

EGU

Hydrological Sciences

Business Meeting

Wednesday April 18, 2007

Günter Blöschl
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Agenda EGU07 HS

1. Welcome by the Division President
2. Agenda
3. Report on the 2006/2007 Division activities
4. Scientific Programme of the EGU Assembly 2008
5. Sub-divisions
6. Candidates for Division Awards and Medals for 2008
7. Division Publications
8. EGU Topical Conferences
9. Any other business

Divisions

Atmospheric Sciences (AS)

Biogeosciences (BG)

Climate: Past, Present & Future (CL)

Cryospheric Sciences (CR)

Energy, Resources and the Environment (ERE)

Geochemistry, Mineralogy, Petrology & Volc. (GMPV)

Geodesy (G)

Geodynamics (GD)

Geomorphology (GM)

Geosciences Instrumentation and Data Systems (GI)

Hydrological Sciences (HS)

Magnetism, Palaeomagnetism, Rock Physics & Geomaterials (MPRG)

Natural Hazards (NH)

Divisions (cont'd)

Nonlinear Processes in Geosciences (NP)

Ocean Sciences (OS)

Planetary and Solar System Sciences (PS)

Seismology (SM)

Soil System Sciences (SSS)

Solar-Terrestrial Sciences (ST)

Stratigraphy, Sedimentology and Palaeontology (SSP)

Tectonics and Structural Geology (TS)

Hydrological Sciences

Young Scientists Outstanding Poster Paper award (YSOPP)

Congratulations to Jan Seibert founding coordinator
of YSOPP

Recipient of the Union Service Award in recognition
of his outstanding services to the Union in raising the
profile of poster presentations by young scientists.



Hydrological Sciences

Young Scientists Outstanding Poster Paper award (YSOPP)

coordinator: Andreas Güntner

- Procedure
- Presentation of awards for 2006 conference

Other divisions that have followed the Hydrology Example:

- Division on Atmospheric Sciences (AS)
- Division on Climate: Past, Present, Future (CL)
- Division on Ocean Sciences (OS)
- Division on Seismology (SM)
- Division on Nonlinear Processes in Geophysics (NP)
- Division on Biogeosciences (BG)
- Division on Solar-Terrestrial Sciences (ST)

YSOPP

Young Scientists' Outstanding Poster Paper Award

Coordinator for HS:
Andreas Güntner
GeoForschungsZentrum Potsdam, Germany

YSOPP procedure



Participating posters:

- EGU 2005: 40
- EGU 2006: 78
- EGU 2007: 24
- PhD not earlier than in the year before the conference



Top 1 to 3 posters:
YSOPP winners



Ranking based on
evaluation by the judges



Poster evaluation
(scientific, presentation, discussion)



4 judges per poster assigned by
convener and coordinator

Registration by PhD student after acceptance of abstract

YSOPP – for the award winners

- Short presentation at the EGU web site
- Free conference access to next EGU Assembly
- Invitation for a paper in HESS, free of page charges

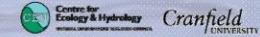
YSOPP 2006 winners

Monica Rivas Casado Cranfield University, UK



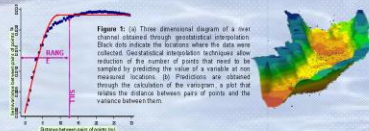
Guidelines for depth data collection in rivers when applying interpolation techniques (kriging) for river restoration

Monica Rivas Casado¹, Sue White¹, Pat Bellamy¹, Douglas Booker¹, Mike Dunbar², Ian Maddock³ and Venkatesh Menvede⁴
¹Institute of Water and Environment, Cranfield University at Silsoe, Silsoe, UK
²Centre for Ecology and Hydrology, Wallingford, UK
³Department of Applied Sciences, Geography & Archaeology, University of Worcester, Worcester, UK
⁴Center for Research in Water Resources, University of Texas at Austin, Texas, USA



Statement of the problems:

River restoration projects require the implementation of monitoring programmes to assess the river quality before and after the implementation of the project. Biological, chemical and hydromorphological (i.e. depth, velocity and substrate) variables are monitored for this purpose. Field work is time and cost consuming and can be reduced with the application of geostatistical interpolation techniques.



