

# ProbeField - A novel protocol for robust in field monitoring of carbon stocks and soil fertility based on proximal sensors and existing soil spectral libraries

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**Project start:** November 2021

**Duration:** 36 months

**Coordinator:** Bo Stenberg (SLU, Sweden)

14 partners in 12 countries with varying kinds of soil spectral libraries (Figure 1)

**Aim:** Quick and simple soil analyses directly in the field through proximal sensing (visible and near infrared (vis-NIRS), 400-2500nm) (Figure 2)

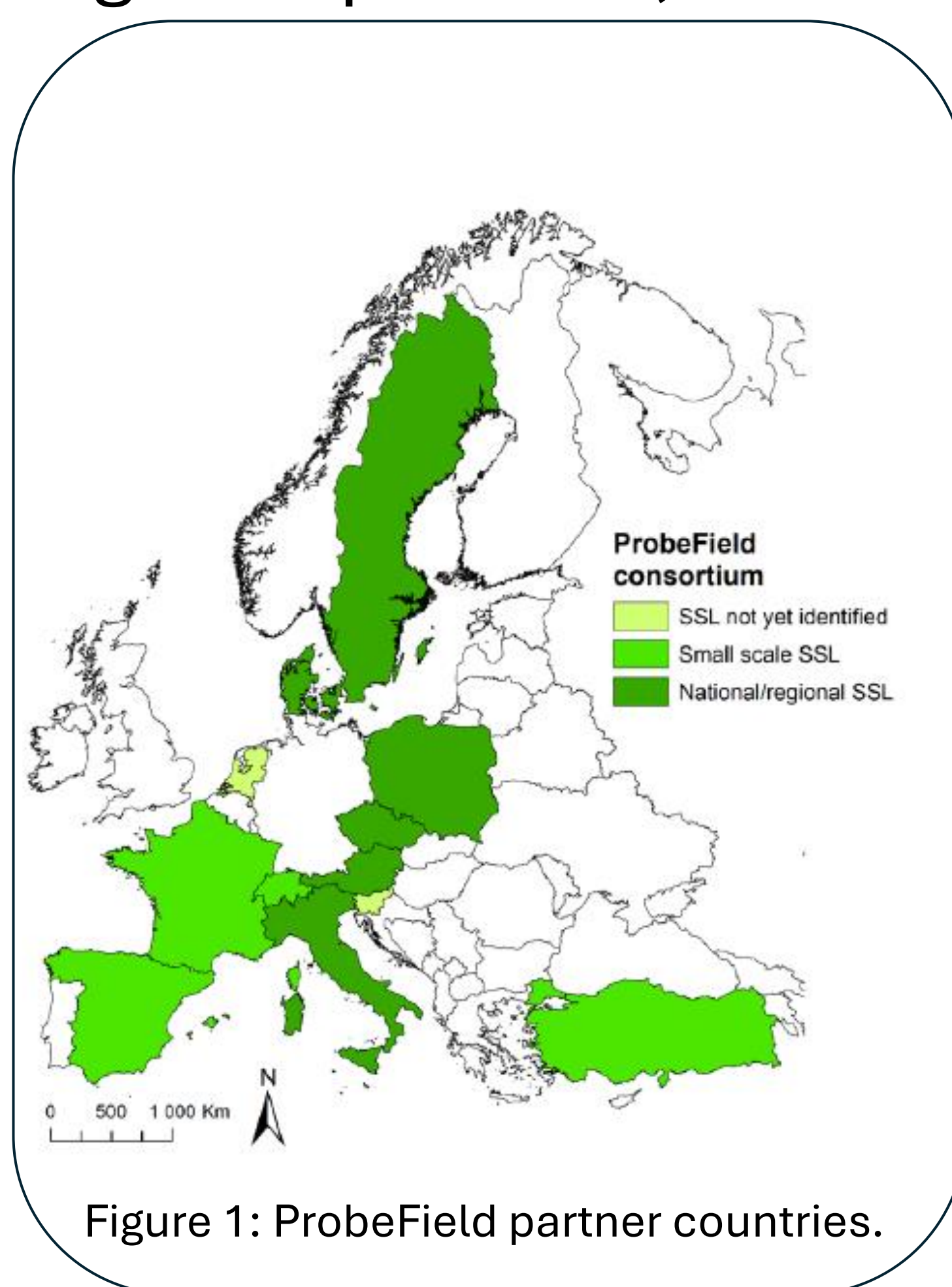


Figure 1: ProbeField partner countries.

