IAHS Symposia (HS) and Workshops (HW)

HS01 Changes in Flood Risk and Perception in Catchments and Cities

Convener: Magdalena Rogger (Vienna, Austria)

Co-conveners: Hafzullah Aksoy (Istanbul, Turkey), Michelle Kooy (Delft, The Netherlands), Andreas Schumann (Bochum, Germany), Elena Toth (Bologna, Italy), Yangbo Chen (Guangzhou, China), Valérie Borrell (Montpellier, France)

Commissions: ICWRS, ICRS, ICHS, ICSW

Abstract deadline 16 November 2014

Description

Many major and devastating floods have occurred around the world recently which has changed people's perception towards flood risks. Their number and magnitude seems to have increased with an increased extent of inundated areas and higher and more numerous flood peaks than in the decades before. The reasons for this increased risk can be attributed to a number of different drivers. It can be argued that they are caused by ongoing climate change and related changes in temperatures, weather patterns and extremes. However, there are some other aspects which have to be considered as well: changes in land use such as the intensification of agricultural management resulting in changed soil properties, or urbanization encroaching on the flood plains and exposing an increasing number of people to floods. Furthermore, our limited knowledge about the stochastic character and the long-term variability of flood occurrences aggravates the problem. The potential increase in flood risks has raised stakeholders' awareness of flood issues posing a major challenge to water resources management and the need for including flood risk changes in regional planning decisions. Yet, knowledge is often incomplete which raises the question of decision making under uncertainty.

The aim of this symposium is to discuss and bring together new approaches, methodologies and tools on how to characterize the current knowledge about temporal and spatial changes of the flood characteristics in watersheds and river basins, the impact of such changes on flood risk and the consequences of such observed or assumed developments on flood risk management. The focus is on hydrological drivers of increasing flood risk and on structural and non structural water management measures to reduce flood risk in rural catchments and urban areas. Case studies in historic cities and papers that combine and/or compare various risk types are particularly encouraged. Furthermore, contributions that illustrate how the perception of flood risk has changed over recent years and on how such changes influence water management decisions are very welcome. The symposium covers the following main themes:

- Observed changes in flood characteristics and flood risk in urban areas
- Observed changes in flood characteristics and flood risk at the catchment scale
- Increased flood risk perception and its influence on water resource management decisions

- Tools and structural and non structural management measures to address changes in flood characteristics in water management planning

Note: To be pre-published in Proceedings of the International Association of Hydrological Sciences* (read more)

HS02 Hydrologic Non-Stationarity and Extrapolating Models to Predict the Future

Convener: Jai Vaze (Canberra, Australia)

Co-Conveners: Francis Chiew (Canberra, Australia), Denis Hughes (Grahamstown, South Africa), Vazken Andreassian (Paris, France)

Commissions: Panta Rhei, PUB,ICSW, ICWRS

Abstract deadline 16 November 2014

Description

The term 'hydrologic non-stationarity' has been used to describe many things, ranging from climate and streamflow variability evident in different periods within a long hydroclimate time series to changes in climate–runoff relationships and dominant hydrological processes over time. Hydrologists have excelled in developing models for numerous applications, through analysing and interpreting climate and hydrologic data to understand hydrologic processes, conceptualising the processes in hydrological models, and calibrating and testing models against observations. These models are particularly good in predicting the streamflow response to changes in the climate inputs and catchment characteristics. However, extrapolating hydrological models to predict further into the future will become more challenging as streamflow will be increasingly influenced by higher temperatures and changed ecohydrological processes under higher CO_2. Reliably modelling these is difficult because of the complex interactions and feedbacks between many variables and processes in a future environment not seen in the past (i.e. hydrologic non-stationarity that has not been observed).