This project aims to produce a set of guidelines for the collection of hydromorphological data when applying geostatistical interpolation techniques. Three main problems are identified when designing efficient & effective sampling strategies for hydromorphological parameters:

- Spatial:** where and how many points need to be collected? (Figure 2 & 3)
- Scale:** what is the length of the river that needs to be sampled?
- Temporal:** how often do we need to repeat the sampling procedure? (Figure 4)

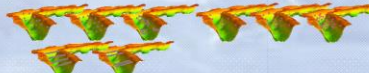
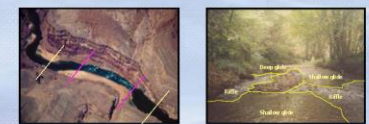


Figure 2: Schematic diagram of the bathymetry of the Beie river site. Different sampling strategies: random points, regular transects and regular grids have been compared to assess the accuracy when predicting depth, velocity and substrate at non-measured locations.

Figure 3: Schematic diagram of the bathymetry of the Beie river site. Different sampling densities have been compared to assess the accuracy when predicting depth, velocity and substrate at non-measured locations.

Figure 4: The distance recommended to characterise the spatial variability of a site varies according to different authors.



Guidelines for hydromorphological data collection:

- Geostatistics proved to be a useful tool for the development of optimal sampling strategies.

THE SPATIAL PROBLEM

- It is recommended to apply grid sampling strategies when characterising the spatial pattern of depth rather than applying any type of transect sampling strategies.

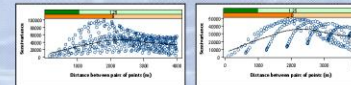


Figure 5: Results obtained with regular or stratified transects (right) have been proved to be highly sensitive to the number of points sampled, as well as to the location of these transects. Grid sampling strategies (left) provide better results when characterising the depth spatial pattern. Differences between both variograms are clear. (Note the scale of the y-axis and the distribution of the points). Regular grids provide a variogram that is more similar to the obtained with an observer's original data set from which the sampling strategies were derived.

- The use of random grids is preferred to the use of stratified and regular grids since (i) results obtained for random grids do not significantly differ from those obtained with regular grids and (ii) random sampling strategies (i.e. random walk) are less time consuming sampling strategies.
- During the data collection procedure it is necessary to invest special effort in characterising the deepest areas of the river site to be sampled since this could have an effect on the variogram calculation.
- Sampling density needs to be selected according to the objective for which the data is being collected (Figure 6). A set of tables relating the accuracy obtained in the predictions when applying a specific sampling density are being developed.

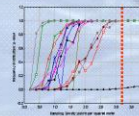
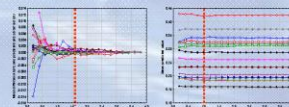


Figure 6: Results obtained when comparing 20 different sampling densities for some of the indicators analyzed. The vertical red lines indicate the recommended sampling density for each objective. Note that this value is different according to the indicator that is being characterised.



- The variogram is a tool that can be used to understand the spatial pattern of a variable under study. Its calculation needs to be accompanied by a sensitivity analysis that considers the variogram model selected, the number of pairs of points, the lag distance selected the maximum distance used, the azimuth tolerance and the azimuth direction. Otherwise, variogram results could be misleading.
- The higher the hydromorphological uniformity and continuity of the river site, the lower the sampling density that needs to be applied.

THE SCALE PROBLEM

- The distance sampled needs to be longer (from two to three times longer) than the maximum distance that we want to consider for the analysis of the spatial structure.
- Results suggests that repetitions of the depth spatial pattern might not correspond to a fixed sampling distance and this needs to be defined according to the characteristics of each river site. Repetition in the characteristics of river depth have been encountered at distances equal to 500 m, 350 m and 150 m (Figure 8) for the rivers Brazos and Sulphur.

Point number	Cycle	Wavelength	Distance
1	0.2214	176	100
2	0.1243	776	153
3	0.2251	437	175
4	0.2251	174	100

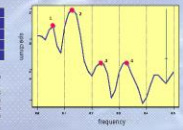
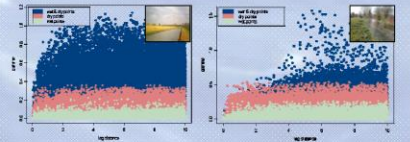


Figure 8: The variogram cloud represents the distance between pairs of points and the variance of all these pairs of points. The image shows three variogram clouds one calculated for data collected in the wet channel (blue), data collected in the wet banks (green) and all the collected data (black). Note that the variogram cloud is able to identify the relation between the banks and the wet bed. This could be useful to quantify the physical changes achieved with restoration projects.

