No.134
August 2017



Circulation

The Newsletter of the British Hydrological Society

Contents

History of Hydrology Wiki

A Hydrologist retires

Evaporation and food security

Updated NRFA peak flows data

Reports from Travel Grant recipients

IASWS, Taormina, and EGU, Vienna

Peter Worlf symposiuim 2017

UK Hydrological Bulletin

Copy deadline for Circulation No. 135 24th October 2017

Latest News from the History of Hydrology Wiki

Material is still being added to the History of Hydrology Wiki site. We now have over 100 biographies of hydrologists and a new category for papers and books about the history of hydrology has been added (the Annotated Bibliography category). This new category is still sparsely populated, so suggestions for the most important papers and books that should be included are welcome.

Or even better, remember that since this is a Wiki site you can register to add entries or modify material in the existing entries. Please do so, the more people who contribute, the greater a resource the site will prove to be. Templates are available for the different categories (Biographies, Histories of Experimental Catchments, Hydrological Textbooks, Histories of Institutions, Annotated Bibliography).

You can find the site at **History-of-Hydrology.net**

Keith Beven

BHS Committee

HURRY – only a few more days to the 18 August deadline for nominations!

All members will have received email copies of the forms for new members. We have five vacancies – Honorary Treasurer, 3 Ordinary Members and a Young Member Representative. Please support the the Society so that we can continue to provide the services you need and grow the science and profession of hydrology in the future.

If you've lost your form, worry not – more details of how to apply and copies to download are available on the web site.

President's Piece

Hydrologists – an endangered species?

The readers of Circulation are the converted, fascinated by the fickle nature of water movement at scales ranging from the microscopic to the global, and from seconds to decades, and committed to solving the grand challenges, from flood forecasting to securing water supplies. On June 24th The Guardian reported "a quarter of England's rivers are at risk of running dry" as the driest October to March period for 20 years was followed by an extremely dry April and below average rainfall in May. One observer was quoted as saying "south-east England has received less rainfall over winter than Menorca!" Then, on Tuesday 18th July torrential flooding devastated the Cornish fishing village of Coverack. The storm, described by one observer as "apocalyptic", was the worst to hit Cornwall since the Boscastle disaster in 2004. Are we developing the next generation of hydrologists with the skills to advance our theoretical and practical knowledge to help model and manage such extremes in the future?

Employers suggest they are finding difficulty in recruiting hydrologists with the skills they need, often failing to appoint at the end of the first search round. Technical specialists are becoming a rare breed as 'project management' becomes the preferred career path. I attended a meeting of the chairs of the eight ICE Specialist Knowledge Societies on 26th July; all raised the same concerns.
Our next national meeting on 13th September at Loughborough University will address this issue. Under the heading 'Whither Engineering Hydrology?', practitioners and academics will debate the future of hydrology as both an academic discipline and career pathway. What 'hydrology' will engineers, planners and managers need?

This year we had a strong list of applicants for Post Graduate scholarships to support Master's degrees in hydrology. The majority (56%) had first degrees in geography or environmental science; 16% were in geology and 11% in ecology – and 11% in mathematics. There were none with a first degree in engineering. As the training in hydrology has become increasingly embedded in the environmental sciences, have we trivialised the physical science content of our degree programmes in search of the cash cow? Have we become complacent because of the array of off-the-shelf software packages? How do we incentivize technical specialisms as career paths?

Do join us to discuss the future of hydrology as an academic discipline and a profession. The AGM will be held over lunch at this meeting and we shall be asking members to approve amendments to our statutes to keep them up to date with external requirements as a Charity.

Professor Geoff Petts
President

A Hydrologist Retires

A few years ago, I was in a meeting when someone asked whether I was retiring, to which Chris Collier responded: "what him? – he'll never retire!" Well, I'm sorry to disappoint Chris, but as of 1 June, I've not taken on any more new work.....

My last day of work was spent as a witness at an informal planning enquiry in a stuffy District Council chamber: this made me realise there could be more to life than this. I had already been winding down from work, and this finally tipped the balance – time might be running out.

It is almost the 49th anniversary of my starting work, arriving at Larne off the ferry on 1 August 1968, and making my way to Queen's University Belfast, Geography Dept. They were surprised to see me, as I was not expected until the 24th of the month, by which time my supervisor would have been back from summer-school in New Orleans. So I had plenty of time to read Roy Ward's "*Principles pf Hydrology*", sign up for the University cricket team, and send messages to any friends who would like to come over from England to enjoy a lazy three weeks.

After growing up in East Anglia, the hills and the rain of Northern Ireland were something of a change. I was working on a project investigating water balances for upland catchments, a joint study between Queen's University and Belfast Water Commissioners, funded by the International Hydrological Decade. I did all those basic field hydrology tasks: current metering, rainfall measurement, sediment sampling, observation well dipping, and was on the duty roster of observers for the climate station on the roof of the Geography Department at Queen's. This focus on fieldwork and observations was a major focus of much of my early career, and I have always regarded the practical measurement approach to be the basis of hydrology.

After a very thorough training year with the erstwhile Devon River Authority, I worked on further research (storm observations over the Sussex RA area, with SRA themselves) as Assistant Hydrologist, and then crossed the 'great divide' (or should I say 'watershed'?!) into the private sector.

From being solely a surface water person, I suddenly found myself involved with the Thames Groundwater scheme, and learnt all about pump-tests, yield/drawdown and Theiss curves.

