Oko project, Guyana – update on structural geological architecture and controls to mineralisation

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Executive summary - I

- Deposit architecture comprises elongate quartz veins/reefs of variable width bounded by zones of intense non-coaxial shearing. Intervening intervals of host-rock is generally much less strained.
- Fabric asymmetry combined with linear kinematic indicators that developed in the final stage of shear development suggests accommodation of dominantly east-side-up, dip-slip movement with a minor component of sinistral strike-slip.
- Pre-shear shortening has been ascribed to the second deformation event, D2, which produced upright folds of a fabric, S1. F2 folds hosted east-side down, dextral shearing on their long limbs as deformation progressed. Progressive strain accumulation against the quartz reefs rotated S2 and F2 fold hinges toward parallelism with the shear reef contacts. Deformation was then accommodated in zones of high shearing strain along the reef contacts. Earlier shearing on the F2 long limbs (equivalent to D2 shears) was effectively overridden by the subsequent contact-parallel, east-side-up, sinistral shear. This process is similar to that of reactivation, which was documented and defined by Bell (1986) and Davis (1995).
- Although a continuum of deformation is envisaged from pre-shear D2 shortening with F2 fold formation through to rotation of fold hinges and subsequent fold destruction as the shear zones developed, structure populations have been separated for measurement and analysis. Under this scheme, the shear zones have been designated as D3 structures, and the shear foliation as S3. This has allowed for measurement of separate populations and incorporation into the structural database. Under this scheme, the shear zones are interpreted as forming in the local D3 event of the Oko deposit, being products of a deformation history that comprises development of composite fabrics during a protracted contractional event. As noted, folds and cleavages produced in earlier events (D1 and D2) have been progressively rotated into parallelism with the shear zones.
- A steeply pitching L33 extension lineation is well-developed in the S3 shear zones.
- Shear zone morphology is commonly litho-dependent. For example, the shears have evolved from breccias to pervasive shears in competent units, whereas they have progressed from folded ± veined intervals to ductile shears in the relatively more laminated and phyllosilicate-rich lithologies.

Executive summary - II

- Vein morphology commonly comprises shear laminations that are typically proximal to the vein – wall-rock contacts. The shear laminations very commonly represent products of deformation of wall-rock clasts that were progressively dissolved to form stylolites that in turn evolved to graphitic shears and equate to S3. A second form of mineralogically different stylolite is characterized by white mica and also hosts gold. Formation of the white mica stylolites overlapped that of the graphitic stylolites, cross-cutting the early-formed ones. Gold is interpreted as being deposited structurally late in the geological history of the deposit, being hosted dominantly by the graphitic shears and stylolites and, to a much lesser degree, the white mica-bearing stylolites.
- Grade distribution plots overlain on structural orientation data in 3D show that the permeability network for mineralising fluids was dominated by the intersection between S2 and S3 i.e. the L23 intersection lineation. L23 lineations show a range of orientations due to rotation toward the L33 extension lineation, producing non-cylindrical F23 folds. North-plunging L23 dominate and provided the primary permeability for mineralising fluids during D3, with high-grade shoot orientations paralleling this orientation. Less common L23 with low plunges to the south have provided secondary permeability.
- Dead zones in veins are to be expected. This is because the veins are simply hosts but pre-date the mineralisation. The intersection of a permeability network that has been accessed by gold-bearing fluids after vein formation is necessary to produce zones of significant mineralisation. As such, identification of competent hosts (i.e. the veins) and the prospective shears is critical. Keep in mind that other competent hosts favourable for formation of gold depositional sites (e.g. zones of alteration, rigid igneous intrusions, homogenous and massive sedimentary units), may be present.
- If all the criteria are present but grade isn't, it means we are on the prospective structure and that more drilling is justified. A lack of gold in assay means this is the cliché of a technical success and that good grades may be very close by, just not in the small-volume sample in the initial hole.
- The system will change in character, despite it being a product of a regional permeability-forming, mineralisation event. Many factors impact permeability and the creation of sites favourable to deposition of hydrothermal mineralisation, including, but not limited to:
  - Rock-type – chemical and/or structural attributes
  - Stress field variation
  - Structural architecture – pre- and syn-mineralisation
  - Rigid bodies – e.g. intrusions that impact the stress field
  - Fluid pathway and units traversed

Executive summary - III

- Brief visits were made to several of the hard-rock gold mineralization occurrences in the district, including Oko NW, Donika, Shepherds and Ameru. Several consistent litho-structural relationships were noted:
  - Mineralisation is hosted by quartz veins that are hosted in turn by carbonaceous sedimentary sequences, typically adjacent to non-argillaceous sedimentary units. Adjacent units are commonly sandstone that is relatively vein-free.
  - Gold grade vary markedly in the veins, indicating the presence of shoots separated by relatively lower-grade to gold-absent volumes.
  - The veins are deformed, displaying boudinage, shear laminations, folding and stylolite development.
  - Folds were noted adjacent to the veins and are interpreted as products of shortening strain that accumulated at the vein contacts. The axial planes and axes of the folds show progressive rotation into the shears.
  - Vein surfaces locally display well-developed lineations conforming to extension lineation populations and fold axes.
  - Kinematics on structures hosting the quartz veins are variable, depending on structure orientation and the order of the structure (e.g. first-order structures may be sinistral and deform second-order structures that are dextral).
- At the district-scale, the consistency in structural style and commonality in location of the veins within the sedimentary sequences suggests a regional-scale permeability event that localized quartz vein emplacement into favourable structural sites, which manifested as ductile shears in carbonaceous sedimentary sequences. Furthermore, the structural history and age of the veins is tentatively interpreted as being the same across the district, including at Oko Main.
- Based on the inferred similar structural age of the veins, gold is interpreted as post-dating them. This explains the variability of gold in the vein systems, with mineralization being localized in permeable zones where post-vein shears have intersected them.
- Overall, the understanding of the mineralised systems at the deposit- and district-scale has been enhanced by undertaking the fundamental tasks of resolving the geological history, dividing the geological features into discrete populations, collecting orientation data, and comparing grade/geochem trends with the geometries of structures. Continued application of this process will be critical to ongoing exploration and resource addition.

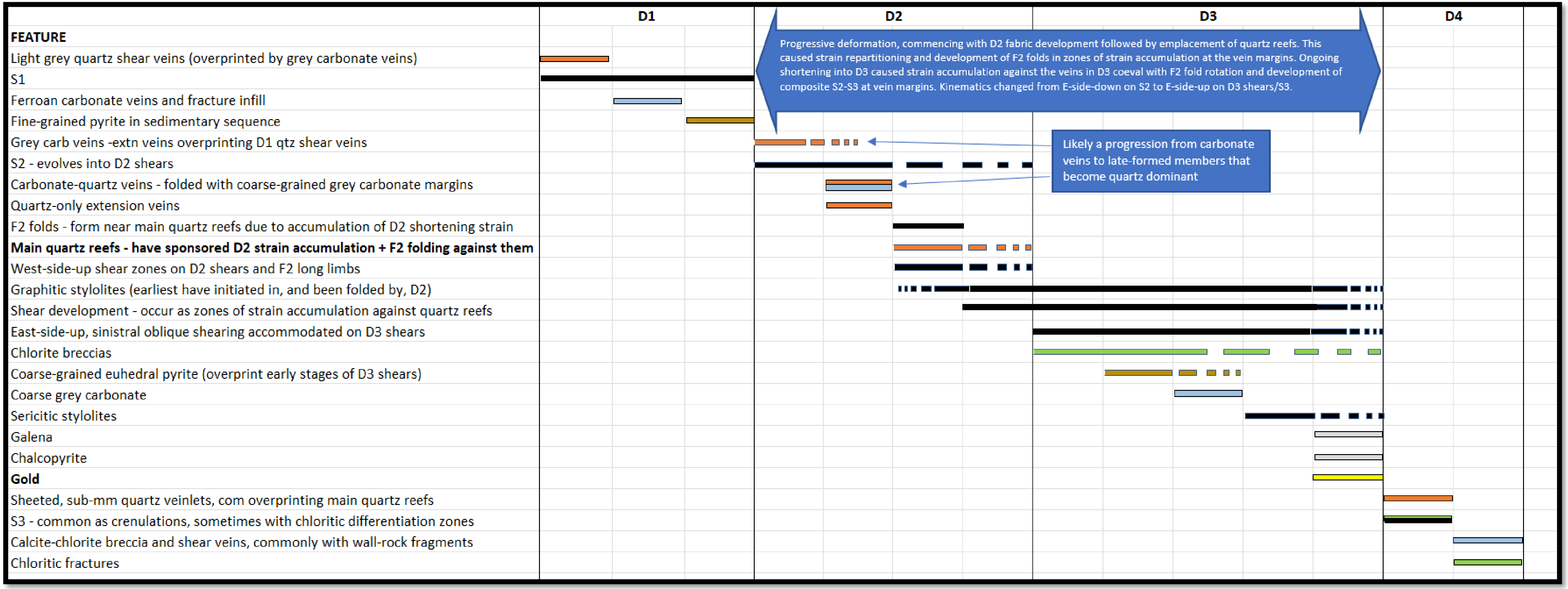
Background

- Dr Brett Davis, Olinda Gold Pty Ltd (Olinda), spent Monday 22 May to Tuesday 30 May on site at G2 Goldfield's (G2) Oko project in Guyana.
- The site visit entailed review of diamond core from the Ghanie and Oko Main deposits, combined with a visit to several prospects.
- The review was conducted in conjunction with G2 geology personnel Boaz Wade, Collin Griffith, Rondi Samdass, Andre McAlmont, and with Roopesh Sukhu in absentia.
- A geological history for the Oko-Ghanie mineralised system has been resolved based on overprinting and geometric relationships. The determination of the structural age of gold deposition allowed the identification of structures that were critical to controlling the orientation and sites of mineralisation.
- The gold-critical structures were measured in spatially oriented drill core and orientation data was plotted in 3D space and compared with gold grade data.
- This report details the findings of the review and provides insight into geological features critical to gold localisation. Importantly, these findings are discussed in terms of ongoing resource extension and exploration programs.

Geological history

The history shown in the table below has been compiled predominantly from drill holes into the Oko Main deposit, with some contributions from Ghanie.

The following slides show examples of some of the important elements of the history. Note that a detailed review of the alteration assemblages is yet to be incorporated.

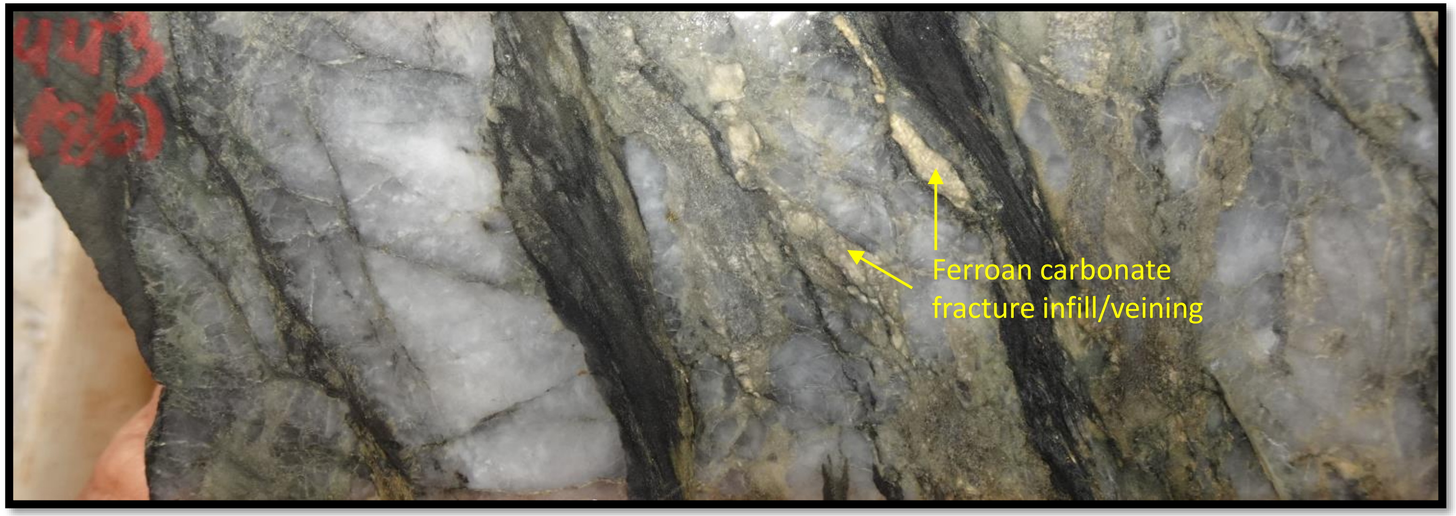


D1 quartz veins overprinted by ferroan carbonate

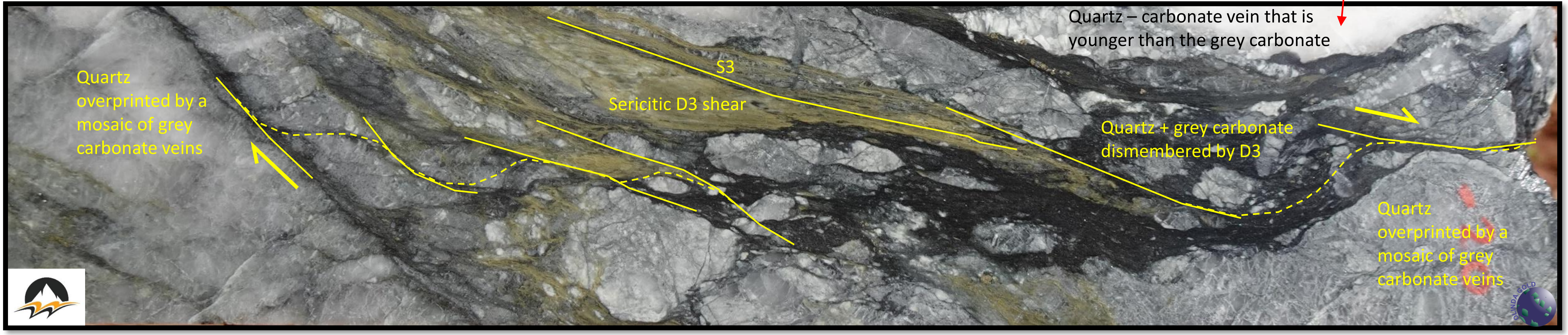
The earliest stages of hydrothermal mineral deposition recognized comprise quartz veins that are strongly ductilely and brittlely deformed.

Brittlely deformed quartz vein of this population are overprinted by fracture-filling brown ferroan carbonate (photo at right).

Subsequent carbonate deposition manifests as grey extension veins and fracture networks that commonly impart a grey colour to the quartz (photo below).



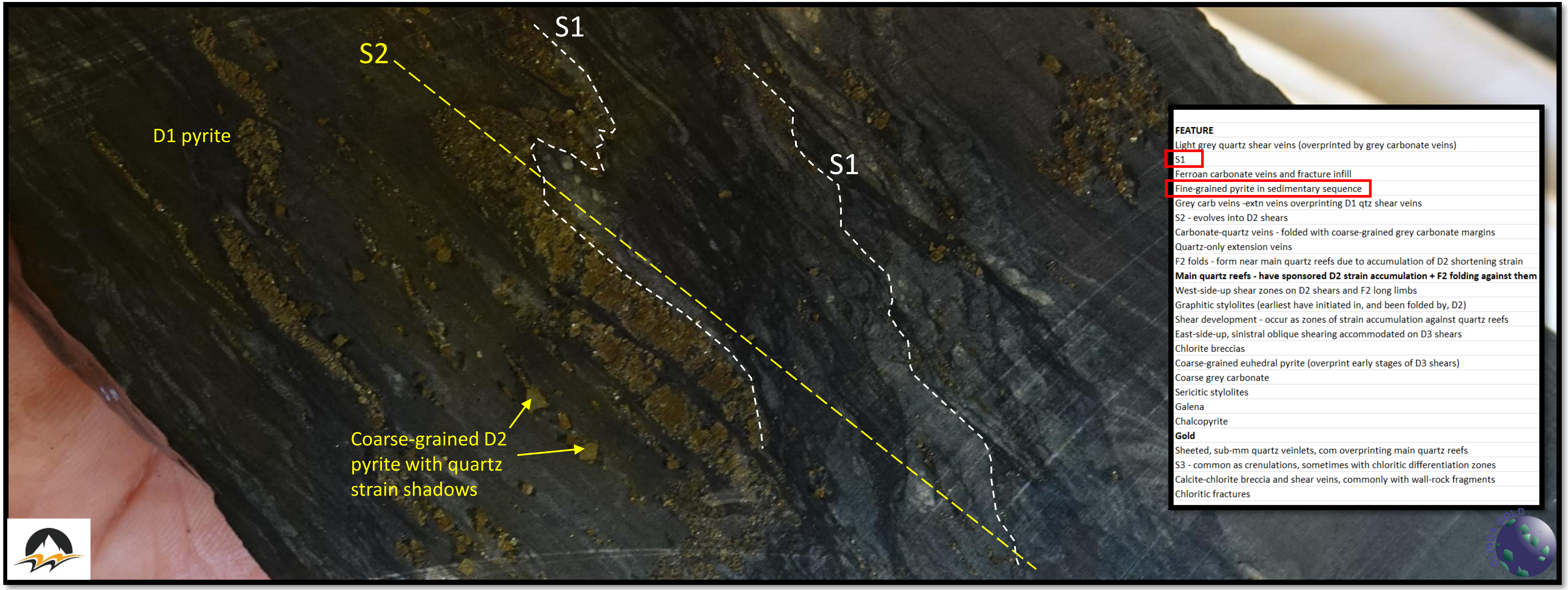
FEATURE
Light grey quartz shear veins (overprinted by grey carbonate veins)
S1
Ferroan carbonate veins and fracture infill
Fine-grained pyrite in sedimentary sequence
Grey carb veins -extn veins overprinting D1 qtz shear veins
S2 - evolves into D2 shears
Carbonate-quartz veins - folded with coarse-grained grey carbonate margins
Quartz-only extension veins
F2 folds - form near main quartz reefs due to accumulation of D2 shortening strain
Main quartz reefs - have sponsored D2 strain accumulation + F2 folding against them
West-side-up shear zones on D2 shears and F2 long limbs
Graphitic stylolites (earliest have initiated in, and been folded by, D2)
Shear development - occur as zones of strain accumulation against quartz reefs
East-side-up, sinistral oblique shearing accommodated on D3 shears
Chlorite breccias
Coarse-grained euhedral pyrite (overprint early stages of D3 shears)
Coarse grey carbonate
Sericitic stylolites
Galena
Chalcopyrite
Gold
Sheeted, sub-mm quartz veinlets, com overprinting main quartz reefs
S3 - common as crenulations, sometimes with chloritic differentiation zones
Calcite-chlorite breccia and shear veins, commonly with wall-rock fragments
Chloritic fractures



D1 pyrite

Accumulations of pyrite grains defined lithological layers that are parallel to S1 and folded by D2.

Pyrite in these layers is generally finer-grained than that noted parallel to post-D2 fabrics. As such, it is tentatively interpreted as an early stage of sulphide, although the possibility exists it is a post-D1 replacement product of lithologies of favourable composition.



D2 grey carbonate veins

Much of the carbonate associated with this stage of hydrothermal mineral deposition occurs as extensional fracture infill that cross-cuts competent D1 lithologies.

The intensity and volume of D1 carbonate veining is commonly so high in the host quartz veins that it turns them grey and masks their mineralogy.

Note that there are two stages of quartz veins over printed by the grey carbonate.

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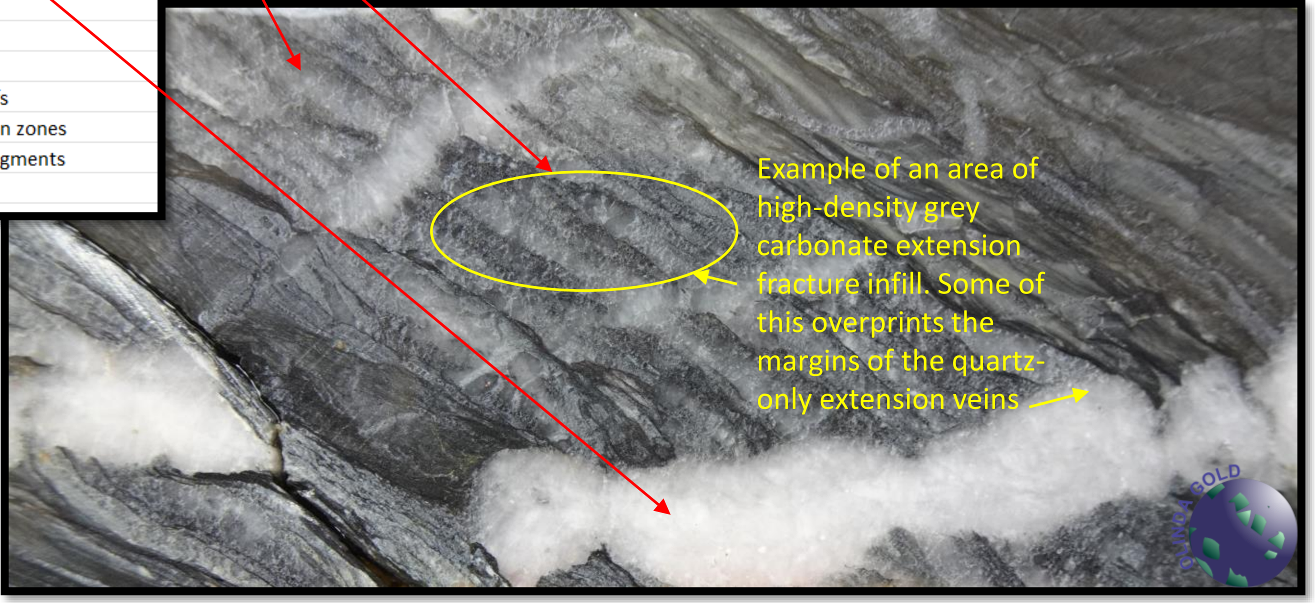

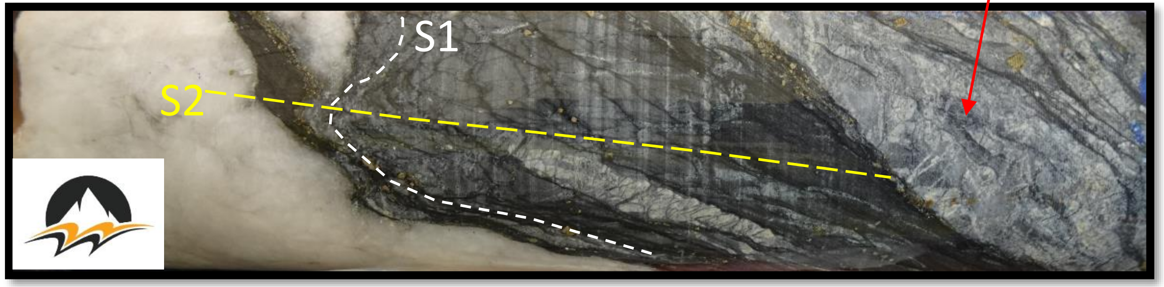

D2 and D3 - veining and deformation

The photo below is from adjacent to one of the quartz reefs. Strain has accumulated against the reefs in both D2 and D3, producing a zone of intense, foliation-dominated deformation.