THE TEMPORAL PROBLEM

- The variogram cloud (Figure 9) is able to detect differences between the spatial structure of the bed channel and the spatial structure of the river banks. This suggests that the variogram cloud could be used as a tool (i) to describe the hydromorphological characteristics (depth) of the channel and (ii) to detect the temporal changes in the hydromorphological characteristics of the river.

Figure 9: The variogram cloud represents the distance between pairs of points and the variance of all these pairs of points. The image shows three variogram clouds one calculated for data collected in the wet channel (blue), data collected in the wet banks (green) and all the collected data (black). Note that the variogram cloud is able to identify the relation between the banks and the wet bed. This could be useful to quantify the physical changes achieved with restoration projects.



YSOPP 2006 winners

Jane Grant University of Aberdeen, UK



Groundwater influence in hyporheic zones: a key control on site selection for Atlantic salmon spawning in a braided river system?

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http://www.abdn.ac.uk/geography/hydrology/index.html**

UNIVERSITY OF ABERDEEN

1. INTRODUCTION

- Over the past 30 years the numbers of Atlantic salmon (*Salmo salar* L.) spawning in Scottish freshwater streams has declined. Conservation initiatives to protect this species have focused on preserving the integrity of their upland spawning sites. Discrepancies exist between predicted available spawning habitat derived from values of hydraulic and sedimentary variables and those observed by streamlining streams. These differences may be due to the physicochemical characteristics of the hyporheic zone within the spawning grounds.
- This study investigates the physicochemical influence of ground water-surface water interactions occurring within specific channel types on redd site selection.

2. OBJECTIVES

- To identify the sources and flowpaths of waters entering a highly braided system and to separate reaches into channel types based on their physicochemical characteristics.
- To observe if, in braided systems where habitat availability is high, do salmon actively seek to spawn in channels where the hyporheic zone is dominated by ground waters.
- To correlate spawning site selection to any spatial patterns of water quality across the braids.



Figure 2: Spawning Atlantic salmon (J.V. Rylanders)

3. STUDY SITE

- The Glen Feshie Braids, the biggest braided river system in the UK (Figure 1).
- An Atlantic salmon and Sea trout (*Salmo trutta*) spawning tributary of the river Glen Cullinston, Scotland (Figure 2A).
- Catchment area is 231 km², study area: 3.5 x 3 km.
- Altitudinal range of 230 – 1115 m.
- The complex network of channel channels facilitates extensive groundwater-surface water interchange giving rise to high levels of up-to-temp and variation in hyporheic water quality within spawning grounds.



Figure 3: Location of Feshie

4. METHODOLOGY

- April-May 2005, every channel of the braids was walked, sedimentary and hydraulic variables noted and a detailed GIS Arcview map of habitat suitability was constructed (Figure 4).
- During Summer 2006 – Spring 2006 intensive hydrochemical surveys of the braided system were carried out. Using natural tracers, trace metals, dissolved oxygen (DO) and Chlorinity, temperature and chloride.
- PCA and Ordination analysis was used to see if there was any obvious clustering of channel types based on physicochemical parameters.
- During spawning season October – November 2006, every channel was walked daily and redds were recorded using GPS.
- Post spawning hyporheic water quality sampling devices were inserted down into the hyporheic zones of spawning and non-spawning sites and a series of water quality samples were collected (Figure 5).



Figure 4: Mapping channel types



Figure 5: Installation of hyporheic water sampling equipment



Figure 1: The Feshie Braids

5. RESULTS

- Results from the April – May habitat survey of the braids showed habitat suitability across the braids to be high.
- Five main channel types were recognizable: main river channels, side channels, hillside tributary streams, mixed alluvial and groundwater, and groundwater.
- 220 redds were recorded. Of these 31.4% occurred in groundwater channels, 32% in hillside tributaries, 3.6% main, 3.6% side, and 14% in mixed alluvial channel types (Figure 6).
- Clustering and superimposition of redds occurred in areas of strong spawning groundwater.
- Water quality data from the hyporheic samplers showed that there were marked differences in levels of DO, Chlorinity and temperature between channel types.