This symposium directly addresses a key issue in the IAHS 2013–2022 Panta Rhei Decade (Change in Hydrology and Society). We invite papers addressing hydrologic non-stationarity and challenges in extrapolating hydrological models to predict the future. This includes papers on observed hydrologic non-stationarity, limitations in modelling through non-stationarity and adapting hydrological models or modelling methods to simulate the future. Modelling methods may range from smart regionalisation, calibration and parameterisation against long hydroclimate records with changing climate–runoff relationships over time, improved conceptualisation of hydrologic processes under extreme conditions (e.g. different surface–groundwater connectivity through long wet and dry spells), to adapting and building models that may adequately simulate surface–atmosphere feedbacks and dominant ecohydrological processes in a significantly warmer and higher CO_2 world.

Note: To be pre-published in Proceedings of the International Association of Hydrological Sciences* (read more)

HW01 Exchange Processes at Aquatic Boundaries and Their Effects on Ecosystems

Convener: Gunnar Nützmann (Berlin, Germany)

Co-Conveners: David Hannah (Birmingham, U.K.), Makoto Taniguchi (Kyoto, Japan), Dan Rosbjerg (Lyngby, Denmark), Jim Butler (Lawrence, USA)

Commissions: ICSW, ICGW

Description

Without doubt the fast technological development was an important driver for the significant progress in eco-hydrology in the recent past. Measurement equipment is getting smaller, cheaper and more robust. Spatial and temporal resolutions are increasing. Novel technologies allow simultaneous measurement of a huge number of data points. Methods for pattern identification reveal increasing spatial heterogeneity with improving datasets. And last but not least these, technologies enable process identification at different spatial and temporal scales in order to study the main drivers of hydrological and biogeochemical exchange mechanisms at aquatic and/or aquatic/marine boundaries. In particular, mixture and buffer zones with different water bodies can be described as aquatic or aquatic/marine boundaries that make unique hydrogeochemical-ecological conditions. Subterranean estuaries with seawater and groundwater/river water interactions in the coastal zone, the riparian zone with river water and groundwater interaction, and lacustrine areas with lake water and groundwater interaction, are all important in terms of biodiversity and ecosystem services. They are significant in hydrological, coastal oceanographic and environmental evaluations as well. In this Workshop, results from field measurements using different technologies and modelling studies with various spatial and temporal scales in these boundary zones will be discussed.

HW02 Hydrological Model Intercomparison for Climate Impact Assessments

Convener: Valentina Krysanova (Potsdam, Germany, IAHS)

Co-Conveners: Berit Arheimer (Norrkoping, Sweden, IAHS), Eva Boegh (Roskilde, Denmark, IAHS), Alexander Gelfan (Moscow, Russia, IAHS), Ingjerd Haddeland (Oslo, Norway, IAHS), Neil Holbrook (Hobart, Australia, IAMAS), Li Jianping (Beijing, China, IAMAS/IUGG), Stewart Franks (Hobart, Australia, IAHS), Guo Qing Wang (Nanjing, China, IAHS)

Commissions: ICWQ, ICCLAS, ICSIH, ICSW, ICCL/IAMAS

Description

A systematic approach is required for assessing climate change impacts on hydrological processes and accounting for error propagation through the modelling chain. Until recently, different hydrological models were applied for river basins worldwide using different climate scenarios and various bias-correction methods, and the outputs were hardly comparable. Therefore, it was difficult to assign uncertainties to specific parts of the model chain.

This Workshop will be an interactive event merging perspectives from hydrologists and climatologists in climate impact assessment. The aim is to advance the understanding of error propagation through the complex work flow, when modelling climate change impact on water resources. At this Workshop, different research groups will present their results for eleven large river basins across the

world using the same climate dataset provided by the Coupled Model Intercomparison Project Phase 5 (CMIP5). Other similar studies on error propagation in climate impact assessment for other regions are also welcome.
We will discuss sources of uncertainties in impact studies and make a synthesis of results from pre-prepared modelling in large river basins worldwide. This will enable an analysis of similarities and dissimilarities in results with reference to catchment behaviour, climate zone and model concept for present and future climate. The ambition is to publish a Special Issue in a scientific journal afterwards, also including a synthesis paper based on the outcome of the model intercomparison at the meeting. The Workshop is linked to the on-going Inter-sectoral Impact Models Intercomparison Project (ISI-MIP: http://www.isi-mip.org/) initiative coordinated at the Potsdam Institute for Climate Impact Research (PIK, Germany).