Note the deflection of S2 into S3, which is the same for the segments of folded carbonate-quartz veins. This is consistent with the sinistral, E-side-up, oblique sense of shear accommodated by D3 shear zones.

Note also that the coarse-grained pyrite overgrows the S3 and is elongate in it, consistent with D3 growth.

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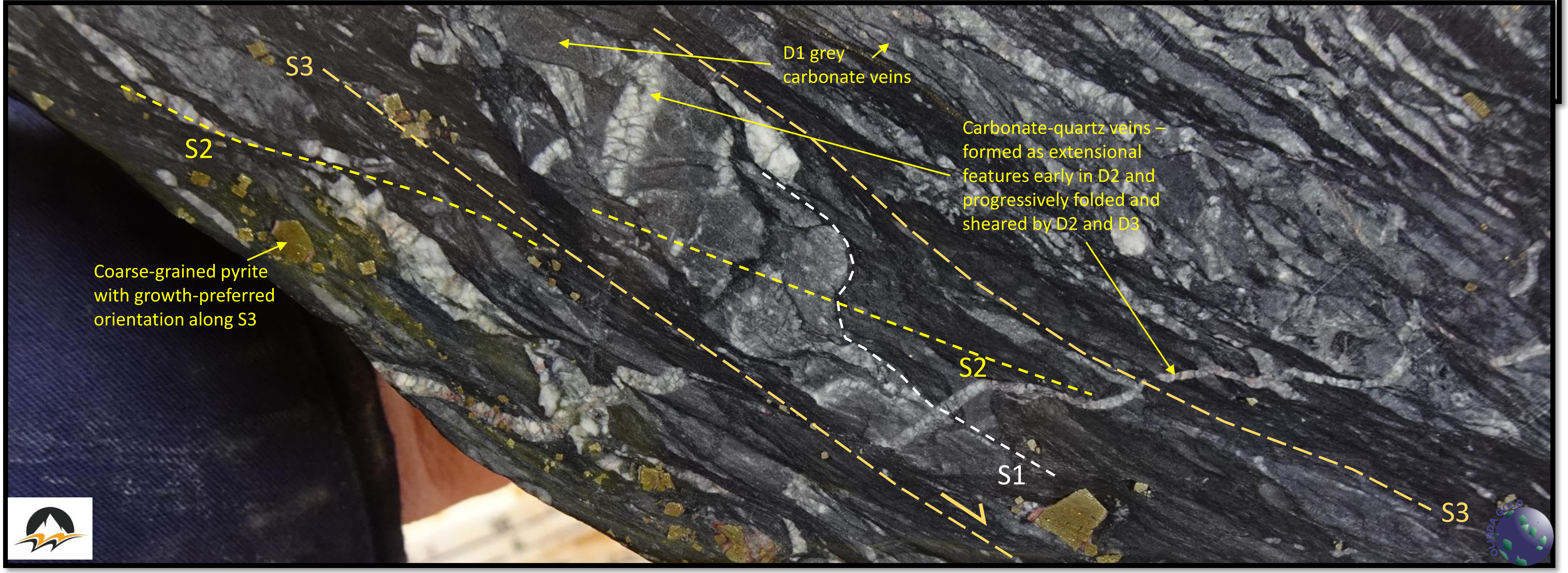


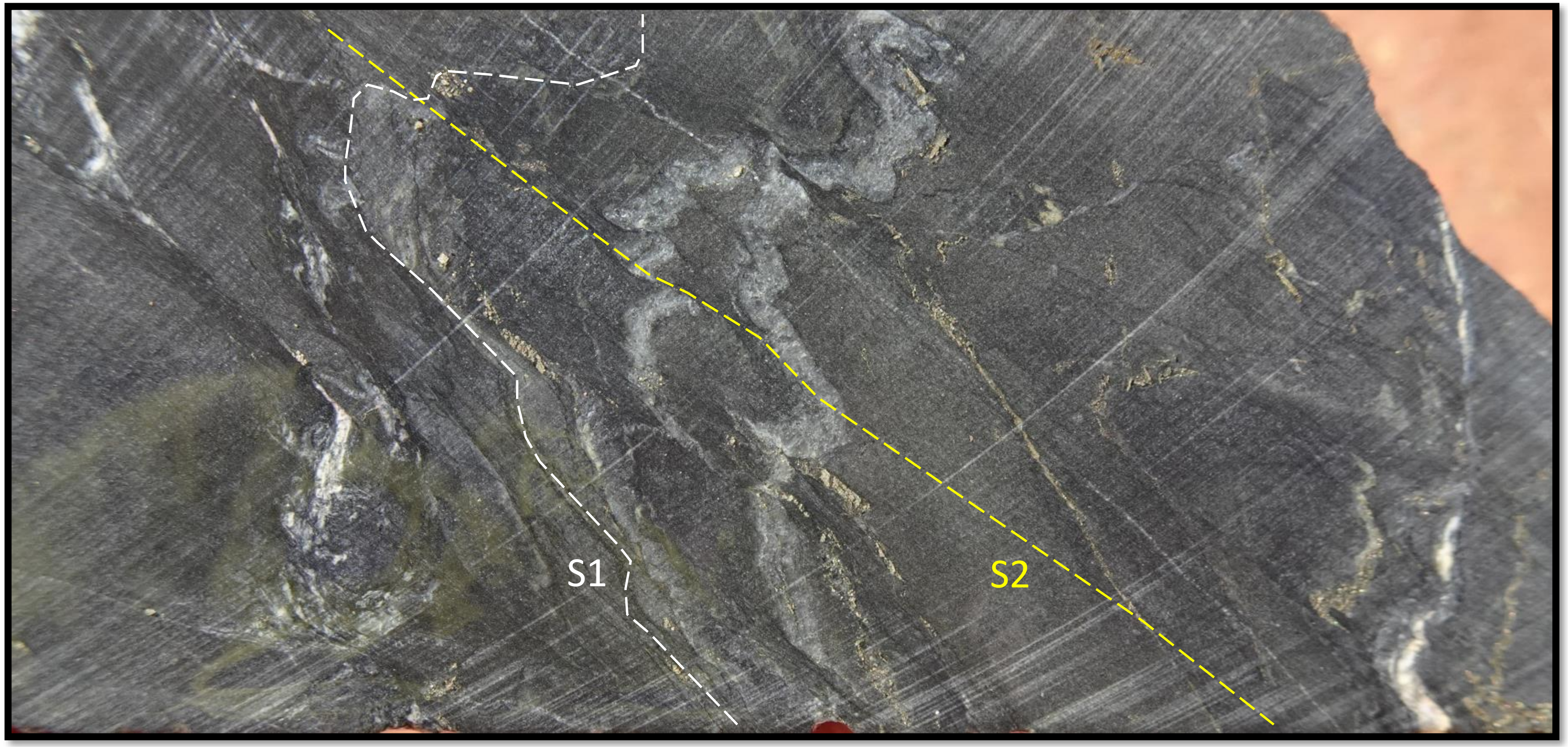
D2 and D3

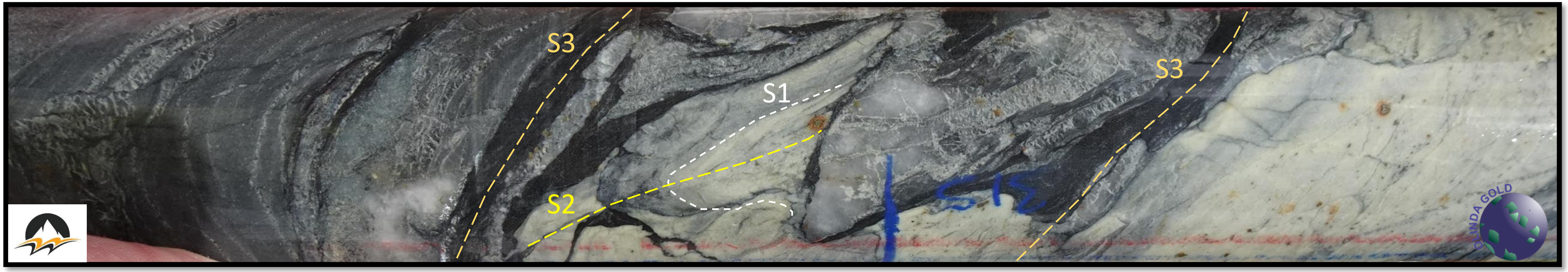
D3 rarely forms folds, being predominantly a foliation- and lineation-forming event in conjunction with shear zone development.

D3 likely represents a continuum from D2 and could be viewed as progressive deformation that overprints the earlier-formed F2-forming shortening phase of D2.

Many of the structures formed adjacent to the reefs are morphologically similar to S-C fabrics, due to the high shearing strain, and could be mistaken as such if evidence for F2 folds was not identified. That is, the structural geometries commonly manifest as asymmetric foliations wrapping into D3 high strain zones.

In detail, however, these fabrics are commonly the axial plane to folds at moderate to high angles to the D3 shears, and the drill core examined during this assignment shows abundant evidence for D2 shortening prior to reef-parallel shearing.



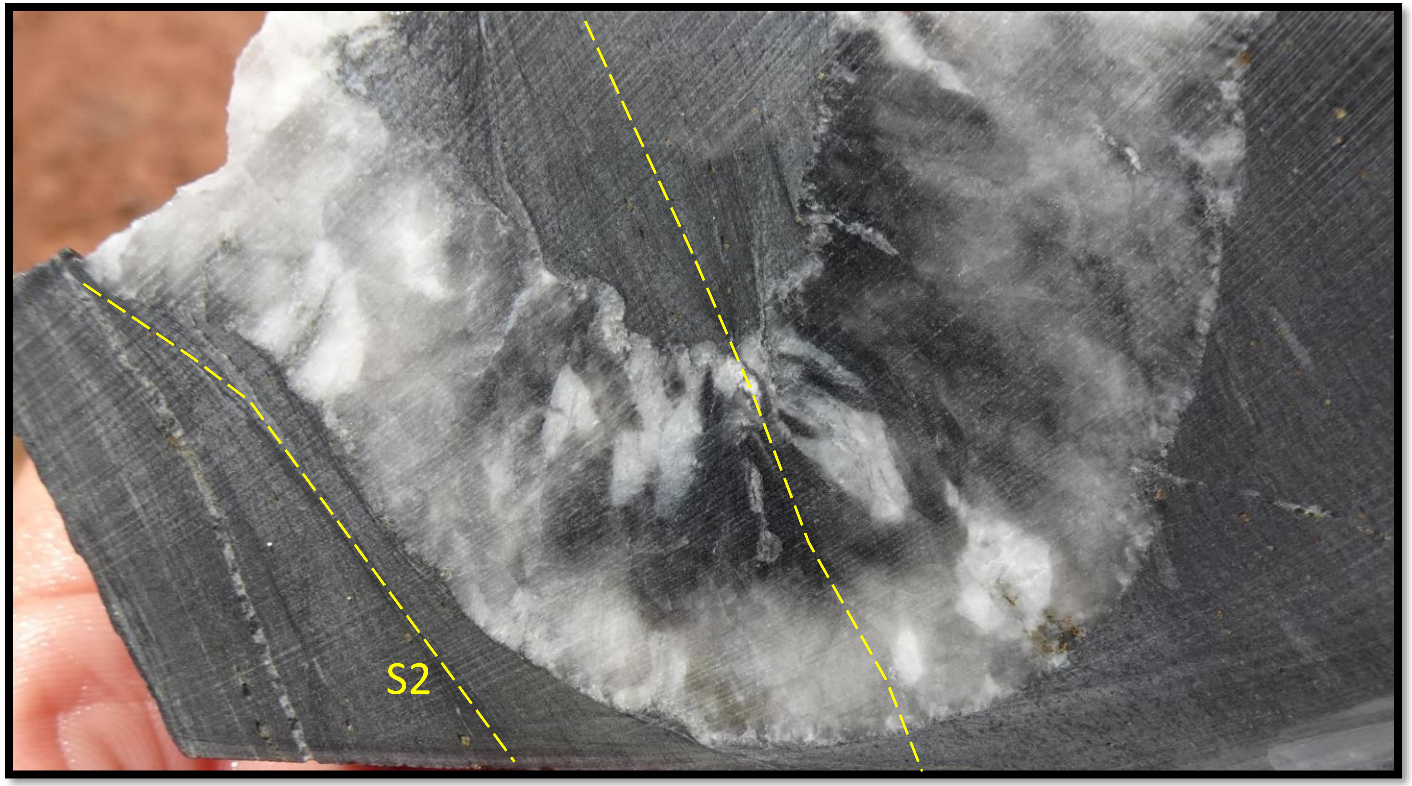


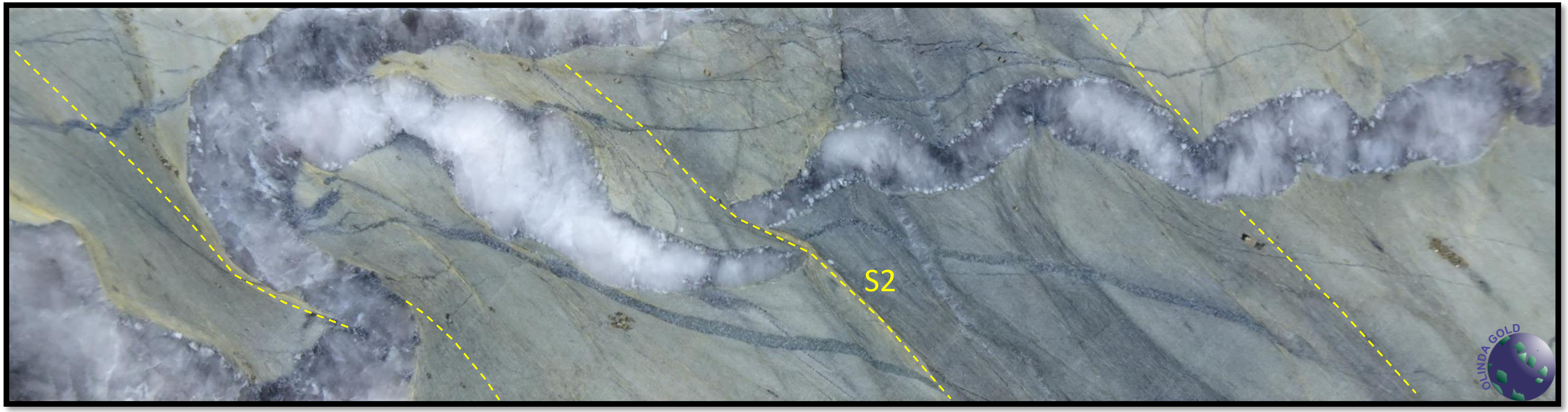
Quartz – carbonate veins

This population of veins has a distinctive rind of white to dark-grey, relatively coarse-grained carbonate lining the vein walls.

The main quartz reefs are inferred as cutting this population, which has been folded by D2 and D3.

They appear mineralogically distinct from the reefs that lack the carbonate zone at the vein margins.





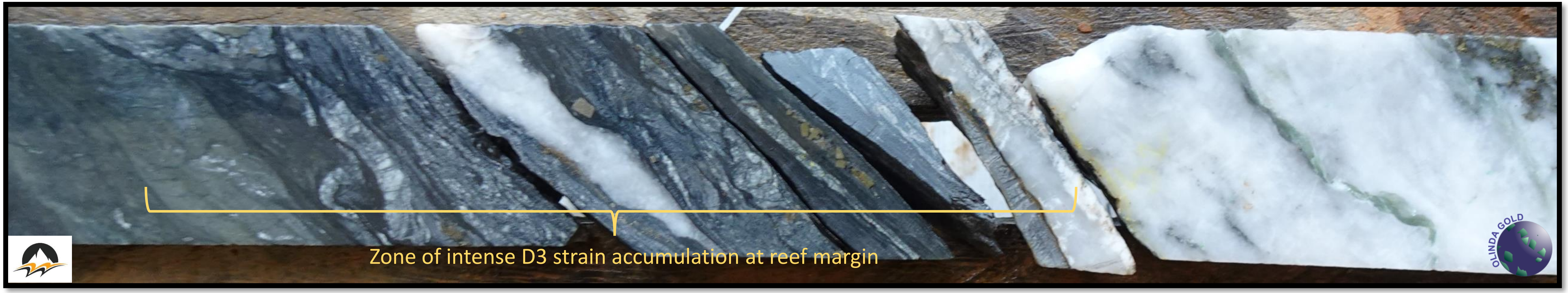
The main quartz reefs

The main quartz reefs comprising each of the mineralized zones are interpreted as being emplaced during D2, and then progressively deformed in the same event.

F2 folds are best developed adjacent to the reefs where shortening strain has accumulated (photo at right). Shortening strain progressed to intense shearing strain at the reef boundaries during the latter stages of D2 and during D3.

Lamination of the reefs occurred initially as a primary feature that manifests as elongate clasts of wall-rock subparallel to the reef margins and as subparallel veins in the adjacent wall-rock (photo below). Combined with breccia textures, this indicate emplacement as hydrothermal breccia veins and extension veins coeval with deformation.

Internal textures related to vein formation have been strongly modified by progressive D2 and D3. Primary lamination has been exploited to produce intense zones of shear lamination internal to the veins.



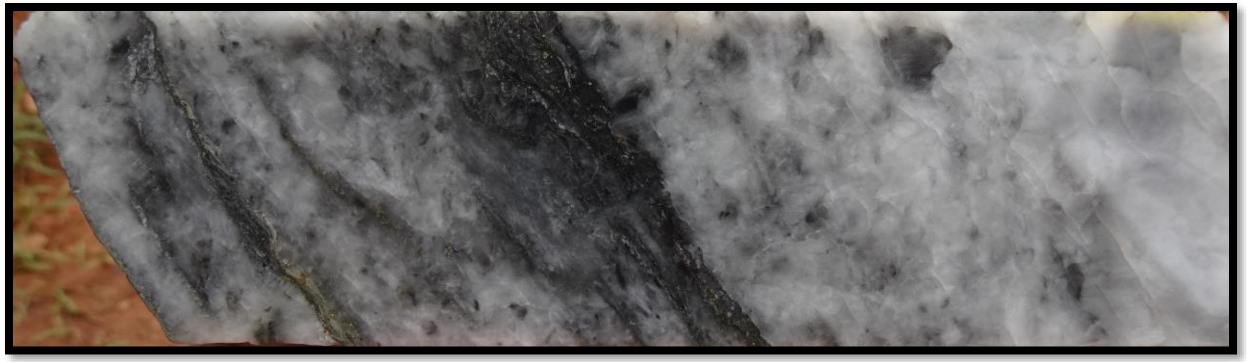
The main quartz reefs

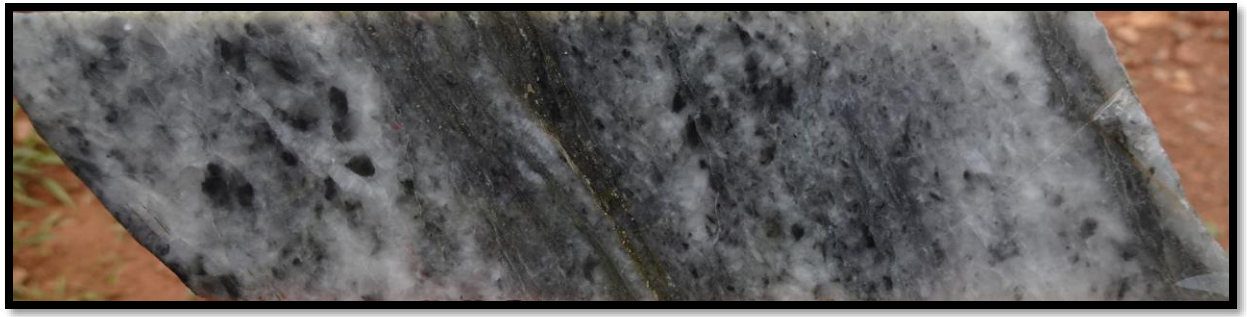
The quartz reefs contain abundant wall-rock clasts. Locally, these comprise breccia textures indicative of vein emplacement processes incorporating hydrothermal brecciation.

