IAHS Newsletter

NL94 August 2009

The mouth of the Morteratsch Glacier (largest in the Bernina Range of the Bündner Alps) in Switzerland, where a conference on "Snow, Ice and Water in the Alpine Region – more topical than ever", was recently held. See report, page 9.

Status and Perspectives of Hydrology in Small Basins

The *International Workshop on Status and Perspectives of Hydrology in Small Basins* was held on the occasion of 60 years of hydrological measurements in the four small Bramke research basins in the Upper Harz Mountains, Germany. They were established in 1948, under extremely difficult financial and logistic conditions, by deeply committed researchers from the forestry administration and the Research Centre (now: Federal Institute) of Hydrology, concentrating successively on questions of forest hydrology. In the following decades miscellaneous projects of various universities, institutes and agencies were implemented.

The workshop was convened jointly by the Department of Hydrology and Landscape Ecology at the Technical University Braunschweig (TUBS), Germany and the German National Committee for the IHP of UNESCO and the HWRP of WMO, in cooperation with the European EURO FRIEND Project 5, *Continued on page 6*

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Hyderabad Convention *6–11 September 2009*

Invitation to all Young/Early Career Hydrologists to meet in Hyderabad to discuss what will make IAHS more attractive to them and others – see page 5.

Data and Information – glasshouses and the throwing of stones

There is an old English saying: "*People who live in glasshouses should not throw stones*". See the discussion after sessions on "Data for All" at the Fifth World Water Forum.

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Happy 90th Birthday IUGG

The International Union of Geodesy and Geophysics, IUGG, celebrated its 90th birthday in July this year. The Hydrology Section of IUGG, created in 1922, became IAHS, which has participated fully in IUGG activities ever since, along with the other member associations.

Article on page 12

Hydrological Sciences Journal (*HSJ*)

The IAHS journal, *HSJ*, will be published in partnership with a world leading publisher from January 2010, bringing benefits to authors, readers, and IAHS members. For a start, the online manuscript submission system goes live on 20 August. *See page 8*

A Note to Members *from Arthur Askew, IAHS President*

It is hard to believe that it is now well over four years since I took over the rôle of President of the Association from Kuniyoshi Takeuchi. Then we were all in Foz do Iguaçu, Brazil, halfway between the most productive hydroplant in the world and the greatest waterfall in the world and on top of one of the largest aquifers. A lot has happened in the meantime on the world's stage, both for good and for bad, and within the Association, overwhelmingly for good I am glad to report. This is a good note on which to step aside, as I will in a few weeks time, and hand the baton to my good friend and long-time colleague: Gordon Young.

One lasting impression that I will carry with me as I leave this post is the privilege I have had in heading an association in which the great majority of the work is done by individual hydrologists, nearly all on a voluntary basis. In the "old days" it was accepted that staff could spend a certain amount of time contributing to international projects because the outcome would in time benefit the whole hydrological community. Starting in the 1980s, we have seen a gradual but seemingly unstoppable shift away from this policy, or rather tradition. Now each employee must account for every hour spent against a set of funded projects: "If it doesn't make money, don't spend time on it". In the last few years, some international non-governmental organizations, in addition to paying travel and living expenses, pay experts just to attend meetings. It is now difficult even for United Nations agencies to obtain the contributions from countries on which they have traditionally relied. Under these circumstances, I am constantly impressed by the commitment that so many individual members have to the science of hydrology as evidenced by their contributions to IAHS. So I am keen to record my indebtedness to these members for their continued support, without which the Association could not function.

When I took over the Presidency from Kuni Takeuchi, I had no intention of introducing any revolutionary changes. I sought the views of members and came to the conclusion that things were in general going well. Based on the philosophy "if it's not broken, don't fix it", I proposed only a few changes to the way things were done. I will not claim for myself any great success in this regard. But I do take great pleasure in recording that, thanks to the efforts of others, the Association has continued to thrive.

The world in which the Association functions is constantly changing, and so we must repeatedly review our policies and practices to see how best to position ourselves to fulfil our objectives in each new situation. High-level meetings are now at last giving close and urgent attention to the growing shortage of freshwater resources; we find ourselves in the midst of a major revolution in technical publishing; and a number of other non-governmental organizations are showing an interest in hydrology. These are only three of the challenges we face. They could develop into serious problems, or they could be used to our advantage. Much will depend on how we, as an Association, respond. Gordon Young has sought advice as to how our members see the future of IAHS and I look forward with interest to the discussion of the main topics raised. Yes, some of them have been discussed twelve, eight or even as recently as four years ago, but they are still relevant and will benefit from a further airing.

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Edited by Cate Gardner

IAHS is a nongovernmental not-for-profit scientific organization dedicated to serving the science of hydrology and the worldwide community of hydrologists.

The Newsletter is distributed free of charge to members of IAHS. This Newsletter and previous issues may be downloaded from: *www.iahs.info*

Articles from IAHS members on all aspects of hydrology and related topics are welcomed for publication in the Newsletter. They should be sent to the IAHS Secretary General, Pierre Hubert, preferably to: *pjy.hubert@free.fr*, or to: IAHS, UMR Sisyphe, Université Pierre & Marie Curie, Case 105, 4 Place Jussieu, 75252 Paris Cedex 05, France

Advertisements may be placed in the Newsletter, or inserts may be mailed with it, at the discretion of the IAHS Secretary General. Contact: *cate@iahs.demon.co.uk*

The next IAHS Newsletter will be published in November/December 2009; copy deadline 31 October 2009.

Lectures by award-winning hydrologists – Japan Society of Civil Engineers International Contribution Award

Dr Andras Szollosi-Nagy, Deputy Assistant Director General of UNESCO, and Dr Kuniyoshi Takeuchi, Director of the International Centre for Water Hazard and Risk Management (ICHARM), were awarded the 2008 International Contribution Award by the Japan Society of Civil Engineers (JSCE) for their outstanding contributions to global water issues. To celebrate, the National Institute for Land and Infrastructure Management and the Public Works Research Institute jointly held a special lecture meeting on *Global Climate Change and Challenges in Water Management* on 29 May 2009 in Tokyo.

Dr Takeuchi spoke on *Disaster Management for Sustainable Well-being*, addressing "human empowerment" as a key concept in disaster management.

Dr Szollosi-Nagy discussed *Global changes and their impacts on water resources: new challenges and opportunities for civil engineers.* Noting the significance and difficulty of solving global water issues, he concluded by quoting the words of John. F. Kennedy: "Anybody who can solve the problems of water will be worthy of two Nobel Prizes, one for peace and one for science".

Message from the President-elect

from Gordon Young gordonyoung_wwap@yahoo.com

In the last newsletter I posed several questions concerning the future of our Association and since that time I have canvassed all members, including all officers of IAHS and its Commissions and Working Groups, all National Representatives and all individual members for their vision, opinions and suggestions on our future activities and ways of conducting our business.

