

# REQUEST FOR ADDITIONAL RESOURCES IN THE CURRENT YEAR FOR AN EXISTING SPECIAL PROJECT

**MEMBER STATE:** CROATIA

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**Project title:** The Adriatic decadal and inter-annual oscillations: modelling component

**Project account:** SPCRDENA

<b>Additional computer resources requested for</b>	<b>2018</b>
High Performance Computing Facility (units)	2,100,000
Data storage capacity (total) (Gbytes)	/

*Continue overleaf*

<sup>1</sup> The Principal Investigator is the contact person for this Special Project

## Technical reasons and scientific justifications why additional resources are needed

The physical explanation of the thermohaline oscillations of the Adriatic-Ionian System (BIOS) is still under debate as they are thought to be generated by either pressure and wind-driven patterns or dense water formation travelling from the Northern Adriatic. The aim of the ADIOS project (currently funded for the next three years) is to numerically investigate and quantify the processes driving the inter-annual to decadal thermohaline variations in the Adriatic-Ionian basin with a high resolution Adriatic-Ionian fully coupled atmosphere-ocean model.

Within the first year of the special project (sperdena), the Adriatic-Ionian model was developed and is currently running continuously on the ECMWF supercomputing facilities. This model consists in two nested atmospheric grids of 15-km and 3-km and two nested ocean grids of 3-km and 1-km and will be run for a 30-year re-analysis period (1987-2017) as well as one or two 30-year RCP scenarios (2070-2100) via a surrogate climate change method (Schär et al., 1996).

Due to the high resolution of the grids (up to 3-km for the atmosphere and 1-km for the ocean), the optimal configuration was found to produce a month of model results per day. Each 30-year long simulation thus require a full year elapse time to be produced. In addition, the total amount of SBUs needed to continuously run the model during one year is:  $230\text{CPUs} \times 365\text{days} \times 86400\text{s} \times P \sim \mathbf{33,000,000 \text{ SBUs}}$ .

Due to a misinterpretation of the ECMWF regulations only **13,000,000 SBUs** were asked per year in the special project. It means that the special project only covers about 5 months of simulation per year (= per 30-year long simulation). High resolution climate modelling at the coastal scale is currently under development (for example within the MEDCORDEX initiative) and is not state of the art, the project is thus facing some understandable technical challenges including, principally, the stretch in numerical resources needed to run such a model. This year special project credits were already spent at the end of September but thanks to the support of the Croatian Hydrological and Meteorological Services, the missing resources were covered by the ECMWF Croatian account quota and the evaluation run (1987-2017) was not interrupted. However, if some additional credits are available before the end of 2018, our special project could definitely benefit from 3 weeks of additional resources:  $230\text{CPUs} \times 21\text{days} \times 86400\text{s} \times P \sim \mathbf{2,100,000 \text{ SBUs}}$ .

Schär, C., Frei, C., Lüthi, D., Davies, Huw C. (1996). Surrogate climate-change scenarios for regional climate models. *Geophysical Research Letters*, 23 (6). <https://doi.org/10.1029/96GL00265>