The breccia textures are commonly spatially associated with zones of lamination defined by deformation and elongate wall-rock clasts.

Lamination of the reefs is interpreted as occurring in several ways:

- As a primary feature due to incorporation of elongate wall-rock clasts into the veins during extensional opening.
- As slivers of wall-rock that have been structurally sliced into the veins during progressive D2, and particularly D3, deformation.
- As separate veins that have been juxtaposed due to significant dissolution of wall-rock between them during intense progressive deformation.





The main quartz reefs

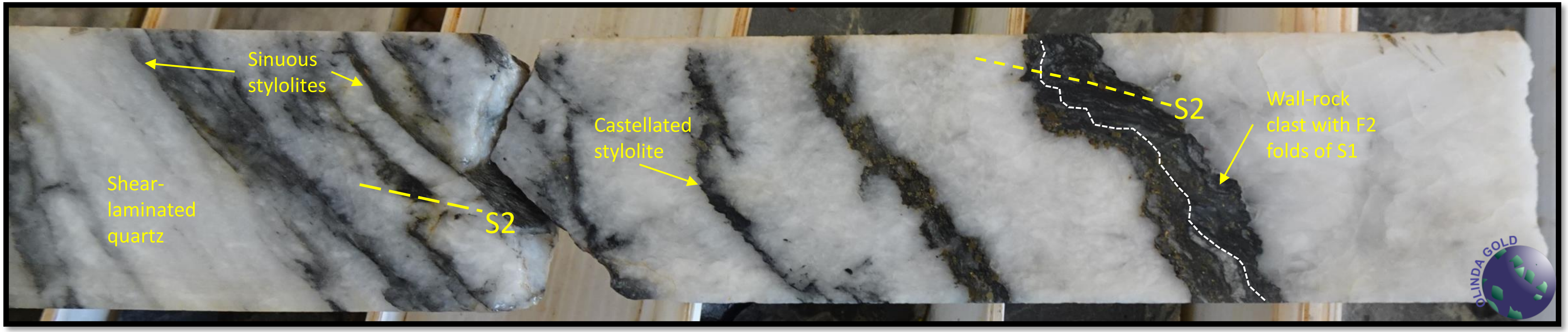
The quartz reefs contain abundant wall-rock clasts, which are typically subparallel to the vein margins.

The wall-rock clasts have undergone intense deformation, accommodating much of the strain internal to the veins due to their fine-grained, phyllosilicate-graphite – rich composition.

As D2 and D3 deformation progressed, minerals in the wall-rock clasts that could not accommodate the deformation were dissolved out, leaving residual insoluble minerals, commonly graphite, producing stylolites that are typically subparallel to the reef margins.

Further deformation has transformed the castellated stylolites, which were produced by dissolution, into sinuous stylolites that accommodated shearing strain.

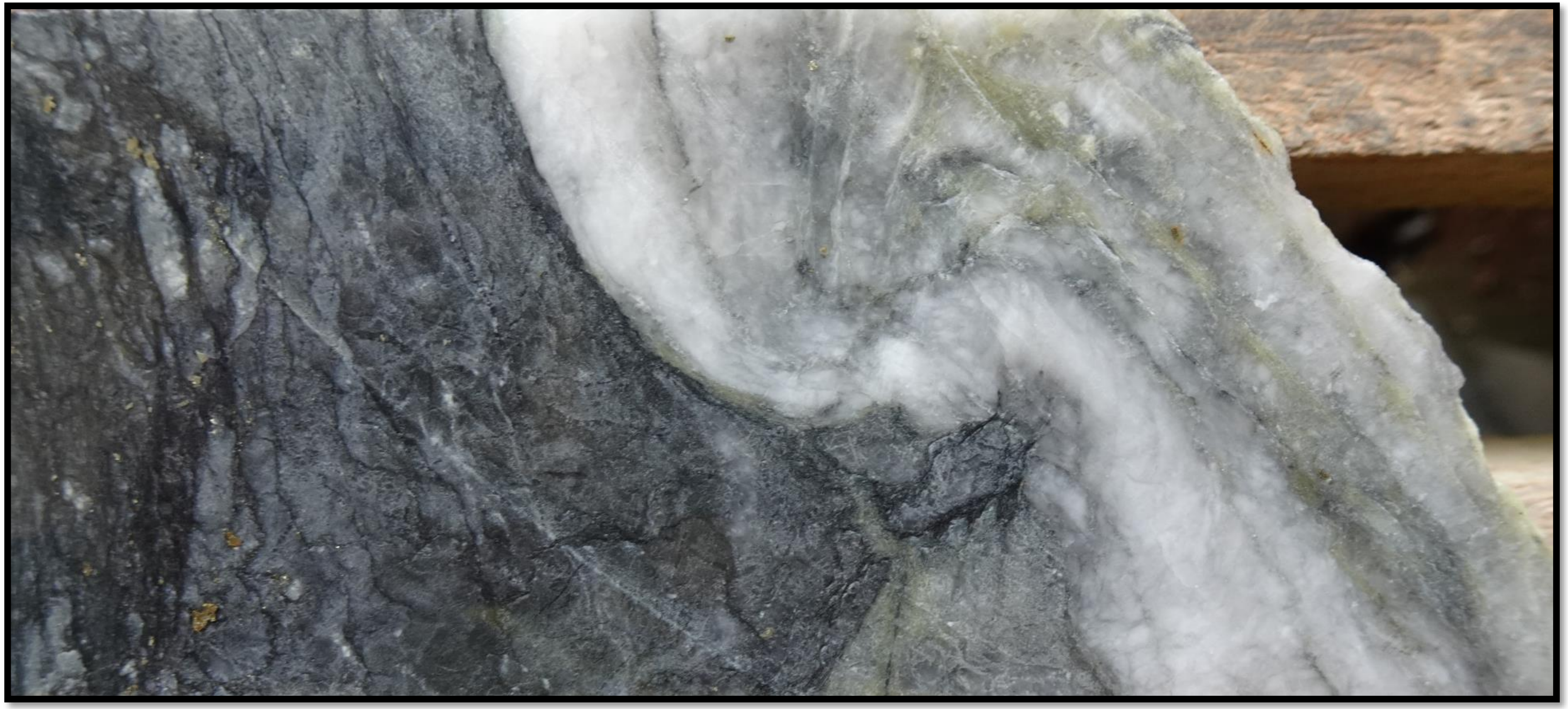
The example at right shows well-developed lamination due to veining parallel to strongly deformed wall-rock slivers. The example below shows, from right to left, evolution from wall-rock clasts with S2 to castellated stylolites to sinuous stylolites with laminated quartz. Some F2 folding of the reef is apparent



The main quartz reefs

Examples of D2 deformation of the quartz reefs.

The photo at right shows folding of the reef margin and early-formed shear laminations.



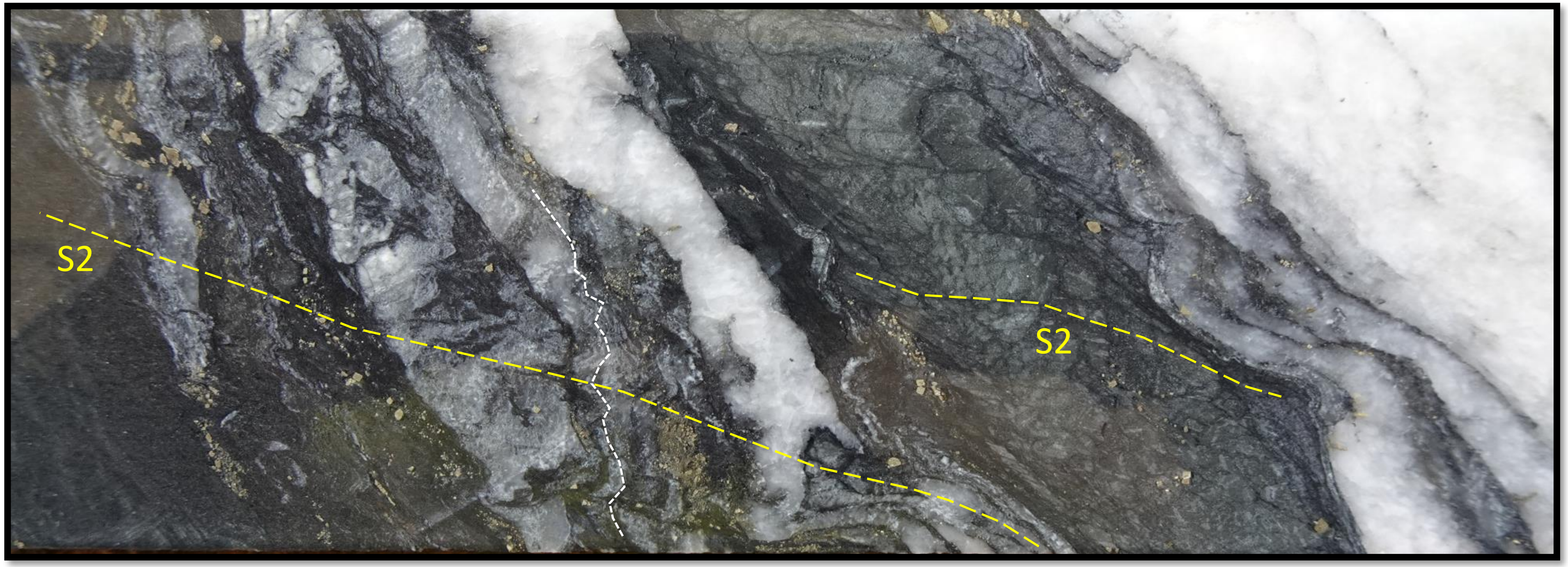
The main quartz reefs

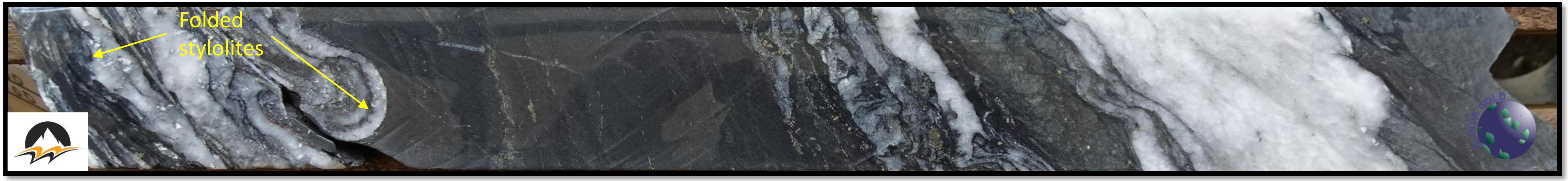
Examples of D2 deformation of the quartz reefs.

The photo at right is part of the image below it and shows folding of the reef margin and early-formed shear laminations.

Preservation of the D2 differentiated crenulation cleavage, S2, can be seen in the wall rock.

On the left-hand side of the photo below, the F2 fold has folded early-formed stylolites.



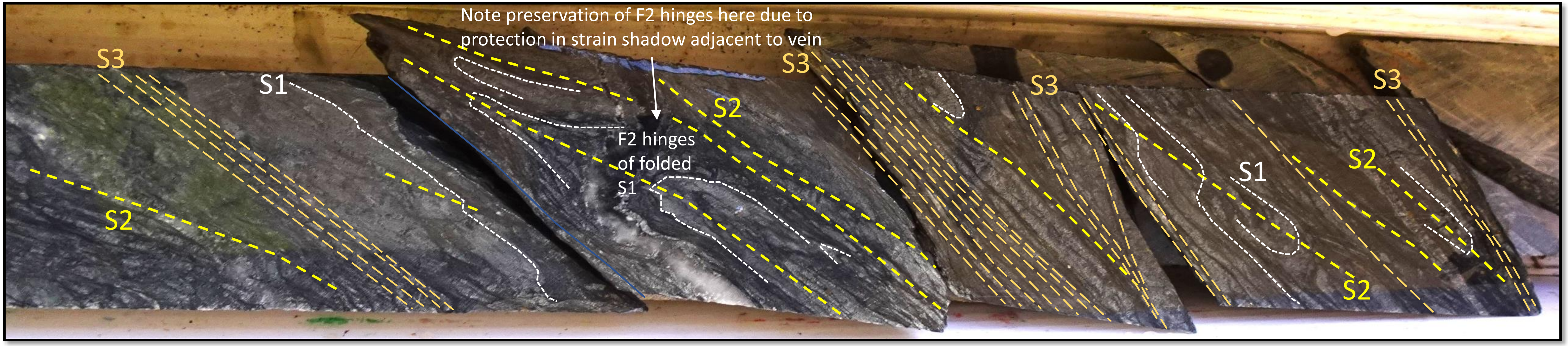


D3 shear evolution

The shears hosting the mineralized zones are products of progressive deformation that have produced composite fabrics through foliation reworking and transposition.

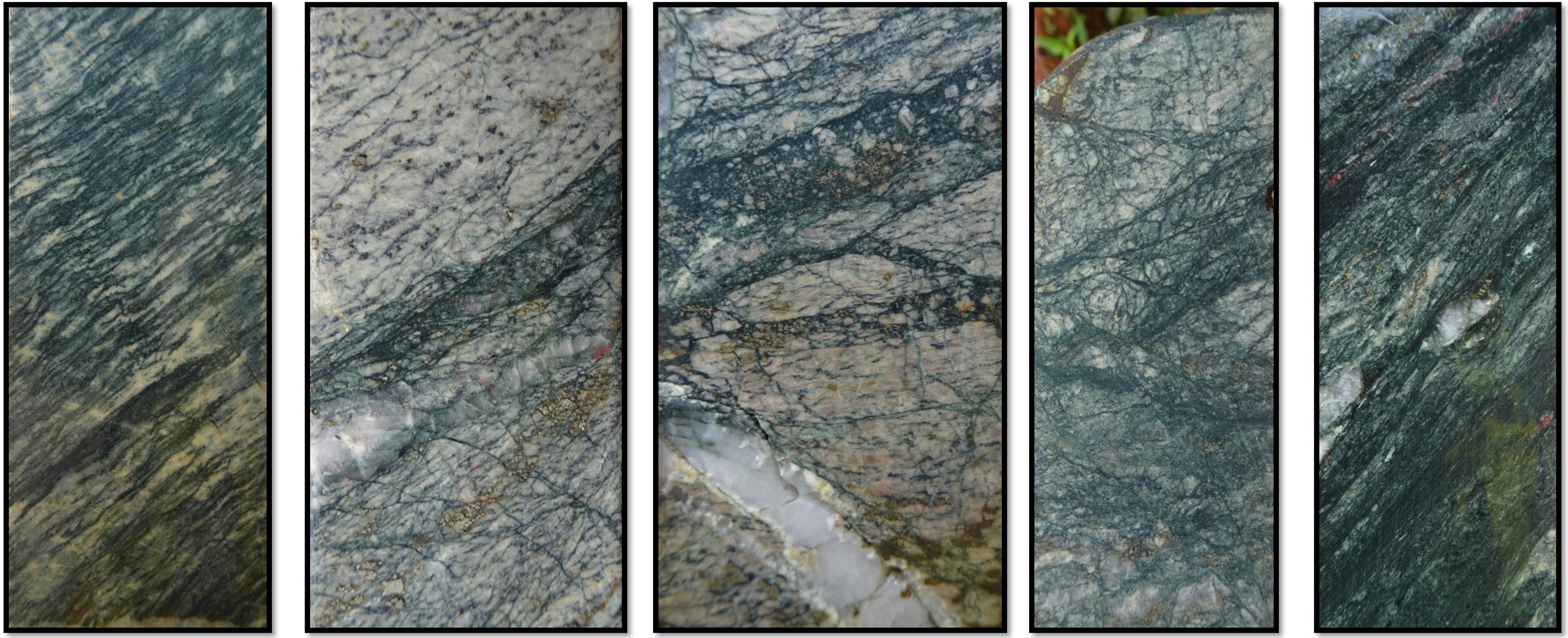
Two principal pre-cursor fabrics have been identified, produced during D1 and D2.

Locally, the products of the pre-D3 deformation are preserved in zones of low strain.

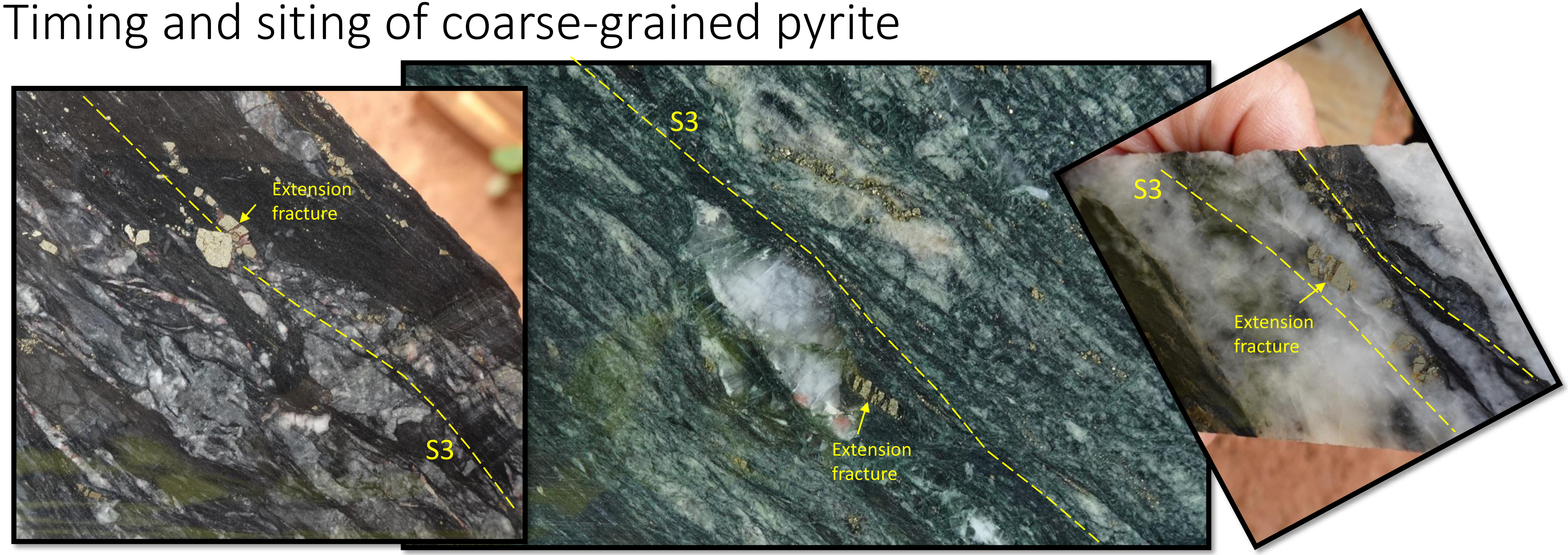


D3 shear evolution

The photos below show the transition from the S1-S2 composite foliation through D3 breccia development to the development of a pervasive, intense ductile D3 shear zones in intrusive rocks (identified by site geologists as a diorite).



Timing and siting of coarse-grained pyrite



The age of the coarse-grained pyrite is interpreted as D3, based on:

- Coarse-grained pyrite is commonly localized in the zones of strain accumulation at the margins of the quartz reefs.
- The pyrite overgrows the S3, and the growth-preferred orientation of the grains is parallel to S3.
- The grains commonly exhibit extensional fractures at a high angle to S3, consistent with breakage of the competent grains under the same stress field responsible for formation of the D3 shear zones.

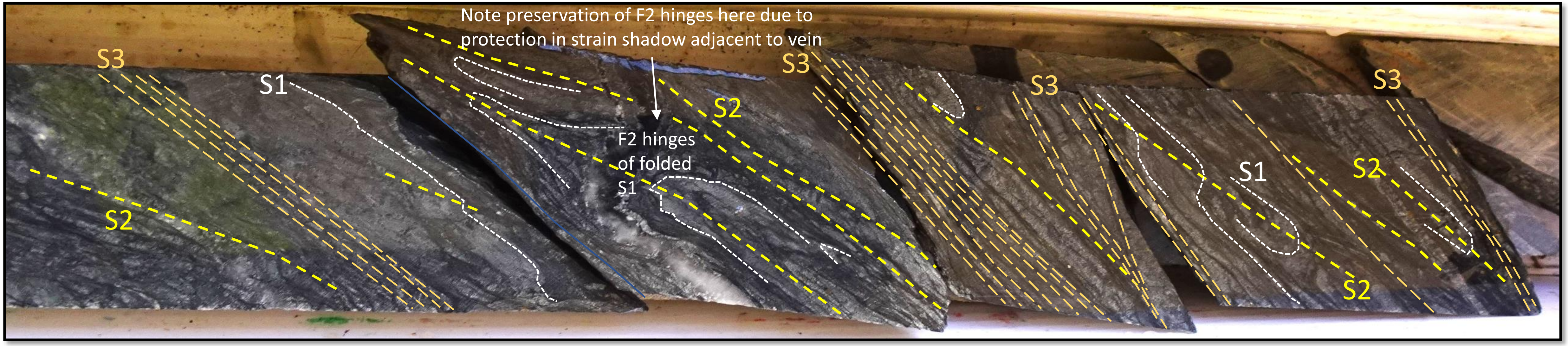
All of these relationships are compatible with syn-D3 growth that commenced after D3 shear formation and that ceased before the end of D3.

