

Bedeutung von Bodendaten für die EU: Global Soil Partnership Soil Data and Information Systems



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European Commission

<http://eusoils.jrc.ec.europa.eu/>

What is the Joint Research Centre?

The JRC is a Directorate General of the European Commission

European Council

European Parliament

European Commission
27 Commissioners



Mrs Maire GEOGHEGAN-QUINN
European Commissioner for
Research, Innovation and Science

7th FWP 2006-2013

DG
RESEARCH

DG
JRC

.....

DG
ENVIRONMENT

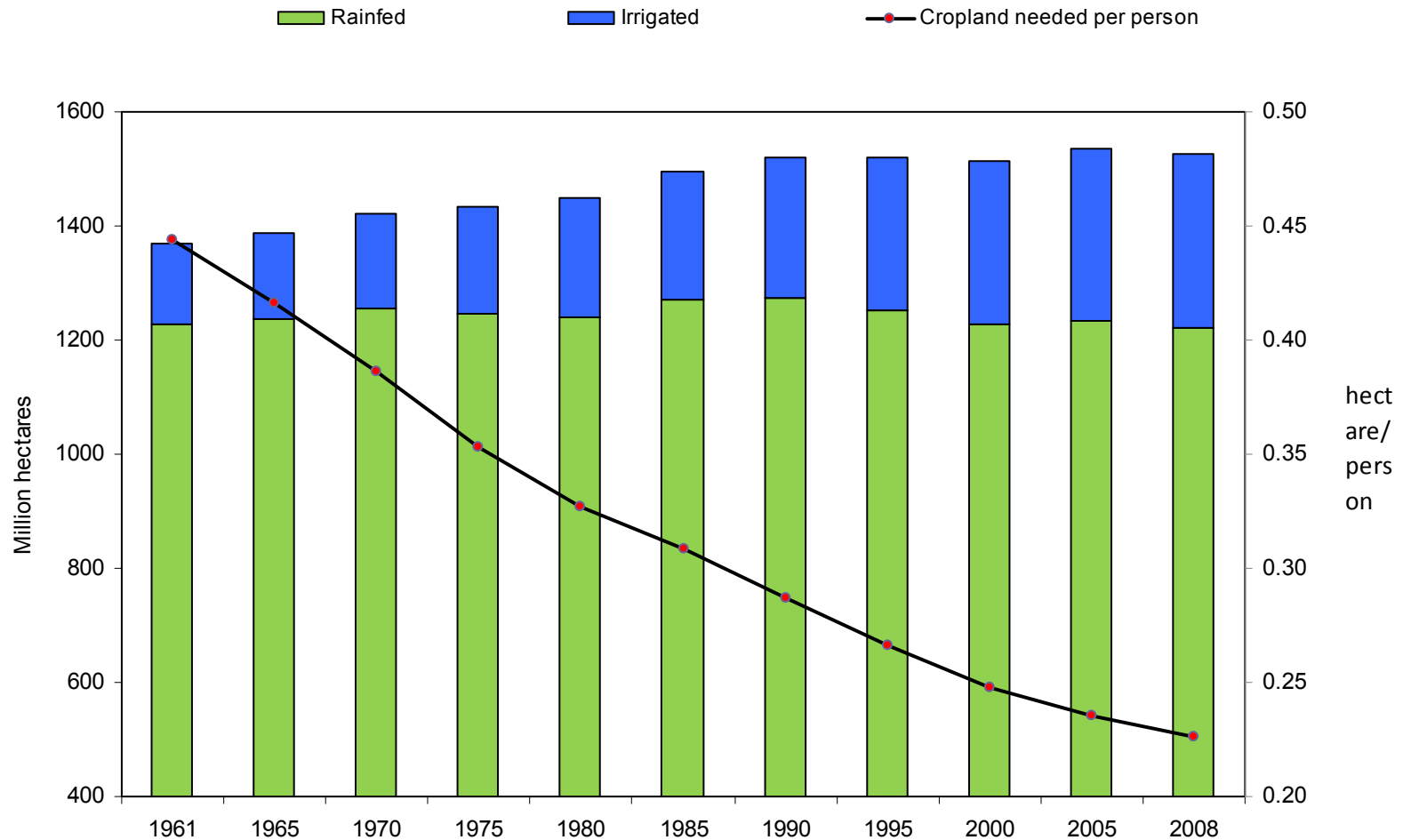
OTHER DGs

Scientific and technical support to EU policy
development and implementation

- Common Agricultural Policy (CAP)
- Climate Change Policy (Post-Kyoto debate)
- Energy Policy (Renewable Energies Directive)
- Biodiversity (Nature) Protection Policy
- Water Protection Policy
- Forest Protection Policy
- Regional Policies
- Food Safety (EFSA)
- Food security
- Development Policy
- Waste Policy
-etc

Assuring that there will be enough fertile soils for feeding future generations

Evolution of land under irrigated and rainfed cropping (1961-2008)



Why a Partnership?

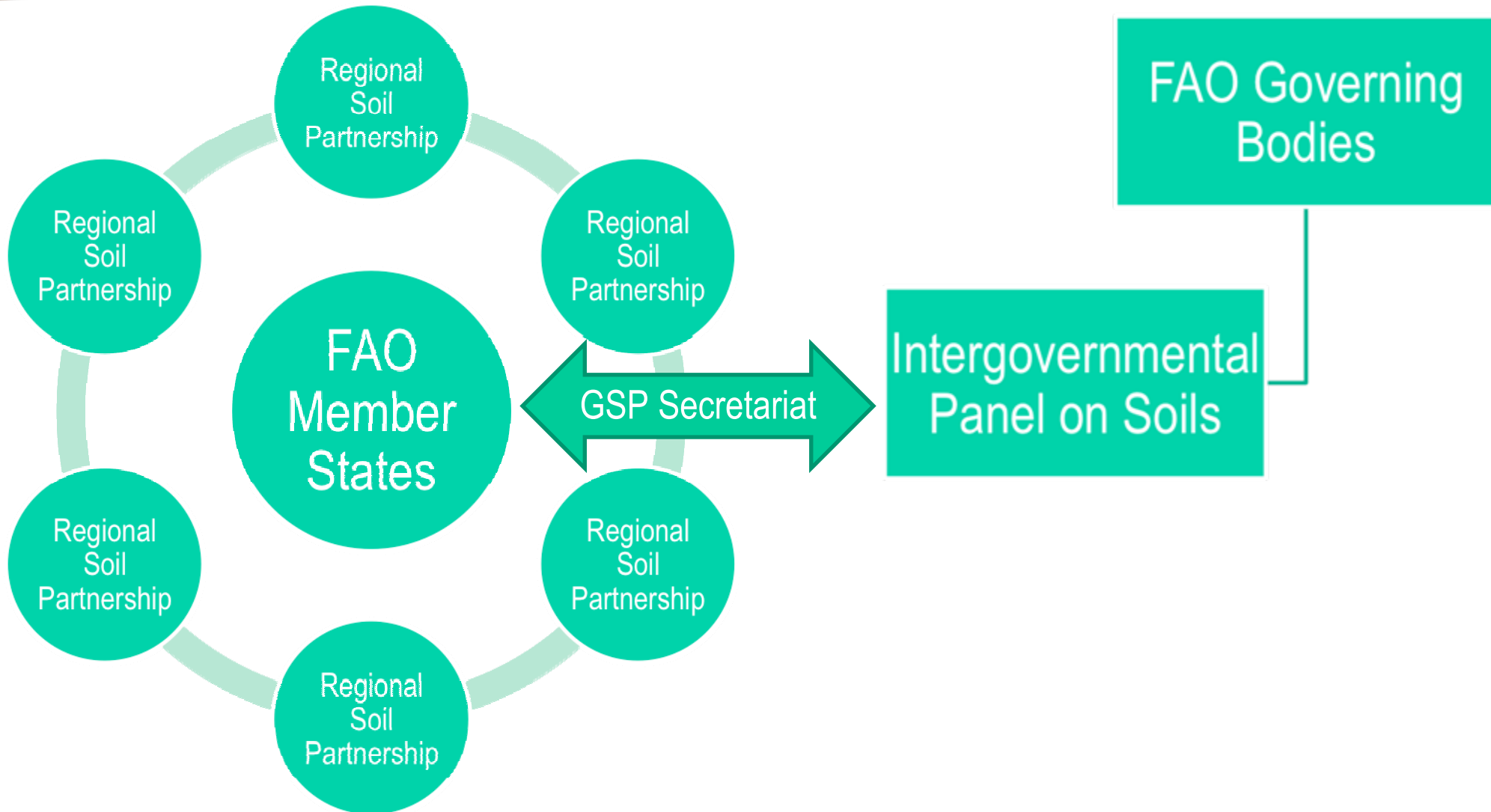
A Global Soil Partnership (complementing the **Global water partnership**) can bring due recognition and concerted action with stakeholders at international, national and local levels to protect and sustain soil and water resources as the basis for sustainable agriculture and food security.

It will provide a **platform for updating and sharing knowledge** on soils, for **developing capacities** of land users and technical institutions and providing information and evidence **for strengthened policies and programmes**

Our Proposal: three main elements of the GSP

- A **Partnership** open to governments and all relevant stakeholders and organizations;
- A **Secretariat** who will implement the vision and mission of the GSP through Regional Partnerships;
- **An Intergovernmental Technical Panel on Soils** of 25 high-level scientists providing scientific and technical advice to the Global Soil Partnership and FAO.

The Global Soil Partnership



EU Thematic Strategy for Soil Protection adopted by the European Commission on the 22nd of September 2006

- COMMUNICATION COM(2006) 231 on the Thematic Strategy for Soil Protection
- DIRECTIVE COM(2006) 232 establishing a framework for the protection of soil and amending Directive 2004/35/EC
- IMPACT ASSESSMENT SEC(2006) 620 of the Thematic Strategy for Soil Protection

<http://ec.europa.eu/environment/soil/index.htm>

<http://ies.jrc.ec.europa.eu>

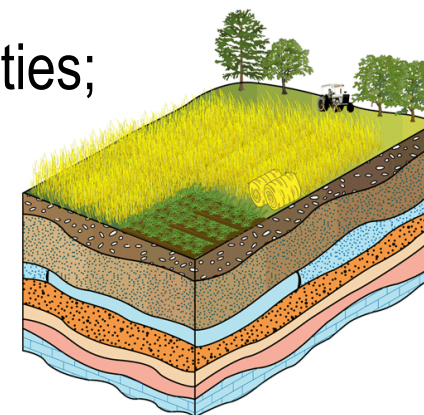
<http://eusoils.jrc.it>

Soil defined as the top layer of the earth's crust situated between the bedrock and the surface, excluding groundwater.

