Postdoctoral Researcher Position in Ecological Knowledge-Guided Machine Learning at Aarhus University Denmark

A 2.5-year position as Postdoctoral Researcher within the field of Freshwater Ecology is available at the Department of Ecoscience, Aarhus University. The expected start date is 1st of September 2026 or as soon as possible thereafter. The position seeks to strengthen and complement the Department's ongoing activities in freshwater ecology, particularly aquatic ecosystem modelling and water quality modelling, with focus on Knowledge-Guided Machine Learning. The position is a rewarding opportunity to be integrated in an excellent freshwater group. The department's research and advisory activities are project-based with a solid tradition in cross-disciplinary research and international collaboration.

Application Deadline:
02 March 2026

Institute/Faculty:
Department of Ecoscience

Faculty:
Faculty of Technical Sciences

Academic contact person:
Robert Ladwig
Tenure Track
+4522366967
rladwig@ecos.au.dk

Vacant positions:
1

Number of months:
30

Hours per week:
37

Expected date of accession:
01/09/2026

Job description

The postdoctoral researcher will work with Dr. Robert Ladwig on developing hybrid models that integrate limnological knowledge into machine learning models following the paradigm of **Knowledge-Guided Machine Learning** (KGML). The position is part of an on-going project on "**Integrating AI into Aquatic Ecosystem Models to Decode Ecological Complexity**" funded by Villum Fonden. Within that project, the focus is on exploring novel ways to infer information from environmental data to update our scientific conceptual models. The data foundation will come from the long-term lake monitoring initiative LTER-DK, which includes several Danish lakes equipped with real-time and high-frequency monitoring buoys, incl. Lake Ravn near Aarhus. The monitoring at Lake Ravn consists of three monitoring buoys, an automatic profiling station, and a weather station. Further, weekly water quality sampling and turbulence profiles provide additional data for training and testing. A specific aim is to further develop the methodology of **modular compositional learning** (MCL). Here, an aquatic ecosystem model is decomposed into modular sub-components that can be either process-based models and/or deep learning models. MCL has the flexibility to replace any uncertain process description with a deep learning model, which makes it ideal for ecological simulations where precise mathematical descriptions of key processes are lacking but data for training are available. The MCL methodology will be applied on critical ecological processes, i.e., vertical turbulent diffusion, phytoplankton production and consumption, greenhouse gas emissions, etc., to develop hybrid models. Performance will be compared to several 1D aquatic ecosystem models to evaluate if the respective hybrid MCL models are improving their performance. The overall project aim is on refining current aquatic ecosystem models by building models based on KGML to have improved projections and more robust estimates of uncertainty.

The project provides training and growth opportunities in AI. Candidates who have strong interest in machine learning, but minimal experience, are encouraged to apply. Along the same lines, candidates with a strong foundation in machine learning, minimal experience in freshwater ecology, but a strong interest to develop models for environmental challenges, are also encouraged to apply.

The postdoctoral researcher will work within an interdisciplinary team of computational and applied scientists. The work will be done in close collaboration with international and interdisciplinary colleagues. There will be close collaborations with colleagues at the University of Wisconsin-Madison and Virginia Tech (USA).

In the Computational Limnology team at the Freshwater Ecology section at Aarhus University, we are striving to have a diverse, fair and inclusive team and work environment. Team members are supporting each other and help when we see someone physically or mentally struggling. We work respectfully with people from different backgrounds, experiences and nationalities. To collaborate more efficiently and ensure reproducibility, we implement the principles of open data and open science.

Your profile

The ideal candidate should have:

- A PhD in environmental engineering, ecology, environmental science, biology, data science, computer science, or a closely related field
- Knowledge of freshwater ecology and/or physical limnology
- Experience with numerical modelling
- Experience with programming languages, esp. Python, and familiarity in NumPy, SciPy and Pandas
- Experience with scientific programming
- Experience with scientific writing

- Excellent written and spoken English
- Interest in deep learning and Knowledge-Guided Machine Learning
- Interest in scikit-learn, PyTorch and TensorFlow

Personal qualifications required include the ability to work closely with other researchers/groups within the Department as well as with external end users, and the ability to collaborate and build relationships. Teamwork and cross-disciplinary research are key elements for the Institute.