HW03 Multivariate Analysis in Hydrological Modelling

Convener: Andras Bardossy (Stuttgart, Germany)

Co-Conveners: Fateh Chebana (Quebec, Canada), Jose Luis Salinas (Vienna, Austria)

Commissions: ICSH

Description

Spatially and temporally limited, and often erroneous, hydrological and meteorological observations combined with the high spatial variability of the input and state variables of hydrological models lead to high uncertainties in their output. In order to quantify and to reduce these uncertainties a statistical description of the contributing uncertainties is of central importance. The description of spatial and temporal variability of the input and state variables requires multivariate (spatial and temporal) statistics. The estimation of model parameters under uncertainty, the quantification of parameter interdependence and the estimation of the corresponding output uncertainty also require the use of multivariate statistical methods.
The purpose of this Workshop is to present and to discuss spatial, temporal and other multivariate statistical techniques and their use for the improvement of hydrological modelling.

HW04 Hydrological Change in Statistical Perspective

Convener: Demetris Koutsoyiannis (Athens, Greece)

Co-Conveners: Ebru Eris (Izmir, Turkey), Uwe Haberlandt (Hannover, Germany), Barry Croke (Canberra, Australia), Hafzullah Aksoy (Istanbul, Turkey)

Commissions: ICSH, ICWRS, Panta Rhei

Description

Hydrological change and its relationship with evolving societal systems is the focus of the decade long (2013–2022) Panta Rhei research initiative of the International Association of Hydrological Sciences (IAHS). While change occurs on all time scales, naturally the long-lasting changes are of greater importance for society. In the long run, the description and modelling of change inescapably demand statistical and stochastic approaches to incorporate characterization of uncertainty, which is amplified by change. While change is a general notion with a rather loose meaning, several scientific terms have been used to specify it such as trend, shift, nonstationarity and many more. Again, however, some of these terms do not have a clear meaning while others that do have (e.g. nonstationarity) are often misused. Therefore, a clarification of the terminology and the concepts

related to change is necessary and important from a scientific point of view, but also for practical reasons, due to implications in engineering design and management. Furthermore, the statistical description of changing systems implies several research questions such as: Can data alone or models alone support characterization of change? When can change be modelled by a stationary approach and when does it need a nonstationary one? What data do we need to support a nonstationary approach and what is the implied uncertainty? How do statistical tests adapt in the presence of irregular long-term change which manifests itself as long-range dependence? How can we exploit information from deterministic models and incorporate it in a stochastic approach of change? What is the contribution of Bayesian approaches in incorporating deterministic predictions of changing systems in a stochastic context?

HW05 Societal Relevance of Groundwater: Ever Increasing Demands on a Limited Resource

Convener: Corinna Abesser (Wallingford, UK)

Co-Conveners: Barry Croke (Canberra, Australia), Jim Butler (Lawrence, USA)

Commissions: ICGW, ICWRS

Description

The demand and pressure on groundwater resources is rapidly increasing due to the increase in conventional and unconventional use of aquifers. Increasing groundwater demands for irrigation of cash/energy crops, exploitation of shale gas, as well as new uses of groundwater and underground space (e.g. as an energy carrier, heat store/reservoir, repository for hazardous waste or carbon dioxide) require an improved understanding of the impact these uses have on groundwater resources and associated entities (e.g. surface water bodies, infrastructure). At the same time, it may require new management and governance models that allow the effective regulation of these activities to ensure the protection of groundwater resources from overuse and pollution, and the effective and fair sharing of the resource between the different stakeholders.
Government agencies (including geological surveys and environment protection bodies) play an important role in ensuring that relevant research is carried out/commissioned to gain a better understanding of the processes and interactions related to these new technologies/uses and to provide the sound scientific foundation upon which new regulations and policies can be based.
In this Workshop, we specifically invite contributions from field and modelling studies on the direct and indirect impacts of unconventional uses of aquifers and the subsurface on groundwater resources. This embraces all aspects related to the installation and running of systems/operations, as well as issues of resource impairment and stakeholder conflict. We encourage contributions on the regulation of these activities in different countries and the role that governments/agencies play in ensuring that relevant research is commissioned to help understand environmental impacts and to inform effective policy making and governance.

