Panta Rhei – Everything Flows
Change in Hydrology and Society
IAHS Scientific Decade 2013-2022
www.iahs.info/pantarhei

Details of the Proposal

Title of the Working Group

Data-driven Hydrology

Abstract of the proposed research activity

To improve predictability (see Target: Estimation and prediction), the first, fundamental contribution must come from the full exploitation of data, including the new types of data, obtained through modern monitoring technologies. Innovative ideas are needed to build methods able to extract information from the data, and there are many signatures in the observations that are still to be explored. Data-driven modelling techniques may help to understand the value and the limitations of what data can tell us, for example their salience as input variables or their informative content for calibration purposes. In addition, such models are powerful aggregators of information, potentially able to handle various types of data derived from different sources and expressed in different manner (including also soft and proxy data as such that may be available from social analyses) and incorporating the new data sources (e.g. remote sensing, verbal information, etc.).

Panta Rhei Research Themes, Targets and Science Questions addressed by the Working Group

The research activity would encompass all Science Questions and Targets, but in particular they will be relevant to:

Science questions:

5. How can we advance our monitoring and data analysis capabilities to predict and manage hydrologic change?

Targets:

2. Estimation and prediction

3. Science in practice

Societal impact of the Working Group activity

The group has a consolidated tradition of cooperation at international level (for example into the Hydroinformatics Sub-division of EGU -and former EGS - and in the bi-annual Hydroinformatics conferences started in 1994 and supported by IAHS), is a natural development along the lines of the Joint IAHR-IAHS-IWA Technical Committee on Hydroinformatics, and it is formed by researchers coming from a wide spectrum of countries and continents where their activity may be developed also in strict cooperation with stake-holders and data-providers. Citing the International Conference on Hydroinformatics 2012: "Hydroinformatics is a strongly inter-disciplinary field, which links water and environmental problems with various computational modelling methods and fast developing information and communication technologies. The latest developments in Hydroinformatics link science and engineering practice together with stakeholders' views as well as social considerations."

List of Participants

Please include at least 6 members from 3 different countries. Make an effort to ensure interdisciplinarity. Add rows at the Table if necessary.

Name of Participant	Affiliation (full address and email)	Role in Working Group	Main expertise
1 Robert Abrahart	Associate Professor, School of Geography, University of Nottingham, Nottingham, United Kingdom.	Member	Data driven modelling, neural networks, genetic programming, fuzzy logic, spatial analysis, spatial data .
2 Fi-John Chang	Distinguished Professor, Department of Bioenvironmental Systems Engineering, National Taiwan University, Taiwan.	Member	Data driven modeling, artificial intelligence, optimization, hydro-informatics, integrated water resources management, flood forecasting, water allocation, eco-hydrology, system analysis.
3 Amin Elshorbagy	Professor, Hydrology and Water resources Engineering, University of Saskatchewan, Saskatoon, Canada.	Member	Data driven modeling, system dynamics, decision analysis, integrated water resources systems, flood analysis.
4 Holger Maier	Professor, Water & Environmental Engineering, The University of Adelaide, Adelaide, South Australia, Australia.	Member	Data driven modelling, optimization using evolutionary algorithms and other metaheuristics, decision support, sensitivity and uncertainty analysis, integrated water resources systems, water supply, environmental management.
5 Asaad Shamseldin	Associate Professor, Deputy Head (Research), Department of Civil and Environmental Engineering, University of Auckland, Auckland, New Zealand.	Member	Data Driven modeling, neural networks, fuzzy systems, symbolic regression, hydrology, climate change, urban water systems, water demand management, risk and uncertainty analysis .
6 Dimitri Solomatine	Professor, Hydroinformatics. UNESCO-IHE Institute for Water Education, Delft, The Netherlands.	Member	Data driven modelling, optimization of water systems, decision support, uncertainty analysis, flood forecasting, hydroinformatics.
7 Elena Toth	Ass. Professor Department of Civil, Environmental and Chemical Engineering, University of Bologna, Bologna, Italy.	Chair	Data-driven modelling, calibration of rainfall-runoff models, time-series analysis, flood forecasting; predictions in ungauged basins, catchment classification.