HORIZON-MISS-2021-SOIL-01-01 /
Preparing the ground for healthy soils:
Building capacities for engagement, outreach and knowledge
PREPSOIL – 2022-2025

PREPSOIL DELIVERABLE

Title	PREPSOIL workshop report - Earth observation for soil health monitoring; obstacles and proposals in overcoming them
Work package no:	5
Deliverable Related no:	D5.2
Deliverable no:	
Deliverable description:	Addition to D5.2, which contains a review of scientific knowledge (bibliography, expert opinions, current EU projects), an inventory of the technological resources mobilised (vectors, sensors, current and planned products, services), and the identification of obstacles to greater use of Earth observations for soil monitoring and measurement needs to reduce/minimise these difficulties.
Due date:	30.06.2024
Submission date:	Addition to D5.2 published on 25 June 2025
Version:	Addition to D5.2
Dissemination level:	PU
Authors:	Fenny van Egmond
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Project acronym: **Project name:**	**PREPSOIL** **Preparing for the 'Soil Deal for Europe' Mission**
Project number:	**101070045**
Call topic:	**HORIZON-MISS-2021-SOIL-01-01**
Type of action:	**HORIZON-CSA**

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the European Union

Contributors

Name	Organisation & Country
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Revision history

Version	Date	Reviewer	Modifications
01	22 June 2025	Pierre Renault, INRAE, France	textual

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Introduction

Wageningen Research organized a workshop on the potential and obstacles concerning the use of Earth Observation for soil health monitoring, as was done in other countries as well in the context of the PREPSOIL project, task 5.2. The WR workshop did not have a national focus but was instead aimed at gaining insights on the topic from the international proximal soil sensing community. This community is very knowledgeable on the potential of spectroscopy and other sensing techniques for measuring soil properties relevant to soil health and agricultural land uses, mostly at smaller scales like fields, farms, regions. Although the focus of the community is on proximal soil sensing, meaning sensing soil while being either in contact with, driving over, or flying over the soil with low altitudes, many of the participating scientists and interested users also use satellite imagery. Either for direct sensing, or as covariate to other data sources in a digital soil mapping approach, or sometimes as data layer in sensor fusion approaches. At the Sixth Global Proximal Soil Sensing Workshop in Ghent, Belgium from 14 to 17 October 2024, the participants were invited to participate to a dedicated online PREPSOIL workshop in the context of T5.2.

Method and participation

The workshop took place on 7 November 2024 in an online format. The time was selected to accommodate the European and American time zones. It is possible that potential participants from more Eastern time zones could not attend due to the scheduled time (16 hr CEST). The workshop lasted for 1,5 hours and was attended by 9 people. Excluding the organizer there were 2 participants from Wageningen Research, the Netherlands, 3 from ISRIC-World Soil Information, the Netherlands but international participants, 1 from University of Ghent, Belgium, 1 from IRDA, Canada, 1 from Agrometius, Belgium. Of the participants 5 represent research institutes, 1 a university, 1 a research institute directed connected to a provincial government and 1 an agricultural advisory company.

The agenda was:

- Introduction
- Introductory presentation
- Discussion around two questions: obstacles and solutions for EO use
- Wrap-up

The introductory presentation is attached to this report as annex 1. In this presentation the PREPSOIL project was introduced. This was followed by a recollection of the relevance of soil and soil health for the Sustainable Development Goals and crucial ecosystem services, the threats to soil health and legislative action undertaken to remedy these threats in combination with the need for soil monitoring. After this identification of the problem challenge possible solutions from the domain of Earth Observation for soil sensing were presented. This included some results on identified obstacles and user needs from the CUP4SOIL project funded by the FPCUP (Framework Partnership Agreement on Copernicus User Uptake) program.

The introduction set the scene for the main objective of the workshop: to discuss around two central questions:

1. With regard to your needs (spatial resolution, revisit frequency, accuracy), identify bottlenecks (scientific, technological, technical, skills …) to greater use of satellite Earth Observations (EO) and CLMS and/or Galileo/EGNOS products for soil monitoring;
2. Propose measures to reduce/minimize these difficulties, ranking them (subjectively) successively (i) according to their supposed impact on the bottlenecks, and (ii) according to their ease - or even cost - of implementation. (We can imagine that these two criteria will be used by the people in charge of prioritizing these measures).

The workshop concluded with the provision of links to the results of the workshops in other countries, the announcement of the virtual discussion group on this topic, and an outlook on the activities of PREPSOIL on the topic of soil monitoring: ‘MONITORING: Providing direction and capacities for the future harmonized soil health monitoring mechanisms’ including the link to more information.

Results

The discussion focused around the two questions posed:

1. With regard to your needs (spatial resolution, revisit frequency, accuracy), identify bottlenecks (scientific, technological, technical, skills …) to greater use of satellite Earth Observations (EO) and CLMS and/or Galileo/EGNOS products for soil monitoring;
2. Propose measures to reduce/minimize these difficulties, ranking them (subjectively) successively (i) according to their supposed impact on the bottlenecks, and (ii) according to their ease - or even cost - of implementation. (We can imagine that these two criteria will be used by the people in charge of prioritizing these measures).

Main obstacles identified and/or topics that were mentioned by the participants as responses to these questions and which were discussed were:

- Cloud cover
- Resolution
- General usage constraints

Clouds

Cloud cover is reported as a major bottleneck to the use of EO. The example provided was that only 5 images of the 48 Sentinel 2 images taken in a growing season in Belgium were usable. As solution, cloud removal algorithms were mentioned, but this only results in averages over a certain area and it was mentioned that the algorithms should be verified by a trusted organization. Snow cover was also mentioned as an obstacle in northern regions, as well as the coverage of the soil with vegetation for most of the year in temperate regions, limiting the number of days in which the soil itself can be seen. This results in a main application of EO in relation to soil monitoring being to study the differences in vegetation, as a proxy for differences in the soil.

Resolution

Resolution was not indicated as a limiting factor. In fact, it was stated that very high resolution imagery is not needed for a lot of applications. Changing the fertilizer rate on a spreader takes time, so 10 m resolution is sufficient on a 8 ha field, and 5 m resolution is too high for precision fertilization applications. Currently sprayers work on 30 m resolution and liming on 10 m resolution. However, the machines are evolving quickly and there are machines available that can vary the dosage per nozzle or group of nozzles on a sprayer, so in 5 years' time the higher resolution of EO imagery might be manageable.

The biggest gain of using EO in agriculture is in identifying the good and bad zones in a field. The reason for the good or bad performance is often not known but the most limiting factor to crop growth should be addressed first. This first identification of variation in the field, the identification of good and bad zones is a useful first step in field management improvement and here EO can come in useful, depending on the crop and/or use of the field.

For more high resolution applications like disease detection or measurements at small parcels, UAV's are used.

General usage constraints

It was stated that farmers often do not know how to open the EO map, so companies are providing this service for them. If EO products or resulting maps are to be used by end-users, they should be super simple to use.
At present, many products are conceived as being too scientific and therefore hard to understand. For example, it is often not fully clear what a vegetation index means and when to use it. A question is posed and not readily answered; to what extent does standardization impact the use and easy of use of EO products?
A note is made that NASA provides free courses in Jupyter notebooks and QGIS. And Copernicus is serving EO vegetation indices products.

The Canadian ministry monitors every 5 years and uses a participatory app to collect ground truth data.

Conclusion

Three main obstacles or factors influencing the application of EO products for soil and crop monitoring were discussed: cloud cover, resolution and general usage constraints. While there are solutions or work-arounds mentioned for each of these topics, these are not necessarily straightforward to be applied widely.

Funding

This research was funded by the European Union Horizon Europe Coordinating and Supporting Action (CSA) 'Preparing the European Mission towards healthy soils' (PREPSOIL) (Grant Agreement N° 101070045).

Wageningen, the Netherlands, 23 June 2025

Annex 1: slides presented at the workshop

Workshop

Earth observation for soil health monitoring; obstacles and proposals in overcoming them

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Agenda

- Introduction
- Introductory presentation
- Discussion around two questions: obstacles and solutions for EO use
- Wrap-up

- Is it ok for everyone if we record the meeting for note keeping?

