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Automatic Calibration of the SHETRAN Hydrological Modelling System Using MSCE

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Abstract Automatic calibration is preferred because it provides an objective and extensive searching in the feasible parameter space. In this study, the Modified Shuffled Complex Evolution (MSCE) optimization algorithm is applied to automatically calibrate the physically-based spatially-distributed hydrological model SHETRAN in the 705-km^2 semi-arid Cobres basin in southern Portugal, with a spatial resolution of 2 km and a temporal resolution of 1 h. Twenty-two parameters are calibrated for the main types of land-use and soil. Nash-Sutcliffe Efficiency (NSE) is 0.86 for calibration and 0.74 for validation for basin outlet; NSE is respectively 0.65 and 0.82 for calibration, 0.69 and 0.63 for validation of internal gauging stations Albernoa and Entradas. As for storm events, NSE is 0.87 and 0.64 respectively for Storms No.1 (during the calibration period) and No.4 (during the validation period) at basin outlet; it is 0.69 and 0.65 for Storm No.4 respectively at Albernoa and

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