Nickel mineralizations of the Birimian greenstone belt of Makalondi (Liptako Province of Niger, West Africa)

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The Birimian greenstone belt of Makalondi is located in the western part of the Liptako province of Niger (Fig. 1A). It represents the northeastern part of the Man Shield (Fig. 1B). Several nickel indices have been highlighted (Dion, 1973) in the eastern part of the Makalondi greenstone belt, which is characterized by a strong aeromagnetic anomaly.

The methodological approach implemented consists of a field study followed by a polarizing microscopic analysis in transmitted and reflected light.

The nickel-bearing rocks are mainly represented by talc-chlorite schists, sericite schists and silicified ultramafic rocks. Three types of nickel mineralization were distinguished: disseminated, stockwork and enclave (Figs. 2A,B).

Macroscopic analysis, combined with microscopic observations, shows that nickel mineralization is the result of serpentinization of ultramafic rocks, which is caused by a late hydrothermal silicification (Figs. 2C-E). This serpentinization, especially of olivines, would have released nickel. The latter has been concentrated by hydrothermal processes leading to high grades of nickel reaching 4000-5900 ppm (Dion, 1973; Hassan and Marcos, 1987). Exceptionally, a sample analyzed by Dion (1973) gave a grade of 8400 ppm.

Keywords: Makalondi, Nickel mineralization, Liptako Province, Nickel-bearing rocks

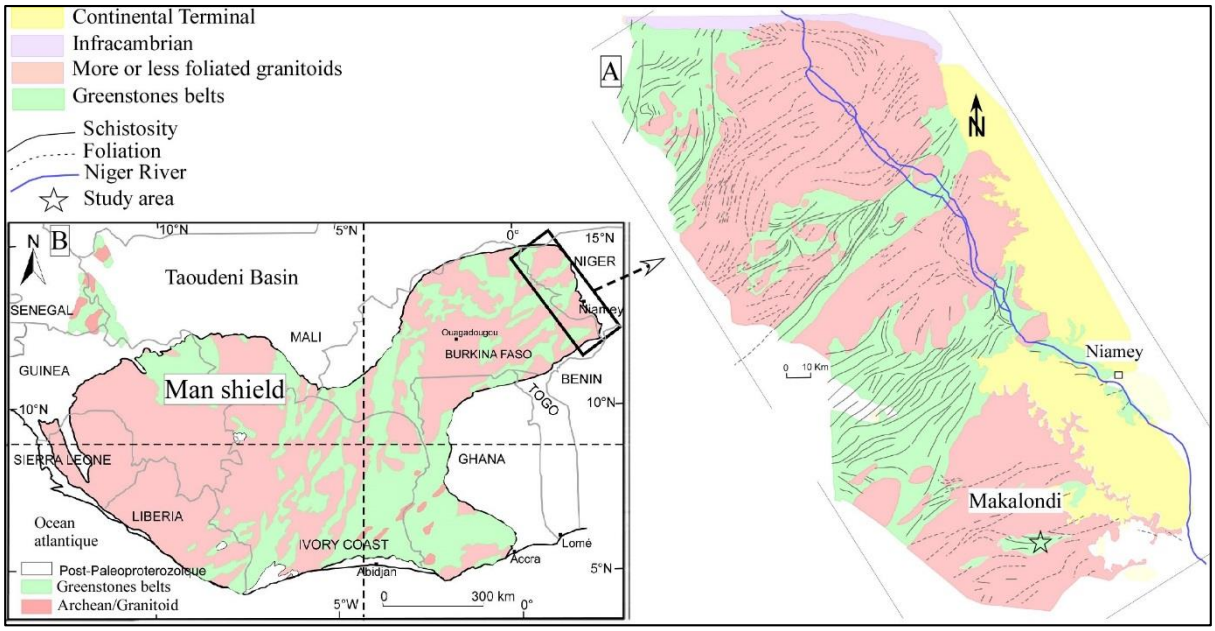

Figure 1 (A) - Simplified geological map of the Man's Shield (Milési et al., 1989) and (B) location of the study area in the Niger Liptako province (Machens, 1967, modified).

