JRC
EUROPEAN COMMISSION

NEWSRELEASE

Leading soil scientists showcase new Digital Soil Mapping technologies to help fight land degradation and hunger

16th February, 2008 – Leading soil scientists today showcased important new techniques for measuring soil degradation and fertility and called for greater global recognition of the critical role soil plays in determining the health of the planet, affecting a range of the Earth's 'vital signs' ranging from food production to flood prevention and management.

The call came during a session of the annual meeting of the American Association for the Advancement of Science (AAAS) in Boston, as scientists presented a range of new techniques which permit unprecedented levels of detail and accuracy in 'soil mapping'.

Despite an increasing realisation by scientists and policy makers of the crucial role that soil plays in such areas of the ecosystem as food production, the provision of clean water, the generation of greenhouse gas sinks, the provision of raw materials and the preservation of the gene pool, soil survey is a declining activity. This was one of the key messages put forward by scientists during a symposium entitled "*Soil Protection for Sustainable Well-Being".*

Soil survey has not changed that much over the last 50 years. Traditionally, surveyors dug pits in the ground to examine soil characteristics. Based on this information and on their reading of the landscape, approximate boundaries between different soil types were drawn.

Digital Soil Mapping (DSM) provides soil scientists with a set of new tools to help them map soil characteristics by integrating laboratory and field data with innovative mapping techniques. Through geo-statistical concepts, DSM can provide ground-breaking datasets in a way that traditional soil survey could not and at the same time supply complete coverage of the territory under investigation.

European Science and Research Commissioner Janez Potočnik, attending AAAS for the first time added: *"We definitely undervalue the contribution of soil to our bio-diversity, but unless we protect it better, we will soon realise its importance in the worst possible way. Soil is an immensely valuable but finite resource, which requires protection to ensure future food security and environmental quality."*

Symposium organizer Luca Montanarella of the European Commission's Joint Research Centre (JRC) said the reason for the decline in soil mapping was the time-consuming and expensive nature of traditional methods for the collection of reliable information.

"Soil is a living system and once destroyed it is lost forever," he added. "Erosion, contamination, decline of organic matter content, landslides and flooding all contribute to the degradation of a resource that is fundamental to our survival".

Around 16% of the European Union's territory is affected by some sort of soil degradation. In many parts of the world, the 'sealing' of soil due to housing and infrastructure development is progressing at an alarming rate. In Germany this has been recorded at more than 100 hectares per day. Soil sealing can severely affect the natural hydrological cycle. The loss of soil to urban surfaces contributed significantly to the recent cases of severe flooding in Europe.

Digital Soil Mapping: a cost-effective way to uncover new information

According to speaker Jonathan Hempel from the National Geospatial Development Center of the United States Department of Agriculture, the decline in soil surveying makes it all the more important that alternative and innovative methods should be investigated to collect crucial soil information.

Soil scientists representing a global consortium of experts dedicated to shedding new light on the state of the soil on the planet (see note to editors), stressed the growing importance of remotely sensed data from satellites and sophisticated geo-statistical models. These novel approaches are referred to as Digital Soil Mapping (DSM).

The session heard that Digital Soil Mapping combines information acquired by a host of new technologies, including GPS receivers, field scanners, and remote sensing with related environmental datasets (e.g. digital elevation models) for subsequent processing by novel computational methods, such as geo-statistical interpolation, inference algorithms and Geographical Information Systems (GIS).

Key benefits of DSM include the generation of large scale geo-spatial datasets that can provide soil information on the Earth's surface at very high resolutions (for example, every 100 metres or in some cases, even every 10 metres) and, as a result of the predictive power of DSM, the technique can provide continuous information over large regions. In this way, many soil properties such as soil texture, available water capacity, soil depth, acidity or alkalinity etc. that are crucial to support agricultural practices and soil protection measures can be mapped from a limited amount of information in a rapid and detailed manner.

As well as being much cheaper, speaker Alfred Hartemink of World Soil Information highlighted Digital Soil Mapping's capability to produce new and critical information. Using advanced modelling tools, for example, the Joint Research Centre has developed procedures to assess the amount of biomass (living material) in the soil at a resolution of 100 metres. Biomass is a measure of the driving force behind the soil food chain and is a parameter not normally collected during traditional soil survey techniques.

"Soil performs a multitude of environmental, economic, social and cultural functions and thus plays a vital role in sustaining life, supporting global environmental systems and conserving biodiversity. In some soils, more than 5 tonnes of animal life can live in one hectare of soil. The sustainable management of soil is fundamental for the development of a stable agricultural system, for reducing famine and combating land degradation," said speaker Alex McBratney of Sydney University.

Further information:

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Notes for Editors

- The Joint Research Centre is a Directorate-General of the European Commission. Comprising 2,900 employees in seven research Institutes in five European Union Member States, the JRC is organizing 10 sessions at the 2008 AAAS meeting.
- The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the

European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

- Set up in New York (University of Columbia) in December 2006, the consortium of expert scientists from soil Institutes around the world (see below) aims to provide support to the three UN Conventions on Desertification, Climate Change and Biodiversity. Their overriding goal is to assist international efforts in the fight against hunger by fostering greater knowledge of one if its main causes - soil degradation.

- Consortium members are:

  - **Institute for Environment and Sustainability (IES)** within the European Commission's Joint Research Centre (JRC)
  - **Center for International Earth Science Information Network** (CIESIN) within the Earth Institute at Columbia University (USA)
  - **Natural Resources Conservation Service** (NRCS) is a federal agency under the US Department of Agriculture (USA)
  - **ISRIC - World Soil Information**, an independent foundation with a global mandate, funded by The Netherlands, and with a strategic association with Wageningen University and Research Centre (The Netherlands)
  - **Empresa Brasileira de Pesquisa Agropecuária** (Embrapa) - The Brazilian Agricultural Research Corporation (Brazil)
  - **Centro Internacional de Agricultura Tropical (CIAT)** - International Center for Tropical Agriculture, a not-for-profit organization that conducts socially and environmentally progressive research aimed at reducing hunger and poverty and preserving natural resources in developing countries (Columbia),
  - **International Council for Research in Agroforestry (ICRAF)**
  - **World Agroforestry Centre** (Kenya)
  - **Commonwealth Scientific and Industrial Research Organisation** (CSIRO), Australia's national science agency (Australia)
  - **Institute of Soil Science** (ISSIS) of the Chinese Academy of Sciences (China)
  - **Sydney University** (Australia)

- Technically, the consortium has joined forces to utilise DSM techniques to produce harmonised maps of soil properties that facilitate the assessment of soil degradation and soil fertility at a previously unforeseen high resolution (90 m) for 90% of the Earth's land mass.

- The consortium is divided into six ‘nodes’: North America, South America, Europe, Africa, Asia and Oceania. Each node is responsible for the mapping of its own continent.

- The European node is located at the European Commission's Joint Research Centre in Ispra, Italy. More recently, the Joint Research Centre coordinated the creation of the first “Soil Atlas of Europe”. The Atlas attempts to illustrate the complex inter-linkages between soil degradation processes and threats to human health and security by describing and mapping major soil functions. The Atlas also discusses the principal threats to soil across Europe. The JRC is also coordinating the first ever soil atlas for the northern circumpolar region (part of the International Polar Year) and for Africa (in collaboration with UN FAO, African and European soil scientists).

- For more information, please visit:

  http://eusoils.jrc.ec.europa.eu/dsm/

  http://www.globalsoilmap.net