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Geological setting and gold mineralisation characteristics at the Me Xi, Vinh Linh, Quang Tri, Vietnam

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ABSTRACT

The Me Xi gold deposit is located in Vinh Linh, Quang Tri, Truong Son Fold Belt, Vietnam, about 45 km to the east of the Sepon Mineral District, Laos PDR. Gold mineralisation at Me Xi is predominantly hosted in siltstone and subordinate calcareous siltstone, sandstone, shale, black shale and calcareous shale of Ordovician - Early Silurian Long Dai formation that were metamorphosed at greenschist facies. The igneous rocks that are closest to Me Xi deposit include undated porphyritic dolerite and mafic dykes. Two gold mineralisation zones consisting of eight mineralised bodies have been recorded, in which the main zone is ~ 640 m long and ~10÷60 m wide. The largest gold mineralisation body has a length of ~220 m and a width of ~0.5÷3 m. Gold mineralisation occurred mainly as stockwork quartz-sulphide veins that were typically characterised by the brittle deformation of host rocks. At least four hydrothermal stages were observed at the deposit, of which gold was accumulated in the stage 2 veins and possibly stage 3 veins that has similar mineralogical assemblage and alteration patterns to those of the stage 2. These stockwork stages 2 and 3 veins predominantly consist of pyrite and minor chalcopyrite, gold, arsenopyrite, pyrrhotite and galena in association with strong silicification, chloritisation, sericitisation and subordinate decalcification. The pre-Au stage 1 veins are rarely observed, but this hydrothermal stage records an initial deformation of the host sequence. The post-Au stage 4 is characterised by carbonate-rich quartz stockwork veins with local patches of sulphides.

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1. Introduction

The central Truong Son Fold Belt is a large area, covering two provinces of Vietnam (i.e. Quang Binh and Quang Tri) and southern Laos. Previous studies (e.g., Hoa et al., 2008; Shi et al., 2015; Gardner et al., 2017; Dung et al., 2024) have confirmed that there are at least four magmatism periods in the Truong Son Fold Belt, including Ordovician-Silurian (~420÷470 Ma), Late Carboniferous-Early Permian (~280÷300 Ma), Late Permian-Middle Triassic (~245÷270 Ma) and Middle-Late Triassic (~200÷245 Ma). The last three magmatic events (Indosini) are very popular and dominate the magmatic occurrences in the region (Dung et al., 2024, Hoa et al., 2008; Shi et al., 2015). Related metallogenic events linked to those four magmatic events also have been confirmed via various published papers. The Early Paleozoic metallogenic event, for the first time, has been recorded in central Vietnam at the Duc Bo VHMS Zn-Pb-Cu deposit (Zaw et al., 2014) and a Cu deposit in southern Laos (Gardner et al., 2017). Many mineral districts that are genetically linked to the last three magmatic events have been found in Laos and Vietnam (e.g., Cromie, 2010; Manaka, 2014; Zaw et al., 2014).

The central Truong Son Fold Belt is one of the most potential metallogenic regions in the South East Asia with tens of gold occurrences recorded. In Quang Binh and Quang Tri provinces, about 30 gold prospects have been discovered and noted in different geological maps. These prospects include Me Xi, Xa Loi, Dong Chat, Khe Reu, Bach Dan, Lang Ho, Ba Tung, Tram Coc, La Sam, A Vao, A Dang and A Pey (Quang Tri province), Khe Nang - Khe Net, Khe Dap - Khe Truong - Khe Da Trang, Suoi Kin, Xa Khia, Khe Reu, Bach Dan, Duong 10, Duong 16, Lang Ho, Thu Lu, Dong Vang (Quang Binh province). So far, all of these prospects have not been well studied and explored yet. On the regional scale, the most significant deposits that have been well studied in the Truong Son Fold Belt occurred to the south of Quang Tri and Quang Binh provinces, at the Tam Ky-Phuoc Son Suture Zone. These deposits include (1) Sepon Cu-Au deposits, Laos PD, (2) Phuoc Son Au - Pb - Zn deposits and (3) Bong Mieu Au (± Pb, Zn) deposits, (e.g. Cromie, 2010; Manaka 2014, Tran et al., 2006). Most of the mineralisation systems in the Truong Son Fold Belt are hosted in metamorphic rocks at greenschist facies and some of them are hosted in amphibolite to granulite facies (e.g., Zaw et al., 2014; Lepvrier et al., 2004). There are several mineralisation styles as well as deposit types in the Truong Son Fold Belt. The most popular Au mineralisation style is the sediment hosted Au deposits, and is initially linked to the Idosini events (e.g., Lai et al., 2014; Manaka, 2014). Other mineralisation styles include the Cu-Zn-Pb VHMS system in Duc Bo, Vietnam (Zaw et al., 2014), Cu-Au porphyry-skarn deposits and Carlin-like Au deposits in Sepon, Laos (Cromie, 2010) and in Phu Kham, Northern Laos (Zaw et al., 2014), low sulfidation epithermal Au deposit in Phu He and Ban Hoayxai, Northern Laos (Zaw et al., 2014), skarn and sediment hosted Au deposits/ orogenic Au deposits in Bong Mieu (Tran et al., 2006; Zaw et al., 2014); Intrusion-related Au-Pb-Zn deposits in Phuoc Son (Manaka, 2014).

