Hydrological Modelling in Irrigated Areas
– A Case Study in Zhanghe Irrigation System, China

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Hydrological modelling faces great difficulties in irrigated areas due to the highly dynamic water cycling processes caused by irrigation and drainage practices. This paper describes a study on process based water balance modelling integrated with remote sensing/GIS spatial analysis in the Zhanghe Irrigation System, Southern China. Irrigation water reuses through local water storages were analysed based on remote sensing interpretations and GIS spatial modelling. Time series evapotranspiration is estimated using Simplified Surface Energy Balance (SSEB) algorithm with Landsat ETM+ imagery. The results are then fed into an irrigation diagnosis and planning tool OASIS to assess the water balance in the irrigated areas and the impacts on performance of agricultural water management with various irrigation and drainage practices. The results revealed that the intensive canal system and local storages accompanied with current off-farm and on-farm water management practices have significantly altered the hydrological processes of the region. Water is highly regulated in the system. Up to 33% of irrigation diversion is reused through small storages and drainage networks. The well-developed infrastructure and associated management practices form a powerful water recycling mechanism that only 18% per cent of total water inflow (precipitation plus irrigation) flows out the system. The study suggests that, to better model water flows in irrigated systems, a balanced modelling approach is required between simulating the complex hydrological processes and accounting water budget components.