International Association of Volcanology and Chemistry of the Earth's Interior

Institute for Geological and Mining Research Cameroon

IAVCEI-Commission on Volcanic Lakes

SECOND CIRCULAR

IAVCEI-CVL9 Workshop, Yaoundé, Cameroon (13-20 March 2016)

On behalf of the CVL Steering Committee I am delighted to present you the second circular of the 9th Workshop of the IAVCEI Commission on Volcanic Lakes, CVL9, to be held in March 2016 in Cameroon, Western Africa. Needless to say that the volcanic lakes Nyos and Monoun have played a kickstarting role in the history of our scientific community. The groundbreaking research during the past 30 years at Lake Nyos and Monoun have lined out the track many geochemists and limnologist still follow. We will be happy to have our 3-yearly appointment, this time at the shores of the Cameroonian lakes, in early 2016.

"30 years after the Lake Nyos disaster"

Date of the conference: 13th - 20th March, 2016

Venue of the conference: Conference Centre, Yaoundé

Yaoundé Conference Centre

Main focuses of the 9th CVL Workshop

- Thirty years of Lake Nyos gas disaster and degassing: before, during and after.
- Outcomes of SATREPS-NyMo project (2011-2016): the joint project between Japan and Cameroon will come to an end in 2016. Many outcomes from these 5 years of international collaboration and scientific research will take a central role during CVL9.
- Field work: comparison and knowledge exchange on field and analytical methods.

Participants

This conference will bring together volcanologists, hydrologists, geochemists, limnologists, geothermal researchers and end users (disaster managers, organisations and others) interested in volcanic lakes and volcano degassing.

TO REGISTER:

If you want to participate CVL9, please fill in the attached inscription form and send it back to Dmitri Rouwet (cvl.dmitri@gmail.com) and Greg Tanyileke (gtanyileke@yahoo.co.uk), before 31 October 2015.

Preliminary Program CVL9-Cameroon

13 March 2016: evening ice-breaker in the hotel

14, 15, 16 March 2016 (Part A): three full days of talks and posters session are foreseen. Proposed scientific sessions are:

1. ***How the lake basins form: geology of volcanic lake settings***

2. ***Precursors for unrest and phreatic eruptions: the speed of water and chemical compounds***

3. ***Storage and release of gas from Nyos-type lakes I: technical and engineering aspects***

4. ***Storage and release of gas from Nyos-type lakes II: geochemical and limnological aspects***

5. ***The fluid sound: geophysics translated to volcanic lakes***

6. ***The reigning reservoir: hydrology around volcanic lakes and indirect hazards and utilities***

7. ***Swirling steam devils: evaporation and degassing from active lakes?***

8. ***Bio-activity lakes: a new lake type***

Scientific contributions on any of the scientific themes shall be by *oral presentation or posters.*

Abstract submission deadline: *30 September 2015*

abstract format: max 1 page (including figures if wished), size 12, times new roman, spacing 1.5, including authors and their affiliations.

poster format: details later

On the last day of talks (16 March) in the afternoon a **CVL steering meeting** will be held.
All participants are invited to participate and decide on:
(1) the CVL steering committee for the next 3 years (2016-2019)
(2) presentation and selection of CVL10-2019 site.

PROPOSALS FOR SITES OF CVL10-2019 ARE VERY WELCOME.
PLEASE CONSIDER YOUR COUNTRY AS ONE OF THE NEXT POSSIBLE SITES FOR CVL10, AND PREPARE A PROPOSAL AS A PPT PRESENTATION.

17 March 2016: Lake Monoun (Part A)

- visit to Lake Monoun (no sampling)
- drive to Bamenda for the night

18-19-20 March 2016: Lake Nyos (Part A)

- visit to Lake Nyos
- Sampling, measurements and field work (rafts will be available)

21-22-23 March 2016: Post-CVL field trip **(Part B)**

- visit to Lake Barombi Mbo
- visit to Mount Cameroon

COST PART A

Category	Amount (Euro)
CVL members and affiliates*	400
Accompanying person	250
Students	200
Non members	450

***To become a CVL member, please contact cvl.dmitri@gmail.com for the inscription form. CVL members should first become IAVCEI members. To become a IAVCEI member, please visit http://www.iavcei.org/**

COST PART B: 160 Euro

THE INSCRIPTION FEE WILL BE PAID CASH ON-SITE AT ARRIVAL DURING REGISTRATION. PLEASE PROVIDE THE SUFFICIENT AMOUNT OF MONEY WHEN COMING TO CAMEROON.