The Me Xi hydrothermal Au deposit is located in Vinh Linh district, Quang Binh province, north central Vietnam, about 45km to the east of the Sepon Mineral District, Laos PDR., in the central Truong Son Fold Belt. The gold mineralisation at Me Xi was discovered by Sam et al. (1999) while establishing the Vit Thu Lu Geological Map at the scale of 1:50 000. Since 2012, Axiom Vietnam Mining had launched an exploration program at the Me Xi Prospect. By December 2016, the company had accomplished stream sediment and soil survey programs and completed eight diamond drill holes comprising 967 meters of core. The exploration activities have discovered that free gold occurred in association with quartz-sulphide veins and related alteration haloes. The mineralisation zones are controlled in ENE-WSW faults and deformational zones in metasediments of greenschist facies, consisting of phyllite quartzite and metamorphic siltstone. This study aims to document the geological setting and detailed gold mineralisation characteristics at the Me Xi gold deposit for the first time. It focuses on the lithological and structural controls to the mineralisation, hydrothermal paragenetic sequences and their characteristics in relation to the gold mineralisation.

2. Methodology

- Field mapping and core logging: were used to establish the local geological map, cross sections, mineralisation and alteration zones.

- Petrography: was used to examine (1) the mineralogy for different rock units and hydrothermal stages, (2) the micro textures of rocks and the mineralisation stages, (3) the morphorlogy and structures of minerals.

- Scanning electron microscope (SEM): was used to define minerals that are difficult to be defined by a classic microscope.

3. Geological setting

The Me Xi gold deposit is located in the north central Vietnam, to the north of the Tam Ky-Phuoc Son Suture Zone in the Truong Son Fold Belt. The deposit geology of the Me Xi area is briefly reported by Sam et al. (1999) in the geological map scaled 1:50 000. In light of exploration results from the Axiom Mining Vietnam during 2012÷2016 and the authors' mapping, detailed core logging and petrography, further understanding of the deposit geology has been achieved. This section presents a new geological map with a typical cross-section and a new interpretation of the stratigraphy (Figure 1) for the deposit.

3.1. Stratigraphy

The sedimentary rocks at the Me Xi prospect are largely composed of siltstone-sandstone, calcareous siltstone, shale and black shale that were grouped into Ordovician-Early Silurian Long Dai formation and were metamorphosed at the greenschist facies. The stratigraphy at the Mexi could be grouped into two main units, including siltstone-sandstone and siltstone-shale. The first unit is dominated by the thin bedded siltstone layers intercalated with thin-bedded or lenses of sandstone layers (Figure 2a). Fresh hand specimens of the siltstone are grey, whereas sandstone is pale grey (Figure 2b). The second unit is dominated by siltstone and calcareous siltstone layers intercalated with thin-bedded shale, black shale and calcareous shale (e.g., Figures 2c,d), with the total thickness varying from ~30 m to 100 m. The siltstone from this unit has finer grain sizes compared to that of the siltstone-sandstone unit and usually occurs in thicker layers. Calcareous siltstone and shale are respectively characterised by their coarser grain size, the carbonate cements (Figure 2d) and/or small carbonate lenses. Coarse grains of cubic pyrite are commonly disseminated in the black shale and calcareous units (Figure 2d).

3.2. Magma

There are two types of igneous units in the study area, including porphyritic dolerite and mafic dykes. The porphyritic dolerite crop outs approximately 3km southwest of the Me Xi deposit centre (Figure 2e). The rock contains about 40% of dark minerals (i.e., pyroxene, olivine, hornblende, biotite) and 60% of bright minerals (plagioclase) that were partially altered to secondary minerals such as chlorite, epidote and sericite. Sphene was found in some samples and was locally replaced by leucoxene. The mafic dykes have greyish-green colors and fine-grained textures (Figure 2f) and were observed in the drill cores and at outcrops outside the central Me Xi deposit. The mafic dykes are vertical and trend E-W with the various widths of 1÷10 m. The dolerite and mafic dykes locally host thin quartz-sulphides veins containing pyrite, pyrrhotite, sphalerite, galena and chalcopyrite in association with chlorite, epidote, sericite and quartz alteration that are similar to those in the Au mineralisation zones.

3.3. Structure

The structures in the Me Xi deposit are characterised by (1) the sub-E-W faults trending 100÷110^{0}C and ~ 75^{0}C that are parallel with the mineralisation zones and (2) the late NW-SE fault that cut the mineralisation zone. In the Adit A20 where the best Au grade has been recorded (3m@51.7g/t), the normal fault has been recorded, and this type of fault is also recorded at some outcrops in the deposit center.

4. Gold mineralisation characteristics at Me Xi

The mineralisation characteristics including the geometry of mineralised bodies, vein paragenesis, alteration, ore mineralogy and gold composition at the Me Xi gold deposit are investigated based on drill core logging, field mapping and microscopic analyses.

