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**Cover illustration** Imja Glacier and the moraine-dammed Imja Lake in the Khumbu Himal region, Nepal, 4 October 2010. The two peaks beyond the end of the lake are Toboche (6501 m) and Cholatse (6440 m). Photograph by Jeffrey S. Kargel, University of Arizona.

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Glaciology in High Mountain Asia



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# PREFACE

In March 2015, the International Glaciological Society (IGS) convened an international symposium on glaciology in High Mountain Asia (HMA) in Kathmandu, Nepal, with the support of the International Centre for Integrated Mountain Development (ICIMOD). As demonstrated in both the symposium and this associated thematic issue of the *Annals of Glaciology*, glaciology in the HMA region necessarily covers an impressive range of topics in both breadth and depth, and demonstrates strong interdisciplinarity and inventiveness. In a heavily populated region where the headwaters of nearly all major rivers originate in glacierized basins, field-based and remote-sensing observations are combined with modelling and sensitivity studies. Meteorology, climatology and hydrology are incorporated into studies of past, present and future glacier change.

In light of the magnitude 7.8 earthquake that hit Nepal on 25 April 2015, we dedicate the symposium and the thematic issue of the *Annals* to both the victims and the survivors of the tragedy. This preface offers a brief summary of the symposium and the thematic issue, and provides broad recommendations for future glaciological research in the region.

The IGS symposium highlighted advances in glaciology with a particular focus on the glaciers of High Mountain Asia, which includes the Himalaya, the Karakoram, the Hindu Kush, the Pamirs, the Tien Shan, the Altai and the Tibetan Plateau. HMA glaciers were a notable 'blank spot' in the 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change, and while some research had been conducted in time for the IPCC's Fifth Assessment Report in 2013, there had not been a scientific symposium focused specifically on the glaciers of the region.

With an innovative conference format that included less formality and more time for discussions and synthesis, networking opportunities, and fantastic science, the Kathmandu symposium has had a major impact on the science of glaciology in the region (Qiu, 2015). It has also provided an attractive template for future scientific symposia. The final programme reflected the inputs of the scientific steering committee, the local organizing committee, and the work of Michelle Laurie, a meeting facilitation consultant engaged by ICIMOD.

From 1 March to 6 March 2015, 245 scientists, researchers and students from 27 countries gathered at the Yak and Yeti Hotel in Kathmandu for the IGS Symposium on Glaciology in High Mountain Asia. Students made up 40% of the participants, and nearly half were from the HMA region (Bhutan, China, India, Kazakhstan, Kyrgyzstan, Nepal, Pakistan). A breakdown of the registration statistics is as follows:

- Number of participants, 245
- Number of students, 98
- Number of female participants, 67
- Number of students with travel support, 62
- Number of countries represented, 27
- Number of regional (HMA) participants, 120.

The conference programme included 65 oral presentations and 160 poster presentations spread over five days. A midweek Open Spaces session on Wednesday morning, where session proposals were solicited on the spot and organized into a series of parallel group discussions, generated lively discussions and interactions in a novel format. Other events included a pre-symposium Media Panel and a Young Scientist panel discussion (1 March), a reception and dinner hosted by ICIMOD (1 March), a public screening of the documentary *The Himalayas: The Abode of Snows* followed by a question-and-answer session (4 March), and the IGS Reception Dinner and International Association of Cryospheric Sciences student presentation awards (5 March).

A speaker policy was adopted by the local organizing and scientific steering committees to guide the selection of oral presenters. The policy aimed to reflect both the gender balance and geographic distribution of the conference participants, and to encourage students and early-career scientists. How did we do? Of the 65 scheduled presentations, 39% were given by residents of ICIMOD member countries (versus 48% of registrants). Some 32% of the talks were given by females (versus 27% of registrants), and 35% of the talks were given by students (versus 40% of registrants).

Student travel support totalling more than US\$30 000 was provided to 62 participants, with funds donated by regional and international organizations. A full list of student travel support donors is given below.

The International Association of Cryospheric Sciences (IACS) and the IGS provided prizes for outstanding student presentations (oral and poster). The award for best oral presentation was given to Philip Kraaijenbrink of Utrecht University, for his talk on 'Multi-temporal monitoring of debris-covered glacier surfaces using unmanned aerial vehicles'. The award for best poster went to Martina Barandun of the University of Fribourg for her presentation entitled 'Re-analyzing seasonal mass balance observations at Abramov Glacier, Kyrgyzstan, from 1968 to 2013'.

Honourable mentions for best student presentations were given to Mohd Farooq Azam (National Institute of Hydrology, Roorkee, India); Evan Miles (Cambridge University, United Kingdom); and Désirée Treichler (University of Oslo, Norway). These awards were presented by Andrew Mackintosh, Secretary General of IACS, and Doug MacAyeal, President of the IGS, at the final reception dinner.

A total of 97 manuscripts were submitted to be considered for publication in volume 57, issue 71 of the *Annals of Glaciology*. Of these, 59 were rejected and 38 were accepted. Of the 138 authors of accepted papers, 49 were conference registrants; 31 of the accepted papers were written by registrants. Although there are no ice sheets, ice shelves or sea ice in High Mountain Asia, the breadth and depth of much of glaciology are exemplified by the papers that appear elsewhere in this issue. The subjects addressed include land-terminating glaciers, lake-terminating glaciers, glaciers both free of debris and covered by debris, glaciers <1 km<sup>2</sup>, and regions occupied by thousands of km<sup>2</sup> of ice cover. There are papers on avalanches, snow cover, lake ice, glacier meltwater runoff and sediment transport, glacial landforms and permafrost. The relations between glaciers and their climatic forcing, both past and future, are represented, as are the monitoring of glacier change and the implications of glaciers and glacier changes for the safety and wellbeing of communities and of global society.

Glaciological research in High Mountain Asia will continue to be of high importance in the future. For successful and fruitful research that benefits those directly affected by glaciers and especially by glacier change, the following factors should be considered:

1. Regional and international cooperation and collaboration and data sharing in a data-sparse region
2. Integration of field-based monitoring, remote sensing, and modelling studies to maximize our understanding of both processes and regional patterns
3. Scientific transparency and rigour to ensure that results are robust, and can be used to inform public policy
4. Enhancement of the capacities and skills of regional students and researchers to ensure that scientific progress is led by those from the region

Conference funding and student travel support was provided by ICIMOD and its core donors (Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, Pakistan) and the Government of Norway through its support of the ICIMOD Cryosphere Initiative. Additional student travel support was graciously provided by: L'Institut de Recherche pour le Développement (IRD; France); Laboratoire d'Etude des Transferts en Hydrologie et Environnement (LTHE; France); Labex OSUG@2020 (Observatoire des Sciences de l'Univers de Grenoble; Investissements d'avenir – Agence Nationale de la Recherche; France); Department for International Development (DFID; United Kingdom); United Nations Development Program (UNDP) Pakistan; and the Divecha Centre for Climate Change (India). The International Association of Cryospheric Sciences is gratefully acknowledged for sponsoring the student presentation awards. The views and interpretations in this publication are those of the authors and they are not necessarily attributable to their organizations.

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