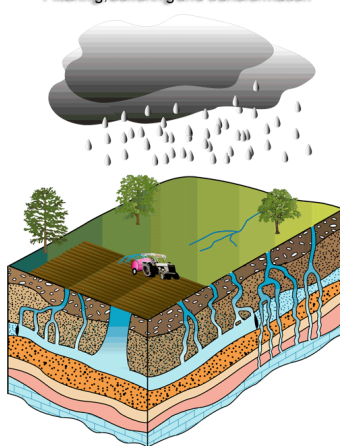
Soil functions to be protected:

1. Biomass production, including in agriculture and forestry;
2. Storing, filtering and transforming nutrients, substances and water;
3. Biodiversity pool, such as habitats, species and genes;
4. Physical and cultural environment for humans and human activities;
5. Source of raw materials;
6. Acting as carbon pool;
7. Archive of geological and archeological heritage.

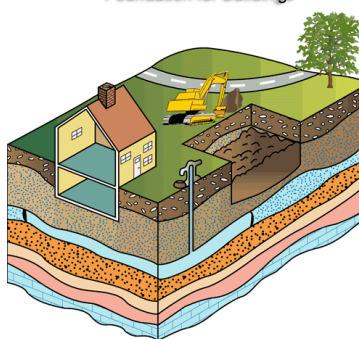
Basis for biomass production



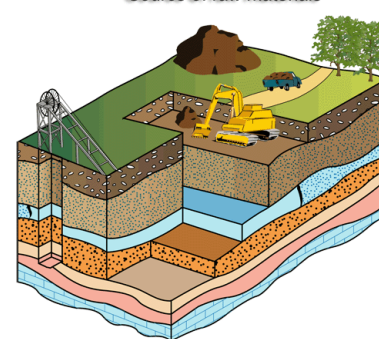
Filtering, buffering and transformation



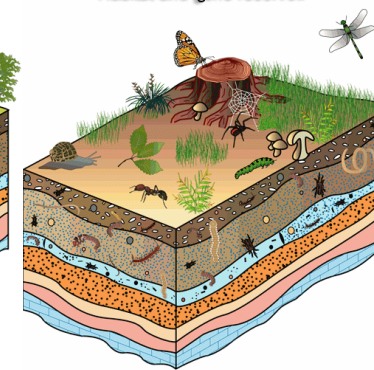
Foundation for Buildings



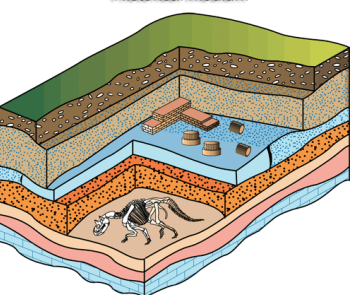
Source of raw materials



Habitat and gene reservoir



Historical medium





Sealing



Erosion



Organic matter decline

Compaction



**Salinisation
Acidification**

Landslides



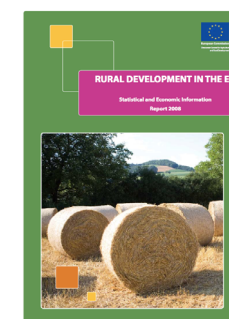
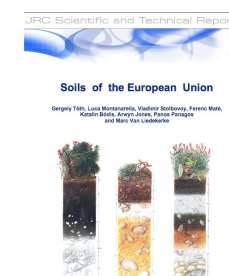
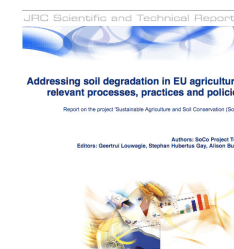
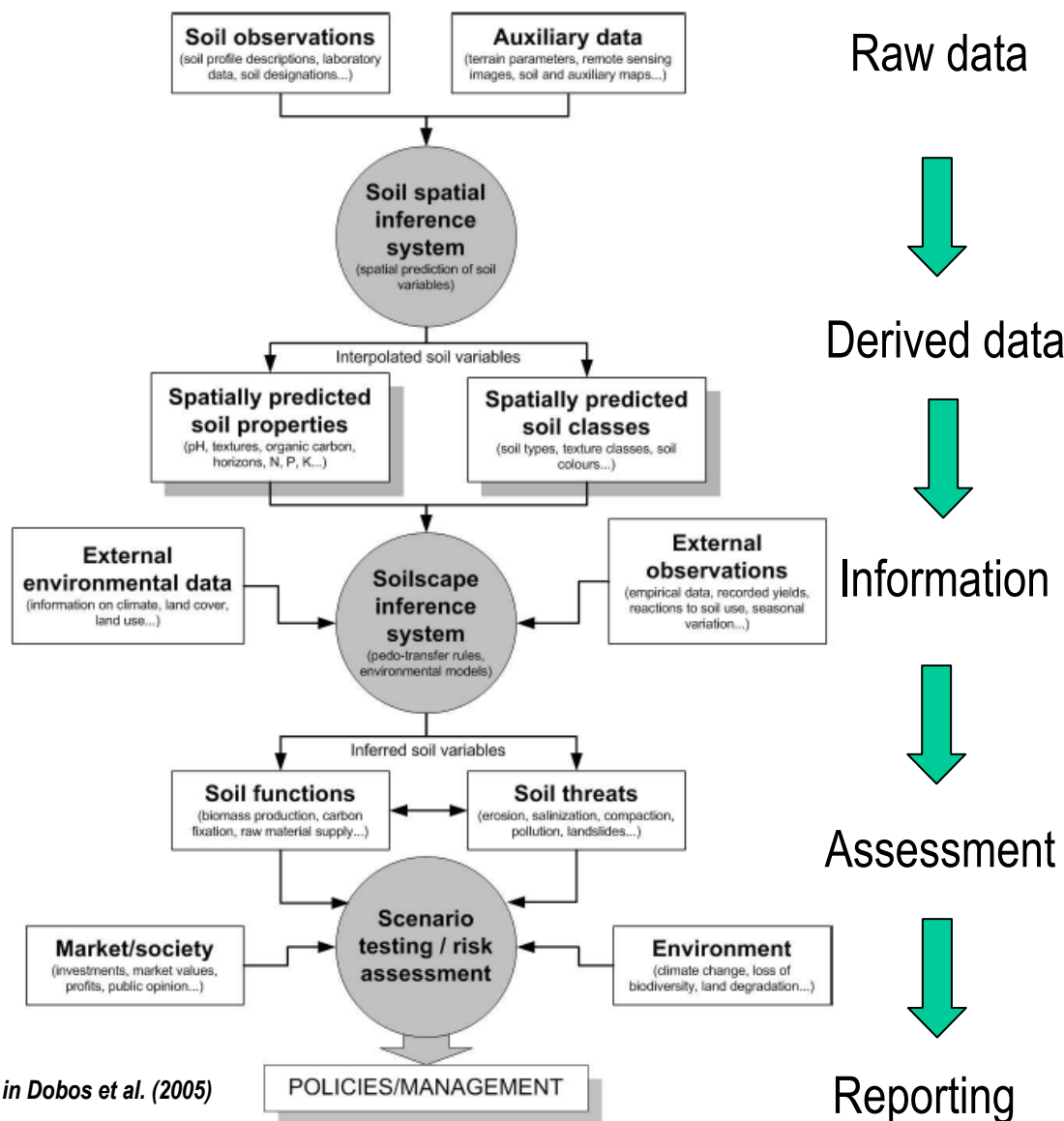
Contamination



THE MAJOR SOIL TYPES OF EUROPE

[illegible]

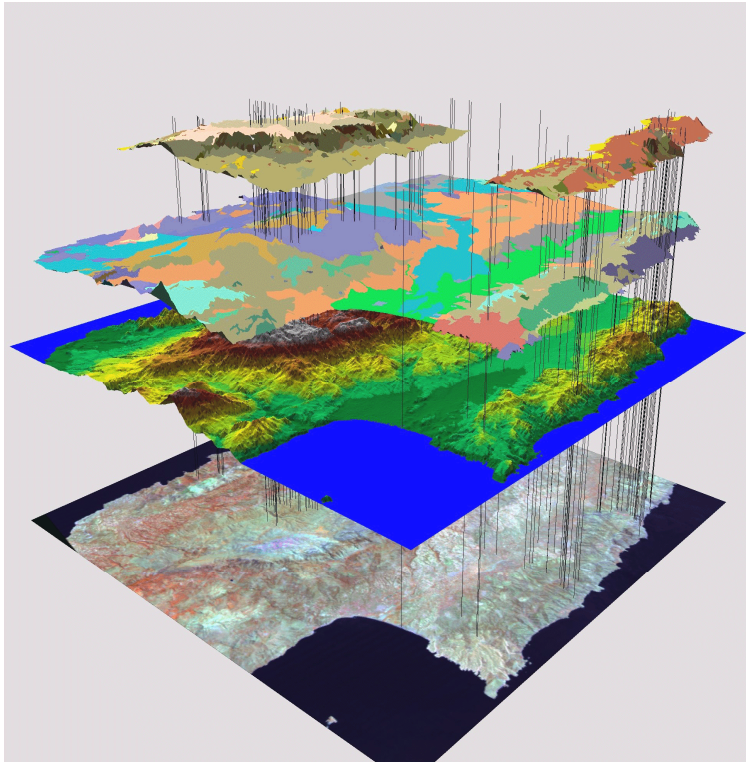
From raw data to policy relevant soil information in the framework of the DPSIR scheme:



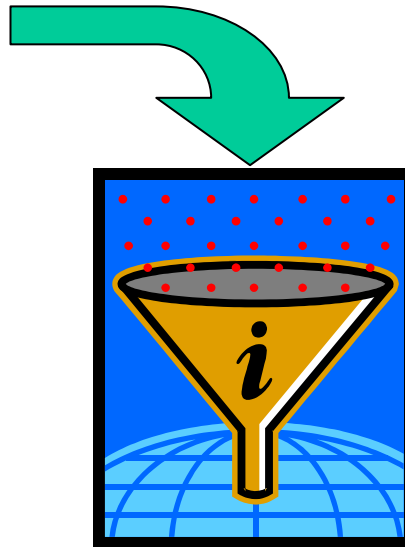
What do we do?

