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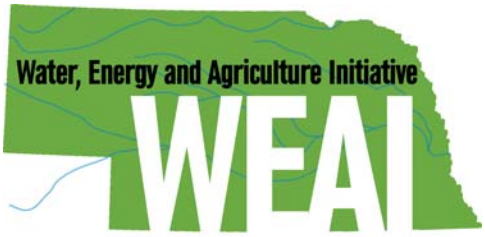

Water, Energy and Agriculture Initiative

Optimization of Irrigation Efficiency of Center-pivot Systems Using Spatial and Temporal Data Integration

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ABSTRACT. The efficiency of a center pivot irrigation system is greatly dependent on the ability to provide the water supply needed to meet the demands of the rowing crop. While limited water supplies may educe crop yield due to water stress, excessive irrigation may result in wasted resources and, if extreme, may also reduce yields. The optimized need for irrigation water changes temporally and spatially. Various methods have been deployed to focus on either level of variability. Thus, soil sensor telemetry and crop modeling frequently allow improved irrigation scheduling. On the other hand, dense-resolution proximal soil sensing allows identifying spatial variability of topsoil water storage capacity that also affects the needs for irrigated water. The research intends to integrate on-the-goal soil sensing technology with stationary sensor networks to supplement decision making processes to optimize irrigation scheduling as well as to prescribe site-specific water management if appropriate for a given site.

The Water, Energy and Agriculture Initiative funds research to maximize the efficiency with which water and energy resources are used to sustain economic development and water conservation in Nebraska agriculture.

The Nebraska Center for Energy Sciences Research administers the initiative, which was created in 2008 through a partnership of the center, the Nebraska Public Power District, the Nebraska Corn Board, the Nebraska Soybean Board and UNL's Agricultural Research Division