Stockwork exhibiting polymetallic occurrences in the Neoproterozoic sediments of Firgoun area, West Niger, Eastern border of West African Craton

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The presumed Neoproterozoic sedimentary deposits of the Firgoun region, staking the eastern border of the West African Craton (Fig. 1), represent the equivalent of the basal deposits of the Taoudenni and Gourma basins to the north (Bertrand-Sarfati et al. 1991, Miningou et al., 2017, Reichelt, 1972) and the Volta Basin to the South (Affaton, 1990). According to Konaté et al. (2018), the uppermost levels of Firgoun deposits present strong similarities with the Cryogenian "Triad" of the Taoudenni, Gourma (Béli region) and Volta basins.

The aim of this preliminary study is to determine the mineralogical composition of the polymetallic stockwork (Figs. 2A,B) highlighted in the quartzitic sandstones. This kind of outcrop is widespread in Neoproterozoic formations in the Gourma (Béli region) and the Volta basins (Blot, 2002). The same author attributed them to a gossan (iron hat) likely to contain polymetallic concentrations. As mentioned by Miningou et al. (2017), the latter would probably be enriched during the different tectonic episodes of the Pan-African event.

The microscopic analysis of the thin and polished sections show that the stockwork includes different kinds of minerals such as hematite, magnetite, pyrite, malachite, etc. (Fig. 3). Radier (1956), Sougy (1957) and Dietrich (1959) pointed the presence of copper mineralization indices in three sectors, notably Firgoun, Donkolo with rare flecks and veins of chalcosin, and malachite and azurite coatings in dolomites (Radier, 1956; Sougy, 1957) and Koutougou (malachite coatings associated with chrysocolla and arranged on the surface of schistose planes (Dietrich, 1959).

However, the presence of accompanying minerals in the stockwork facies could be related to a probable hydrothermal source of the Firgoun area copper mineralization. This is consistent with the observations made by Blot (2002) and Miningou et al. (2017) who consider that the wide distribution of stockwork outcrops paves the way for the research of metalliferous deposits rich in Cu, Pb, Zn, Mo, As, Cd, and Co.

Keywords: Polymetallic concentrations, stockwork, Neoproterozoic sediments of Firgoun, Gourma Basin.

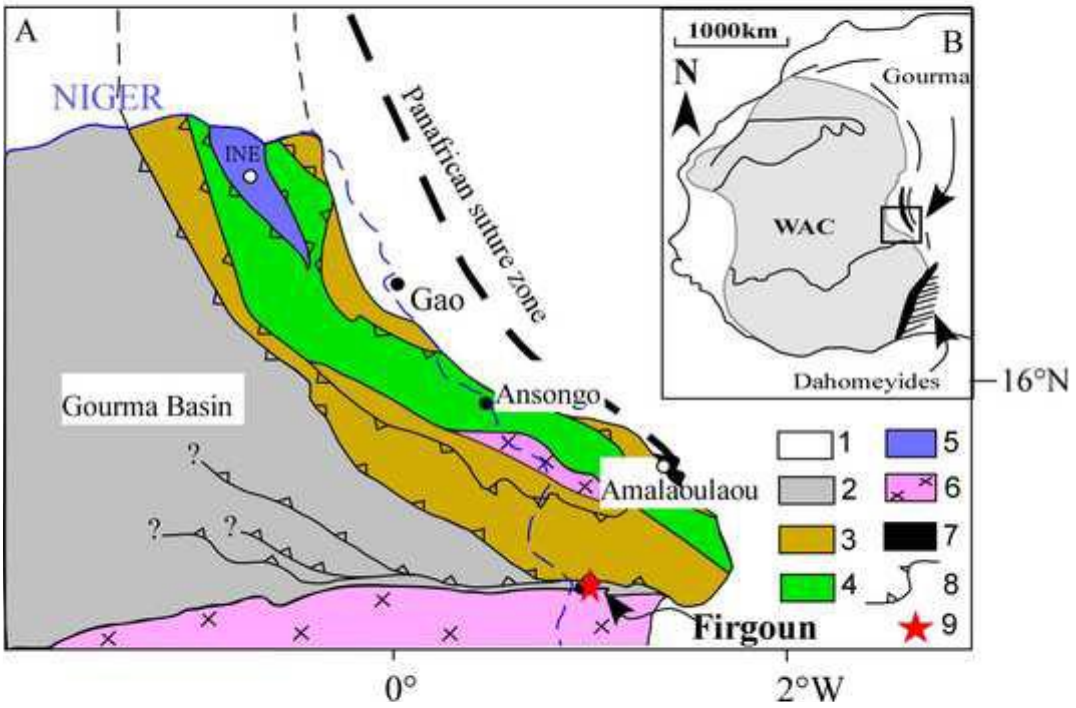

Figure: 1. (A) Geological sketch map locating the Firgoun area into the southeastern of the Gourma Basin (Caby et al., 2008). (B) Location of the Gourma Basin on the eastern border of the West African Craton (Attoh and Nude, 20016). 1. Phanerozoic; 2. Gourma basin; 3. External nappes; 4. Internal nappes with HP–LT; 5. and UHP metamorphism (INE:Inedem); 6. Paleoproterozoic rocks of the WAC and Bourré inlier; 7. Mafic-ultramafic massifs; 8. Major thrust; 9. Study area.

