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Can we use citizen science to upscale soil data collection?

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BONARES

UFZ HELMHOLTZ Zentrum für Umweltforschung

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BIOÖKONOMIE

Who are we and what are our main goals?

Expedition Erdreich is a Citizen (Soil) Science Campaign in 2020-2021.

We want the public to recognize the value, beauty, and functions of soils.

We also will assess to what extent Citizen Science soil data can be used for large scale scientific surveys and modeling.

Project Partners:

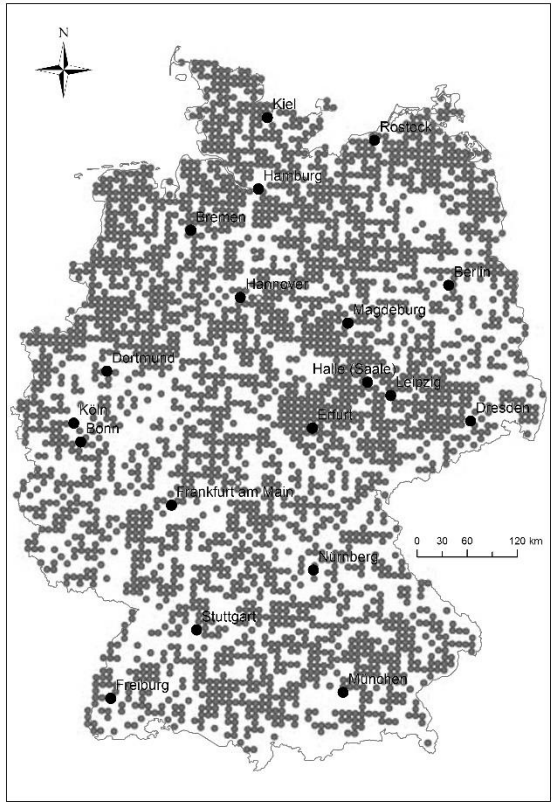
Soil Science
UFZ – Helmholtz-Centre for Environmental Research
BonaRes

Didactics
IPN – Leibniz Institute for Science and Mathematics Education

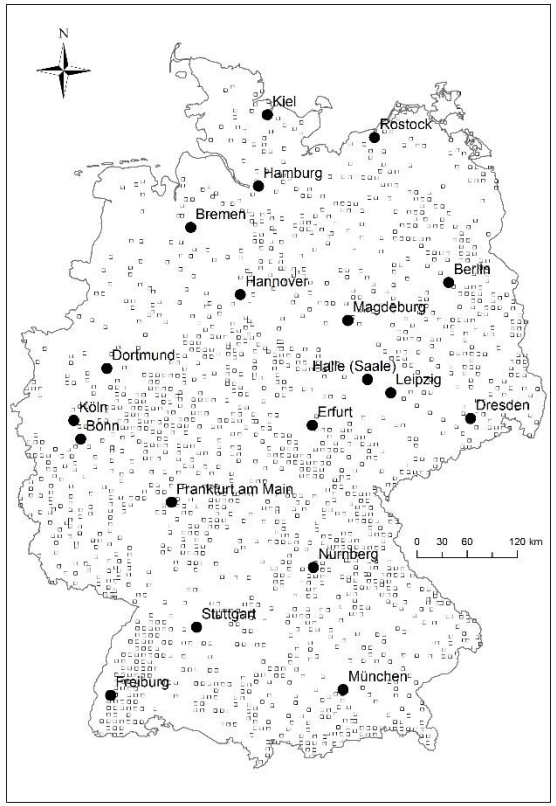
Public Relations
familie redlich – Agentur für Marken und Kommunikation

Coordination/Funding
DLR – Project Management Agency
BMBF – Federal Ministry of Education and Research