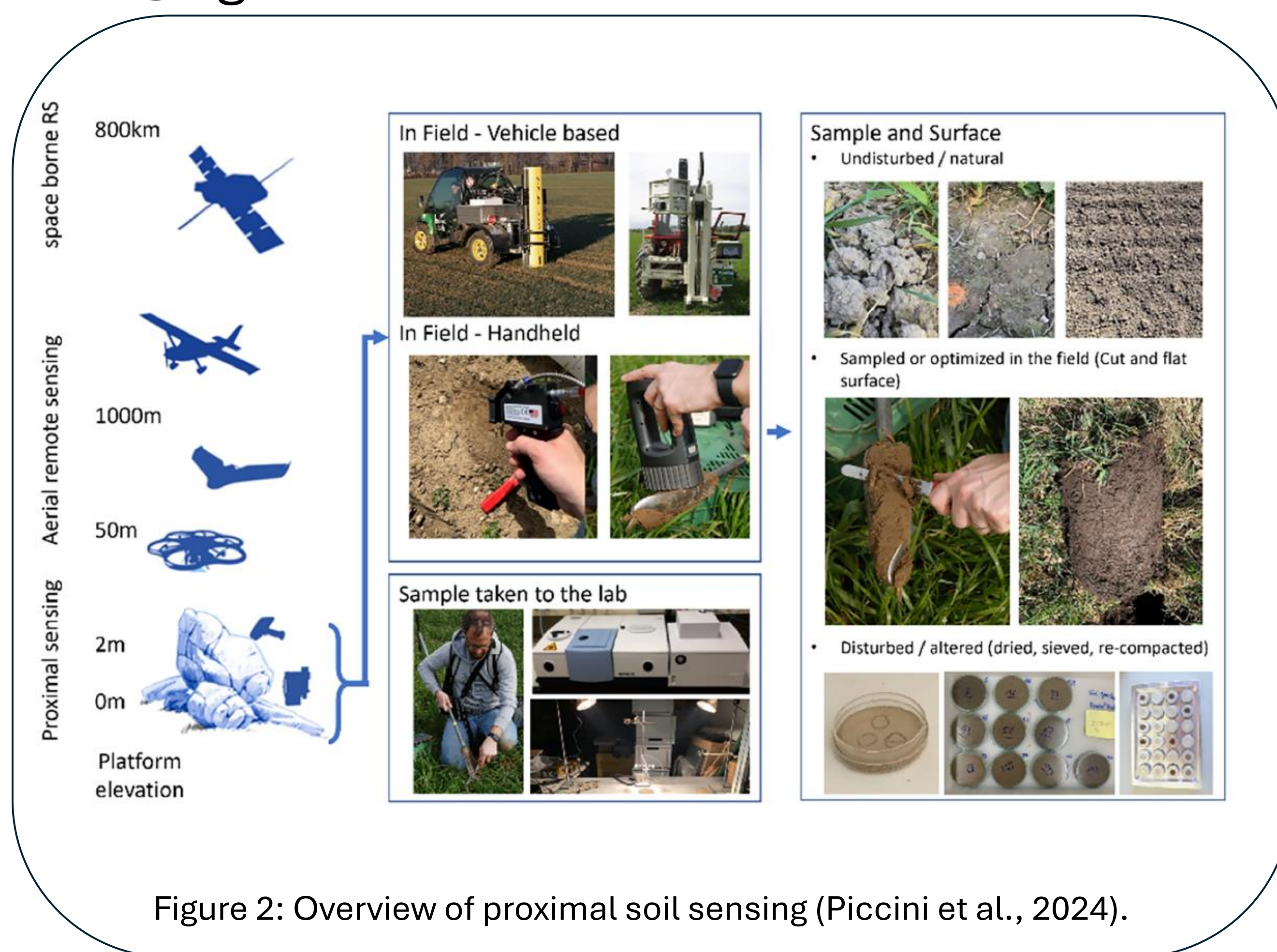


Figure 2: Overview of proximal soil sensing (Piccini et al., 2024).

