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## The International Karakoram Project

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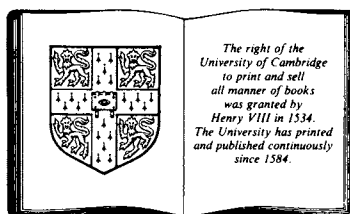
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THE INTERNATIONAL  
**KARAKORAM**  
PROJECT

**Volume 1**

Proceedings of the International Conference  
held at  
Quaid-i-Azam University  
Islamabad  
Pakistan

EDITED BY K. J. MILLER



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These proceedings are dedicated to the memory of  
J. F. BISHOP  
who died on Kurkun (4730 m) on 14 July 1980  
during the course of  
The International Karakoram Project

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## Preface

These volumes detail a comprehensive series of inter-related studies carried out by seventy-three scientists from China, Pakistan and Britain who visited the Karakoram mountains in the summer of 1980. These men and women were members of the Royal Geographical Society Project to the world's highest mountain range as part of the Society's 150th anniversary celebrations.

The proceedings are divided into two volumes; the first volume being reserved for papers presented and discussed, in conference, in Islamabad, Pakistan prior to the field work. The second volume is reserved for papers based on the field work conducted during the course of the International Karakoram Project, or IKP for short, and read at a conference at the Royal Geographical Society, London.

The two volumes present a comprehensive cover of the earth sciences, ranging in scale from surveys to measure the effects of impacts between the Eurasian and Indian tectonic plates, to electron microscope studies on weathering processes. The six general subject areas are: geology, glaciology, geomorphology, seismology and topography (survey). The sixth subject is concerned with the indigenous population namely social, economic and health aspects of villagers, the architectural form and structural stability of their homes and the order of priorities they have to accept when combating the greatest number of natural hazards known to man which include earthquakes, drought, fire, floods, famine, landslides, avalanches and disease.

These proceedings therefore bring together a collection of papers to provide a datum for future scientific research in the Karakoram. The IKP also proved to be a catalyst for the founding of the Karakoram Research Cell (KRC) by the University Grants Commission of Pakistan. The KRC will be responsible for co-ordinating the research work conducted in the Karakoram by future researchers; see Volume 2.

The varied scientific programmes undertaken were supported by many national and international bodies, listed elsewhere, but a special mention must be made of Academia Sinica, Beijing and the Ministry of Science and Technology, Islamabad who joined the Royal Geographical Society in sponsoring the venture. These three together with The Overseas Development Administration of the UK Government and the British Council initially made the project a reality and finally an international success in scientific collaboration.

K. J. Miller  
Leader of the  
International Karakoram Project

Sheffield 1982

Other publications related to the International Karakoram Project: Continents in Collision, 212 pp, K.J. Miller, ISBN 0 540 010669. George Philip and Son Ltd. London.

## Preface to Volume 1

This volume contains a unique set of inter-related technical papers. The text, supported by 55 figures, 62 maps, 44 photographs, 58 graphs and 36 tables of data, is a record of a conference at which, for the first time, scientists from many countries gathered together to discuss the multi-disciplinary problems created within, and by, the Karakoram and neighbouring high mountain ranges. Here are the world's largest glaciers outside the polar regions, the greatest precipices on the land-surface of the earth, the most rapidly changing topography known to man, and the greatest concentration of 7000 m peaks.

Furthermore, although the conference concerned itself predominantly with the earth sciences and the conditions of human life amidst an unimaginable chaotic landscape, a most important aspect of the meeting was to discuss recent scientific and technological developments that could assist the many programmes of research to be conducted during the course of the International Karakoram Project (IKP).

As the conference progressed a third and most important feature developed, namely the interaction between members of various teams. Usually an expedition to the Karakoram is limited in time and manpower because of finance, weather and logistical problems, but this large scale venture permitted, for example, geomorphologists to discuss transient landforms with the housing and natural hazards team examining the optimal siting of buildings. This second team in turn necessarily involved itself with earthquake studies whilst the seismology team interacted with the surveyors measuring surface deflections of tectonic plates. Similarly the glaciologists discussed modern survey systems to measure the dangerous movements of the immense glaciers that threaten the day-to-day pattern of existence of the indigenous population. Thus it can be seen that the conference allowed a full circle of debate to take place between all the scientists involved with the project and the many other experts who attended the conference as delegates. There were many varied forms of interactive discussions, some based on the usefulness of specific sets of data to the different groups of investigators, some based on the requirement to develop similar and collaborative, data-collecting techniques, while some discussions were concerned with methods of data analysis and their comparison.

Another important thread which passes through these proceedings is one related to the history of the Karakoram and many papers present a review and bibliography of man's knowledge of the Karakoram Range, thereby forming a datum for future work. Papers such as the analysis of the 1913 trigonometrical survey linking the grids of the Indian subcontinent to that of the USSR to form the greatest land survey network on earth is of note, particularly since the 1913 link is now known to have crossed the suture zone between the Eurasian and Indian tectonic plates. Other examples are the papers by the Chinese members who have briefly and succinctly presented many of their own long-awaited results from extensive research programmes in and around the Karakoram between 1974 and 1976.

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This volume also presents details on modern systems, equipment and techniques for investigating difficult problems in the earth sciences and which were to be employed in the Karakoram, many for the first time. Additional information is presented that relates to other parts of the world but which have an important bearing on the initiation of specific Karakoram studies, e.g., the first ever recording and presentation of depth profiles of wet ice of temperate glaciers and ice caps. A few papers discuss problems of great concern to all mankind, problems that, once solved, will bring benefits to the peoples of the Karakoram.

The importance of the conference and these proceedings can perhaps best be judged from the opening speeches made by the President of Pakistan, General Zia-ul-Haq, and Lord Shackleton to whom we are indebted for their assistance in the entire Project as well as their attendance at the conference. Lord and Lady Hunt together with the British Ambassador, Oliver Forster and the staff of the British Council also gave valuable assistance throughout the period of the IKP. Finally a special mention and our grateful thanks must be awarded to Dr S. A. R. Jafree of Quaid-i-Azam University who organised the conference on behalf of the International Karakoram Project.

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22–25 June 1980

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**Conversion Units**

To convert from	to	multiply by
inch	metre (m)	$2.54 \times 10^{-2}$
foot	metre (m)	$30.48 \times 10^{-2}$
mile	kilometre (km)	1.609
pound force	newton (N)	4.448
kilogram force	newton (N)	9.807
kilogram force/metre <sup>2</sup>	pascal (Pa)	9.807
pound mass	kilogram mass (kg)	$4.536 \times 10^{-1}$
pound force/in <sup>2</sup>	pascal (Pa)	$6.895 \times 10^3$
torr	pascal (Pa)	$1.333 \times 10^2$
bar	pascal (Pa)	$1 \times 10^5$
angstrom	metre (m)	$1 \times 10^{-10}$
calorie	joule (J)	4.184
foot-pound	joule (J)	1.356
degree Celsius	kelvin (K)	$T_K = T_C + 273.15$

Multiplication factor	Prefix	Symbol
$10^{-12}$	pico	p
$10^{-9}$	nano	n
$10^{-6}$	micro	$\mu$
$10^{-3}$	milli	m
$10^3$	kilo	k
$10^6$	mega	M
$10^9$	giga	G