Figure 6: Channel types in Feshie Braids

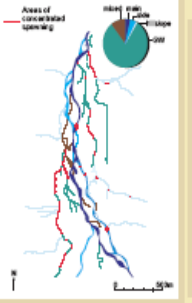


Figure 7: Key spawning sites

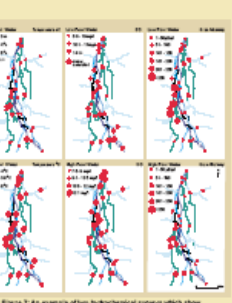


Figure 8: An example of two hydrochemical surveys which show temperature, DO and Chlorinity variability in 1 hr along across the braids

6. CONCLUSIONS

- Different types of groundwater-surface water exchange occurs across the 5 channel types of the Glen Feshie Braids producing high levels of spatio-temporal variation in hyporheic water quality within spawning grounds.
- Despite high levels of spawning habitat availability across the whole of the braids, 31.4% of the Atlantic salmon still choose to spawn in locations which displayed strong groundwater signatures.

7. FUTURE WORK

- Repeat redd counts across the braids during spawning season 2006.
- Excavation of a number of redds to examine juvenile/survival.
- Implementation of egg chambers equipment with water quality measuring devices into the hyporheic zone of known groundwater dominated spawning sites.

YSOPP 2006 winners

Peter Kienzler ETH Zürich, Switzerland



A-08542 **Subsurface storm flow - the crucial role of interaction**

Peter Kienzler & Felix Naef

Introduction

Subsurface storm flow in lateral preferential flow paths in the vadose zone can contribute substantially to storm flow and lead to unexpected fast change of the soil. Our study addresses the following questions:

What are the reasons for different rates of lateral preferential flow?

How do spatially variable site characteristics and temporarily variable moisture conditions influence the initiation of lateral preferential flow?

The degree of interaction is one parameter influencing subsurface storm flow. The term "interaction" describes the water transfer between preferential flow paths in the surrounding soil matrix. It cannot be directly quantified. Visualizations of infiltration paths with dyes (see figure on the right), tracer experiments and measurements of the soil water regime help to estimate the degree of interaction.

Naef & Naef, *Int J* 271, 139-154

Methods

Sprinkling experiments were made and natural rainfall events were monitored on test slopes in four different catchments in Switzerland. Fig. A shows the two sprinkling setups used (42 mm/h and 10 mm/h, 100 m²), highly resolved measurements of soil moisture and suction, piezometric heads and surface and subsurface runoff in different depths were made. Instantaneous tracer injections during steady state conditions were used to estimate flow velocities.

Event and pre-event water fractions were determined in the different flow components using artificially tracers (sprinkling water and ²²²Rn as natural tracer). There is no ²²²Rn in the precipitation and a site-specific steady state is reached after about two weeks (B). During sprinkling experiments we compared pre-event water fractions determined with sodium and determined with an artificial tracer (B below).

In detailed analysis of soil profiles we investigated hydromorphic features, the thickness and texture of different soil layers, depth to bedrock, grain size distribution, packing density and macroporosity density (C). Ground penetrating radar measurements were used to scale up the observed soil structures (D). (For details on the last point please visit our poster presentation on Friday, A-03138, where geophysical methods can contribute to subsurface storm flow investigations)

Koblentz

Subsurface flow responded quickly to rainfall events (A). Tracer injections evidenced subsurface flow with high flow velocities over more than 115 m (B). Subsurface flow had a low fraction of pre-event water. Such a response requires long and well-connected lateral flow paths. In fact, preferential flow was located with ground penetrating radar (GPR), when highly concentrated NaCl solution was injected as a line source into the soil to enhance the radar reflections (C). Obviously, the lateral flow in test pipes was directly fed from precipitation and only a very low interaction with the soil matrix occurred, which was mostly bypassed (D).

Im Sertel

Subsurface flow in a thin weathered layer above the bedrock and in a soil pipe responded strongly delayed to precipitation (A) and contained nearly no event water. Large differences between SSF velocities over 4 m distance and 8 m distance were observed (B), which indicate short and weakly connected lateral flow paths. At nearly 70% of the sprinkled water was stored in the soil during the experiment, a high degree of interaction occurred. Comparison of soil suction and subsurface flow intensity shows a strong relation between soil saturation and subsurface flow (C). Apparently, lateral subsurface storm flow was initiated and led indirectly from the saturated subsoil (D).