One day in 1975 one of the Partners called me into his office, handed me a large blue box containing 5 volumes. Basically I was told that I should get to grips with the Flood Studies Report, as this would now be essential for all the company's dam inspections and other flood design work. This was probably the 'Damascus Moment' that focused my career.

Over the preceding years I had met some older hydrologists who had worked abroad, and their experiences were of great interest, so overseas work became one of the things on my 'to-do' list. At this time, the mid-70s, the colonial service type jobs were being replaced by aid-funded projects, and there were plenty of these with UK-based consultants. Thus in May 1976, I, along with wife and very young family, were on a flight to Java: I was to be Hydrologist on the East Java Irrigation Project for 18 months. From then until nearly 2000, I must have spent more time abroad than in the UK.

I won't go into details, otherwise it will sound like an

obituary! Suffice it to say it was all very interesting and rewarding, to see so many countries and encounter so many different people as colleagues and friends.

There were times when I wondered what on earth had got me into this situation – such as trying to navigate through the Papua New Guinea Highlands for a newly arrived helicopter pilot using a US Tactical Air Pilotage Chart (TAPC), and finding my way across the highlands of north-west Iran with some vague maps, a compass and the Anglo-Iranian Oil Company phrasebook. Fortunately I had a tri-lingual driver, Mohammed, who on arrival in a particular village announced that the book would be no good as "Here sir, they talk Turkey" (Turkish).

Not all the postings were so adventurous. As time went by, I became more desk-bound in project management roles. I have often been asked about the favourite country in which I worked, and get some surprise reactions when I immediately answer "Bangladesh": the nature of the work, the people (mostly) and five seasons of cricket.

Two years as the WMO Chief Technical Advisor to the National Flood Forecasting Centre was equally demanding and rewarding and, like the old BBC radio programme, 'The Time of my Life'. The team of local staff and international consultants were able to make some tremendous advances in use of weather radar, introduction of near real-time computer models for river level forecasts, data exchange and other co-operation with the Bangladesh Meteorological Department, and much clearer and meaningful forecasts and warnings publication, eventually available on a website. So successful were we, that at the end of two years, the UNDP announced that the FFWC didn't need any more funding support from them!

I shan't go into the way aid support has changed, but the move away from practical in-country support from experienced engineers and scientists as at the start of my overseas career, to the politically-correct notions of 'institutional support', 'training the trainers' and support of projects and programmes on environmental or gender-equality grounds, have not helped the parlous state of instrumentation, monitoring and data production in many national hydrological and meteorological services, usually in those places most in need of a good quality information.

Unfortunately we are sometimes at risk in this country of giving up on field observations and local knowledge, to become dependent on models, which despite unbelievable increases in power, capacity and sophistication over the course of my career, are never going to be perfect. Knowledge, judgement and a certain amount of scepticism will always be required, and should remain the prerogative of hydrological professionals. Nowhere is this more required than in the need to maintain a sensible approach to 'climate change', to temper the politically inspired rhetoric. This fixation with things all getting worse has led, in my opinion, to some very poor decisions from Defra/EA, where results which are basically speculation, have been turned into inflexible policy and procedure, and centralised 'one-size fits all criteria' are applied unquestioningly by functionaries. One has only to look at a typical letter from the EA to a local authority rejecting a Flood Risk Assessment, to see that it is put together as a string of standard responses.

But one mustn't go out on a curmudgeonly note: all my former colleagues, associates and friends in

the hydrometeorological world have probably heard them all before. Much better is to quote the late Brian Johnston (cricket broadcaster), who gave his autobiography the title:

"It's Been a Lot of Fun".

James Dent
Hadleigh, Suffolk
June 2017

More on Evaporation – and Future Food Security

Colin Clark's piece in *Circulation 133* calls for comment, particularly the claim that "plants are good at water conservation". I can't speak for Somerset, but in dry Anglia evapotranspiration (ET) by plants consumes around 75% of average rainfall. Humans abstract the equivalent of around 5%, and return most of it after use. Which exactly is 'good at conservation'? But what I'm sure Colin means is that when water is scarce, plants can restrict ET and so conserve water when necessary. True enough, but a plant in that state is merely staying alive, not actively growing. Water is conserved, but at the expense of productivity.

Colin shows lysimeter-based correlations between AE and rainfall. But rainfall does not drive AE – it only constrains it in time of shortage. The drivers are temperature, wind, humidity and cloud cover (just think of the best conditions to dry the washing!). All of these are predicted to change for the worse, ie more PE, in the decades ahead. And the potential increases are alarmingly big. AE will of course be less, and the step from PE to AE is both crucial and complex. But as far as farm crops are concerned, the increasing size and frequency of water stress will mean either more irrigation if an economic source can be found; or less productivity if it can't.

On the same timescale, global food production faces more and greater threats, and some of the biggest are hydrological. Vanishing snowpacks, melting glaciers and aquifers being emptied will all widely reduce dry-season water, whilst reductions in rainfall and increases in ET will widely increase the need for it. Food security can be fragile already and with population escalating, what prospect for the price, and even the availability, of food imports?

So, if the climate predictions are right, it looks as if global changes will drive us to grow more of our own food, while hotter drier summers constrain our ability to do so.

Colin concludes that "hydrology...belongs in the field". Does it not also belong, at centre-stage, in strategic consideration of a very uncertain future?

