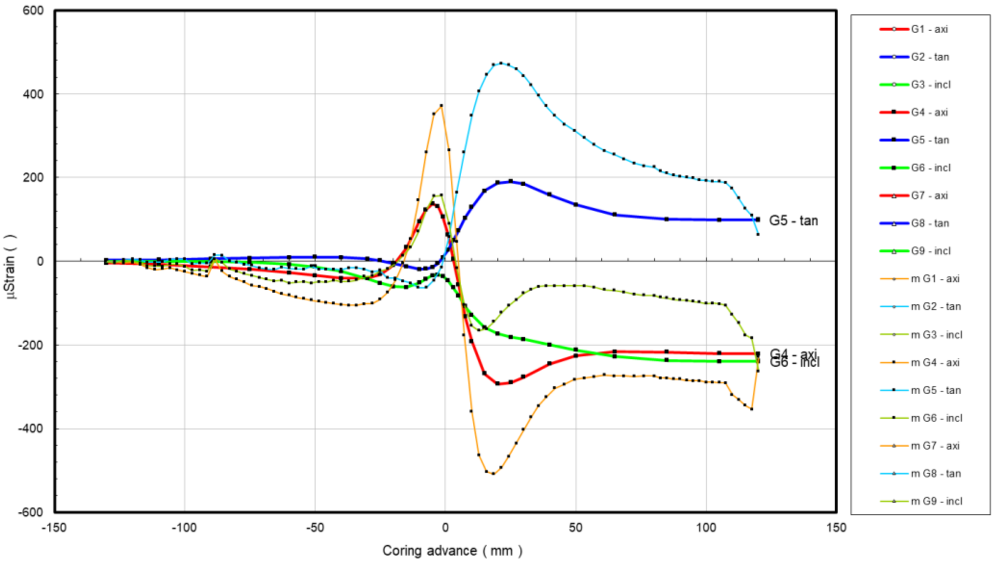
2.5	0.95	**P**

G5,tan

2.5	0.60	**P**

G6,incl

-4.3	1.1	**P**



Rosette 3

G7,axi

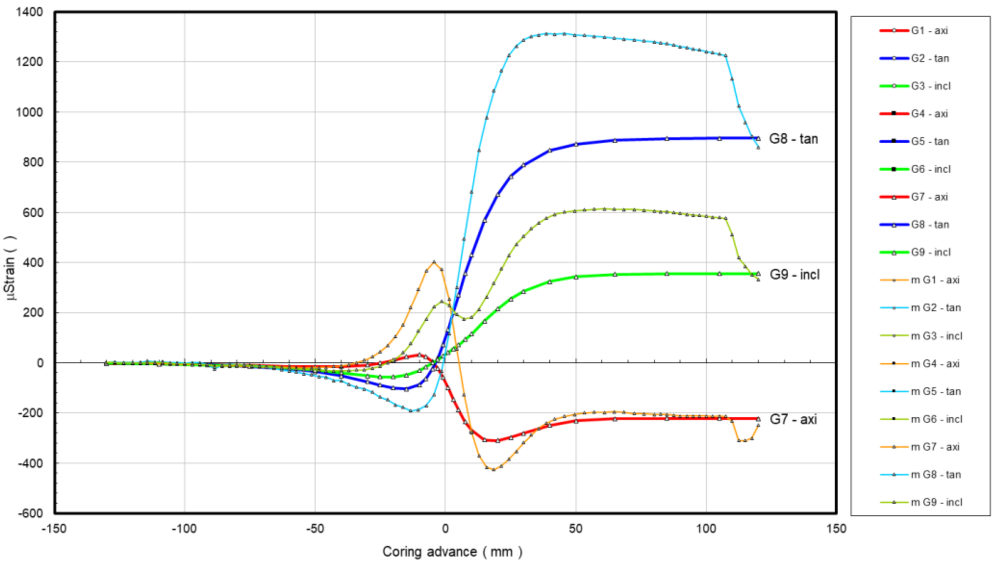
10	1.1	**P**

G8,tan

1.5	0.95	**P**

G9,incl

1.7	0.99	**P**



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

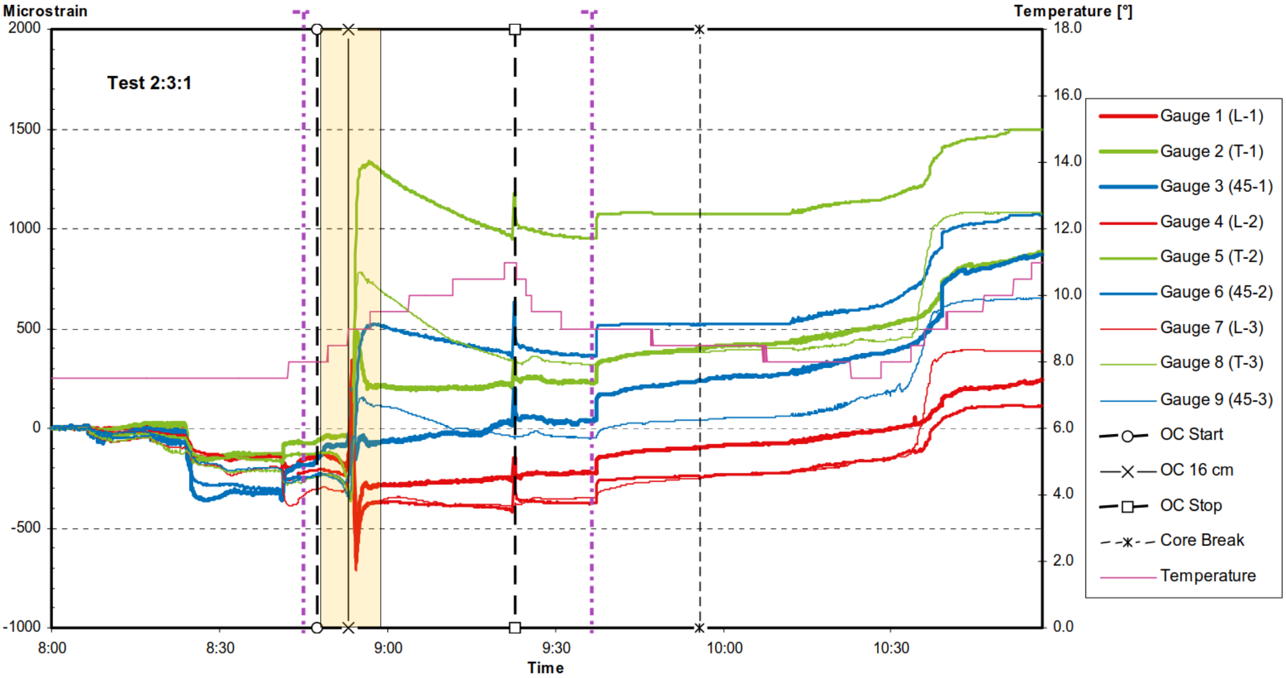
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-210	273	186	-229	63	-263	-248	860	332
@50mm	-209	648	202	-283	312	-59	-207	1307	606
@120mm	-210	273	186	-229	63	-263	-248	860	332

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	22.4	282	4	5.6	14	26	-10.2	184	63	22.2	101	2.5	-6.9	*43 %*
@50mm	40.9	285	2	15.5	15	14	1.5	186	76	40.9	104	14.7	2.3	
@120mm	24.3	282	5	6.9	15	25	-8.8	183	64	24.1	101	4.0	-5.7	

KFM07C 2:3:1, depth: 156.00 m

G	8/9	Strains stable before overcoring.
P	5/9	Strains are within the elastic transient strain range (yellow shade)
P	2,4,3	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,G,M	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 25 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in most of the strain gauges, not associated with temperature effects because it is uneven for equally oriented strain gauges. Flush-off causes permanent shift in rosettes number 2 and 3. The vertical stress is 4.4 times the overburden weight. The vertical stress is 1.6 times the overburden weight.
P		***Overall strain reliability***



Overcoring record:

Table A-5. Key measurement data for test no. 2:3:1, 160.37 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-04-24	17:01:00
Mixing of glue	2006-04-24	17:26:00
Application of glue to gauges	2006-04-24	17:33:00
Probe installation in pilot hole	2006-04-24	17:41:15
Start time for dense sampling (5 s interval)	2006-04-25	07:00:00
Adapter retrieved	2006-04-25	07:34:40
Adapter on surface	2006-04-25	07:37:50
Drill string fed down the hole	2006-04-25	07:50:20
Drill string in place	2006-04-25	08:24:00
Flushing start	2006-04-25	08:25:15
Rotation start	2006-04-25	08:46:20
Overcoring start	2006-04-25	08:47:30
Overcoring 4 cm	2006-04-25	08:49:10
Overcoring 8 cm	2006-04-25	08:50:30
Overcoring 12 cm	2006-04-25	08:51:10
Overcoring 16 cm	2006-04-25	08:53:05
Overcoring 20 cm	2006-04-25	08:54:25
Overcoring 24 cm	2006-04-25	08:55:55
Overcoring 28 cm	2006-04-25	08:57:15
Overcoring 32 cm	2006-04-25	08:58:45
Overcoring stop (100 cm)	2006-04-25	09:22:50
Flushing off	2006-04-25	09:37:25
Core break	2006-04-25	09:55:50
Core retrieval start	2006-04-25	10:12:15
Core & probe on surface	2006-04-25	10:40:00
End of strain registration	2006-04-25	10:58:50
Calculation of strain difference: OC Start	2006-04-25	08:45:30
Calculation of strain difference: OC Stop	2006-04-25	09:35:50

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.9
16 – 32 cm	2.8
32 cm – overcoring stop	2.8

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

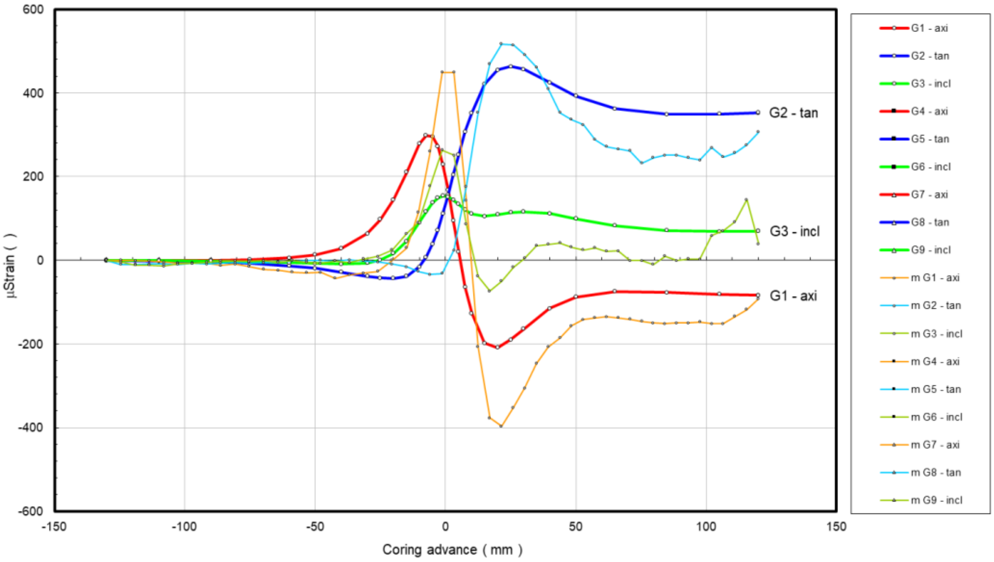
2.0	1.0	**M**

G2,tan

1.1	0.79	**M**

G3,incl

1.7	0.50	**P**



Rosette 2

G4,axi

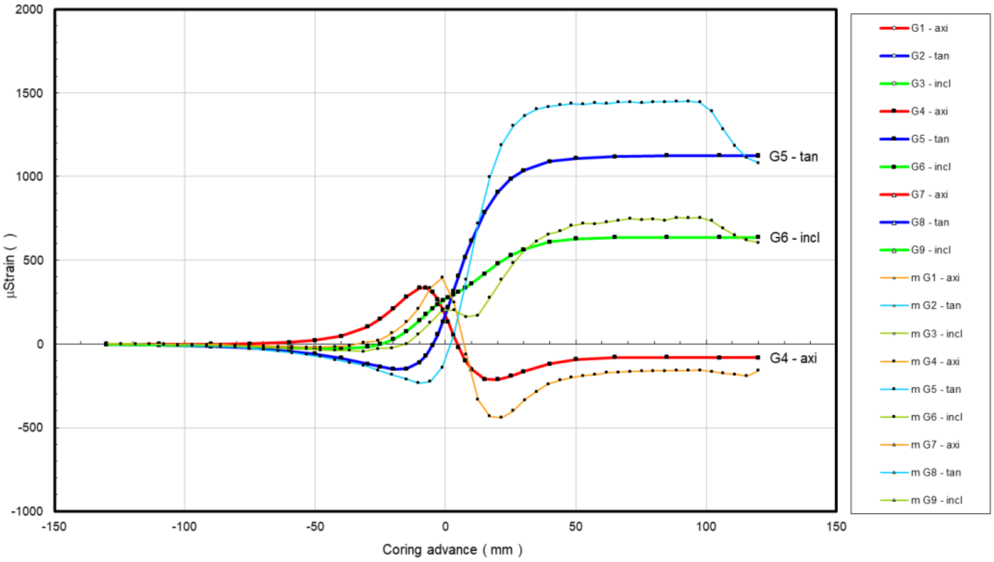
2.0	2.3	**G**

G5,tan

1.4	0.96	**M**

G6,incl

1.1	0.97	**G**



Rosette 3

G7,axi

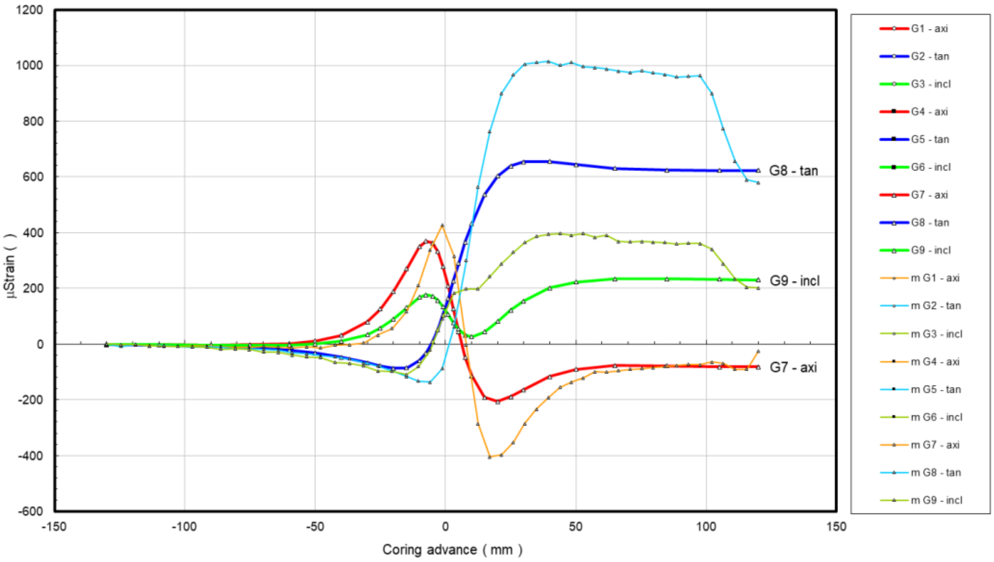
2.0	0.30	**M**

G8,tan

1.7	0.94	**P**

G9,incl

1.7	0.88	**P**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

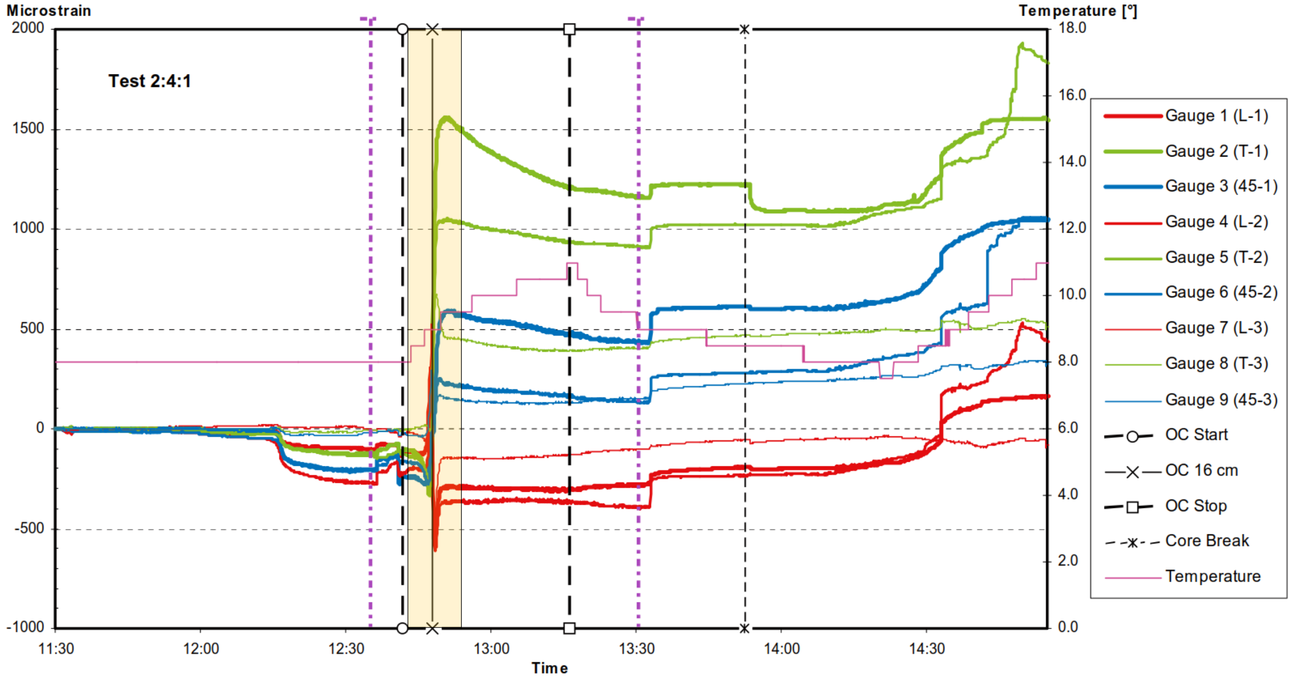
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-92	306	39	-160	1081	606	-24	580	201
@53mm	-142	324	25	-190	1431	720	-121	996	397
@120mm	-92	306	39	-160	1081	606	-24	580	201

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	27.9	139	1	13.0	49	9	6.8	233	81	27.9	139	12.9	7.0	*37 %*
@53mm	40.6	327	4	18.2	58	8	9.6	211	81	40.5	147	18.0	9.9	
@120mm	29.6	139	0	14.6	49	7	8.2	230	83	29.6	139	14.5	8.3	

KFM07C 2:4:1, depth: 158.31 m

G	9/9	Strains stable before overcoring.
G	8/9	Strains are within the elastic transient strain range (yellow shade)
M	2,7,0	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,M,P	Stability of inverse stress solution after passing gauges section over 54 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 54 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 34 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Moderate/small drift in most of the strain gauges, not associated with temperature effects because it is uneven for equally oriented strain gauges. Flush-off causes permanent shift in rosettes number 2 and 3. The vertical stress is 4.4 times the overburden weight.
P		***Overall strain reliability***



Overcoring record:

Table A-6. Key measurement data for test no. 2:4:1, 162.69 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-04-26	15:40:00
Mixing of glue	2006-04-26	00:00:00
Application of glue to gauges	2006-04-26	00:00:00
Probe installation in pilot hole	2006-04-26	16:06:30
Start time for dense sampling (5 s interval)	2006-04-27	07:00:00
Adapter retrieved	2006-04-27	07:41:40
Adapter on surface	2006-04-27	07:44:00
Drill string fed down the hole	2006-04-27	08:42:00
Drill string in place	2006-04-27	09:30:15
Flushing start	2006-04-27	12:25:00
Rotation start	2006-04-27	12:41:30
Overcoring start	2006-04-27	12:41:50
Overcoring 4 cm	2006-04-27	12:43:40
Overcoring 8 cm	2006-04-27	12:45:20
Overcoring 12 cm	2006-04-27	12:46:55
Overcoring 16 cm	2006-04-27	12:47:50
Overcoring 20 cm	2006-04-27	12:49:05
Overcoring 24 cm	2006-04-27	12:50:30
Overcoring 28 cm	2006-04-27	12:51:50
Overcoring 32 cm	2006-04-27	12:53:10
Overcoring stop (100 cm)	2006-04-27	13:16:15
Flushing off	2006-04-27	13:32:00
Core break	2006-04-27	13:52:30
Core retrieval start	2006-04-27	14:12:00
Core & probe on surface	2006-04-27	14:30:30
End of strain registration	2006-04-27	14:55:25
Calculation of strain difference: OC Start	2006-04-27	12:34:50
Calculation of strain difference: OC Stop	2006-04-27	13:31:15

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.7
16 – 32 cm	3.0
32 cm – overcoring stop	2.9

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

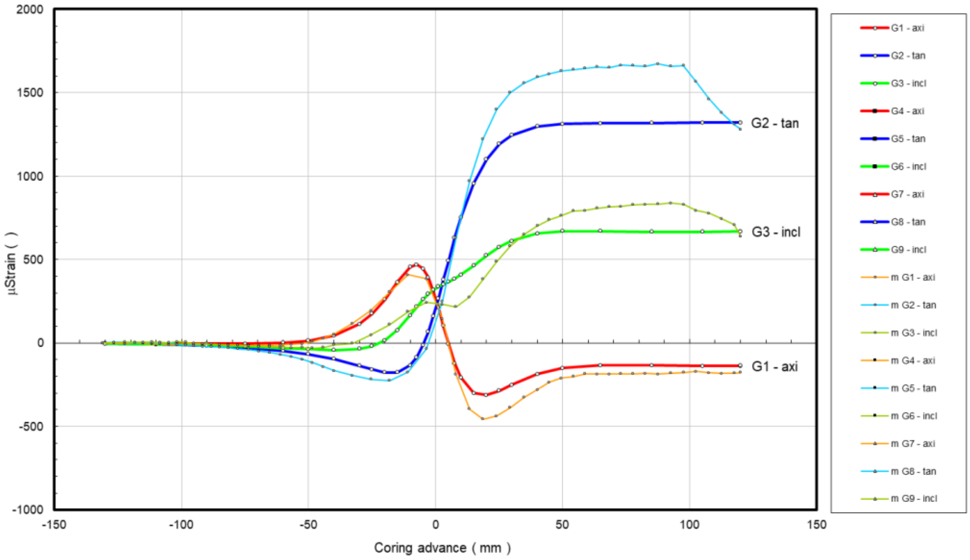
1.5	1.3	**G**

G2,tan

1.3	0.99	**M**

G3,incl

1.2	0.95	**G**



Rosette 2

G4,axi

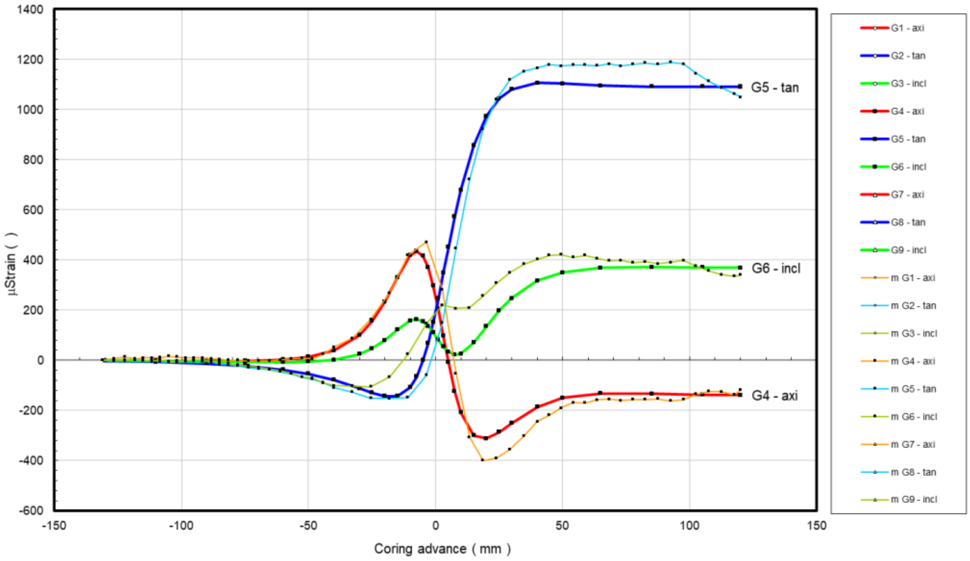
1.3	0.95	**G**

G5,tan

1.1	0.97	**G**

G6,incl

-	0.91	**M**



Rosette 3

G7,axi

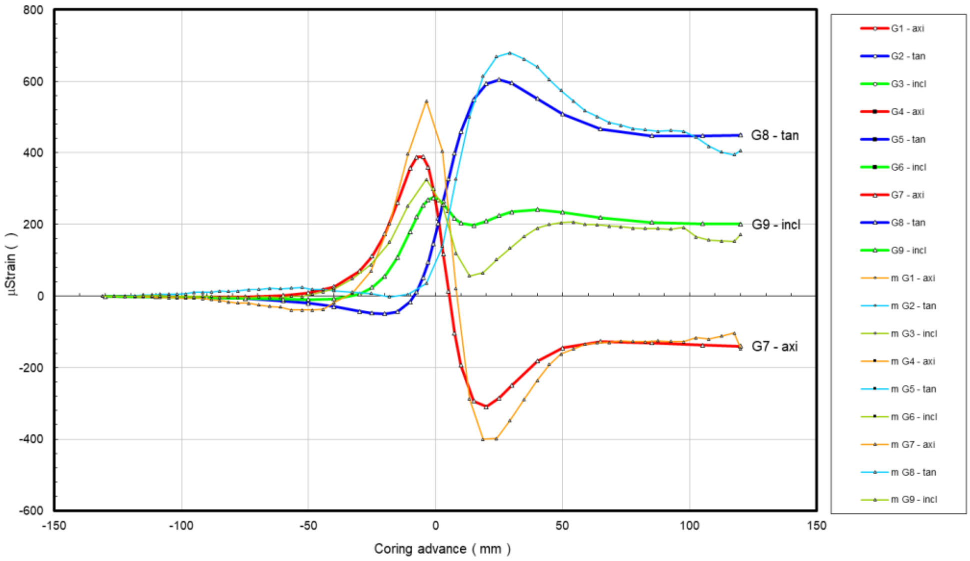
1.5	1.0	**G**

G8,tan

1.1	0.88	**G**

G9,incl

1.2	0.85	**G**



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

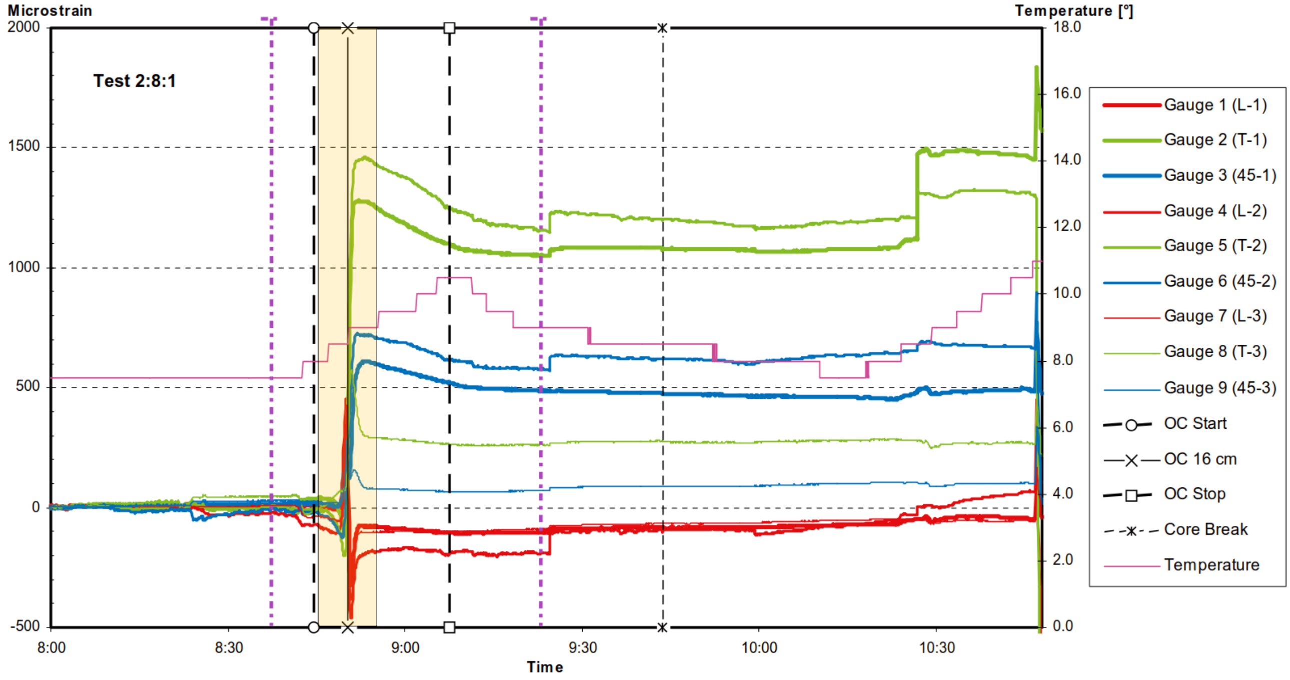
Depth	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-176	1279	638	-119	1050	341	-148	407	173
@54mm	-201	1638	791	-169	1177	410	-148	545	207
@120mm	-176	1279	638	-119	1050	341	-148	407	173