Luteral

Subsurface flow in small lateral soil pipes directly above the bedrock responded quickly to precipitation (A). A gravity subsation built up above the bedrock and initiated this flow (B). Individual lateral pipes started to flow with substantial time lags. Pipes with high lag times had higher concentrations of pre-event water as pipes starting quickly (C). Evidently, some of these pipes were directly connected to vertical preferential infiltration, showed a low interaction with the surrounding soil matrix and were directly fed from precipitation. In contrast, other pipes were disconnected from vertical preferential infiltration, showed a high interaction with the surrounding soil matrix and were indirectly fed (D).

Schlüssberg

Subsurface flow in a system of macropores embedded in the subsoil responded slightly delayed to precipitation (A). A high change of soil moisture and saturated conditions were observed in the subsoil (B). Subsurface flow contained about 50% of pre-event water (C). Obviously, there was a remarkable degree of interaction between preferential flow and the soil matrix and subsurface flow was initiated from the saturated subsoil (D).

The crucial role of interaction

The subsurface flow intensity varied substantially depending on how the flow was initiated. When the soil characteristics favoured a low degree of interaction between preferential flow and the soil matrix, subsurface flow was mainly fed by bypass flow resulting in a quick subsurface flow response. In contrast, when high interaction occurred, subsurface flow was fed from saturated parts of the soil and the intensity was much lower.

The rate of pre-event water in subsurface flow responded extremely sensitive to the degree of interaction and the rate of direct or indirect feeding of lateral preferential flow. Fast subsurface flow in the soil consists therefore of event water flowing through preferential flow paths and of pre-event water mobilised in saturated zones in the soil matrix. The extent of these saturated zones and the degree of interaction between the saturated soil matrix and preferential flow paths determine the amount of pre-event water in the subsurface flow as well as the intensity of the flow.



Photo: Peter Kienzler
 Peter Kienzler (p.kienz@ethz.ch)
 Felix Naef (f.naef@ethz.ch)
 ETH Zürich, Switzerland, CH-8093 Zürich

EGU 07 - Hydrological Sciences papers

Total number of papers

	<i>hydrol.</i>	<i>co-listed</i>	<i>total</i>
2004	650	332	982 papers
2005	1052	680	1732 papers
2006	1070	488	1558 papers
2007	1063	541	1604 papers

2007: 38 HS + 22 non-HS sessions

	<i>papers</i>	<i>avg. papers per session</i>
Orals	566	9.4
Posters	1038	17.3
Total	1604	26.7

