

---

# Mountain Mapping and Visualisation

---

Proceedings of the  
6<sup>th</sup> ICA Mountain Cartography Workshop  
11 – 15 February 2008, Lenk, Switzerland





---

# Mountain Mapping and Visualisation

---

Proceedings of the  
6<sup>th</sup> ICA Mountain Cartography Workshop  
11 – 15 February 2008, Lenk, Switzerland



## **Workshop Organisation**

Institute of Cartography, ETH Zurich, Switzerland.  
[www.karto.ethz.ch](http://www.karto.ethz.ch)

## **Organising Committee**

Lorenz Hurni, Christian Häberling, Bernhard Jenny, Melanie Kunz,  
Anna Leonowicz, Christophe Lienert, Stefan Räber, Olaf Schnabel, Adrian Weber.  
Institute of Cartography, ETH Zurich, Switzerland.

## **Cover Picture**

Figure of the prototype Atlas of Switzerland 3. The image shows a virtual 3D panorama of the Wildstrubel massive, Bernese Oberland, seen from the Lenk valley. © 2008 swisstopo / ETHZ (BA2008RG)

---

# Edition Notice

---

## **Publisher**

ETH Zurich  
Institute of Cartography  
Wolfgang-Pauli-Strasse 15  
CH-8093 Zurich  
Switzerland  
e-mail: [hurni@karto.baug.ethz.ch](mailto:hurni@karto.baug.ethz.ch)  
phone: +41 44 633 30 33 / 34  
fax: +41 44 633 11 53  
[www.karto.ethz.ch](http://www.karto.ethz.ch)

## **Editorial Board**

Lorenz Hurni, Karel Kriz

## **Design / Technical Editors**

Stefan Räber, Robin Loop

## **Print**

Reprozentrale Höggerberg,  
CH-8093 Zurich, Switzerland

## **Bindery**

Pagina AG,  
CH-8353 Hittnau, Switzerland

## **Financial Support**

International Cartographic Association,  
[www.icaci.org](http://www.icaci.org)

## **ISBN**

978-3-033-01884-6

## **Note**

ICA Commission on Mountain Cartography assumes no responsibility for material, manuscript, photographs or artwork. This current issue is your personal copy. An electronic edition is available online at [www.mountaincartography.org](http://www.mountaincartography.org).  
© 2008 ICA Commission on Mountain Cartography

## Foreword

### Dear readers,

I am very pleased to present you the proceedings of the 6<sup>th</sup> International Mountain Cartography Workshop "Mountain Mapping and Visualisation". The symposium was held under the auspices of the Commission on Mountain Cartography of the International Cartographic Association (ICA – ACI) and took place at Lenk/Simmental (Switzerland) from February 11 to 15, 2008. It was organised by staff members of the Institute of Cartography at ETH Zurich.

The Commission on Mountain Cartography of ICA evolved from a working group of the German Society of Cartography in 1999. Since then, a very successful series of 6 bi-annual workshops were organised. It is in the nature of things that the symposia could always take place in a splendid mountain environment: at Bielerhöhe/Silvretta (Austria) in 1998, Rudolfshütte/Hohe Tauern (Austria) in 2000, Mount Hood/Oregon (USA) in 2002, Vall de Núria/Catalonia (Spain) in 2004, Bohinj (Slovenia) in 2006, and Lenk (Switzerland) in 2008.

As in the preceding workshops, most of the contributions in this volume belong to one of two major topic groups: a substantial part of the papers deals with cartographic, i.e. design-related aspects of mountain cartography. The special morphology, natural phenomena and land cover, but also the utilisation by men represents a special challenge for cartographers when visualising mountainous areas. The contributions in this volume demonstrate the application of existing techniques, as well as the further development of methods of relief representation on various media like paper, computer screen and mobile devices. Beside the cartographic visualisation methods, a second group of papers deals with methods of mapping and analysis of natural man-influenced spatially-related phenomena and processes in mountains. Here, too, the adequate cartographic representation of investigation results plays an important role, because it represents the interface to the addressee, i.e. the map reader. I hope that this volume demonstrates especially to scientists the added value of cartographic visualisations designed in a user-friendly manner.

Beside the organisers of the workshop, I would express my sincere thanks to the Swiss Society of Cartography and many others for supporting the workshop. The following members of the Commission on Mountain Cartography of ICA were reviewing the conference abstracts: Christian Häberling, Karel Kriz, Tom Patterson, Maria Pla and Dušan Petrovič. The editorial work of the volume was carried out by Christian Häberling, Bernhard Jenny, Melanie Kunz, Corina Pachlatko and Adrian Weber of the Institute of Cartography at ETH Zurich. A very special "Merci!" goes to Stefan Rüber for the overall editorial work and for the diligent layout and design of this publication.

