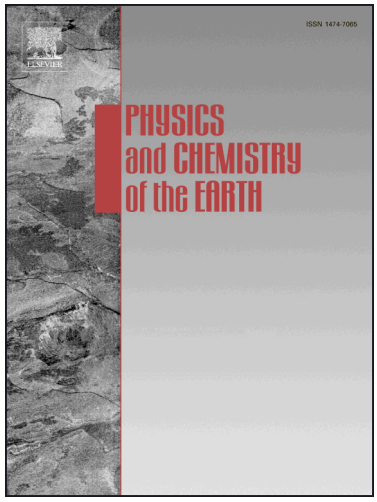

Impacts of land use and land cover changes on surface energy and water balance in the Heihe River Basin of China, 2000-2010

Xiangzheng Deng, Qingling Shi, Qian Zhang, Chenchen Shi, Fang Yin

PII: S1474-7065(15)00003-0
DOI: http://dx.doi.org/10.1016/j.pce.2015.01.002
Reference: JPCE 2328

To appear in: *Physics and Chemistry of the Earth*

Received Date: 6 August 2014
Revised Date: 7 January 2015
Accepted Date: 9 January 2015

Please cite this article as: Deng, X., Shi, Q., Zhang, Q., Shi, C., Yin, F., Impacts of land use and land cover changes on surface energy and water balance in the Heihe River Basin of China, 2000-2010, *Physics and Chemistry of the Earth* (2015), doi: http://dx.doi.org/10.1016/j.pce.2015.01.002

Impacts of land use and land cover changes on surface energy and water balance in the Heihe River Basin of China, 2000-2010

Xiangzheng Deng[a, *], Qingling Shi[a, b], Qian Zhang[a], Chenchen Shi[c] and Fang Yin[a]

[a]*Center for Chinese Agricultural Policy, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China*
[b]*School of Economics,Fudan University, Shanghai 200433, China*
[c]*State Key Laboratory of Water Environment Simulation, School of Environment, Beijing Normal University, Beijing 100875, China*

* Corresponding Author. Tel: +86-10-64888385
E-mail: dengxz.ccap@igsnrr.ac.cn
Fax: +86-10-64856533

Highlights

- Spatiotemporal variance of land use and land cover changes (LUCC) impact on the energy and water balance was analyzed in the inland river basin.
- WRF model was adopted in simulating change of the energy and water balances.
- Conversion from grassland to barren or sparsely vegetated land remarkably influences surface energy balance.
- There are similar seasonal trends of the impacts of LUCC on precipitation, runoff and evapotranspiration.

Abstract

It is well known that there are huge land use and land cover changes (LUCC) all over the world in recent decades, and plenty of ensuing effect appeared on the energy and water balance. This study aims to analyze the impacts of land use and land cover changes on the energy and water balance in the Heihe River Basin of China during 2000-2010, and four key study sites with representative hydrological stations and dramatic LUCC in the past decades were selected to illustrate the responses of the energy and water balance to LUCC. First, LUCC of the Heihe River Basin from 2000 to 2010 was analyzed based on the interpretation of remote sensing images. Then a series of indicators of the energy and water balances were simulated with the Weather Research and Forecasting (WRF) model and corresponding land use and land cover data. Thereafter the impacts of LUCC on the surface energy and water balance were detected and analyzed. The spatial-temporal variance of the impacts of LUCC on energy and water balance in a typical arid inland river basin was specifically presented in following analysis. The results show that different land use/cover