

Soil biodiversity monitoring in the open landscape across Austria with a focus on earthworms and soil microorganisms: opportunities and challenges

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Problem: Soil biota is not taken into account by existing programs of biodiversity monitoring in Austria

Goal: To determine the causes of various indicators of soil biodiversity in the agricultural landscape

Objectives:

- A systematic monitoring of earthworms (EW) in the agricultural landscape
- Analysis of factors determining the occurrence of earthworms
- Creating of a Red List of earthworms for Austria on the basis of historical and current data

Historical context

General

- Earthworms in Austria are not systematically studied
- We collected historical earthworms data for Austria starting from 1890 (Figure 1, 2)

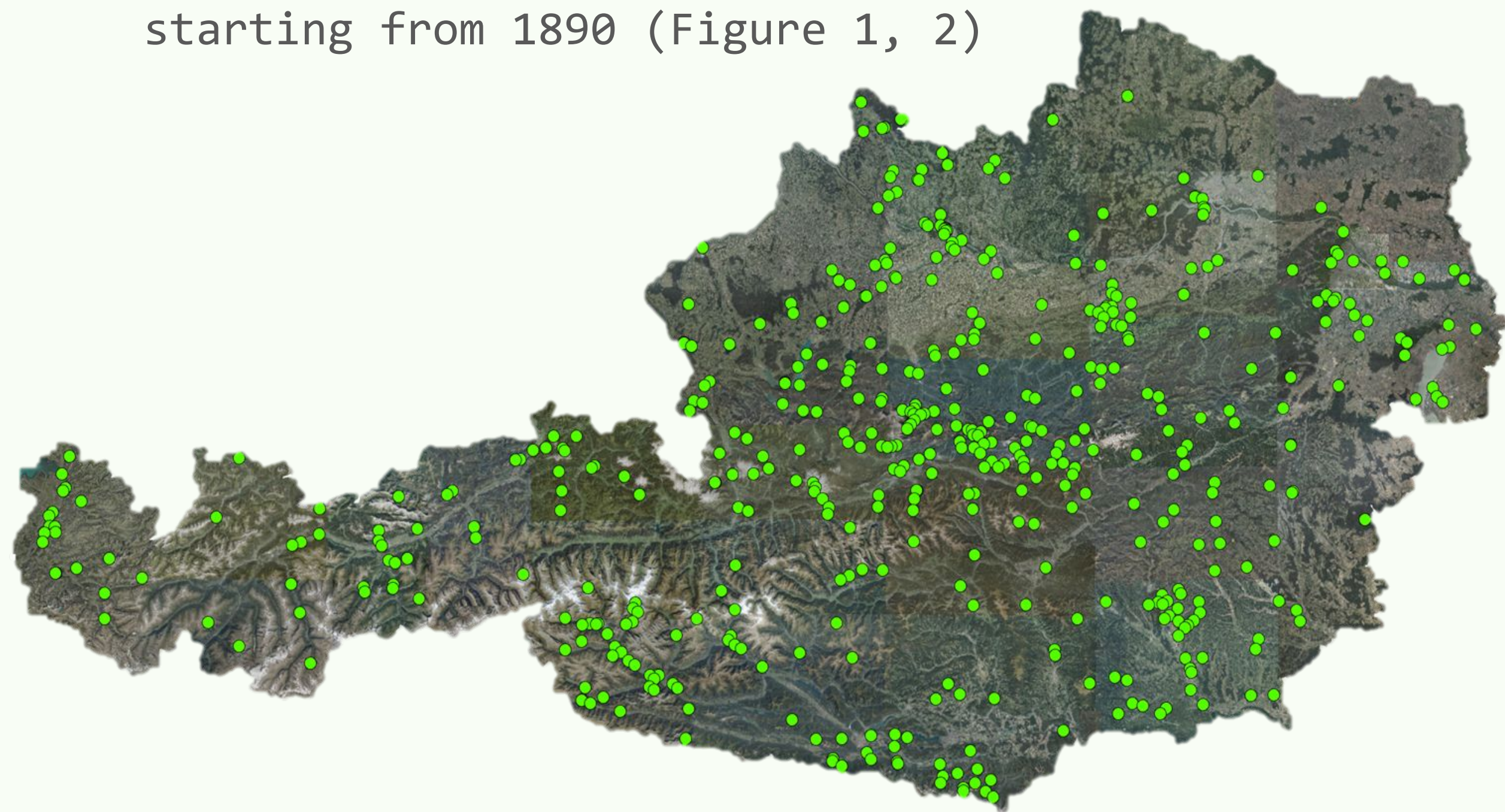


Figure 1: Locations with EW reports from 1890 onwards

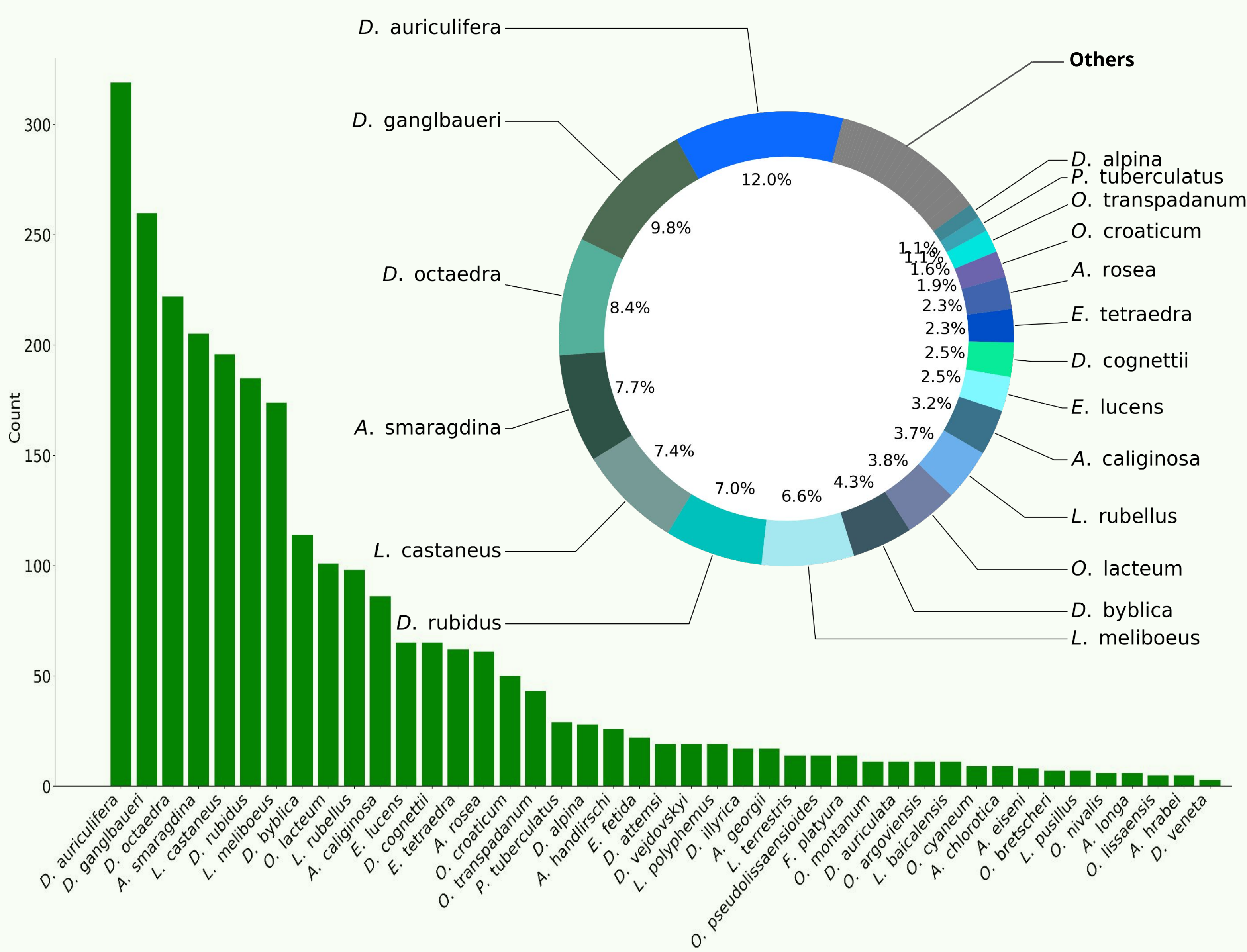


Figure 2: Number of times and rate at which particular EW species were reported in Austria from 1890 onwards (nomenclature as used in different reports)

Challenges

- Species naming is not uniform: some of the species have about 10 different names
- The sampling area cannot be precisely estimated, in the best case toponyms are given
- Some of the settlements nowadays have different names
- Sampling sites spread around the country unevenly
- No uniform sampling methodology was used

