Yves Tramblay, Agnieszka Rutkowska, Eric Sauquet, Catherine Sefton, Gregor Laaha, Marzena Osuch, Teresa Albuquerque, Maria Helena Alves, Kazimierz Banasik, Aurelien Beaufort, Luca Brocca, Stefania Camici, Zoltán Csabai, Hamouda Dakhlaoui, Anna Maria DeGirolamo, Gerald Dörflinger, Francesc Gallart, Tobias Gauster, Lahoucine Hanich, Silvia Kohnová, Luis Mediero, Ninov Plamen, Simon Parry, Pere Quintana-Seguí, Ourania Tzoraki & Thibault Datry (2021) Trends in flow intermittence for European rivers, Hydrological Sciences Journal, 66:1, 37-49, DOI: 10.1080/02626667.2020.1849708

Abstract:

Intermittent rivers are prevalent in many countries across Europe, but little is known about the temporal evolution of intermittence and its relationship with climate variability. Trend analysis of the annual and seasonal number of zero-flow days, the maximum duration of dry spells and the mean date of the zero-flow events is performed on a database of 452 rivers with varying degrees of intermittence between 1970 and 2010. The relationships between flow intermittence and climate are investigated using the standardized precipitation evapotranspiration index (SPEI) and climate indices describing large-scale atmospheric circulation. The results indicate a strong spatial variability of the seasonal patterns of intermittence and the annual and seasonal number of zero-flow days, highlighting the controls exerted by local catchment properties. Most of the detected trends indicate an increasing number of zero-flow days, which also tend to occur earlier in the year, particularly in southern Europe. The SPEI is found to be strongly related to the annual and seasonal zero-flow day occurrence in more than half of the stations for different accumulation times between 12 and 24 months. Conversely, there is a weaker dependence of river intermittence with large-scale circulation indices. Overall, these results suggest increased water stress in intermittent rivers that may affect their biota and biochemistry and also reduce available water resources.