Hydrol. Earth Syst. Sci. Discuss., 3, S898–S900, 2006
www.hydrol-earth-syst-sci-discuss.net/3/S898/2006/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Uncertainties in river basin data at various support scales – Example from Odense Pilot River Basin" *by* J. C. Refsgaard et al.

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Received and published: 11 September 2006

This paper presents the very important topic of data uncertainty assessment in a simple and systematic way. The effect of the spatial and temporal support change is considered - a problem which is unfortunately very often neglected in hydrology. Tables 1-4 summarizes the important aspects very well. The case study - Odense river is a good illustration of the methodology.

Critical remarks:

The problem of change of support is well known in the mining geostatistical literature. Unfortunately the authors did not discuss these methods. The extension variance given

by:

$$\sigma_E^2(v, V) = \mathrm{Var}(Z(v) - Z(V))$$

with Z being the variable under study, v and V being the respective supports, describes the uncertainty in the case of extending a small scale variable to a larger scale block. This can be calculated as:

$$\sigma_E^2(v, V) = 2\bar{\gamma}(v, V) - \bar{\gamma}(v, v) - \bar{\gamma}(V, V)$$

with γ being the variogram and

$$\bar{\gamma}(v, V) = \frac{1}{|v||V|} \int_{x \in v} \int_{y \in V} \gamma(x - y)\, dx\, dy$$

(For detailed description see (1).

This method only requires the knowledge of the variogram which can be derived from the correlation length and the variance of the variable. As the variograms are guessed in table 5 I do not see any reason for not using the above formulas instead of the somewhat obscure equivalent sample sizes. The calculations are very simple. I checked some of the results and recieved similar quantities. The above reference also includes information on the dispersion variance - which is a measure of subscale variability and could be useful for modelling purposes.

Some of the error assumptions are contradicting my experience. Discharge data have very high relative errors for low and high flows - exceeding the 10 % by far.

In general the errors are of mixed character a part of them being additive another proportional. For example for precipitation the evaporation losses are additive but wind losses proportional. The same applies to many other variables too. I missed discussions on this.

The normal assumption might be reasonable for many parameters but seldom for water quality. The P figures indicate a that a lognormal distribution could fit better. It would be no problem to extend the methodology to lognormal variables.

HESSD

3, S898–S900, 2006

In summary this is an interesting and important paper but the suggested methodology could be improved easily.

(1) Journel, A. and Huijbregts, C.: Mining Geostatistics, Academic Press, 1978.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 1943, 2006.