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Field work plan at Lake Nyos and Monoun by Osaka & Kyoto team

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Introduction

The purposes of the study of our group are (1) to clarify the CO₂ supply system and the pathway of CO₂ to the lakes, and (2) to establish an automatic device to find forerunners of limnic eruption. In the March 2012 survey, we measured sound velocity depth-profiles of lake water and developed the method to estimate the dissolved CO₂ concentration using sound velocity. Now we are preparing a paper on the method.

In the 2014 survey, we plan to test some new devices to monitor the lakes. We would like to share the technique for observation with Cameroonian members. We wish the member of project join the activities described as follow.

Activities

1. Measurement of sound velocity profile at Lakes Nyos and Monoun
2. Measurement of the CO₂ flux from soil and the surface of Lakes Nyos and Monoun
3. Photography of the bottom of the lakes by an underwater camera with pressure container
4. Colorimetry of water of the lakes by the underwater camera

Member of Osaka & Kyoto team

1. Kazuto SAIKI (Osaka Univ.)
2. Katsuya KANEKO (Kyoto Univ.)

Schedule

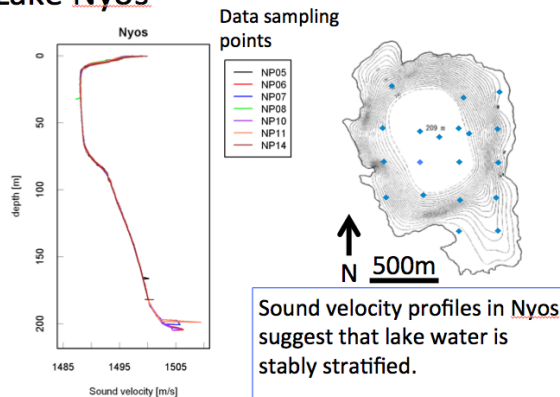
Date	Day	Saeki team
February 23, 2014	Sun	Leave Japan
February 24, 2014	Mon	Arrive at Yde, AF900
February 25, 2014	Tue	Visit IRGM, JICA-Yde Office, Banking
February 26, 2014	Wed	Move from Yde to Bamenda
February 27, 2014	Thu	Move from Bamenda to Nyos
February 28, 2014	Fri	Lake Nyos survey
March 1, 2014	Sat	Lake Nyos survey
March 2, 2014	Sun	Lake Nyos survey
March 3, 2014	Mon	Move from Nyos to Foubot
March 4, 2014	Tue	Lake Monoun survey
March 5, 2014	Wed	Lake Monoun survey
March 6, 2014	Thu	Move Foubot to Younde. Leave Yde, AF901
March 7, 2014	Fri	Arrive at Paris. Leave Paris, AF292
March 8, 2014	Sat	Arrive at Osaka-Kansai

Details on the activities

1. Measurement of sound velocity profile at Lakes Nyos and Monoun

In 2012 survey, sound velocity profiles were measured at 19 points at Lake Nyos and 14 points at Lake Monoun.

Lake Nyos



Lake Monoun

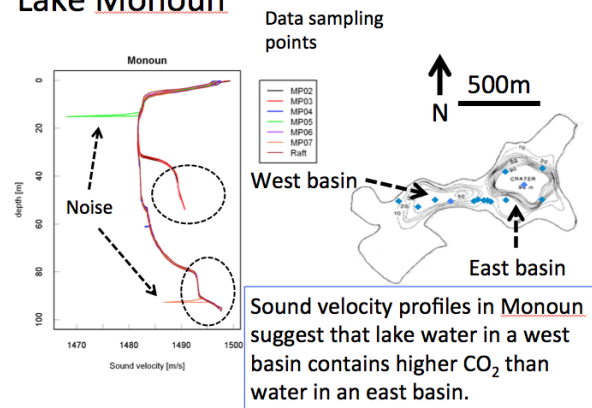


Figure 1. Distribution of the measuring points for sound velocity at Lake Nyos and Lake Monoun with some representative profiles.

In 2014 survey, the same points will be measured to compare with the data in 2012. To estimate dissolved CO₂ concentration, we used the model equation

$$\Delta v = k_1[\text{CO}_2(\text{aq})] + k_2[\text{HCO}_3^-]$$

where Δv is the difference in the sound velocity between CO₂-containing solution and pure water at a given temperature. We obtained k_1 from laboratory experiments and k_2 from field data. Our interest is whether k_2 value has changed or not.

2. Measurement of the CO₂ flux from soil and the surface of Lakes Nyos and Monoun.

We made a portable sensor to measure CO₂ flux from soil with the help of Issa-san. The sensor was tested at Izu-Oshima volcano and we confirmed it works well. Now Dr. Kaneko is trying to make it more compact. We will measure CO₂ flux from the surface of Lakes Nyos and Monoun and CO₂ flux from ground around the Lakes.

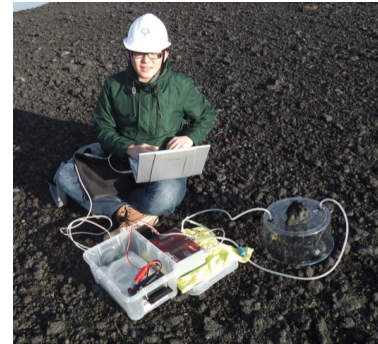


Figure 2. CO₂ flux sensor being tested at Izu-Oshima.

3. Photography of the bottom of the lakes by an underwater camera with pressure container

An underwater camera with pressure container (200 m resist) has been prepared. We will take photos and movies of the bottom of the lakes.



Figure 3. Underwater camera.

4. Colorimetry of water of the lakes by the underwater camera

Using the underwater camera, we will try colorimetry of lake water at various depth. Now we are making a standard color target to measure the absorbance of lake water. We expect that the color of water will be sensitive to the chemical properties of water.