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REVIEWER'S REPORT

Manuscript No.: **IJAR-57756**

Title: Caractérisation pétrographique et minéralogique des granitoïdes et des pegmatites du massif panafricain de Haraze Djombo (Batha, centre du Tchad).

Recommendation:
Accept after minor revision……

Rating	Excel.	Good	Fair	Poor
Originality		✔		
Techn. Quality		✔		
Clarity		✔		
Significance	✔			

Reviewer Name: **Faheem Abdul Muneeb**

Detailed Reviewer's Report

Detailed Reviewer's Report

Overall Evaluation

The manuscript titled *"Petrographic and Mineralogical Characterization of Granitoids and Pegmatites in the Pan-African Haraze Djombo Massif (Batha, Central Chad)"* investigates the

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petrographic characteristics, mineralogical composition, and geodynamic significance of granitoids and pegmatitic formations within the Haraze Djombo sector of the Batha Massif in central Chad. Using field observations, optical petrography, and X-ray diffraction (XRD) analysis, the study seeks to characterize the mineral assemblages of the Djombo and Gleb sectors and evaluate their metallogenic implications, particularly with respect to hydrothermal gold mineralization.

The topic is geologically relevant and contributes to ongoing discussions concerning the Pan-African Belt, post-collisional granitoid magmatism, hydrothermal alteration, and mineral exploration in Central Africa. The manuscript appropriately identifies the relative scarcity of modern petrographic and mineralogical studies concerning the Batha region and attempts to address this gap through integrated petrographic and XRD-based investigation. The focus on granitoid evolution and hydrothermal quartz-bearing pegmatites also gives the study potential economic significance, especially in relation to gold prospecting within the region.

One of the manuscript's strongest aspects is its combination of field geology, petrographic observation, and mineralogical characterization. The descriptions of the amphibole-biotite granite, biotite-muscovite granite, and pegmatitic quartz veins are detailed and generally well-supported by both microscopic observations and XRD results. The integration of photomicrographs and diffraction spectra further strengthens the empirical dimension of the paper.

The manuscript also demonstrates familiarity with regional geological literature concerning the Saharan Metacraton and Pan-African tectonics. The discussion linking granitoid emplacement to post-collisional crustal relaxation during the late Ediacaran period is generally coherent and supported through references to relevant regional studies.

At the same time, the manuscript would benefit from stronger analytical depth and greater methodological precision. Certain interpretations concerning hydrothermal evolution and metallogenic potential occasionally appear somewhat speculative relative to the amount of geochemical evidence presented. The paper also contains several language inconsistencies, formatting irregularities, and repetitive explanations that require editorial refinement.

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Additionally, some petrographic interpretations would benefit from more quantitative mineralogical support and clearer distinction between observation and interpretation.

Overall, the manuscript presents valuable petrographic and mineralogical data from an understudied region and has clear publication potential following moderate revision and editorial improvement.

Strengths of the Paper

A major strength of the manuscript is its focus on a geologically underexplored area within central Chad. The study contributes new petrographic and mineralogical observations concerning the Haraze Djombo Massif and helps expand geological understanding of Pan-African granitoid evolution within the Saharan Metacraton context.

The integration of multiple analytical approaches is also commendable. The combined use of field observations, thin-section petrography, and XRD analysis provides a relatively robust framework for characterizing the granitoids and pegmatites studied. The methodological procedures are generally clear and technically appropriate for the objectives of the study.

The petrographic descriptions are among the strongest components of the manuscript. The discussions concerning saussuritization, quartz microfracturing, chloritized biotite, allanite occurrence, cataclastic textures, and hydrothermal alteration demonstrate careful petrographic observation and meaningful mineralogical interpretation.

The XRD analysis section is also well organized. The identification of quartz, microcline, albite, biotite, and tremolite within the Djombo granite, as well as the exceptionally pure quartz assemblage in the Gleb pegmatite, contributes useful mineralogical information. The inclusion of diffraction spectra and mineralogical tables improves the scientific clarity of the study.