The replies have been many and varied, reflecting the quite different circumstances and perspectives of the 5000 or so members. Here I attempt to summarize the main responses in order that you might consider them and further formulate your opinions before our discussion of them in Hyderabad.

Scientific mandate

- *Scientific direction* We do not cover all aspects of the science and there is a need for better inclusion of: (a) Climate change and variability as drivers of hydrology; (b) Ecology; (c) Urban hydrology; and (d) Mountain hydrology. It can be argued that all topics, including those mentioned, can be included within the present commission structure. Thus we need to discuss ways in which to clearly expand the present scope of topics considered.
- *Relevance of our science to society* There is a need to make our knowledge and understanding more clearly useful to societal problems. We should identify topics of direct relevance to society, realising that not all scientific topics are clearly relevant to societal needs. We might consider requesting all Commissions and Working Groups to give examples of how their work impacts society. We might consider having more symposia focusing on scientific contributions to societal needs, and we should more effectively communicate the outcomes of meetings to policy makers.

Basic structure of IAHS

- *Number of Commissions, Working Groups and Task Forces* There are divergent views here – some believe we have too many Comms and WGs, some too few to cover all aspects of our mandate. Noting that some Comms and WGs are relatively inactive, we might consider the need both for more Comms and WGs and/or amalgamation or even elimination of some.
- *Fundamental restructuring of Commissions, Working Groups* While some like the present structure, others express a need to consider a fundamental restructuring of IAHS. Should the Association be restructured to eliminate commissions and replace them with themes? Here we should be cautious of drastic change as it may destroy the Association. We might consider forming a high-level Task Force to seriously consider a fundamental restructuring with a view to action at the next IUGG Assembly in 2011.

Functioning of IAHS

- *Number and types of meetings* Some request a larger number of small meetings and conferences and more use of the Internet for contact between scientists. While we are fixed fairly firmly to our major assemblies every two years, and while many commissions have additional symposia, we might canvass younger scientists on the most effective forms of meetings and consider more use of the Internet for chat groups, etc.
- *Outputs from Commissions and Working Groups* We need to have clearer rules on expected mandates and outputs from Comms and clear mandates and timelines for all WGs and Task Forces. Some WGs have clearly not performed well and their continued existence should be questioned.

Involvement of individuals and groups

- *National Representatives* There is much concern here: NRs are appointed by countries with, usually, little input / advice from individuals. We need to draw up and distribute a clearer set of tasks and expectations for all NRs recognizing that conditions are very different from one country to another – expectations must be commensurate with abilities to undertake tasks – and we should consider providing each NR a listing of individual members within his/her country.
- *Involvement and motivation of young scientists* This is a very important concern and many believe that IAHS is not attractive for young scientists. We should examine techniques employed by other organizations within the ICSU structure and AGU and EGU. We should consider setting up a Task Force of younger officers to recommend how better to involve young scientists.
- *Involvement of individuals and institutions in developing countries* A major concern of scientists in those countries. This has always been a topic of high priority for IAHS and should remain such. We should try to ensure good representation from developing countries of scientists as officers of IAHS; seek more sources of funding for participation of developing country scientists in IAHS events; and continue to better disseminate IAHS literature.

Communications

- *Publications* There were few comments on publications as actions are already well underway. Much progress has already been achieved for *HSJ* and we continue to push for a resolution on the status of the Red Book series.
- *Newsletters* There were pleas from some for retention of hard-copy distribution, but appreciated that we must, to a large extent, go electronic. Newsletters are appreciated and content is generally regarded as very good. We should make sure that members are given email notice of electronic publications.
- *Website* While the content of the IAHS website has been improved dramatically over the last decade, some feel that there is still a need to revamp sections of it, particularly some of the sections dealing with Commissions and Working Groups. It would be relatively straightforward to improve these sections with marked and immediate benefits to IAHS. We should consider investing some IAHS funds into website development and we might engage a group of younger scientists to advise on the best way forward.

All these issues will be discussed at the IAHS Assembly in Hyderabad in September*. Officers of the Association and its Commissions and Working Groups will be encouraged to discuss the issues at the Bureau meetings of the Association. All participants at the Assembly are encouraged to take part in the plenary session of the Association and the plenary sessions of the Commissions, where the issues will again be discussed. All members are invited to respond by email to the President or to any of the officers of the Association so that the widest possible review of the issues can be achieved.

*See also, the invitation to young/early career hydrologists, p. 5

DATA AND INFORMATION – glasshouses and the throwing of stones

Over the last twelve months we have all looked askance as the financial system of the world has teetered on the brink of collapse. We have asked ourselves how such highly trained – and highly paid – experts could make such mistakes? Some clearly knew what was happening, but those in control simply would not listen to their warnings or did not believe what they were told.

How can they say that they did not understand? Surely they knew what it was they were investing in? Surely they had studied the past history of these financial instruments and understood their characteristics? Surely they had tested their economic models under extreme conditions, etc., etc.

There is an old English saying: "*People who live in glasshouses should not throw stones*". We now know that we all live in one vast atmospheric greenhouse but, I ask myself, do we hydrologists and water managers also live in glasshouses? So, should we beware of throwing stones at our financial colleagues? I suggest that at least we think carefully before we do so.

Firstly: do we really understand the natural aquatic environment? The more we uncover its infinite complexity, the more we realize how imperfect are our attempts to model and predict its behaviour. However, we need not hang our heads in shame. We can be proud of what we have learnt through our painstaking research and of the truly excellent work that is still being done to push back the frontiers of the sciences of hydrology and water management.

Secondly: do we truly know the nature of the water resources that we manage and in which we are investing so much time and money? Here we face a major problem, namely a serious lack of data and information. How can we draw up plans for the sustainable development of a water resource if we do not know how much water there is, or the quality of that water, or, in the case of groundwater, even where it is? There is a chronic shortage of the data and information that will allow us to answer these questions, and, the really bad news is that the situation is getting worse. How can we criticize financial mangers for investing millions in financial instruments that they did not know anything about, if we invest millions in projects for managing a water resource without first investing a few thousand in collecting the data we need to understand the resource? Well, maybe we can criticize those responsible, because we have been pleading for decades for the allocation of more funds to the collection of data, but without much success. So, while we cannot be proud of our achievements in data collection, we can be proud of what we have achieved in understanding and managing water resources given the few, and poor quality of, the data that we have at our disposal.

Thirdly, do we know enough about the past of the water resource we wish to develop? Here we face the age old curse of the need for long time series of data. A few kilometres from where I am writing this text (in Geneva) lies CERN – the European Organization for Nuclear Research – whose new machine, the Large Hadron Collider, should be re-started within the next few months. My friends at CERN tell me that within hours of its starting they should know whether it is working as planned; within days they should know whether it is capable of doing the task for which it was installed; and within months it might have made some of the scientific breakthroughs that we all await. In this, we can be very jealous of the physicists because it takes decades to collect enough climatological and hydrological data to design a good water project – and we cannot rush this. Time cannot be bought. Therefore, we simply have to insist that data collection is a long-term investment and impatience and big dollars late in the game cannot compensate for the lack of foresight.

