

Job Description

Job Title:	Research Associate in Project on the Stochastic Transport in Upper Ocean Dynamics (STUOD) ERC Synergy Grant 2020
Department/Division/Faculty:	Department of Mathematics, Faculty of Natural Sciences
Campus/Location:	South Kensington Campus
Job Family/Level:	Research Job Family, Research Associate* (Research salary scale)
Responsible to:	Prof Dan Crisan
Key Working Relationships (Internal):	Staff and students involved in the STUOD project. Other Members of the Department of Mathematics at IC and EU collaborators.
Key Working Relationships (External):	N/A
Contract type:	Full time and fixed term for 24 months

Background:

Applications are invited for a Research Associate position in the Department of Mathematics at Imperial College London. The position is funded by the European Research Council.

The successful applicant will be working on the Stochastic Transport in Upper Ocean Dynamics (STUOD) ERC Synergy Grant 2020. The STUOD project aims to deliver new capabilities for assessing variability and uncertainty in upper ocean dynamics. Its results should provide decision makers a means of quantifying the effects of local patterns of sea level rise, heat uptake, carbon storage and change of oxygen content and pH in the ocean. Moreover, its multimodal monitoring aims to enhance the scientific understanding of marine debris transport, tracking of oil spills and accumulation of plastic in the sea.

The STUOD approach accounts for transport on scales that are currently unresolvable in computer simulations, yet are observable by satellites, drifters and floats. Four scientific capabilities will be engaged: (i) observations at high resolution of upper ocean properties such as temperature, salinity, topography, wind, waves and velocity; (ii) large scale numerical simulations; (iii) data-based stochastic equations for upper ocean dynamics that quantify simulation error; and (iv) stochastic data assimilation to reduce uncertainty. These four scientific capabilities must tackle a network of joint tasks achieved through cooperation of three world-calibre institutions: IFREMER (ocean observations, reanalysis); INRIA (computational science); and Imperial College London (mathematics, data assimilation).

The team's complementary skill sets need to combine to produce a single synergetic effort towards four interlinked goals:

- (1) Coordinate and interpret high-resolution satellite and in situ upper ocean observations.
- (2) Extract correlations from data needed for the mathematical model.
- (3) Perform an ensemble of computer simulations using our new stochastic partial differential equations (SPDE) which are derived by matching the observed statistical properties.
- (4) Apply advanced data assimilation and computer simulations to reduce model uncertainty. We believe that to achieve these goals we must rely on synergy in our combined expertise.

The post holder will work closely Prof Dan Crisan (Imperial College London) as well as well as with Prof Darryl Holm (Imperial College London), Prof Bertrand Chapron (Ifremer) and Prof Etienne Mémin (Inria).

www.imperial.ac.uk/ocean-dynamics-synergy/

Purpose of the Post:

The PDRA will take the lead on developing numerical experiments to test new theories related to the STUOD project. In addition, the PDRA will be involved in the theoretical development of variational models of ocean dynamics and rough paths. The PDRA will also have the opportunity to develop an independent research project related to the topic of this grant.

Key Responsibilities

The main duties of the Research Associate will include:

- To contribute towards the achievement of the Programme's aims and objectives.
- To take initiative in the planning of research
- To identify and develop suitable techniques for the analysis of the mathematical models developing
- the STUOD project
- To maintain accurate and complete records of all findings
- To write regular (monthly) internal reports
- To write reports for submission to research sponsors
- To prepare material for presentation in oral and poster formats
- To take responsibility for organising resources and effective decision making in support of research
- To attend relevant workshops and conferences as necessary
- To promote the reputation of the Research Group, the Programme, the Department and the College
- To present findings to colleagues and at conferences
- To draft publications and prepare them for submission to refereed journals
- To submit publications to refereed journals
- To contribute to writing bids for research grants
- To undertake instruction of MSc and PhD students as agreed
- To develop contacts and research collaborations within the College and the wider community
- To work with the team to adapt existing and develop new research methodologies, software packages
- and materials.

Administration and other activities:

- To undertake appropriate administration tasks
- To contribute to the Department's teaching activities as appropriate
- To attend relevant meetings
- To comply with relevant College policies, including Financial Regulations, Equal Opportunities Policy,
- Promoting Race Equality Policy, Health and Safety Policy, Information Systems Security Policy and
- Intellectual Property Rights and Register of Interests Policy

Where Imperial or funder conditions necessitate, you will be required to complete timesheets for your work on projects in a timely manner.