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CSA – Preparing for the 'Soil Deal for Europe' Mission

- **HORIZON-MISS-2021-SOIL-01-01** /
  - Preparing the ground for healthy soils: building capacities for engagement, outreach and knowledge
- **Project Coordinator:** Dr. Niels Halberg
  - **Coordinating Organisation:** Danish Centre for Food and Agriculture – Aarhus University
- **Planned duration:** 36 months, formal starting date July 1st, 2022.

Overall intention : Supporting the Soil Mission through the DG AGRI secretariat

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Consortium and coverage

Academic partners

- AU
- WUR
- SLU
- INRAE
- NIBIO
- ZALF
- IUNG
- CSIC
- ÖMKi
- DELTARES
- JRC

Consulting experts

- LESPROJEKT
- TRUST-IT
- COMMPLA

EU & national associations *

- ENOLL
- RE-SOIL
- COPA-COGECA
- ACR+
- F-PCTEX (ERIAFF)
- ACTA

* Some countries not represented by the partners' legal addresses are still covered by the members of the associations, achieving full EU coverage, and some associated countries (Turkey, Romania, Greece, Bulgaria, Croatia, Austria, Cyprus, Ireland, Luxembourg, Malta, Portugal, UK, Slovenia, Finland, Latvia, Estonia, Lithuania)

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Main activities and outcomes

KEY PRINCIPLES

STOCKTAKING
From previous initiatives, especially on agricultural soils.

OPEN SCIENCE
By default, multi-plying the impact.

FLEXIBLE
Smooth communication and adaptation to the Mission's needs.

CAPABLE
Consortium composed of the top EU researchers, agencies and stakeholder associations.

STAKEHOLDER MANAGEMENT
Expansion of National Soil Hub concept, coordination and organisation of stakeholder identification, engagement and co-creation. At EU, national and regional levels. Multi-actor approach.

SOIL NEEDS
Evaluation of soil needs, at least in 19 regions, focusing in the landscape level.

MONITORING
Assessment of indicators for different land uses, exploring EO and citizen science, improvement of monitoring knowledge

LIVING LABS
Elaboration of model business plans, incl. governance and sustainability.

WEB PORTAL
Knwledge aggregator, spaces for inter-connection, LL atlas, promotion of best practices and advocates, etc.

Specific events and activities, including science-policy interface, planned to build awareness, and improve the knowledge base among citizens, land managers and urban planners,
as well as facilitating connections among different communities of practice; dialogues w Soil Advocates

Building on EJP SOIL program, SMS project, SOILS4EU, …
Expanding to different soil use types and broader scope of Soil Mission

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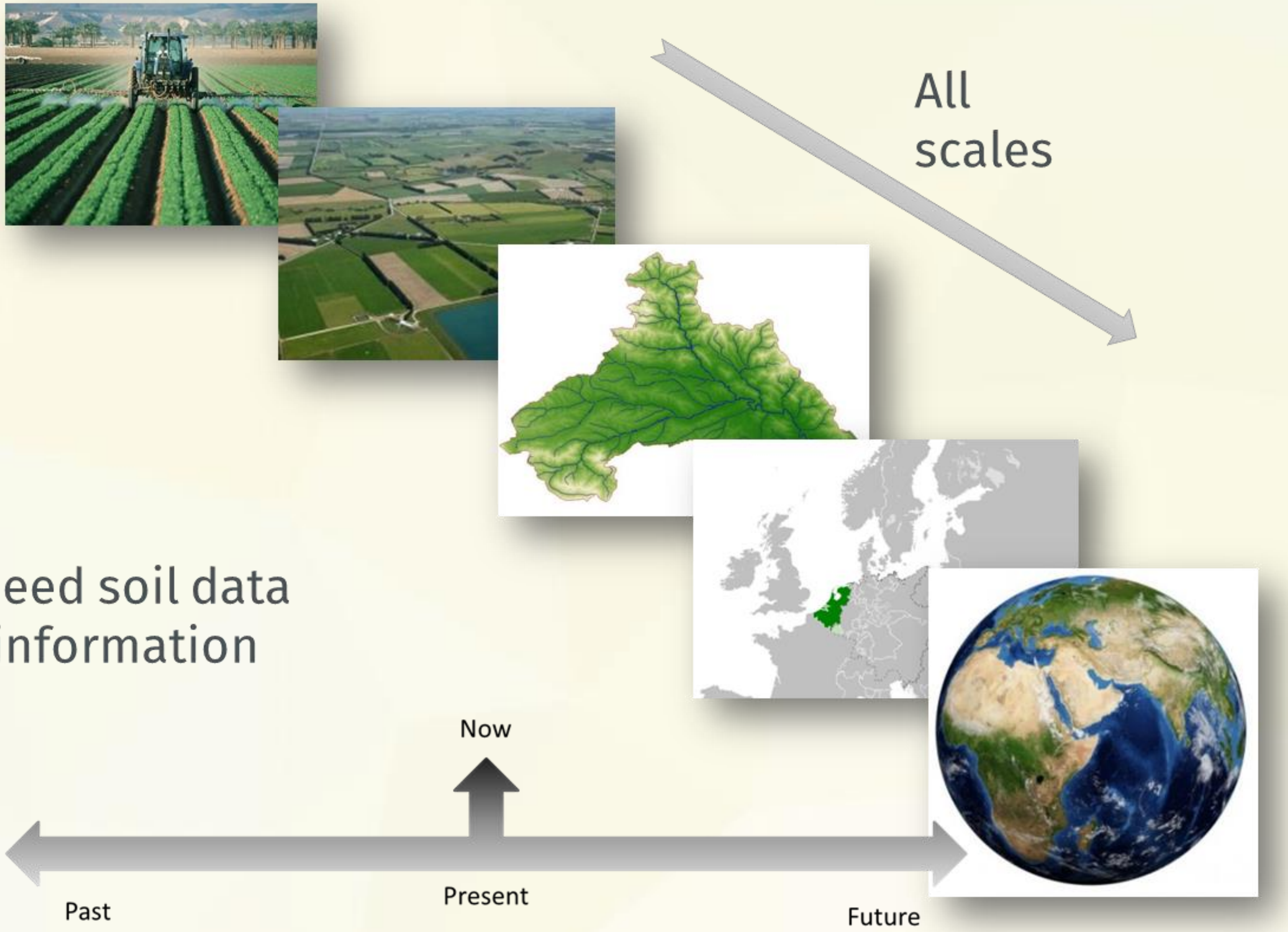
Data need



