



## Efforts and barriers in common descriptions, data base building and mapping the soils of Europe

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**Bridging the Centuries**

**Budapest**

**16 September 2009**



# Towards a European Soil Map: I

**1905**

E. Ramann (D) : Soil zones in Europe 1: 40,000,000  
Different soil developments in different climatic and geological regions

**1909**

**1st International conference of Agrogeology, Budapest**

**1914**

K. Glinka (RUS) The Great Soil Groups of the World and their Development

P. Treitz (HU) coupled the Glinka global soil map with other soil maps (e.g. a precipitation and a vegetation map), but particularly with the soils of south-eastern Europe 1:10,000,000



# Towards a European Soil Map: II

## 1924 4th International Conference of Agrogeology, Rome

Commission 'Nomenclature and Classification': B. Frosterus (FI)  
Commission 'Soil Mapping', Subcommission 'European Soil Map':  
G. Murgoci (RO), after 1925: H. Stremme (DE)

G. Murgoci: Instructions to compose a European soil map (with genetic "soil types", regions, soil profiles, etc.) – based on the Romanian 1908 map & 1.5 million European geological map

1927 1st Conference of the International Soil Science Society, Washington, 1927 1:10,000,000 map, legend in German, French, and Polish, 27 map units (chernozems, rendzinas, podzols, peat, salty soils..)

Decision to produce a 1:2,500,000 soil map of Europe



**Stremme, H.  
(1937).**

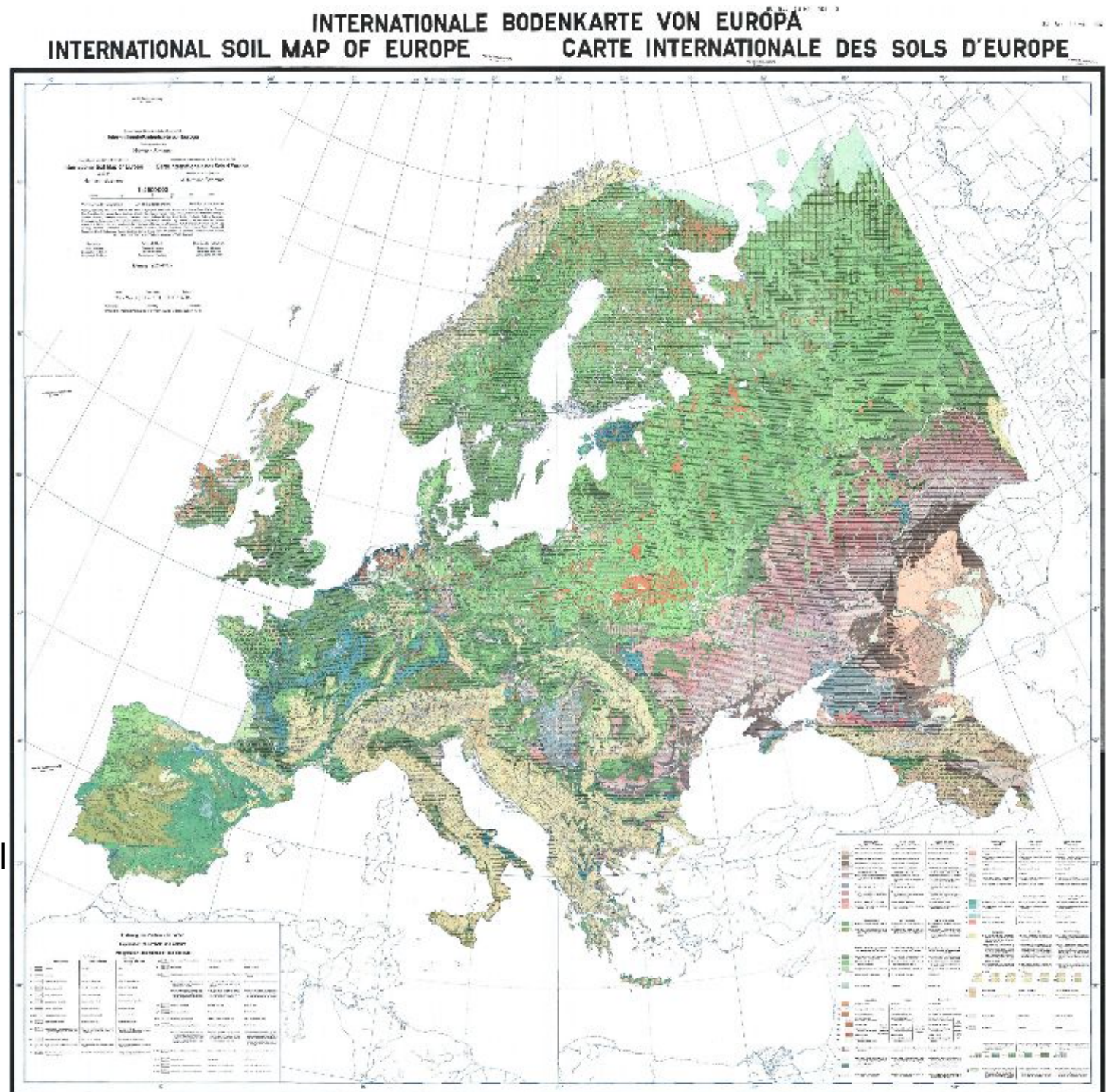
**International Soil  
Map of Europe  
1:2,500,000.**