* Candidates who have not yet been officially awarded their PhD will be appointed as Research Assistant within the salary range £38,194 – £41,388 per annum.

Person Specification

Requirements	Essential (E)/ Desirable (D)
Candidates/post holders will be expected to demonstrate the following:	
Education	
Research Assistant: Near completion of a PhD (or equivalent) in Nonlinear Filtering and/or Data Assimilation or a closely related discipline	E
Research Associate: Hold a PhD in Nonlinear Filtering and/or Data Assimilation or a closely related discipline, or equivalent research, industrial or commercial experience	E
Experience & Knowledge	
A broad and strong background in Nonlinear Filtering / Data Assimilation	E
Expertise in Stochastic Partial Differential Equations	E
Experience writing research papers in Stochastic Filtering / Data Assimilation	E
Knowledge of Data Assimilation techniques	E
A track record of independent research in Stochastic Analysis/Data Assimilation	E
Experience of giving talks at internationally recognised conferences and workshops	E
A strong interest and knowledge of Stochastic Geophysical Fluid Dynamics	E
Expertise in Machine Learning Techniques	D
Experience with programming in Firedrake	D
Skills & Abilities	
Excellent written (English) communication skills and the ability to write clearly and succinctly for publication	E
Excellent verbal (English) communication skills including the ability to deal with a wide range of people, and to communicate complex information clearly	E
Strong computational skills	E
Ability to identify, develop and apply concepts, techniques and methods in new contexts	E
Ability to keep accurate records of research results and activity, help with reporting	E
Ability to exercise initiative and judgement in carrying out research tasks	E
Ability to conduct a detailed review of recent literature	E
Creative and open approach to problem-solving	E
Ability to organise own work independently	E
Ability to prioritise own work in response to deadlines	E
Ability to work effectively with a team of researchers and across disciplines	E
High level analytical capability	E
Ability to assess resource requirements and deploy them effectively	E
Ability to encourage research culture in others	D
Ability to deliver high quality scientific talks	D
Ability to direct the work of a small research team and motivate others to produce a high standard of work	D
Ability to motivate and guide the work of others	D
Other	
Willingness to work as part of a team, to be open-minded and cooperative and to align individual work with the overall direction of project.	E
Commitment to meeting deadlines	E
Commitment to maintaining and enhancing facilities and training others in their use	E
Flexible attitude towards work	E
Discipline and regard for confidentiality and security at all times	E

Willingness to travel both within the United Kingdom and abroad to conduct research and attend conferences/workshops and other meetings.	E
Willingness and ability to report and present work to a wider community	E

Further Information

Please note that job descriptions cannot be exhaustive, and the post-holder may be required to undertake other duties, which are broadly in line with the above key responsibilities.

Imperial College is committed to equality of opportunity and to eliminating discrimination. All employees are expected to follow the [Imperial Values & Behaviours framework](#). Our values are:

- Respect
- Collaboration
- Excellence
- Integrity
- Innovation

Employees are also required to comply with all College policies and regulations paying special attention to: Confidentiality, Conflict of Interest, Data Protection, Equal Opportunities, Financial Regulations, Health and Safety, Information Technology, Smoking, Private Engagements and Register of Interests. They must also undertake specific training and assume responsibility for safety relevant to specific roles, as set out on the [College Website Health and Safety Structure and Responsibilities](#) page.

The College is a proud signatory to the San-Francisco Declaration on Research Assessment (DORA), which means that in hiring and promotion decisions, we evaluate applicants on the quality of their work, not the journal impact factor where it is published. For more information, see <https://www.imperial.ac.uk/research-and-innovation/about-imperial-research/research-evaluation/>

The College believes that the use of animals in research is vital to improve human and animal health and welfare. Animals may only be used in research programmes which are ultimately aimed towards finding new treatments and making scientific and medical advances, and where there are no satisfactory or reasonably practical alternatives to their use. Imperial is committed to ensuring that, in cases where this research is deemed essential, all animals in the College's care are treated with full respect, and that all staff involved with this work show due consideration at every level. [Find out more about animal research at Imperial.](#)

We are committed to equality of opportunity, to eliminating discrimination and to creating an inclusive working environment for all. We therefore encourage candidates to apply irrespective of age, disability, marriage or civil partnership status, pregnancy or maternity, race, religion and belief, gender reassignment, sex, or sexual orientation. We are an [Athena SWAN Silver Award](#) winner, a [Disability Confident Leader](#) and a [Stonewall Diversity Champion](#).

May 2023