



HAL
open science

CeLL, an agent based model for exploring the spatial influence of climate change on *Lobesia botrana* population dynamics

Amelia Caffarra, Etienne Delay, Hervé Quénot

► To cite this version:

Amelia Caffarra, Etienne Delay, Hervé Quénot. CeLL, an agent based model for exploring the spatial influence of climate change on *Lobesia botrana* population dynamics. Symposium international ClimWine, Apr 2016, Bordeaux, France. halshs-01350049

HAL Id: halshs-01350049

<https://shs.hal.science/halshs-01350049>

Submitted on 3 Aug 2016

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

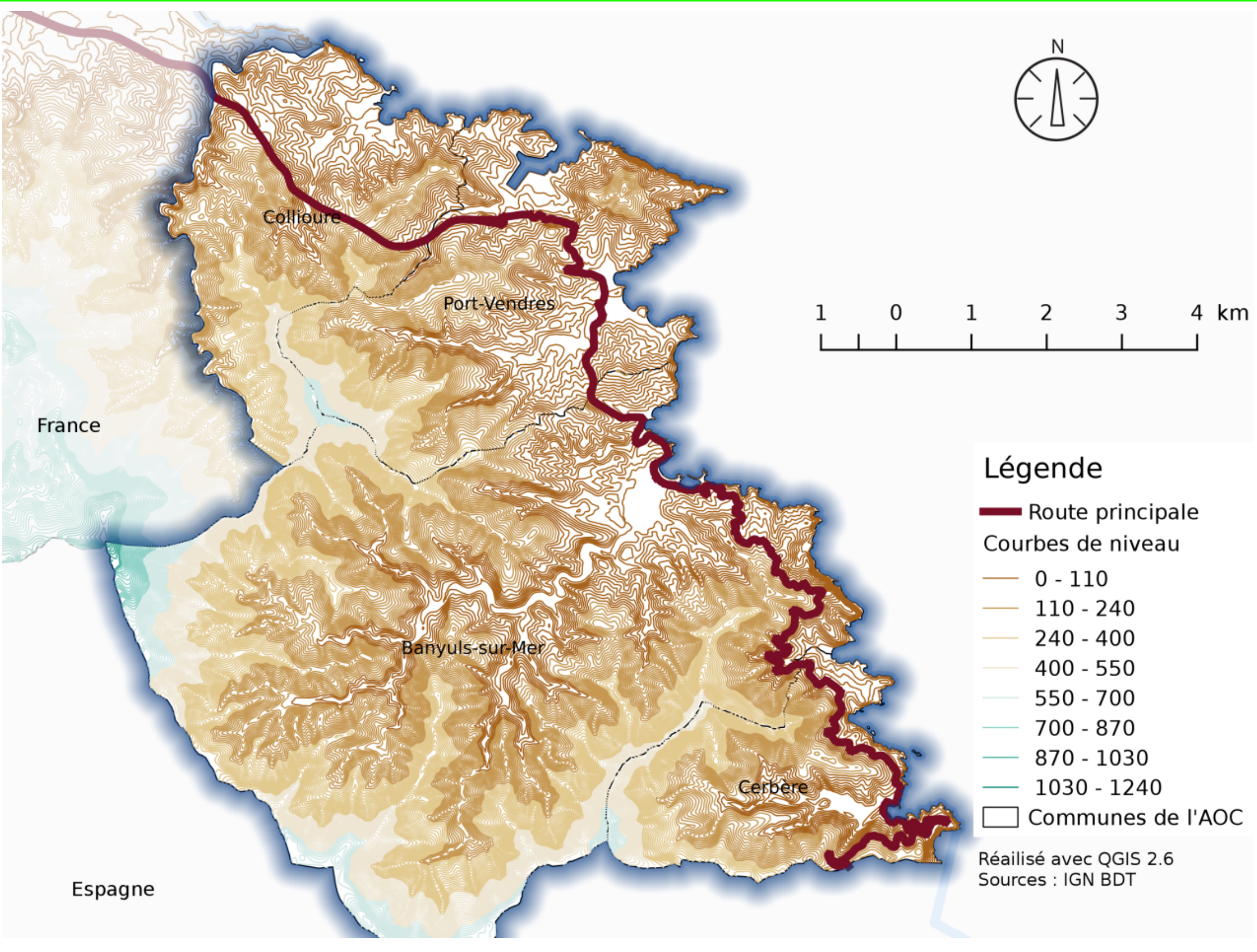


Distributed under a Creative Commons Attribution 4.0 International License

CeLL, an agent based model for exploring the spatial influence of climate change on *Lobesia botrana* population dynamics

