



MAPPING SERVICES IN THE EUROPEAN SOIL PORTAL

THE EUROPEAN SOIL PORTAL OFFERS A NUMBER OF ON-LINE APPLICATIONS AND SERVICES TO THE PUBLIC USER. DUE TO THE COPYRIGHT LIMITATIONS IN THE EUROPEAN SOIL DATABASE (AS THE DATA CANNOT BE DISTRIBUTED FOR FREE), THE SOIL PORTAL HAS DISSEMINATED THE INFORMATION OF THE EUROPEAN SOIL DATABASE THROUGH VARIOUS APPLICATIONS VIA INTERNET.

Distributing geographic information via the Internet allows for real-time integration of data from around the world. The software developed allows the users to exchange, integrate, and analyze data in new ways. Users can combine Soil data and information accessed via the Internet with their local data for display, query, and analysis.

The mapping services have been developed towards this direction as they serve the public user. **SOMIS (SOil Map Internet Service)** is the most important web-based application that allows the user to navigate the European Soil Database and interact through map operations. The user can zoom and pan the maps, query them, identify and select features and perform advanced printing.

The following applications-services are currently available:

- **SOil Map Internet Server (SOMIS) v2.0:** is an updated version of SOMIS v1.0. This map server publishes all the maps derived from attributes which are present in the Soil Geographical Database of Eurasia at scale 1:1,000,000 (version 4 beta) and the Pedotransfer Rules Data Base (version 2.0), which are components of the ESDB (European Soil Database) (Fig. 2).
- **SOMIS v1.0:** is the first version of the **SOil Map Internet Server** and publishes a limited number of maps derived from attributes that are present in the ESDB.

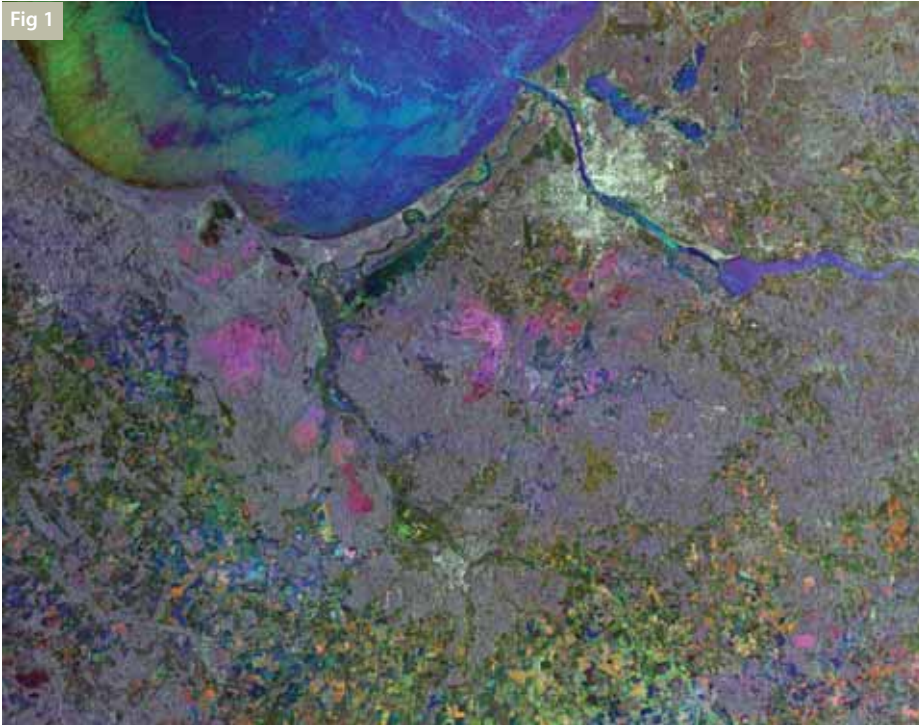


FIG. 1: This Synthetic Aperture Radar (SAR) multitemporal colour composite image is centred over Riga (bright area top centre), the capital of Latvia, situated on the Baltic Sea coast at the mouth of the Daugava River. (Courtesy ESA)

- **MEUSIS (Multiscale European Soil Information System):** is the prototype of the Multi-scale European Soil Information System (MEUSIS); it is an application which allows the user to navigate in the Alpine Reference Grid. The objective of this application is to allow the user to navigate in a large trans-boundary area by zooming in from upper scales towards more detailed data (Fig. 3).
- **Pan European Soil Erosion Estimates (PESERA):** is an interactive application that allows the user to navigate in the Pan European Soil Erosion Estimates (PESERA) map and data. Soil erosion estimates (t/ha/yr) by applying the PESERA GRID

model at 1km, using the European Soil Database, CORINE land cover, climate data and a Digital Elevation Model. The resulting estimates of sediment loss are from erosion by water. The PESERA model produces results that depend crucially on land cover as identified by CORINE and the accuracy of the interpolated meteorological data.