Finally, do we understand the water-related disasters that cause so much death and destruction world-wide? Protection against any threat requires that we know and study "the enemy" – in this case, major floods and droughts. By definition, these are very rare beasts and to really understand their cause and nature we need many thousands of years of record. This is obviously out of the question and so we have to estimate what such a flood would be like by studying much shorter records. We have risen to this challenge and can offer sound advice for use in warnings and protective measures, but our ability to do a good job is directly related to the availability of long time series of data. We cannot start collecting the data when we see that you have a problem; by then we are already 30 years too late.

Over the past twelve years, the World Water Council has organized a series of World Water Fora at three-year intervals. They have covered the vast range of topics that are involved in the study and management of freshwater. However, even though the lack of data has frequently arisen in debate, it has not been possible in the past to get this problem onto the agenda. It was only in February 2008, when the final topics for the Fifth Forum were being agreed, that there was a "grass roots" appeal to devote some attention specifically to data, and IAHS was asked to take on the responsibility for convening the relevant sessions.

The Fifth World Water Forum was held in Istanbul, from 16 to 22 March 2009, during which a series of four sessions was devoted to the topic "Data for All". We invited WMO to join us as co-convenors.

It was recognized that every decision on freshwater, ranging from those related to complex hydrological processes to a choice of policy for water management, must logically be based on a set of knowledge which in turn is derived from information obtained by analysing data of some kind. Discussion therefore concentrated on reviewing the many types of data that are needed, whether or not they are available and if not, why not.

Also addressed was the need for data to be stored and analysed within a logical framework so that the necessary harmonization can be obtained and meaningful conclusions drawn as a basis for decision making. Time was also devoted to the vexed questions of why data collection is so low on the priority list and why so often there are limitations on the exchange of data and information at international and even national level.

There was one repeated message: the challenges to be faced in the water sector are growing, but the data available to provide the information to guide and monitor the responses are not; indeed in many regions, availability is decreasing. There is an inverted pyramid: a great deal of global activity supported on a very narrow data base.

The outcome of the sessions may be summarized as follows:

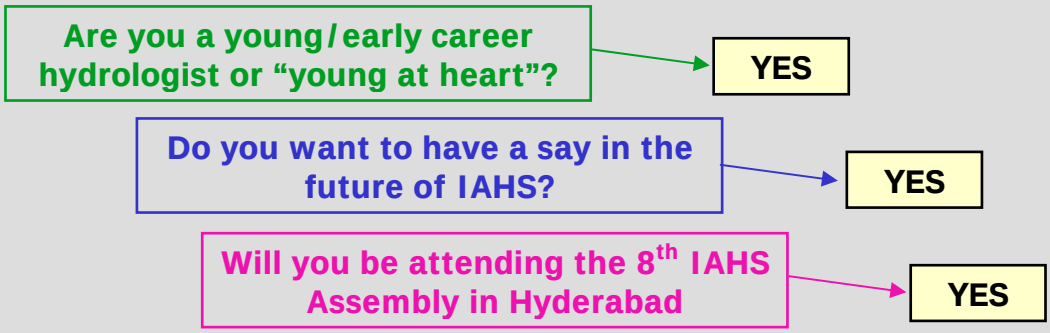
- The lack of integrated water data is a systematic impediment to informed decision making related to the sustainable use of water resources. Data are needed to provide information not just about water quantity, both on the surface and underground, but also about its quality, social and economic relations as well as environmental dimensions.
- Data collection and application must be elevated on the agendas of future high-level meetings, including the next World Water Forum.
- Data provision and interpretation should be demand driven and reflect the needs of different disciplines and different users at different levels.
- We need programmes that are clearly specified, well designed and adequately funded.
- We need agreed coherent frameworks to support national data collection and processing.
- We need strong legal and institutional agreements at country and regional level, encouraging cooperation and coordination, but this will only be helpful if we increase the resources for data collection, integration and dissemination.
- The role and contribution of the data suppliers should be recognised and they should receive systematic feedback.
- Those present agreed to work together to establish an on-going process, with clear goals and timelines, to bring together hydrologists, economists, social scientists and statisticians to promote the importance of data collection and exchange and strengthen coordination and co-operation between the institutions concerned.

I am not qualified to advise whether you should or should not throw stones at those so-called financial experts who have lost us our savings. That is for you to decide. On the second question, however, I do feel qualified to answer. Yes – we hydrologists and water managers certainly do live in glasshouses because we do not know all we need to in order to manage our water resources. On the other hand, we live behind reinforced glass because we have achieved considerable success in analysing situations and forecasting the future despite our shortage of data. More than this, we have constantly pleaded for increased support for the collection of the data and information that we need. So stones should not be thrown at us. In fact, I am not in favour of throwing stones at all; such actions rarely improve matters. Rather, I would appeal once again and with renewed force, to those who have the power to do so, to put support for data collection high on the agenda at national and international level, or accept responsibility for putting in jeopardy all efforts to manage water in a sustainable manner.

Now we must get on with establishing the on-going process referred to in the last bullet point above.

Arthur J. Askew

This article is also published in: *Asian Water* vol. 25(5), June 2009.



Then come along to the

IAHS Young/Early Career Hydrologists Meeting

WHEN? Wednesday 9th September, 17:15–19:00
WHERE? Hyderabad International Convention Centre (HICC), room to be advised

AIM OF THE MEETING Propose your suggestions for making IAHS more attractive to young/early career hydrologists. The meeting will be chaired by Kate Heal (The University of Edinburgh) who will take forward your suggestions to the IAHS Plenary on Thursday 10th Sept.

TYPES OF SUGGESTIONS TO DISCUSS

- How to increase involvement of young/early career hydrologists in IAHS activities?
- Young/early career hydrologists as co-convenors of symposia/workshops?
- Publication in peer-reviewed journals?
- New awards for young/early career hydrologists?
- Use of travel funds to encourage young/early career hydrologists, especially from developing countries, to participate in IAHS events?
- How could the current IAHS structure be made more accessible to young/early career hydrologists?
- Your ideas

OPEN TO ALL YOUNG/EARLY CAREER HYDROLOGISTS

Status and Perspectives of Hydrology in Small Basins

Report from an International Workshop held in Goslar Hahnenklee, Germany, 30 March–2 April 2009

Participants assembled on the steps of the workshop venue Hahnenkleer Hof Hotel

Continued from page 1

the Mediterranean MED FRIEND, the Euromediterranean Network of Experimental and Representative Basins (ERB), and organised jointly with UNESCO/IHP, WMO and IAHS. A limited number of almost 70 researchers from 24 countries attended the workshop. Participants were actively involved by presenting a paper or poster attached to the plenary sessions working group meetings. Moreover, all participants attended one of the working groups, developing answers and contributions to questions on the necessity of operation and research in small hydrological basins as well as on future contributions to hydrological research and knowledge. The annual meetings of the ERB steering committee and the members of EURO FRIEND Project 5 "Catchment Hydrological and Biogeochemical Processes in a Changing Environment" were also held on this occasion.