David Evans
davidevans.water
@btopenworld.com

PS: More on our unpreparedness for the 'dry side' of climate change at DOI: 10.1680/jensu.15.00016 (or on request)



Updated NRFA peak flows data released

At the end of April 2017, the National River Flow Archive released an update to its peak flow data holdings and updated the files for use in the WINFAP software for flood estimation. The dataset includes Annual Maximum (AMAX) and Peaks over Threshold (POT) data for 951 gauging stations in the UK. Stations in England and Northern Ireland have been updated with an additional water year of data (up to the end of September 2015), and a full period of record review has been carried out for a subset of stations in Wales and Scotland. The new WINFAP-FEH files were produced on 28th April 2017 and reflect the NRFA data holdings at that point. Version 5 of the files is available for download from the NRFA website (http://nrfa.ceh.ac.uk/winfap-feh-files), with an accompanying release note highlighting major changes since version 4.1. Version 5 of the WINFAP-FEH files is the second version released since stewardship of the national peak flows database was passed to the NRFA.

In addition to the core peak flow data, there have been a number of metadata updates including, FEH suitabilities, ratings and datums, missing and rejected data, and station descriptions. This additional information about the gauging stations is provided to allow hydrologists to make informed judgements regarding use of the data.

The NRFA undertook a project to update grid references for all stations on the archive and have now used those to calculate new catchment boundaries, catchment areas, and statistics and FEH descriptors. The updated grid references have already been released and version 5 of the peak flows dataset includes the updated catchment areas and FEH descriptors.

The peak flows data which are provided through this service originates from gauging stations operated by a range of UK hydrometric measuring authorities as is the case with other NRFA data. Maintenance of the NRFA peak flow data, including the latest update, is carried out under a collaborative project between the Centre for Ecology & Hydrology, Environment Agency, Natural Resources Wales, Northern Ireland Rivers Agency and Scottish Environment Protection Agency.

Stephen Turner
CEH Wallingford

First, Kim Vercruysse from Cranfield went to IASWS 2017

Interactions between Sediments and Water

Taormina, Italy
17-22 June 2017

The IASWS 2017: what, where and why?

This Symposium is held every three years and brings together scientists from all over the world seeking to promote, encourage and recognize excellence in scientific research related to sediments and their interactions with water and biota in fluvial, lacustrine and marine systems and with particular reference to problems of environmental concern.

As PhD student approaching the end of my project, I was really looking forward to attending the Symposium and to presenting my work to some of the most experienced experts in the field. More specifically, I was hoping to get some ideas, perspectives, and feedback that can help orientate me towards finishing my degree.

My PhD project: studying dirt

First, what is my project about? I am a student at Cranfield University and I study the temporal variability in fine (suspended) sediment transport in the River Aire in northern England. More specifically, I aim to better identify the factors and mechanisms underlying suspended sediment transport by linking insights from temporal variations in suspended sediment concentrations, sediment sources and hydro-meteorological information. Why do I do this? Well, while fine sediment is a fundamental part of river systems, human interventions in the landscape have often strongly disturbed the natural sediment balance and quality in rivers, leading for example to biodiversity losses, pollution, higher water treatment costs and increased flood risk. The problem with addressing these issues is that fine sediment transport is extremely variable in time and space, which really complicates our ability to predict sediment concentrations in rivers and manage it accordingly.

Furthermore, specifically for the River Aire, Leeds City Council and its partners are currently finalizing the construction of a Flood Alleviation Scheme to protect the City of Leeds against fluvial flooding. Therefore, good insights into the quantity and driving forces of fine sediment transport is not only valuable from a scientific point of view, but also to help develop management plans to ensure long term flood protection and biodiversity.

My presentation: sediment fingerprinting

At the Symposium, I presented the results of a sediment fingerprinting study that aimed to quantify sediment source contributions to the suspended sediment and, more specifically, how I used that information to identify the dominant mechanisms underlying temporal variability in suspended sediment transport.

Sediment fingerprinting is a technique that aims to link physical and/or geochemical characteristics of the suspended sediment in the river to different

potential sediment sources (soils) on land, which can then be used to develop statistical models to estimate the relative contribution of different sources to the suspended sediment (see figure). Different types of sediment fingerprinting techniques exist. I used a relatively new technique based on Infrared spectroscopy, mainly because it is faster (and cheaper) than the other techniques and thus allows to do much more measurements (which is important if you want to capture variations in sources at a high temporal resolution).

I am not going to tell you all about the specific methods and results (which you can hopefully read about in a paper soon), but in short, my results show indeed considerable variation in the sediment source contribution during and between individual high flow events. Small events, in terms of river streamflow, are marked by relatively high contributions of urban street dust, while a high streamflow corresponds with higher sediment contributions from riverbanks and pasture. But, the really new and exciting bit about my research is that I applied sediment fingerprinting at a very high temporal resolution, resulting in a large and unique dataset of sediment source information. This allowed me to do a multivariate analysis between the source contributions and a set of variables related to streamflow and precipitation. This analysis showed that source contributions are correlated to different hydro-meteorological factors. For example, contribution of urban street dust to the suspended sediment responds very fast to precipitation, while sediment coming from pasture is generally more correlated to the amount of precipitation in the past month and thus has a lower response to precipitation. My results emphasize the importance of capturing sediment source variations to gain better insights into the drivers of fine sediment transport.

