TropSOC Database (version 1.1)

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1. Licence

2. Citation

When using the data please cite:

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The data are supplementary material to:

Doetterl S., Asifiwe R.K., Baert G., Bamba F., Bauters M., Boeckx P., Bukombe B., Cadisch G., Cizungu L.N., Cooper M., Hoyt A., Kabaseke C., Kalbitz K., Kidinda L., Maier A., Mainka M., Mayrock J., Muhindo D., Mujinya B.B., Mukotanyi, S.M., Nabahungu L., Reichenbach M., Rewald B., Six J., Stegmann A., Summerauer L., Unseld R., Vanlauwe B., Van Oost K., Verheyen K., Vogel C., Wilken F., Fiener P. Organic matter cycling along geochemical, geomorphic and disturbance gradients in forests and cropland of the African Tropics - TropSOC database v1.0. Copernicus GmbH. https://doi.org/10.5194/essd-13-4133-2021, 2021.

3. Changelog

5 September 2022: release of Version 1.1

The following files were updated for version 1.1 (Finalized August 16th 2022).

Within those files, updates encompass:

- 11_plots_points: Corrections to soil profile classification
- 223_soil_spec: Corrections to units of XRF and ICP-OES measurements + Sand & Silt texture corrected
- 261_parent_material: Corrections to units of XRF measurements
- 271_profiles: Corrections to soil profile classification
- 311_biomass: Renaming "tubers" to tuberous roots
- 323_soil_spec: Corrections to units of XRF and ICP-OES measurements + Sand & Silt texture corrected

Please note all columns are subdivided in the csv files with ";"

For questions, please contact: sdoetterl@usys.ethz.ch (Dr. Sebastian Doetterl, Project Leader)

4. Data Description

We provide version 1.0 of an open access database created as part of the project **"Tropical soil organic carbon dynamics along erosional disturbance gradients in relation to variability in soil geochemistry and land use" (TropSOC).** TropSOC v1.0 contains spatial and temporal explicit data on soil, vegetation, environmental properties and land management collected from 136 pristine tropical forest and cropland plots between 2017 and 2020 as part of several monitoring and sampling campaigns in the Eastern Congo Basin and the East African Rift Valley System. The results of several laboratory experiments focussing on soil microbial activity, C cycling and C stabilization in soils complement the dataset to deliver one of the first landscape scale datasets to study the linkages and feedbacks between geology, geomorphology and pedogensis as controls on biogeochemical cycles in a variety of natural and managed systems in the African Tropics.

4.1. Sampling method

Sampling procedures are described in each metadata description .pdf file accompanying a specific .csv file that represents a methodologically distinct subset of the database. A general overview of field sampling procedures and design is given in the related submission to ESSD which describes the dataset as a whole.

4.2. Analytical procedure:

Analytical procedures are described in each metadata description .pdf file accompanying a specific .csv file that represents a methodologically distinct subset of the database.

4.3. Data processing

Data processing and quality control are described in each metadata description .pdf file accompanying a specific .csv file that represents a methodologically distinct subset of the database.

5. File description

5.1. File inventory

Datasets are given as tab-delimited .csv files. For each .csv file the metadata describing data structure and assessment methods are given in a .pdf file of the same name. Moreover, additional .pdf files for each main section of the database (basic information, forest, cropland, and microscale meteorology) are given, providing an overview of the structure within each section. Note that the '**basic information**' section of the database provides the linkages between individual data, e.g. from soil analysis and the location and/or soil depths where these samples were acquired (for linkages see also Figure 1).

