Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08791, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08791
EGU General Assembly 2008

Coupled stochastic dynamics of soil water and vegetation in water-limited ecosystems: a minimal model

C. De Michele (1), R. Vezzoli (1), H. Pavlopoulos (2), R. J. Scholes (3)

(1) DIIAR, Politecnico di Milano, Italy, (2) Department of Statistics, Athens University of Economics and Business, Greece, (3) CSIR, South Africa

In drylands the soil water availability is a key factor ruling the architecture of the ecosystem. The soil water reflects the exchanges of water among soil, vegetation, and atmosphere. Here, a dryland ecosystem is investigated through the analysis of the local interactions between soil water and vegetation forced by rainfall having stochastic occurrences. The evolution of dryland ecosystems is represented by a system of two differential equations, having two steady states: one vegetated and the other unvegetated. The stationary probability distributions of the soil water content and the vegetation density are derived analytically. Thence, a sensitivity analysis of the stationary probability distributions on rainfall and model parameters has been carried out. This analysis points out the influence of the rainfall process, soil and vegetation properties on the stationary probability distributions of soil water and vegetation. The approach can potentially be extended to address more complex models.