### Liebe Leserinnen und Leser

es freut mich, Ihnen mit diesem Band die Beiträge des 6. Internationalen Gebirgskartografie-Workshops unter dem Motto „Mountain Mapping and Visualisation“ vorstellen zu dürfen. Das unter der Schirmherrschaft der Kommission für Gebirgskartografie der Internationalen Kartografischen Vereinigung (ICA) stehende Symposium mit rund 60 Teilnehmenden fand vom 11. bis 15. Februar 2008 an der Lenk im Simmental (Schweiz) statt. Es wurde von einem Team aus Mitarbeiterinnen und Mitarbeitern des Instituts für Kartografie der ETH Zürich organisiert.

Die Kommission für Gebirgskartografie der ICA ging 1999 aus einer Arbeitsgruppe der Deutschen Gesellschaft für Kartografie hervor. Seither konnten im Zweijahres-Rhythmus sechs äusserst erfolgreiche Workshops durchgeführt werden. Es liegt in der Natur der Sache, dass diese immer in einer prächtigen Gebirgsumgebung stattfinden konnten: 1998 auf der Bielerhöhe/Silvretta (Österreich), 2000 in der Rudolfshütte/Hohe Tauern (Österreich), 2002 am Mount Hood/Oregon (USA), 2004 im Vall de Núria/Katalonien (Spanien), 2006 in Bohinj (Slowenien) und 2008 an der Lenk (Schweiz).

Wie bereits in den vorangegangenen Workshops können die meisten Beiträge in diesem Band einer von zwei Hauptgruppen zugeordnet werden: Ein wesentlicher Teil der Papers beschäftigt sich mit kartografischen, d.h. vor allem gestalterischen Aspekten der Gebirgskartografie. Die Beiträge in diesem Band zeigen sehr schön die Anwendung bestehender Techniken aber auch die Weiterentwicklung von Methoden der Geländedarstellung auf verschiedensten Medien wie Papier, Bildschirm und portablen Geräten auf. Neben der kartografischen Visualisierung werden in einem zweiten Schwerpunkt Methoden der eigentlichen Kartierung und Analyse von natürlichen und durch den Menschen beeinflussten raumbezogenen Phänomenen und Prozessen im Gebirge behandelt. Ich hoffe, dass dieser Band insbesondere Wissenschaftlerinnen und Wissenschaftlern den Mehrwert qualitativ hochstehender, benutzergerecht gestalteter kartografischer Visualisierungen aufzeigt.

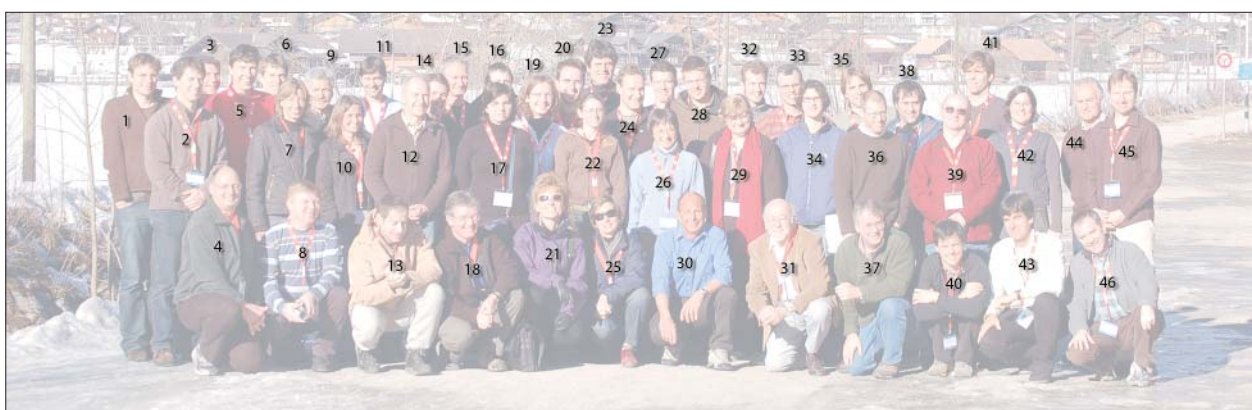
Neben den Organisatorinnen und Organisatoren des Workshops möchte ich der Schweizerischen Gesellschaft für Kartografie und weiteren Personen für die Unterstützung bei der Durchführung des Workshops danken. Folgende Mitglieder der Kommission für Gebirgskartografie der ICA haben die Begutachtung der Abstracts besorgt: Christian Häberling, Karel Kriz, Tom Patterson, Maria Pla und Dušan Petrovič. Bei der Redaktion des Bandes haben Christian Häberling, Bernhard Jenny, Melanie Kunz, Corina Pachlatko und Adrian Weber vom Institut für Kartografie der ETH Zürich mitgewirkt. Ein ganz spezielles "Merci!" geht an Stefan Rüber für die Gesamtedaktion und die sorgfältige Gestaltung des vorliegenden Werkes.



