

GIS and Soil Spatial Analysis

Spatial analysis and mapping of soil properties

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

The InfoSol Unit at INRA Orléans is gathering all the data on French soil properties and geographical distribution. Numerous databases are available at the regional and national scale according to various types of data and geographical supports. For instance these data are available:

- A 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 soil profile data (from soil inventory and mapping, irregularly spread over the French territory, various soil depths, years of sampling from 1960 to nowadays).
- Soil test analysis on the agricultural topsoil, either georeferenced or aggregated at the municipality level

We will address the following issues:

How can we use and combine these different data sources to produce accurate geographical predictions of soil properties? How can we use data from one source to validate the predictions obtained from another one? How can we derive some soil properties from external data of other soil data or the combination of both? We will focus on the “Région Centre”.

Skills

Engineer, Master or PhD

Soil science

Ability to work with R packages

GIS - spatial analysis - Geostatistics

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

Dr Nicolas Saby nicolas.saby@orleans.inra.fr

How to apply?

Send a mail including CV and a cover 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.

Saby NPA, Marchant BP, Lark RM, Jolivet CC, Arrouays D. 2011. Robust geostatistical prediction of trace elements across France. *Geoderma*, 162: 303-311.

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*.

Orton TG, Saby NPA, Arrouays D, Jolivet CC, Boulonne L, Villanneau E, Paroissien JB, Marchant BP, Caria G, Barriuso E, Bispo A, Briand O. Early view. Inference and spatial prediction with below quantification limit data for analyzing the distribution of PCB concentrations across a region of France. *Journal of Environmental Quality*.