

A fully funded 3-year PhD studentship on Modelling geomagnetic bird navigation

We invite applications from qualified and highly motivated students for a **3-year PhD studentship in Geographic Information Science**, fully funded by the Leverhulme Trust. The PhD studentship is based at the School of Geography & Sustainable Development at the University of St Andrews, Scotland, UK and the work will be performed in collaboration with the Max Planck Institute of Ornithology (MPIO) in Radolfzell, Germany. The student will be supervised by Dr Urška Demšar and Dr Jed Long at the University of St Andrews and Prof Martin Wikelski and Dr Kamran Safi at the MPIO as external advisors.

The Leverhulme PhD studentship covers tuition fees at the UK/EU level and a yearly stipend of £14,553/year for 3 years. Note that this studentship is available for UK/EU citizens only (applications from non UK/EU citizens will not be considered).

The studentship starts in October 2018.

Project description:

This project will model how migratory birds use the information in the Earth's magnetic field to find their way during their long journeys. We will employ a big data analytics approach to better understand what strategies the birds use for their navigational feats. For this, we will collect real geomagnetic data with Unmanned Aerial Vehicle surveys under both calm and disturbed geomagnetic conditions – St Andrews is located at a relatively high northern latitude and therefore frequently experiences disturbances in the Earth's magnetic field caused by solar storms. These real geomagnetic data will then be used as the conceptual space within which we will simulate various bird navigational strategies through Agent-Based Modelling (ABM), which is frequently used for investigation of human navigation, but has rarely been applied in the context of animal movement. Simulations will be grounded in ornithological research and will correspond to several proposed (but not yet confirmed) geomagnetic navigation strategies, which were identified through ecological experiments. Results will be validated through a comparison with real navigational patterns from MPIO bird tracking studies. The ultimate goal is to find out if and how our data-driven navigational simulations corroborate the biological theory.

This is primarily a data science project, consisting of the collection of geomagnetic data and development of new ABM methods for navigation within these data. The work will however be fully informed with biological domain knowledge through the collaboration with MPIO. The project is expected to result in a completed PhD thesis and in several journal publications.

We are looking for a candidate who fulfils the following requirements:

- Interest in GIScience and specifically in movement analytics.
- Ability to work with and develop new methods for big spatial data.
- An MSc in a relevant discipline: GIScience, Geoinformatics, Geomatics Engineering, Remote Sensing, Geodesy, Surveying Engineering, Computer Science.
- Knowledge/prior experience with working with geomagnetic data (either from satellite or terrestrial sources) is a plus.
- Excellent English skills (note that University of St Andrews requires 6.5 or 7.0 on IELTS for admission of PhD students and that the successful candidate will be required to either provide an IELTS (or equivalent) certificate or take the test as soon as possible after acceptance in order to obtain an unconditional offer from the University. See here for a list of alternative equivalent tests: <https://www.st-andrews.ac.uk/elt/entry/postgraduate/>).
- Coding skills (preferably in Free and Open Source Software (FOSS) environments: Python, R, QGIS).

How to apply:

Please complete the online application at the following URL:

<https://www.st-andrews.ac.uk/study/apply/postgraduate/research/>

Please, ensure that you do the following:

- Apply to the “School of Geography and Sustainable Development”.
- Apply to the programme “PhD Geography (Science)”.
- Note on the application that you are applying for the PhD studentship supported by the Leverhulme Trust
- Note that the title of the project is “Modelling geomagnetic bird navigation.”
- Name your principal supervisor: Urska Demsar.

You will be asked for the following accompanying documents:

- Academic qualifications – upload your diploma and academic transcripts
- CV
- Reference contact details for two academic referees, who will be automatically contacted by the system and asked to upload their reference letters (these should be available before the interviews)
- Research proposal – this is a pre-defined project, so leave this empty, or copy the text from this ad
- Statement of purpose – write a cover letter, where you outline your interest in the topic and your suitability for this project.
- Original academic writing sample – provide a recent writing sample (e.g. a published paper or your MSc thesis)
- Additional documents - upload the following two documents:
 - If already available, a scanned copy of the IELTS certificate (or equivalent, as per above). If not, skip this step.
 - A sample of your written code (e.g. a programme you wrote as an assignment in your MSc courses). This can be in any programming language, although languages used in FOSS are a plus.

Application DL: 15 Aug 2018

Interviews with shortlisted candidates will be scheduled for the week starting 20 August 2018. Interviews for non-local candidates will be conducted via Skype.