

A satellite data-driven, client-server decision support application for agricultural water resources management

Water cycle extremes such as droughts and floods present a challenge for water managers and for policy makers responsible for the administration of water supplies in agricultural regions. In addition to the inherent uncertainties associated with forecasting extreme weather events, water planners need to anticipate water demands and water user behavior in atypical circumstances. This requires the use decision support systems capable of simulating agricultural water demand with the latest available data. Unfortunately, managers from local and regional agencies often use different datasets of variable quality, which complicates coordinated action.

In previous work we have demonstrated novel methodologies to use satellite-based observational technologies, in conjunction with hydro-economic models and state of the art data assimilation methods, to enable robust regional assessment and prediction of drought impacts on agricultural production, water resources, and land allocation. These methods create an opportunity for new, cost-effective analysis tools to support policy and decision-making over large spatial extents. The methods can be driven with information from existing satellite-derived operational products, such as the Satellite Irrigation Management Support system (SIMS) operational over California, the Cropland Data Layer (CDL), and using a modified light-use efficiency algorithm to retrieve crop yield from the synergistic use of MODIS and Landsat imagery.

Here we present an integration of this modeling framework in a client-server architecture based on the Hydra platform. Assimilation and processing of resource intensive remote sensing data, as well as hydrologic and other ancillary information occur on the server side. This information is processed and summarized as attributes in water demand nodes that are part of a vector description of the water distribution network. With this architecture, our decision support system becomes a light weight ‘app’ that connects to the server to retrieve the latest information regarding water demands, land use, yields and hydrologic information required to run different management scenarios. Furthermore, this architecture ensures all agencies and teams involved in water management use the same, up-to-date information in their simulations.

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