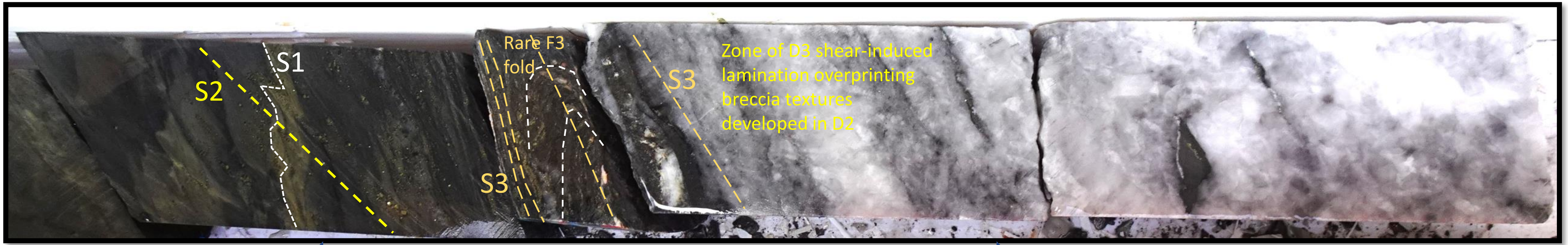
Architecture of D3 reef-bounding shears

The examples below show typical architecture for structures bounding the gold-bearing reefs.

D2 produced F2 folds in these zones due to accumulation of shortening strain against the reefs. Relicts of the F2 folds manifest as tight and/or asymmetric structures with S2 both as axial planes and bounding them.

S2 and F2 folds have been rotated toward the S3 and are preserved in relatively lower strain zones that have fabrics at a low to moderate angle to S3.





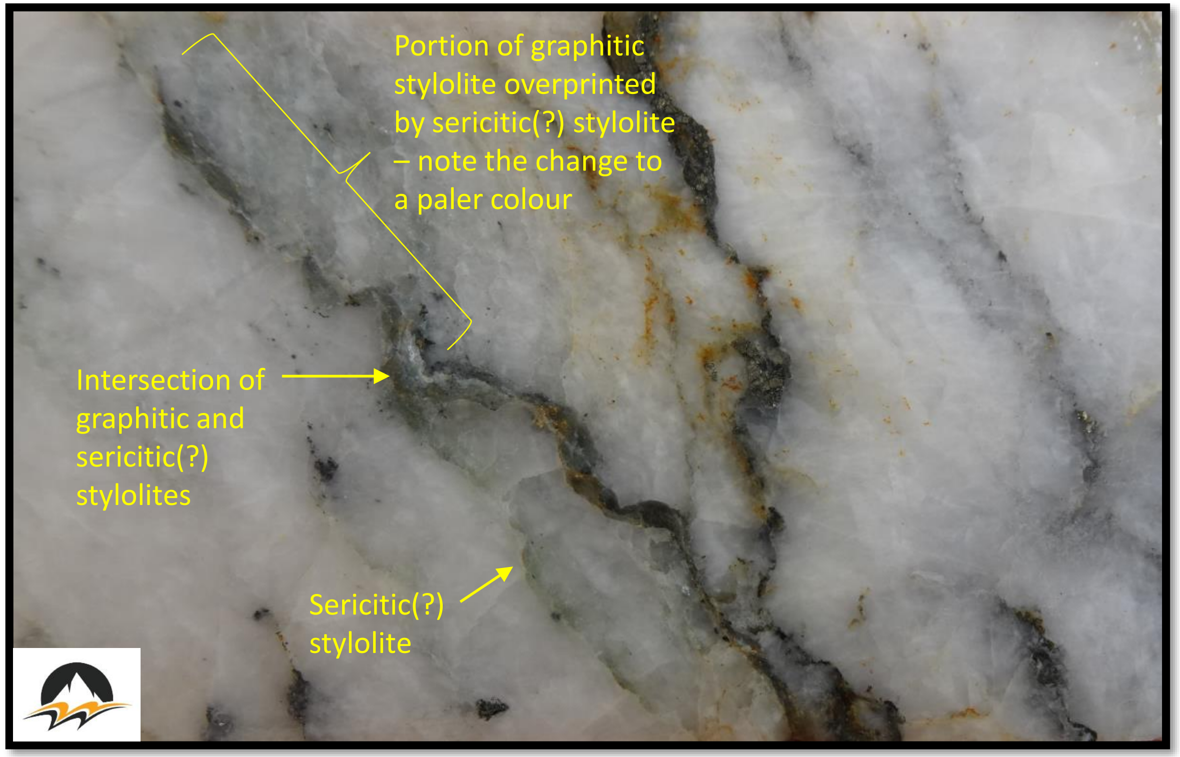
Zone of D2 + D3 strain accumulation at quartz reef margin

Quartz vein structures

Gold is hosted by two mineralogically distinct forms of stylolite, the older and longer-lived being graphite-rich, and the younger, shorter-duration population being white mica-rich.

Overprinting relationships indicate the white mica (sericite?) stylolites overprint the graphitic ones.

Both sets of structures were active during progressive D3, with the graphitic stylolites evolving from wall-rock clasts and accommodating significant dissolution.

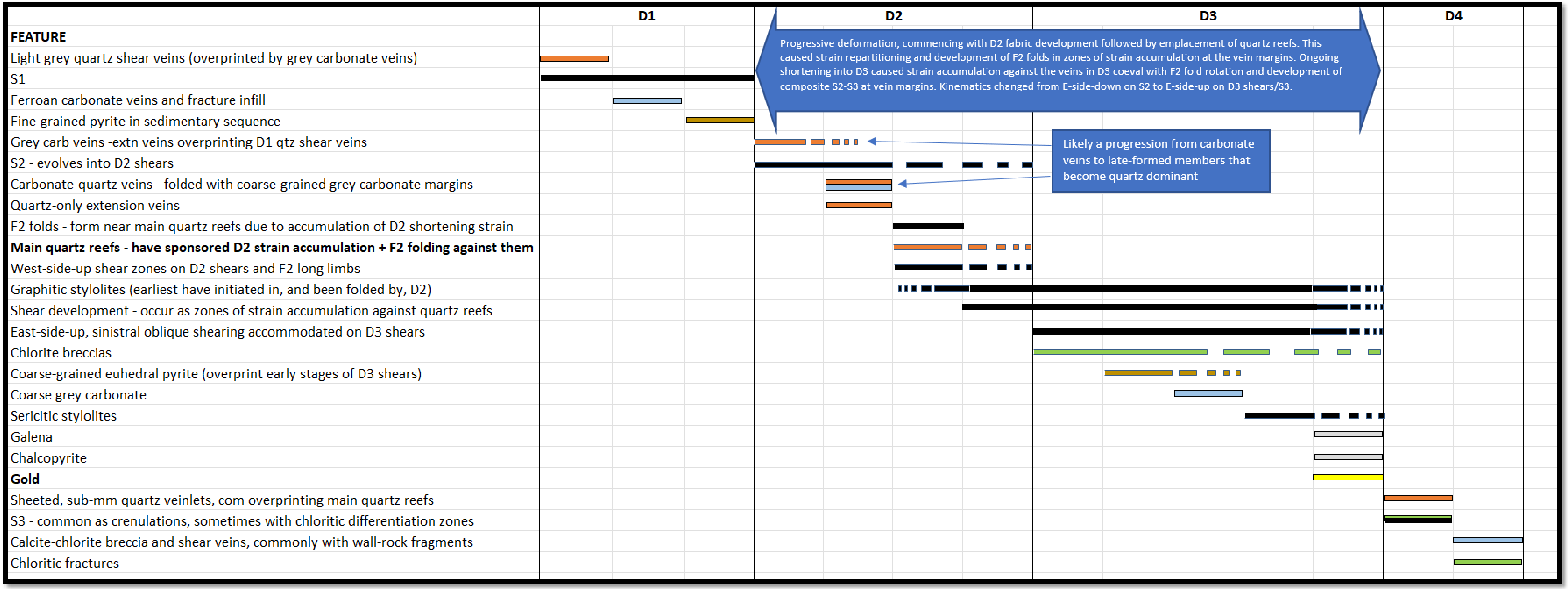


Structural age, siting, and controls to gold

Consistent overprinting relationships and geometries in diamond drill core from Ghanie and Oko Main show that gold has been introduced late in the geological history of the mineralized system and well after emplacement of the quartz reef hosts.

These relationships indicate deposition of gold into structurally favourable sites late in D3, representing the final stage in deposit evolution.

The following slides show examples of the structural timing, siting and controls to gold mineralization.



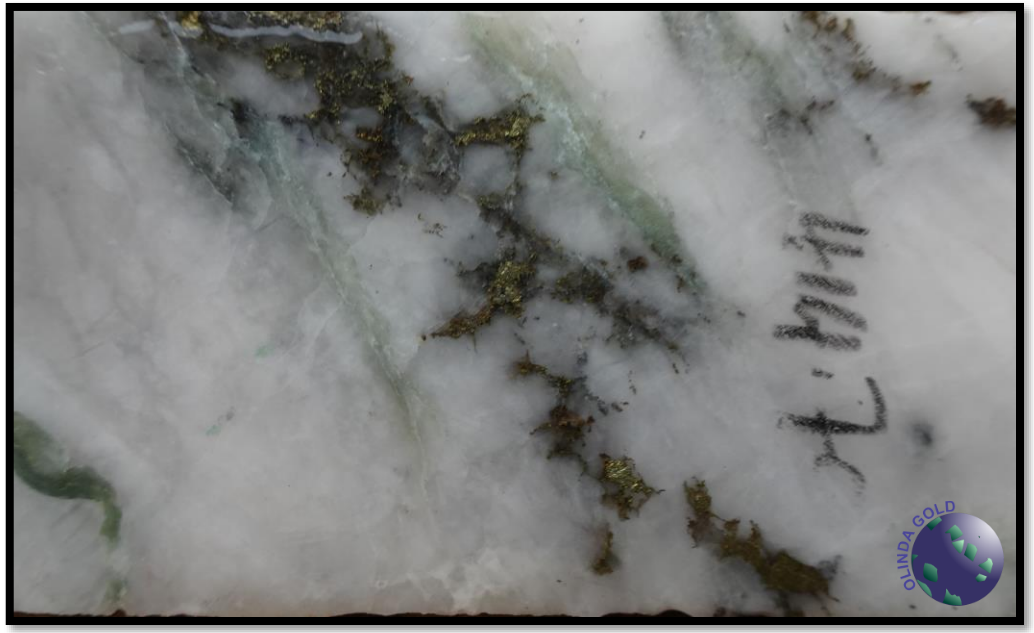
Deformation of quartz reefs – relationship to mineralisation

The photos here show some of the D3 structural sites that host sulphides and gold in the quartz reefs.

At top right, the gold (circled) is hosted in a stylolite that is linked to a relict clast of graphitic wall-rock.

In the example at bottom right, chalcopyrite is hosted in a zone of crackle brecciation that has developed between white mica-bearing stylolites.

In the example at bottom left, gold occupies a low mean stress site adjacent to older pyrite grains that have undergone extensional fracture in D3. This example is shown in detail in the next slide.



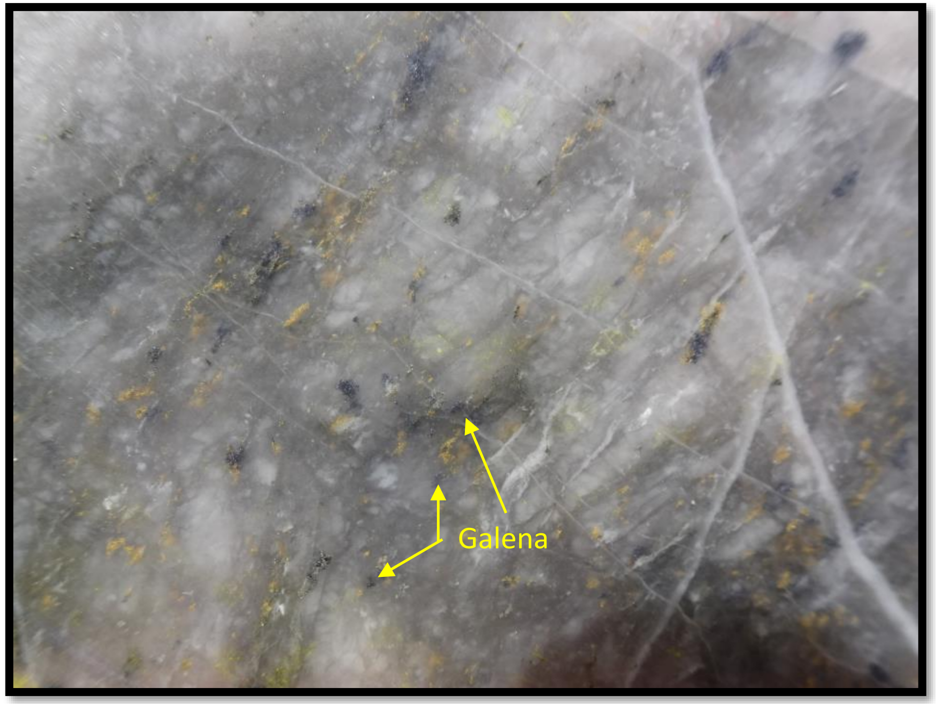
Structural age, siting, and controls to gold

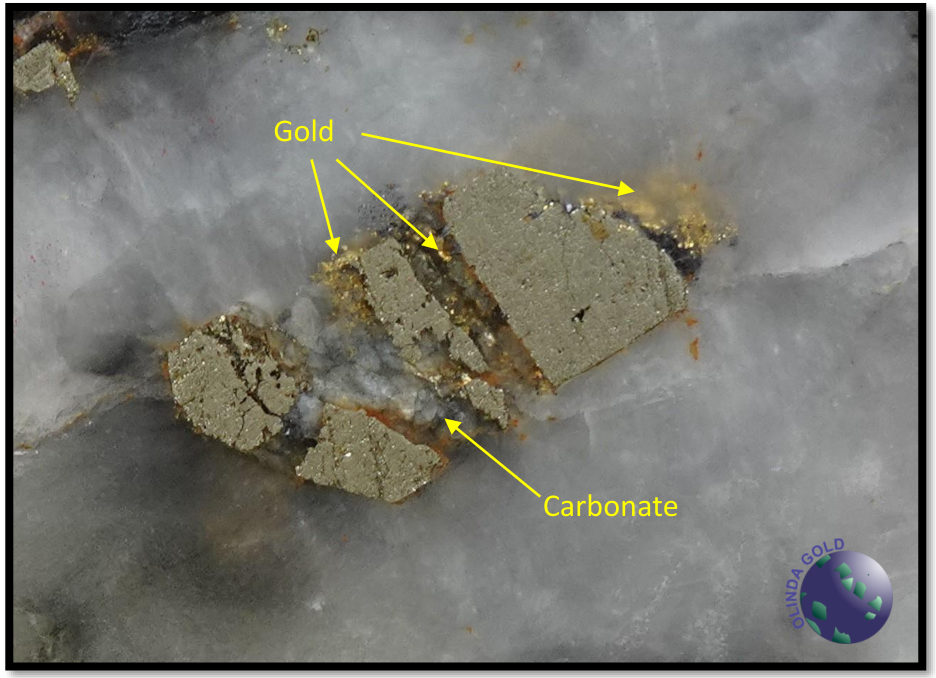
The photos here show textures indicative of a structural control that produced a preferred linear geometry to gold mineralization.

In the top photo at right, abundant gold occurs in spatial association with galena as elongate, rugby-ball shaped accumulations comprising numerous small gold grains. The preferred host is grey quartz that is the matrix to brecciated and recemented earlier white quartz, which manifests as elongate breccia fragments.

The lower photo shows an asymmetric pyrite grain, suggesting it grew under conditions of non-coaxial stress during an imposed shear stress. The grain has undergone extensional deformation, with infill of fractures by ferroan carbonate and gold.

Gold is localized in low mean stress sites that are asymmetrically disposed at the ends of the pyrite fragments, which were produced during sinistral, east-side-up shear.

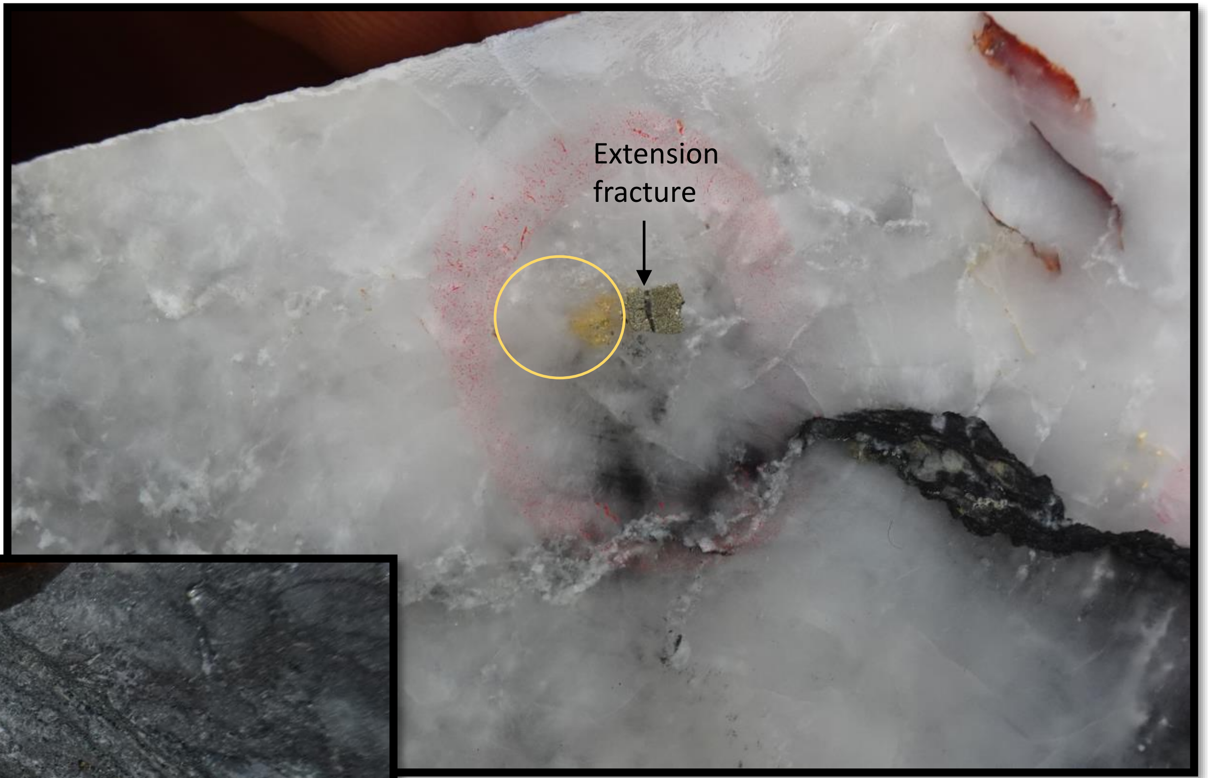


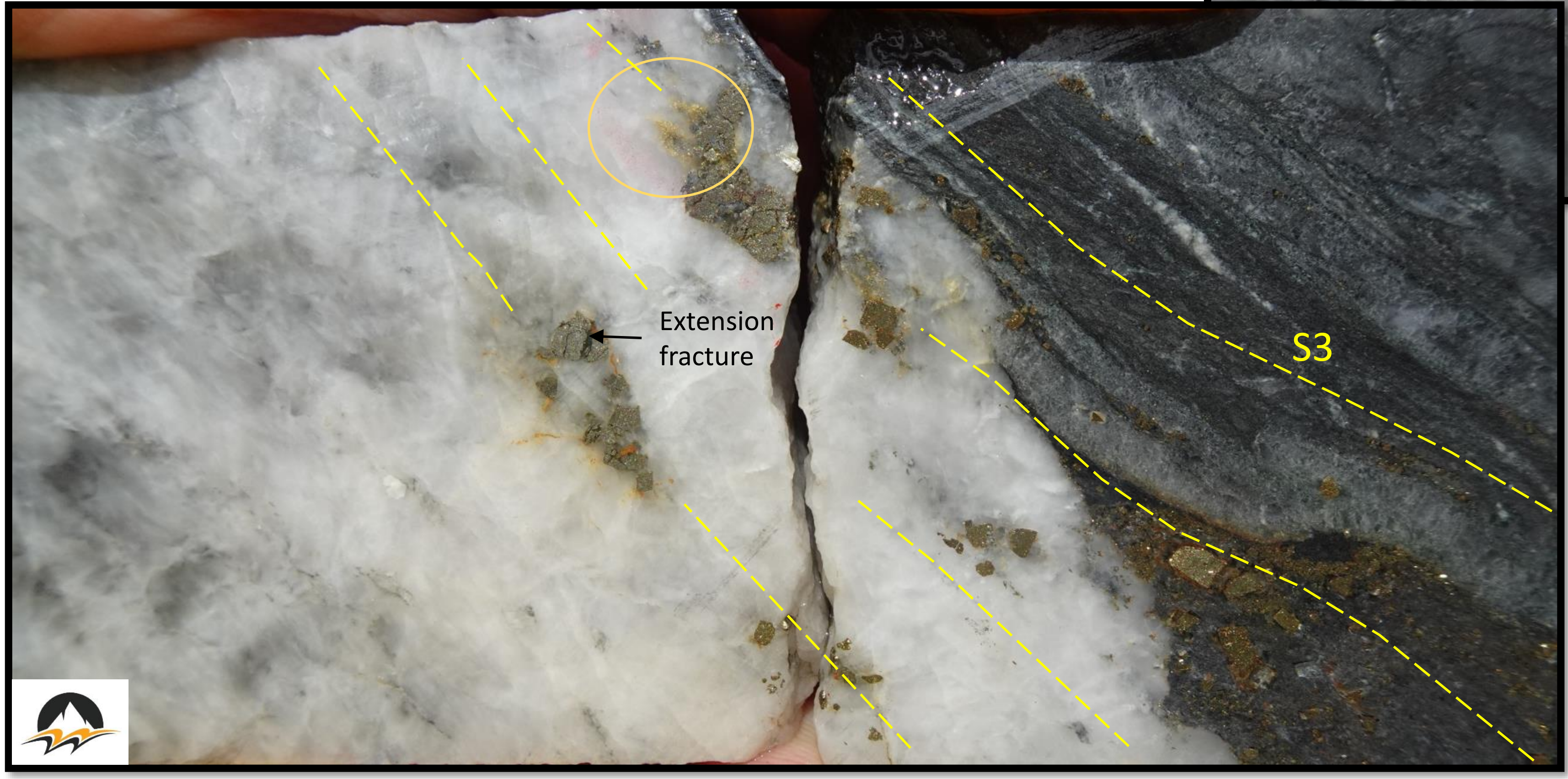


Structural age, siting, and controls to gold

Gold (circled) in the photos here is associated with pre-gold pyrite that has overgrown the S3 in the wall rocks, with aggregates of grains being parallel to S3 in the reefs.

