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RESEARCH ARTICLE

PETROGENESIS AND GEOCHEMISTRY OF BIRIMIAN GRANITOIDS IN THE EASTERN KORHOGO BELT: GEODYNAMIC IMPLICATIONS

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Abstract

The Birimian formations of West Africa represent one of the most significant Paleoproterozoic provinces, hosting greenstone belts and granitoid intrusions with major metallogenic potential. In northern Côte d'Ivoire, the eastern Korhogo belt remains poorly documented despite its economic importance. This study presents new petrographic and geochemical data on granodiorites and granites from the Korhogo belt to clarify their petrogenesis and tectonic setting. Petrographic observati ons reveal pervasive alteration, with plagioclase transformed into sericit e, carbonates, and epidote, and ferromagnesian minerals destabilized into chlorite and epidote.Geochemical analyses show that the granitoids are calc-alkaline, potassic, and I-type, ranging from metaluminous to peraluminous compositions. Their trace element patterns are characteri zed by enrichment in large ion lithophile elements (LILE), negative Nb-Ta anomalies, and strong fractionation of light rare earth elements (LREE), with variable europium anomalies. These features indicate a mixed crustal and mantle origin, consistent with subduction-related magmatism in a continental arc setting. The pervasive hydrothermal alteration and greenschist facies metamorphism reflect post-magmatic processes associated with regional deformation and fluid circulation. Overall, the Korhogo granitoids contribute to refining the geodynamic framework of the Baoulé-Mossi domain and highlight the metallogenic potential of Birimian terranes in Côte d'Ivoire.

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Introduction: -

The Birimian formations of West Africa represent one of the most important Paleoproterozoic provinces, composed of NE–SW oriented greenstone belts and large sedimentary basins intruded by granitoid massifs and metamorphosed under greenschist facies conditions. These belts are globally recognized for their metallogenic potential, particularly gold mineralization, and have been studied extensively since the pioneering works of Milési et al. (1989, 1992).

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Côte d'Ivoire alone hosts nearly 35% of these Birimian units, making it a key territory for understanding the geodynamic evolution of the Baoulé-Mossi domain within the West African Craton (Bessoles, 1977).

Birimian granitoids are generally grouped into sodic TTG-type suites emplaced between 2.25 and 2.12 Ga and calc-alkaline, potassic suites emplaced between 2.12 and 2.09 Ga, with late alkaline granites and syenites reported in Burkina Faso, Côte d'Ivoire, and Senegal (Morel & Alinat, 1993; Naba et al., 2004; Tapsoba et al., 2013; Hirdes & Davis, 2002). These intrusions are not only markers of crustal growth but also central to metallogenesis, as auriferous mineralizations are frequently associated with shear zones at contacts between metasediments, greenstone units, and granitoids (Feybesse, 2001; Gbamélé, 2012; Houssou, 2013).From a regional perspective, the Korhogo belt forms part of the NE–SW oriented Birimian greenstone belts that dominate the Baoulé-Mossi domain. These belts are intruded by granitoids of varying affinities, ranging from sodic TTG suites to potassic calc-alkaline granitoids, emplaced between 2.25 and 2.09 Ga (Morel &Alinat, 1993; Naba et al., 2004; Tapsoba et al., 2013). The Korhogo granitoids, however, remain less studied compared to those of the Boundiali branch, despite their importance in understanding crust-mantle interactions and the geodynamic evolution of the Paleoproterozoic. Thus, the study area provides a unique opportunity to investigate the petrographic and geochemical characteristics of Birimian granitoids, to clarify their petrogenesis, and to assess their role in the tectonomagmatic evolution of the West African Craton.

The Boundiali-Korhogo belt in northern Côte d'Ivoire comprises two branches: Boundiali (western) and Korhogo (eastern). While Boundiali has been relatively well studied (Turner, 1993; Yacé, 2002), the Korhogo branch remains poorly documented despite hosting major mining activities, including the Tongon deposit. Exploration programs by BHP Minerals and SODEMI (1988–1994) revealed volcanosedimentary sequences of basaltic to andesitic rocks, schists, felsic tuffs, and minor cherts, intruded by calc-alkaline granitoids and doleritic dykes (BHP Minerals, 1994; Adegoké, 1996). These lithologies were affected by regional greenschist facies metamorphism, locally reaching amphibolite facies (Feybesse, 2001; Hirdes & Davis, 2002). Mineralization in the Korhogo belt, as in other Birimian terranes, is closely linked to shear zones controlling hydrothermal fluid circulation and gold deposition (Gbamélé, 2012; Houssou, 2013).

