

Data management and modelling: a model-based assessment of management options to maintain soil organic carbon stocks in agricultural soils

PhD course, 2 ECTS

Date and location:

27th May – 31st May 2024,

with one preparatory meeting and a five-day workshop on campus Ultuna.

Background

Soils are complex systems where physical, chemical and biological processes occur simultaneously. In order to understand and evaluate the behavior of the soil system in response to external influences such as climate change or management practices, process-oriented models have become indispensable tools, especially for future predictions. Advances in technology and database development have reduced the run time of simulations, allowing the evaluation of long-term scenarios using models linked to large databases. However, this often increases the size and complexity of the input data and model outputs. Finding the right tools to help organize this data has become key to modelling studies, regardless of the model and scale of interest. Considering that knowledge and skills in data management are a prerequisite for researchers, this workshop will provide tools and examples on how to organize datasets and link them to two process-oriented models for agricultural (and grassland) soils.

Course content

The aim of this course is to (i) introduce working with the database system *PostgreSQL*, (ii) apply two database-driven process-oriented models using an example dataset and visualize the outcomes using the *R software*, (iii) develop different agricultural management scenarios for simulations and (iv) evaluate simulation results from a process and soil systems perspective.

The course consists of two parts:

1) A preparatory online meeting on 20th May 2024, 9:30-12:00, during which we'll review each participant's experience and set the framework for the upcoming workshop. In addition, the software necessary for participation will be installed together in order to avoid system errors during the actual workshop.

2) A workshop, which will be held at campus Ultuna (Uppsala, Sweden) from 27th to 31st May 2024 with the participation of experts in this particular research area (see below). This will culminate in a wrap-up session on the final day of the workshop, where students will give an oral presentation of their own research.

The participants are expected to actively participate in the exercises and discussions.

Participation in the preparatory meeting is compulsory!

Requirements

Participants are expected to bring and work on their own laptops. Basic knowledge of soil science and soil processes is a prerequisite.

The course will be held in English.

Costs and reimbursement

The course is free of charge for all participants. For participants affiliated with an EJP SOIL partner (see <https://ejpsoil.eu/>), costs for travel and accommodation are covered by the EJP SOIL program and are reimbursed after the course. During the course, coffee and tea, as well as lunch will be provided.

Plan for workshop lectures and exercises

The workshop consists of lectures and practical exercises, including 15 – 30 minutes morning and afternoon coffee breaks and a 1.5-hour lunch break.

Monday, 27th May: *PostgreSQL database usage – data import/export, data management, interfaces*

Tuesday, 28th May: *Modelling soil processes using the CANDY model*

Wednesday, 29th May: *Modelling soil processes using the CNP model*

Thursday, 30th May: *Group work on scenario simulations*

Friday, 31st May: *Presentation of group work, course wrap-up*

Confirmed lecturers

- Assoc. prof. Katharina Meurer (Department of Soil & Environment, Swedish University of Agricultural Sciences – SLU, Uppsala, Sweden)
- Dr. habil. Uwe Franko (Halle (Saale))
- Eric Bönecke (Leibniz Institute of Vegetable and Ornamental Crops – IGZ, Grossbeeren, Germany)
- Lukas Hey (NUW IES – RPTU, Landau (Rheinland-Pfalz, Germany))

Please do not hesitate to contact Katharina Meurer if you have any questions regarding the course.

Contact for applications: Dr. Katharina Meurer, katharina.meurer@slu.se

Deadline for applications: 15th April 2024

Maximum number of participants: 25