

## Ecological analysis of glacial biology on tropical glaciers of Ruwenzori mountains,Uganda,Africa

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### Introduction

Ruwenzori mountains are located at the westernmost of Uganda, tropical Africa. Although in the equatorial area (0N, 29E), there are glaciers (4700-5000m a.s.l.) In Africa, only three mountains have glaciers, Kilimanjaro, Mt. Kenya, and Ruwenzori, and some scientists said that all of these glaciers will disappear during 2020s. So, it is urgent to research this area as soon as possible.

On glacier's surface, there are some psychrophilic microorganisms like snow algae. And almost no glacial biological research was carried out on tropical region. So, we took researches on Ruwenzori mountains on Feb.2012 and Feb.2013.

We analyzed altitudinal distribution and biomass of snow algae and also analyzed optimum temperature of yeasts which were collected in Ruwenzori mountains.

### Methods

Sampling was held on 4 sites, the one on Mt. Speke and the others on the Stanley Plateau Glacier (S1=4714m, S2=4740m, S3=4850m). We sampled glacier surface ice by a stainless scoop rinsed with ice around the site. After melting, we put formalin into sample. Volume of formalin is about 3% of melting ice.

First, we counted snow algae in this sample by a fluorescence microscope and calculated algal biomass.

Second, we analyzed the optimum temperature of yeasts which was picked on Ruwenzori glaciers. We put the yeasts into YEPD liquid culture medium and cultivated it on different temperature (5-30 degrees Celsius, with 5 degree interval). After cultivation, we measured optical density by absorption photometer (filter: 660nm).

### Results

On first experimental work, 5 kinds of snow algae are found.

These are; *Cylindrocystis brebissonii*, *Ceratodon purpureus* (The mosses), green round unicellular organisms, red round unicellular organisms, and protonema algae, which has never reported on other glacial biological research.

*Cylindrocystis brebissonii* are found all altitude. It was found at only lower ablation area of glacier in Himalaya and Patagonia, so that suggest all of Ruwenzori glacier has become ablation area. *Ceratodon purpureus* are found only ST-S1. It is also no report that mosses inhabit on glacier surface.

On second experimental work, we analyzed several kinds of yeasts, but for all yeasts, their optimum temperature is 20-30 degrees Celsius, not cold but middle-high temperature, although they are picked at glacier surface, which is considered as cold environment.

It suggest that there are positive feedback effect on melting glaciers. If glacier surface are becoming warm by some trigger such as global warming, glacial microorganisms which has middle-high optimum temperature are increasing and reducing glacier surface albedo. After that, because of reducing surface albedo, glacier surface has more heating energy and becoming warm, so some microorganisms are more increasing... it is positive feedback.

We suggest that glacier melting will occur more rapidly than we expected because of this positive feedback.