However, the geochemical characterization of the Korhogo granitoids particularly rare earth element fractionation patterns, trace element anomalies, and tectonomagmatic affinities remains scarce. This gap limits understanding of crust-mantle interactions and geodynamic processes during the Paleoproterozoic. The present study aims to provide a comprehensive petrographic and geochemical characterization of granitoids from the eastern Korhogo belt to clarify their mineralogical features, geochemical signatures, petrogenetic origins, and geodynamic implications within the Paleoproterozoic subduction-related context of the Baoulé-Mossi domain. By integrating petrographic observations and geochemical data, this work contributes to refining knowledge of Birimian granitoids in Côte d'Ivoire and provides new insights into crustal growth, mantle contributions, and metallogenic potential in West African terranes.

Study Area: -

The study area is in northern Côte d'Ivoire, within the eastern branch of the Korhogo greenstone belt, also known as the Korhogo belt. This belt belongs to the Baoulé-Mossi domain of the West African Craton, which is bounded to the west by the Archean Kenema-Man domain and separated by the Sassandra fault (Bessoles, 1977). The Korhogo belt extends across the administrative regions of Poro and Tchologo and is part of the Paleoproterozoic Birimian terranes that cover nearly two-thirds of Côte d'Ivoire.

Geologically, the area is characterized by volcano-sedimentary sequences composed of basaltic to andesitic lavas, intercalated schists, felsic tuffs, and minor cherts, intruded by calc-alkaline granitoids and doleritic dykes (BHP Minerals, 1994; Adegoké, 1996). These lithologies are affected by regional greenschist facies metamorphism, locally reaching amphibolite facies, consistent with the metamorphic imprint observed in other Birimian belts of West Africa (Milési et al., 1989; Feybesse, 2001; Hirdes & Davis, 2002). The Korhogo belt is flanked on both sides by granitoid massifs, which play a significant role in its structural framework and metallogenic potential.The area hosts important mining activities, including the Tongon gold deposit and several promising prospects, highlighting its economic relevance (Turner, 1993; Yacé, 2002). Mineralization is closely associated with shear zones that crosscut Birimian lithologies, controlling hydrothermal fluid circulation and gold deposition (Houssou, 2013; Gnanzou, 2014; Ouattara, 2015; Assie et al., 2024).

