



## **Will Europe See More Frequent and Severe River Flow Droughts in the Future?**

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For the coming decades climate change is projected not only to result in higher temperatures, hence higher evaporative demands, but also to induce changes in the seasonality of precipitation patterns, with wetter winters and dryer summers, as well as to increase the frequency and intensity of extreme climatic events. The combination of these patterns of change will likely result in more frequent, severe and persistent droughts in large parts of Europe, especially in the south.

This study presents a pan-European assessment of the possible impacts of climate change on low flows in Europe by comparison of river flow drought characteristics for current and future climate. We employ high resolution (12 km spatial resolution) regional climate data from the HIRHAM model for the control period and the future period based on the SRES A2 greenhouse gas emission scenario to force a hydrological model. Low flow characteristics for current and future climate are derived from the simulated river flow series using extreme value analysis. More specifically, we employ the methods of block maxima and partial duration series to select minimum flows and maximum flow deficits and fit extreme value distributions by the maximum likelihood method.

Regions most prone to an increase in river flow drought are southern and south-eastern Europe, but minimum flows will also decrease significantly in many other parts of Europe, especially in summer. In snow dominated regions winter droughts are projected to be less severe because a lower fraction of precipitation will fall as snow in warmer winters.