

Circulation

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The Newsletter of the British Hydrological Society

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My ICE

Just a gentle reminder that the link on our web site 'Updatng and renewing subscriptions' at www.hydrology.org.uk/php takes you direct to the 'business' bit of the Civils when you need access to membership details such as subs paid, change of address, etc.

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President's Piece

In my last President's Piece I raised the issue of the future of *Circulation*, and whether it might evolve into an electronic-only publication. I am grateful to those members who contacted me and the Editor with their comments – inevitably quite a range of views from surprise that this hasn't been done before to regret if we were to lose the distinctive format of our current communication with members. The committee discussed the subject at some length at our April meeting and were split right down the middle. Consequently, there will be no change for the time being, but we will be looking further at how an electronic-only communication might develop. Given the spread of views, the future of *Circulation* is something that we may decide to put directly to the membership in due course.

Amongst the questions raised by members was whether they could individually opt in/out for receiving the hard copy version. At the moment we feel that would be an unsatisfactory half-way house because the cost saving (and hence money available for investing in the electronic version, or other BHS activities) would be relatively modest.

Another thing I mentioned last time is our biennial Symposium at the University of Westminster on September 12th and 13th. Planning for this has unfortunately been hampered by illness, but everything is now in hand. Further details are contained in this edition of *Circulation*, including a new submission deadline for abstracts. The delegate charges are also very attractive, thanks to the special arrangements that Geoff Petts has been able to make with his university. But please don't leave it to the last minute, as if too many people do that we may have to cancel for lack of interest.

This issue is accompanied by a notification of committee vacancies and request for nominations. The future health of the Society depends on the willingness of members to get involved, and we are very grateful to those who give their time for this (and to those employers who support their staff in committee membership). There are vacancies for ordinary committee members and for the two executive committee roles of Honorary Secretary and President (the latter to follow a year as President-elect). We'd love there to be sufficient interest for us to need to hold elections, though historically that has rarely been the case. With regard to the executive positions, there is a natural reluctance for people to put themselves forward, so if you think your colleague or boss would be a good candidate why not nominate them (with their agreement, of course!).

One of the consistent highlights of BHS in recent years has been the Peter Wolf Symposium, and I am certainly looking forward to attending this year's event in Leeds. The team from the Canal and River Trust have put together a good programme, so if you are a student or in the early years of your career I encourage you to see if any last-minute places are still available.

Peter Ede
President

Seasonal Forecasting: meeting user needs

A two-day BHS meeting on seasonal forecasting of water resources was held at Loughborough University on 24–25 January 2018. The event was supported by the British Hydrological Society, the RCUK Drought and Water Scarcity Programme, Water @ Loughborough, and Water @ Reading. The aim was to address various technical aspects of seasonal forecasting of floods and droughts, and to discuss how forecast providers might better address user needs in these areas. **Robert Wilby** (Loughborough University) opened the workshop with key questions such as: How meaningful are our forecast metrics? How should we benchmark the skill of different forecasting technologies? How do we live with and communicate the uncertainties of a forecast? How should we package the forecasts and make them available to diverse communities of users?

The meeting began with a session on the user perspective on seasonal forecasts. **Ceris Jones** (National Farmers' Union, NFU) presented the role of seasonal forecasts for British farming. This community has a real appetite for weather information at relevant temporal and spatial scales because farming is inherently a risky business. This can mean checking multiple forecast sources and a combination of different weather variables and forecast types. The majority of NFU members are interested in three-month forecasts (e.g. a seasonal winter weather forecast presented in a user-friendly format). Members find that probabilistic forecasts and confidence intervals are useful when taking high-risk decisions in complex situations.

Richard Davis (Environment Agency, EA) then discussed operational ensemble projections, scenarios and forecasts for water resources. Operational ensemble climate projections have been provided by the EA since 2012, although scenarios and reasonable worst case scenarios are also still used by decision makers. While there have been some improvements in the underlying science, it is still not possible to use information of sufficient skill, at the right time, right scale and in the right format. Forecasts need to be accessible to decision makers, and the latest science must be embedded within the organisations responsible for drought management to be effective. There is also scope to test the skill of past forecasts now that there are about six years of data.

Session 2 focused on European seasonal forecasting. **Ilias Pechlivanidis** (Swedish Meteorological and Hydrological Institute, SMHI) presented SMHI's pan-European seasonal forecasting service (http://swicca.climate.copernicus.eu/indicator-interface/seasonal-forecasts-maps/) and discussed the need for strong user engagement through better communication of results and co-production of knowledge. This work shows that European climate services can provide useful seasonal information for a number of sectors such as energy, water, and agriculture. The skill and reliability of forecasts is region, season and lead time dependent. There is a strong need to engage with users and co-design user-tailored services. Reliable forecasts, communication, guidance, and metadata are the key characteristics of a user-oriented

seasonal forecasting service.

Katie Smith (Centre for Ecology and Hydrology) then introduced the EDgE project – an End-to-end Demonstrator for improved decision making in the European water sector (http://edge.climate.copernicus.eu). EDgE is a pan-European proof-of-concept web service developed to support decision making for the water sector at monthly, seasonal, and multi-decadal lead times. The demonstrator is being co-developed with close interaction between computer scientists, hydrologists, modellers and stakeholders representing key decision-makers (including those responsible for operational water resource management, hydropower and public water supply). Stakeholders were asked to provide feedback at several focus groups, outlining the hydro-climate services they currently use, and those that they require for their operational decision-making procedures. The demonstrator has incorporated the stakeholder feedback, paying close attention to presenting the skill and uncertainty in the forecasts and climate projections.

