

Abstract for the “Rencontre du réseau MEXICO 2018”.

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Title: A dynamical model for the growth of a stand of Japanese knotweed including mowing as a management technique.

In this presentation, we focus on calibration and result exploration of an individual-based model describing an ecological complex system through simulations performed with the OpenMOLE software (a model exploration software). Our aim is to find efficient management techniques to control an invasive clonal species: the Japanese knotweed (*Fallopia japonica*). We propose an individual based model for the spatial dynamics of a stand of Japanese knotweed, which takes into account mowing as a management technique.

We use simulations to study in more detail the model with the mowing term. Our aim is to evaluate the influence of management parameters such as the mean number of mowing events a year, or the duration of the management activities, on two quantities: the population size, and the invaded area of the knotweed stand.

A first step consists in calibrating the plant dynamics focussing on those model parameters for which no value in the literature was available. We aim to identify plant parameter values that lead to the best fit between model outputs and field data from stands observed in the French Alps, for which we have information about their management. To perform the calibration, we use a genetic algorithm method implemented in OpenMOLE software.

Once the sets of plant parameters are complete, we analyze the influence of management parameters on model outputs. The analysis is again performed with OpenMOLE, which facilitates the access to various intensive computation infrastructures.

Until now, we just use correlations and plots to assess the formulas we propose for regression curves on the outputs of the model. We are thus interested in statistical methods to make our observations more rigorous, and we hope this meeting is a good opportunity for that.

The interest of these formulas (associating model outputs with management parameters) is for example the evaluation of the potential benefit in terms of invaded area reduction, of mowing the stand once more each year. They can also suggest the minimal duration of the management activities necessary to achieve eradication (if it is possible at all, given a certain frequency of mowing). More generally, they enable to answer questions about the efficient mowing strategies.