IAHS 2022

XIth SCIENTIFIC ASSEMBLY

29 May to 3 June 2022 - Montpellier (France)

Workshops' programme

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1. Open Science starring Hydrology

Conveners: Nilay Dogulu , Honeyeh Iravani, Jean N. Namugize, Michelle Newcomer

Open science is the new black! In recent years there has been a massive shift towards making science and research open. Many scientific disciplines are joining the open science movement. Hydrological sciences are also taking their part to nurture a culture of open science. Several efforts led by the early career hydrologists are gaining further momentum. However, awareness on the purpose, scope and benefits of open science remains considerably low at the larger scale.

In this workshop, the participants will get familiar with open science concepts and tools, and learn how to apply these in their scientific research and beyond. We will discuss the recent developments regarding open science within the hydrology community. We will also share recommendations and best practices on how to support the transition to open science at both individual and institutional levels.

The workshop is tailored for early career researchers with very little or basic knowledge of open science. If you are interested in open science you are kindly invited to join regardless of your career stage and background.

Please note that a pre-registration is not necessary. The workshop will be open to a limited number of participants selected on a first come-first served basis. In cooperation with the Young Hydrologic Society.

2. How to write a proposal in Hydrology

Conveners: Giova Mosquera, Joris Eekhout, Nilay Dogulu, Tirthankar Roy

Did you recently finish your water-related PhD in which financial and logistical resources were at hand through the grant/project of your advisor/s? Did you just get your “dream” postdoctoral job position? Even though you have mastered the “art” of writing and publishing papers in hydrology during your doctoral studies, are you now struggling to draft a competitive proposal to acquire funding to address those sneaky questions that you couldn’t unravel during your PhD work? If your answer is yes to these questions, don’t worry, you are not alone and we are here to help!

Obtaining funds from local, national and/or international organizations to finance the advancement of hydrological knowledge is a crucial step in the career of a young hydrologist. Recognizing that such endeavor is not a trivial and straightforward task, this workshop aims to provide early career hydrologists with support to overcome the challenges of preparing and submitting relevant and competitive proposals to develop their own research ideas and move forward with their academic careers. Particular attention will be given to the selection of an appropriate call for a given project and how to increase the chance of getting a project funded while giving crucial tips on managing the

proposal preparation process. Come join us to hear the advice of highly experienced researchers in hydrological sciences!

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3. Promoting your research findings to the scientific community

Conveners: Joris Eekhout, Svenja Fischer, Elzbieta Czyzowska-Wisniewski, Nilay Dogulu

Due to the increasing number of publications, it is becoming more and more important to promote your latest research findings to your fellow scientists. This is a step out of many researchers' comfort zone but could potentially increase the impact of your publication. This workshop aims to give some practical tips and tricks on how to promote your papers to fellow scientists, leveraging the strengths of social media. Promoting your paper will in most cases involve visual storytelling, for instance through graphical abstracts, video abstracts and interactive infographics. Furthermore, you can let your paper stand out through well-designed figures, which often give the first impression of a paper.

This workshop will provide design tips, good/bad examples and a selection of (open source) tools that could help you to reach a wider scientific audience. It is intended for early career researchers, but please feel free to join along as the topic is of interest to many.

Please note that a pre-registration is not necessary. The course will be open to a limited number of participants selected on a first come-first served basis. In cooperation with the Young Hydrologic Society.

4. Applications of satellite remote sensing in hydrological assessments

Conveners: Tirthankar Roy, Kartic Bera, Honeyeh Iravani, Jean N. Namugize, Gokcen Uysal

Recent advances in satellite remote sensing have been significantly beneficial for the hydrology community, enabling sophisticated investigations in regions with limited in situ data. These datasets typically cover large regions at high spatial and temporal resolutions, which is invaluable for distributed assessment of different hydrological processes. Over time, satellite remote sensing datasets have also been available for a wide range of variables, such as precipitation, evapotranspiration, soil moisture, flood inundation, snow, etc. Interdisciplinary research in hydrology has found these datasets extremely useful. Therefore, knowing what types of datasets are available, how to download and process them, and how to use the processed data in hydrological assessments are extremely useful skills.

This workshop aims to familiarize the participants with a wide range of satellite remote sensing datasets that can be used for various hydrologic assessments. The workshop will also include example demonstrations of the applicability of these datasets in real problems. Participants will have the opportunity to take part in a Q&A session at the end of the workshop.

Please note that a pre-registration is not necessary. The course will be open to a limited number of participants selected on a first come-first served basis. In cooperation with the Young Hydrologic Society.

5. Modeling in Hydrology: from process-based to AI models

Conveners: Elzbieta Czyzowska-Wisniewski, Michelle Newcomer, Kartic Bera, Svenja Fischer, Gokcen Uysal, Giovanny Mosquera

Hydrological models are essential for improving our understanding of processes naturally occurring throughout the water cycle as well as predicting and incorporating future environmental changes in complex and heterogeneous hydrological systems at different spatial (from plot to global) and temporal (from a single event to decades) scales. Furthermore, current hydrological models have to address many complex and challenging issues such as: data collection scaling, research problem scaling, and parameter uncertainty, etc. As a consequence, they are crucial tools to test hypotheses obtained from field and experimental observations and for risk assessment and decision-making applications targeted to enhance water management strategies. Hydrological models extend and improve continuously.