We need soil data
and information

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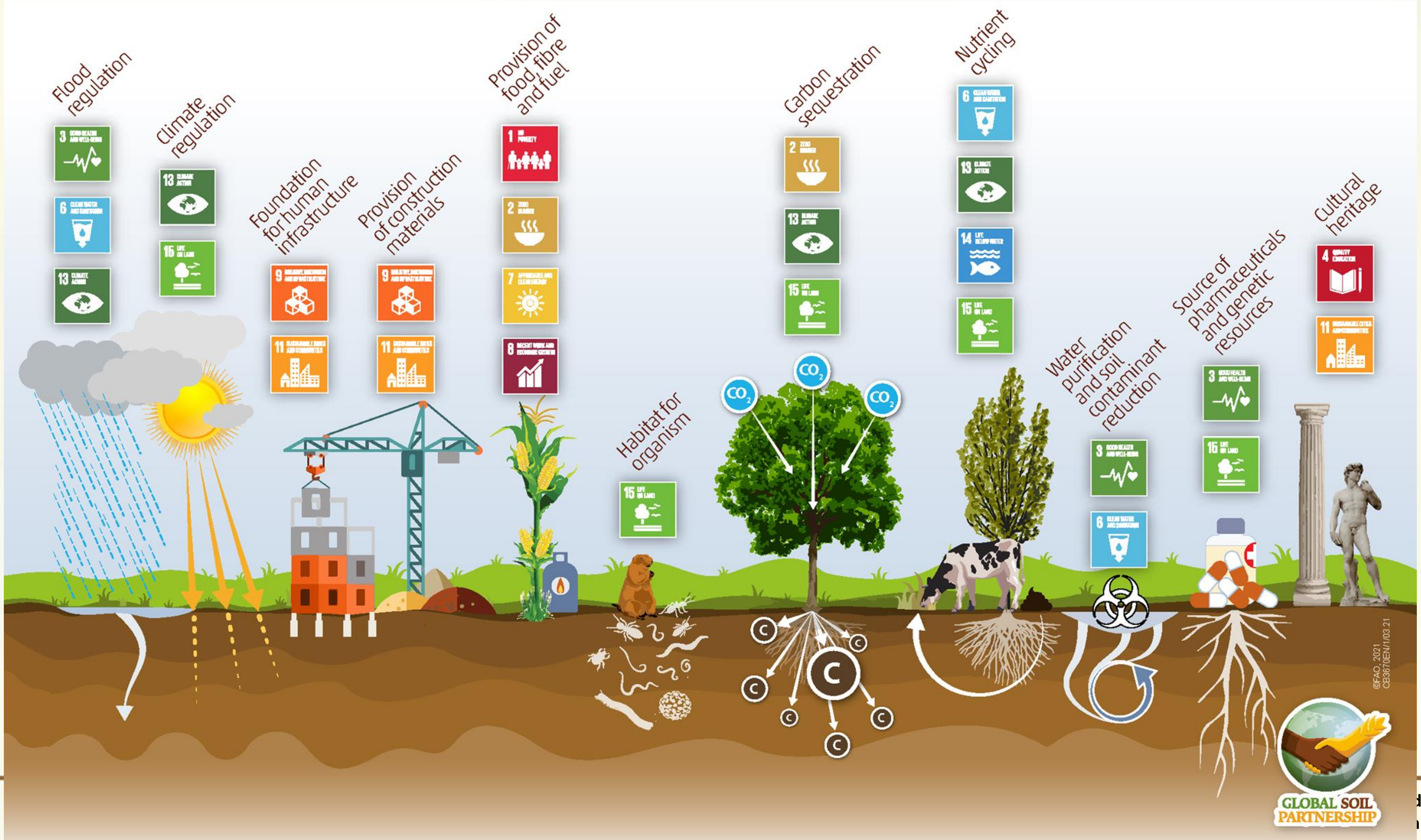
Soil’s contribution to the UN sustainable development goals



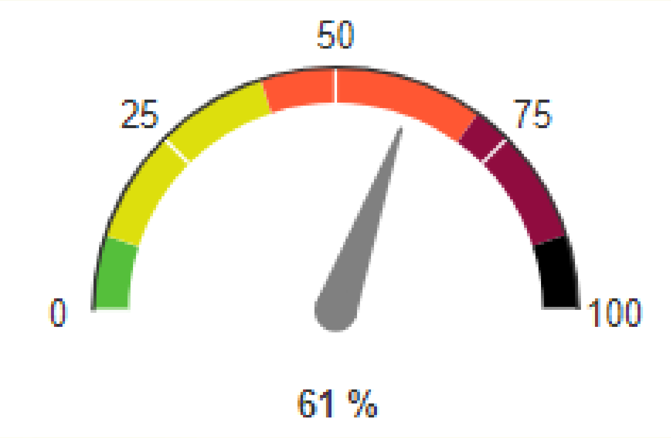
Global and EU soil degradation

At the global level:

Most assessments show that between **20-40%** of the global land area is degraded or degrading to varying extents and degrees.

From: https://www.unccd.int/sites/default/files/2022-04/UNCCD_GLO2_low-res_2.pdf

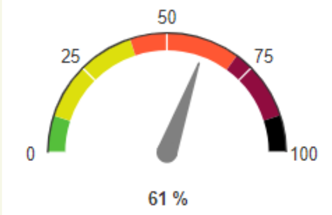
At the EU level



From: https://esdac.jrc.ec.europa.eu/esdacviewer/euso-dashboard/

Funded by the European Union

Soil: slow pedogenesis *vs* fast degradation



% soil beyond threshold

- **The 10 main independent forms of soil degradation:**
  - Reduced biodiversity, → EU: 36 %
  - Decrease in organic matter, → EU: 52 %
  - Soil sealing, → EU: 7 %
  - Erosion,
    - Gully erosion → EU: ???
    - Diffuse water erosion → EU: 24 %
    - Wind erosion → EU: 6 %
    - Harvest erosion → EU: 3 %
    - Tillage erosion → EU: 26 %
  - Compaction,
  - Waterlogging/drought,
  - Nutrient depletion,
  - Acidification,
  - Salinization,
  - Pollution.

From: https://esdac.jrc.ec.europa.eu/esdacviewer/euso-dashboard/

!

- 1 cm of soil formed in 240 years can be eroded away in 1 to 10 years (or during a storm or excavation for building);
- 2 m of soil formed in 48,000 years can be destroyed for urbanization in a matter of minutes.

(C. Valentin, 2024. Personal Comm.; Valentin, C. 2018. Les sols au cœur de la zone critique 5: dégradation et réhabilitation (Vol. 5). ISTE Group.)

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EU legislation

The European Green Deal

Soil Strategy 2030 (adopted 2021)

Vision and definition for healthy soil

- **Soil health**: good chemical, biological and physical condition and provision of as many ecosystem services as possible
- By 2050, soils are healthy and resilient, which requires decisive change.
- Protection, sustainable use and restoration of soil becomes the norm.
- Solution for climate neutrality, clean circular economy, biodiversity loss, protection of human health, desertification and land degradation.

European Commission

Soil Monitoring and Resilience Directive (proposal 5 July 2023)

EUROPEAN COMMISSION

Brussels, 5.7.2023
COM(2023) 416 final

2023/0232 (COD)

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on Soil Monitoring and Resilience (Soil Monitoring Law)

{SEC(2023) 416 final} - {SWD(2023) 416 final} - {SWD(2023) 417 final} - {SWD(2023) 418 final} - {SWD(2023) 423 final}

The need for soil monitoring to support public policies etc.

For what use in soil management

What should be monitored

Various links between these categories

- **Soil health** (linked to their contribution to ecosystem services; Human-oriented);
- **Soil functions** (Action of the soil on itself, a wider ecosystem and/or Humans);
- **Soil elementary processes** (physical, chemical, or biological);
- **Soil properties** (e.g. %clay, pH, bulk density …);
- **Soil degradation indicators**

How

- Sampling and laboratory analysis
- *In situ* observations / measurements:
  - Ground measurements
  - Remote sensing (Satellite-based EO, UAV, airborne sensors);
- Combining observations and calculations

- Positioning of indicators in a reference framework of possibilities (use of thresholds, etc.), interpretation and possible definition of corrective measures such as sustainable land management practices

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WP6 Supporting harmonised soil information and reporting

