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Hydrology and Earth System Sciences Discussions

Interactive comment on "Flood trends and variability in the Mekong river" *by* J. M. Delgado et al.

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We thank the anonymous referee for her/his valuable comments and suggestions.

Reply to major comments:

#1

We followed your suggestion of "repeat[ing] the MC with constant scale parameter as a function of the time-dependence of the location parameter ", in order to find out whether the probability of false positives was not above the nominal significance level, which was also mentioned by anonymous referee #3, on her/his second major comment.

The same Monte Carlo experience was performed for testing for false positives. The synthetic data was generated with constant scale parameter, while the location parameter was made vary from a constant value to a linear time variable with slope double the one found significant for Pakse. The probability of a false positive slightly oscillated around 0.06, below the nominal significant value, which supports the results obtained by the NSGEV on section 4.3.

Additionally, in conformity with anonymous referee #2's suggestion, we improved the methodology of parameter estimation by adding parameters on a forward selection. Instead of adding the two linear parameters at one step and checking the significance of the model, we now only added a second linear parameter if the first was statistically significant. Then, the significance of the second parameter was estimated with regard to the previous model (chi-square with one degree of freedom) and to the stationary GEV model (chi-square with two degrees of freedom). If both tests are passed, we accept location and scale parameters as time variable, otherwise only the most statistically significant or none of the two parameters is considered.

#2

We agree with you on the wavelet diagrams being discussed too summarily. We shall describe them better on the revised paper. The variance and wavelet plots will be updated with significant levels, together with a discussion of the results newly obtained.

#3

Some of the factors you mention were aproached by Hadeland 2006 (J. Hydrol. 210-223) and Lu 2006 (HESS 181-195). Regarding water use, Hadeland 2006 modeled the irrigation demand for river Mekong and, as far as model results are to be trusted, the impact of irrigation on the monthly average discharge "is relatively little" and only evident on the dry season.

Regarding changes caused by dam building, Lu 2006 argues that their effect was lim-

ited to the upper reaches of the Mekong. Furthermore, the first of the chinese dams was commissioned in 1993, while the reported enhancement in variance starts earlier, in the early eighties. This is enough to dismiss dams as the cause for different behavior of the flood variability during the last 20 years of the 20th century in Vientiane and downstream stations, although their impact is not fully understood.

Regarding land use and land use change, it is difficult, if not impossible at present, to evaluate its effect on the Mekong floods, due to the lack of long term data on land use. Furthermore, Bruijnzeel 2004 (Agriculture, Ecosystems and Environment, 185-228) argues that the “effects of land use change on the magnitude of flood peaks in large rivers are difficult to evaluate because such changes are rarely fast and consistent (except perhaps where population pressure is very high) and often compounded by climatic variability ”. This is certainly not enough to dismiss further investigation on the possible contribution of LULUC to flood peaks.

These three points will be included in the discussion of the results.

Reply to minor comments:

We thank you for the minor comments given. They will be very useful for improving the revised paper.

3. The data is not publicly available. This will be mentioned on the revised paper.

6. The hypothesis is presented by Anderson 2002 (Science Vol. 297, n. 5581, 596-599)

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 6691, 2009.