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Uncertainty analyses in large scale simulated runoffs with the model NAVMO

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Distributed models have been increasingly designed and used to simulate catchment responses considering the variabilities of the system. However, even with such models the simulations contain uncertainties due to poor quality input data, model parameterization and model structure. This paper reports the uncertainties analyses carried out in simulated runoffs at various catchments in the large semiarid upper Paraíba river basin, Brazil, with the distributed model NAVMO, considering different basin divisions and databases. The analyses were carried out in relation to previous work with the model, which was calibrated for the region divided into 61 sub-basins and used to simulate long-time series of runoff considering other basin divisions (10, 21, 31 and 40) and four databases consisting of 16, 18, 35 and 80 rainfall stations. The parameters of the model were also calibrated for the region divided into 31 sub-basins and used to simulate long-term time series of runoff with the other basin divisions (10, 21, 40 and 61), which served as the basis for investigating the uncertainties in the model parameterization and structure through comparisons and statistical criterions. The investigations were carried out by analyzing the statistical properties of the simulated series such as: the sum of annual simulated values, the double mass curve, the coefficient of determination, the sum of squared differences, the parametric t-test and F-test, the Wilcoxon test and fitting typical distributions of probability (e.g., Gama, Pearson III, Normal, Gumbel and GEV). The results showed that the simulations were sensitive to the basin divisions, model parameterization and rainfall database. Also, the uncertainties decreased as the number of basin divisions and rainfall data quality increased. Moreover, the results were affected by the model structure regarding the drainage system, and rainfall database that depend on the division of the region.