Integrating large spatial datasets

Spatial data

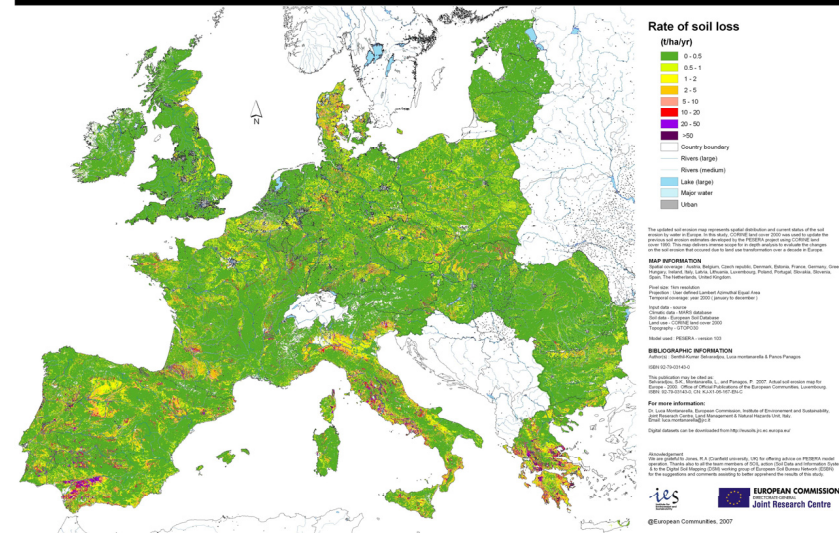


Models

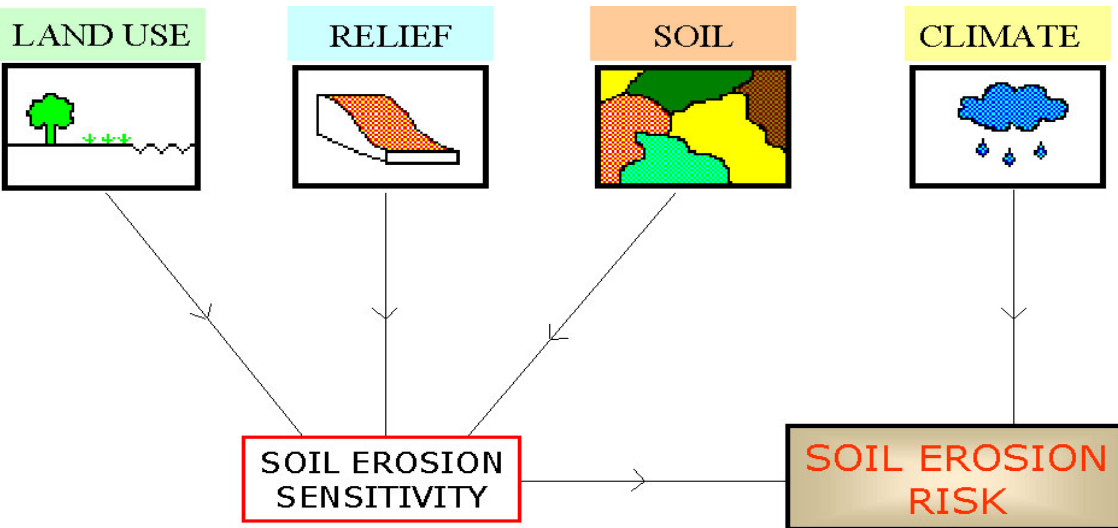


Integrated assessments

Actual Soil Erosion Map for Europe - 2000

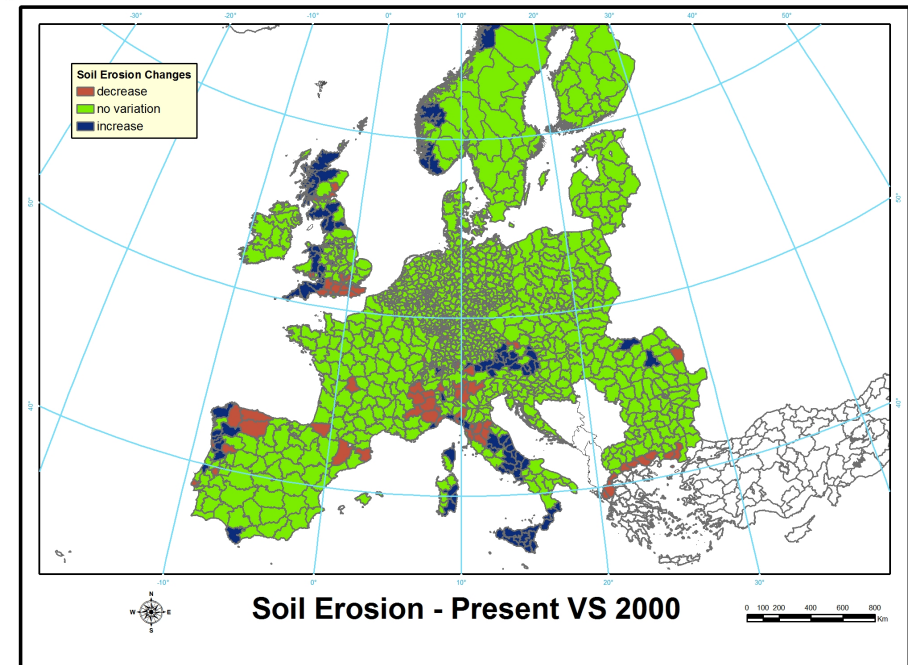
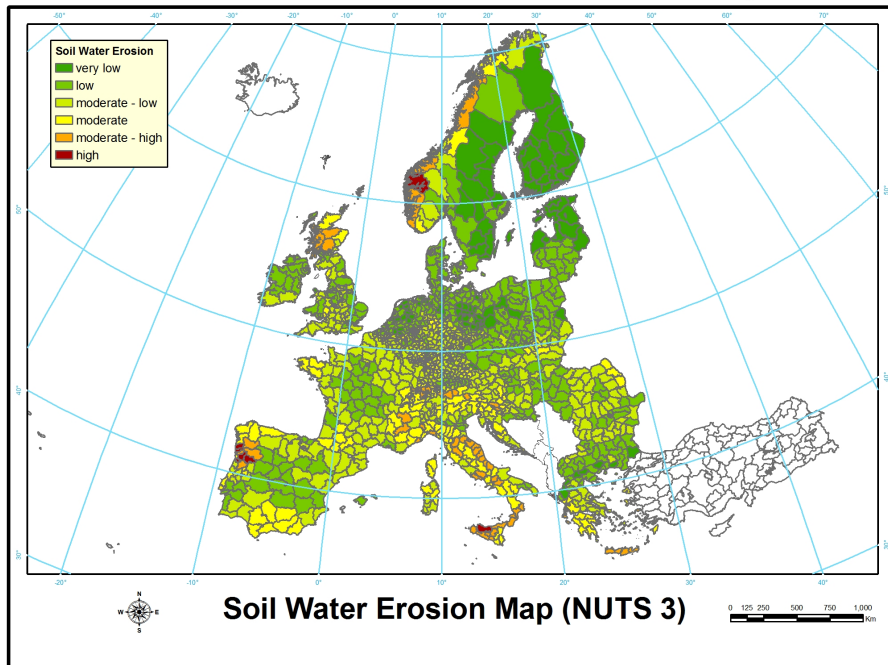


IRENA indicator 23 – Soil erosion



Integrating large spatial data for European assessments:

- CORINE Land Cover
- High Resolution DEM
- European Soil Database
- MARS climate data



Cost of soil erosion

Water erosion: 115 Million ha
Wind erosion: 42 Million ha



Table 1: Estimated total annual cost of soil erosion (million € 2003)

	On-site costs	Off-site costs	Total estimate
Lower bound	40	680	720
Intermediate	588	6,676	7,264
Upper bound	860	13,139	13,999

Note: These estimates are taken from the Ecologic study and relate to the surface affected by erosion in 13 countries and to five land use categories covering a surface area of 150 million ha

European Topsoil Organic Carbon Content

- Spatial data layer of estimated OC contents in the upper 30cm of the surface horizon of soils in Europe.
- Produced by applying the revised PTR and temperature function to 1km spatial data layers of soil, land cover and climate.
- OC content (%) in the surface horizon (0-30 cm) of soils.

