SPITFIRE

NERC SCIENCE OF THE ENVIRONMENT

SPITFIRE Doctoral Training Partnership (DTP)

Research Experience Placement 2017

Project Brief

Applications close at Noon, Friday, 2 June 2017

Lead Supervisor:	Dr Jo Nield
Email:	J.Nield@soton.ac.uk
University/Research Organisation:	University of Southampton
Department:	Geography and Environment
Project Title:	Characterising saltation over early-stage aeolian bedforms on a beach

Total Student Support Costs: £2500	£2500 (£200 for 10 weeks plus £500 research and training support grant)
Based on a minimum of £200/week full time for a minimum of 8 weeks and maximum of 10 weeks and a £500 Research and Training Support Grant.	

Proposed Start Date: **Monday, 26 June 2017**	Proposed End Date: **Friday, 1st September 2017**
Projects should run over the summer vacation and we recommend that projects will have terminated by 15 September 2017.	

Brief Summary – please provide a brief summary (maximum 300 words) of the project.

Early-stage bedforms, or protodunes are common on sandy beaches and often develop topography of 10 cm or more over several hours. This topography interacts with the wind flow and changes the saltation (or wind-blown sand transport) above the surface. Ultimately, these protodunes are the precursors to embryo and eventually mature dunes, and so it is important to understand how feedbacks between flow, transport and form contribute to this development sequence. This summer project fits within a larger research framework with collaborators from Universities of Oxford and Loughborough and will specifically focus on improving our understanding of the saltation dynamics above early-stage protodunes. It will involve fieldwork on a UK beach using multiple terrestrial laser scanners to measure the beach surface through time (both topography and surface moisture changes), along with an estimate of saltation height and density above the surface. This will be complimented by wind measurements and drone images to characterise larger contextual pattern development. The data will be analysed and measures of saltation extracted using the Geography Geocomputational Suite Facilities and the Southampton Supercomputer. Environmental Sensing at Southampton (https://esas.soton.ac.uk/), within Geography and Environment Unit operates three terrestrial lasers scanners and associated software and the student will receive training both in the use of this equipment and subsequent software and analysis using Leica Cyclone, Matlab and bespoke C codes, along with supervision in the development of new

analytical modelling techniques. Along with the field campaign and software training, supervision will involve progress meetings and interactions with the rest of the Earth Surface Dynamics research group, including a presentation on findings towards the end of the project. This project would be suitable for a Physics, Maths or Computer Science student that is interested in observing some active coastal and desert processes, and developing skills to quantify these numerically.

Please give an indicative timescale for the student's work over the length of the project: (maximum 150 words).

The project will involve both field and computer algorithm components. The student will participate in a field campaign on a UK beach, including preparation (1 week). Field tasks include assisting with the set-up of anemometers and saltation sensors, assisting in the deployment of drone technology and the operation of a terrestrial laser scanner. Tasks within the Geography and Environment Geocomputational Suite will be split between extraction of raw data using the Leica Cyclone software package (2 weeks), initial analysis using C codes, Matlab and the Southampton Supercomputer (2 weeks) and development of new techniques (4 weeks). The final week will include a presentation to Earth Surface Dynamics Research Group members and contributing to a report which will form the basis of a journal manuscript. Throughout the duration of the project, supervision will be given on aeolian (windy) processes and bedforms and use of innovative methodologies to characterise these.

Proposed procedure for appointing students, including selection criteria:

Please identify specific criteria that should be considered for the selection of placement students e.g. specific quantitative skills that may be required, subject knowledge etc. If a student has been pre-selected, or the research area has been led by the student, please provide the student's contact details, and a summary of their suitability for the SPITFIRE DTP REP programme.

Student should have some programming experience (ideally either Matlab, python, C, Fortran, or any other similar language).

Student should have an interest in environmental processes, or aerodynamics, though do not necessarily need to have undertaken modules in this, as training will be given during the field campaign (e.g. some of the best students taking my third year aeolian processes module have come from Physics with a limited environmental background, but a keen interest in applying theory in the field).