Hydrol. Earth Syst. Sci. Discuss., 10, C6926–C6929, 2013
www.hydrol-earth-syst-sci-discuss.net/10/C6926/2013/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Geostatistical prediction of flow-duration curves" *by* A. Pugliese et al.

Anonymous Referee #2

Received and published: 27 December 2013

General comments The paper presents a novel method for prediction of flow-duration curves in ungauged basins, which is of interest to the readers of HESS and which would make a valuable contribution to the literature. However, before publication the quality of the paper should be improved by addressing a number of methodological and technical issues, including a better discussion of the limitations and assumptions in the method as well as the language and structure of the paper. Many of the issues were brought up by the first reviewer and since these are already mentioned I will focus this review on other aspects of the paper.

The data from several of the gauging stations are not independent since they are coming from stations that are located upstream/downstream on the same river. This would likely make it easier to predict streamflow at a new location when part of the catchment is in fact gauged and these data are used in the prediction (especially when

the method is based on spatial proximity), and this might therefore limit the predictive power in completely ungauged catchments. How similar are the upstream/downstream FDCs? How does the fact that upstream/downstream stations are included affect the evaluation of the method? Please also discuss how this relates to the assumptions implicit in the different regionalisation methods that are used: the top-kriging as well as the regression-based methods.

Specific comments

Abstract. There is a lot of information about the method in the abstract but very little information about the results (only one sentence), more information about the findings of the study should be given.

Page 13058, line 4. The aim, part (iii) could be better formulated to rather be about "to evaluate" the method in comparison to other regionalisation methods instead of "to use".

Since data from some of the basins in the study region are used in Fig 1 it would make more sense to describe the study region and data as the second section after the introduction, otherwise it is not clear what the basin numbers in Fig 1 refer to.

The main assumptions behind the Top-kriging method should be highlighted better in section 2.1, and later discussed in relation to the results and how well they were satisfied for this case study. Isotropy is mentioned on page 13065, line 11, as an "hypothesis", but this is rather an assumption here. How well is this (and other assumptions) satisfied in the study region? As the first reviewer also pointed out, the sample and fitted variograms should also be reported.

Page 13066, line 14. "Rather dense raingauge network" specify this in terms of numbers of gauges per km2

Page 13068, Line 6-9. The cross-validation is described as "comprehensive", but ideally (if there are more catchments than in this case) one would set aside a whole set

of catchments in a separate validation set, which would then constitute a stronger test than a cross-validation. Also, what does “As anticipated” refer to here?

Page 13068, line 10-20. It is not clear if the gauging station for the ungauged station is removed before the estimation of the variograms. If not, why is this not done? If it is included then some of the information from the ungauged basin is used in the method and it is not truly a prediction for an ungauged basin. Please clarify this.

Page 13068, line 16. The choice of n=6 neighbouring stations needs to be better motivated. This could be done by presenting a figure of cross-validation results plotted against the number of surrounding stations used.

Page 13068, Line 23 to Page 13069, Line 4. This information is quite general and vague, and the steps i-iv in cross-validation methods are probably obvious to most readers, so this could be excluded.

Page 13074, Line 10 “More accurate predictions for 10 out of 18 catchments”, this is still just about half of the cases and does not distinctly “confirm good performance”. Please write this in a more nuanced way.

Page 13075, Line 11-12 and Page 13078, Line 14-16. It is highlighted as an advantage that the method only relies on spatial proximity, however this may also be an important limitation of the method in other regions where e.g. geology have a larger impact on streamflow such that the hydrological behaviour of nearby catchments may be quite different. In the study, there was also poorer performance for the 3701 catchment that had a different behaviour. This limitation and the general applicability of the method in other areas should be better discussed.

The Conclusions section is too long, it is about as long as the discussion section. In its present form it is written as an extended abstract describing the whole study. It would be better to just shortly (e.g. with a few bullet points) describe the main findings/conclusions that can be drawn from the paper, the rest of the information does not

need to be repeated here.

Table 1. This table should show the characteristics for each basin instead of the statistics for the whole dataset to make it possible to interpret the results for the different basins. It should also give the number of years with data for each catchment.

Technical comments Table 1. Too many significant digits are given for MAP.

Figure 1. should be “thick line” instead of “tick line”

Figure 3. Show maps of MAP and MAF as well.

Figure 6 and Figure 8. No units are given on the axes.

Page 13058, line 8. The abbreviation MAP for Mean Annual Precipitation should be introduced here and used consistently for the remainder of the paper.

The English language needs to be checked throughout the paper since the text is full of minor grammatical errors (e.g. using “then” instead of “than” in many places, “reminder” instead of “remainder” on p 13067, line 11, “routinely” should be “repeatedly” on p 13060, line 2, etc). I also recommend avoiding the use of emphasis words such as “very”, “excellent”, “extremely”, “scrupulously”, “superior”, etc. Grammatically it would be more consistent to also write the steps 1-6 in the cross-validation on Page 13068 in the past tense instead of present. The paper could also benefit from a revision of the text to reduce repetition, e.g. Page 13074, Line 2-5 is repeated information and could be excluded.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 13053, 2013.