Forecasting tools in water resources to ground public policy and management debates in sound scientific methods

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Abstract Society faces challenges in management and use of water resources that are global in nature and yet impact communities and individuals locally. While this presentation focuses on issues common to irrigated agriculture in semi-arid grasslands with applications from the central plains of the USA, the computational framework is extensible to other challenges. Individually, computational models are overviewed that enable studies of groundwater hydrogeology, agricultural economics, and agro-ecology. Each model is capable of reproducing historical data (groundwater declines, economic decisions, crop yields), and provides a tool to forecast disciplinary perspectives into the future. Collectively, models are integrated using the Open Modelling Interface (OpenMI), which enables output from one model to be used as input to others and provides a tool to integrate perspectives. This novel framework is being applied to study the impacts of policy change on water resources, land-use choices, and agricultural productivity.

Key words groundwater; Analytic Element Method; modelling; OpenMI; economics; agriculture; Ogallala Aquifer; High Plains, USA