IMPORTANT NOTE:

BE AWARE THAT ENTERING CAMEROON GENERALLY REQUIRES A VISA AND A YELLOW FEVER VACCIN. PLEASE PREPARE ON TIME FOR THESE ISSUES!

Field trip sites along the Cameroon Volcanic Line

Field trip sites (PART A)

- *Lake Nyos and its environs*


Degassing


Dam reinforcement

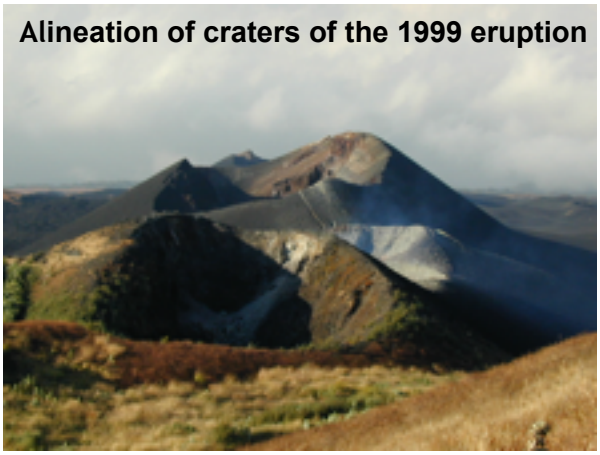
Scoria cone

- Lake Monoun

Three degassing pipes at Lake Monoun

Post-CVL excursion sites (PART B)

- *Lake Barombi Mbo, Mt Cameroon-1999 lava front in the west coast of the Atlantic Ocean*



1999 lava flow cuts Limbe-Edenau highway

LODGING

We plan to lodge most of the participants at **Meumi Palace Hotel** (3***) which is not far from the Congress hall where the workshop will take place.

http://www.pacmanhotels.com/Hotel/Hotel_Meumi_Palace.htm

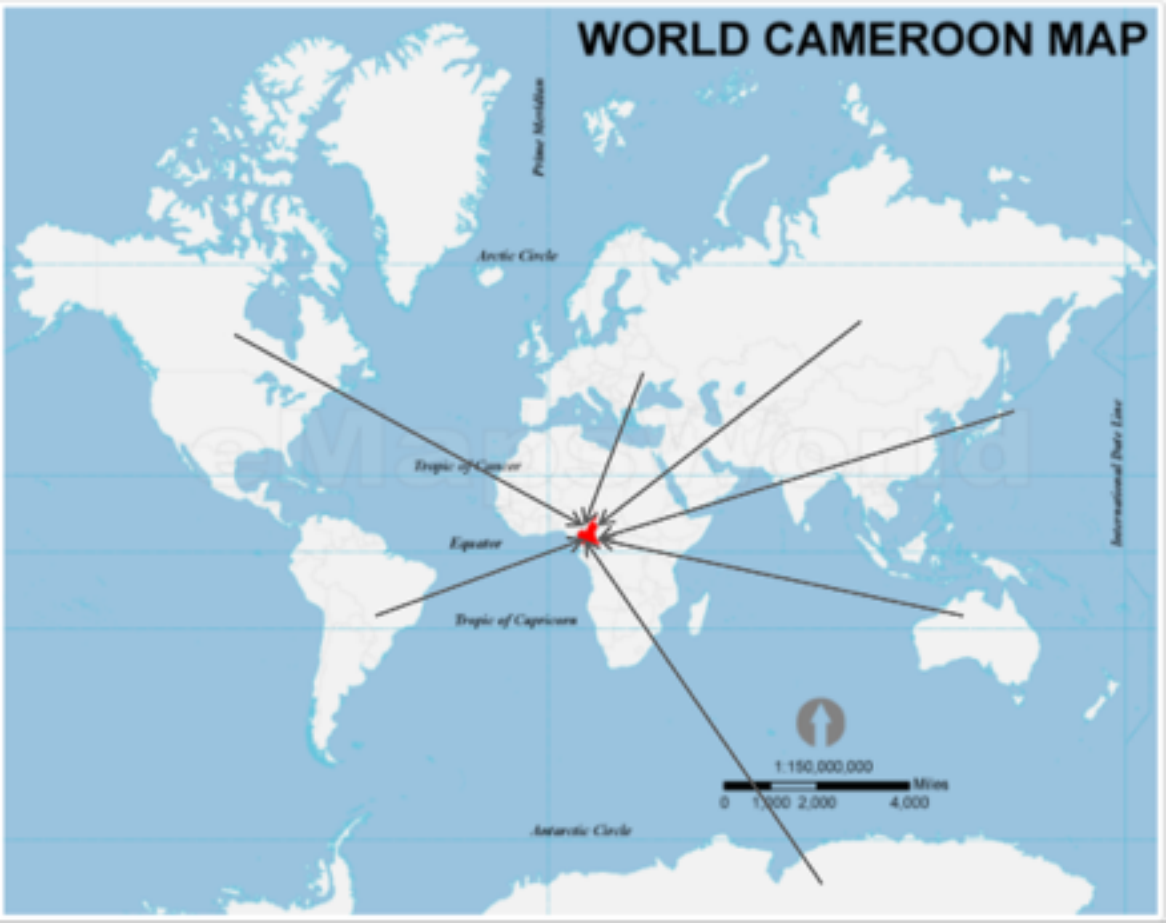
For the night near Lake Monoun we will stay in a hotel in Bamenda.