The fact that I have a quite unique dataset offers a lot of opportunities from a scientific point of view, but also posed some challenges in terms of data interpretation. I was therefore really curious about the opinion of other (more experienced) scientists about my work and methods. After my presentation, I generally received positive reactions, and I especially appreciated some comments that proved that my presentation was



River Aire in the city of Leeds colouring chocolate rown after a a rainfall event the day before



clear and understandable, and that other people also see the benefit of my research. For example, Abdulvahed Khaledi Darvishan from Tarbiat Modares University in Iran, asked about the effect of rainfall patterns across the catchment on the variable contributions of sediment sources to the suspended sediment. This is something I was hoping to find, but the results suggest that this is not a dominant factor in controlling the variations. Phillip Owens from University of Northern British Columbia in Canada asked about the management implications of my findings and how it compares to a previous study in the area. This in my opinion is very important and I aim to address this thoroughly in my thesis.

Conclusion

In short, the Symposium was a great experience for me! But, I also have to admit that talking about your own research is not always easy, especially being a young scientist among much more experienced scientists. Though, it is a fundamental part of doing science: exchanging ideas and insights not only broadens your own knowledge, but it also puts your research into perspective. It especially pushes you through the bubble that is easily developed when you are working on a 3-year project as a PhD student. And that is exactly what I needed in those final PhD months! So thank you very much BHS, for awarding me with a Travel Grant to attend the Symposium!

Contact and further information

For further information, you can visit the Symposium's website: www.iasws2017.altervista.org/

A selection of papers presented in the conference is planned be published in a special issue of "Journal of Soils and Sediments" by the end of next year.

If you would have any questions about my own research, feel free to contact me on k.vercruysse@cranfield.ac.uk, follow me on Twitter (@_KimVercruysse), or visit our research group website at Cranfield University on: http://www.bankfull.org.uk

Second, Pia Benaud studying at Exeter University, went to

EGU General Assembly

Vienna
April 2017

As a final year PhD student, EGU 2017 presented a timely opportunity and the benefits of my attendance were three-fold:

(I) an opportunity to discuss and evaluate my research findings with an audience of international experts and peers,
(II) a chance to gain exposure to the latest developments and conversations within a rapidly evolving field, and
(III) a platform from which I could align and develop my research ideas with the wider community, as I look to the next stage of my career.

I secured two presentations at the conference, allowing me to dissemination the findings from key pieces of work from my PhD research. The first was a paper presentation entitled 'What can

we learn from national-scale geodata describing soil erosion?' This body of work is a synthesis and analysis of all readily accessible, UK-based, empirical data on soil erosion. Through exploring the strengths and weaknesses within the existing dataset, I have sought to explain why existing attempts to build a national understanding of soil erosion in the UK fall short. The collated information from soil erosion studies will be made available online to all users as an open-access geodatabase, upon final publication. This was well received by the audience who thought it would be of value to the modelling community and agreed with my conclusions.

The second was a poster presentation entitled 'Utilising Structure-from-Motion approaches to develop a spatial understanding of soil erosion processes, in an experimental setting'. This piece of work is a novel intersection between established and developing methods for the quantification of soil erosion rates. Through utilising the experimental rigour afforded within laboratory-scale experiments, I presented an analysis of the capabilities of Structure-from-Motion photogrammetry in this setting. Using the workflow I presented, I constructed point clouds with a ground sampling distance and RMSE of less than 0.2 mm. Consequently, this approach permits the quantification of the fine-scale changes in surface topography resulting from water erosion processes and will be an invaluable tool for the spatially-explicit evaluation of soil erosion models.

My poster received a lot of attention –– I was busy discussing my findings for the full session –– which was incredibly rewarding. It was great to have so many people interested in my findings, and the feedback from and discussions with peers doing similar research was invaluable and encouraged me to keep pursuing the work.

I cannot thank BHS enough for the Travel Grant, attending EGU was just what I needed to motivate me for the final PhD push!

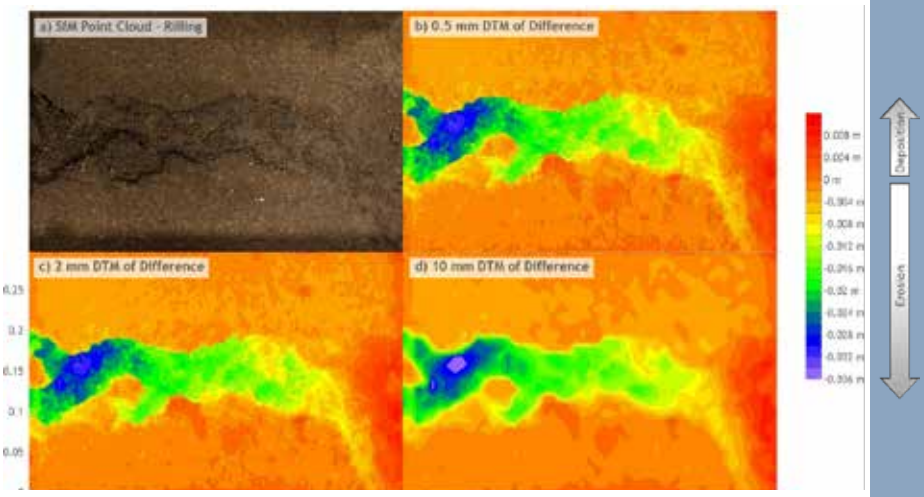


Fig 1 (a) True colour SfM point cloud of erosion plot, and DTM of difference for total surface change at (b) 0.5 mm, (c) 2 mm, and (d) 10 mm grid resolution.

Louise Slater from Loughborough also went to the EGU meeting

In January 2017, I returned to the UK to begin a lectureship at University, after completing a postdoctoral scholarship at the University of Iowa in the United States. I was keen to attend the European Geosciences Union (EGU) meeting in Vienna to meet other researchers in my field, explore new ideas, and obtain feedback on ongoing work. The BHS travel grant was most helpful as it enabled me to attend the meeting and present two talks: one paper on hydrological forecasting, and one interactive PICO on science communication.

