



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

Understanding flood changes

Abstract of the proposed research activity

The purpose of the Working Group activity is to understand the fundamental processes relating floods to their drivers in order to understand how floods have changed and may change in the future. Floods of several types will be considered, including river floods, flash floods, dam-break floods, ice-jam floods, glacial-lake floods, urban floods, coastal floods and hurricanes. Specifically, the following key questions will be addressed: When, where, how have floods changed? Why do floods change? How sensitive are floods of different type to changes in their drivers? How confident can we be about predicting future changes in floods? It is argued that understanding the flood processes for each of the flood type is a prerequisite for estimating the flood hazard reliably. This is particularly important if one expects the landscape or climate characteristics to change in the future. Changes in drivers such as climate, land use and river works are of particular interest.

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

This working group will address all three targets identified in the Panta Rhei Science plan (see <http://distart119.ing.unibo.it/iahs/>), particularly focusing on the first one, i.e.,

Understanding. The main Science Question outlined in the plan that will be addressed by the proposed working group is:

SQ1 (Target 1): What are the key gaps in our understanding of hydrologic change?

Nevertheless, the work of the WG will be beneficial also for the other Science Questions, in particular to:

SQ4 (Targets 2 and 3): How can we use improved knowledge of coupled hydrological-social systems to improve model predictions, including estimation of predictive uncertainty and assessment of predictability?

SQ6 (Target 3): How can we support societies to adapt to changing conditions by considering the uncertainties and feedbacks between natural and human-induced hydrologic changes?

Societal impact of the Working Group activity

Given the recent and expected future changes in the water-related environment, developing strategies of flood risk management and implementing them pose a number of challenges. This WG will focus on the hazard part of the flood risk change. We believe that offering insightful explanations of changes that have already happened in flood frequency, magnitude and seasonality and what are the underlying reasons for that, may result in a more informed assessment of the flood risk change and in a gain of wider acceptance of the flood risk management decisions by the society.

List of Participants

Name of Participant	Affiliation (full address and email)	Role in Working Group (Chair or Member)	Main expertise
Alberto Viglione	Institute of Hydraulic Engineering and Water Resources Management Vienna University of Technology, Karlsplatz 13/222 A-1040 Vienna, Austria Email: viglione@hydro.tuwien.ac.at Tel.: +43-1-58801-22317 Fax: +43-1-58801-22399	Chair	Catchment hydrology, flood process understanding and flood frequency analysis
Berit Arheimer	Swedish Meteorological and Hydrological Institute, Berit.Arheimer@smhi.se	Member	Process-based modelling, PUB, comparative hydrology, forecasts, impact of change
Giuseppe Tito Aronica	Department of Civil Engineering University of Messina, Messina, Italy garonica@unime.it	Member	Flash flood and associated hazard analysis, design flood estimation, urban hydrology, uncertainty analysis, small catchment modeling, flood risk analysis, analysis of hydrological extreme events, hydrology of Mediterranean areas
Günter Blöschl	Institute of Hydraulic Engineering and Water Resources Management Vienna University of Technology, Vienna, Austria bloeschl@hydro.tuwien.ac.at	Member	Flood hydrology
Marco Borga	Department of Land, Environments, Agriculture and Forestry, University of Padova, Padova, Italy	Member	Rainfall estimation and modelling, catchment hydrology, flood process understanding, climate

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Paolo Burlando	Institute of Environmental Engineering, ETH Zürich, Switzerland paolo.burlando@ifu.baug.ethz.ch	Member	Rainfall analysis and modelling, hydrological modelling, catchment and flood hydrology, climate change
Attilio Castellarin	Department DICAM - Faculty of Engineering, University of Bologna, Italy attilio.castellarin@unibo.it	Member	Surface water resources assessment; anthropogenic effects on hydrological processes and Water-Society interactions; hydrological predictions in ungauged basins; frequency analysis of hydrological extreme events
Pierluigi Claps	Dipartimento di Ingegneria dell'Ambiente, del Territorio e delle Infrastrutture (DIATI), Technical University of Turin, Italy pierluigi.claps@polito.it	Member	Catchment hydrology, statistical modeling of floods, flood frequency representation in mountain basins
Julia Hall	Institute of Hydraulic Engineering and Water Resources Management Vienna University of Technology, Vienna, Austria hall@hydro.tuwien.ac.at	Member	Hydro-climatology, spatial & temporal pattern identification, flood process understanding, flood seasonality
Yeshewa Hundecha	Swedish Meteorological and Hydrological Institute, yeshewatesfa.hundecha@smhi.se	Member	Parameter estimation and regionalization; stochastic modeling of hydrometeorological variables; modeling and analysis of hydrological/hydrometeorological extremes
Andrea Kiss	Institute of Hydraulic Engineering and Water Resources Management Vienna University of Technology, Vienna, Austria kiss@hydro.tuwien.ac.at	Member	Environmental history
Thomas Kjeldsen	Department of Architecture and Civil Engineering, University of Bath, UK trk23@bath.ac.uk	Member	Frequency analysis of environmental extremes, catchment modelling and urban hydrology
Silvia Kohnová	Department of Land and Water Resources Management, Faculty of Civil Engineering, Slovak University of Technology Bratislava, Slovakia silvia.kohnova@stuba.sk	Member	Regional methods in hydrology; regional flood frequency analysis; seasonality and design flood estimation; regionalization of model parameters
Heidi Kreibich	German Research Centre for Geosciences (GFZ), Section 5.4 Hydrology, Potsdam, Germany heidi.kreibich@gfz-potsdam.de	Member	Flood risk, particularly vulnerability
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Peter Molnar	Institute of Environmental Engineering, ETH Zürich, Switzerland peter.molnar@ifu.baug.ethz.ch	Member	Statistical analysis and stochastic modeling of rainfall; rainfall-runoff transformation and watershed modeling; fluvial systems processes
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Eric Sauquet	National Research Institute of Science and Technology for Environment and Agriculture, Lyon, France eric.sauquet@irstea.fr	Member	Flood frequency analysis, regionalisation and climate change
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