UIBM
The Next Generation of Biodiversity Models

UIBM = Universal Individual-Based Model
Project website: http://uibm-de.sourceforge.net
Project administrator: Dr. U. Grueters, uwegrueters@sourceforge.net

UIBM Characteristics

- **UIBM** aims to simulate plant diversity in herbaceous, grassland communities, which hold the majority of vascular plant diversity in Central-Europe.
- **UIBM** aims to simulate the plant diversity response to management intensification, nutrient load and climate change factors. It improves **SDMs**, which restrict themselves to climate change.
- **UIBM** is a process-based model. This is an advantage over empirical/statistical **SDMs**, which rely heavily on expert knowledge and suffer from methodological limitations.
- **UIBM** simulates local species composition of herb communities on a Braun-Blanquet minimum area. These are advantages over process-based **DGVMs**, which are limited to large-scale plant functional type responses of natural vegetation and difficult to validate.
- **UIBM** is an individual-/agent-based model with a functional-structural basis.
- As with **DGVMs** the functional basis consists of widespread organ energy-/gas-exchange models, scaled up to the canopy via a layered radiation interception and turbulent transfer model.
- In **UIBM** species are constructed from life-cycle traits contained in databases. This better satisfies the huge data requirements of **IBMs** on the individual level.
- The structural basis is derived from trait minima/maxima on the organ level This replaces data requiremtns of **IBMs** on the individual level.
- The methodology to construct species in **UIBM** relies on multivariate allometry and serial biological reasoinng.

UIBM Parametrization

(experience with *Arrhenatherum elatius*)

16 plant traits were successfully derived from databases.

9 plant traits could not be derived from databases . (no. of internodes/stem, root:shoot ratio, 5 functional ecop hysiological traits, evtl. better with other species)

15 assumptions about plant traits had to be made..

Current generation biodiversity models

SDMs = species distribution models
DGVMs = dynamic global vegetation models
IBMs = individual-based models

UIBM Design/Implementation:
U Grueters, R Dahlem, J Senkbeil, M Woetzel

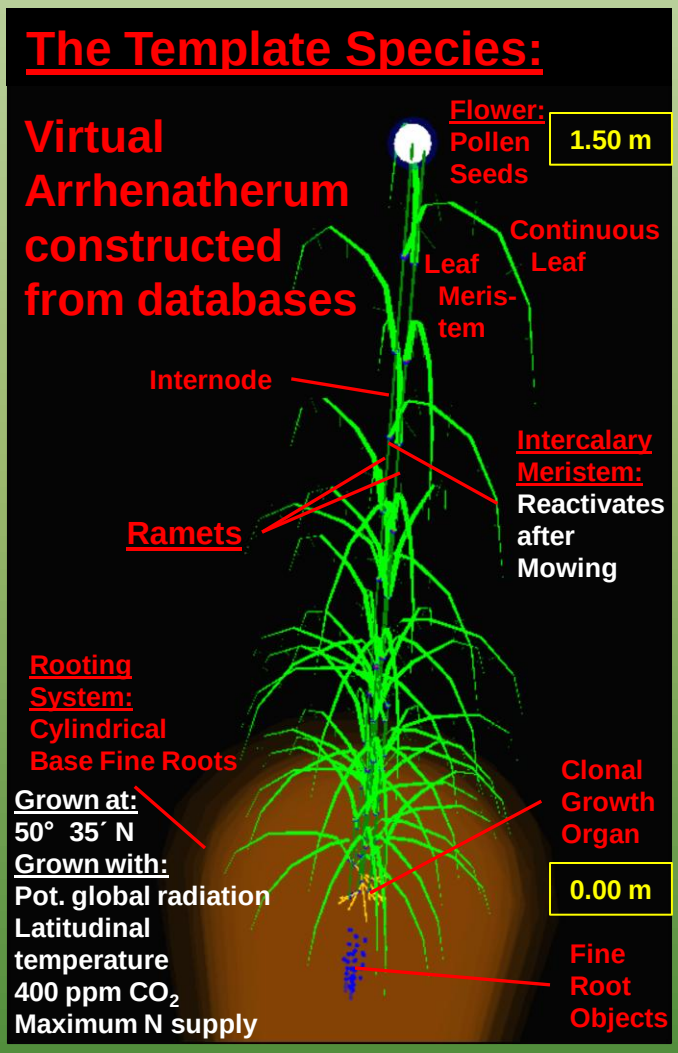
Basic UIBM Idea

(which makes UIBM a biodiversity model)

Once a template species is successfully constructed from databases, more species can be easily constructed, since information in the databases is idential for all species.

The Template Species:

Virtual Arrhenatherum constructed from databases



UIBM Application

- Generate locally validated virtual communities in **UIBM**.
- Remove dependence on expert knowledge from **SDM** development. Develop **SDMs** from „transparent“ virtual communities generated with **UIBM** rather than from „black-box“ real communities.
- Do virtual climate scenario and management scenario experiments in **UIBM**.
- Do bio-manipulative experiments in **UIBM** to study species interactions.