Jul 11th, 3:10 PM - 3:30 PM

PEPIC – understanding the impacts of different PET methods on simulating global crop-water relations of maize

Wenfeng Liu  
*Swiss Federal Institute of Aquatic Science and Technology, wenfeng.liu@eawag.ch*

Hong Yang  
*Swiss Federal Institute of Aquatic Science and Technology, University of Basel, hong.yang@eawag.ch*

Follow this and additional works at: [https://scholarsarchive.byu.edu/iemssconference](https://scholarsarchive.byu.edu/iemssconference)

Part of the Civil Engineering Commons, Data Storage Systems Commons, Environmental Engineering Commons, Hydraulic Engineering Commons, and the Other Civil and Environmental Engineering Commons

Liu, Wenfeng and Yang, Hong, "PEPIC – understanding the impacts of different PET methods on simulating global crop-water relations of maize" (2016). *International Congress on Environmental Modelling and Software*. 9.  
[https://scholarsarchive.byu.edu/iemssconference/2016/Stream-B/9](https://scholarsarchive.byu.edu/iemssconference/2016/Stream-B/9)

This Event is brought to you for free and open access by the Civil and Environmental Engineering at BYU ScholarsArchive. It has been accepted for inclusion in International Congress on Environmental Modelling and Software by an authorized administrator of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.
PEPIC – understanding the impacts of different PET methods on simulating global crop-water relations of maize

Wenfeng Liu1, Hong Yang1,2

1Eawag, Swiss Federal Institute of Aquatic Science and Technology, Ueberlandstrasse 133, CH-8600 Duebendorf, Switzerland (wenfeng.liu; hong.yang}@eawag.ch
2Faculty of Sciences, University of Basel, Petersplatz 1, CH-4003 Basel, Switzerland

Abstract: Previous research investigating the impacts of different potential evapotranspiration (PET) estimation methods on crop modelling have mostly been conducted at the field level or regional scale. These investigations have focused on either yields or crop water use. A comprehensive assessment of impacts of different PET methods on crop-water relations has been absent on a global scale. Here, PEPIC, a grid-based EPIC (Environmental Policy Integrated Climate) model within a Python environment, was developed to enhance our understanding of such impacts on global crop-water relations of maize at a spatial resolution of 30 arc minutes. The estimated national yields match well with the reported yields especially by using the Penman-Monteith estimation method, indicating the robustness of the PEPIC model on representing global yield patterns. Results show that the estimated PET varies largely among different PET methods in the same climate zones. Variations of crop water use (CWU) estimates and irrigation water requirements caused by the PET method were greater than the effect of the PET method on crop yield. Water availability plays an important role in such uncertainties. There were low variations for irrigated yields and rainfed CWU in the regions with limited rainfall, but the variations for irrigated CWU and rainfed CWU in the regions with sufficient rainfall were quite high. This study highlights the significance of considering the uncertainties derived from different PET estimation methods for investigating crop-water relations.

Keywords: PEPIC; PET; maize; crop-water relations; global modelling.