DMP title

Project Name Internal Funds DMP - DMP title

Grant Title C3/22/005

Principal Investigator / Researcher Bart Muys

Description With this C3 project we want to evaluate and optimize rock dust application for restoration of acidified forests. The project has a triple goal. First, we will reinforce knowledge by increasing the technology readiness level towards application. Second, we will form a consortium that, based on the obtained pilot dataset and living labs, will submit a horizon Europe project. Third, together with external partners (Bodemkundige Dienst van België and Bosgroep Zuid- Nederland) we aim to design and roll out an expert system for consultancy activities. Our first research question assesses both chemical rock product variables (dataset originating from 4 screening tests for product ANC), next the behaviour of rock dust products on soils is predicted by a mechanistic model that uses data from these screening tests. The second research question addresses planting pit applications of rock dusts, here a longitudinal dataset of tree growth (height, diameter) as a function of rock dust and substratum is made with intermittent measures of leaves' nutrient contents. The third research question determines the long-term effects via a dataset that combines different historical experiments and the effects on soil chemistry (pH, %BS), tree growth (tree ring analyses), tree nutrition (needle nutrient concentrations), and biodiversity of the assessed plots. The last research question will combine the previous lines of knowledge in a probabilistic Bayesian Belief Network to estimate (un)certainty of output variables in rock dust restoration after updating certain input variables (rock type, soil type, trees, time since application...).

Institution KU Leuven

1. General Information

Name of the project lead (PI)

Bart Muys

Internal Funds Project number & title

C3/22/005

Rock dust as a restoration measure for acidified forests: from mineral to helicopter application

2. Data description

2.1. Will you generate/collect new data and/or make use of existing data?

both.

2.2. What data will you collect, generate or reuse? Describe the origin, type and format of the data (per dataset) and its (estimated) volume. This may be easiest in a numbered list or table and per objective of the project.

- Longitudinal chemical titration experiment (spreadsheet + R code, via labwork)
- Chemical pHstat experiment (spreadsheet, via labwork)
- Longitudinal soil suspension experiment (spreadsheet + R code, via labwork)
- Longitudinal mesocosm outdoor experiment (spreadsheet + R code, via field + labwork)
- Combination of experiments 1-4 in a mechanistic model (spreadsheet + R code, modeling)
- Short-term field experiment longitudinal soil, growth responses (spreadsheet + R code, via field + labwork)
- Long-term field experiments: longitudinal growth responses and single soil response (spreadsheets + R code, via + field + labwork)
- Database and Bayesian Belief Network (database + model + R code, via modeling)

Total data volume estimate (40 GB)

3. Ethical and legal issues

3.1. Will you use personal data? If so, shortly describe the kind of personal data you will use. Add the reference to the file in KU Leuven's Record of Processing Activities. Be aware that registering the fact that you process personal data is a legal obligation.

no

3.2. Are there any ethical issues concerning the creation and/or use of the data (e.g.

experiments on humans or animals, dual use)? If so, add the reference to the formal approval by the relevant ethical review committee(s).

no

3.3. Does your research possibly result in research data with potential for tech transfer and valorisation? Will IP restrictions be claimed for the data you created? If so, for what data and which restrictions will be asserted?

Yes, the pH model derived from dataset 1-4 is of interest for valorisation by the soil service of Belgium. The IP will be valorised by a cooperation agreement where the soil service may use this model for consulting in return for a financial return to KU Leuven.

The bayesian belief network is of interest for both broadening the consultancy goal from soil advise to trees and biodiversity.

The data remain property of the KU Leuven.

3.4. Do existing 3rd party agreements restrict dissemination or exploitation of the data you (re)use? If so, to what data do they relate and what restrictions regarding reuse and sharing are in place?

No

4. Documentation and metadata

4.1. What documentation will be provided to enable understanding and reuse of the data collected/generated in this project?

For each **workpackage** a README-file will be included that explains the scope, and methodology of the experiments and why a certain setup was chosen.

