Geophysical Research Abstracts,
Vol. 11, EGU2009-876, 2009
EGU General Assembly 2009

Spatial-temporal Evolution of Crop Productivity and Evapotranspiration by an Ecosystem Model and Remotely Sensed Data in the North China Plain

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North China Plain(NCP) as the main grain-producing region, its production is closely related with national food safety. Spatial-temporal evolution of crop production, water consumption and its driving forces in NCP should be clarified for productivity and water demand trend analysis. In this paper, a dynamic ecosystem model (VIP model) is fused with remotely sensed NDVI to simulate the productivities and evapotranspiration of winter wheat and summer maize in NCP from 1981-2006. It is found that the biomass and evapotranspiration increased before 1997 and then kept relative steady. However, due to the improvement of harvest index, grain yield per unit area grew significantly in the whole period, with grain yield per unit area one times higher in 2000 than 1981. Large amounts of fertilizer and high quality varieties application are the principle reasons of grain yield and water use efficiency improvement. The climatic change contributes 8.5% of the annual productivity fluctuation. On the whole region, the spatial-temporal evolution is clearly related with local conditions, e.g. irrigation facilities and soil conditions.