Geophysical Research Abstracts
Vol. 13, EGU2011-9434, 2011
EGU General Assembly 2011
© Author(s) 2011

Hydroclimatic Trends in the Mississippi River Basin from 1948 to 2004

Taotao Qian, Aiguo Dai, Kevin E. Trenberth, and Jialin Lin
United States (qian.taotao@gmail.com)

The trends of the surface water and energy budget components in the Mississippi River basin from 1948 to 2004 are investigated using a combination of hydrometeorological observations and observationconstrained simulations of the land surface conditions using the latest version of the Community Land Model version 3 (CLM3). The atmospheric forcing data for the CLM3 were constructed by adding the intramonthly variations from the 6-hourly National Centers for Environmental Prediction–National Center for Atmospheric Research (NCEP–NCAR) reanalysis to observation-based analyses of monthly precipitation, surface air temperature, and cloud cover. The model-based analysis suggests that, for the surface water budget, the observed increase in basin-averaged precipitation is compensated by increases in both runoff and evapotranspiration. For the surface energy budget, the decrease of net shortwave radiation associated with observed increases in cloudiness is compensated by decreases in both net longwave radiation and sensible heat flux, while the latent heat flux increases in association with wetter soil conditions. Both the simulated surface water and energy budgets support the view that evapotranspiration has increased in the Mississippi River basin from 1948 to 2004. Sensitivity experiments show that the precipitation change dominates the evapotranspiration trend, while the temperature and solar radiation changes have only small effects. Large spatial variations within the Mississippi River basin and the contiguous United States are also found. However, the increased evapotranspiration is ubiquitous despite spatial variations in hydrometeorology.