For each **experiment** (=spreadsheet) there is METADATA (.txt.-file) that describes each column and its units and the most important statistical analyses.

4.2. Will a metadata standard be used? If so, describe in detail which standard will be used. If not, state in detail which metadata will be created to make the data easy/easier to find and reuse.

Yes, we are currently developing a general strategy (rolling out in Spring 2023) where everything is saved on Onedrive, and access is given to the promotor.

5. Data storage and backup during the project

5.1. Where will the data be stored?

The master copy of the data, i.e. active working data during the project, is kept on the personal laptop of the researcher (Robrecht Van Der Bauwhede) which is backed up to OneDrive, this cloud is used as the research unit's central storage facility to which the promotors of the project have access.

Furthermore, the project is backed up by the division of forest, nature and landscape's K-drive.

5.2. How will the data be backed up?

The data will be stored on the university's central servers with automatic daily back-up procedures (Onedrive) and periodic back-ups to the division's K-drive (every month).

5.3. Is there currently sufficient storage & backup capacity during the project? If yes, specify concisely. If no or insufficient storage or backup capacities are available, then explain how this will be taken care of.

Yes, there is sufficient storage capacity. The Onedrive offers 2 TB of data storage and the current project size is estimated to be between 20 and 40 GB.

5.4. What are the expected costs for data storage and backup during the project? How will these costs be covered?

No additional costs are expected

5.5. Data security: how will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

Only people with personal access (secured by KU Leuven authenticator) can open the files. The yearly change in passwords and the multifactor control provide the desired data security.

6. Data preservation after the end of the project

6.1. Which data will be retained for the expected 10 year period after the end of the project? If only a selection of the data can/will be preserved, clearly state why this is the case (legal or contractual restrictions, physical preservation issues, ...).

All data will be retained.

6.2. Where will these data be archived (= stored for the long term)?

The data will be stored on the university's central servers (with automatic back-up procedures) for at least 10 years, conform the KU Leuven RDM policy.

6.3. What are the expected costs for data preservation during these 10 years? How will the costs be covered?

Expected costs are limited, considering the limited size of the data (20-40 GB)

7. Data sharing and re-use

7.1. Are there any factors restricting or preventing the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions or because of IP potential)?

The data that are mutually created for the valorisation by the 3 partners are property of all 3 and can therefore not be shared without consent of all other parties. This will be stated in a cooperation agreement.

7.2. Which data will be made available after the end of the project?

WP1: data and methodology are described in a research paper but raw data is not publicly made available

WP2: data is described in a research paper and made publicly available

WP3: data is described in a research paper and made publicly available

WP4: general model discoveries for rock dust applications in forests can be published but the raw data to train the model remains the property of KU Leuven and the soil service of Belgium for valorization in the expert system

7.3. Where/how will the data be made available for reuse?

- In a restricted access repository

Research Data Repository of KU Leuven

7.4. When will the data be made available?

- Upon publication of the research results

Upon publication of the research results

7.5. Who will be able to access the data and under what conditions?

The research data should be available to scientists upon request.

The models used for valorization are IP which remains the property of the KU Leuven and the soil service of Belgium and therefore does not get shared.

7.6. What are the expected costs for data sharing? How will these costs be covered?

The cost will depend on the journal which is not clear yet. The project engineer Robrecht Van Der Bauwhede also has an FWO-SB grant-bench fee to cover costs.

8. Responsibilities

8.1. Who will be responsible for the data documentation & metadata?

Robrecht Van Der Bauwhede

8.2. Who will be responsible for data storage & back up during the project?

Robrecht Van Der Bauwhede

8.3. Who will be responsible for ensuring data preservation and sharing?

Robrecht Van Der Bauwhede

Bart Muys

Karen Vancampenhout
Erik Smolders

8.4. Who bears the end responsibility for updating & implementing this DMP?

The end responsibility for updating and implementing the DMP is with the supervisor (promotor Bart Muys) and the main researcher (Robrecht Van Der Bauwhede).