

Outline of the Glaciological Expedition of Nepal: Boring Project 1981 and 1982

Keiji HIGUCHI*

Glaciological Expedition of Nepal, Contribution No. 85
*Water Research Institute, Nagoya University, Nagoya 464

1. Introduction

Glaciological and meteorological observations on the glaciers and climates in the Nepal Himalaya were carried out as the "Glaciological Expedition of Nepal (GEN)" in 1973, 74, 75, 76 and 78, with the permission and cooperation of His Majesty's Government of Nepal, under the leadership of Keiji Higuchi (Higuchi, 1976, 1977, 1978 and 1980). The object of these observations is to obtain the data of the state of the glaciers in the Himalaya and of their current variations, in order to understand the relation between glaciers and climate. The results obtained by these observations were published under the title of "Glaciers and Climates of Nepal Himalayas—Report of the Glaciological Expedition of Nepal", Parts I, II, III and IV, as special issues of Vols. 38, 39, 40 and 41 of "Seppyo" (Journal of the Japanese Society of Snow and Ice) in 1976, 77, 78 and 80 respectively.

As seen in the papers contained in these reports, the present states of distribution, characteristics and variations of glaciers in the Nepal Himalaya were studied by cooperative work of scientists in the research fields of glaciology, meteorology, geology, geomorphology and hydrology. Therefore, it was planned as the next step of the GEN to study the climatic change and glacier fluctuations during the period of about 1,000 years before the present. In 1981 and 1982, glaciological, hydrological and geomorphological observations of the glaciers and surrounding areas in the Nepal Himalaya were carried out as the "Glaciological Expedition of Nepal (GEN)—Boring Project", with the permission and cooperation of His Majesty's Government of Nepal, as overseas field research supported by a grant-in-aid for Scientific Research from the Ministry of Education, Science and Culture (MONBUSHO), Japanese Government.

The object of this expedition is to study climatic change and glacier fluctuation during the period of about 1,000 years before the present in the Nepal Himalaya on the basis of the results obtained by analysis of ice cores drilled out from glaciers and sediment cores from the bottom of glacier lakes, and also on the basis of observations of landforms caused by glaciation. Especially, it was attempted in this expedition to clarify such conditions during the little ice age (Lamb, 1972) as glacier variations, climatic conditions, and areal variation of the cryosphere, and whether the "little ice ages" in monsoon Asia coincide with those in other areas.

In addition to the studies on climatic change, basic observations were carried out on the relation between meteorological conditions and glacier mass balance, and also runoff of rivers in the glacierized area, since hydrological studies are important to develop water resources in the Nepal Himalaya.

2. Observations

The observations of the GEN-Boring Project 1981 and 1982 are divided into 5 kinds as follows.

1) Core sampling of glacier

Core sampling was done in the accumulation area of Yala Glacier located in Langtang Himal down to 60 m in depth or through the bottom of the glacier. The location of Langtang Himal is shown in Fig. 1. By the use of snow and ice cores obtained, the following analyses were carried out.

- a) physical properties of glacier ice
- b) stable oxygen isotopic composition
- c) gross β activity
- d) Tritium concentration
- e) Solid particle concentration

2) Detailed studies of the glacier

The glacier where core sampling was done in Langtang Himal was intensively investigated by the following observations:

- a) form of present glacier and glacier expansion in the past
- b) periglacial phenomena
- c) mass balance of the glacier
- d) meteorological conditions in the glacier area
- e) processes of accumulation
- f) glacier flow rate and particle path

3) Sampling of lacustrine deposits in glacier lakes

Lacustrine deposits are sampled out of the bottom of glacier lakes. The following items are analyzed:

- a) pollen analysis
- b) detailed stratigraphy
- c) C^{14}

4) Studies on glacier hydrology

The following data concerned with glacier hydrology are obtained in Langtang Valley regions.

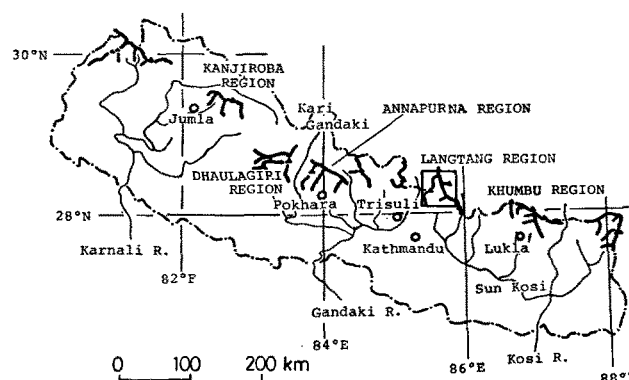


Fig. 1. Langtang Himal in Nepal.