A. Caffarra¹, E. Delay², H. Quenol³
¹ITK, Clapiers, France
²Laboratoire GEOLAB Université de Limoges, Limoges, France
³Laboratoire LETG-COSTEL, Rennes, France

Context



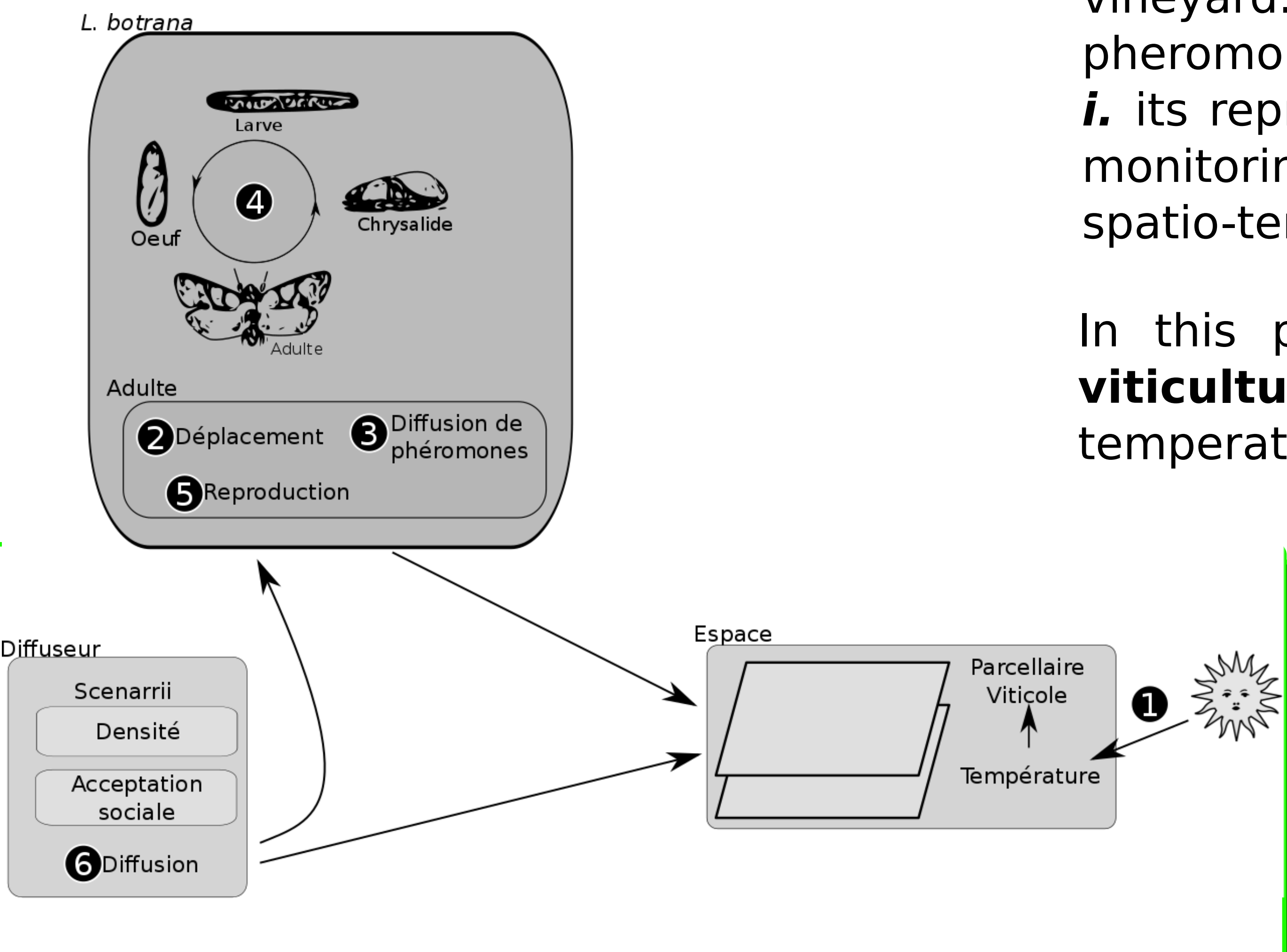
The European Grapevine moth (*Lobesia botrana*) is one of the most noxious vineyard-pests in the European and Mediterranean area. Its larvae feed on grapevine flowers and berries, with a facultative diapause and a variable number of generations per year, depending on temperature and photoperiod.