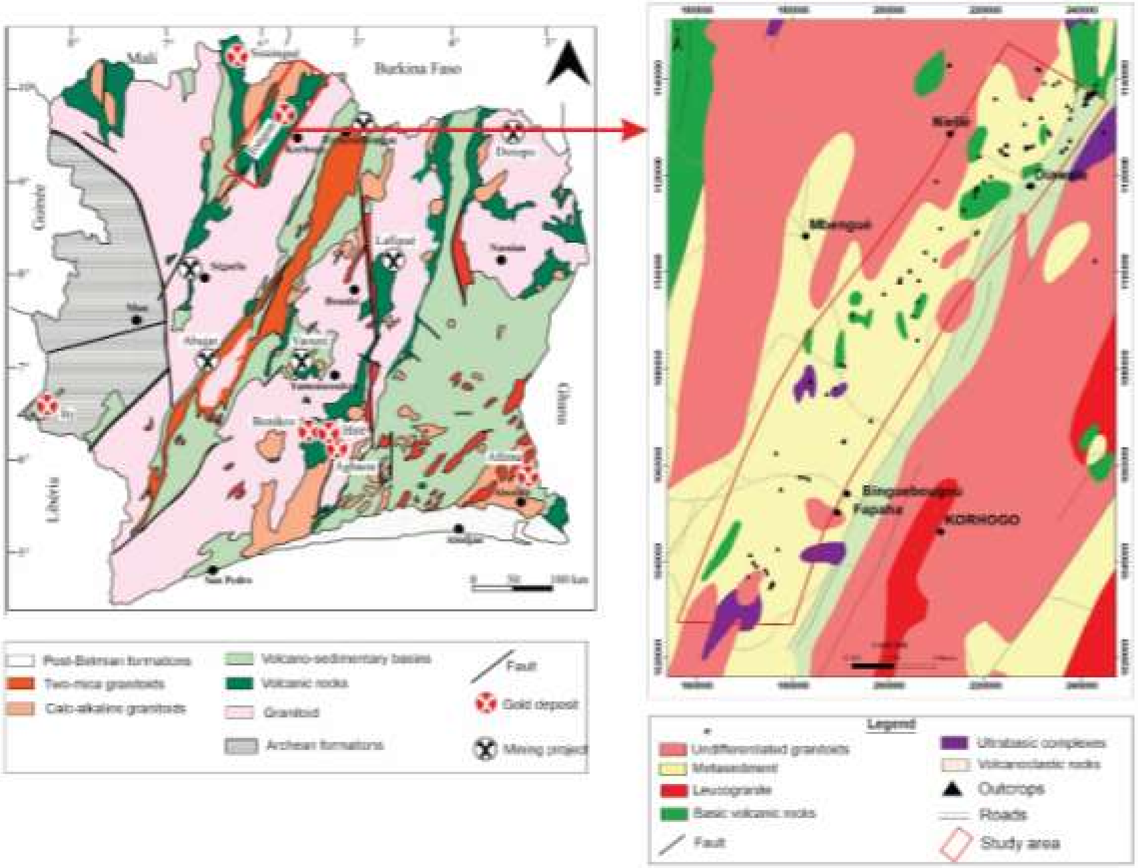

Figure 1. Geological map of the Korhogo belt

Methodology: -

Fieldwork and sampling: -

Field investigations were conducted across several localities in the eastern Korhogo belt, notably Niellé, Diawala, and Fapaha (Fig. 1). Representative samples were collected from fresh granitoid outcrops and artisanal mining sites to minimize weathering effects. A total of twenty-four fresh granitoid samples, including granodiorites and granites, were systematically collected across the study area to ensure representative coverage of the main lithological variations.

Petrographic analysis: -

Macroscopic observations were first carried out to describe lithological features, textures, and alteration patterns. Thin sections were prepared at the Laboratory of Geology, Mineral Resources, and Energy (Université Félix Houphouët-Boigny, Abidjan).This analysis was performed under transmitted light using an Optika® polarizing microscope. Oxides and sulfides were examined under reflected light with an Olympus BX-60 microscope equipped with an imaging system. This combined approach allowed detailed characterization of mineral assemblages within the principal lithologies, auriferous quartz veins, and hydrothermal alteration zones. Microscopic observations focused on mineral assemblages, textural relationships, and alteration features. Quartz, plagioclase, amphibole, and biotite were systematically described, along with secondary minerals such as chlorite, epidote, and sericite. These petrographic data provided insights into magmatic crystallization processes and subsequent hydrothermal overprints, highlighting pervasive alteration and fissural transformations.

Geochemical analysis and data treatment: -

Rock powders obtained after crushing were analyzed for major and trace elements. Initial preparation was performed at Bureau Veritas in Abidjan, while chemical analyses were conducted at Bureau Veritas Commodities Ltd (Canada). Major elements were determined using Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), whereas trace and rare earth elements (REE) were measured by Inductively Coupled Plasma MassSpectrometry (ICP-MS). Analytical precision and accuracy were ensured using international standards and duplicates.

Major element compositions were plotted on classification diagrams such as Middlemost (1994) for rock type identification, Shand (1922) for alumina saturation index, and the AFM diagram of Irvine & Baragar (1971) to distinguish tholeiitic versus calc-alkaline affinities. Trace element data were normalized to the primitive mantle (Sun & McDonough, 1989) to highlight enrichment in large ion lithophile elements (LILE) and anomalies in high field strength elements (HFSE). Rare earth element patterns were normalized to chondritic values, allowing evaluation of fractionation trends and anomalies in Ce and Eu. These results were then compared with regional Birimian granitoid suites described in Côte d'Ivoire, Burkina Faso, and Senegal (Morel & Alinat, 1993; Naba et al., 2004; Tapsoba et al., 2013; Hirdes & Davis, 2002), providing a framework for interpreting crust-mantle interactions and subduction-related magmatism (Pearce, 1983; Pearce et al., 1984).

Results: -

Petrography: -

Granites: The granites, which are widespread throughout the study area, are coarse-grained and intrusive into metabasalts (Fig. 2C). They are traversed by quartz veins and locally exposed along riverbanks and consist of quartz, feldspar, and biotite crystals, with microcline and orthoclase locally observed. Plagioclase is partially altered to sericite and epidote, while biotite shows incipient chloritization (Fig. 2D). Muscovite is less abundant, and opaque minerals occur in minor amounts. Quartz displays a characteristic rolling extinction. Biotite is present, with some sections showing incipient chloritization, which is more abundant than muscovite. Microcline, orthoclase, and opaque minerals are also observed.At the field scale, the observed quartz veins generally trend NE–SW with thicknesses ranging from a few centimeters to over one meter.