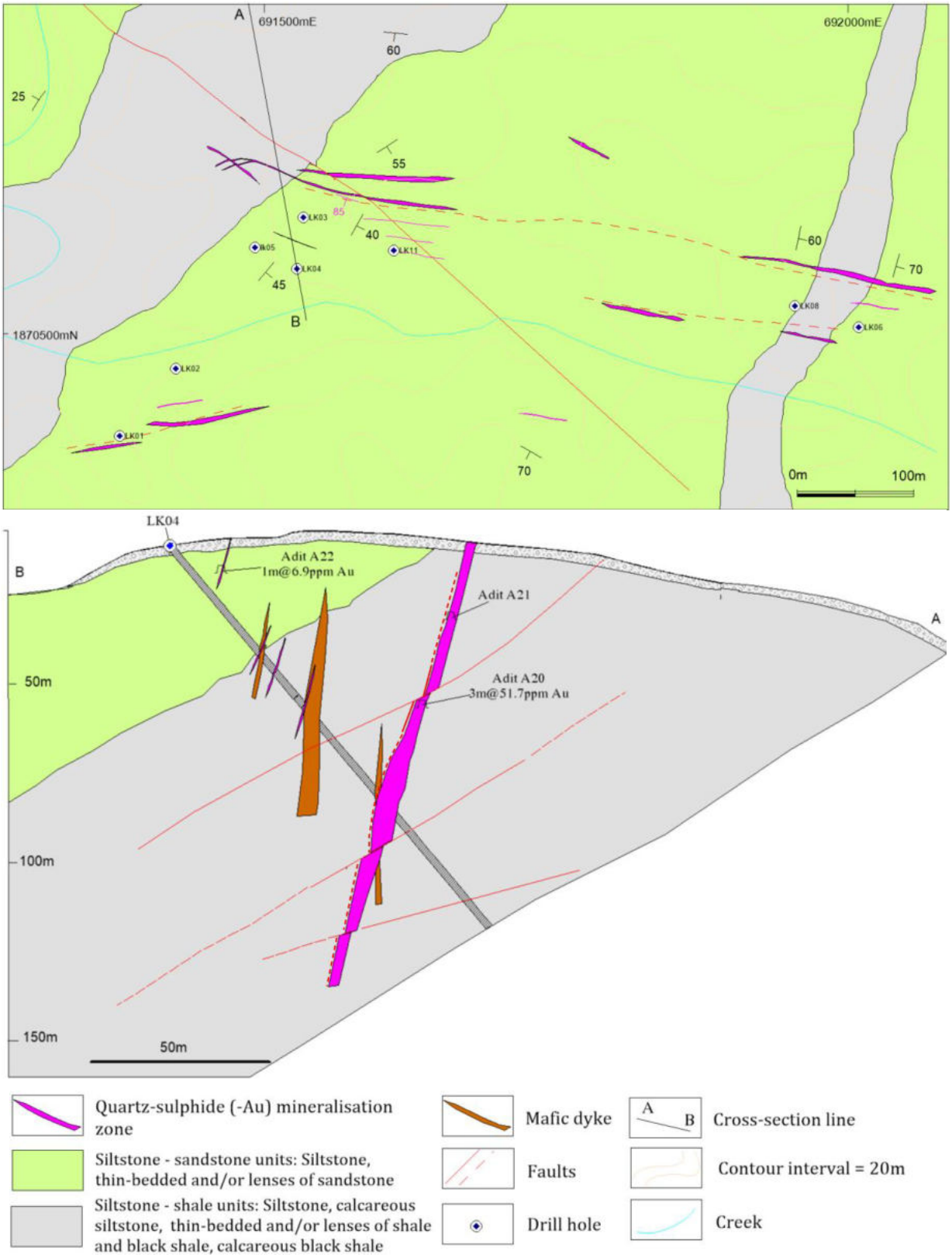

Figure 1. Geological map and a representative cross-section of the Me Xi gold deposit, central Vietnam.