**Editor: W.  
Hollstein. 1925-  
1937. Gea-  
Publishing, Berlin.  
1937.**

- 12 sheets

- 4.8 m<sup>2</sup>

- archive of the  
Prussian Geological  
Survey (now BGR)





## Soil Map Legend

- combination of colours and patterns

### Soil sets (colours)

- Steppe soils with A-C profiles
- Dry forests soils
- Forests soils (Podzolic types with ABC profile)  
Central and N. Europe
- Wet soils
- Saline soils
- Rock soils (skeletal soils)
- Mountain soils

- 42 soil types

### Soil varieties (texture)

(pattern)

- Clay soil
- Loam
- Fine sandy to silty soil
- Sandy and gravelly soil
- Very fine sandy soils (loess)
- Sandy and gravelly soil
- Morainic soil
  - boulders
  - clayey
  - fine sandy
  - sandy

**1952 Gent, Belgium** Request to FAO to sponsor European Working Party on Land Utilization and Conservation to harmonize methodologies and classification systems (R. Dudal, R. Tavernier, and D. Osmond)

**1959 Oxford, United Kingdom** first draft of 1:2.5 million scale soil map of Europe; published by FAO in **1966**

**1965 Working Party on Soil Classification** proposes the preparation of 1:1 million scale map

**1981 FAO - UNESCO Soil Map of the World 1:5,000,000**  
2 two map sheets covering Europe incorporating European systems of soil classification into an internationally recognised legend





**Table 1: National Soil Survey Institutes and Scientists involved in the preparation of the earliest Soil map of Europe (1952-1981)**

Country	Institute	Soil Scientist.
Austria	Geographisches Institut der Universitat Wien	J.Fink
Belgium	Centre de cartographie des sols	R. Tavernier
Bulgary	Pouchkarov soil science institute	I. Garbouchev
Cyprus	Department of Agriculture	G.C. Grivas
Denmark	Agricultural University of Denmark	K. Rasmussen
Finland	Agricultural Research Center	M.Sillanpaa
France	Institut Nationale de Recherche Agronomique (INRA) & Centre National de recherches agronomiques (CNRA)	M. Jamagne
Germany (Federal Republic)	Soil Science Institute University Bonn	E. Muckenhausen.
Greece	Agricultural Faculty Athens	N. Yassoglou
Hungary	University of Agriculture	I. Szabolcs
Ireland	The Agricultural Institute	J. Lee
Iceland	University Research Institute	D. Johannesonn
Italy	Instituto di Geologia applicata della università degli studi di Firenze	F.Mancini
Luxemburg	Administration des services techniques d'agriculture	J.P. Wagener
Netherlands	Soil Survey Institute (STIBOKA)	H. De Bakker
Norway	Norwegian Agricultural University	J. Lag
Poland	Polish Academy of Sciences	B. Dobrzanski
Portugal	Servico de Recohencimento e de Ordinamento Agrario	J. Carvalho Cardoso
Romania	Soil Science and Research Institute	N. Flores
Sweden	Royal College of Forestry & College of Agriculture	L. Wiklander
Switzerland	Institut fédéral de recherché agricoles	L.F. Bonnard
Czechoslovakia	Research Institute for Soil Science and agrochemistry	j. Nemecek
Turkey	Ministry of rural affairs and cooperation	O. Akyurek
United Kingdom	National Research Council Soil Survey England and Wales & Macaulay Institute for soil research	D.A. Osmond
U.R.S.S.	All-union Society of soil scientists	V. Kovda
Yougoslavia	Yugoslav Society of Soil Sciences	M.Ciric.



