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:
  Juan Antonio Hernández Agüero
- Applicant's institutional address:
  Misión Biológica de Galicia (MBG-CSIC) A Carballeira, 8, 36143 Pontevedra, Galicia, Spain
- Applicant's e-mail:
  juan.aguero@csic.es
- Project title:
  Forecasting Global Change Impacts On Ecosystems Using a Unified Plant Functional Spectrum.
- Are you asking for core EVA data (non-repeated vegetation surveys) or for ReSurveyEurope data (repeated vegetation surveys)?
  Both, if possible; EVA data only otherwise.
- Brief description of the aims and methods of the study:

  Plant diversity and functional traits have long been at the centre of biogeographical research, and interest has only grown in recent years as climate change, land use changes, and the spread of invasive species reshape vegetation across the globe. Understanding how plant functions are distributed across environments is especially relevant to anticipate ecosystem responses, given the role that traits play in ecosystem functioning and the provision of ecosystem services. However, straightforward approaches for predicting functional structure from environmental features are not yet available.

  Recent years have seen parallel progress on three fronts that are key to a more predictive functional ecology. *i*) Vegetation plot databases now compile community composition at large scales at unprecedented coverage; *ii)* trait databases provide a common ground to characterise plant functioning beyond species identity; and *iii)* high-resolution environmental layers describe climate, soil, and land use at scales relevant to plant communities. The convergence of these three sources opens the door to linking environment and plant function at macroecological scales in ways that were not feasible until recently.

  Two recent analytical frameworks make it possible to turn this information into a coherent description of plant function at the community level. The first is a unified plant functional space built on the main independent axes of above- and belowground trait variation across species, which provides a common reference to compare communities across regions and biomes regardless of their taxonomic composition (Carmona et al. 2021 Nature; Carmona & Beccari 2025

New Phyt). The second is the trait probability density (TPD) framework, which describes each community as a probabilistic distribution within that space and captures both intraspecific variability and the multidimensional structure of functional diversity (Carmona et al. 2016 TREE; Carmona et al. 2019 Ecology). Together, these tools move the analysis of community functional structure from single mean values to full functional distributions. Our group has led their development and application over the past decade, which places us in a strong position to extract the maximum value from a dataset of EVA's scope.

Within the ERC-funded PLECTRUM project, we aim to apply this approach to European vegetation at a resolution that was not previously feasible. Recent advances in deep learning, particularly in generative models, are well suited to capture the complex, non-linear links between environmental conditions and the multidimensional functional structure of plant communities. A central piece of the project is a new dataset of root functional traits measured on hundreds of European plant species, which extends the unified functional space belowground and addresses one of the most persistent gaps in trait-based ecology. Recent work has shown the value of deep learning for analysing European vegetation plots from a taxonomic and habitat-classification perspective (Leblanc et al. 2025, Nature Plants); we aim to complement this line of research by focusing on the functional dimension of communities and their relationship with the environment, an angle that to our knowledge has not yet been explored at this scale.

Our aim is to characterise the relationship between environmental conditions and the functional structure of European plant communities, and to use this relationship to map functional composition across climatic, edaphic, and land-use gradients at continental scale. To this end, we plan to combine EVA vegetation plots with a curated set of aboveground and belowground plant traits and with gridded environmental layers covering climate, soil, and land use. The analytical core will draw on the unified functional space and probability-based community descriptors developed by our group, in combination with deep learning approaches well suited to capturing the multidimensional, non-linear nature of these relationships.

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

Carlos P. Carmona, Erico Tordoni, Eleonora Beccari and potentially other members of the TraiLab team (at Spanish Research Council and Tartu University).

- Estimated time of delivery of results (e.g., manuscript submission):

12 months until submission of first manuscript.

- Geographic area needed (e.g., countries or range of geographic coordinates):

Longitude from 25° W to 42° E and latitude 34°N to 72°N (Europe), excluding Russia, Macaronesia islands (Azores, Madeira, the Canaries) and excluding North of Africa, Anatolia and Greenland. We are only interested in study sites in Europe avoiding sparse data (e.g. Russia, Turkey).

- 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, we will need georeferenced plots. We can accept any accuracy if they are georeferenced.

- Vegetation types needed (syntaxa):

All types of terrestrial vascular plant vegetation across Europe.

- Other data selection criteria:

We need plant cover of each species in each plot.

- Envisaged publications:

"Linking environment and plant functional structure across European vegetation: a deep learning approach" "Forecasting shifts in the functional structure of European plant communities under global change" "Identifying functionally vulnerable plant communities across Europe" "Plant trait syndromes and community-level invasibility across European vegetation" "From functional structure to ecosystem functioning across European plant communities"

- 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.

We will only store the minimum amount of data necessary to repeat the analyses. Species names will be anonymised, and coarse-grid coordinates will be used.

- 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: https://www.iavs.org/page/governance_code-of-proffesional-ethics). 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.

An invitation will be extended to all custodians that could contribute more than just by providing the existing data. Data providers interested in collaborating should complete the EVA form

- 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.

Milan Chytrý

- 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.

Pontevedra, Spain

Juan Antonio Hernández-Agüero

References:

Carmona, C. P., Bueno, C. G., Toussaint, A., Träger, S., Díaz, S., Moora, M., ... & Tamme, R. (2021). Fine-root traits in the global spectrum of plant form and function. *Nature*, *597*(7878), 683-687.

Carmona, C. P., & Beccari, E. (2025). The path toward a unified trait space: synthesizing plant functional diversity. *New Phytologist*, *248*(5), 2236-2242.

Carmona, C. P., De Bello, F., Mason, N. W., & Lepš, J. (2016). Traits without borders: integrating functional diversity across scales. *Trends in ecology & evolution*, *31*(5), 382-394.

Carmona, C. P., de Bello, F., Mason, N. W., & Lepš, J. (2019). Trait probability density (TPD): measuring functional diversity across scales based on TPD with R. *Ecology*, *100*(12), e02876.

Leblanc, C., Bonnet, P., Servajean, M., Thuiller, W., Chytrý, M., Aćić, S., ... & Joly, A. (2025). Learning the syntax of plant assemblages. *Nature Plants*, 1-15.