The welcome addresses were given by Siegfried Demuth, UNESCO Paris, Johannes Cullmann, German IHP/HWRP National Committee, Koblenz, Andreas Herrmann and Sybille Schumann, TUBS, Braunschweig. The oral and poster presentations focused on the following topics:

- Presently operated small hydrological research basins (keynote: Andreas Herrmann); 60 years of hydrological measurements in the Bramke research basins (introductory: Sybille Schumann; 3 paper and 2 poster presentations);
- Fundamental hydrological results drawn from studies in the operation of small basins (keynote: Piet Warmerdam, Wageningen, The Netherlands; 8 papers and 7 posters);
- Hydrological process knowledge drawn from studies in/the operation of small basins (6 papers and 4 posters);
- Importance of hydrological data and results from small basins for hydrological modelling (5 papers and 2 posters).

The extended abstracts of all the oral and poster presentations on this broad range of topics have been pre-published in the series *Landschaftsökologie und Umweltforschung* **50**, Braunschweig, edited by Andreas Herrmann & Sybille Schumann. The programme of the workshop and pdf files of the abstracts can be downloaded at

www.small-hydro-basins.org.

In advance of the workshop, the organizers developed a poster template heading for a special poster exhibition providing information about all the small basins represented at the workshop. In total, 38 research basins were eventually displayed using the same poster template format – see the example on p. 7. Meanwhile, a digital inventory of these basin posters had been prepared and provided to the workshop participants. It will be accessible via the Internet in due course. Full oral and poster papers will be published in the IAHS Red Book series in late autumn 2009.

The contributions made by four working groups, all introduced by keynotes in one plenary session, underscored the workshop character of the event. The working groups were expected to develop and summarize answers to the questions posed with respect to hydrological research in small basins. Some of the results achieved by the working groups are listed as follows:

1 Which achievements are expected from research in small basins in the coming decades?
Keynote by Laurent Pfister, Luxembourg & Stefan Uhlenbrook, Delft, The Netherlands; 4 short papers

A Besides enhancing hydrological process understanding, research in small basins is expected to substantially increase its contributions to studies of land use and climate change, interdisciplinary studies, the study of uncertainties and the development of new measuring techniques. It was found that networks of small basins are important tools in several types of studies, e.g. large-scale modelling validation, assessment of socio-economic aspects of the hydrological cycle, detection of trends and changes in runoff regimes, and ecosystem responses due to anthropogenic activities and climate variability. It was also stressed that scientists from a number of disciplines rely on hydrological knowledge gained in small basins, e.g. geochemists, ecologists, pedologists, biologists.

2 Which contribution to the monitoring and understanding of changes in physical processes, water fluxes, water balance and global warming effects is expected? Keynote by Zbigniew Kundzewicz & Fred Hattermann, Potsdam, Germany; 6 short papers

A In this context, work in small hydrological basins is expected to enhance the knowledge of matter transport under natural conditions and possible transport process changes in a changing environment. An improved understanding of the overall processes is expected i.a. to yield better guidelines and tools for watershed management. The comparison of processes

Poster template: Example with the Lange Bramke Basins. 38 research basins were displayed

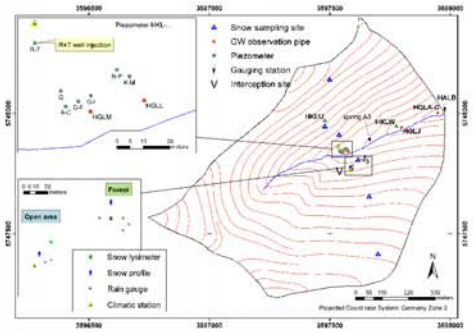
Lange Bramke

Bramke basin, Germany

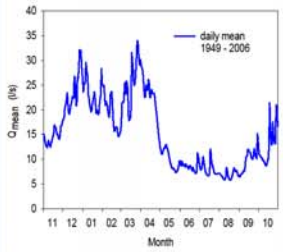
Basin characteristics

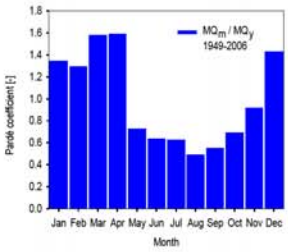
River Basin / River Basin (according EU-WFD)	Oker river basin / Weser river basin
Operation (from... to...)	Since 1948, still in operation
Gauge coordinates / Gauge datum:	10°26'E; 51°52'N / 537.76 m a.m.s.l.
Catchment area:	0.76 km²
Elevation range:	538 – 700 m a.m.s.l.
Basin type: (alpine, mountainous, lowland)	Mountainous
Climatic parameters: (mean precipitation, temperature and others)	1240 mm (1949-2007), 6.5°C (1962-2007)
Land use:	90% Norwegian spruce, 10% grassland
Soils:	Podsolic brown earth, brown earth Podsol, Pseudogley
Geology:	Sandstones, shaly quartzite
Hydrogeology: (Type of aquifers, hydraulic conductivity)	Fractured rock aquifer with a shallow porous aquifer overlay along the stream channel
Characteristic water discharges: (Q_{min}, Q_{max}, Q_{mean})	0.0 l/s, 15.79 l/s, 634 l/s (1949-2007)

Map of the research basin



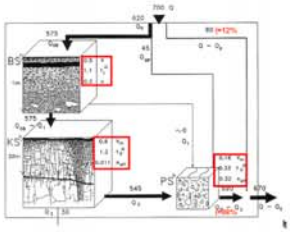
Mean hydrograph / Pardé flow regime





Special basin characteristics (hydrogeology, lakes, reservoirs etc.)