For the nights near Lake Nyos we will stay at the Science-lodge. Beds, kitchen, hot water, showers and WIFI is available.

NB: Please consider material for camping at the shores of Lake Nyos, as we may only be able to provide lodging for about 50 people.

As an appetiser besides the scientific program: some Cameroonian dishes

We will keep you informed on the progress of the CVL9 workshop as we would like all of you to converge in Cameroon for this unique event in March 2016.



For further information please contact:

Greg Tanyileke, CVL Secretary and chief CVL9 organiser: gtanyileke@yahoo.co.uk

Dmitri Rouwet, CVL Leader: cvl.dmitri@gmail.com

For a scientific warm-up: suggested reading

- Aka FT, Kusakabe M, Nagao K,Tanyileke GT (2001) Noble gas isotopic compositions and water/gas chemistry of soda springs from the islands of Bioko, Sao Tome and Annobon, along with Cameroon Volcanic Line, West Africa. Applied Geochem 16:323-338
- Aka FT, Nagao K, Kusakabe M, Sumino H, Tanyileke G, Ateba B, Hell J (2004) Symmetrical helium isotope distribution on the Cameroon Volcanic Line, West Africa. Chem Geol 203:205-223
- Barberi F, Chelini W, Marinelli G, Martini M (1989) The gas cloud of Lake Nyos (Cameroon, 1986): Results of the Italian technical mission. J Volcanol Geotherm Res 39:125-134
- Barfod DN, Ballentine CJ, Halliday AN, Fitton JG (1999) Noble gases in the Cameroon line and the He, Ne, and Ar isotopic compositions of high μ (HIMU) mantle. J Geophys Res 104:29509-29527
- Chau HF, Kwok PK, Mak L (1996) A model of gas buildup and release in crater lakes. J Geophys Res 101 (B12):28253-28263
- Christenson, B., Németh, K., Rouwet, D., Tassi, F., Vandemeulebrouck, J., Varekamp, J.C. (2015) Volcanic Lakes. Book chapter Volcanic Lakes (Springer-Heidelberg). Eds. Rouwet, D., Christenson, B., Tassi, F., Vandemeulebrouck, J., 1-20. doi:10.1007/978-3-642-36833-2_1
- Evans WC, Kling GW, Tuttle ML, Tanyileke G, White LD (1993) Gas buildup in Lake Nyos, Cameroon: The recharge process and its consequences. Appl Geochem 8:207-221
- Evans WC, White LD, Tuttle ML, Kling GW, Tanyileke G, Michel RL (1994) Six years of change at Lake Nyos, Cameroon, yield clues to the past and cautions for the future. Geochem J 28:139-162
- Faivre Pierret RX, Berne P, Roussel C, Le Guern F (1992) The Lake Nyos disaster: model calculations for the flow of carbon dioxide. J Volcanol Geotherm Res 51:161-170
- Freeth SJ, Kay RLF (1987) The Lake Nyos gas disaster. Nature 325:104-105
- Freeth SJ, Kling GW, Kusakabe M, Maley J, Tchoua FM, Tietze K (1990) Conclusions from Lake Nyos disaster. Nature 348:201
- Freeth SJ (1994) Lake Nyos: can another disaster be avoided? Geochem J 28:163-172
- Giggenbach WF (1990)Water and gas chemistry of Lake Nyos and its bearing on the eruptive process. J Volcanol Geotherm Res 42: 337-362
- Halbwachs M, Grangeon J, Sabroux J-C, Villevielle A (1993) Purge par auto-siphon du gaz carbonique dissous dans le lac Monoun (Cameroun): premiers resultants experimentaux. C. R. Acad. Sci., Paris, t. 316, Serie II, 483-489
- Halbwachs M, Sabroux JC (2001) Removing CO_2 from Lake Nyos in Cameroon. Science 292:436
- Halbwachs M, Sabroux J-C, Grangeon J, Kayser G, Tochon-Danguy J-C, Felix A, Beard J-C, Villevieille A, Vitter G, Richon B, Wuest A, Hell J (2004) EOS, 85, No. 30, 27 July 2004:281-288
- Halliday AN, Dickin AP, Fallick AE, Fitton JG (1988) Mantle dynamics: A Nd, Sr, Pb and O isotopic study of the Cameroon Line Volcanic chain. J. Petrol. 29, 181-211
- Kanari S (1989) An inference on process of gas outburst from lake Nyos, Cameroon. J Volcanol Geotherm Res 39:135-149
- Kantha LH, Freeth SJ (1996) A numerical simulation of the evolution of temperature and CO_2 stratification in Lake Nyos since the 1986 disaster. J Geophys Res 101 (B4):8187-8203
- Kling GW, Clark MA, Compton HR, Devine JD, Evans WC, Humphrey AM, Koenigsberg EJ, Lockwood JP, Tuttle ML, Wagner GN (1987) The 1986 Lake Nyos gas disaster in Cameroon, West Africa. Science 236:169-175