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	39.6	215	2	21.3	305	11	8.5	117	79	39.6	35	20.8	9.0	*18 %*
@54mm	50.3	29	1	26.3	299	9	12.2	129	81	50.3	30	26.0	12.5	
@120mm	41.3	215	1	22.9	305	12	9.6	119	78	41.3	34	22.3	10.2	

KFM07C 2:8:1, depth: 170.15 m

M	7/9	Strains stable before overcoring.
M	5/9	Strains are within the elastic transient strain range (yellow shade)
M	5,3,1	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,G,G	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 30 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in most of the strain gauges, not associated with the temperature because it is uneven for equally oriented strain gauges. Flush off induces a shift in the strains in rosette number 2.
P/M		***Overall strain reliability***



Overcoring record:

Table A-7. Key measurement data for test no. 2:8:1, 174.60 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-06	17:00:00
Mixing of glue	2006-05-06	17:15:00
Application of glue to gauges	2006-05-06	17:20:00
Probe installation in pilot hole	2006-05-06	17:28:00
Start time for dense sampling (5 s interval)	2006-05-07	07:00:00
Adapter retrieved	2006-05-07	07:37:50
Adapter on surface	2006-05-07	07:41:50
Drill string fed down the hole	2006-05-07	07:52:45
Drill string in place	2006-05-07	08:23:00
Flushing start	2006-05-07	08:23:30
Rotation start	2006-05-07	08:44:15
Overcoring start	2006-05-07	08:44:35
Overcoring 4 cm	2006-05-07	08:46:20
Overcoring 8 cm	2006-05-07	08:47:40
Overcoring 12 cm	2006-05-07	08:49:00
Overcoring 16 cm	2006-05-07	08:50:20
Overcoring 20 cm	2006-05-07	08:51:40
Overcoring 24 cm	2006-05-07	08:53:00
Overcoring 28 cm	2006-05-07	08:54:20
Overcoring 32 cm	2006-05-07	08:55:45
Overcoring stop (100 cm)	2006-05-07	09:07:35
Flushing off	2006-05-07	09:24:40
Core break	2006-05-07	09:43:45
Core retrieval start	2006-05-07	09:58:45
Core & probe on surface	2006-05-07	10:26:00
End of strain registration	2006-05-07	10:48:15
Calculation of strain difference: OC Start	2006-05-07	08:38:15
Calculation of strain difference: OC Stop	2006-05-07	09:23:35

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.0
32 cm – overcoring stop	5.7

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

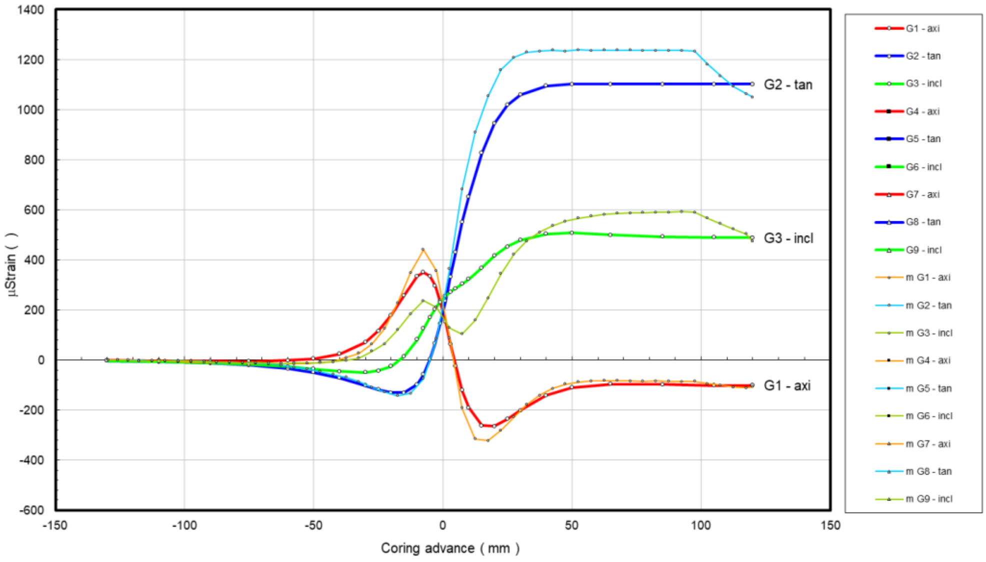
1.2	1.1	G

G2,tan

1.1	0.96	G

G3,incl

1.2	1.0	M



Rosette 2

G4,axi

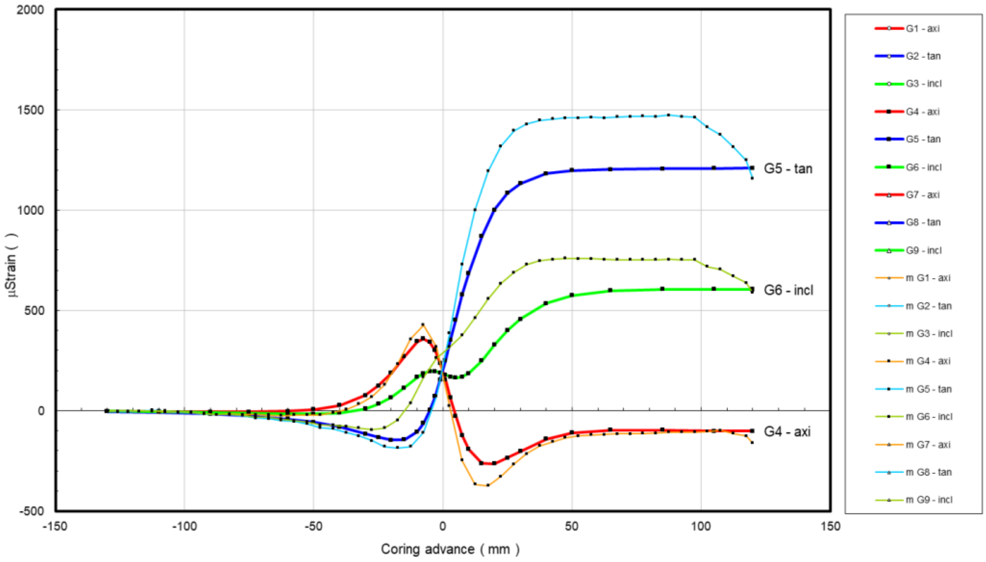
1.4	1.6	G

G5,tan

1.3	0.93	M

G6,incl

1.2	0.95	M



Rosette 3

G7,axi

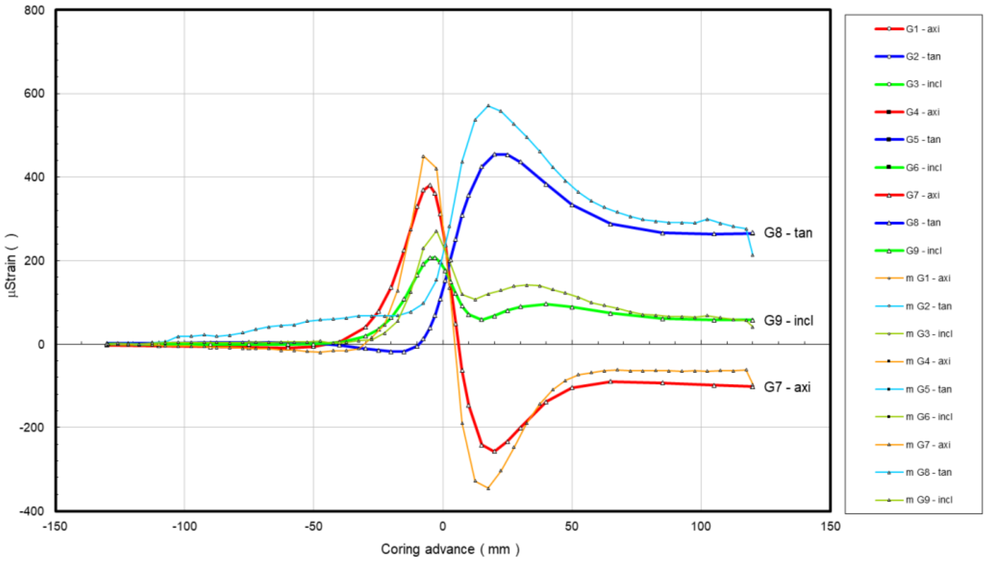
1.4	1.0	G

G8,tan

1.3	0.75	P

G9,incl

1.5	0.75	G



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

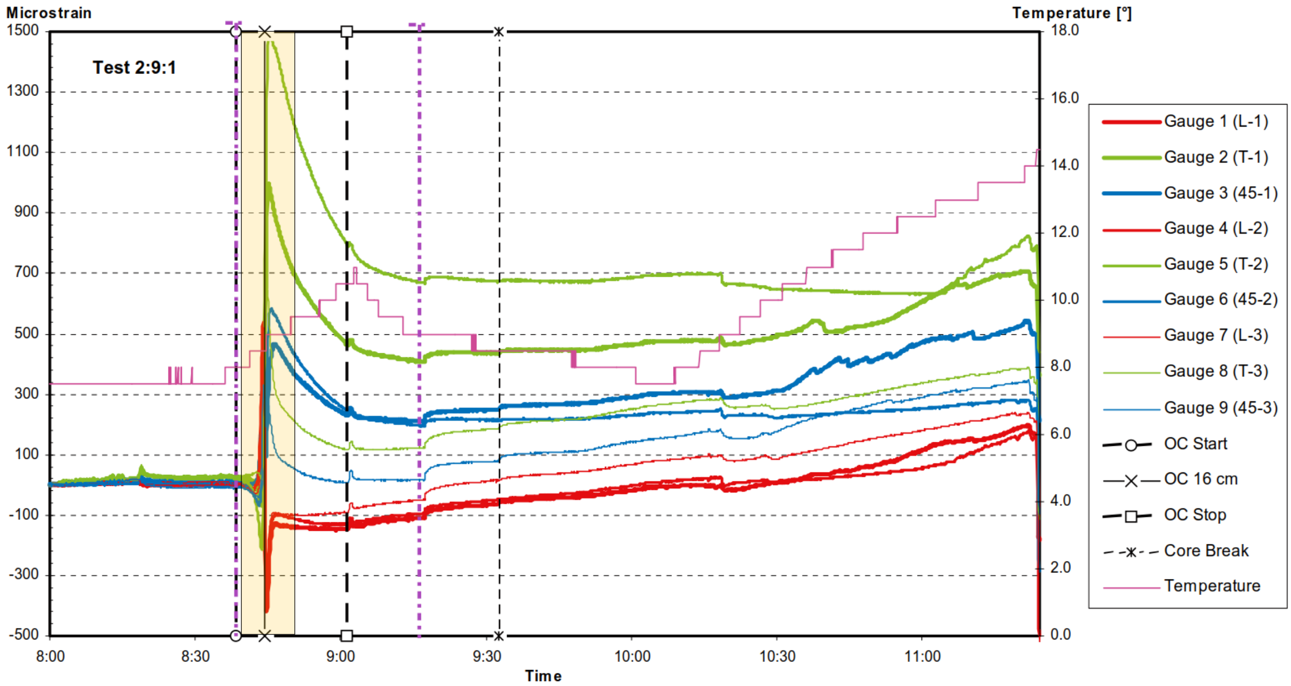
Depth	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-108	1050	473	-162	1157	589	-97	213	41
@53mm	-88	1239	567	-126	1459	758	-73	364	112
@120mm	-108	1050	473	-162	1157	589	-97	213	41

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	38.5	355	8	17.4	85	1	5.1	185	82	37.9	175	17.4	5.7	*23 %*
@53mm	49.8	358	9	23.7	268	1	11.2	172	81	49.0	178	23.7	12.1	
@120mm	40.4	355	7	19.0	265	0	6.3	172	83	39.9	175	19.0	6.8	

KFM07C 2:9:1, depth: 171.17 m

G	9/9	Strains stable before overcoring.
P	3/9	Strains are within the elastic transient strain range (yellow shade)
P	0,0,9	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 54 mm for s1, s2 and s3 magnitudes
G	G,G,P	Stability of inverse stress solution after passing gauges section over 54 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 24 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Very high drift in most of strain gauges, not associated with the temperature because it is uneven for equally oriented strain gauges. The vertical stress is 1.8 times the overburden weight.
P		***Overall strain reliability***



Overcoring record:

Table A-8. Key measurement data for test no. 2:9:1, 175.62 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-07	16:45:00
Mixing of glue	2006-05-07	16:56:00
Application of glue to gauges	2006-05-07	17:01:00
Probe installation in pilot hole	2006-05-07	17:11:00
Start time for dense sampling (5 s interval)	2006-05-08	07:00:00
Adapter retrieved	2006-05-08	07:35:10
Adapter on surface	2006-05-08	07:39:40
Drill string fed down the hole	2006-05-08	07:43:55
Drill string in place	2006-05-08	08:15:05
Flushing start	2006-05-08	08:18:00
Rotation start	2006-05-08	08:38:05
Overcoring start	2006-05-08	08:38:30
Overcoring 4 cm	2006-05-08	08:40:10
Overcoring 8 cm	2006-05-08	08:41:35
Overcoring 12 cm	2006-05-08	08:42:55
Overcoring 16 cm	2006-05-08	08:44:15
Overcoring 20 cm	2006-05-08	08:45:35
Overcoring 24 cm	2006-05-08	08:46:55
Overcoring 28 cm	2006-05-08	08:48:15
Overcoring 32 cm	2006-05-08	08:49:35
Overcoring stop (101 cm)	2006-05-08	09:01:25
Flushing off	2006-05-08	09:17:45
Core break	2006-05-08	09:32:40
Core retrieval start	2006-05-08	09:49:35
Core & probe on surface	2006-05-08	10:16:40
End of strain registration	2006-05-08	11:24:15
Calculation of strain difference: OC Start	2006-05-08	08:38:30
Calculation of strain difference: OC Stop	2006-05-08	09:16:25

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.0
32 cm – overcoring stop	5.8

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

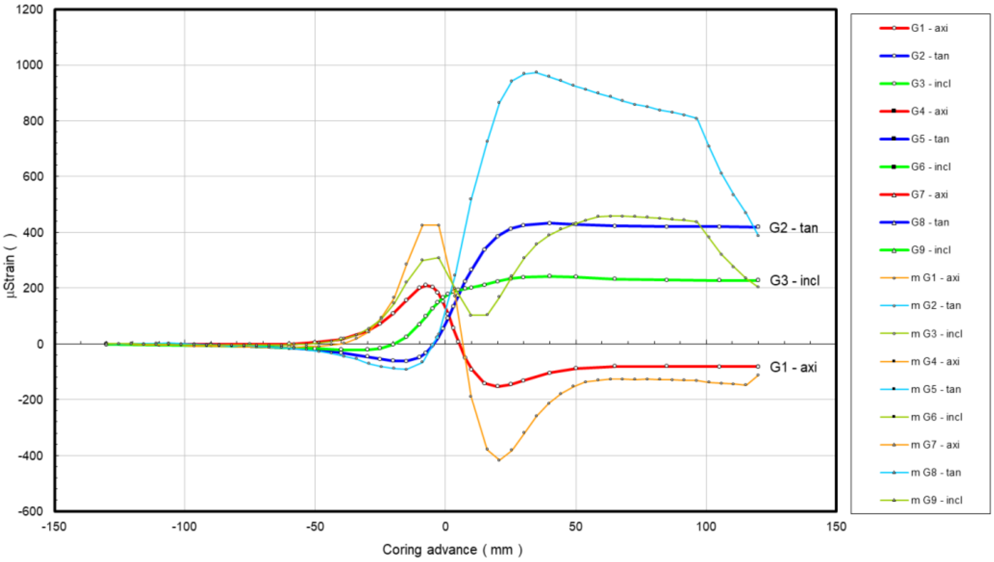
2.8	0.80	**P**

G2,tan

2.3	0.95	**P**

G3,incl

1.9	0.95	**P**



Rosette 2

G4,axi

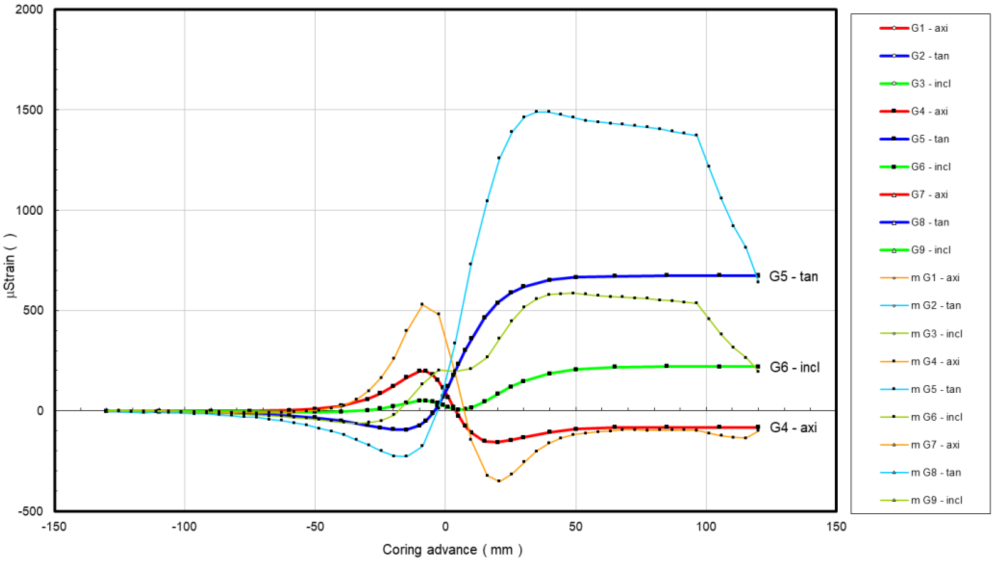
2.7	1.0	**P**

G5,tan

2.4	0.96	**P**

G6,incl

2.6	0.95	**P**



Rosette 3

G7,axi

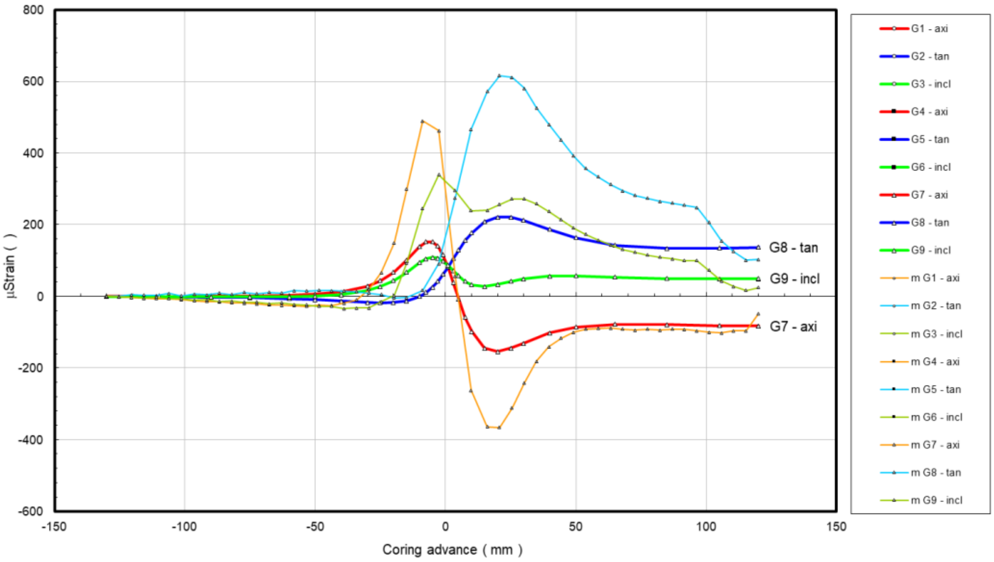
2.3	0.60	**P**

G8,tan

2.8	0.75	**P**

G9,incl

3.3	0.35	**P**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

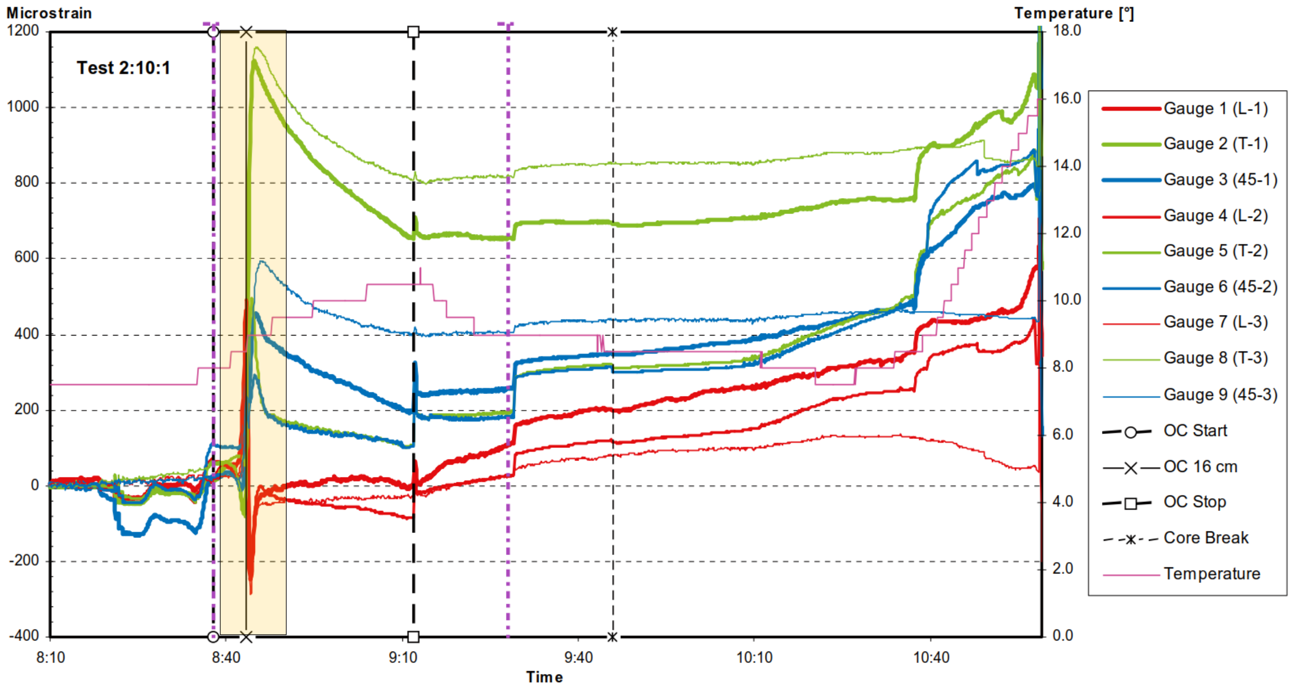
original	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-71	387	203	-59	641	195	-8	143	24
@54mm	-137	912	443	-111	1446	580	-92	357	173
@120mm	-111	387	203	-99	641	195	-48	103	24

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	23.5	176	2	8.8	266	3	4.1	57	87	23.5	176	8.7	4.1	*87 %*
@54mm	57.2	357	2	26.0	266	18	20.8	93	72	57.1	177	25.5	21.4	
@120mm	25.3	176	2	10.4	266	4	5.6	66	85	25.3	176	10.3	5.6	

KFM07C 2:10:1, depth: 172.19 m

M	7/9	Strains stable before overcoring.
P	2/9	Strains are within the elastic transient strain range (yellow shade)
P	0,3,6	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 51 mm for s1, s2 and s3 magnitudes
G	G,M,M	Stability of inverse stress solution after passing gauges section over 51 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
M		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 20 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Very high drift in most of the strain gauges, not associated with the temperature because it is uneven for equally oriented strain gauges. The vertical stress is two times the overburden weight. The intermediate and minimum principal stresses moderately rotate around the maximum principal stress although the magnitudes differ.
P		***Overall strain reliability***



Overcoring record:

Table A-9. Key measurement data for test no. 2:10:1, 176.65 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-08	17:10:00
Mixing of glue	2006-05-08	17:26:00
Application of glue to gauges	2006-05-08	17:35:00
Probe installation in pilot hole	2006-05-08	17:50:50
Start time for dense sampling (5 s interval)	2006-05-09	07:00:00
Adapter retrieved	2006-05-09	07:37:50
Adapter on surface	2006-05-09	07:40:20
Drill string fed down the hole	2006-05-09	07:46:10
Drill string in place	2006-05-09	08:35:00
Flushing start	2006-05-09	08:17:40
Rotation start	2006-05-09	08:37:30
Overcoring start	2006-05-09	08:37:50
Overcoring 4 cm	2006-05-09	08:39:15
Overcoring 8 cm	2006-05-09	08:40:40
Overcoring 12 cm	2006-05-09	08:42:00
Overcoring 16 cm	2006-05-09	08:43:20
Overcoring 20 cm	2006-05-09	08:44:40
Overcoring 24 cm	2006-05-09	08:45:55
Overcoring 28 cm	2006-05-09	08:47:15
Overcoring 32 cm	2006-05-09	08:48:40
Overcoring stop (99 cm)	2006-05-09	09:11:50
Flushing off	2006-05-09	09:29:15
Core break	2006-05-09	09:45:45
Core retrieval start	2006-05-09	10:08:05
Core & probe on surface	2006-05-09	10:40:00
End of strain registration	2006-05-09	10:40:00
Calculation of strain difference: OC Start	2006-05-09	08:37:50
Calculation of strain difference: OC Stop	2006-05-09	09:28:50

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.9
16 – 32 cm	3.0
32 cm – overcoring stop	2.9

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

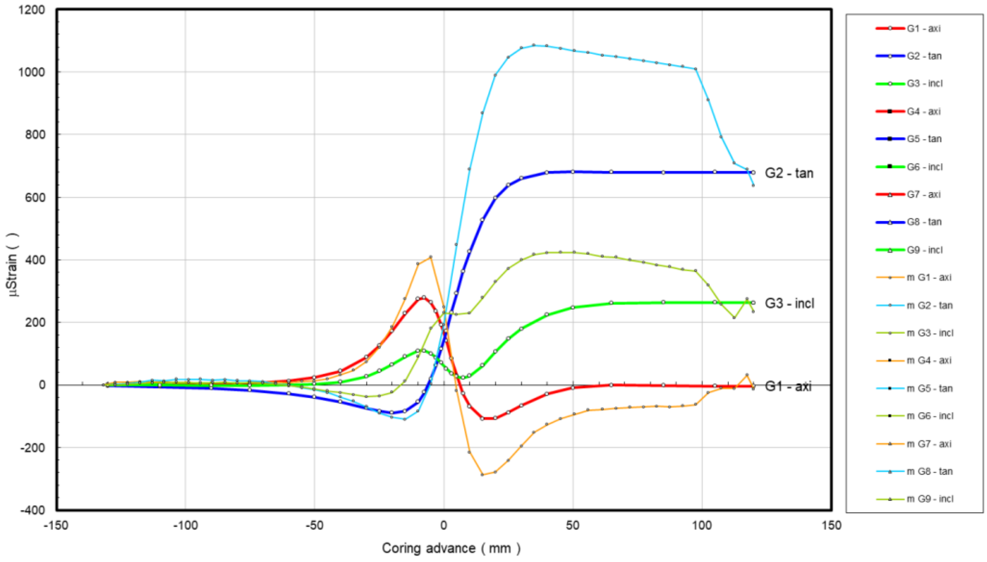
2.7	1.0	**M**

G2,tan

1.6	0.94	**P**

G3,incl

2.0	0.92	**P**



Rosette 2

G4,axi

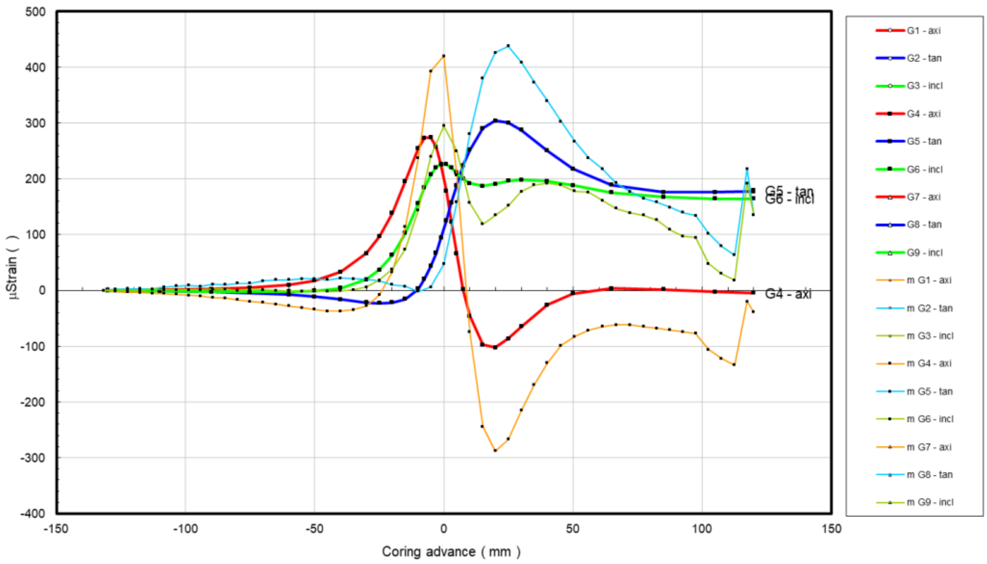
2.8	-	**P**

G5,tan

1.4	0.90	**P**

G6,incl

1.3	0.85	**P**



Rosette 3

G7,axi

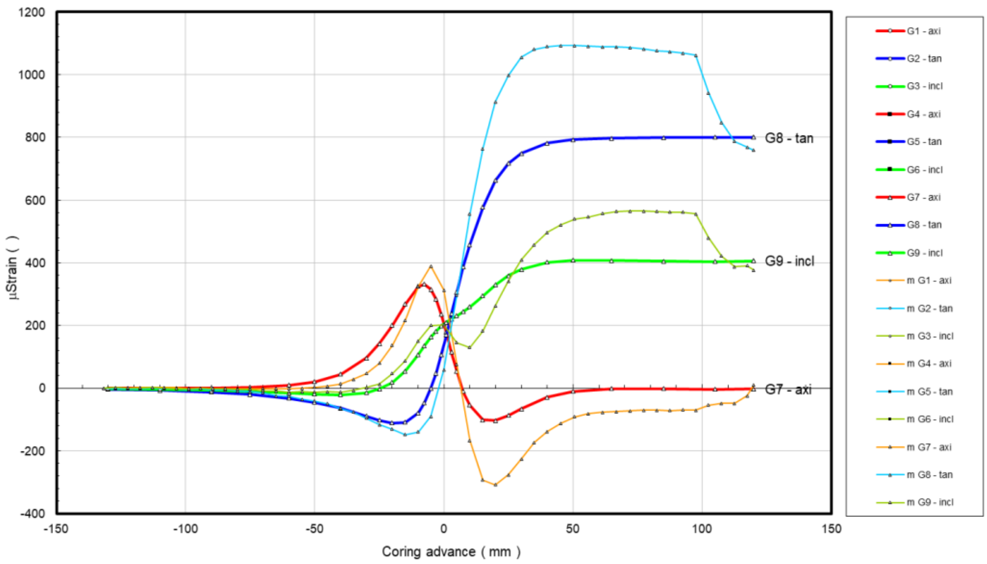
3.0	-	**P**

G8,tan

1.4	0.96	**M**

G9,incl

1.4	0.97	**M**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

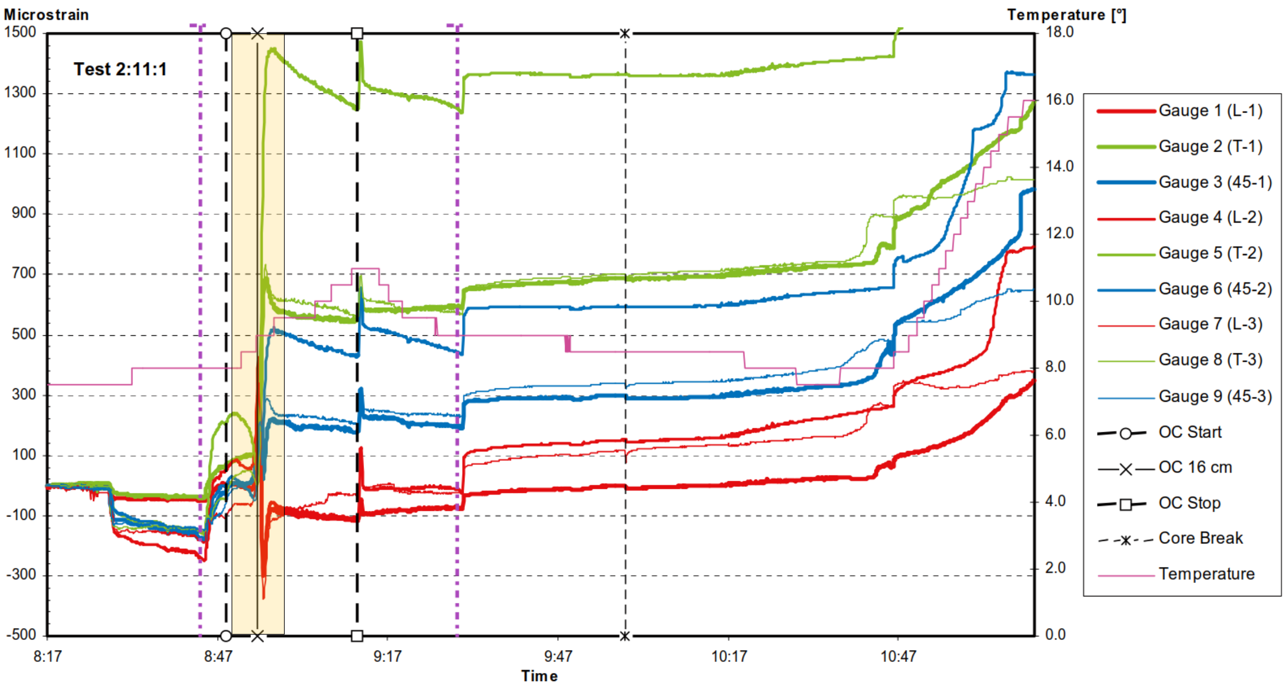
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-14	637	234	-39	135	135	11	759	376
@51mm	-93	1068	424	-83	267	178	-91	1093	540
@120mm	-14	637	234	-39	135	135	11	759	376

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	26.3	51	5	13.1	143	25	8.3	310	65	26.1	50	12.3	9.3	*47 %*
@51mm	42.3	55	3	20.4	145	8	11.9	303	81	42.2	54	20.2	12.1	
@120mm	28.2	51	5	14.9	143	25	9.8	310	65	28.1	50	14.0	10.8	

KFM07C 2:11:1, depth: 173.18 m

M	6/9	Strains stable before overcoring.
M	6/9	Strains are within the elastic transient strain range (yellow shade)
M	1,3,5	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,G,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,G,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 15 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Moderate to high drift of the strain gauges 5,6 and 8 lasting over the elastic transient strain range. Noteworthy is the instability of the strain gauge number 5. Both strain picking times are questionable. The vertical stress is 2.6 times the overburden weight. The flush-off has higher impact in rosette number 2,
M/P		***Overall strain reliability***



Overcoring record:

Table A-10. Key measurement data for test no. 2:11:1, 177.65 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-09	17:30:00
Mixing of glue	2006-05-09	17:54:00
Application of glue to gauges	2006-05-09	17:58:00
Probe installation in pilot hole	2006-05-09	18:06:00
Start time for dense sampling (5 s interval)	2006-05-10	07:00:00
Adapter retrieved	2006-05-10	07:44:30
Adapter on surface	2006-05-10	07:47:45
Drill string fed down the hole	2006-05-10	07:55:55
Drill string in place	2006-05-10	08:45:05
Flushing start	2006-05-10	08:27:15
Rotation start	2006-05-10	08:45:30
Overcoring start	2006-05-10	08:48:30
Overcoring 4 cm	2006-05-10	08:50:00
Overcoring 8 cm	2006-05-10	08:51:20
Overcoring 12 cm	2006-05-10	08:52:45
Overcoring 16 cm	2006-05-10	08:54:10
Overcoring 20 cm	2006-05-10	08:55:30
Overcoring 24 cm	2006-05-10	08:56:50
Overcoring 28 cm	2006-05-10	08:58:05
Overcoring 32 cm	2006-05-10	08:59:30
Overcoring stop (100 cm)	2006-05-10	09:11:40
Flushing off	2006-05-10	09:30:20
Core break	2006-05-10	09:58:55
Core retrieval start	2006-05-10	10:15:40
Core & probe on surface	2006-05-10	10:45:00
End of strain registration	2006-05-10	11:12:00
Calculation of strain difference: OC Start	2006-05-10	08:42:30
Calculation of strain difference: OC Stop	2006-05-10	09:29:40

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.0
32 cm – overcoring stop	5.6

Reinterpretation

Ranking of the strain response per gauge rosette

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

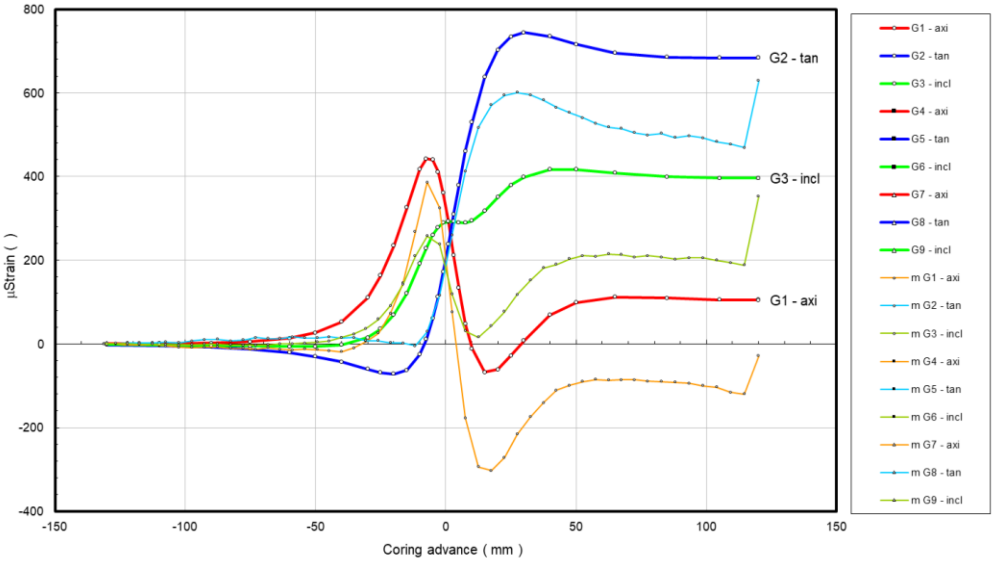
3.7	-0.36	P

G2,tan

0.85	0.92	P

G3,incl

0.07	0.87	P



Rosette 2

G4,axi

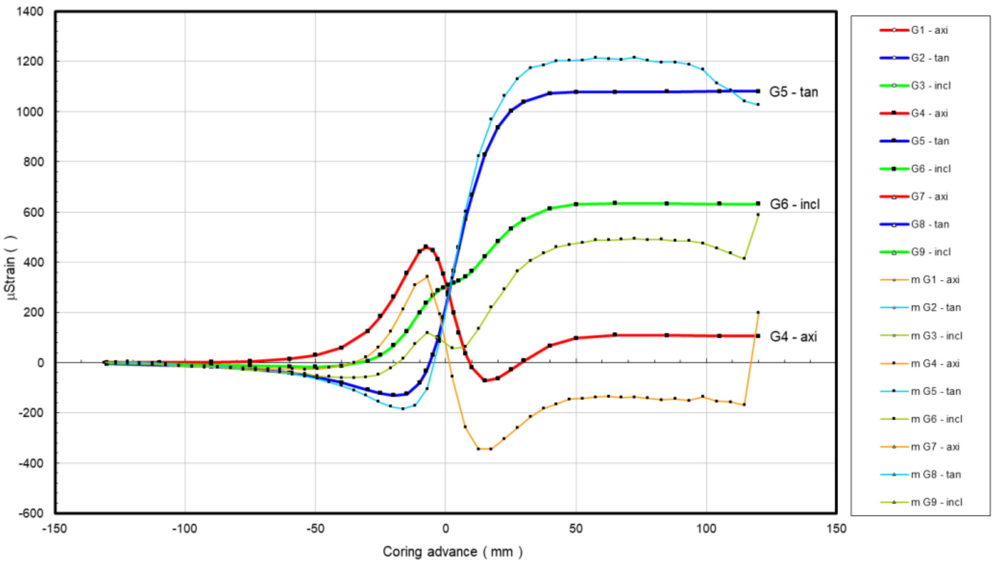
4.5	1.8	P

G5,tan

1.1	0.96	G

G6,incl

0.75	0.93	M



Rosette 3

G7,axi

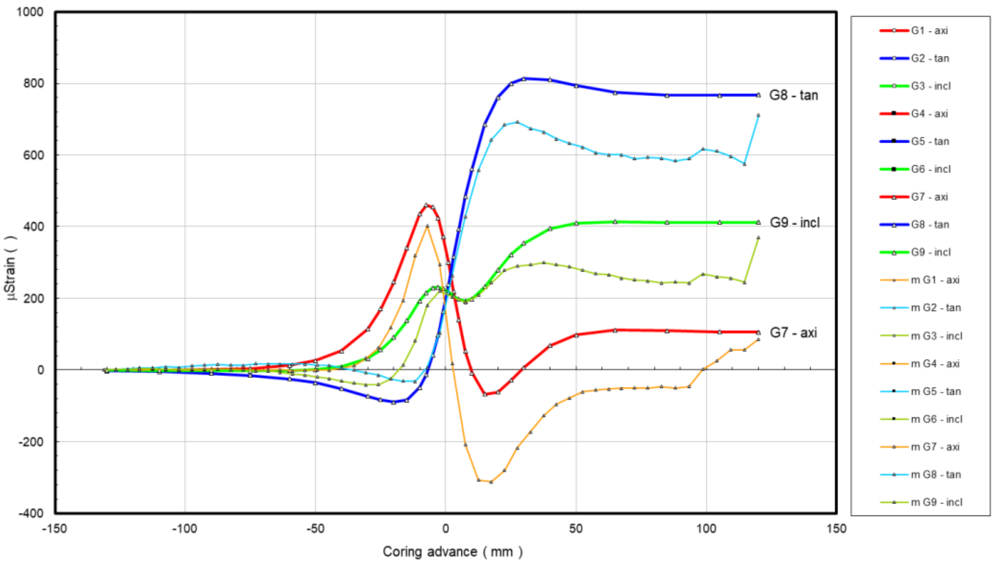
3.8	0.90	P

G8,tan

0.78	0.94	M

G9,incl

0.58	0.90	M



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

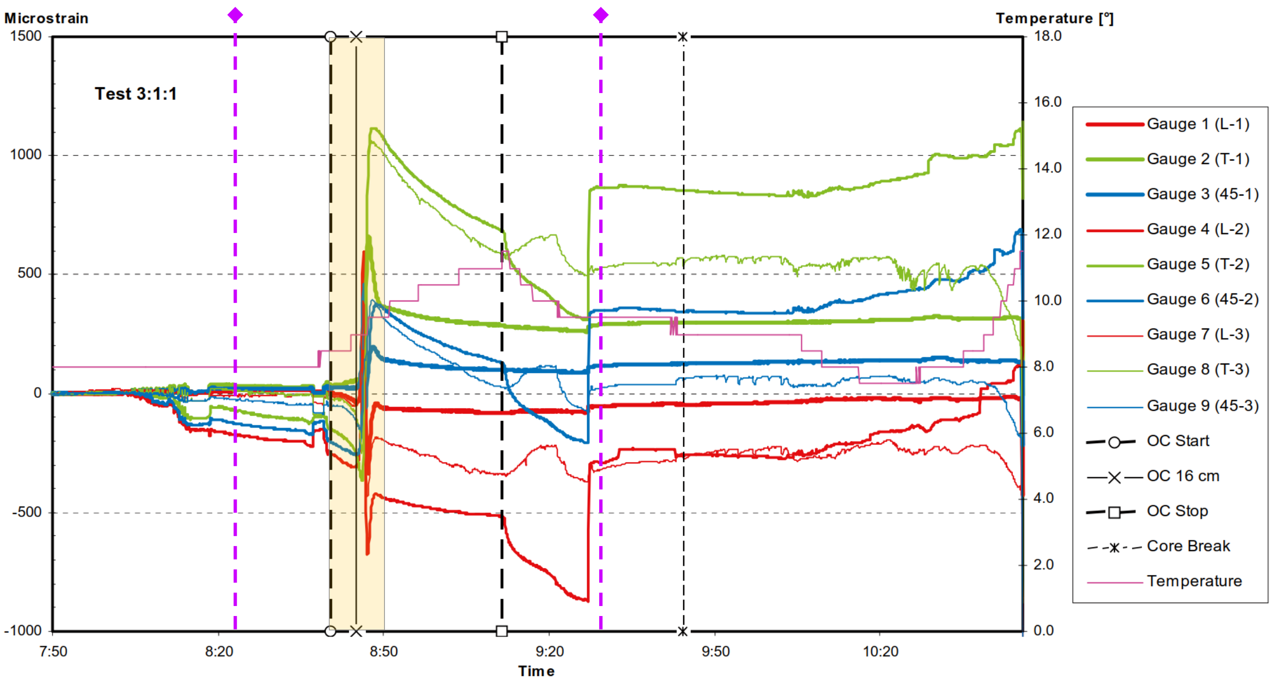
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-29	629	353	200	1026	589	86	712	370
@53mm	-90	540	211	-143	1205	478	-61	622	279
@120mm	-29	629	353	200	1026	589	86	712	370

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	26.8	270	6	19.7	1	7	12.2	141	80	28.5	90	19.6	12.5	*32 %*
@53mm	30.4	89	1	16.9	359	3	2.6	192	87	30.4	89	16.9	2.7	
@120mm	28.7	271	6	21.5	1	8	13.7	145	80	25.2	89	15.3	2.1	

KFM07C 3:1:1, depth: 187.92 m

P	5/9	Strains stable before overcoring.
P	3/9	Strains are within the elastic transient strain range (yellow shade)
P	0,0,9	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,M	Stability of inverse stress solution after passing gauges section over 61 mm for s1, s2 and s3 magnitudes
P	P,P,P	Stability of inverse stress solution after passing gauges section over 61 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 27 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in most of the strain gauges and gauge number 7 after elastic range, not associated with temperature because it is uneven for equally oriented gauges. Flush off induces high unrecoverable strains for strain rosette number 2. Time for final strain pick highly questionable. Solution strain picking time extremely weird.
P		***Overall strain reliability***



Overcoring record:

Flushing start	2006-05-13	08:18:00
Rotation start	2006-05-13	08:40:05
Overcoring start	2006-05-13	08:40:25
Overcoring 4 cm	2006-05-13	08:42:05
Overcoring 8 cm	2006-05-13	08:43:25
Overcoring 12 cm	2006-05-13	08:44:45
Overcoring 16 cm	2006-05-13	08:45:05
Overcoring 20 cm	2006-05-13	08:46:25
Overcoring 24 cm	2006-05-13	08:47:45
Overcoring 28 cm	2006-05-13	08:48:10
Overcoring 32 cm	2006-05-13	08:51:40
Overcoring stop (90 cm)	2006-05-13	09:11:20
Flushing off	2006-05-13	09:27:00
Core break	2006-05-13	09:44:10
Core retrieval start	2006-05-13	10:03:10
Core & probe on surface	2006-05-13	10:29:00
End of strain registration	2006-05-13	10:45:55
Calculation of strain difference: OC Start	2006-05-13	08:23:30
Calculation of strain difference: OC Stop	2006-05-13	09:29:40

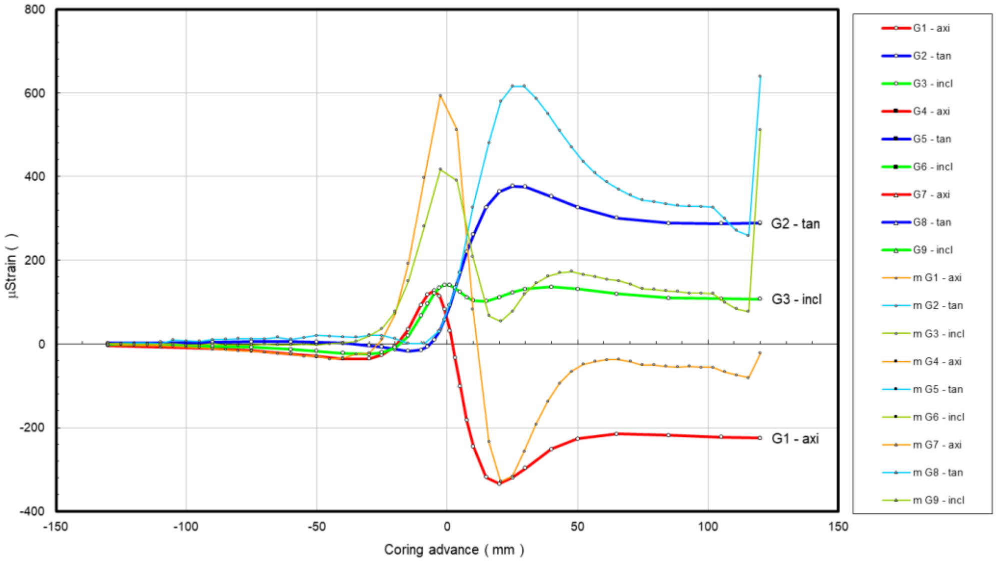
Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

