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Deformation structures associated with Niou gold deposit, Goren belt, Burkina Faso, West African Craton

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1 Niou gold mineralization geological settings

The Goren district, located within the Boromo-Goren belt in the north-eastern region, is recognized for its significant gold deposits, exemplified by the Bissa gold deposit and the well-known artisanal mining site of Bouda. These features have led to the area becoming a focus for gold prospecting activities. Consequently, recent exploratory endeavors have identified a new deposit in this district, notably in the Niou area(fig.1).

Despite the importance of these gold occurrences as exploration targets in the district, **the key parameters associated with gold mineralization are not well constrained**.

Understanding which structures can control mineralization allows to:

- Well-planned drilling and exploration targeting
- Better understanding mineralization geometry and its style for a better oppressing
- Contribute a better understanding of the Burkina and WAC portfolio

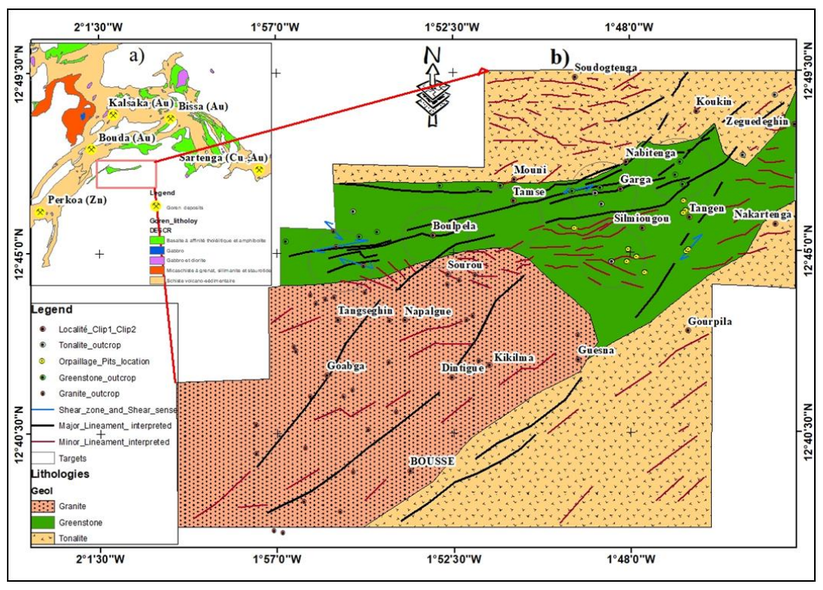
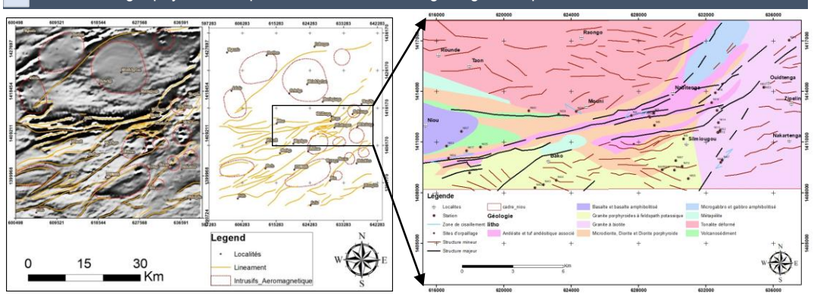


Fig1:Geological maps showing: a) Goren district(in BGGB) and study area location b) study area

2 Methods

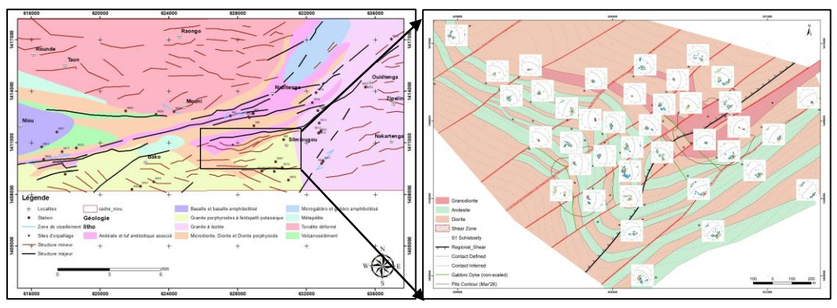
- Fields and pit mapping focuses in structural data collection
- Oriented drill cores examinations and structural data collections
- Airbone geophysical imagery interpretation combined fields measurements
- Orthomosaic and a Digital Surface Model (DSM) combine pit mapping measurements
- Modelling into Leapfrog software

3 Airborne geophysical interpretation and main zone geological maps of Niou Area



- At large scale, most of the major structures trend to NE, E-W a later one with mores intrusions like granites intrusions
- At Niou Main zone, two bigs shears zones oriented NE-SW are cross cut by later one oriented one created dilatation zone for gold mineralization
- Lithotypes look like basaltes and andesites in middle part but major part is dominated by granites tonalites and gabbros