Granodiorite: Samples were collected from the localities of Niellé, Diawala, and Fapaha. In outcrop, the rocks are massive, mesocratic, and display granular to porphyroid textures, intruding into metabasalts. Several specimens were obtained from artisanal gold mining zones. Macroscopic examination reveals quartz, plagioclase, amphibole, biotite, as well as sulfides and oxides. Under the microscope, the rocks are generally composed of quartz, plagioclase, green hornblende, and biotite (Fig. 2A). Quartz commonly occurs as phenocrysts with distinctive rolling extinction. Plagioclase also appears as phenocrysts, often altered and transformed into sericite, carbonates, and epidote, with magmatic zoning visible in some sections (Fig. 2B). Green hornblende is typically of medium grain size, while biotite, locally associated with hornblende, contains zircon inclusions. These ferromagnesian minerals frequently destabilize into chlorite and epidote. Additionally, fine veinlets of quartz–sericite are observed, associated with chlorite, sulfides, and oxides.

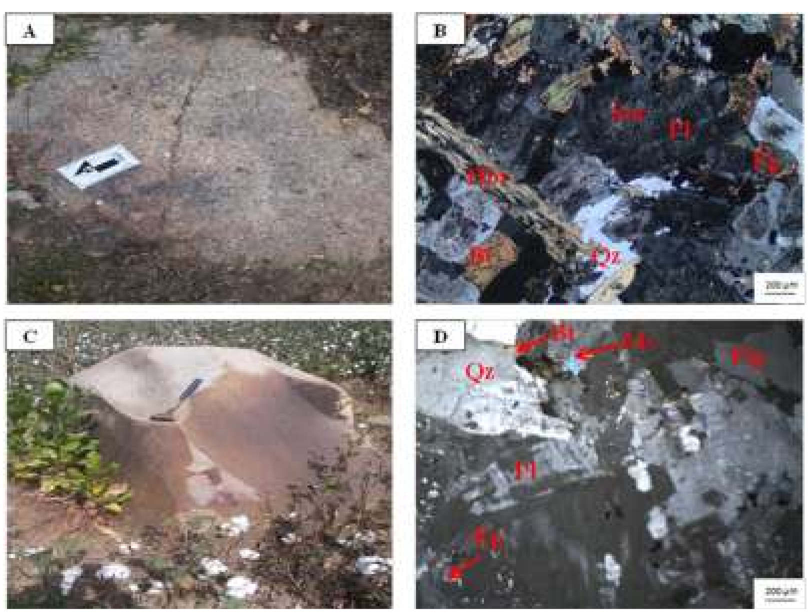

Figure 2. Granodiorites and granites: macroscopic and microscopic views. (A–B) Macroscopic and microscopic views of granodiorites; (C–D) Macroscopic and microscopic views of granites. Mineral abbreviations: Ms = muscovite; Flp = feldspars; Hbv = green hornblende; Bt = biotite

Geochemistry: -

Major Elements: -

The major element compositions classify the rocks as granodiorites and granites according to Middlemost (1994) (Fig. 3A). The granodiorites show SiO_2 contents ranging from 65.13 to 67.84%, MgO from 1.37 to 2.95%, Fe_2O_3 between 3.80 and 5.47%, and Al_2O_3 from 9.55 to 15.77%. Na_2O and K_2O vary respectively from 2.72–4.93% and 0.61–3.21%, while TiO_2 remains low (0.40–0.57%) (Table II). The granodiorites exhibit chemical compositions consistent with calc-alkaline rocks (Fig. 3B). Normative quartz contents range from 16.49 to 31.35%, hypersthene from 2.81 to 5.45%, and diopside from 1.34 to 4.15% (Table I). Notably, sample T02-1 contains no normative diopside. In addition, normative olivine is absent in all these rocks. The granites are richer in silica (72.27–74.42%) and alkalis (Na_2O = 4.65–5.37%; K_2O = 2.14–4.03%), with lower MgO (0.27–0.52%) and Fe_2O_3 (1.25–2.13%) (Table II). On Shand's (1922) diagram, granodiorites plot in the metaluminous field, while granites are peraluminous (Fig. 4A). The AFM diagram of Irvine & Baragar (1971) confirms a calc-alkaline affinity typical of subduction-related magmatism (Fig. 4B).

Table I. Normative compositions of granodiorites from the Korhogo belt.

