

# Mission report on geological fieldwork at Lake Nyos in December 2014-January 2015

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## 1. Introduction

We undertook the third geological fieldwork in and around Lake Nyos from 29 December 2014 to 1 January 2015 to evaluate the eruptive history of Nyos Volcano and the related scoria cone. We obtained enough geological data and samples to establish the eruption history and magmatic processes of this volcano on completion of this fieldwork. Main results obtained during our fieldwork are given in this report.

## 2. Landform evolution of scoria cone complex NE of Lake Nyos

There is a scoria cone located about 1.5 km northeast of Lake Nyos. It is called Fon's mountain by local inhabitants. Our previous field surveys in January 2011 and March 2014 discovered a scoria-fall deposit originating from this scoria cone and confirmed that the scoria-fall deposit directly overlies pyroclastic surge deposits from Lake Nyos. This suggests that the scoria cone eruption occurred immediately after the Nyos maar-forming eruption.



Fig. 1. Eastern view of Fon's scoria cone near Lake Njupi.

Since the Fon's scoria cone is not a single scoria cone but a complex of several pyroclastic cones (Fig. 1), we examined in detail, the landform evolution of the scoria cone complex. Firstly, we discovered several hummocks at the northwestern foot of the scoria cone (Figs. 2



Fig. 2. Debris-avalanche hummocks (arrows) at the northwestern foot of Fon's scoria cone.

and 3). The largest hummock is about 100 m across and 5 m high. A large amount of bombs (<140 cm in diameter), which display cauliflower-shapes or bread-crust surfaces, occur on the surfaces of the hummocks. Although we could not observe the cross section of the hummocks, we consider that these hummocks are debris avalanche deposits originating from a sector collapse of the Fon's scoria cone (the initial edifice). After the sector collapse, the present scoria cones were formed. A few vents are observed in the scoria cone complex, and the eastern crater produced large amounts of xenolith-rich bombs. At the last stage, the scoria cone produced a lava flow westwards (less than 500 m long; Fig. 1).



Fig. 3. A debris-avalanche hummock of 40 m across and 5 m high..

### 3. Distribution and source of lava flows related to the Nyos eruption

We confirmed the extent of lava flows from Lake Nyos volcano and the related scoria cone. The distal end of lava flows is located about 10 km northeast of Lake Nyos. At the distal site, the lavas are about 50 m wide and 5-7 m thick (Fig. 4), and are aphyric basalts with abundant granitic xenoliths.



Fig. 4. Distal end of lava flows from Lake Nyos.

Previous studies inferred that most of lavas were produced from the Fon's scoria cone near Lake Njupi. We examined the distribution of proximal lava flows in detail, and concluded that almost all lava flows in the study area originated not from the Fon's scoria cone but from Lake Nyos although the scoria cone produced a small amount of lava as described above (Fig. 1). These evidences suggest that the lava flows from Lake Nyos swept northeastward about 18 km along valleys. The total volume of lava is estimated at  $9 \times 10^6 \text{ m}^3$ , assuming an average thickness of 5 m and an average width of 100 m. We collected several lava samples from proximal area to distal area for chemical analyses to evaluate the magmatic processes related to the Lake Nyos eruption.