

REQUEST FOR A SPECIAL PROJECT 2018–2020

MEMBER STATE: Croatia.....
 This form needs to be submitted via the relevant National Meteorological Service.

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Project Title: Fast solver for Wave modelling and Fitting of coefficients.....

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.)	2018	
Would you accept support for 1 year only, if necessary?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>

Computer resources required for 2018-2020: (To make changes to an existing project please submit an amended version of the original form.)		2018	2019	2020
High Performance Computing Facility	(SBU)	100000	100000	100000
Accumulated data storage (total archive volume) ²	(GB)	8G	8G	8G

An electronic copy of this form must be sent via e-mail to: *special_projects@ecmwf.int*

Electronic copy of the form sent on (please specify date):

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 an annual progress report of the project’s activities, etc.

² 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.

Principal Investigator:

Project Title:

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.

Requests asking for 1,000,000 SBUs or more should be more detailed (3-5 pages).

Following submission by the relevant Member State the Special Project requests will be evaluated by ECMWF as well as the Scientific and Technical Advisory Committees. The evaluation of the requests is based on the following criteria: Relevance to ECMWF's objectives, scientific and technical quality, disciplinary relevance, and 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.

Large requests asking for 10,000,000 SBUs or more will receive a detailed review by members of the Scientific Advisory Committee.

All accepted project requests will be published on the ECMWF website.

1. Challenges and objectives

The goal of the simulation is twofold.

1. Run large scale simulation of the unstructured WAM model and WWM model.
2. Fit the coefficients of the source term in the wave model of the WAM parameterization

2. Running the model WAM and WWM

The WWM model is a third generation wave model that solves the Wave Action Equation on unstructured grids. In particular it contains the Cycle IV parameterization of the WAM model and the Ardhuin parameterization ST4 of the WaveWatch III model.

The WAM model now contains the unstructured WWM code in it but the restructuring of the code has not been complete and there are differences between both models. The impact of various design decision in the performance is unclear and how it scales on a large number of processors is not known. We need access to a large number of nodes in order to see specific impact of design decisions.

Improvement made to the WWM model could be used in the WAM model as well since their structure are somewhat similar.

The part of the code that takes the most computational time is the advection in geographical and frequency/direction space. We implemented an implicit scheme for the solution of the WAE. It is especially important to be able to assess various choice of numerics and again the behavior on a large number of processors remains unknown so far.

3. Fitting model values

In the DHMZ we run the WWM model operationally in order to provide wave forecasts. We use the WAM formulation there. The problem is that the fitting of coefficients is not done well and is especially difficult for the Adriatic. Thus we need to be able to run repeated runs of the model with varying coefficients in order to fit the coefficients.

Having access to the ECMWF computer would help in that respect. This is important since the model parameterization depend on the grid chosen.

4. Need for ECMWF hardware

The hardware available at the Croatian meteorological institute is quite limited. At the present time it is just 288 processors which of course, cannot all be used at the same time.

Having access to the Cray computer will allow to see how some configuration scale over a number of processors that are unfeasible in the Croatian institute.

For example simulating on 540 nodes for 1 hours would cost 8404 SBU which is relatively ok for the goal of the project. This of course does not exclude running the model in our institute but instead complements it.