	Granodiorite DIA 21	Granodiorite DIA 25	Granodiorite FAP 7	Granodiorite N 02-1	Granodiorite N10
Apatite	0,28	0,39	0,37	0,26	0,40
Ilmenite	0,17	0,19	0,15	0,22	0,17
Orthose	17,38	14,08	16,14	3,59	19,01
Leucite	0,00	0,00	0,00	0,00	0,00
Kaliophyllite	0,00	0,00	0,00	0,00	0,00
Albite	39,00	37,95	41,70	22,98	36,04
Nepheline	0,00	0,00	0,00	0,00	0,00
Anorthite	10,23	13,91	12,78	12,04	12,55
Titanite	0,76	1,13	0,84	0,84	0,95
Perovskite	0,00	0,00	0,00	0,00	0,00
Rutile	0,00	0,00	0,00	0,00	0,00
Corindon	0,00	0,00	0,00	0,00	0,00
Aegyrine	0,00	0,00	0,00	0,00	0,00
Magnetite	0,00	0,00	0,00	0,00	0,00
Hematite	4,27	5,33	3,80	5,47	4,50
Diopside	2,87	2,80	1,34	0,00	4,15
Wollastonite	0,45	0,67	0,50	18,17	0,56
Larnite	0,00	0,00	0,00	0,00	0,00
Hypersthene	3,71	4,23	2,81	5,31	5,45
Olivine	0,00	0,00	0,00	0,00	0,00
Silice	21,09	19,63	19,82	31,35	16,49

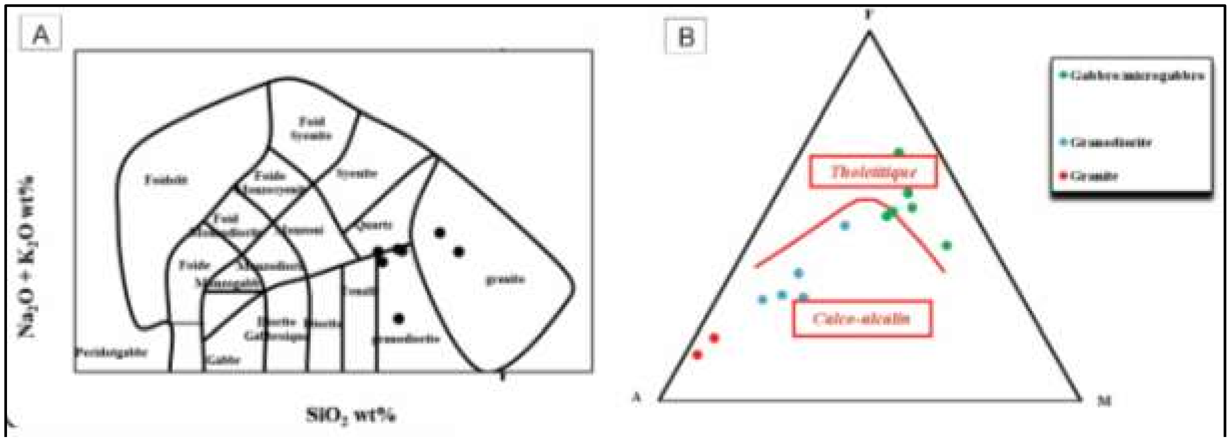

Figure 3. Geochemical diagrams of granitoids from the eastern branch of the Korhogo belt, with (A) the Middlemost (1994) classification diagram applied to the Korhogo granitoids and (B) the AFM diagram illustrating the geochemical trends of the plutonic rocks.

