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Synvolcanic Au-Ag±Cu-Zn-Pb massive sulphides, veins and disseminations of the Westwood deposit, Abitibi greenstone belt, Québec

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SYNVOLCANIC Au-Ag ± Cu-Zn-Pb MASSIVE SULPHIDES, VEINS AND DISSEMINATIONS OF THE WESTWOOD DEPOSIT, ABITIBI GREENSTONE BELT, QUÉBEC

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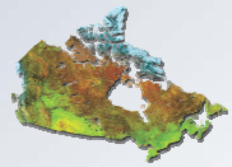

GAC-MAC Winnipeg 2013
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Geological Association of Canada – Mineralogical Association of Canada Joint Annual Meeting
Winnipeg Convention Center
May 22, 2013

Preface

The Westwood research activity is part of the Lode Gold project within the TGI-4 program (Targeted Geoscience Initiative 4) of the Geological Survey of Canada; a collaborative geoscience program that provides industry with the next generation of geoscience knowledge and innovative techniques, which will result in more effective targeting of buried mineral deposits (Natural Resources Canada website). The Westwood research project is a collaborative effort that involves Iamgold Corporation, the GSC, the Institut national de la Recherche scientifique, the Ministère des Ressources Naturelles du Québec (MRNFQ), the Fonds de Recherche du Québec - Nature et Technologie (FQRNT) and the Natural Sciences and Engineering Research Council of Canada (NSERC) .

The Westwood activity includes a Ph.D. project for which the main objective is to establish the geological footprint of the deposit and to further understand the relationship between the different types of mineralization encountered within the deposit and at camp scale. It will also help improve the genetic model for Archean magmatic-hydrothermal gold systems.

Abstract

The Westwood deposit (3.715 Moz of Au) includes three distinctive mineralized corridors stacked from north to south: 1) Zone 2 Extension, 2) North Corridor and 3) Westwood Corridor. The Zone 2 Extension consists of cm- to dm-wide pyrite- and chalcopyrite-rich quartz veins and dissemination zones whereas the North Corridor consists of cm- to dm-wide quartz-pyrite-chalcopyrite ± sphalerite veins and disseminations as well as thin, semi-massive to massive sulphide veins. The hydrothermal envelopes of these two corridors are slightly discordant to the stratigraphy and main foliation. Finally, the Westwood Corridor consists of discontinuous stratabound polymetallic semi-massive to massive sulphide lenses, veins and disseminations.

The Westwood mineralized corridors are part of the Doyon-Bousquet-LaRonde mining camp and are hosted in metavolcanic rocks of the Bousquet Formation (2699-2696 My), which forms a steeply south-dipping, east-trending homoclinal sequence facing south. The study area is metamorphosed to greenschist-amphibolite facies transition and deformation is heterogeneously distributed with high strain corridors typically localized at lithological contacts and within synvolcanic alteration zones.

The Warrenmac massive sulphide lens (Westwood Corridor) is characterized by pyrite-sphalerite-chalcopyrite ± galena-pyrrhotite and is overlain by a highly transposed stringer zone, which are both anomalous in Sn, Hg, As and Sb. Sericite, quartz, biotite, chlorite and Mn-garnet define the metamorphosed proximal alteration assemblage whereas an aluminous alteration assemblage (staurolite, andalusite, kyanite) is preferentially developed at depth (> 1.5 km). Mapping of the Warrenmac discovery outcrop revealed that felsic volcaniclastic rocks hosting the massive sulphide lens are intruded by low-permeability mafic sills which acted as cap rocks for ascending hydrothermal fluids. Moreover, synvolcanic alterations discordant and strongly transposed into the main foliation combined with the presence of abundant sulphide fragments within felsic volcaniclastic breccias suggesting a synvolcanic origin for the Au mineralization.

Zone 2 Extension and Doyon mine mineralization (~1.5 km west of Westwood) are interpreted to be genetically related to the synvolcanic Mooshla pluton whereas Westwood and North corridors have a VMS-type origin and are located on the same stratigraphic horizon as LaRonde Penna mine 20 North lens to the east. U/Pb zircon dating suggest that the three mineralized corridors might have been formed in less than 2 My. The Westwood deposit therefore represents a unique opportunity to test the hypothesis of a continuum between vein-type mineralization associated with a synvolcanic intrusion and auriferous massive sulphide lenses, and thereby contribute to a better understanding of Archean auriferous magmatic-hydrothermal systems. Metallogenic continuums are well documented in younger geological environments such as telescoped porphyry-epithermal systems.

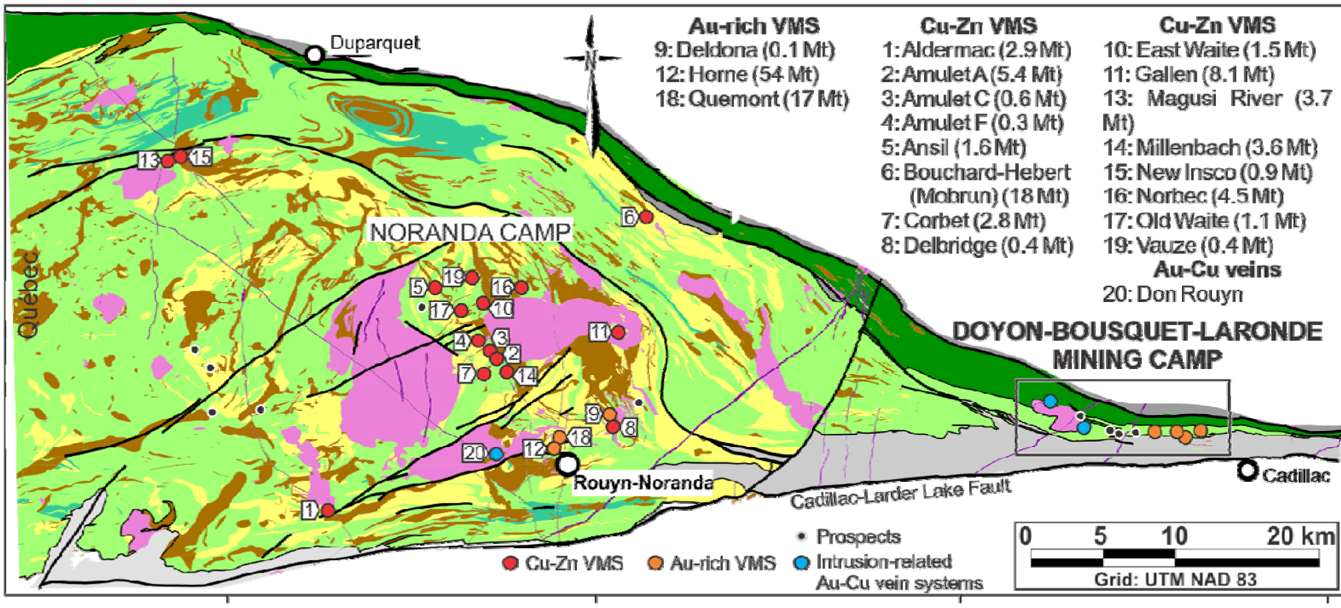
Westwood Project overview

- Surface exploration and discovery of Au-rich quartz veins and sulphide zones in the 30's
- Short-lived underground production of 3 tons @ 200 g/t Au in 1938
- Warrenmac lens discovery and delineation in the 70's and 80's
- Exploration drift and delineation of the main zones since 2002
- 3.73 Moz of Au in both reserve and resource categories in 2013*
- Production started in march 2013 ➔ 16 years mine life

For more technical information ➔ www.iamgold.com

*Iamgold is reporting mineral resources and reserves estimates in accordance with the CIM guidelines

Blake River Group (2704-2695 Ma)



From Mercier-Langevin et al. (2009)

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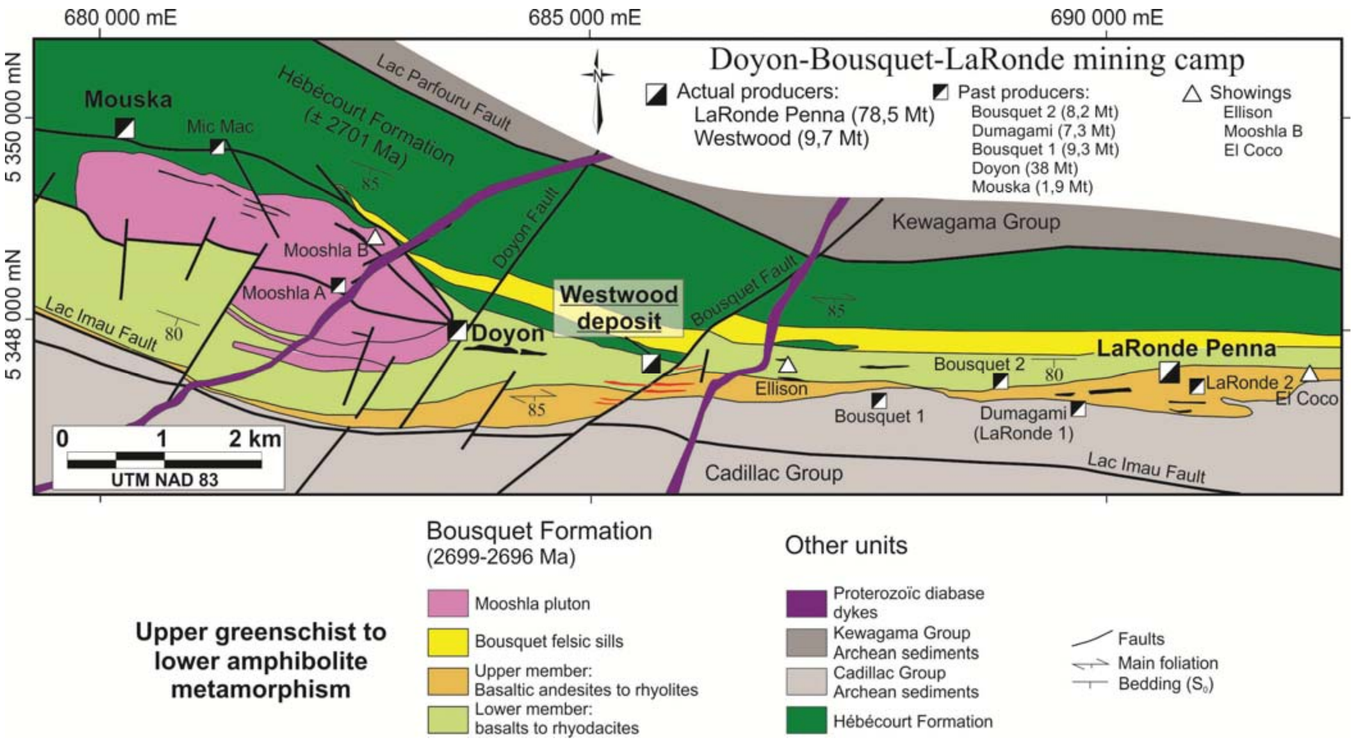
The Westwood deposit is hosted in the Bousquet Formation which is one of the youngest volcanic succession of the Blake River Group (BRG).

The Doyon-Bousquet-LaRonde (DBL) camp is located halfway between Rouyn-Noranda and Val d'Or, near the village of Cadillac.

The DBL camp is also 40 km east from the Noranda mining camp which is known for it's Cu-Zn and Au-rich VMS deposits (e.g., Horne and Quemont).

Doyon-Bousquet-LaRonde mining camp



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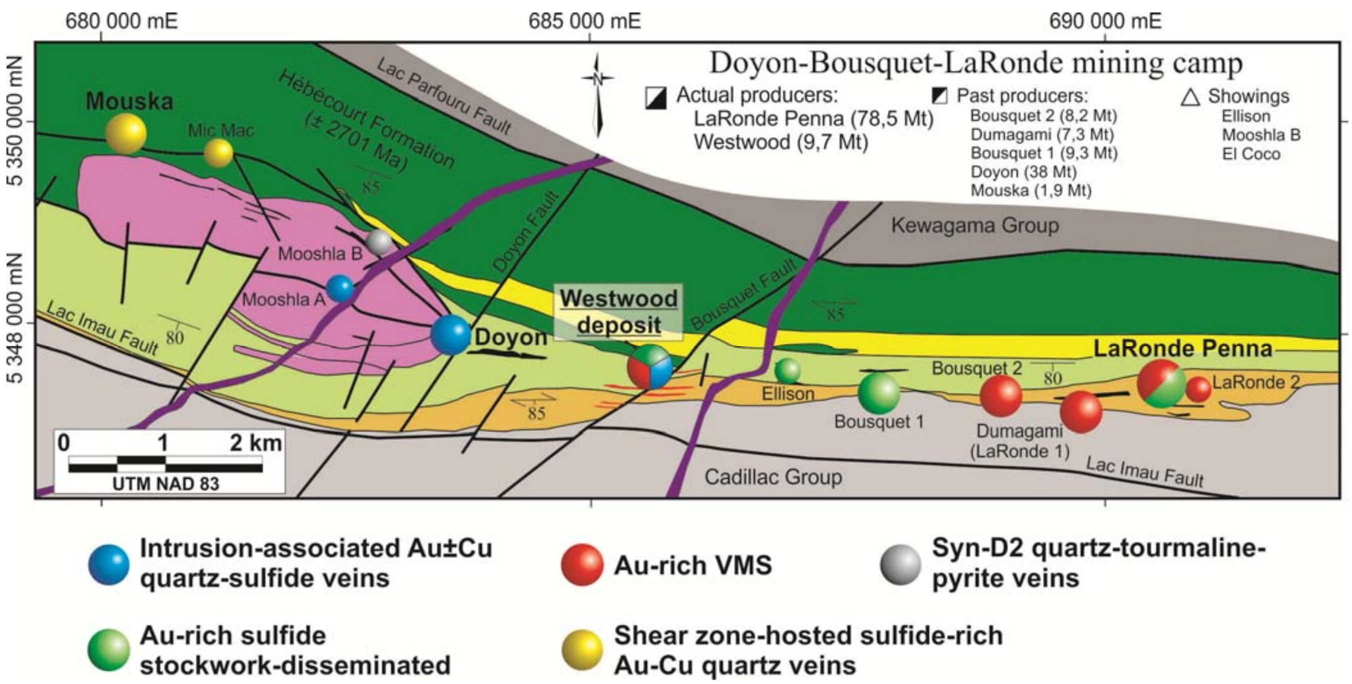
The BRG in this area is limited to a highly strained relatively thin band of volcanic and intrusive rocks that forms a steeply dipping, southward-facing homoclinal succession.

The base of the BRG consist of tholeiitic basalts (Hébécourt Formation) whereas the upper section consists of differenciated volcanic and intrusive rocks of the Bousquet Formation. The Bousquet Formation is divided in 2 members: a lower member that is dominated by tholeiitic to transitional mafic to felsic sills and volcaniclastic rocks, and an upper member that is dominated by intermediate to felsic, transitional to calc-alkaline flow-dome units cut by mafic sills.

The Mooshla pluton is a synvolcanic polyphased intrusion coeval and comagmatic with the Bousquet Formation lower and upper members. The volcanic sequence is in contact with the Porcupine-age Cadillac Group turbidites to the south and the Porcupine-age Kewagama Group turbidites to the north.

All rocks, alteration assemblages and ore zones were metamorphosed to upper greenschist/lower amphibolite facies.

