SPECIAL PROJECT PROGRESS REPORT

All the following mandatory information needs to be provided. The length should *reflect the complexity and duration* of the project.

Reporting year	2023
Project Title:	Speeding up ocean spin-up using stochastic parametrisations
Computer Project Account:	spgbchri
Principal Investigator(s):	H. M. Christensen K. J. Strommen
Affiliation:	University of Oxford Physics Department Parks Rd, Oxford OX1 3PU
Name of ECMWF scientist(s) collaborating to the project (if applicable)	N/A
Start date of the project:	2023
Expected end date:	2025

Computer resources allocated/used for the current year and the previous one

(if applicable)
Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)			25,00000	0
Data storage capacity	(Gbytes)			500	0

Summary of project objectives (10 lines max)

We will utilise ideas from stochastic parametrisations and machine learning to improve the coupling between the ocean and atmosphere components of the coupled IFS system, with a focus on cases when the ocean resolution is higher than the atmosphere. There are two key goals.

Firstly, we will use ideas from the stochastic parametrisation community to develop a stochastic representation of the unresolved variability in surface fluxes to improve the mean state and variability of the low-resolution atmosphere, to compensate for its lower resolution. Secondly, we will use ideas from machine learning to downscale the low-resolution atmospheric fields, to statistically add detail when feeding information from the atmosphere back into the ocean.

Summary of problems encountered (10 lines max)

No problems were encountered so far in this incarnation of the project.

Summary of plans for the continuation of the project (10 lines max)

The plans for this first year of the project are to generate initial testing data, consisting of up to 10-years of an EC-Earth3 climate simulation coupled to a high-resolution ocean component. This will allow us to carry out any optimisation and debugging required for the larger set of experiments taking place in the following two years. The data generated will also be used to carry out initial analysis of air-sea coupling and heatflux variability: this will form the basis of initial testing of neural network fits and the creation of simplified statistical models that will inform stochastic parameterisation development.

List of publications/reports from the project with complete references

N/A.

Summary of results

No simulations have taken place so far, since the two postdoctoral research assistants who will be hired to carry them out have not yet started post. They are scheduled to start before the end of the summer of 2023: the initial test simulations described above are therefore expected to take place in the autumn. There are therefore no results to describe as of the first reporting period.