Third, **Louise Arnal** (University of Reading) presented the European Flood Awareness System (EFAS). The EFAS seasonal outlook provides users with the latest Europe-wide overview of river flow trends (anomalously high or low flows) for the next 8 weeks. Seasonal climate forecasts improve the seasonal streamflow forecast quality (compared to using historical meteorological observations) for the first month of lead time only, on average, over Europe. However, the quality is improved more and for longer lead times in some parts of Europe and for certain seasons (especially in autumn and winter). Overall, seasonal streamflow forecasts (produced using either seasonal climate forecasts or historical meteorological observations) are potentially useful for predicting anomalously high or low streamflows months in advance in Europe, and could be of benefit to many water-related applications.

The last session was on seasonal drought and precipitation forecasting. **Laura Baker** (University of Reading) introduced an improved seasonal prediction of UK regional precipitation using atmospheric circulation. The Met Office's seasonal forecast system, GloSea5, has been found to have significant skill for forecasting wintertime North Atlantic circulation patterns. A statistical downscaling technique has been developed using these outlooks of winter circulation to provide forecasts of regional and gridded precipitation in the UK. The work has shown that precipitation derived in this way is more skilful than that taken directly from GloSea5.

Maliko Tanguy (Centre for Ecology and Hydrology) then discussed improving seasonal drought forecasting, with recent advances in streamflow forecasts from the IMPETUS project. The Ensemble Streamflow Prediction (ESP) method has been fully assessed for the UK and can now be used as a benchmark to evaluate more complex forecasting methods. ESP was found to have high skill in south-East England. Methods based on dynamical atmospheric forecasts (such as sub-sampled ESP conditional on the NAO index or fully coupled hydrological model/rainfall forecasts systems) improve streamflow forecasting skills for seasonal predictions in winter (DJF) for the UK, especially in the north and west. A sensitivity analysis of streamflow predictions on the quality of rainfall drivers was carried out to determine how good the rainfall forecasts need to be in order to

be useful for hydrology.

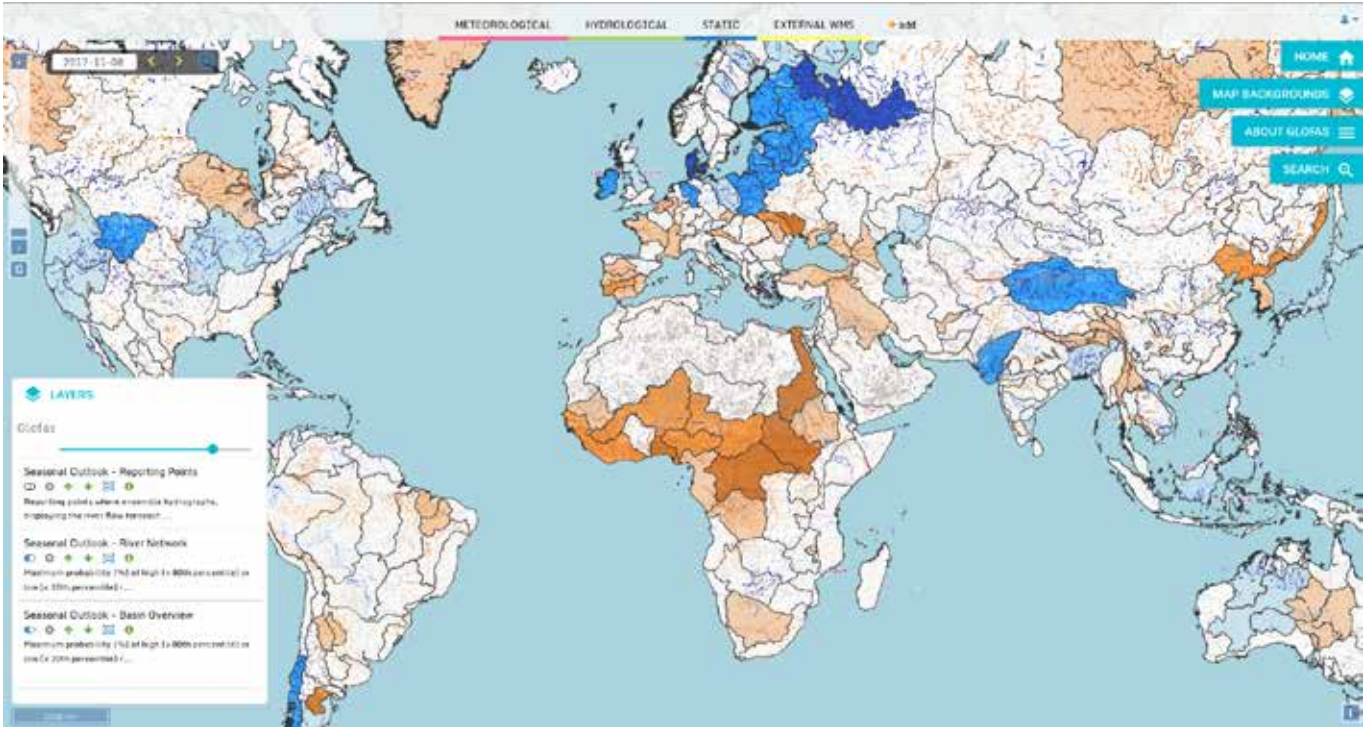
Doug Richardson (Newcastle University) spoke about weather patterns and drought: frequencies, persistence and forecasting. Weather pattern classifications are a useful tool for reducing complex atmospheric processes into a few discrete states. These patterns can be used to provide local estimates of rainfall or other meteorological variables. A set of weather patterns classified by the Met Office has been linked with UK drought via changes in both frequencies and persistence. Persistence in the Met Office patterns could provide useful information for forecasting.