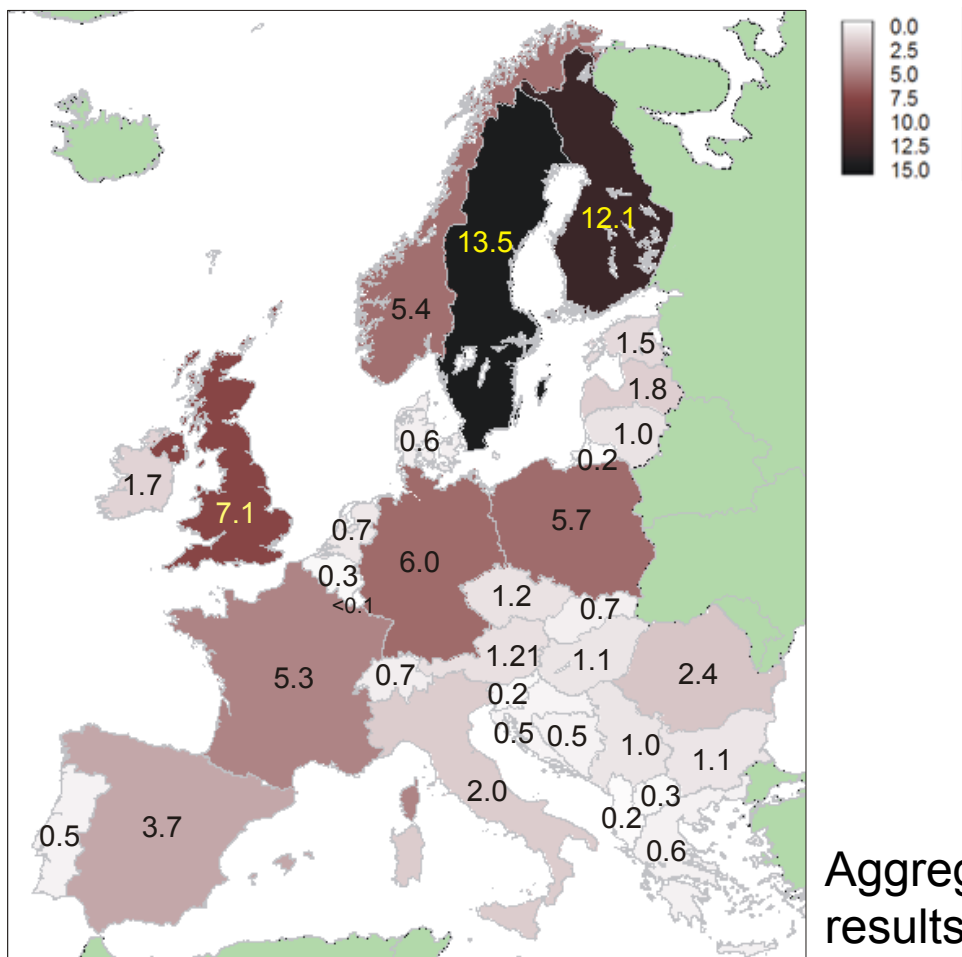
OC Stocks: 71 Pg C in EU27



OCTOP for 1990

Topsoil Organic Carbon Stocks

Organic Carbon stocks per country(0-30cm) in Pg, 1990



Aggregated
results

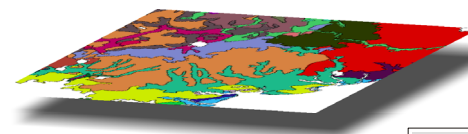
Preliminary results from project CLIMSOIL
“Review of existing information on the interrelations between soil and climate change”
Tender n°: ENV.B.1/SER/2007/0036

Country	JRC Pg	NRCS SOC Map Pg	Other Pg
Albania	0.2	0.3	
Austria	1.2	1.4	1.2
Belgium	0.3	0.4	0.3
Bosnia and Herzegovina	1.0	0.7	
Bulgaria	1.1	1.2	
Croatia	0.5	0.7	
Cyprus	*	0.1	
Czech Republic	1.2	0.9	
Denmark	0.6	0.8	0.6
Estonia	1.5	1.0	
Finland	12.1	10.7	7.5
France	5.3	6.7	3.1
Germany	6.0	5.4	
Greece	0.6	0.9	
Hungary	1.0	1.1	
Iceland	*	1.2	
Ireland	1.7	1.2	2.0
Italy	2.0	3.9	1.9
Latvia	1.8	1.6	
Lithuania	1.0	1.5	
Luxembourg	<0.1	<0.1	
Netherlands	0.7	1.0	0.3
Norway	5.4	4.6	
Poland	5.7	5.1	
Portugal	0.5	1.1	
Romania	2.4	3.1	
Slovak Republic	0.7	0.7	
Slovenia	0.2	0.3	
Spain	3.7	5.6	
Sweden	13.5	6.2	
Switzerland	0.7	0.6	0.5
United Kingdom	7.1	6.6	4.6, 9.8 (UK)
TOTAL	79.7	75.3**	

** For countries common with JRC map

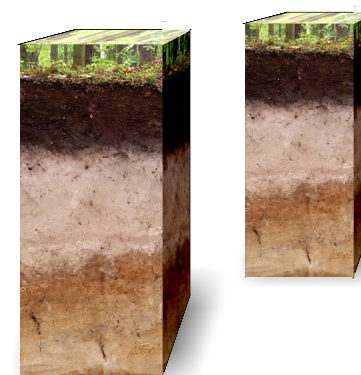
Mapping and Monitoring

- **Mapping**
symbolically represent
the geographic
distribution of an object
on the Earth surface.
- **Monitoring**
sample information on an
object systematically and
on a regular basis.



STU	NB POLYS	NB SMU	AREA	WRBFU
4401665	8	1	178.43	HSdy
4401666	8	1	68.63	CMdy
4401668	2	1	44.63	CMeu
4401669	2	1	44.63	Cmgl
4401670	2	1	22.31	GLeu
4401671	1	1	142.01	CMeu
4401672	1	1	142.01	CMeu
4401673	1	1	94.67	Cmdy
...	...	...	...	...