Section conclusion

- Historical data provide a taxonomic overview, but abundance and biomass are often missing
- More systematic and methodological approach to sampling is necessary

Ongoing project

Sampling campaign

- 200 quadrants across the country (Figure 3)
- 1 arable and 1 grassland site per quadrant
- EW sampling with hand-sorting (20x20x20 cm, 3 replicates; soil coring) (Figure 4)

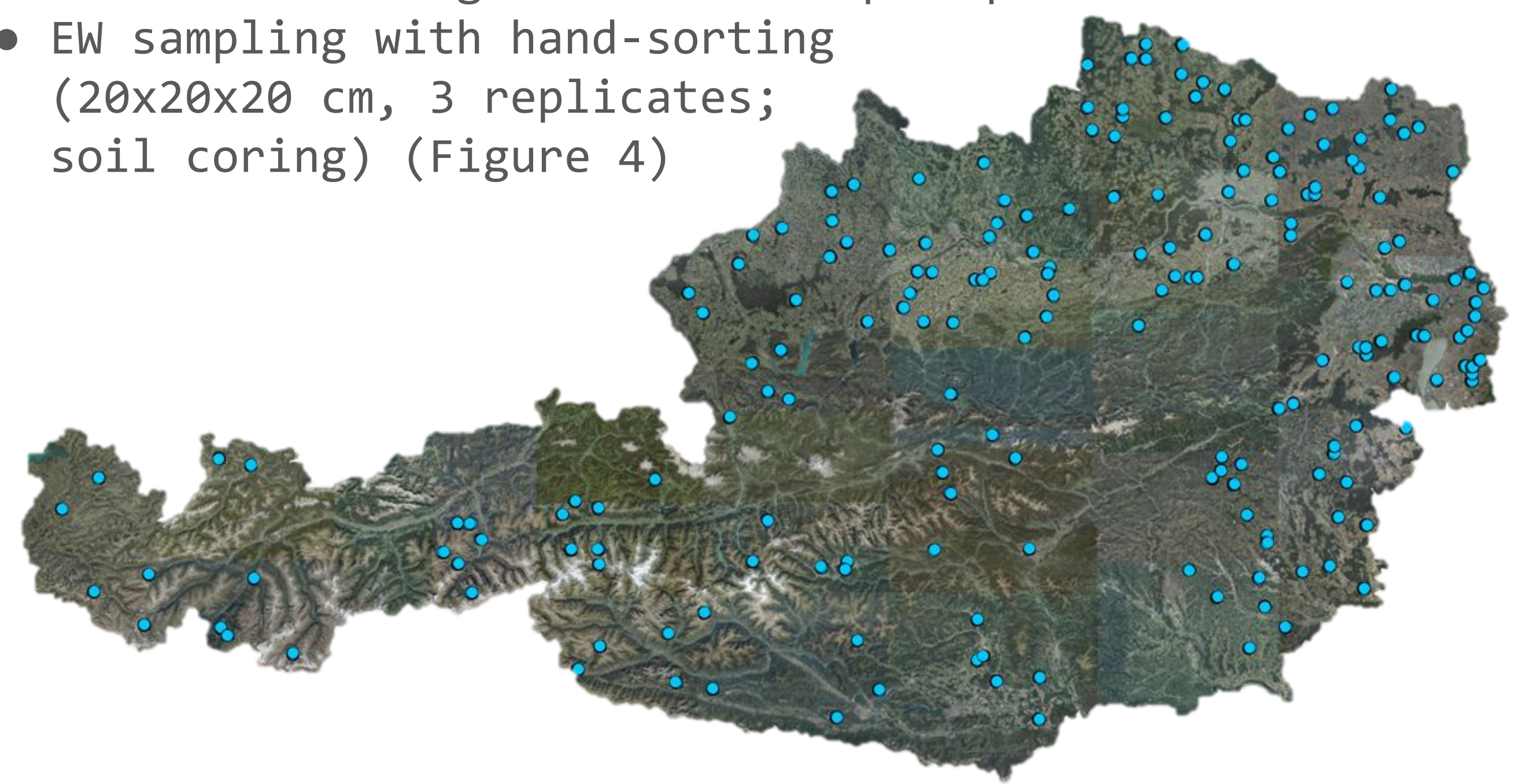


Figure 3: Distribution of the sampling sites across Austria

Analysis for

- Earthworms: species diversity, abundance, and biomass
- Microorganisms (MO): biomass and necromass
- Soil parameters: pH, texture, SOM, bulk density, etc