Doyon-Bousquet-LaRonde mining camp



Modified from Mercier-Langevin et al. (2009)

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The camp hosts 5 different, but perhaps closely related styles of mineralization:

1) Au-rich VMS systems such as LaRonde Penna and Bousquet 2-Dumagami;

2) Au-rich sulphide stockworks and disseminations (e.g., Bousquet 1 deposit);

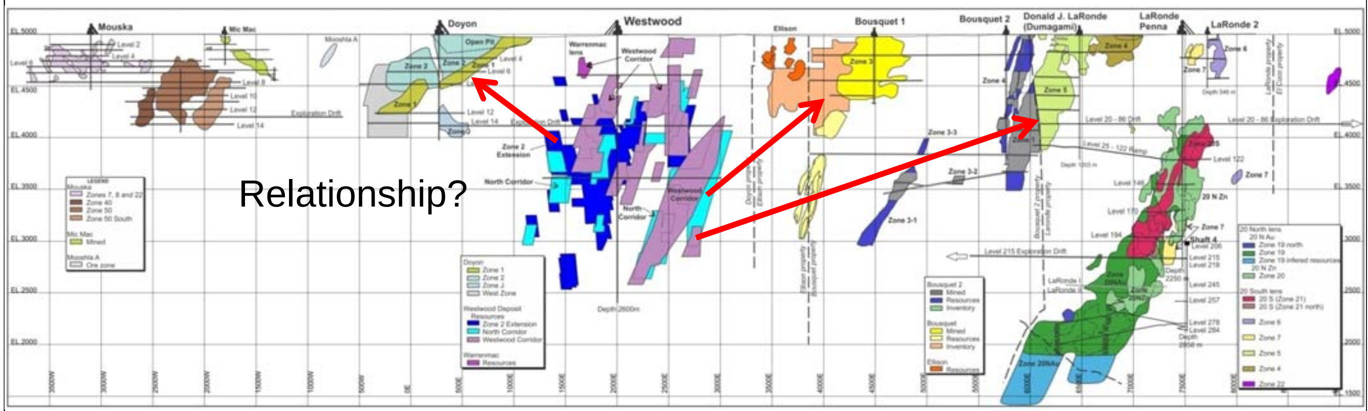
3) Intrusion-related Au-Cu quartz-sulphide veins that are possibly genetically related to the intrusion (e.g., Doyon deposit);

4) Some shear zone-hosted sulphide rich Au-Cu veins that plausibly represent remobilized synvolcanic sulphide-rich mineralization (e.g., Mouska deposit);

5) Syn-main deformation or orogenic shear zone hosted quartz-tourmaline-carbonate-pyrite veins in the Mooshla pluton.

DBL mining camp E-W composite longitudinal section

Mouska	Doyon	Westwood	Bousquet 1	Bousquet 2-Dumagami	LaRonde Penna
2.6 Mt @ 12.6 g/t 1 Moz Au (+ Cu)	37.7 Mt @ 5.4 g/t Au 6.5 Moz Au	10.4 Mt @ 11.2 g/t 3.73 Moz Au (+ Zn-Cu-Ag)	29.6 Mt @ 3.4 g/t Au 3.2 Moz Au	15.5 Mt @ 7.8 g/t Au 3.9 Moz Au	79 Mt @ 3.7 g/t 9.4 Moz Au (+ Zn-Cu-Ag)



Modified from Mercier-Langevin et al. (2009)

Total camp: ca. 175 Mt for 28 Moz Au

2 km

Looking North

Global gold endowment figures include total historical production
plus current reserves and resources data taken from public sources and are for comparison purposes only

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Let's now focus on the Westwood deposit itself

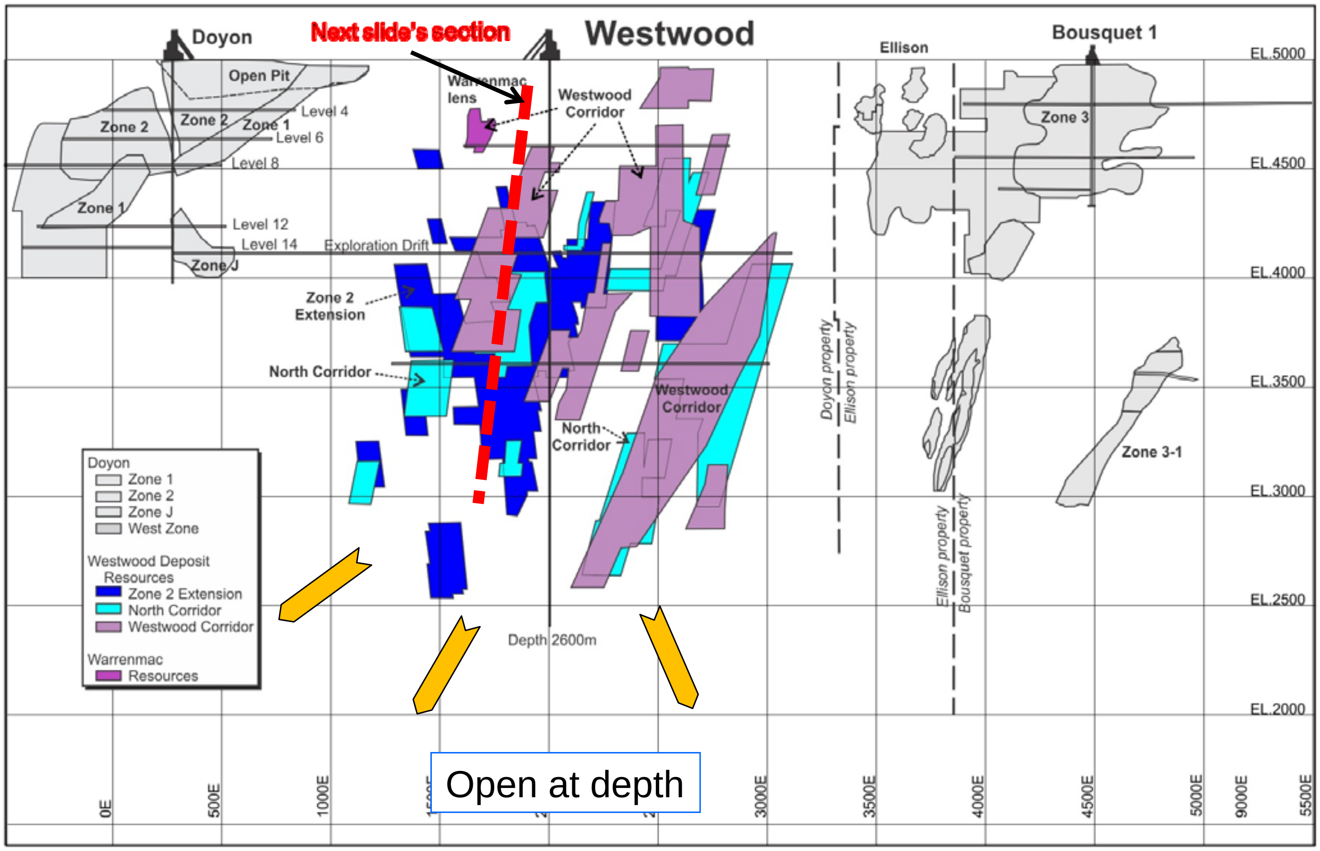
This map shows a composite longitudinal section of the Doyon-Bousquet-LaRonde (DBL) camp with the location and the spatial distribution of the major deposits of the camp.

Westwood is located halfway between Doyon and Bousquet 1 mines which are both past producers. Some of the Westwood deposit mineralized corridors show features that are similar to the Doyon vein-type deposit whereas other mineralized corridors are more similar to the Bousquet 1-2 and LaRonde Penna VMS-type deposits.

The presence of stacked, multiple types of mineralization in the same deposit will provide an apportunity to determine the timing and relationship between them.

A good understanding of this key area will contribute to the better understand the metallogenic evolution of the entire district.

Westwood deposit E-W longitudinal section



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The deposit consists of numerous E-trending, subvertical ore zones grouped in three « corridors » based on stratigraphic position and mineralization style.

Those corridors are stacked from north to south in the lower and upper members of the Bousquet Fm.

As shown here on a composite longitudinal view, Westwood ore zones extend from near surface to a depth of at least 2.5 km, and stretch for over 2 km on an east-west axis and the deposit is still open at depth.

Now lets take a look at a N-S section through the deposit highlighted here by the red dashed line.

Westwood deposit North-South section

Looking west

west-central part of deposit

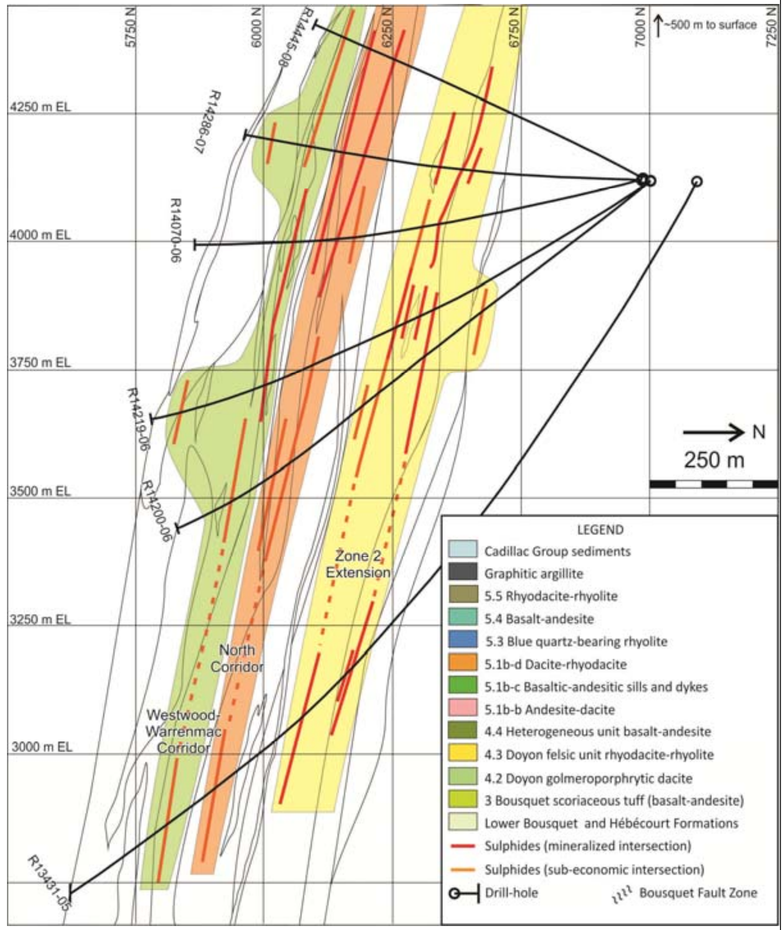
3 mineralized corridors

Zone 2 Extension

North Corridor

Westwood Corridor

Stratigraphy established despite intense deformation



Modified from Wright-Holfeld *et al.* (2010)

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The three mineralized corridors are hosted in the volcanic and intrusive rocks of the Bousquet Formation as shown here on a N-S geologic section (looking west) in the central part of the deposit (see previous image for location).

The northernmost corridor is called the Zone 2 Extension, the central corridor is called North Corridor and the southernmost corridor is called Westwood Corridor.

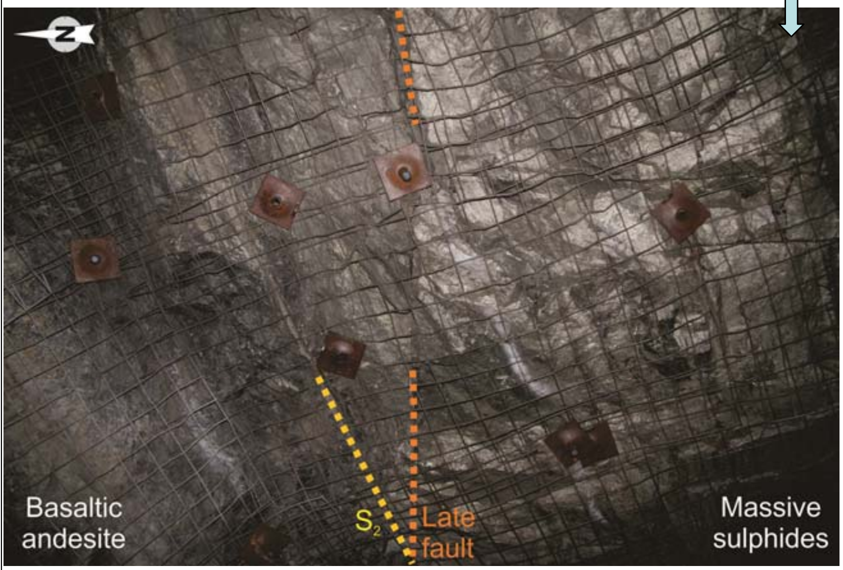
Despite intense deformation in that part of the camp, we were able to establish the stratigraphy of the area using surface and underground mapping, drill hole description, extensive lithogeochemistry and compilation.

Zone 2: Lower Bousquet Fm

North Corridor and WW Corridor: Upper Bousquet Fm

Structural geology

E-W subvertical schistosity with strong oblate flattening
Local subvertical stretching lineation
Au remobilisation in late quartz veins and fractures/faults
Multiple generations and sets of late faults dissecting the ore zones



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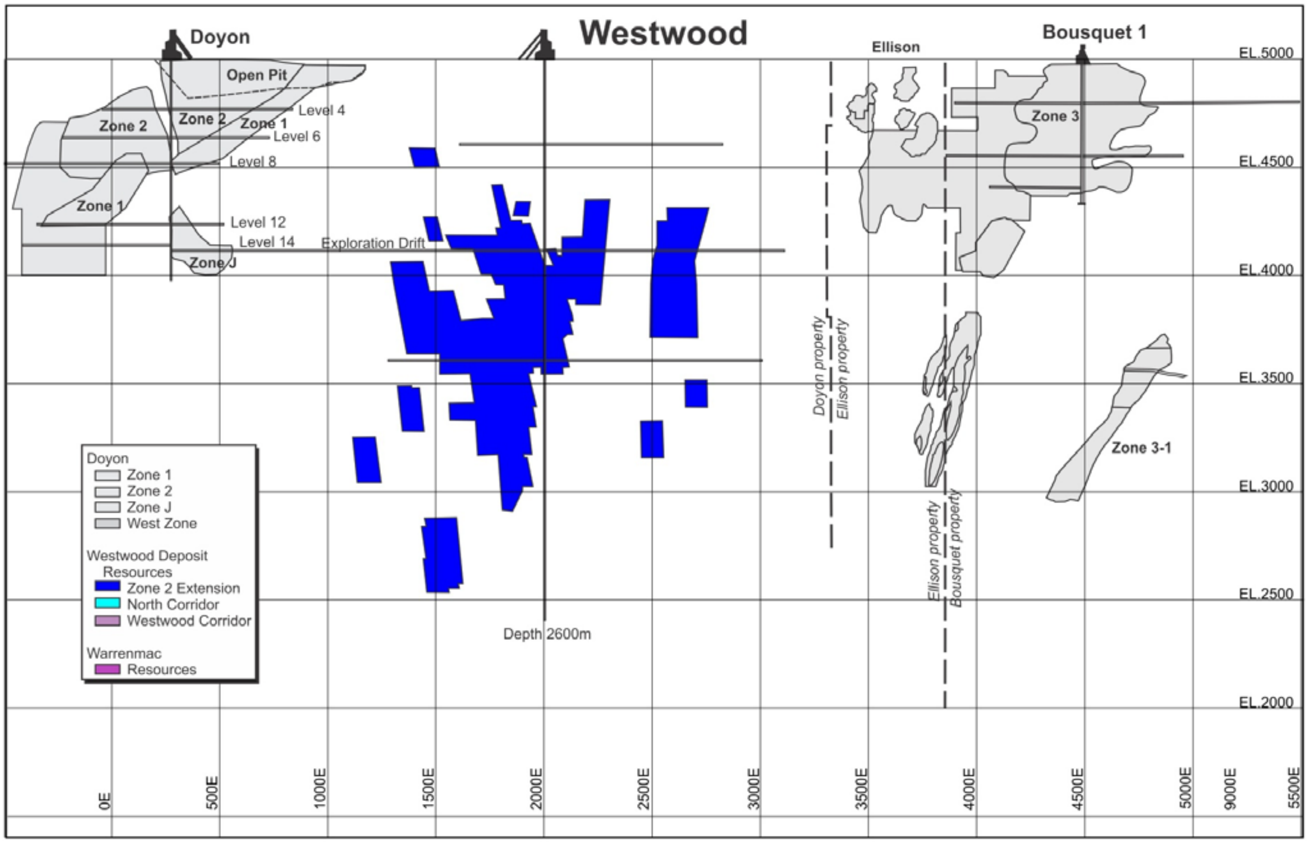
Primary volcanic and hydrothermal features are often strongly obscured by the intense strain superimposed on the rocks in the study area.

The picture to the left shows a late NE-SW trending subtle fault which puts in contact a massive sulphide lens with the basaltic andesite. These late faults are approximately parallel with the main foliation.

The second picture shows the oblate flattening of the clasts of a monogenic felsic breccia. Although flattening is apparent on this slide, other areas are stongly affected by a well developed stretching (prolate) deformation, the lineation plunging steeply to the west.

