Geophysical Research Abstracts
Vol. 16, EGU2014-4072, 2014
EGU General Assembly 2014
© Author(s) 2014. CC Attribution 3.0 License.

Modelling the effect of field management on crop water productivity and catchment hydrology

Hanne Van Gaelen (1), Patrick Willems (2), Jan Diels (1), and Dirk Raes (1)

(1) Department of Earth and Environmental Sciences, KU Leuven – University of Leuven, Celestijnenlaan 200 E, 3001 Leuven, Belgium (hanne.vangaelen@ees.kuleuven.be), (2) Department of Civil Engineering, KU Leuven – University of Leuven, Kasteelpark Arenberg 40, 3001 Leuven, Belgium

Upgrading crop water productivity (WP_{ET}) is crucial to assure food production in a future world, where simultaneously the world population grows and land and water resources become increasingly limited. Adapted field management is one of the key solutions to upgrade WP_{ET} for rainfed agriculture in drought prone regions. However field management strategies should be assessed considering their impact on a larger scale (catchment hydrology), and this for current and future climatic conditions.

By linking a crop water productivity model (AquaCrop) to a lumped conceptual hydrological model (VHM), we aimed to develop a general modeling procedure to evaluate the impact of field management on WP_{ET} and catchment hydrology. To avoid disadvantages related to other model approaches, we specifically aimed at a procedure that (i) can be applied for both current and future climatic conditions, (ii) is widely applicable and generally relevant, i.e. also for developing countries, and (iii) requires a relatively small number of explicit parameters and mostly-intuitive input variables.

The linkage between AquaCrop and VHM is tested for two catchments in Flanders with a high proportion of agricultural land. After the VHM model is calibrated and AquaCrop simulations are run for the different land units (crop-soil combinations) of the catchment, the response behaviour of the VHM unsaturated zone model and the AquaCrop soil water balance is compared. Differences are identified and interpreted and a final coupling of the two models is established trough the water balance of the unsaturated zone. Thereby the overland runoff and water percolation to the groundwater or subsurface flow are the most crucial linkage components. After both models are linked different field management scenarios can be investigated with respect to their effect on both WP_{ET} and catchment hydrology.