



Brugga basin's TAC^D Model Adaptation to current GIS PCRaster 4.1

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The process-oriented catchment model TAC^D (Tracer-Aided Catchment model – Distributed) was developed in the Brugga Basin (Dark Forest, Germany) with a modular structure in the Geographic Information System PCRaster Version 2, in order to dynamically model the natural processes of a complex Basin, such as rainfall, air temperature, solar radiation, evapotranspiration and flow routing among others. Further research and application on this model has been done, such as adapting other meso-scaled basins and adding erosion processes in the hydrological model.

However, TAC^D model is computationally intensive. This has made it not efficient on large and well discretized river basins. Aswell, the current version is not compatible with latest PCRaster Version 4.1, which offers new capabilities on 64-bit hardware architecture, hydraulic calculation improvements, in maps creation, some error and bug fixes.

The current work studied and adapted TAC^D model into the latest GIS PCRaster Version 4.1. This was done by editing the original scripts, replacing deprecated functionalities without losing correctness of the TAC^D model. The correctness of the adapted TAC^D model was verified by using the original study case of the Brugga Basin and comparing the adapted model results with the original model results by Stefan Roser in 2001. Small differences were found due to the fact that some hydraulic and hydrological routines were optimized since version 2 of GIS PCRaster. Therefore, the hydraulic and hydrological processes are well represented.

With this new working model, further research and development on current topics like uncertainty analysis, GCM downscaling techniques and spatio-temporal modelling are encouraged.