

An outline of Glaciological Expedition of Nepal: Langtang Himil Project 1987–88

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Abstract

For studying glacio-hydrological and glacio-meteorological processes relating to the glacio-hydrospheric environment of the Himalayas, field observations were made in Langtang Valley, most intensively in Yala Glacier, Central Nepal from August to October, 1987, and from March to April, 1988. This is the second activity of "Glaciological Studies in Asian Highland Regions during 1985–1989" conducted in glacial areas of Nepal and China. The observations in the Nepal side have been continued as a cooperative project between Japan and Nepal entitled "Glaciological Expedition of Nepal (GEN-LP)", which began in 1973. Emphasis was placed on investigations of the behavior and discharge process of meltwater and rainwater from the surface of a glacier through a glacier body to a stream at a glacier terminus helped by observing bore holes drilled in the accumulation area of Yala Glacier.

1. Introduction

Systematic glaciological studies of the Nepal Himalayas have been continued since 1973 under the title of "Glaciological Expedition of Nepal (GEN)" as a cooperative research project between Japan and Nepal. The first stage of GEN was mainly conducted in a glacial region of Kumbu Himal and its vicinity in East Nepal. The fruitful products of the first stage were published as a series entitled "Glaciers and Climates of Nepal Himalayas, Part I, Part II, Part III and Part IV (Higuchi, 1976; 1977; 1978; 1980)", as a Special Issue of *Seppyo* (The Journal of Japanese Society of Snow and Ice). They reveal the present glacier conditions and the variation of glaciers over a long term in the Nepal Himalayas.

The second stage of GEN was started in 1981 by shifting a research area to Langtang Valley of the Langtang Himal in Central Nepal, situated 60 km northward from Kathmandu (Higuchi, 1984). After a preliminary reconnaissance, the first attempt of core drilling was successfully completed in an ablation area and an accumulation area of Yala Glacier in

Langtang Valley in 1981 and 1982; one full-depth core some 30 m long, was obtained at the ablation area and another 60 m long at the accumulation area, aiming at constructing climatic history in Langtang Valley during the past several hundred years. In addition, fundamental data relating to the glacio-hydrospheric environment in Langtang Valley were collected in collaboration with a glacier boring project. The results of this project were reported under the title of "Glacier Studies in Langtang Valley in 1981–82" (Higuchi, 1984), as publication No. 2 of Data Center for Glacier Research, Japanese Society of Snow and Ice.

A five-year plan, "Glaciological Studies in Asian Highland Regions" was started in 1985. The plan was aimed at collecting detailed glaciological, climatological and hydrological data and at making a comparative study of glaciers in Nepal and China. As the first year (1985) of the plan in the Nepal side, "Glaciological Expedition of Nepal-Langtang Himal Project 1985–86 (GEN-LP 1985–86)" was conducted at Langtang Valley. In the first year (1985) of the expedition, hydrological and meteorological stations were established at Kyangchen Gomba (3920 m a.s.l.), 5 km

upstream from Langtang Village for the purpose of collecting long-term data for a period of at least 10 years with the permission and cooperation of Department of Hydrology and Meteorology, Ministry of Water Resources, His Majesty's Government of Nepal. From July 1985 to July 1986, the first full-year hydrological and meteorological observations were carried out at the stations in addition to glaciological observations of Yala Glacier near Kyangchen Gomba. The results were published as papers and were also reported in "Bulletin of Glacier Research, No. 5" (Watanabe and Higuchi, 1987). GEN-LP 1987-88 was made as the second year activity in the five-year plan in the Nepal side, with the cooperation of Nepalese researchers of Department of Hydrology and Meteorology. This paper outlines GEN-LP 1987-88.

2. Aim and observation

The aim of GEN-LP 1987/88 is to investigate glacio-hydrological and glacio-meteorological processes relating to the glacio-hydrospheric environment in Langtang Himal and to continue meteorological and hydrological observations at the stations set on Kyangchen Gomba beginning 1985. Especially, investigations were attempted of the behavior and discharge process of meltwater and rainwater from a glacier surface through a glacier body to a stream at a glacier terminus helped by studying bore holes drilled in the accumulation area of Yala Glacier. In addition, miscellaneous investigations were also conducted of glacio-biology, glacial geomorphology and Tibetology for understanding a general feature concerning the glaciers of the Langtang Himal Region.

The main scheme of observations is as follows:

- 1) Relationships between water level of an en-glacial unconfined aquifer and the amount of infiltrated glacier meltwater or/and rainwater.
- 2) Flow rate of an en-glacial aquifer in the accumulation area.
- 3) Areal distribution of the amount of glacier meltwater over Yala Glacier.
- 4) Areal distribution of precipitation in Langtang Valley.
- 5) Altitudinal distribution of surface air temperature.
- 6) Amount of runoff in a stream from a terminus of Yala Glacier and in Langtang Khola, the main river of Langtang Valley.
- 7) Hydraulic characteristics of a glacier body, such as permeability coefficient and the amount of suspended water in the glacier body by studying cores obtained by drilling.
- 8) Densification processes from snow into ice under water suspended and soaked conditions.
- 9) Surface mass balance of the Yala Glacier.
- 10) Periglacial landforms.
- 11) Late quaternary glacier fluctuations.
- 12) Micro-plants in dirt layer dust of Yala Glacier.
- 13) Tibetological studies of Langtang Village.

A part of the results is also reported in this Issue of Bulletin of Glacier Research No. 7 by Motoyama and Yamada (1989), Murakami *et al.* (1989), and Watanabe *et al.* (1989).

3. Members

Glaciological Expedition of Nepal, Langtang Himal Project 1987/88 (GEN-LP 1987-88) was carried out by the following members:

(Japanese Members)

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