EU Soil Policies for soil protection

Request for soil indicators

CURRENT SITUATION

ESDAC EU-WIDE SOIL MAPS & LUCAS SOIL MONITORING

May not be representative

NATIONAL SOIL MAPS & SOIL MONITORING

Not EU-Harmonised

Science

SUPPORTING EUSO

EJP SOIL TECHNICAL SOLUTION

EU-WIDE HARMONISED NATIONAL SOIL MAPS & SOIL MONITORING. WITH LUCAS AS *DE FACTO* STANDARD

MEMBER STATES DECISION

Main threats to soil and soil needs identified in 20 EU regions

Activities / Regions	Soil threat
Cow Dairy Farming: Gelderland, Netherlands	Too dry (Podzol, Anthrosol), Too wet (Fluvisol), Soil compaction (everywhere)
Sheep Agrosilvopastoral Farming:Sardegna, Italy	Erosion (water), desertification.
Irri… Spain	soil erosion and soil pollution. A general soil degradation process is found due to the increase in machinery (heavy machinery), pesticides, soil compaction, loss of soil structure and reduction in water retention by soils.
	Erosion (water), desertification, salinization, pollution, compaction.
…many	SOC decline, compaction, biodiversity decline, soil erosion (water, wind, tillage); decreasing water retention capacities
	Erosion, soil sealing, compaction, biodiversity decline
	SOC loss, nutrient loss, compaction (topsoil and subsoil), water and tillage erosion, reduced water retention capacity, reduced soil fertility.
	Soil consumption and sealing; soil organic matter loss; moderate- high risk of drought; moderate-high risk of flood; moderate risk of soil erosion; high risk of soil pollution; low risk of soil salinity; low- moderate risk of functional soil biodiversity deterioration.
	Wind erosion and desertification due to climate change and historical change in water management
	High precipitation rates, poor drainage, soil compaction (saturated soil during harvest), soil erosion, soil sealing. Part time farming, intensive agriculture, limited time to spend on farm work, sometimes lacking/to small economic incentives, high pressure on agricultural land.
I…	1. Soil erosion, 2. Soil contamination, 3. Soil acidification, 4. Urban sprawl and urbanization & 5. Invasive organisms
D…	Sealing, contamination, loss of biodiversity, loss of organic matter (peat), land subsidence, soil degradation due to disturbance, compaction, and -in parts (external)- salinization (through Noordzeekanaal)
Po…	contamination, sealing, land abandonment
Fo…	Peatland drainage for forestry; tracks from harvesters
For…	
For…	
Agr…	Erosion, compaction, lack of fertility
Alpin… , France	Climate change (erosion, changes in the cryosphere and water resources, increase in climatic hazards and risks in the high mountains, increase and elevation of wooded areas, artificialization of valley bottoms, greening); Mass tourism (urbanization, biodiversity degradation, erosion)
Peatlands: Eastern and Midland, Ireland	Drainage of peatlands led to peat shrinkage, compaction, subsidence, erosion and greenhouse gas emissions
Reforestation: Vysočina, The Czech Republic	Erosion, Acidification

Soil needs:

Agricultural land:
Transforming the CAP into a system of balanced payments for ecosystem services;

Forest land:
Taking sustainable forest management strategies into consideration;

Mixed production systems:
taking into consideration several aspects and overlapping policy frameworks (forest/agriculture);

Urban & agglomeration system:
Integrating the detrimental impacts of soil sealing into the decision-making process at the policy level

Possible contributions of Earth Observation to soil monitoring

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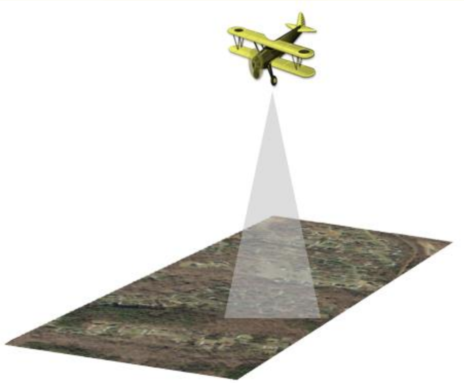
Satellite EO, UAV and airborne sensors to characterize soils

- Digital soil mapping: soil properties , incl. soil organic carbon concentration, soil moisture, texture
- Land cover
- Area of forest and other wooded lands (including biodiversity estimate)
- Vegetation fractional cover (F-Cover)
- Landscape heterogeneity (and its impact on surface biodiversity)
- Topography
- Erosion estimates



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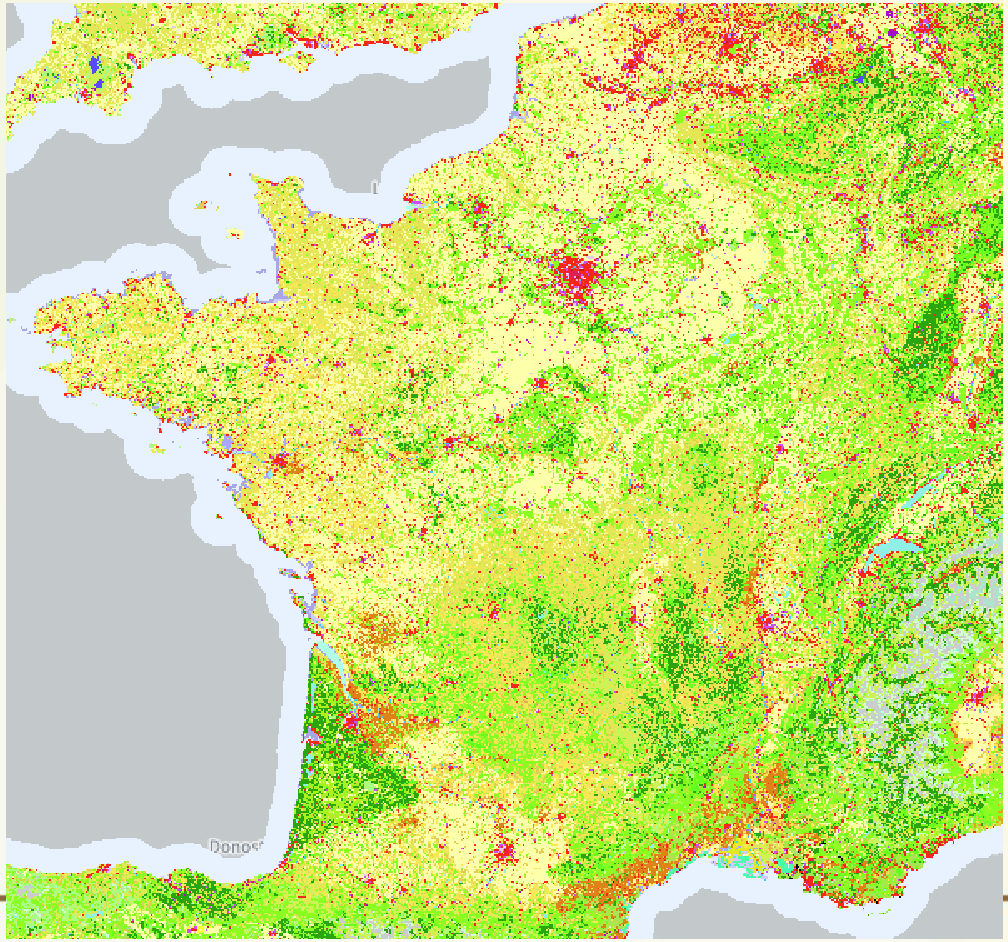
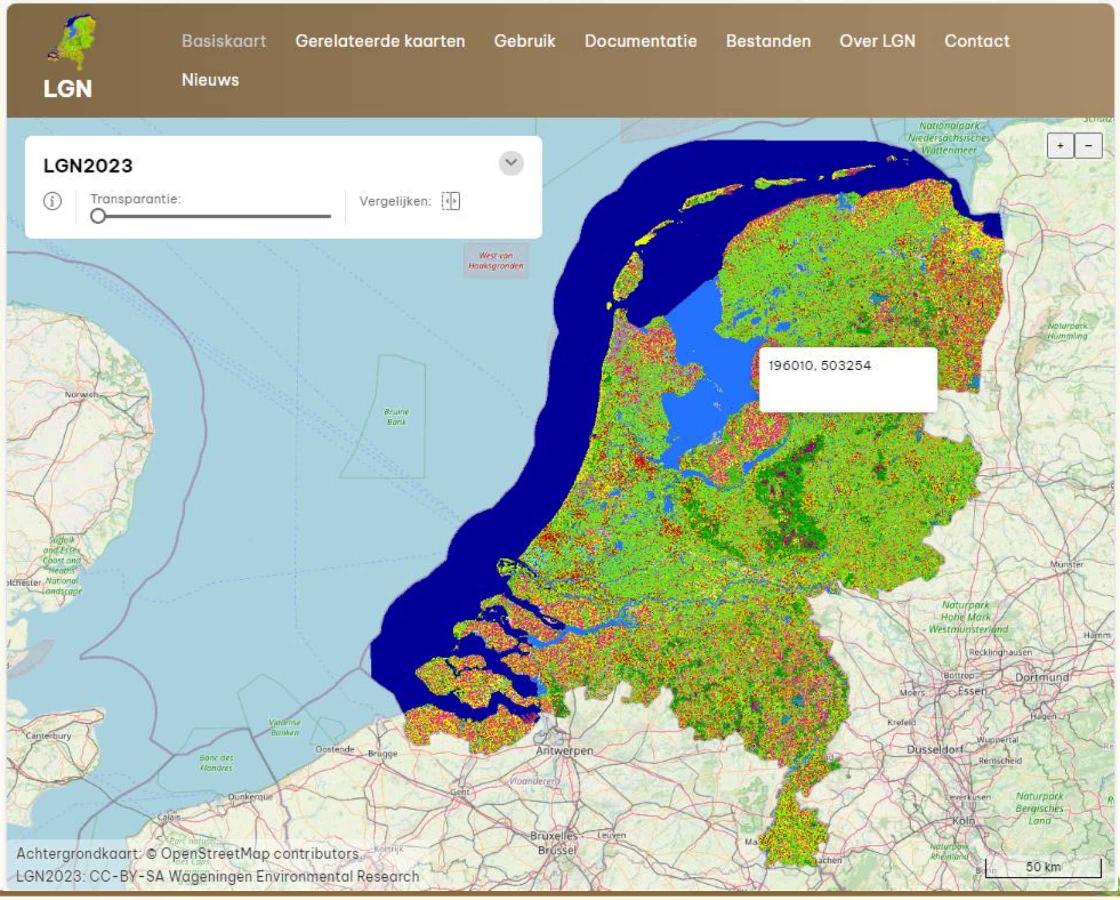
Most used RS product: Land Cover maps