# The advent of the digital age & JRC!

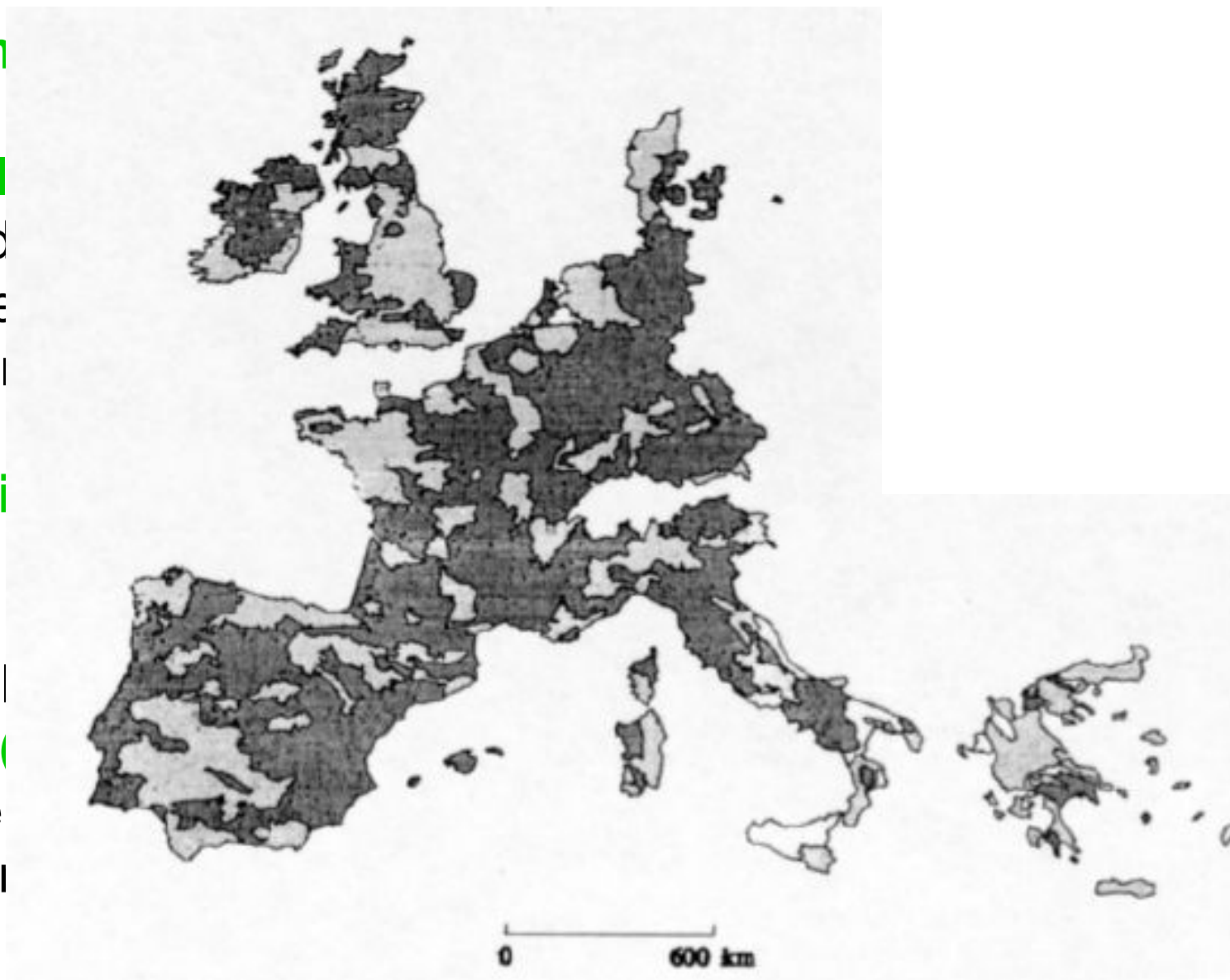
**1982** Con

**1985** Soil

Published  
MS; 7 she  
(R. Taveri

**1986** Digi  
(Platou).

**1987** EC |  
**Sensing** (  
paramete  