Prof. Dr. Lorenz Hurni



## Group Photo



- |                           |                          |                          |
|---------------------------|--------------------------|--------------------------|
| 1 – Alexander Thimm       | 17 – Gabriela Ilies      | 33 – Alex Tait           |
| 2 – Richard Ladstädter    | 18 – Alastair Pearson    | 34 – Michaela Kinberger  |
| 3 – Igor Drecki           | 19 – Constantin Beyer    | 35 – Adrian Weber        |
| 4 – Christian Häberling   | 20 – Loïc Gondol         | 36 – Martin Gamache      |
| 5 – Dušan Petrovič        | 21 – Blanca Baella       | 37 – Tom Patterson       |
| 6 – Bernhard Jenny        | 22 – Sabine Stäuble      | 38 – Guillaume Fortin    |
| 7 – Claudia Trochsler     | 23 – Peter Jordan        | 39 – Tibor G. Tóth       |
| 8 – Marin Ilies           | 24 – Olaf Schnabel       | 40 – Juan Ignacio Galera |
| 9 – Hans-Uli Feldmann     | 25 – Maria Pla           | 41 – Christophe Lienert  |
| 10 – Sandra Greulich      | 26 – Anna Leonowicz      | 42 – Melanie Kunz        |
| 11 – Arne Rohweder        | 27 – David Schobesberger | 43 – Karel Kriz          |
| 12 – Manfred Buchroithner | 28 – David Theler        | 44 – William Cartwright  |
| 13 – Jürg Gilgen          | 29 – Gizella Bassa       | 45 – Stefan Räber        |
| 14 – William E. McNulty   | 30 – Martin Gurtner      | 46 – Lorenz Hurni        |
| 15 – Roger Smith          | 31 – Toni Mair           |                          |
| 16 – Rafał Jońca          | 32 – Nathaniel V. Kelso  |                          |

### Not on the photograph:

- |                          |                          |                      |
|--------------------------|--------------------------|----------------------|
| 47 – Stefan Arn          | 52 – Ernst Hutzler       | 57 – Julien Vallet   |
| 48 – Costante Bonacina   | 53 – Kevin McManigal     | 58 – Giorgio Vassena |
| 49 – Jesus Miguel Garcia | 54 – Julita Petrovič     | 59 – Kirsten Wolff   |
| 50 – Berta Haselböck     | 55 – Blaž Petrovič       |                      |
| 51 – Helene Haselböck    | 56 – Oscar Schönenberger |                      |

For further information about paper authors see pages 281 – 286.

---

# Content

---

004 **Edition Notice**

005 **Foreword**

007 **Group Photo**

## Papers

011 **The Rwenzori Trekking GIS**

Costante Bonacina, Giorgio Vassena, Giuseppa Cipriano, Susanna Bulferetti, Bob Nakilesa

017 **Investigations into the Spatial Pattern of Annual and Interannual Snow Coverage of Brøgger Peninsula, Svalbard, 2000 – 2007**

Manfred F. Buchroithner, Nadja Thieme, Jack Kohler

023 **Evaluation of Cartographic Resources in Researching Landforms in High Mountains**

Igor Drecki, Justyna Żyszkowska

033 **Cartographic Analysis of Avalanche Hazard Maps**

Markus Eckerstorfer

041 **Charles Jacot-Guillarmod – One of the Pioneers of the Swiss Style of Rock Representation**

Hans-Uli Feldmann

049 **Multidate Mapping Approach to Determine Alpine and Subalpine Vegetation Variations on Mount Jacques Cartier, Quebec, Eastern Canada (1973 – 2004)**

Guillaume Fortin, Jean-Luc Pilote

057 **Mobile Mountain Mapping**

Juan Ignacio Galera, Jesus Miguel Garcia, Joaquín Ramirez

063 **Aerial Photos + Photogrammetric Plot = swisstopo's Rock Representation: Caricatured Mountains?**

