

Development of a Big Data-based drought prediction system

Supervisors: Dr Xiaogang Shi (Lancaster University) and Professor Andrew Binley (Lancaster University)

Why is this project interesting?

Droughts stand among the most damaging natural disasters in human, environmental and economic terms. Since 1900, more than 11 million people have died as a consequence of droughts and more than 2 billion have been affected by droughts. The severity of drought depends on its duration, intensity, spatial extent, and local socioeconomic conditions. According to the IPCC report, the duration and intensity of droughts have increased and the extent of drought-affected areas globally is likely to increase over the next century, which is broadly consistent with expected changes in the hydrologic cycle under warming. Therefore, drought monitoring and forecasting is vital for stakeholders (e.g., the government, local authorities, private sectors, communities, and farmers) to make decisions on drought management and mitigation. Droughts can be monitored effectively using climatic drought indices. But there is limited capability to use these indices due to sparse observation networks. Now, with the advent of advanced remote sensing techniques, a range of Big Data sources have been recognized as useful tools for the large-scale area monitoring. We believe that the advances in land surface models, global Big Data sources, and data assimilation now make it possible to develop a regional drought monitoring and forecasting system for drought-affected areas, where drought predictions are most needed and in situ networks are sparse. Therefore, this PhD project will deliver a better understanding of the drought impacts and support increased preparedness and resilience to droughts, and hence will contribute to societal well-being, environmental sustainability, and economic growth in the drought-affected areas.

What's in it for you?

Through the guidance of the supervisory team, you will develop an interdisciplinary way of approaching remote sensing and hydrologic hazards. Extensive training will be given to the student in the fundamentals of drought forecasting, climate informatics and data science. You will benefit from the research training programme offered at Lancaster University, by being part of the large and vibrant Lancaster Environment Centre and by becoming a member of the water and climate research group. Moreover, there is great potential for high quality academic publications of the results.

Who should apply?

We are seeking applications from graduates in a relevant subject area, such as hydrology, physical geography, and computing science. Graduates in mathematics, physics, and engineering with an interest in applying their skills to the environmental sciences are also welcome. This project requires strong numerical and analytical skills, and relevant programming experience.

The small print

Studentship funding: Full studentship (UK/EU tuition fees and stipend (£14,553 2017/18 [tax free])) for UK/EU students for 3.5 years. Unfortunately funding is not available for International (non EU) students.

Academic Requirements: First-class or 2.1 (Hons) degree, or Masters degree (or equivalent) in an appropriate subject.

Deadline for applications: Midnight 20 April 2018

Provisional Interview Date: TBC

Start Date: October 2018

For further information or informal discussion about the position, please contact Dr Xiaogang (John) Shiat <u>xiaogang.shi@lancaster.ac.uk</u>

Application process: Please upload a completed application form (download from http://www.lancaster.ac.uk/media/lancaster-university/content-

<u>assets/documents/lec/pg/LEC_Funded_PhD_Application-Form.docx</u>) outlining your background and suitability for this project and a CV at LEC Postgraduate Research Applications, <u>http://www.lancaster.ac.uk/lec/graduate-school/phd/apply-online/</u>. Applications and CVs must be submitted as either word documents or pdf files, no other file types are accepted. Please note only applications submitted as per these instructions will be considered. Please do not email applications in as they will not be considered.

You also require two references, please send the reference form (download from http://www.lancaster.ac.uk/media/lancaster-university/content-

<u>assets/documents/lec/pg/LEC_Funded_PhD_Reference_Form.docx</u>), with your details completed, to your two referees and ask them to email it to Andy Harrod (<u>gse@lancaster.ac.uk</u>), Postgraduate Research (PGR) Co-ordinator, Lancaster Environment Centre by the deadline. References must be submitted as either word documents or pdf files, no other file types are accepted.

Due to the limited time between the closing date and the interview date, it is essential that you ensure references are submitted by the closing date or as soon as possible.

Please note if English is not your first language you will be required to provide evidence of your proficiency in English (see: http://www.lancaster.ac.uk/study/international-students/english-requirements/requirements-p2/). This evidence is only required if you are offered the funded position, it is not required as part of this application process.