The pyrite grains have undergone extensional fracturing, with infill by coarse-grained carbonate, as seen in the previous slide.





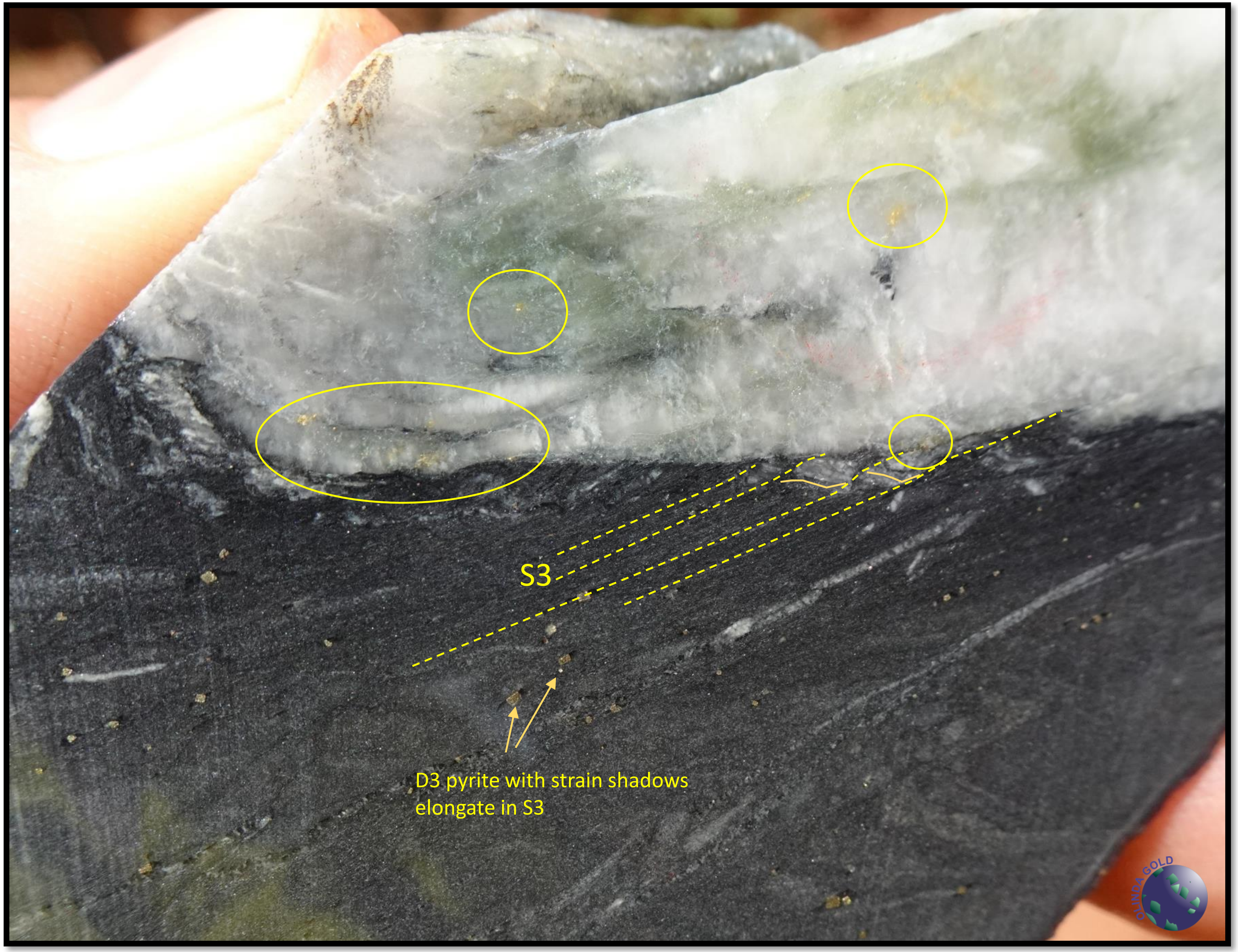
Gold is localized in the extensional fractures and at the low mean stress sites at the ends of the rigid pyrite grains.

Structural age, siting, and controls to gold

Example of an F3 fold of a reef margin that has localized gold (circled) deposition.

Early-formed laminations are locally stylolitic and have been folded with the reef and overprinted by white mica.

Gold occurs in the laminations and at the vein margin.



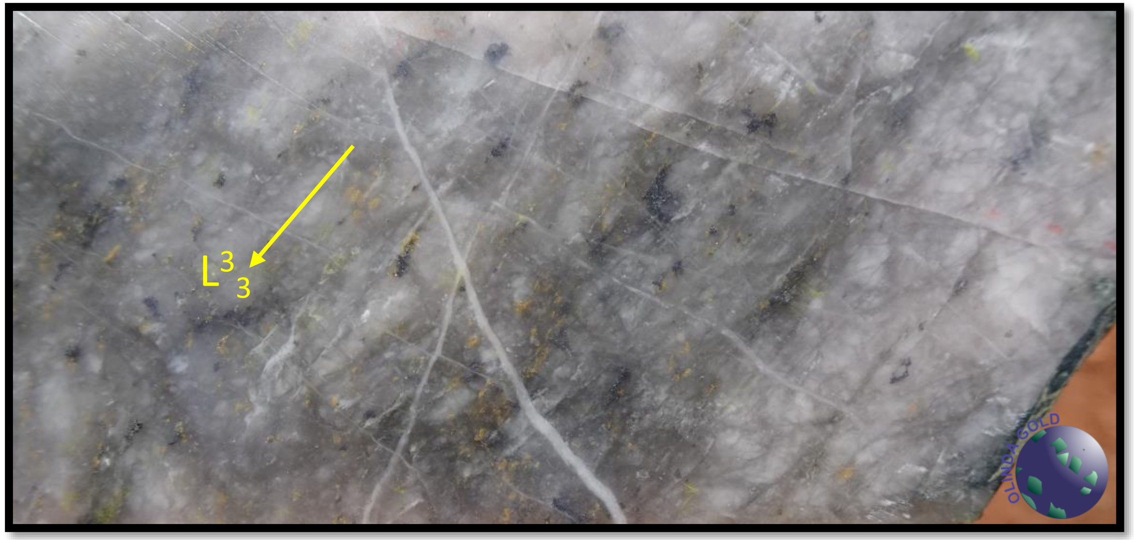
Structural age, siting, and controls to gold

Overprinting relationships indicate gold was introduced into the quartz reefs well after their initial formation.

Deformation of the competent quartz hosts has produced structures and low mean stress sites (e.g. adjacent to pre-gold pyrite shown in previous slides)that were exploited by gold deposition.

These structures include stylolites that were active in D3 and shear laminations inside the veins that are continuous with S3 in the country rock.

The laminations host a pronounced D3 extension lineation, L^3_3, which shows a geometric relationship with grade distribution at the deposit-scale. Rare examples, such as that at bottom right, show gold grain accumulations with a preferred growth orientation that defines the L^3_3.



Relationship between S2 and S3

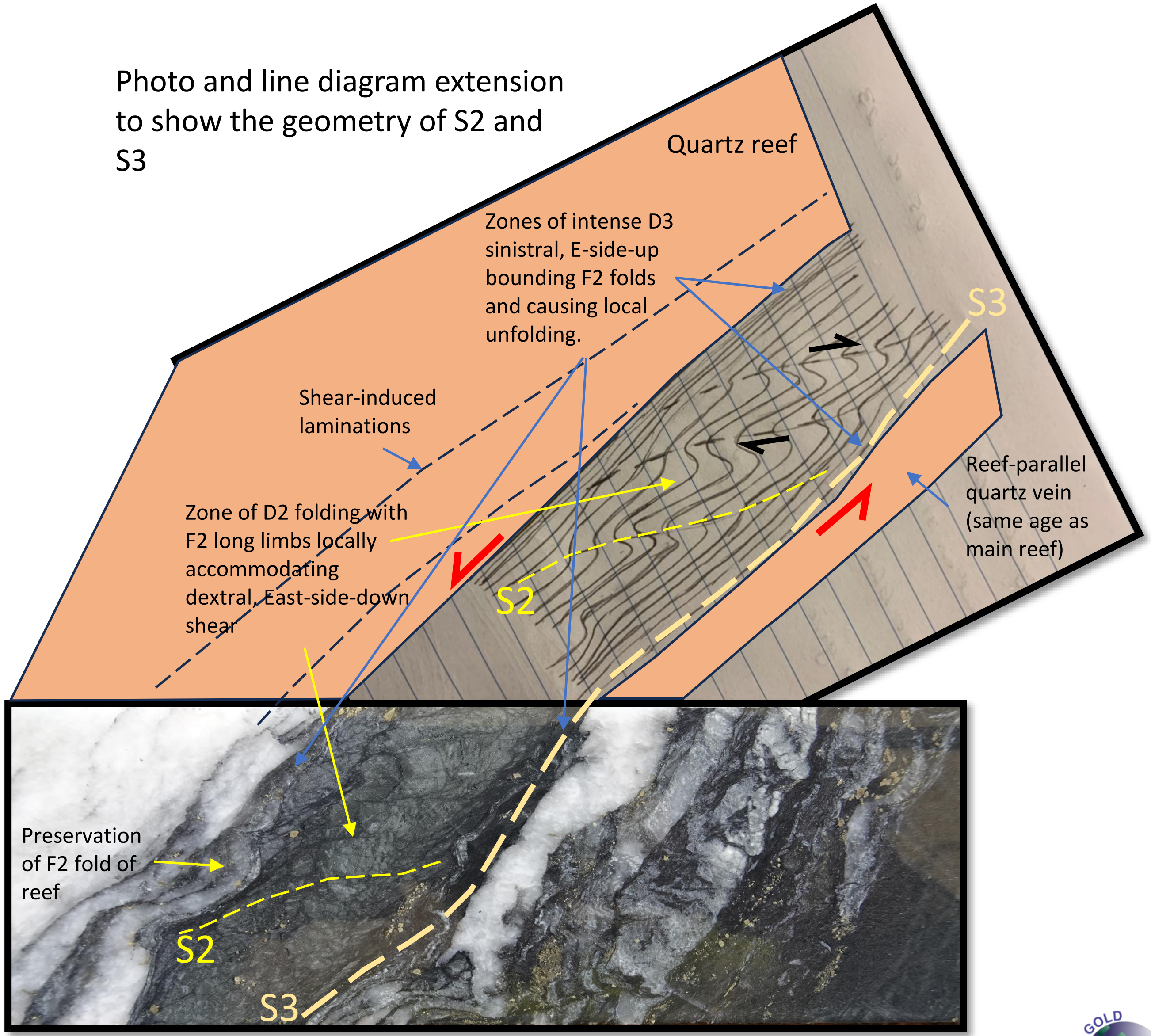
The angular relationship between S2 and D3 reef-parallel shears geometries is not dissimilar to those produced during the process of reactivation as defined by Bell (1986) and documented by Davis (1995).

Hence, if D2 and D3 represent a continuum, the angular difference between S2 and S3 could be a function of strain repartitioning during late D2 (herein called D3) that resulted in accumulation of shearing strain along the reef margins, rather than being strictly parallel to S2 shear planes at a high angle to the shortening direction.

Although the process of reactivation doesn't necessitate a change in orientation of the bulk shortening direction, it is conceivable that a slight change in the orientation of the principal far-field stress may have marked the transition from D2 to the one herein defined as D3.

The diagram at right shows the angular relationships expressed between S2 and S3 in drill core, and the opposing senses of shear accommodated in D2 (black) and D3 (red).

Photo and line diagram extension to show the geometry of S2 and S3



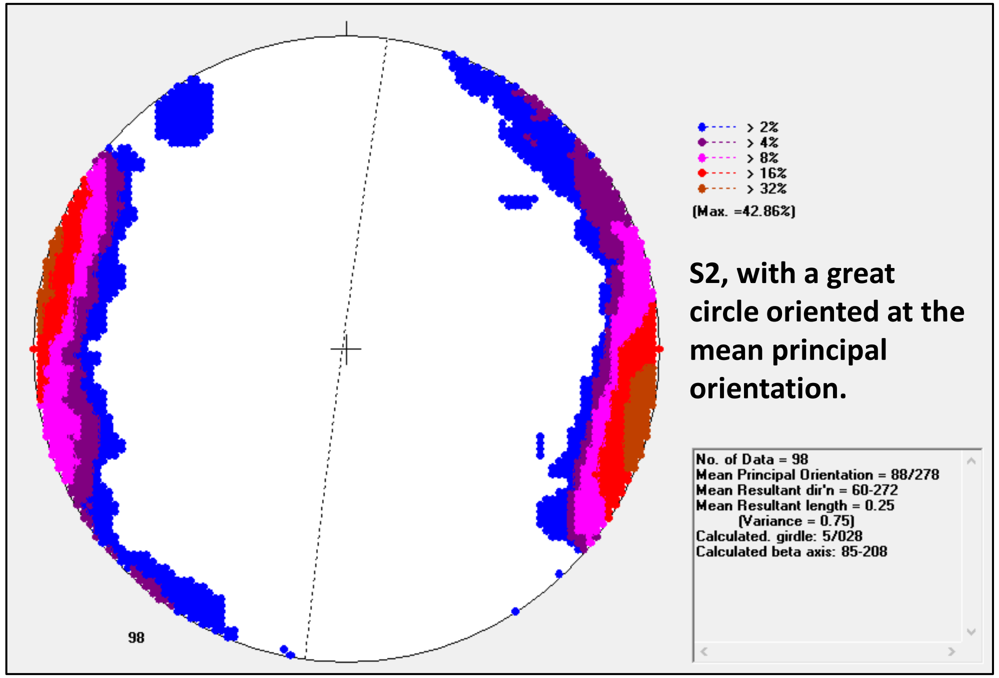
Structural data

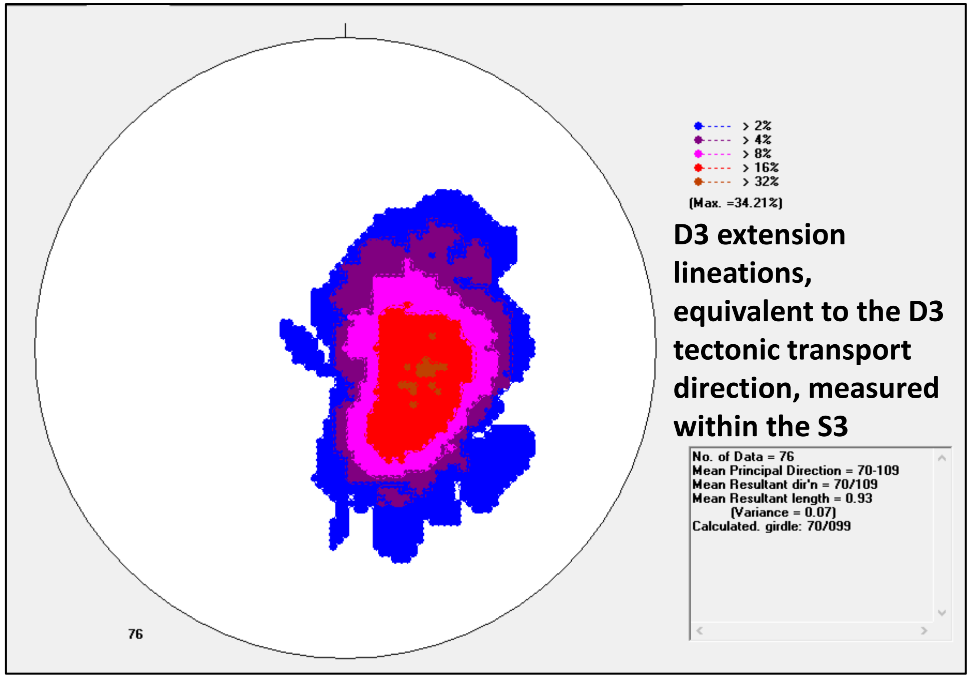
Three principal structures are measurable in drill core – S2 (top right), S3 (bottom right) and the D3 extension lineation, L33 (centre bottom).

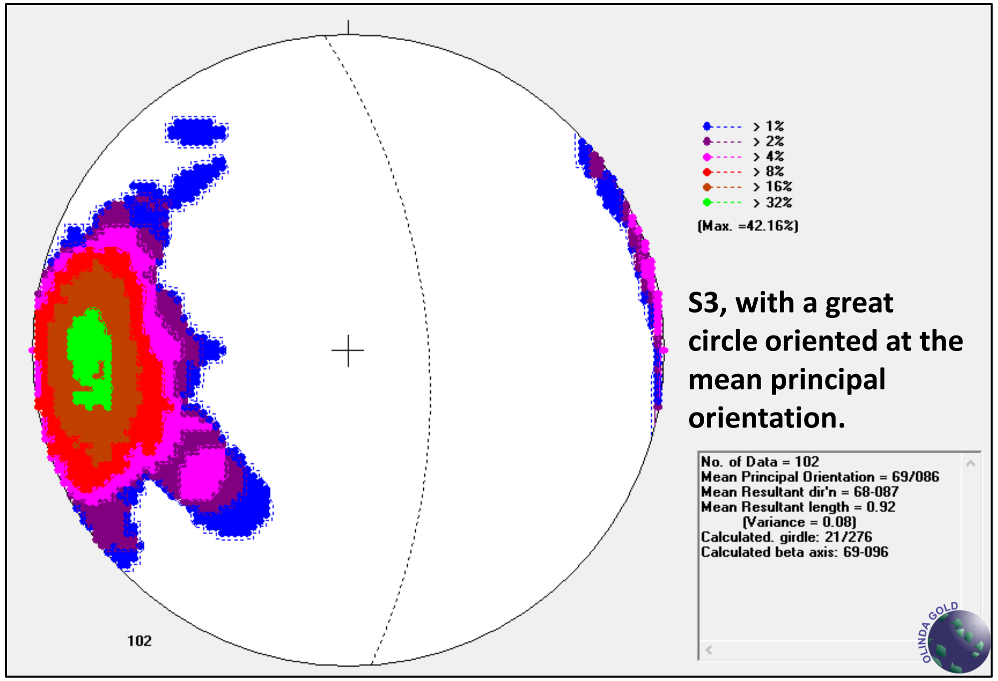
Data for these structures is shown here and indicate:

- L33 generally has a steep pitch in the S3
- S2 and S3 have similar strikes but slightly different dip values. Overlap in orientations is due to rotation of S2 into the S3 during progressive D3 shearing.

All data have been measured in spatially oriented diamond core (predominantly half-core) using a compass and core orienting frame.







Structural data

The plots here show linear data extracted from spatially oriented drill core.

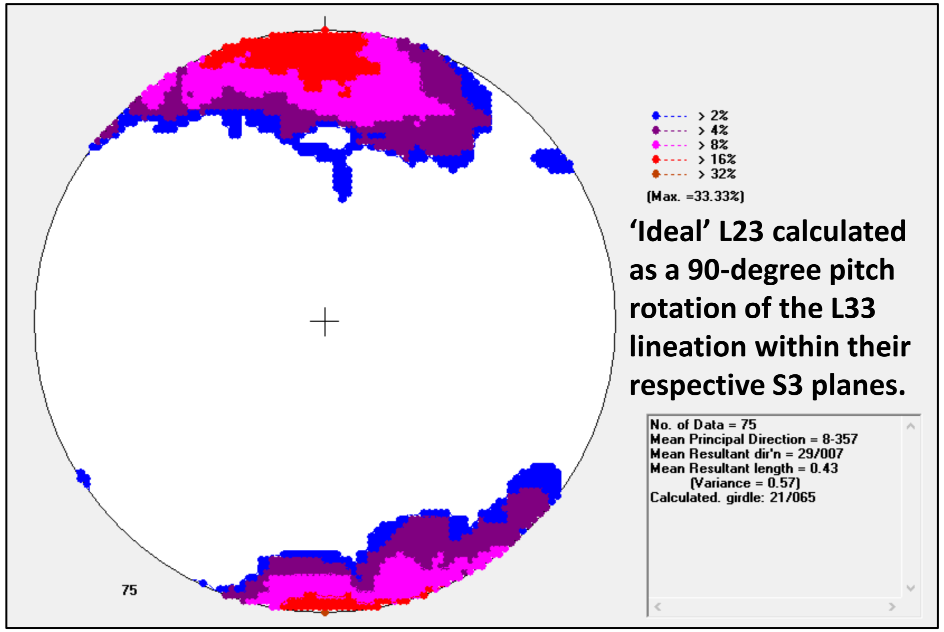
In a volume of layered rock that has undergone a simple deformation history, with the undeformed layers lying in the σ1-σ2 plane, the fold axes (parallel to intersection lineations) will form at a high angle to σ3, which will be subparallel to the extension lineation. Both the intersection lineation and the extension lineation will lie in the σ2-σ3 plane.

