University of Reading

JOB DESCRIPTION

Vacancy reference:	SRF41511
Post Title:	Research Scientist in Global Storm Resolving Modelling
Grade:	Grade 7
School/Department:	National Centre for Atmospheric Science, School of Mathematical, Physical and Computational Sciences
Reports to:	Prof P.L. Vidale
Responsible for:	None

Purpose

We seek a post-doctoral Research Scientist for the High Resolution Global Climate Modelling (HRCM) core programme, a key aspect of strategic research developed at the National Centre for Atmospheric Science in Reading. We will develop and exploit mesoscale global configurations (sub-10km in both atmosphere and ocean) of current coupled models – based on HadGEM3 –, suitable for the investigation of scale interactions in the climate system. The focus of the post is the development of a shallow configuration of the NEMO ocean model, to enable sub-seasonal to seasonal global simulations at 3km. These developments will be ported in the medium term to a new global configuration, based on the new atmospheric dynamical core, GungHo, supported by a complementary post in HRCM.

The project will involve close collaboration within the National Centre for Atmospheric Science, particularly the tropical group, who have developed similar capability with the KPP model. The post holder will work very closely with the Met Office, particularly collaborating with the K-Scale project, with the National Oceanographic Centre, as well as with ECMWF, who also use NEMO in similar configurations. Multiple collaborative opportunities are offered at the international level: HRCM lead scientists are involved in world-leading programmes (e.g. WCRP Digital Earths, EU Horizon 2020, EU Horizons Europe) and engage internationally in the co-design of modelling systems that span conceptual models, all the way to state-of-the-art numerical models (examples are found within our EU collaborations in ENES, ESIWACE, NextGEMS). HRCM are also world-leaders in the use of High-Performance Computing.

Main duties and responsibilities

- Contribute to the definition and process-based assessment of HadGEM3 at N1280 to N2560 (~10km to ~5km), coupled to (shallow) NEMO ocean at 1/12, with the goal of reaching 1/36 degrees (in collaboration with the Hadley Centre and NCO, who have already experimented with that advanced resolution).
- Develop coordinated ocean only experiments in collaboration with the ocean groups at the Met Office Hadley Centre and at the National Oceanographic Centre (NCO).
- Develop coordinated ocean only experiments in collaboration with global-to-regional coupled experiments with the K-scale and "Path to High Resolution" groups at the Met Office Hadley Centre.
- Work jointly with the other HRCM post holder, to develop further future, high-resolution global configurations based on LFRic.

- Exploit these global configurations to mirror global storm resolving (GSRM) experiments carried out in the context of the NextGEMS project.
- Contribute to designing and executing major HRCM-group climate model simulations, including the analysis and management of associated data.
  - Assess model skill in reproducing a wide range of phenomena across scales, with a focus on process interactions at the finest mesoscale (mesoscale-gamma, 2-20km).
  - Carry out analyses that focus on the interaction of the ocean mesoscale with the tropical atmosphere, to investigate evidence of organisation and upscale modification of the mean state. Examples of such phenomena include the Madden-Julian oscillation, tropical cyclones and organised convection in general. See also the further particulars.
  - Design, perform and evaluate sensitivity studies to elucidate the role of specific phenomena in the climate system.
- Prepare scientific papers for publication.
- Attend national and international conferences to promote the results of the project.
- Interact with collaborators at the Met Office, ECMWF and internationally, through project meetings and other collaborative mechanisms.
- Maintain an awareness of current progress in relevant research areas, to ensure that the research carried out remains at the cutting edge.

Supervision received

Supervision will be provided by the Principal Investigator of the project, Prof Pier Luigi Vidale, as well as Dr Malcolm Roberts (MO). The PI will provide extensive support to develop and implement the model configurations. Prof Vidale and Dr Roberts have decades of expertise in weather and climate modelling at high resolution.

Supervision given

There are opportunities for the post-holder to be involved in teaching graduate and undergraduate courses, and to supervise or co-supervise M.Sc. and B.Sc. research projects. The post-holder is also expected to substantially contribute to the bi-annual NCAS Climate Modelling Summer School.

Contact

The post-holder will be based in the National Centre for Atmospheric Science, Department of Meteorology at the University of Reading. The post-holder will work closely with project partners across NCAS, particularly at Leeds, and with colleagues at the Met Office and ECMWF.

Terms and conditions

Full-time post, initially for three-years, but intended for extension into a permanent position. The opening of this post is part of a team building exercise that aims to achieve capability in global convection-permitting modelling, coupled to the ocean and suitable for climate modelling at ~3km, in the next five years.

Expected start date: 1 September 2022.

This document outlines the duties required for the time being of the post to indicate the level of responsibility. It is not a comprehensive or exhaustive list and the line manager may vary duties from time to time which do not change the general character of the job or the level of responsibility entailed.

Date assessed:

PERSON SPECIFICATION

Job Title	School/Department
Research Scientist	**SMPCS/Meteorology/NCAS**

Criteria	Essential	Desirable
Skills Required	- Strong scientific analytical skills. - Fortran/Python programming - Ability to perform analysis of Large Data - Strong computer programming skills. - Good writing and communication skills.	- Unix shell scripting - Data manipulation/analysis using standards (e.g. NetCDF4, HDF5, GRIB2) - Experience in ocean-atmosphere coupling - Understanding of massively parallel computing paradigms
Attainment	- Ph.D. in Mathematics, Physics, Physical Science, or equivalent research experience. - A publication record appropriate to experience.	- A Ph.D. in climate, Earth system or atmospheric science. - A track record in ocean and and/or atmospheric modelling at the mesoscale
Knowledge	- Knowledge of, or evidence of a serious interest in, ocean dynamics and physics. - Understanding of coupled physical processes relating to "ocean weather" and the global climate system.	- Knowledge of ocean-atmosphere interactions - Knowledge of modes of tropical climate variability and their teleconnections. - Knowledge of tropical cyclones and their interaction with the ocean.
Relevant Experience	- Research in a physical science. If the science is not climate-related, then evidence of the ability to acquire relevant knowledge. - Experience in running/developing the NEMO ocean model - Experience in numerical modelling, preferably in a High-Performance Computing (HPC) environment - Experience of analysis and visualisation of large and complex scientific datasets.	- Climate system research, particularly in tropical meteorology. - Experience of working with large, complex environmental simulation systems and underlying infrastructure, - Running the Met Office Unified Model. - Process-based and/or statistical analysis of weather/climate model output.
Disposition	- Self-motivated and capable of independent work - Capable of working within a team to deliver common goals. - Willingness to travel to relevant institutions and events.	- Enjoy working as part of a team. - Enjoy being at the forefront of science

Other	• Clear potential to deliver an outstanding research record.	

Completed by: P.L. Vidale   Date: 8/4/22