- Copernicus Land Monitoring Service
  - CORINE LAND COVER, resolution 100m, every six years (last=2018), 44 classes



- National services
  - In the Netherlands: LGN, resolution 5m, yearly (51 classes, adapted to the country characteristics)



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Soil indicators suggested by EU

a lot in common

- by the ***Soil Health and Food*** Mission Board:
  - Presence of soil pollutants, excess nutrients and salts,
  - Soil organic carbon,
  - Soil structure including bulk density and the absence of soil sealing and erosion,
  - Soil biodiversity,
  - Soil nutrients and pH,
  - Vegetation cover,
  - Landscape heterogeneity,
  - Area of forest and other wooded lands.

- in the proposal of the ***Soil Monitoring and Resilience*** Directive:
  - Salinization,
  - Soil erosion,
  - Loss if soil organic C,
  - Subsoil compaction,
  - Excess nutrient content in soil,
  - Soil contamination,
  - Reduction of soil capacity to retain water,
  - Excess nutrient content in soil,
  - Acidification,
  - Topsoil compaction
  - Loss of soil biodiversity
  - Land take and soil sealing.

Impacting all other factors,
Used for computing the indicators

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EUSO satellite use for soil degradation estimation

- EO often used as a covariate in the spatial description instead of directly derive the status of the indicator;

(T. Breure (JRC), personal communication)

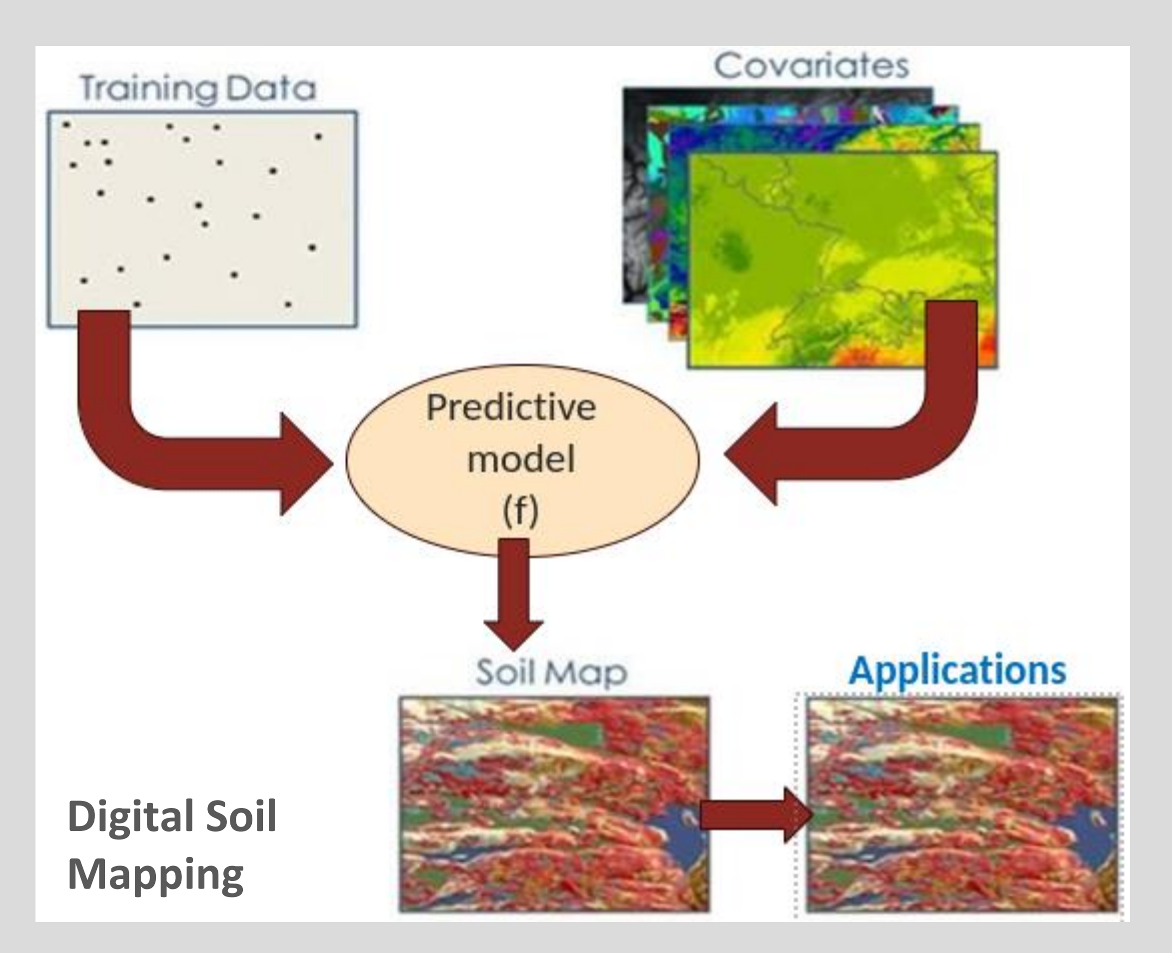
	Product available					
SOIL DEGRADATION INDICATOR	CLMS	Galileo/ EGNOS	Other	Sensor used to derive the product	Auxiliary data used to estimate the indicator (Please complete this information only when Earth Observation (EO: satellite, UAV, airborned sensor) are involved)	Current spatial resolution/ revisit frequency
Soil erosion						
Water erosion	Yes	No	Yes	NSRTM, SPOT 4/5, SPOT VEGETATION, RapidEye, IRS P6 LISS II	Land cover, vegetation statistics, digital elevation model	100 m / not specified
Wind erosion	Yes	No	Yes	MODIS, Landsat/Terra	Bare soil (%), snow cover, land cover, field boundaries	100 m / not specified
Harvest erosion	Yes	No	Yes	SPOT 4/5, RapidEye, IRS P6 LISS II	Land cover	100 m / not specified
Tillage erosion	Yes	No	Yes	Sentinel–1, MERIS, SRTM, ASTER, Landsat-5 MSS/TM, Landsat-7 ETM, SPOT-4/5, IRS P6 LISS III, MODIS	Land cover, digital elevation model, land management, vegetation statistics	100 m / not specified
Post-fire erosion	No	No	Yes	MERIS, PROBA-V, Sentinel-3/OLCI and SLSTR, Sentinel-2	Burnt area, vegetation statistics, land cover	25 m /annual
Soil pollution						
Copper	Yes	No	Yes	IRS P6 LISS III, RapidEye, MODIS, SRTM, ASTER	Land cover, vegetation statistics (evi), digital elevation model	500 m / not specified
Mercury	Yes	No	Yes	IRS P6 LISS III, RapidEye, MODIS, SRTM, ASTER, Landsat	Land cover, vegetation statistics (evi), digital elevation model, reflectance, surface temperature	100 m / not specified
Zinc	No	No	Yes	SPOT-4/5, IRS P6 LISS III, SRTM, ASTER, Landsat 7	Land cover, digital elevation model, vegetation statistics	250 m / not specified
Soil nutrients						
Nitrogen surplus	No	No	No			LUCAS points
Phosphorus deficiency	Yes	No	Yes	SRTM, ASTER, MODIS, IRS P6 LISS III, RapidEye	Land cover, digital elevation model, vegetation statistics, reflectance	LUCAS points
Phosphorous excess	Yes	No	Yes	SRTM, ASTER, MODIS, IRS P6 LISS III, RapidEye	Land cover, digital elevation model, vegetation statistics, reflectance	LUCAS points
Loss of soil organic carbon						
Distance to maximum SOC level	Yes	No	No	SPOT-4/5, IRS P6 LISS III, RapidEye, Sentinel-2 and Landsat-8	Land cover	500 m / 4-6 years
Loss of soil biodiversity						
Potential threat to biological functions	Yes	No	No	IRS P6 LISS III, RapidEye	Land cover	4-6 years
Soil compaction						
Susceptibility to soil compaction	No	No	No			500 m / Not specified
Soil salinization						
Secondary salinization risk	No	No	Yes			500 m / Not specified
Loss of organic soils						
Peatland degradation risk	No	No	Yes			1 km / Not specified
Soil consumption						
Soil sealing	Yes	No	Yes	Sentinel–2	Impervious built-up layers	10m / every 3 years

