Seasonal variation of major ions and trace element distribution in streams draining the mineralized Lom Basin, East Cameroon

*Mumbfu Ernestine Mimba[1,2], Takeshi Ohba[1], Salomon César Nguemhe Fils[2], Mengnjo Jude Wirmvem[1], Festus Tongwa Aka[2]

1. Department of Chemistry, School of Science, Tokai University, 2. Institute of Geological and Mining Research

Surface water and boreholes comprise the major source of water supply for domestic and small scale mining operations in the Lom Basin. Streamwater chemistry of the mineralized basin was investigated for the first time in order to show the seasonal variation in major ion distribution patterns and identify the origin and geochemical behaviour of some trace elements. A total of 81 water samples collected from lower order streams during the dry and wet seasons, were analysed for major ion and trace element contents. Results revealed that all the measured physico-chemical parameters varied narrowly between the dry and wet seasons. Concentrations of Cl^- showed no fluctuations throughout the sampling seasons due to its conservative nature and limited potential sources. Nitrate levels decreased in the wet period owing to dilution by surface runoff. Dissolved SO_4^{2-} concentrations were low for both seasons indicating the dissolution of low sulphide minerals associated with gold deposits. The concentration of the major ions Ca^{2+}, Mg^{2+}, Na^+, K^+ and HCO_3^- slightly increased during the wet season as they are flushed from soils during precipitation. As a whole, the seasonal regime of stream water chemistry is controlled by the following processes: a) contribution of major cations and HCO_3^- from chemical weathering supplied by ground water flow during the dry season. b) leaching of salts from surface soil layers during rain events and c) dilution by surface runoff during the wet season. Streamwater is characterised by low acidity and trace metal loadings reflecting low sulphide solubility and the likely buffering capacity of silicate minerals. In this strongly lateritic environment, the weathering of vein gold mineralisation results in sulphide oxidation and the entrapment of a significant portion of released trace metals in ferruginous oxide phases. Despite the past and active small-scale mining operations, the streams have not been impacted. Bearing in mind that legal standards for water chemistry evaluation are yet to be fixed in Cameroon, our findings may assist policy makers to set guidelines, especially in mineralised areas.

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