GIS Layer and Attribute



Field Survey

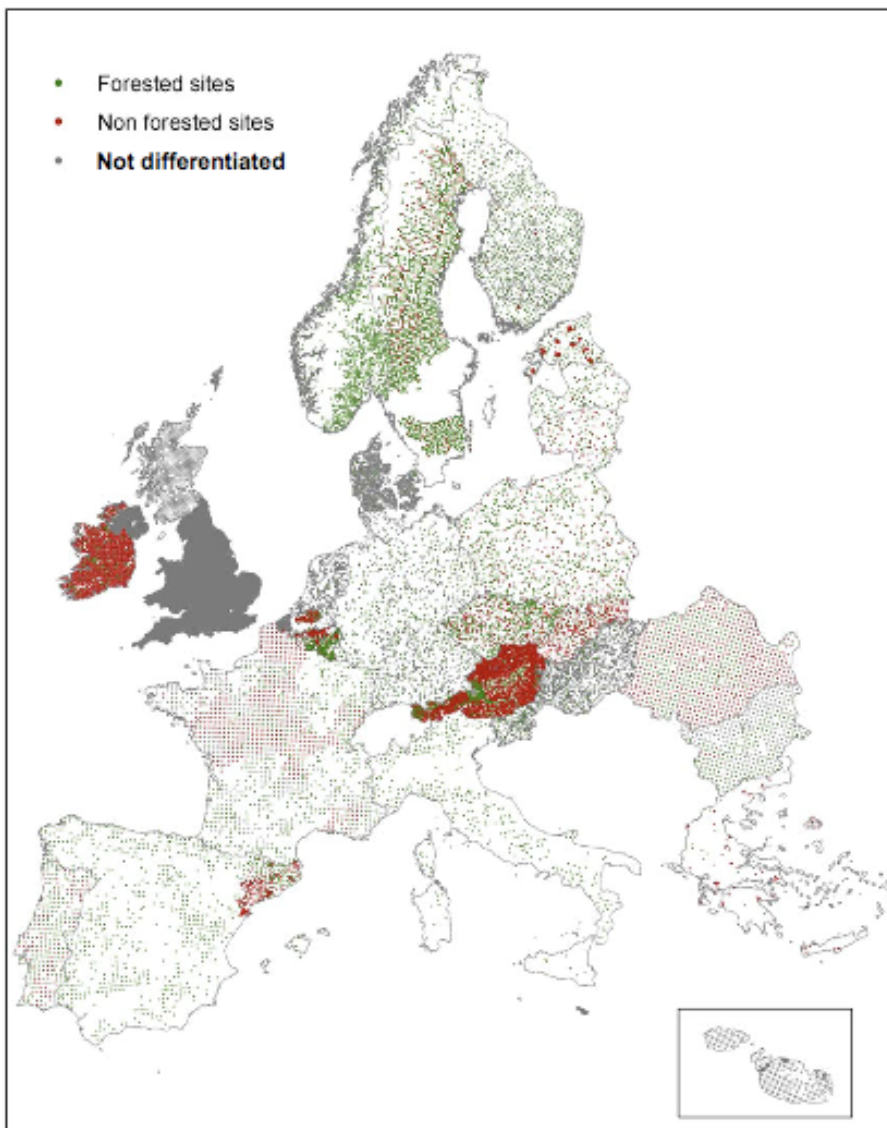


Figure 3: Distribution of soil monitoring sites in Europe

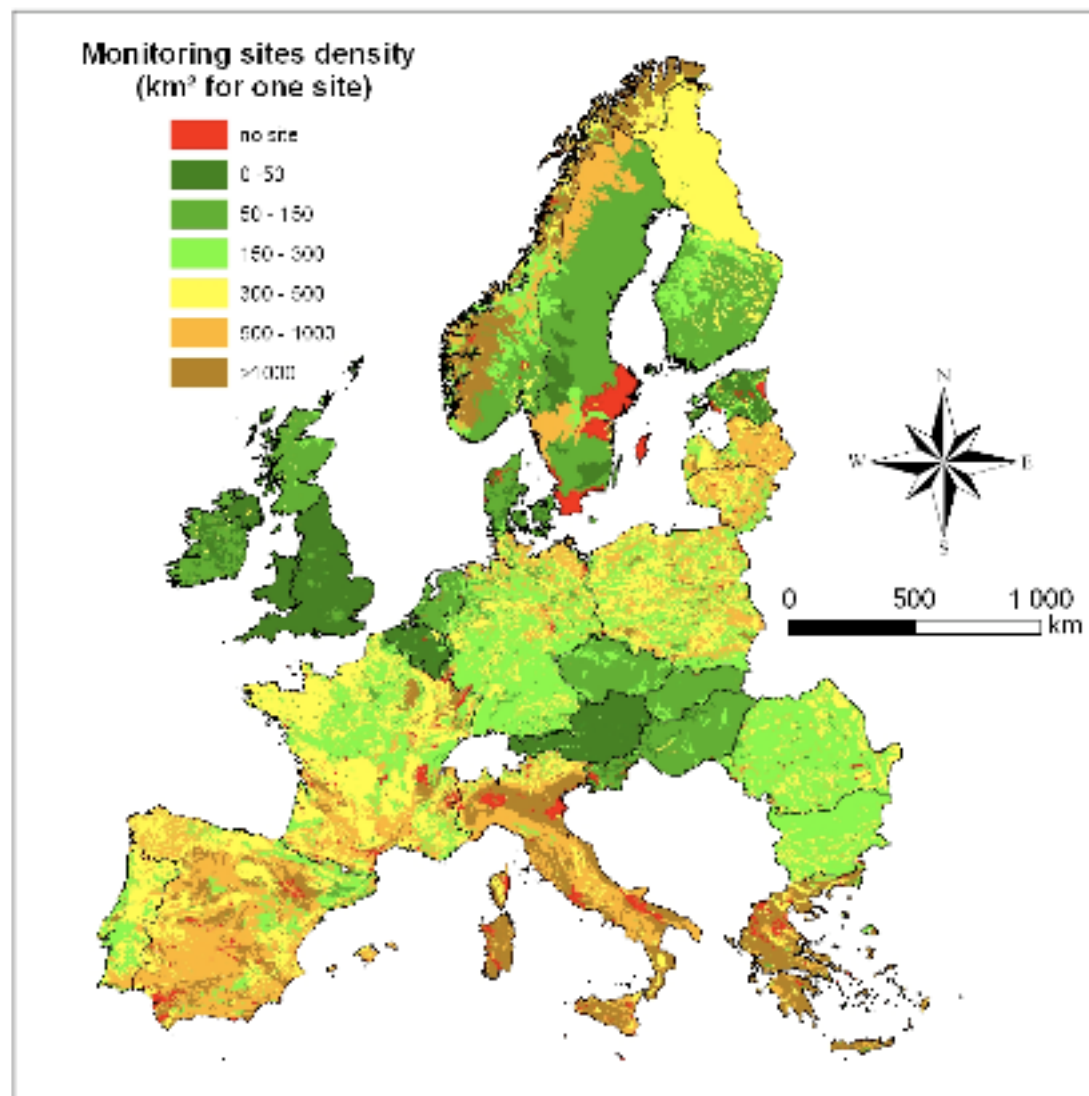
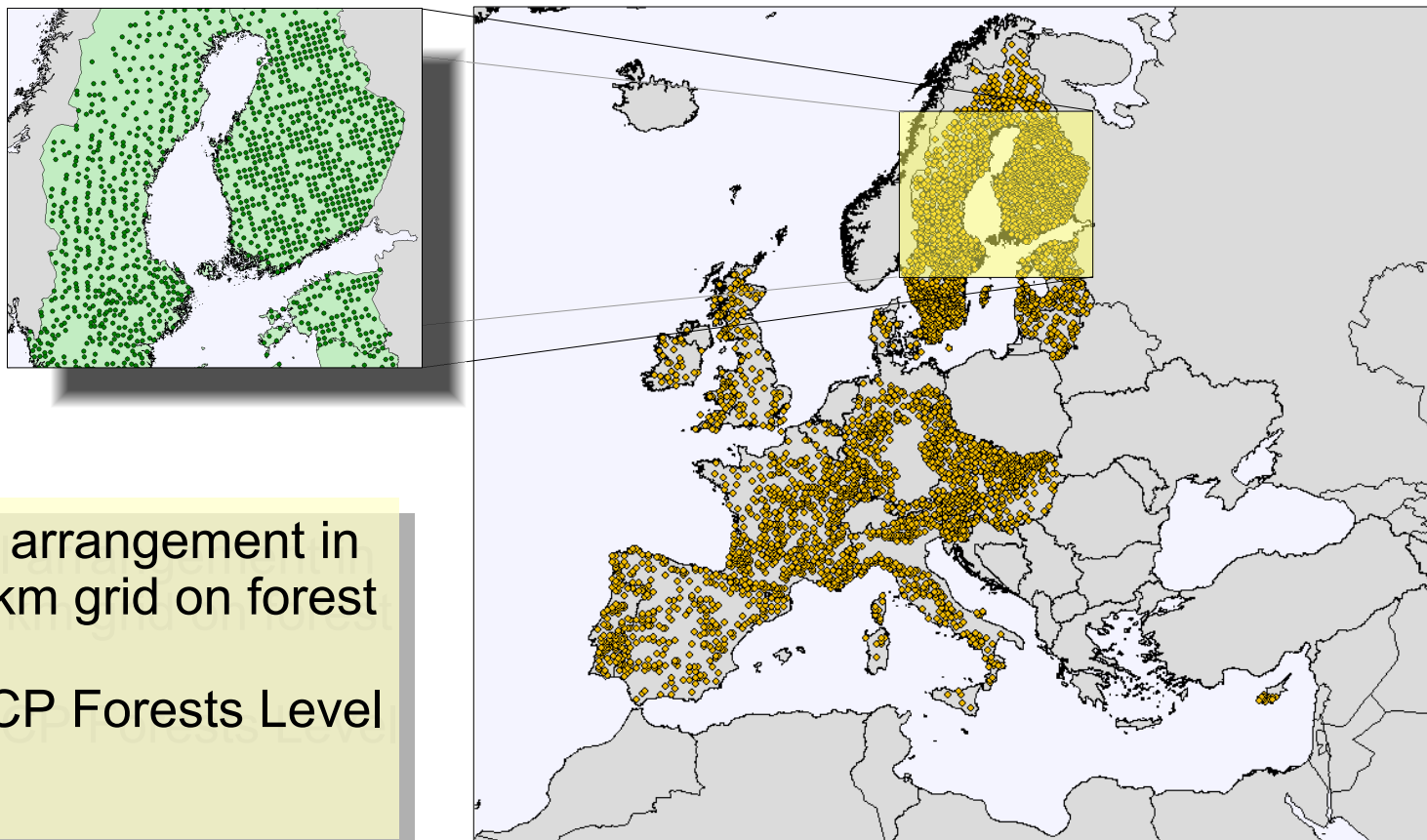