Zone 2 Extension – Qtz-Py±Cpy-Sph veins/disseminations



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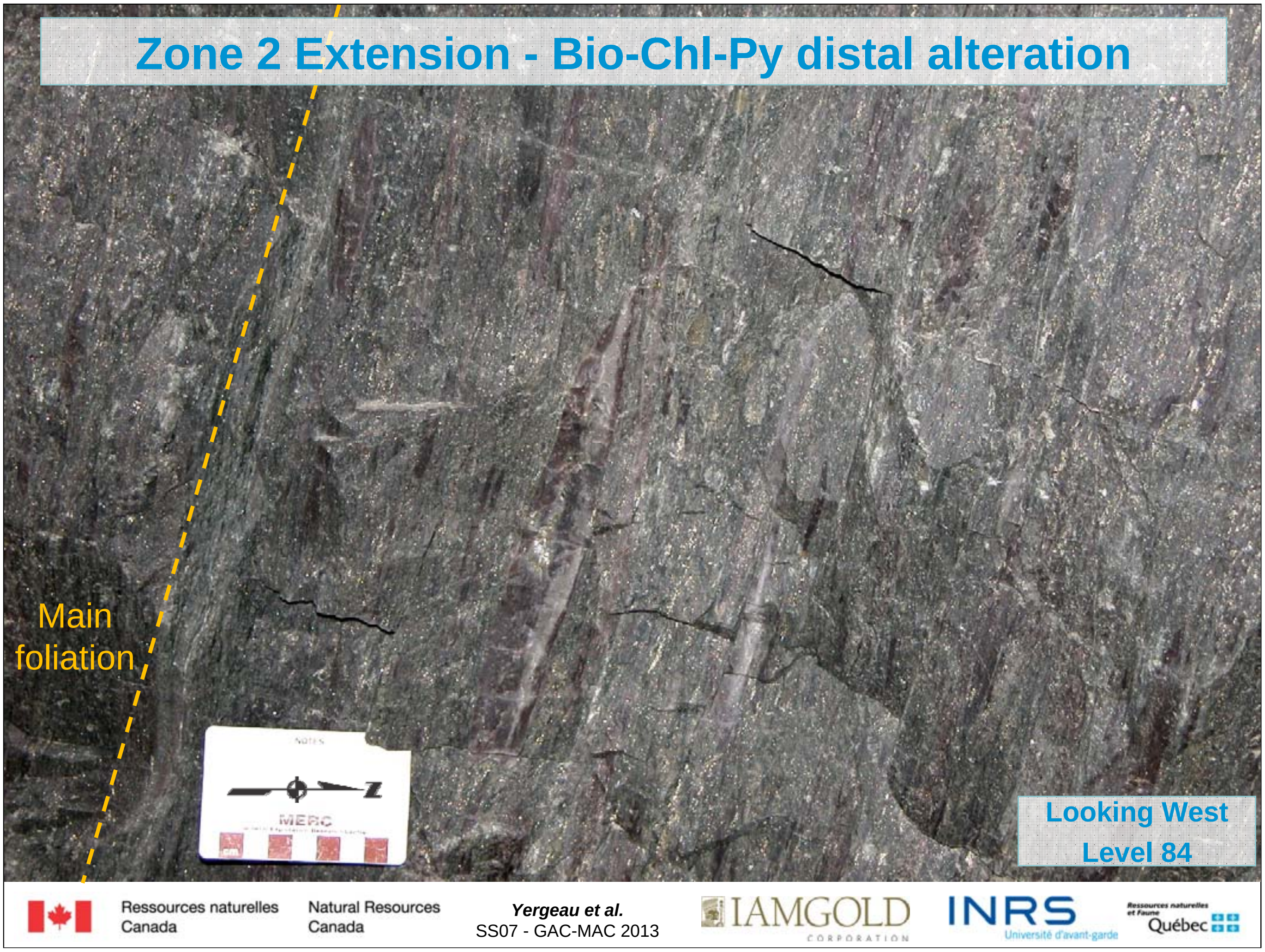
The Zone 2 Extension mineralization (northernmost) consists of quartz-pyrite ± chalcopyrite and rare sphalerite veins and disseminations.

Here you can see the distribution of the Zone 2 Extension mineralized zones which are steeply West- and East-plunging (Outline by Iamgold Corp. using a 6 g/t Au cut-off).

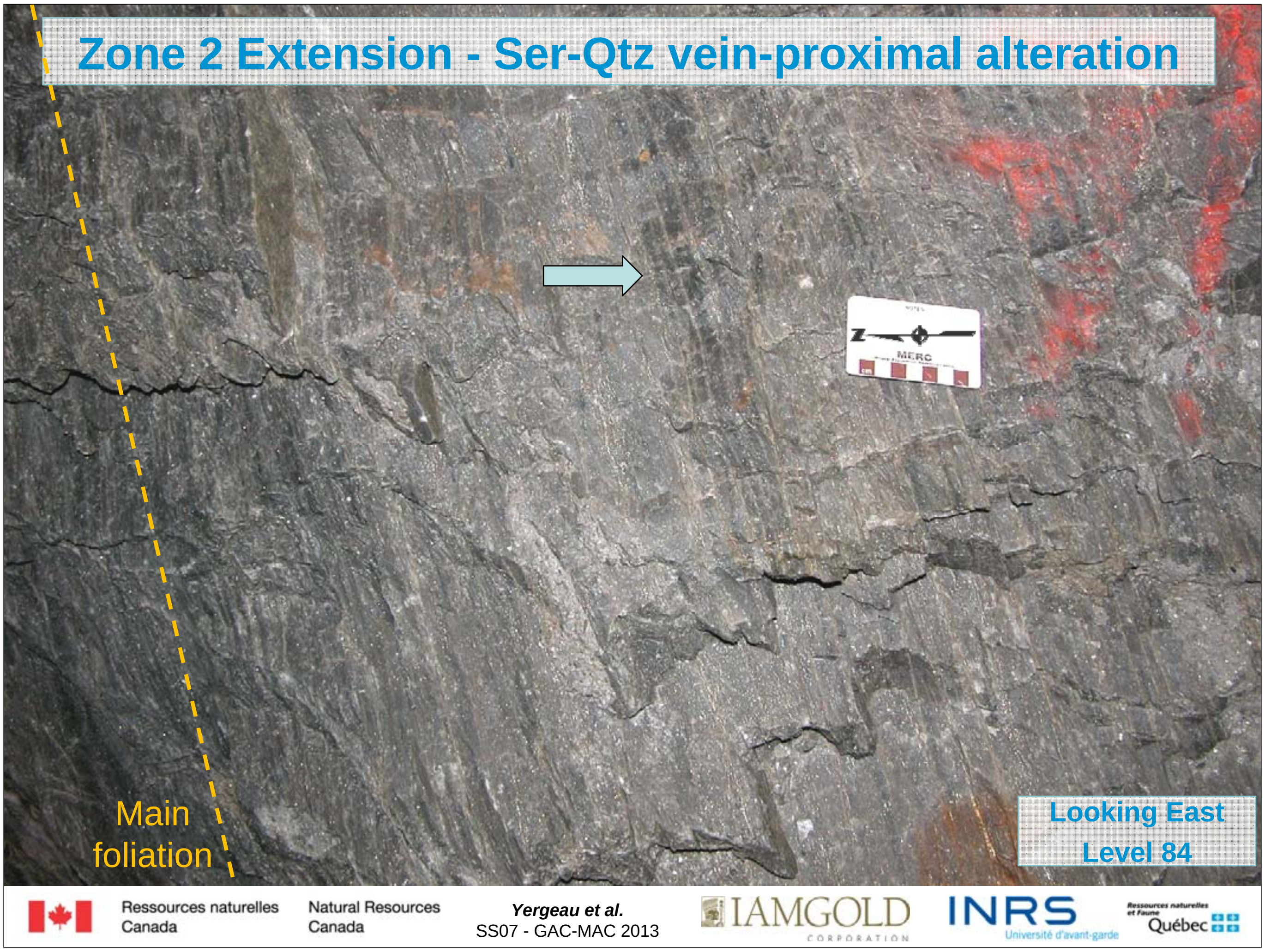
Please note that those outlines reflects the actual known economic areas of the mineralized corridor but that the mineralization itself is much more extensive.



The Zone 2 Extension mineralization is hosted in variably altered mafic to felsic massive and volcaniclastic rocks as shown here.

These rocks are weakly to strongly chlorite-, biotite-, pyrite- and carbonate-altered.

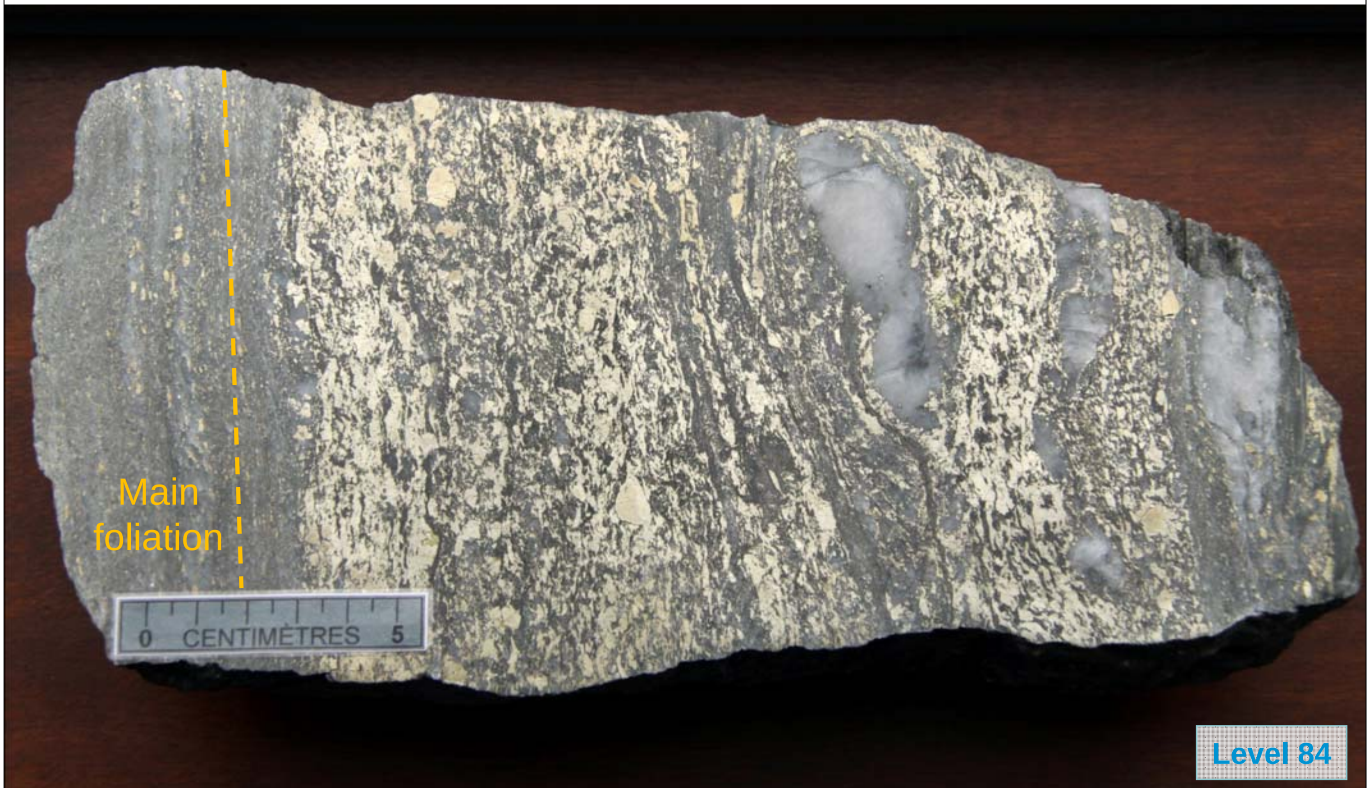
This example illustrates the intensity of the main deformation in the Westwood area with felsic clasts that are strongly flattened parallel to the main foliation.



The distal chlorite-biotite-carbonate alteration is gradually replaced by a strong sericite-quartz alteration with abundant disseminated pyrite proximal to the Zone 2 Extension veins.

The arrow is showing a zone which has been partially preserved despite the development of the proximal Ser-Qtz alteration.

Zone 2 Extension – 2-30 vein



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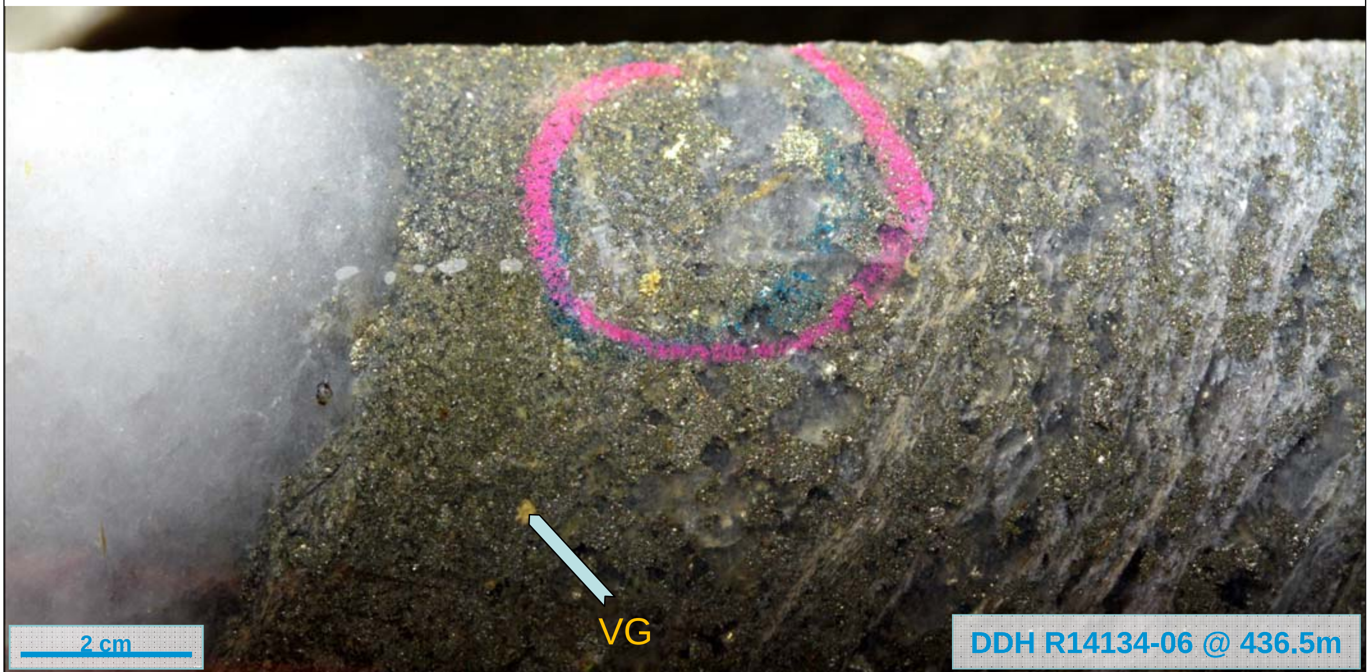
This picture shows a polished slab of the 2-30 vein, the main vein of the Zone 2 Extension Corridor which consists of boudinaged gold-rich quartz-pyrite veins with some chalcopyrite that are hosted in strongly sericitized felsic and intermediate rocks. Such veins can locally be up to a couple meters thick and be surrounded by numerous smaller, gold-rich veinlets and disseminations.

As mentioned before, the veins of the Zone 2 Extension are similar to those of the Zone 2 and Zone West at the Doyon mine west of Westwood.

Gold in sulphidized/sericitized host rock



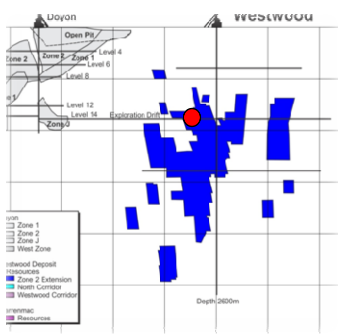
Sulphidized and sericitized wall rocks may also contain significant gold as shown here.