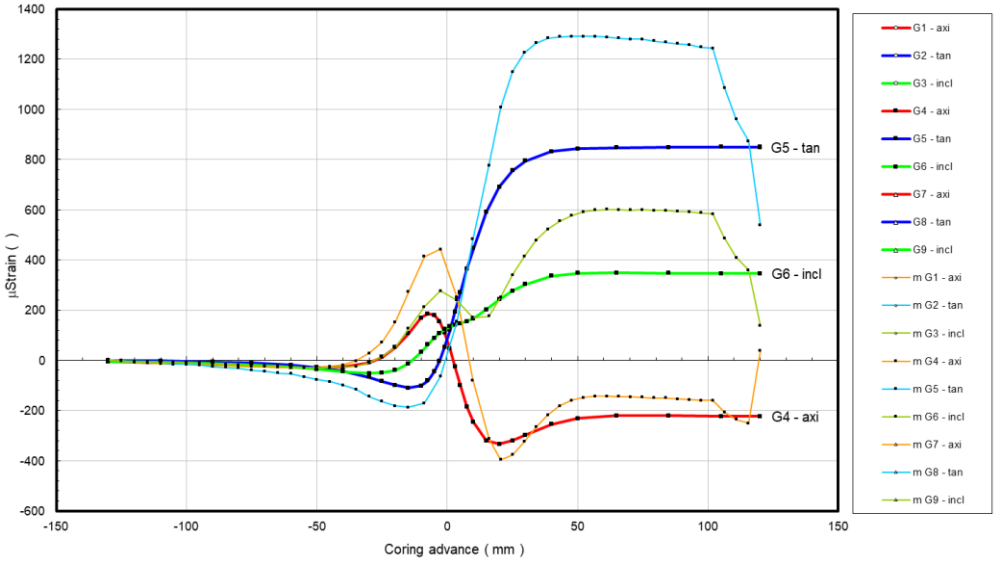
<u>Rosette 1</u>

G1,axi	4.3	0.10	P
G2,tan	1.7	0.90	P
G3,incl	-	0.72	P



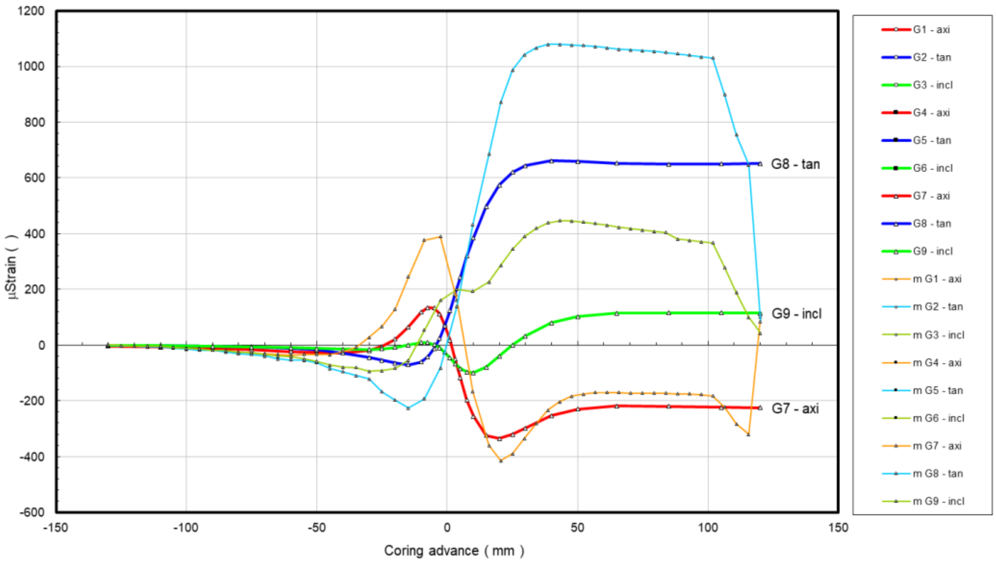
<u>Rosette 2</u>

G4,axi	2.50	-1.1	P
G5,tan	1.70	2.4	P
G6,incl	1.7	0.40	P



<u>Rosette 3</u>

G7,axi	2.6	-0.44	P
G8,tan	1.7	0.13	P
G9,incl	-2.2	0.39	P



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

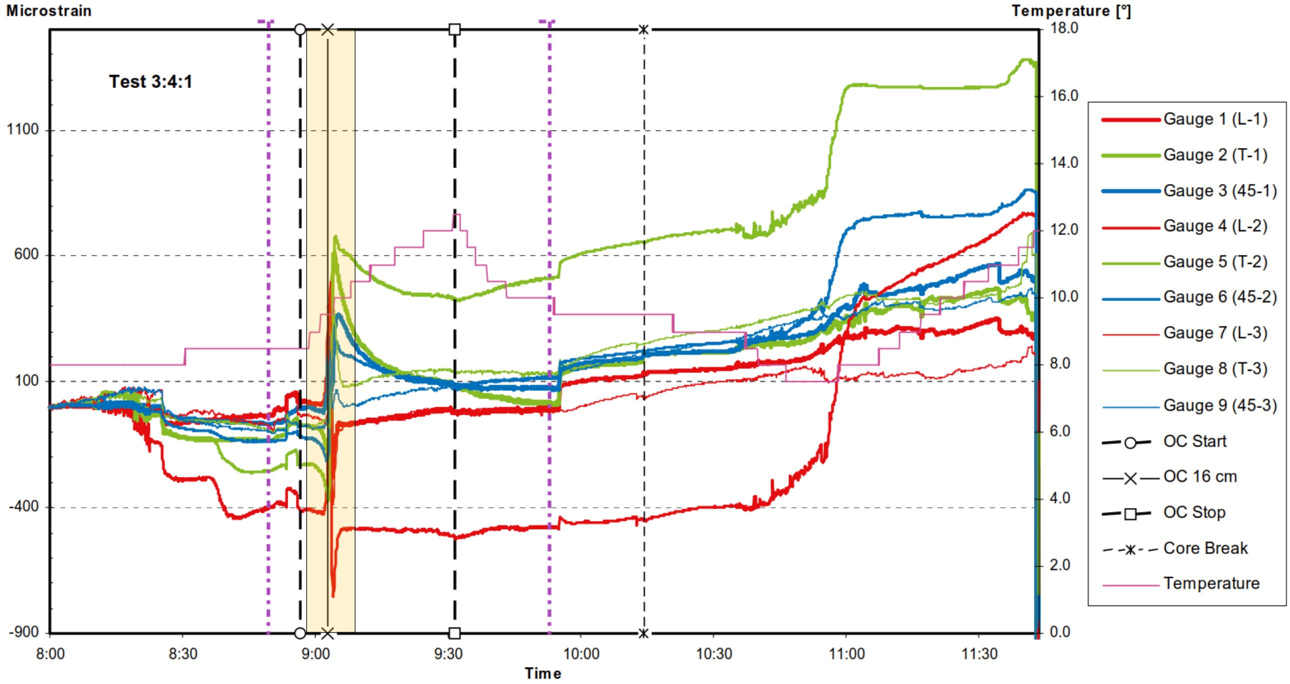
	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-22	640	512	40	538	137	102	85	43
@61mm	-38	387	154	-143	1288	602	-170	1067	430
@120mm	-22	640	512	40	538	137	102	85	43

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	27.2	116	16	10.8	24	8	9.4	269	72	25.9	116	10.8	10.8	*78 %*
@61mm	50.2	354	6	26.4	84	1	8.9	182	84	49.7	174	26.4	9.4	
@120mm	29.1	116	15	12.6	206	1	11.3	300	75	27.9	116	12.6	12.5	

KFM07C 3:4:1, depth: 190.74 m

M	7/9	Strains stable before overcoring.
P	5/9	Strains are within the elastic transient strain range (yellow shade)
P	1,1,7	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
M	M,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 21 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Rosette number 2 (gauges number 5 and 6) reveal sensitive to drilling operations (poor bonding ?). High drift of most strain gauges (2,3,5,6) after elastic range, not associated with temperature because it is uneven for equally oriented gauges. The vertical stress is 2.0 times the overburden weight.
P		***Overall strain reliability***



Overcoring record:

Table A-12. Key measurement data for test no. 3:4:1, 195.31 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-15	16:15:00
Mixing of glue	2006-05-15	16:40:00
Application of glue to gauges	2006-05-15	16:43:00
Probe installation in pilot hole	2006-05-15	16:51:50
Start time for dense sampling (5 s interval)	2006-05-16	07:00:05
Adapter retrieved	2006-05-16	00:07:42
Adapter on surface	2006-05-16	07:45:00
Drill string fed down the hole	2006-05-16	07:51:00
Drill string in place	2006-05-16	08:23:30
Flushing start	2006-05-16	08:23:40
Rotation start	2006-05-16	08:50:30
Overcoring start	2006-05-16	08:56:45
Overcoring 4 cm	2006-05-16	08:58:40
Overcoring 8 cm	2006-05-16	09:00:00
Overcoring 12 cm	2006-05-16	09:01:30
Overcoring 16 cm	2006-05-16	09:02:40
Overcoring 20 cm	2006-05-16	09:04:05
Overcoring 24 cm	2006-05-16	09:05:25
Overcoring 28 cm	2006-05-16	09:06:45
Overcoring 32 cm	2006-05-16	09:08:15
Overcoring stop (100 cm)	2006-05-16	09:31:40
Flushing off	2006-05-16	09:55:15
Core break	2006-05-16	10:14:10
Core retrieval start	2006-05-16	10:34:10
Core & probe on surface	2006-05-16	11:04:00
End of strain registration	2006-05-16	11:43:45
Calculation of strain difference: OC Start	2006-05-16	08:48:45
Calculation of strain difference: OC Stop	2006-05-16	09:53:40

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.7
16 – 32 cm	2.9
32 cm – overcoring stop	2.9

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

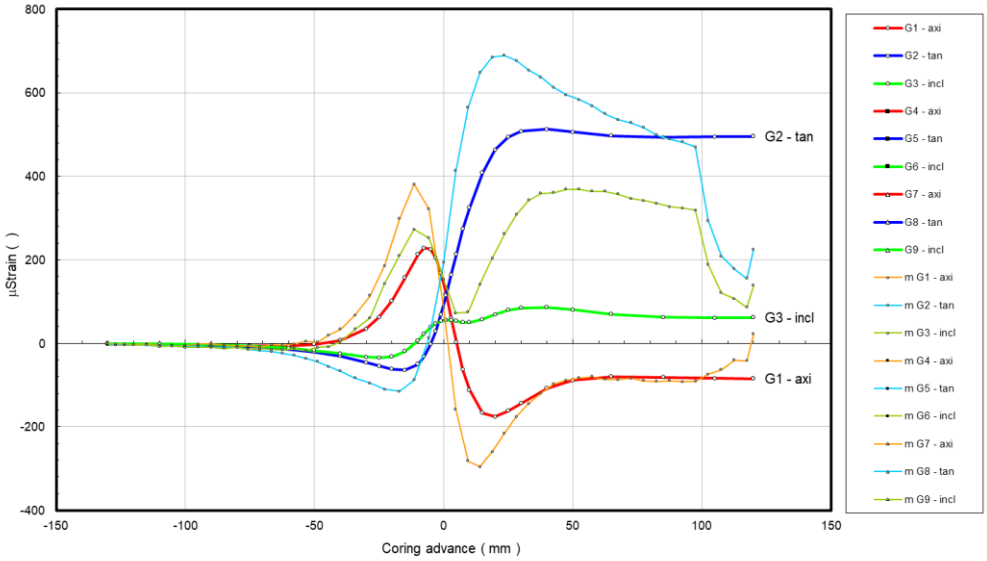
1.7	-0.2	**P**

G2,tan

1.3	0.50	**P**

G3,incl

3.2	1.4	**P**



Rosette 2

G4,axi

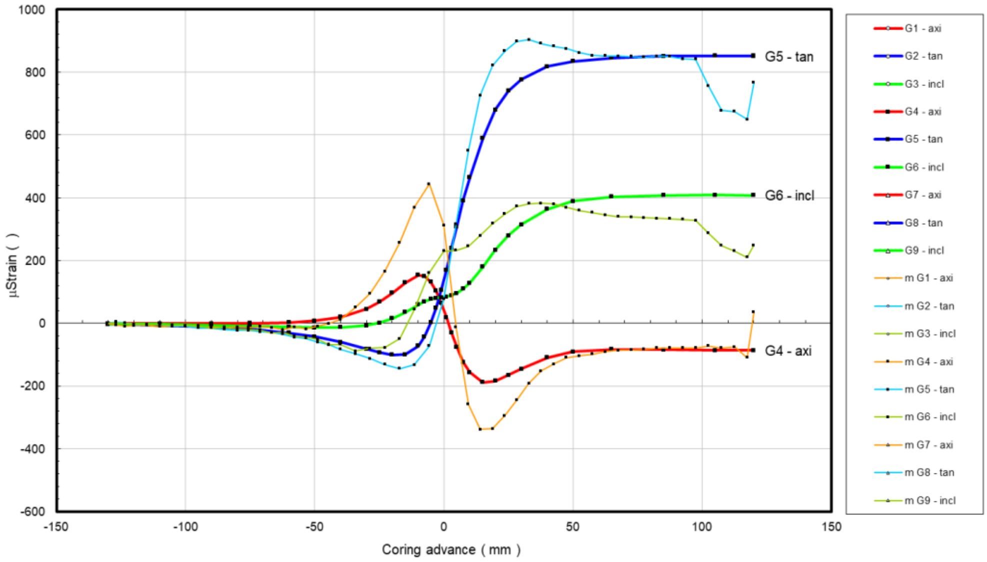
3.0	-0.5	**P**

G5,tan

1.1	0.9	**G**

G6,incl

3.0	0.52	**P**



Rosette 3

G7,axi

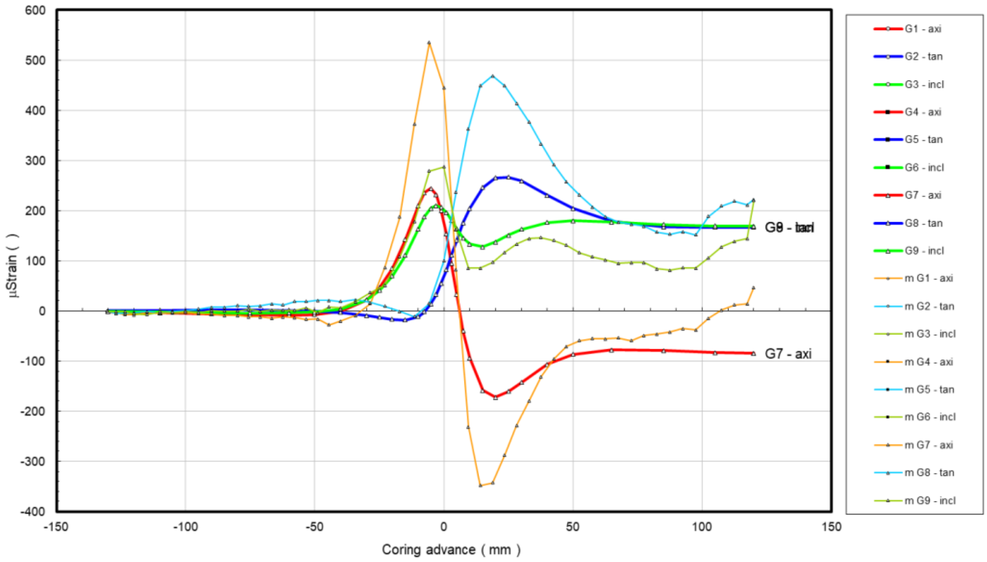
2.1	-0.5	**P**

G8,tan

1.7	1.27	**P**

G9,incl

1.7	1.3	**M**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

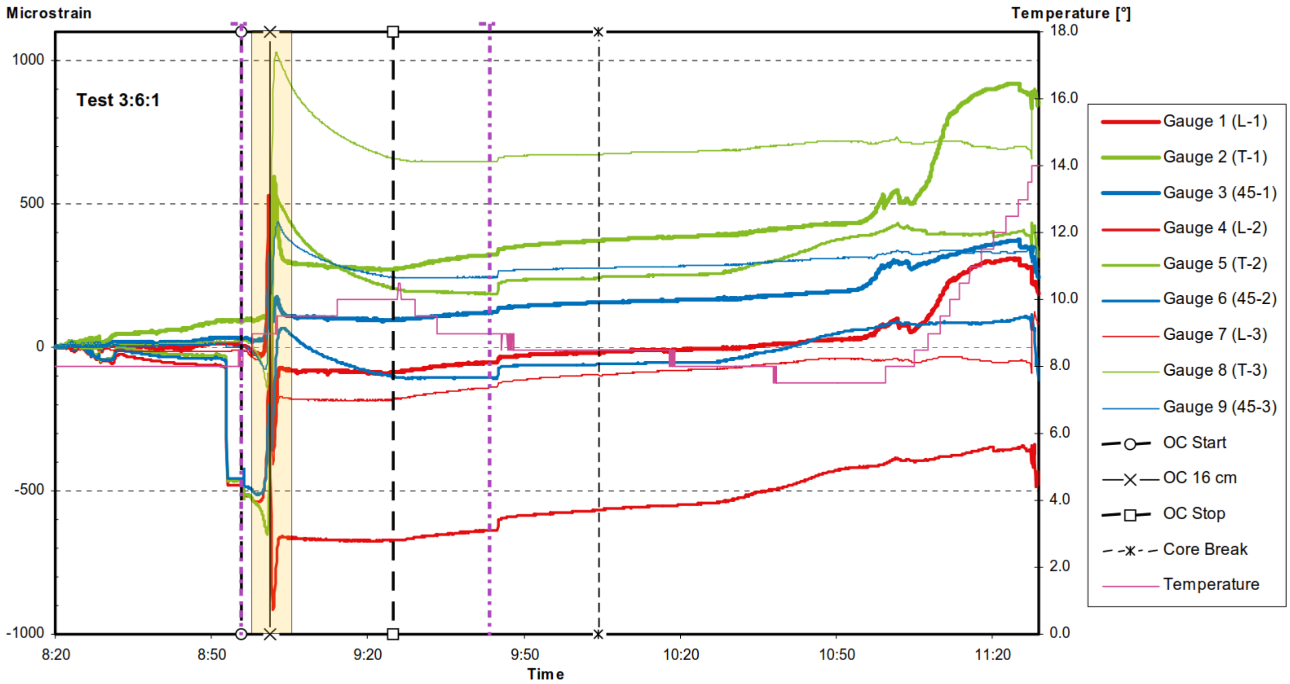
Depth	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	23	225	139	35	767	249	47	222	220
@53mm	-83	583	369	-104	862	360	-59	231	116
@120mm	23	225	139	35	767	249	47	222	220

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	22.6	326	22	9.8	81	46	7.2	219	36	20.7	144	8.2	10.7	*43 %*
@53mm	29.7	308	11	14.8	38	0	7.3	130	79	28.9	128	14.8	8.1	
@120mm	24.8	326	22	11.5	80	44	9.1	218	38	22.8	144	10.1	12.5	

KFM07C 3:6:1, depth: 192.70 m

M	7/9	Strains stable before overcoring.
P	5/9	Strains are within the elastic transient strain range (yellow shade)
P	1,6,2	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 magnitudes
G	G,G,P	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 29 MPa
Y		Core disking observed within ±130 mm from the section of the strain gauges
		Shift of the strain gauges of the rosette number 2 before the overcoring and the axial strain gauge number 4 during the elastic range. A high drift lasting over elastic transient strain range is found. The high drift of most strain gauges (5,6,8,9) after the elastic range is not associated with temperature effects because it is uneven for equally oriented gauges. The vertical stress is 2.3 times the weight of overburden.
P		***Overall strain reliability***



Overcoring record:

Table A-13. Key measurement data for test no. 3:6:1, 197.28 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-17	18:00:00
Mixing of glue	2006-05-17	19:48:00
Application of glue to gauges	2006-05-17	19:50:00
Probe installation in pilot hole	2006-05-17	19:59:55
Start time for dense sampling (5 s interval)	2006-05-18	07:00:00
Adapter retrieved	2006-05-18	07:41:20
Adapter on surface	2006-05-18	07:45:20
Drill string fed down the hole	2006-05-18	07:56:45
Drill string in place	2006-05-18	08:30:35
Flushing start	2006-05-18	08:30:40
Rotation start	2006-05-18	08:55:30
Overcoring start	2006-05-18	08:56:00
Overcoring 4 cm	2006-05-18	08:57:35
Overcoring 8 cm	2006-05-18	08:58:50
Overcoring 12 cm	2006-05-18	09:00:10
Overcoring 16 cm	2006-05-18	09:01:30
Overcoring 20 cm	2006-05-18	09:02:50
Overcoring 24 cm	2006-05-18	09:04:10
Overcoring 28 cm	2006-05-18	09:05:30
Overcoring 32 cm	2006-05-18	09:06:55
Overcoring stop (85 cm)	2006-05-18	09:25:20
Flushing off	2006-05-18	09:45:20
Core break	2006-05-18	10:04:40
Core retrieval start	2006-05-18	10:27:25
Core & probe on surface	2006-05-18	11:04:50
End of strain registration	2006-05-18	11:29:15
Calculation of strain difference: OC Start	2006-05-18	08:56:00
Calculation of strain difference: OC Stop	2006-05-18	09:43:20

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.9
16 – 32 cm	3.0
32 cm – overcoring stop	2.9

Reinterpretation

Ranking of the strain response per gauge rosette:

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

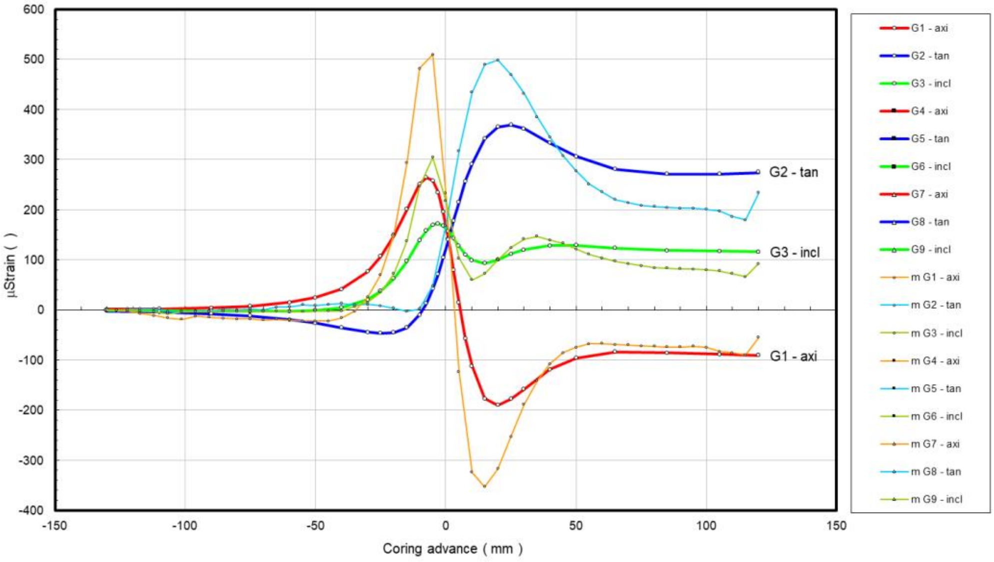
2.0	0.50	M

G2,tan

1.3	0.87	M

G3,incl

1.8	0.85	M



Rosette 2

G4,axi

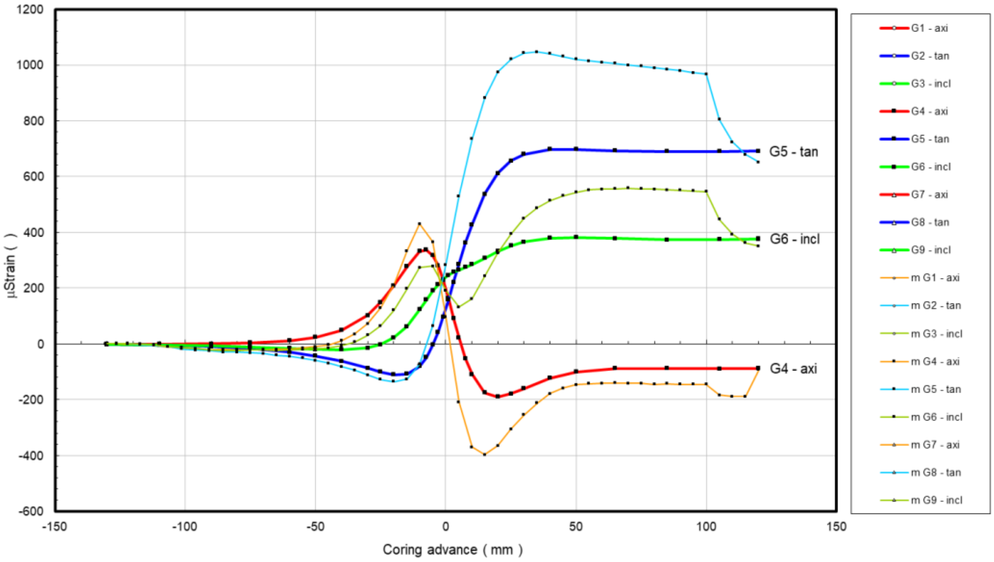
2.10	1.0	M

G5,tan

1.50	0.98	P

G6,incl

1.5	0.97	P



Rosette 3

G7,axi

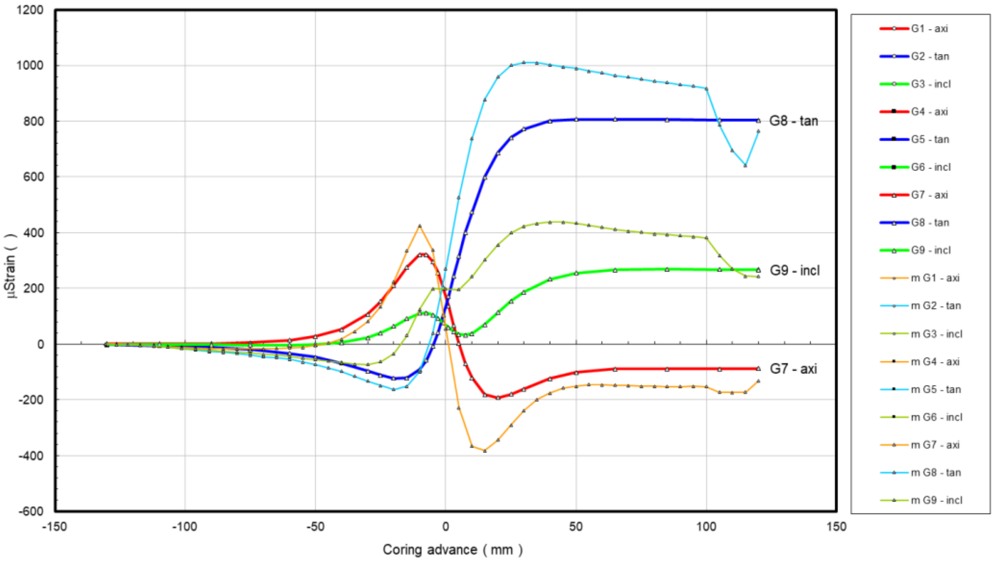
2.9	1.4	M

G8,tan

1.3	0.95	G

G9,incl

2.0	0.91	M



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

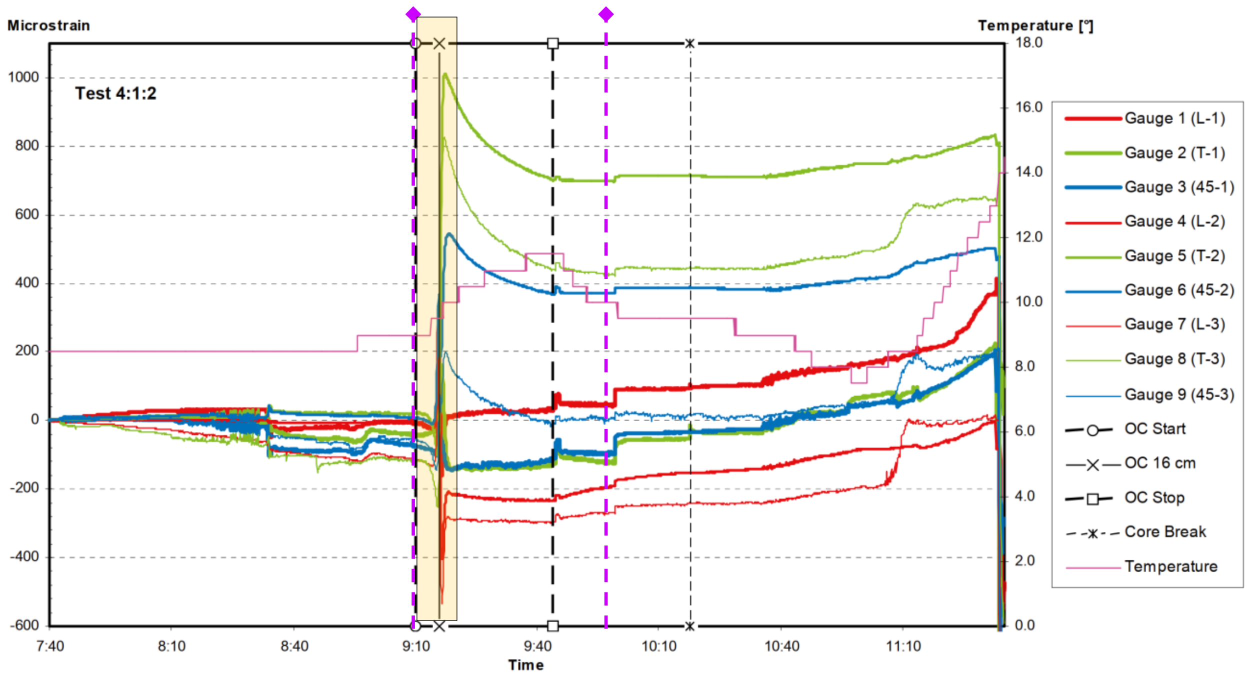
Depth	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-55	234	92	-93	652	351	-131	765	243
@50 mm	-75	277	121	-146	1021	543	-152	990	434
@120 mm	-55	234	92	-93	652	351	-131	765	243