The first session on the folowing day was on operational forecasting for national water resources. **Jamie Hannaford** (Centre for Ecology and Hydrology) presented the science and the practicalities of operational seasonal hydrological forecasting (www.hydoutuk.net). The UK Hydrological Outlook is a multi-method, operational seasonal hydrological forecasting system delivered through collaboration between CEH, British Geological Survey, the Met Office and other UK agencies. The service delivers monthly forecasts of streamflow and groundwater levels, with an emphasis on forecasting over the next three months, accompanied by outlooks over longer time horizons. While there have been major advances in the science of seasonal forecasting for the UK, it still remains an inherently challenging endeavour given the variability of our weather. Thus, in some places, there remains a gap between user requirements and scientific realities. Ongoing challenges include blending multiple forecasting methods into a single coherent narrative for broad audiences.

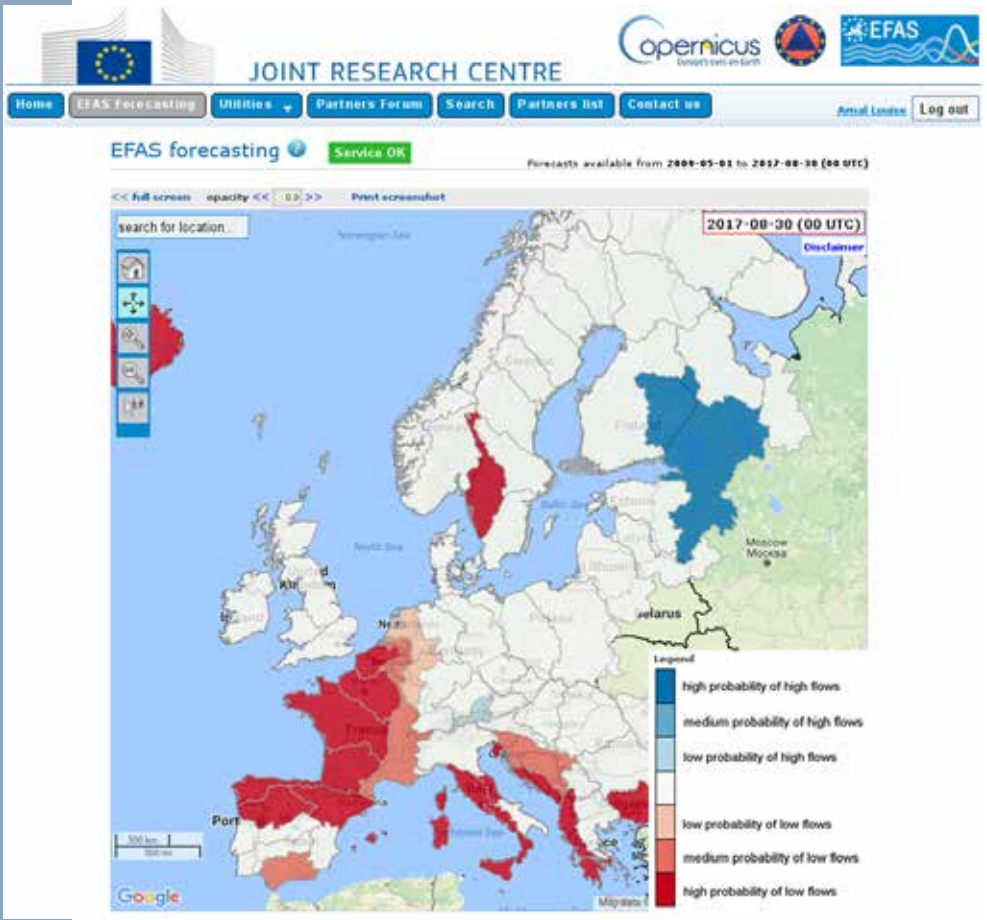
Konrad Bogner (Swiss Federal Institute for Forest, Snow and Landscape Research) presented an application of Hydrological Extended Range Forecasts for Swiss Water Resources Management. Hydrological variables such as surface and subsurface runoff and soil water content were analysed for Switzerland. The skill of extended range hydrological forecasts based on Numerical Weather Predictions was found to be generally superior to the skill of forecasts based on climatological predictions. The results of this study could be applied gainfully for various kinds of long-term water management planning and are going to be implemented via the Swiss drought information platform (www.drought.ch).

