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Interactive Comment

Interactive comment on "Application of Weighted Semivariogram Model (WSVM) based on fitness to experimental semivariogram on estimation of rainfall amount" *by* S.-J. Wu et al.

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The paper proposes a weighted semivariogram to deal with the determination of the variogram parameters and aimed at improving the quality of estimation models. Although the paper relatively clear, I am concerning about the methodology they propose and the idea of combining basic variogram structures to "optimize" the fitting. 1. Improvement in results is simply consequence of adding flexibility to the minimization of the misfit, by adding several structures of different types. However, this approach lacks a reasonable interpretation of the resulting model. Furthermore, no nugget effect is considered. Ans: Generally speaking, the nugget effect represents variability at distances smaller than the typical sample spacing, such as the measurement error; thus, the nugget model accounts for the discontinuity at the origin attributed to small-scale variation. However, the sort of semivariograms provide continuous and smoothen estimation near the known position, whereas the estimation from semivariogram models with the nugget effect significantly differ from the known value even at short distances (Saveliev et al., 1998). Therefore, the proposed WSVM is based on TSVMs without the nugget effect in this study. The above description would be added in the section 2.1. âĂć Saveliev, A.A., Mucharamova, S.S., and Piliugin, G.A., 1998. Modeling of the daily rainfall values using surface under tension and Kriging. Journal of Geographic Information and Decision Analysis, 2(2), 52-64.

2. Cross validation as a method to optimize variogram parameters is quite sensitive to the search parameters considered. Results could change significantly with other search parameters. Ans: In this study, the cross validation is majorly used in the selection of the best-fit TSVM, and the associated parameters are calibrated by means of the sensitivity-parameter-based genetic algorithm developed by Wu et al., (2011), using the observed rainfall amount of rainstorm event in which the number is specified by the cross validation. Surely, the uncertainty in the optimal parameters should be caused by the number of rainstorms used in the parameter calibration. Therefore, this uncertainty may be reduced using the other optimization method, which is another future work. âĂć Wu. S.J., Lien, H.C., and Chang, C.H., 2011. Calibration of Conceptual Rainfall-Runoff Model using Genetic Algorithm Integrated with Runoff Estimation Sensitivity to Parameters. Journal of Hydroinformatics (in press).

3. The authors should discuss the issue of stationary in the determination of the variogram parameters and selection of populations to be modeled. Ans: In general, the traditional Kriging model is hypnotized to be a spatial random process with a stationary covariance function, namely, the semivariogram model (Xiong et al., 2007). The stationary covariance implies that the smoothness of a response is fairly uniform in each

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region of the input space (Paciorek, 2003), and this is easy to simplify the analysis and reduce the amount of prior information, which should be given in advance (Currin et al., 1991). Nevertheless, the assumption of a stationary covariance structure underlying Kriging does not deal with these situations which the degree of smoothness of a response obviously varies (Xiong et al., 2007). Since the proposed WSVM is composed of the various types of TSVM, in which the associated weights of TSVM could be varied with different situations and regions, in the future, the application of WSVM could be validated on reducing the uncertainty in the assumption of the stationary and enhancing reliability and accuracy of the estimated semivariograms. The above description would be added in the conclusion. âĂć Xiong, Y., Chen, W., Apley, D., and Ding, X., 2006. A non-stationary covariance-based Kriging method for metamodelling in engineering design. International Journal for Numerical Methods in Engineering, 72, 733-756. âĂć Currin, C., Mitchell, T., Morris, M., and Ylvisaker, D., 1991. Bayesian prediction of determination functions with applications to the design and analysis of computer experiments. Journal of the American Statistical Association, 86,953-963. âĂć Paciorek, C.J., 2003. Nonstationary Gaussian processes for regression and spatial modeling. Ph.D Dissertation, Carnegie Mellon University, Pittsburgh, PA, U.S.A.

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