- Kling GW, Evans WC, Tanyileke G, Kusakabe M, Ohba T, Yoshida Y and Hell JV (2005) Degassing Lakes Nyos and Monoun: Defusing certain disaster. Proc. National Academy of Sciences of the USA 102:14185-14190
- Kling GW, Tuttle ML, Evans WC (1989) The evolution of thermal structure and water chemistry in Lake Nyos. J Volcanol Geotherm Res 39:151-156
- Kusakabe M, Ohsumi T, Aramaki S (1989) The Lake Nyos gas disaster: chemical and isotopic evidence in waters and dissolved gases from three Cameroonian crater lakes, Nyos, Monoun and Wum. J Volcanol Geotherm Res 39:157-185
- Kusakabe M, Sano Y (1992) Origin of gases in Lake Nyos, Cameroon. Natural Hazards in West and Central Africa, International Monograph Series on Interdisciplinary Earth Science Research and Applications (Freeth SJ, Ofoegb CO, Onohua KM eds.), 83–95, Friedrich Vieweg & SohnVerlag, Braunschweig, Wiesbaden.
- Kusakabe M, Tanyileke G, McCord SA, Schladow SG (2000) Recent pH and CO_2 profiles at Lakes Nyos and Monoun, Cameroon: implications for the degassing strategy and its numerical simulation. J Volcanol Geotherm Res 97:241-260
- Kusakabe M, Ohba T, Issa, Yoshida Y, Satake H, Ohizumi T, Evans WC, Tanyileke G, Kling GW (2008) Evolution of CO_2 in Lakes Monoun and Nyos, Cameroon, before and during controlled degassing. Geochem J 42:93-118
- Lockwood JP, Rubin M (1989) Origin and age of the Lake Nyos maar, Cameroon. J Volcanol Geotherm Res 39:117-124
- McCord SA, Schladow SG (1998) Numerical simulations of degassing scenarios for CO_2-rich Lake Nyos, Cameroon. J Geophys Res 103:12355-12364
- Nagao K, Kusakabe M, Yoshida Y, Tanyileke G (2010) Noble gases in Lakes Nyos and Monoun, Cameroon. Geochem J 44:519-54
- Nojiri Y, Kusakabe M, Tietze K, Hirabayashi J, Sato H, Sano Y, Shinohara H, Njine T, Tanyileke G (1993) An estimate of CO_2 flux in Lake Nyos, Cameroon. Limnol Oceanogr 38:739-752
- Rouwet D, Christenson BW, Tassi F, Vandemeulebrouck J (2015) Volcanic Lakes. Springer-Heidelberg. Eds. Rouwet, D., Christenson, B., Tassi, F., Vandemeulebrouck, J., 1-20. doi: 10.1007/978-3-642-36833-2.
- Rouwet, D., Tassi, F., Mora-Amador, R., Sandri, L., Chiarini, V. (2014) Past, present and future of volcanic lake monitoring. J. Volcanol. Geotherm. Res. 272, 78-97. doi:10.1016/j.jvolgeores. 2013.12.009
- Sano Y, Wakita H, Ohsumi T, Kusakabe M (1987) Helium isotope evidence for magmatic gases in Lake Nyos, Cameroon. Geophys Res Lett 14:1039-1041
- Sano Y, Kusakabe M, Hirabayashi J, Nojiri Y, Shinohara H, Njine T and Tanyileke G (1990) Helium and carbon fluxes in Lake Nyos, Cameroon: constraint on next gas burst. Earth Planet Sci Lett 99:303-314
- Sabroux JC, Villevieille A, Dubois E, Doyotte C, Halbwachs M, Vandemeulebrouck J (1990) Satellite monitoring of the vertical temperature profile of lake Nyos, Cameroon. J Volcanol Geotherm Res 42:381
- Schmid M, Lorke A, Wuest A, Halbwachs M, Tanyileke G (2003) Development and sensitivity analysis of a model for assessing stratification and safety of Lake Nyos during artificial degassing. Ocean Dynamics 53:288-301

