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Optimal crop selection and water allocation under limited water supply in irrigation

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Due to climate change, extreme weather conditions such as droughts may have an increasing impact on irrigated agriculture. To cope with limited water resources in irrigation systems, a new decision support framework is developed which focuses on an integrated management of both irrigation water supply and demand at the same time. For modeling the regional water demand, local (and site-specific) water demand functions are used which are derived from optimized agronomic response on farms scale. To account for climate variability the agronomic response is represented by stochastic crop water production functions (SCWPF). These functions take into account different soil types, crops and stochastically generated climate scenarios. The SCWPF's are used to compute the water demand considering different conditions, e.g., variable and fixed costs. This generic approach enables the consideration of both multiple crops at farm scale as well as of the aggregated response to water pricing at a regional scale for full and deficit irrigation systems. Within the SAPHIR (SAxonian Platform for High Performance IRrigation) project a prototype of a decision support system is developed which helps to evaluate combined water supply and demand management policies.