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Hydrology and Earth System Sciences Discussions

Interactive comment on "Extreme precipitation and extreme streamflow in the Dongjiang River Basin in southern China" *by* W. Wang et al.

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The paper presents results from a trend analysis study of different precipitation and streamflow indices from a river basin in southern China. The analysis includes application of the Mann-Kendall test for testing trends in annual extreme precipitation and streamflow series. In addition, 3 different tests are applied to test for trends in monthly precipitation data before and after 1979. The robustness and power of the 3 tests are analysed using Monte Carlo simulations.

As also demonstrated by the comprehensive literature review included in the paper, numerous trend analyses for detecting evidence of climate changes in hydro-meteorological records from different parts of the world have been reported. As such,

the paper provides similar analysis for a particular region. However, as compared to many papers that address the issue of trend detection, the present paper provides a more comprehensive analysis by including 4 different trend tests, some of which are not usually applied in trend analysis of hydro-meteorological records. In addition, the paper includes an evaluation of the robustness and power of the tests, which is extremely important for a judgement of the outcome of the trend tests. Although the evaluation of robustness and power of the tests confirm previous results for non-parametric tests, it is important to document these results in the context of trend analysis.

Thus, the paper provides some new insight into the use of statistical tests for detecting trends in hydro-meteorological records, which justifies publication in HESS. However, several issues need to be addressed before publication (to also meet the comments raised by the referee):

1. The paper includes a comprehensive state-of-the-art review of different trend analyses. However, no critical evaluation of the results is included. For instance, are statically rigorous and consistent methods being used in the analyses for assessing the significance of detected trends? Since the use of different trend tests and their robustness and power are essential issues discussed in the paper, it would strengthen the paper to put it into perspective with previous work in the area. In this regard, the main contributions of the paper as compared to previous studies should be emphasised.

2. The presentation of the different tests in Section 3 is a bit confusing in relation to which data they are applied to in the analysis, i.e. the MK test is applied to annual series of extreme indices, whereas the KS, L and Q tests are applied to the distribution of daily precipitation amounts. In fact, the KS, L and Q tests could be applied also to the distributions of extreme indices. In this case the KS test would consider only the extreme tails of the distribution of the daily precipitation amounts similar to the L and Q tests applied in the paper.

3. The authors state that the KS, L and Q tests are not commonly applied in hydrology.

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The KS test has been used in hydrology, whereas the L and Q tests are not that widely applied.

4. The Monte Carlo analysis of the robustness and power of the KS, L and Q tests is based on a gamma distributed parent. How sensitive are the results to the choice of distribution?

5. The review and argumentation for the use of the KS, L and Q tests on page 2337, line 26 – page 2338, line 11 is out of place. This should be included in the Introduction or in Section 3 describing the test statistics rather than in the results section.

6. On page 2334, line 21 nine indices are referred to. However, only 8 indices are given in Table 2.

7. The first section in Discussions and conclusions is unclear and should be revised.

8. Include explanation of markers for precipitation and streamflow stations in Fig. 1.

9. Some linguistic flaws need to be corrected.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 2323, 2007.