This workshop aims to provide a broad overview regarding current-state-of-the-art in hydrological modelling. The following main avenues in hydrological modelling will be presented: (a) data-model integration - developed on the basis of architectural requirements for data integration, (b) artificial intelligence - machine learning, and (c) hybrid modelling incorporating hydrological knowledge and data-driven approaches. Participants will have the opportunity to take part in a Q&A session at the end of the workshop.

Please note that a pre-registration is not necessary. The course will be open to a limited number of participants selected on a first come-first served basis. In cooperation with the Young Hydrologic Society.

6. Artificial intelligence and Data Science for urban water networks

Conveners: Salem Benferhat , Nanée Chahinian , Carole Delenne , Alain Dezetter , Francesca Frontini, Lucile Sautot, Karim Tabia, Andrea Tettamanzi

The use of Artificial Intelligence techniques is spreading in hydrology. A special session was dedicated to "Deep Learning" at the last edition of the EGU, 32 papers with the keywords "Artificial Intelligence" have been published in the IAHS Journal of Hydrological Sciences since 2019, 144 in "Journal of Hydrology", 26 in "Water Resources Research". The topic is therefore attracting water scientists. In parallel, Data Science and IA communities are federating and opening up to other disciplines through specific calls for proposals.

This session aims to bring together scientists from the AI and Water Science communities on the one hand and Water Managers/Industry and scientists on the other hand. Its main objective is to allow the emergence of new research ideas, both applied and theoretical, through exchanges and encourage the setting up of future European and global research consortia.

The session will have a mixed format of presentations and lectures. The first part of the presentation will be dedicated to "hard" science, the second part will present or explore practical applications dedicated to water professionals and urban water system managers who would thus identify research/scientific teams that would be able to put forward solutions in line with their problems.

A formal call for papers will be made and the selection of speakers will be based on a 200-word abstract.

7. Rainfall-runoff modelling with the open-source airGR and airGRteaching R packages

Conveners: Olivier Delaigue, Guillaume Thirel, Charles Perrin, David Dorchies

Rainfall-runoff models are essential tools to simulate streamflows from meteorological variables, with various applications for flood risks estimation, water resources management or low-flow related issues. Two free and open-source R packages, airGR and airGRteaching, are developed at INRAE, France, for hydrological modelling. These tools provide access to the conceptual rainfall-runoff models GR4H, GR4J, GR2M and GR1A among others, which can be run at the hourly, daily, monthly and annual time steps. They also include a snow module, a calibration tool, efficiency criteria calculation and plotting facilities. airGRteaching is conceived for straightforward applications through a graphical user interface and requires limited coding knowledge. airGR is more flexible, with various tuning options in the modelling chain, available through more advanced (but still reasonable) programming efforts.

Objectives: The workshop is open to students, engineers and researchers seeking for detailed information on the GR family of hydrological models and hands-on experience with the airGR and airGRteaching packages. At the end of this workshop, participants will be able to understand the

structure and functioning of GR models, to use the airGR and airGRteaching packages, and to perform a complete modelling exercise on a graphical user interface and using code lines.
Prerequisite: Basic knowledge in hydrological modelling and R programming
Miscellaneous: A full program and a subscription link will be provided later on. The workshop will span over 2 days, just after or just before the IAHS General Assembly. Subscription to the IAHS conference is compulsory but no additional fee will be required.

8. When are hydrological data informative (or not)? Testing for information content in the face of sources of uncertainty.

Conveners: Vazken ANDRÉASSIAN, Pierre BRIGODE

When used in a predictive context, rainfall-runoff models can be used to simulate the flow response of a given catchment to an ensemble of meteorological scenarios, for example to assess the future impacts of climate change. In this context, rainfall-runoff models are expected to be robust, i.e., dealing with hydro-meteorological conditions potentially very different from current conditions. The main difficulty in obtaining robust models comes from the identification of their parameters, which is generally done by calibration on observations. This calibration consists in extracting sufficient information from the observed data, so that the models can then accurately reproduce the hydrological behavior under never-seen conditions. However, many studies show that this calibration phase introduces a certain dependence of the parameters on the datasets used for the model calibration, thus limiting their transposability. Moreover, some periods, or even some particular events contained in the observation series seem to influence more strongly the value of the obtained parameters.

These questions raise the issue of the (dis)informative content of the data used to calibrate rainfall-runoff models: if some periods can be considered as disinformative for a hydrological model, how is it possible to detect them? By what criteria (quantitative and/or qualitative) and with what methods (rainfall-runoff model, statistical analysis, etc.)? Does ignoring these periods have a significant impact on the performance of rainfall-runoff models and thus on the robustness of the models?

The workshop intends to bring together a large group of researchers around the following question: *"How to identify the (des)information content of hydro-climatic data used for the calibration of rainfall-runoff models? "*

The participants will be asked to use their models and calibration methods on a common catchment dataset. This dataset will be assembled in advance by the workshop conveners. Within this dataset, errors will be deliberately introduced (randomly or using a predefined error model) to analyze the behavior of the calibration models and algorithms and of the (dis)information content detection methods. The participants will be proposed a specific testing protocol on the catchment sample and will have to propose innovative solutions to identify informative or disinformative data and to produce robust models. The outcomes of the workshop may be published as a special issue in a leading journal.