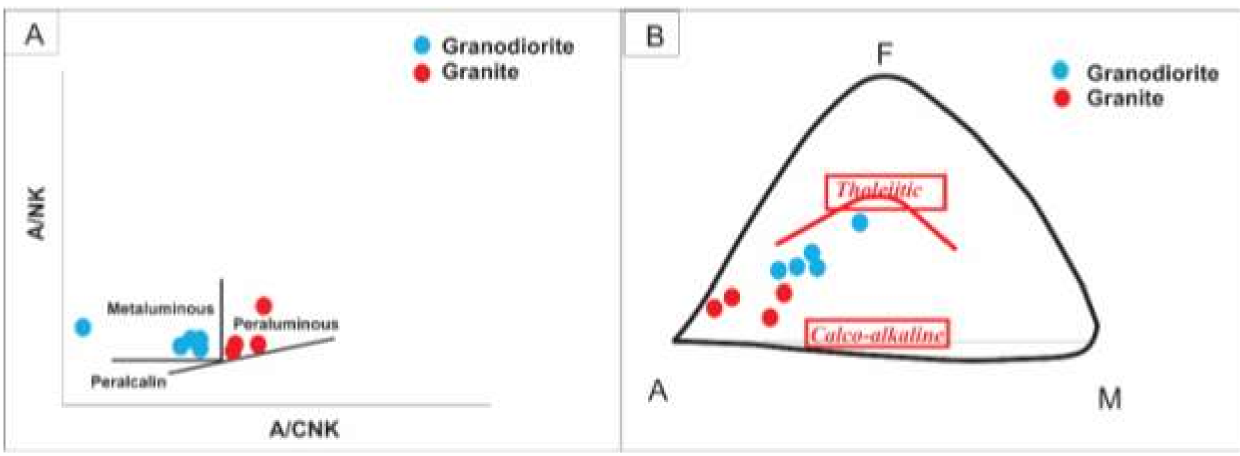

Figure 4. Geochemical diagrams of granitoids from the eastern branch of the Korhogo belt, with (A) the Shand (1922) classification diagram applied to the Korhogo granitoids and (B) the AFM diagram of Irvine and Baragar (1971) illustrating the geochemical characteristics of the Korhogo granitoids.

Trace elements and Rare Earth Elements (REE): -

Trace element data reveal enrichment in large ion lithophile elements (LILE) such as Cs, Ba, Rb, and K, and depletion in high field strength elements (HFSE) like Nb and Ta, producing negative Nb-Ta anomalies. The total REE content (ΣREE) in granodiorites ranges from 90.62 to 145.94 ppm, while granites vary between 16.72 and 243.58 ppm (Table II). Chondrite-normalized REE patterns (Sun & McDonough, 1989) show strong enrichment in light rare earth elements (LREE) with moderate to high fractionation [$(La/Sm)_N$ = 4.51 – 4.69 et (La/Yb)N = 7.63 – 26.53], and depletion in heavy rare earth elements (HREE) [(Gd/Yb)N = 1.00–3.13] (Fig.5A). The granitoids display enrichment levels ranging from 1 to 25 times the chondritic values. They typically exhibit a slightly negative to positive europium anomaly (Eu/Eu* = 0.90–1.11) and negative cerium anomalies (Ce/Ce* = 0.60–0.92) (Table II). The negative Ce anomaly is characteristic of modern arc magmas but may also result from post-magmatic processes, such as extensive hydrothermal fluid circulation (Abouchami et al., 1990; Sylvester & Attoh, 1992).

Multi-element spectra normalized to the primitive mantle (Fig. 5B) reveal significant enrichments in large-ion lithophile elements (LILEs: Cs, Rb, Ba, K), accompanied by general negative anomalies in Nb, Ta, P, Ti, and V. Such geochemical signatures-particularly Ba and Sr enrichment coupled with Nb, Ta, and Ti depletion—are typical indicators of subduction-related environments.

Table II. Major, trace, and rare earth element geochemistry of granitoidsamples from the eastern Korhogo Belt

	Sample/ Major elements (%)	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	MnO	TiO2	P2O5	Cr2O3	LOI	Total
Granodiorite	DIA21	67.84	14.54	4.27	3.18	2.02	4.61	2.94	0.08	0.4	0.12	0.02	0.43	100
Granodiorite	DIA25	65.61	15.07	5.33	4.08	2.21	4.49	2.38	0.09	0.57	0.17	0.02	0.62	100
Granodiorite	N02-1	67.5	9.55	5.47	11.35	2.12	2.72	0.61	0.1	0.46	0.12	0.03	4.36	100
Granodiorite	N010	65.13	15.11	4.5	4.1	2.95	4.26	3.21	0.08	0.48	0.17	0.04	1.65	100
Granite	DIA22-3	72.27	14.78	2.13	1.14	0.52	4.65	4.03	0.05	0.31	0.11	0.01	0.56	100
Granite	FAP18	74.42	14.78	1.25	1.63	0.27	5.37	2.14	0.04	0.09	0.02	0.02	0.65	100
	Sample/ Trace elements (ppm)	Ba	Be	Co	Cs	Ga	Hf	Nb	Rb	Sn	Sr	Ta	Th	
Granodiorite	DIA21	572	2	11.8	0.4	15.3	3.2	3.5	67.4	<1	515.9	0.4	4.6	
Granodiorite	DIA25	516	1	12.2	1	17.1	3.8	4.1	63.1	<1	645.1	0.4	3.9	
Granodiorite	N02-1	269	2	11.4	0.5	14.1	2.8	4.2	13.3	<1	486.9	0.3	2.7	
Granodiorite	N010	824	2	14.4	2.7	16.8	3.8	5.7	64	<1	713.9	0.5	6.7	
Granite	DIA22-3	976	1	6.4	2.4	15.9	4	6	120.3	<1	558.5	0.7	8	
Granite	FAP18	981	3	1.2	0.6	13	1.5	3	42.4	<1	697.5	0.2	0.4	
	Sample/ Trace elements (ppm)	U	V	W	Zr	Y	La	Ce	Pr	Nd	Sm	Eu	Gd	
Granodiorite	DIA21	1.8	86	0.7	113.2	41.2	23.5	36.5	4.95	18.8	3.46	0.99	4.14	
Granodiorite	DIA25	1.2	104	<0.5	138.3	13.9	19	37.5	4.26	15.6	3.39	0.93	3.04	
Granodiorite	N02-1	0.6	63	22.4	98.3	13.5	20.9	39.9	4.67	17.8	3.79	1.79	3.44	
Granodiorite	N010	2.9	78	9.4	141	9.7	32	65.2	7.2	27.8	4.38	1.22	3.16	
Granite	DIA22-3	3.1	27	0.5	168.6	20	66.3	80.4	15.19	55.4	8.61	2.17	6.44	
Granite	FAP18	0.1	<8	<0.5	47.2	3.4	3.7	6.5	0.74	3.2	0.5	0.16	0.4	
	Sample/ Trace elements (ppm)	Tb	Ni	As	Cd	Sb	Bi	Ag	Au	Hg	Tl	Se		
Granodiorite	DIA21	0.63	9.1	2.8	<0.1	<0.1	<0.1	<0.1	2.9	<0.01	<0.1	<0.5		
Granodiorite	DIA25	0.45	9.4	2.9	<0.1	<0.1	<0.1	<0.1	1.7	<0.01	<0.1	<0.5		
Granodiorite	N02-1	0.47	15.4	8.6	<0.1	0.4	<0.1	0.1	5.2	0.01	<0.1	<0.5		
Granodiorite	N010	0.39	43.1	15.9	<0.1	0.1	<0.1	<0.1	<0.5	<0.01	0.1	<0.5		
Granite	DIA22-3	0.77	9.8	0.9	<0.1	<0.1	<0.1	<0.1	1.6	<0.01	0.1	<0.5		
Granite	FAP18	0.07	1.3	1	<0.1	<0.1	<0.1	<0.1	0.7	<0.01	<0.1	<0.5		

