Geophysical Research Abstracts
Vol. 16, EGU2014-14689, 2014
EGU General Assembly 2014

A Fokker-Planck-Kolmogorov approach for inverse modeling of complex processes applied to a hydrological system

Efrain Dominguez (1), Thomas Rosmann (2), and John Chavarro (2)

(1) Pontificia Universidad Javeriana, Facultad de Estudios Ambientales y Rurales, Departamento de Ecologia y Territorioi, Bogota, Colombia (e.dominguez@javeriana.edu.co, +57 +1 3208320 Ext.4859), (2) Pontificia Universidad Javeriana, Maestria en Hidrosistemas. Bogota, Colombia

In order to extract the mathematical operators that rule complex system behavior, a numeric scheme of the multi-dimensional Fokker-Planck-Kolmogorov equation is proposed allowing, through conjugate gradient optimization, the identification of deterministic kernels for an observed complex system. This scheme is analyzed using a hydrological basin as example but can be used in many fields. It is assumed that there are observed input-output signals of the system and no especial assumptions about the system kernel are required. This approach can be used at different time resolutions and it is expected to be powerful enough to characterize hydrological variability at different time scales, even under no-stationary conditions. This inverse modeling scheme has three different identification methods, the first one is related to Langevin equations system types, thus random components are described, additively, as noises while in the second method they are represented by the noises intensities instead of noise processes itself. As a result of this inverse modeling approach, hydrological processes can be described as a combination of deterministic kernels and random processes and the system phase space dimensionality can be objectively established. In this work, proposed approach was used to study hydrological variability, trends and extremes at different time resolution.