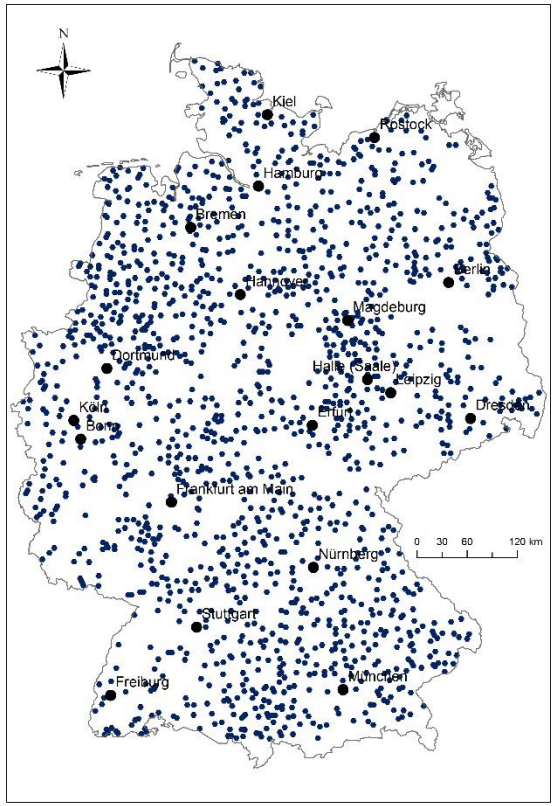
Scientific soil surveys in Germany



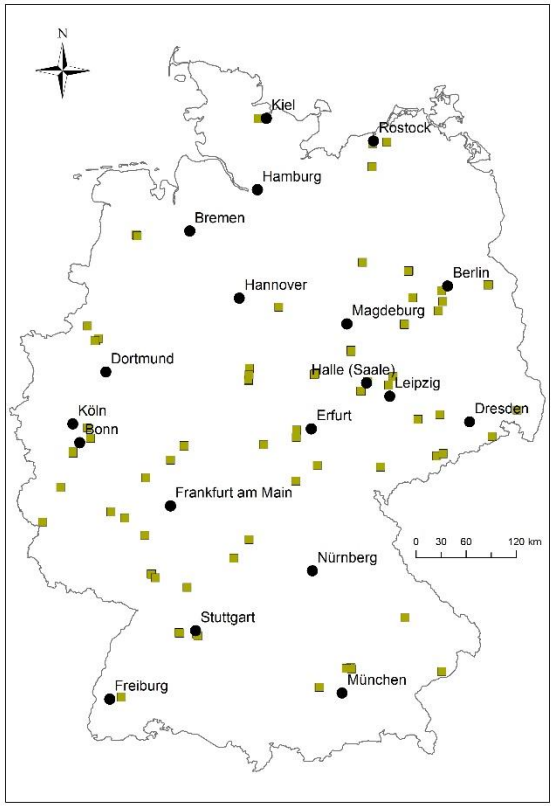
National Soil Inventory
Agriculture (n=3104)
Source: Thuenen 2019
Data: partly open access



National Soil Inventoriy
Forest (n=1859)
Source: Thuenen 2019
Data: no open access

