Geophysical Research Abstracts
Vol. 20, EGU2018-15979-3, 2018
EGU General Assembly 2018

A stochastic investigation of the intermittent behaviour of wind; application to renewable energy resources management

Akis Gkolemis, Panayiotis Dimitriadis, Georgios Karakatsanis, Theano Iliopoulou, and Demetris Koutsoyiannis
Department of Water Resources and Environmental Engineering, National Technical University of Athens, Greece

A challenging characteristic of renewable energy systems is intermittence of the related natural processes (such as wind), whose management imposes an additional cost. This also implies the need to immediate back up the extra supply (introduced by the resource's physical bursts) to other units (e.g. in a hybrid pumped storage hydropower system). The complexity of this issue does not just rely on the need for optimizing the hybrid system but rather on the requirement for simulating these bursts. In this study, we introduce and test an innovative model for the wind process by simultaneously preserving not only the marginal distribution (including extreme events), correlation structure (from small to large scales) and internal double (diurnal and seasonal) periodicities but also its intermittent behaviour. Furthermore, we present a pilot application including a pumped storage hydropower system and we show how the additional cost imposed by the intermittent behaviour of wind can be estimated.
Acknowledgement: This research is conducted within the frame of the course "Stochastic Methods" at the School of Civil Engineering of the National Technical University of Athens (NTUA), Greece. The students, PhD candidates, Fellow Researchers, Post-Doc Researchers and Professors are struggling to deliver research results without any financial support.