Preliminary 2007 programme

- 49 Sessions in the call for papers

Thoughtful discussions during programme preparation

Statistics on submitted abstracts

1063 abstracts submitted to hydrology division

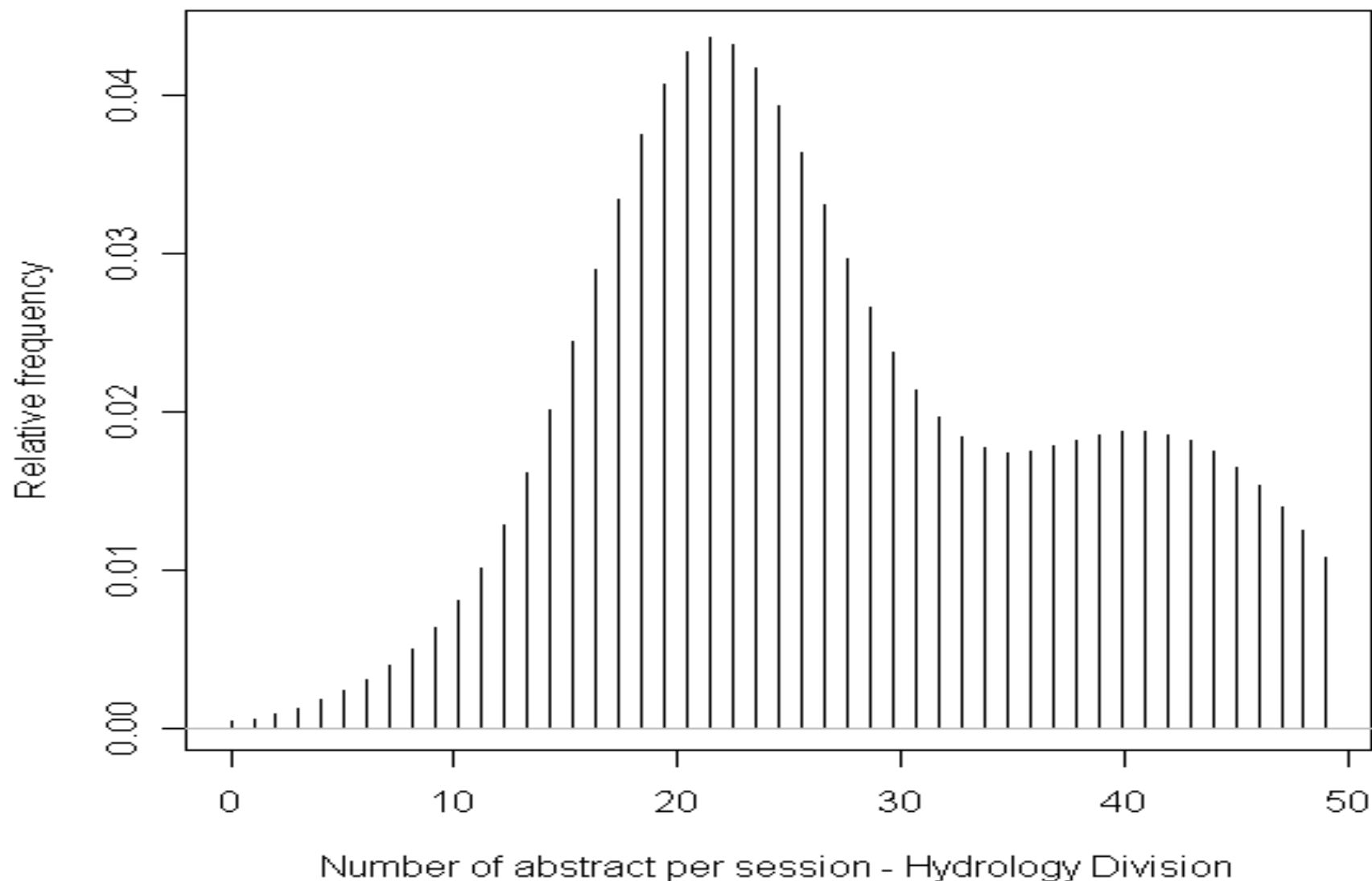
38 sessions with more than 13 abstracts

36 sessions with more than 15 abstracts

26 sessions with more than 20 abstracts

13 sessions with more than 30 abstracts

Frequency distribution of number of submitted abstracts



Draft programme after abstract submission

- 11 sessions merged
- 38 sessions after the abstract submission.

Scheduling

Criteria

- Avoid overlap among similar topics
- Conveners' requests.
- Poster sessions scheduled after oral blocks
- Uniform distribution of poster sessions during week
- Minimise overlap among divisions

Constraints

- Number of time blocks and rooms
- Schedule blocks of the same session in sequence

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5th EGU Assembly: Vienna, 13-18 April 2008

Organising sessions

- Programme should be clear
- Minimise duplication of and overlap among sessions
- Carefully choose breadth of session topic
- Try (small number of) visionary sessions
- Encourage *poster only* sessions
- Open forum in splinter meeting rooms
- Meeting in Vienna - involve new member countries

Parallel orals/posters?

2006 business meeting: 4 oral blocks/day

2007: dedicated poster sessions during the day not permitted by EGU in order to decrease number of the people in rooms

Additional authors-in-attendance from 17.30 to 19.00 when no oral sessions are held

2008: 4 or 5 oral blocks?

EGU HS 2008 programme

We may have a few more sessions next year, but.....

Scientific programme should be clear

- Authors should have a clear understanding of the programme.
- Programme can be organised in sessions and subsessions.
- Sessions which do not reach a minimum number of papers (ideally 20) are merged or scheduled as poster only.

Approximate schedule of EGU 2008 programme preparation

- May: preparation of skeleton programme by subdivisions.
- Mid of June: publication of the skeleton programme on the web – open call for sessions.
- September: finalisation of the programme by subdivision chairs and EGU programme committee.
- Please contact the relevant subdivision chair if you would like to propose a session for EGU 2008.