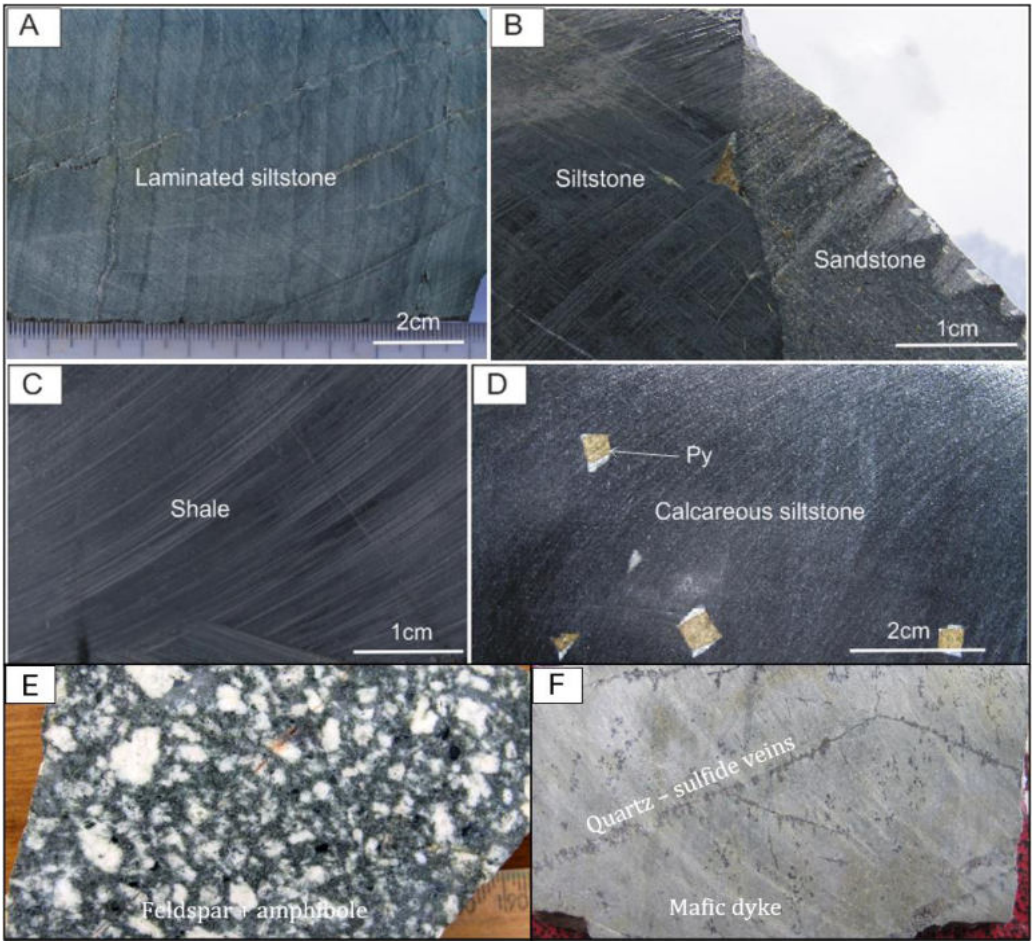

*Figure 2. Representative photographs of different rock units in the Me Xi area. **A.** Hand specimen of laminated siltstone at LK11@66.8 m. **B**. Fine-grained siltstone interbedded with fine-grained sandstone at LK04@96.7 m. **C.** Hand specimen of shale at LK04@73.4 m. **D**. Calcareous siltstone containing coarse-grained cubic pyrite (Py) at LK04@98.7 m. **E**. Porphyritic dolerites occurring at ~3 km from the centre of the Me Xi deposit. **F**. Fine-grained mafic dykes overprinted by thin quartz-sulphide veins at Lk04@39.4 m in the central area of the Me Xi, Quang Tri.*

Eight Au-bearing mineralised bodies of two mineralisation zones have been recorded in the deposit. The main mineralisation zone trends ~100^{0}C, dipping south and contains six mineralisation bodies (Figure 1). This zone has a length of ~640 m and a width of ~10÷60 m. The high-grade Au bodies are located in the east of the mineralisation zone where an interval of 3m@51.7g/t has been recorded (Axiom, 2006). The thickness of Au mineralisation bodies generally varies from 1÷2.5 m, locally up to 4 m. The second mineralisation zone is located to the SW of the main zone and includes two small Au mineralised bodies with a total length of ~160 m and a thickness of 0.5÷2 m. The Au ore at different mineralised bodies in Me Xi occurred as hydrothermal stockwork quartz-sulphide veins hosted in the metasediments of the Long Dai formation (Figure 3).

4.1. Mineralisation paragenesis, composition and ore textures

The mineralisation paragenesis at the Me Xi has been mainly determined from overprinting and cross-cutting relationships between different vein sets observed in the Au mineralised zones and the micro relationships of minerals under microscopy. A summary of mineral paragenesis is presented in Table 1. In general, there are four mineralisation stages at Me Xi as below:

Figure 3. Typical stockwork veins of Au-bearing quartz-sulphide at the Me Xi deposit.

- Stage 1: Quartz + pyrite + chalcopyrite;
- Stage 2: Quartz + chlorite + calcite + pyrite + galena + chalcopyrite + pyrrhotite + gold + arsenopyrite;
- Stage 3: Quartz + chlorite + calcite + sericite + pyrite + chalcopyrite + galena (+gold?);
- Stage 4: Quartz + calcite + pyrite + chalcopyrite.

Table 1. Mineral paragenesis at the Me Xi deposit, central Vietnam.

Stage / Mineral	1 (Pre-Au)	2 (Syn-Au)	3 (Syn-Au?)	4 (Post-Au)
Pyrite				
Chalcopyrite				
Arsenopyrite				
Galena				
Gold			?	
Pyrrhotite				
Quartz				
Chlorite				
Calcite				
Sericite				

Mineral abundance:

━━━ Major; ——— Minor; - - - - - Trace.

The mineral composition and ore textures for each hydrothermal stage are described as follows.

Stage 1: The stage 1 mineralisation displays brecciated vein textures (Figure 4) and is not commonly found in the study area. The mineralogy of this vein stage mainly includes white, grey quartz and minor pyrite and chalcopyrite. Silicification is commonly found at the haloes of this vein stage.

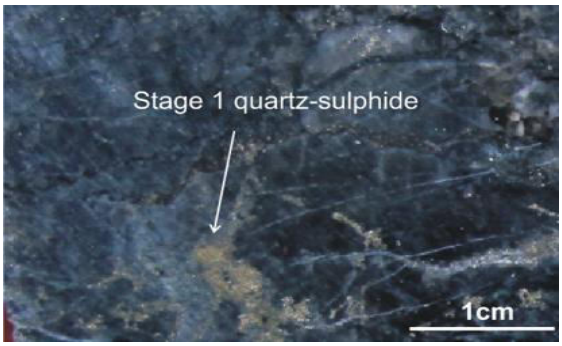

Figure 4. Drill core of stage 1 pyrite quartz veins at LK05@96.3 *m.*

Stage 2: The stage 2 hydrothermal stage occurred as stockwork quartz-sulphide veins and was defined by their overprinting relationship with the stage 1 veins (Figure 5a). This stage erased most of the initial textures of the early stage. The veins are usually thin (<5 cm) and locally contain massive sulphide patches (Figure 5a) in association with chloritisation, silicification and sericitisation (Figure 5b). Decalcification was also observed in this hydrothermal stage, consequently creating vuggy quartz textures due to the dissolution of carbonate. The mineral assemblage of this vein stage includes quartz, chlorite, calcite, pyrite, galena, chalcopyrite, pyrrhotite, gold and arsenopyrite (Figure 5), of which gold is closely associated with arsenopyrite.

Stage 3: Stage 3 veins are identified based on cross-cutting and overprinting relationships with the other vein generation (Figure 6a), cutting stage 2 veins and cutting by stage 4 veins. This vein type is typically characterised by chlorite-rich stockwork veins (Figures 6a,b) with the mineral assemblage of pyrite, chalcopyrite, galena, quartz, chlorite, sericite and minor calcite (Figures 6c-f). Vuggy quartz was locally observed in this vein type, possibly due to the dissolution of carbonates (Figure 6b). The mineral assemblages for this stage, especially in alteration, are similar

to that of the stage 2 veins excepting that Au has not been observed in collected samples from this vein stage.

