Report GD-29: Bibliography on the Hydrology of the Himalaya-Karakoram Region
by Gordon J. Young and Bhanu Neupane

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About the World Data Center System

The World Data Center System

The World Data Centers (WDCs) were established in 1957 to provide archives for the observational data resulting from the International Geophysical Year (IGY). In 1958 the WDCs were invoked to deal with the data resulting from the International Geophysical Cooperation 1959, the one-year extension of the IGY. In 1960, the International Council of Scientific Unions (ICSU) Comite International de Geophysique (CIG) invited the scientific community to continue to send to the WDCs similar kinds of data from observations in 1960 and following years, and undertook to provide a revised Guide to International Data Exchange for that purpose. In parallel, the CIG inquired of the IGY WDCs whether they were willing to treat the post-IGY data; and with few exceptions, the WDCs agreed to do so. Thus the WDCs have been serving the scientific community continuously since the IGY, and many of them archive data for earlier periods.

In November 1987 the International Council of Scientific Unions (ICSU) Panel on World Data Centers prepared a new version of the Guide to International Data Exchange, originally published in 1957, and revised in 1963, 1973 and 1979. The new publication, Guide to the World Data Center System, Part I, The World Data Centers (General Principles, Locations and Services), was issued by the Secretariat of the ICSU Panel on World Data Centers. This new version of the Guide contains descriptions of each of the twenty-seven currently operating disciplinary centers, with address, telephone, telex, and contact persons listed. The reader is referred to the new Guide for descriptions of the responsibilities of the WDCs, the exchange of
data between them, contribution of data to WDCs, and the dissemination of data by them. The WDCs for Glaciology are listed below.

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<td>University of Colorado</td>
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<td><strong>Telefax:</strong> (303) 492-2468</td>
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<td><strong>e-mail:</strong> <a href="mailto:nsidc@nsidc.org">nsidc@nsidc.org</a></td>
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<td><strong>Director:</strong> Roger G. Barry</td>
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<td><strong>e-mail:</strong> <a href="mailto:ojm21@cus.cam.ac.uk">ojm21@cus.cam.ac.uk</a></td>
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<td><strong>Manager:</strong> Oliver J. Merrington</td>
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Additionally, the World Glacier Monitoring Service provides international data services including data analyses and preparation of specialized data products. It merges the previous activity of the Permanent Service on the Fluctuations of Glaciers and the Temporary Technical Secretariat for World Glacier Inventory. These activities are not part of the WDC system but the center cooperates with WDCs in the discipline. Users wishing assistance in seeking data or services from this group may contact an appropriate WDC.

**World Glacier Monitoring Service (WGMS)**

Dr. W. Haeberli  
Section of Glaciology  
VAW/ETH, ETH Zentrum  
8092 Zürich SWITZERLAND

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**Bibliography on the Hydrology of the Himalaya-Karakoram Region: Foreword**

In 1982, WDC-A published a bibliography of glacial hydrology prepared by a Working Group of the International Commission on Snow and Ice, chaired by Professor Gordon Young, who also edited *Glaciological Data, Report GD-12*. The current issue represents a continuation of this focus. Snow and ice cover in the Karakoram-Himalaya play a dominant role in the hydrology of south Asia through their contribution to water supply, hydropower installations, and water-related hazards including river and glacier-lake outburst floods, and snow avalanches. Apart from hydrological considerations, Himalayan snow cover extent is a factor in the strength and timing of the Indian summer monsoon. The recession of glaciers in the Karakoram-Himalaya is also a significant component of the contribution of mountain glaciers to global sea-level rise.

We therefore welcome the compilation of this bibliography by Gordon Young and Bhanu Neupane and their contribution to its publication in this series. Thanks are due to Ann Brennan for editorial work, Carol Pedigo for word processing support, and Mike Meshek for HTML formatting of the bibliography for this WWW version.