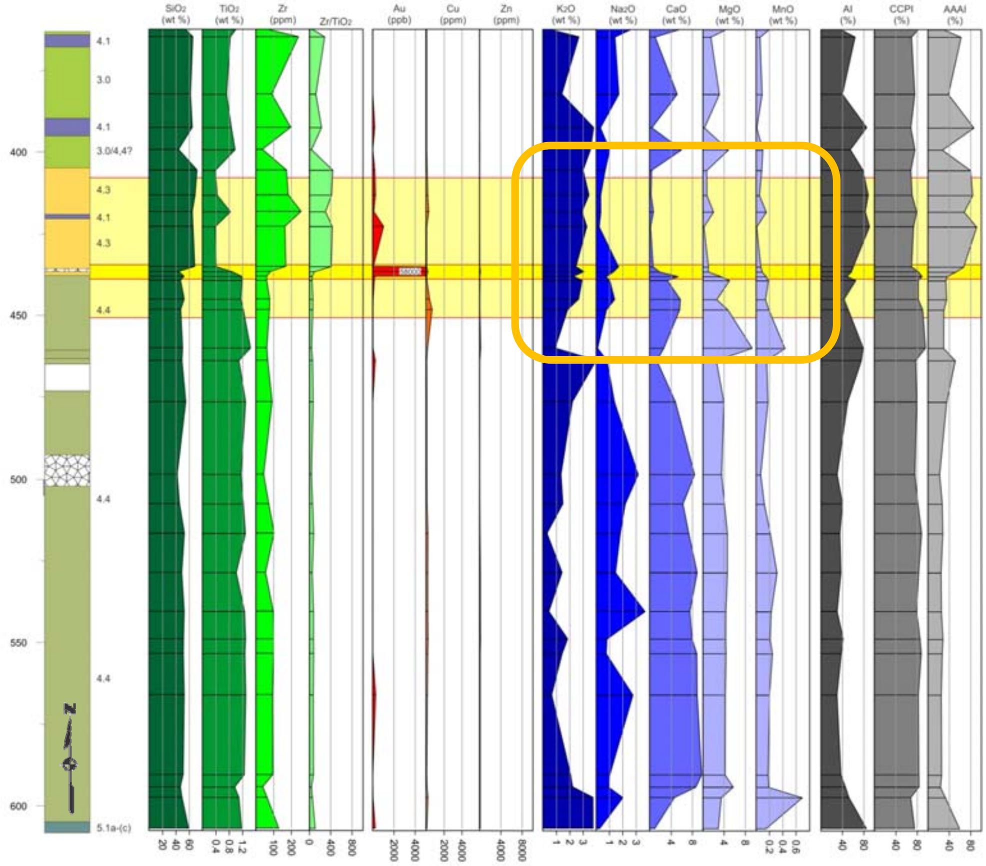
Zone 2 Extension – DDH R14134-06 @ 350-600m

High K_2O

Low Na_2O, MgO
&
MnO

Ser-Qtz alteration





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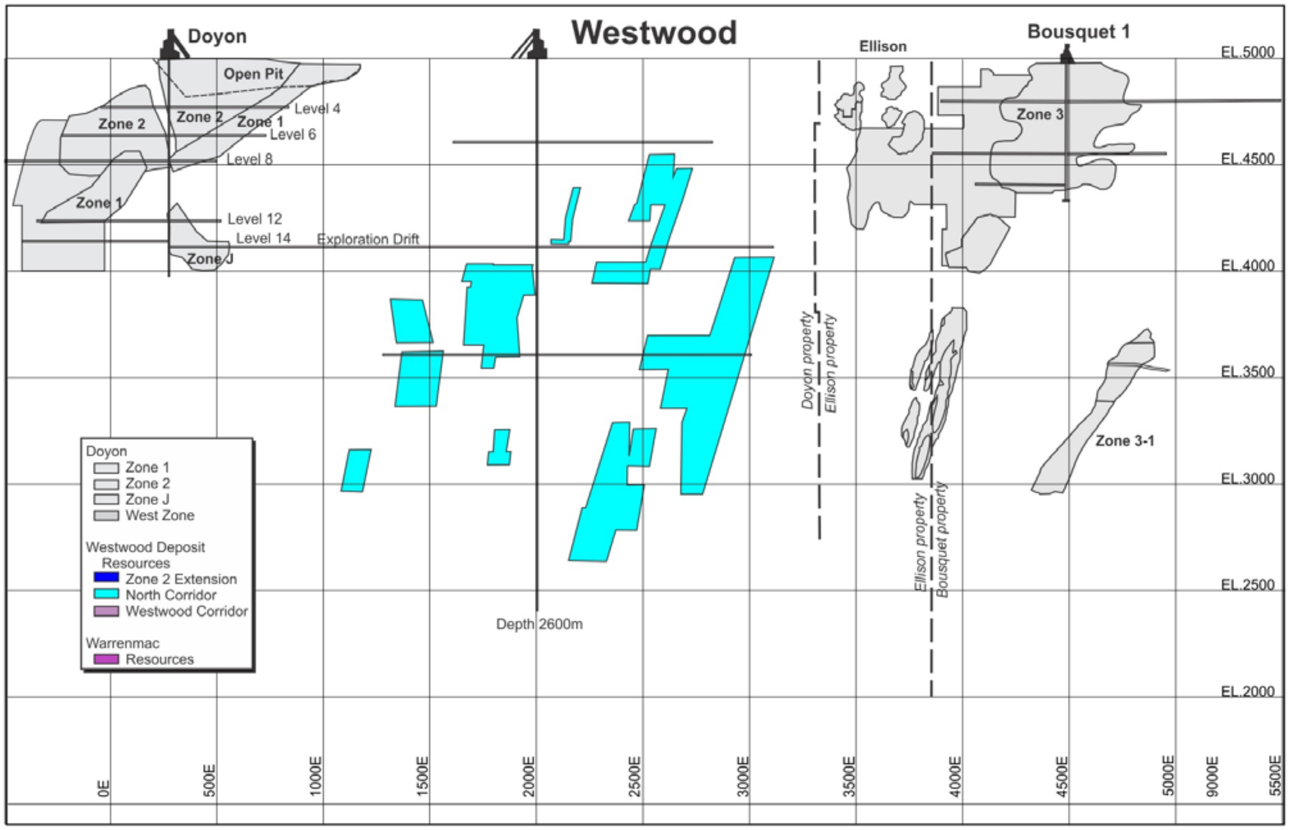
This figure shows a lithogeochemical profile along ddh R14134-06 that intersects the Zone 2 Extension Corridor (piercing point shown on the inset longitudinal map).

The Zone 2 Extension corridor is in this case hosted in the Doyon felsic unit and the overlying mafic rocks (sharp Zr and TiO_2 contrasts).

We can also see that this gold-enriched corridor is characterized by high K_2O, low Na_2O, MgO and MnO values, in agreement with the sericite-quartz alteration assemblage.

North Corridor – Py-Sph-Po±Cpy-Gn-Qtz veins & disseminations



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Now a few words about the North Corridor that consists of narrow sulfide-quartz veins with local disseminated style mineralization. The North Corridor is located between the Zone 2 Extension Corridor to the North and the Westwood Corridor to the South.

This longitidinal map illustrates the distribution of the North Corridor mineralized zones which are generally steeply West-plunging (Outline by Iamgold Corp. using a 6 g/t Au cut-off).

Please note once again that those outlines reflect the actual known economic areas of the mineralized corridor but that the mineralization itself extends outside of those richer and/or thicker zones.

The North Corridor is characterized by a distal quartz-biotite-chlorite-hornblende-garnet ± sericite alteration assemblage as illustrated here.

North Corridor - Ser-Py-Qtz proximal altered host rocks

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The North Corridor veins, as shown here, are typically surrounded by a cm to dm-wide sericite-quartz alteration halo that replaces the distal biotite-bearing alteration.

North Corridor - Highly strained Py-Po-Cpy-Sph-Qtz vein and Ser-Py-Qtz altered host rocks

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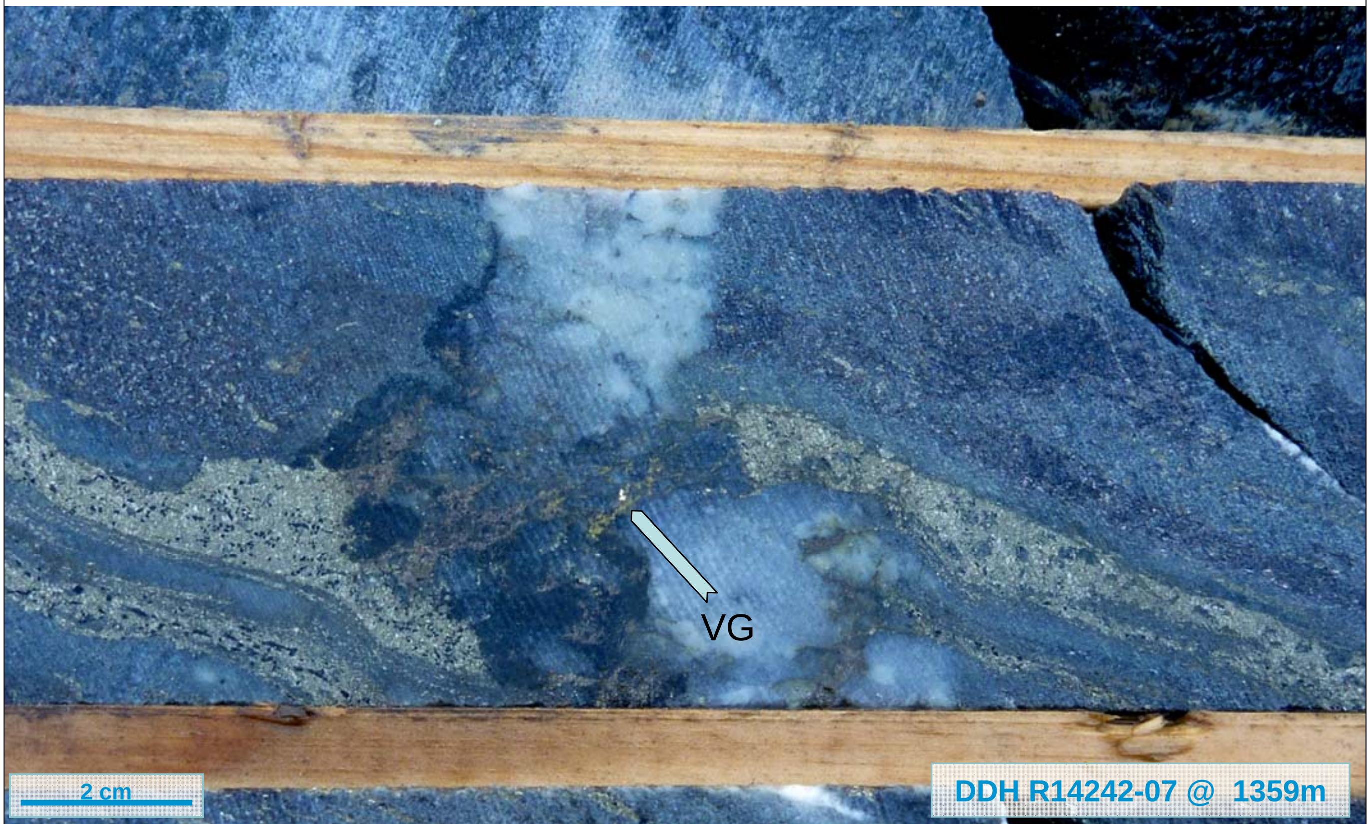
The North Corridor veins consist of highly strained sulphides, with variable amounts of pyrite, pyrrhotite, chalcopyrite and sphalerite.

The veins are commonly strongly foliated, folded and transposed into the main foliation.

North Corridor - Vein intersected by a late Qtz vein



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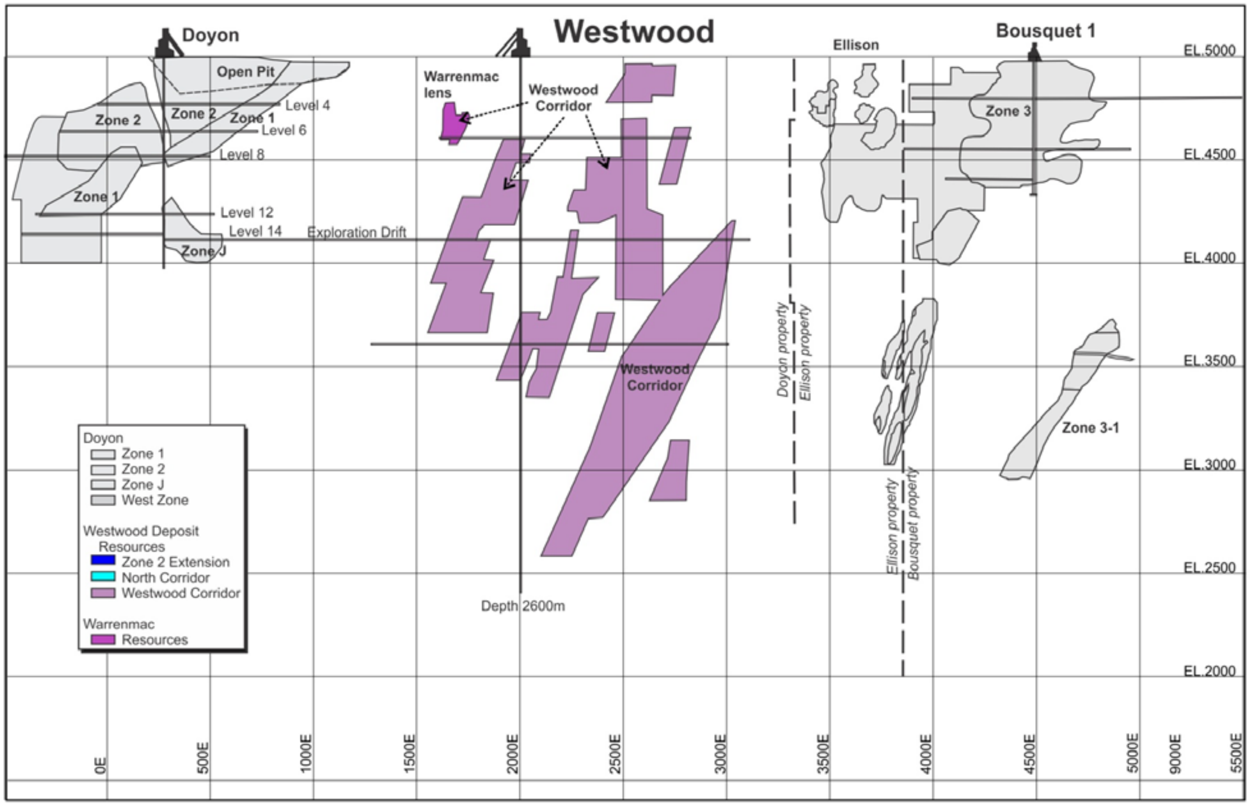
This picture shows an early to syn-main deformation quartz vein which crosscuts a foliation-parallel North Corridor vein, causing a local remobilization (liberation) of gold, probably as a result of pyrite breakdown to pyrrhotite.

Westwood Corridor - Sulphide stockwork & (semi)-massive sulphides



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The Westwood Corridor is the uppermost and southernmost mineralized corridor at Westwood deposit.

The mineralized zones (resources category) are generally steeply West-plunging.

Please note once again that those outlines reflect the actual known economic areas of the mineralized corridor but that the mineralization extends beyond those limits.

The Westwood footwall sequence is characterized by a distal biotite-quartz-sericite-garnet alteration halo as shown here with darker biotite zones and pinkish Mn-rich garnet porphyroblasts in a felsic volcanic rock.

WW - Gnt-Chl-Tur-Cb-Py footwall alteration

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The relative abundance of garnet porphyroblasts generally increases towards the ore zones and can form centimeter to decimeter-thick garnet rich bands hosted in mafic rocks that are transposed into the main foliation.

WW – Bo-bearing alteration replaced by ore-proximal Ser-Py-Qtz

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The biotite-chlorite-quartz-sericite-garnet alteration is gradually replaced by a quartz-sericite-pyrite assemblage closer to the ore zones, similarly to the two previous corridors.