At Oko, the intersection lineation L23 and extension lineation L33 have formed during D3. L23 lineation orientations that are calculated to lie at 90 degrees to L33 form the distribution shown at upper right. However, this is a construct, and does not represent the reality of the lineation distributions. Rather, the L23 shows a spread of measurements within the S3, with a maxima that has a low to moderate plunge to the NNE i.e. there is no maxima at a high angle to L33.

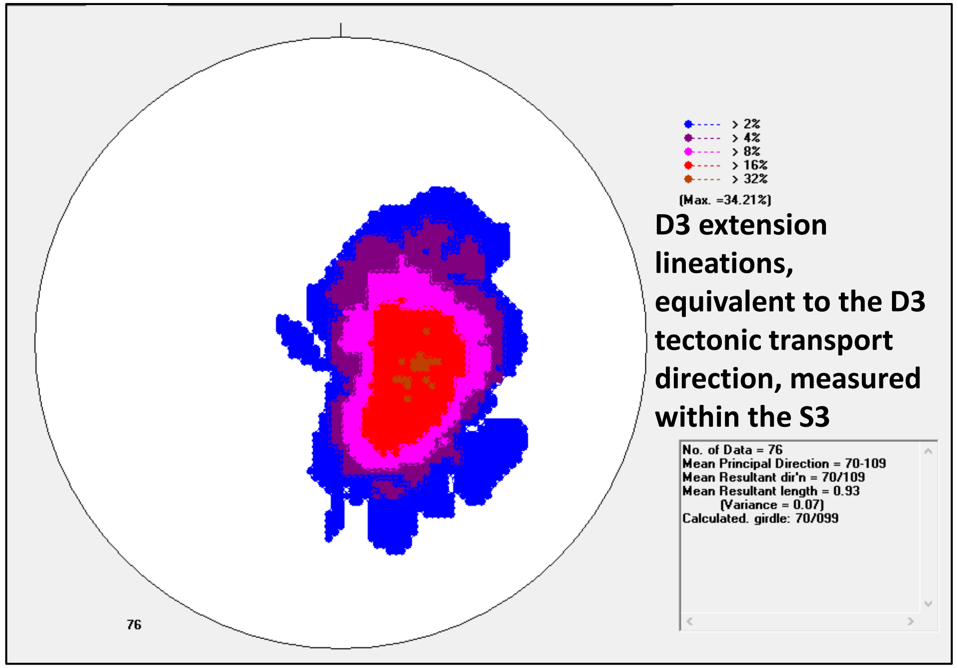
The variation in L23 orientations in reality from those in the constructed ideal plot is a function of two things:

- The original orientation of S2, which will not have been in the σ1-σ2 plane in D3
- Rotation of the L23 toward the extension direction, L33, during progressive D3

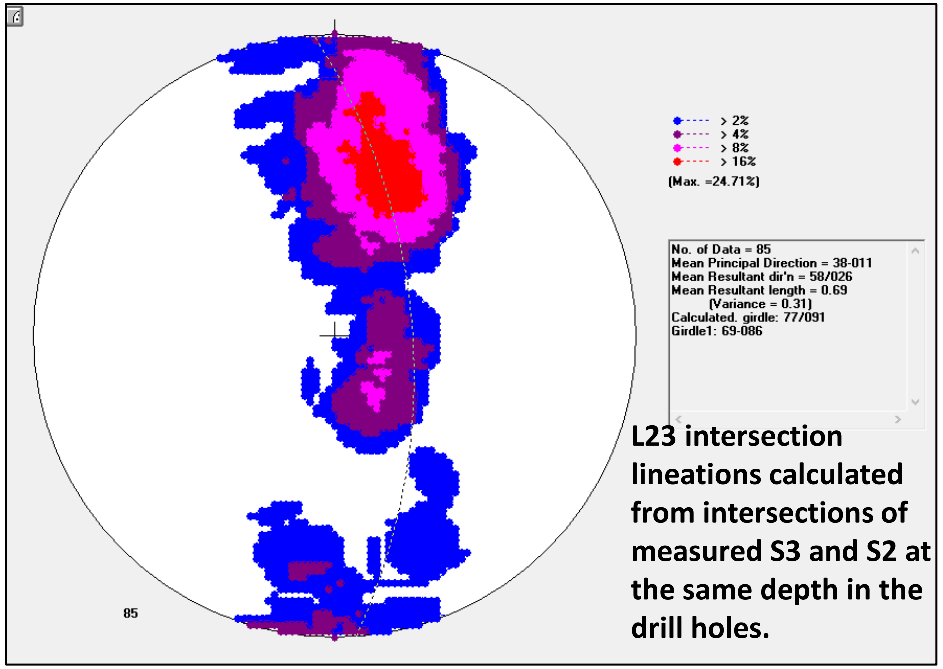
Given the significant amount of shearing strain represented in zones of D3 strain accumulation at the reef margins, the process of lineation rotation is considered relatively more important. This is shown diagrammatically in the next slide.



'Ideal' L23 calculated as a 90-degree pitch rotation of the L33 lineation within their respective S3 planes.



D3 extension lineations, equivalent to the D3 tectonic transport direction, measured within the S3



L23 intersection lineations calculated from intersections of measured S3 and S2 at the same depth in the drill holes.

Structural data and controls to mineralisation

The diagram at right shows the geometries produced, and kinematics operating, during D3.

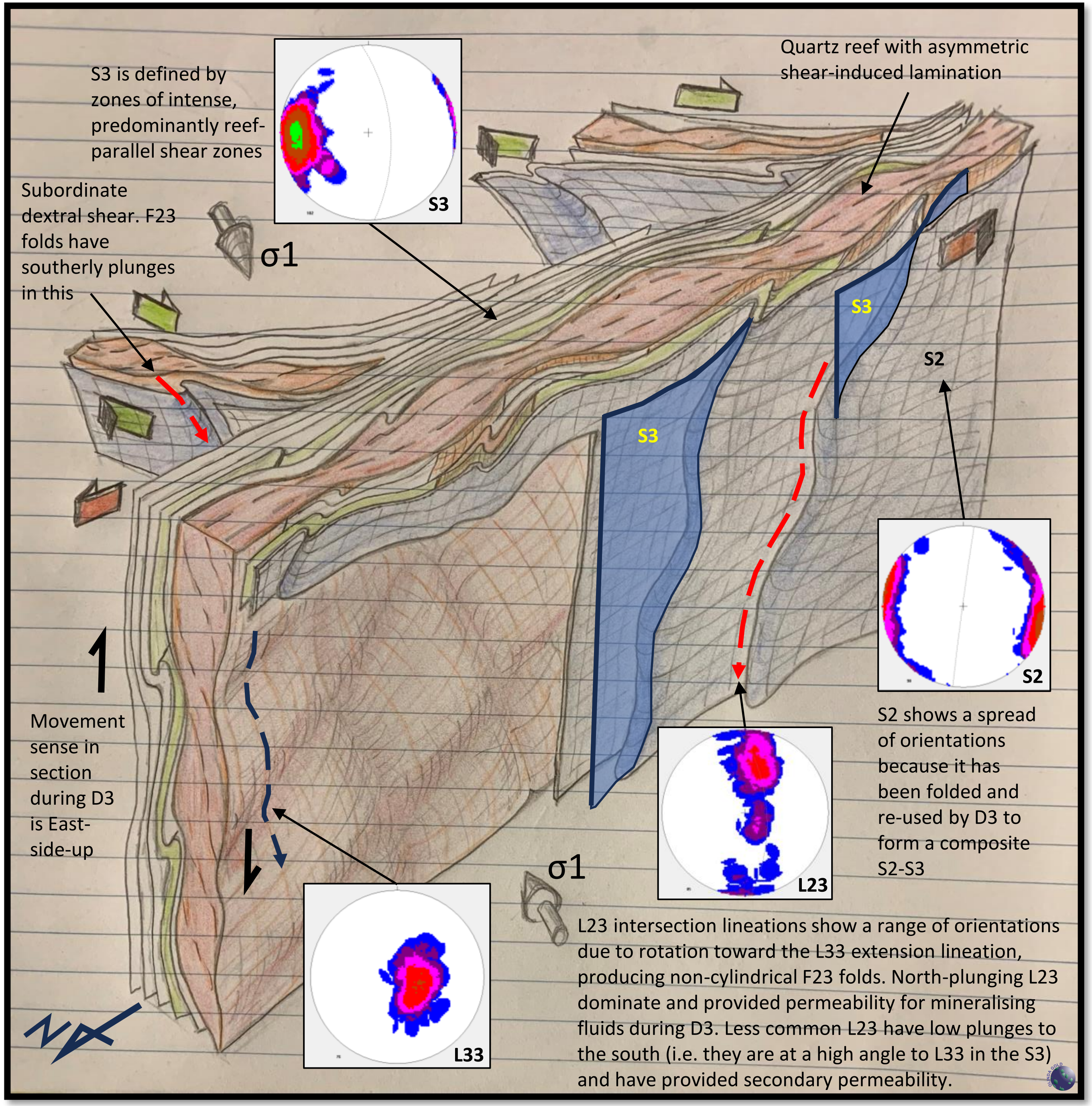
There are at least 5 variably mineralised shears at Oko, comprising a sheeted population, which have accommodated sinistral, East-side-up, oblique motion during D3.

Elsewhere in the district, such as at Oko NW, subordinate, second-order shears have accommodated dextral movement. The variation in movement sense is interpreted as being largely a function of the shear orientations relative to the principal stress, and with kinematics changing sense depending on the order of the shears. For example, Sinistral first-order shears will bound dextral second-order shears, which can in turn bound sinistral third-order shears and so forth.

Importantly, different sense of movement will have been associated with differently oriented extension lineations and can produce folds with variable plunges at high to moderate angles to these.

Note that the movement senses in section and plan will have caused asymmetric boudinage, with shear-induced laminations cutting acutely across the reefs. Locally, where σ2 and σ3 were close in magnitude, there is the possibility of chocolate tablet boudinage, although this is considered uncommon. Boudin necks will plunge subparallel to F23 axes.

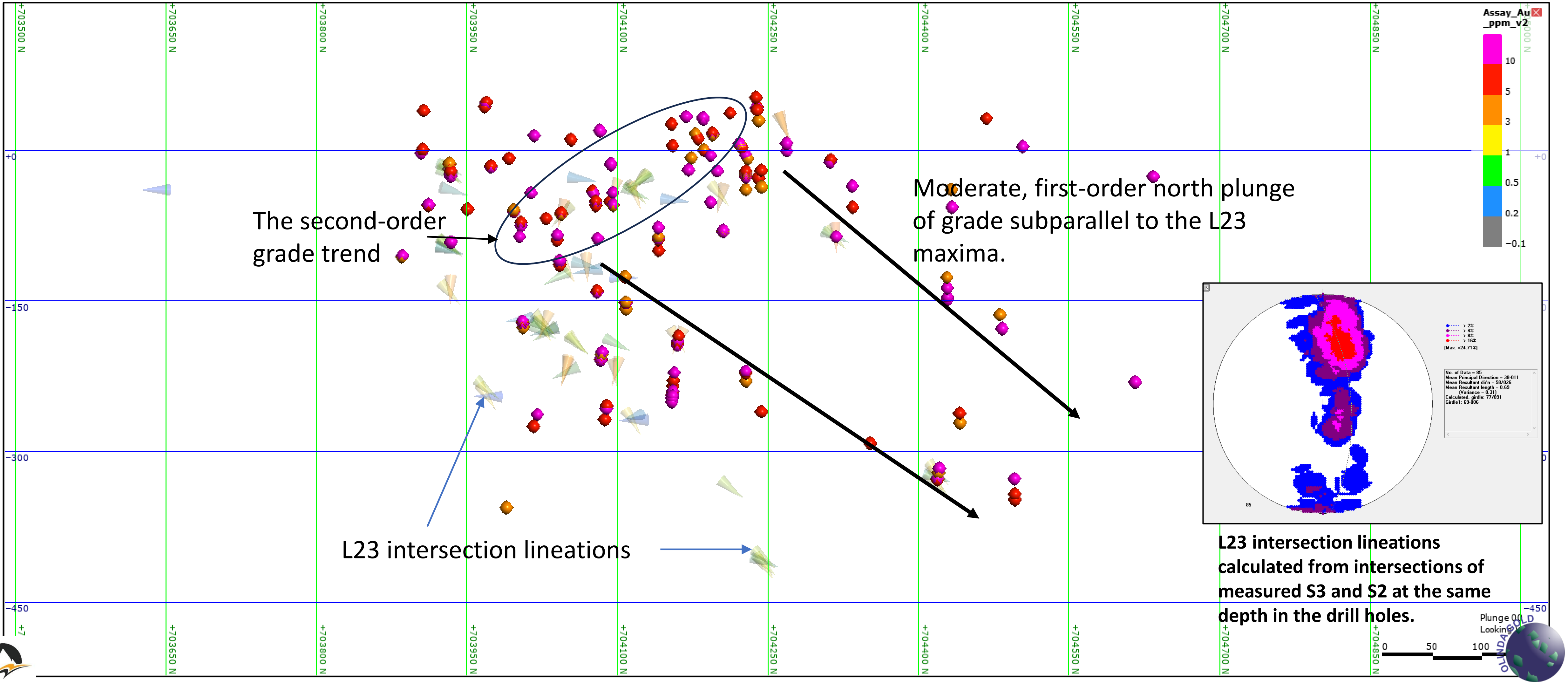
The permeability network for mineralising fluids was dominated by L23, which lineations show a range of orientations due to rotation toward the L33 extension lineation, producing non-cylindrical F23 folds. North-plunging L23 dominate and provided permeability for mineralising fluids during D3. Less common L23 with low plunges to the south have provided secondary permeability. These controls are shown for Shears 3, 4, and 5 in the following slides.



Structural data and controls to mineralisation – Shear 3

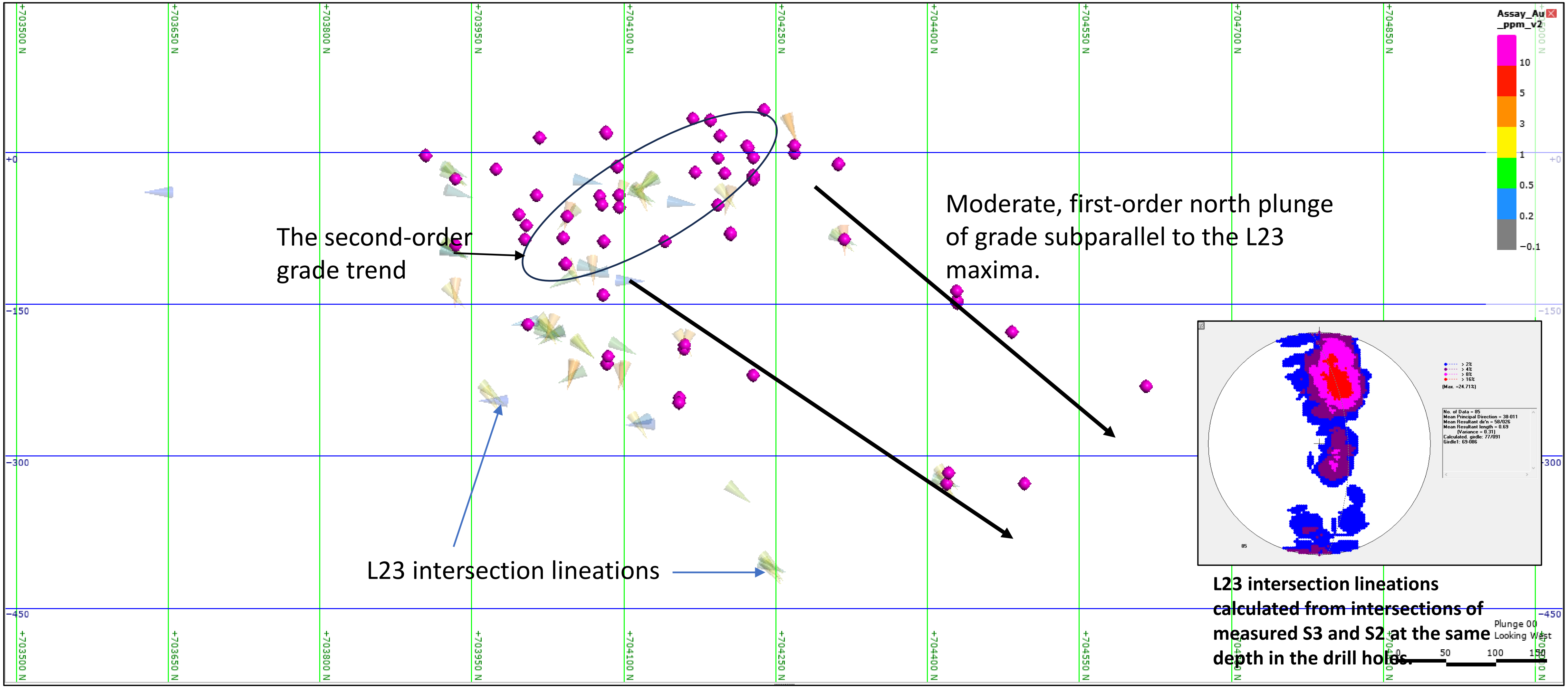
Shear 3 Long Section – viewing West.

Drill hole assays above 4gpt Au, overlain on L23 intersection lineations. Note the moderate, first-order north plunge of grade subparallel to the L23 maxima. The second-order grade trend (=permeability network) is shown by the oval at a high angle to this.



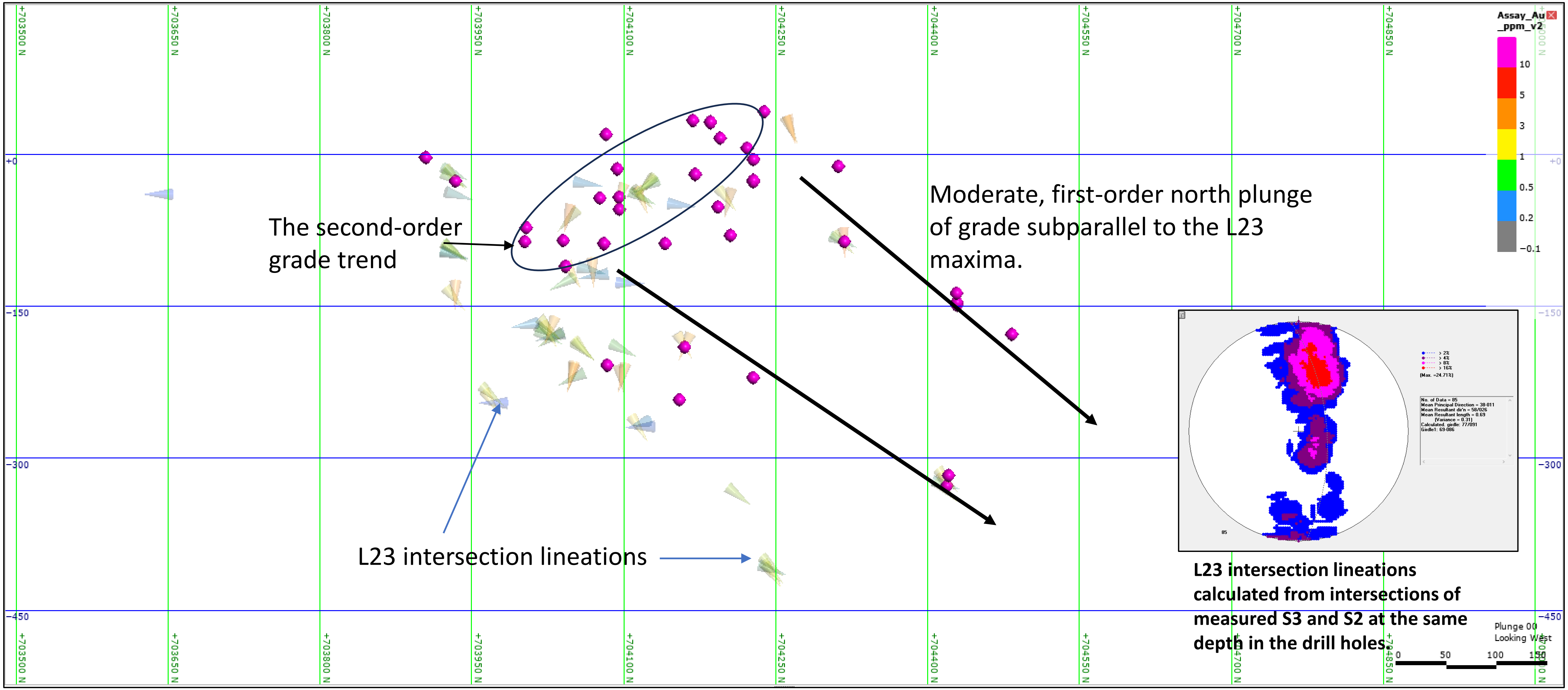
Structural data and controls to mineralisation – Shear 3

Shear 3 Long Section – viewing West.
Drill hole assays above 15gpt Au, overlain on L23 intersection lineations.