*Roger G. Barry*  
Director, National Snow and Ice Data Center  
WDC-A for Glaciology
Bibliography on the Hydrology of the Himalaya-Karakoram Region: Preface

Sources

In order to compile this bibliography, a wide range of sources was extensively searched and referenced. These sources include books, journals, dissertations, reports and multi-media systems. The bibliography particularly relied on the individual collections of faculty members and students of Wilfrid Laurier University (WLU), various bibliographic updates of Cold Regions Research Centre of WLU, and the publications of institutions directly or indirectly related with the snow and ice hydrology of the Himalaya-Karakoram mountain ranges. Institutional sources include: World Data Centers for Glaciology in Lanzhou, China (WDC-D), and in Boulder, Colorado, USA (WDC-A); Japanese Society on Snow and Ice, Nagoya, Japan; Water and Power Development Authority (WAPDA) Pakistan; and Water and Energy Commission Secretariat (WECS) and International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal.

The major book sources include, International Association of Hydrological Sciences (IAHS) publications, various scholarly accounts of scientific expeditions as well as bilateral and multi-lateral works on the snow and ice hydrology of Himalaya-Karakoram. The major journal sources include: *Annals of Glaciology; Bulletin of Glacier Research; Zeitschrift für Gletscherkunde and Glazialgeologie; Journal of Glaciology; Seppyo;* Italian journals on high mountain hydrology; *Mountain Research and Development;* and the Chinese journals of *Academia Sinica.* Among multi-media sources, the internet news magazine *Himnet*, especially its endnote, Arctic and Antarctic Region CD-ROM, and GEO-Ref CD-ROM contributed to a significant number of records in the bibliography.

Organization of the Bibliography

The references are presented separately for the Himalaya and Karakoram mountain ranges. Within each of these major sections there are sub-sections as described in the table of contents. There is some overlap between the major sections and considerable overlap between the sub-sections.

The main stem of the Indus river has been taken as the basis for separating the two mountain ranges. References pertaining to upper-Indus basin and Nanga Parbat appear in both the Himalaya and Karakoram sections. General records, such as those written on the hydrology of the South-Asian mountains or those without clear distinction, also appear in both the sections. References pertaining to the catchments on the north slopes of the Himalaya and the Karakoram are included.

Acknowledgements

This bibliography has been compiled through the efforts of many individuals over several years. In particular we acknowledge the considerable contributions of Professor Kenneth Hewitt, Chris Bradley, Robert A. Metcalfe, Cameron Chadwick, Richard Pyrce and Corinne Schuster.

*Gordon J. Young and Bhanu Neupane*
Cold Regions Research Centre
Wilfrid Laurier University
1.1 General References on Himalayan Hydrology


1.2 Climate of the Himalaya


1.3 Snow and Ice of the Himalaya


Church, J.E. Himalaya co-operative snow surveys. Science and Culture, 13(5): 174-177.

Church, J.E. Snow seeking in the Himalaya (Home of snow). Science and Culture, 13(3): 82-86.


Wadia, D.N. (1941) Pleistocene Ice Age deposits of Kashmir. (In: *Proceedings of the National Institute of Science India, Vol. 7*. Mimeograph.)


Zhang, S., Zhang, Q., Xie, Z. and Zen, Q. (1973) Distribution of deuterium and heavy water in the ice and snow meltwater in the region of Mt. Qomolangma in southern part of the Xizang Autonomous Region, China. *Scientia Sinica*, no. 9: 4-27.
1.4 Glacier Studies in the Himalaya


Dainelli, G. (1933) Buddhists and Glaciers of Western Tibet. Bologna, Italy.


Müller, F. (1980) Present and late pleistocene equilibrium line altitude in the Mt. Everest Region - An application of the glacier inventory. (In: Clarke, R.T., ed. *International Workshop*


1.5 Hydrology of the Himalaya


Lausanne, Switzerland, 27 August-1 September 1990. International Association of Hydrological Sciences. IAHS/AISH Publication. no. 193: 777-784.)


Salomonson, V. V. and N. H. MacLeod (1989) Nimbus hydrological observations over the watersheds of the Niger and Indus Rivers. In: Fourth Annual Proceedings, Earth Resources Review, Doc. no. MSC 05937: 5.1-5.11. NASA: US.