WW–Ore proximal footwall Sr-Py-Qz pervasive alteration

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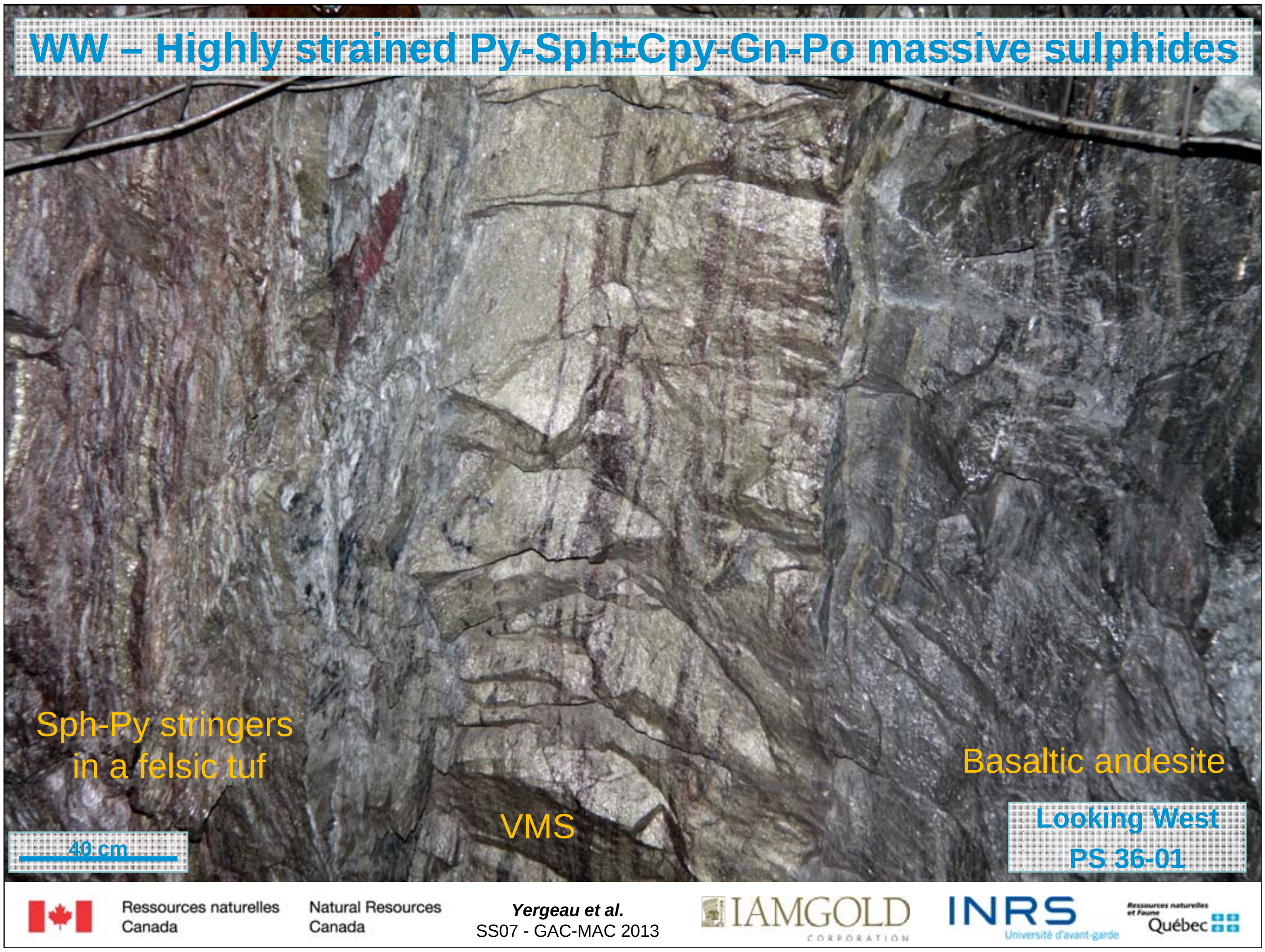
This sericite-quartz alteration eventually becomes pervasive proximal to the ore zones where the rock exhibits a strong schistosity.



The Westwood corridor is characterized by continuous to discontinuous horizons of disseminations, semi-massive sulphides and gold-rich polymetallic massive sulphide lenses that can be up to 14 meters thick.

The massive sulphide lenses are generally associated with zones of semi-massive and stringer type mineralization.

This picture shows the Warrenmac lens, which is one of the zones in the deposit where the Westwood Corridor consists of gold-rich polymetallic massive sulphides.

WW – Stringers, dissemination and replacement

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Here is a good example of the stringer-type mineralization that often occurs around the massive to semi-massive sulphides.

The stringers are often present in volcaniclastic units, and here we can see a nicely preserved felsic clast.

WW – Stringers, dissemination and replacement

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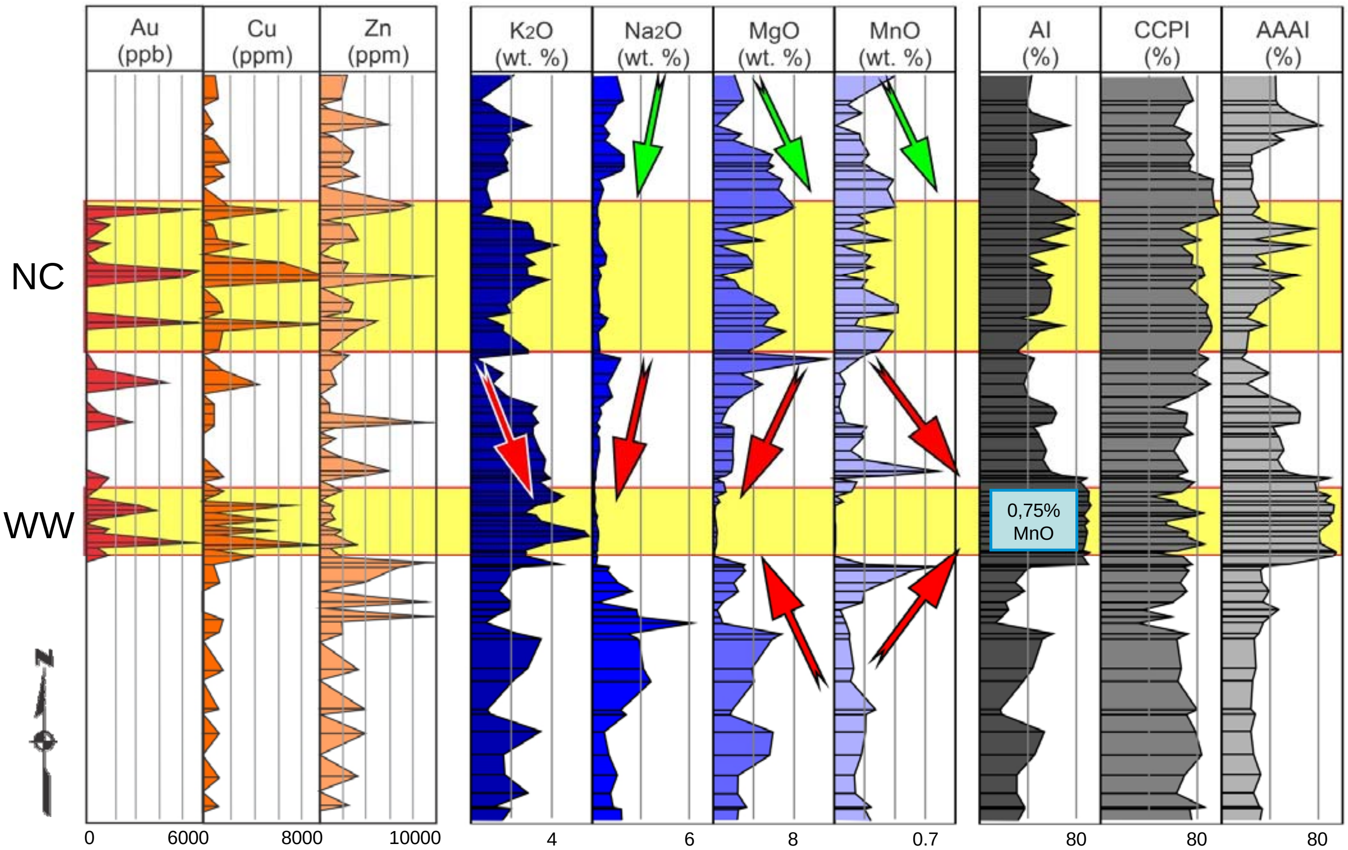
This is an example of the stringer or replacement-type zone in the hanging wall of the Warrenmac lens.

The grayish-white cores of felsic rock are remnants of the host felsic volcaniclastic unit where fragments were partly silicified, sericitized and mineralized by circulating hydrothermal fluids.

WW+NC - DDH 1158-02 Mn-K gain, Na-Mg loss



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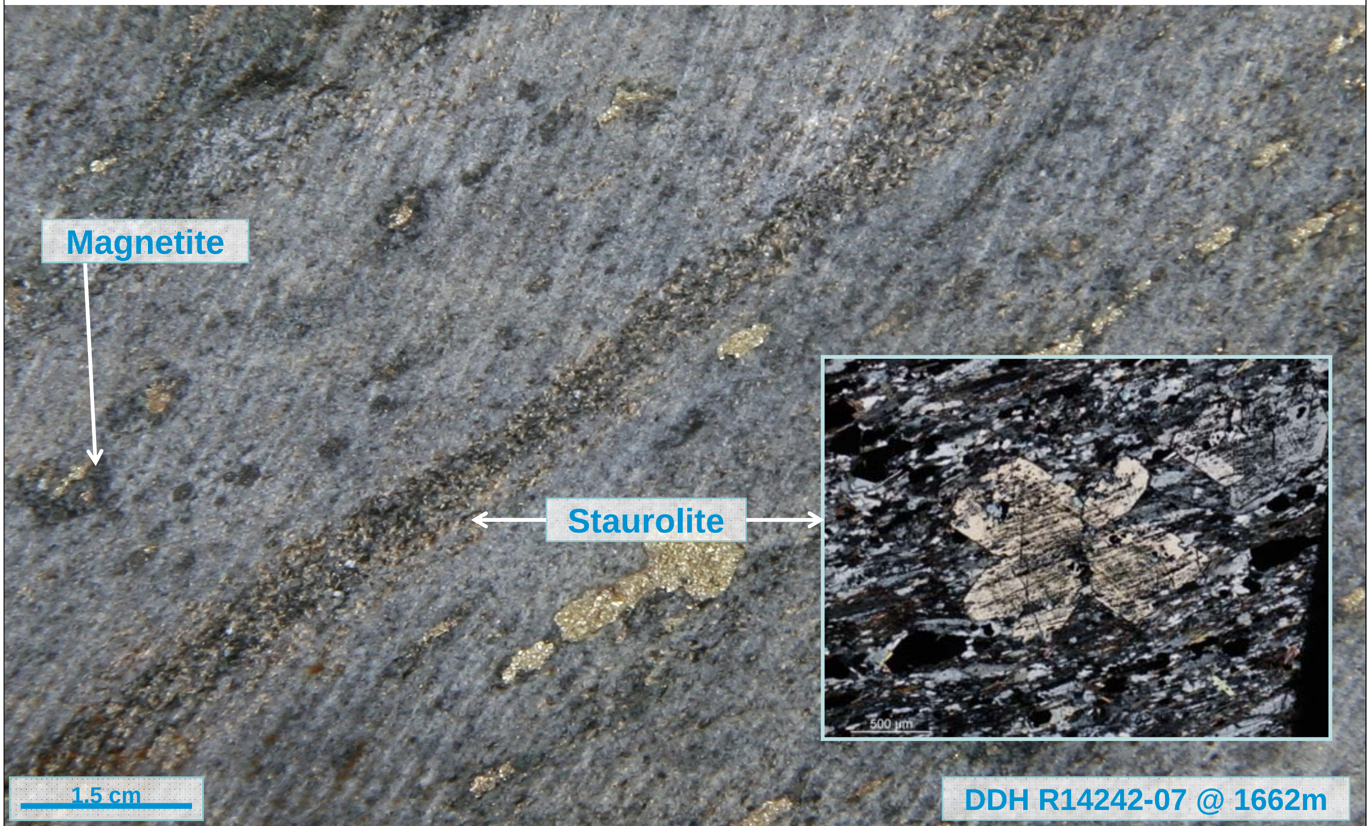
If we look at the geochemical trends associated with the Westwood Corridor (red arrows), we can see that Na_2O and MgO are gradually leached near the ore zone, whereas K_2O and MnO contents significantly increase, in agreement with the presence of the biotite-sericite and Mn-rich garnet alteration assemblages shown earlier.

The North Corridor (green arrows) is also characterized by a gradual loss of NaO but no leaching of MgO is observed. This is consistent with the relatively weak intensity of the biotite-sericite alteration in the North Corridor.

WW at depth - Py-St-Qtz-Bio-Ser-Mt alteration



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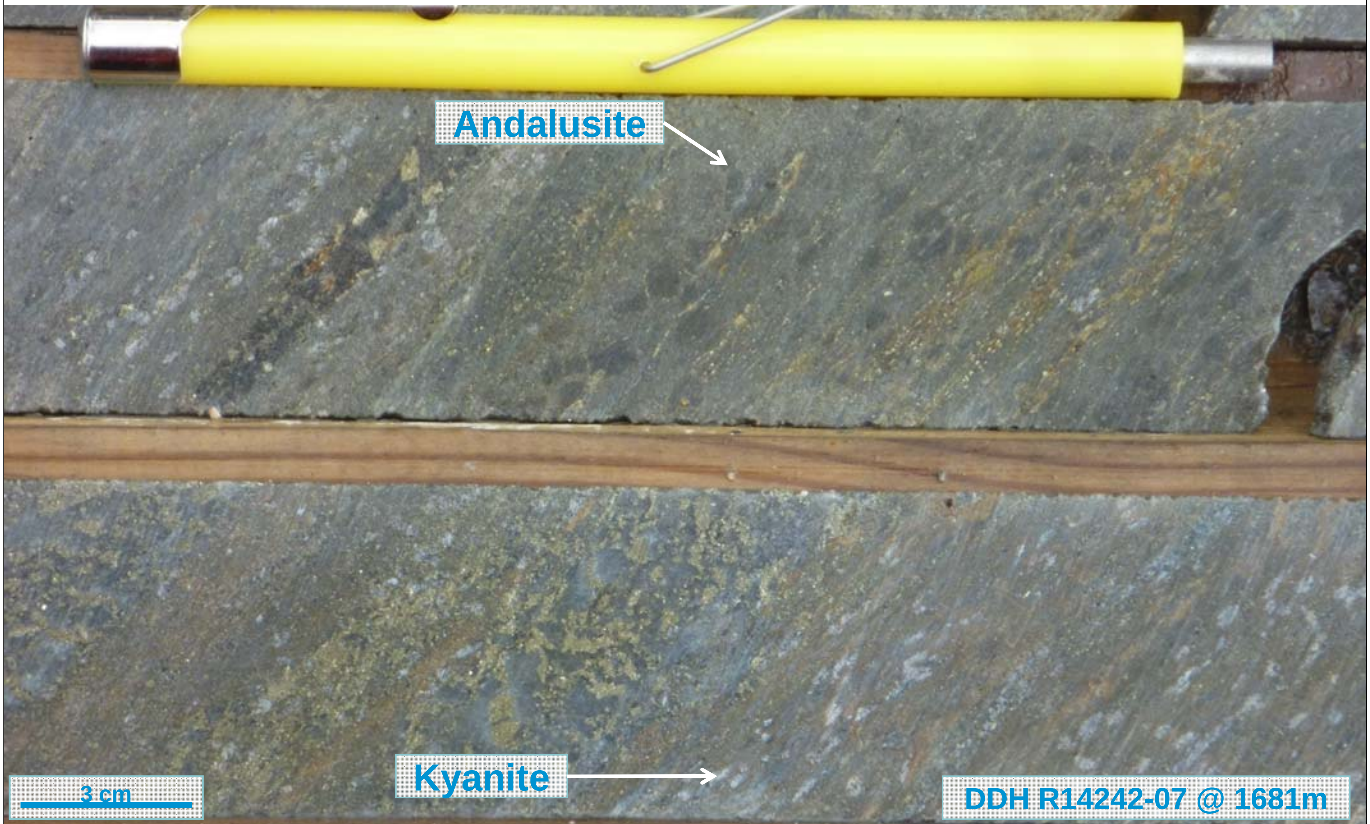
Another interesting feature of the Westwood Corridor is the presence of aluminous alteration in the easternmost and deepest part of the corridor as shown here with the presence of very fine-grained staurolite within the foliation.

The dark spots consist of intergrowned magnetite-pyrite-pyrrhotite grains.

The presence of magnetite within the footwall of the Westwood Corridor is another key feature of the aluminous alteration zone.

