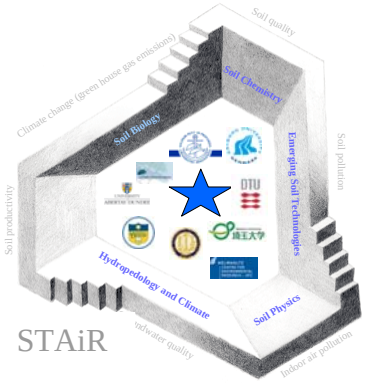
"Walking the interdisciplinary path of science gives you the chance to move up the STA*i*Rs to a higher level of knowledge"



Five PhD positions open for inquisitive and ambitious candidates within the International Research Education Programme for Soil Technology and Inter-disciplinary Research in Soil and Environmental Sciences, STAiR

The focus of STAiR (www.stair.agrproject.dk) is on the soil critical zone between the Earth's atmosphere and groundwater. STAiR combines research in soil science on the fundamental scale – within themes of (i) Soil Physics, (ii) Soil Chemistry, and (iii) Soil Biology – with themes on a larger and more applied scale (iv) Hydropedology & Climate, and (v) Emerging Soil Technologies. STAiR is the first inter-disciplinary Soil and Environmental Sciences programme in Denmark, uniting PhD students and internationally recognized scientists as their supervisors and teachers at seven research units in Denmark. Internationally, PhD students and leading researchers from 14 research units in six countries join in a tight research education programme, enabling both Danish and international Ph.D. students to freely access state-of-the-art laboratory and field facilities spanning different soil and climate zones. As an integral part of STAiR, we have established a young scientist forum where the students can exchange knowledge. The STAiR supervisors are soil scientists, agronomists, environmental engineers, geologists, biologists, biotechnologists, and chemists, with strong international reputation. Scientists and facilities at the 11 STAiR partners provide an excellent and interdisciplinary research platform for the PhD students.

STAiR is now looking for a number of bright and enthusiastic people with excellent MSc degrees in relevant natural science, agricultural or engineering disciplines to fill the following five PhD positions:

STAiR012009. **Soil pore characteristics and its hydraulic properties as affected by traffic-induced compaction and distortion:**
Subsoil compaction is a major threat to sustainable soil quality. It reduces the saturated hydraulic conductivity and may induce preferential flow. Soil compaction also reduces soil aeration and increases emissions of the greenhouse gas N_2O through denitrification at anaerobic sites. Preferential flow in macropores has been shown to facilitate the transport of otherwise immobile pollutants such as phosphorus, pesticides, and PAHs to receiving water bodies. Many studies have investigated the effects of agricultural field traffic on soil stresses and strains in the subsoil, as well as soil compaction effects on crop yield. However, studies of the effects of compaction on soil pore functioning and transport processes are sparse and the effects are still poorly understood. We are looking for a strong PhD candidate to work within an inter-Nordic team of researchers and PhD students who are exploring compaction effects on soil aeration and hydrological processes. We wish the PhD student to focus on pore volume reduction and distortion and its effect on hydraulic properties. The successful candidate will be employed at the Faculty of Agricultural Sciences, Aarhus University, Denmark. Main Supervisor: Senior Scientist Per Schjønning per.schjonning@agrsci.dk

STAiR022009. **Linking the toxicity of organic soil contaminants to their chemical activity:**
The strong sorption of many contaminants to the soil matrix reduces their environmental and human risk as well as the opportunities for their remediation. Substantial efforts are currently directed at the clean-up of strongly adsorbed contaminants such as Polycyclic Aromatic Hydrocarbons (PAH), which might not be sufficiently mobile and active to justify this effort. The exposure and ecotoxicity of strongly bound organic contaminants will be studied using soil organisms as models with the working hypothesis that toxicity is closely related to the chemical activities of the soil contaminants. The overall aim of this research will be to determine whether non-accessible contaminants remain bound or whether they might lead to a significant environmental and human exposure. The successful candidate will be employed at the National Environmental Research Institute, Aarhus University, Denmark. Main supervisor: Senior Scientist Philipp Mayer phm@dmu.dk

