Geophysical Research Abstracts
Vol. 18, EGU2016-64, 2016
EGU General Assembly 2016

How far can we go in hydrological modelling without any knowledge of runoff formation processes?

Georgy Ayzel
Institute of Water Problems, Moscow, Russian Federation (hydrogo@yandex.ru)

Hydrological modelling is a challenging scientific issue for the last 50 years and tend to be it further because of the highest level of runoff formation processes complexity at the different spatio-temporal scales. Enormous number of modelling-related papers have submitted to the top-ranked journals every year, but in this publication speed race authors have pay increasing attention to the models and data they use by itself rather than underlying watershed processes. Great community effort of the free and open-source models sharing with high availability of hydrometeorological data sources led to conceptual shifting paradigm of hydrological science to the technical-oriented direction. In the third-world countries this shifting is more clear by the reason of field studies absence and obligatory requirement of practical significance of the research supported by the government funds. As a result we get a state of hydrological modelling discipline closer to the aim of high Nash-Sutcliffe efficiency (NSE) achievement rather than watershed processes understanding. Both lumped physically-based land-surface model SWAP (Soil Water - Atmosphere - Plants) and SCE-UA (Shuffled Complex Evolution method developed at The University of Arizona) technique for robust model parameters search were used for the runoff modelling of 323 MOPEX watersheds. No one special data analysis and expert knowledge-based decisions were not performed. Median value of NSE is 0.652 and 90% of watersheds have efficiency bigger than 0.5. Thus without any information of particular features of each watershed satisfactory modelling results were obtained. To prove our conclusions we build cutting-edge conceptual rainfall-runoff model based on decision trees and adaptive boosting machine learning algorithms for the one small watershed in USA. No one special data analysis or feature engineering was not performed too. Obtained results demonstrate great model prediction power both for learning and testing periods (NSE > 0.95). The way we obtain our results is clear and direct: we used both open-source physically based and conceptual models coupled with open access data. However these results does not make a significant contribution to the hydrological cycle processes understanding. And not the hydrological modelling itself but the reason why and for what we do it is the most challenging issue for the future research.