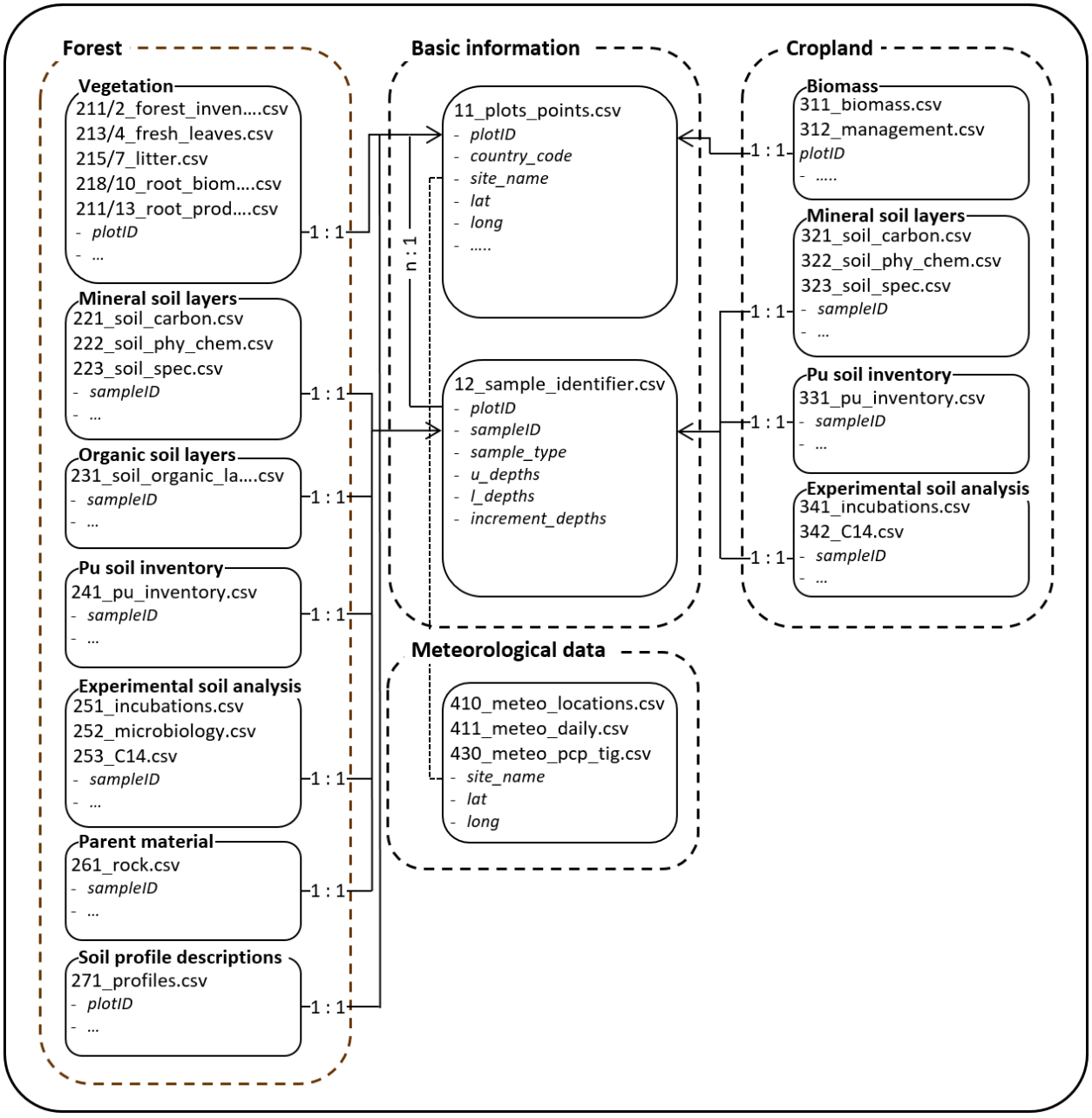

Figure 1. Overview of linkages between datasets in the TropSOC database v1.0. Note that for each data .csv-file an .pdf-file is given detailing the metadata of the respective data sheet.

5.2. File naming convention

Files are numbered hierarchically and named following the domain of the data with being part of: 1 Basic Information; Forest Data; Cropland Data; Micrometeorological Data.

Table 1. Structure of the TropSOC database. For each topic a .pdf file is given that entails an overview for the available data sets. Each dataset comprises a data-containing .csv file and an additional metadata-containing .pdf file of the same name.

