Geophysical Research Abstracts
Vol. 19, EGU2017-16932, 2017
EGU General Assembly 2017

Analysis of shifts in the spatial distribution of vegetation due to climate change

Manuel del Jesus (1), Javier Díez-Sierra (1), Andrea Rinaldo (2), and Ignacio Rodríguez-Iturbe (3)

(1) Universidad de Cantabria, Environmental Hydraulics Institute, Spain (manuel.deljesus@unican.es), (2) Department of Civil, Environmental and Architectural Engineering, University of Padova, Padua, Italy. Laboratory of Ecohydrology ECHO/IIE/ENAC, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland., (3) Zachry Department of Civil Engineering. Texas A&M University. College Station, Texas (USA).

Climate change will modify the statistical regime of most climatological variables, inducing changes on average values and in the natural variability of environmental variables. These environmental variables may be used to explain the spatial distribution of functional types of vegetation in arid and semiarid watersheds through the use of plant optimization theories. Therefore, plant optimization theories may be used to approximate the response of the spatial distribution of vegetation to a changing climate. Predicting changes in these spatial distributions is important to understand how climate change may affect vegetated ecosystems, but it is also important for hydrological engineering applications where climate change effects on water availability are assessed.
In this work, Maximum Entropy Production (MEP) is used as the plant optimization theory that describes the spatial distribution of functional types of vegetation. Current climatological conditions are obtained from direct observations from meteorological stations. Climate change effects are evaluated for different temporal horizons and different climate change scenarios using numerical model outputs from the CMIP5. Rainfall estimates are downscaled by means of a stochastic point process used to model rainfall. The study is carried out for the Rio Salado watershed, located within the Sevilleta LTER site, in New Mexico (USA).
Results show the expected changes in the spatial distribution of vegetation and allow to evaluate the expected variability of the changes. The updated spatial distributions allow to evaluate the vegetated ecosystem health and its updated resilience. These results can then be used to inform the hydrological modeling part of climate change assessments analyzing water availability in arid and semiarid watersheds.