



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 Research Theme

Hydro-meteorological extremes: Decision making in an uncertain environment

Abstract of the research theme

Hydro-meteorological hazards can have cascading effects and far-reaching implications on water security, with political, social, economic and environmental consequences. Millions of people worldwide are forcibly displaced as a result of natural disasters, creating political tensions and social needs to support them. These events observed in developed and developing nations alike, highlight the necessity to generate a better understanding on what causes them and how we can better manage and reduce the risk.

This proposed theme aims at providing practical solutions of knowledge transfer from research into practice. Flood risk is strongly dependent on the interaction between changes in the hydrological cycle and the human development. In consequence, it is of great interest to take preventive action through the communication of uncertain research results to decision makers. Recent events around the world indicate that a better communication between researchers, decision makers and society is pivotal for the generation of a successful disaster risk reduction strategy. Moreover, the size of registered damages and losses reveal the urgency of doing so, even under a context of limited predictability. Therefore, potential topics of study in this theme envisage the involvement of society in (1) the development and use of smart technologies for weather and hydrological prediction purposes, (2) effective communication of uncertainty to communities facing hydrological risks, (3) real-time hydrological model feedback.

Panta Rhei research Targets and Science Questions addressed by the Research Theme

Target #3: Science in Practice

4. How can we use improved knowledge of coupled hydrological-social systems to improve model predictions, including estimation of predictive uncertainty and assessment of predictability?
5. How can we advance our monitoring and data analysis capabilities to predict and manage hydrologic change?
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 Research Theme

The entities exposed to flood hazards are wide-ranging: humans, agriculture; infrastructure; and the environment. Indeed, recent disasters remind us of our society's increasing vulnerability to the consequences of population growth and urbanisation, economic and technical interdependence, and environmental change. In view of the magnitude and ubiquity of the hydro-climatic change now under way, new approaches in water-resource risk assessment and planning are needed. Understanding the complexities of the interrelationships of natural and social domains is vital. The assessment of risk and uncertainty is essential for an adaptive risk management, both in the evaluation of strategies to increase resilience, and in facilitating risk communication and successful mitigation. The effective integration of science into policy development and practical problem-solving will entail sustainable development; transferring research and scientific findings into applied adaptive strategies will be possible by the promotion of scientific policy advice through straightforward honesty about risk and uncertainty.

Panta Rhei Working Groups referring to the Research Theme

In order to tackle this Research Theme, an initial Working Group is also proposed. Academic members are:

Dr. Adrián Pedrozo-Acuña (National Autonomous University of Mexico, Mexico)

Dr. Agustín Breña-Naranjo (National Autonomous University of Mexico, Mexico)

Prof. Dawei Han (Bristol University, United Kingdom)

Prof. Gareth Pender (Heriot-Watt University, United Kingdom)

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