25th International Congress on Modelling and Simulation, Darwin, NT, Australia, 9 to 14 July 2023
mssanz.org.au/modsim2023

WaterSENSE: Update on implementing water use monitoring and assessment services

S. Wonink [a], B. Jackson [b], J. Brombacher [a], R.W. Vervoort [c], T. Einfalt [d], M. Alderlieste [e], P. Chambel Leitão [f] and M. Noort [g]

[a] eLEAF BV; [b] Water Technology Pty Ltd; [c] ARC ITTC DARE, The University of Sydney; [d] Hydro and Meteo GmbH; [e] Hydrologic BV; [f] Hidromod LDA; [g] HPC International
Email: willem.vervoort@sydney.edu.au

Abstract: Water sharing in the Murray–Darling Basin is at the forefront of management of Australia's water resources, specifically with prediction of an increase in the variability for a future climate. Lack of capacity to proactively monitor and identify landscape and hydrological changes, including allegations of water theft, have recently made headline news across Australia. While NSW is improving the management, regulation, compliance and enforcement of water sharing, the massive areal coverage makes monitoring challenging and there is limited access to data and tools that allow for the state-wide operational monitoring of water consumption. Traditional methods to monitor compliance (e.g. installation of water meters) take years to implement and involve high costs and human resources to maintain. Accurate, inexpensive, and rapid monitoring tools promise to get an improved insight in the water use. WaterSENSE develops water-monitoring capabilities to support effective water management ranging from irrigated fields and districts to entire river basins. The goal of WaterSENSE is to develop a modular, operational, water-monitoring system built on Copernicus Earth Observation data to provide water managers with a toolbox to obtain reliable and actionable information on water availability and water use for transparency across the entire water value chain.

The Water Use Monitoring and Auditing Services (WUMAS) is central to WaterSENSE as it provides water use monitoring information at different time and spatial resolutions. Our research is focused on different technology elements and its integration into a single system. The information is made available in online dashboards such as the HydroNET platform, a SaaS decision support system for water managers, allowing comparison of estimated irrigated water use with water permits. WUMAS is also associated with AQUASAFE, through HydroNET which enables the running of farm-scale hydrology models such as Mohid Land and HydroAquafarm. High-resolution (10 m) remote sensing-based evapotranspiration (ET) data based on the ETLook energy balance model is used to estimate irrigation water use from irrigated agricultural pixels to the weighted average ET of a subset of natural Hydrological Similar Pixels. The accuracy of the results depends also on the accuracy of other (EO based) information source. We will further outline the newly developed modelling at the farm scale and related to vegetation condition and surface water detection and the integration of the different data sources in the HydroNET platform.

Keywords: *Environmental monitoring, water auditing, satellite observations, data platform*