HW06 Socio-Hydrology: The Dynamic Interplay between Water and Human Systems

Convener: Giuliano Di Baldassarre (Uppsala, Sweden)

Co-Conveners: Tara Troy (Bethlehem, USA), Veena Srinivasan (Karnataka, India), Fuqiang Tian (Beijing, China), Michelle Kooy (Delft, The Netherlands), Pieter van der Zaag (Delft, The Netherlands)

Commissions: Panta Rhei

Description

Hydrological scientists have shown how human activities, such as land-use change or the construction of dams and reservoirs, have significantly changed the hydrological regime of river basins. Meanwhile, social scientists have demonstrated how this hydrological change has an impact on patterns of human settlements as well as the ways in which social relations unfold. Thus, as societies change the hydrological regime, hydrological changes simultaneously shape societies. The dynamic interplay between hydrology and society is still poorly understood. In this context, socio-hydrology aims to overcome this lack of knowledge by understanding the behaviour of river basins as fully coupled human–water systems and explaining long-term trajectories of co-evolution.
This Workshop will bring together socio-hydrological studies, dealing with:
- Observation of interactions and feedbacks between physical and social processes (empirical studies),
- Contrasting case studies: learning from similarities and differences (comparative analysis),
- Conceptualization of the dynamics of deeply intertwined human-water systems (socio-hydrological modelling and theory).

HW07 Control of Water Resource Systems

Convener: Ronald van Nooijen (Delft, The Netherlands)

Co-Conveners: Alla Kolechkina (Delft, The Netherlands), Andrea Castelletti (Milano, Italy)

Commissions: ICWRS

Description

Today it is rare to find a water resource system where the interaction with society can be ignored. Most systems consist of both natural and manmade components and are governed by both natural processes and processes within society. The interaction between society and the natural system is complex. An important part of this interaction consists of our attempts as humans to alter the system behaviour through the construction and manipulation of structures such as wells, dams, pumps, weirs, gates, sluices and locks. In a changing world it can no longer be taken for granted that the operational rules for the manipulation of the manmade components of the water resource system will be appropriate over the whole life time of the infrastructure. This Workshop is intended for presentations on the formulation and adaptation of operational rules for the automated manipulation of manmade components of water resource systems with changing boundary conditions, or, less formally, for presentations on computer control of water resource systems in a world in flux.

HW08 Water Security in a Changing World

Convener: Barry Croke (Canberra, Australia)

Co-Conveners: Stephen Mallory (Pretoria, South Africa), Amin Elshorbagy (Saskatoon, Canada), Graham Jewitt (Pietermaritzburg, South Africa), Crystèle Leauthaud (Montpellier, France), Yves Tramblay (Montpellier, France)

Commissions: ICWRS, ICSW

Description

Secure access to adequate, good quality water is a major issue in drier countries. This covers not only arid climates, but also wetter climates that have highly seasonal rainfall with extended dry periods (e.g. monsoon affected regions). The impact of climate change, increasing water demand through industrialisation in developing countries and population growth can significantly reduce water security (both water quality and quantity). This can be further influenced by the introduction of ecological flow requirements. Contributions from a hydrological perspective as well as those considering an integrated approach (coupling hydrology with ecological, social, economic, ...) are encouraged.

HW09 Hydrology Education in the Classroom

Convenors: Thorsten Wagener (Bristol, U.K.)