Mean annual water fluxes [mm WC] and hydraulic reservoir features



BS = Soil water reservoir
KS = Fractured rock groundwater reservoir
PS = Porous groundwater reservoir
Q = Water flux [mm/a]
V; Vm = Total volume; volume of mobile water [10^6 m³];
t_t = Mean transit time of tracer [a];
t_w = mean transit time of water [a]
n = Total porosity
n_{eff} = Effective porosity

Instrumentation and data

Measured hydrological parameters	Measuring period	Temporal resolution	Number of stations
Stream flow	Nov 1948 – cont.	1h 10 min (since 1992)	1
Precipitation	1949 – cont. 1980 – cont. 1992 – cont.	Daily Hourly Impuls/ 0.1mm	2
Air temp., humidity	1987 – cont.	1h / 10 min.	2
Groundwater level	1988 – cont. 1992 – cont.	Weekly, Hourly	21 5
Environmental isotopes ^3H, ^2H, ^{18}O	Event based	Event dependent	Event dependent

Applied models

1. Concept model
2. Mike Basin
3. Feflow
4. IHACRES

Main scientific results

1. No overland flow exists. Direct runoff (=event water) equals to 12 %(= 80 mm/a) of total which is less than 5% of the input. Since interflow is negligible, indirect flow is 88 % (= 590 mm/a) and consists of groundwater.
2. The unsaturated zone and the fissured rock aquifer are short-cut by preferential flow paths which enable fast percolation. Groundwater recharge is extremely high (620 mm/a). The mean transit time of groundwater is 2.0 years.
3. Subsurface pressure heads and groundwater exfiltration react spontaneously on basin input. The latter controls the generation of flood hydrographs which consist dominantly of groundwater. Major cross-faults function as efficient drain channels.
4. The successive steps of the runoff formation process are probably the following:

   (i) Infiltration with saturation of top soils, quick drainage through macropores towards greater depths, and compression of the capillary fringe which may initiate pulse pressure transmission and connected aquifer reactions without mass transfer;

   (ii) Rise of piezometric table, i.e. increase of subsurface pressure head and subsequent mass displacement, which can be split into vertical seepage in the unsaturated (cf. (i)) and lateral (groundwater) flow in the saturated zone; and

   (iii) Groundwater exfiltration to stream channels as a combined effect of pressure transmission and mass transfer, with hydrograph generation as a result. To maintain the quantitative input/output balance, short-term groundwater losses are compensated without much delay, i.e. groundwater recharge is a permanent process throughout the year.

Key references for the basin

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in urban/industrial and remote/pristine catchments is expected to supply important information for water and land use management under climate and land use change conditions and to provide key insights for improving pollution control.

3 What may be the scientific contribution to the PUB initiative and what can be expected vice versa? Keynote by Ian Littlewood, Reading, UK; 3 short papers

A Small basins can contribute to developing transfer functions from gauged to ungauged basins due to their high temporal and spatial data resolution. They contribute i.a. to learning how small-scale processes aggregate to larger-scale processes. Networks (meshes) of small basins could help improve the knowledge of assigning processes to other hydrological scales.

4 Do we need research results from small basins for the further development of mathematical hydrological models? Keynote by Keith Beven, Lancaster, UK; 4 short papers

A It has been stressed that it is indispensable to bring modellers and field researchers together, and that small basins act as an important platform in this respect (research, training and education). It has been ascertained that small basin studies are very important in improving model process representations in models and, in particular, in rejecting approaches that inadequately represent processes. Processes translated into models can be evaluated and validated in small basins. Importance and impact of measured parameters in models can also be assessed. Field researchers can also benefit from modellers, e.g. in identifying important physical processes contributing to runoff formation in different environments. Models may also reveal the need for new types of field observations.

The working group results were presented and discussed in the plenary during the final session of the workshop. The main results will be compiled in the Braunschweig Declaration. The latter will be published together with the main working group outcomes and points on the future demands and challenges facing hydrology at the small-basin scale, and on the necessity of operation and research in small hydrological basins. The Declaration will also be made available to organisations, associations, institutions and stakeholders involved.

The workshop included a half-day field trip, headed by Andreas Herrmann and Sybille Schumann, in cooperation with Henning Meesenburg and Birte Scheler of the Northwest German Forest Research Station (NW-FVA) in Göttingen. The field trip focused on hydrological and forest-hydrological research in the Lange Bramke basin, presently performed by the latter two research institutes. The relevant field guide can be downloaded at:

www.small-hydro-basins.org.

Another point of interest was the Okerstausee Reservoir dam. Here, the participants were informed about the present-day water management in the West Harz Mountains, concentrating on its main objectives drinking water supply and flood prevention. Evidence of historical water management in the region, associated with silver and copper mining, was already demonstrated prior to the field trip at places close to the workshop venue. At the close of a guided walk through the old town of Goslar, a UNESCO world heritage site, the workshop dinner was celebrated in a restaurant offering a choice of regional specialities.

Andreas Herrmann (Braunschweig), Ulrich Schröder (Koblenz) and Sybille Schumann (Braunschweig)

Developments for Hydrological Sciences Journal (HSJ)

IAHS is pleased to announce that from January 2010 *Hydrological Sciences Journal* (*HSJ*) will be published in partnership with Taylor & Francis, one of the world's leading academic journal publishers.

This is an exciting move. Taylor & Francis will develop *HSJ* much more than IAHS could do alone, bringing gains for both readers and contributors, and building further on the Journal's long tradition of quality with inclusiveness.

Improvements

With Taylor & Francis, *HSJ* will see several improvements. The journal will increase in size by a third, i.e. to eight issues per volume. It will move to Taylor & Francis' **informa**world platform, which will bring many benefits, including HTML versions of articles, forward citation linking, and online publication of articles ahead of the print issue through *iFirst*. Also, articles in volumes published two or more years previously will be made available open access, if not already so. A ScholarOne Manuscripts online submission and review system is being set up for the journal to further speed the peer-review process, and will go live on **20 August**.

Benefits to IAHS members

This new arrangement will bring benefits to IAHS members, including lower personal subscription prices. For IAHS members in the most financially-disadvantaged countries, there will be free online subscriptions. *HSJ* will continue to be included in the UNDP Online Access to Research in the Environment (OARE) programme, enabling access from libraries in poorer developing countries.

In addition, all IAHS members will be eligible for discounts on other Taylor & Francis publications.

A partnership

Frances Watkins continues as production editor for *HSJ* at IAHS Press and copy-editing will remain in-house so that quality is maintained. And, Frances will handle author problems as before. Taylor and Francis will deal with final production, printing and hosting, plus subscriptions and marketing.

Submitting manuscripts in future

Submissions should be made online at the *HSJ* ScholarOne Manuscripts site; a link to it will be established from the IAHS website. New users should first create an account. Once logged on to the site, submissions should be made via the Author Centre. Online user guides and access to a helpdesk are available on this website. Manuscripts may be submitted in any standard format, including Word, PostScript and PDF. These files will be automatically converted into a PDF file for the review process. (Note ScholarOne Manuscripts is also known as Manuscript Central.)

About Taylor and Francis

Taylor & Francis is part of Informa, and dedicated to the dissemination of scholarly information, drawing on expertise developed since first publishing learned journals in 1798. They now publish 1500 journals in association with 340 societies and institutions, operating from a network of 20 offices worldwide.

