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Sensitivity analysis of Takagi-Sugeno-Kang rainfall-runoff fuzzy models

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Abstract. This paper is concerned with the sensitivity analysis of the model parameters of the Takagi-Sugeno-Kang fuzzy rainfall-runoff models previously developed by the authors. These models are classified in two types of fuzzy models, where the first type is intended to account for the effect of changes in catchment wetness and the second type incorporates seasonality as a source of non-linearity. The sensitivity analysis is performed using two global sensitivity analysis methods, namely Regional Sensitivity Analysis and Sobol's variance decomposition. The data of six catchments from different geographical locations and sizes are used in the sensitivity analysis. The sensitivity of the model parameters is analysed in terms of several measures of goodness of fit, assessing the model performance from different points of view. These measures include the Nash-Sutcliffe criteria, volumetric errors and peak errors. The results show that the sensitivity of the model parameters depends on both the catchment type and the measure used to assess the model performance.

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