- Schmid M, Halbwachs M, Wuest A (2006) Simulation of CO_2 concentrations, temperature, and stratification in Lake Nyos for different degassing scenarios. Geochem Geophys Geosyst doi: 10.1029/2005GC001164
- Sigurdsson H, Devine JD, Tchoua M, Pressor TS, Pringle MKW, Evans WC (1987) Origin of the lethal gas burst from Lake Monoun, Cameroun. J Volcanol Geotherm Res 31:1-16
- Sigvaldason GE (1989) Interanational Conference on Lake Nyos disaster, Yaounde, Cameroon, 15-20 March 1987: Conclusions and recommendations of the conference. J Volcanol Geotherm Res 39:97-107
- Tassi, F., Rouwet, D. (2014) An overview of the structure, hazards, and methods of investigation of Nyos-type lake from the geochemical perspective. J. Limnol 73(1), doi: 10.4081/jlimnol.2014.836.
- Tassi F, Vaselli O, Tedesco D, Montegrossi G, Darrah T, Cuoco E, Mapendano MY, Poreda R, Delgado Huertas A. Water and gas chemistry at Lake Kivu (DRC): Geochemical evidence of vertical and horizontal heterogeneities in a multibasin structure. Geochemistry, Geophysics and Geosystems (G3), Vol. 10, No. 1, doi:10.1029/2008GC002191 (2009)
- Tazieff H (1989) Mechanisms of the Nyos carbon dioxide disaster and of so-called phreatic steam eruptions. J Volcanol Geotherm Res 39:109-116
- Tietze K (1987) The Lake Nyos gas catastrophe in Cameroon: cause, sequence of events, consequences. Proc XXII Congress IAHR, Lausanne, 93-98
- Tietze K (1992) Cyclic gas bursts: are they a 'usual' feature of Lake Nyos and other gas-bearing lakes? Natural Hazards in West and Central Africa, International Monograph Series on Interdisciplinary Earth Science Research and Applications (Freeth SJ, Ofoegb CO, Onohua KM eds.), 97-107, Friedrich Vieweg & SohnVerlag, Braunschweig, Wiesbaden
- Tuttle ML, Clark MA, Compton HR, Devine JD, Evans WC, Humphrey AM, Kling GW, Koenigsberg EJ, Lockwood JP, Wagner GN (1987) The 21 August 1986 Lake Nyos gas disaster, Cameroon. US Geol Surv Open-File rept 87-97:58 pp
- Yoshida Y, Issa, Kusakabe M, Satake H, Ohba T (2010) An efficient method for measuring CO_2 concentration in gassy lakes: Application to Lakes Nyos and Monoun, Cameroon. Geochem J 44:441-448