European Vegetation Archive

Data Request Form

To obtain data from the European Vegetation Archive (EVA), including the ReSurveyEurope Database, please first enquire the EVA database administrator Ilona Knollová (ikuzel@sci.muni.cz) whether the data that meet your needs are available. If they are, please fill in the form below and submit it to Ilona or another member of the EVA Coordinating Board (or ReSurveyEurope Board if you ask for data from the ReSurveyEurope Database).

- Applicant's name:

  Koenraad Van Meerbeek, Chang Liu

- Applicant's institutional address:

  sGlobe lab | Department of Earth and Environmental Sciences | KU Leuven
  Celestijnenlaan 200E, 3001 Heverlee BELGIUM

- Applicant's e-mail:

  koenraad.vanmeerbeek@kuleuven.be
  chang.liu1@kuleuven.be

- Project title:

  Explore How Functional Composition Drives Ecosystem Functioning in European Grasslands

- Are you asking for core EVA data (non-repeated vegetation surveys) or for ReSurveyEurope data (repeated vegetation surveys)?

  ReSurveyEurope

- Brief description of the aims and methods of the study:

  The positive relationship between biodiversity and EFs has been extensively studied and documented over the past several decades[1,2]. While much of this research has traditionally focused on species richness and composition[3], studies have also highlighted the importance of functional traits in explaining EFs. Both the functional identity (FI) and functional diversity (FD) of a community have been recognized as fundamental to understanding EFs[4]. Together, they functionally define the niche complementarity and selection effects that underpin biodiversity-ecosystem functioning relationships[5,6]. A higher niche complementarity enables a more complete resource usage, thus enhancing productivity[7]. In addition, asynchrony in responses to environmental conditions may also help buffer against climatic fluctuations, potentially increasing ecosystem stability[8].

  Grasslands, as open-habitat ecosystems, are particularly vulnerable to the impacts of climate change, lacking the canopy that buffers forest understory species from global warming[9,10]. The forecasted impacts of global change are expected to erode the diversity and threaten EFs and associated services of grasslands[11]. Given the importance of the functional composition for EFs, in this project, we are going to explore how functional composition influences the productivity and stability of grassland ecosystems and find the key drivers of grassland ecosystem functioning from the functional perspective.

This project is structured around two work packages (WPs). In the first WP, we will examine the relationship between functional composition and NDVI-based metrics of grassland productivity and stability. Grassland plots will be extracted, and community-weighted mean (CWM) values for multiple traits will be calculated using the trait data provided in ReSurveyEurope. Additionally, three functional diversity metrics—functional richness (FRic), functional evenness (FEve), and functional dispersion (FDis)—will be computed across different functional trait groups. Productivity will be quantified using three NDVI-based proxies: the mean NDVI value, peak NDVI value, and time-integrated NDVI value over the resurvey period (exceeding five years). Stability will be assessed using the standard deviation (SD) and coefficient of variation (CV) of these NDVI metrics. To examine the linear relationships between FI/FD and the NDVI-based metrics, we will construct generalized linear mixed models (GLMMs), incorporating environmental variables and random effects study design.

The second WP will focus on the event-based resistance and resilience of grassland ecosystems. The extreme drought events across the resurvey period of each plot will be identified based on precipitation data. We will calculate the cumulative water deficit to spatially and temporally detect extreme drought events. The resistance and resilience metrics will be calculated to represent the temporal stability of grassland ecosystems under extreme drought disturbance. Then the GLMM will be applied to examine the associations between FI/FD and resistance/resilience metrics.

Overall, this project will provide a more comprehensive understanding of the functional composition-ecosystem functioning relationship at a large scale, encompassing diverse climate zones and grassland types. Meanwhile, the role of niche complementarity and selection effects will be evaluated and discussed through the inclusion of multiple traits and FD metrics.

1. Hagan, J. G., Vanschoenwinkel, B. & Gamfeldt, L. We should not necessarily expect positive relationships between biodiversity and ecosystem functioning in observational field data. *Ecology Letters* **24**, 2537–2548 (2021).
2. Gonzalez, A. *et al.* Scaling-up biodiversity-ecosystem functioning research. *Ecology Letters* **23**, 757–776 (2020).
3. Tilman, D., Isbell, F. & Cowles, J. M. Biodiversity and Ecosystem Functioning. *Annu. Rev. Ecol. Evol. Syst.* **45**, 471–493 (2014).
4. Gagic, V. *et al.* Functional identity and diversity of animals predict ecosystem functioning better than species-based indices. *Proc. R. Soc. B.* **282**, 20142620 (2015).
5. Mason, N. W. H., Mouillot, D., Lee, W. G. & Wilson, J. B. Functional richness, functional evenness and functional divergence: the primary components of functional diversity. *Oikos* **111**, 112–118 (2005).
6. Steudel, B. *et al.* Contrasting biodiversity–ecosystem functioning relationships in phylogenetic and functional diversity. *New Phytologist* **212**, 409–420 (2016).
7. Petchey, O. L. Integrating methods that investigate how complementarity influences ecosystem functioning. *Oikos* **101**, 323–330 (2003).
8. Dukes, J. S. Biodiversity and invasibility in grassland microcosms. *Oecologia* **126**, 563–568 (2001).
9. De Frenne, P. *et al.* Global buffering of temperatures under forest canopies. *Nat Ecol Evol* **3**, 744–749 (2019).
10. Strömberg, C. A. E. Evolution of Grasses and Grassland Ecosystems. *Annu. Rev. Earth Planet. Sci.* **39**, 517–544 (2011).
11. Unger, S. & Jongen, M. Consequences of Changing Precipitation Patterns for Ecosystem Functioning in Grasslands: A Review. in *Progress in Botany* (eds. Lüttge, U. & Beyschlag, W.) vol. 76 347–393 (Springer International Publishing, Cham, 2015).

