

LATE REQUEST FOR A SPECIAL PROJECT 2026–2028

MEMBER STATE: Italy

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Project Title:

Update of the SPITBRAN 2018-2020 Special Project

To make changes to an existing project please submit an amended version of the original form.)

If this is a continuation of an existing project, please state the computer project account assigned previously.	SPITCAPE	
Starting year: (A project can have a duration of up to 3 years, agreed at the beginning of the project.)	2026	
Would you accept support for 1 year only, if necessary?	YES ☒	NO ☐

Computer resources required for project year:	2026	2027	2028
High Performance Computing Facility [SBU]	1.1 M		
Accumulated data storage (total archive volume) ² [GB]	1000 B		

EWC resources required for project year:	2026	2027	2028
Number of vCPUs [#]			
Total memory [GB]			
Storage [GB]			
Number of vGPUs ³ [#]			

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.

³ The number of vGPU is referred to the equivalent number of virtualized vGPUs with 8GB memory.

Principal Investigator:

Project Title:

Extended abstract

In the framework of the ECMWF SPITBRAN 2018-2020 Special Project, a high-resolution model hindcast has been produced using the BOLAM and MOLOCH models (Drofa, 2025) to downscale ERA5 data across the time series 1975-2024.

Such hindcast was validated in several contexts (Capecchi et al., 2023, Cavalleri et al., 2025, Vannucchi et al., 2021) and it was found to provide reliable data as regards precipitation and wind speed and direction at 10-metre above ground. Based on the atmospheric data provided by the BOLAM/MOLOCH hindcast, a second hindcast was developed using the WW3 model to produce a long-term wave dataset over the Mediterranean basin, employing an unstructured grid with a resolution of up to 500 m near the Italian coasts.

The BOLAM/MOLOCH hindcast contributes also to enriching the landscape of convection-permitting reanalyses available for the Italian territory. Giordani et al. (2025) demonstrated the added value of the ensemble product that can be constructed from the set of Italian convection-permitting reanalyses.

Moreover, we emphasize that the availability of such a dataset has enabled our institution (LaMMA) to activate a range of marine climatological analysis services for private stakeholders carrying out offshore operations (e.g., the installation of submarine power cables). This highlights how the production of high-resolution atmospheric datasets and downstream wave model products has positive impacts on the economic and industrial sectors, and is not confined solely to the scientific and academic domain.

Finally, we highlight that the methodological approach adopted during the Special Project proved to be useful and effective, attracting the interest of the SLAPIS project partners and leading to the development of the Special Project "A High-Resolution Hindcast for the Sahel Region Based on ERA5 Data and the MOLOCH Model."

We request computational resources to carry out the BOLAM/MOLOCH hindcast simulations for the year 2025, and to extend the dataset to 2026 as soon as the corresponding ERA5 data become available in the MARS archive. In practice, we plan to update the dataset with an approximate two-month delay relative to the availability of ERA5 data. The experimental design of the simulations is frozen and follows the configuration developed at the beginning of the ECMWF SPITBRAN 2018-2020 Special Project (i.e., we use the MOLOCH model version 2017). This activity will soon extend the hindcast time series to cover the 1975-2025 period (and subsequently 1975-2026), establishing it as the dataset with the longest continuous historical record and enabling more comprehensive and statistically robust climatological analyses.

Based on previous experience, the computational resources required during this year to produce the 2025 simulations and the first ten months of 2026 amount to $547,500 + 450,000 = 997,500$ SBUs. We add an additional 10% to account for potential tests and errors, for a total of approximately **1.1 million SBUs**. Data storage is estimated in **1 TB** on ECFS.

References

- Capecchi, V., Pasi, F., Gozzini, B., & Brandini, C. (2023). A convection-permitting and limited-area model hindcast driven by ERA5 data: precipitation performances in Italy. *Climate Dynamics*, 61(3), 1411-1437.
- Cavalleri, F., Lussana, C., Viterbo, F., Brunetti, M., Bonanno, R., Manara, V., Lacavalla, M., Sperati, S., Raffa, M., Capecchi, V.,... & Maugeri, M. (2024). Multi-scale assessment of high-resolution reanalysis precipitation fields over Italy. *Atmospheric Research*, 312, 107734.
- Drofa, O. (2025). Pochva: a new hydro-thermal process model in soil, snow, and vegetation for application in atmosphere numerical models. *Geoscientific Model Development*, 18(11), 3175-3209.
- Giordani, A., Ruggieri, P., & Di Sabatino, S. (2025). Added value of a multi-model ensemble of convection-permitting rainfall reanalyses over Italy. *Atmospheric Research*, 108402.
- Vannucchi, V., Taddei, S., Capecchi, V., Bondoni, M., & Brandini, C. (2021). Dynamical downscaling of era5 data on the north-western mediterranean sea: From atmosphere to high-resolution coastal wave climate. *Journal of Marine Science and Engineering*, 9(2), 208.