Introduction & structure of the data base	0_intro_structure.pdf
1. Basic information	**1_basic_information.pdf**
1.1. Location and basic background information for all plots and points where data were collected	11_plots_points.csv/pdf
1.2. Data base internal connection between location of plots and points and soil data from different soil depths	12_sample_identifier.csv/pdf
2. Forest	2_forest.pdf
2.1. Vegetation	
2.1.1. Forest inventory	211_forest_invent.csv/pdf
2.1.2. Forest inventory aggregated	212_forest_invent_agg.csv/pdf
2.1.3. Fresh leaves chemistry	213_fresh_leaves.csv/pdf
2.1.4. Fresh leaves chemistry aggregated at species level	214_fresh_leaves_agg.csv/pdf
2.1.5. Litter fall	215_litter.csv/pdf
2.1.6. Litter fall aggregated to seasonal values	216_litter_seasonal.csv/pdf
2.1.7. Litter fall aggregated to annual values	217_litter_annual.csv/pdf
2.1.8. Root biomass	218_root_biomass.csv/pdf
2.1.9. Root biomass aggregated to seasonal values	219_root_biomass_seasonal.csv/pdf
2.1.10. Root biomass aggregated to annual values	2110_root_biomass_annual.csv/pdf
2.1.11. Root productivity	2111_root_prod.csv/pdf
2.1.12. Root productivity aggregated to seasonal values	2112_root_prod_seasonal.csv/pdf
2.1.13. Root productivity aggregated to annual values	2113_root_prod_annual.csv/pdf
2.2. Mineral soil layers	
2.2.1. Soil carbon and nitrogen including organic matter fractions	221_soil_carbon.csv/pdf
2.2.2. Physicochemical soil properties from laboratory analyses	222_soil_phy_chem.csv/pdf
2.2.3. Physicochemical soil properties from NIR-MIR spectroscopy	223_soil_spec.csv/pdf
2.3. Organic soil layers	231_soil_organic_layer.csv/pdf
2.4. Pu soil inventory	241_pu_inventory.csv/pdf
2.5. Soil experiments	
2.5.1. Incubation experiments	251_incubation.csv/pdf
2.5.2. Microbial biomass and enzyme experiments	252_microbiology.csv/pdf
2.5.3. ^{14}C data from bulk soil and CO_2 measurements	253_c14.csv/pdf
2.6. Parent material	261_rocks.csv/pdf
2.7. Soil profile descriptions	271_profiles.csv/pdf
3. Cropland	3_cropland.pdf
3.1. Biomass & management	
3.1.1. Biomass yield based on plot data	311_biomass.csv/pdf
3.1.2. Land management data	312_management.csv/pdf
3.2. Mineral soil layers	
3.2.1. Soil carbon and nitrogen including organic matter fractions	321_soil_carbon.csv/pdf
3.2.2. Physicochemical soil properties from laboratory methods	322_soil_phy_chem.csv/pdf
3.2.3. Physicochemical soil properties from NIR-MIR spectroscopy	323_soil_spec.csv/pdf
3.3. $^{239+240}Pu$ soil inventory	331_pu_inventory.csv/pdf
3.4. Soil experiments	
3.4.1. Incubation experiments	341_incubation.csv/pdf
3.4.2. ^{14}C data from bulk soil and CO_2 measurements	342_c14.csv/pdf
4. Micrometeorological data	4_meteo.pdf
4.1. Locations of meteorological stations	410_meteo_locations.csv/pdf
4.2. Daily meteorological data from six meteorological stations	420_meteo_daily.csv/pdf
4.3. High resolution 5 min triggered precipitation data	430_meteo_pcp_tig.csv/pdf

5.3. Description of data tables

Data tables including, units, parameters, naming routines and description are given in each metadata description .pdf file accompanying a specific .csv file that represents a methodologically distinct subset of the database.

6. References

The dataset is described in detail as part of the following submission:

Doetterl S., Asifiwe R.K., Baert G., Bamba F., Bauters M., Boeckx P., Bukombe B., Cadisch G., Cizungu L.N., Cooper M., Hoyt A., Kabaseke C., Kalbitz K., Kidinda L., Maier A., Mainka M., Mayrock J., Muhindo D., Mujinya B.B., Mukotanyi, S.M., Nabahungu L., Reichenbach M., Rewald B., Six J., Stegmann A., Summerauer L., Unseld R., Vanlauwe B., Van Oost K., Verheyen K., Vogel C., Wilken F., Fiener P. Organic matter cycling along geochemical, geomorphic and disturbance gradients in forests and cropland of the African Tropics - TropSOC database v1.0*.,* Copernicus GmbH. https://doi.org/10.5194/essd-13-4133-2021, 2021.

The following references use part of the data presented here for a scientific interpretation:

Bukombe B., Fiener P., Hoyt A., Doetterl S. Controls on heterotrophic soil respiration and carbon cycling in geochemically distinct African tropical forest soils. *Soil Discussion (pre-print).* https://doi.org/10.5194/soil-2020-96, 2021.

Kidinda LK, Olagoke FK, Vogel C, Kalbitz K, Doetterl S. Patterns of microbial processes shaped by parent material and soil depth in tropical rainforest soils*. Soil Discussion (pre-print*). https://doi.org/10.5194/soil-2020-80, 2020.

Reichenbach M., Fiener P., Garland G., Griepentrog M., Six J., Doetterl S. The role of geochemistry in organic carbon stabilization in tropical rainforest soils. *Soil Discussion* (*pre-print).* https://doi.org/10.5194/soil-2020-92, 2021.

Wilken F., Fiener P., Ketterer M., Meusburger K., Muhindo D.I., Van Oost K., Doetterl S. Assessing soil erosion of forest and cropland sites in wet tropical Africa using $^{239+240}$Pu fallout radionuclides. *Soil Discussion (pre-print).* https://doi.org/10.5194/soil-2020-95, 2020.