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Discovery of Columbite-Tantalite ores and Orogenic gold occurrences in Bitsina area, Nyong group, Cameroon: Constraints from stream sediments geochemistry and alluvial particles microchemistry

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ABSTRACT

Bitsina area belongs to the Nyong group, which is the NW border of Congo Craton in Cameroon. To investigate the prospectivity of the area, 99 samples of stream sediments were collected by panning. Stream sediment geochemistry and microchemistry (ICP-AES & ICP-MS) were used to determine the nature and elemental content of the heavy mineral fraction. 51 gold grains and 52 heavy black particles were selected for microchemical analysis.

The geochemistry of stream sediments yielded very high contents of Gold (Au>10 g/t for most of the samples). Gold showed moderate positive correlations with high field strength elements and light rare earth elements and negative correlations with Cu and Zn which suggest a felsic source. Other elements with high contents include Nb (80->1000 ppm), Ta (2.0-50 ppm), TiO_2 (20.1-30%), Fe_2O_3 (1.5-30%). Nb and Ta show high positive correlations with TiO_2 and negative correlations with Fe_2O_3.

Microchemical analysis of gold particles yielded Au content that varies from 89 wt% -100 wt%, Ag content varies between 0-10.5 wt%, Cu content between 0-1.5% and Hg content 0%. Their fineness varies from 894 to 1000. Au-Ag-Cu ternary plots suggest a mesothermal orogenic gold deposit type which overlaps the epithermal deposit; this is consistent with the gold deposit types identified in the Nyong group. The high content of Cu in some gold grains is suggestive of high temperatures during precipitation. X-ray Diffraction and in situ analysis of heavy black mineral revealed that they are made up of TiO_2, Fe_2O_3, Nb, Ta, Zr. They are highly enriched in Nb and Ta with average concentrations of 590.2 ppm and 37.7 ppm respectively. The studied heavy black minerals are Nb-Ta rutiles that form coltan ores from alluvial placers.

Mineral inclusions deduced from EDS maps of gold grains suggest that gold grains mineralization is coeval with rutiles, ilmenites and zircons.