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Do we need to represent the non-stationary world in hydrological impact models?

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In most of Europe, catchment water resources and hydrological behaviour have been modified (to a lesser or greater extent) by anthropogenic activities, including changes in rural and urban landcover, river channel management, soil compaction and sealing, water impoundments, abstractions, transfer and discharges. Furthermore, the past 70 or so years have been a period of unprecedented social, economic, technological and political change, affecting all sectors of the economy from agriculture to energy generation. It is highly likely that the next 50 years will be similarly dynamic.

This presentation will approach the question of "What is a 'good' hydrological model for impact study?" from the perspective of the potential ability of hydrological models to simulate future river flows that take account of future climatic and socio-economic changes and associated autonomous adaptation. In particular, the presentation will:

• Describe quantified European versions of the Shared Socio-economic Pathways (SSP1, 3, 4 and 5) developed within the IMPRESSIONS FP7 project, and their implications for future water demand, water resource management and abstraction management;
• Present results of simulated landcover and landuse from the IMPRESSIONS Integrated Assessment Platform (IAP) 2 for Europe under these contrasting European Shared Socio-economic Pathways and Representative Concentration Pathways (RCP2.6, 4.5 and 8.5). These show significant spatial changes (urban, agricultural and forestry expansion/contraction and irrigation patterns) and geographic shifts, resulting from changing housing demand, food and timber demand and imports, water resource availability and agricultural productivity- with consequences for evapo-transpiration, abstraction and soil properties.
• Report on a literature review on the extent to which different characteristics of adaptation (both autonomous and planned) are represented within a broad range of hydrological models used in climate change assessments.

Given that neither the climate, socio-economic context nor river basins themselves are stationary, the presentation will conclude with a discussion of the methodological implications for how modellers can simulate robust projections of future hydrological change.