The second session focused on Advances in global seasonal forecasting. **Rebecca Emerton** (University of Reading) presented Global Scale Seasonal Hydro-meteorological Forecasting with the Global Flood Awareness System (GloFAS, developed by ECMWF and the European Commission Joint Research Centre). Global overviews of the upcoming hydrological situation are key for organisations working internationally, such as governments, or for humanitarian aid. GloFAS seasonal outlooks provide open access to forecasts of regions likely to experience unusually high or low river flow, up to 4 months ahead (www.globalfloods.eu). Ensemble hydrographs and persistence diagrams are available at points covering the global river network. Evaluation against observed river flow and reanalysis data is ongoing and will be made available via the GloFAS website. Preliminary results using reanalysis indicate forecasts are, on average, slightly more skilful during winter, and for high flows.

Jonathan Eden (Coventry University) spoke about probabilistic empirical prediction of seasonal climate: evaluation



Flood early detection up to 30 days in advance with the Global Flood Awareness System (GloFAS, www.globalfloods.eu)



The European Flood Awareness System (EFAS, https://www.efas.eu/)

and potential applications. Empirical prediction systems have an important role to play, both as a benchmarking tool for operational forecasts and as a forecast system in their own right. The KNMI Probabilistic Empirical Prediction (K-PREP) is built on physical principles with predictive information taken from the global CO_2–equivalent concentration, large-scale modes of variability in the climate system and regional-scale information. Comparison of the K-PREP system with EUROSIP forecasts reveals a number of areas where an empirical approach can add significant value to seasonal forecasts.

The last session of the day was on lakes, canals, and hydropower. **Kevin Sene** (Lancaster Environment Centre) presented challenges in seasonal forecasting for large lakes and reservoirs. Water levels respond over a range of timescales and the impacts of flow regulation often need to be considered. Statistical and stochastic techniques can help to assess

the most important influences and the interactions between them, with the potential to be used as forecasting models in their own right. Exploratory studies suggest that forecast performance might be improved by using data assimilation techniques more typical of short range flow forecasting, including climate indices.

David Mould (Canal & River Trust) then discussed the use of seasonal forecasting for effective water management across the canal network. The Canal & River Trust is a custodian of 2,000 miles of waterways in England and Wales. The Canal & River Trust's Water Management Team are currently updating their water resources modelling platform to Aquator, as part of the Water Resources Strategy. Once this is in place the Trust will be in a position to more effectively include seasonal forecasting in operational modelling. The key requirements for outputs from seasonal forecasting are simplicity of output for integration into modelling tools (e.g. summary data), and communicating the certainty of output for different regions.

To conclude the day, **Robert Wilby** (Loughborough University) spoke about minimalist seasonal forecasting to support hydropower utilities. This limited-data/ forecasting approach was developed with the close cooperation of local hydrometeorological experts and operators of the Nurek hydropower plant in Tajikistan. ENSO teleconnections were translated into tables of reservoir inflow anomalies to provide hydropower managers with several months lead-time. The resulting step-by-step guidance requires minimal technical or computing resources, and can be applied to publicly available information – all considerations in data sparse, low capacity regions.

In summary, the workshop covered a range of seasonal forecasting issues, including the current wealth and diversity of models, outputs, and interfaces that are now available to users. We learnt that whilst users tend to seek information that is specific to a given location, lead time, and/or purpose, they are often keen to compare results from multiple sources to evaluate levels of confidence among forecasts. Discussions during the workshop suggested that the 'gap' between forecasts and end-users is narrowing but that there is still room for more communication and exchange between the two groups. In particular, it appears that new multi-model visualisation tools are helping to centralise outputs such that users can quickly compare and interpret forecasts based on their specific needs. There was also willingness on the part of both the users and producers of seasonal forecasts to seek new opportunities to work together within our respective communities.

Louise Slater and Robert Wilby
Loughborough University



A new road map for flood hydrology

The Environment Agency is taking the lead in a joint approach involving governments, academics and industry to outline a future vision for flood hydrology and agree on prioritised actions and research needs to move us forward. The aim is to bring together those whose work underpins all inland flood risk to outline a joint way forward.

Why now?

Its time to act because:

- Many of the current methods are based on approaches that were developed in the 1990s
- Risk changes over time so we need an approach that can reflect that
- We want to understand the spatial nature of flooding and what can be achieved by making interventions in the catchment;
- The National Flood Resilience Review calls for an ambitious long-term joined-up approach in hydrology and meteorology towards a more realistic treatment of flood events
- The Defra/EA Joint Research Programme has received many disparate and competing flood hydrology research proposals in recent years. (We will ensure the ideas behind recent proposals are captured and prioritised in the development of the road map alongside newly identified needs)

A vision for flood hydrology 10–20 years from now

We need to:

- Create a list of prioritised research needs in flood hydrology to influence EA/Defra R&D Programme and the wider research community
- Create a list of short- and longer-term prioritised national user needs and actions that can be taken to address them.
- Build links to create a robust community of flood hydrology expertise with a champion.
- Improve awareness of the importance of flood hydrology in the flood risk industry.

What next?

A staged approach is planned. First, the EA will collect ideas from a smaller group of selected stakeholders and hold a workshop after the summer break. They will then consult more widely in the autumn.

