Geophysical Research Abstracts
Vol. 14, EGU2012-11550, 2012
EGU General Assembly 2012

Scale-dependent controls on the metabolic organization of river basins

K. Caylor and I. Rodriguez-Iturbe
Princeton University, Department of Civil and Environmental Engineering (kcaylor@princeton.edu)

The metabolism of a river basin is defined as the set of processes through which the basin maintains its structure and responds to its environment. Green (or biotic) metabolism is measured via transpiration and blue (or abiotic) metabolism through runoff. Recently, a principle of equal metabolic rate per unit area throughout the basin structure has been developed and tested in a river basin characterized by large heterogeneities in precipitation, vegetation, soil, and geomorphology. Empirically derived, remarkably constant rates of average transpiration per unit area through the basin structure lead to a power law for the probability distribution of transpiration from a randomly chosen subbasin. While the empirical evidence suggests that river basin metabolic activity is linked with the fractal geometry of the network, a challenge remains in understanding how and when such organization plays a determining role in governing basin hydrological dynamics. In this presentation, I will review prior work seeking to understand the role of vegetation in governing basin response and propose use of geomorphological scaling laws as means for determining the potential for surface pattern (i.e. vegetation structure) to impact the dynamical behavior of river basin metabolism.