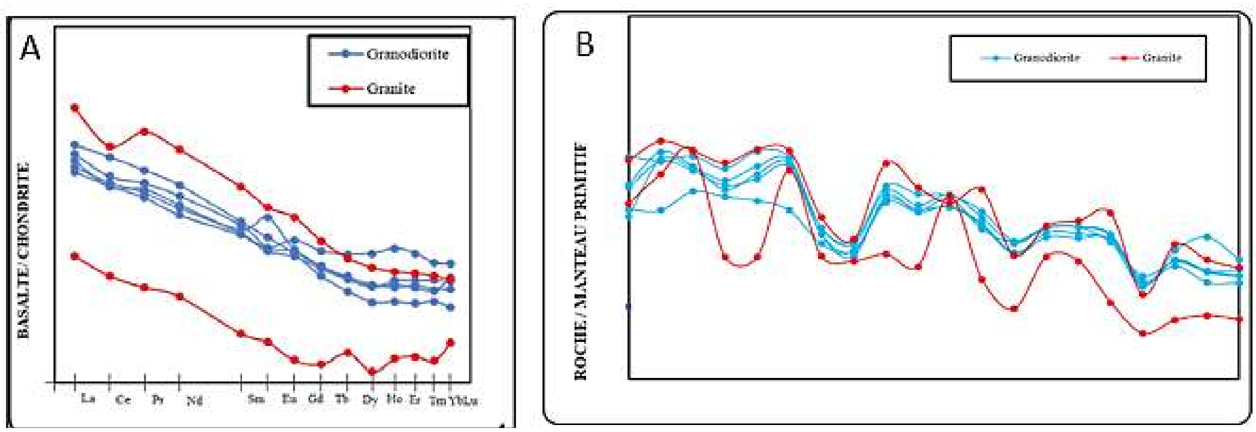

Figure 5. (A) Rare earth element (REE) spectra normalized to chondrites for granitoids of the Korhogo belt. (B) Multi-element spectra normalized to the primitive mantle for granitoids of the Korhogo belt.