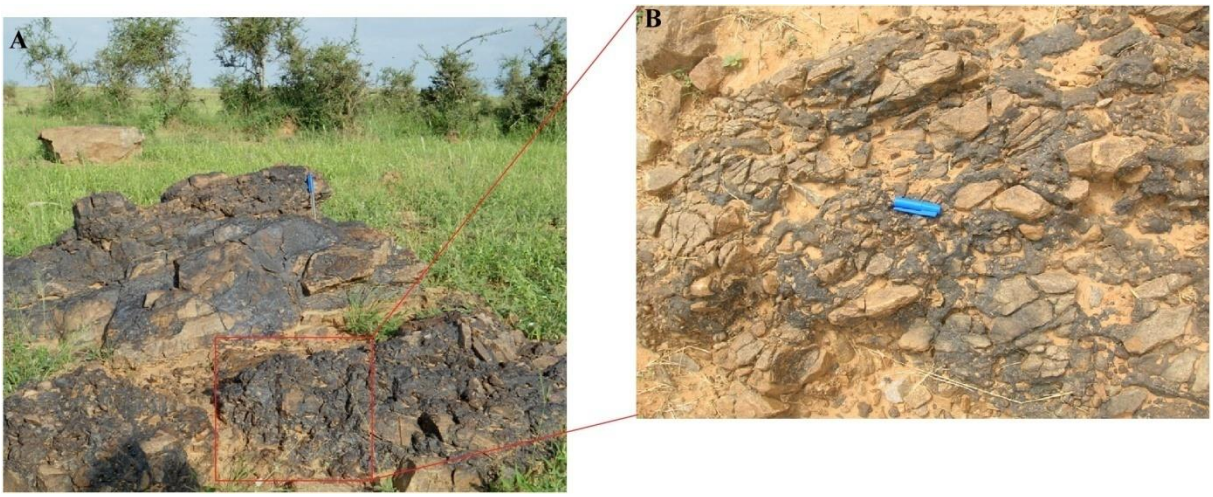

Fig 2: A. Stockwork outcropping in Firgoun area. B. The fractures are infilled with ferruginous oxides

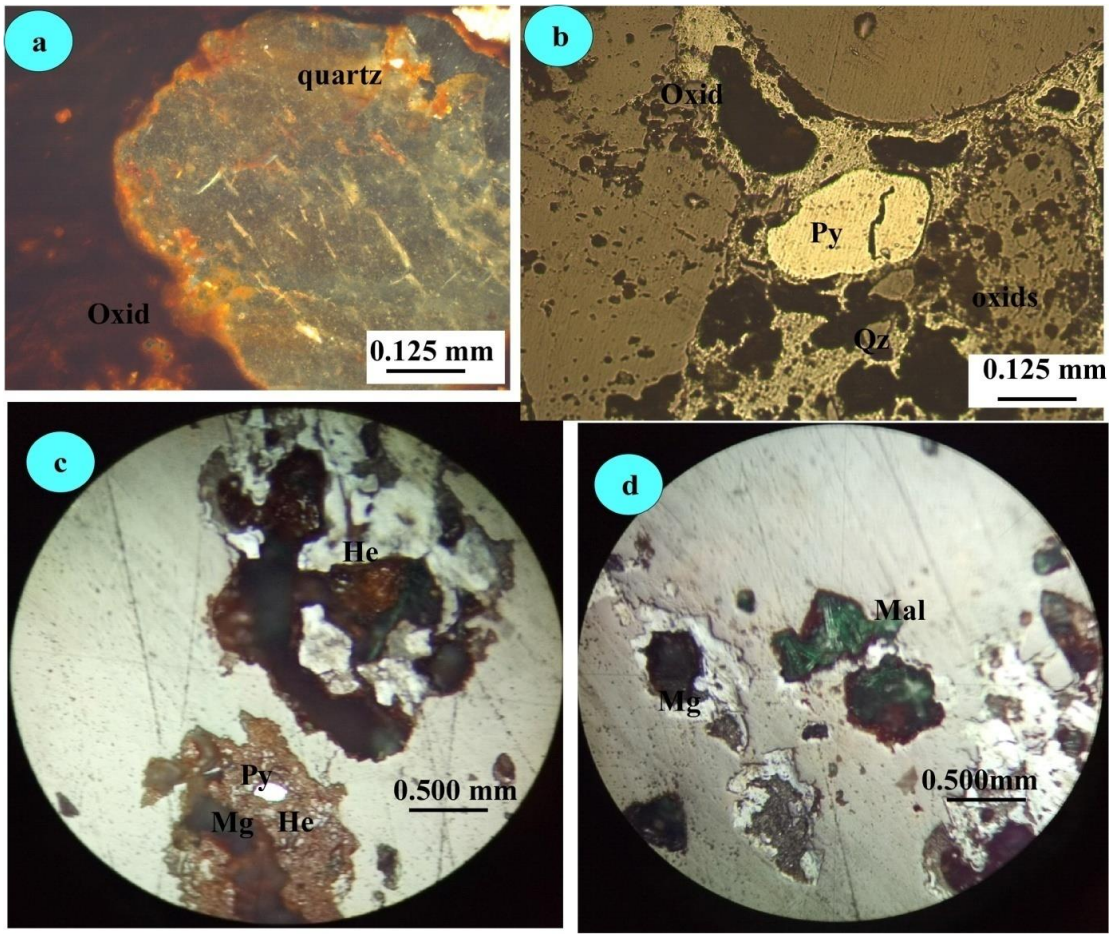

Figure 3: Photomicrographs of the Firgoun area stockwork showing pyrite, chalcopyrite, malachite, and hematite. Py: pyrite, Mg: magnetite, Mal: malachite, He: hematite, Qz: quartz

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