My first talk was titled 'Statistical-dynamical long range seasonal forecasting of streamflow with the North-American Multi-Model Ensemble' (NMME)". The paper introduce d a new statistical method for long-range flow forecasting, developed with Gabriele Villarini and Allen Bradley (IIHR-Hydroscience and Engineering) and Gabriel Vecchi (Princeton University). Traditionally, hydrological forecasting approaches are either statistical, relating climate precursors to streamflow, or dynamical, forcing hydrological models with the most recently available meteorological forecasts. In contrast, hybrid dynamical statistical models benefit from different strengths: they are computationally efficient, can integrate and 'learn' from a broad selection of input data (General Circulation Model (GCM) forecasts, Earth Observation time series, teleconnection patterns), and can benefit from recent progress in machine learning (e.g. multi-model blending, post-processing and ensembling techniques).

To compute our probabilistic streamflow forecasts, we used climate forecasts from the NMME. The NMME is a 'prediction experiment', to which several U.S. (NOAA, IRI, NCAR, NASA) and Canadian (CMC) modeling centres contribute real time seasonal-to-interannual predictions. The project aims to facilitate the development of multi-model forecasting schemes by providing publicly-available hindcasts and forecasts online. We used these data to develop a systematic framework for statistical-dynamical forecasting of streamflow using outputs from eight NMME GCMs (CCSM3, CCSM4, CanCM3, CanCM4, GFDL2.1, FLORb01, GEOS5, and CFSv2). At several hundred U.S. Midwest stream gauges with long (50+ continuous years) streamflow records, we fit probabilistic statistical models, building on the approach described in Slater *et al.* (2017).

A range of predictors were used, including basin-averaged precipitation, antecedent wetness, temperature, agricultural row crop acreage, and population density. We evaluated a broad range of model formulations for every site, for all streamflow percentiles (ranging from minimum to maximum flows) and across the full range of lead times (from one to ten months ahead of the season) (Fig. 1). Our findings revealed that statistical dynamical streamflow forecasts are skillful, and may enable water managers to make practical decisions about water supply and allocation, reservoir operation, flood risk, urban planning, navigation and crop forecasting.

It was particularly interesting to present this work in a hydrological forecasting session and to discuss our approach with other ensemble forecasters. I was initially a little uncertain whether the use of a statistical methodology for seasonal flow forecasting would be well received, and was therefore

extremely encouraged to hear the positive opinion and suggestions of the EGU's hydrological forecasting subdivision delegates. There was considerable interest in our use of land cover predictors in the models and to hear that our findings confirmed some of the results that were obtained in the EDgE project regarding the predictability of high and low flows.

Christel Prudhomme (European Centre for Medium-Range Weather Forecasts, ECMWF) highlighted the fact that there are now many different seasonal forecasting models, and it helps if we use consistent forecast skill evaluation metrics and methodologies to compare the strengths and biases of different methods. Niko Wanders (Utrecht University) and Shaun Harrigan (Centre for Ecology and Hydrology, CEH) both suggested using the Ensemble Streamflow Prediction (ESP) approach as a benchmark to evaluate the skill of our method (by measuring how much forecasting skill can be obtained using only initial conditions).

Several collaborations have emerged from these discussions, with the partners from the IMproving PRedictions and management of hydrological Extremes (IMPREX) project consortium, and with a Canadian research group, aiming to compare the skill of the statistical dynamical forecasting method with that of more traditional hydrological forecasting systems. As an early career researcher, I felt that meeting with these researchers was invaluable, as it made me feel part of a greater scientific community.

My second presentation was a solicited PICO talk – 'An early career researcher's perspective on presenting flood risk research to the media' – in the session *How my water research made the news* which was co-organized by the Young Hydrologic Society (YHS, youngHS.com). In truth, I was initially a little hesitant about giving this talk as I still have limited

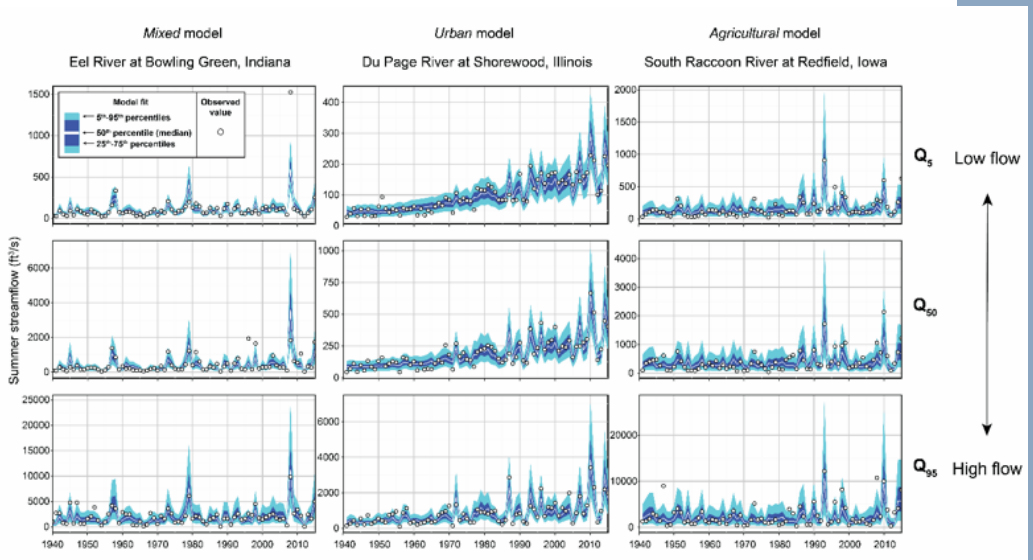


Fig. 1 Probabilistic statistical modelling of seasonal streamflow quantiles (Q5 to Q95) at three stream gauges.