Get involved

Please get in touch with **Anita Asadullah** with any comments or to register your interest or ideas.

National Operations lead: Anita Asadullah, National Flood Hydrology team

Research Theme lead: Sue Manson, Incident management and modelling

Flood Hydrology team email: FCRMM&FIH@environmentagency.gov.uk

Research team email: fcerm.evidence@environment-agency.gov.uk.

Research team website: http://evidence.environment-agency.gov.uk/FCERM/en/Default/FCRM.aspx

Enquiries: enquiries@environment-agency.gov.uk.

BRITISH HYDROLOGICAL SOCIETY
NATIONAL SYMPOSIUM

12th – 13th September, 2018

HYDROLOGY: ADVANCES IN THEORY AND PRACTICE

University of Westminster,
Marylebone, London NW1

This will be our 13th National Symposium, one of the best opportunities we have for networking. Please support this event, which promises to be a memorable occasion, up to our usual high standard.

THE CALL FOR PAPERS AND POSTERS IS NOW OPEN

We welcome abstracts for both oral and poster presentations on all areas of hydrology and also for the following thematic sessions:

Hydrology and Sediment Systems
Hydrology and Ecosystem Services
Hydroecology

Please submit Abstracts to g.petts@westminster.ac.uk before Tuesday 31st May

National River Flow Archive

Review of the Year: 2017/2018

The UK Surface and Groundwater Archives Committee convened for its 35th annual meeting at CEH's Wallingford Headquarters on Wednesday 7th March 2018

The SAGA Committee comprises representatives of organisations from across the UK involved in the measurement, management or use of hydrometric data. This year's meeting was attended by the Scottish Environment Protection Agency, Environment Agency, Natural Resources Wales, Department for Infrastructure – Rivers (NI), NERC, BHS, Met Office, Canal and Rivers Trust, British Geological Survey, DEFRA, CIWEM and representatives from the UK water industry.

The NRFA's activities include updating and ongoing maintenance of the nation's central database for hydrometric data. Ensuring that the archive is up-to-date involves an intensive programme of year-round work to quality control new data before it is added to the archive, and make corrections and updates to existing data. The NRFA's core daily mean flow



dataset alone was subject to around 750,000 updates and changes in the last 12 months. This year's update to the archive this year contained data for water year 2015/2016, an extreme year in hydrological terms, as highlighted in the NHMP report and Weather paper published in 2016. There were numerous new river flow records broken during 2015/2016 – 107 daily flow records and 70 peak flow records.

NRFA staff continue to liaise and engage with key stakeholders and the user community. In November 2017, the NRFA hosted Environment Agency Hydrology staff for a workshop on Data Quality. At the end of March, NRFA staff also attended the Flood & Coast 2018 exhibition in Telford, which provided further opportunities for community engagement.

2017/2018 saw two releases of the WINFAP-FEH data files for use in flood estimation – the most recent being version 6 in February 2018. In addition to the core peak flow data, a swathe of metadata updates have been included, which relate to FEH catchment descriptors and 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 website remains very popular and has seen further increases in activity. During 2017, there were over 44,500 downloads of river flow, spatial and metadata and over 65,000 users on the NRFA website.

Looking forward, into 2018/2019 the NRFA hope to launch a number of new developments designed to further improve access to our data and help users to better understand the UK freshwater environment.

New members

James Ball .....Epsom, Surrey
Michael Bradnam.....Glasgow
Martin Colling..... Durham
John Easton ..... London
Leonora Jackson.....Haywards Heath, West Sussex
Richard Keightley.....Hawkins,London
Shahid Latif.....Kuala Lampur, Malaysia
Nikolaos Mastrantonas..... Reading
Maryann McDonald.....Edinburgh
Jess Moloney.....Kingston-Upon-Hull City Council
Andrea Momblanch Benavent .....Cranfield University
Harriet Robson.....Essex & Suffolk Water
Kelly Rose.....Consett, County Durham
Sarah Ryan.....Limerick,Ireland
Kjerstine Severinsen..... Edinburgh
Elaine Simpson..... Norwich
David Wilson..... Macclesfield, Cheshire

Paul Novak

Paul (Pavel) Novak, one of the most eminent members of the British Hydrological Society, sadly died on 22 February 2018 in Newcastle upon Tyne at the age of 99. Apart from his distinguished career as a practising hydraulic engineer, researcher and teacher, his life encapsulated all the personal and national tragedies and misguided political directions of Europe in the 20th century.

Paul was born to a liberal Jewish family in August 1918 just before the end of WWI in what was still the Austro-Hungarian Empire but shortly became Czechoslovakia. He grew up and received his early education in the small town of Stribro but in his teens his family moved to Prague. In 1939, Paul had just entered a degree course in Civil Engineering in the Prague Czech Technical University when the Nazis occupied Czechoslovakia. Paul and his parents sensed the dreadful outcome that was to follow. He narrowly escaped, travelling through Holland for sanctuary in England, but tragically his parents, sister, relatives and many friends did not; he never saw them again.

In spite of the obstacles of being one refugee amongst many in Britain during the war, Paul managed to continue his education at University College, Nottingham leading to an external honours degree in Civil Engineering of London University and then to a teaching post at Nottingham. In August 1943, Paul married Elizabeth (Eli), who like Paul, was a European war-refugee (from Austria).

