Contribution ID : 157

HYDROFOSS

Thursday 14 Sep 2006 at 09:15 (00h30')

The aim of this research is to demonstrate how watershed management can be achieved by using Free and Open Source Software for Geomatic (FOSS4G) through hydrological modelling.
This work was carried on in the frame of an interreg IIIA project between Italy and Switzerland named ?Sviluppo di un sistema di gestione dei rischi idrogeologici nell'area del lago Maggiore? (?Development of a management system for the hydro-geological risk in the Lake Maggiore area?) partially funded by the Europe Union.
For this purpose a new hydrological model called ?HydroFOSS? was developed.
HydroFOSS is:
a)distributed - the hydrological variables are continuously described in the space.
b)Physically based - all the involved variables have a physical meaning.
c)Continuous - operates over an extended period of time, determining flow rates and conditions during both runoff periods and periods of no surface runoff.
d)Modular - is a combination of different modules describing the processes involved in the rainfall-runoff process.
e)GIS embedded - is fully developed into a GIS system by using the GIS's commands and library functions.
f)Open Source - developed by using exclusively Free and Open Source Software.
Due to the specific area of study (the Lake Maggiore is situated across Italy and Switzerland, in the Alpine region) the processes considered in the hydrological model development are the solar radiation, the evapotranspiration, the snowmelt and accumulation, the canopy interception, and the runoff.
The heterogeneity of the needed data, in terms of formats, topology, coordinate systems, and time-spatial resolutions bring us to the development of a geodatabase that considers the time component. For this task a methodology to handle raster series has been developed.
Once the data have been organized in the geodatabase, the further required step is the data processing for model input generation. This task involves either the spatialization of numerous variables and the validation of different data, two cases were deeply investigated (the validation of the meteorological radar rainfall observations, and the best interpolation technique for temperature meteorological station observations) while, due to time restrictions, a standard approach has been followed in other cases.

The chosen processes were then simulated by developing specific new commands in the GIS GRASS and the overall model was setted up by means of a general script that automatically executes all the required operations.
Finally a link between the HydroFOSS model and the automatic inverse calibration model UCODE-2005 (Poeter et al., 2005) was generated and a case study application was successfully carried on.

This solution has shown how a fully open access, both in term of cost and in term of control, to all the modelled processes and data can be achieved by using Open Source Software and a modular approach. Moreover the usage of a GIS allows the management of heterogeneous data and helps models integration because of its intrinsic data exchange, analysis and visualization capabilities.

Primary authors : Dr. CANNATA, massimiliano (supsi)

Co-authors : Prof. BROVELLI, Maria Antonia (politecnico di Milano)

Presenter : Dr. CANNATA, massimiliano (supsi)

Session classification : Session 3 : GRASS Desktop

Track classification : GRASS

Type : Conference