experience with the media, aside from a few interviews and press releases. Thus, rather than focusing solely on my own experience, I felt that it would be more useful for other early career researchers to produce a synthesis of the reasons why we need science communication and of general advice for engaging in outreach. Some of the best scientific ideas tend to remain in closed access within the specialist literature, and it seems to me that if we wish to increase dissemination of these ideas and promote a positive attitude towards science, then we have a social responsibility to engage with the media.

In my talk, therefore, I discussed a few of the most useful techniques for increasing research visibility. The first is to establish a digital presence to make sure that our work can be found. Among the multitude of existing social media channels – ResearchGate, ORCID, Mendeley, Google Scholar, Altmetrics, Publons, newsletters, and personal webpages – Twitter is certainly one of the most useful for discovering ongoing projects and interacting with other scientists.

By tweeting other people's work in addition to our own, we are helping to foster a sense of community, developing ties with other scientists, and making sure that the main messages from our research get into the public domain. In terms of media communication and interviews, perhaps the most useful tip that I came across is to ask ourselves why the public should care about what we are doing. To communicate that message, we must then boil down our findings into 10-20 second sound-bites, without being too technical or over-explaining, and ideally provide real-life examples illustrating the idea in colourful or descriptive terms.

Other speakers in the session described issues such as the importance of choosing words carefully to avoid miscommunication pitfalls (Hubert H.G. Savenije) or the role of the narrative, in an 'age of narrative-driven media' (Rolf Hut). The session was particularly lively and engaging, and the conveners – Stefanie Lutz, Andrea Popp and Tim van Emmerik – are now synthesizing all the contributions into a Commentary, reflecting both the journalists and the hydrologists' points of view. I am certainly looking forward to reading the synthesis of these talks.

Overall, for me, the highlight of the EGU meeting was without a doubt getting to know all the researchers working in similar areas, and feeling part of a much broader scientific community.

Slater, L.J., Villarini, G., Bradley, A., Vecchi G. (2017) A dynamical statistical framework for seasonal streamflow forecasting in an agricultural watershed, Climate Dynamics. https://doi.org/10.1007/s00382-017-3794-7

Congratulations to Keith Beven for his appointment as a Fellow of the Royal Society *

This is a real boost for hydrology as from the listings of FRSs, both past and present, it appears that not very many of these illuminati claim to be hydrologists. This is perhaps understandable as our delightfully catholic profession includes many eminent sceintists who naturally give their core discipline as 'physicist' or 'mathematician'.

Peter Wolf Symposium 2017

Centre for Ecology & Hydrology, Wallingford

3–4 May 2017

Alan Jenkins (Centre for Ecology & Hydrology) introduced the event, highlighting the vital nature of water to society and how a better understanding of hydrological processes is needed to make well informed decisions. Both Alan and Peter Ede (President-elect of BHS, Mott MacDonald) talked about their exciting and diverse careers in the field of hydrology, encouraging delegates to continue with enthusiasm for a rewarding career.

Day one began with a keynote talk from Anne van Loon (University of Birmingham), stressing the need and importance, as well as the challenges, of understanding hydrological processes in the Anthropocene. Drawing on examples from her drought research, Anne showed how human influences can impact hydrological processes and also described ways of identifying and separating these human influences from the natural processes.

An interesting interactive exercise got delegates thinking about their work and whether it was primarily focused on hydrology in the context of society or the impact of society on hydrology.

Miles Clement (Newcastle University) presented first on an innovative use of satellite imagery for flood mapping, showing an example from the winter 2015/2016 flood event. Chris Rhodes (Mott MacDonald) then talked about methods for assessing the resilience of water supply systems for drought planning. James Fidal (University of Bath) followed, comparing the performance of rainfall-runoff models in urban catchments.

Just before lunch, Ioanna Panagea (Centre for Ecology & Hydrology) spoke on the impact of climate change on yields in the Mediterranean rangelands. Florence Lloyd (Swansea University) then explored methods for analysing trends in precipitation in a Welsh catchment and Santos González-Rojí (University of the Basque Country) evaluated precipitation downscaling methods over the Iberian Peninsula. Harriet Robson (Mott MacDonald) described how specialist industry software was used for water supply system forecasting and Josie Baulch (University of Southampton) explored the relationship between drought hazard and ENSO in sub-Saharan Africa.



Robert Wilby (Loughborough University) gave the second keynote talk discussing common problems caused by errors in data which can cause inaccuracies and uncertainties to propagate throughout your research. He left delegates with an important message: be cautious with the data you use and scrutinise it carefully before you start to use it.

