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Development of an Open Source GIS based Distributed Hydrological model System - MWEasyDHM

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Spatially distributed hydrological model is an important tool for studying the hydrological cycle, making flood forecasting, simulating environmental and ecological processes and estimating crop water demand and so on. Successful distributed hydrological model and systems have been further achieved in many developed countries. However, there needs one GIS based Distributed Hydrological Model system to carry out hydrological simulation suitable for current conditions of China.

In this paper a distributed hydrological model system for easy manipulation, MWEasyDHM (MapWindow based Distributed Hydrological Model), was developed based on MapWindow GIS platform, an open source GIS software. The system contains pretreatment, model parameters optimization and posttreatment modules to simplify the works of building distributed hydrological model. The pretreatment module includes hydrological analysis, model parameters estimation and weather data interpolation parts based on huge amount of spatial and temporal data sets such as weather, land use, soil type, etc. With the pretreatment results, distributed hydrological model could be calculated and optimal model parameters could be obtained with LH-OAT parameters sensitivity analysis and SCE-UA parameters optimization. After model simulation, the model results could be displayed with tables, charts and GIS forms, in addition, spatial and temporal statistics and analysis could be easily achieved with the postreatment.

Finally, a brief application of MWEasyDHM will be described to demonstrate the flexibilities and capacities of the model system. With the successful development of MWEasyDHM, the processes of model building, calibration and application could be much easier and distributed hydrological model could be easily applied to the areas of water resources management.