

Postdoctoral position (18 months) for a mathematical modeller at the SIMBIOS Centre and the BIOEMCO Laboratory in France.
Deadline: 31 may.

Description

The MEPSOM project (Multiscale Modelling and Emergent Properties of Microbial degradation of Soil Organic Matter) aims at understanding carbon dynamics in soil at the fine scale and how this translates at the soil core level.

The 18 month post doc position will involve adapting a fungal growth model (See Falconer et al. references below) into three different models which differ in their assumptions about how the soil pore space is represented i.e. voxel- or geometrical-based models. These models will be developed within the MEPSOM project. The existing fungi model is a PDE model of fungal growth and interactions.

The position will involve spending 9 months at SIMBIOS, Scotland an international interdisciplinary research team interested in the emergent properties of soil. The other 9 months will be spent in France at Bioemco, Paris region (Paris ENS and INRA Grignon), an international research team working on nutrient dynamics in soils.

At SIMBIOS, the candidates work will consist in altering or extending the existing model to study:

- To what degree can the fungal model be simplified without losing its behaviour ?
- Adding discrete hotspots of Carbon resources
- Adding fungal growth response to water distribution
- Run explorative scenarios relating to organic matter decomposition and degradation to initially assess model performance and help guide experimentation

At Bioemco, the work will consist in adapting the model to the two other model architecture used in the MEPSOM project:

- Lattice Boltzmann 'architecture' that simulate water and nutrient fluxes and compare its behaviour with the PDE version
- Geometrical based description of the soil (Monga et al 2008)

The candidate is required to have computer modelling experience and preferably a physics, maths or engineering background. Candidates with a background in geoscience, ecology or biology with a strong modelling track record should also apply.

The successful candidate will be based in SIMBIOS for 9 months (Dundee, Scotland) and 9 months at the Bioemco laboratory (Paris, France).

The candidate should have experience in numerical modeling and a relevant degree, preferably in physics or mathematics. Candidates with training in geoscience, biology and ecology with experience in modeling are also invited to bid.

Interested candidates should send a CV, a publication list and a cover letter in English

to r.falconer @ abertay.ac.uk, xavier.raynaud @ ens.fr vpot@grignon.inra.fr and before May 31.

Ruth E. Falconer, James L. Bown, Nia A. White & John W. Crawford (2008). Fungal Interactions in Fungi; The Royal Society Interface. 5(23).

Ruth E. Falconer, James L. Bown, Nia A. White & John W. Crawford (2007). Biomass Recycling: a key to efficient foraging; Oikos, 116 (9): 1558-1568.

Ruth E. Falconer, James L. Bown, Nia A. White & John W. Crawford (2005). Biomass Recycling and the origin of phenotype in fungal mycelia. - Proc. Roy. Soc B. Lond. 272: 1727-1734.

I. Ginzburg (2005). Equilibrium-type and link-type lattice Boltzmann models for generic advection and anisotropic-dispersion equation. Adv. Water Resour., 28: 1171-1195.

O. Monga, M. Bousso, P. Garnier, V. Pot (2008). 3D geometric structures and biological activity: application to microbial soil organic matter decomposition in pore space. Ecol. Mod., 216, 291-302.

Contacts:

Ruth Falconer, SIMBIOS r.falconer@abertay.ac.uk

http://www.simbios.ac.uk/SIMBIOS_Team/Ruth_Falconer.php

Xavier Raynaud, Bioemco, 46 rue d'Ulm, 75230 Paris CEDEX 5 FRANCE.

Phone: +33 144 323 884. xavier.raynaud@ens.fr

Valérie Pot, EGC, Grignon, France