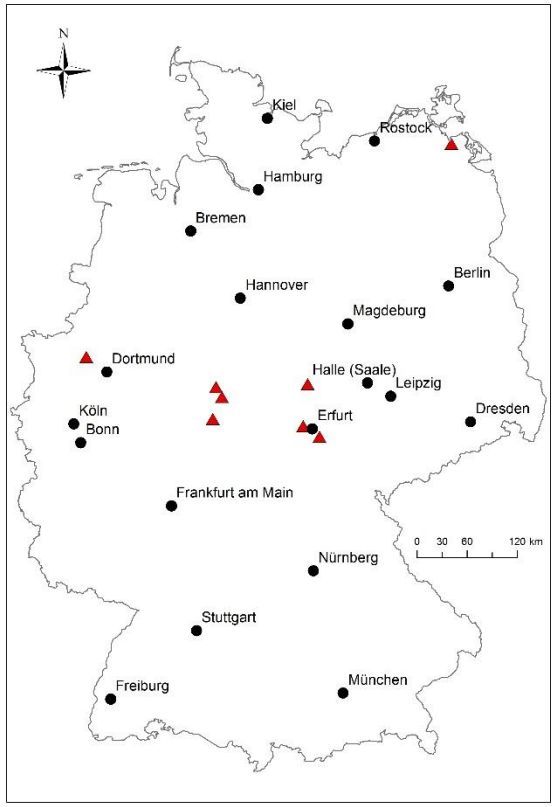


EU Soil Survey
Different land uses (n=1549)
Source: JRC 2012
Data: open access

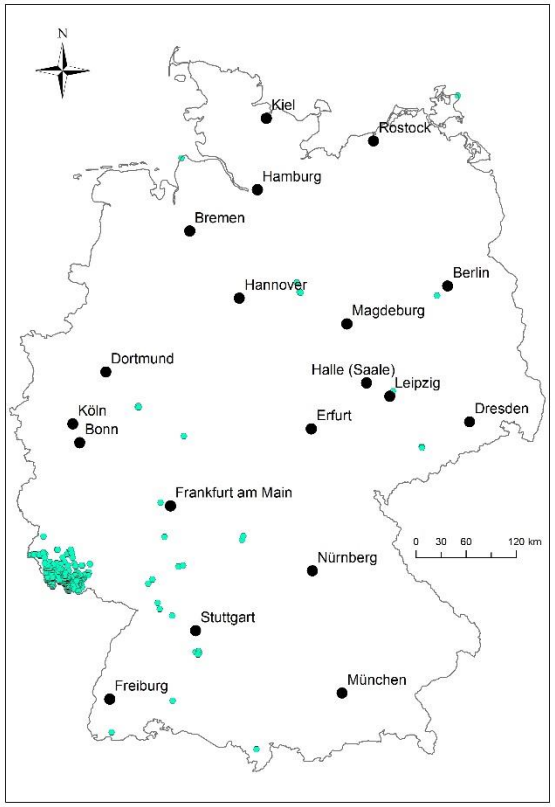


Long term field experiments
Agriculture (n=140)
Source: Grosse&Herold 2020
Data: partly open access

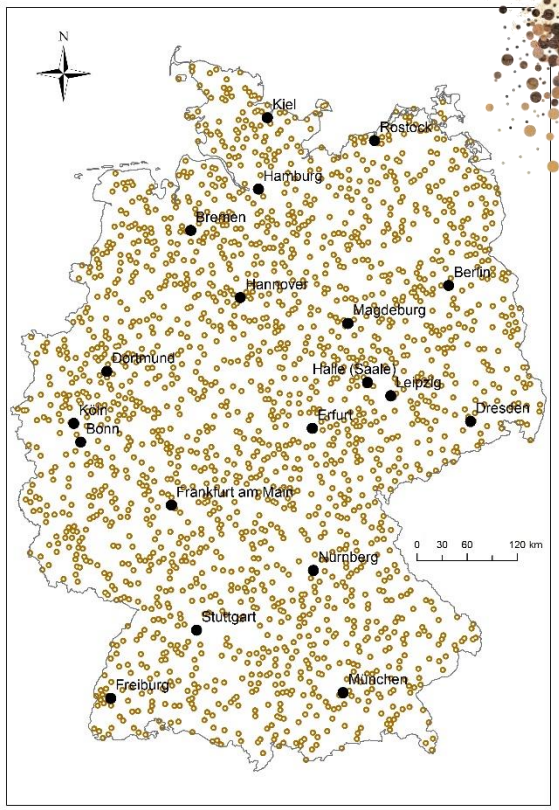
Citizen Soil Science in Germany



Teatime4science.org
Different land uses (n=8)
Source: teatime4science.org
Data: open access



Sample das Saarland
Different land uses (n≈320)
Source: www.hips.saarland
Data: no open access



Expedition Erdreich (projected!)
Different land uses (n>1500)

Data: open access

What are we doing?

Citizen Science Infrastructure:

soil survey protocol; action kit; online infrastructure for communication and data management

Collecting soil information/ data management:

collected features: location; land use; sun exposure; tea bag index (TBI); soil texture; pH-value; soil color; root density; soil macrofauna; and additional voluntary information

Networking / public relations:

partnering with schools as well as farmers, food, and foresters organisations; workshop series; online course; summer school; website; social media

Quality control / research:

data assessment and data flagging; for research projects please see next slide

Research & Cooperation

Reference surveys and tea bag index measurements

gradients (atmospheric, soil texture, land use, agricultural practices)

Tea Bag Index - Method development

in case Lipton will change tea composition we could run a largescale survey with alternative tea compositions

Tea Bag Index and soil respiration research

Which co-variables can best explain TBI values and therefore soil respiration in Germany?
Do soil datasets compiled by citizen scientists meet scientific criteria?
Can citizen science soil surveys contribute to develop sustainable soil management strategies?
Which role can up-scaled citizen science soil surveys play for soil monitoring in Germany?
Can citizen science soil surveys supplement national reporting (e.g. SDG 15.3)?