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Subdivisions to:

- screen all session proposals
- merge proposals as appropriate

- Please join the HS subdivisions if you are interested in being involved in the session planning

- This year's sessions are not automatically renewed
- Please submit session proposals to the relevant chair
- Likely to have a 30% / 70% oral poster split

HS open Subdivisions

Precipitation & climate: D. Koutsoyiannis (chair)

Catchment hydrology: J. Seibert (chair)

Erosion, sedimentation & river processes: F. Gallart (chair)

Estuaries, wetlands & eco-hydrology: F. Laio (chair)

Unsaturated zone: W. Durner (chair)

Groundwater: E. Zechner (chair)

Remote sensing & data assimilation: W. Wagner (chair)

Water Policy & management: N. van de Giesen (chair)

Hydroinformatics: D. Solomatine (chair)

Hydrological forecasting (new): meeting on Friday, room SM2 at 12.15.

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- Dalton Medal 2007 awardee: E. Wood
- Darcy Medal 2007 awardee: L. Gottschalk

Medal Committees:

President, Past president (chair), past three medalists

Call for proposals: G. Bloeschl

bloeschl@hydro.tuwien.ac.at

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EGU Hydrological Sciences Division Journal

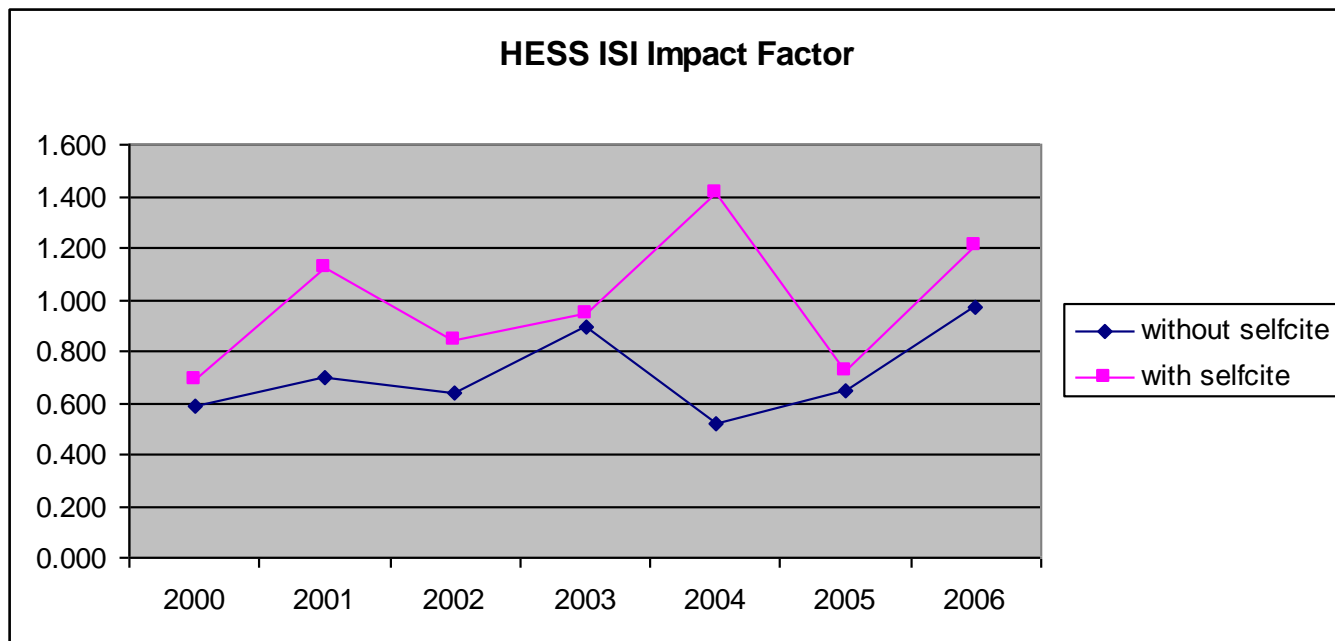
Hydrology and Earth System Sciences (HESS)
electronic

Executive Editors:

Hubert Savenije, Murugesu Sivapalan, Kurt Roth

Hydrology and Earth System Sciences (HESS)

- 50 topical editors
- In 2006 112 papers in HESS-D and 73 in HESS
- Impact factor 2006: expected 1.1



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Issues taken to Council in 2006

... Single oral rule - invited papers have been exempted

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Issues to be taken to Council for 2008

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