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King).



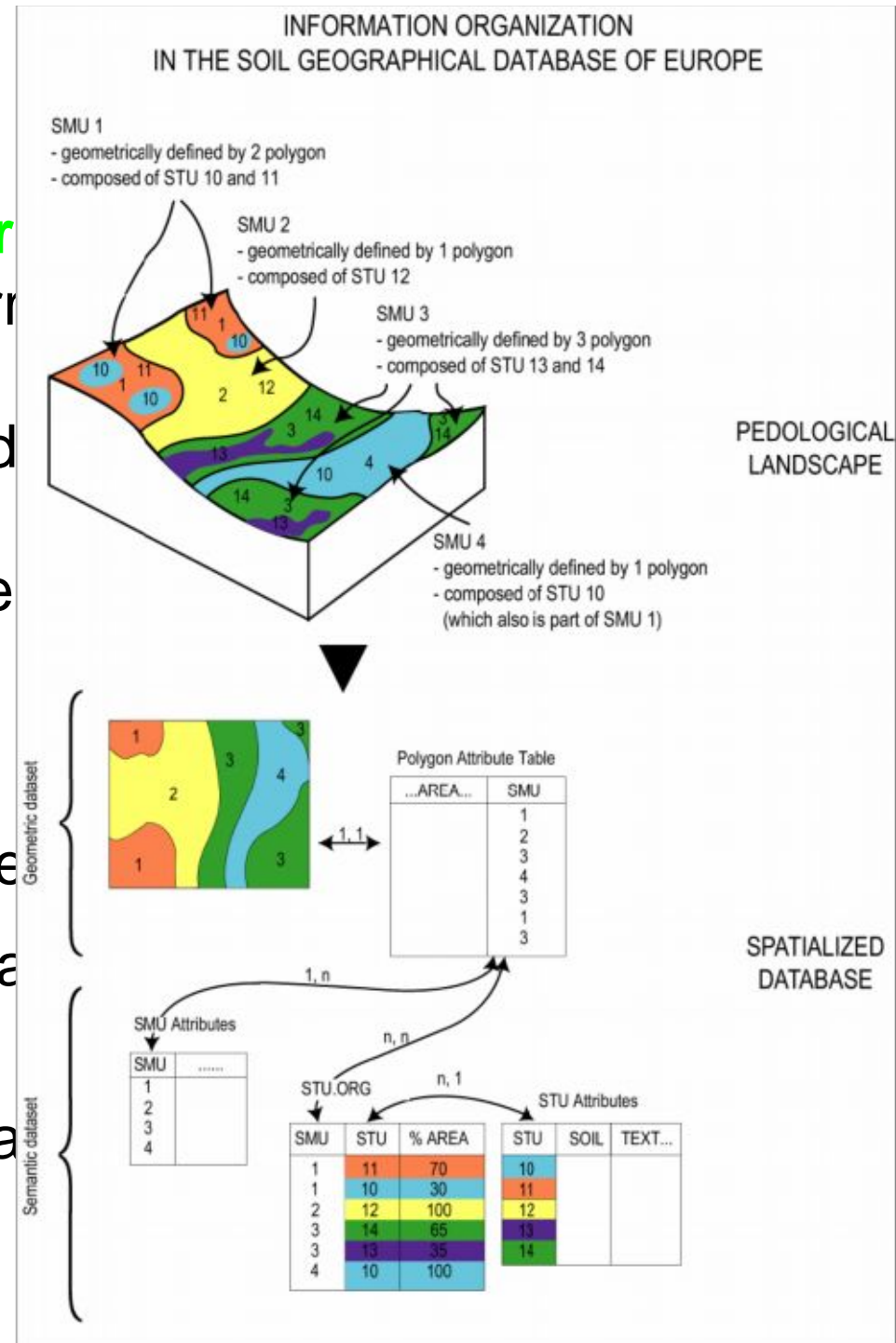




**1992 1:1,000,000-scale Eur Group** (M. Jamagne, A. Burr

Concept of soil mapping and  
Soil archives of Ghent Unive

