



Management Strategies to Sustain Irrigated Agriculture with Combination of Remote Sensing, Weather Monitoring & Forecasting and SWAP Modeling

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Today world's water systems face formidable threats due to climate change and increasing water withdraw for agriculture, industry and domestic use.

Projected in many parts of the earth increases in temperature, evaporation, and drought frequency shrunk water availability and magnify water scarcity.

Declining irrigation water supplies threaten the sustainability of irrigated agricultural production which plays a critical role in meeting global food needs.

In irrigated agriculture there is a strong call for deep efforts in order on the one hand to improve water efficiency use and on the other to maximize yields.

The aim of this research is to provide tool to optimize water application with crop irrigation by sprinkling in order to sustain irrigated agriculture under limited water supply by increasing net returns per unit of water.

For this aim some field experimental results of 2012 year growing season of alfalfa, corn and soya irrigated by sprinkling machines crops at left bank of Volga River at Saratov Region of Russia. Additionally a combination of data sets was used which includes MODIS images, local meteorological station and results of SWAP (Soil-Water-Atmosphere-Plant) modeling. This combination was used to estimate crop water stress defined as ratio between actual (ET_a) and potential (ET_c) evapotranspiration. By this way it was determined the effect of applied irrigation scheduling and water application depths on evapotranspiration, crop productivity and water stress coefficient. Aggregation of actual values of crop water stress and biomass data predicted by SWAP agrohydrological model with weather forecasting and irrigation scheduling was used to indicate of both rational timing and amount of irrigation water allocation. This type of analysis facilitating an efficient water management can be extended to irrigated areas by developing maps of water efficiency application serving as an irrigation advice system for farmers at his fields and as a decision support tool for the authorities on the large perimeter irrigation management. The authors would like to express their gratitude to the Russian Foundation of Basic Research for providing financial support of the project 16-05-01097