Snow, ice and water in the Alpine region: the system is undergoing radical change

Climate change will dramatically modify the water cycle in the Alpine region. At a recent conference of the Swiss Hydrological Commission (CHy), scientists discussed what the future might hold in store for us.

When the River Aare flooded the Matte quarter of the city of Bern (Switzerland) in May 1999, this event was considered a once-in-a-century event. The last time a similar flood had happened was before World War I. The next century lasted 6 years and 3 months: in the late summer of 2006, the Matte area was under water once again. The Aare's uncanny repeat messed up long-term flood statistics. Similarly, the River Lütschine in the Bernese Oberland has had four once-in-a-century events since 2000.

Is this accumulation cyclical or does it follow a trend? Petra Schmocker-Fackel, of the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), explored this question in Bern on 5 June 2009, in her paper given at the conference entitled *Snow, Ice and Water in the Alpine Region – more topical than ever*. The event was co-organized by the Swiss Hydrological Commission, CHy (*see box*), the Swiss Snow, Ice and Permafrost Society (SEP/SIP), the Swiss Society of Hydrology and Limnology (SCHL/SSHL), and the Swiss Cryospheric Commission. What made the conference theme so topical was like a red thread in all the papers that were presented: the climate is changing and this will have enormous impacts on the water cycle in Switzerland and neighbouring countries.

Among the most serious impacts is a possible increase of floods. There have always been times of increased flood events of the kind we have observed in the past 30 years: the last one began in the early 19th century and lasted nearly 100 years. But in between, there were always quiet times, as in the mid-20th century. A new trend might now be interfering with this cycle. Predictions show that climate warming will lead to an accumulation of strong rainfall. Such events will have dramatic consequences if the storage capacity of a river's catchment is exhausted by prior rainfall: "this can lead to discharge amounts that exceed any amounts previously measured," said Petra Schmocker-Fackel. In order to predict future flood risks, she pointed out, the dynamics of the system need to be taken into account in addition to climatic change: "it is important to know what the maximum amount of precipitation is beyond which water is no longer held back in a catchment".

Today, Alpine rivers are regulated by glacial regimes, but by the end of the 21st century, glaciers will only consist of meagre leftovers. At the Laboratory of Hydraulics, Hydrology and Glaciology (VAW) of the ETH Zürich, models of the future development of glaciers and of their influence on Alpine rivers have been developed. Discharge is predicted to increase at first, as water storage will decrease due to the melting of ice. Depending on the size of glaciers, peak flows will be reached after 20 to 60 years. After this, discharge amounts will decrease. Andreas Bauder and Matthias Huss of the VAW concluded: "at the end of the 21st century we have to expect water shortages that will have an influence on the management of water resources beyond the region".

The supra-regional character of the theme was also clear in Bettina Schlaefli's presentation of research results. Schlaefli is a hydrologist at the University of Delft in The Netherlands who is working on the influence of climate change on Alpine rivers: from a hydrological point of view, what is happening in the Alps is also influencing the estuary of the Rhine. The climate in future will probably lead to a reduction of annual precipitation; a marked decrease in the summer will overcompensate the slight increase in the winter. This is not the only reason why rivers will carry less water on the whole: as much more precipitation will evaporate on the areas affected by ablation after glaciers have retreated than when they were covered with ice, discharge amounts are likely to decrease much more than precipitation amounts. Some scenarios show that we must expect a decrease by up to 7% in productivity of hydropower plants by 2050.

With an increase in debris flows and rockfalls, the consequences of thawing in the Alpine areas covered by ice until now will be just as dramatic, although only local. Glacier retreat and thawing of permafrost are increasing the volume of loose sediment that can start moving. The debris flow in Guttannen in 2005, totalling a volume of 500 000 m^3, was the result of such a development. The numerous rockfalls that have taken place in the past few years are also probably due to changes in surface ice and permafrost. "However, the processes that lead to a fall are not yet understood well enough," concluded Christian Huggel of the Department of Geography, University of Zürich, summarizing research results on this topic. Natural hazard management is therefore facing a complex situation and can rely far less on past experience.

Another trend is less of lesser consequence: complete freezing of lakes is increasingly rare. The older generations will remember the 1st of February 1963, when the authorities declared the Lake of Zürich fit for ice-skating. H. J. Hendricks Franssen of the Institute of Environmental Engineering, ETH Zürich, who is a passionate ice-skater, reviewed all available sources on the freezing of eleven lakes in the Swiss Mittelland in the period between 1901 and 2009. The development of a complete ice cover on a lake depends mainly on the number of days during which the air temperature remains below freezing point, and on how many degrees Celsius below zero it is; but the threshold for the sum of the *negative degree days* is different for each lake. The decisive factor is depth: with its maximum depth of 260 m the Lake of Brienz never froze, although it is quite cold in the area. But the Lake of Morat, which lies in a milder climate area but is only 45 m deep, froze 28 times in the 20th century.

In the past 40 years, Swiss lakes in the lowlands froze much less often than before; in the past two decades this trend has increased. In the case of lakes that freeze rather rarely, this is particularly striking. Climate scenarios for the Alpine area predict an increase in winter temperatures by 2070 of between 1.2 and 4.5°C compared with the status in 1990. It is likely to be too warm for lakes to freeze completely in future; in the coming decades, it will at least still be possible to occasionally do some ice-skating on natural ice across smaller, less deep waters.

The technical term for the sudden emptying of a glacial lake is "jökulhlaup". The term comes from Iceland, where the phenomenon often occurs. We had better practice this tongue-twister, since jökulhlaups are happening more

frequently in the Alps as well. The most well-known example in Switzerland is the lake that has regularly been forming at the Unterer Grindelwaldgletscher. Meanwhile the glacier has become the scene of a summer spectacle that occurs every year and displays the whole gamut of consequences that can result from ice melting in the Alps. The glacier is currently losing 10×10^6 m^3 of ice per year; in the area where the lake forms, its surface is 200 m lower than it used to be 150 years ago. The sides of the mountain that used to be supported by the glacier have become unstable, leading to several major earthslides. A spectacular one was the slide on the right-hand flank of the valley in the early summer of 2005, which brought the Stieregghütte – a mountain farm and hut – literally to the edge of a cliff; or, on the other side of the glacier, the collapse of the "Schlossplatten", where an area with a volume of 2×10^6 m^3 of rock fell on the glacier in 2006.

A jökulhlaup has also already occurred in the area: at the end of May 2008, 800 000 m^3 of water were drained into the Lütschine River. The lake is becoming larger every year. At the beginning of June 2009 it already contained 2.5×10^6 m^3 of water. Hansruedi Keusen, who works for Geotest and is meticulously monitoring the events related to the Grindelwaldgletscher dynamics, estimates that the volume of the lake could increase to 10×10^6 m^3 by 2011. This must not happen, as an outbreak with this volume of water would have catastrophic consequences right down to the area around Interlaken. This is why a gallery is being built to allow water to be discharged as soon as the lake reaches a volume of 300 000 m^3. This artificial outlet will be ready by the spring of 2010.