- 1995** Work commences on
- Soil Geographical Database
  - Soil Profile Analytical Da (Madsen, Jones)
  - Pedo-transfer Rules Databa



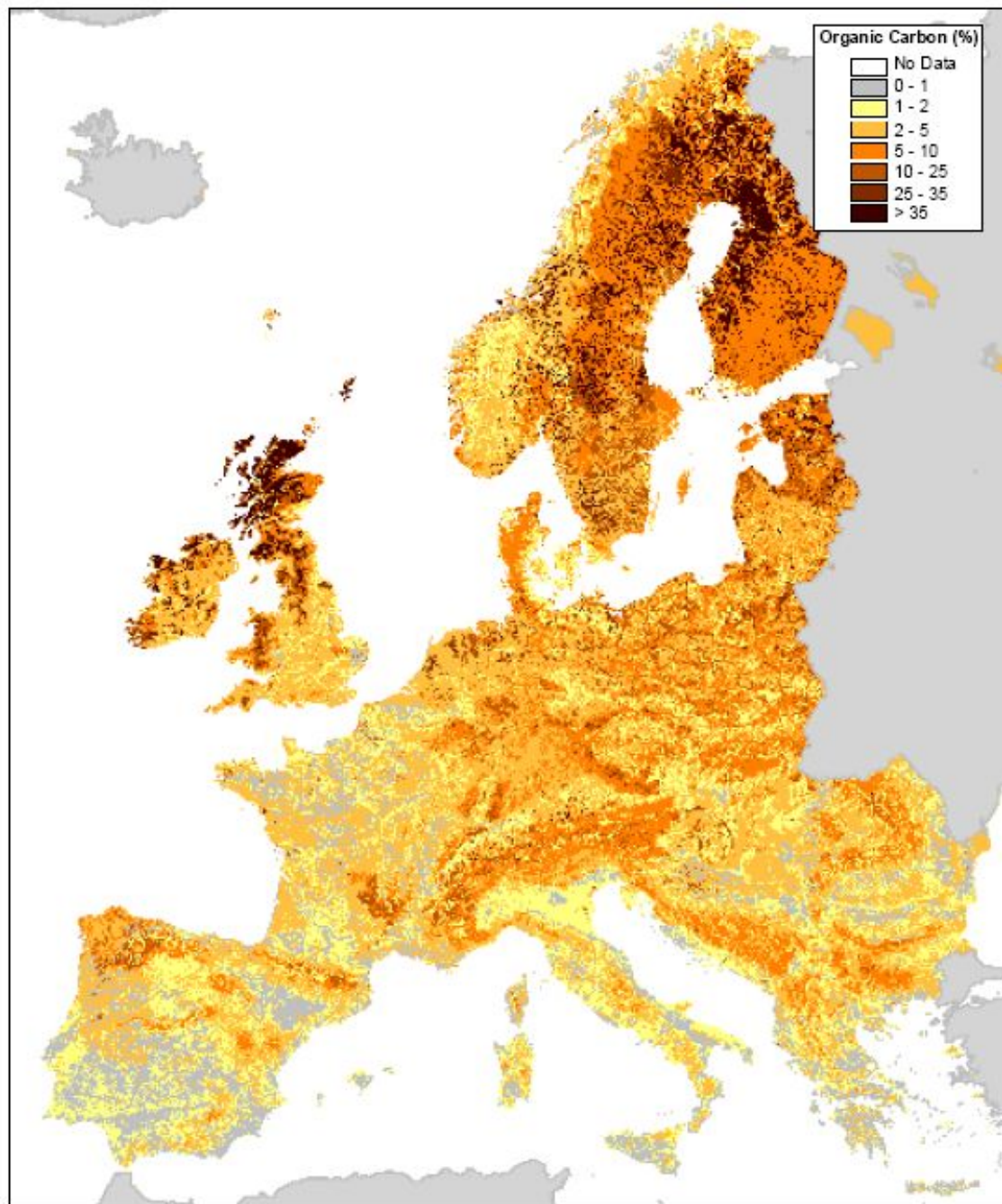
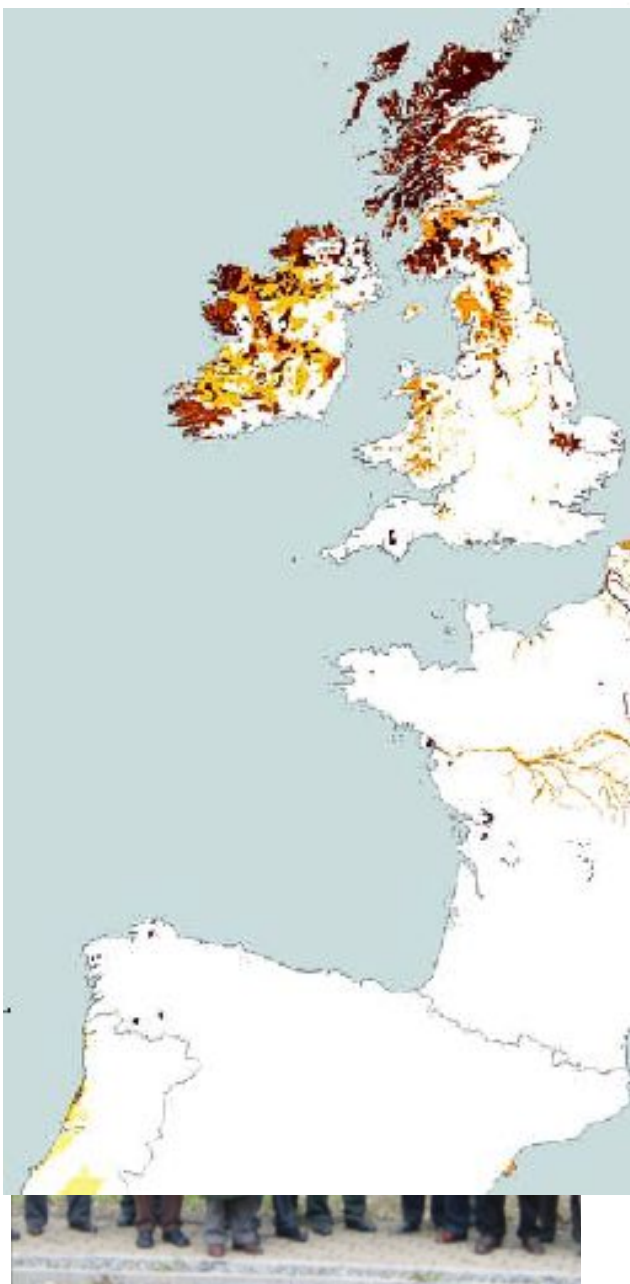