Co-Convenors: Denis Hughes (Grahamstown, South Africa), Stefan Uhlenbrook (Delft, The Netherlands), Dominic Mazimavi (Capetown, South Africa), Eric Servat (Montpellier, France), Valérie Borrell (Montpellier, France)

Commissions: Education WG, ICSW

Description

What shall we teach students of hydrology in the classroom? What material shall we use and how does it depend on whether the students are engineers or scientists from different primary disciplines? How far should the curriculum be tailored to regional hydrologic characteristics? What is the role of field and lab work and what is feasible given budget constraints in different institutions? What is the role of computing competency for hydrology today? Recognising that different institutions have different dominant interests within the hydrological sciences, is it possible to identify the core skills, or core levels of understanding that all students should ideally develop?
These are the kind of questions we'd like to discuss during a workshop focused on hydrology education in the classroom. We are also interested in contrasting undergraduate and postgraduate (Masters and PhD) education, as well as contrasting courses that are designed mainly for hydrologic science or for water management. We are looking for a mixed group of presenters and people interested in discussing these issues. We assume that opinions will vary widely across regions, institutions and personal preferences. Though, we are also hoping that common ground can be identified.

HW10 The Role of Sediment as an Indicator of Hydrological and Societal Change

Convener: Micheal Stone (Waterloo, Canada)

Co-Conveners: Adrian Collins (Okehampton, U.K.), Paolo Porto (Reggio Calabria, Italy), Valentin Golosov (Moscow, Russia), Per Stålnacke (Ås, Norway)

Commissions: ICCE

Description

There is increasing global awareness of natural and anthropogenic disturbance impacts on hydrological processes that influence the mobilization, transport and fate of sediment in a range of terrestrial and aquatic environments. These impacts which occur at a range of spatial and temporal

scales have important societal implications. Accordingly, it is necessary to understand, estimate and predict these processes/impacts through the use of appropriate indicators to assess the effects of changing hydrology and its relationship to society. The goal of this symposium is to evaluate the potential of sediment as an indicator of hydrological and societal change in a range of hydrological and terrestrial environments. This topic is relevant for the Panta Rhei decade announced by IAHS and it is expected to contribute to the following science questions: 1) What are the key gaps in our understanding of hydrologic change and related societal impacts due to sediment transfer? 2) From a societal perspective, how can environmental monitoring and data analysis capabilities be advanced to predict and manage hydrologic change impacts on sediment transport dynamics? 3) What is the utility of sediment as an indicator of hydrological and societal change?

HW11 Fingerprinting Techniques: Evaluating Methodological Approaches, Problems and Uncertainty

Convener: Paolo Porto (Reggio Calabria, Italy)

Co-Conveners: Adrian Collins (Okehampton, U.K.), Allen Gellis (Baltimore, USA)

Commissions: ICCE

Description

Sediment source fingerprinting techniques have been increasingly used over the last three decades to provide information on the sources of fine-grained (recent and historical) sediment transported by rivers. To date, a wide range of sediment properties have been used to fingerprint those potential sources. These include, amongst others, colour, mineral-magnetic properties, geochemistry, fallout radionuclides, and stable isotopes. Recent applications of source tracing procedures have used biomarkers and compound specific stable isotopes (CSSIs) to investigate sources of sediment-associated organic matter. Numerical mass balance or so-called 'unmixing' models are generally used to estimate the relative contribution of the potential sediment sources on the basis of statistically-verified composite signatures for source discrimination.

There is increasing interest in the potential impact of environmental change, including both climate and land use change, on sediment pressures in catchments and river basins. The resulting increased sediment stress can cause significant environmental problems associated with sedimentation in river channels, reservoirs, canals and related hydraulic structures, increased water treatment costs and the degradation of water quality and aquatic habitats including those used by fish. Such detrimental impacts have raised political awareness of the need to manage the sediment problem and, in turn, this has resulted in an increasing volume of scientific work applying and refining sediment source fingerprinting techniques and procedures.
Given the increasing usage of sediment sourcing based on fingerprinting methods, it is timely to review critical outstanding issues identified by ongoing research to assist improved harmonisation of the critical methodological steps involved, including:

- The selection of robust source and sediment sampling strategies designed to address issues such as scale dependency and temporal representativeness
- The pre-selection of robust fingerprint properties for supporting source discrimination for fine-grained sediment and associated organic matter
- The use of independent statistical tests for confirming source discrimination
- The use of procedures and weightings for improving linkages between source discrimination and numerical modelling for source apportionment
- The inclusion of corrections and weightings to capture physical process impacts on the comparison of source and sediment fingerprint properties

- The selection of search tools for driving source apportionment
- The representation of uncertainty and its communication to stakeholders

Submissions to this Workshop are encouraged from anyone using sediment fingeprinting to trace the key sources of sediment and associated organic matter either for scientific or policy support purposes. The learning from the Workshop will be summarised using a variety of outputs including a special issue in a leading international journal.

