DMP title

Project Name Assessing critical thresholds of tropical ecosystems integrity using water content estimated from field and microwave remote sensing data - DMP title

Project Identifier 95614

Grant Title G0F6922N

Principal Investigator / Researcher Ben Somers

Project Data Contact Paulo Negri Bernardino; negribernardino.paulo@kuleuven.be; +55 19 996450886

Description Several ecosystems worldwide are subjected to droughts with certain frequency and drought stress is a major driver of ecosystem functioning decreases, productivity losses, and disruptions in the carbon balance. Global climate change might aggravate issues related to drought stress, and we still lack knowledge on many aspects of plants and ecosystems response to drought. Thus, in this project we aim at answering two main research questions: (1) What are the thresholds in the system water content that lead to a decrease in ecosystem's productivity and/or leaf area, and an increased flammability risk? (2) How abiotic (e.g., soil) and biotic (e.g., species composition) factors influence these thresholds? To answer these questions, we plan to use field data (from the Cerrado biome in central Brazil) combined with state-of-the-art microwave remote sensing data and time series analysis.

Institution KU Leuven

1. General Information
Name applicant

Paulo Negri Bernardino

FWO Project Number & Title

G0F6922N - Assessing critical thresholds of tropical ecosystems integrity using water content estimated from field and microwave remote sensing data.

Affiliation

- KU Leuven

2. Data description
Will you generate/collect new data and/or make use of existing data?

- Generate new data
- Reuse existing data

Describe in detail the origin, type and format of the data (per dataset) and its (estimated) volume. This may be easiest in a table (see example) or as a data flow and per WP or objective of the project. If you reuse existing data, specify the source of these data. Distinguish data types (the kind of content) from data formats (the technical format).

WP1: Modeling relative water content at the ecosystem scale

Type of data	Format	Volume	Input/output	How data were created
Land cover map	.tif	30 GB	Input	Provided by MapBiomas; created using Landsat imagery; 30 m spatial resolution; ranging from 1990 to 2020.
Sentinel-1 SAR imagery	.tif	500 GB	Input	Provided by ESA Copernicus programme; 10 m spatial resolution; bimonthly from 2015 to 2022.
Field data	.csv	< 1 MB	Input/output	Variables measured in the field (e.g., vegetation and soil water content, species survey, plant functional traits).
Relative water content maps	.tif	250 GB	Output	Monthly maps from 2015 to 2022 at 10 m spatial resolution.

WP2: Determining ecosystem-scale relative water content thresholds for distinct vegetation types

Type of data	Format	Volume	Input/output	How data were created
Landsat NDVI	.tif	1 GB	Input	Provided by USGS; 30 m spatial resolution; monthly from 2015 to 2022.
MODIS NDVI	.tif	60 MB	Input	Provided by USGS; 250 m spatial resolution; bimonthly from 2015 to 2022.
MODIS LAI	.tif	10 MB	Input	Provided by USGS; 500 m spatial resolution; bimonthly from 2015 to 2022.
MODIS Vegetation Continuous Fields (VCF)	.tif	< 1 MB	Input	Provided by USGS; 250 m spatial resolution; yearly from 2015 to 2022.
MODIS Burned Area product	.tif	5 MB	Input	Provided by USGS; 500 m spatial resolution; monthly from 2015 to 2022.
Disturbance events maps	.tif	5 MB	Output	Maps with the detected disturbance events.

WP3: Assessing the influence of biotic and abiotic factors on relative water content thresholds

Type of data	Format	Volume	Input/output	How data were created
Soil grids	.tif	10 GB	Input	Provided by ISRIC; 250 m resolution; variables such as sand, clay, and silt content, nitrogen concentration, cation exchange capacity.
SPEI	.nc	350 MB	Input	Provided by CSIC; 0.5 ° spatial resolution; monthly from 1901 to 2018.
Biotic and abiotic factors maps	.tif	10 MB	Input/output	Maps of the compiled and derived variables.

