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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Applications of time series analysis in geosciences: an overview of methods and sample applications" *by* W. Gossel and R. Laehne

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Comments on the Paper (hess-2013-398) entitled, "Applications of time series analysis in geosciences: an overview of methods and sample applications".

General Comments: This manuscript presents a study that utilized four geoscientific datasets for comparing time series analysis methods. Title of the manuscript includes 'time series analysis' but only trend and periodicity of the time series are discussed; homogeneity, normality and stochastic component are not talked in the manuscript, which are other important aspects of time series analysis. Manuscript fits well within the scope of the journal but it does not represent any novelty, ideas, tool or data. Abstract does not reflect actual work of the manuscript. Methodology for the employed

time series methods should be briefly discussed, which is presently missing. The employed parametric methods are classic in nature such as linear regression for trend analysis; instead more powerful and widely-used non-parametric methods such as Mann-Kendall test should be used for trend detection. Furthermore, more than two methods should be used for detecting any time series characteristics. Discussion of the results is not proper. Conclusions are not really the conclusion drawn from the findings of the study but they simply indicate general features and/or advantages and limitations of different methods. Most of the cited references dealing with time series analysis are either very old or not authentic. Overall, the work is not up to the mark as required by a paper to be published in an international journal. I recommend REJECTION of the manuscript.

Specific Comments: Title of the manuscript says application of time series analysis in 'geosciences', but it is observed that application data include climate parameters/variables also.

Abstract of the manuscript generally include brief information on objectives, study area, methodology, findings and conclusions, which are entirely missing in the abstract.

Introduction section needs to provide justification to carryout the study.

Time series methods also identify normality, homogeneity and stochastic component of the times series.

Periodicity identification for equi-distant and non-equidistant data by 2 and 3 methods, respectively provide strength to the study but samples size should be large enough. Areal extent of the application area should be enlarged by employing more number of sites in analysis.

Traditional and recent books on time series analysis, e.g. Shahin et al. (1993) and Machiwal and Jha (2012) may be consulted for additional methods and information. Shahin, M., Van Oorschot, H.J.L. and De Lange, S.J. (1993) Statistical Analysis in

Water Resources Engineering. A.A. Balkema, Rotterdam, The Netherlands. Machiwal, D. and Jha, M.K. (2012). Hydrologic Time Series Analysis: Theory and Practice. Springer, Germany and Capital Publishing Company, New Delhi, India, 303 p.

Recent studies on trend analysis, e.g. Panda et al. (2007), Shamsuddhua et al. (2009) and Machiwal and Jha (2014) may also be cited. Panda, D.K., Mishra, A., Jena, S.K., James, B.K. and Kumar, A. (2007). The influence of drought and anthropogenic effects on groundwater levels in Orissa, India. Journal of Hydrology, 343: 140-153. Shamsudduha M, Chandler RE, Taylor RG, Ahmed KM. 2009. Recent trends in groundwater levels in a highly seasonal hydrological system: the Ganges–Brahmaputra–Meghna Delta. Hydrology and Earth System Sciences Discussions 6: 4125–4154. Machiwal, D. and Jha, M.K. (2013). Characterizing rainfall-groundwater dynamics in a hard-rock aquifer system using time series, geographic information system and geostatistical modelling. Hydrological Processes, 28: 2824-2843.

2nd last para of Introduction should be part of Section 3, where data description is needed to be mentioned.

References for all the formulae are required.

Last para of Introduction, line 1: which procedure:

Numbers should be provided to all the equations in order of their appearance.

Check symbol representing ‘sigma in equation 6, which is not appearing full.

Sample size for all analyses should be clearly mentioned.

General information for all methods requires authentic citations.

Which software was used for Wavelets and other analyses?

Section 3, Applications: Climate data are not geoscientific data?

How many no. of sites for the applied data?

Discussion is not adequate. It should be based on inferences made from finding of the study.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 12793, 2013.