Structural data and controls to mineralisation – Shear 3

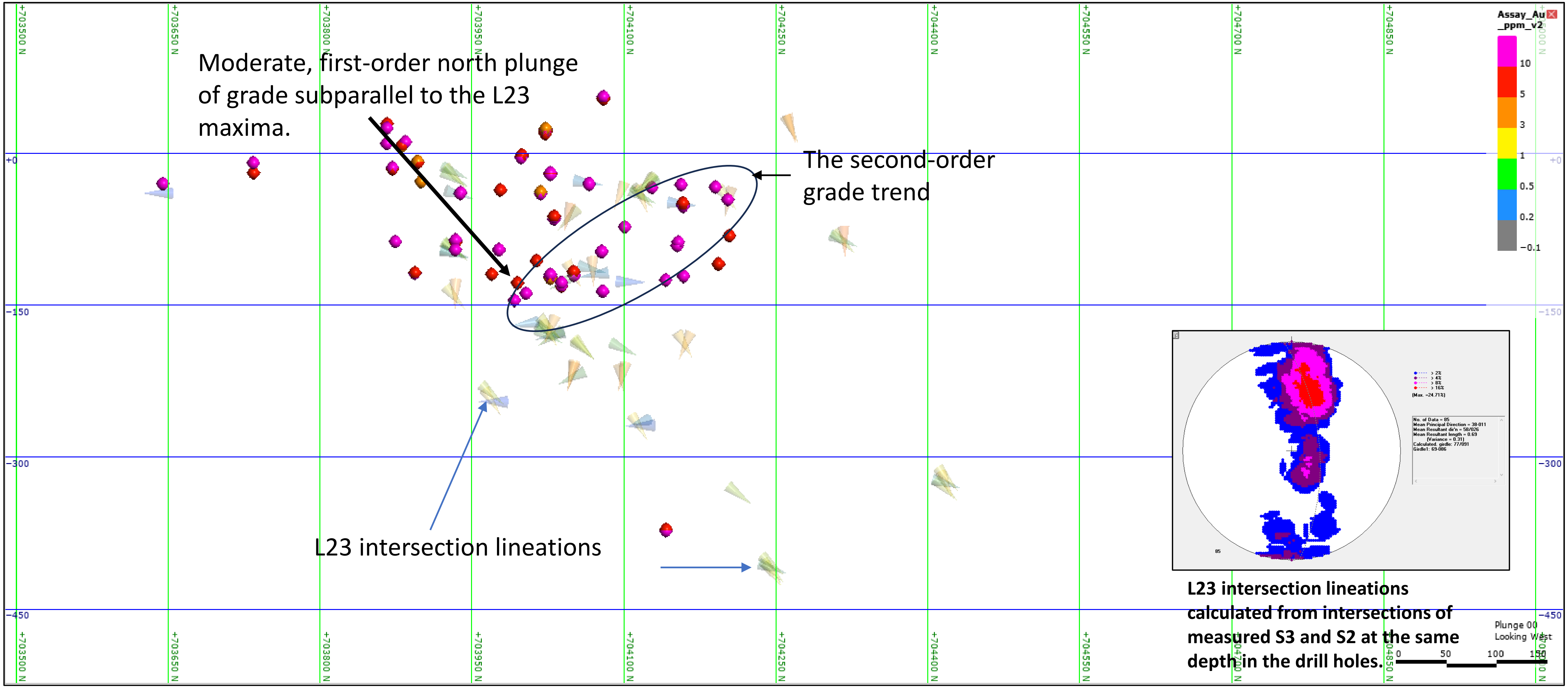
Shear 3 Long Section – viewing West.
Drill hole assays above 31gpt Au, overlain on L23 intersection lineations.



Structural data and controls to mineralisation – Shear 4

Shear 4 Long Section – viewing West.

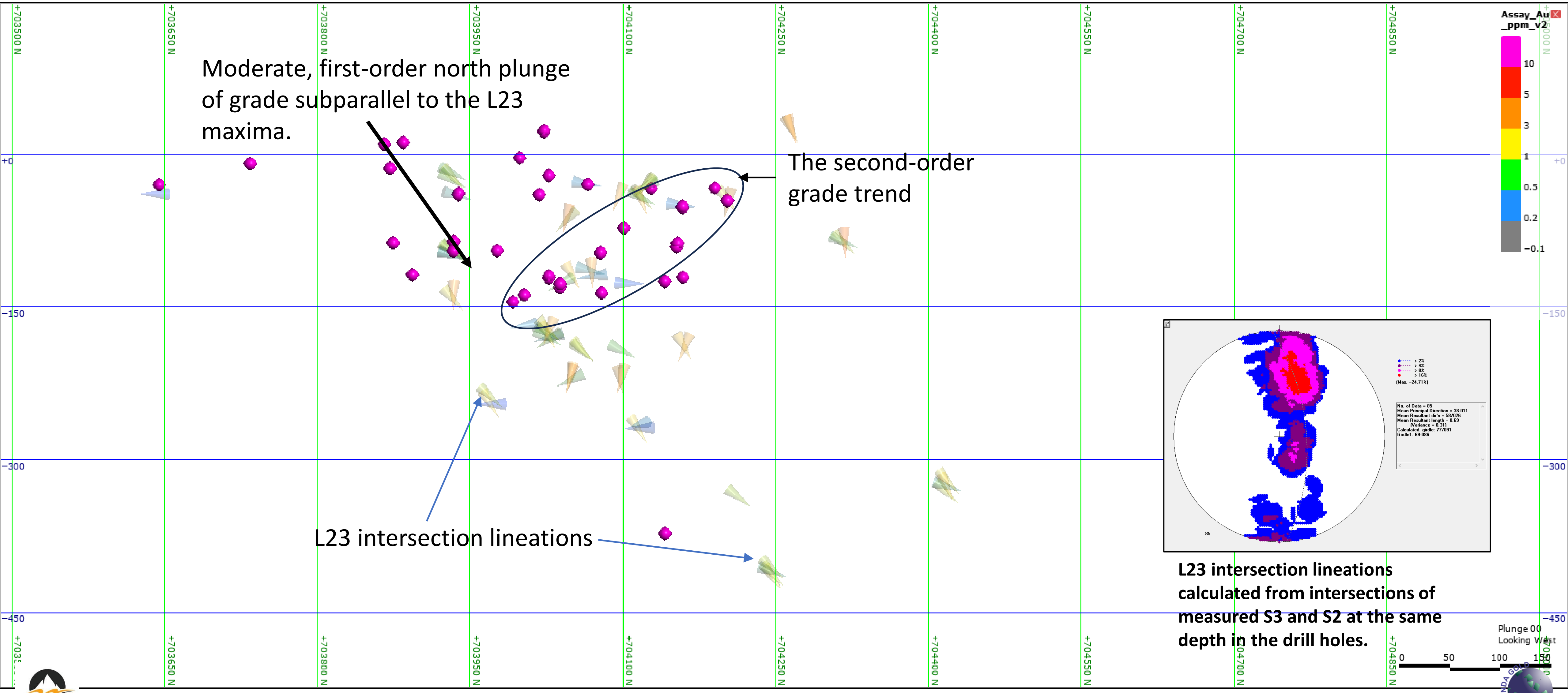
Drill hole assays above 4gpt Au, overlain on L23 intersection lineations.



Structural data and controls to mineralisation – Shear 4

Shear 4 Long Section – viewing West.

Drill hole assays above 15gpt Au, overlain on L23 intersection lineations.

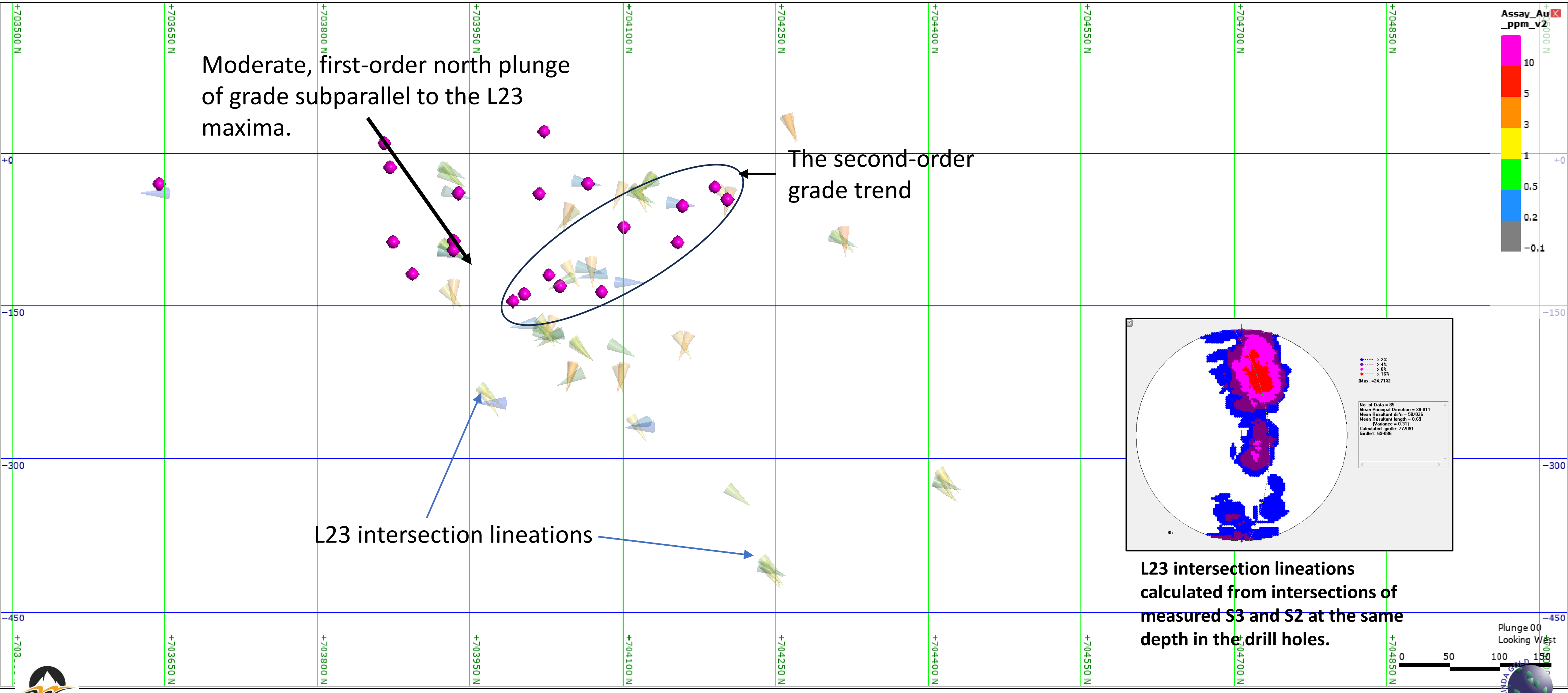


L23 intersection lineations calculated from intersections of measured S3 and S2 at the same depth in the drill holes.

Structural data and controls to mineralisation – Shear 4

Shear 4 Long Section – viewing West.

Drill hole assays above 31gpt Au, overlain on L23 intersection lineations.

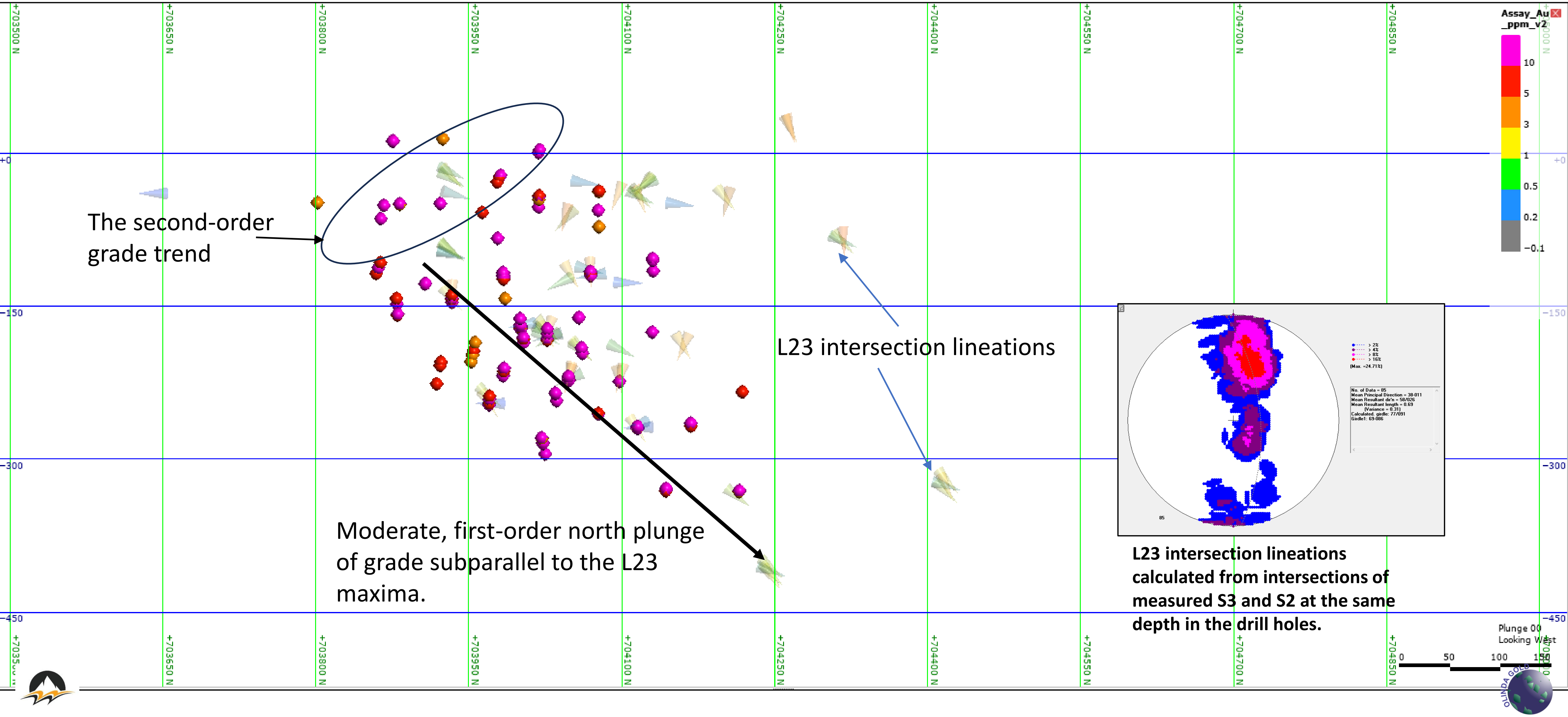


L23 intersection lineations calculated from intersections of measured S3 and S2 at the same depth in the drill holes.

Structural data and controls to mineralisation – Shear 5

Shear 5 Long Section – viewing West.

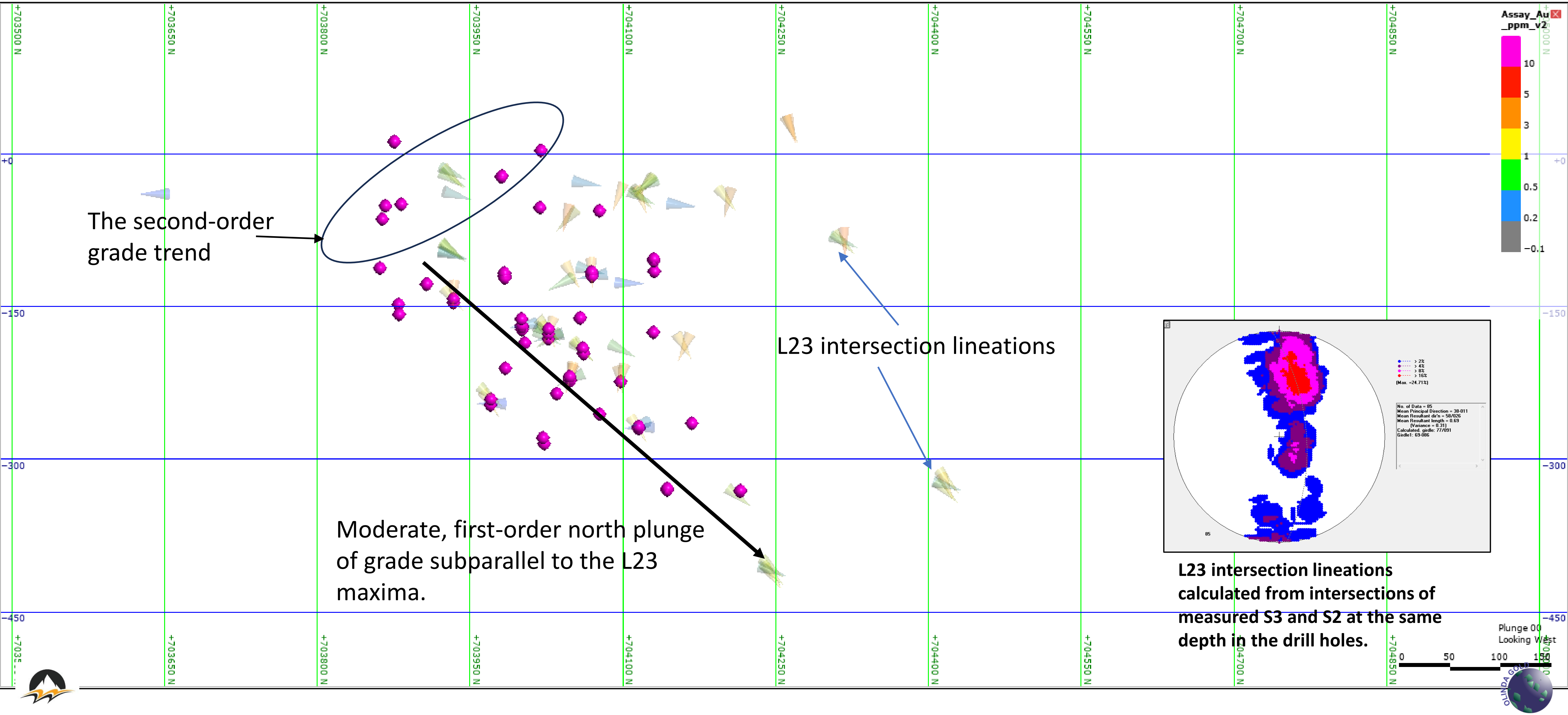
Drill hole assays above 4gpt Au, overlain on L23 intersection lineations.



Structural data and controls to mineralisation – Shear 5

Shear 5 Long Section – viewing West.

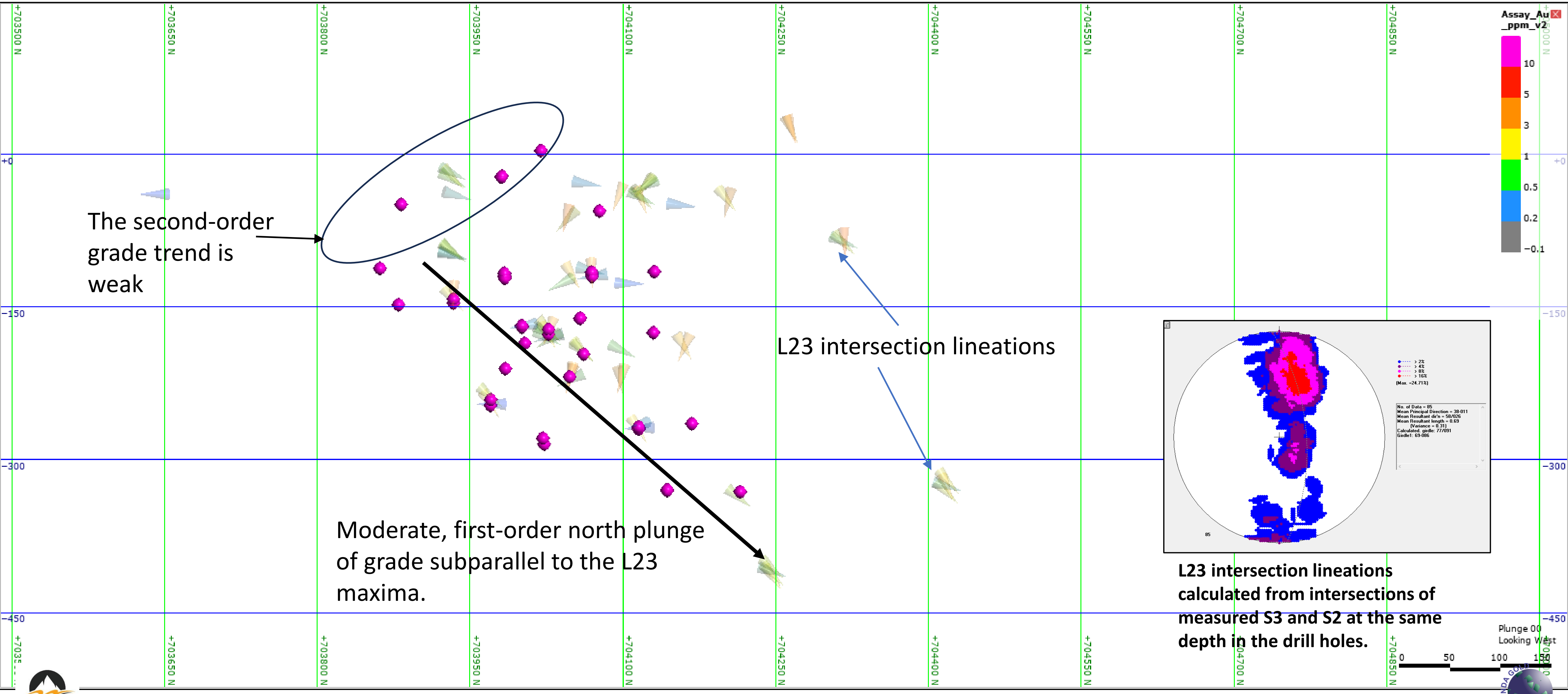
Drill hole assays above 15gpt Au, overlain on L23 intersection lineations.



Structural data and controls to mineralisation – Shear 5

Shear 5 Long Section – viewing West.

Drill hole assays above 31gpt Au, overlain on L23 intersection lineations.