Stage 4: The stage 4 hydrothermal veins are determined on the basis of the cross-cutting relationships with older veins (Figure 7). This vein type shows carbonate-rich quartz stockwork textures with locally disseminated pyrite and chalcopyrite or patches of these sulphides. This stage is interpreted as the post-mineralisation vein based on its barren assay results as well as no gold grains being observed in this stage.

4.2. Alteration

At the Me Xi deposit, hydrothermal alteration occurs adjacent to veins hosted in the metasediments. The stage 1 and 4 hydrothermal events record weak to medium silicification, whereas the stage 2 and 3 events show phyllic alteration (i.e., quartz-pyrite-sericite), chloritisation and decalcification.

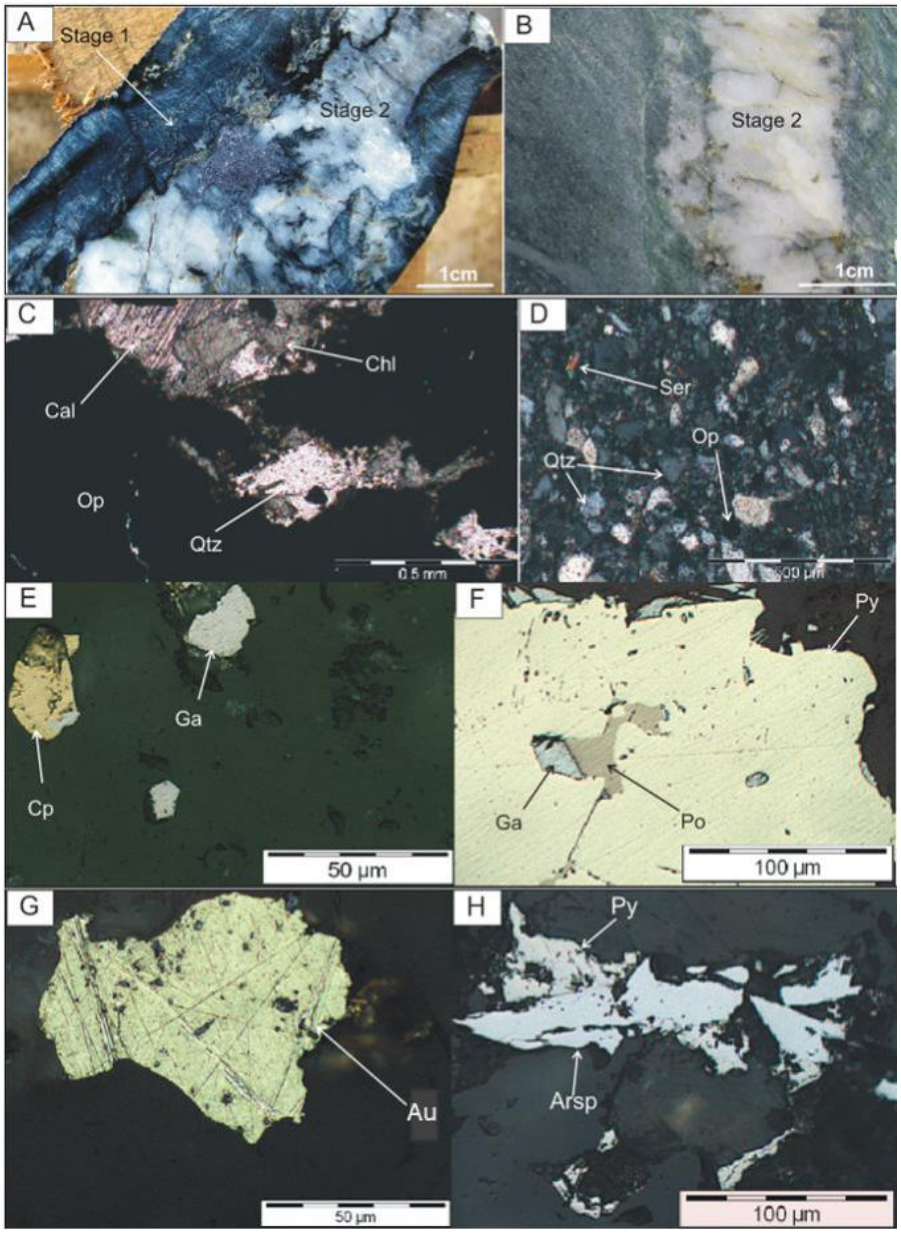

*Figure. 5. Representative images showing stage 2 mineralisation characteristics at the Me Xi deposit: **A**. A stage 2 vein overprinting a stage 1 brecciated veins at LK02@43.1 m; **B**. A hand specimen of a stage 2 quartz-sulphide vein associated with strong chloritisation, sericitisation and silicification at LK06@59.5 m; **C**. Quartz (Qtz), chlorite (Chl) and calcite (Cal) enclosed in sulphide (Op) at LK01@76.7 m; **D**. Quartz (Qtz), sericite (ser) and sulphides (Op) in alteration haloes at LK06@59.5 m; **E**. Chalcopyrite (Cpy) and galena (Ga) under reflected light, sample LK02@43.1m; **F**. Galena (Ga) and pyrrhotite (Po) inclusion occurred inside pyrite (Py) at LK02@44.2 m; **G**. Gold grains (Au) under reflected light, sample A20-1A; **H**. Pyrite (Py) and arsenopyrite (Arsp) are closed to Au grains in G.*