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	31.2	222	6	16.1	313	10	11.8	103	79	31.0	42	15.9	12.1	*29 %*
@50mm	47.1	36	9	23.0	306	9	21.5	128	81	47.1	36	23.0	21.6	
@120 mm	33.3	222	6	18.0	313	12	13.5	107	77	33.1	42	17.8	13.9	

KFM07C 4:1:2, depth: 233.24 m

G	9/9	Strains stable before overcoring.
P	5/9	Strains are within the elastic transient strain range (yellow shade)
P	2,2,5	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 33 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		High or moderate drift of most strained gauges after elastic range, not associated with temperature because it is uneven for equally oriented. Selection of original stress solution the strains for rosette number 1 are weird. Vertical stress is tensile.
P		***Overall strain reliability***



Overcoring record:

Table A-14. Key measurement data for test no. 4:1:2, 238.05 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-21	16:49:00
Mixing of glue	2006-05-21	16:49:00
Application of glue to gauges	2006-05-21	16:52:00
Probe installation in pilot hole	2006-05-21	17:05:00
Start time for dense sampling (5 s interval)	2006-05-22	07:00:00
Adapter retrieved	2006-05-22	07:43:10
Adapter on surface	2006-05-22	07:48:10
Drill string fed down the hole	2006-05-22	07:50:00
Drill string in place	2006-05-22	08:55:50
Flushing start	2006-05-22	08:38:30
Rotation start	2006-05-22	08:53:30
Overcoring start	2006-05-22	09:10:30
Overcoring 4 cm	2006-05-22	09:12:15
Overcoring 8 cm	2006-05-22	09:13:35
Overcoring 12 cm	2006-05-22	09:14:55
Overcoring 16 cm	2006-05-22	09:16:20
Overcoring 20 cm	2006-05-22	09:17:40
Overcoring 24 cm	2006-05-22	09:19:00
Overcoring 28 cm	2006-05-22	09:20:20
Overcoring 32 cm	2006-05-22	09:21:40
Overcoring stop (100 cm)	2006-05-22	09:44:25
Flushing off	2006-05-22	09:59:35
Core break	2006-05-22	10:18:00
Core retrieval start	2006-05-22	10:35:05
Core & probe on surface	2006-05-22	11:15:00
End of strain registration	2006-05-22	11:35:35
Calculation of strain difference: OC Start	2006-05-22	09:10:30
Calculation of strain difference: OC Stop	2006-05-22	09:57:25

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.7
16 – 32 cm	3.0
32 cm – overcoring stop	3.0

Reinterpretation

Ranking of the strain response per gauge rosette

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

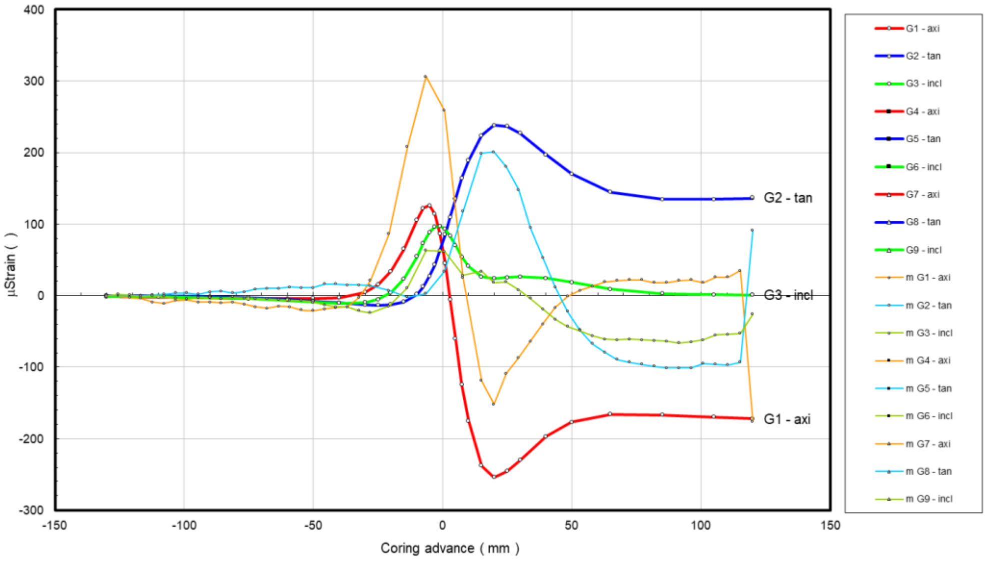
2.5	1.0	**P**

G2,tan

1.2	0.68	**P**

G3,incl

0.65	-	**P**



Rosette 2

G4,axi

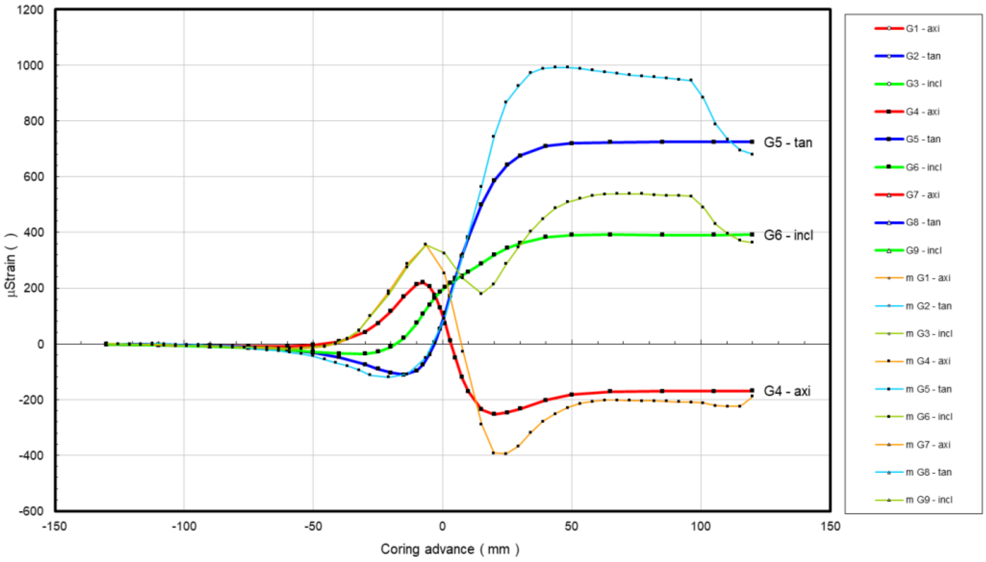
1.7	1.1	**G**

G5,tan

1.4	0.96	**M**

G6,incl

1.4	0.95	**M**



Rosette 3

G7,axi

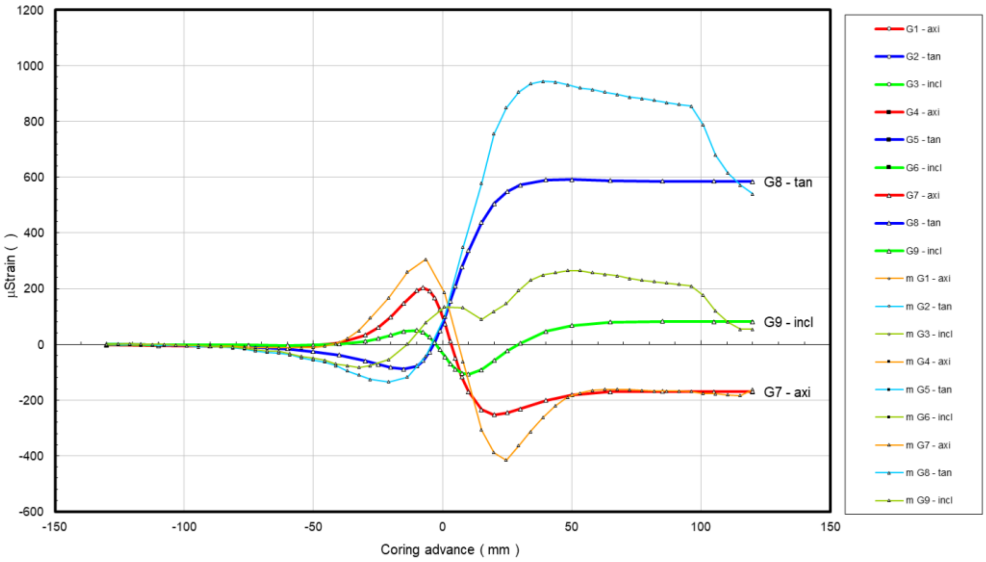
1.65	1.0	**G**

G8,tan

1.60	0.98	**P**

G9,incl

-1.5	0.67	**P**



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

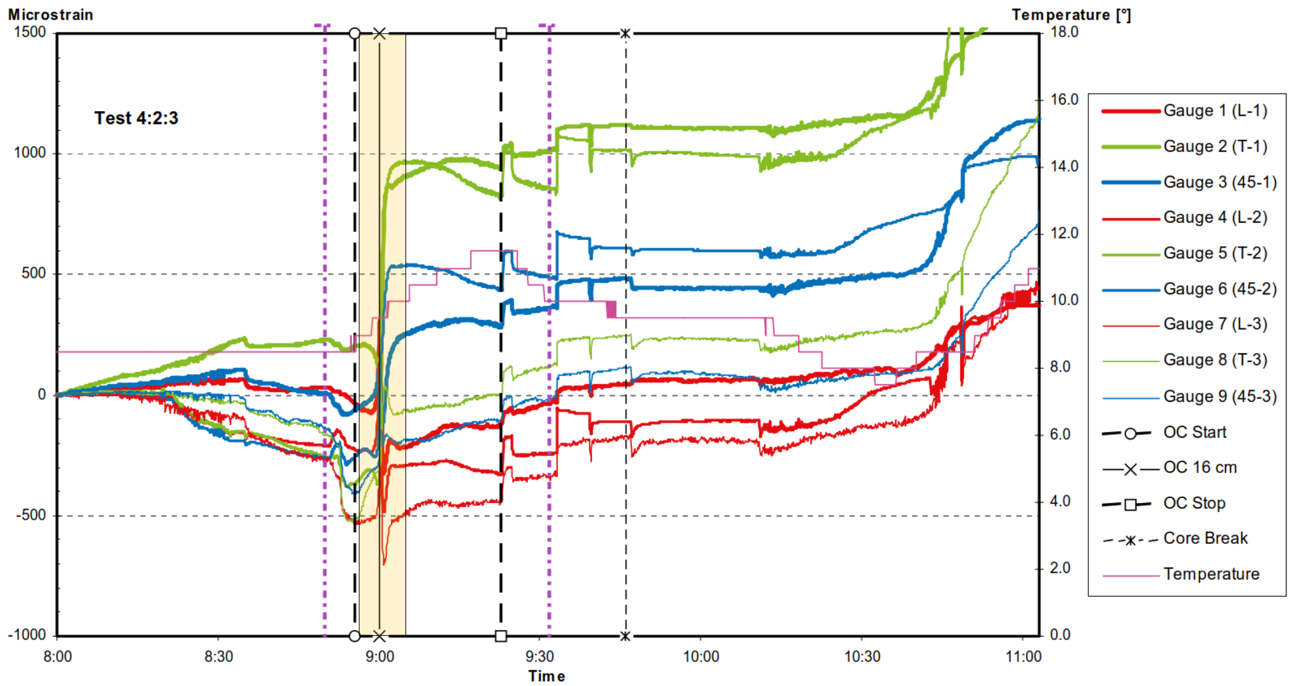
Depth	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-176	91	-26	-189	680	364	-162	540	54
@53 mm	7	-48	-49	-214	988	521	-175	921	265
@120 mm	-176	91	-26	-189	680	364	-162	540	54

Transient stress solutions:

	σ_1			σ_2			σ_3			σ_H		σ_h	σ_v	U.Err
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	27.1	208	5	9.3	299	10	-0.7	93	79	26.9	28	9.0	-0.2	*51 %*
@53 mm	47.4	213	3	14.7	309	66	11.4	122	24	47.4	33	11.9	14.2	
@120 mm	29.6	208	5	11.6	299	11	1.4	96	78	29.4	28	11.2	1.9	

KFM07C 4:2:3, depth: 237.87 m

P	6/9	Strains stable before overcoring.
M	4/9	Strains are within the elastic transient strain range (yellow shade)
P	4,1,4	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
G	G,G,P	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 magnitudes
G	G,P,P	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 43 MPa
N		Core disking observed within ±130 mm from the section of the strain gauges
		Rosette number 3 shows higher and different drift before overcoring. Rosette 3 strains for original solution are weird. Flush-off cause moderate permanent shift. Vertical stress about four times the weight of overburden. Intermediate and minor principal stresses highly rotated around maximum principal stress.
P		***Overall strain reliability***



Overcoring record:

Table A-15. Key measurement data for test no. 4:2:3, 242.70 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-23	15:00:00
Mixing of glue	2006-05-23	15:27:00
Application of glue to gauges	2006-05-23	15:31:00
Probe installation in pilot hole	2006-05-23	15:40:45
Start time for dense sampling (5 s interval)	2006-05-24	07:00:00
Adapter retrieved	2006-05-24	07:45:50
Adapter on surface	2006-05-24	07:49:30
Drill string fed down the hole	2006-05-24	07:56:00
Drill string in place	2006-05-24	08:57:50
Flushing start	2006-05-24	08:24:25
Rotation start	2006-05-24	08:54:00
Overcoring start	2006-05-24	08:55:30
Overcoring 4 cm	2006-05-24	08:56:15
Overcoring 8 cm	2006-05-24	08:57:30
Overcoring 12 cm	2006-05-24	08:59:45
Overcoring 16 cm	2006-05-24	09:00:10
Overcoring 20 cm	2006-05-24	09:01:30
Overcoring 24 cm	2006-05-24	09:02:50
Overcoring 28 cm	2006-05-24	09:04:05
Overcoring 32 cm	2006-05-24	09:05:40
Overcoring stop (82 cm)	2006-05-24	09:22:55
Flushing off	2006-05-24	09:30:00
Core break	2006-05-24	09:46:05
Core retrieval start	2006-05-24	10:11:00
Core & probe on surface	2006-05-24	10:46:00
End of strain registration	2006-05-24	11:03:20
Calculation of strain difference: OC Start	2006-05-24	08:49:30
Calculation of strain difference: OC Stop	2006-05-24	09:31:55

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	3.4
16 – 32 cm	2.9
32 cm – overcoring stop	2.9

Reinterpretation

Ranking of the strain response per gauge rosette

– strains after 100 mm are replaced by later values until the most stable state before core break

Rosette 1

G1,axi

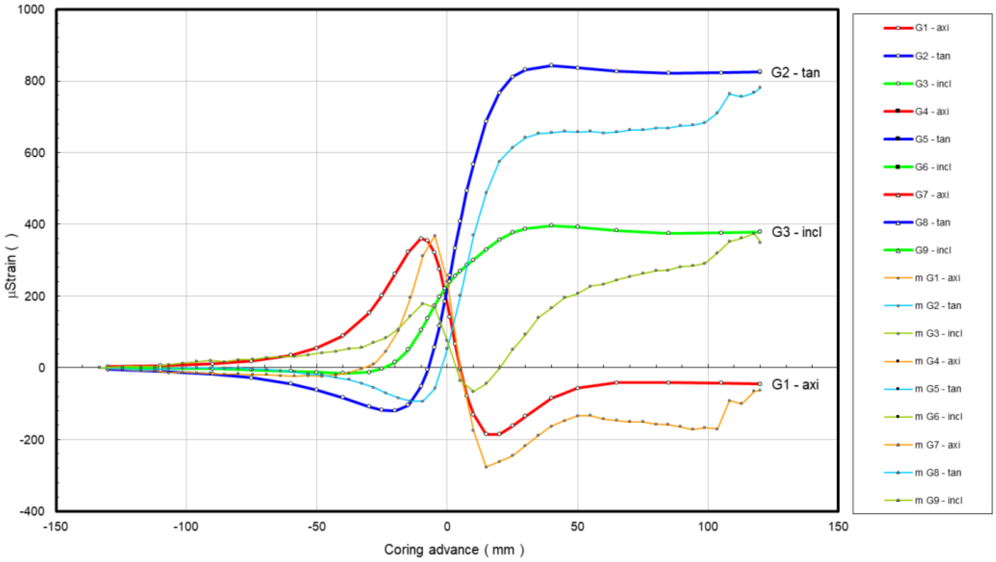
1.5	1.2	G

G2,tan

0.74	0.93	G

G3,incl

-0.20	0.90	P



Rosette 2

G4,axi

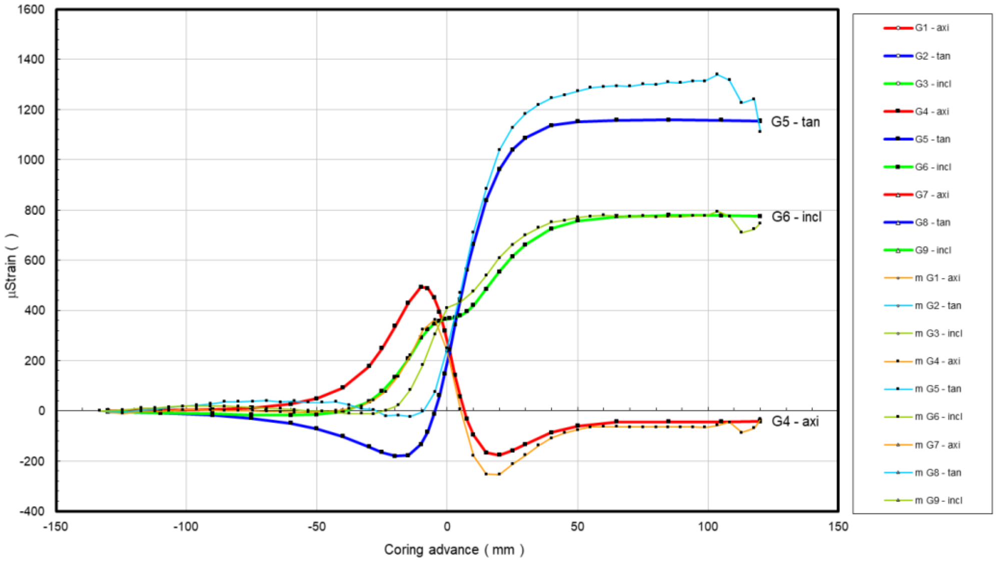
1.43	1.0	G

G5,tan

0.10	1.1	M

G6,incl

-	0.93	G



Rosette 3

G7,axi

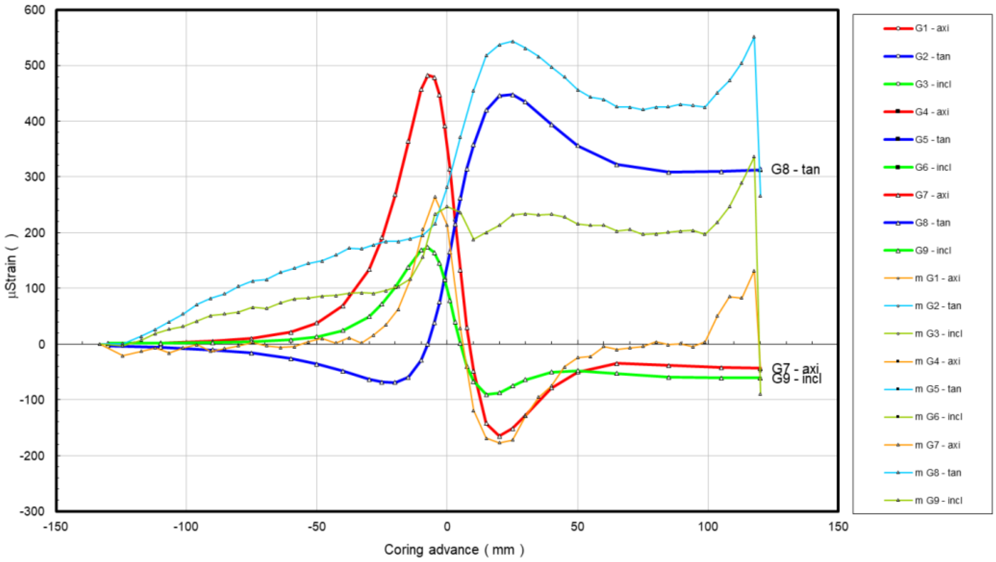
0.54	1.2	P

G8,tan

-1.8	0.85	P

G9,incl

-1.4	1.4	P



OCS

Original Sicada reported and other semi-stable stress solutions:
– Sicada reported solution without water pressure
– other solutions with water pressure

Transient strains:

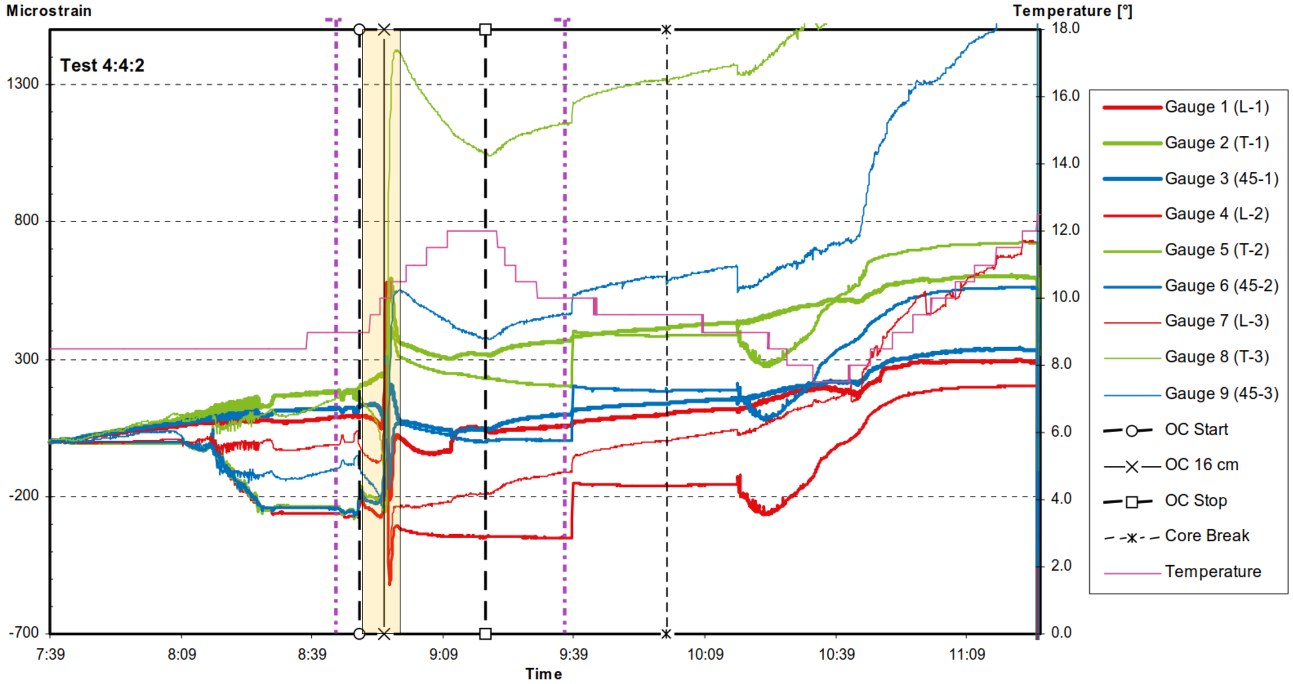
Depth	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-63	781	349	-33	1110	747	-48	266	-90
@50 mm	-134	657	207	-75	1274	771	-24	456	216
@120 mm	-63	781	349	-33	1110	747	-48	266	-90

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	47.1	324	18	26.9	72	43	17.3	217	41	44.7	140	21.9	24.8	*31 %*
@50 mm	52.8	332	15	28.3	227	45	25.0	76	41	51.1	153	26.5	28.5	
@120 mm	49.0	323	17	28.6	70	44	19.4	217	41	46.9	140	23.7	26.4	

KFM07C 4:4:2, depth: 253.81 m

G	7/9	Strains stable before overcoring
M	5/9	Strains are within the elastic transient strain range (yellow shade)
P	5,1,3	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 magnitudes
G	G,P,P	Stability of inverse stress solution after passing gauges section over 53 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
P		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 34 MPa
Y		Core disking observed within ±130 mm from the section of the strain gauges
		High or moderate drift of most strained gauges after elastic range, not associated with temperature because it is uneven for equally oriented gauges. Vertical stress 1.7 times the weight of overburden. Intermediate and minor principal stresses highly rotated around maximum principal stress.
P		***Overall strain reliability***