In order to predict its occurrence, different predictive models have been developed and can be found in the literature. However, none of these models is spatially explicit and allows to represent simultaneously the temporal and spatial dynamics of this pest.

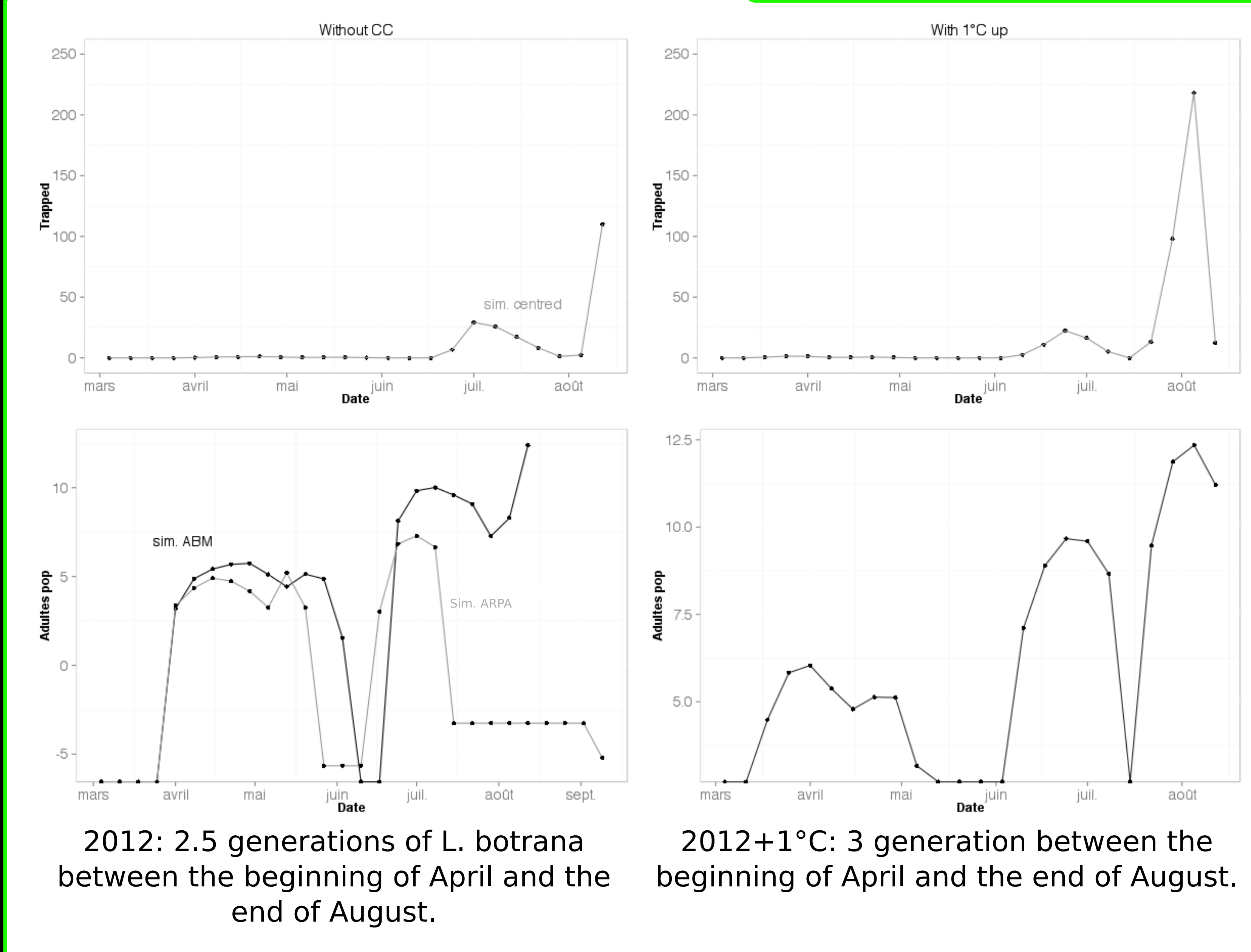
Our is to fill this gap, through the development of **an Agent Based Model (ABM CELL model)** representing *L. botrana* movement and mating, and capturing its emerging temporal and spatial patterns and dynamics over a vineyard. In particular, we focus on the modelling of spatial effects elicited by pheromones on the pest, in order to be able to simulate :

- i.** its reproductive behaviour,
- ii.** the effect of spatial positioning of pheromone monitoring traps,
- iii.** the effects of temperature and its alterations on population spatio-temporal dynamics