3 Niou gold mineralization lithostructural maps base on recent drill holes measurements results



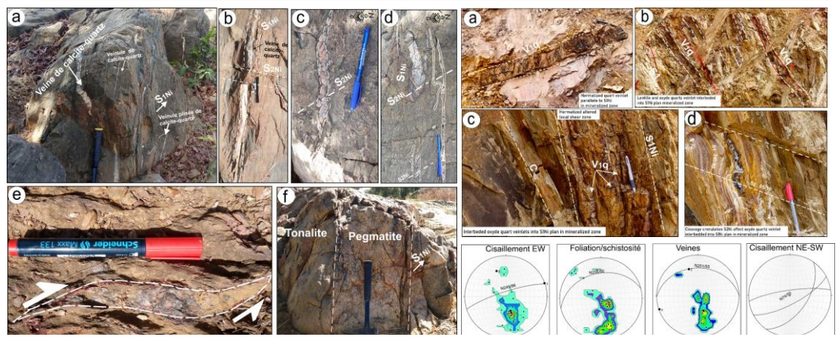
- 20 structurals diamonds drill holes provides litho and strcutural informations

3 lithostructurals domains:

- Domain 1 oriented NE-SW
- Domain 2 oriented N-S
- Domain 3 oriented NW-SE

- Thoses domains are controlled by repeated seconds shear zones and SZ controls schistosity trends in theses domains

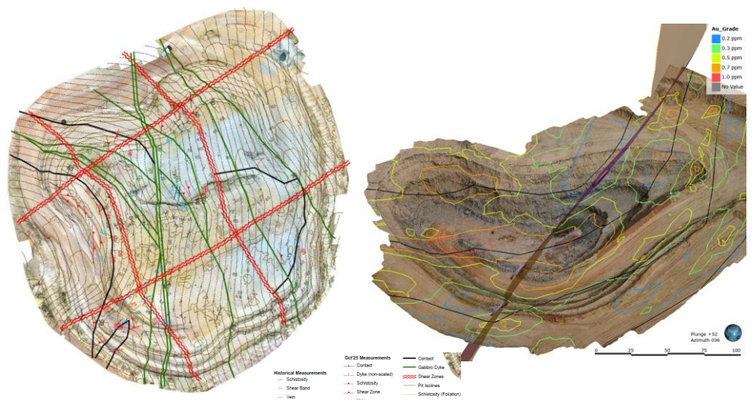
4 Outscrops and pit structures



Outcrops and pit mapping show:

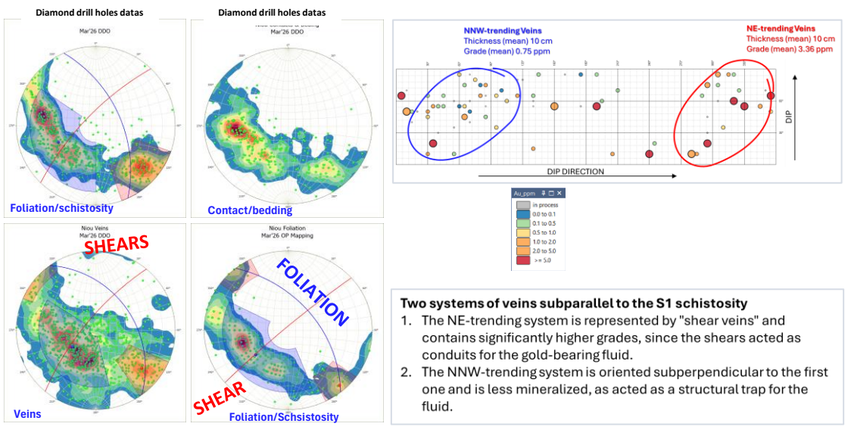
- S_{1Ni} schistosity with V1Ni veins concordants with S_{1Ni} exhibits an almost ENE-WSW trend with a mean strike of 256° and a dip of 50° to the north
- Interbeded oxyded hermatite-quartz veins and veinlets concordant to S_{1Ni} in mineralized zones
- Flexured shears veins into mineralized zones
- S_{2Ni} microfolds and crenulation cleavage
- shears bands delineate S1Ni schistosity and form synschisteux C/S shear structures trending to N249° and dipping to N
- Pegmatite dikes form intruded unit across tonalitic areas around Niou NW part

5 Orthomosaic and a Digital Surface Model (DSM) and mineralization structural control



- Structural trend based on S1 schistosity measurements.
- Ores zones (colored lines) follow the generalized orientation of S1 (black lines).
- Shear zones acted as the main conduits for ascending ore-bearing fluids.
- Schistosity facilitated lateral fluid dispersion, creating rocks pervasively impregnated with sulfides.