WW at depth - Aluminous (Ky-And-Ser-Qtz-Py) alteration



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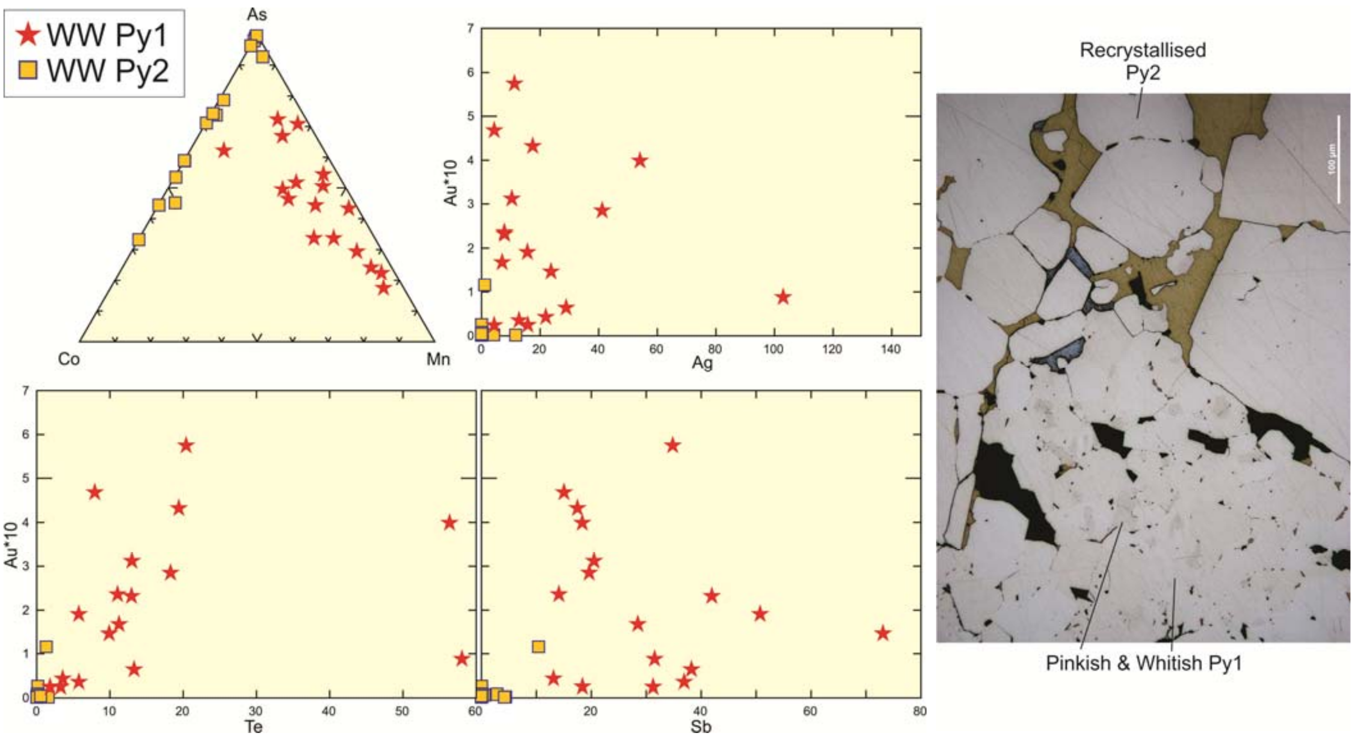
As the aluminous alteration becomes more intense towards the mineralized zones, andalusite and kyanite porphyroblasts appear, in association with auriferous disseminated to semi-massive sulphides in a silicified and sericitized matrix.

Pyrite composition - LA-ICP-MS analysis – WW Corridor



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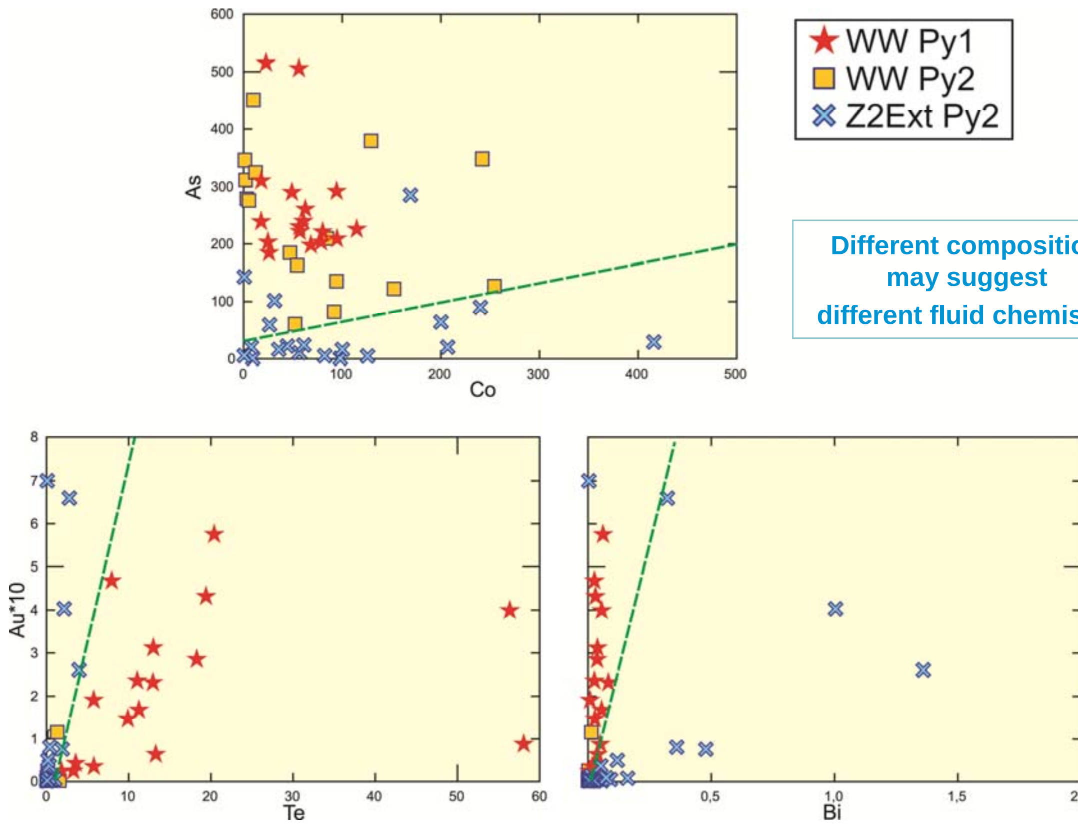
There are 2 types of pyrite within the Westwood Corridor: 1) whitish to pinkish primary pyrites, 2) white, large recrystallized euhedral pyrite grains containing little or no inclusions.

The composition of those 2 types of pyrite differ significantly: the primary pyrites (Py1) being enriched in Mn, Ag, Au, Te and Sb compared to Py2 which likely expelled those elements during recrystallization.

The Py2 grains are often accompanied by chalcopyrite and galena whereas the primary pyrites are not.

Pyrite composition - LA-ICP-MS analysis – WW & Z2Ext



Different composition may suggest different fluid chemistry

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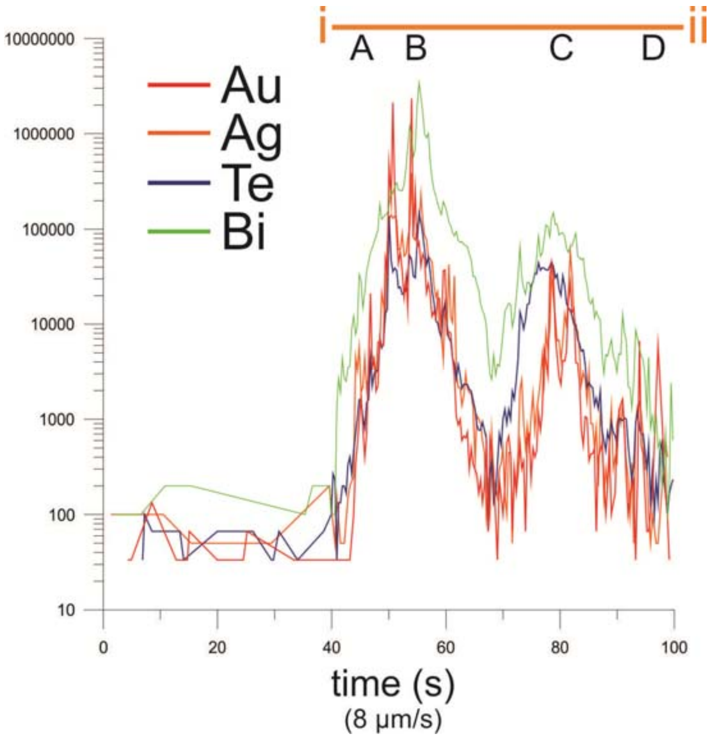
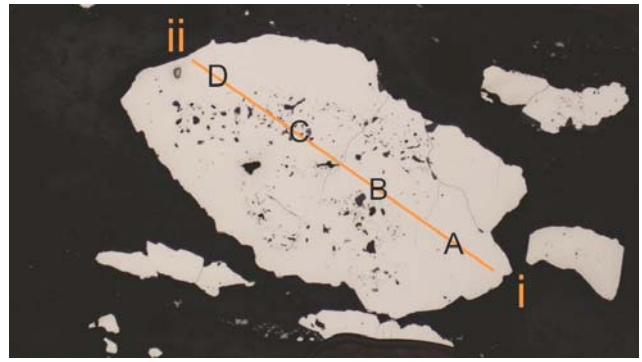
The pyrites in the Zone 2 Extension veins have inclusion-rich cores with recrystallized margins.

The Zone 2 Extension pyrites composition differs from that of the Westwood Corridor: they are on average slightly more cobaltiferous rather than arseniferous, and they are enriched in bismuth rather than tellurium.

These preliminary results may suggest that the fluids which formed the pyrites of the Zone 2 Extension were substantially different from the fluids responsible for the formation of the other corridors, even if texturally the pyrites are similar.

Pyrite composition - LA-ICP-MS analysis – Py2 traverse





Inclusion-rich pyrites
=
Relicts of primary pyrites

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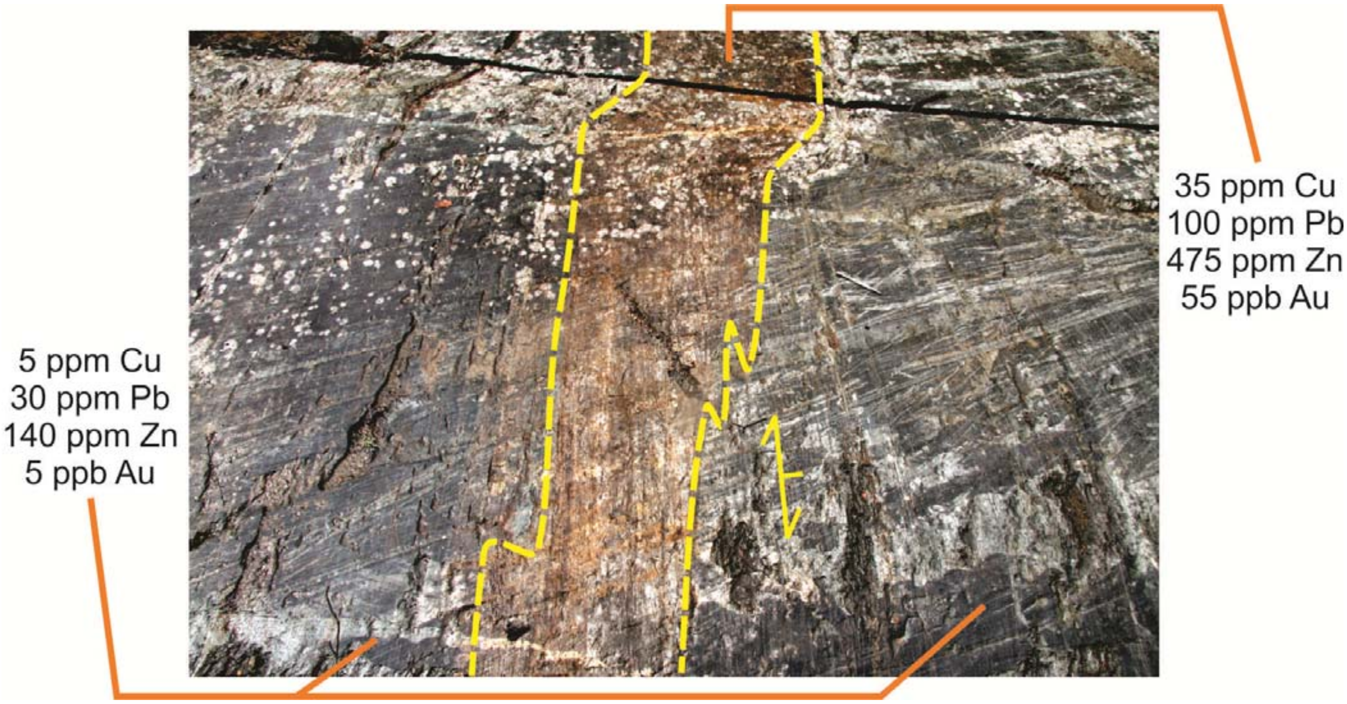
This figure shows a laser ablation profile along a traverse through a Zone 2 Extension pyrite grain (Py2) composed of inclusion-rich zones and more intensely recrystallized zones.

The inclusion-rich zones are clearly enriched in base metals and Co-Te-Bi-Au-Ag-Sn-Sb compared to the recrystallized parts. The exact composition of these inclusions has not been determined yet and more work is going on on trying to better define the nature of those inclusions.

The inclusion-rich zones are interpreted as relicts of primary pyrites.

This indicates that that the pyrites were enriched in trace elements prior to metamorphism and deformation.

Timing of mineralization – Westwood Corridor



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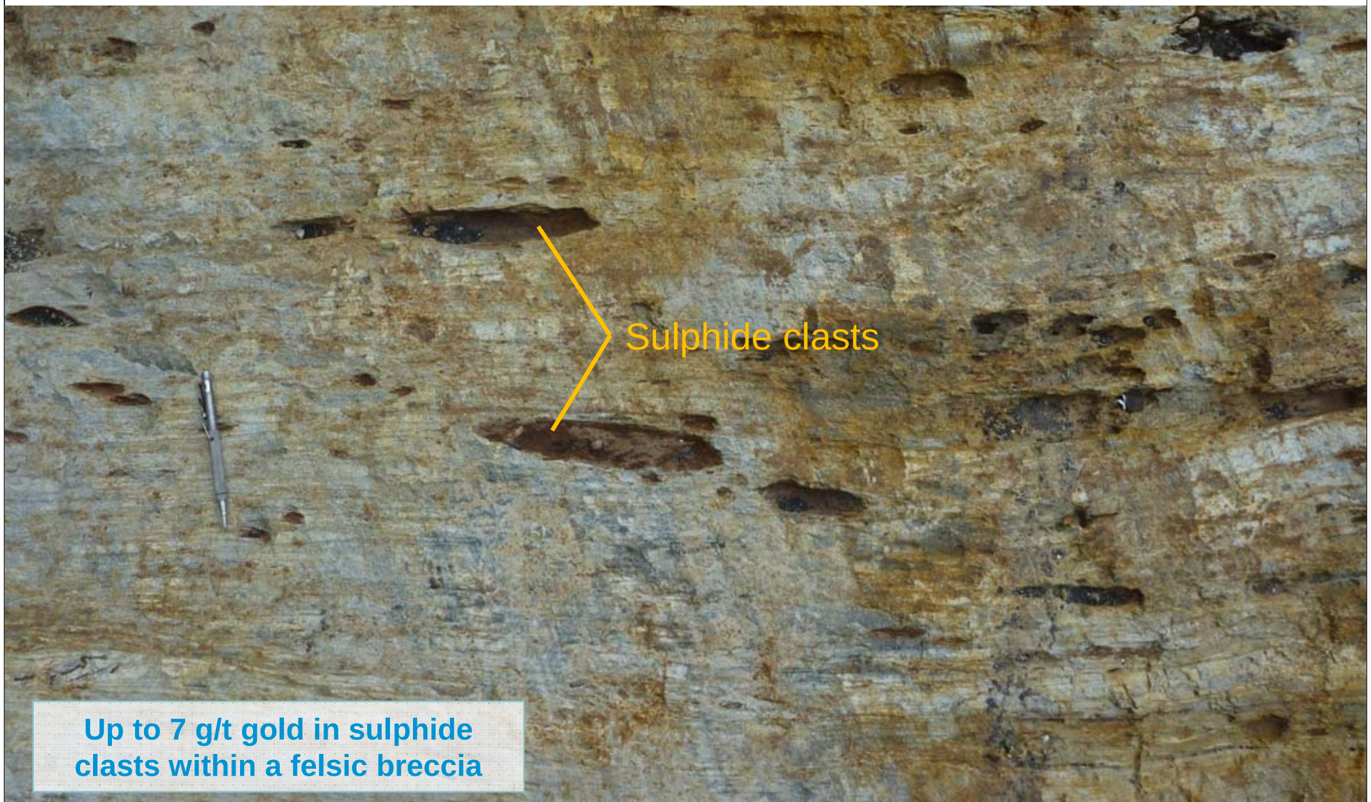
The Westwood Corridor alteration zones are metamorphosed, slightly discordant to stratigraphy and sub-parallel to the main foliation.