- **Organic Carbon in Topsoils (OCTOP) in Europe:** is an interactive application that allows the user to navigate in European soils Organic Carbon Content. The Soil Portal makes available the Maps of Organic carbon content (%) in the surface horizon of soils in Europe. The data are in ESRI GRID

format and are available as an ASCII raster file or in native ESRI GRID format.

- **ECALP (Eco-pedological Map of the Alps):** The prototype 1km x 1km Grid system in the Alpine Territory. The ECALP service allows the navigation in 5 selected Trans-boundary areas and presents the prototype of the Alpine Ecopedological Information System.

- **Soils of Eurasia** (according to WRB Group Classification): is an interactive application that allows the user to select one or more soil types, after which a map is created which shows these soil types.

- **Soil Profiles of Europe:** Contains Soil Profile Data covering Belgium, Denmark, England, Finland, Germany, Italy, Luxembourg, Netherland, Portugal, Scotland and Wales. The application is user-friendly and the user has first to zoom in an Area and afterwards to select the appropriate polygon where an information window will pop-up with the Soil Profile.

From technical point of view, the mapping techniques have been developed on the ESRI ArcIMS platform. Authoring the Soil maps involves adding Soil data layers (mainly coming from the European Soil Database), setting layer symbology (according to Standards in the Soil Community) and so on, and then saving the map to a map configuration file. Publishing a map as a service involves using the ArcIMS Administrator to register the map configuration file with the ArcIMS Application Server.

The Soil maps have been designed in ArcIMS Author and have been saved as map configuration files. Those configuration files have an .axl extension and are written in ArcXML. A map configuration file defines the content of the map. ArcXML elements and



FIG. 2: The map server publishes all the maps derived from attributes which are present in the Soil Geographical Database of Eurasia at scale 1:1,000,000.

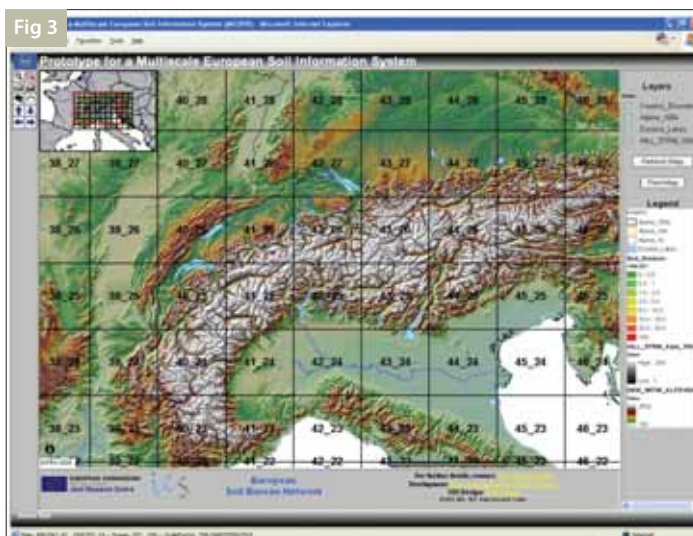


FIG. 3: Multi-scale European Soil Information System (MEUSIS); it is an application which allows the user to navigate in the Alpine Reference Grid.

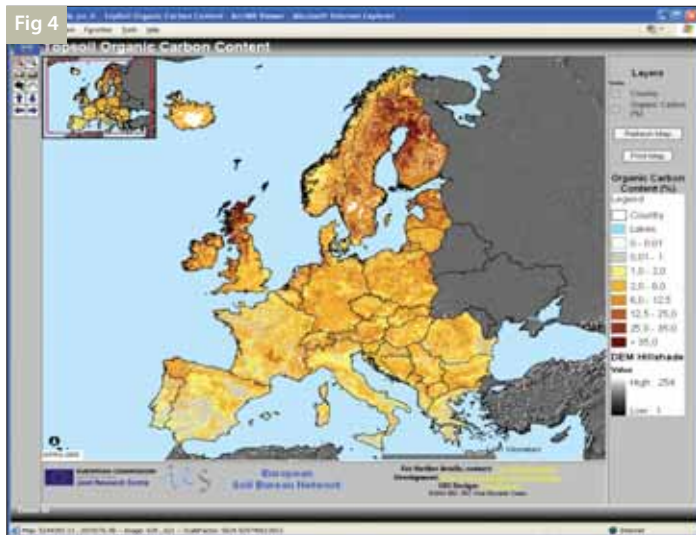


FIG. 4: An interactive application that allows the user to navigate in the Pan European Soil Erosion Estimates (PESERA) map and data.

attributes are used to define such things as the location of the data, layer symbology, geo-coding properties, and stored queries.