At the end of WW2, in 1945, Paul and Eli returned to Czechoslovakia to help in the rebuilding of that country and it was for this main purpose that Paul's very productive 22 years of work began in the Water Resources Research Institute in Prague. Paul quickly established a reputation in hydraulic engineering, chiefly with his work on physical hydraulic models of navigation, hydroelectric and similar large engineering schemes. His work and expertise became recognised both nationally and internationally and this led to a strong career-long attachment to the International Association of Hydraulics Research (IAHR). In 1949, Paul was awarded his first Doctorate (Ing.Dr.).

The Communist takeover after WW2 led to increasing restrictions and anti-intellectual bias and persecution and prevented Paul from leaving the country for 10 years. Then in 1967/68 for a brief period political tensions relaxed and restrictions were lifted in the Prague Spring. Paul was able to travel again and to receive international and national recognition; he was elected to the Council of the IAHR and he was awarded a second doctorate by the Prague Technical University.

Paul was part of the Prague intelligentsia and

vice chairman of the Prague Executive-Socialist Academy and as such he became *persona non grata* when the enlightened regime came to an abrupt end as the Soviet tanks rolled in on 21st August 1968. For Paul, it was time again to escape the ensuing threats and oppression; he became a refugee for a second time in Britain, this time with his family.

Given his academic reputation he soon received invitations for professional engagement in the USA, in Europe and in the UK but the University of Newcastle upon Tyne was the fortunate recipient of his services and in 1970 he there became Professor of Civil and Hydraulic Engineering. For the next 13 years Paul developed the teaching and research of water resources and hydraulic engineering in the department of Civil Engineering. When he formally retired in 1983 the Water Resources Group was reported to be the largest of its type in the UK. However, he continued for many years to publish learned papers and books, even into his 90s. Between 1983 and 1991 he was Editor of the Journal of Hydraulics Research. In the post-Communist era he returned many times to the Czech Republic where his scientific pre-eminence and the contribution that he had made to the country's welfare were again recognised.

Many of his students at Newcastle and members of BHS will remember him not only for his intellectual rigour but also for his kindness and particular sympathy for those, like himself, were displaced by oppressive regimes.

David Archer

Paul Younger

Very sad to learn the death of Paul Younger, late of Glasgow and Newcastle Universities. Paul has been a great friend to BHS (Treasurer, 1994-96) and is fondly remembered by many for organising/hosting the whisky tasting (yes, really) at the 5th BHS National Hydrology Symposium staged at Heriot Watt, Edinburgh. His enthusiasm was a delight to encounter, even (perhaps specially so) in his work on mitigating mining pollution.

Celia Kirby

PhD thesis

Another title to add to the 2017 list published in Circulation No. 136

Author	*Title*	*University*
Creed, Margaret Julia	Numerical modelling of sediment transport, bed morphology and porous obstructions in shallow channels uk.bl.ethos.736022	Edinburgh

About Drought

Around 120 people representing a very broad range of interests and expertise joined us to connect with the truly interdisciplinary research initiative that is the RCUK Drought & Water Scarcity (DWS_ programme.)

The About Drought Showcase was a major opportunity to discover more about the outputs emerging from the £12 million five-year Research Council-funded programme aimed at supporting improved decision-making and communication in relation to droughts and water scarcity for a range of sectors.

We began with introductions to the DWS projects, alongside views from the stakeholders – **Stacey Sharman** (Defra), **Steven Wade** (Atkins) and **Ana-Maria Millan** (CCWater) – who presented views from their respective industries about the challenges and opportunities relating to drought.



Delegates then split into interactive sessions covering key themes from the programme: Agriculture, Monitoring & Early Warning, Data, Drought Narratives, Water Supply, Environment, Communities. Alongside these there was even a 'Waterways Walk', taking in the hydrological sites of Birmingham to allow for informal discussions between delegates and stakeholders.

Coming back together in

the afternoon, a panel discussion helped to sum up some of the main themes from the day, and Paul Hinksey (Environment Agency) closed the discussion, pondering "What's next for Drought Research and Management?" Finally, the day ended with networking and delegates were able to peruse a number of project stands, get hands-on with the data, listen to drought narratives and of course take part in the popular 'Drought Forecasting Game'.

Outputs from the day will be available to view in the updated e-delegate pack and slides and other material from each session will be available on the About Drought website in due course at:

http://www.aboutdrought.info

The UK Drought & Water Scarcity programme has been running for over three years and has already led to significant advances in our understanding of the many complex, interlinked drivers of drought and to the wide range of impacts and the diversity of management responses. The final phase of the programme is now underway and, over the next 18 months, will synthesise the knowledge and outputs from the four research projects to maximise the impact of the programme for a diverse range of stakeholders.

Stephen Turner
CEH Wallingford

Editorial

Following the membership ballot, the proposed amendments to the BHS Statutes are now agreed and the revised version is available on the web site.

Votes received:	**57**
In favour:	**54**
Against:	**1**
Void:	**2**

During the 'Meetings' slot at our last Committee meeting it was noted – and greatly appreciated – that the interesting meeting at Loughborough University (see page 4) by attracting a great many delegates resulted in a handsome contribution to BHS funds. The organisers are warmly thanked. This led on to some concern that meetings organised by the Society's Regional Groups are somewhat less frequent than in past years and there are discussions in hand considering how best to assist financially.

