

REQUEST FOR A SPECIAL PROJECT 2023–2025

MEMBER STATE: FRANCE

Principal Investigator¹: Gaston IRRMANN

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Project Title: Testing Ocean Modelling Software NEMO new communication patterns

If this is a continuation of an existing project, please state the computer project account assigned previously.	SP _____	
Starting year: (A project can have a duration of up to 3 years, agreed at the beginning of the project.)	2023	
Would you accept support for 1 year only, if necessary?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>

Computer resources required for 2023-2025: (To make changes to an existing project please submit an amended version of the original form.)	2023	2024	2025
High Performance Computing Facility (SBU)	1 000 000		
Accumulated data storage (total archive volume) ² (GB)	250		

Continue overleaf

¹ The Principal Investigator will act as contact person for this Special Project and, in particular, will be asked to register the project, provide annual progress reports of the project's activities, etc.

² These figures refer to data archived in ECFS and MARS. If e.g. you archive x GB in year one and y GB in year two and don't delete anything you need to request x + y GB for the second project year etc.

Principal Investigator:

Gaston IRRMANN

Project Title:

Testing Ocean Modelling Software NEMO new communication patterns

Extended abstract

All Special Project requests should provide an abstract/project description including a scientific plan, a justification of the computer resources requested and the technical characteristics of the code to be used. The completed form should be submitted/uploaded at <https://www.ecmwf.int/en/research/special-projects/special-project-application/special-project-request-submission>.

Following submission by the relevant Member State the Special Project requests will be published on the ECMWF website and evaluated by ECMWF and its Scientific Advisory Committee. The requests are evaluated based on their scientific and technical quality, and the justification of the resources requested. Previous Special Project reports and the use of ECMWF software and data infrastructure will also be considered in the evaluation process.

Requests exceeding 5,000,000 SBU should be more detailed (3-5 pages).

Our latest developments on ocean model NEMO (Nucleus for European Modelling of the Ocean) demonstrate that performances can be significantly improved by changing the communication pattern. However, after testing several communication patterns on several supercomputers we became aware that the most efficient pattern is extremely dependent on the supercomputer used.

Our objective now is to find out the elements that are responsible for this behaviour. We therefore would like to test on the soon to be available Atos supercomputer the efficiency of NEMO with a few different communication patterns, among others: neighborhood collective, persistent calls or the regular non-blocking pattern.

Such tests could provide us with information likely to allow further optimizations of the communication patterns, or, at the very least, identify the appropriate communication pattern to be used on your supercomputer when running NEMO.

Since the tests have already been carried out on supercomputers Irene (TGCC) and Spartan (Atos) they should be trivial to install and run. Moreover, the tests are based on a configuration that does not need input files. This will enable us to limit the time window of our intervention to only a few weeks.

While we occasionally want to run on many nodes we also only need to run simulations for short amounts of time. Hence, the total computing resources needed should not exceed 1 000 000 SBU.