

Digital Soil Mapping

Mapping soil properties at regional scale

Deadline for application: September 5th, 2012

Duration: 12 months

Salary: Between 1570 and 2095 €/month, net of charges depending on experience

Location: INRA (National Institute for Agronomic Research) InfoSol Unit, Orléans, France

Starting date: November 1st to December 1st, 2012

Rationale and objectives

Numerous soil data are available at the county or the regional level in France. However most of these data are either legacy point data unevenly spatially distributed, or polygon data based on soil type classes mapping. There is a strong need to develop techniques enabling to predict soil properties at varying depths and on a fine raster support to feed models of soil functioning and to predict soil parameters dynamics. The work will focus on a region of France (The “Région Centre”) where various soil data are available.

In this work, we will use data from :

- The systematic soil monitoring network of French soils (i.e. ca 2200 sites, distributed according to a 16 to 16 km grid, SOC data available for the 0 to 0.3 and the 0.3 to 0.5 m layers).
- Numerous legacy SOC profile data (from soil inventory and mapping, irregularly spread over the French territory, various soil depths, years of sampling from 1960 to nowadays).

We will address the following issues

What type of digital soil mapping techniques are best suited to map target properties (mainly carbon) at the county and regional level, considering the availability of the data? Which available co-variables can we use and which improvement do we get by using them? Can we use these data and future scenario to map the possible change in soil properties?

Skills

Engineer, Master

Soil science, soil carbon

Ability to work with R packages

GIS – spatial analysis- Digital Soil Mapping

Data mining, regression and classification tools, statistics

Scientific English reading, speaking and writing

Scientific referents

Dr Manuel Martin manuel.martin@orleans.inra.fr

Dr Dominique Arrouays dominique.arrouays@orleans.inra.fr

How to apply?

Send a mail including CV and a letter to the referents

Relevant recent publications

Lo Seen D, Ramesh BR, Nair KM, Martin MP, Arrouays D, Bourgeon G. 2010. Soil carbon stock, deforestation and land-cover changes in the Western Ghats biodiversity hotspot (India). *Global Change Biology*, 16(6): 1777-1792.

Jalabert S, Martin MP, Renaud JP, Boulonne L, Jolivet C, Montanarella L, Arrouays D. 2010. Estimating forest soil bulk density using boosted regression modeling. *Soil Use and Management*, 26: 516-528.

Martin MP, Wattenbach M, Smith P, Meersmans J, Jolivet CC, Boulonne L, Arrouays D. 2011. Soil organic carbon stocks distribution in France. *Biogeosciences*, 8: 1053-1065.

Angers DA, Arrouays D, Saby NPA, Walter C. 2011. Estimating and mapping the carbon saturation deficit in French agricultural topsoils. *Soil Use and Management*, 27, 448-452.

Grinand C, Barthès BG, Brunet D, Kouakoua E, Arrouays D, Jolivet C, Caria G, Bernoux M. 2012. Prediction of soil organic and inorganic carbon contents at a national scale (France) using mid infrared reflectance spectroscopy (MIRS). *European Journal of Soil Science*, 63, 141-151.

Orton T, Saby NPA, Arrouays D, Walter C, Lemerrier B, Schvartz C, Lark RM. 2012. Spatial prediction of soil organic carbon from data on large and variable spatial supports. I. Inventory and mapping. *Environmetrics*, 23, 129-147.

Orton T, Saby NPA, Arrouays D, Walter C, Lemerrier B, Schvartz C, Lark RM. 2012. Spatial prediction of soil organic carbon from data on large and variable spatial supports. II. Mapping temporal change. *Environmetrics*, 23, 148-161.

Arrouays, D, Marchant BP, Saby NPA, Meersmans J, Orton TG, Martin MP, Bellamy PH, Lark RM, Kibblewhite M. 2012. Generic issues on broad scale soil monitoring schemes: A review. *Pedosphere*, 22(4), 456-469.

Meersmans J, Martin MP, De Ridder F, Lacarce E, Wetterlind J, De Baets S, Le Bas C, Louis BP, Orton TG, Bispo A, Arrouays D. On line. A novel soil organic C model using climate, soil type and management data at the national scale (France). *Agronomy for Sustainable Development*.

Meersmans, J, Martin, M.P, Lacarce E, De Baets, S, Jolivet, C, Boulonne, L, Lehmann, S, Saby, N.P.A, Bispo, A, Arrouays, D. On line. A high resolution map of the French soil organic carbon. *Agronomy for Sustainable Development*.