Celia Kirby

Operational Fluvial Flood Forecasting in Ireland:

Review of Hydrological Models and Integrator Systems

Met Éireann, in collaboration with the Office of Public Works (OPW), is currently engaged in the establishment of a National Flood Forecasting and Warnings Service (NFFWS) for fluvial and coastal floods. To inform and support this task a range of existing available hydrological models and integrator systems are to be reviewed, developed and trialled for operational use.

The study was awarded to IMDC, an engineering company experienced in hydrological modelling and forecasting systems. The study contains the following stages:

- Comprehensive literature review of existing hydrological models,
- Comprehensive literature review of existing integrator systems,
- Model development for five representative catchments,
- Trialling of hydrological models for fluvial flood forecasting.
- Trialling of integrator systems for fluvial flood forecasting,

Based on the literature review, three hydrological models and three integrator systems will be selected for further development and trialling on five representative catchments. Each model is first calibrated and validated, and then tested, both with historic data and with real-time forecast data from a number of meteorological data-sets, including a two-month pre-operational test.

The target forecast accuracy is expressed in terms of advance warning time and flow magnitude. A model should predict the actual peak flow to within +/- 10% and 6 hours of the actual peak at the gauged forecast points, and with a lead time of greater than 24 hours.

More details can be found on https://www.met.ie/review-of-hydrological-models

Submissions from providers
Providers of hydrological models and integrators systems suitable for real-time flood forecasting are kindly invited to get in contact with Met Éireann. Suitable models and integrator systems will then be included in the literature review.

Your submission should reach us by 15th of June 2018.

Email: hydroreview@met.ie

C/O: Eoin Sherlock
Address: Met Éireann, Glasnevin Hill, Dublin 9, D09 Y921, Ireland
Tel: +353-1-8064200





A major BHS National Meeting
...at the planning stage for early next year

UK reservoir spillway flood hydrology

The current design flood estimation standard techniques for dam spillway safety assessments are based on hydrological research and state-of-the-art thinking now more than four decades old. In the light of experience with these techniques, and given the progress that has been made in extreme rainfall analysis, rainfall–streamflow modelling, etc, the question arises:

Should current standard techniques forreservoir and spillway design flood estimation now be comprehensively reassessed with a view towards their possible improvement?

The meeting will bring together practitioners and research hydrologists to consider this question. It is anticipated that the meeting will also be of interest to:

- engineers and administrators engaged in, or responsible for, reservoir design and dam safety inspections;
- reservoir/dam owners;
- government agency regulators.

Ideas for possible speakers (self-nominations welcome) on specific topics are requested. Possible topic areas include:

- case-study hydrological aspects of dam spillway inspections (lessons learned);
- estimation of design (extreme) rainfall and corresponding flood flow hydrographs, e.g. Probable Maximum Precipitation profiles and Probable Maximum Flood hydrographs;
- relevant rainfall–streamflow modelling techniques (including model parameter regionalization to assist with estimating hydrographs at ungauged sites); and
- relevant administration/governance.

If you wish to help plan this meeting or contribute a presentation please contact

Ian Littlewood
ianlittlewood505@btinternet.com
British Hydrological Society

Duncan Faulkner
duncan.faulkner@jbaconsulting.com
JBA Consulting

by the end of May 2018.

Events Calendar 2018

Date	Title	Venue	Type
08-10 May	Remote sensing and hydrology	Cordoba	AHS symposium
07-08 June	Peter Wolf Symposium 2018	Leeds	BHS National
24-28 June	IEMSs 2018	USA	Conference
03-04 July	Atmospheric Science Conference 2018	York	RMet Soc
18 July	Diffuse pollution: policy, practice, investment	London	CIWEM Conference
12-13 Sept	**BHS NATIONAL HYDROLOGY SYMPOSIUM**		**Westminster Univ**
18-20 Sept	Advanced drought monitoring, prediction & management capabilities	Lancaster Univ	India-UK Water Centre
2019			
March (tbc)	UK Reservoir spllway flood hydrology	London	BHS National

BHS Photographic competition

Just to remind you.....

We hope you will take part in the competition announced recently (first prize £100). Full details and rules for entry are listed on the BHS web site.
With the summer approaching and/or as a result of the recent 'hydrologically-interesting' last 6 months, we expect to receive some fabulous entries.

Results to be announced at the BHS National Hydrology Symposium in September.

Closing date: 10 August 2018.

UK Hydrological Bulletin: February – April 2018

The late winter and early spring of 2018 underlined the inherent variability of weather conditions across the UK. Unseasonally warm episodes contrasted with persistent freezing conditions with snow forming a more substantial fraction of total precipitation than in recent years — particularly in southern Britain. Depressed river flows characterised much of the country during late February and early March but, thereafter, runoff rates recovered dramatically and widespread floodplain inundations continued well into April. In most regions, the counterbalancing effect of this hydrological turbulence resulted in near-average runoff at the national scale over the three months. With groundwater level recoveries gathering momentum through the spring, and reservoirs stocks generally close to capacity, the water resources outlook is healthy.

