Software data news

Soil organic carbon content indicators and web mapping applications

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Abstract

Distributing geographic information via the Internet allows interoperability with similar information and 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 various environmental indicators (organic carbon content) and information accessed via the Internet with their local data for display, query, and analysis. In order to guarantee interoperability, the developed services are based on international standards, as promoted by the INSPIRE initiative.

Software availability

Soil Organic Carbon Application Service A software product that facilitates the fast provision of data maps tailored to the common Internet user who wants to access this specific information.
Name of software and data set: Soil Organic Carbon Content.
Developer: Panos Panagos, E-mail address: panos.panagos@jrc.it.
Contact address: Institute for Environment and Sustainability of the European Commission, Ispra, VA, IT-21027, Italy. Tel.: +39 0332 785574.
Program Language: HTML, JavaScript and ESRI ArcGIS 9.1.
Hardware required: any personal computer running Windows.
Software required: Internet Explorer or any other browser.
Program size: 1 MB.
Availability and cost: free of charge.

1. Soil Portal and soil organic carbon indicators

At the European level, there is a serious lack of geo-referenced, measured and harmonised data on soil organic carbon available from systematic sampling programmes. At the present time, the most comprehensive data on the organic carbon/matter content of European soils remain those that can be derived from the European Soil Database in combination with associated databases on land cover, climate and topography. The Joint Research Centre of the European Commission made a study combining all these data, resulting in a European raster map that contains "topsoil soil organic carbon content" (expressed in %) and cell size of 1 km.

This map is embedded in the European Soil Portal, the premier site for soil data at European level (web address: http://eusoils.jrc.ec.europa.eu/). This portal contributes to a thematic spatial data infrastructure for soils in Europe.

It presents data and information regarding soils at European level. Moreover, the Soil Portal makes maps available through an interactive web application, the OCTOP Map Server that allows the user to navigate in them and to produce custom maps (Fig. 1).
The average citizen may be interested in those data as soil organic carbon is a principle indicator of soil quality (physical and chemical properties) and it is a major accumulator of nutrients. It is also considered as one of the most important indicators in the framework of Kyoto protocol.

For the meaningful spatial representation of topsoil organic carbon (OC_TOP), an alternative methodology of using sample data, in combination with an extrapolation algorithm, was developed. The approach is based on processing a revised Pedo-Transfer Rule and the European Soil Database (Panagos, 2006). The rule is taking as an input the European Soil Database (topsoil bulk density, topsoil soil texture), Corine Land Cover and Accumulated Average Annual Temperature. The data are distributed through a user authentication mechanism.

The European Soil Portal also offers a number of online applications (Panagos and Van Liedekerke, 2006) and services to the public user. Such applications as OCTOP Map and SOMIS (Soil Internet Mapping Server) come in two variants. The first as a true application, where the Map Server delivers data and determines the user interface (Fig. 1). The second variant as a map service to appropriate map clients that succeed in retrieving and combining several maps from several servers and presenting them as one to the user. The latter approach of distributing geographic information via the Internet allows for real-time integration of data from around the world. Such software allows users to exchange, integrate and analyze data in new ways.

2. Interoperability and web mapping services

The idea behind Web Map Service (WMS) is to produce dynamically maps of spatially referenced data from geographic information. The WMS international standard defines a “map” to be a portrayal of geographic information as a digital image file suitable for display on a computer screen. The WMS specification standardizes the way in which maps are requested by clients and the way that servers describe their data holdings.

In order to guarantee interoperability, the developed services are based on international standards, as promoted by INSPIRE (Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community) and Open GIS Consortium. 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 in order to attain the maximum interoperability of data and services.

3. Implications and awareness

The average citizen may use a web browser in order to access environmental information in various environmental portals. Such portals become more and more user-friendly and a large number of data sets are available either for downloading or for previewing. Regarding the later case, most of the portals such as the European Soil Portal provide services to the users in order to make those data/maps easy to manipulate.

Fig. 1. OCTOP web application.

1 http://inspire.jrc.it/.
2 http://www.opengeospatial.org/.
The use of web mapping services allows the public user to take advantage of the interoperability (Denzer et al., 2005) and to combine environmental maps with other mapping services.

The user can use simple navigation operations such as Zooming, Panning, Layering and Legend display and can export customized maps as a PDF document. The user-friendly interactive operations allow the user to learn more about this environmental indicator and to raise his interest.

Online Internet information services regarding environmental indicators like soil organic carbon, offer to the public added value and knowledge about common environmental problems and the potential impacts it could have on his daily life. Prime requirement for such services (Smiatek, 2004) is the ease with which data can be accessed and interpreted. Embedding such services in containers of related products helps the user to orienteer himself even more in the complex jungle of data, maps, reports, indicators and services. The European Soil Portal shows the way and future developments include the offering of the soil products in even wider accepted map based environments such as the Google Earth community.

References