CUP4SOIL and WorldSoils

CUP4SOIL methodology

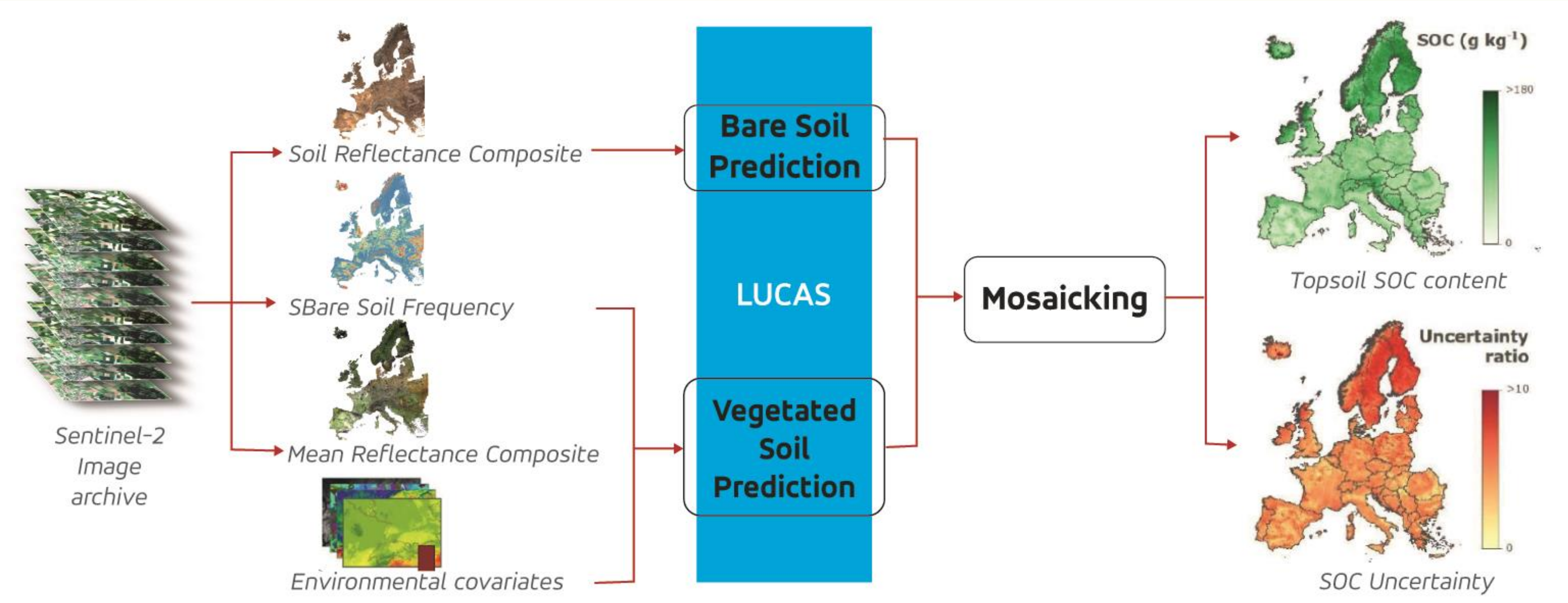
- Input data from LUCAS (and other sources in WoSIS if relevant)
- Covariates:
    - Data prepared by DLR
    - Data available from Copernicus (DEM, land cover)
    - Geology/parent material (JRC)
    - Simple radar products from Sentinel1

- Model: quantile random forest (robust approach allowing pixel-based uncertainty assessment)
- Outputs:
    - Primary soil properties
    - Uncertainty index
    - Other uncertainty measures (to be further developed)



CUP4SOIL and WorldSoils

WorldSoils methodology



What are main drawbacks reported so far?

Examples from the CUP4SOIL survey

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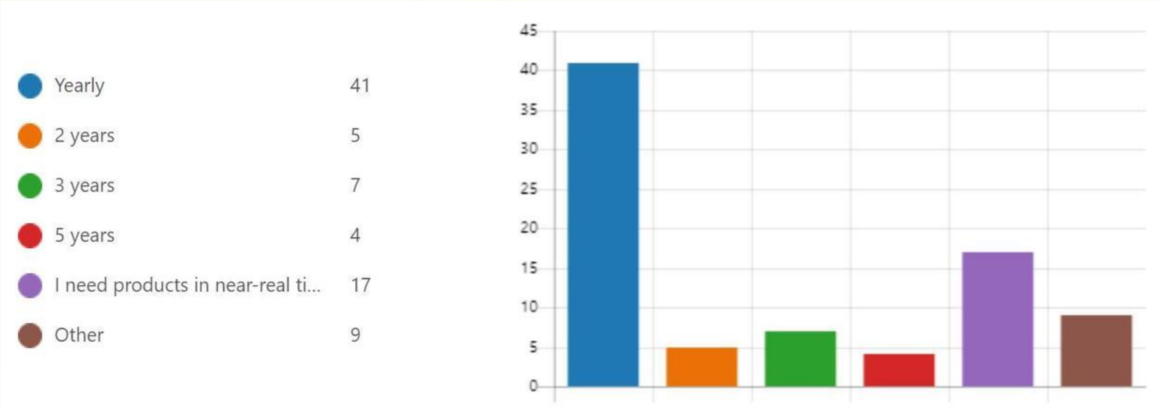
CUP4SOIL and WorldSoils user surveys

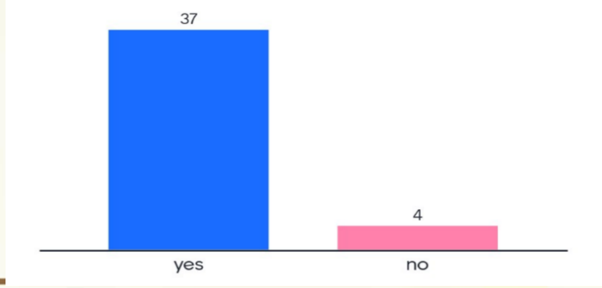
CUP4SOIL

Survey (83 responses)



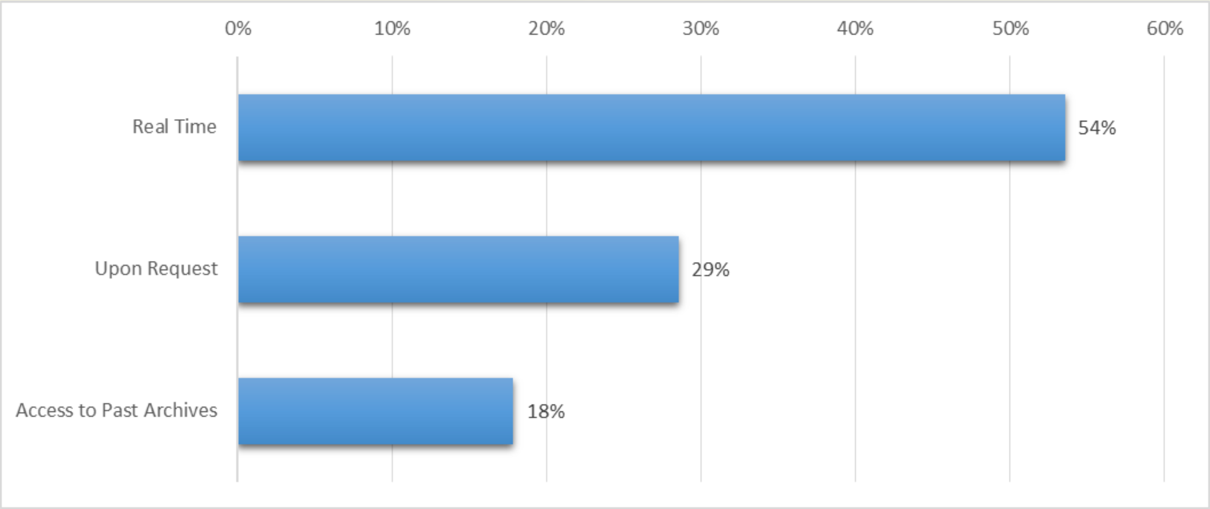
Mentimeter (58 responses)

If it is not feasible or meaningful to make yearly or near-real time updates to the products, is a longer (5/10 years) update period still useful?