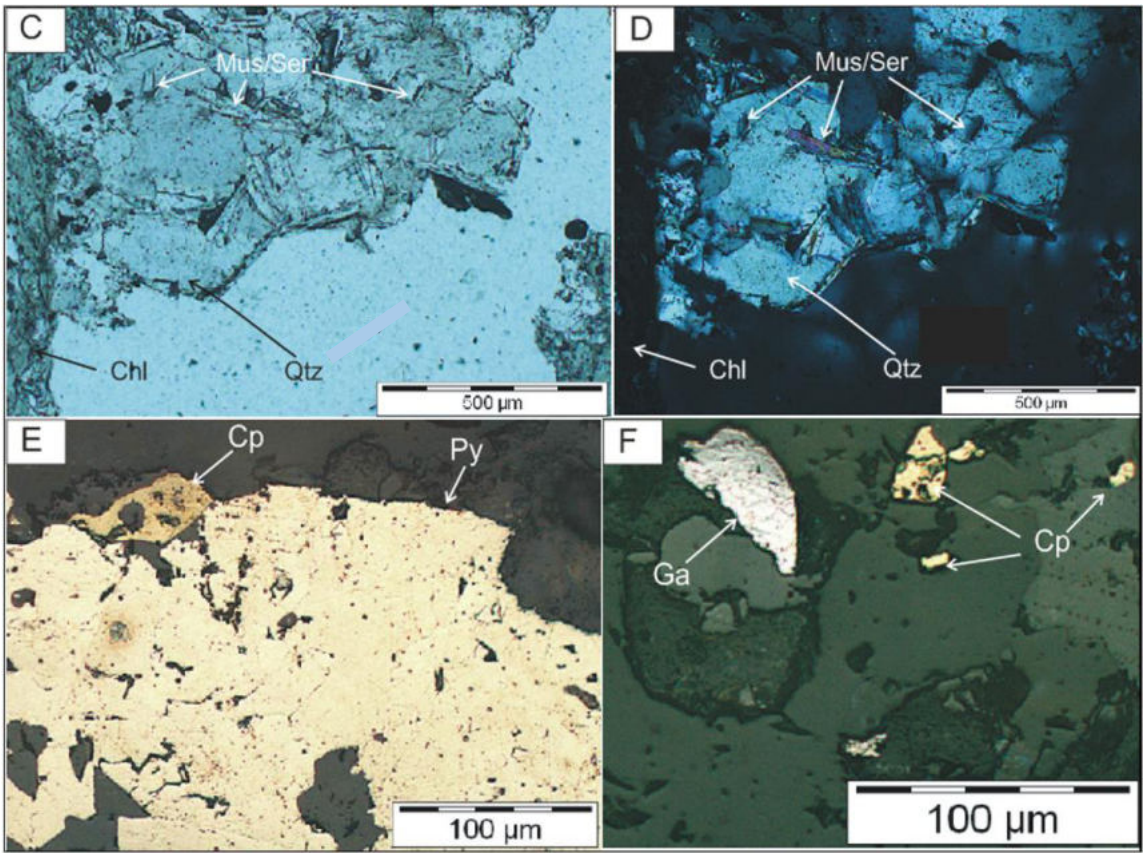

Figure. 6. Characteristics of stage 3 mineralisation at the Me Xi Au deposit: ***A.*** *Stage 3 stockwork veins overprinting the stage 2 veins. Sample No. Lk02@43.1 m;* ***B.*** *Typical stage 3 stockwork veins. Sample. No LK05@27.6 m;* ***C,D.*** *Stage 3 veins consist mainly of quartz (Qtz) and chlorite (Chl) and subordinate muscovite/sericite (Mus/ser) under plane-polarised and cross-polarised lights respectively. Sample No. LK05@26.2 m;* ***E.*** *Pyrite (Py) and chalcopyrite (Cpy) under reflected light. Sample No. LK05@39.7 m;* ***F.*** *Galena (Ga) and chalcopyrite (Cpy) under reflected light. Sample No. LK05@39.7 m.*

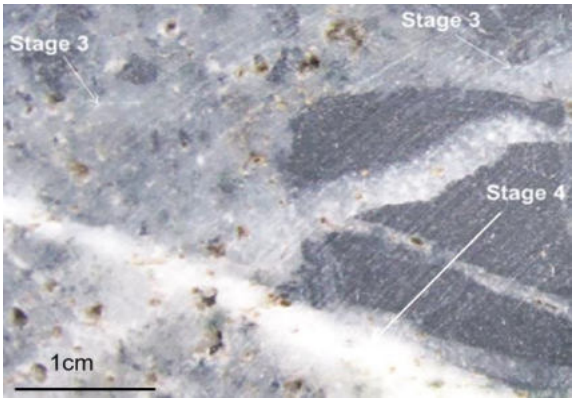

Figure. 7. Drill cores showing stage 4 veins cutting stage 3 stockwork veins at LK05@32.6 *m.*

In the Au-bearing stage 2 hydrothermal event, the veins usually display a typical alteration halo of chlorite-sericite-quartz alteration (Figure 8a), in which the sericite was found to replace feldspar cements of sandstone and siltstone (Figures 8a-f). The silicification has a close spatial relationship with Au in a few samples (e.g., sample No. A20_1A). The intensity of silicification depends on the density of veins (Figures 8b,c) and the permeability of the fluids against the host rock. Alteration haloes of veins are commonly narrow, from a few millimetres to centimetres due to the size of veins. However, the stockwork veining zone usually has several meters of strong alteration haloes. Pyrite and chalcopyrite commonly disseminate in all alteration haloes (e.g. Figure 8g).

