



Virtual laboratories: new opportunities for collaborative water science

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Reproducibility and repeatability of experiments are the fundamental prerequisites that allow researchers to validate results and share hydrological knowledge, experience and expertise in the light of global water management problems. Virtual laboratories offer new opportunities to enable these prerequisites since they allow experimenters to share data, tools and pre-defined experimental procedures (i.e. protocols). Here we present the outcomes of a first collaborative numerical experiment undertaken by five different international research groups in a virtual laboratory to address the key issues of reproducibility and repeatability. Moving from the definition of accurate and detailed experimental protocols, a rainfall-runoff model was independently applied to 15 European catchments by the research groups and model results were collectively examined through a web-based discussion. We found that a detailed modelling protocol was crucial to ensure the comparability and reproducibility of the proposed experiment across groups. Our results suggest that sharing comprehensive and precise protocols and running the experiments within a controlled environment (e.g. virtual laboratory) is as fundamental as sharing data and tools for ensuring experiment repeatability and reproducibility across the broad scientific community and thus advancing hydrology in a more coherent way.