1.6 Water Related Hazards in the Himalaya


Starkel, L. (1972) The role of catastrophic rainfall in the shaping of relief of the lower Himalaya (Darjeeling Hills). *Geographica Polonica, 21:* 103-143.


1.7 Water Resources in the Himalaya


Hewitt, K. (1987) Himalayan Glaciers and snowfields: research into a major water resource. Report to IDRC:


1.8 Secondary Readings on Himalayan Hydrology


Blandford, W.T. (1878) *Scientific results of the Second Yarkland Mission; based upon the collections and notes of the late Ferdinand Stoliczka.* Calcutta.


Bruce, C.G. (1907) *In the footsteps of Marco Polo, being an account of a journey from Simla to Pekin.* Edinburgh.


Bruce, C.G. (1910) *Twenty Years in the Himalaya.* London.

Burnes, A. (1839) *A memoir of a map of the Eastern Branch of the Indus, giving an account of the alterations produced in it by the earthquake of 1819 and the bursting of the dams in 1826; etc.* Bombay.


Cunningham, J.D. (1848) Journal of a trip through Kulu and Lahul to the Chu Mureri Lake in Ladak, during the months of August and September 1846. *Journal of the Asiatic Society of Bengal*, 18: Part I: 45.


Dainelli, G. (1924) Il limite delle nevi nel bacino superiore dell'Indo (Caracorum e Himalaya Occidentale. (In: *Recueil de travaux de fort a M.Journal Cvijic par ses amis et collaborateurs etc.*, Belgrade.)


Forster, G. (1808) *A journey from Begal To England, through the northern part of India, Kashmire, Afghanistan and Persia, and into Russia by the Caspian Sea*. Faulder: London.


Fraser, D. (1820) *Journal of a Tour through part of the Snowy Range of the Himalaya mountains and to the sources of the rivers Jamna and Ganges*. London.


Fraser, J.B. (1820) Account of a journey to the sources of the Jumna and Bhagirathi rivers. *Asiatic Researches*, 13: 170 et. seq.


Henderson, G. and Hume, A. O. (1873) Lahore to Yarkland. Incidents of the Route and Natural history of the countries traversed by the expedition of 1870 under F.D. Forsyth. Reeveex: London.


Hora, S.L. (1939) The origin of the great river gorges of the Himalayas as evidenced by the distribution of fishes. (In: 25th Indian Science Congress, India.)


Macpherson, J. (1854) The mineral waters of India, with some hints on spas and Sanatoria. Indian Annals of Medical Science, 7-17.


Oswald, F. (1910) *Trans-Himalaya and Tibet*. *Science Progress*, no. 17:


Pratt, J.H. (1860) On the physical difference between a rush of water like a torrent down to a channel and the transmission of a wave down a river - with reference to the inundation of the Indus as observed at Attock in August, 1858. *Journal of the Asiatic Society of Bengal*, 29: 274-282.


### 2.1 General References on Karakoram Hydrology


2.2 Climate of the Karakoram


2.3 Snow and Ice of the Karakoram


Priest, J.E. (1936) Snow surveys in West Pakistan water resources development. (In: *Proceedings of the 30th Western Snow Conference*, Cheyenne, WY, April 1962, 40. Cheyenne, WY.)


### 2.4 Glacier Studies in the Karakoram


Dainelli, G. (1923) I ghiacciai del Caracorum. *La Terra e la Vita.*


Dainelli, G. (1933) *Buddhists and Glaciers of Western Tibet*. London.


Visser, C. (1931) *Door de Bergwoestijnen van Azie*. Rotterdam.


2.5 Hydrology of the Karakoram


Central Board of Irrigation, India (1948) Some features of precipitational variations in the Upper Indus Catchment - A probability method of Approach. 93-111. Annual Report, Central Board of Irrigation: India.


Salomonson, V.V. and MacLeod, N.H. (1989) Nimbus hydrological observations over the watersheds of the Niger and Indus Rivers. In: Fourth Annual Proceedings, Earth Resources Review. 5.1-5.11. NASA Doc. no. MSC 05937: US.


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Burnes, A. (1839) *Travels into Bokhara; etc., Chapter 9 on the Sources of the Ind*. John Murray: London.


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