- a) quality and quantity of glacier runoff
- b) amount of suspended particles and solute of glacier runoff
- c) accumulation processes of suspended particles on the bottom of glacier lakes
- d) thermal regime of glacier lakes

Above data will clarify the role of glaciers for water resources as well as the relationships between lacustrine deposits and climate.

5) Flight observations

Since the termini of glaciers in the Nepal Himalaya are located above 5,000 m, it is often difficult to take useful pictures showing the total image of glaciers. Moreover, it is sometimes impossible to make glaciological observations from the valley course because the valley is quite deep. So, a general view of the glacier system and glacier pictures were obtained by means of flight observations in the Langtang region.

3. Members

The members of the GEN-Boring Project 1981 and 1982 were:

Leader

Dr. K. Higuchi (1981 and 1982)

Professor; Water Research Institute, Nagoya University.

Chief; Data Center for Glacier Researches, Japanese Society of Snow and Ice.

Leader of GEN 1973, 1974, 1975, 1976 and 1978.

Members

Dr. O. Watanabe (1981 and 1982)

Associate Professor; Water Research Institute, Nagoya University.

Member of GEN 1975 and 1978.

Dr. T. Yamada (1981 and 1982)

Research Associate; The Institute of Low Temperature Science, Hokkaido University.

Dr. K. Kamiyama (1981 and 1982)

Research Associate; Geophysical Laboratory, Kyoto University

Dr. Y. Ageta (1982)

Associate Professor; Faculty of Education, Yamaguchi University.

Dr. Y. Ono (1982)

Lecturer; Institute of Geoscience, University of Tsukuba.

Mr. S. Takenaka (1981)

Research Assistant; Water Research Institute, Nagoya University.

(Present Address: Environmental Research and Technology Institute Co., Ltd.)

Mr. K. Yokoyama (1981)

Research Assistant; Disaster Prevention Research Institute, Kyoto University.

(Present Address: Lecturer; Faculty of Home Economics, Mukogawa Women's University.)

Mr. T. Kurokawa (1981)

Boring Technician; Nittoku-Kensetsu Co., Ltd.

Mr. M. Yoshida (1982)

Research Assistant; Water Research Institute, Nagoya University.

Mr. H. Takahara (1982)

Research Assistant; Water Research Institute, Nagoya University.

Mr. H. Iida (1982)

Research Assistant; Water Research Institute, Nagoya University.

Mr. H. Motoyama (1982)

Research Assistant; The Institute of Low Temperature Science, Hokkaido University.

Mr. M. Takikawa (1982)

Research Assistant; Faculty of Science, Toyama University.

Mr. S. Kohshima (1982)

Research Assistant; Faculty of Science, Kyoto University.

Mr. Dhruba D. Mulmi (1981 and 1982)

Chairman; Department of Meteorology, Trichandra Campus, Tribhuvan University, Kathmandu.

Mr. Khadga B. Thapa (1982)

Chairman; Department of Meteorology, Trichandra Campus, Tribhuvan University, Kathmandu.

Mr. Zheng Benxing (1982)

Associate Professor; Lanzhou Institute of Glaciology and Cryopedology, Lanzhou, People's Republic of China.

Mr. T. Ohata

Research Associate; Water Research Institute, Nagoya University.

4. Acknowledgments

We take this opportunity to express our sincere gratitude to His Majesty's Government of Nepal for special consideration to our organization in connection with the permission to conduct the "Glaciological Expedition of Nepal: Boring Project 1981" (Ref. R. D. 216/038/039) and "Boring Project 1982" (Ref. R.D. 063/039/040).

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Our particular thanks are due to the staffs of the Meteorological Service, His Majesty's Government of Nepal for their cooperation in the field observations and data analyses, and to the staffs of Trans-Himalayan Tour Pvt. Limited, Shangri La Tour Pvt. Limited, Royal Nepal Airlines, and especially Capt. E. Wick for their support to our expedition.

We are very much obliged to the people who helped this expedition in Nepal. The expenses of this expedition, the research work and publication were supported by a grant-in-aid for Scientific Research from the Ministry of Education, Science and Culture, Japanese Government. We would like to express our sincere thanks to them.

