



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

Changes in Flood Risk

Abstract of the proposed research activity

Flood risks emerge from extreme hydrological events and exposure of human activities. A large part of the observed upward trend in damage is assumed to be related to socio-economic factors, such as accumulation of assets and increasing vulnerability in flood-prone areas. However, other factors play a role as well, such as climate change and human interventions in river systems and catchments. There is a significant research gap in (semi-)quantitative studies on the joint effects of hazard, exposure and vulnerability change and their drivers. Thus, the objective of the proposed Working Group is the attribution of past and the projection of future changes in risk. The Working Group aims at understanding, quantifying and modelling the linkages between physical or socio-economic drivers and changes in flood risk as well as exploring adaptation pathways. Key questions are: Why is flood risk changing? How may risk change in the future? How can adaptation reduce risks?

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

The working group will address all three targets of Panta Rhei, namely UNDERSTANDING, ESTIMATION AND PREDICTION and SCIENCE IN PRACTICE. The following Panta Rhei science questions will be addressed:

2. How do changes in hydrological systems interact with and feedback on natural and social systems driven by hydrological processes?
3. What are the boundaries of coupled hydrological and societal systems? What are the external drivers and internal system properties of change? How can boundary conditions be defined for the future?

6. 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

Authorities responsible for flood risk management and the (re-)insurance industry need to better understand how changes in climate and other human interventions into rivers and catchments as well as shaping assets and their distribution affect flood risk. To understand how different drivers jointly change flood risk or counterbalance each other is essential for decision-making. For example, the implementation of flood protection may have counterbalanced increasing flooding due to climate change. We have established connections with authorities ranging from local (e.g. municipalities of Dresden or Cologne) to regional (e.g. International Commission for the Protection of the Rhine (ICPR)) and to the insurance industry (e.g. Munich Re) including consultancy (e.g. RMS). The research delivered by the Working Group will be disseminated through the partner network and precipitate in better planning decisions and more robust risk assessment strategies also in the context of adaptation to climate change.

List of Participants

Name of Participant	Affiliation (full address and email)	Role in Working Group (Chair or Member)	Main expertise
1. Heidi Kreibich	German Research Centre for Geosciences (GFZ), Section 5.4 Hydrology, Telegrafenberg, D – 14473 Potsdam, Germany, Tel.: +49-331-2881550, Fax: +49-331-2881570, heidi.kreibich@gfz-potsdam.de	Chair	Flood risk, damage modelling, vulnerability, adaptation
2. Sergiy Vorogushyn	German Research Centre for Geosciences (GFZ), Section 5.4 Hydrology, Telegrafenberg, D – 14473 Potsdam, Germany, Tel.: +49-331-2881519, Fax: +49-331-2881570, vorogus@gfz-potsdam.de	Co-Chair	Flood risk, flood hydraulics
3. Bruno Merz	German Research Centre for Geosciences (GFZ), Section 5.4 Hydrology, Potsdam, Germany	Member	flood frequency, flood risk analysis
4. Jeroen Aerts	IVM, VU University Amsterdam, The Netherlands	Member	Flood risk
5. Karsten Arnbjerg-	Dept. of Env. Eng., Technical University of Denmark, Lyngby,	Member	Urban flood risk, climate change impact assessment

Nielsen	Denmark		
6. Giuseppe T. Aronica	Department of Civil Engineering University of Messina, Italy	Member	Flood propagation modeling, flood risk analysis and mapping, debris flow, vulnerability and damage assessment, urban flooding
7. Giuliano Di Baldassarre	UNESCO-IHE, Institute for Water Education, Delft, The Netherlands	Member	Human-flood interactions, Risk dynamics, Inundation modeling
8. Paul Bates	School of Geographical Sciences, University of Bristol, UK	Member	Flood risk, flood hydraulics
9. Laurens Bouwer	Deltares, The Netherlands	Member	Flood risk, vulnerability, economic loss estimation
10. Zbigniew W. Kundzewicz	Institute for Agricultural and Forest Environment, Polish Academy of Sciences, Poznań, Poland and Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany	Member	intense precipitation, climate change impacts, change detection
11. Maria Carmen Llasat	University of Barcelona, Department of Astronomy and Meteorology, Barcelona, Catalonia, Spain	Member	Heavy rainfalls and flash-flood risk, vulnerability, societal impact, flood risk awareness
12. Annegret H. Thieken	Institute of Earth and Environmental Science, Universität Potsdam, Germany	Member	Flood risk, damage modelling, adaptation
13. Alberto Viglione	Institute of Hydraulic Engineering and Water Resources Management, Vienna University of Technology, Austria	Member	Catchment hydrology, flood process understanding, flood frequency analysis