Figure4: Density of sites in soil mapping units of Europe

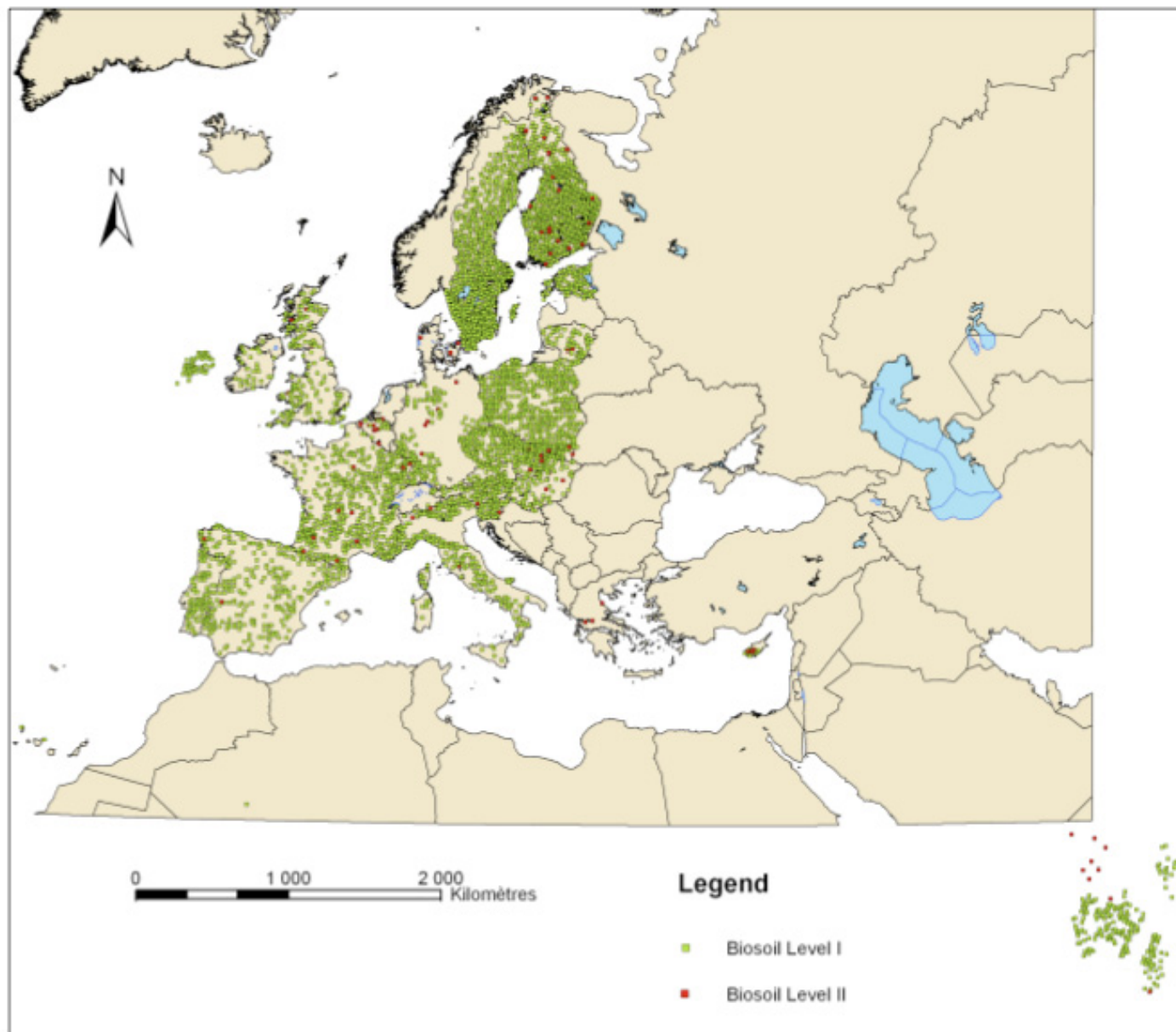
Distribution of Level 1 Survey Plots

Plot Location



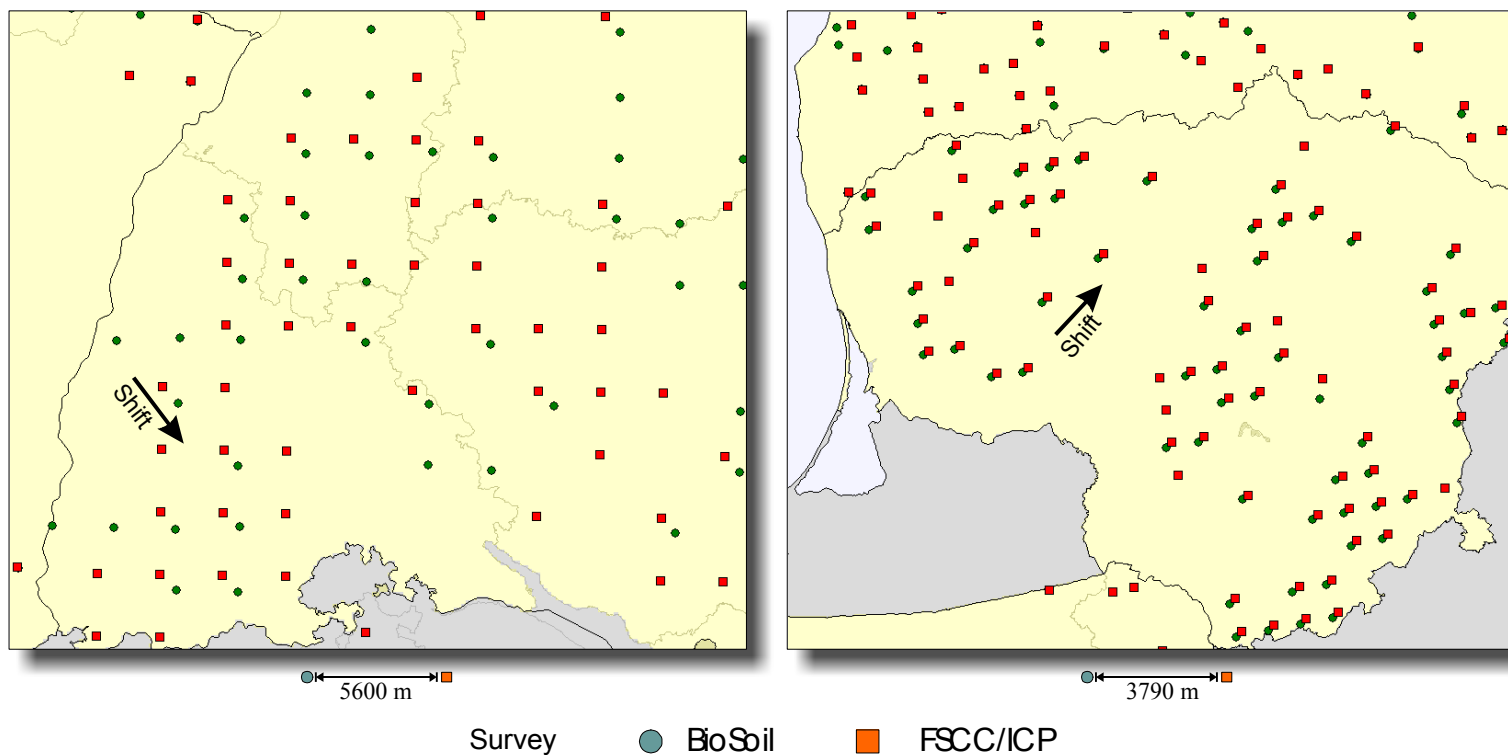
- Nominal arrangement in 16 x 16 km grid on forest land.
- Use of ICP Forests Level 1 plots.

BioSoil/Soil Level 1 Sample Plots



BioSoil vs. FSCC / ICP Forests 1996 Survey

Geographic Co-Location



BioSoil/Soil Level 1 vs. FSCC/ICP Forests Plot Locations

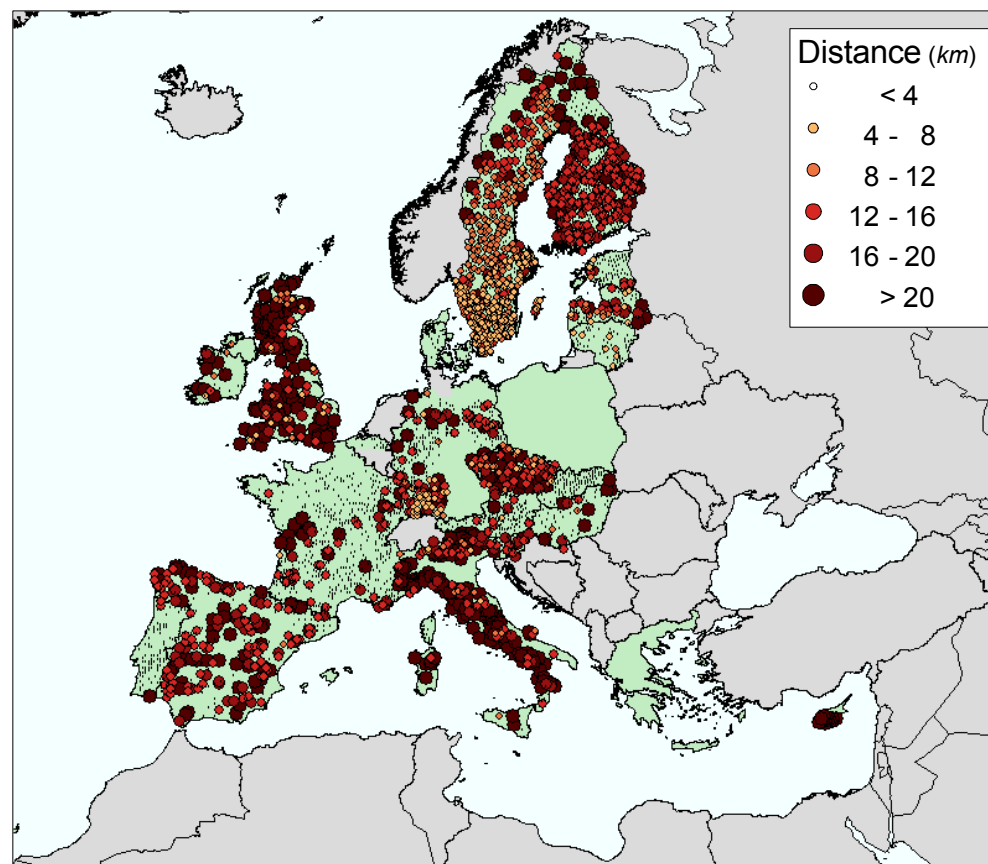
BioSoil vs. FSCC / ICP Forests 1996 Survey

Geographic Co-location

Identification of previous plot by geographic position is not apparent:

- new plots installed;
- coordinates of existing plots modified;
- systematic shift introduced.

Plots within 2,500m: 2,289



**Distance between BioSoil and FSCC / ICP
Forests Sample Coordinates**

Organic Carbon Content

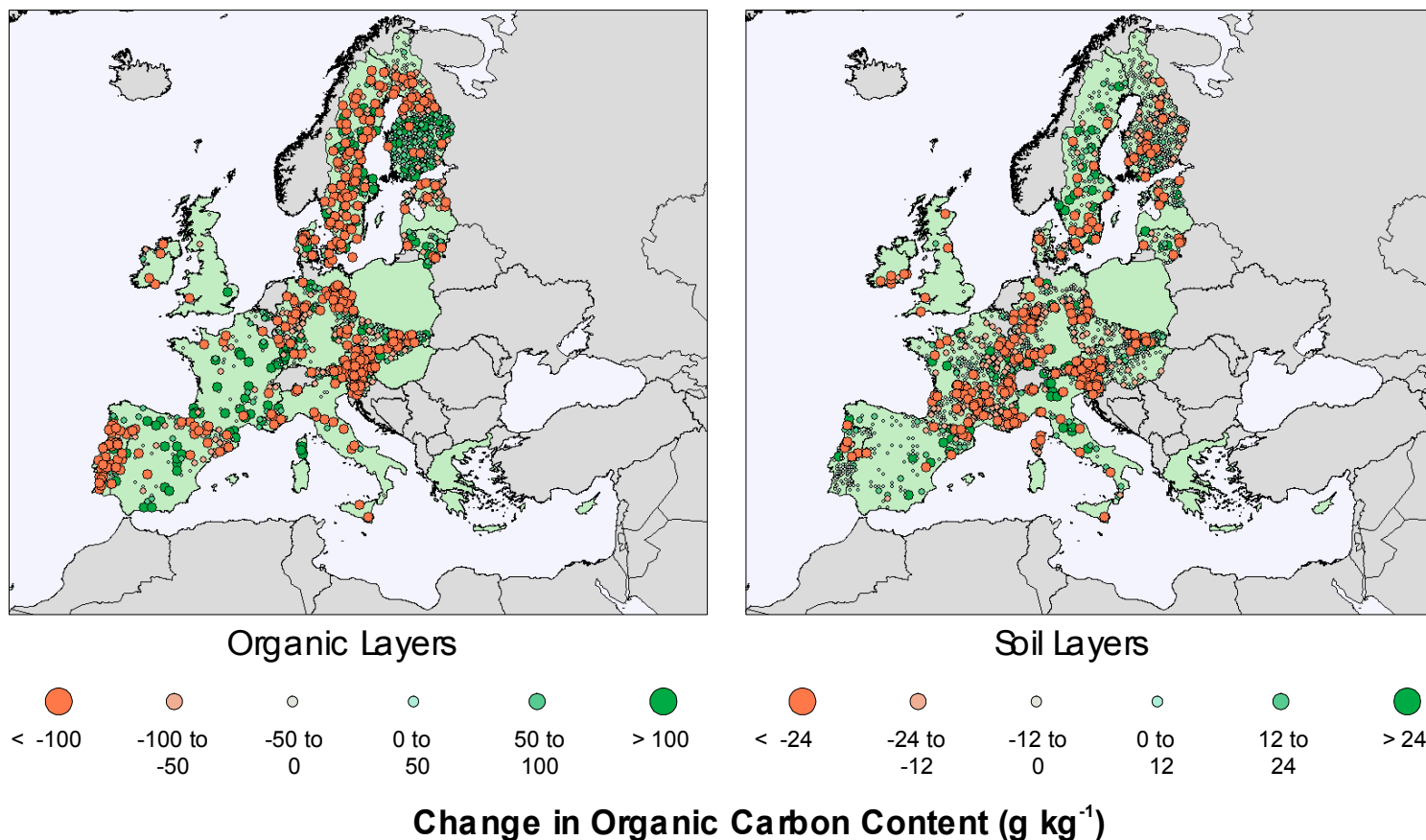
Condition	Occurrence	
	<i>Plots</i>	<i>of Plots (%)</i>
Records	4,027*	
Only organic layer data	73	1.8
No organic layer indicated	884	22.0
Missing data for organic layer	321	8.0
Only soil section data	1,097	27.2
No soil section indicated	181	4.5
Missing data for soil section	327	8.1
No data for 0-10cm soil section	130	3.2
No data for 10-20cm soil section	52	1.3
Data for analysis	2,735**	67.9