Glenn Watts (Environment Agency) followed with the final keynote talk giving pointers on how to ensure your research has

New members

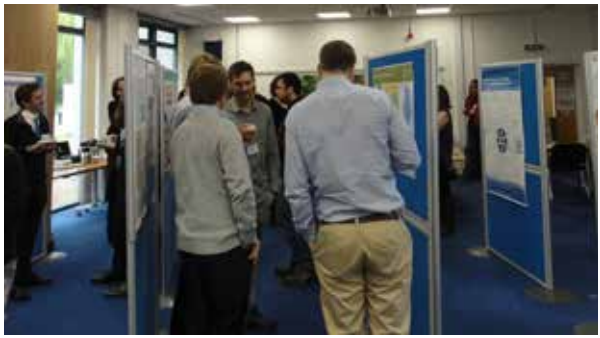
Niklolai Brekenfield.Birmingham University
Lisa Stein .....Bristol University
Marie Arnaud.....Leeds University
Chijioke David Eke .....Coventry University
Deniz MaAndrew .....Aecom
Liam Nicholson.....Mott Macdonald, Leeds
Alice Gent .....Heriot Watt University
Susanna Neale.....Environment Agency

an impact and increase its usefulness for decision makers. Glenn emphasised that, for decision makers, the most informative work is concise and timely with carefully thought-out implications and solutions.

Fergus McClean (Newcastle University) showed how cloud computing can be used for large-scale flood modelling and the problems that may arise from this. Ben Smith (Newcastle University) described methods to identify areas at risk from multi-source flooding (surface and groundwater) and noting where a scarcity of information on groundwater flooding has occurred. Iskra Mejía-Estrada (University of Bristol) finished off the presentations with her talk on modelling the meteorological and hydrological processes of flash flood events. The proceedings were brought to a close by a poster session with 15 posters over which there was plenty of discussion.

At the Symposium dinner, Peter Ede awarded prizes for presentations and posters. Three prizes were awarded for the oral presentations: Miles Clement (Newcastle University) got first prize for his presentation, "Multi-temporal flood mapping from space: insights into the 2015–16 winter storms"; Chris Rhodes a runner-up prize for his presentation, "How can we assess the resilience of our current water supply system against droughts not previously observed?" and Florence Lloyd (Swansea University) was a runner-up prize for her presentation, "Quantile regression technique for trend analysis of precipitation for flood risk assessment in south Wales, UK". Rosie Lane (University of Bristol) was awarded first prize for her poster, "Benchmarking hydrological model predictive capability for UK river flows and flood peaks".

The field trip took place on day two of the Symposium. The morning was spent at HR Wallingford. Sam James, Darren Lumbroso and Ralph Ledbetter gave presentations on the water resources work and innovative research undertaken at HR Wallingford. This was followed by tours of their physical modelling hall and the UK Ship Simulation Centre, with some delegates getting the chance to captain tug boats on the Thames in London or ferries coming into port at Dover (with varying degrees of success!).



After lunch, Nick Everard (Environment Agency) gave a potted history of river gauging techniques. He focused on recent exciting technological advances and the importance of observations for all types of hydrological studies, in

particular, how they can complement modelling studies. Delegates were then treated to a demonstration of the ARC-Boat on the river Thames in Wallingford.

The ARC-Boat uses an acoustic Doppler profiler (ACDP) on the underside of the boat to take many thousands of measurements across the channel, providing data on the bathymetry and flow of the river. Some lucky delegates were able to drive the ARC-Boat producing a map of channel bathymetry, whilst learning about its limitations and advantages over traditional gauging methods as well as how best to control the ARC-Boat.

It was obvious throughout the event that everyone was not only enthusiastic about their research but also interested in the research of others. The different backgrounds of attendees, whether students, early career researchers, those in consultancy or from regulatory bodies meant discussions were varied, and hopefully reflected the varied nature and scope of the British Hydrological Society. We hope the Peter Wolf Symposium continues to be a valuable event for hydrology students and early career hydrologists in future years.

We very much enjoyed hosting the Symposium at the Centre for Ecology & Hydrology in Wallingford and would encourage others to host the event at their own institution in the future. Special thanks go to guest speakers Alan Jenkins, Peter Ede, Anne van Loon, Robert Wilby, Glenn Watts, Nick Everard and all those at HR Wallingford who contributed to the field trip. We very much appreciate their time, experience and wise words.

Lucy Barker, Olivia Hitt and Stephen Turner, Centre for Ecology & Hydrology
Iskra Mejía-Estrada, University of Bristol



UK Hydrological Bulletin: May – July 2017

Following the lowest October–April rainfall for Great Britain since the extreme drought of 1975/76, drought conditions continued to intensify during May when estimated runoff from the country as a whole was the second lowest for the month in a series from 1961. The stress on water resources, agriculture and river ecology increased during the late spring but an exceptionally cyclonic episode in early June triggered a seasonally unusual, and spatially uneven, recovery in river flows. Moderate floodplain inundations were common during an episode which, across much of the country, demonstrated that substantial early summer rainfall can have a very material impact on drought risk. Nonetheless, groundwater levels remained depressed in a few parts of lowland England throughout both June and July.

Regional rainfall totals for May featured an unusual degree of uniformity – implying a notable contrast between relatively wet conditions in the English Lowlands and substantial rainfall deficiencies to the west and north. In the latter regions, many rivers registered less than 50% of their average monthly flow and a few, including the Spey and Tyne (Northumbria) reported new minimum runoff totals for the month. More notably in a water resources context, total outflows from Great Britain over the October-May period was the lowest since 1975/76 (see Fig 1).

In Northern Ireland the exceptional 8-month rainfall deficiency was reflected in the runoff from the Mourne basin – the lowest for May in a series from 1982. Whilst reservoir stocks were generally holding up well, soil moisture deficits increased steeply through the spring and groundwater levels in some Chalk wells showed little or no recovery over the 2016/17 recharge season. This was a primary factor in calls by the water industry to moderate water demand, particularly in much of south-east England.

