Geophysical Research Abstracts
Vol. 19, EGU2017-11713, 2017
EGU General Assembly 2017

Budyko framework of catchment water-energy balance: Enhancement and Application

Xianli Xu (1,2) and Meixian Liu (1,2)

(1) Institute of Subtropical Agriculture Chinese, Academy of Sciences, China (xianlixu@isa.ac.cn), (2) Huanjiang Observation and Research Station for Karst Ecosystem, Chinese Academy of Sciences

Quantifying partitioning of precipitation into evapotranspiration (ET) and runoff is the key to assessing water availability globally. We developd a universal model to predict water-energy partitioning ([U+03D6] parameter for the Fu's equation, one form of the Budyko framework) which spans small to large scale basins globally. A neural network (NN) model was developed using a data set of 224 small U.S. basins (100–10,000 km2) and 32 large, global basins (∼230,000–600,000 km2) independently and combined based on both local (slope, normalized difference vegetation index) and global (geolocation) factors. The Budyko framework with NN estimated [U+03D6] reproduced observed mean annual ET well for the combined 256 basins. The NN model enhances the capability of the Budyko framework for assessing water availability at global scales using readily available data.
Based on the datasets of 13 typical catchments that have different karst landform coverages in southwest China, we proved that budyko hypothesis is suitable for karst catchments; and found that catchment water-energy balance is firstly energy limited in subtropical karst area of China (rich cloudy days), but also specifically constrained by special geological background (limestone dominate), that is, water supply become more and more limiting with increases in the portion of karst landform in a catchment.