The stage 3 hydrothermal event has similar alteration assemblages to that of stage 2, including chloritisation and phyllic alteration. However, the dense stockwork veining of stage 3 generates

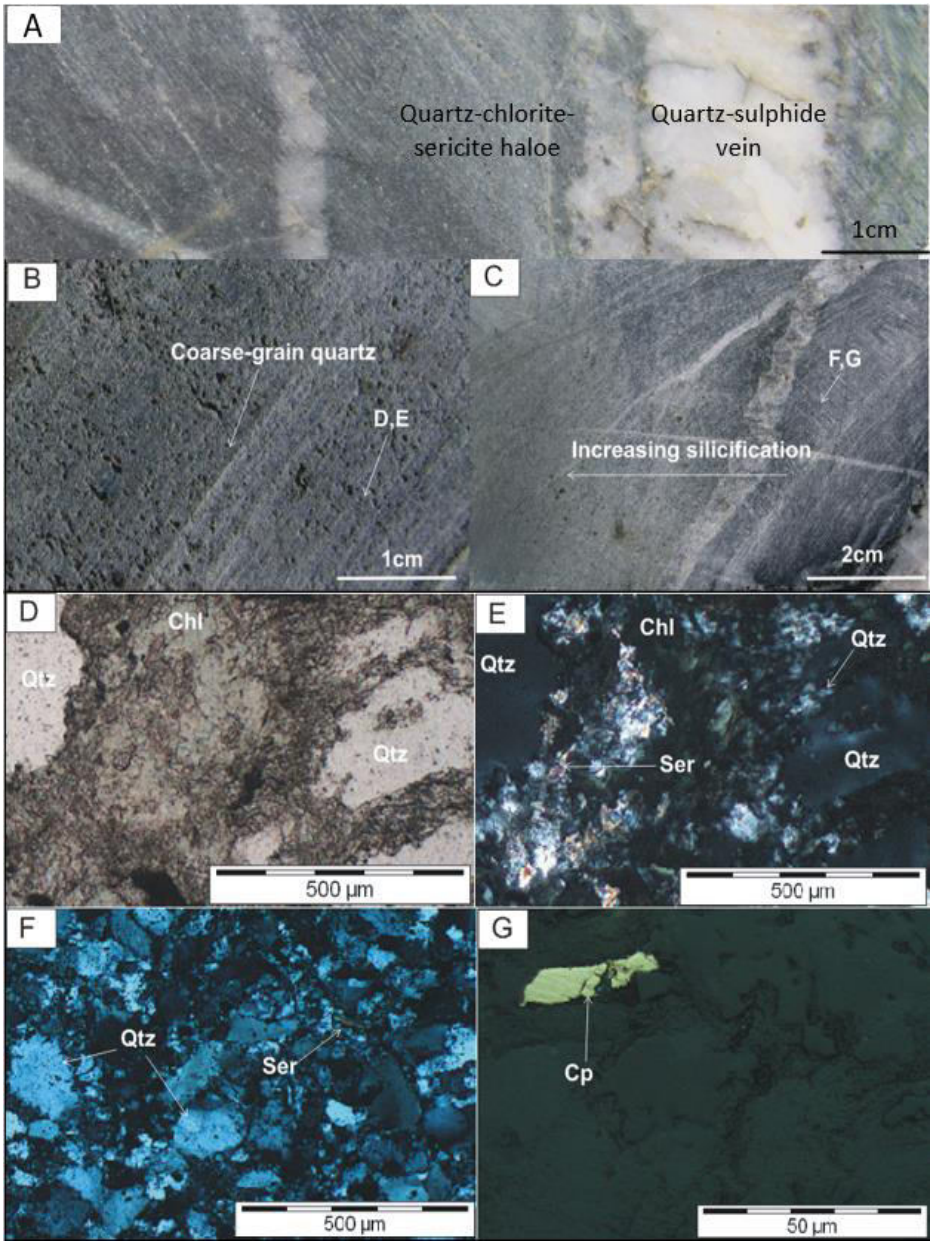

*Figure. 8. Alteration characteristics of the Au-bearing stage 2 hydrothermal event at the Me Xi, north central Vietnam: **A**. Typical quartz - sericite - chlorite alteration haloes of quartz-sulphide veins at LK05@32.6 m; **B**. A Hand specimen of strongly altered host rock at LK06@59.5 m; **C**. Increasing silicification to the vein at LK06@60.9 m; **D and E**. Quartz (Qtz), chlorite (Chl) and sericite (Ser) in an alteration zone under plane-polarized light and cross-polarised light respectively, sample No. LK06@59.5 m; **F and G**. Quartz (Qtz), sericite (Ser) and chalcopyrite (Cp) in the altered host rock at LK06@60.9 m.*

pervasive alteration zones compared to that of the stage 2 hydrothermal event.

5. Discussion

5.1. Geological setting

The Me Xi Au deposit occurred in the central Truong Son Fold Belt, to the northern part of the Tam Ky-Phuoc Son Suture Zone. The mineralisation zones were hosted in the Ordovician-Early Silurian sequence of siltstone-sandstone, calcareous siltstone, shale and black shale that was grouped into the Long Dai formation, and was metamorphosed at the

greenschist facies. The deposit was controlled by the thrust faults trending sub-E-W.

The igneous rocks in the study area consist of (1) porphyritic dolerite that occurred at ~3 km to the deposit center and (2) mafic dykes that were observed in the deposit centre. The timing for the formation of these rocks in the area is still unclear because the rocks have not been dated yet. However, the magmatic history of the region has been recorded by two main discrete periods, including Ordovician-Silurian or Permian-Triassic. While the Permian-Triassic magmatism and related metallogeny events have been largely recorded in the Truong Son Fold Belt (e.g., Zaw et al, 2014; Dung et al., 2024; Trong et al., 2021), the Ordovician-Silurian magmatism and related metallogeny in this terrane just have been discovered in some locations in Laos (Gardner, et al., 2017) and Vietnam (Zaw et al, 2014; Dung et al., 2024; Trong et al., 2021). Based on the magmatism history of the region, the porphyritic dolerite in the area could have been formed during Ordovician-Silurian or Permian-Triassic but geochronological and geochemical studies for this rock are needed to have better knowledge in the geological and tectonic setting of rock, the timing for the formation of this rock type as well as its possible linkage to the Au mineralisation in the area.

