

Interactive comment on “Streamflow trends in Europe: evidence from a dataset of near-natural catchments” by K. Stahl et al.

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This is a fundamentally sound and straightforward analysis of annual, monthly, and low streamflow trends in Europe. The work represents a significant addition to the existing literature on streamflow trends, which the authors thoroughly review. Its value over previous studies derives from the use of an expanded, high-quality dataset having broad geographical coverage across Europe. The paper is well organized and written, and the authors have clearly paid considerable attention to the strengths and weaknesses of previous trend studies. Overall, the paper provides a solid benchmark assessment and context against which both past and future European streamflow trend analyses can be evaluated.

The choice by the authors to report trend direction and magnitude, and not statistical significance, is welcome recognition that significance testing for hydro-climatic trends is meaningless in the absence of a valid null hypothesis. Thus, they avoid the inveterate problem of ascribing more meaning and certainty to their results than sound statistical reasoning merits. I realize that there continue to be many adherents to the practice of significance testing but, unless the underlying physical process is well understood, one cannot know what the appropriate null hypothesis should be. Given that long time series of discharge generally do not look like white noise, significance testing based on a white noise assumption (i.e., no change) is especially problematic. The authors are to be commended for recognizing this.

A particular strength of this paper is the use of multiple time periods for evaluating the temporal evolution of streamflow changes across Europe. This is a reasonable approach to understanding the extent to which trends are associated with specific time periods. However, given that all four of the time periods analyzed end in 2004, the results are still influenced by the prevailing character of precipitation at the end of the observational record. There really is no way to avoid this problem completely, but one approach that has been used is to vary the beginning date and ending date of the trend analysis. That is, to perform sequential trend tests on all possible periods (e.g., of at least 10 years in length) during one of the prescribed time frames used by the authors (like 1952-2004). The number of sites with increasing or decreasing trends for each 10-year time period would be counted and the counts would then be plotted against the beginning and ending years of each period analyzed. An example of this approach is given in McCabe and Wolock, GRL, 2002. Although I am not recommending the authors do this as a condition of publication, I am suggesting that they would achieve a more thorough understanding of exactly how streamflow increases and decreases evolved in recent decades across Europe by doing so. It would also facilitate the identification of step changes versus more gradual trends that is important for assessing the role of various climate forcings.

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