* 4,024 Plots with corresponding reference data

** Plot location not considered

1996 vs. 2006 Soil Survey

Change in Organic Carbon in Organic and Soil Layer



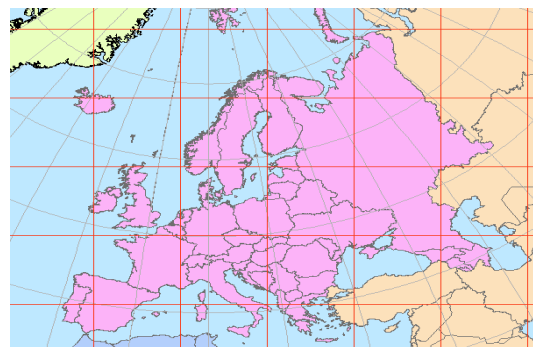
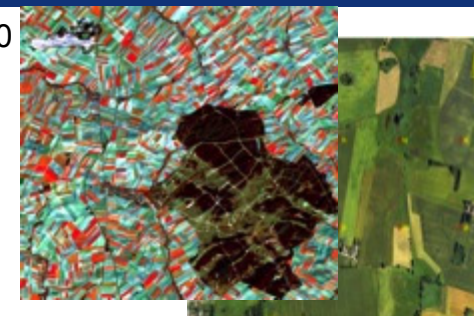


Image 2000



Ortho-Photos

1.000.000 points

Photo-Interpretation

Sampling

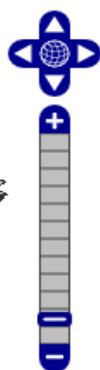
Stratum	Points
Arable	uuuuu
Water	xxxxxx
Artificial	yyyyyy
Woodland	zzzzz

250.000 points

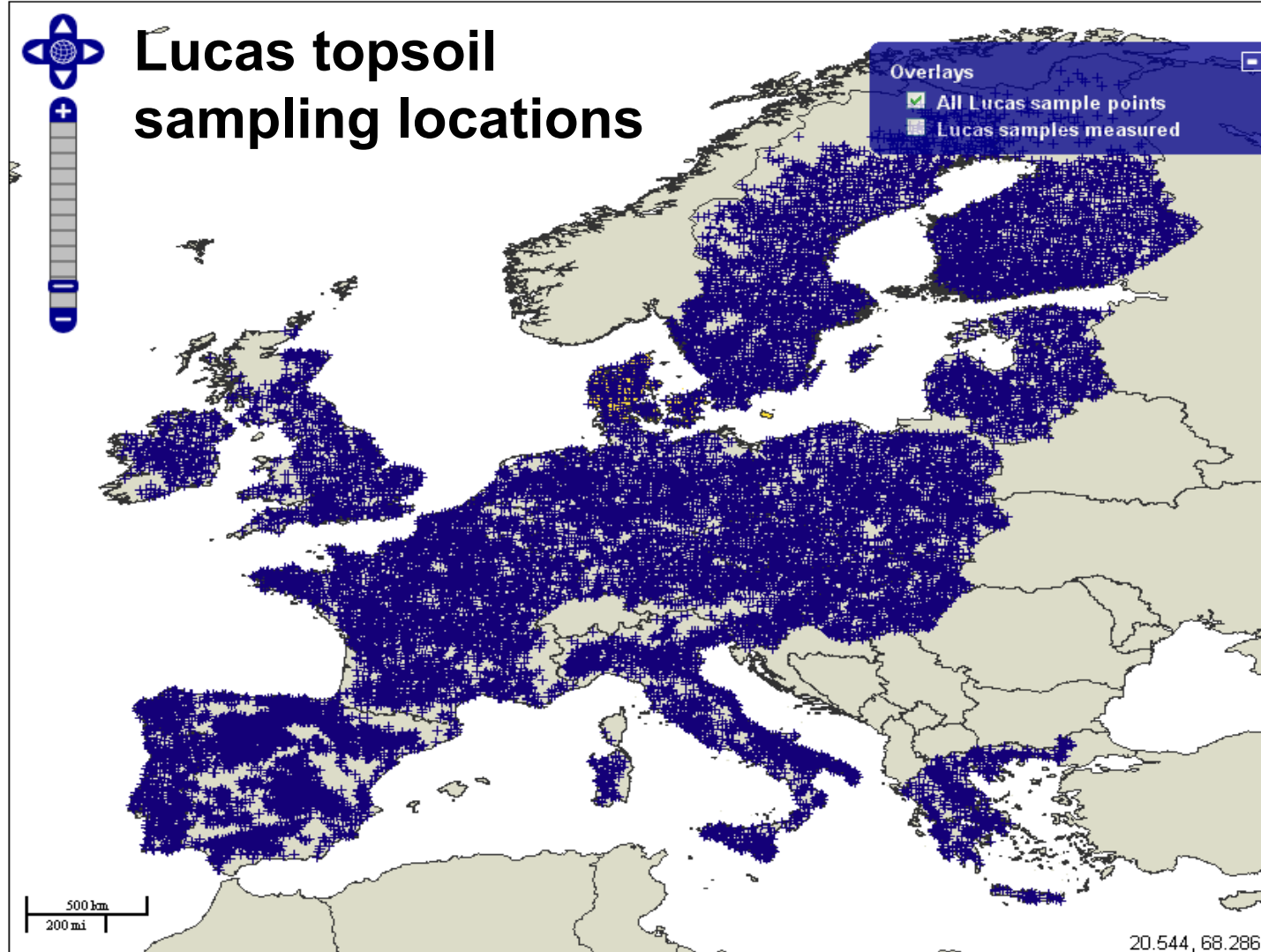


Survey

Compute statistics



Lucas topsoil sampling locations



Select from the dropdown list to zoom to country extent

AUSTRIA
BELGIUM
BULGARIA
CYPRUS
CZECH REPUBLIC
DENMARK

Select Lucas property of interest

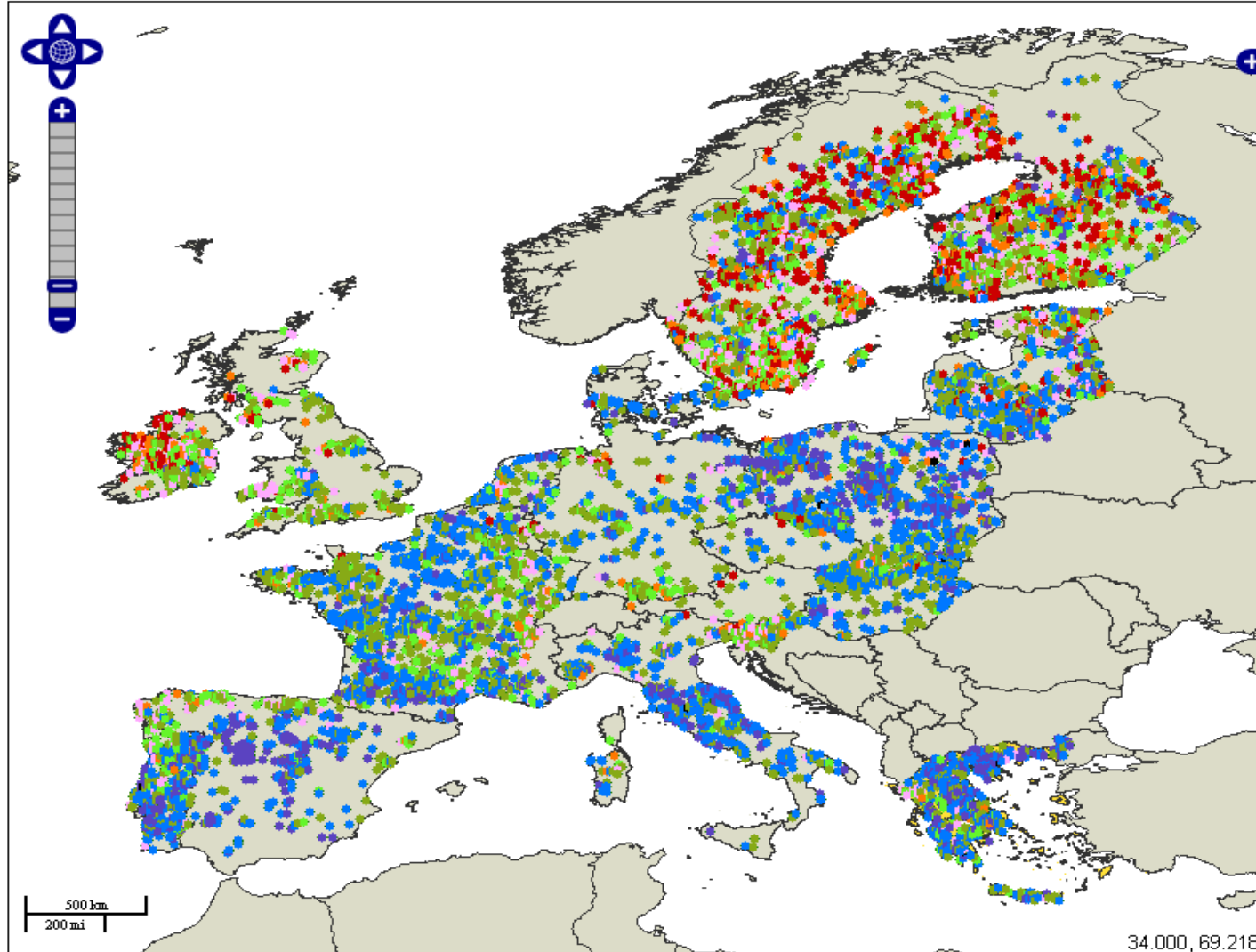
coarse_fr
clay
silt
sand
pH_CaCl2
pH_H2O