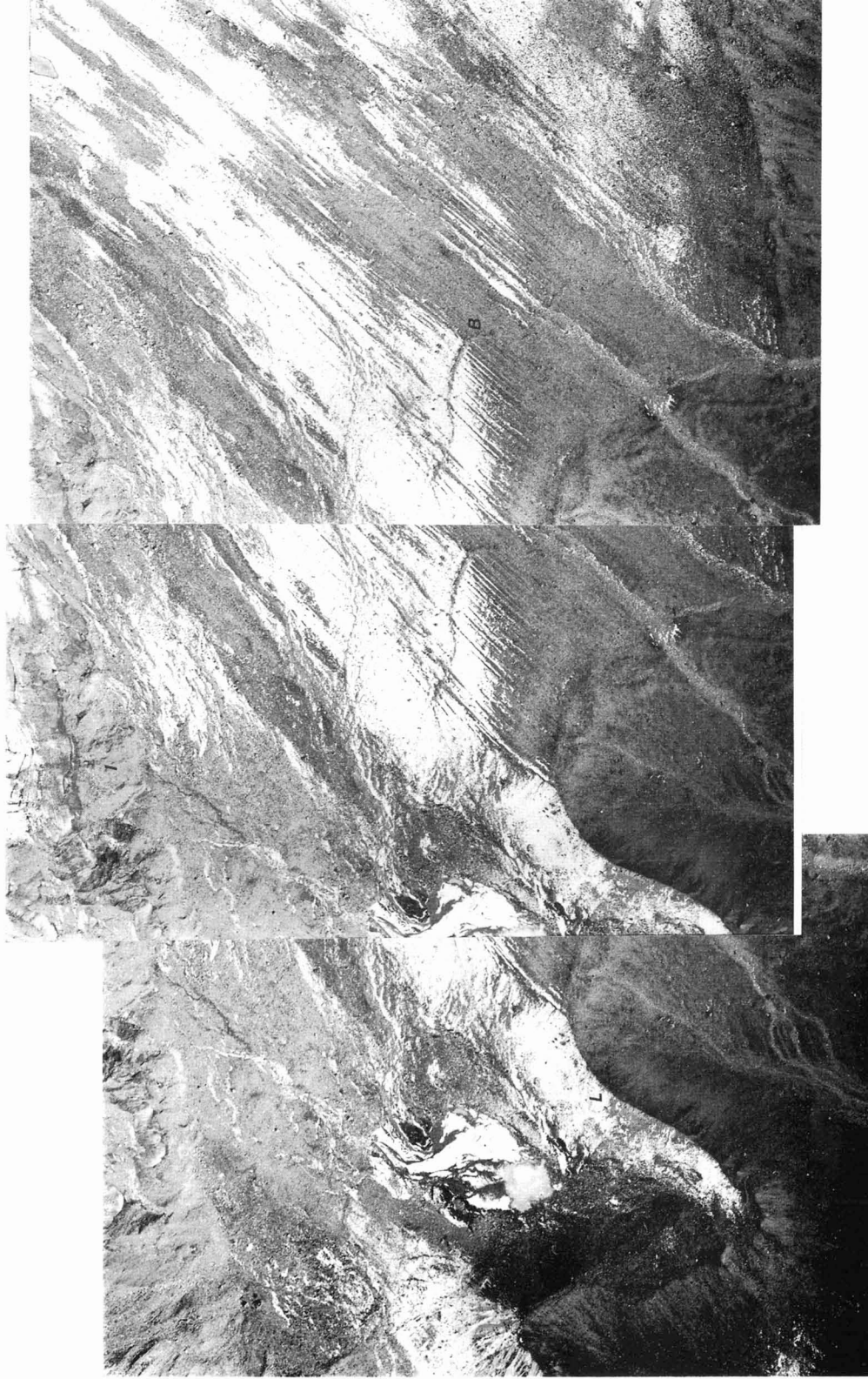
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Frontispiece 1. Aerial oblique photograph of Yala Glacier.
1: 1981 Boring site, 2: 1982 Boring site.



Frontispiece 2. Proglacial features of the western part of Dakpatsen Plateau.

