



Natural Environment Research Council Advanced Training Short Course

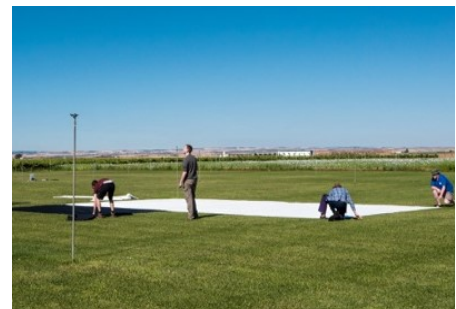
Field Spectroscopy, Fluorescence and Thermal Measurements and Process Modelling for Earth Observation and Environmental Science

12th – 16th June 2017, Albacete, Spain

The aim of this NERC funded Advanced Training Short Course (ATSC) is to provide UK registered PhD students and early career researchers (ECRs), with a unique opportunity to gain both theoretical and practical ‘hands-on’ experience in near-ground and airborne state-of-the-art Earth observation (EO) measurement techniques. Training will be provided in: spectroscopy, sun-induced fluorescence (SIF) and thermal infrared (TIR) field measurements; field validation techniques for airborne EO; and data processing and analysis. The European Space Agency announced in 2015 that the Earth Explorer 8 mission would be a Fluorescence Explorer (FLEX). Knowledge of the techniques introduced during this course will aid scientists better understand SIF measurements, model and analyse SIF data, and be able to support FLEX calibration and validation field campaigns. Lectures and tutorials will also include airborne campaign planning and ground support measurement sampling strategies.



Lectures and tutorials will be delivered in Albacete, southern Spain and field work will be conducted at Las Tiasas Experimental Farm, Barrax, near Albacete. Las Tiasas is a well-established and characterised agricultural research facility and one where weather conditions in June are expected to be suitable for passive optical EO relying on stable solar illumination. A NERC Airborne Research Facility campaign is scheduled during the course and concurrent field training will be conducted.



The course will be led by Dr Alasdair Mac Arthur, from GeoSciences, University of Edinburgh, Dr Jose Gormez-Dans from University College London, Dr Gary Llewellyn from the NERC Airborne Research Facility (NERC ARF) at BAS and experts in SIF (Luis Alonso) and TIR (Juan Carlos Jimenez-Muñoz) field measurement and EO from the University of Valencia and from King’s College London.

Trainees will gain hands-on experience using state-of-the-art field spectroradiometers and accessories (FluoWat leaf clip for leaf-scale SIF measurements) and the Piccolo doppio spectrometer system (for canopy-scale SIF measurements). In addition, ceptometers (for canopy leaf area index), leaf chlorophyll meters, thermal cameras and radiometers (for surface temperature) and sunphotometers (to characterise the atmosphere), will be used. ARF will collect data using their AISA Fenix and Owl imaging sensors during the course. These data will be subsequently processed and made available online – attendance at the course indicates your acceptance to participate in development of the online course content. An archived dataset from Barrax will be used during the course to enable hands-on experience of data processing airborne data to be gained.

The aims (and learning out comes) of this course are to:

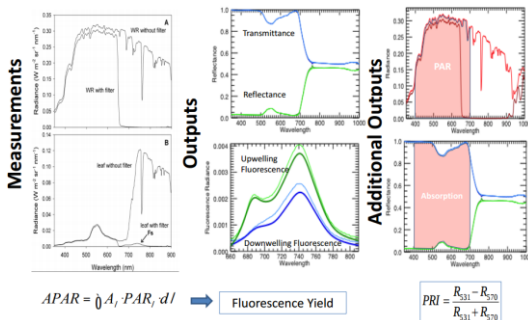
1. understand field spectroscopy and SIF measurement techniques and uncertainties;
2. develop and implement field spectroscopy sampling methodologies for EO cal./val. and radiative transfer modelling purposes;
3. plan a hyperspectral airborne campaign with ground support measurements;





4. conduct field spectroscopy and SIF measurements and metadata acquisitions as ground support for an airborne hyperspectral campaign;
5. process FS and airborne data to IS units and geographical positions;
6. develop a thorough understanding of data assimilation/inverse methods to retrieve key land surface parameters to better understand Earth systems or gain new science insights.

The Preliminary program is available from [here](#). Priority will be given to NERC funded CASE or Doctoral Training Partnership students, although other UK based PhD students and ECRs may apply. Basic knowledge of the python programming language is required.



To apply please email < jan.fillingham@nceo.ac.uk > confirming explicitly that you meet the following criteria: you are a UK-registered PhD student or ECR working in a sector aligned to NERC's science remit (see <http://www.nerc.ac.uk/research/portfolio/remit/>); that you have basic python programming skills; that your institute will provide you *standard field work and travel insurance*; and *that you are able to attend the training course in Spain from 13th to 17th June 2017*. Applicants will also be expected to

review lecture videos 1 to 3, 6, 8, and 9 to 11 of the NCEO online course <<https://www.nceo.ac.uk/training/atsc-training/>> and demonstrate an understanding of the basics of field spectroscopy, measurement uncertainties, airborne optical imaging and atmospheric correction from these. Only brief revision of the online course content will be provided in Albacete. If you confirm by email that you will meet these criteria prior to arrival in Albacete, you will be invited to submit an application which should include:

1. **An up-to-date CV**
2. **A Letter of Motivation. This should include: a brief description of your PhD or PDRA research project; an explanation of how your current research activities will benefit from this course; and a brief description of how your future career may also benefit (an Impact Statement). The Letter of Motivation should not exceed 1000 words.**

The deadline for receipt of applications is 13th April 2017 and applicants will be notified of the outcome by 27th April 2017.

The number of participants is limited to 12 and will be selected by this ATSC's organising committee.

Travel and field research work insurance is not provided by the course organisers. It is essential that all the trainees are covered by insurance for travel and field work by their home institution. An email from each student's home institute supervisor confirming insurance cover is required prior to places being confirmed. Accommodation and meals will be provided during the course and trainees are expected to share same-sex twin bed bedrooms. Trainees are required to pay for their travel to and from their home institute and this expense, supported by receipts, will be reimbursed up to a maximum of £350.00, on successful completion of the course. At the end of the course trainees are required give a presentation in groups and provide individual Science Report (max four pages) demonstrating that the aims of the course have been met.

