Lakes Nyos and Monoun, Cameroon: Current status

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Follow-up surveys of Lakes Nyos and Monoun (Cameroon) which exploded in the mid 1980s killing about 1800 people, indicate that temperature, total dissolved ions, and CO_2 concentration in the bottom water of both lakes have been increasing since the last explosions. Currently the highest CO_2 concentration (~350 mmol/kg) is observed below 190 m depth at Nyos. The CO_2 recharge rate in the deep waters is ~100 Mmol/yr, at least as high as in the previous ten years. The measured total gas pressure was ~15 bar, 70% saturation. The highest ratios of $^{3}He/^{4}He$ ($8.1x10^{-6}$) and $^{40}Ar/^{36}Ar$ (600), suggestive of magmatic affiliation, also occur at these depths. At Monoun, the highest CO_2 concentration of ~160 mmol/kg is observed between 60-95 m depth. The gas pressure at 80 m is 7.2 bar, and the highest saturation is 91% at 61 m. The lakes may spontaneously explode in the near future if CO_2 saturation is reached at any depth. However, gas explosion at these lakes can occur at any time upon introduction of external forcing such as a landslide.

Funded by the Cameroonian Government, Office of Foreign Disaster Assistance (US-AID), French Embassy in Cameroon and the Japanese Ministry of Education and Culture, a permanent degassing pipe was installed in January 2001 at Lake Nyos, and at Lake Monoun in January 2003. The Nyos pipe has been working intermittently. The maximum current gas removal rate is ~900 Mmol/yr at Nyos (Halbwachs, 2002), several times greater than the natural recharge rate. Although we do not have a good estimate of gas removal and natural recharge rates at Lake Monoun, immediate threat of limnic explosion is decreasing at both lakes. Security and safety measures, including warning systems with IR CO_2 detectors, were also set up at both lakes, since many people are returning to the area for agro-pastoral activities.