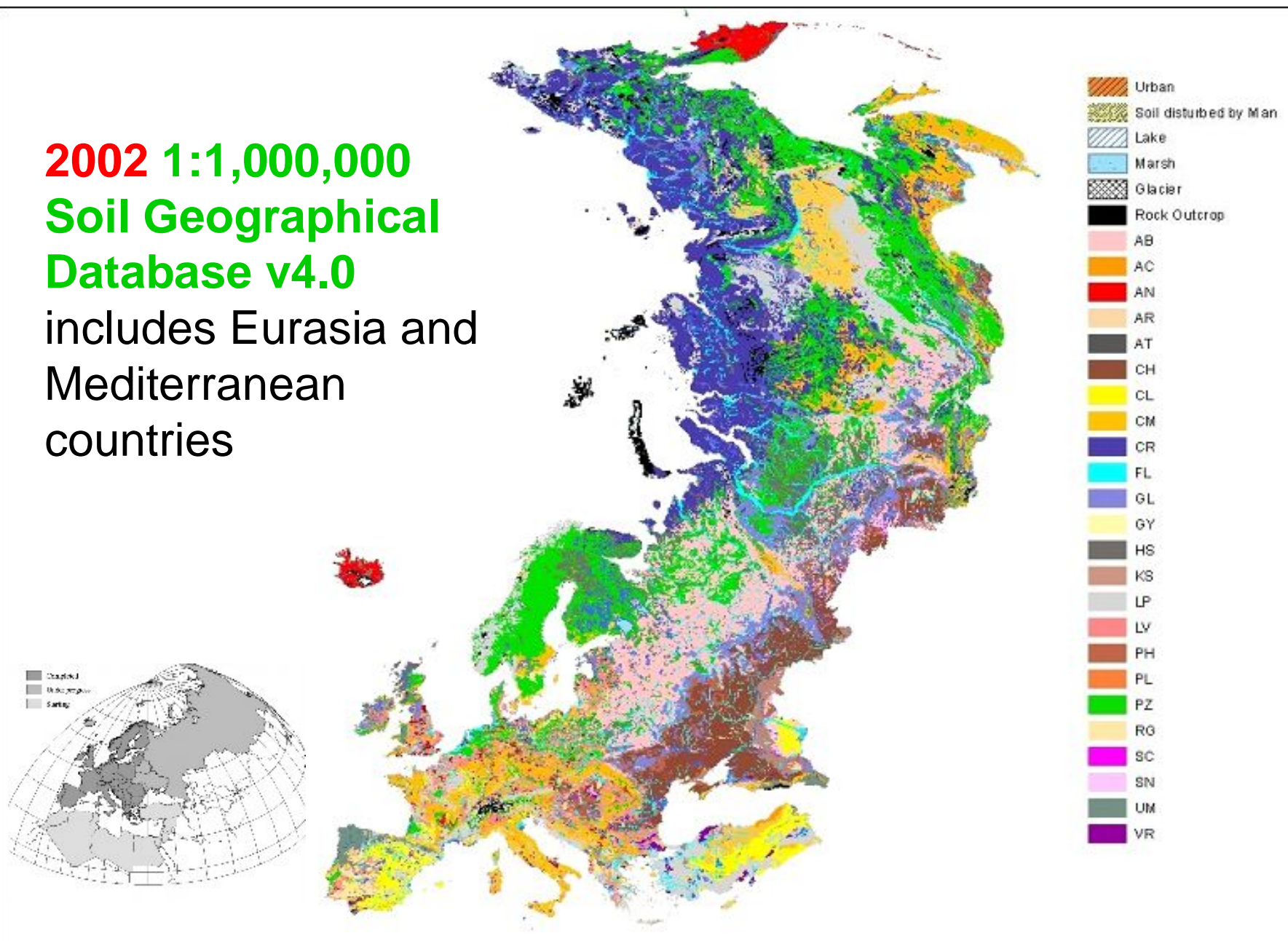
Figure 10: Organic carbon content (%) in the surface horizon of soils in Europe (S.P.I.04.72)