Jürg Gilgen

071 **Cartography of High Mountain Areas**

Loïc Gondol, Arnaud Le Bris, François Lecordix

081 **The Swiss Alpine Club SAC and its Role in National Mapping**

Martin Gurtner

085 **Cartographic Mountain Relief Presentation**

Lorenz Hurni

093 **Rodnei Mountains Tourist Map**

Gabriela Ilies, Marin Ilies

097 **Automatic Scree Representation for Topographic Maps**

Bernhard Jenny, Ernst Hutzler

103 **Photogrammetric Map of the Tatra Mountains (1934) as an Example of Local Adaption of Swiss Style Cartography**

Rafał Jońca

107 **Designing the DEM of the Base of the Swiss Plateau Quaternary Sediments**

Peter Jordan

115 **Documentation of the Retreat of Gössnitzkees and Hornkees Glaciers (Hohe Tauern Range, Austria) for the Time Period 1997 – 2006 by Means of Aerial Photogrammetry**

Viktor Kaufmann, Richard Ladstädter



- 125 **Interdisciplinary Research in High Mountain Areas of North-East India**  
Michaela Kinberger, Karel Kriz, David Schobesberger
- 129 **Cartographic Design Issues Utilizing Google Earth for Spatial Communication**  
Karel Kriz
- 133 **Hazard Maps in Switzerland**  
Melanie Kunz, Lorenz Hurni
- 139 **Generating Hypsometric Layers from GTOPO30 for Small-Scale Mapping**  
Anna Leonowicz, Bernhard Jenny
- 147 **A Real-Time Flow Map of the Swiss 1:200,000 River Network**  
Christophe Lienert, Olaf Schnabel, Ernst Hutzler, Lorenz Hurni
- 155 **Creating a National Geographic-Style Physical Map of the World**  
Tom Patterson
- 163 **The Terrain Models of Joachim Eugen Müller (1752 – 1833) and the Production of the "Atlas Suisse par Meyer et Weiss"**  
Alastair Pearson, Martin Schaefer, Bernhard Jenny
- 171 **Web Application for Topographic Maps Changes Acquisition**  
Dušan Petrovič, Blaž Kovačič
- 177 **New Requirements for the Relief in the Topographic Databases of the Institut Cartogràfic de Catalunya**  
Blanca Baella, Maria Pla
- 185 **An Ambitious Relief Model Project**  
Stefan Räber, Lorenz Hurni
- 195 **Panoramic Maps Over the Years**  
Arne Rohweder
- 201 **Evaluating the Effectiveness of 2D vs. 3D Trailhead Maps**  
David Schobesberger, Tom Patterson
- 207 **Developing a 3D Dynamic Map of New Zealand's Backcountry**  
Roger Smith
- 211 **Historical Mapping for Landscape Reconstruction**  
Sabine Sträuble, Simon Martin, Emmanuel Reynard
- 219 **Mountain Ski Maps of North America**  
Alex Tait
- 227 **Mapping Sediment Transfer Processes Using GIS Applications**  
David Theler, Emmanuel Reynard
- 235 **ViViTo**  
Alexander Thimm, Christian Schmid, Ruedi Haller
- 241 **Accidental cARTographer**  
Tibor G. Tóth
- 249 **High Precision LiDAR Mapping for Complex Mountain Topography**  
Julien Vallet
- 255 **Use of NASA World Wind Java SDK for Three-Dimensional Accessibility Visualization of Remote Areas in Lao P.D.R.**  
Adrian Weber, Andreas Heinimann, Peter Messerli

## Abstracts

- 261 **Combination of Traditional Hill-Shading and Digital Cartography on Small Scale Maps**  
Gizella Bassa
- 263 **A Retrospective Look at National Geographic Magazine's Mountain Depictions in Maps, Panoramas and Perspective Views**  
Martin Gamache
- 265 **Building Smart Interactive Maps: Enabling Map Projections in Adobe Flash**  
Nathanial V. Kelso
- 267 **The Future of Terrain Presentation at National Geographic Magazine**  
William E. McNulty
- 269 **Rwenzori Meteo and Geodetic Network**  
Giorgio Vassena<sup>1</sup>, Gregorio Mannucci<sup>2</sup>, Giuseppa Cipriano<sup>2</sup>, Gustavo Corti<sup>2</sup>, Costante Bonacina<sup>3</sup>, Matteo Sgrenzaroli<sup>3</sup>, Bob Nakilesa<sup>4</sup>
- 271 **Mountain Mapping and DSM Generation Using High Resolution Satellite Image Data**  
Kirsten Wolff, Armin Gruen

## Reports

- 273 **Report of the 6<sup>th</sup> ICA Mountain Cartography Workshop**  
Christian Häberling, Lorenz Hurni
- 279 **A "Wild" Thing**  
Martin Gurtner
- 281 **Authors**