STAiR032009. **Self-organization in the soil-microbe system:**
The thin soil vadose zone regulates water and chemical fluxes between the atmosphere and water aquifers and thereby controls their quality. Vital economic, environmental, and human health issues are linked to the biophysical properties and functionality of the soil vadose zone. Given this importance, it is surprising how little we know about our most important natural resource. It has recently been suggested that the soil-microbe system should be regarded as self-organized, *i.e.*, that the organization will increase, without being controlled by environmental factors or an encompassing or otherwise external system. When such a self-organized system is disturbed by e.g. physical or chemical stress, its resistance to change from the equilibrium state as well as its resilience to return to this equilibrium state is challenged. These classical concepts from ecosystem research extend our framework for interpretation of soil behaviour and help identify thresholds of soil disturbance that may be critical to a continued soil function. We are looking for a strong PhD candidate to work within an international team of researchers and PhD students who are exploring soil architecture and infrastructure; i.e., the soil's inner space. We wish the PhD student to focus on the area of soil-microbe self-organization, this having potentially major impact on understanding the soil architectural development. The successful candidate will be employed at the Faculty of Agricultural Sciences, Aarhus University, Denmark. Main supervisor: Senior scientist Lis Wollesen de Jonge Lis.W.de.Jonge@agrsci.dk

STAiR042009. **Long-term climate change effects on dynamics of microorganisms and carbon in the root zone:**
Climate change including higher temperatures, changed precipitation patterns and elevated atmospheric CO_2 is expected to change the intensity and pathways for gains and losses of soil carbon. Each climate change factor can alter function and composition of soil microbial communities and thereby influence the decomposition of plant litter in the root zone.
The objective of this PhD work is to identify the microbial communities actively involved in C-assimilation in the root zone and clarify and quantify the community shifts in response to several years of climatic perturbation combining extended summer drought, increased temperature and elevated CO_2.The PhD-project is linked to CLIMAITE, the world's biggest *in situ* experiment to investigate the combined effects of climate change factors on ecosystem processes and functions (climaite.dk). The successful candidate will be employed at the National Laboratory for Sustainable Energy, Technical University of Denmark. Main supervisor: Professor Per Ambus peam@risoe.dtu.dk

STAiR052009: **Wetland hydro-biogeochemical phosphorus cycling:**
Restoration of riparian wetlands on agricultural land has a high priority in the control of diffuse nutrient losses to surface waters. Predictions of phosphorus retention or release in restored wetlands are, however, extremely challenging because of the complex interactions and feedbacks between hydrology and sediment biogeochemistry. This project aims to provide the basis for scientifically based solutions for predictions of phosphorus dynamics in restored wetlands. In order to cope with the complex hydro-geochemical nature of wetlands, this project applies a new approach by defining a wetland typology containing hydrological and geochemical classes, based on the hypothesis that key biogeochemical and hydro-physical characteristics can be used to predict phosphorus behaviour. The objectives are to investigate, identify and quantify key biogeochemical and hydro-physical parameters controlling phosphorus cycling, and establish quantitative relations for predicting phosphorus dynamics. The successful candidate will be employed at the Faculty of Agricultural Sciences, Aarhus University, Denmark. Main supervisor: Senior scientist Charlotte Kjærgaard
C.Kjaergaard@agrsci.dk

You can read much more about the individual PhD positions and link to the official job announcements for each position at www.stair.agrproject.dk

Qualifications
The PhD positions are three-year positions. Applicants to the PhD positions must have a Master's degree or graduate in the very near future (documentation for final thesis and date of examination must be enclosed in the application). Matriculation as a PhD student will be in accordance with Ministerial Order no. 18 of 14 January 2008 on the PhD Programme at Universities. Employment will be as soon as possible and latest by September 1, 2009.

Closing date for applications is March 30, 2009 at 12.00 noon.
Applications received after the closing date for applications will not be considered!