## 2002 1:1,000,000 Soil Geographical Database v4.0

includes Eurasia and  
Mediterranean  
countries





## More detail? Modern concept?

**1993** Feasibility study on the creation of a soil map of Europe at a scale of 1:250,000. CEC (Dudal, Bregt and Finke)

**1999** Georeferenced Soil Database for Europe – Manual of Procedures (Finke)

Initiatives by individual countries

**2009** ESNB WG 250,000

**1909 1st International conference of Agrogeology, Budapest** – proposal for regional mapping at **1:250,000!!!**



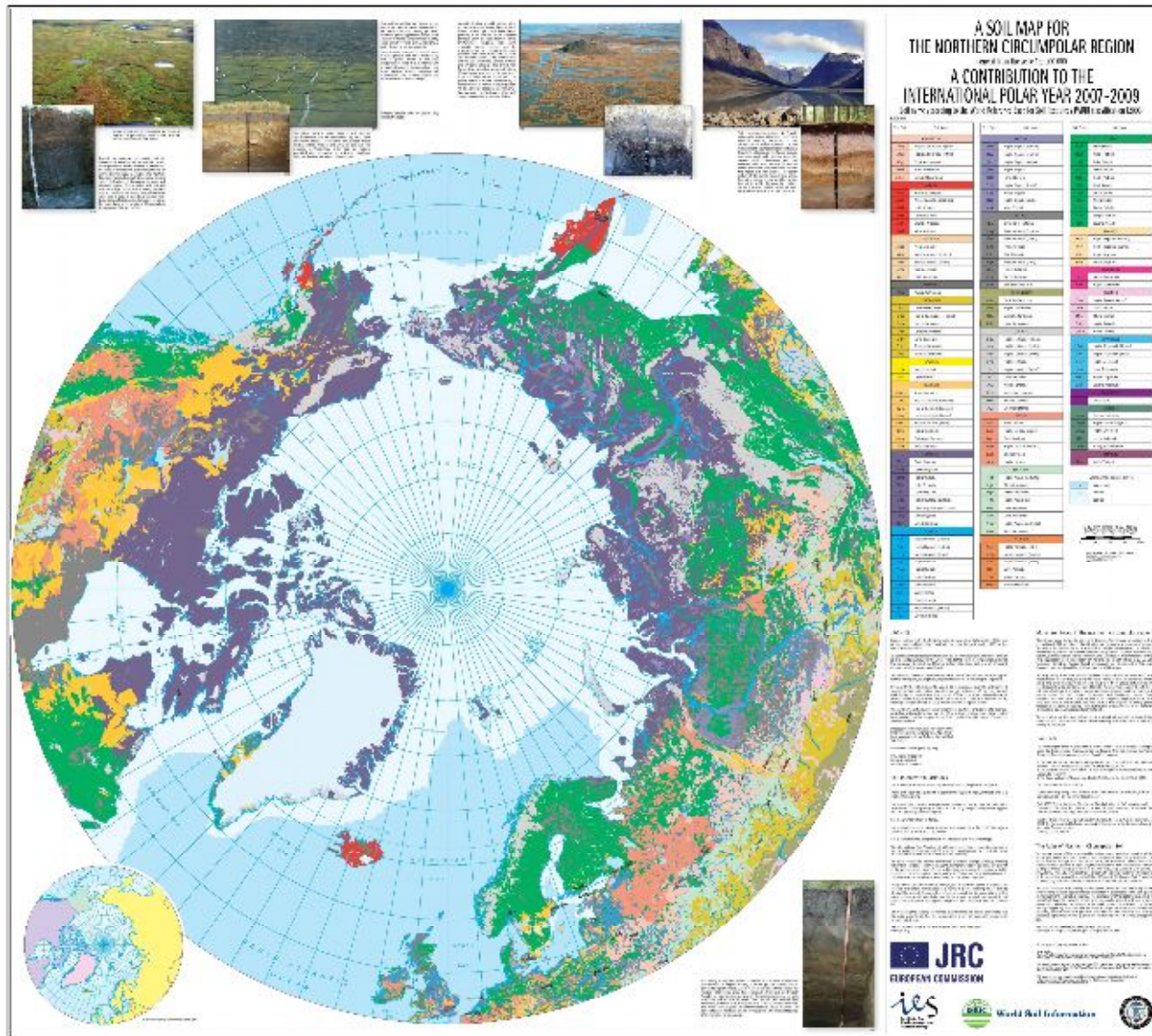


# THE FUTURE?



## 2009 Northern Circumpolar Soil Atlas

Joint Research Centre





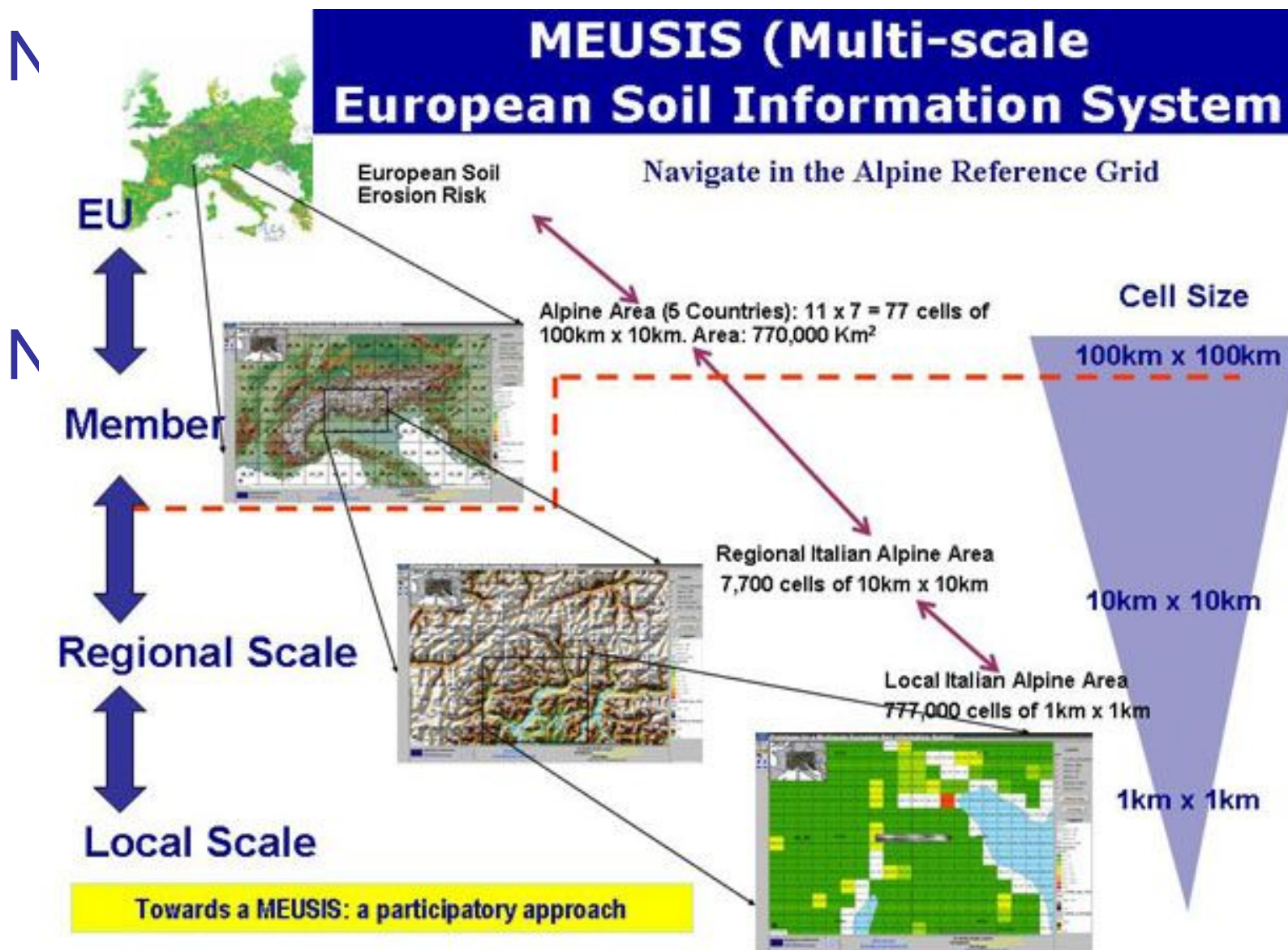
# Digital Soil Mapping: an alternative?

- Geo-statistical prediction of soil properties from environmental spatial datasets.
- Describes uncertainties, pixel-based, ready other earth and social sciences
- Mixed reaction amongst 'traditional' soil mappers

**21<sup>st</sup> Century** Soil Map of Europe through GlobSoil.Net (JRC Europe-node)

- 90m six soil properties  
(clay content, organic carbon content, pH, estimated cation-exchange capacity, electrical conductivity and bulk density)
- Pedo-transfer functions to predict more difficult to measure soil functions  
(e.g. available soil water storage, carbon density and phosphorus fixation)



