Geophysical Research Abstracts
Vol. 21, EGU2019-6655-1, 2019
EGU General Assembly 2019

Water saving irrigation matters on regional crop water footprint accounting and benchmarking: evidence from wheat in China

Wei Wang, La Zhuo, Pute Wu, Yilin Liu, and Meng Li
Northwest A&F University, Yangling, China (weiweiwang@nwafu.edu.cn)

With the quantitative accuracy of spatial and temporal scales being improved, water footprint (WF) of regional crop production is a suitable indicator to obtain comprehensive understanding of water efficiency in agriculture. In water-deficient areas, water-saving agriculture is developing rapidly. However, to date, there is no study that explicitly addresses the effect of water saving irrigation developments on large-scale WF accounting. Here, we fill this gap for the first time through a case study of wheat in China over 2000-2014, during which the cultivated area for micro-irrigation expanded 14 times. The green and blue WFs of both rain-fed and irrigated wheat are estimated using the AquaCrop model at a 5×5 arc-minute resolution for each year. For irrigated wheat, we distinguish three irrigation techniques: furrow, sprinkler and micro-irrigation. The WF benchmarks for each irrigation type are further estimated separately for arid and humid zones. Results show that the annual contribution of the WF of wheat production under different irrigation techniques in the overall decreasing national total (by 4.4%) changed significantly, in line with changes in harvested area over the study period. Irrigation accounted for 70% of annual WF in China's wheat land. Furrow irrigation dominated the national total WF. The occupation by WF under micro-irrigation was the smallest but jumped by 14 times in quantity whereas that under sprinkler halved. China's average WF per ton of wheat under sprinkler irrigation was 21% higher than that under micro-irrigation in 2014. The WF benchmarks of wheat in arid zones show significant sensitivities to irrigation techniques. The 20th percentile WF benchmarks of wheat under micro-irrigation was 13% and 31% smaller than that under furrow and sprinkler irrigation, respectively, in arid zones. Meanwhile, the high provincial heterogeneities in terms of WF under varied distribution of irrigation techniques were also shown. The study provides possibility and shows importance to account for developments of water saving techniques in large scale crop WF estimations.