WorldSoils

Survey (56 responses)



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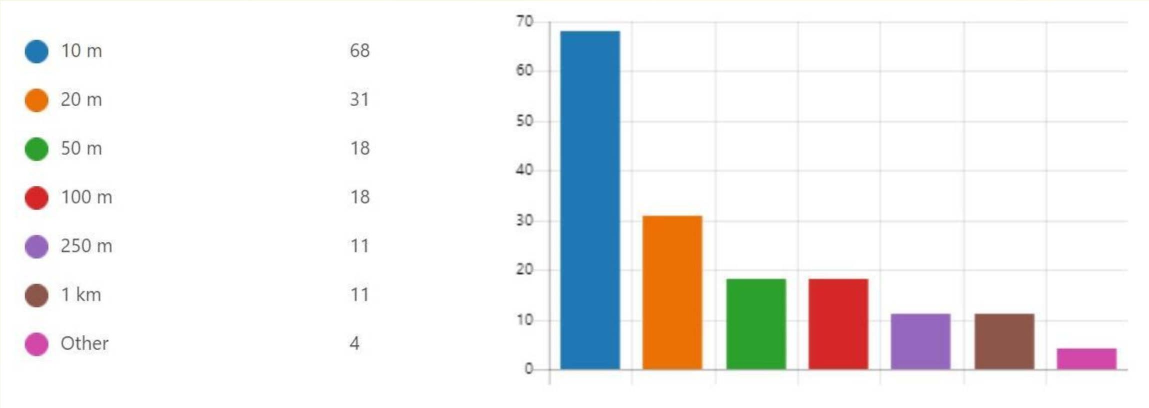
CUP4SOIL and WorldSoils user surveys

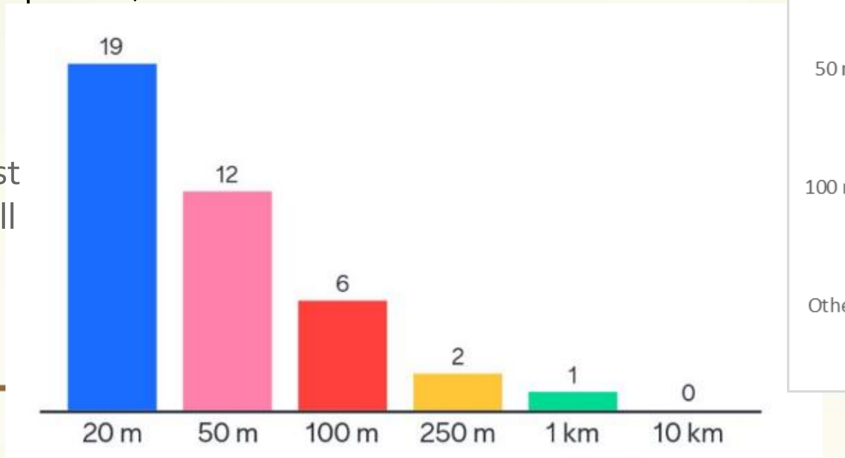
CUP4SOIL

Survey (83 responses)



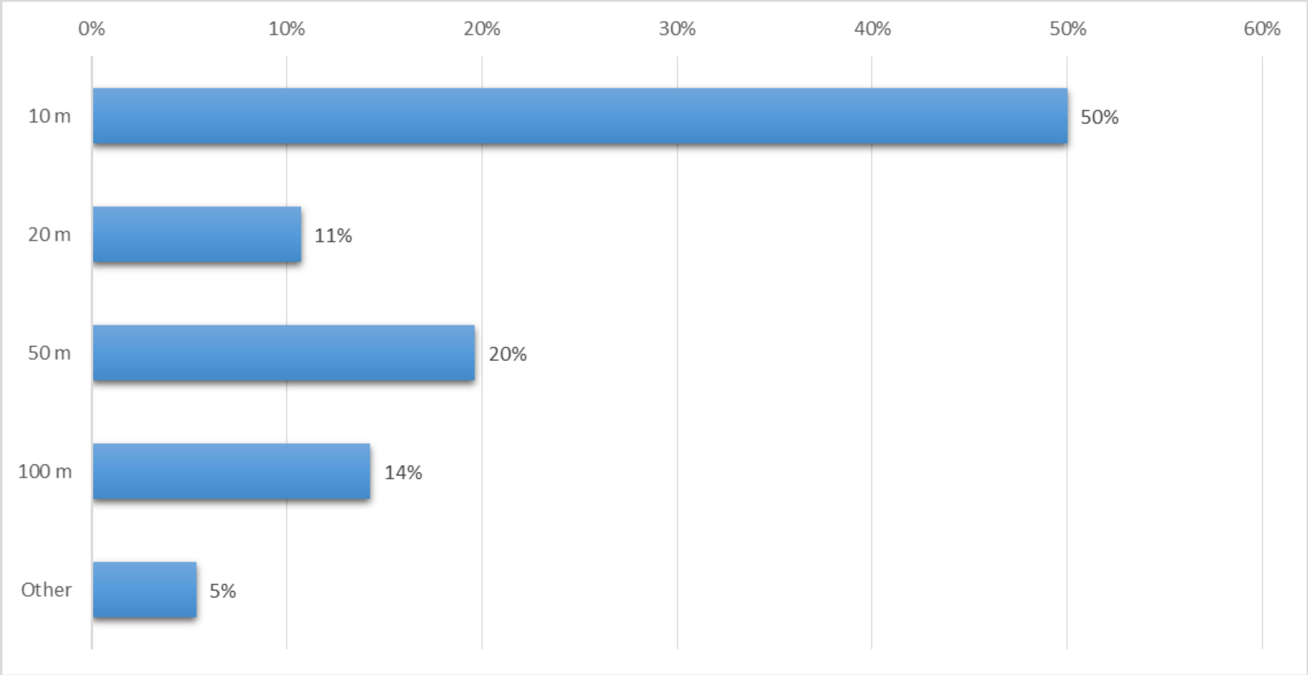
Mentimeter (58 responses)

Finer resolutions are always desirable, but what are the coarsest reslutions that would still work for your use? (with accuracy matching resolution)



WorldSoils

Survey (56 responses)