Overcoring record:

Table A-16. Key measurement data for test no. 4:4:2, 258.73 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-05-28	16:15:00
Mixing of glue	2006-05-28	16:43:00
Application of glue to gauges	2006-05-28	16:46:00
Probe installation in pilot hole	2006-05-28	16:57:00
Start time for dense sampling (5 s interval)	2006-05-29	07:00:00
Adapter retrieved	2006-05-29	07:43:20
Adapter on surface	2006-05-29	07:47:40
Drill string fed down the hole	2006-05-29	07:59:00
Drill string in place	2006-05-29	08:49:30
Flushing start	2006-05-29	08:30:00
Rotation start	2006-05-29	08:50:20
Overcoring start	2006-05-29	08:50:50
Overcoring 4 cm	2006-05-29	08:52:30
Overcoring 8 cm	2006-05-29	08:53:50
Overcoring 12 cm	2006-05-29	08:55:10
Overcoring 16 cm	2006-05-29	08:56:30
Overcoring 20 cm	2006-05-29	08:57:50
Overcoring 24 cm	2006-05-29	08:59:10
Overcoring 28 cm	2006-05-29	09:00:30
Overcoring 32 cm	2006-05-29	09:01:50
Overcoring stop (80 cm)	2006-05-29	09:19:45
Flushing off	2006-05-29	09:40:30
Core break	2006-05-29	10:01:00
Core retrieval start	2006-05-29	10:17:00
Core & probe on surface	2006-05-29	10:52:00
End of strain registration	2006-05-29	11:26:55
Calculation of strain difference: OC Start	2006-05-29	08:44:50
Calculation of strain difference: OC Stop	2006-05-29	09:37:45

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	2.8
16 – 32 cm	3.0
32 cm – overcoring stop	2.7

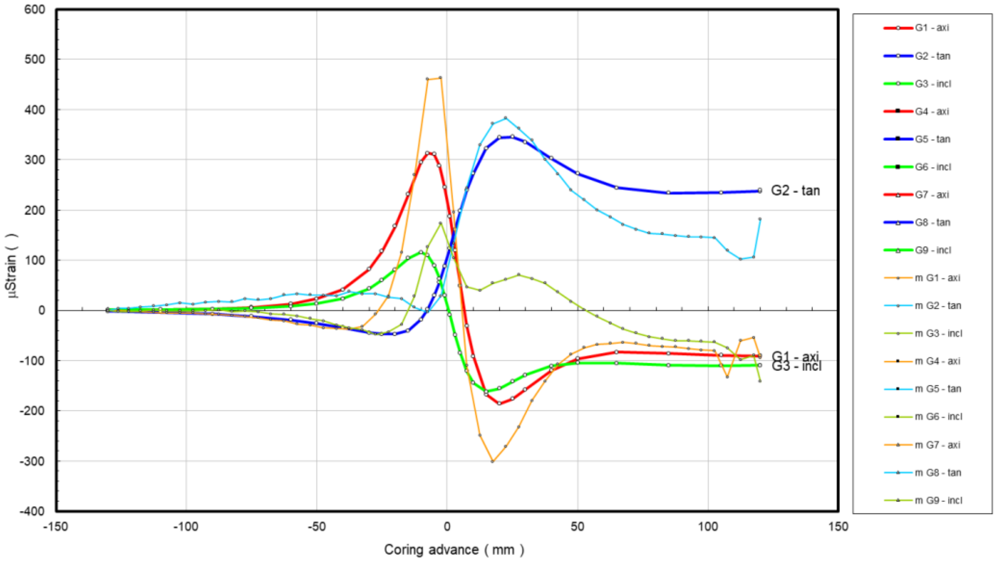
Reinterpretation

Ranking of the strain response per gauge rosette

– strains after 100 mm are replaced by later values until the most stable state before core break

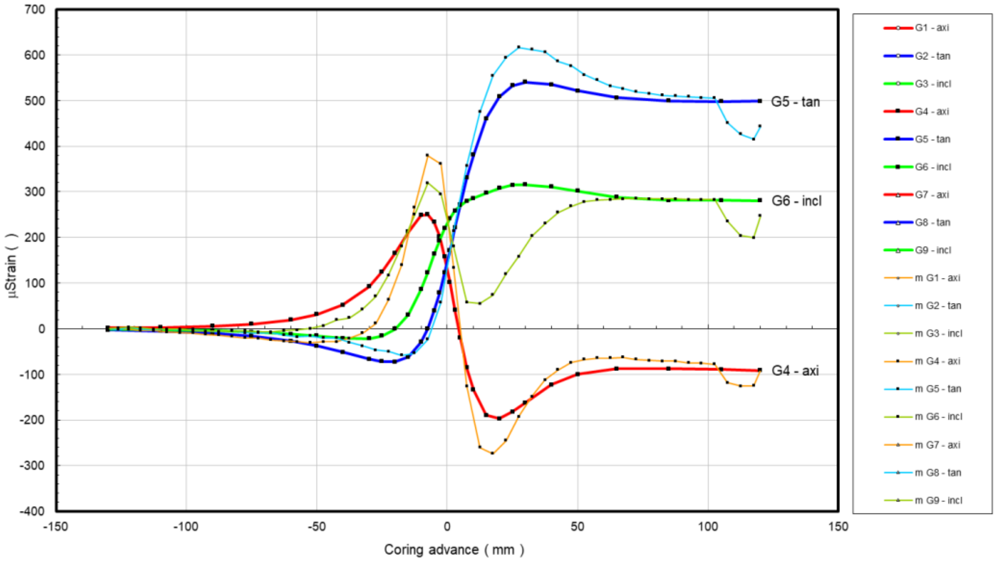
Rosette 1

G1,axi		
1.7	-0.60	G
G2,tan		
1.1	0.45	P
G3,incl		
-4	0.81	P



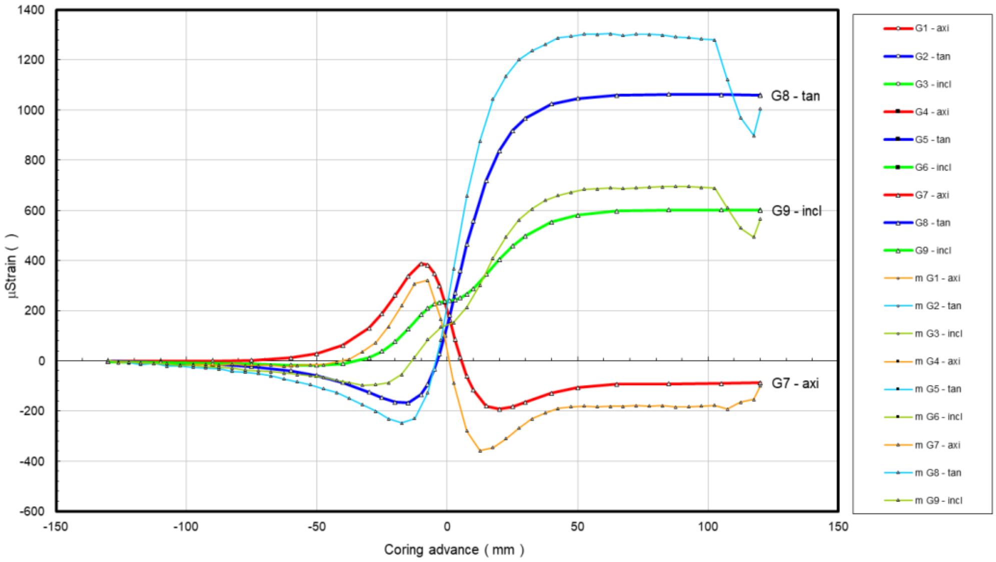
Rosette 2

G4,axi		
1.5	-1.4	G
G5,tan		
1.1	0.83	G
G6,incl		
0.20	0.71	P



Rosette 3

G7,axi		
1.9	-1.7	G
G8,tan		
1.5	0.85	M
G9,incl		
-	0.82	G



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

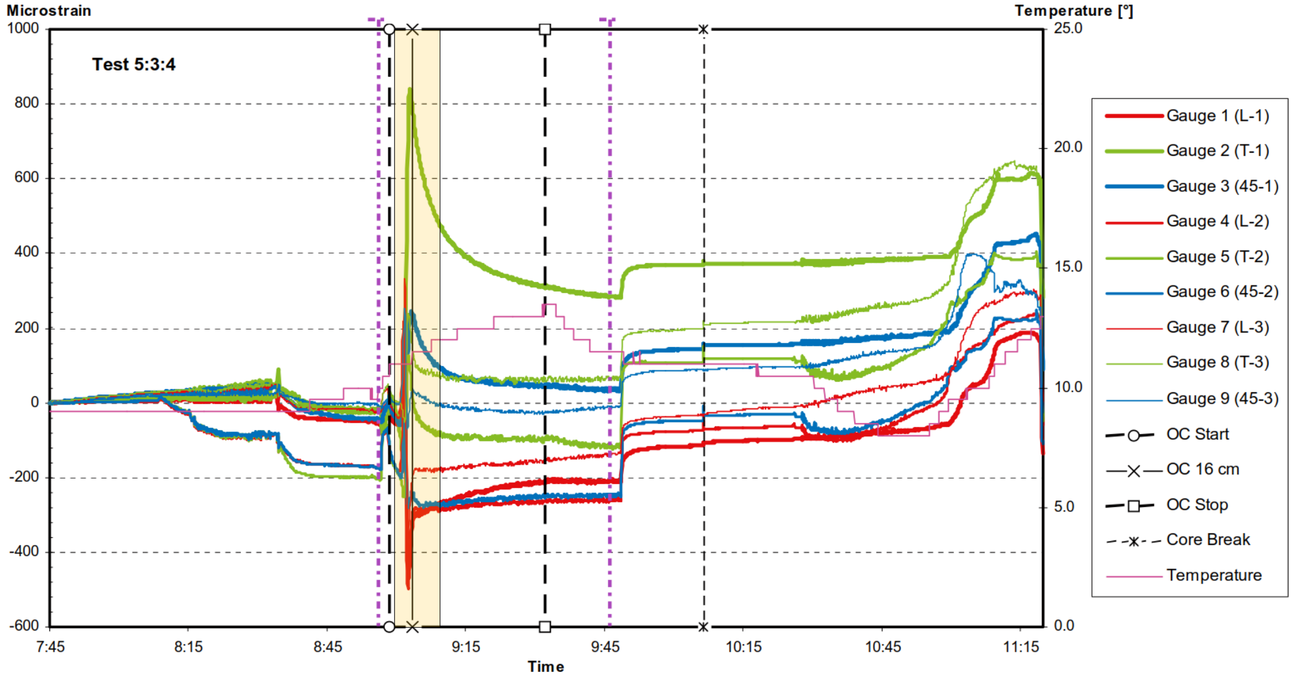
Depth	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	-95	182	-142	-90	443	247	-99	1004	567
@53mm	-74	220	1	-67	556	278	-180	1303	684
@120mm	-95	182	-142	-90	443	247	-99	1004	567

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	32.9	3	11	15.6	103	41	7.3	260	47	32.1	0	11.8	11.9	*20 %*
@53mm	46.1	2	8	20.4	111	68	15.6	269	21	45.6	1	16.2	20.3	
@120mm	35.5	3	11	17.9	102	41	9.8	261	47	34.8	1	14.3	14.2	

KFM07C 5:3:4, depth: 314.56 m

M	7/9	Strains stable before overcoring.
M	5/9	Strains are within the elastic transient strain range (yellow shade)
P	0,2,7	Reliability of transient strains, number *good, moderate* and *poor* transient strains correlation (next page)
P	P,P,P	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 magnitudes
P	P,P,P	Stability of inverse stress solution after passing gauges section over 50 mm for s1, s2 and s3 orientations
N		Stress solution is based on the strains at the end of the elastic range
G		Reliability for elastic stress condition by considering water pressure, based on T/s3,max: 18 MPa/ 8 MPa
Y		Core disking observed within ±130 mm from the section of the strain gauges
		High drift in rosette number 2 before overcoring. High drift of most strain gauges after elastic range not associated with temperature because it is uneven for equally oriented gauges. Maximum principal stress plunge 60 degrees and vertical stress 1.4 times the weight of overburden.
P		***Overall strain reliability***



Overcoring record:

Table A-17. Key measurement data for test no. 5:3:4, 316.25 m borehole length.

Activity	Date [yy-mm-dd]	Time [hh:mm:ss]
Activation time	2006-06-11	14:15:00
Mixing of glue	2006-06-11	14:52:00
Application of glue to gauges	2006-06-11	14:56:00
Probe installation in pilot hole	2006-06-11	15:07:00
Start time for dense sampling (5 s interval)	2006-06-12	07:00:00
Adapter retrieved	2006-06-12	07:39:05
Adapter on surface	2006-06-12	07:43:10
Drill string fed down the hole	2006-06-12	07:57:40
Drill string in place	2006-06-12	08:40:00
Flushing start	2006-06-12	08:34:10
Rotation start	2006-06-12	08:58:20
Overcoring start	2006-06-12	08:58:25
Overcoring 4 cm	2006-06-12	08:59:30
Overcoring 8 cm	2006-06-12	09:00:55
Overcoring 12 cm	2006-06-12	09:02:15
Overcoring 16 cm	2006-06-12	09:03:30
Overcoring 20 cm	2006-06-12	09:05:00
Overcoring 24 cm	2006-06-12	09:06:20
Overcoring 28 cm	2006-06-12	09:07:45
Overcoring 32 cm	2006-06-12	09:09:00
Overcoring stop (100 cm)	2006-06-12	09:32:10
Flushing off	2006-06-12	09:48:40
Core break	2006-06-12	10:06:20
Core retrieval start	2006-06-12	10:25:00
Core & probe on surface	2006-06-12	11:07:10
End of strain registration	2006-06-12	11:20:00
Calculation of strain difference: OC Start	2006-06-12	08:55:25
Calculation of strain difference: OC Stop	2006-06-12	09:46:10

Overcoring advance	Overcoring rate [cm/min]
0 – 16 cm	3.1
16 – 32 cm	2.9
32 cm – overcoring stop	2.9

OCS

Ranking of the strain response per gauge rosette

– strains after 100 mm are replaced by later values until the most stable state before core break

<u>Rosette 1</u>

G1,axi

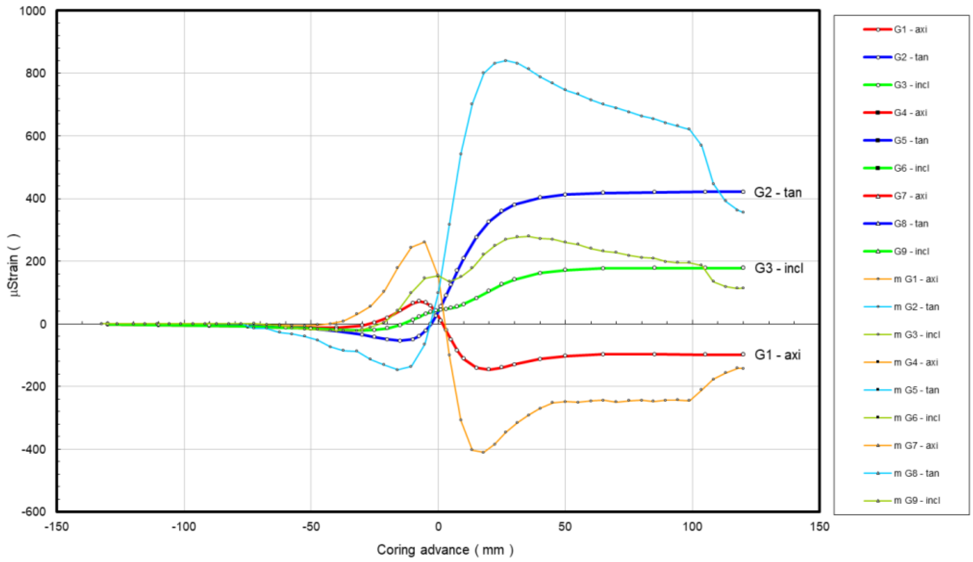
3.8	-1.4	P

G2,tan

2.8	0.86	P

G3,incl

1.6	0.63	P



<u>Rosette 2</u>

G4,axi

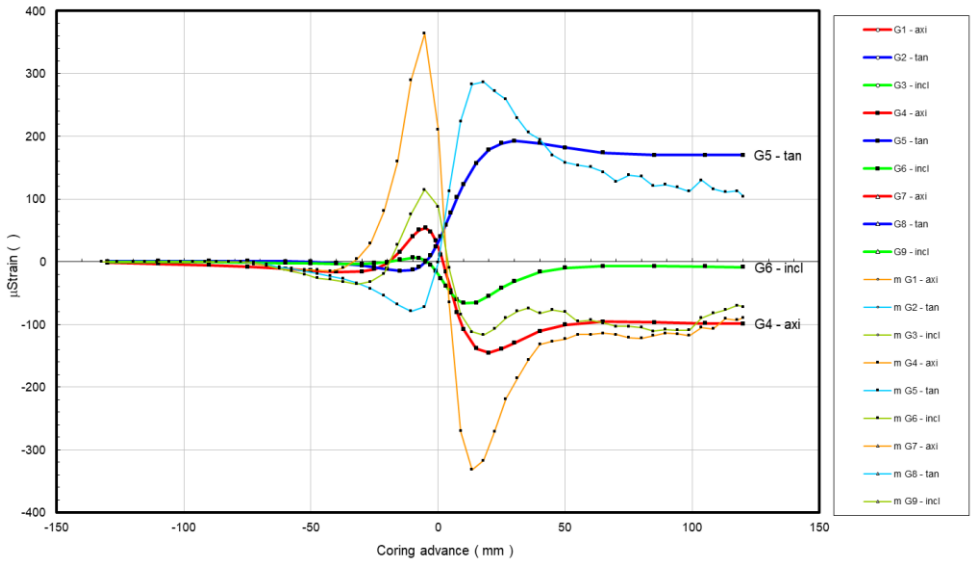
>5	1.2	P

G5,tan

1.5	0.66	M

G6,incl

2.0	8.4	P



<u>Rosette 3</u>

G7,axi

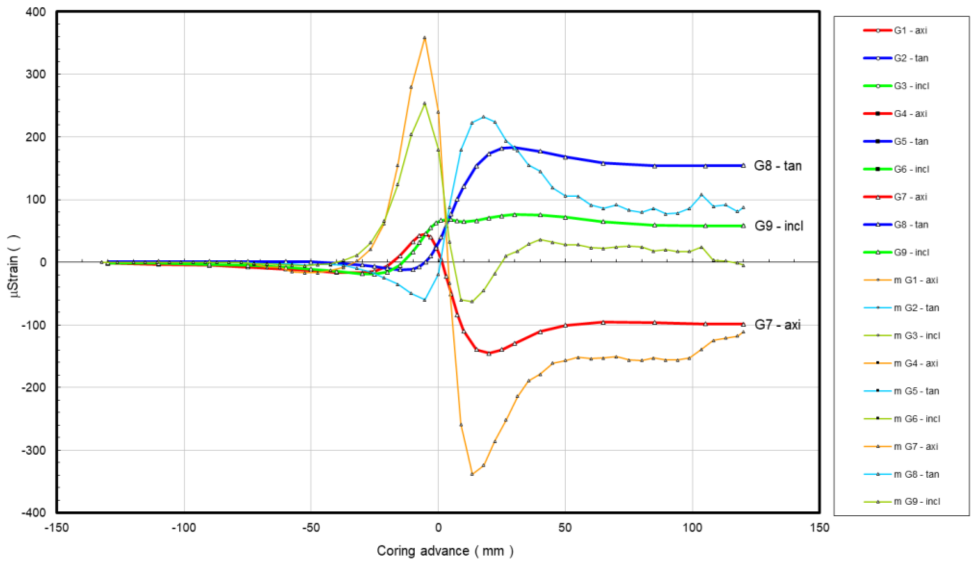
>5	1.1	P

G8,tan

1.7	0.53	M

G9,incl

3.34	-0.03	P



OCS

Original Sicada reported and other semi-stable stress solutions:

– Sicada reported solution without water pressure

– other solutions with water pressure

Transient strains:

Time	1A-1	1T-2	1incl-3	2A-4	2T-5	2incl-6	3A-7	3T-8	3incl-9
original	150	333	122	149	100	95	149	98	54
@50 mm	-249	747	260	-123	158	-80	-157	106	28
@120 mm	-143	355	115	-89	104	-72	-111	88	-5

Transient stress solutions:

	σ_1			**σ_2**			**σ_3**			**σ_H**		**σ_h**	**σ_v**	**U.Err**
	mag	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**Plunge**	**mag**	**Trend**	**mag**	**mag**	
original	13.2	170	61	9.5	343	29	4.0	74	3	10.4	165	4.0	12.3	
@50 mm	23.3	310	6	5.7	219	8	-5.6	76	80	23.0	130	5.4	-5.1	
@120 mm	12.3	310	3	5.6	219	7	-3.7	65	82	12.3	130	5.5	-3.5	

Appendix 2

Ranking of the results for the ranking of the elastic constants, transient strains, interpreted stress state and overall ranking

SICADA

ID order	BH	Test	Vertical depth (m)	Rock Type	s1 Mag. [MPa]	s1 Dip [°]	s1 Bearing [°]	s2 Mag. [MPa]	s2 Dip [°]	s2 Bearing [°]	s3 Mag. [MPa]	s3 Dip [°]	s3 Bearing [°]	sH MPa	Bearing [°]	sh MPa	sV MPa
1	KFK001	1.1	11.48	Granite to granodiorite	14.2	1.1	99.6	11.5	8.9	9.4	-3.3	81.0	196.9	14.2	100.4	11.1	-3.0
2	KFK001	1.2	28.97	Granitic gneiss	36.2	11.9	87.1	18.5	3.4	177.8	6.9	77.6	283.5	34.9	86.6	18.5	8.2
3	KFK001	1.3	29.57	Granitic gneiss	30.0	6.6	58.5	16.7	13.8	326.8	-2.6	74.6	173.5	29.6	60.6	15.6	-1.1
4	KFK001	1.4	47.98	Granitic gneiss	11.3	1.4	5.8	3.2	6.4	96.0	0.0	83.5	263.4	11.3	5.8	3.1	0.0
5	KFK001	2.1	69.02	Granitic gneiss	14.9	5.6	310.9	6.5	2.9	220.6	-10.1	83.7	103.4	14.6	131.4	6.5	-9.9
6	KFK001	2.2	87.61	Granitic gneiss	17.5	5.0	341.5	5.3	2.4	251.3	-5.1	84.4	135.5	17.3	161.7	5.3	-4.9
7	KFK001	2.3	88.23	Granitic gneiss	29.1	1.5	267.9	20.4	10.7	177.6	2.8	79.2	5.9	29.0	88.4	19.8	3.4
8	KFK001	3:1	131.22	Granitic gneiss	15.6	4.3	154.3	14.5	9.7	245.0	5.0	79.4	40.5	15.6	149.2	14.2	5.3
9	KFK001	3:2	131.79	Granitic gneiss	13.0	8.4	292.5	10.1	2.0	22.8	6.7	81.3	126.2	12.8	112.1	10.1	6.9
10	KFK001	3:3	132.35	Granitic gneiss	21.8	45.5	319.5	14.8	15.8	66.2	4.9	40.2	170.0	16.1	98.1	11.1	14.2
11	KFK001	3:4	134.02	Granitic gneiss	18.5	27.9	279.3	11.5	4.6	11.7	6.6	61.6	110.3	15.9	96.6	11.5	9.2
12	KFK001	4:1	163.15	Granitic gneiss	13.0	3.0	226.0	11.2	2.9	135.9	4.7	85.8	2.4	13.0	46.6	11.2	4.7
13	KFK001	4:2	164.41	Granitic gneiss	23.2	7.8	274.7	15.7	23.1	8.0	3.5	65.5	167.3	22.9	90.9	13.7	5.7
14	KFK001	5:1	192.38	Granitic gneiss	20.6	6.9	275.1	16.5	9.1	184.0	3.8	78.5	41.9	20.4	98.3	16.1	4.3
15	KFK001	5:2	193.00	Granitic gneiss	19.1	17.7	275.8	11.2	1.9	185.2	-7.9	72.2	89.4	16.6	97.9	11.2	-5.4
16	KFK001	6:1	216.51	Granitic gneiss	18.0	24.2	332.0	15.7	0.0	62.0	2.5	65.8	152.0	15.7	62.0	15.4	5.1
17	KFK001	6:2	217.24	Granitic gneiss	23.8	26.6	180.6	15.5	10.1	85.4	2.3	61.2	336.5	19.9	13.9	14.8	7.0
18	KFK001	6:3	244.55	Granite to granodiorite	17.3	6.5	45.9	10.5	19.4	313.6	8.7	69.5	153.6	17.1	46.4	10.3	9.0
19	KFK001	7:1	273.26	Granite to granodiorite	39.3	3.3	323.0	20.3	19.3	54.2	8.2	70.4	223.8	39.2	142.4	19.0	9.6
20	KFK001	7:2	273.93	Granite to granodiorite	37.2	8.5	270.1	19.8	6.0	1.0	10.6	79.6	125.6	36.7	89.6	19.7	11.3
21	KFK001	8:1	297.32	Granite to granodiorite	21.0	14.1	310.2	13.1	13.6	43.7	9.6	70.2	175.9	20.4	128.7	12.9	10.5
22	KFK001	8:2	297.95	Granite to granodiorite	33.9	32.1	329.2	11.9	6.5	235.1	4.8	57.1	134.9	25.7	151.3	11.7	13.1
23	KFK001	9.1	372.25	Granite to granodiorite	41.5	5.3	147.7	29.2	9.2	56.8	7.3	79.4	267.6	41.2	149.2	28.7	8.1
24	KFK001	9.2	374.99	Granite to granodiorite	40.7	6.0	163.1	25.9	16.7	71.3	3.2	72.2	272.3	40.4	165.4	24.0	5.5
25	KFK001	9.3	375.78	Granite to granodiorite	44.8	5.6	121.8	20.3	4.8	31.3	2.5	82.6	261.3	44.4	122.1	20.2	3.1
26	KFK001	10:1	420.20	Granite to granodiorite	62.1	3.9	127.8	41.9	12.6	36.9	12.8	76.8	234.8	61.9	129.0	40.5	14.4
27	KFK001	10:2	458.10	Granite to granodiorite	56.9	8.6	138.9	30.3	1.7	48.6	19.3	81.2	307.2	56.1	139.0	30.3	20.1
28	KFK001	11:1	483.34	Granitic gneiss	63.4	9.5	302.0	46.0	23.7	36.2	25.9	64.2	191.8	62.6	118.5	42.6	30.2
29	KFK001	11:2	497.49	Granitic gneiss	54.3	3.5	158.9	26.6	1.7	249.0	15.7	86.1	4.7	54.2	158.9	26.6	15.8
30	KFK001	11:3	499.38	Granitic gneiss	51.4	4.2	153.5	34.2	12.3	62.6	12.6	77.0	262.1	51.2	154.6	33.2	13.7
31	KFK003	1:1	19.17	Granite to granodiorite	21.7	3.9	332.4	17.5	7.7	62.9	4.7	81.3	216.0	21.6	150.9	17.2	5.0
32	KFK003	1:2	19.78	Granite to granodiorite	15.6	2.8	131.3	11.9	1.2	221.4	5.6	86.9	334.4	15.6	131.2	11.9	5.6
33	KFK003	1:3	20.33	Granite to granodiorite	27.0	8.4	91.5	20.1	8.3	0.3	10.2	78.1	226.2	26.7	93.3	19.9	10.8
34	KFK003	3:1	70.14	Granitic gneiss	14.7	2.5	145.0	12.8	37.3	53.1	4.4	52.6	238.3	14.7	147.1	9.7	7.5
35	KFK003	3:2	70.72	Granitic gneiss	22.4	5.8	88.5	15.4	10.6	357.4	5.8	77.9	206.7	22.3	89.8	15.0	6.3
36	KFK003	4:1	100.54	Granitic gneiss	21.4	12.8	132.6	9.0	6.7	41.1	2.0	75.5	283.8	20.4	133.5	8.9	3.1
37	KFK003	4:2	101.15	Granitic gneiss	22.0	4.5	341.6	10.3	0.5	251.6	0.0	85.5	155.6	21.8	161.7	10.3	0.2
38	KFK003	4:3	101.75	Granitic gneiss	16.7	4.9	133.0	7.1	6.2	223.6	3.4	82.1	5.1	16.6	132.8	7.1	3.5
39	KFK003	5:1	132.22	Granitic gneiss	23.0	6.9	314.9	13.7	23.2	222.0	8.6	65.7	60.6	22.8	136.3	12.9	9.6
40	KFK003	5:2	132.83	Granitic gneiss	17.4	8.5	316.5	9.0	76.8	86.1	8.5	10.0	224.9	17.2	136.4	8.5	9.2
41	KFK003	5:3	133.45	Granitic gneiss	20.7	2.1	313.7	6.3	5.9	43.9	0.8	83.8	204.5	20.7	133.6	6.2	0.9
42	KFK003	6:1	151.30	Granitic gneiss	18.8	9.6	2.6	9.2	30.2	98.3	7.0	58.0	256.8	18.5	1.7	8.6	7.9
43	KFK003	6:2	151.90	Granitic gneiss	17.8	13.0	327.1	13.4	5.5	58.4	11.6	75.9	171.0	17.5	146.5	13.4	11.9
44	KFK003	7:1	183.92	Granitic gneiss	32.0	17.9	322.1	11.4	11.6	56.0	8.6	68.4	177.3	29.8	141.6	11.2	10.9
45	KFK003	7:2	184.97	Granitic gneiss	17.6	31.6	21.7	8.3	0.5	291.4	3.1	58.4	200.5	13.6	22.0	8.3	7.1
46	KFK003	8:1	214.76	Granitic gneiss	21.2	25.9	0.8	11.9	7.7	94.6	8.5	62.8	199.9	18.8	179.0	11.8	11.0
47	KFK003	8:2	215.37	Granitic gneiss	20.7	27.5	351.1	10.2	16.9	90.2	1.1	56.9	208.0	16.9	161.5	9.0	6.0
48	KFK003	8:3	215.97	Granitic gneiss	21.8	13.1	185.8	16.8	17.9	91.4	5.0	67.6	310.1	21.1	14.0	15.5	7.0
49	KFK003	9:1	244.75	Granite to granodiorite	27.1	11.2	354.0	10.3	6.4	262.7	-4.0	77.0	143.4	25.9	175.1	10.1	-2.6
50	KFK003	9:2	245.44	Granite to granodiorite	20.7	17.2	323.7	15.1	7.6	231.4	7.8	71.1	118.5	19.6	147.4	14.9	9.1
51	KFK041		3.31	Granitic gneiss										9.2	129.0	4.1	1.1
52	KFK041		4.42	Granitic gneiss										20.9	110.0	7.0	0.6
53	KFK041		12.82	Granite to granodiorite										17.9	6.0	13.9	-6.6
54	KFK041		13.21	Granite to granodiorite										19.5	149.0	16.9	1.6
55	KFK041		13.91	Granite to granodiorite										22.5	112.0	16.8	0.0
56	KFK041		20.62	Granite to granodiorite										21.7	113.0	12.9	-1.6
57	KFK041		28.82	Granitic gneiss										8.5	138.0	2.2	0.6
58	KFK041		28.41	Granite to granodiorite										23.6	138.0	11.9	-8.8