Synoptic patterns in February were dominated by a strong easterly airflow bringing disruptive blizzards and sustained freezing conditions to much of the UK. With a much reduced frequency of Atlantic low pressure systems, precipitation totals were notably low – less than 50% of the monthly average in parts of central Scotland and south-west England. Correspondingly, river flows declined steeply over the last 10 days of the month – frozen catchments were a contributory factor. By month-end, seasonally depressed flows were registered at most index gauging stations across the country and, in England, depressed groundwater levels were recorded in a few southern and eastern aquifer outcrop areas. Fortunately the benefits of abundant replenishment during January meant that most reservoir stocks remained well within 10% of capacity at month end.

March was another cold month – on the 2nd Oxford reported its lowest March temperature since 1845 – and

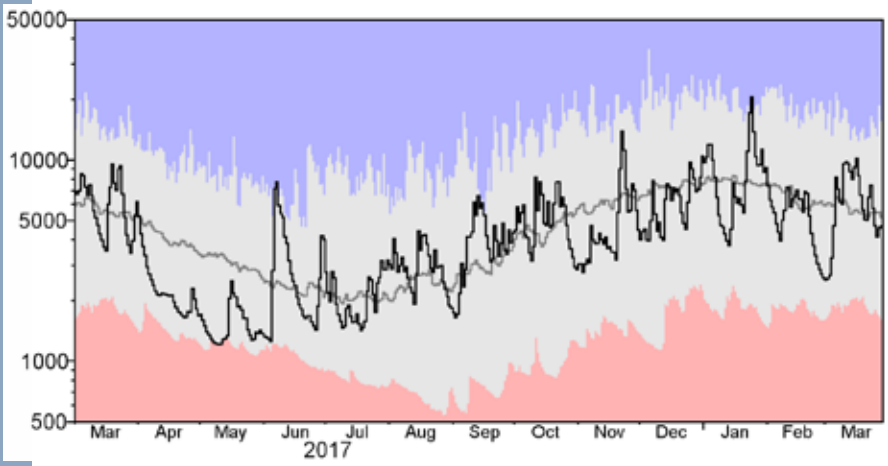


Fig 1 Daily outflows (m^3s^{-1}) from Great Britain (black trace); the blue and pink envelopes are the long term daily max. and min. Outflows and the grey trace is the long term daily average.

pipe-bursts associated with the freezing conditions caused localised water supply stress. Precipitation at the national scale was near-average but much of England and Wales was notably wet, the Wessex region registered its second wettest March since 1947. Flood alerts were widespread across England by the end of the first week – and in many catchments snowmelt was an appreciable aggravating factor whilst, in Northern Ireland, levels in Lough Neagh were notably high. In contrast, early March runoff in north-western Britain was very meagre and some rivers, e.g. the Nevis in the Scottish Highlands, closely approached their lowest recorded flow for the time of year. Elsewhere, March runoff totals were generally well above average and, for England, the second highest (provisionally) since 1982. In the South-West, the Exe and Tone were among a number of rivers establishing new maximum runoff totals for the month.

Entering April, many catchments were very vulnerable to further rainfall and a multi-fronted low pressure system tracking north overnight (1st/2nd) triggered over 200 Flood Alerts across England and Wales. The continuing saturated soil conditions also created problems for agriculture, delaying the planting of spring-sown crops and the release of livestock from their winter quarters. By the second week, the impact of abundant early spring recharge to most aquifers (see Fig. 2) became evident, particularly in Dorset as groundwater flood alerts began to be issued. Rivers were generally in high spate across England, but although the wet weather resulted in significant transport disruption, the natural drainage function of floodplains was well demonstrated and generally the community impacts of this high flow episode were limited. Synoptic patterns changed dramatically on the 18th and 19th (when London recorded its warmest April day since 1949) and runoff rates declined substantially as soil moisture deficits began their seasonal increase.

Terry Marsh
25/4/18

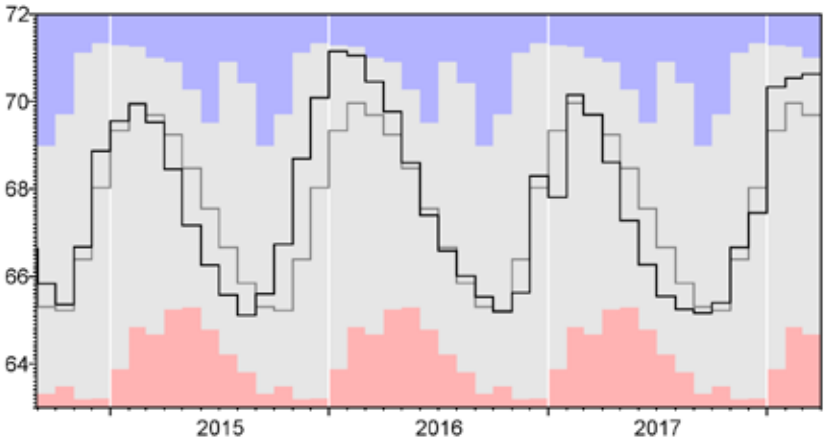


Fig. 2 Monthly mean groundwater levels for the Ashton Farm well in Dorset. The blue and pink envelopes are the long term monthly max. and min. average; the grey trace is the long term monthly average.

