Geophysical Research Abstracts
Vol. 13, EGU2011-7683, 2011
EGU General Assembly 2011

Cellular Automata and Agent-Based Models in response to different environmental problems: a review of French research over the last ten years

Johnny Douvinet (1), Cyril Fleurant (2), Daniel Delahaye (3), Sebastien Caillautl (3), and Vincent Viel (3)

(1) University of Avignon, UMR ESPACE 6012 CNRS,AVIGNON, France (johnny.douvinet@univ-avignon.fr), (2) AgroCampus Ouest, Landscape Unit Research, Angers, France., (3) University of Caen, GEOPHEN, UMR LETG 6554 CNRS, Caen, France

Cellular Automata (CA) and Agent-Based Models (ABM) are used to better assess patterns and processes resulting from environmental interactions using simple rules. Over the last ten years, the applications have been carried out on various complex systems: flash floods, fire propagation, river meandering, landscape evolution... The frequent use these applications demand are supported by an array of advances in field outside of physical geography as physics, computer sciences and mathematics. This communication presents common, singular and innovative applications observed in French research. On one hand, the CA RuiCells aims at understanding the spatial hydrological behaviours in all points of one catchment, linking impacts due to basin forms and slopes through local to global scales (Delahaye et al., 2007). The CA Soda has been developed to measure erosion at fine scale, less than a few meters (Vallette, 2006). Smoothed-particules can also be implemented in CA to improve dynamics or hydrological fluxes (Drogoul, 1995). On the other hand, ABM appears in geomorphology after first initiatives in ecology, sociology or human geography in the 1990's. Modules of CATCHSCAPE allow to simulate the hydrological system with its distributed water balance, irrigate schemes management, crop and vegetation dynamics (Bécu et al. 2008). For alluvial plains, ABM can also be used to simulate processes between independent interacting entities which behave according to the local environment (Teles et al., 1999). At the opposite, many models have been developed in other countries, as for simulating erosive thresholds (Favis-Mortlock, 1998), lava dynamics (Avolio et al., 2006), fluvial meandering (Coulthard and Van de Wiel, 2006), evolution of coasts (Dearing et al., 2005) and dunes (Thomas and Nicholas, 2007). Consequently, this communication addresses the debate on two questions: why French geomorphologist researchers are late in applying CA and ABMs, and is the simplification in processes had led to change research questions or to offer new perspectives?