

A STUDY ON THE CRUSTAL MOVEMENTS IN THE NEPAL HIMALAYAS

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INTRODUCTION

The formation process of the Himalaya Mountains signifies a most exciting crustal movements producing the biggest upheaval on the surface of the earth. The movement started in the Tertiary Period and accelerated through the Quaternary; the rate of upheaval for these highest mountains in the world being far greater than other mountain ranges. Furthermore, the movement seems to be still active either continuously or discontinuously. Nevertheless the kinematics and/or dynamics of the crustal movement has not been investigated systematically, and still open to question in spite of the theories and hypothesis based on the concepts of classical orogeny and plate tectonics.

Under the circumstances, basic data on the crustal movement of the Nepal Himalayas are most necessary. The upheaval process of some ten million years from Tertiary to present should be understood by the analysis of the kinematics being constructed by the time dependence process of the three dimensional architecture of the mountains. In other words, the crustal movement of 10^{7-8} years should be revealed by geological method, that of 10^{4-5} years by geomorphological method, and 10^{0-2} years by geodetic method. These data should be integrated to elucidate the problem.

The geological investigations of the Nepal Himalayas have been conducted by the scientists of the Tethys Society and various universities in Japan since 1962. Some of the main achievements of these investigations have been published in the "Geology of the Nepal Himalayas" (edited by S. Hashimoto, 1973).

Under the present project, "Study on the Crustal Movements in the Nepal Himalayas", field works were carried out in 1980 to 1981 with the permission and cooperation of His Majesty's Government of

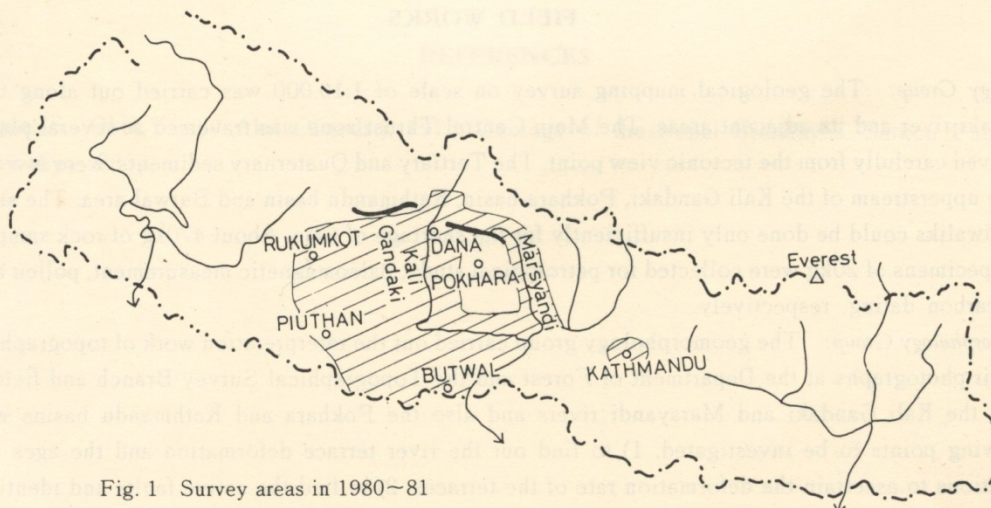


Fig. 1 Survey areas in 1980~81

Nepal and with the financial support of the Ministry of Education, Science and Culture, Government of Japan. During this period the areas surveyed were the Kali Gandaki river, the Marsyandi river, the southern region of the Dhaulagiri Himal and Butwal-Tansen including the Kathmandu basin (Fig.1). The work was supervised by K. Kizaki, and the members mentioned below constituted the field investigation team.

CONSTITUTION OF THE TEAM

The members of the investigation team were as follows:

Dr. Koshiro Kizaki, Leader

Professor, Department of Marine Sciences, Ryukyu University.

Dr. Kazunori Arita,

Research Associate, Department of Geology and Mineralogy, Hokkaido University.

Dr. Daigoro Hayashi,

Research Associate, Department of Marine Sciences, Ryukyu University.

Dr. Takashi Kano,

Lecturer, Department of Mineralogical Sciences and Geology, Yamaguchi University.

Mr. Mitsuo Yoshida,

Graduate Student, Department of Geology and Mineralogy, Hokkaido University.

Mr. Shuji Iwata,

Research Associate, Department of Geography, Tokyo Metropolitan University.

Dr. Takashi Nakata,

Associate Professor, Department of Geography, Hiroshima University.

Mr. Hidetsugu Yamanaka,

Graduate Student, Department of Geography, Tohoku University.

Mr. Kotaro Yokoyama,

Education Associate, Disaster Prevention Research Institute, Kyoto University.

Mr. Makoto Ohmura,

Undergraduate Student, Department of Geophysics, Kyoto University.

Dr. Toran Sharma, Liaison Officer,

Department of Mines and Geology, His Majesty's Government of Nepal.

FIELD WORKS

Geology Group: The geological mapping survey on scale of 1:10,000 was carried out along the Kali Gandaki river and its adjacent areas. The Main Central Thrust zone was traversed at several places and observed carefully from the tectonic view point. The Tertiary and Quaternary sediments, were investigated in the upperstream of the Kali Gandaki, Pokhara basin, Kathmandu basin and Butwal area. The survey of the Siwaliks could be done only insufficiently for the shortage of time. About 470kg of rock samples and soil specimens of 20kg were collected for petrological study, paleomagnetic measurement, pollen analysis and carbon dating, respectively.

Geomorphology Group: The geomorphology group carried out the interpretation work of topographic maps and air-photographs at the Department of Forest and the Topographical Survey Branch and field works along the Kali Gandaki and Marsyandi rivers and also the Pokhara and Kathmandu basins with the following points to be investigated, 1) to find out the river terrace deformation and the ages of their formations to ascertain the deformation rate of the terraces, 2) to find the active faults and identify their

acting period, dislocational sense, dislocational dimensions and rate, 3) to make effort to reveal the mountain topography of the past according to the climatic environment, river features and slope features of the past.

Geodetic Group: The group conducted the geodetic survey works at Dana and Kerabari with the cooperation of other members. At Dana they set up a strain grid to measure the distances and angles among the four stations of the grid which should cover the Main Central Thrust. The levelling survey along the track was also carried out crossing the Thrust between the two points 3,000m away. At Kerabari the levelling survey was also done between the two points 5,000m away crossing the Main Boundary Fault. Remeasurements of these points and the grid will be conducted five years later.

ACKNOWLEDGEMENTS

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