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: MET NORWAY

Principal Investigator[1]: Stephanie Guedj

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Address: Henrik Mohns plass 1, 0371 Oslo, Norway

Project title: Arctic Weather Satellite All-sky Radiance DA Implementation (AWARI)

Project account: **SPNOGUED**

Additional computing resources requested for year		**2026**
High Performance Computing Facility	[SBU]	25 million
Graphics Processing Unit Cluster - A	[GBU]	1.05 million
Graphics Processing Unit Cluster - B	[GBU]	0.99 million
Total DHS Data storage capacity	[GB]	110 TB
EWC resources		
Number of vCPUs	[#]	70
Total memory	[GB]	350 GB
Storage	[GB]	25 TB

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

Number of vGPUs[3]	[#]	2

Continue overleaf

Technical reasons and scientific justifications why additional resources are needed

We request more resources to validate and extend the AWARI project with Arctic Weather Satellite (AWS) observations. This work directly continues AWARI's objective of optimising the use of AWS data for Arctic forecasting, while addressing the project's identified future direction: exploiting polar-orbiting satellite observations in AI/ML prediction systems.

AWARI has already assimilated AWS observations operationally in AROME-Arctic under clear-sky conditions and developed a technically working all-sky assimilation configuration in our traditional weather forecast system. Some data assimilation experiments are still planned based on CPUs to validate the all-sky configuration and explore all-surface assimilation capabilities over sea-ice. An additional user has been recently added to the special project for that purpose.

In parallel and for longer term, as agreed with ESA, we are progressively reshaping the AWARI project toward more machine learning approaches, AI-GraphDOP (Direct Observation Prediction).
GPU resources are required because AI-GraphDOP is a data-driven modelling and data-assimilation approach whose training, fine-tuning, and large ensemble of sensitivity or observation-system experiments cannot be performed efficiently on CPU-based HPC resources. Training and evaluating the model requires repeated forward and backward passes over large multivariate geophysical datasets, high-dimensional neural-network parameters, and satellite observation streams. GPUs provide the parallel arithmetic throughput needed to make these experiments feasible within the project period.

The proposed work will use AWS observations, including the new 325 GHz channels, to:

- Implement and run AI-GraphDOP with AWS data.
- Assess the added value of AWS observations in an end-to-end, data-driven prediction framework.
- Explore the use of microwave observations in cloudy, precipitating, and surface-sensitive Arctic scenes.
- Evaluate the impact of AWS on high-impact events, including polar lows and heavy precipitation.
- Support future constellation and observation-requirement studies for missions such as EPS-Sterna.

This research is timely because operational AI/ML systems such as ECMWF's AIFS and emerging data-assimilation capabilities are advancing rapidly. A GPU-enabled AWARI continuation would allow MET Norway to build capability in AI-based satellite-data exploitation, complement its existing conventional assimilation work, and prepare for the next generation of polar satellite systems.

The requested GPUs will therefore be used exclusively for the scientifically justified AWARI continuation activities: model training, fine-tuning, inference, observation-system experiments, and evaluation of AWS impact in AI-GraphDOP.