Using ArcIMS, we have managed to centrally build and deliver a wide range of Soil maps, data, and applications to all the colleagues of our Infrastructure as well as outside through the World Wide Web. Recently, the ArcIMS /ArcMap Server allows users to take advantage of

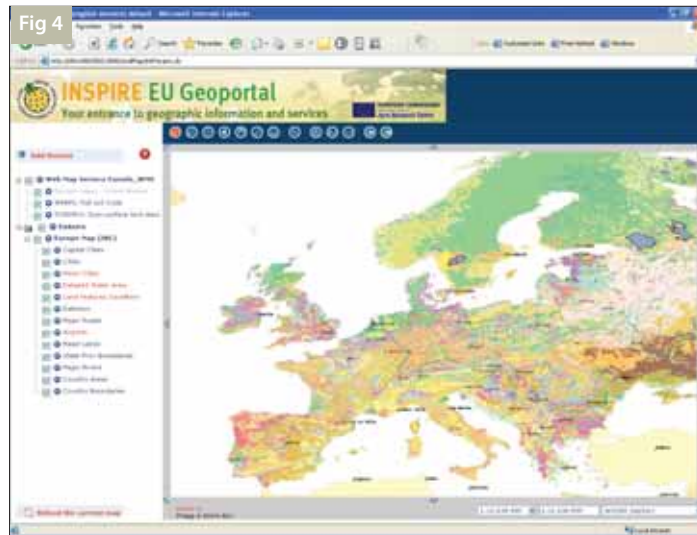


FIG. 5: The INSPIRE EU Geo-portal Viewer.

the advanced data access and cartographic capabilities offered in ArcMap by publishing ArcMap documents (MXD files) on the Internet.

Interoperability and Web Mapping Service (WMS)

In the Soil Portal, WMS services have been developed compliant with INSPIRE principles and Open GIS Consortium standards. In practice, this means that the SOMIS (European Soil Database attributes), PESERA (Soil Erosion Estimates), OCTOP (Organic Carbon), MEUSIS (Multi-Scale Soil Information System, ECALP (Ecopedological Map of the Alps) and The Soil Profile layers can be viewed through any Web Mapping Service Client (WMS Standalone or Web viewer, ESRI ArcGIS).

A Web Map Service (WMS) produces maps of geo-referenced data. A "map" is defined as the visual representation of geodata; a map is not the data itself. WMS is the production of spatially referenced data dynamically from geographic information. The map itself is an actual portrayal of geographic information presented as a digital image file for display on a computer. WMS maps are in picture formats such as PNG, GIF or JPEG. The OGC WMS specification standardizes the way in which maps are requested by clients and the way that servers describe their data holdings.

A WMS Viewer is either a standalone application or a web interface (INSPIRE EU Geo-portal) or can be a part of ESRI ArcGIS and allows the user to combine layers coming from different Map Servers. In the European Soil Portal case, this means that the Soil layers may be viewed through any Web Map Service Client in combination with other layers coming from other Map Servers all around the world.

In order to guarantee interoperability, the developed services are based on international standards, as promoted by the INSPIRE initiative. According to INSPIRE principles, the mapping services have been extended so that it is possible to combine layers of maps located in different Map servers all around the World, based on internationally accepted Web Map Service (WMS) standards and specifications from the Open GIS Consortium, as also laid down in the INSPIRE Guidelines, in order to attain the maximum interoperability of data and services.

Panos Panagos and **Marc Van Liedekerke** are both working for the *Institute of Environment and Sustainability, Joint Research Centre of the European Commission.*

For more information: <http://eusoils.jrc.ec.europa.eu>

FIG. 6: The green landscapes of Belgium, the Netherlands and Luxembourg – collectively known as Benelux – as seen by Envisat, along with a corner of France and the south-east coast of the United Kingdom across the English Channel (La Manche). Sedimentary outflow from the River Thames is clearly seen – the same phenomena can be seen at smaller scales at the other river mouths in the image. (Image was acquired by Envisat's Medium Resolution Imaging Spectrometer (MERIS) in Full Resolution mode. Courtesy ESA)

