

SPITFIRE Doctoral Training Partnership (DTP)

Research Experience Placement 2017

Project Brief

Applications close at Noon, Friday, 2 June 2017

Lead Supervisor:	Chuang Xuan & Paul Wilson
Email:	c.xuan@soton.ac.uk
University/Research Organisation:	University of Southampton (UoS)
Department:	Ocean and Earth Science
Project Title:	Reconstructing climate and geomagnetic change information preserved in marine sediments from the Portuguese margin

Total Student Support Costs: £	£2500 (£200 for 10 weeks plus £500 research and training support grant)
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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, 1 September 2017
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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.*

Marine sediments from the Iberian margin have played a pivotal role in our understanding of many key aspects of Earth's past climate. The remarkable correlation of planktic/benthic oxygen isotope data of these sediments to the Greenland/Antarctic ice core records and the region's unique location have made the Iberian margin a focal point to study marine-ice-terrestrial linkages, rapid climate change, African aridity, and contourite deposition. Palaeomagnetic analyses and X-ray fluorescence (XRF) scan of piston cores from the margin have provided high-resolution proxy records of these palaeoenvironmental changes, and offered valuable insights into the dynamics, causes and consequences of Earth's past magnetic field variation during the latest Pleistocene. This project aims to reconstruct long and continuous high-resolution palaeomagnetic and palaeoclimate records using new and exceptional sediment archive recently drilled off the southwestern Iberian margin by Integrated Ocean Drilling Program (IODP) Expedition 339 (Mediterranean Outflow) at Site U1391.

This project is closely linked to ongoing research in Ocean and Earth Science led by Dr Chuang Xuan (expertise in geomagnetism & palaeomagnetism) and by Prof Paul Wilson (expertise in palaeoclimatology and palaeoceanography). Existing data from the top ~25 m sediments of Site U1391 have demonstrated exceptional potential of using these sediment archives to reconstruct high-fidelity and detailed climate and geomagnetic change records. Dr Xuan will provide supervision and guidance on the student's work related to palaeomagnetism, and Prof Wilson will offer advice related to XRF data collection and palaeoenvironment interpretation. The student will be involved in the collection of continuous high-resolution XRF scan and paleomagnetic measurement for sediments from deeper part (i.e. >25m) of Site U1391, and use the new and existing data to delve into Pleistocene history and shed new light on fundamental climate processes and geomagnetic field behaviours and impacts. The student will gain interdisciplinary research experiences in palaeoclimatology, palaeoceanography, and palaeomagnetism, and learn novel methods for managing and analysing large volumes of research data.

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.*

Week 1 (26 June): (1) discuss with supervisors to develop understanding of the project and expectation; (2) complete required health & safety training in the laboratories (i.e. UoS Palaeomagnetism Research Facility & BOSCORF NERC Facility); (3) complete necessary induction on related instrument (i.e. superconducting rock magnetometer, XRF scanner); (4) collect XRF scan and palaeomagnetism measurement for 1 or 2 u-channel samples (typically 1.5 m long with 2 cm by 2 cm cross section).

Weeks 2-7 (3 July – 11 August): (1) complete majority of the XRF scan and palaeomagnetism data collection; (2) learn and experience managing and processing of large volumes of research data; (3) develop understanding for the data and start making palaeomagnetic and palaeoenvironment interpretations; (4) discuss with supervisors on initial results.

Weeks 8-10 (14 August – 1 September): (1) complete data collection for any remaining samples; (2) discuss results and interpretations with supervisors; (3) complete a report for the project work.

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.

Successful candidate should have suitable skills in collecting, managing, and processing of large volumes of research data. Students with quantitative skills in statistical or time series analysis are encouraged to apply.