European Union

Lucas samples analysed: 7429
of a total number of: 20748

Parameter Unit Decimals	Unit of measurement	Precision (in decimals)
Coarse fragments	%	0
Particle size distribution (FAO, 1990a)	-	-
Clay content	%	0
Silt Content	%	0
Sand Content	%	0
pH(CaCl ₂)	-	1
pH(H ₂ O)	-	2
Organic carbon	g/kg	1
Carbonate content	g/kg	0
Phosphorus content	mg/kg	1
Total nitrogen content	g/kg	0
Extractable potassium content	mg/kg	1
MULTISPECTRAL Properties (with diffuse reflectance measurements saturation)	-	-
Cation exchange capacity	cmol(+)/	-

parameter		Sample analysis pcs/week
		1000
Particle size distribution	ISO 11277.	300
pH	ISO 10390.	1000
Organic carbon	ISO 10694.	300
Carbonates	ISO 10693.	1000
Phosphorus	ISO 11263	600
Total Nitrogen	ISO 11261.	300
Extractable Potassium	Soil Survey Laboratory Manual; Soil Survey Investigation Report No. 42	300
Cation exchange capacity	ISO 11260.	300
Multispectral properties	Diffuse reflectance measurements	1000



Organic Carbon

Not measured	●
< 10	●
10-20	●
20-40	●
40-60	●
60-100	●
100-200	●
> 200	●

Select from the dropdown list
to zoom to country extent

AUSTRIA
BELGIUM
BULGARIA
CYPRUS
CZECH REPUBLIC
DENMARK

Select Lucas property of
interest

pH_CaCl2
pH_H2O
OC
Ca_CO3
N
P
K
SFC Area

European Union

Lucas samples analysed: 7429
of a total number of: 20748

Preliminary results

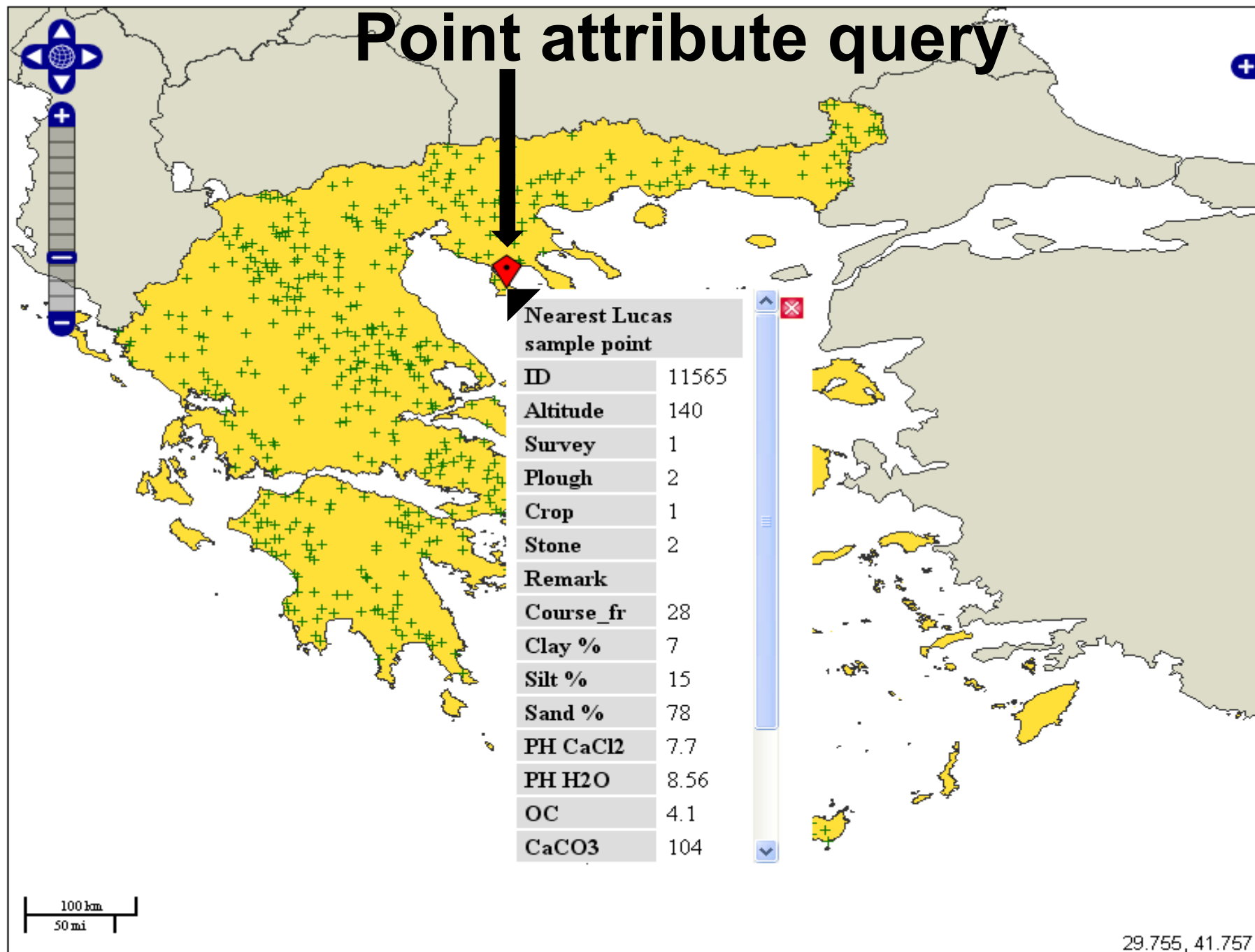
Table 4. Relative mean organic carbon content of mineral soils under major land uses in different European regions (in % of the highest value)

region	croplands	woodland	grassland
Scandinavian	100	100	100
Central European	47.5	57,3	65,1
Mediterranean	41.8	82,5	59,5

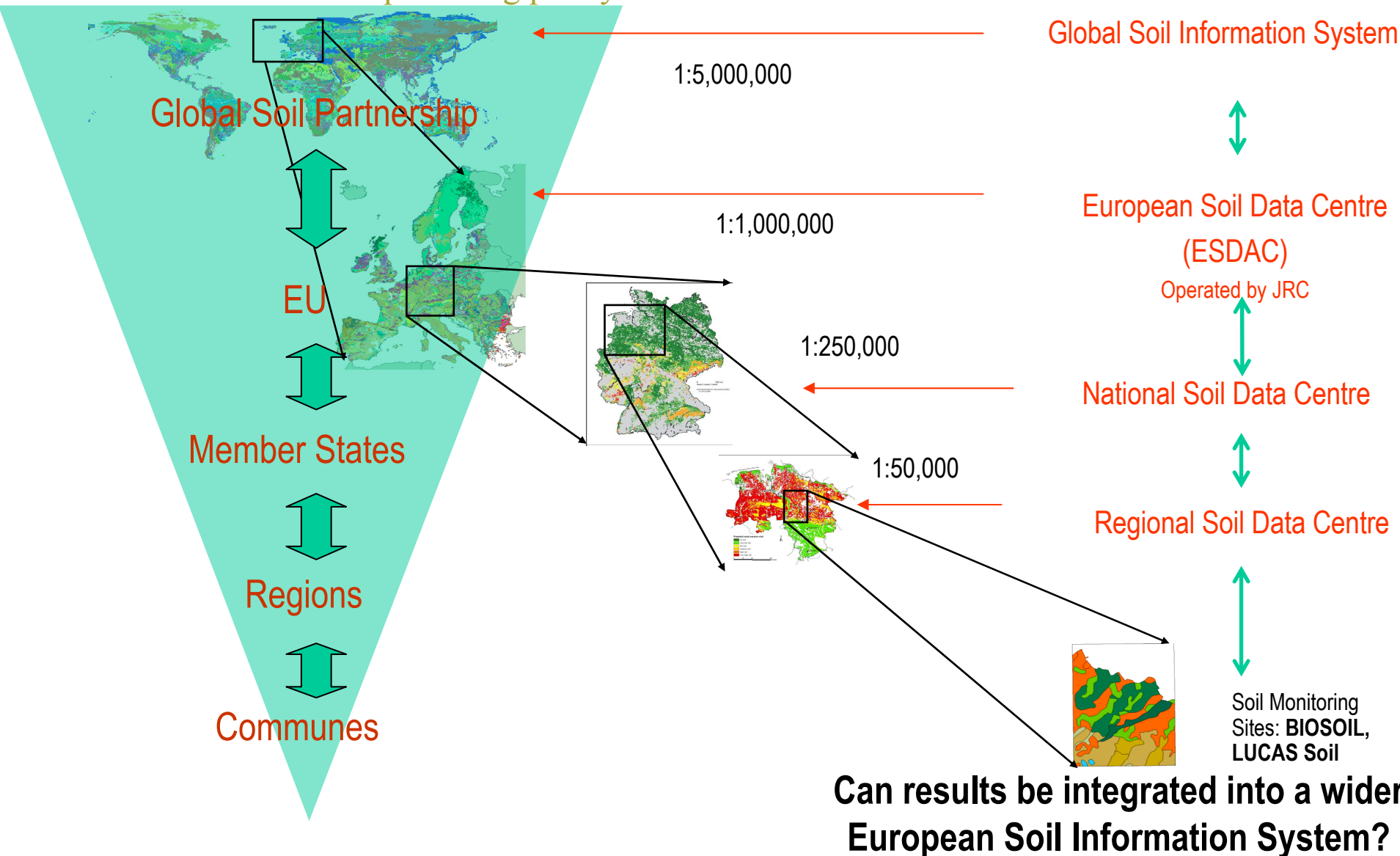
Table 3. Indicative organic carbon figures in mineral soils (<12% OC) in different European regions by land use type

region	Croplands		
	mean OC content g/kg	std. deviation	N
Scandinavian	29.9	20.6	544
Central-European	14.2	7.6	1075
Mediterranean	12.5	8.8	1420
	Woodland		
	mean OC content g/kg	std. deviation	N
Scandinavian	42.2	27.0	1954
Central-European	24.2	19.0	368
Mediterranean	34.8	25.8	413
	Grassland		
	mean OC content g/kg	std. deviation	N
Scandinavian	35.8	22.1	212
Central-European	23.3	19.5	497
Mediterranean	21.3	16.4	477

Point attribute query



Data centers providing policy relevant soil information at different scales



SOIL

Land Management & Natural Hazards Unit



GLOBAL SOIL PARTNERSHIP

