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	2024 (1st year of the project)
Project Title:	Adriatic Sea Climate: towards kilometre-scale biogeochemical modelling
Computer Project Account:	spcrtojc
Principal Investigator(s):	Iva Tojčić
Affiliation:	Ruđer Bošković Institute, Zagreb, Croatia; Faculty of Science, Split, Croatia
Name of ECMWF scientist(s) collaborating to the project (if applicable)	/
Start date of the project:	January 1st 2024
Expected end date:	December 31st 2026

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)	/	/	20,000,000	861.423
Data storage capacity	(Gbytes)	/	/	25,000	988560MB

Summary of project objectives (10 lines max)

The project aims to couple various biogeochemical models with the AdriSC model to evaluate their performance in terms of accuracy and computational efficiency under different configurations. Key objectives include understanding the significance of kilometre-scale biogeochemical modelling for hazard assessments in the Adriatic Sea, examining the impact of extreme events on primary production both historically and under future climate warming scenarios (RCP 8.5), and assessing the long-term changes in biogeochemical hazards and their effects on coastal communities. The feasibility of producing high-resolution coupled atmosphere-ocean-wave-biogeochemical results at a climate scale using ECMWF resources is also planned to be tested.

Summary of problems encountered (10 lines max)

The primary issue encountered was the difficulty in restarting the coupled AdriSC and Selma models during test runs exceeding one week. This challenge disrupted the continuity and stability of the simulations, hindering the evaluation of the model's performance over extended periods. Resolving this problem is crucial for achieving the project's objectives of producing reliable kilometre-scale coupled atmosphere-ocean-wave-biogeochemical results and assessing long-term biogeochemical hazards and their impacts on the Adriatic Sea and its coastal communities.

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

The next steps of the project involve first resolving the restart problem with the coupled AdriSC and SELMA models to ensure stable and continuous long-term simulations. Following this, the focus will shift to integrating and coupling other biogeochemical models such as ERSEM, BFM, and PISCES with the AdriSC suite. Depending on the performance of these models and their configurations, two biogeochemical setups will be selected: (1) a simpler configuration for studying primary production under extreme events, and (2) a more complex configuration for examining the Adriatic Sea ecosystem under long-term climate changes. Finally, the impact of both past and future extreme events on the Adriatic Sea ecosystem will be comprehensively studied using these selected configurations.

List of publications/reports from the project with complete references

There are still no publications from this project, as it is in its initial phase.

Summary of results

If submitted **during the first project year**, please summarise the results achieved during the period from the project start to June of the current year. A few paragraphs might be sufficient. If submitted **during the second project year**, this summary should be more detailed and cover the period from the project start. The length, at most 8 pages, should reflect the complexity of the project. Alternatively, it could be replaced by a short summary plus an existing scientific report on the project attached to this document. If submitted **during the third project year**, please summarise the results achieved during the period from July of the previous year to June of the current year. A few paragraphs might be sufficient.

So far, we successfully coupled the AdriSC model with the SELMA model. This involved evaluating SELMA in terms of complexity, source code modularity, coupling feasibility, and computational costs. Various configurations of SELMA were tested to find the best balance between result accuracy and running time. This initial evaluation provides a foundation for assessing the performance of SELMA and sets the stage for future integration and testing of other biogeochemical models within the AdriSC modelling suite.