L: moraine ridge of Little Ice Age maximum advance *B*: terminal moraine of till sheet B *I*: ice cored moraine of Unnamed Glacier



Frontispiece 3. Proglacial features of the central part of Dakpatsen Plateau
A-F: terminal moraines of till sheets A to F L: moraine ridge of Little Ice Age maximum advance G: Glacier camp



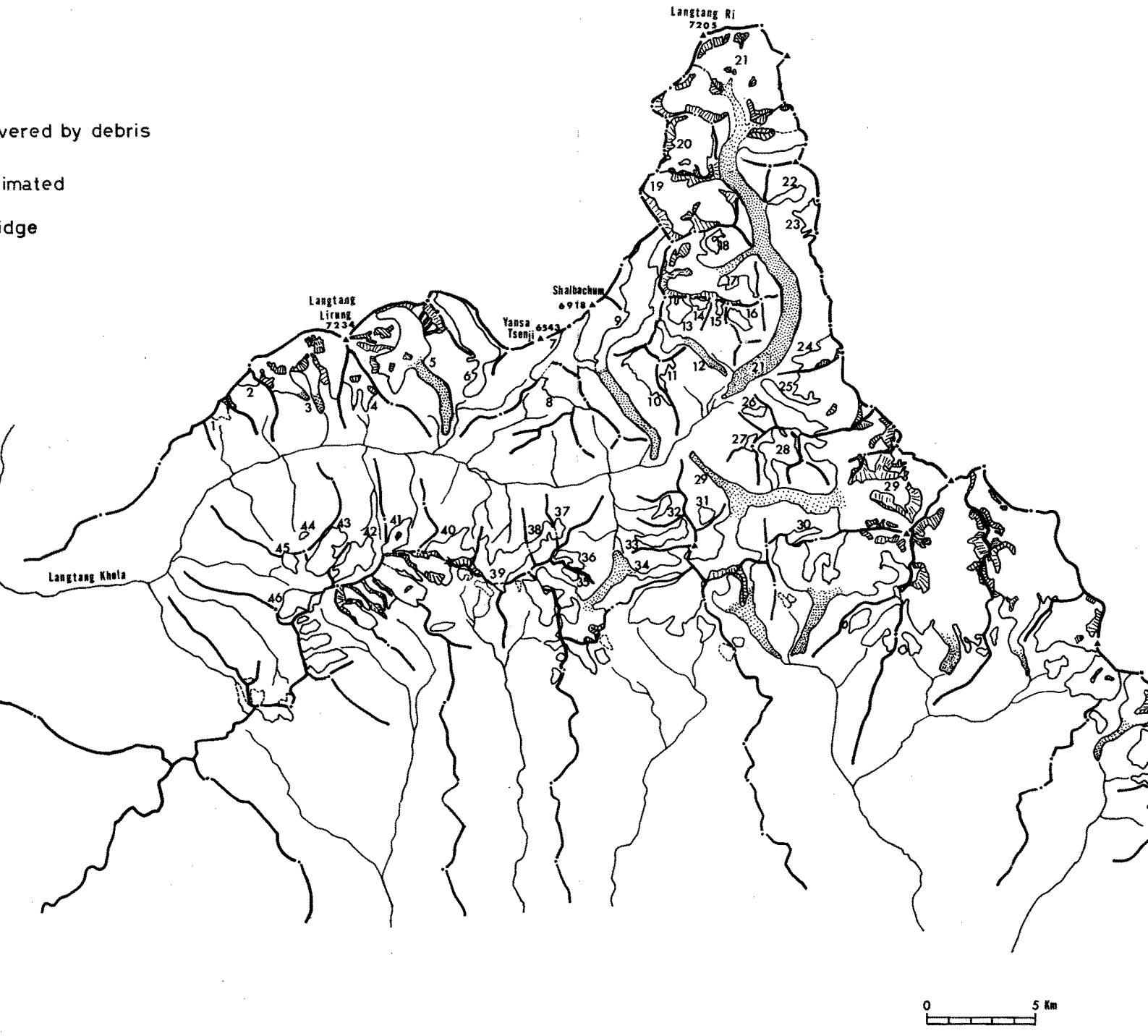
Frontispiece 4. Langtang Valley-Kyangchen (center) and Yala Glacier (upper left).