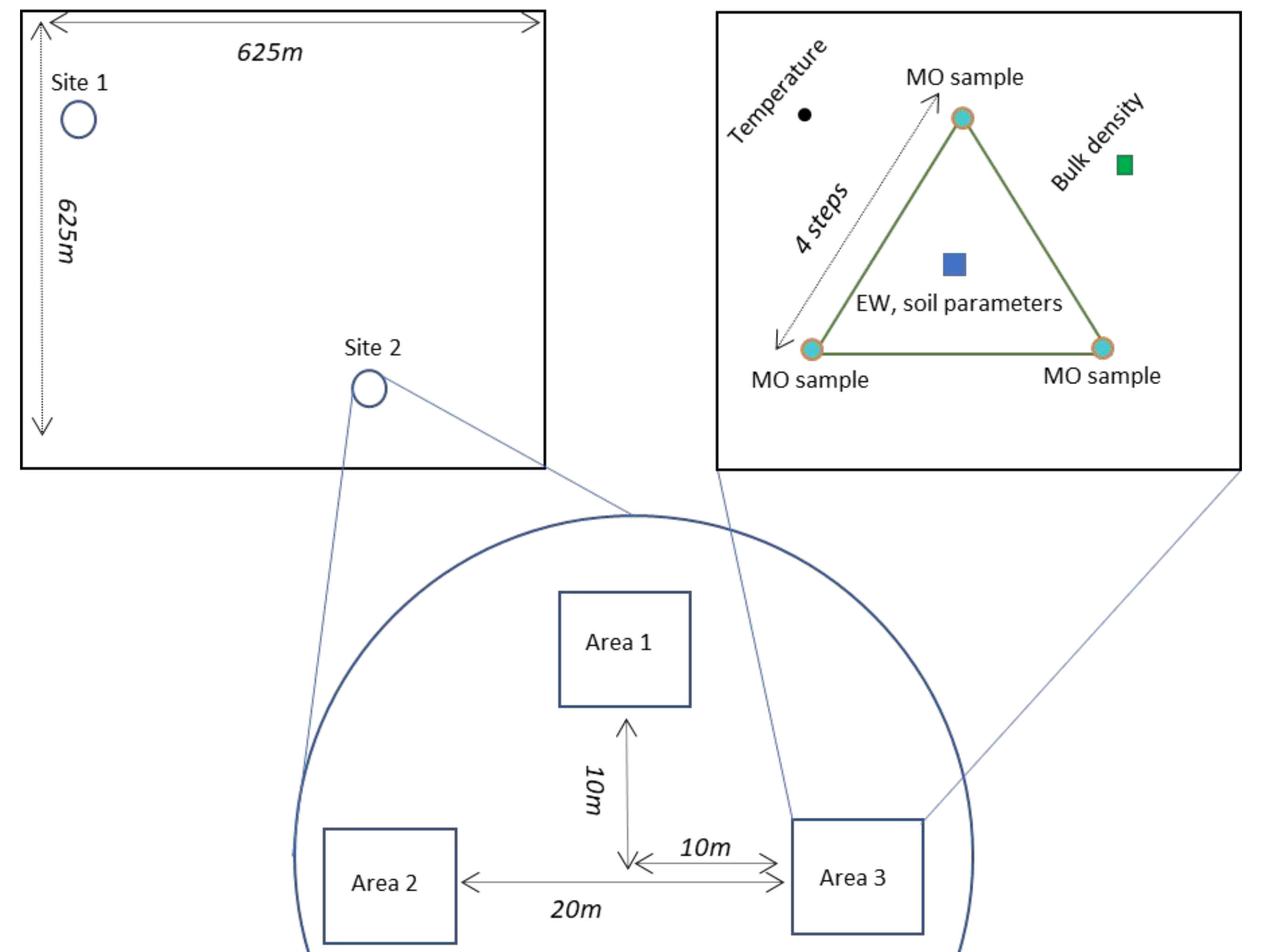


Figure 4: Sampling scheme per quadrant

Challenges

- Permission of land owners is required prior to the sampling
- Accessibility of some sites is limited due to remoteness
- Weather conditions might interfere with the sampling

Opportunities

- Creating of first Austrian EW catalogue
- Broad involvement of stakeholders such as farmers, students, and the public
- Laying foundation for EW Red Book creation for Austria