HW12 Using Environmental Observatories in Catchment Studies and Management

Convener: Wouter Buytaert (London, U.K.)

Co-Conveners: Elango Lakshmanan (Chennai, India), David Hannah (Birmingham, U.K.)

Commissions: ICCE, ICSW, ICGW

Description

The combination of advances in sensor technology, data processing and visualisation, and networking technologies makes it possible to design and implement complex tools for environmental data analysis, simulation and decision support. Increasing numbers of such environmental observatories are being established which include measurements of hydrological and hydrologically-relevant parameters. These represent advances on the collection of datasets through their greater emphasis on data use to inform decision-making and management. Contributions are invited from around the world of examples of the use of environmental observatories for advancing understanding of processes affecting hydrology and of catchment management.

HW13 Hydrological Predictions in Ungauged Basins

Convener: Hafzullah Aksoy (Istanbul, Turkey)

Co-Conveners: Murugesu Sivapalan (Urbana, USA), Yangbo Chen (Guangzhou, China), Alberto Viglione (Vienna, Austria), Roger Moussa (Montpellier, France), Ebru Eris (Izmir, Turkey)

Commissions: ICSW, ICWRS, ICRS, ICSH, PUB

Description

Predicting water quantity and quality in the mostly ungauged water catchment areas of the world is vital to practical applications such as the design of drainage infrastructure and flood defences, runoff forecasting, erosion control, management of nutrient export, and other catchment management tasks such as water allocation and climate impact analysis. The last decade of the International Association of Hydrological Sciences (IAHS) was dedicated to Predictions in Ungauged Basins (PUB). Despite the advances achieved in the last years and the closure of the PUB Decade, continued research on PUB is still needed, in particular in the context of the new decade on Change in Hydrology and Society (Panta Rhei). The focus is still on how best to predict hydrological variables (now involving both water quantity and quality) that are not directly observed in basins, compounded by the need to account for a changing environment where human impact is predominant. This Workshop calls for papers arising from research on predictions in ungauged basins, including but not limited to: predictions of floods and low flows, long-term water balance, runoff hydrographs, nutrient and sediment concentrations in river flows using data-based statistical methods (including alternative regionalization approaches) and process-based models, in particular

in human-impacted catchments and/or catchments undergoing climate change. Papers that present novel approaches to develop hydrologic understanding through the exploitation of comparative hydrology using data from a large number of catchments across gradients of climate, geology and degree of human impacts are especially welcome.

HW14 Advancing Water Quality Prediction at the Catchment Scale: New Theories and Approaches

Convener: Matthew Hipsey (Crawley, Australia)

Co-conveners: Michael Rode (Magdeburg, Germany), Valentina Krysanova (Potsdam, Germany), Kate Heal (Edinburgh, U.K.), Gil Mahé (Rabat, Morocco)

Commissions: ICWQ, ICSW

Description

To improve our ability to predict how water quality will respond to environmental changes we need an improved framework for analysing and learning from case-studies of how different water qualities evolve across different catchments. A temporal framework for analysing the evolution of water quality in catchments is proposed, where catchment systems move from Phase I (low human population and pristine water quality), through Phase II (increasing resource exploitation and human population resulting in water quality deterioration) to Phase III (reduced intensity in human activity, either through economic collapse or environmental policy), following which water quality improves to a new "state" in Phase IV. It is expected that different water quality concerns (nutrients, sediment, pathogens, chemicals) will follow different trajectories depending on landscape complexity and underlying geomorphological and socio-economic conditions, and may also be more or less sensitive to climate change and land-use policy. Of particular interest will be the analysis of the recovery seen in water quality in the final equilibrium phase, and understanding what natural and social factors determine the degree of recovery. Contributions are invited to this Workshop that present novel approaches to: (a) analyse long-term catchment water quality datasets using this novel framework, or (b) demonstrate underlying catchment system dynamics relevant to water quality using novel model approaches. Contributions should aim to improve water quality modelling rigour using advanced methods for model application and assessment.