5.2. Mineralisation characteristics

Four hydrothermal events hosted in metasediments have been recorded in the Me Xi area, including the pre-Au stage 1, syn-Au stage 2 and possibly stage 3, and post-Au stage 4. The stage 1 veins are not commonly observed at the Me Xi deposits. However, the typical brecciated texture of the vein may suggest that this hydrothermal stage initially deformed the sedimentary sequence, which was then followed by the later hydrothermal events, evidenced by the overprinting textures, of which the stage 1 veins have been overprinted and replaced by the later hydrothermal events, erasing the initial textures of the stage 1 veins.

The nature of the narrow stockwork veins of stages 2 and 3 at Me Xi suggests a brittle structure controlling the mineralisation which was possibly formed in a shallow environment with low-medium depositional temperatures. The relatively chlorite-rich veins containing calcite suggest predominant near-neutral conditions (Zharikov, 1998) whereas the appearance of local pyrrhotite-bearing veins indicates a locally reduced environment for the mineralisation conditions. The chlorite-rich stage 3 stockwork veins also suggest a neutral environment for the stage 3 mineralisation (Zharikov, 1998). Gold has not been observed in polished thin sections for stage 3 but the positive gold contents in assay data for the drill core samples collected in stage 3 and the trace content of gold found in stages 2 and 3 pyrite (Truong et al., 2015) indicate that gold could occurred in the stage 3 but has not been observed in the polished thin sections.

The Me Xi deposit is located in the Truong Son Fold Belt where two discrete magmatic and metallogenic events have been recorded as discussed in the previous section. The Ordovician - Silurian magmatic events have been lined to the Cu-Au mineralisation in Laos (e.g., Gardner, et al., 2017), and the VHMS Zn-Pb-Cu system in Duc Bo, Quang Nam (Zaw et al., 2014). The Permian - Triassic magmatic and metallogenic events dominated in the Truong Son Fold Belt. These can be separated into two major events, including the ~290÷245 Ma pre-collision and syn- to post-collision between Indochina and South China plates after ~245 Ma (eg., Zaw et al., 2014), that have been linked to many Au, Au-Pb-Zn and Cu-Au deposits in the Truong Son Fold Belt (e.g.: Ban Hoayxai, Long Chieng Track, Sepon in Laos; Bong Mieu, Phuoc Son in Vietnam; Cromie, 2010; Zaw et al., 2014, Manaka, 2014). In light of the above study results, the Au mineralisation at Me Xi could be related to either Ordovician - Silurian or Permian - Triassic magmatic and metallogenic events.

The Me Xi sediment-hosted Au deposit occurred in the central Truong Son Fold Belt, where over tens of gold occurrences have been recorded. The mineralisation at the Me Xi deposit is characterised by quartz-sulphide (mainly pyrite and arsenopyrite)-carbonate-gold in association with silicification, chloritisation and sericitization along sub-E-W faults hosted in metasediments. Most of the other gold occurrences in the central Truong Son Fold Belt also occurred as quartz-sulphide-gold hosted in metasediments somehow are similar to those in Me Xi. These are also typical

characteristics of orogenic and/ or sediment-hosted Au deposits in Northeast Vietnam, Southeast China and the Truong Son Fold Belt (e.g., Cromie, 2010; Zaw et al., 2014; Tran et al., 2016; Nevolko et al., 2017). At the Me Xi deposit, an outcrop of dolerite was found ~3 km from the deposit. This could be possibly related to the mineralisation system. Thus, more studies about the age and geochemistry of igneous rocks, the ore genesis and the timing of mineralisation at Me Xi are needed to have a better understanding of mineralisation at Me Xi as well as in the central Truong Son Fold Belt.

6. Conclusion

The geological setting and gold mineralisation characteristics at the Me Xi Au deposit are summarised below:

- The Me Xi Au deposit is hosted in an Ordovician-Early Silurian sequence dominated by siltstone with subordinate sandstone, shale (including black shale and calcareous shale), and calcareous siltstone that were grouped into the Long Dai formation and have been metamorphosed at the greenschist facies.
- The igneous rocks at Me Xi area include undated porphyritic dolerite and mafic dykes that could be formed during Ordovician-Silurian and Permian-Triassic events based on the magmatic history of the region.
- At the Me Xi deposit, two Au mineralisation zones consisting of eight Au mineralisation bodies have been recorded, in which the main zone is ~ 640 m long and 10÷60 m wide whereas the largest gold mineralisation body is ~220 m long and 0.5÷3 m wide.
- Four hydrothermal stages have been identified at Me Xi, and gold was confined to stage 2 and possibly stage 3 hydrothermal events. The Au mineralisation occurred mainly as stockwork quartz-sulphide veins that were typically characterized for brittle deformation. The main ore mineral composition of these stages includes pyrite, chalcopyrite, gold, arsenopyrite, pyrrhotite and galena in association with silicification, chloritisation, sericitisation and decalcification.
- The sediment-hosted Au mineralisation at Me Xi is similar to many Au occurrences in the central Truong Son Fold Belt and NE Vietnam which is a typical characteristic of orogenic Au deposits.

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Contributions of authors

Truong Xuan Le - writing, review & editing; Hai Thanh Tran and Khin Zaw - review & editing; Thu Thi Le - conducting fieldwork and collecting field data.

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