European Vegetation Archive

Data Request Form

To obtain data from the European Vegetation Archive (EVA), please first make an enquiry to the EVA database administrator Ilona Knollová (ikuzel@sci.muni.cz) whether the data meeting 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.

- Applicant's name:

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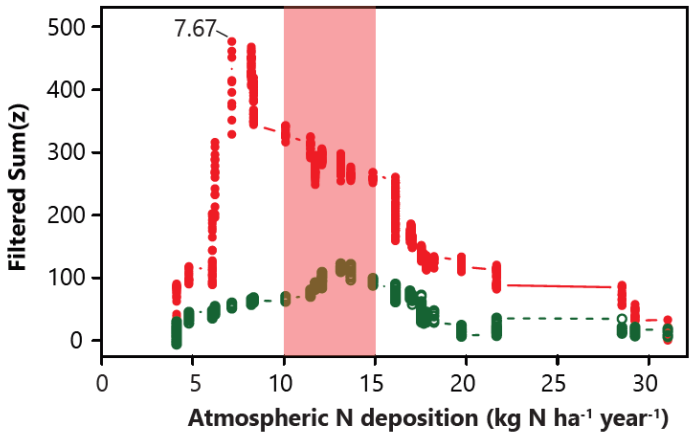
- Project title:

RECALL – Revisiting CriticAL Loads of atmospheric nitrogen deposition

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

In a recent European survey of semi-natural grasslands on both acidic and calcareous parent material, and in Atlantic European bogs, we found with TITAN analyses that communities of arbuscular and ericoid mycorrhizal fungi showed the highest negative change at levels of atmospheric nitrogen deposition of 7 to 8 kg N ha-1 year-1 (*Global Ecology and Biogeography* Ceulemans et al. 2019, Ceulemans et al. in preparation; an example figure can be found below). The results are remarkably consistent with the work of Sietse Van der Linde et al. (*Nature* 2018) in a European survey of ectomycorrhizal communities of a range of tree species that also showed negative change points at 5 to 6 kg N ha-1 year-1. These results call into question the current critical loads that are used in European environmental policy. Similarly, the late Richard Payne found that the critical loads for higher plant species in grasslands may be set too high (*PNAS*, Payne et al. 2013). Following the troubles in the Netherlands with wide-spread street protests of farmers against the nitrogen policy of the Kingdom, and the

unspoken but clearly present disgruntled lobby in Belgium, we feel it would be an excellent time to step in as scientists and revisit the critical loads with a critical eye.
Together, we already have access to datasets with hundreds of plots of bryophytes in European grasslands, mycorrhizae (orchid and arbuscular) in European grasslands (several types), heathlands and bogs (ericoid), European forests (ecto-), but we want to pull our resources and add as much published data as possible on all types of taxonomic groups that were observed in standardized methods. Next to additional bryophytes, higher plants and mycorrhizae; we aim to include lichens and arthropods such as butterflies.
We then propose to analyze the data with a TITAN procedure that calculates average change points in taxon occurrence across an envrionmental gradient and integrates these at the community level to identify points in environmental change coinciding with maximal community change. This will allow to verify the critical loads with large-scale empirical evidence across taxonomic groups and habitat types. The proposed procedure is simple and should lead to a straightforward paper to revisit (comfirm or reject) the environmental policy.
We would be very grateful if you are willing to share your data with us in this initiative we tentatively named RECALL (REvisiting CritiCAL Loads).



Example Figure (Ceulemans et al. 2019): Results of the threshold indicator taxa analyses across the European gradient of nutrient pollution. Indicators of nutrient pollution are atmospheric nitrogen deposition. Red symbols show cumulative decreasing arbuscular mycorrhizal fungi OTUs (z-) whereas green symbols show cumulative increasing arbuscular mycorrhizal fungi OTUs (z+), across both calcareous and acidic grasslands. The value of atmospheric nitrogen deposition and soil phosphorus at the sum (z-) peak is depicted, indicating the strongest community-level change point (the value of the environmental gradient where OTUs exhibit the most directional change). Red background shade in the left panel depicts the critical loads of atmospheric nitrogen deposition of 10 to 15 kg N ha-1 year-1, currently used in environmental policy for European grasslands.

