Postdoctoral Researcher (f/m/d): Theory development for neutral biodiversity dynamics on dendritic networks

The Center for Advanced Systems Understanding (CASUS) is a German-Polish research center for data-intensive digital systems research. We combine innovative methods from mathematics, theoretical systems research, simulations, data science, artificial intelligence, and computer science to provide solutions for a range of disciplines – materials science under ambient and extreme conditions, earth system research, systems biology and medicine, and autonomous vehicles.

CASUS was jointly founded in August 2019 by the Helmholtz-Zentrum Dresden-Rossendorf (HZDR), the Helmholtz Centre for Environmental Research (UFZ), the Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG), the Technical University of Dresden (TUD) and the University of Wroclaw (UWr). CASUS is located in the heart of Görlitz at the border between Germany and Poland. The CASUS start-up phase is hosted by the Helmholtz-Zentrum Dresden-Rossendorf and is financed by the Federal Ministry of Education and Research (BMBF) and the Saxon State Ministry for Higher Education, Research and the Arts (SMWK).

The Calabrese lab in the department of Earth System Science is looking for a postdoctoral researcher interested in theory development focused on applying neutral models of biodiversity to river networks. The position can begin immediately, and the contract will be limited to 31 March 2022. Extension beyond this period is possible pending available funding and satisfactory performance.

The Scope of Your Job

The successful candidate will be part of a team studying how river network geometry and hydrology interact to shape freshwater fish biodiversity patterns in river systems worldwide. This position will focus on pursuing analytical solutions to neutral biodiversity models applied to dendritic networks. The postdoc will begin with an existing neutral model that has successfully been applied to the Mississippi-Missouri river system (Muneepeerakul et al. 2008), and explore strategies for solving the model analytically. Subsequently, the postdoc will expand the model to consider deviations from purely neutral dynamics including those generated by point sources of pollution and changes in flow control (e.g., dam removal or reservoir construction). The position requires advanced mathematical skills and experience in working with multivariate stochastic processes.

Your Tasks

- Explore strategies for solving neutral biodiversity models on dendritic geometries;
- Refine an existing neutral model from the Mississippi-Missouri river system;
- Extend the focal models to consider deviations from purely neutral dynamics;
- Work with our team to connect the developed models to an extensive dataset on fish biodiversity in river systems.
- Publish results in academic, peer-reviewed journals;
- Present results at scientific meetings.

Your Qualifications

- Ph.D. in physics, mathematics, mathematical biology/ecology, or a related field;
- A solid background in mathematics, with an emphasis on multivariate stochastic processes;
- Strong motivation to work in a collaborative environment;
- Excellent communication skills in English in a professional context (presentation of research results at scientific meetings, colloquial discussions, writing of manuscripts);

- Evidence of the ability to publish results in top peer-reviewed journals;
- Experience in linking stochastic process models to data is advantageous but not required.

What We Offer

- A vibrant research community in an open, diverse, and international work environment;
- Scientific excellence and broad national and international science networks;
- Salary according to the German Collective Wage Agreement for the Civil Service (TVöD E13);
- Comprehensive benefits package (30 vacation days per year, company pension plan [VBL], flexible working hours, in-house health management, relocation assistance).

Review of applications will begin on 24 August 2020, but consideration of candidates will continue until the position is filled. Please submit your application (including a one-page cover letter, CV, academic degrees, transcripts, etc.) online on the HZDR application portal: https://www.hzdr.de/db/Cms?pNid=490&pOid=61571&pContLang=en

Deadline:

Rolling application – open until filled.

For details please contact:

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Literature Cited:

Muneepeerakul, R., Bertuzzo, E., Lynch, H.J., Fagan, W.F., Rinaldo, A., Rodriguez-Iturbe, I., 2008. Neutral metacommunity models predict fish diversity patterns in Mississippi–Missouri basin. Nature 453, 220–222. https://doi.org/10.1038/nature06813