

Interactive comment on “Recent trends in groundwater levels in a highly seasonal hydrological system: the Ganges-Brahmaputra-Meghna Delta” by M. Shamsudduha et al.

Anonymous Referee #2

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This paper dealt with an interesting phenomenon of the changing pattern of groundwater levels with high seasonality. It is useful as, with limited information, trend analysis provides potential insights on groundwater levels. The key method used is STL. However, the presentation is not clear and the literature review is not fully up to date, especially the statistical methods. There following comments should be fully addressed before publication. (1) Page 4127 L19-21. The claim on disadvantage is bias. It is only partly true. For example, all the parametric model characterize the trend rather than just

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identify then trend. (2) The review is not fully up to date. There are some methodical development. For example, Shao and Campbell (2002: "Modeling trends in groundwater levels". Australian & New Zealand Journal of Statistics, 44, 129-141) provided a model with seasonality and different types of change points. Genton and Hall (2007: "Statistical inference for evolving periodic functions". Journal of Royal Statistical Society Series B, 69(4): 643-657) discuss some issues and solutions in nonparametric setting with periodic function. (3) The setting in model (1) can only decompose a periodic function with fixed amplitude. However, the results in the paper (see Fig. 6) have varying amplitudes (Panel b). Is it based on multiplicative model? (4) It is not clear that how the linear trend (Fig. 5) for different percentiles (5% median and 95%) were calculated. Is it by least squares method? If yes, it is problematic; see statistical quantile regression (e.g. Koenker, R.W., 2005. Quantile Regression. Cambridge University Press). (5) It is not clear why the paper does try to explore the relationships between rainfall and groundwater levels. I believe that it should be relatively easy to obtain rainfall data. Ferdowsian, Pannell, McCarron, Ryder and Crossing (2001: "Explaining groundwater hydrographs: separating atypical rainfall events from time trends". Australian Journal of Soil Research 39, 861-875) provided a simple model which might useful for this purpose.

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