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

Data Request Form

Yes. Professor Carly J. Stevens from the University of Lancaster (c.stevens@lancaster.ac.uk), dr. Maarten Van Geel (maarten.vangeel@kuleuven.be), Prof. Dr. Jürgen Dengler (juergen.dengler@uni-bayreuth.de; Switzerland) and Dr. Idoia Biurrun (idoia.biurrun@ehu.es; Spain).

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

As our goals and methods are concise, we expect that we should be able to produce results in the form of a A1 manuscript submission within six months after receiving the data.

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

Entire range of the EVA dataset, excluding Asian part of Russia, North Africa and the Canary Islands, but including at the geographic extremes the whole of Turkey, Russia west of Urals and Iceland.

- 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 require referenced plots at a minimum accuracy of 8 kilometers as the resolution of the nitrogen deposition model corresponds to a grid of 8 km by 8 km grid cells. However, the more accurate the coordinates, the better.

- Vegetation types needed (syntaxa):

All.
As our goal is to revisit the critical loads for all habitat types, and as we aim to inform the European environmental policy with large-scale empirical evidence, we request data on all syntaxa that are available in the EVA database. It would be very helpful to have a habitat or phytosiological classification per plot.

- Other data selection criteria:

  - Plots **surveyed between the years 2000 and 2018**.
  - We also request the data on higher plant species.
  - The dataformat is preferably in txt format if possible.

- Envisaged publications:

We aim to publish a consice manuscript with a single main goal: to evaluate whether the currently set critical loads of atmospheric nitrogen deposition in European environmental policy are supported by large-scale empirical evidence. As secondary goals we also aim to distinguish between oxidized nitrogen compounds and reduced nitrogen compunds wich has not been done before at a large scale. The importance of this may not be underestimated as both require different environmental mitigation strategies as oxidized nitrogen originates mainly from combustion processes and reduced nitrogen originates mainly from intensive agriculture. The combination of higher plant species with our already collected datasets on lichens, bryophytes and mycorrhizae and the elsewhere requested data on arthropods, also adds to the novelty

of the envisaged publication, in our opinion. Therefore we aim for a publication in a well-respected high impact factor journal such as *Global Environmental Change – Human and Policy Dimensions* (IF 10.4) or *Global Change Biology* (IF 8.9). In our opinion, this is a very realistic goal. The people in this project also have experience publishing in these high impact factor journals with publications in *Science*, *Nature Plants* and *Global Change Biology*, amongst other.

- 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 for 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 from 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.

No

- 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. 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.

We are happy to follow the IAVS Code. Following the data request identifying the number of plots to be used from each dataset, each contributing dataset can nominate within one month one potential co-author from its team with particular interest and competence for the topic. We will tentatively accept one opt-in author if the contributed dataset(s) accounts for 1% or more of the finally used data and will consider at our discretion opt-in requests from smaller data contributions when the nominated person contributes particular competences that are useful for the papers. Tentative co-authors will have time to check the manuscript and make their contributions at least once before submission for a period of at least 3 weeks. According to the IAVS Code, only those persons who have made an intellectual contribution by the time of submission, will be finally listed as co-authors.

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

Jürgen Dengler and Idoia Biurrun, custodians of the EVA databases Nordic-Baltic Grassland Vegetation Database (NBGVD), German grassland vegetation database

(GrassVeg.DE) and Basque vegetation database (BIOVEG), support this proposal

We agree with the terms of EVA Data Property and Governance Rules as approved on 26 May 2012 (http://euroveg.org/download/eva-rules.pdf).

Leuven, Belgium, Lancaster, United Kingdom, Wädenswil, Switzerland, and Bilbao, Spain

Dr. Tobias Ceulemans

Dr. Maarten Van Geel

Prof. Dr. Carly J. Stevens

Prof. Dr. Jürgen Dengler

Dr. Idoia Biurrun