



Layers dependencies specifications in the APILand simulation approach: an application to the coupling of a farm model and a carabid model

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► To cite this version:

Hugues Boussard, Gilles Martel, Chloé Vasseur. Layers dependencies specifications in the APILand simulation approach: an application to the coupling of a farm model and a carabid model. Colloque LandMod 2010: International Conference on Integrative Landscape Modelling, Feb 2010, Montpellier, France. pp.1. hal-01458622

HAL Id: hal-01458622

<https://hal.science/hal-01458622>

Submitted on 6 Jun 2020

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Layers dependencies specifications in the APILand simulation approach: an application to the coupling of a farm model and a carabid model



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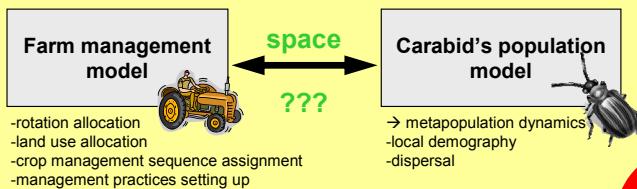


REASERCH ASPECT

ENGINEERING ASPECT

1. modelling requirement definition

Scientific question: What are the impacts of practice management systems on a carabid metapopulation viability and structure?



→ Modelling question: How to manage space ?

2. conceptual modelling

Which space representation ?

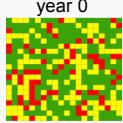
→ An explicit landscape model allows spatial structure emergence AND maximum independency of externals models to make the whole model more flexible



→ Modelling question: How to assure communication between externals models ?

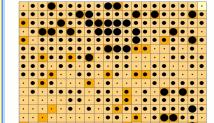
4. model assessment

Simulations over 10 years



year 0
 grassland
 corn
 wheat

Examples of outputs...

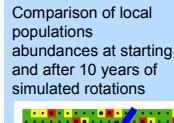


Carabids density Year 1
 adult

Carabids density Year 10
 adult

1 - 1000
 1001 - 10000
 10001 - 100000

● 10001 - 100000



Comparison of local populations abundances at starting and after 10 years of simulated rotations

Carabids density Year 10
 adult

1 - 1000
 1001 - 10000
 10001 - 100000

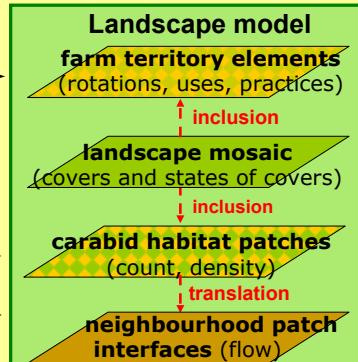
● 10001 - 100000

Comparison of local populations with the same crop but different landscape context and history after 10 years

Results: Emergence of a spatially structured metapopulation at the landscape level resulting from spatio-temporal connectivity

Modelling process

3. model implementation



→ How is the landscape model implementation done ?

APILand : Application Programming Interface Landscape

What is APILand ?

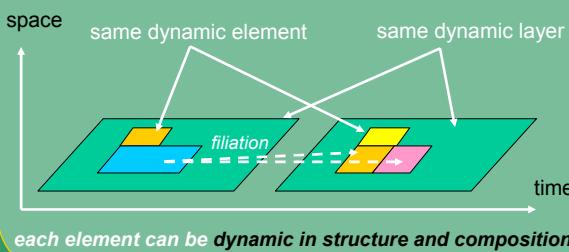
technical aspects

- Library 100% pure JAVA™ → toolbox, reusability
- Oriented-object modelling → flexibility, UML
- Designs patterns → designing good practices

useful to manage dynamic landscape elements

- Different aspects of the same object
- 2D Spatio-temporal or spatio-dynamical objects
- Historical objects
- Dealing with different scales
- Dynamic and thematic layers

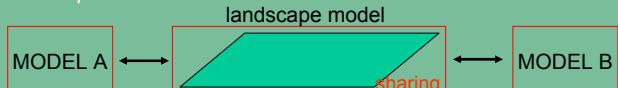
What is a dynamic layer ?



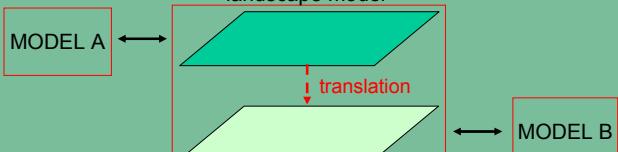
What is a spatial link ?

3 types have been identified

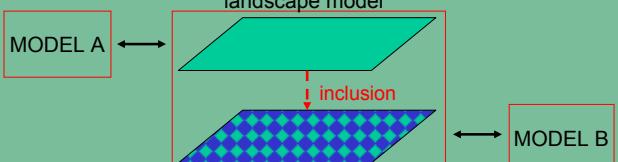
1. The « sharing » is used when externals models have the same representation of what is the Landscape



2. The « translation » is used when a layer comes up from another one. It can be :
- a treatment (ex: vector to raster conversion),
 - an analysis (ex: heterogeneity),
 - a filtering,
 - ...



3. The « inclusion » is used when the specification of a thematic layer is an extension of another one



→ Through combinations of dynamic layers and spatial links, APILand permits to JAVA™ programmers to easily and quickly develop landscape simulators