Another positive aspect is the manuscript's regional geological contextualization. The discussion appropriately situates the granitoids within the broader framework of Pan-African post-collisional magmatism and references relevant tectonic models concerning the Saharan Metacraton and Central African Fold Belt.

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The economic implications of the study are also noteworthy. The discussion connecting quartz veins, cataclastic textures, hydrothermal alteration, and fault-controlled fluid circulation to possible gold mineralization provides practical relevance for future mineral exploration activities in the region.

Areas for Improvement

Although the manuscript presents useful petrographic and mineralogical data, the analytical dimension could be strengthened further. Several interpretations concerning metallogenic potential and hydrothermal evolution are presented with relatively high confidence despite the absence of direct geochemical or ore mineral analyses. While the observations are suggestive of hydrothermal activity, the conclusions regarding gold potential would benefit from more cautious phrasing unless supported by additional geochemical evidence.

The study would also benefit from incorporating whole-rock geochemistry or trace element data where possible. At present, the interpretations concerning peraluminous affinity, calc-alkaline signatures, and tectonomagmatic setting rely primarily on petrographic and mineralogical observations. Additional geochemical support would significantly strengthen the petrogenetic discussion.

The methodology section is generally clear but could provide greater detail regarding sampling strategy. The manuscript does not fully explain:
how representative samples were selected,
the total number of samples analyzed,
or whether the XRD analyses were performed on all sampled lithologies or only selected specimens.

The petrographic descriptions are detailed, but some sections occasionally move too quickly from observation to interpretation without sufficient analytical separation. For example, interpretations concerning hydrothermal conditions and tectonic evolution would benefit from clearer explanation of the specific mineralogical indicators supporting those conclusions.

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Some interpretations related to metallogenesis also appear somewhat generalized. The association between quartz veins, cataclasis, iron oxides, and gold mineralization is plausible and supported by regional analogues, but the paper would benefit from acknowledging that such features alone are not definitive evidence of economically viable mineralization. A more balanced formulation would improve scientific precision.

The manuscript also requires substantial editorial refinement. There are several grammatical inconsistencies, awkward sentence constructions, punctuation irregularities, and formatting issues throughout the text. Certain sections contain repetitive phrasing, particularly in the discussion and conclusion. Careful proofreading by a fluent academic English editor would significantly improve readability.

Figure presentation could also be improved in some places. While the photomicrographs are useful, several images would benefit from:
clearer labeling,
higher resolution,
more consistent scale bars,
and improved contrast between minerals.

Additionally, some figure captions remain relatively brief and could provide more interpretive detail for readers unfamiliar with the petrographic context.

The discussion section would benefit from greater engagement with broader regional comparisons. While relevant literature is cited, the manuscript could more explicitly compare the Haraze Djombo granitoids with similar Pan-African granitoid suites elsewhere in Chad, Cameroon, Sudan, or the Central African Fold Belt.

The conclusion summarizes the findings effectively but occasionally repeats earlier statements almost verbatim. A more concise synthesis emphasizing the broader geological significance of the study would strengthen the final section.

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Finally, several formatting inconsistencies are visible in the references and mineralogical tables, including spacing irregularities, inconsistent capitalization, and typographic symbols. These should be standardized according to the journal's formatting guidelines before publication.

Final Recommendation

Accept with Minor Revisions

The manuscript presents a valuable petrographic and mineralogical investigation of granitoids and pegmatites from the Haraze Djombo Massif in central Chad. Its integration of field observations, petrographic characterization, and XRD analysis contributes meaningful geological data from an understudied region and provides useful insight into Pan-African magmatism and hydrothermal evolution.

Although the paper would benefit from stronger analytical precision, clearer methodological explanation, cautious interpretation of metallogenic implications, and substantial editorial refinement, these concerns are manageable through revision and do not fundamentally undermine the scientific contribution of the study.

With moderate revisions and careful proofreading, the manuscript is suitable for publication consideration.