Reliability of Young's modulus / Reliability of recorded strains

ID order	E-data set	Average E_rep. GPa	Average E_rt GPa	Average (E-E_rt)/E_rt	E-reliability	OC-data set	Stability before overcoring	All strains take place within elastic region	Reliability of transient strains	Stability of transient stress magnitudes	Stability of transient stress orientations	Stress solution based on strains in the end of elastic region	Reliability for elastic stress condition with water pressure	Core disking	**Overall Strain Reliability**
1	C	70	68	3%	G	B									
2	C	70	70	-1%	G	B									
3	C	70	70	-1%	G	B									
4	C	70	70	-1%	G	B									
5	C	70	70	-1%	G	B									
6	C	70	70	-1%	G	B									
7	C	70	70	-1%	G	B									
8	B	76	70	8%	M	B									
9	B	81	70	15%	G	B									
10	B	78	70	11%	M	B									
11	B	76	70	7%	M	B									
12	B	75	70	7%	M	B									
13	B	75	70	7%	M	B									
14	B	72	70	2%	G	B									
15	B	78	70	10%	M	B									
16	B	76	70	7%	M	B									
17	B	75	70	6%	G	B									
18	B	**87**	68	**27%**	M	B									
19	B	72	68	6%	G	B									
20	B	76	68	11%	G	B									
21	B	80	68	18%	G	B									
22	B	80	68	17%	G	B									
23	C	75	68	10%	G	B									
24	C	75	68	10%	G	B									
25	C	75	68	10%	G	B									
26	C	75	68	10%	G	B									
27	C	75	68	10%	G	B									
28	C	75	70	6%	G	B									
29	C	75	70	6%	G	B									
30	C	75	70	6%	G	B									
31	B	69	68	2%	G	B									
32	B	72	68	5%	G	B									
33	B	72	68	6%	G	B									
34	B	66	70	-7%	M	B									
35	B	68	70	-4%	G	B									
36	B	66	70	-6%	G	B									
37	B	68	70	-3%	G	B									
38	B	70	70	0%	G	B									
39	B	63	70	-10%	M	B									
40	B	65	70	-8%	M	B									
41	B	69	70	-2%	G	B									
42	B	61	70	-14%	P	B									
43	B	63	70	-11%	M	B									
44	B	69	70	-2%	G	B									
45	B	61	70	-13%	M	B									
46	B	71	70	0%	G	B									
47	B	72	70	2%	G	B									
48	B	72	70	1%	G	B									
49	B	67	68	-2%	G	B									
50	B	61	68	-10%	G	B									
51	C	80	70	14%	P	C									
52	C	80	70	14%	P	C									
53	C	80	68	18%	G	C									
54	C	80	68	18%	G	C									
55	C	80	68	18%	G	C									
56	C	80	68	18%	G	C									
57	C	80	70	14%	P	C									
58	C		68		P	C									

SICADA					Variability of stress solution (3=low, 2=moderate, 1=high, 0=unreliable)										Overall reliability												Notes
																	Worst of columns: X,AI,AK	AI, ALL	X,AI,AM	AI,AN	X,AI,AO	AI,AP	X,AI,AR	AI,AS	X,AI,AT	X,AI,AU	
ID	BH	Test	Vertical depth (m)	Rock Type	s1		s2		s3		sH		sh	sV	Data sets		s1		s2		s3		sH		sh	sV	
order					mag	ori	mag	ori	mag	ori	mag	ori	mag	mag	Y.m.	T.Strain	mag	ori	mag	ori	mag	ori	mag	ori	mag	mag	
1	KFK001	1.1	11.48	Granite to granodiorite	G	P	P	P	R	G	G	P	P	R	C	B	B-G	B-P	B-P	B-P	B-R	B-G	B-G	B-P	B-P	B-R	
2	KFK001	1.2	28.97	Granitic gneiss	M	M	M	P	R	G	M	M	P	R	C	B	B-M	B-M	B-M	B-P	B-R	B-G	B-M	B-M	B-P	B-R	
3	KFK001	1.3	29.57	Granitic gneiss	G	M	P	M	R	G	M	P	P	R	C	B	B-G	B-M	B-P	B-M	B-R	B-G	B-M	B-P	B-P	B-R	
4	KFK001	1.4	47.98	Granitic gneiss	M	M	M	M	R	M	M	M	R	R	C	B	B-M	B-M	B-M	B-M	B-R	B-M	B-M	B-M	B-R	B-R	
5	KFK001	2.1	69.02	Granitic gneiss	G	M	M	M	R	G	G	M	P	R	C	B	B-G	B-M	B-M	B-M	B-R	B-G	B-G	B-M	B-P	B-R	
6	KFK001	2.2	87.61	Granitic gneiss	M	M	P	M	R	G	P	M	R	R	C	B	B-M	B-M	B-P	B-M	B-R	B-G	B-P	B-M	B-R	B-R	
7	KFK001	2.3	88.23	Granitic gneiss	G	M	P	P	R	G	G	M	P	R	C	B	B-G	B-M	B-P	B-P	B-R	B-G	B-G	B-M	B-P	B-R	
8	KFK001	3:1	131.22	Granitic gneiss	G	R	M	R	R	P	G	P	P	M	B	B	B-M	B-R	B-M	B-R	B-R	B-P	B-M	B-P	B-P	B-M	
9	KFK001	3:2	131.79	Granitic gneiss	G	M	G	R	R	R	G	M	P	G	B	B	B-G	B-M	B-G	B-R	B-R	B-R	B-G	B-M	B-P	B-G	
10	KFK001	3:3	132.35	Granitic gneiss	G	P	M	P	R	P	G	P	P	G	B	B	B-M	B-P	B-M	B-P	B-R	B-P	B-M	B-P	B-P	B-M	
11	KFK001	3:4	134.02	Granitic gneiss	G	M	M	R	R	R	G	P	R	G	B	B	B-M	B-M	B-M	B-R	B-R	B-R	B-M	B-P	B-R	B-M	
12	KFK001	4:1	163.15	Granitic gneiss	G	R	M	R	R	R	G	P	R	M	B	B	B-M	B-R	B-M	B-R	B-R	B-R	B-M	B-P	B-R	B-M	
13	KFK001	4:2	164.41	Granitic gneiss	G	M	P	P	R	P	G	G	R	P	B	B	B-M	B-M	B-P	B-P	B-R	B-P	B-M	B-G	B-R	B-P	
14	KFK001	5:1	192.38	Granitic gneiss	G	M	M	P	R	P	G	M	R	M	B	B	B-G	B-M	B-M	B-P	B-R	B-P	B-G	B-M	B-R	B-M	
15	KFK001	5:2	193.00	Granitic gneiss	G	G	P	G	R	G	G	G	P	G	B	B	B-M	B-G	B-P	B-G	B-R	B-G	B-M	B-G	B-P	B-M	
16	KFK001	6:1	216.51	Granitic gneiss	G	M	P	R	R	M	G	P	R	M	B	B	B-M	B-M	B-P	B-R	B-R	B-M	B-M	B-P	B-R	B-M	
17	KFK001	6:2	217.24	Granitic gneiss	G	G	M	M	R	M	G	G	P	M	B	B	B-G	B-G	B-M	B-M	B-R	B-M	B-G	B-G	B-P	B-M	
18	KFK001	6:3	244.55	Granite to granodiorite	G	R	G	R	R	R	G	G	P	M	B	B	B-M	B-R	B-M	B-R	B-R	B-R	B-M	B-G	B-P	B-M	
19	KFK001	7:1	273.26	Granite to granodiorite	G	G	G	G	R	M	G	G	P	M	B	B	B-G	B-G	B-G	B-G	B-R	B-M	B-G	B-G	B-P	B-M	
20	KFK001	7:2	273.93	Granite to granodiorite	G	G	G	M	R	R	G	G	P	M	B	B	B-G	B-G	B-G	B-M	B-R	B-R	B-G	B-G	B-P	B-M	
21	KFK001	8:1	297.32	Granite to granodiorite	G	G	G	M	R	R	G	G	P	M	B	B	B-G	B-G	B-G	B-M	B-R	B-R	B-G	B-G	B-P	B-M	
22	KFK001	8:2	297.95	Granite to granodiorite	G	G	M	M	R	P	G	P	M	G	B	B	B-G	B-G	B-M	B-M	B-R	B-P	B-G	B-P	B-M	B-G	
23	KFK001	9.1	372.25	Granite to granodiorite	G	G	M	G	R	P	G	G	P	P	C	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-P	
24	KFK001	9.2	374.99	Granite to granodiorite	G	G	M	G	R	P	G	G	P	P	C	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-P	
25	KFK001	9.3	375.78	Granite to granodiorite	G	G	M	G	R	R	G	G	M	P	C	B	B-G	B-G	B-M	B-G	B-R	B-R	B-G	B-G	B-M	B-P	
26	KFK001	10:1	420.20	Granite to granodiorite	G	G	M	G	R	P	G	G	P	M	C	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-M	
27	KFK001	10:2	458.10	Granite to granodiorite	G	G	G	M	P	R	G	G	P	G	C	B	B-G	B-G	B-G	B-M	B-P	B-R	B-G	B-G	B-P	B-G	
28	KFK001	11:1	483.34	Granitic gneiss	G	G	M	M	P	P	G	G	P	M	C	B	B-G	B-G	B-M	B-M	B-P	B-P	B-G	B-G	B-P	B-M	
29	KFK001	11:2	497.49	Granitic gneiss	G	G	G	G	R	R	G	G	P	M	C	B	B-G	B-G	B-G	B-G	B-R	B-R	B-G	B-G	B-P	B-M	
30	KFK001	11:3	499.38	Granitic gneiss	G	G	M	G	R	P	G	G	P	M	C	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-M	
31	KFK003	1:1	19.17	Granite to granodiorite	G	P	M	P	R	G	G	M	P	R	B	B	B-G	B-P	B-M	B-P	B-R	B-G	B-G	B-M	B-P	B-R	
32	KFK003	1:2	19.78	Granite to granodiorite	G	M	M	P	R	M	G	P	P	M	B	B	B-G	B-M	B-M	B-P	B-R	B-M	B-G	B-P	B-P	B-M	
33	KFK003	1:3	20.33	Granite to granodiorite	G	M	M	R	R	M	G	M	P	M	B	B	B-G	B-M	B-M	B-R	B-R	B-M	B-G	B-M	B-P	B-M	
34	KFK003	3:1	70.14	Granitic gneiss	G	P	M	P	R	M	G	M	P	M	B	B	B-M	B-P	B-M	B-P	B-R	B-M	B-M	B-M	B-P	B-M	
35	KFK003	3:2	70.72	Granitic gneiss	G	R	M	R	R	G	G	M	P	R	B	B	B-G	B-R	B-M	B-R	B-R	B-G	B-G	B-M	B-P	B-R	
36	KFK003	4:1	100.54	Granitic gneiss	G	G	M	G	R	R	G	G	P	P	B	B	B-G	B-G	B-M	B-G	B-R	B-R	B-G	B-G	B-P	B-P	
37	KFK003	4:2	101.15	Granitic gneiss	G	G	M	G	R	R	G	G	P	P	B	B	B-G	B-G	B-M	B-G	B-R	B-R	B-G	B-G	B-P	B-P	
38	KFK003	4:3	101.75	Granitic gneiss	G	G	G	G	R	P	G	G	P	P	B	B	B-G	B-G	B-G	B-G	B-R	B-P	B-G	B-G	B-P	B-P	
39	KFK003	5:1	132.22	Granitic gneiss	G	G	G	M	R	M	G	G	P	M	B	B	B-M	B-G	B-M	B-M	B-R	B-M	B-M	B-G	B-P	B-M	
40	KFK003	5:2	132.83	Granitic gneiss	G	M	M	R	R	R	M	M	R	P	B	B	B-M	B-M	B-M	B-R	B-R	B-R	B-M	B-M	B-R	B-P	
41	KFK003	5:3	133.45	Granitic gneiss	G	G	G	M	R	P	G	M	P	R	B	B	B-G	B-G	B-G	B-M	B-R	B-P	B-G	B-M	B-P	B-R	
42	KFK003	6:1	151.30	Granitic gneiss	G	M	G	G	R	M	M	P	P	M	B	B	B-P	B-M	B-P	B-G	B-R	B-M	B-P	B-P	B-P	B-P	
43	KFK003	6:2	151.90	Granitic gneiss	G	M	G	M	R	R	G	G	P	G	B	B	B-M	B-M	B-M	B-M	B-R	B-R	B-M	B-G	B-P	B-M	
44	KFK003	7:1	183.92	Granitic gneiss	G	G	G	M	R	P	G	G	P	G	B	B	B-G	B-G	B-G	B-M	B-R	B-P	B-G	B-G	B-P	B-G	
45	KFK003	7:2	184.97	Granitic gneiss	G	G	G	M	R	P	G	G	P	M	B	B	B-M	B-G	B-M	B-M	B-R	B-P	B-M	B-G	B-P	B-M	
46	KFK003	8:1	214.76	Granitic gneiss	G	G	G	M	R	R	G	G	P	G	B	B	B-G	B-G	B-G	B-M	B-R	B-R	B-G	B-G	B-P	B-G	
47	KFK003	8:2	215.37	Granitic gneiss	G	G	M	G	R	P	G	G	P	M	B	B	B-G	B-G	B-M	B-G	B-R	B-P	B-G	B-G	B-P	B-M	
48	KFK003	8:3	215.97	Granitic gneiss	G	M	M	P	R	P	G	M	P	M	B	B	B-G	B-M	B-M	B-P	B-R	B-P	B-G	B-M	B-P	B-M	
49	KFK003	9:1	244.75	Granite to granodiorite	G	G	M	G	G	P	G	G	P	G	B	B	B-G	B-G	B-M	B-G	B-G	B-P	B-G	B-G	B-P	B-G	
50	KFK003	9:2	245.44	Granite to granodiorite	G	M	M	M	R	P	G	M	P	M	B	B	B-G	B-M	B-M	B-M	B-R	B-P	B-G	B-M	B-P	B-M	
51	KFK041		3.31	Granitic gneiss											C	C											
52	KFK041		4.42	Granitic gneiss											C	C											
53	KFK041		12.82	Granite to granodiorite											C	C											
54	KFK041		13.21	Granite to granodiorite											C	C											
55	KFK041		13.91	Granite to granodiorite											C	C											
56	KFK041		20.62	Granite to granodiorite											C	C											
57	KFK041		28.82	Granitic gneiss											C	C											
58	KFK041		28.41	Granite to granodiorite											C	C											

SICADA																	
					s1			s2			s3						
ID order	BH	Test	Vertical depth (m)	Rock Type	Mag. [MPa]	Dip [°]	Bearing [°]	Mag. [MPa]	Dip [°]	Bearing [°]	Mag. [MPa]	Dip [°]	Bearing [°]	sH MPa	Bearing [°]	sh MPa	sV MPa
59	KFM01B	1:4:1	229.46	Granite	50.5	42.4	101.6	37.4	38.9	324.0	29.6	22.8	214.2	44.1	112.5	31.3	42.2
60	KFM01B	1:4:1	229.46	Granite	41.3	6.0	104.4	21.9	33.9	198.5	6.9	55.4	5.6	41.0	102.7	17.1	11.9
61	KFM01B	1:5:1	230.49	Granite to granodiorite	38.7	12.4	281.7	22.3	18.9	187.3	15.6	67.1	43.1	37.7	103.3	21.6	17.4
62	KFM01B	1:7:1	232.46	Granite	40.2	12.1	288.6	32.4	16.9	194.9	19.0	69.0	52.7	39.4	114.2	31.1	21.1
63	KFM01B	2:1:3	390.27	Granite to granodiorite	56.0	35.4	222.0	36.5	50.0	74.3	15.7	16.2	323.9	49.1	49.1	17.7	41.4
64	KFM01B	2:3:1	395.86	Granite to granodiorite	42.3	28.0	140.7	25.2	33.7	30.0	10.3	43.4	260.9	37.2	151.6	18.6	21.9
65	KFM01B	2:5:1															
66	KFM01B	2:8:2	451.82	Granite to granodiorite	46.8	23.4	155.9	14.5	62.2	11.0	10.0	14.3	252.2	41.7	156.8	10.4	19.3
67	KFM01B	2:9:1	453.04	Granite	19.5	13.7	132.0	2.6	34.4	32.4	-3.1	52.2	240.4	18.4	134.1	0.7	0.0
68	KFM02B	1:7:1	104.45	Granite	10.8	6.2	113.6	4.8	25.8	20.6	-1.0	63.4	216.0	10.7	115.6	3.7	0.2
69	KFM02B	1:13:3	126.22	Granite	8.8	19.6	167.4	-0.4	12.6	72.9	-6.9	66.4	312.0	7.1	171.0	-0.8	-4.8
70	KFM02B	1:17:2	134.48	Granite	15.1	14.8	125.8	4.9	10.7	218.7	2.3	71.6	343.2	14.2	125.1	4.8	3.2
71	KFM02B	2:1:3	146.86	Granodiorite	13.7	58.9	138.4	11.9	25.0	357.8	3.4	17.3	259.5	12.2	167.9	4.3	12.5
72	KFM02B	2:3:4	154.14	Granodiorite	8.3	26.0	131.8	5.1	8.8	226.1	-0.2	62.3	333.3	6.8	120.0	4.9	1.6
73	KFM02B	2:6:2	167.88	Granodiorite	10.4	14.3	154.9	4.3	50.1	262.7	-3.3	36.3	54.1	9.9	149.9	-0.6	2.0
74	KFM02B	2:7:2	169.69	Granodiorite	20.0	11.7	152.9	9.5	19.3	247.1	4.9	67.2	33.4	19.5	151.3	9.0	6.0
75	KFM02B	3:18:1	241.62	Granite to granodiorite	21.3	4.7	127.6	11.8	30.2	220.4	5.4	59.4	29.7	21.2	126.5	10.1	7.1
76	KFM02B	3:19:1	242.55	Granite to granodiorite	15.9	10.2	139.0	11.7	14.3	231.7	1.1	72.3	14.7	15.5	133.3	11.0	2.2
77	KFM02B	3:21:1	244.87	Granite to granodiorite	16.6	10.4	130.0	8.7	18.2	223.5	1.0	68.9	11.7	16.2	127.1	7.9	2.3
78	KFM02B	4:3:1	290.42	Granite to granodiorite	16.3	1.5	296.1	8.1	43.3	204.6	3.8	46.7	27.7	16.3	116.4	6.1	5.8
79	KFM02B	4:7:1	294.23	Granite to granodiorite	14.3	7.3	324.1	5.8	78.6	93.9	3.3	8.6	233.0	14.2	143.9	3.3	5.9
80	KFM02B	4:8:1	295.08	Granite to granodiorite	14.4	2.9	280.7	7.6	5.4	190.4	0.7	83.9	38.6	14.4	101.0	7.5	0.8
81	KFM07B	1:1:1	51.88	Granodiorite	7.3	46.9	203.8	4.6	41.3	43.7	2.0	10.0	304.7	5.8	31.1	2.1	6.0
82	KFM07B	1:2:1	52.72	Granite	7.8	25.7	73.6	6.4	64.2	250.3	0.1	1.3	343.0	7.6	73.1	0.1	6.7
83	KFM07B	1:3:1	53.66	Granite	5.8	3.2	240.5	3.0	77.8	345.7	-0.1	11.7	149.9	5.8	60.2	0.0	2.9
84	KFM07B	1:4:1	54.40	Granite	15.5	51.0	325.6	8.8	17.7	78.8	1.8	33.4	181.0	10.0	106.9	5.3	10.7
85	KFM07B	1:5:1	55.57	Granite	13.5	6.9	213.0	6.8	77.7	336.9	-1.4	10.1	121.8	13.4	32.3	-1.1	6.6
86	KFM07C	1:1:5	94.76	Granite	28.0	3.0	174.8	22.0	21.4	83.6	1.5	68.4	272.3	27.9	177.2	19.2	4.3
87	KFM07C	1:2:4	100.49	Granite	26.2	9.0	169.7	12.1	22.2	263.4	1.3	65.9	59.1	25.7	167.5	10.5	3.4
88	KFM07C	2:8:1	170.15	Granite	38.5	7.5	355.2	17.4	1.3	85.4	5.1	82.4	185.1	37.9	175.1	17.4	5.7
89	KFM07C	2:9:1	171.17	Granite	23.5	1.5	175.9	8.8	2.6	266.0	4.1	87.0	56.5	23.5	175.9	85.9	4.1
90	KFM07C	2:10:1	172.19	Granite	26.3	5.2	50.7	13.1	24.9	143.1	8.3	64.5	309.8	26.1	50.0	12.3	9.3
91	KFM07C	1:4:1	104.36	Granodiorite	24.5	23.5	9.9	12.8	20.9	109.4	-2.4	57.7	236.5	21.1	178.3	10.1	3.8
92	KFM07C	2:1:3	153.93	Granodiorite	22.4	4.3	282.3	5.6	26.3	14.4	-10.2	63.3	183.7	22.2	100.9	2.5	-6.9
93	KFM07C	2:3:1	156.00	Granodiorite	27.9	0.7	139.0	13.0	8.6	48.9	6.8	81.4	233.3	27.9	139.0	12.9	7.0
94	KFM07C	2:4:1	158.31	Granodiorite	39.6	1.5	214.7	21.3	11.3	305.0	8.5	78.6	117.2	39.6	34.5	20.8	9.0
95	KFM07C	2:11:1	173.18	Granodiorite	26.8	6.1	270.4	19.7	7.4	1.2	12.2	80.4	141.3	26.6	89.5	19.6	12.5
96	KFM07C	3:1:1	187.92	Granodiorite	27.2	16.0	116.1	10.8	7.7	23.9	9.4	72.1	269.1	25.9	116.3	10.8	10.8
97	KFM07C	3:4:1	190.74	Granodiorite	22.6	22.1	326.1	9.8	45.6	80.6	7.2	36.1	218.9	20.7	144.0	8.2	10.7
98	KFM07C	3:6:1	192.70	Granodiorite	31.2	5.7	222.3	16.1	9.9	313.3	11.8	78.5	102.7	31.0	42.0	15.9	12.1
99	KFM07C	4:1:2	233.24	Granodiorite	27.1	4.9	208.3	9.3	10.2	299.2	-0.7	78.6	93.0	26.9	27.8	9.0	-0.2
100	KFM07C	4:2:3	237.87	Granite to granodiorite	47.1	18.3	323.6	26.9	43.2	71.6	17.3	41.2	216.8	44.7	139.8	21.9	24.8
101	KFM07C	4:4:2	253.81	Granite to granodiorite	32.9	11.4	2.6	15.6	41.0	102.7	7.3	46.7	260.2	32.1	0.3	11.8	11.9
102	KFM07C	5:3:4	314.56	Granite to granodiorite													