HW15 Tracer Methods for Understanding the Response of Hydrological Systems to Transient Contamination Inputs

Convener: Przemyslaw Wachniew (Krakow, Poland)

Co-conveners: Piotr Maloszewski (Munich, Germany), Josep Mas-Pla (Girona, Spain), Maki Tsujimura (Tsukuba, Japan), Z. Pang (Beijing, China), Jan-Willem Foppen (Delft, The Netherlands)

Commissions: ICT

Description

The success of measures undertaken to preserve and improve the quality of water resources depends on the ability to predict trends in water quality. This is, however, not possible without considering time-lags that characterize the responses of hydrological systems to both the commencement and cessation of anthropogenic disturbances such as diffuse pollution or climate and

land-use change. The scales of these time-lags are often underestimated and decision makers and water resources managers tend to overlook their significance when assessing water quality trends in catchments. Even in relatively shallow aquifers a significant fraction of groundwater flow-paths can be characterized by transit times of the order of tens of years. Knowledge of the distribution of water and solute travel times is fundamental for assessing temporal aspects of water quality.
Tracer methods combined with mathematical and numerical modelling can provide information on the transit time distribution as they integrate functioning of hydrological systems over a wide range of temporal and spatial scales. This Workshop is aimed at presenting applications of environmental and artificial tracers in addressing the response of hydrological systems at different scales.

HW16 Observations and Modelling of Land–Atmosphere–Society Interactions in Hydrology

Convener: Eva Boegh (Roskilde, Denmark)

Co-conveners: Lauren Paige Seaby (Roskilde, Denmark), Koray Yilmaz (Ankara, Turkey), Hubert Savenije (Delft, The Netherlands)

Commissions: ICCLAS, Panta Rhei

Description

Human activities are now generally recognized as the main driver of climate and hydrological change (IPCC, 2014) which are affecting snowpacks, groundwater levels, river flows and ecosystems over extended regions. Consequently, research is needed to develop methods for representation in hydrological models of not only land use, but other human activities including population demands for energy, water, food and living space. Such development is needed to understand and predict the strengths and relative impacts of land–atmosphere–society interactions on hydrological processes of importance for environmental flows, water resource availability and climate adaptation/mitigation research. The current Workshop aims to present and discuss observations and modelling studies addressing land use, water use and other societal impacts on atmospheric and hydrological fluxes in the past and future. In particular, the role of land–atmosphere–society interactions to develop climate-robust target measures for water environments in human-dominated landscapes will be discussed at the Workshop.

HW17 Hydrological Forecasting and Predictive Uncertainty: Advances and Challenges of Transferring Science into Operational Practice

Convener: Maria-Helena Ramos (Paris, France)

Co-Convener: Walter Collischonn (Porto Alegre, Brazil), Fredrik Wetterhall (Reading, U.K.), Andy Wood (Boulder, USA), Jan Verkade (Delft, The Netherlands), Jutta Thielen (Ispra, Italy), Massimiliano Zappa (Zurich, Switzerland), Marco Borga (Parma, Italy), François Anctil (Québec, Canada), Qingyun Duan (Beijing, China), Q.J. Wang (Highett, Australia)

Commissions: HEPEX, ICSW

Description

Hydrological predictions provide crucial information for users making decisions based on unknown future hydrometeorological conditions. This may concern users dealing with both risk assessment

and water resources management, and involves several scales in time and space. A large number of operational applications may benefit from hydrological forecasting systems that issue reliable and accurate predictions: flood warning, drought risk management, reservoir control, water use planning, hydropower production, etc. This Workshop is dedicated to address scientific developments in hydrological forecasting and uncertainty assessment for the needs of practitioners, decision- and policy-makers. The objective is to identify challenges and discuss solutions in implementing, using and communicating uncertain predictions in operational practice.
The Workshop will focus on:

