



Science for Solutions decade: **HELPING**
Hydrology Engaging Local People IN one Global world
IAHS Scientific Decade 2023-2032
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Details of the Working Group – Irrigation quantification & management & its effect on the water cycle

Describe the work and how your suggested working group will contribute to the goal(s): The Working Group aims to advance our knowledge of the irrigation process, its quantification, and on how the management of irrigation water could impact the water and energy cycles, and how we could better implement this process and effects into land surface models. We will look at irrigation at multiple scales, from the field scale (Theme 1, Research Goal 1) to Irrigation district areas and continental areas, by understating the differences and similarities across world regions (Theme 1, Research Goal 2).

Agriculture is the largest consumer of water worldwide (70% of freshwater withdrawals), but at the same time there is a significant concern regarding the inefficient utilization of water within the agricultural sector. Climate changes and increasing human pressure are further enhancing the conflictual problems in water use also in countries traditionally rich in water.

Furthermore, reliable and organized data on water withdrawals for agricultural purposes are generally lacking worldwide, thus making irrigation the missing variable to close the water budget over anthropized basins.

In the last recent years, there has been an increased interest in irrigation mapping, quantification, and improved management, with the development of several methods based only on satellite remote sensing data of soil moisture, on hydrological modeling alone or through integration of satellite retrievals and models. However, it remains poorly simulated by models as well as it's poorly monitored on the ground.

The main questions we aim to address are: how much water is used for irrigation worldwide at multiple scales? How can we improve the modeling of the irrigation process in our hydrological models integrating with remote sensing data? What are the impacts of irrigation on the water and energy cycles, and how will they change over time if better irrigation water management approaches are implemented?

Describe the methods you will use to achieve the goal(s): The initial steps will be a workshop, followed with a survey and literature review to exploit the state of the knowledge on the irrigation process observation and modeling, and its impact on the water cycle at different spatial and temporal scales. We'll organize then a series of workshops to allow researchers working on the irrigation topic to connect each other and create a network of scientists, focusing on cutting-edge research questions. Promote international collaboration. Development of common activities to advance the understanding of the role of irrigation in the water cycle, and the way irrigation water management impacts the water and energy cycles, as well as the challenges of quantifying and modeling the irrigation (e.g. models intercomparison, data and knowledge exchange, etc.). Connection with other existing working groups,

as the GEWEX GLASS/GHP Irrigation Cross-Cut as an initiative of the GEWEX GLASS and GHP panels.

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

(a) In a short-term perspective, the main aim is to create a global network of researchers, which is diverse, multi-disciplinary and collaborative, working on the irrigation topic. Identification of the state of the art on available datasets, process knowledge and methodologies, helping to identify new research questions. (b) For a long-term perspective, the aim is to improve the knowledge of the irrigation process and management, and its impact on the water and energy cycles, and develop datasets and modeling approaches to map the irrigation at multiple scales, and intercompare them on common case studies. (c) The ultimate result is to leverage this working group network and results to build long-lasting activities on irrigation water volume quantification and management; and to involve irrigation water stakeholders to contribute increasing the knowledge on the importance of monitoring the water use of irrigation. The results of the working groups will be published by the end of the decade as scientific papers.

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