Geophysical Research Abstracts
Vol. 13, EGU2011-3072, 2011
EGU General Assembly 2011

Spatial Simulation of evapotranspiration of semi-arid Inner Mongolian grassland based on MODIS and eddy covariance data

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In semi-arid regions of Central Asia water shortage results from low annual precipitation (P) with high interannual variability. Evapotranspiration (ET) dominates water balance losses entirely. Previous studies showed large differences between individual grassland sites in the partitioning of ET into evaporation and transpiration, but only little difference in the evaporative ratio ET/P. The hydrological model BROOK90 was applied to the Xilin river catchment in Inner Mongolia (China) in combination with data from MODIS (Moderate Resolution Imaging Spectroradiometer) and ET measurements. The ET part of the model was parameterised using several years of eddy covariance (EC) measurements over grasslands differing in grazing intensity and leaf area index (LAI). Using a relatively well established relationship of LAI and P, as well as LAI and temperature derived from MODIS, the water balance components of a 16 km^2 sample area in the catchment were modelled with a 1 km^2 resolution for the vegetation period of 2006. All pixels were modelled assuming a similar ET control as at the EC sites. Spatial variation in ET as well as in the partitioning of ET between transpiration and evaporation could be identified. The results indicate the potential to use MODIS data and BROOK90 to upscale ET of semi-arid grasslands from site to larger grass dominated catchments.