EMI R&D 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 …2026……..……

Project Title: ……..……
Neural Network-based Responsive Ice Cover for Operations (NN-RICO)
……..……

Computer Project Account: spnokaeh……..……

Principal Investigator(s): Marvin Kähnert..……

……..……

Affiliation: MET-Norway..……

Name of ECMWF scientist(s) collaborating to the project (if applicable) ……..……

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Start date of the project: 01.01.2026..……

Expected end date: 30.12.2028..……

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)			20M	38K
Data storage capacity	(Gbytes)			55000	0

Summary of project objectives (10 lines max)

Investigated the sensitivity of the HARMONIE-AROME model to an evolving sea-ice cover during selected periods corresponding to the annual SvalMIZ field campaigns near Svalbard. These campaigns provide observations of atmospheric and near-surface conditions in the marginal ice zone, enabling detailed model evaluation. A neural-network-based machine-learning model for predicting sea-ice evolution will be coupled to HARMONIE-AROME and used to assess the impact of dynamic sea-ice conditions on forecast quality. During the course of the project, the scope was expanded to include a model intercomparison involving forecasting systems from ECMWF and ECCC.

Summary of problems encountered (10 lines max)

The desired HARMONIE-AROME model version for this project, the operationally used AROME-Arctic, first had to be established on the ATOS platform. In addition, the expanded project scope, which now includes a model intercomparison, required revisions to both the boundary conditions and the overall experimental design. These technical and scientific challenges have since been resolved. The only remaining issue is the proper coupling of the NN to the model version that is used in this project.

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

All required data for the 2024 period is in place. The first model runs are being started. The 2025 period will follow suit in this year. A successful coupling to the NN model is expected at the end of this year.

List of publications/reports from the project with complete references

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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.

A key objective of the project is to perform the experiments using the operational configuration of AROME-Arctic. Achieving this required substantial technical work, including testing and adaptation of the model system on the ATOS platform. In parallel, considerable effort was devoted to the preparation of boundary conditions and the design of an experimental framework suitable for the model intercomparison.

Particular attention was given to establishing a realistic representation of sea ice within the study region. This involved devising an appropriate strategy for initializing and constraining sea-ice conditions throughout the simulation period, ensuring consistency between the atmospheric model

and the prescribed sea-ice state. Boundary conditions for the 2024 SvalMIZ campaign period have now been successfully prepared. With these tasks completed, the first of the planned numerical experiments is currently underway.