- How to efficiently postprocess atmospheric predictions for their use in hydrologic models?
- How to produce reliable probabilistic predictions of extremes in hydrology?
- How to evaluate probabilistic hydrologic forecasts in a manner that is meaningful to users and adapted to their decision-making contexts?
- How to combine various techniques for reducing and estimating hydrologic predictive uncertainty (e.g., ensembles and/or multi-models, data assimilation and post-processing)?
- How to make efficient use of estimates of predictive uncertainty in practice?
- How can users be more engaged in the definition and development of novel, probabilistic products that respect their needs for warning time, accuracy and reliability?
- What best practices can be identified when facing the challenges of transferring science into operational practice to respond to stakeholders and societal needs?

The Workshop is organized under the auspices of HEPEX (www.hepex.org) which was launched in 2004 to foster scientific developments necessary to improve the skill of probabilistic hydrological predictions and their use in operational contexts. This Workshop will also highlight how the new IAHS decade, Panta Rhei, and the HEPEX initiative can be complementary in fostering hydrological sciences and applications for the benefit of society.

HW18 Advances in Remote Observation of Snow

Convener: Tobias Jonas (Davos, Switzerland)

Co-convener: Jeffrey Deems (Boulder, USA), Hans-Peter Marshall (Boise, USA), Ernesto Trujillo Gomez (Lausanne, Switzerland), Juraj Parajka (Vienna, Austria)

Commissions: ICSIH, IACS

Description

A revolution in remote sensing of the cryosphere is underway. High resolution terrestrial and airborne LiDAR is being not only used to characterize terrain and vegetation canopy structure, but to quantify snow volume and distribution across the landscape. Similar achievements have been accomplished with snow observations using terrestrial and airborne radars, snow sonars, terrestrial photography, digital optical spectrometers and imaging thermal radiometers to define the distribution of snow depth, SWE, albedo, snow covered area, surface temperature and other critical snowcover parameters. These data are then used in multi-scale model simulations of snowcover state, and energy and mass fluxes. As the technology evolves, we expect to see a reduction in cost in deploying these sensors by using unmanned aerial vehicles (UAVs). This session aims to bring those working in this exciting new field together to present the “state of the science” as it integrates field measurements, remote sensing and models to improve our understanding of snow hydrology. Submissions may include validation of observations, new sensors and sensor platforms, and we encourage multi-sensor observations and integration of remote sensing data with field measurements, and models.

HW19 Remote Sensing Retrievals of Precipitation and Evapotranspiration

Convener: Christopher Neale, Daugherty Water for Food Institute, University of Nebraska, USA

Co-Convener: Bob Su (University of Twente, The Netherlands), Simon Stisen (Center for Hydrology, Geological Survey of Denmark), Ian Cluckie (Swansea University, Wales, UK)

Commissions: ICRS

Description

Precipitation and evapotranspiration are the two most significant variables of the water balance, particularly when monitoring watersheds and agricultural systems. Important for runoff generation and agricultural production, they are typically measured at the surface, at a point scale, so their distributed availability at larger scales is welcome for modellers and water managers.

The science of retrieving these variables through remote sensing approaches has advanced considerably over the last decade, with the advent of new satellite systems and modelling approaches. Many of the developed methods of retrieving precipitation using ground radar, stationary satellite instruments and passive microwave sensors on polar orbiting satellites have become operational. Likewise, retrievals of spatially distributed evapotranspiration using energy balance models such as the Two-source model (TSM), SEBAL/METRIC, SEBS and others have matured, and several near-real time applications can be found in the literature.
With the development of these remote sensing techniques integration with distributed hydrological models has become more widespread. Especially the evaluation of model simulated spatial patterns of evapotranspiration and catchment scale validation of precipitation estimates.

This workshop invites contributions relevant to quantifying these important hydrological variables through remote sensing approaches and modelling. We invite papers that describe methodology as well as mature applications using multi-temporal, multi-sensor approaches with fusion of data from different sources. Likewise, papers that describe integration of remotely sensed precipitation and evapotranspiration with distributed hydrological models are welcomed.