Discussion: -

Comparison with regional Birimian granitoids: -

The Korhogo granitoids exhibit petrographic and geochemical features consistent with Birimian granitoids described in other West African terranes. Their calc-alkaline affinity, potassic nature, and I-type character are comparable to granitoids reported in Burkina Faso, Ghana, and Senegal (Morel &Alinat, 1993; Naba et al., 2004; Tapsoba et al., 2013; Sylvester, 1994; Hirdes & Davis, 2002). The enrichment in LILE and depletion in Nb-Ta observed in the Korhogo granitoidsare typical of subduction-related magmatism, confirming their emplacement in a continental arc setting. However, the variability in europium anomalies and the pervasive hydrothermal alteration distinguish them from less altered granitoids in the Boundiali branch, suggesting local processes of fluid circulation and post-magmatic modification (Taylor & McLennan, 1985; Rollinson, 1993).This alteration marked by plagioclase breakdown into sericite, carbonates, and epidote, together with biotite chloritization is consistently developed across all sampled localities (Niellé, Diawala, and Fapaha). Although minor textural variations occur at the thin-section scale, the intensity and style of alteration do not vary systematically between sites. Instead, they reflect a relatively homogeneous regional overprint linked to greenschist facies metamorphism and widespread hydrothermal fluid circulation, underscoring the belt-scale imprint of tectonothermal processes in the Korhogo granitoids.

Petrogenesis and crust-mantle interactions: -

The geochemical signatures of the Korhogo granitoids indicate a mixed origin involving both crustal and mantle contributions. The strong fractionation of LREE relative to HREE, coupled with negative Nb-Ta anomalies, supports derivation from partial melting of a crustal source influenced by mantle inputs. The coexistence of metaluminous granodiorites and peraluminous granites suggest variable degrees of crustal assimilation and fractional crystallization. The calculated tracer element ratios further substantiate these interpretations. The Korhogo granitoids display $(La/Sm)_N$values ranging from 4.51 to 4.69, $(La/Yb)_N$ ratios between 7.63 and 26.53, and $(Gd/Yb)_N$ values of 1.00 to 3.13. Europium anomalies (Eu/Eu*) vary from 0.90 to 1.11, while cerium anomalies (Ce/Ce*) range between 0.60 and 0.92. These ratios highlight strong LREE enrichment, moderate HREE depletion, and variable Eu anomalies, all consistent with subduction-related magmatism in a continental arc setting.These findings align with models of Paleoproterozoic crustal growth in the Baoulé-Mossi domain, where TTG suites represent early crustal accretion and calc-alkaline granitoids reflect subsequent arc magmatism (Condie, 1997; Martin, 1994; Sylvester, 1994).

Petrogenetic and geodynamic implications: -

The combined petrographic and geochemical evidence suggests that the granitoids of the Korhogo belt originated from partial melting of a crustal source with mantle contributions. Their calc-alkaline and potassic nature, together with metaluminous to peraluminous character, supports emplacement in a continental arc setting during the Paleoproterozoic. The pervasive hydrothermal alteration and greenschist facies metamorphism reflect post-magmatic processes associated with regional deformation and fluid circulation. Overall, the granitoids of the eastern Korhogo belt record the interaction between crustal and mantle materials in a subduction-related geodynamic context, contributing to the understanding of crustal growth and magmatic evolution within the Baoulé-Mossi domain of the West African Craton (Milési et al., 1989; Milési et al., 1992; Pearce, 1983; Pearce et al., 1984).

Conclusion: -

The granitoids of the eastern Korhogo belt provide new insights into the Paleoproterozoic evolution of the Baoulé-Mossi domain within the West African Craton. Petrographic observations reveal that these rocks are predominantly granodiorites and granites, affected by pervasive hydrothermal alteration and greenschist facies metamorphism. Geochemical analyses classify them as calc-alkaline, potassic, and I-type granitoids, with metaluminous granodiorites and peraluminous granites reflecting variable crustal assimilation and fractional crystallization. Their trace element and REE patterns show enrichment in LILE, depletion in Nb-Ta, strong LREE fractionation, and variable Eu anomalies, consistent with subduction-related magmatism. The integration of petrographic and geochemical data demonstrates that the Korhogo granitoids originated from partial melting of a crustal source with mantle contributions, emplaced in a continental arc setting during the Paleoproterozoic. The pervasive alteration and structural control by shear zones highlight the role of post-magmatic processes in modifying their geochemical signatures and enhancing their metallogenic potential. Comparisons with granitoids from Burkina Faso, Ghana, and Senegal confirm that the Korhogo belt shares regional features of Birimian magmatism, while also exhibiting local variations linked to hydrothermal activity and crust-mantle interactions. Ultimately, this study bridges the gap between regional geological frameworks and local geochemical signatures, refining our understanding of crustal growth, mantle contributions, and tectonomagmatic processes in Birimian terranes. The results underscore the geodynamic significance of the Korhogo granitoids in the stabilization of the West African Craton and their metallogenic importance for gold mineralization. Future work should integrate geochronological constraints and isotopic studies to further clarify the timing, sources, and evolution of these granitoids within the broader Paleoproterozoic geodynamic context.

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