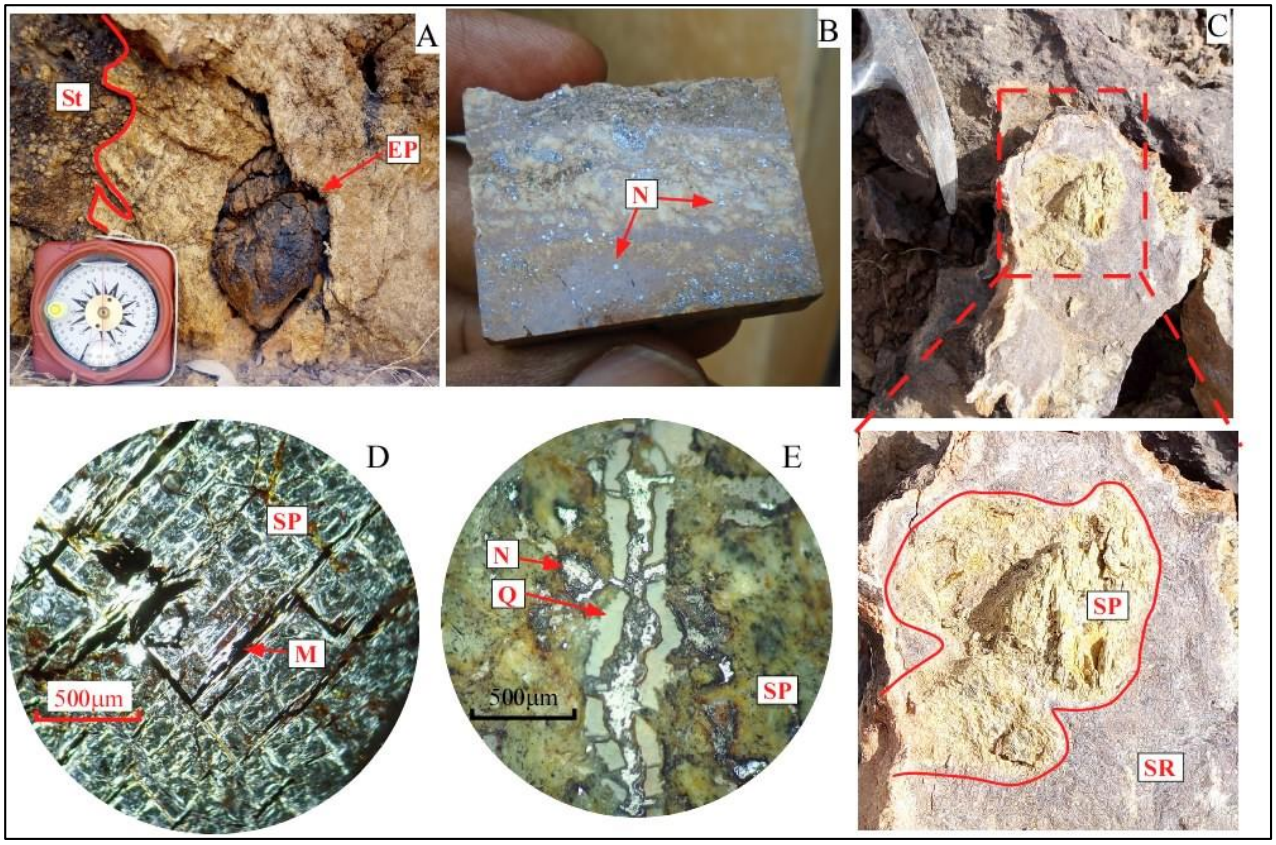

Figure 2: Images showing the different aspects of the serpentinization process leading to the concentration of Nickel. A: Stockwork (St) of nickel mineralization (B) and enclave of nickel-bearing peridotite (EP); B: disseminated nickel (N) mineralization in schists; C: enclave of serpentinized peridotite (SP) in silicified rocks (SR); D: microscopic photo (in transmitted light; Nic +) serpentinized peridotite (SP) with a mesh structure and microscopic vein of magnetite (M); E: Microscopic photo (in refleted light, Nic //) nickel-bearing silicified fluid (Q)

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