Hydrology and Earth System Sciences Discussions

Interactive comment on "A method for low flow estimation at ungauged sites, case study in Wallonia (Belgium)" *by* M. Grandry et al.

Anonymous Referee #1

Received and published: 6 December 2012

General Comments The aim of this paper is to provide a regional method to estimate low flows in gauged and ungauged catchments of a given region for a given return period. A low flow frequency analysis on AM7 has been carried out using different distributions (two-parameter Lognormal and Gamma) in 59 gauging stations. 25 different climatic and physical catchment variables have been then used to build regression models aimed to estimate the minimum 7-day average flow for different return periods. Authors claim that the novelty of this work lies on the ability of linking low flows to the return period. The paper is in general well written and potentially useful for water management in Belgium, thus deserves publication. Some parts are not easily readable, thus I would suggest an improving in the paper organization. Furthermore, a deeper physical interpretation of the regional equations could improve the paper value.

Specific Comments While the low frequency literature is well documented in the introduction, providing several up-to-date references, the importance of this topic is just hinted to the reader, with only few references. Please provide more discussion on that.

Par.2.5 Low flow regionalization: Authors stated that "Meteorological data (AP, SP, WP, ST), PET and Pe were simulated by the hydrological model EPICgrid (Sohier et al., 2009)". The only variable that could be estimated by a hydrological model is the percolation. The others are meteorological input and there is no way for a hydrological model to simulate them. More important, Authors calculate the recession coefficients using a method by Lang and Gille (2006). This paper is not available on ISI thus is hidden to any reader. I suggest to describe at least the key assumption of this method. Being this variable very important for regional analysis I guess it is worth to deepen this topic. It is based on streamflow measures? Or what?

Par 3.1 Frequency analysis. In order to simplify the model structure, it is possible to use just one distribution? I know that this could be an approximation for several places, but it will lead to a more elegant model structure. Par 3.3.1. It is very hard to read this section. I guess it is because the presence of 9 equations. I would suggest to use a parametric form for the equations and to report in a table the coefficient values. For instance, Eqs (4,5,6,7) may be written as $AM7\_TX = Area10^{(a+bLg+cSa+dWP+eRC)}$ Reporting in a table the values of a, b, c, d, e. Same for Eqs. 9, 10. 11,12; same for eqs 14-21.

I'd like to hear your point of view on why Lg Sa WP Pe and RC drive the values of AM7_TX. The discussion is focused on the statistical role of these variables, but almost nothing has been said on the physical role of each variable. This would give much strength to the discussion.

Authors themselves declare that Regional models give good results but do not improve all estimates of Global model. In my opinion regional models could be eliminated from the paper without reducing paper appeal.

Technical Corrections

Page 11589 L15. Provide a reference for this software. Table 1 seems to have a different format from Table 2. Figure 1,4,5: Ticks and labels are too small