Biodiversity Dynamics
Grassland Biodiversity Dynamics

Authors:
Thomas Banitz, Franziska Taubert
Helmholtz Centre for Environmental Research – UFZ, Leipzig, Germany

Introduction

While **productivity** is typically the focus of grassland site management, plant **biodiversity** is another important characteristic of grasslands, which does not necessarily coincide with high productivity. However, both are important for long-term feed and bioenergy supply, food security, and the diversity of other trophic levels (e.g. pollinators). We therefore investigate how different **climate change** scenarios, soil conditions and **management** regimes affect grassland biodiversity and productivity. We apply the grassland model GRASSMIND and develop it further. GRASSMIND is an **individual-based, mechanistic ecological model**. For a given grassland site, it explicitly simulates the processes that let biodiversity dynamics emerge: individual plants can establish, grow and die.

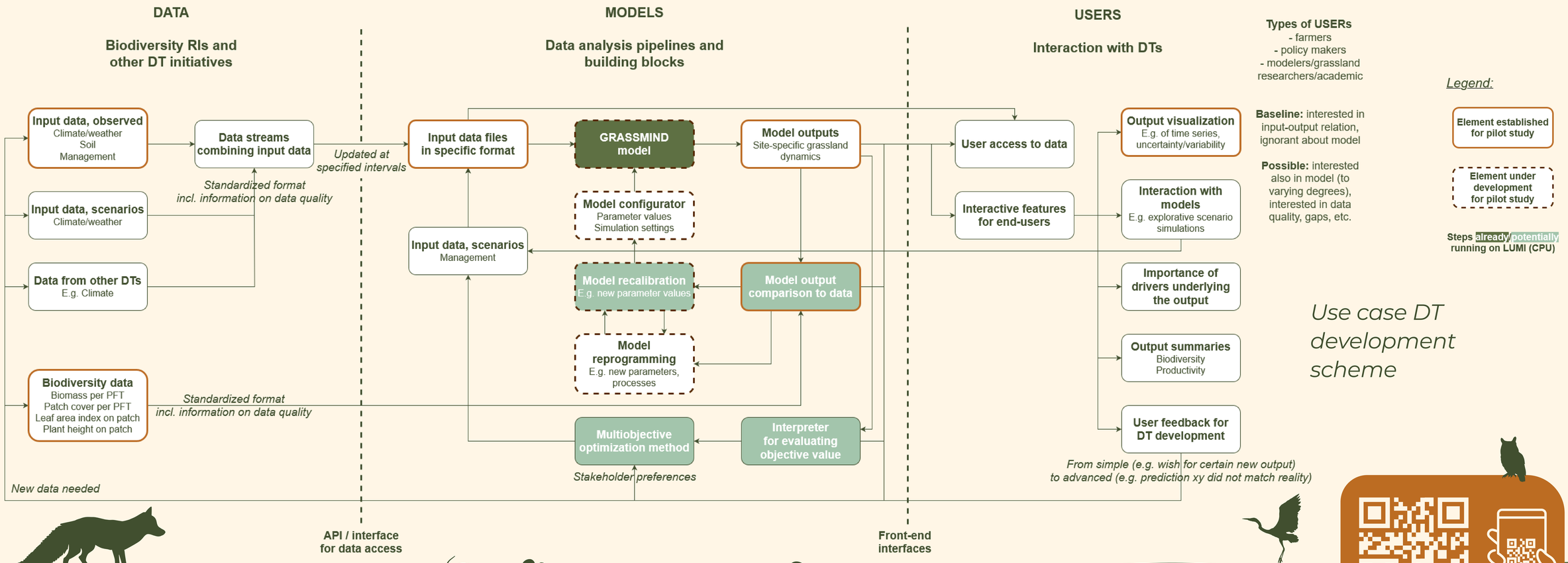
Biodiverse grassland in Germany. © André Künzelmann, UFZ

Technical description

- For the pilot study, we focus on **one site in Germany** (GCEF, run by UFZ) with multiple grassland plots under different, well-controlled management and climate conditions. **Observations** were biomass, vegetation cover, mowing yield and leaf area index (2013-2022).
- The pipeline elements developed (cf. UC scheme below) include **data preparation** as input for simulations or as patterns for model **recalibration**. Also scripts were developed that minimize deviations between observations and model results (parallelized, using Matlab), and the **model** was and is further **improved**.

Outputs

- **GRASSMIND runs on LUMI**, incl. parallelization over hundreds of cores. LUMI results match accurately to those from Windows or the UFZ Linux cluster. Test runs on LUMI were used to assess the number of single stochastic replicate runs required such that the mean results get approximately invariant. We will test the transferability of the recalibration to Python and LUMI.
- We also developed result **visualization scripts**, so far specific to the pilot study. They can be adapted to suite data from additional sites.



Funded by the European Union

@BiodiversityDT | /company/biodt | BioDT | /communities/biodt

BIODT biodiversitydigitaltwin