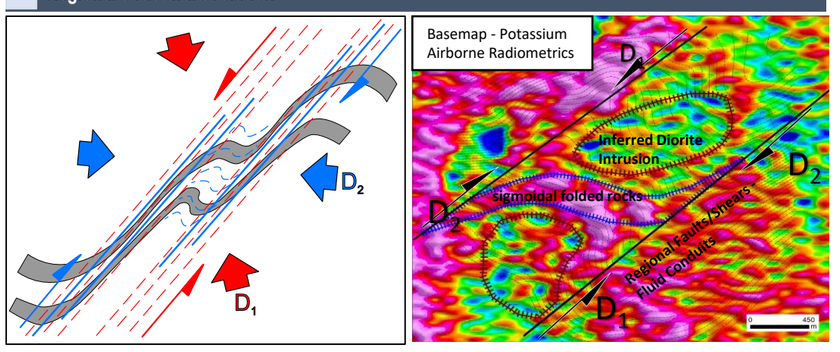
6 Main structure(diamond drill holes and Open pit) stereoplot



Two systems of veins subparallel to the S1 schistosity

1. The NE-trending system is represented by "shear veins" and contains significantly higher grades, since the shears acted as conduits for the gold-bearing fluid.
2. The NNW-trending system is oriented subperpendicular to the first one and is less mineralized, as acted as a structural trap for the fluid.

7 Regional structural evolution



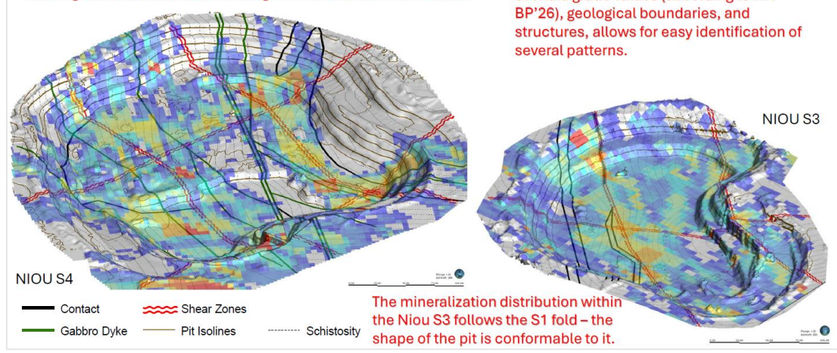
- S_{1Ni} schistosity concordant veins and veinlets show their emplacement in a context of ductile deformation, particularly in a shear deformation context D1 and are interpreted as having been formed by sliding involving a shear component
- Intrusion causes deflection and simple simple shearing on their flancks an deformation distribution
- Permeability increasing repeated fluids migration and gold mobilization leads to to multiple redeposits events and enrichments zone.

8 Modelling, domaining and imputs to targetting

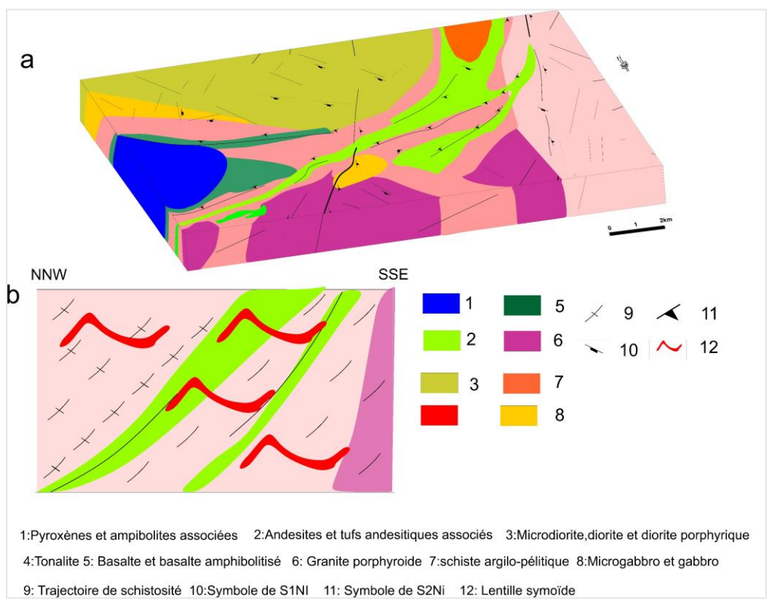
NIOU MAPS ON PIT SURFACE

Gabbro dikes within the Niou S4 area mark the contacts between andesites and diorites (emplacement occurred along weakened zones). Therefore, they effectively highlight the boundaries of lithological domains with different gold mineralization intensities.

The overall view of the DSM of pits with overlaid grade values (according to RM BP'26), geological boundaries, and structures, allows for easy identification of several patterns.



- Hight grade strong mineralization zones linear trends associated with shear zones
- Obvious lithological control of mineralization
- The mineralization follows the S1 fold –the pit shape is conformable to it



9 Conclusion

Niou gold deposit exhibits a strong structural imprint. Mineralization is primarily controlled by local shear bands with a major subvertical orientation, although these bands bend in the western sector. Quartz-carbonate shear veins and extension veins concordant with the S1Ni schistosity represent the preferential sites for gold crystallization, demonstrating strong structural control of the schistosity over mineralization. This study highlights the Niou gold deposit and contributes to our understanding of the West African craton's mineral portfolio, although further studies on the evolution of the hydrothermal system are needed for a better understanding of this deposit, which is currently being mined in the Goren segment

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