Coupling SWAT and tempQsim Mohid River Network

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The general aim of the tempQsim project is to improve and create tools that increase the efficiency of integrated water management in semiarid river catchments. To meet this aim, special dynamics of ephemeral and temporary waters have to be accounted for. Common problems for the application of basin models in the temporary catchments are related to: i) Periods without runoff (which results in numerical problems for most models) ii) Extreme first flush effects with the beginning of the rain period (sub-hourly time steps required in simulations) iii) Quality of the water (sediments, solutes) is frequently poor and highly variable in time. In order to respond to such demands a physical based model tempQsim Mohid River Network was developed (Galvão et al., 2005). tempQsim Mohid River Network computes water, sediments and properties transport in a river network. The model is written in FORTRAN 95 and follows an object oriented programming philosophy with a finite volume approach (Braunschweig et al, 2004). The different processes occurring in the river are programmed in different modules. Fluid flow in this model is governed by conservation equations for mass, momentum, energy and any additional constituents. The numerical algorithm is based on the finite volume approach and for that reason equations are presented in their integral form. Following this strategy it is easier to build conservative transport models and coupling between modules is also simpler because it is based on fluxes. SWAT is a widely used catchment model (Arnold et al, 2005), which has been used in the tempQsim project. This model was tested in numerous sites and is accompanied with databases and interfaces that facilitate application. However this model does not have object oriented programming, making it difficult to introduce new processes. To make use of Swat advantages and at the same time solving the specific processes in

temporary rivers SWAT model was coupled with tempQsim Mohid River Network. This module can be used independently as an autonomous program. This work shows results of coupling SWAT model to tempQsim Mohid River Network.

References

Galvão P., Braunschweig F., Trancoso R., Neves R. & Cooper D., 2005. Modularity in integrated catchment modeling covering different time-scales. Geophysical Research Abstracts, EGU Meeting 05-A-08325, Wien 25-29 April (Austria).

Braunschweig, F., Chambel, P., Fernandes, L., Pina, P. & Neves, R., 2004. The object oriented design of the integrated modelling system Mohid. Proceedings of the XVth International Conference on Computational Methods in Water Resources (CMWR XV), June 13-17, Chapel Hill, NC, USA.

Arnold, J. G. and Fohrer, N. (2005) SWAT2000: current capabilities and research opportunities in applied watershed modelling Hydrol. Process. 19, 563-572