This picture shows a sericite-pyrite alteration corridor replacing the Chl-Gnt-Bio distal alteration.

The Ser-Py alteration corridor is 10 times richer in gold and is also anomalous in base metals compared with the background Chl-Gnt-Bio alteration.

Timing of mineralization – Westwood Corridor



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The Westwood Corridor is also locally characterized by felsic volcaniclastic breccias containing clasts of massive sulphides, which suggests that the auriferous sulphide deposition occurred and was partly reworked during volcanism and thus before the main deformation event.

Pyrite, sphalerite and locally chalcopyrite are the dominant sulphide clasts forming minerals and are gold-enriched with values up to 7g/t.

Timing of mineralization – Westwood Corridor

Metamorphosed, discordant and foliation-parallelized alteration zones

Auriferous sulphide clasts-bearing felsic talus breccias

Strongly deformed sulphides with durchbewegung textures

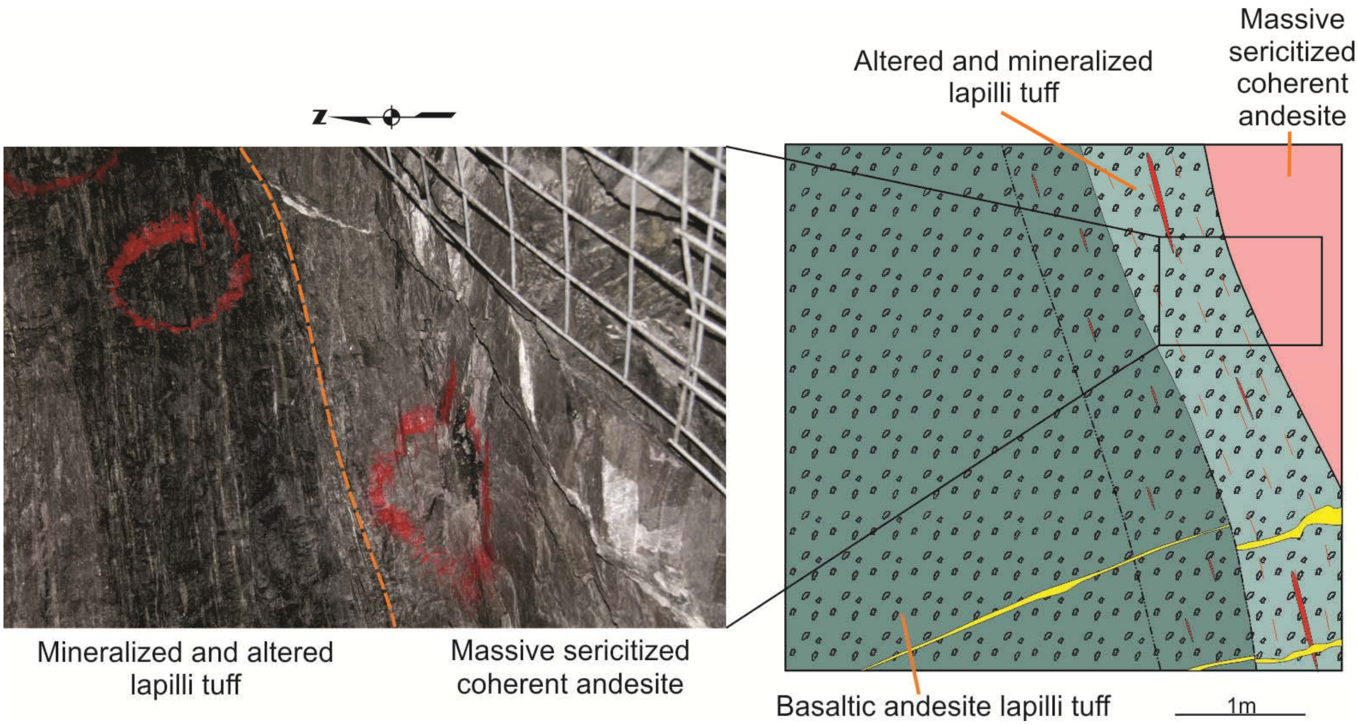
Primary auriferous pyrites with recrystallized, granoblastic margins into the main foliation

Stringer and replacement zones controlled by the primary permeability of host rocks

Synvolcanic origin

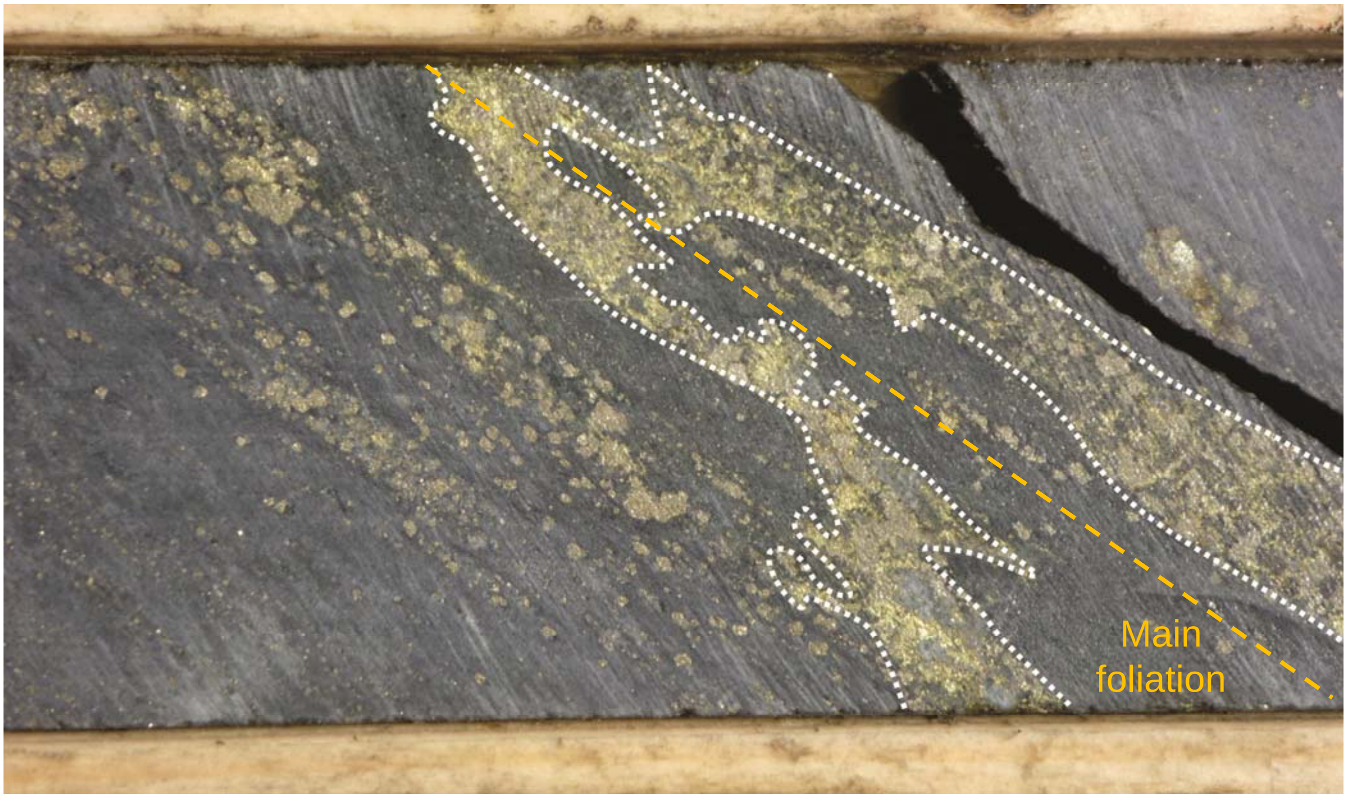
To summarize, the key elements in the timing of events and gold mineralization for the Westwood corridor include:

Timing of mineralization – North Corridor



The timing of events in the North Corridor is complex, however, as suggested by the elements shown on this picture, the North Corridor mineralization was formed by replacement at the contact of a mafic lapilli tuff overlain by a massive massive andesite unit which acted as a cap rock to the rising hydrothermal fluids.

Timing of mineralization – North Corridor footwall veinlet



3 cm

DDH R14242-07

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The North Corridor veins are often intensely folded, boudinaged and transposed into the main foliation, whereas pyrite is strongly recrystallized, suggesting a pre-main deformation and peak metamorphism origin for the mineralization.

Timing of mineralization – North Corridor

Metamorphosed alteration assemblages similar to those associated with the WW Corridor

Recrystallized and remobilized sulphides

Folded and transposed stringers/veins

Same pyrite textures as in WW & Z2Ext corridors with early, inclusion-rich cores and metamorphic, inclusion-free rims

Stringer and replacement zones controlled by the primary permeability of host rocks

Synvolcanic origin

Timing of mineralization – Zone 2 Extension

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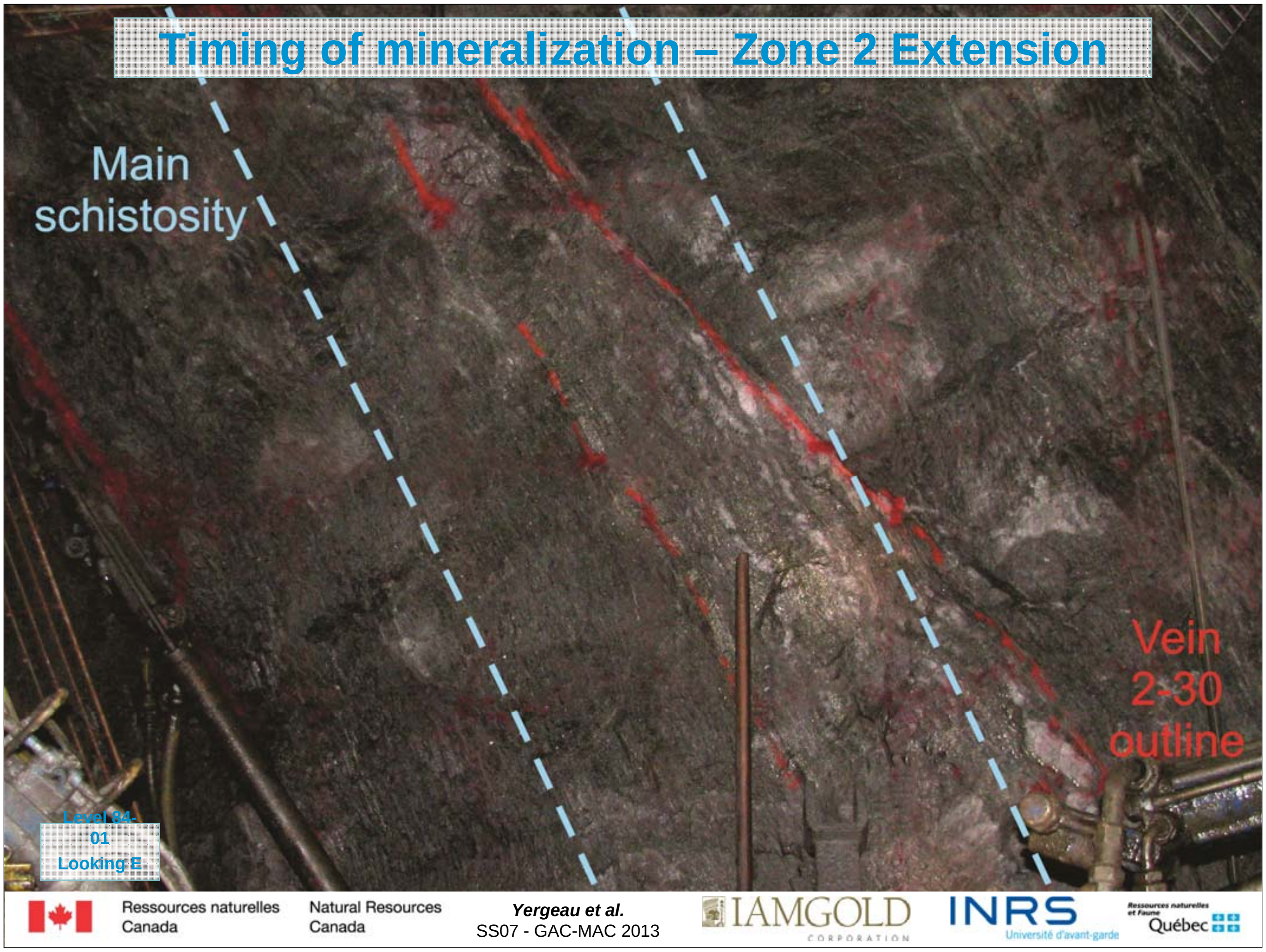
This picture shows the gradual replacement of a felsic breccia by pyrite and chalcopyrite in association with a strong sericite alteration.

Some of the fragments are almost totally replaced by sulphides whereas others have partly preserved their original features.



This picture shows the Zone 2 Extension vein 2-30 at the 84-01 level.

The “vein” is slightly discordant to the main foliation.

In detail, the foliation crosscut the vein at a very shallow angle, indicating that the vein is pre- to early-main foliation/deformation.

