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MAGMATIC FLUID SUPPLY INTO LAKES NYOS AND MONOUN, AND MITIGATION OF NATURAL DISASTERS

Takeshi Ohba[1*], Minoru Kusakabe[2], Akira Ueda[2], Maki Tsujimura[3], Tomofumi Kozono[4], Mie Ichihara[5], Yujiro Suzuki[5], Kazuto Saiki[6], Katsuya Kaneko[7], Yasuo Miyabuchi[8], Tetsuo Kobayashi[9], Katsuro Anazawa[5], Toshihiko Sugai[5], Yutaka Yoshida[10], Akihiko Terada[11], Miyuki Yoshikawa[12], Tetsuya Yokoyama[11], J. V. Hell[13], Luc Sigha[13], Greg Tanyileke[13], Issa[13], Fantong Wilson[13], F. T. Aka[13]

[1]Tokai University, [2]Toyama University, [3]University of Tsukuba, [4]National Research Institute for Disaster, [5]University of Tokyo, [6]Osaka University, [7]Kyoto University, [8]Kumamoto University, [9]Kagoshima University, [10]Yoshida Consulting Engineer Office, [11]Tokyo Institute of Technology, [12]Aso Volcano Museum, [13]IRGM Cameroon

In 1980s, the gas disasters at Lakes Nyos and Monoun killed 1800 of residents. The lakes are located in the northwestern region of Cameroon. The cause of the death was the atmospheric oxygen shortage due to the high concentration of CO2 in air. The CO2 was explosively discharged at the lakes. The discharge of CO2 was termed as "limnic eruption". Before the discharge, CO2 was dissolved in the deep lake water. If we compare the lake water with magma, and, CO2 gas with volatile in magma, the analogy between limnic and magmatic eruptions is recognized.

The accumulation of CO2 continues even after the limnic eruption, because the supply of CO2 into the lake cannot be stopped. The CO2 is expected to be carried by a thermal water discharged at the bottom of lakes. In order to secure the lakes, degassing pipes have been installed at the both lakes supported by the Nyos-Monoun Degassing Project (NMDP). Japan, Cameroon, USA and France have been involved in NMDP. In 2011, the most of CO2 in the water of Lake Monoun has been removed by the degassing pipes. The removal of CO2 in the water of Lake Nyos is still insufficient. About 70% of CO2 is left in the lake water relative to the maximum amount observed just after the limnic eruption in 1986. New degassing pipes will be installed additionally at Lake Nyos in this year. The life span of degassing magma is much longer than that of our human. The supply of CO2 to the lakes is expected to last long. Moreover the supply rate of CO2 might increase in future. Considering the above situation, the residence around the lake has been prohibited.

Because the limnic eruption is the degassing of CO2 and the concentration of CO2 in lake water is measurable, the prediction of linmic eruption is not impossible. Scientific researches and observation of lakes would provide the information necessary for Cameroonian government to declare the safety of lakes. We have initiated a project along the framework of SATREPS (Science and Technology Research Partnership for Sustainable Development) funded by JST and JICA. In the project, the following researches will be carried out under the cooperation between Japanese researchers and researchers in IRGM (Institute for Geological and Mining Research): 1) The mechanism of limnic eruption, 2) CO2 distribution in lake water, soil and ambient air, 3) Flow of ground water around the lakes, 4) Interaction between CO2 and country rock, 5) Real time monitoring of lake water, 6) Active removal of CO2 dissolved in deep lake water, 7), Eruptive history of lakes, 8) Geochemistry of lakes and volcanoes along Cameroon volcanic line. The project encourages that the result obtained in the above researches is efficiently transferred to administrative agency.

A governmental declaration of lake security should be given considering the scientific results obtained by the cooperative researches. The declaration brings the re-habitation around the lakes and develops the area. Even after the declaration, a sustainable monitoring and researches on the lakes is necessary. For the observation and research, capable young researchers are required. In this project, the capacity building of young Cameroonian researchers and the donation of scientific instruments are included, which are indispensable for the cooperation with developing countries.

Keywords: limnic eruption, CO2, crater lake, disaster prevention