Who we are

The Department of Ecoscience is engaged in research programs and advisory work covering the major biological sub-disciplines. We conduct innovative, advanced research in the areas of aquatic biology and ecology, Arctic environments and ecosystems, biodiversity, conservation biology, and wildlife management. The Department currently employs approximately 300 academic and technical staff, as well as many PhD students.
The qualified candidate will work in a supportive and internationally engaged scientific environment at the Section for Freshwater Ecology.
The department aims to be a supportive and encouraging workplace that offers interesting challenges, collaborative colleagues, and avenues for academic growth.
The department actively facilitates a healthy integration of work and personal life and aspires to recruit and maintain highly skilled individuals who prioritise curiosity and trust

What we offer

The department offers:

- a well-developed research infrastructure, laboratories and access to shared equipment
- Opportunities for interdisciplinary collaboration across Ecosciences focus groups and QGG
- Mentorship and support in developing independent research directions
- Support for grant writing and professional development
- a workplace characterised by professionalism, equality and a healthy work-life balance.

Place of work and area of employment

Main campus of Aarhus University at C.F. Møllers Allé 3, 8000 Aarhus C, Denmark

Contact information

For further information, please contact: Dr Robert Ladwig; +45 22366967; rladwig@ecos.au.dk

Application procedure

Shortlisting is used. This means that after the deadline for applications – and with the assistance from the assessment committee chairman, and the appointment committee if necessary, – the head of department selects the candidates to be evaluated. All applicants will be notified whether or not their applications have been sent to an expert assessment committee for evaluation. The selected applicants will be informed about the composition of the committee, and each applicant is given the opportunity to comment on the part of the assessment that concerns him/her self. Once the recruitment process is completed a final letter of rejection is sent to the deselected applicants.

Letter of reference

If you want a referee to upload a letter of reference on your behalf, please state the referee's contact information when you submit your application. We strongly recommend that you make an agreement with the person in question before you enter the referee's contact information, and that you ensure that the referee has enough time to write the letter of reference before the application deadline.
Unfortunately, it is not possible to ensure that letters of reference received after the application deadline will be taken into consideration.

If you wish to add a referee **after** you have submitted your application, you must send this person's details (name, job title, place of work, and email address) as well as the name of the position you have applied for to: HR.Nattech@au.dk

Formalities and salary range

Technical Sciences refers to the Ministerial Order on the Appointment of Academic Staff at Danish Universities under the Danish Ministry of Science, Technology and Innovation.

The application must be in English and include a curriculum vitae, degree certificate, a complete list of publications, a statement of future research plans and information about research activities, teaching portfolio and verified information on previous teaching experience (if any). Guidelines for applicants can be found here.

Appointment shall be in accordance with the collective labour agreement between the Danish Ministry of Taxation and the Danish Confederation of Professional Associations. Further information on qualification requirements and job content may be found in the Memorandum on Job Structure for Academic Staff at Danish Universities.

Salary depends on seniority as agreed between the Danish Ministry of Taxation and the Confederation of Professional Associations.

Aarhus University's ambition is to be an attractive and inspiring workplace for all and to foster a culture in which each individual has opportunities to thrive, achieve and develop. We view equality and diversity as assets, and we welcome all applicants.

Research activities will be evaluated in relation to actual research time. Thus, we encourage applicants to specify periods of leave without research activities, in order to be able to subtract these periods from the span of the scientific career during the evaluation of scientific productivity.

Aarhus University offers a broad variety of services for international researchers and accompanying families, including relocation service and career counselling to expat partners. Read more here. Please find more information about entering and working in Denmark here.

Aarhus University also offers a Junior Researcher Development Programme targeted at career development for postdocs at AU. You can read more about it here.

The application must be submitted via Aarhus University's recruitment system, which can be accessed under the job advertisement on Aarhus University's website.

Aarhus University

Aarhus University is an academically diverse and research-intensive university with a strong commitment to high-quality research and education and the development of society nationally and globally. The university offers an inspiring research and teaching environment to its 38,000 students (FTEs) and 8,300 employees, and has an annual revenues of EUR 935 million. Learn more at www.international.au.dk/