With the exception of parts of central England, June rainfall totals were generally well above average, particularly in eastern Scotland where a 48-hr rainfall total of 84 mm for Edinburgh during the first week – part of a continuing intense cyclonic episode – contributed to Scotland's wettest June in a series from 1910.

Correspondingly, recoveries in runoff rates were exceptional with significant flooding, particularly in parts of northern Britain (e.g. at Portsoy, Aberdeenshire). Outflows from Great Britain as a whole eclipsed previous daily maxima early in the second week (see Fig. 2) confirming the notable nature of the hydrological transformation, albeit much less dramatic

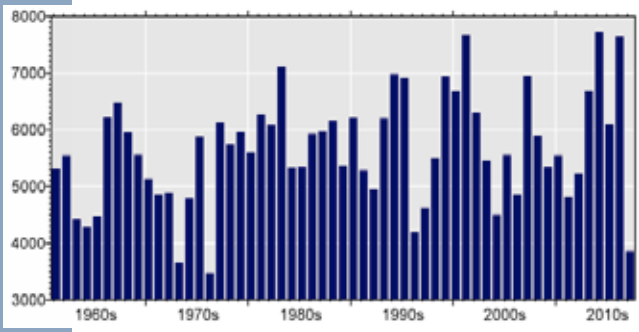


Fig. 1 October-May water-year outflows from Great

than that experienced in the summer of 2007. Steep recessions became re-established during the heatwave conditions of the third week but thereafter thunderstorms were common with localised flash flooding (e.g. in Newcastle) and a number of flood warnings – mostly in southern Scotland and northern England. The spate conditions contributed to well above average June runoff in catchments away from the English Lowlands. In north-east Scotland the Lossie registered its highest June runoff for 50 years while, in contrast, modest mean flows characterised many southern and eastern rivers including the Tone (Somerset), Coln (Gloucestershire) and Stringside (Norfolk) each reporting less than 60% of the June mean.

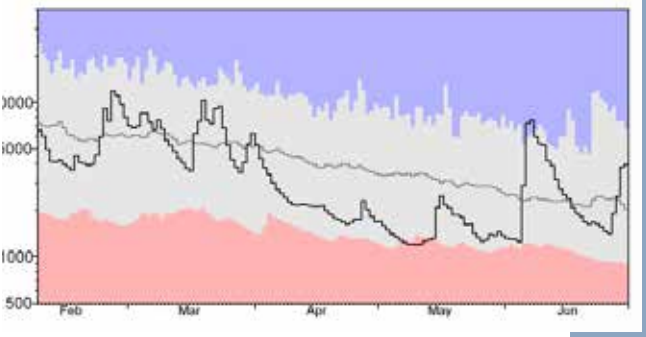


Fig 2 Daily outflows from Great Britain ((m3s-1). (Blue envelope: pre-2017 daily max, pink envelope: daily min. The grey trace is the long term average)

Following substantial late-June downpours (with some flash flooding), soil moisture deficits in early July generally remained below average for the time of year. Exceptions included much of southern England where a spray irrigation demand remained high. Generally, the unsettled early summer ensured that reservoir stocks were mostly within 10% of the average for time of year but relatively depressed in some southern impoundments, including Roadford and Wimbleball in the South West and – most notably – Bewl (Kent) which was at its lowest for early July since 1990.

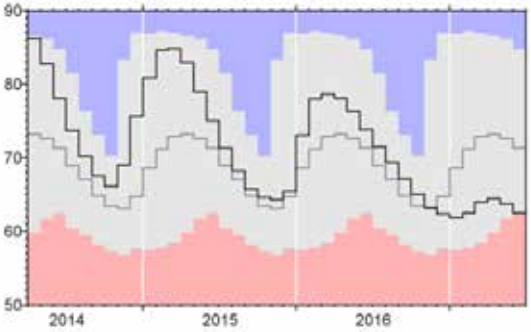


Fig. 3 Monthly groundwater levels in the Chalk at Little Bucket (Kent)

Groundwater levels remained below average although within the normal range across most major aquifers but close to seasonal minima in a few southern outcrops, e.g. at Bussels in the South West and Little Bucket Farm (Kent) where levels closely approached the lowest on record for July (see Fig. 3).Generally however the drought threat was greatly diminished relative to the late spring, reinforced by unsettled weather through July with a cluster of Flood Alerts in responsive – mostly urban – catchments with significant transport disruption, as in Carlisle on the 22nd and Belfast on the 26th.

Terry Marsh
29/07/17

Important dates!

13th September 2017
BHS Annual General Meeting
Loughborough

27-28 September 2017
FLOOD EXPO 2017
Use the hyperlink on the BHS website for more details and to register for (free) tickets

05-07 September 2017
Resilience to Global Changes – Anticipating the Unexpected
The 7th International Conference on Flood Management (ICFM7),



Hydrologists of the future.....see page 15

Circulation **is published quarterly. It is free to members of the British Hydrological Society and costs £25 to nonmembers on annual subscription.**

- **Membership enquiries: Tim Fuller, BHS Secretary, Institution of Civil Engineers, 1-7 Great George Street, London SW1P 3AA. Tel: 0207 665 2234 Email: bhs@ice.org.uk**
- **Editor: Celia Kirby Tel: 01544 230053 Email celia.kirby@btinternet.com**
- **Web pages: http://www.hydrology.org.uk/**

Circulation **is indexed in** *Geosystems' Hydrotitles* **&** *GeoArchive* **and** *NISC HydroROM.*