- Will someone else be involved in data editing or analysis in addition to the applicant?

Besides ir. Chang Liu (PhD student) and prof. Koenraad Van Meerbeek (promotor), dr. Yann Hautier (co-supervisor) and Jonas Simons (PhD student) will also join this project.

- Estimated time of delivery of results (e.g., manuscript submission):
  September 2025 (first paper) and February 2026 (second paper)

- Geographic area needed (e.g., countries or range of geographic coordinates):
  Europe, excluding the Russian Federation, Turkey, Georgia, Azerbaijan, and Armenia.

- Do you need plots to be georeferenced? If so, what is the minimum accuracy of plot location (in metres or kilometres) needed for your project?
  Yes, with kilometre-grid accuracy (<=1000m)

- Vegetation types needed (syntaxa):
  Grassland (herbaceous-dominated vegetation plots)

- Other data selection criteria:
  (1) Only include data collected from the 1984 onward;
  (2) Only include plots with a minimum observation span (defined as the period between the first and the last observations) of five years;
  (3) Exclude plots with plot sizes larger than 900 m^2.

- Envisaged publications:
  Two papers in scientific journals such as Global Ecology and Biogeography and Journal of Ecology.

- Data deposition. Some journals require data used for the analysis to be stored in a public repository to ensure the repeatability of the analysis. According to EVA Rules, you are not allowed to store the original vegetation-plot data obtained from EVA. However, if you plan to publish in such a journal, you may deposit a reduced EVA-derived dataset that (1) would make it possible to repeat the analysis published in the paper and (2) does not contain any information not used in the analysis. For example, such a dataset can contain only a subset of species (e.g., only angiosperms or only neophytes), or replace species names with codes, or replace species cover values with presences/absences, or remove all the header data, or replace the exact plot coordinates by coarse grid-cell coordinates etc. If you plan to deposit reduced information from vegetation plots, please describe here what might be deposited. If the project developed so that you needed to deposit more information than specified here, you would need to ask specific permission from the Custodians of the EVA databases used in your analysis before the dataset is deposited.

  Possible deposition of functional diversity and CWM trait value at the plot level.

- Plant trait data from the TRY consortium. If you plan to combine your analysis of vegetation-plot data with plant trait data, you can also request a dataset of 18 gap-filled traits for a large number of plant taxa prepared by the TRY consortium. These traits include Leaf area, Specific leaf area, Leaf fresh mass, Leaf dry matter content, Leaf C, Leaf N, Leaf P, Leaf N per area, Leaf N:P ratio, Leaf delta15N, Seed mass, Seed length, Seed number per reproductive unit, Dispersal unit length, Plant height, Stem specific density, Stem conduit density, and Conduit element length. This dataset can be provided to you by the EVA manager together with the vegetation-plot data. If you use this dataset, you must inform about your project the TRY data contributors who might be potentially interested and invite them as potential co-authors, assuming they will make an intellectual contribution to your paper. The list of the TRY data contributors will be sent to you together with the gap-filled trait dataset.

  Yes

- Specification of the co-authorship arrangements in publications based on the requested data. Note that the EVA Rules recommend that co-authorship is offered to a representative of each database providing data that are particularly important for the project (e.g., a relatively large proportion of the final dataset used in the analyses or data from unique vegetation types or under-represented geographic areas). This database representative should be an expert in the topic of the project (not necessarily the custodian or deputy custodian), and this person should contribute to the project more than just by providing the existing data, e.g. by intellectual contribution to the concept of the paper, preparation of new data, or helping with data analysis, interpretation of the results or writing parts of the paper (see the IAVS Code of Professional Ethics: http://iavs.org/Governance/Code-of-Professional-Ethics.aspx). The project leader should enable active participation by regularly informing potential co-authors about the progress of the project from its early stage. The project leader should also make final co-authorship arrangements based on the real input of the individual contributors.

  Following the guidelines of EVA and ReSurveyEurope, we will offer co-authorship to representatives of databases of particular importance in our analysis (e.g. those that contribute to at least 5% of the data in the final dataset) but expect intellectual contribution beyond data provision, for example involvement in the data analysis or manuscript writing/ revision. Additionally, representatives of databases showing interest in collaboration are invited to fill in the online form provided by the ReSurveyEurope Board, which will be evaluated on an individual request basis.

- Eligibility of the applicant to receive EVA or ReSurveyEurope data. Specify to which EVA or ReSurveyEurope database the applicant has contributed; if the applicant is not the custodian or deputy custodian of an EVA or ReSurveyEurope database, give a name of a custodian or deputy custodian who supports this data request.

  Koenraad Van Meerbeek contributed to the BE_0001 database of ResurveyEurope.

- I agree with the terms of EVA Data Property and Governance Rules as approved on 26 May 2012 (http://euroveg.org/download/eva-rules.pdf).
- If I ask for ReSurveyEurope data, I agree with the terms of ReSurveyEurope Data Property and Governance Rules as approved on 6 April 2022 (http://euroveg.org/download/resurveyeurope-rules.pdf).
- In any result obtained based on EVA core data (non-repeated vegetation surveys), I will cite the EVA report article (Chytrý et al. 2016; https://doi.org/10.1111/avsc.12191). In any result obtained based on the ReSurveyEurope data (repeated vegetation surveys), I will cite the ReSurveyEurope report article as soon as it is published. In addition, I will cite individual source databases used in my project (if possible, in the list of References; if not possible, at least as a list of databases in the electronic supplementary material).
- If I ask for the plant trait data from TRY, I agree to invite to my project the TRY data contributors following the list received from the EVA database manager.

Leuven, 1/29/2025

Koenraad Van Meerbeek
Chang Liu