A sudden emptying of glacial lakes can be due to a variety of causes. Meltwater mostly flows out through channels in the ice; these become larger as a result of warming. The VAW of the ETH Zürich explored the mechanisms of the Gornersee above Zermatt (VS), a lake that forms regularly and then breaks out – though always in a different manner. "It is difficult, if not impossible, to predict when a glacial lake will empty and how high the discharge will be", was Martin Funk's conclusion, a glaciologist at the VAW.

But glacial lake outbursts are not a new hazard in the Alps: they have occurred before, at times with catastrophic impacts. What has changed are the causes: in the past it was usually glacier growth that led to dams and glacial lakes; today these lakes are created by the thawing of ice masses.

In view of the major problems that climatic changes and the resulting changing hydrological cycle will cause in relation to natural hazards, hydropower or agriculture, another transformation is slipping out of attention: aquatic biotic communities will also radically change. Beat Oertli and his team at the Institut Terre-Nature-Paysage (ITNP) of the

Swiss Hydrological Commission – CHy

Opening of the Commission's office on 5 June 2009

CHy's website: http://chy.scnatweb.ch

The Hydrological Commission (CHy) of the Swiss Academy of Sciences (SCNAT) can look back on a varied history. Its precursor was already established in 1863, only to be dissolved in 1915 (Perret, 2001). After having been re-established in 1947, the Hydrological Commission went through a time of prosperity that came to a provisional end in 1991 with the integration of the Commission into the new Swiss Society of Hydrology and Limnology (SGHL/SSHL; Schram, 1994). After the Commission re-emerged in 1998, it spent many years re-defining itself and searching for a new orientation. This has now led to the creation of a professionally operated office for CHy, inaugurated on 5 June 2009 on the occasion of the conference entitled.

At the inauguration, the current president of CHy, Rolf Weingartner, re-affirmed the goal of giving "Swiss Hydrology" a firmer basis in research and tertiary education as a transdisciplinary science. The Commission will aim at improving the position of Swiss hydrology at the national and international levels, promoting innovative projects and offering a first port of call for practitioners. CHy will carry out the basic duties assigned by the Swiss Academy, SCNAT; in addition, it will play a stronger role as the National Committee of IAHS.

Executive Director of CHy, Bruno Schädler

Thus it was logical for the President of the IAHS, Arthur Askew, to offer a welcome address (read with authenticity in his absence by Anne Zimmermann, CDE) that wished CHy and its new office the best of success. He asked the audience to keep in mind that a commission's success depends entirely on the continual commitment of each of its members.

CHy's new office is its "conscience" and thus the port of call for all activities in the field of hydrology in Switzerland, warned Heinz Wanner, President of the Oeschger Centre for Climate Change Research. He summarized his experience as president of numerous scientific commissions in four clear messages that contained the following wishes for the new Executive Director, Bruno Schädler:

- A lot of spirit and creativity;
- Only little time spent on paper work and meetings;
- Tenacity in asking for requested contributions and dealing with financial matters;
- A lot of joy and satisfaction!

Helmut Weissert, President of SCNAT's Platform Geosciences, gave the concluding speech. He emphasized that hydrology is the link between the different geosciences: it leaves a mark even in geological formations such as fossil raindrops and wavelets in marine deposits. Based on experience with Earth's history, the Swiss Hydrological Commission is undoubtedly predestined to look with a sharp eye into the future.

Bruno Schädler
Translation: Anne Zimmermann

University of Applied Sciences in Western Switzerland (HES) tried to predict future colonization of Swiss ponds, pools and small lakes by water plants, larger invertebrates (macroinvertebrates) and amphibians. Calculations for their model are based on biodiversity data collected in 120 small water bodies in Switzerland. Modelling shows that there will be a marked increase in biodiversity as a result of climate warming. This increase will be particularly striking in Alpine water bodies, which are currently still cold and therefore species-poor. As soon as they become warmer, they will become attractive for numerous species that now live in lowland ponds and pools, for example dragonflies: at present, a total of 58 species have been counted in Switzerland, a large number of which will spread upwards into higher habitats in the coming years. In addition, we can expect that Mediterranean species will migrate northwards. This has already been observed: the heat-loving scarlet dragonfly (*Crocothemis erythraea*) is a recent newcomer in Switzerland.

But there will also be losers: for the Azure hawker dragonfly (*Aeshna caerula*) and all other species that require cold water, the habitat will become too small. Seven species of dragonfly that live in Switzerland today are endangered by climate change.

Hansjakob Baumgartner, Bern
Translation: Anne Zimmermann

Remote Sensing and Hydrology 2010

27–30 September 2010
Jackson Hole, Wyoming, USA

Mark your calendars!!! The International Commission on Remote Sensing (ICRS), with the support of IAHS, is organizing another edition of this symposium, ten years after the 2000 edition that was held in Santa Fe, New Mexico, USA. The call for abstracts will be announced during the autumn of 2009.

Come and participate in this high-level symposium on the state-of-the-art of remote sensing applications in hydrology, while enjoying the beauty of the Rocky Mountains and Yellowstone and Teton National Parks.

For more information contact:
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Water, Environment and Climate Change

Report from an international conference held in Cholula, Puebla, Mexico, 13–17 April 2009

The International Conference of Water, Environment and Health Sciences: The Climate Change Challenges (ICWEHS) was organized to provide a forum for the interdisciplinary exchange of ideas and points of view on all the aspects related to water, environment and health sciences, and all the trade-offs between these three fields.

The ICWEHS conference was held at the Universidad de las Americas, Puebla, at Cholula, Puebla, Mexico, on 13–17 April 2009. The conference was funded by Mexico's Nacional Water Commission (CNA), the Mexican Water Technology Institute (IMTA), and Universidad de las Americas, Puebla. The co-sponsors of the ICWEHS conference were the American Institute of Hydrology, the American Society of Civil Engineers, the Colorado Water Institute, International Association of Hydrological Sciences (IAHS), the International Water Resources Association (IWRA) and Mexico's Academy of Engineering.

The ICWEHS conference focused on the following:

Water Precipitation; Potential evaporation; Groundwater; Surface water; Interaction between surface and groundwater

Environment Water and wastewater treatment; Pesticides; Remediation; Hazardous waste; Heavy metals

Health Sciences Epidemiology; Toxicology; Exposure assessment; Risk assessment and communication

Education

Unfortunately, the five papers dealing with health issues were withdrawn because lack of funds prevented the authors' participation at ICWEHS.

More than 100 scholars, experts, professionals and students attended ICWEHS, coming from 15 countries of America, Asia and Europe. Twenty-two papers were presented in six technical sessions. Three plenary sessions and a panel discussion gathered many worldwide well-known scholars who shared their expertise, knowledge and experience.