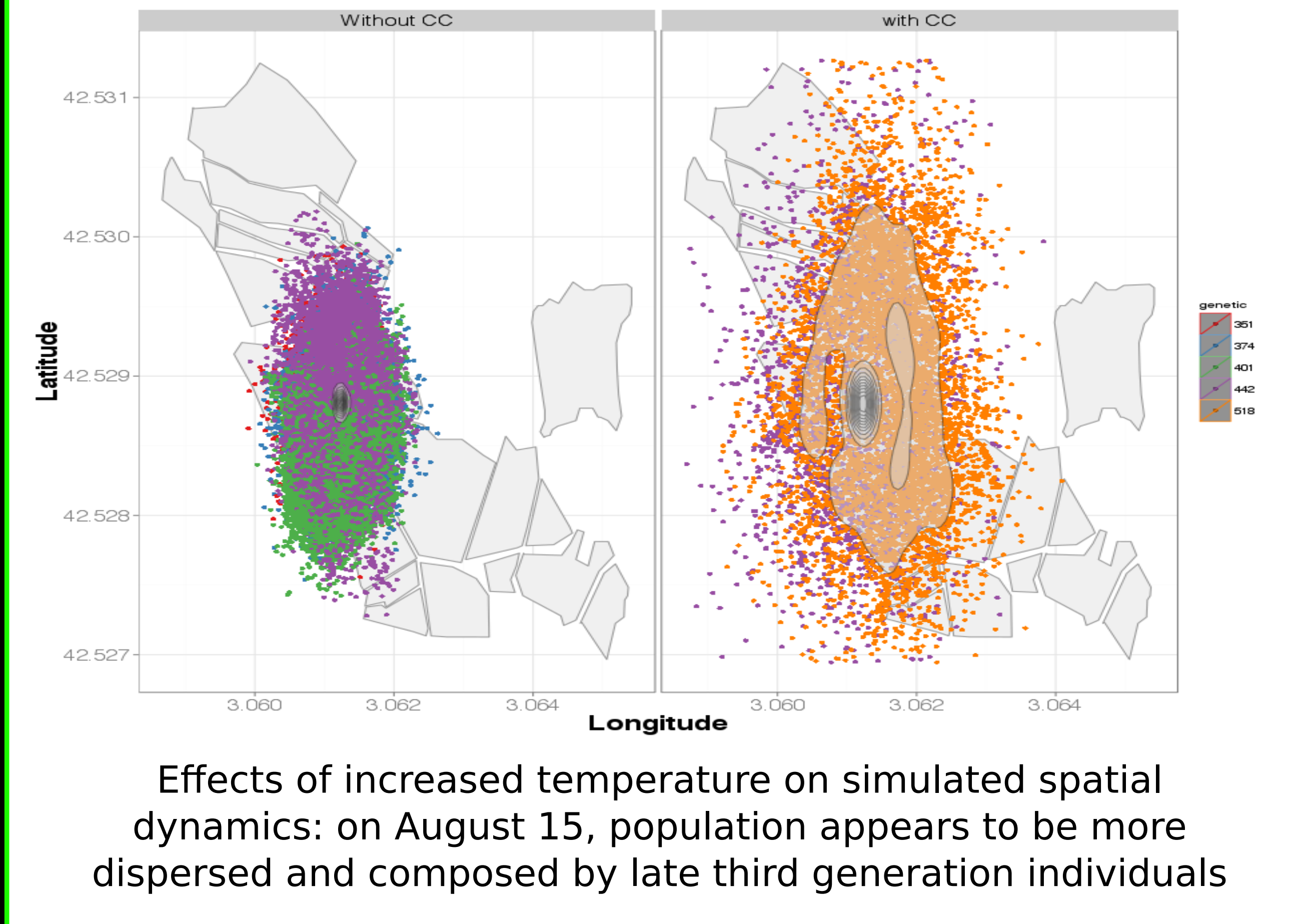
In this poster we present the **simulations of CELL over a 9 hectares viticultural area in the Banyuls AOC** for year 2012, and for a hypothetical temperature increase of +1°C.



Global Results



Agent level results



Effects of increased temperature on simulated spatial dynamics: on August 15, population appears to be more dispersed and composed by late third generation individuals

These preliminary results show the potential of ABMs in representing spatio-temporal dynamics under present and altered climate conditions and to raise scientific questions for further study:

- How will climate change impact *L. botrana* abundance and infestation patterns?
- Will climate change act as a selecting pressure on different phenological phenotypes of *L. botrana*?
- Will the impact of climate change on the interaction between host and pest phenology result in an alteration of infestation patterns?