

REQUEST FOR ADDITIONAL RESOURCES IN THE CURRENT YEAR FOR AN EXISTING EMI R&D PROJECT

Please submit the completed form via <https://www.ecmwf.int/en/support> (choose *Software and Computing*, then *Gain access to computing resources (create ticket)*) or send to special_projects@ecmwf.int

Country/Organisation: Spain

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Address: Av. de los Castros, 39005 Santander, Cantabria

Project title: Next-generation CORDEX simulations across multiple regional domains within the context of the FUTURA project

Project account: SPESMILO

Additional computing resources requested for year		2026
High Performance Computing Facility	[SBU]	45 million (ideally ~ 84 million)
Graphics Processing Unit Cluster - A	[GBU]	
Graphics Processing Unit Cluster - B	[GBU]	
Total DHS Data storage capacity	[GB]	
EWC resources		
Number of vCPUs	[#]	
Total memory	[GB]	
Storage	[GB]	
Number of vGPUs ³	[#]	

Continue overleaf

¹ The Principal Investigator is the contact person for this EMI R&D Project

Technical reasons and scientific justifications why additional resources are needed

Technical reasons and scientific justification

why additional resources are needed

The FUTURA project requires the completion of a coordinated set of CORDEX-CORE CMIP6 regional climate simulations with the WRF model. IFCA is contributing through the production of high-resolution ($\sim 0.11^\circ$) regional climate projections for two continental-scale CORDEX domains, **SAM-12 and AFR-18**. These simulations provide an important contribution to the CORDEX-CORE ensemble and to the regional climate information required for FUTURA and IPCC AR7, with the target article submission deadline of **15 March 2027**.

The simulations are currently ongoing on the ECMWF HPC system. Approximately **30 simulated years have been completed**, and more than **90% of the currently allocated 20 million SBU** has already been consumed.

The original resource request of **20 million SBU** was based on an incorrect conversion between CPU/core-hours and ECMWF Standard Billing Units. CPU-hours were effectively treated as equivalent to SBUs, resulting in a substantial underestimation of the actual computational requirement. This was a resource-accounting error and does not represent any expansion of the scientific scope of the project.

The ongoing production runs now provide a reliable empirical basis for estimating the remaining requirement. The approximately **30 simulated years completed so far have consumed $\sim 18,000,000$ SBU**, including simulation and associated preprocessing and postprocessing. This corresponds to an observed average of:

$18,000,000 / 30 = \sim 600,000$ SBU per simulated year (~ 0.6 million SBU/year).

Approximately **140 simulated years remain** across the two domains (70 years per domain). At the observed computational rate, completing the full remaining programme would therefore require approximately:

140×0.6 million = ~ 84 million SBU.

The requested **45 million additional SBU** would correspond to approximately **75 additional simulated years** at the observed rate. Although this is not sufficient to complete all 140 remaining simulated years, it represents the maximum additional allocation available and would allow us to maximise the amount of the originally planned work completed within the remaining project period.

The additional resources are particularly important because these are long, continuous climate integrations forming part of a coordinated international CORDEX-CORE activity. Reducing the integration periods or substantially delaying the simulations would reduce the completeness of our contribution to the ensemble and limit the subsequent climate-impact and FUTURA analyses. Moving the simulations to another HPC system would also require additional validation and optimisation and introduce machine-related uncertainty at a critical stage of the project.

The simulations also generate substantial volumes of intermediate model files. We therefore request, if possible, **up to 100 TB of SCRATCH storage (instead of the currently allocated 50 TB)** to facilitate the remaining integrations and associated preprocessing and postprocessing. Storage will

be actively managed through removal of unnecessary intermediate files and transfer of required output as appropriate.

Resource	Requirement
Additional ECMWF SBU requested	45 million SBU (maximum available)
Estimated requirement for remaining 140 years	~84 million SBU
Observed computational cost	~0.6 million SBU/year
Approximate coverage of 45 million SBU	~75 simulated years
SCRATCH storage	Up to 100 TB
Remaining simulations	~140 simulated years
Domains	SAM-12 and AFR-18
Target completion	End of 2026

The requested increase is therefore a **correction of the original SBU estimation based on the actual computational cost measured during the first 30 simulated years**, rather than a change in the scientific objectives or scope of the project. We respectfully request the **maximum possible additional allocation of 45 million SBU**, which will allow us to maximise the amount of the originally planned simulations completed within the remaining timeframe and maintain progress towards the FUTURA and CORDEX-CORE objectives.

We greatly appreciate ECMWF's support and consideration of this request.