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Replicability of a modelling solution using NewAGE-JGrass

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Abstract: NewAge-JGrass is a semi-distributed hydrological modelling system. It is based on the object-oriented modelling framework (OMS version 3), on the JGrasstools and on the Geotools. To make it more effective, it is interoperable with many other tools such as R-project, gvSIG GIS, GitHub and other collaborative sharing tools, such as Authorea.

OMS3 allows to create science simulation components, which are implemented with a standard, well-defined purpose and interface. The encapsulation of the source code in components make them easier to be inspected and its copyleft license allows the easy access to the code, its use and its improvement. The components can be connected to obtain a variety of modelling solutions, i.e. a connection of components that perform a modelling task, following an "out-to-in" scheme.

According to the OMS3 standards, each NewAge-JGrass component was developed to simulate a specific hydrological process. After the geomorphological analysis of the watershed, it is possible to perform a complete hydrological analysis, connecting the required components. This involves the use of spatial interpolation tools for the meteorological inputs, the estimation of the radiation balance, the estimation of the evapotranspiration, the computation of the runoff production and the channel routing.

Recently, NewAge-JGrass has been upgraded to be even more usable and replicable. It has been split in smaller well-defined units, the handling of all the inputs and outputs have been demanded to external components and each component has been differentiated to work with raster or punctual input. Furthermore, it has been expanded with new components to perform the statistical analysis of the travel times of the water particles and the solutes transport, which in the last years has been widely investigated.

All the code, the tests and resources are made available on https://github.com/geoframecomponents and the documentation at http://geoframe.blogspot.com, stating a good example of replicable research.