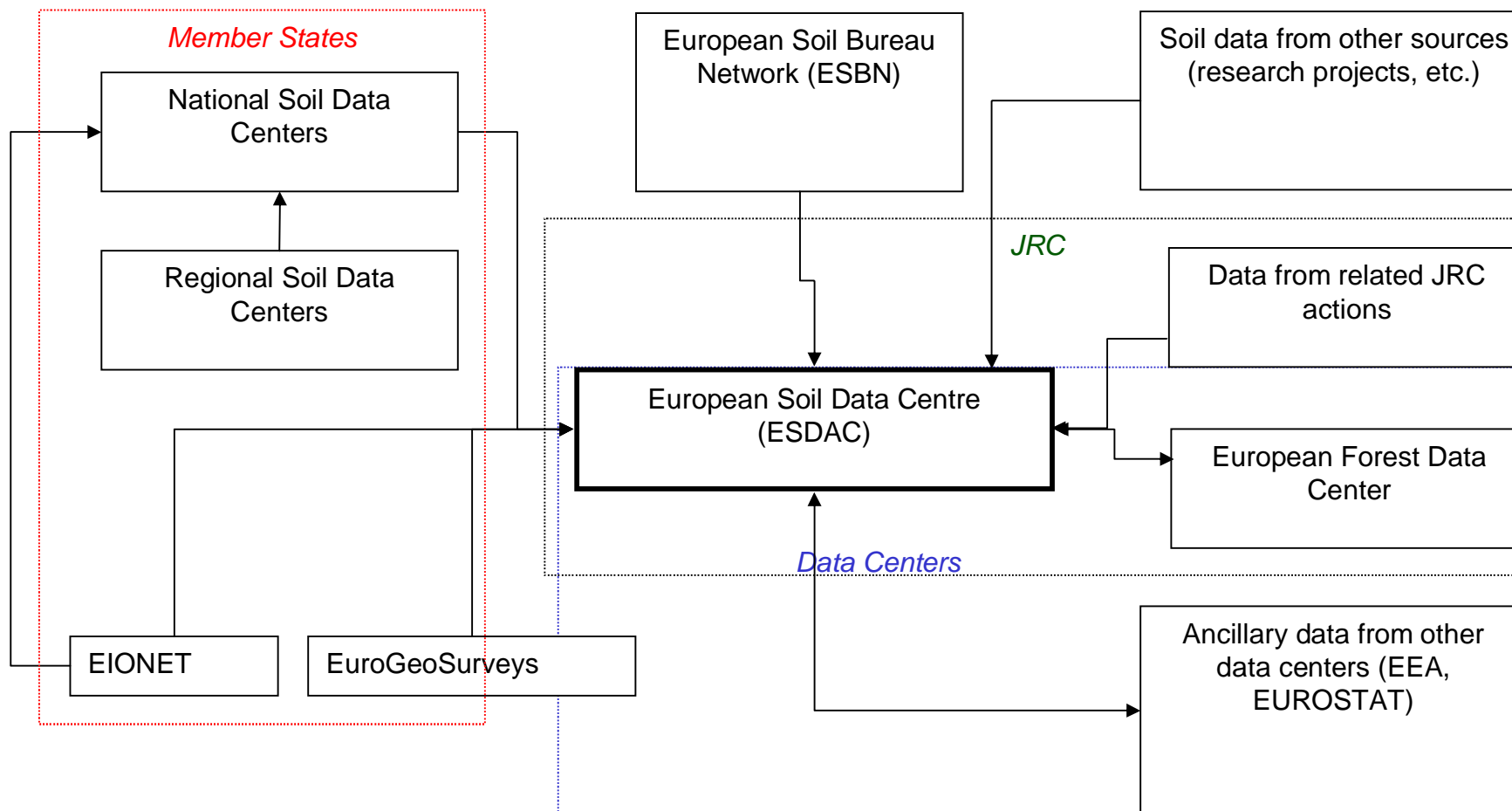






# Preliminary outline of potential soil data providers to the European Soil Data Centre (ESDAC)

Joint Research Centre



“A Single Focal Point for Policy Relevant Soil Information”



1. Drivers for mapping maps given their
2. Enhanced com decline in the der
3. Soil now in the c of soil data. Soil r cost of the declin
4. Countries still m information.

- Soil Thematic Strategy
  - European Data Centre
- Plant Protection Directive
- Nitrates Directive
- GMES
- INSPIRE
- Kyoto Protocol / Emission Trading
- EU Global Development Policies
- Environment and Health Strategy
- Flood Risk Management
- Common Agricultural Policy
- Forest Focus
- Urban Thematic Strategy
- Renewable Energies & Energy Efficiency
- Sustainable Use of Natural Resources Strategy
- Waste Framework Directive

# Technical obstacles to the harmonization of soil data and maps

## 1 Soil profile descriptions

One area of almost total agreement! FAO Guidelines for soil Description  
US Soil Survey Manual. However very few systematic soil surveys take place.

## 2 Soil analytical data

Analytical methods vary! Amount of measured data for modelling is sometimes much less than expected.

## 3 Soil Classification

International approach needed given plethora of national schemes.

WRB used to assist in communication and is an excellent way to classify soil profiles in the field but lacked legend/mapping considerations.

**Enormous progress** in Europe over the last century in bringing together and harmonizing soil information over national borders.

**Still issues** (e.g. analytical procedures, classification)

**Systematic inventory** of soils has **collapsed** in many countries almost halting the generation of new data

Traditional soil maps have **difficulty** to answer policy issues.

**DSM** could be alternative but still in an experimental stage where weaknesses should be corrected at an early stage.



It is recommended to make a special effort to

- (1) to streamline soil analytical procedures
- (2) to develop WRB as a mapping legend
- (3) the acceleration of collecting geo-referenced soil information should overcome the political and commercial obstacles in place until now.
- (4) to follow closely achievements of digital soil mapping and incorporate the more traditional soil mapping methods and results with digital techniques.



# Where are the early maps located?