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Biogeosciences Discussions

Interactive comment on "Importance of long-term monitoring for detecting environmental change: lessons from a lowland river in south east England" *by* T. P. Burt et al.

Anonymous Referee #2

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General comments

This is a short, interesting and illuminating paper. The paper effectively subsamples a rare and long (almost 70 years) water quality time series (nitrate concentrations in the River Stour, SE England), to explore the effects of period start and finish times ('moving windows') on trend detection. The results and conclusions are very instructive, clearly explained and will be very useful not only to Biogeosciences readers and water quality workers, but to many researchers and managers working on environmental time series, including river flow analyses. Addressing the following points would further improve the MS in my view.

Some issues to address

1. Dataset

A few more details of the nitrate dataset used are needed, or at least cited references to where this information can be found, e.g. sampling and lab/field analytical information; accuracy and precision of data; homogeneity of the record; appropriate confidence we can place in the data; how all these may have changed through time; and any likely effects of relaxed monthly sampling post-2001. For an international audience, more location details should be given for the catchment and station in SE England. (There are also a number of rivers with the name Stour in England, including two in the east). The latitude and longitude (as well as the National Grid Reference given), plus county/nearest town, should be declared to allow easy Google-Map searches by the international community. A catchment and land use map would also be useful.

2. Correlation techniques

The actual correlation method and software employed needs to be declared (e.g. Pearson - parametric?). Could the authors comment on their selection rational here? This is important, not least because in many recent hydrological time series analyses, such as for river flows (e.g. Dixon et al., 2006a; 2006b; Kundzewicz and Robson, 2004; Kundzewicz and Radziejewski, 2006; Lins and Slack, 1999), non-parametric techniques for trend definition can be favoured because they may be less influenced by serial correlation in the dataset, make no assumptions about data distributions, and are usually more robust in the presence of outliers. Dixon et al (2006b) also showed the key importance of window length in trend detection when using non-parametric Mann-Kendall tests. It would be useful to know - even for a few sample analyses - if the results would change appreciably if non-parametric techniques were used. In addition, if analyses were repeated for calendar years, would the results differ?

3. Analyses

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River discharge is omitted from the explanatory analyses, which are based on precipitation only. Could some comment be made here to clarify the rationale for this?

A wider issue for environmental scientists and managers: maintenance of environmental monitoring networks

It is unfortunate that the Environment Agency has apparently cut its sampling from weekly to monthly for this station since 2001. There have also been several recent closures across the UK in the network of automatic water quality monitoring stations. This also raises the wider international question of how, in this era of widespread urban and climate change, environmental scientists and managers can best construct and present persuasive arguments to enhance, or at least maintain, environmental monitoring networks in the face of budget pressures on the relevant agencies. Such argument would include the need to: robustly document longer-term environmental change impacts; fully define system dynamics and processes; validate and improve models; and inform management options and quantify the success of policy initiatives. This paper, in its conclusive demonstration that long-term records are essential, reinforces the latter point with some hard evidence.

References

Dixon, H. Lawler, D.M. and Shamseldin, A.Y. 2006a. Streamflow trends in western Britain, Geophysical Research Letters, 33, L19406, doi:10.1029/2006GL027325, 1-7

Dixon, H., Lawler, D.M., Shamseldin, A. Y and Webster, P. 2006b. The effect of record length on the analysis of river flow trends in Wales and Central England. In: Demuth, S. et al. (Eds), Climate Variability and Change - Hydrological Impacts, Proceedings of the Fifth FRIEND World Conference held at Havana, Cuba, November 2006, International Association of Hydrological Sciences Publ. 308, 490-495.

Kundzewicz, Z. W., and Robson, A. J. 2004. Change detection in hydrological records - a review of the methodology, Hydrol. Sci. J., 49(1), 7-19.

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Kundzewicz, Z.W. and Radziejewski, M. 2006. Methodologies for trend detection, In: Climate Variability and Change - Hydrological Impacts, Proceedings of the Fifth FRIEND World Conference held at Havana, Cuba, November 2006. IAHS Publ. 308, pp. 538-549.

Lins, H. F. and Slack, J. R. 1999. Streamflow Trends in the United States, Geophys. Res. Lett., 26(2), 227-230.

Specific questions

1) Does the paper address relevant scientific questions within the scope of BG? YES

2) Does the paper present novel concepts, ideas, tools, or data? YES

3) Are substantial conclusions reached? YES

4) Are the scientific methods and assumptions valid and clearly outlined? - YES, but see above

5) Are the results sufficient to support the interpretations and conclusions? YES

6) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? - Reasonable, but key details are needed: see above

7) Do the authors give proper credit to related work and clearly indicate their own new/original contribution? YES

8) Does the title clearly reflect the contents of the paper? YES

9) Does the abstract provide a concise and complete summary? YES

10) Is the overall presentation well structured and clear? YES

11) Is the language fluent and precise? YES

12) Are mathematical formulae, symbols, abbreviations, and units correctly defined and

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used? YES

13) Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? - It is clearly written generally, though some clarification is needed in the areas indicated above

14) Are the number and quality of references appropriate? YES

15) Is the amount and quality of supplementary material appropriate? NA

Interactive comment on Biogeosciences Discuss., 5, 2369, 2008.