

## Hydrochemical processes and environmental isotope study of groundwaters around Lake Nyos (North-western Cameroon)

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Groundwaters of Nyos catchment situated at the Wum volcanic district in the Western part of the Cameroon Volcanic Line (CVL), have been extensively monitored in summer December 2011 and January 2013 to assess its genetic relationship with lake waters and to identify the main factor controlling its mineralization processes 30 years after the natural disaster which killed about 1700 peoples and more than 3000 cattles (Kling et al., 1989).

The water samples (n= 55) were analyzed on site for temperature, pH, electrical conductivity (EC), oxidation-reduction potential (ORP), alkalinity and Fe<sup>2+</sup> concentration. The major chemical and stable isotopic compositions were determined in laboratory using ion chromatography and mass spectrometer, respectively.

The results of the chemical analyses indicate that groundwaters is bicarbonate magnesio-calco-alkaline type (HCO<sub>3</sub><sup>-</sup> » Mg<sup>2+</sup> > Ca<sup>2+</sup> > Na<sup>+</sup> > K<sup>+</sup>) which is almost the same signature as those of epilimnic water of Lake Nyos. In contrast, those of epilimnic water of the lake and soda springs are enriched in HCO<sub>3</sub><sup>-</sup> and Fe<sup>2+</sup>. This suggests that the shallow water of the lake may constitute the main recharge source of groundwater during summer. The concentrations of major ions in the bottom of the lake are in average 10 times higher than those of groundwaters. This suggests that CO<sub>2</sub>-water-rock interaction have a significant role in the hydrochemical processes taking places in the bottom of the lake. Deep waters of the lake with high CO<sub>2</sub> concentration may not influence groundwater in Nyos watershed.

The D/H and 18O/16O ratios of waters from the lake and groundwaters show two general trends. Borehole and lake waters fall on or close to the typical meteoric water line while rivers and streams deviate significantly. These results indicate that groundwaters and lake waters were originated from surface meteoric water and are affected by evaporation in the unsaturated or in the saturated zone.