3. Legal and ethical issues
Will you use personal data? If so, shortly describe the kind of personal data you will

use. Add the reference to your file in KU Leuven's Register of Data Processing for Research and Public Service Purposes (PRET application). Be aware that registering the fact that you process personal data is a legal obligation.

- No

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

Does your work 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?

- No

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 are in place?

- No

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

For each work package, generated data will be organized in a folder in a structured way (e.g., time series raster data organized inside subfolders) and a text file will be provided containing (1) data type, (2) data format, (3) legend where relevant, and (4) a description of how data were generated. Relevant scripts are also going to be added to the folders.

Will a metadata standard be used? If so, describe in detail which standard will be used. If no, state in detail which metadata will be created to make the data easy/easier to find and reuse.

- No

No standard metadata will be used. However, the following will be provided:

- for field data, a text file containing data collection date, study area coordinates, names of people who contributed in the field campaign, user rights and acknowledgements, and a short description of the sampled variables and their units will be provided;
- for raster data, a text file will be created containing data type, data format, legend where relevant, and a description of how data were generated
- for scripts, a text file containing a date, script developer (and contributors), description of input data needed, description of the output of the script, and user rights and acknowledgements will be provided.

5. Data storage and backup during the FWO project
Where will the data be stored?

The time-stamped master copy of the data will be kept on a OneDrive cloud storage, with a capacity of 2 TB, provided by KU Leuven (https://admin.kuleuven.be/icts/english/services/lio/office365-onedrive-edge). Backup copies will be kept on personal external hard-drives.

How is backup of the data provided?

Scripts and processed data will be stored on OneDrive, in a structured way (i.e., per work package). Unprocessed data will be stored on an external hard-drive, and moreover, a backup of the data stored on OneDrive will be made monthly using this external hard-drive.

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

KU Leuven provides a OneDrive storage capacity of 2 TB. Moreover, an external hard-drive of 2 TB to store unprocessed data and backups was already purchased. Processed data will be saved on the servers of the division and on external hard-drives.

What are the expected costs for data storage and back up during the project? How will these costs be covered?

KU Leuven provides the OneDrive cloud storage for employees for free. The 2 TB external hard-drive was already purchased.

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

The cloud storage provided by KU Leuven is a secure, enterprise cloud storage service with centralized security controls and multi-layered encryption, authorized by KU Leuven.

6. Data preservation after the FWO project
Which data will be retained for the expected 5 year period after the end of the project? In case only a selection of the data can/will be preserved, clearly state the reasons for this (legal or contractual restrictions, physical preservation issues, ...).

All data created during the project will be retained for the expected 5-years period.

Where will the data be archived (= stored for the longer term)?

The data will be stored on the university's central servers (with automatic backup procedures) for at least 5 years, following the KU Leuven RDM policy (https://www.kuleuven.be/rdm).

What are the expected costs for data preservation during the retention period of 5 years? How will the costs be covered?

The data will be stored on the university's central servers. The expected cost for preserving this data is less than 100 euro/year. This cost will be covered by the working budget of Ben Somers, KU Leuven's PI.

7. Data sharing and reuse
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)?

- No

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

All the created outputs (described in section 2) and documented scripts will be made available.

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

- In an Open Access repository

The generated data will be uploaded to Zenodo, while the scripts will be made available on GitHub. Other data will be stored on an internal server.

When will the data be made available?

- Upon publication of the research results

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

The files uploaded to Zenodo and Github will be publicly available under a CC-BY license. Data stored on the university's central servers will be accessible after permission of the promotors.

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

There are no expected costs related to data sharing.

8. Responsibilities
Who will be responsible for data documentation & metadata?

The postdoctoral researcher (Paulo Negri Bernardino) will be responsible for data documentation and metadata.

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

The postdoctoral researcher (Paulo Negri Bernardino) will be responsible for data storage and backup during the project.

Who will be responsible for ensuring data preservation and reuse ?

The postdoctoral researcher (Paulo Negri Bernardino) will be responsible for compiling a folder with all data and corresponding metadata that needs to be preserved. Our division's data storage team will be responsible for storing the data thereafter, with the supervision of the promotors.

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

The promotors bear the end responsibility of updating and implementing this DMP.