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covered by debris

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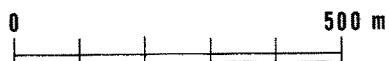
Topographical Map of Proglacial Area of Yala (Dakpatsen) Glacier, Langtang Himal

L E G E N D

General forms

- ▲ Ridge & peak
- ▨ Bare rock walls
- - - Break of depositional slopes
- ⚡ Gully
- ⌒ Talus

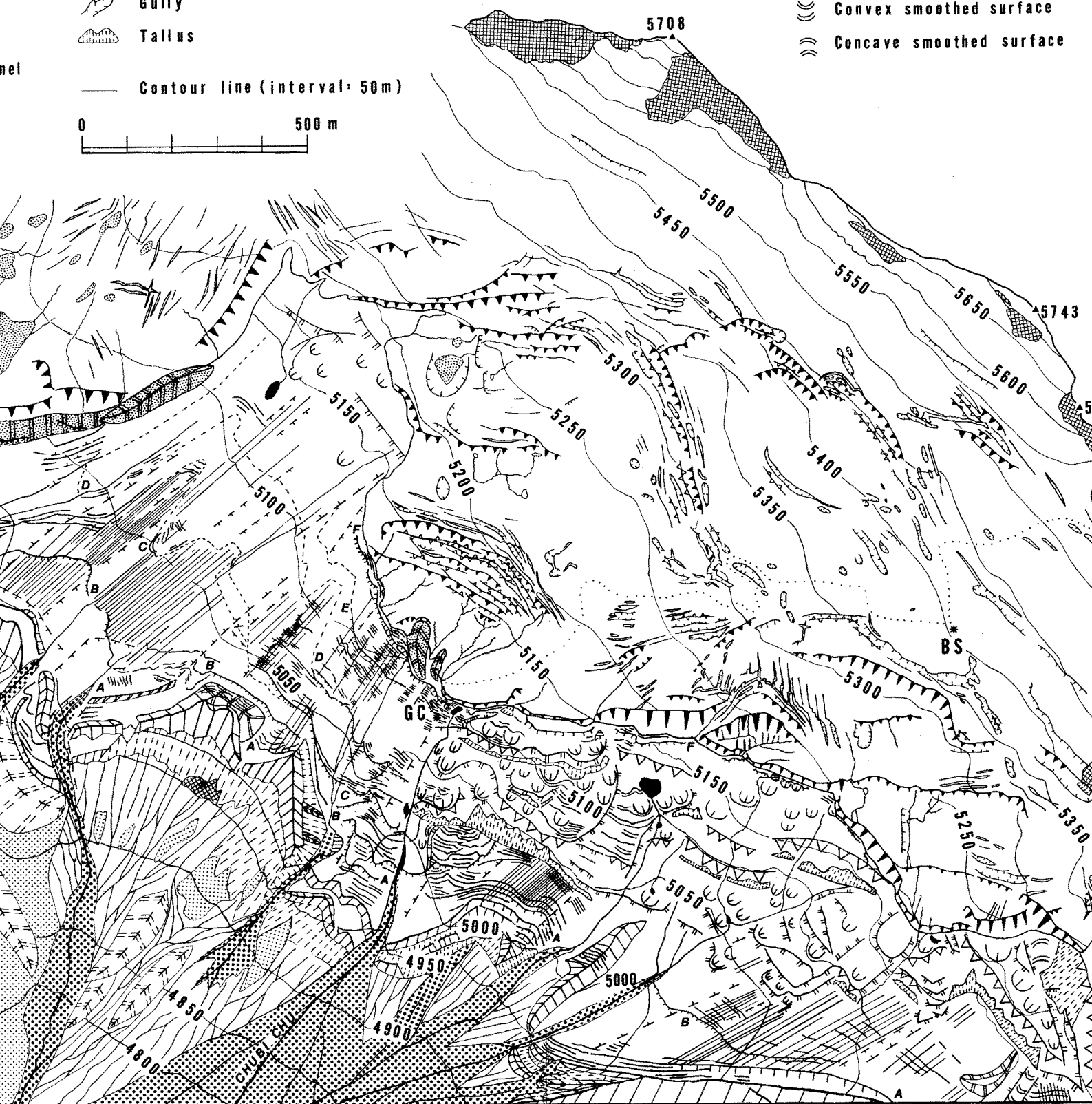
— Contour line (interval: 50m)



- * BS Boring site
- * GC Glacier camp
- ⋯ Route to Pasang Peak

Glacial erosional forms

- ▽ Step (more than 20m high)
- ≡≡≡ Step (less than 20m high)
- ⊖ Roches moutonnées
- ⌒ Convex smoothed surface
- ⌒ Concave smoothed surface



Langtang Valley

