Postdoctoral position: Calibration and validation of the MAELIA Platform

Context. The MAELIA consortium is achieving the development of an integrated agent-based modeling and simulation platform to study the environmental, economic and social impacts of various regulation policies regarding water use and water management in combination with climate change (http://maelia1.wordpress.com). It is currently applied to the case of the French Adour-Garonne Basin, which is the most concerned in France by water scarcity during the low-water period. An integrated approach has been used to represent this social-ecological system: the model combines spatiotemporal models of ecologic processes (e.g. rainfall and temperature changes, water flow, runoff and plant growth) and socio-economic processes (e.g. farmer decision-making process, demography, land use and land cover changes) together with the implementation of various regulatory scenarios regarding the management of low-water flow.

The generation of the simulation model involves a lot of datasets. Structural data are used to instantiate the entities and relationships of the field model. Dynamics data are used for the calibration and validation of internal processes and as data series of external processes that drive the evolution of the social-ecological system. More than 250 files are used from a number of sources and most of them require pre-processing to be put at the required temporal, spatial and functional resolutions.

Objectives. The work to be done consists in the validation of the platform, the quality of the simulation outcomes being assessed in relation with the data collected during the period from 2000 to 2010. Four tasks can now be identified:

a) define criteria and associated metrics expressing the quality of results and the proper functioning of the platform.

b) perform sensitivity analyses to identify the process parameters and initial conditions of the model whose value has a significant impact on the results and assess the magnitude of this impact depending on the range of variation of these parameters and conditions.

c) calibrate the platform and assimilate the data available for the period 2000-2010 on the five major types of processes: plant growth, hydrology, agricultural withdrawals, release to support low water, administrative statement of restriction.

d) implement a technical solution (both software and hardware) with sufficient capacity to achieve (b) and (c) knowing that in the current state, a 30-year simulation takes about 3 hours calculation on a standard server.

Duration : 12 month – The position is available now

Location : UMR AGIR, Institut National de la Recherche en Agronomie (INRA), Toulouse

Remuneration: 2 500 € net

Useful expertise: agent-based simulation, sensitivity analysis, data assimilation, calibration, data analysis, Optimisation, High Performance Computing

Application

Further information can be obtained from Yves Auda (yves.auda@get.obs-mip.fr) or Christophe Sibertin-Blanc (sibertin@irit.fr) to whom application files have to be sent.

Applications will be considered from April 15.