



Science for Solutions decade: **HELPING**  
**Hydrology Engaging Local People IN one Global world**  
IAHS Scientific Decade 2023-2032  
[IAHS Scientific Decade](#)

**Details of the Working Group – Understanding drivers and feedbacks of soil moisture variability across scales, from local to global**

**Describe the work and how your suggested working group will contribute to the goal(s):** The working group will focus on accelerating our understanding of time-space variability of terrestrial hydrology across scales, with a focus on soil moisture, and the drivers and feedbacks. The work will build on limited in-situ studies and promising new approaches to estimating soil moisture at process-scales from satellites, models, and hybrid approaches.

The work will address several goals listed above by focusing on processes at the local scale (Theme 1, Research Goal 1), but looking at this across landscapes and regions to understand differences and similarities (Theme 1, Research Goal 2). It will seek to understand how local drivers convolve to produce larger scale (emergent) properties, and how global changes drive changes locally, so connecting local to global (Theme 1, Research Goal 3).

This will require community synthesis of existing data and knowledge (Theme 1, Community Goal 1). The work will likely have to collate large-sample datasets of soil moisture and other variables from in-situ observations (Theme 1, Outcome/Product Goal 2), complemented by modelled and satellite data to understand differences and similarities. The work will lead to new methods and datasets to bridge across scales (Theme 1, Outcome/Product Goal 3), with potential practical applications for monitoring and assessment (e.g., soil moisture for agriculture, flood/landslide risks or biodiversity/habitats) (Theme 1, Outcome/Product Goal 2).

**Describe the methods you will use to achieve the goal(s):** Initial workshop, survey, and literature review to synthesize the state of knowledge and data on process-scale variability in terrestrial hydrology with a focus on soil moisture, and how this is represented in observations, models, and satellite information at different scales. Workshop to identify of specific research questions that can help drive community work on the topic.

Community organization (e.g., via online collaboration, EGU/AGU meetings) to identify sub-working groups or sub-projects to explore ways to develop new datasets and methods to better represent local scale variability and understand drivers and feedbacks. The working group will focus on engaging outside of North America/Europe and to have dispersed and diverse leadership and membership.

Training workshops and online resources (methods, tools, datasets) to build research capability and document knowledge and data, e.g., 1) methods of data synthesis and analysis of variability, 2) dataset development using models, satellites, and hybrid methods, 3) use of data for applications such as assessment and monitoring.

**Describe the (a) short-term, (b) the long-term and (c) the ultimate results you hope to achieve:**

(a) Short-term – Synthesis of current knowledge, methods and datasets. New research questions that can help drive community work on the topic.

(b) Long-term – New datasets and models to better represent process-scale variability across different landscapes. New approaches to quantify and understand variability across scales.

(c) Ultimate – New understanding of spatio-temporal variability across scales, its drivers, and feedbacks, and how this can improve applications (e.g., agricultural water management, flood mitigation, biodiversity/habitat maintenance, carbon mitigation), including example applications/case studies.

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