Natural Hazards
and Earth System
Sciences

Discussions

Interactive comment on "Non-stationarity in annual and seasonal series of peak flow and precipitation in the UK" by I. Prosdocimi et al.

Anonymous Referee #2

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General comments

The paper provides an assessment of trends in annual and seasonal maxima in peak river flow and catchment average daily rainfall across the UK, which is important when assessing flood risk for the design or maintenance of hydraulic structures. Importantly, the paper continues by considering the implications of the trends identified regarding current design standards for the 2085 horizon.

The subject of the paper is very topical, well organized, easy to read and includes good up –to-date references of the latest key research.

Specific comments

Page 2, Line 20: It is stated 'understanding the relationship between magnitude and frequency of hydrological extremes is of vital importance.' This is true, but this paper (along with many others) only assesses change in the magnitude of annual maxima series, and as a result could fail to detect changes in the frequency of large flood events which would be characterized by a POT series (but not the AMS). As such, the approach used is unable to provide a complete assessment of changes in relationship between the magnitude and frequency of hydrological extremes.

Page 4, Lines 22-23: The high variation in the test results may be partly explained by the analysis not being restricted to catchments with a natural flow regime. Since current design standards only include an allowance for climate change, is it possible to separate the results for catchments with a near-natural flow regime to see what trends are identified in these catchments, and whether the design standards can be considered suitable for this sub-set?

Page 6, Line 1: Please could you provide a couple of examples of why missing data are present in some of the records.

Page 6, Lines 1- 2: For each station, data for a year were considered missing if records were missing for more than three months in a water year. Three months of a year is a significant period, and could mean the peak flow is missed, particularly as data could have been lost to due to gauging equipment being wiped out during a flood.

Page 6, Lines 11-13: Are the differing spatial locations of stations of the stations available for each decade in Fig.2 likely to have a notable impact on the results presented?

Page 6, Lines 17-18: It is unclear what should be compared with the time series W-SEPA in Fig.1

Page 7, Lines 20: Can you suggest an explanation for the rainfall medians being quite variable from decade to decade, with varying patterns for different seasons?

Page 7, Line 26: The 99th percentile of catchment average daily rainfall is used as an

indication of 'storminess'. Storminess is more typically characterized by low pressure and strong winds, and often, but not always precipitation. Storminess is therefore a poor choice of term here and should be replaced.

Page 15, Line 10: Could the resolution of the data partly explain why the river flow and rainfall data gave different results? Maybe the analysis of sub-daily rainfall data could be expected to generate more similar spatial patterns to the river flow data.

Page 15, Line 13: It is stated that the annual process is a combination between the different seasonal processes, but what are the different seasonal processes? Does dividing the data based on dates of the year work sufficiently to separate out the different flood processes, or is there still a mixing of processes?

Page 16, Lines 14-16: It is stated 'it can also be seen as a test on whether the current precautionary levels are safe enough'. However, the test can only consider current observed levels of change. It is unable to consider whether the 20% safety margin is sufficient should the rate of change increase in a changing climate. Without the use of future projections, it is not possible to comment here on whether the 'levels are safe enough', only whether the 20% safety margin is sufficient to accommodate flood levels in 2085 given the current rate of change.

Page 17, Line 18: It is suggested that the sample size can only be increased by waiting more years. However, there are alternative options that could be considered such as the use of historical data or regionalization.

Page 22, Line 26: It is recognized by the authors that some short-term and long-term autocorrelation is likely to be observed in the hydrometric series, and would have an impact on the variability of the test statistic and therefore the power levels. As such, assessing the autocorrelation in the series is an important step which should have been undertaken prior to trend analysis.

Technical corrections

Page 2, line 7: Correct '2-parameters' to '2-parameter' Page 6, Line 16: 'rainfall' instead of 'rainfalls' Page 7, line 11; 'drier' instead of 'dryer' Page 24, Line 10: Correct 'small proportion stations one' to 'small proportion of stations can one' Page 24, Line 11: Correct 'can be rejected' to 'be rejected' Fig 1. Start axis in 1930 instead or 1940.

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