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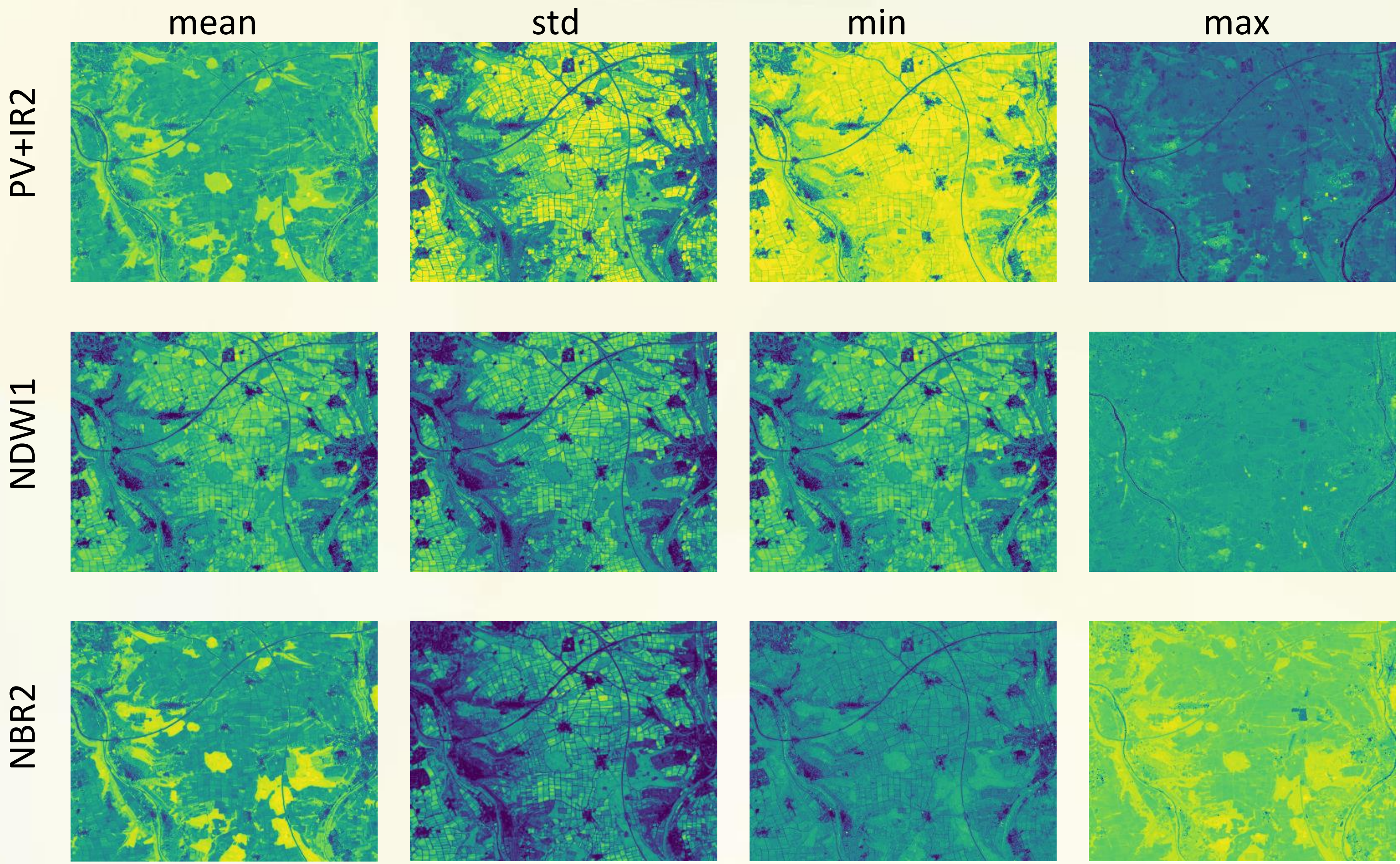
Presentation

- Result plus range
- Different indices



Objectives and next steps of the workshops

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Objectives: to study the integration of EO data in soil monitoring

- With regard to your needs (spatial resolution, revisit frequency, accuracy), **identify bottlenecks** (scientific, technological, technical, skills …) **to greater use of satellite Earth Observations** (EO) and CLMS and/or Galileo/EGNOS products for soil monitoring

- **Propose measures to reduce/minimize these difficulties**, ranking them (subjectively) successively (i) according to their supposed impact on the bottlenecks, and (ii) according to their ease - or even cost - of implementation.
(We can imagine that these two criteria will be used by the people in charge of prioritizing these measures)

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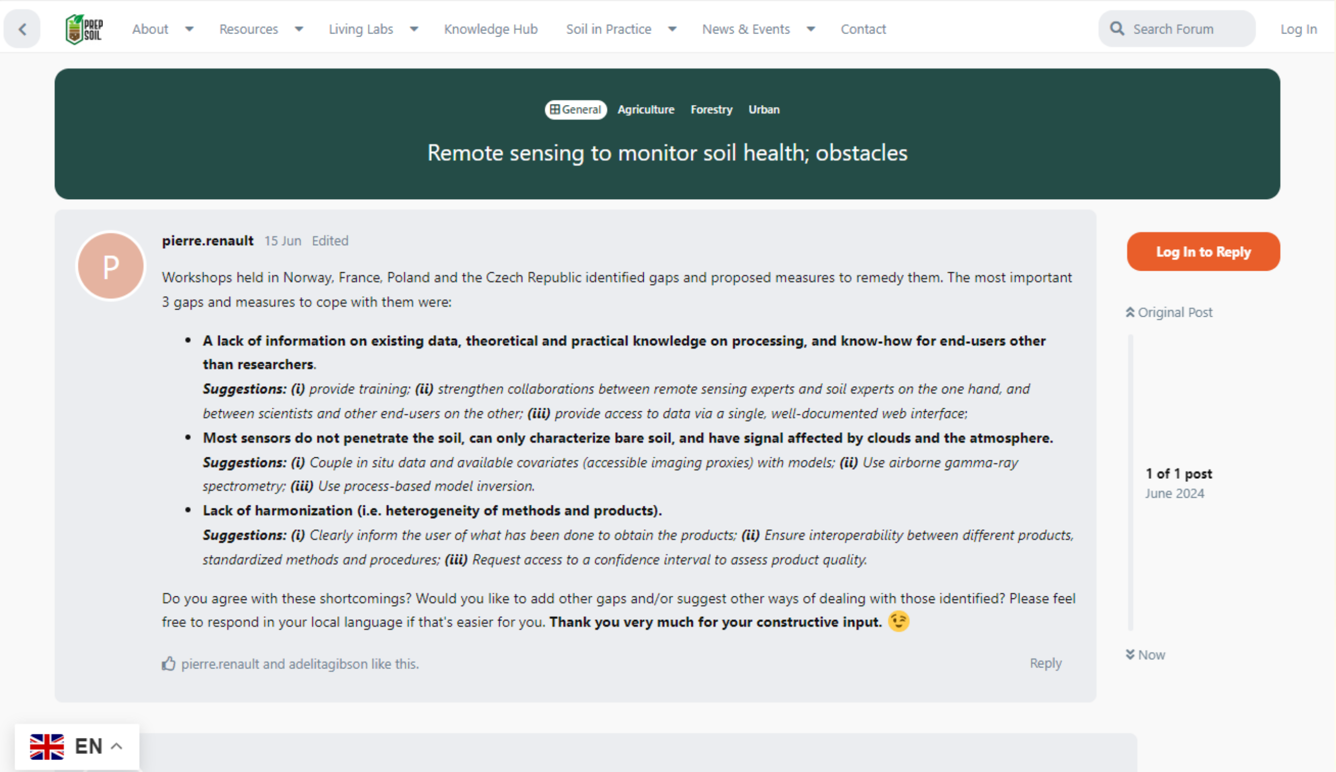
Beyond this workshop

- Short synthesis of the results of the workshop will be written
- Results from other similar workshops (per country) can be found at: Renault, P., Xie, G., & Weiss, M. (2024). Technical feasibility in using CLMS satellite-based EO to estimate soil health indicators. Zenodo. 190 p. (https://doi.org/10.5281/zenodo.13682515)
- Virtual discussion group: https://forum.prepsoil.eu/d/12-remote-sensing-to-monitor-soil-health-obstacles



MONITORING: Providing direction and capacities for the future harmonized soil health monitoring mechanisms

PREPSOIL is analysing the knowledge base available to monitor soil indicators proposed under the Soil Mission and makes a proposal to extend the findings from agricultural soil projects to other types of soils, by:

1. Performing an **in-depth analysis of EU-supported projects related to soil monitoring**, on how to extend results on agricultural soil indicators, while proposing alternative ones for natural, forest, urban and industrial soils (*D5.1 Analysis of Knowledge Base Available to Monitor Soil Indicators Proposed Under the Soil Mission)*.
2. **Integrating citizen science** (CS) (*D5.3 Feasibility of citizen science engagement for soil monitoring according to soil needs and LLs*) identifying potential contributions as well as gaps in CS approaches for different soil use contexts; case study among LLs assessing the potential of using CS in soil monitoring.
3. **Identifying and fulfilling the capacity building needs of decision makers and public officers** (incl. LL members) to assess monitoring outputs (ongoing)
4. Empirically assessing in 6 countries **awareness and understanding of soil health among advisors/consultants** within agriculture and forestry to explore their soil knowledge and how they obtain new knowledge, and to explore how the notion of soil health is manifested in practice in their professional work (ongoing work)

All **outputs** are available at https://prepsoil.eu/outputs

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