ID order	Reliability of Young's modulus					Reliability of recorded strains									
		Average													
	E-data set	E_rep. GPa	E_rt GPa	(E-E_rt)/E_rt	E-reliability	OC-data set	Stability before overcoring	All strains take place within elastic region	Reliability of transient strains	Stability of transient stress magnitudes	Stability of transient stress orientations	Stress solution based on strains in the end of elastic region	Reliability for elastic stress condition with water pressure	Core disking	**Overall Strain Reliability**
59	A	57	64	-12%	G	A	G	G	G	G	G	Y	P	N	**G/P**
60	C														
61	B	57	68	-17%	G	A	G	P	M	G	G	N	P	N	**P**
62	A	68	64	5%	G	A	G	G	G	G	G	Y	P	N	**M**
63	B	68	68	0%	G	A	G	G	G	G	G	Y	P	Y	**M**
64	A	78	68	15%	M	A	M	G	G	G	G	Y	P	N	**M/P**
65	C														
66	B	78	68	15%	G	A	G	M	M	P	G	N	P	Y	**P**
67	A	53	64	-18%	G	A	G	G	M	G	G	Y	M	N	**M**
68	A	**78**	64	**21%**	M	A	G	M	P	P	G	N	G	N	**P**
69	B	**78**	64	**21%**	M	A	G	P	P	P	G	N	G	N	**P**
70	B	**78**	64	**21%**	M	A	G	P	P	P	P	N	G	N	**P**
71	A	**90**	74	**21%**	M	A	G	P	P	P	P	N	G	N	**P**
72	B	**90**	74	**21%**	M	A	G	P	P	P	P	N	G	N	**P**
73	B	**90**	74	**21%**	M	A	G	P	P	P	G	N	M	N	**P**
74	B	**90**	74	**21%**	M	A	G	G	P	P	G	N	M	N	**P**
75	A	**96**	68	**41%**	P	A	G	P	M	P	G	N	M	N	**P**
76	A	79	68	16%	G	A	G	M	M	P	G	N	G	N	**P**
77	A	77	68	14%	G	A	G	M	M	G	G	N	G	N	**M**
78	A	**96**	68	**41%**	M	A	G	P	P	P	G	N	G	N	**P**
79	B	**96**	68	**41%**	M	A	G	P	P	P	G	N	M	N	**P**
80	A	67	68	-1%	G	A	G	P	M/P	P	G	N	G	N	**M/P**
81	B	**53**	74	**-29%**	M	A	G	P	P	P	P	N	G	N	**P**
82	B	53	64	-18%	M	A	G	P	P	P	M	N	G	N	**P**
83	B	53	64	-18%	M	A	G	P	P	P	G	N	G	N	**P**
84	A	53	64	-18%	G	A	G	P	M	M	G	N	G	N	**M/P**
85	B	53	64	-18%	M	A	G	P	P	P	G	N	G	N	**P**
86	B	63	64	-2%	G	A	G	G	G	G	G	N	P	N	**G**
87	A	63	64	-2%	G	A	G	M	M	M	G	N	P	N	**M**
88	A	67	64	4%	M	A	M	M	M	P	G	N	P	N	**P/M**
89	A	**81**	64	**26%**	P	A	G	P	P	P	G	N	P	N	**P**
90	A	69	64	7%	M	A	M	P	P	P	G	N	M	N	**P**
91	A	73	74	-2%	G	A	G	M	P	M	G	N	P	N	**P/M**
92	A	71	74	-4%	M	A	G	P	P	P	G	N	P	N	**P**
93	A	**59**	74	**-21%**	P	A	G	P	P	P	G	N	P	N	**P**
94	A	64	74	-14%	G	A	G	G	M	P	G	N	P	N	**P**
95	A	**56**	74	**-24%**	G	A	M	M	M	G	G	N	G	N	**M/P**
96	A	78	74	6%	P	A	P	P	P	P	P	N	P	N	**P**
97	A	69	74	-8%	G	A	M	P	P	P	M	N	P	N	**P**
98	A	76	74	3%	G	A	M	P	P	P	G	N	P	Y	**P**
99	B	82	74	10%	G	A	G	P	P	P	G	N	P	N	**P**
100	A	**82**	68	**20%**	P	A	P	M	P	G	G	N	P	N	**P**
101	A	72	68	6%	P	A	G	M	P	P	G	N	P	Y	**P**
102	B	70	68	4%	G	A	M	M	P	P	P	N	G	Y	**P**

SICADA					Variability of stress solution										Overall reliability	
					3=low, 2=moderate, 1=high, 0=unreliable											
					s1		s2		s3		sH		sh	sV	Data sets	
ID order	BH	Test	Vertical depth (m)	Rock Type	mag	ori	mag	ori	mag	ori	mag	ori	mag	mag	Y.m.	T.Strain
59	KFM01B	1:4:1	229.46	Granite	G	P	G	P	P	P	G	G	P	M	A	A
60	KFM01B	1:4:1	229.46	Granite												
61	KFM01B	1:5:1	230.49	Granite to granodiorite	M	M	M	P	R	R	M	P	P	M	B	A
62	KFM01B	1:7:1	232.46	Granite	G	P	M	P	R	R	G	R	P	M	A	A
63	KFM01B	2:1:3	390.27	Granite to granodiorite	G	G	M	M	R	M	G	G	P	M	B	A
64	KFM01B	2:3:1	395.86	Granite to granodiorite	G	M	M	P	R	M	G	G	R	P	A	A
65	KFM01B	2:5:1														
66	KFM01B	2:8:2	451.82	Granite to granodiorite	M	G	P	P	R	M	M	G	P	P	B	A
67	KFM01B	2:9:1	453.04	Granite	M	G	P	P	R	P	P	P	R	R	A	A
68	KFM02B	1:7:1	104.45	Granite	G	M	G	M	R	P	G	M	P	R	A	A
69	KFM02B	1:13:3	126.22	Granite	P	M	R	M	M	M	R	G	R	G	B	A
70	KFM02B	1:17:2	134.48	Granite	M	M	M	M	R	R	P	M	R	R	B	A
71	KFM02B	2:1:3	146.86	Granodiorite	P	P	M	P	R	M	M	P	R	P	A	A
72	KFM02B	2:3:4	154.14	Granodiorite	R	G	P	M	R	M	R	P	R	G	B	A
73	KFM02B	2:6:2	167.88	Granodiorite	M	M	R	M	R	M	M	G	R	R	B	A
74	KFM02B	2:7:2	169.69	Granodiorite	M	G	M	G	R	P	M	G	P	R	B	A
75	KFM02B	3:18:1	241.62	Granite to granodiorite	G	M	M	P	R	R	G	M	P	M	A	A
76	KFM02B	3:19:1	242.55	Granite to granodiorite	G	P	G	P	R	R	G	G	P	R	A	A
77	KFM02B	3:21:1	244.87	Granite to granodiorite	G	M	P	M	R	P	G	M	P	R	A	A
78	KFM02B	4:3:1	290.42	Granite to granodiorite	M	M	M	M	R	R	M	P	P	M	A	A
79	KFM02B	4:7:1	294.23	Granite to granodiorite	M	M	M	R	R	P	M	M	P	P	B	A
80	KFM02B	4:8:1	295.08	Granite to granodiorite	G	G	G	M	R	P	G	G	M	P	A	A
81	KFM07B	1:1:1	51.88	Granodiorite	M	M	P	P	R	M	P	G	R	M	B	A
82	KFM07B	1:2:1	52.72	Granite	R	G	M	P	R	G	P	G	R	M	B	A
83	KFM07B	1:3:1	53.66	Granite	R	G	R	R	R	G	P	G	R	R	B	A
84	KFM07B	1:4:1	54.40	Granite	G	M	P	P	R	P	P	R	R	P	A	A
85	KFM07B	1:5:1	55.57	Granite	M	G	P	P	R	P	M	G	G	M	B	A
86	KFM07C	1:1:5	94.76	Granite	G	G	P	G	R	P	G	G	P	R	B	A
87	KFM07C	1:2:4	100.49	Granite	G	R	P	P	R	R	G	P	P	R	A	A
88	KFM07C	2:8:1	170.15	Granite	G	M	G	G	R	R	G	M	P	R	A	A
89	KFM07C	2:9:1	171.17	Granite	R	M	R	M	R	P	R	M	R	R	A	A
90	KFM07C	2:10:1	172.19	Granite	M	G	G	G	R	M	M	G	P	P	A	A
91	KFM07C	1:4:1	104.36	Granodiorite	G	G	M	G	R	P	G	G	P	G	A	A
92	KFM07C	2:1:3	153.93	Granodiorite	P	G	P	G	R	P	P	G	R	G	A	A
93	KFM07C	2:3:1	156.00	Granodiorite	R	M	R	G	M	R	M	G	G	M	A	A
94	KFM07C	2:4:1	158.31	Granodiorite	G	M	M	G	R	P	G	M	P	M	A	A
95	KFM07C	2:11:1	173.18	Granodiorite	G	G	M	G	R	P	G	G	P	R	A	A
96	KFM07C	3:1:1	187.92	Granodiorite	P	P	R	R	R	R	P	P	R	R	A	A
97	KFM07C	3:4:1	190.74	Granodiorite	G	M	G	P	R	R	G	M	P	P	A	A
98	KFM07C	3:6:1	192.70	Granodiorite	M	G	G	M	R	P	M	G	M	M	A	A
99	KFM07C	4:1:2	233.24	Granodiorite	P	M	M	G	R	R	P	M	P	R	B	A
100	KFM07C	4:2:3	237.87	Granite to granodiorite	G	M	P	M	R	R	M	P	P	R	A	A
101	KFM07C	4:4:2	253.81	Granite to granodiorite	G	G	M	G	R	P	G	G	P	M	A	A
102	KFM07C	5:3:4	314.56	Granite to granodiorite	P	G	P	G	R	P	P	G	P	G	B	A

	Overall reliability										Notes
	Worst of columns:										
	X,AI,AK	AI, ALL	X,AI,AM	AI,AN	X,AI,AO	AI,AP	X,AI,AR	AI,AS	X,AI,AT	X,AI,AU	
	s1		s2		s3		sH		sh	sV	
ID order	mag	ori	mag	ori	mag	ori	mag	ori	mag	mag	
59	A-M	A-P	A-M	A-P	A-P	A-P	A-M	A-M	A-P	A-M	Transient strains ranking Good but interpreted stresses strongly rotated indicating anomaly or unreliability. Vertical stress 6.8 times gravitational and core disking should have taken place. Strain ranking reduced to moderate
60											
61	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P	
62	A-M	A-P	A-M	A-P	A-R	A-R	A-M	A-R	A-P	A-M	
63	A-M	A-M	A-M	A-M	A-R	A-M	A-M	A-M	A-P	A-M	Measurement disregarded and not included in the SICADA database since test 2:1:3 showed very high stresses and different orientation compared to all other measurements probably due to the difference in rock type with predominantly more pegmatite. The values have been added from SKB P-04-83 (Sjöberg 2004) for completeness.
64	A-M	A-M	A-M	A-P	A-R	A-M	A-M	A-M	A-R	A-P	Rosette 1 unstable before and after measurement. All principal stresses rotated 28 - 47 degrees from horizontal/vertical alignment, interpreted vertical stress 2.0 times gravitational - all indicating low reliability.
65											
66	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P	
67	A-M	A-M	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-R	Measurement disregarded and not included in the SICADA database since test 2:9:1 gave significantly lower stress magnitudes than other nearby measurements, probably due to the difference in rock type with predominantly more pegmatite. The values have been added from SKB P-04-83 (Sjöberg 2004) for completeness.
68	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-R	
69	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P	A-R	A-P	
70	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-R	A-R	
71	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P	
72	A-R	A-P	A-P	A-P	A-R	A-P	A-R	A-P	A-R	A-P	
73	A-P	A-P	A-R	A-P	A-R	A-P	A-P	A-P	A-R	A-R	
74	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-R	
75	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P	
76	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-R	
77	A-M	A-M	A-P	A-M	A-R	A-P	A-M	A-M	A-P	A-R	
78	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P	
79	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P	A-P	
80	A-M	A-M	A-M	A-M	A-R	A-P	A-M	A-M	A-M	A-P	High drift of all tangential and inclined gauges. Drifting could be temperature related being equal to equally oriented gauges.
81	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P	
82	A-R	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P	
83	A-R	A-P	A-R	A-R	A-R	A-P	A-P	A-P	A-R	A-R	
84	A-M	A-M	A-P	A-P	A-R	A-P	A-P	A-R	A-R	A-P	High to moderate drift on most strained gauges, not associated with temperature because it is uneven for equally oriented gauges. Major principal stress has high plunge of 51 degrees, vertical stress 5.6 times the weight of overburden - both indicate low reliability.
85	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P	
86	A-G	A-G	A-P	A-G	A-R	A-P	A-G	A-G	A-P	A-R	
87	A-M	A-R	A-P	A-P	A-R	A-R	A-M	A-P	A-P	A-R	
88	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-R	High drift of most strained gauges, not associated with temperature because it is uneven for equally oriented gauges.
89	A-R	A-P	A-R	A-P	A-R	A-P	A-R	A-P	A-R	A-R	
90	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P	
91	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P	Selection of stress calculation strains is weird. Moderate drift of almost all gauges, could be associated with temperature because it is similar on all equally oriented gauges.
92	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-R	A-P	
93	A-R	A-P	A-R	A-P	A-P	A-R	A-P	A-P	A-P	A-P	
94	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P	
95	A-M	A-M	A-M	A-M	A-R	A-P	A-M	A-M	A-P	A-R	Moderate to high drift of gauges 5,6 and 8 lasting over elastic transient strain range. Noteworthy is the instability of gauge 5. Both strain picking times questionable
96	A-P	A-P	A-R	A-R	A-R	A-R	A-P	A-P	A-R	A-R	
97	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-P	
98	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P	
99	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-R	
100	A-P	A-P	A-P	A-P	A-R	A-R	A-P	A-P	A-P	A-R	
101	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P	
102	A-P	A-P	A-P	A-P	A-R	A-P	A-P	A-P	A-P	A-P	Values from this overcoring measurement are not included in this Appendix 2, since there is no entry for this test in the SICADA database and the measurement values were partially reported in the background report SKB P-07-130 (Lindfors et al 2007), as the test was considered rejected.

SICADA

ID order	BH	Test	Vertical depth (m)	Rock Type	s1 Mag. [MPa]	s1 Dip [°]	s1 Bearing [°]	s2 Mag. [MPa]	s2 Dip [°]	s2 Bearing [°]	s3 Mag. [MPa]	s3 Dip [°]	s3 Bearing [°]	sH MPa	Bearing [°]	sh MPa	sV MPa
103	KFR27		37.91	Pegmatitic granite	11.1	48.1	160.1	7.7	28.1	286.6	28.0	28.2	33.3	8.8	132.6	4.3	8.5
104	KFR27		38.56	Pegmatitic granite	17.0	21.8	126.4	4.7	39.5	17.2	-0.6	42.6	238.0	15.0	130.8	2.1	4.0
105	KFR27		66.75	Granitic gneiss	16.4	6.5	119.3	7.7	22.8	26.5	4.5	66.2	224.3	16.2	120.1	7.2	5.1
106	KFR27		67.43	Granitic gneiss	17.3	2.3	293.8	9.9	26.5	202.7	7.0	63.4	28.3	17.2	114.1	9.3	7.6
107	KFR27		96.92	Granitic gneiss	17.4	2.9	300.2	6.9	36.9	208.1	5.2	52.9	34.1	17.3	120.5	6.3	5.8
108	KFR27		97.58	Granitic gneiss	16.8	4.8	331.9	3.9	16.8	63.4	0.5	72.5	226.4	16.7	151.6	3.6	0.9
109	KFR27		98.29	Granitic gneiss	19.1	2.8	122.3	11.5	14.5	31.6	1.4	75.3	223.1	19.0	123.2	10.9	2.1
110	KFR27		139.12	Granitic gneiss	26.2	7.5	249.5	21.2	21.7	342.5	5.4	66.9	141.6	26.0	63.6	19.0	8.0
111	KFR27		139.78	Granitic gneiss	13.9	17.5	51.9	1.2	52.9	297.1	-2.3	31.5	153.0	12.7	53.8	-1.3	1.4
112	KFR27		140.46	Granitic gneiss	16.9	3.9	161.0	12.5	5.2	251.3	1.5	83.4	34.1	16.8	160.1	12.4	1.6
113	KFR51		58.16	Pegmatitic granite	8.8	1.2	156.3	6.5	10.4	66.1	2.2	79.5	253.0	8.8	156.7	6.3	2.4
114	KFR51		58.45	Pegmatitic granite	7.2	5.3	320.0	-0.4	0.4	230.0	-5.2	84.7	135.9	7.1	140.0	-0.4	-5.1
115	KFR51		61.67	Pegmatitic granite	22.6	15.3	334.4	7.7	11.4	67.6	-3.3	70.8	192.8	20.9	152.0	7.2	-1.1
116	KFR51		62.02	Pegmatitic granite	21.8	4.4	159.0	3.1	52.8	254.9	2.4	36.9	65.7	21.7	158.9	2.7	3.0
117	KFR51		67.09	Granite to granodiorite	1.8	0.1	136.0	-0.1	3.8	226.0	-2.0	86.2	43.7	1.8	136.0	-0.1	-2.0
118	KFR51		67.84	Granite to granodiorite	8.3	20.6	296.3	2.3	20.1	198.4	1.1	60.6	68.0	7.4	117.8	2.1	2.1
119	KFR51		68.12	Granite to granodiorite	8.2	1.4	317.9	3.4	3.2	227.8	1.7	86.5	71.1	8.2	137.9	3.4	1.7
120	KFR51		72.59	Granite to granodiorite	4.5	0.0	170.2	3.6	32.9	260.2	1.4	57.1	80.2	4.5	170.2	3.0	2.1
121	KFR51		73.50	Granite to granodiorite	3.4	2.0	320.0	0.9	8.4	229.7	-2.3	81.3	63.6	3.4	140.4	0.8	-2.2
122	KFR51		73.89	Granite to granodiorite	9.0	25.2	335.0	6.4	41.9	220.0	0.0	37.6	86.3	8.3	169.1	2.6	4.5
123	KFR52		69.37	Pegmatitic granite	8.2	5.2	345.1	4.4	1.8	255.0	2.1	84.5	145.8	8.1	165.2	4.4	2.2
124	KFR52		69.55	Pegmatitic granite	6.6	1.1	151.1	3.9	6.8	241.2	-0.9	83.1	52.4	6.6	150.9	3.8	-0.9
125	KFR52		71.68	Pegmatitic granite	4.8	14.9	170.0	0.1	14.6	76.0	-1.6	68.9	303.4	4.4	171.4	81.4	-1.1
126	KFR52		72.48	Pegmatitic granite	13.3	0.3	329.5	8.6	4.5	59.5	-0.5	85.5	235.1	13.3	149.5	8.6	-0.5
127	KFR52		72.61	Pegmatitic granite	7.8	5.2	331.8	1.3	17.1	240.2	-6.0	72.1	78.3	7.7	153.3	0.7	-5.3
128	KFR89		10.82	Granite to granodiorite	13.4	24.8	8.1	5.9	20.2	107.9	1.3	57.1	232.5	11.5	1.8	5.2	91.8
129	KFR89		11.39	Granite to granodiorite	13.1	31.1	22.6	7.3	0.9	292.0	-0.6	58.9	200.5	9.4	24.6	7.3	114.6
130	KFR89		16.14	Granite to granodiorite	3.7	16.9	297.5	2.4	36.6	40.6	0.4	48.4	187.5	3.6	109.3	1.6	1.4
131	KFR89		16.78	Granite to granodiorite	6.4	11.8	56.0	1.1	54.7	163.2	-0.4	32.7	318.3	6.2	54.7	0.1	0.9
132	TFKB12		72.34	Granitic gneiss										15.1	156.0	7.2	
133	TFKB12		72.42	Granitic gneiss										9.0	120.0	0.5	
134	TFKB12		73.99	Granitic gneiss										12.9	135.0	5.4	
135	TFKB12		74.96	Paragneiss										13.7	156.0	2.2	

Reliability of Young's modulus / Reliability of recorded strains

ID order	E-data set	E_rep. GPa (Average)	E_rt GPa (Average)	(E-E_rt)/E_rt (Average)	E-reliability	OC-data set	Stability before overcoring	All strains take place within elastic region	Reliability of transient strains	Stability of transient stress magnitudes	Stability of transient stress orientations	Stress solution based on strains in the end of elastic region	Reliability for elastic stress condition with water pressure	Core disking	**Overall Strain Reliability**
103	B	66	60	9%	M	C									
104	C	66	60	9%	M	C									
105	B	66	70	-6%	G	C									
106	C	66	70	-6%	G	C									
107	B	68	70	-3%	G	C									
108	C	68	70	-3%	G	C									
109	B	71	70	1%	G	C									
110	B	70	70	-1%	G	C									
111	C	70	70	-1%	G	C									
112	C	70	70	-1%	G	C									
113	C	51	60	-16%	G	C									
114	B	51	60	-16%	M	C									
115	B	60	60	-1%	G	C									
116	B	64	60	6%	G	C									
117	B	**44**	68	**-35%**	M	C									
118	B	60	68	-12%	G	C									
119	B	72	68	6%	G	C									
120	B	**41**	68	**-40%**	M	C									
121	B	**39**	68	**-43%**	M	C									
122	B	66	68	-3%	G	C									
123	B	60	60	-1%	G	C									
124	B	60	60	-1%	G	C									
125	B	63	60	4%	G	C									
126	C	63	60	4%	G	C									
127	B	60	60	-1%	G	C									
128	B	**38**	68	**-44%**	M	C									
129	C	**38**	68	**-44%**	M	C									
130	B	**24**	68	**-65%**	P	C									
131	B	**33**	68	**-51%**	P	C									
132	C		70		P	C									
133	C		70		P	C									
134	C		70		P	C									
135	C		-			C									

SICADA					Variability of stress solution (3=low, 2=moderate, 1=high, 0=unreliable)										Overall reliability												Notes
ID order	BH	Test	Vertical depth (m)	Rock Type	s1 mag	s1 ori	s2 mag	s2 ori	s3 mag	s3 ori	sH mag	sH ori	sh mag	sV mag	Data sets Y.m.	Data sets T.Strain	s1 mag (Worst of columns: X,AI,AK)	s1 ori (AI, ALL)	s2 mag (X,AI,AM)	s2 ori (AI,AN)	s3 mag (X,AI,AO)	s3 ori (AI,AP)	sH mag (X,AI,AR)	sH ori (AI,AS)	sh mag (X,AI,AT)	sV mag (X,AI,AU)	
103	KFR27		37.91	Pegmatitic granite											B	C											
104	KFR27		38.56	Pegmatitic granite											C	C											
105	KFR27		66.75	Granitic gneiss											B	C											
106	KFR27		67.43	Granitic gneiss											C	C											
107	KFR27		96.92	Granitic gneiss											B	C											
108	KFR27		97.58	Granitic gneiss											C	C											
109	KFR27		98.29	Granitic gneiss											B	C											
110	KFR27		139.12	Granitic gneiss											B	C											
111	KFR27		139.78	Granitic gneiss											C	C											
112	KFR27		140.46	Granitic gneiss											C	C											
113	KFR51		58.16	Pegmatitic granite											C	C											
114	KFR51		58.45	Pegmatitic granite											B	C											
115	KFR51		61.67	Pegmatitic granite											B	C											
116	KFR51		62.02	Pegmatitic granite											B	C											
117	KFR51		67.09	Granite to granodiorite											B	C											
118	KFR51		67.84	Granite to granodiorite											B	C											
119	KFR51		68.12	Granite to granodiorite											B	C											
120	KFR51		72.59	Granite to granodiorite											B	C											
121	KFR51		73.50	Granite to granodiorite											B	C											
122	KFR51		73.89	Granite to granodiorite											B	C											
123	KFR52		69.37	Pegmatitic granite											B	C											
124	KFR52		69.55	Pegmatitic granite											B	C											
125	KFR52		71.68	Pegmatitic granite											B	C											
126	KFR52		72.48	Pegmatitic granite											C	C											
127	KFR52		72.61	Pegmatitic granite											B	C											
128	KFR89		10.82	Granite to granodiorite											B	C											
129	KFR89		11.39	Granite to granodiorite											C	C											
130	KFR89		16.14	Granite to granodiorite											B	C											
131	KFR89		16.78	Granite to granodiorite											B	C											
132	TFKB12		72.34	Granitic gneiss											C	C											
133	TFKB12		72.42	Granitic gneiss											C	C											
134	TFKB12		73.99	Granitic gneiss											C	C											
135	TFKB12		74.96	Paragneiss											C	C											

Designation	Description
G	*Good* reliability
M	*Moderate* reliability
P	*Poor* reliability
R	Rejected
A-G	*Good* reliability for stress data set A (transient strains available)
B-G	*Good* reliability for stress data set B (only final strain readings available)
C-G	*Good* reliability for stress data set C (without strains available, just interpreted in situ stress state)
A-M	*Moderate* reliability for stress data set A (transient strains available)
B-M	*Moderate* reliability for stress data set B (only final strain readings available)
C-M	*Moderate* reliability for stress data set C (without strains available, just interpreted in situ stress state)
A-P	*Poor* reliability for stress data set A (transient strains available)
B-P	*Poor* reliability for stress data set B (only final strain readings available)
C-P	*Poor* reliability for stress data set C (without strains available, just interpreted in situ stress state)
A-R	Rejected measurement for stress data set A (transient strains available)
B-R	Rejected measurement for stress data set B (only final strain readings available)
C-R	Rejected measurement for stress data set C (without strains available, just interpreted *in situ* stress state)

BH	Borehole
s1	Maximum principal stress [MPa]
s2	Intermediate principal stress [MPa]
s3	Minimum principal stress [MPa]
sH	Maximum horizontal stress [MPa]
sh	Minimum horizontal stress [MPa]
sV	Vertical stress [MPa]
E_rep	Elastic modulus presented in the SICADA report [GPa]
E_rt	Average elastic modulus per rock type [GPa]
E-E_rt	Difference between the elastic modulus presented in the SICADA report and the average elastic modulus
	|E-E_rt|>20%