Geophysical Research Abstracts
Vol. 20, EGU2018-13222-1, 2018
EGU General Assembly 2018

What do they have in common? Hydrologic drivers of streamflow correlation and spatial patterns of flow regimes

Gianluca Botter (1), Mario Schirmer (2,3), Andrea Betterle (1,2,3)

(1) University of Padua, Padova, Italy, (2) University of Neuchâtel, Neuchâtel, Switzerland, (3) EAWAG, Zurich, Switzerland

A proper characterization of streamflow patterns in space and time represents a significant scientific challenge with a wide range of implications for human water uses and ecosystem services conservation. Despite this, relatively few rivers are adequately monitored and improving the density of existing gauging networks is often challenged by technical and economical limitations. Therefore, in most practical settings, observational data about spatial and temporal patterns of flow regimes may be inadequate. Following a stochastic framework, this work aims to provide a physically based analytical characterization of the spatial correlation between daily streamflows timeseries at the outlet of two arbitrary catchments. In particular, the streamflow spatial correlation is expressed as a function of the main geomorphoclimatic properties of the contributing catchments, in a framework that also accounts for the nested/non nested nature of watersheds. The spatial correlation of daily streamflows represents an effective and synthetic index that quantitatively encapsulates the similarity between the hydrographs at two arbitrary outlets. Predicted streamflow correlations can be used to identify locations that are highly and/or poorly correlated with existing gauging stations, with implications for the identification of sites that are best suited for the installation of new gauging stations and regionalization techniques. In fact, we show that highly correlated outlets share analogous streamflow statistics, and discuss how predicted streamflow correlations can be used to pair river sites with similar flow regimes in sparsely gauged areas.