What do participants gain from it?

photo credits: familie redlich; www.expedition-erdreich.de; Christian Schneider

What do participants gain from it?

The fun and satisfaction of taking part in an important scientific project!

Educational materials
for schools and individual use (different levels of knowledge)

Soil assessment kits
which can also be used afterwards

Feedback about soil characteristics and functions at their respective locations
online feedback based on the personal data uploaded by participants

Background information on soils and land use
Essays, interviews, and foto documentation from farmers, gardners, scientists, environmentalists

Communication and discussion forum on sustainable soil and land use
for example: farmers meet pupils, foresters meet eco hipsters, land owners meet land useres

Conclusion & Challenges

Can we use citizen science to upscale soil data collection?

We tried to show what we think is needed to upscale citizen soil science to a scale that covers all of Germany and is comparable to scientific soil monitoring efforts.

Open Challenges:

How do we reach and address different target groups and different levels of knowledge?
How do we address the complexity of soils in soil education?
How do we communicate data management procedures to keep the project as transparent as possible?
How do we bring together our goal to collect high quality soil data AND involve people new to the field of soil assessment?
Which protocols of data quality management and data flagging should be applied? How can these methods be communicated to citizen scientists?

Thank you for your attention and we would appreciate your feedback!

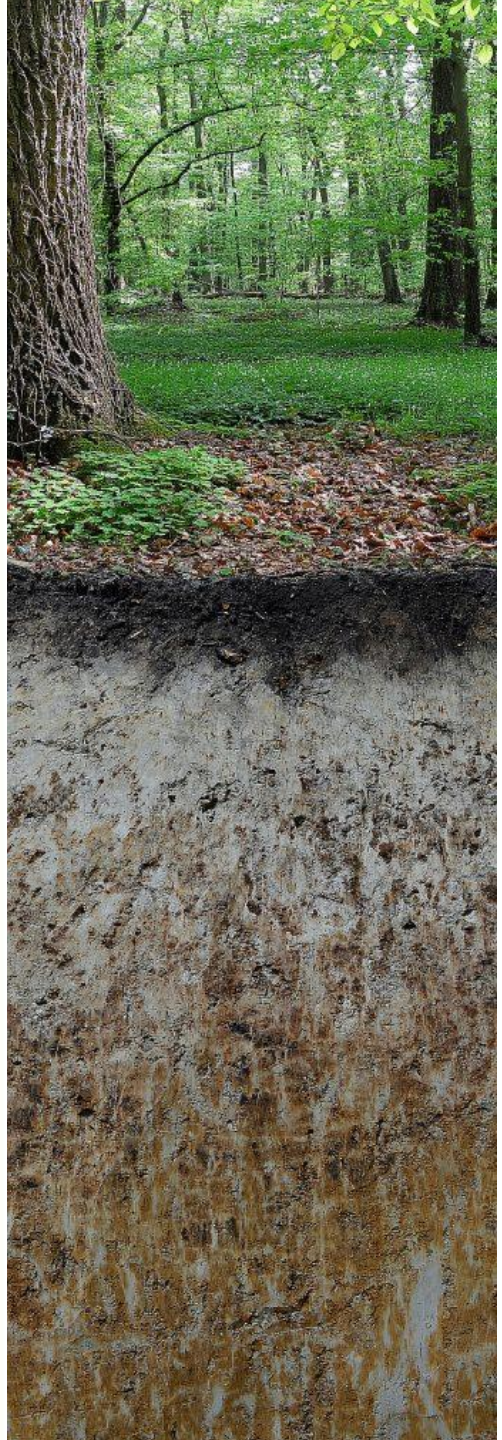


photo credits:
Kuratorium Boden des Jahres
Christian Schneider

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