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

Epistemic Uncertainties

Abstract of the research theme

Considering uncertainties in hydrological experimentation and modelling may be considered state-of-the-art, yet how to account for epistemic (lack-of-knowledge) uncertainties in the prevailing methodologies is far from obvious. When predictions are made of socio-hydrological systems or when decisions are made within them, then there are even more unknowns relating, for example, to human epistemologies, values and behaviour. These are rarely considered at all. The Research Theme *Epistemic Uncertainties* will coordinate research under these strands. Specific research questions include:

- What should a typology of epistemic uncertainties include?
- What are the added "social" epistemic uncertainties in socio-hydrological systems?
- How far do prevailing uncertainty methodologies stretch in capturing epistemic uncertainties?
- How are epistemic uncertainties processed in decision making?
- Are there modes of knowledge production and governance that may safeguard against epistemic uncertainties?

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

This Research Theme addresses all three targets, but predominantly in the context of estimation and prediction (target 2). By analysing the "known unknowns" of epistemic uncertainties, the Research Theme will help address science question 1 ("What are the key gaps in our understanding of hydrologic change?"). Key contributions will further be made to science question 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?") and science question 6 ("How can we support societies to

adapt to changing conditions by considering the uncertainties and feedbacks between natural and human–induced hydrologic changes?"), both having an explicit uncertainty angle.

Societal impact of the Research Theme

Society is faced with urgent decisions of water sharing and adaptation to a changing environment that are linked in complex ways with other resources and human needs. Much about the socio-hydrological system remains unknown, yet decisions have to be made now. Hence, analysing the robustness of those decisions under epistemic uncertainties and finding ways to safeguard against severe surprises will benefit society greatly. It is one aim of the Research Theme to enable the creation and maintenance of interfaces for knowledge exchange with wider society.

Panta Rhei Working Groups referring to the Research Theme

We are also proposing a Working Group with the same name.