The three keynote lecturers were Professor Terry Barker, Director of the Cambridge Centre for Climate Change Mitigation Research (*The effect of climate control on air pollution*), Professor Benito Mariñas of the Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, USA (*Sustainable approaches for the control of emerging waterborne pathogens*), and Professor Jose D. Salas of the Department of Civil and Environmental Engineering, Colorado State University, USA (*On climate variability and change in water resources*).

The members of the Panel for the Discussion were Drs Felipe Arreguin, Under Technical Director (CNA), Humberto Marengo, Hydropower Project Coordinator, Mexico's Federal Power Commission and Polioptro Martinez, General Director (IMTA). On Friday 17 April 2009, a technical field trip to IMTA in the outskirts of Cuernavaca, Mexico, was organized.

Happy 90th Birthday IUGG

http://www.iugg.org

The 18th and 19th centuries were witness to major developments in the Earth Sciences. In parallel, technical and engineering developments made it easier for scientists to travel and communicate with one another. As a result, many saw the advantages of co-ordinated international research. One of the earliest was Alexander von Humboldt (1769–1859) who, after his return from South America, organized widespread simultaneous magnetic observations. Later, Carl Friedrich Gauss (1777–1855) founded the Magnetic Union, which fostered the institution of magnetic observatories during the period 1836–1841. In oceanography and maritime meteorology, international cooperation began in 1853 under the influence of Matthew Fontaine Maury (1806–1873) whose initiative led to an agreement at an international Meteorological Conference in Vienna in September 1873 that an International Meteorological Organization should be formed, later to become the World Meteorological Organization. In August 1894, the Council of the International Geological Congress met in Zurich and decided to create an International Glacier Commission (Commission Internationale des Glaciers, CIG).

By the time of the outbreak of war in Europe in 1914, there were international organizations for geodesy, seismology, meteorology (which took geomagnetism and geoelectricity under its wing) and oceanography. The war interrupted most operations of these bodies, but in 1918 scientific leaders from the allied nations met in London and Paris and decided to found a new body, the International Research Council, the predecessor of the International Council for Science (ICSU). This Council was set up at Brussels, Belgium in 1919 with the purposes of coordinating international activity in the different branches of science and stimulating the creation of international scientific associations or unions, one of the first being the International Union of Geodesy and Geophysics (IUGG).

Thus IUGG was established on 28 July 1919 as an international, non-governmental, non-profit organization, in place of several pre-existing organizations which had been independent and separate from one another. At the outset, IUGG had six sections (re-named associations in 1930), those of geodesy, seismology, meteorology, terrestrial magnetism and electricity, physical oceanography and volcanology. The hydrology section/association was created three years later in 1922 at the first General Assembly of IUGG. The CIG chose to become part of IAHS; in 2007 it moved to become an important element of the newly formed International Association of Cryospheric Sciences.

For a fuller account, see the paper by Alik Ismail-Zadeh and Tom Beer available at the IAHS web site (*www.iahs.info*) under "Happy 90th Birthday IUGG".

Arthur Askew

Calendar of Meetings Organized/Sponsored by IAHS

Details of these plus many non-IAHS meetings are provided at *http://iahs.info* – click on *Meetings*

2009	Conference	Contact details
Wuhan, China 21–25 October	ModelCARE 2009	Yanxin Wang, China University of Geosciences, Wuhan yx.wang@cug.edu.cn; http://www.modelcare2009.org
Tullamore, Ireland 10 November	Irish National Hydrology Conference 2009 ; Innovative approaches in Hydrology - Putting Research into Practice	Laurence Kelly, Office of Public Works, 17-19 Lower Hatch Street, Dublin 2, Ireland tel: +353 1 647 6732; fax: +353 1 676 1714; laurence.kelly@opw.ie
Leysweg, Suriname 10–11 November	SWRIS-Hydrometry Workshop	
2010		
Agadir, Morcco 24–26 March	Integrated water Resources Management and challenges of the Sustainable Development (GIRE3D)	
Ohrid, Macedonia 25–29 May	BALWOIS 2010	secretariat@balwois.org
Zurich, Switzerland 13–18 June	GQ10 Groundwater Quality 2010 Conference	Prof. Dr. habil. Mario Schirmer, Eawag - Swiss Federal Institute of Aquatic Science and Technology, Chairman of the GQ10 Organising Committee Mario.Schirmer@eawag.ch
Warsaw, Poland 14-18 June 0	International Symposium on Sediment dynamics for a changing future	Prof. Dr Kazimierz Banasik, SGGW, icce2010@sggw.pl
Vienna, Austria,	13th ERB Conference	Hubert Holzmann, BOKU, Vienna, Austria; hubert.holzmann@boku.ac.at
Stellenbosch, South Africa 6–9 Sept.	11th International Symposium on River Sedimentation (ISRS)	Technical aspects: Prof Gerrit BASSON grbasson@sun.ac.za ; tel: +27 21 808 4355 Other aspects: Marechia BASSON msb@aspt.co.za ; tel: +27 79 4909 210
Tianjin, China 7–11 September	9th International Conference on Hydroinformatics HIC2010	
Krakow, Poland 12–16 September	XXXVIIIth IAH Congress	Stanislaw Witczak, AGH University of Science and Technology Department of Hydrogeology and Engineering Geology, Krakow, Poland tel: +48 (12) 617 2437; fax: +48 (12) 633 2936; witczak@uci.agh.edu.pl
Prague, Czech Republic 20–23 September	HydroPredict'2010 : 2nd International Interdisciplinary Conference on Predictions for Hydrology, Ecology, and Water Resources Management: *Changes and Hazards caused by Direct Human Interventions and Climate Change*	Dr Zbynek Hrkal, Charles University and VUV Institute, Prague, zbynek_hrkal@vuv.cz; Prof. Hans-Peter Nachtnebel, BOKU University, Vienna Institute of Water Management, Hydrology and Hydraulic Engineering hans_peter.nachtnebel@boku.ac.at
Jackson Hole, Wyoming, USA 27–30 September	Remote Sensing and Hydrology 2010	Christopher Neale (VP ICRS); christopher.neale@usu.edu
Fez, Morocco 25–29 October	6th World FRIEND Conference. *Global Change : Facing Risks and Threats to Water Resources*	Eric Servat, friend2010@msem.univ-montp2.fr http://www.unesco.org/friend2010/water/ihp/pdf/_call_papers.pdf
2011	XXVth IUGG General Assembly, including the Ninth IAHS Assembly will take place in Melbourne, Australia 27 June–8 July 2011	

International Association of Hydrological Sciences
Association Internationale des Sciences Hydrologiques

www.iahs.info

Contacting IAHS and the Commissions

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For information about the Commissions and other groups visit their web sites via www.IAHS.info or contact:

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PUB, Predictions in Ungauged Basins
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