## Activities in Austria

- Investigation on available soil spectral methods (T2.1, Figure 3, Piccini et al., 2024)
- The build-up of the Austrian Soil Spectral Library at AGES (T2.2)
- Testing of the ProbeField field protocol at the AGES tillage trial in Fuchsenbigl (WP2 & WP3, in cooperations with HBLFA Raumberg-Gumpenstein, Figure 4)
- Workshop „NIRS in different cropping systems“ in Poland in May 2024 (T2.5)

## Publications in Austria

- MSc thesis by Magdalena Bieber „VisNIR spectroscopy of agricultural soils for assessing carbon fractions and management practices“ November 2023
- Puccini et al., 2024 In-field soil spectroscopy in Vis–NIR range for fast and reliable soil analysis: A review. Eur J Soil Sci. 2024;75:e13481. <https://doi.org/10.1111/ejss.13481>

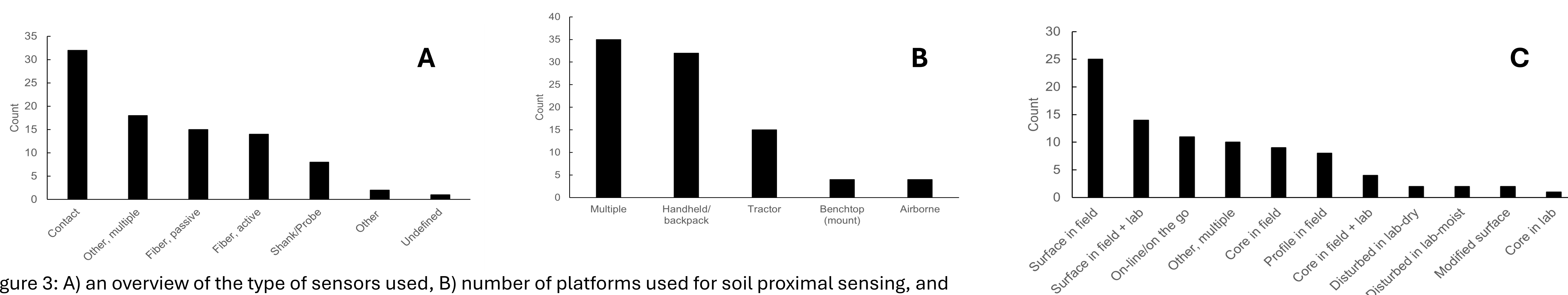


Figure 3: A) an overview of the type of sensors used, B) number of platforms used for soil proximal sensing, and C) soil scanning approaches (Piccini et al., 2024).

## Field protocol, final version for 2023

### Goal of this protocol/this exercise

The goal of this first version of the protocol is three-fold: a) to elaborate the effects of different scanning options and soil surface pre-treatments on the spectra (compared to predictions from dried and sieved (<2mm) laboratory spectra), b) to produce input data for the modelling and model testing for WP 3, and c) serve as initial draft for part of the final protocol.

### Testing the effects of soil surface pre-treatments and scanning position

The following treatments will be investigated:

- Surface – least possible treatment
  - Surface – flattened/compacted
  - Cut – along core/spade surface
  - Mixed – field moist
  - Air dry – unsieved
  - Air dry – sieved <2 mm
  - If your Soil Spectral Library (SSL) protocol requires a different procedure, scan soil according to that protocol.
- For each treatment 5 replicate scans with a vis-NIR spectrometer with contact probe will be collected following the schematic below



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Figure 4: Testing of the ProbeField field protocol at the AGES tillage trial in Fuchsenbigl in July 2023.