Timing of mineralization – Zone 2 Extension

Extensive, strongly schistose sericitic alteration and local zones of silicification forming mineralized corridors with auriferous sulphide disseminations and gold-rich sulphide-quartz veins

S2-foliated and transposed veins and mineralized horizons

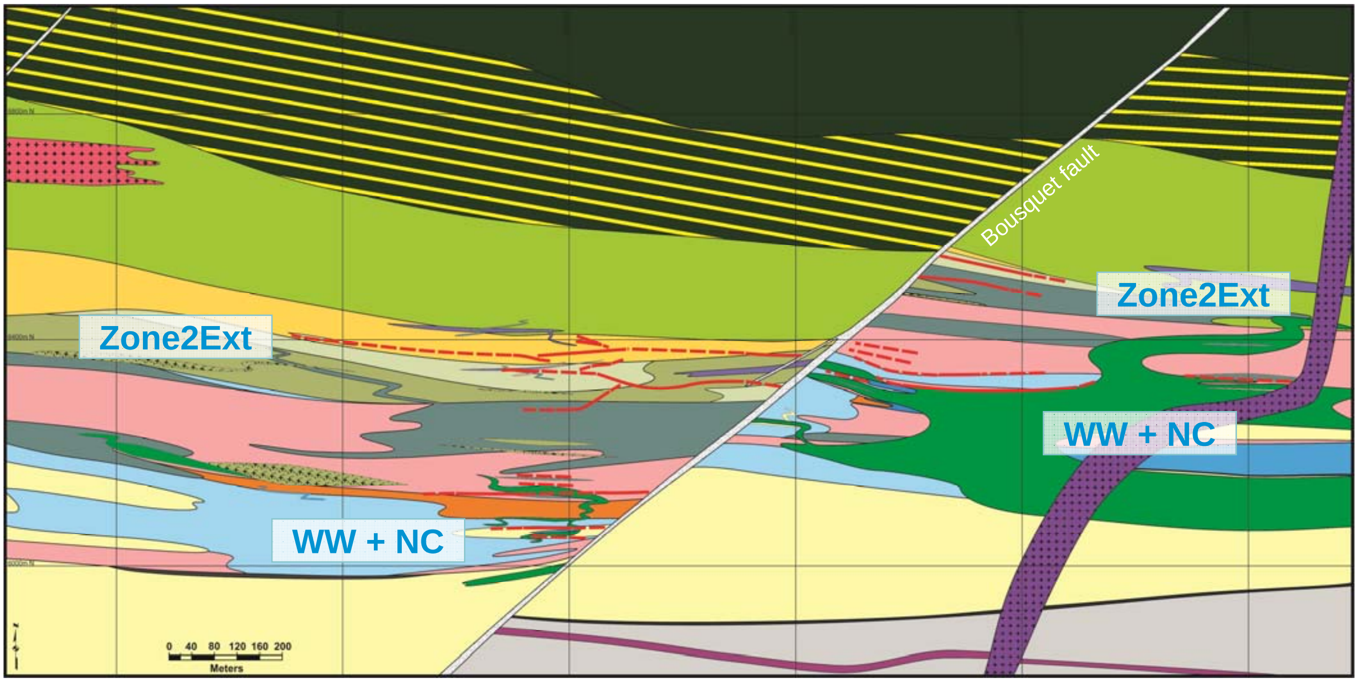
“Veins” are forming a transposed network

Same pyrite textures as in WW & North corridors with early, inclusion-rich cores and metamorphic, inclusion-free rims but with significant differences in the trace elements signature

Ore zones clearly associated with felsic volcanics of lower Bousquet Fm

Pre- to early-D2, and perhaps synvolcanic timing (still under study)

Level 84 geological map (840 meters depth)



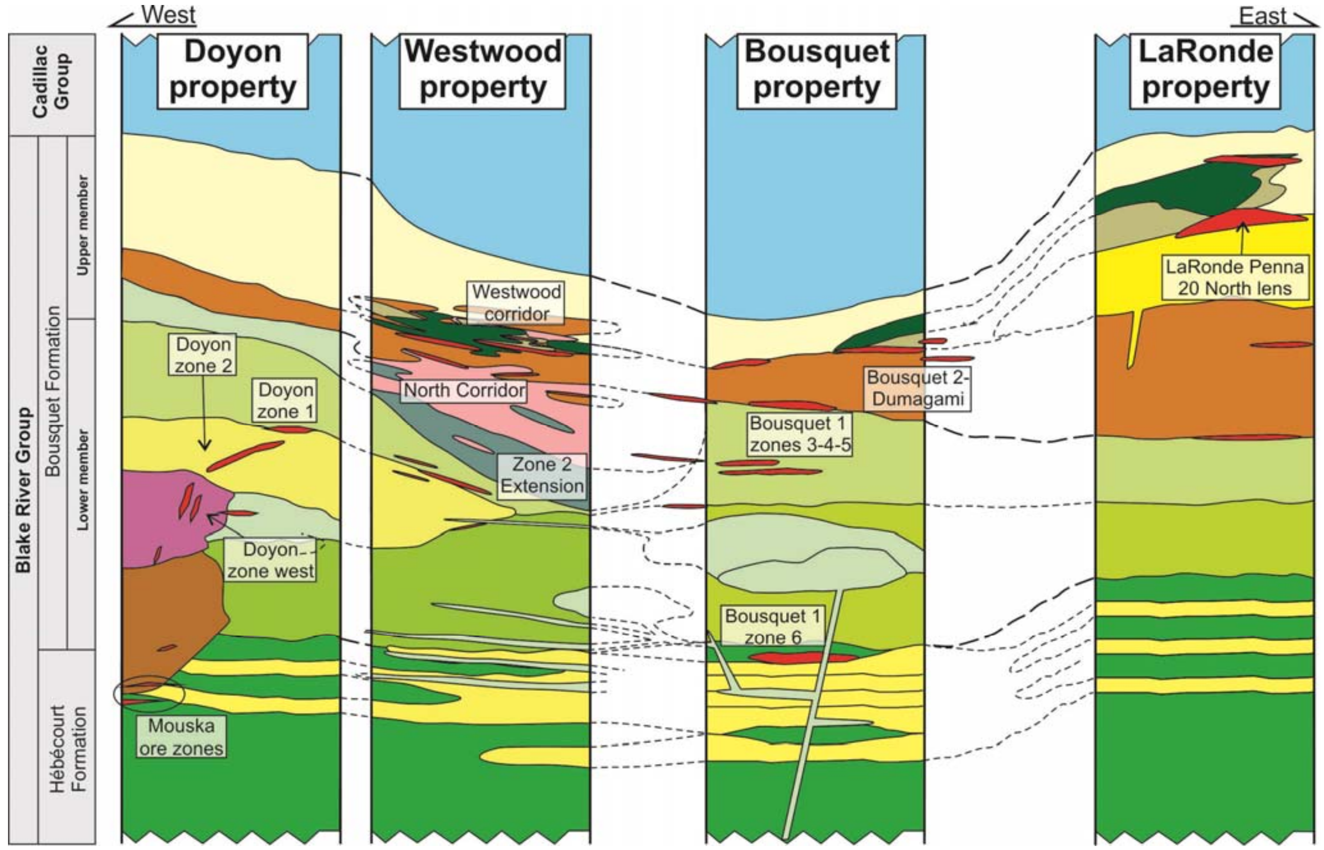
This preliminary geologic map presents the geology and spatial distribution of the ore zones within the mine at a depth of 840 meters.

The late brittle subvertical NE-SW Bousquet fault created a ± 300 meters senestral displacement of the stratigraphy and ore zones.

Most of the Zone 2 Extension ore zones are located on the western side of the Bousquet fault. They form a network which is transposed in the main foliation and is spatially related to the yellow felsic unit and overlying mafic volcanic rocks. The felsic unit, and the Zone 2 Extension ore zones are notably absent on the eastern side of the fault.

The Westwood and North corridors are mainly located on the eastern side of the fault and are spatially related to the presence of basaltic-andesite (green) and blue Qtz-rich rhyolitic (blue) sills which may have acted as impermeable cap rocks.

Spatial and genetic relationships at camp scale



Modified from Lafrance et al. (2003)

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The Westwood and North corridors are located on the same stratigraphic position as the LaRonde Penna 20 North Lens and the Bousquet 2 – Dumagami lens which are synvolcanic gold-rich massive sulphide deposits.

The Zone 2 Extension Corridor is at the same stratigraphic position as the Doyon Zone 2 and Zone 1 ore zones, which are interpreted as intrusion-related synvolcanic gold vein systems.

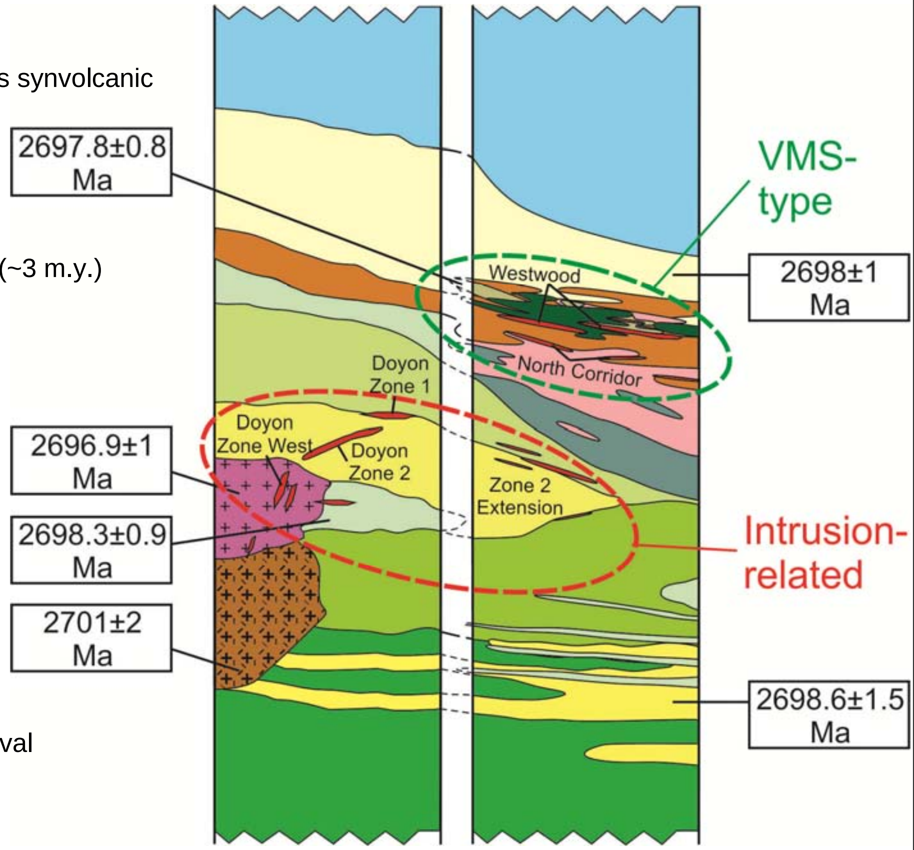
Spatial and genetic relationships at deposit scale

Assuming Westwood mineralization is synvolcanic

Bousquet Fm = 2699-2696 Ma
➔ Time span for gold mineralization (~3 m.y.)

Zone 2 Extension similar to
Doyon Zone 2 and Zone 1
+ at same stratigraphic position
+ in partly pluton-hosted
Possible association with
the intrusion
(Galley and Lafrance, in press)

Late Mooshla phases are coeval
with Bousquet Fm's Upper units
➔ VMS & Intrusion-related are ± coeval



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Assuming that the Westwood ore zones are synvolcanic, the U/Pb zircon dates that have previously been done in the DBL provide precise constraint on the time span of the gold mineralization.

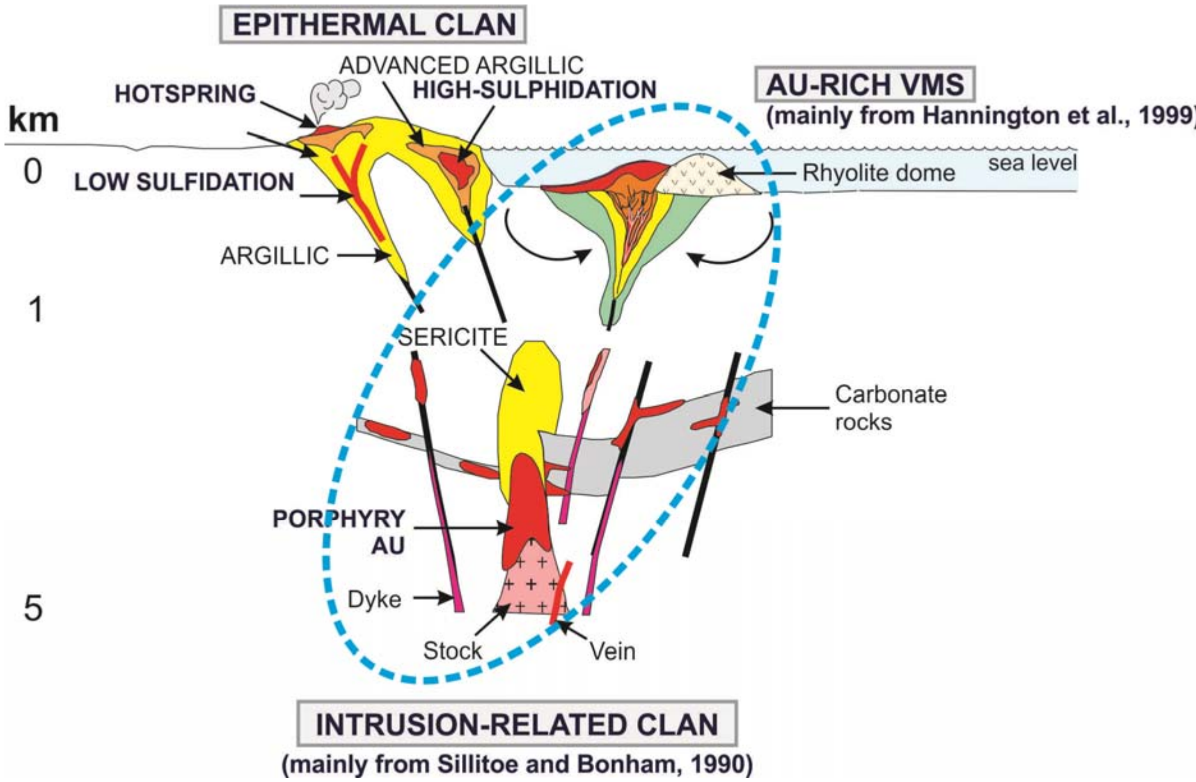
➔Mineralization of the Westwood deposit must have been formed between **2696 and 2699** Ma.

➔Late Mooshla phase hosting Doyon Zone West is coeval with Westwood hangingwall rocks.

➔VMS and Intrusion-related ore are approximately coeval in time.

Please refer to Zhang et al. (1993), Lafrance et al. (2003), Lafrance et al. (2005), Mercier-Langevin (2005), Mercier-Langevin et al. (2007) and McNicoll et al. (in press) for more information on U/Pb dating.

Working hypothesis: Is Westwood part of a telescoped Archean volcanic-intrusive hydrothermal system?



Modified from Dubé *et al.* (2007)

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The various ore styles at Westwood, AND at camp scale seem to be part of a protracted intrusive-volcanic hydrothermal system that expresses itself differently depending on the local geology.

This is a working hypothesis at this stage and there is still a lot of work to do. Work is underway to better constrain the relative and absolute timing of events in the area.

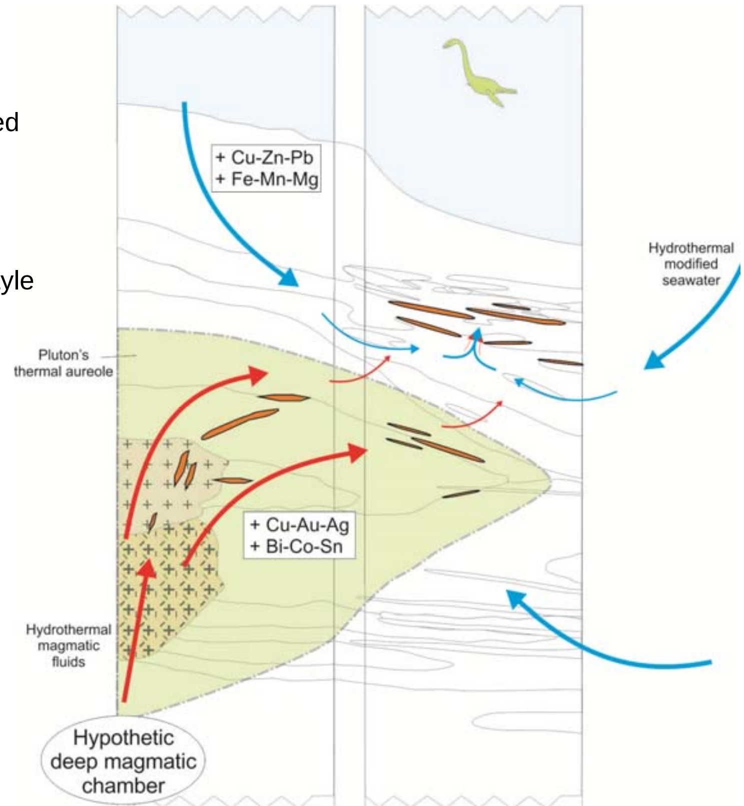
The Westwood deposit represents a key area to test the hypothesis of a genetic relationship between the intrusion, the vein systems, and the VMS lenses.

Westwood preliminary and simplified genetic model

•Westwood Corridor
➔ VMS-type Cu-Zn-Pb-rich mineralization generated by modified seawater circulation with variable magmatic input

•North Corridor
➔ failed VMS system (?) or hybrid mineralization style showing characteristics of both WW and Z2Ext

•Zone 2 Extension
➔ The intrusion and its thermal aureole might have isolated the hydrothermal system, limiting the contribution from seawater-derived fluids and controlling the overall content of the mineralizing fluids in base metals and trace elements



Telescoped magmatic-hydrothermal system?

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The differences and similarities between the 3 mineralized corridors of the Westwood deposit are partially explained by this **preliminary and simplified** genetic model:

1)The enrichment in base metals in WW and CN corridors versus Z2Ext can be explained by a limited circulation of modified seawater (hence a lower base-metal content) around the pluton, therefore in the Zone 2 Extention area, as a result of a gradient due to the pluton's thermal aureole.

2)This phenomenon could also explain the chemical differences between the disparate pyrite types in those corridors: a more important input in magmatic fluids within the Z2Ext corridor would produce Bi-Co-Se enriched pyrites whereas WW and CN pyrites are Cu-Zn-Pb-Te-Mn enriched due to a pronounced modified seawater input.

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