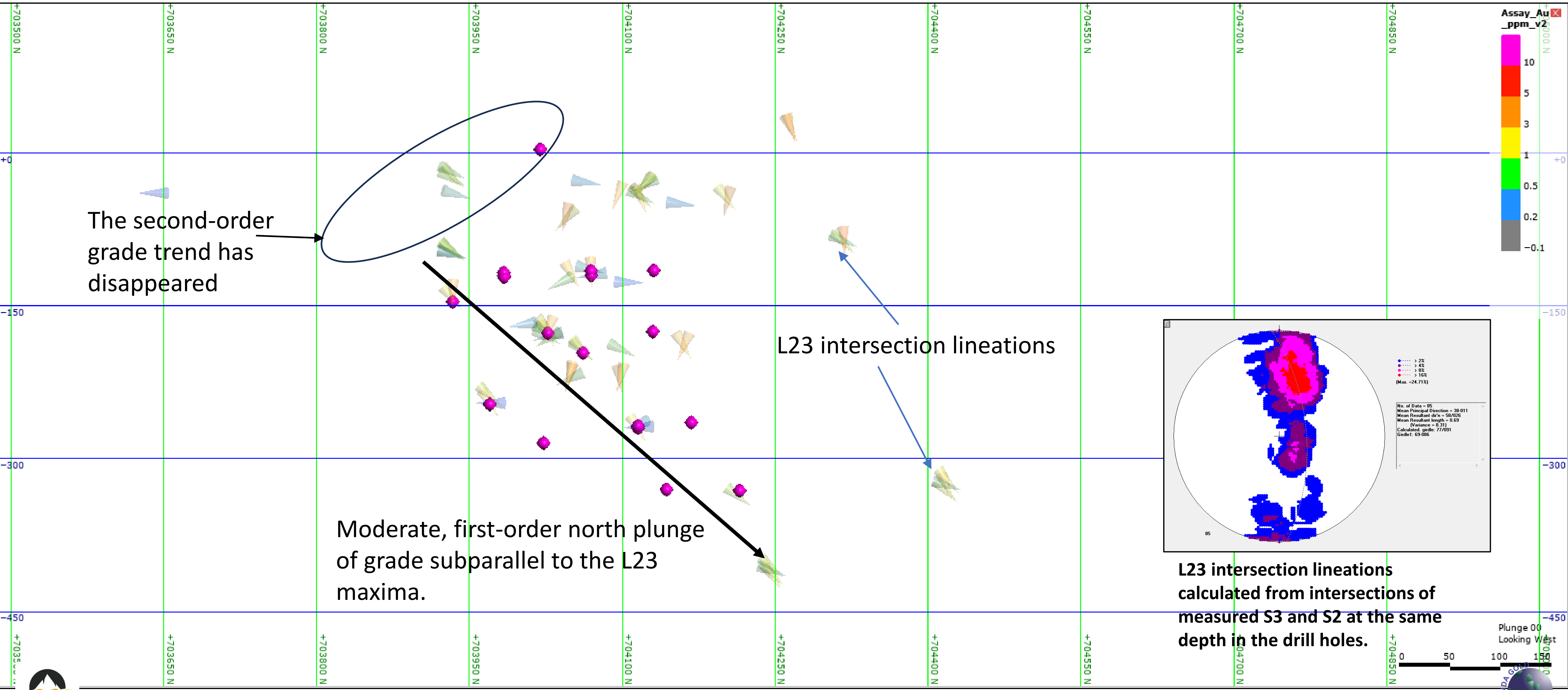


Structural data and controls to mineralisation – Shear 5

Shear 5 Long Section – viewing West.

Drill hole assays above 93gpt Au, overlain on L23 intersection lineations.

This is particularly impressive. At 3Oz/t there is still a strong grade-preferred orientation parallel to dominant, first-order L23 orientation.



District-scale relationships

- Brief visits were made to several of the hard-rock gold mineralization occurrences in the district, including Oko NW, Donika, Shepherds and Ameru. Several consistent litho-structural relationships were noted.
  - Mineralisation is hosted by quartz veins that are hosted in turn by carbonaceous sedimentary sequences, typically adjacent to non-argillaceous sedimentary units. Adjacent units are commonly sandstone that is relatively vein-free.
  - Gold grade vary markedly in the veins, indicating the presence of shoots separated by relatively lower-grade to gold-absent volumes.
  - The veins are deformed, displaying boudinage, shear laminations, folding and stylolite development.
  - Folds were noted adjacent to the veins and are interpreted as products of shortening strain that accumulated at the vein contacts. The axial planes and axes of the folds show progressive rotation into the shears.
  - Vein surfaces locally display well-developed lineations conforming to extension lineation populations and fold axes.
  - Kinematics on structures hosting the quartz veins are variable, depending on structure orientation and the order of the structure (e.g. first-order structures may be sinistral and deform second-order structures that are dextral).

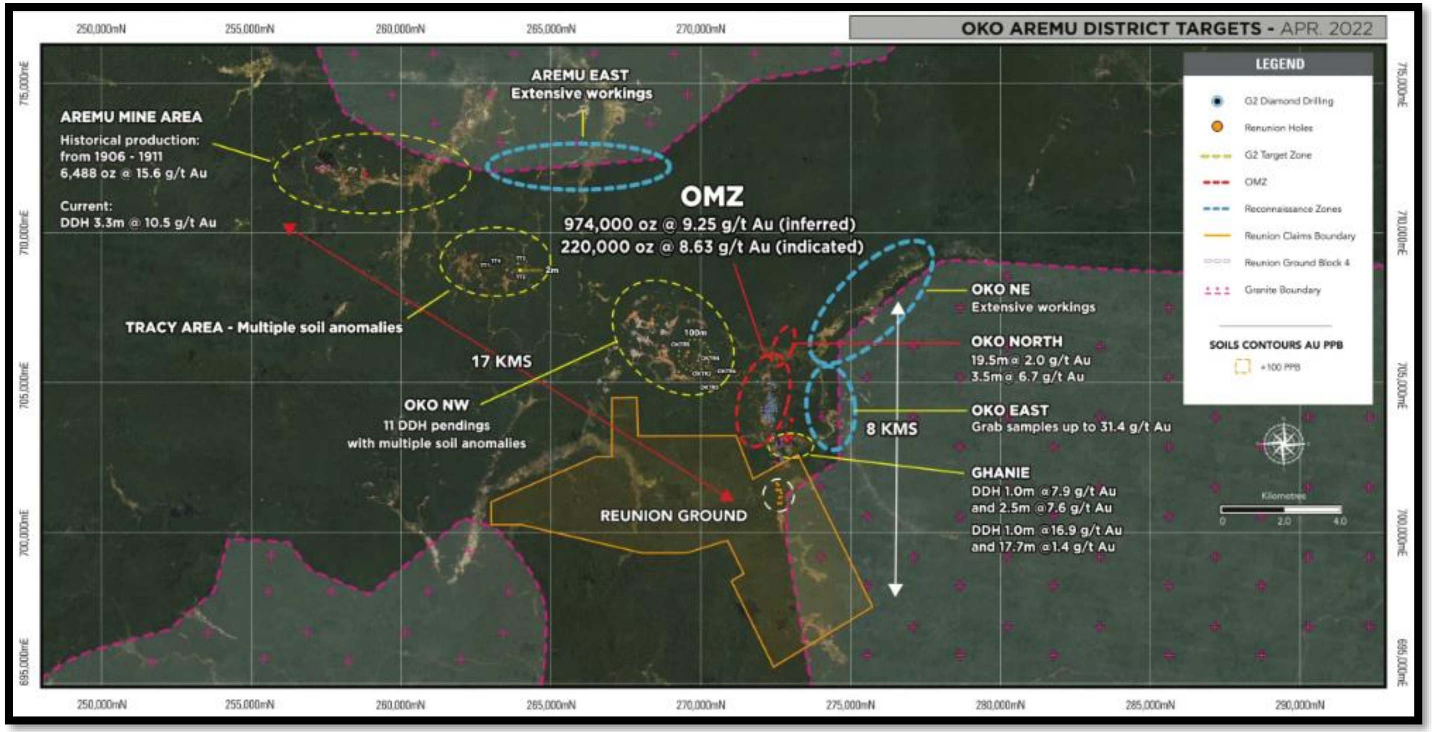
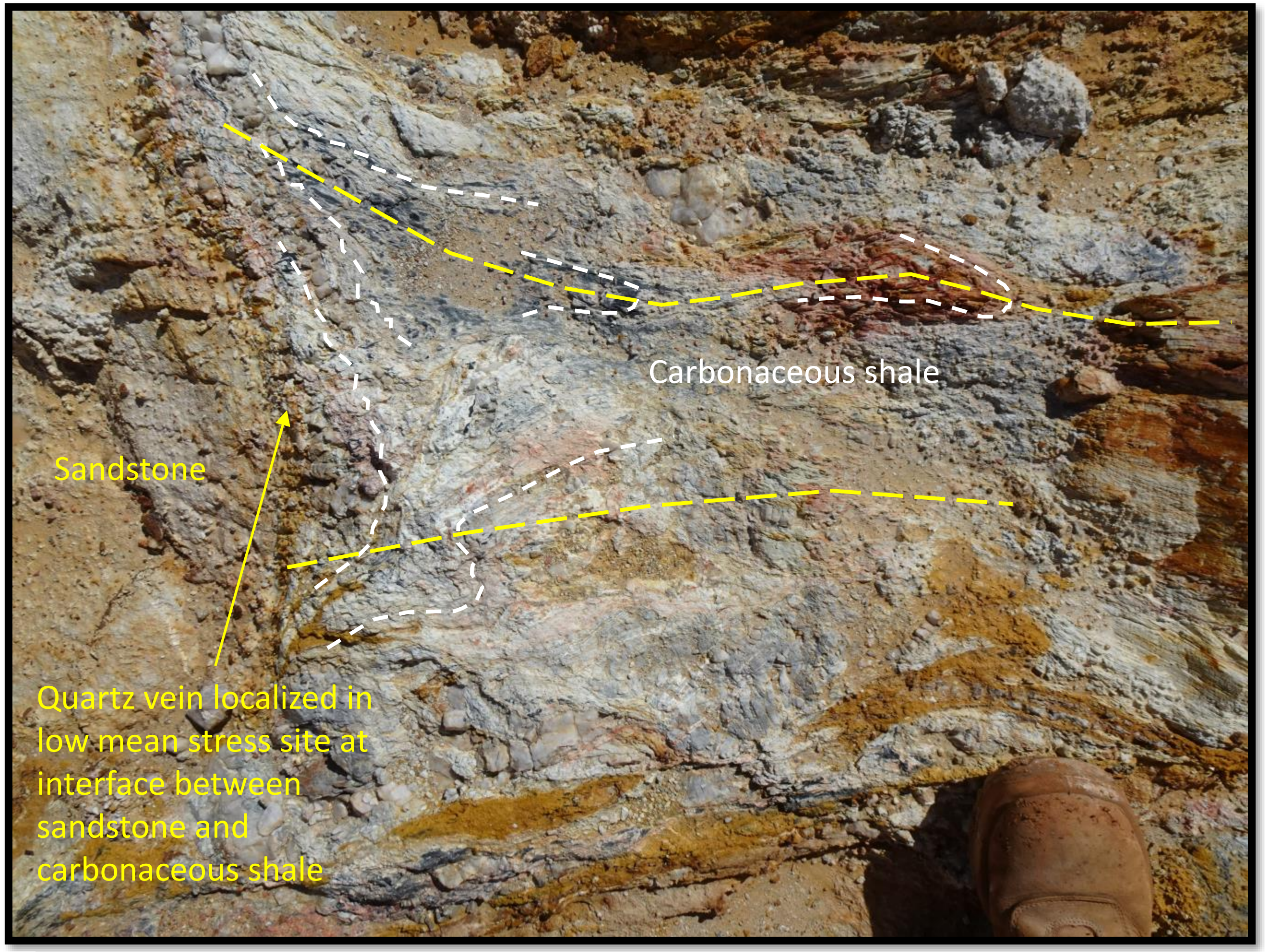


Image from G2 Goldfields' website. https://g2goldfields.com/projects/oko-aremu-trend/

District-scale relationships - Oko NW shear geometries

Examples of mesoscale folds developed adjacent to shear-hosted quartz veins.



Note that these folds would equate to the F2 folds at Oko Main.

District-scale relationships - Oko NW shear geometries

Mesoscale folds are developed adjacent to the quartz vein at Oko NW and show progressive rotation into the zone of high shearing strain localized at the vein contact.

This is the same geometry and structural history noted at Oko Main, where the folds would equate to F2 structures, and the shear zone would equate to S3.

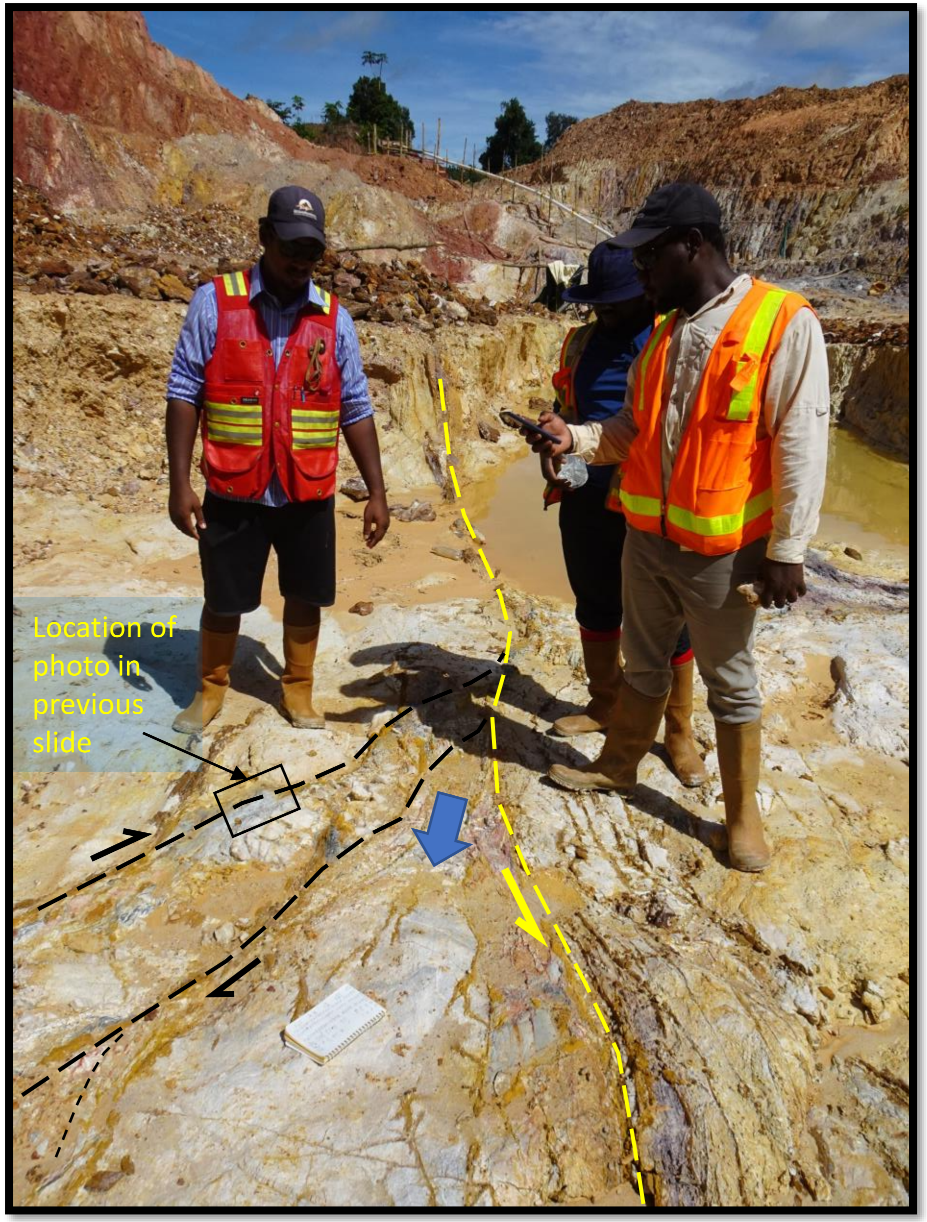
District-scale relationships - Oko NW shear geometries

Two views of the structural geometry hosting two different sense of shear.

The first-order, continuous structure has accommodated a sinistral sense of movement, whereas the second-order, truncated structure has accommodated a dextral sense of shear.

Note that the opposing shear senses cause movement of the block away from the point of intersection (blue arrow), creating a zone of low mean stress.

Compare these geometries with the block diagram constructed for Oko Main and Ghanie.



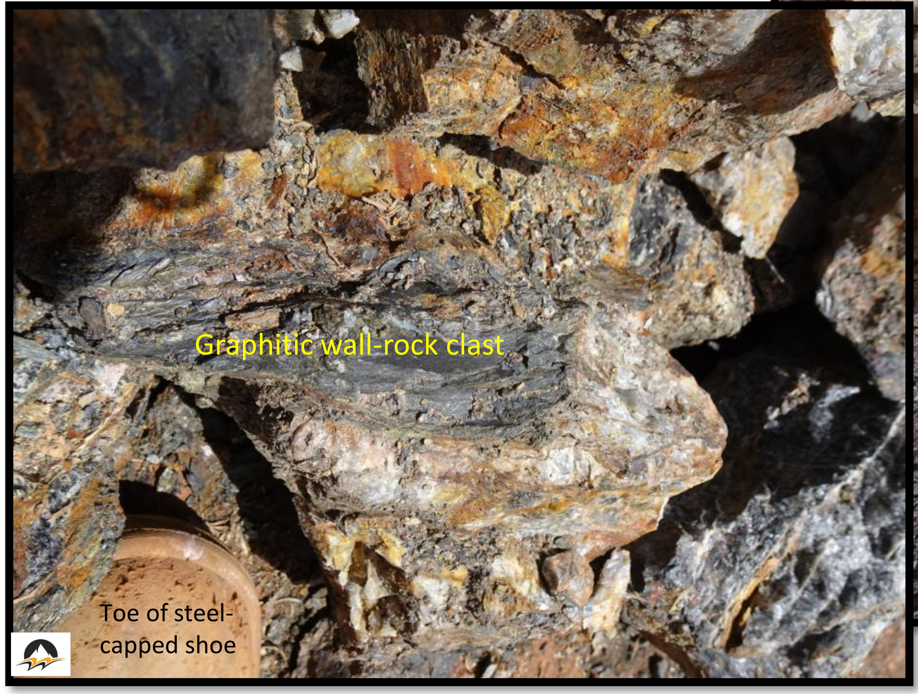
District-scale relationships - Aremu

Asymmetrically boudinaged, shear-laminated quartz veins are localized in the carbonaceous sedimentary rocks adjacent to the contact with relatively non-argillaceous units.

District-scale relationships - Shepherds

Shear-laminated quartz veins are localized in the carbonaceous sedimentary rocks adjacent to the contact with relatively non-argillaceous units at Shepherds.

In detail, the quartz is strongly deformed, containing shear laminations, wall-rock clasts and abundant stylolites.



District-scale relationships

- The consistency in structural style and commonality in location of the veins within the sedimentary sequences suggests a district-scale permeability event that localized quartz vein emplacement into favourable structural sites that manifested as ductile shears in carbonaceous sedimentary sequences. Furthermore, the structural history and age of the veins is tentatively interpreted as being the same across the district.
- Based on the inferred similar structural age of the veins, gold is interpreted as post-dating them. This explains the variability of gold in the vein systems, with mineralization being localized in permeable zones where post-vein shears have intersected them.

Concluding comments

- The findings presented here are not a magic bullet that will guarantee the discovery of more ounces. However, they are the first identification and documentation of the fundamental controls to, and criteria for, formation of significant gold deposits, including high-grade shoots, in the district.
- Given that the criteria for focussing gold-bearing fluids have been identified, future work needs to progress discovery by working from areas of known gold anomalism (e.g. identified through geochemistry, artisanal prospecting etc), assessing the presence or otherwise of the favourable criteria via mapping, first-pass drilling etc, and applying the geometric constraints to the drill testing.
- Dead zones in veins are to be expected. This is because the veins are simply hosts but pre-date the mineralisation. The intersection of a permeability network that has been accessed by gold-bearing fluids after vein formation is necessary to produce zones of significant mineralisation. As such, identification of competent hosts (i.e. the veins) and the prospective shears is critical. Keep in mind that other competent hosts favourable for formation of gold depositional sites, may be present.
- If all the criteria are present but grade isn't, it means we are on the prospective structure and that more drilling is justified. A lack of gold in assay means this is the cliché of a technical success and that good grades may be very close by, just not in the small-volume sample in the initial hole.
- The system will change in character, despite it being a product of a regional permeability-forming, mineralisation event. Many factors impact permeability and the creation of sites favourable to deposition of hydrothermal mineralisation, including, but not limited to:
  - Rocktype – chemical and/or structural attributes
  - Stress field variation
  - Structural architecture – pre- and syn-mineralisation
  - Rigid bodies – e.g. intrusions that impact the stress field
  - Fluid pathway and units traversed
- Overall, the understanding of the mineralised systems at the deposit- and district-scale has been enhanced by undertaking the fundamental tasks of resolving the geological history, dividing the geological features into discrete populations, collecting orientation data, and comparing grade/geochem trends with the geometries of structures. Continued application of this process will be critical to ongoing exploration and resource addition.

References

- Bell, T.H., 1986. Foliation development and refraction in metamorphic rocks: reactivation of earlier foliations and decrenulation due to shifting patterns of deformation partitioning. Journal of Metamorphic Petrology, 4, 421-444.
- Davis, B.K., 1995. Regional-scale foliation reactivation and re-use during formation of a macroscopic fold in the Robertson River Metamorphics, north Queensland, Australia. Tectonophysics, 242, 293-311.