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. Amélie Kirchgaessner
Email:	acrki@bas.ac.uk
University/Research Organisation:	British Antarctic Survey
Department:	Atmosphere, Ice and Climate
Project Title:	How suitable are ceilometer data to estimate cloud cover?

Total Student Support Costs: £	£2100 (£200 for 8 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, 18 August 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.

This should include:

- *Project outline;*
- *Links to staff/School/Centre activity as appropriate;*
- *Supervisory arrangement;*
- *How space/equipment/supporting resource demands will be met;*
- *Elements of the project that will incorporate elements other than computer/modelling e.g. fieldwork and data collection;*
- *How the project will enhance the skills of the appointed student;*
- *Any intellectual property rights concerns that may arise from the work.*

Ceilometers are commercially available instruments that use the backscatter signal of a pulsed laser beam to detect the presence and base height of up to three cloud layers.

Cloud cover information at a location is necessary for many meteorological research questions as well as aircraft operations. Usually this information is provided by trained observers. Because of the manpower required these are "expensive", and therefore often restricted to certain times of the day, or to special intensive observation periods – particularly in remote locations. Initial tests with ceilometer data and synoptic observations from two sites in Antarctica indicate that a continuous record of cloud cover information can be derived from ceilometer data - independent of human observers.

The aim of the REP is to expand from these tests.

The student will be based at the British Antarctic Survey, and be supervised by Dr. Amélie Kirchgaessner in the Climate Processes group (part of the Atmosphere, Ice and Climate team), with

additional support by other members of the team as and when appropriate. They will be located in within one of the student offices, close to the Climate Processes group. They are welcome to attend the various seminars here, to learn about the manifold research carried out at BAS.
A Royal Meteorological Society meeting on June 21st on "Ceilometers and Lidars for Cloud and Aerosol Detection", will provide an ideal opportunity for the student to speak to manufacturers of lidar systems and ceilometers, and meet other scientists working in this field. We hope the student will attend this meeting.

The project will give the student an insight into the day to day work in an environmental research group. It will give them the opportunity to develop their independent, analytical thinking.

Any publications/proposals that directly result from the students work will be credited appropriately.

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

This should include:

- *The broad tasks the student will undertake;*
- *An indicative timescale for these tasks.*

The student will address the following questions:

- Identify and gain access to suitable data sets (1 week)
  - Coincidental synoptic observations and ceilometer data of sufficient temporal resolution and duration.
- Data processing and analysis (5 weeks)
  - develop code to process different formats of synoptic observations and ceilometer data
  - Perform and optimise correlation analysis
  - Is this optimum the same for all locations/data sets?
  - What other factors are important? (seasons, latitude, …)
  - What other statistical methods could be useful to link ceilometer data and synoptic observations?
- Report/Output (1 week)
  - summarise the results in a short report
  - present outcomes in form of a poster
- Hands on (continuously throughout the project, ~1 week)
  - make their own synoptic cloud observations
  - compare them to data from an on-site ceilometer

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.

Preferred background of the student:

This placement would suit a student studying towards a numerate degree with basic physics knowledge. They should have a keen interest in meteorology and/or lidar remote sensing techniques. Some knowledge of meteorology, data processing and programming experience would be desirable.