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

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MEMBER STATE: Netherlands

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Project title: Storylines of changing polar climates

Project account: **SPNLBERG**

Additional computing resources requested for year		2024
High Performance Computing Facility	[SBU]	30.000.000
Total DHS Data storage capacity	[GB]	/
EWC resources		
Number of vCPUs	[#]	/
Total memory	[GB]	/
Storage	[GB]	/
Number of vGPUs[3]	[#]	/

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[1] The Principal Investigator is the contact person for this Special Project

Technical reasons and scientific justifications why additional resources are needed

The aim of the SPNLBERG project is to facilitate numerical simulations for polar research. Within SPNLBERG, we use two regional climate models, RACMO and HCLIM, and the IMAU-FDM model, which simulates the surface snow layer, the firn layer, in greater detail than a regional climate model can.

Most of the budget requested for 2024, 160 million SBU out of 200 million SBU, was allocated to longer RACMO runs. Two of these longer runs were expected to start in autumn 2023. However, due to unforeseen personnel changes, there was a lack of manpower to resolve the technicalities of starting these ESM-driven longer simulations, which pushed back the start of these simulations to 2024. Combined with an underestimation of the computational costs of these long simulations, the situation now is that our budget for 2024 will be exhausted by 6 December, while our simulations are not yet complete. We therefore request the additional budget for 2024 to complete the following numerical simulations, as postponing them to 2025 would further delay us against the EU deadlines, and in any case would hinder the ongoing research projects of the PhD students and postdocs working on them.

1) We request 20 M SBU to complete the second and final high resolution RACMO projection for the Arctic. This projection is using a resolution of 0.1 degree, ~11 km, cover the updated Arctic CORDEX domain, and is driven by boundaries from the Earth System Model CNRM-ESM2-1 for SSP3-7.0. This simulation is performed as part of the EU-funded project PolarRES, and the data will be published on an ESGF node after a quality check. The model output of this simulation, as well as other completed simulations in 2024, will be analysed by PostDocs in our group as well as by other researchers within the PolarRES project.

2) We request 6 M SBU to run the IMAU-FDM simulations for Greenland proposed in the 2024 special project proposal. These simulations have not yet been carried out because the model development had to be completed first. However, this phase has now been completed and it would facilitate the progress of this research project if these simulations could be completed in 2024.

3) We request 3 M SBU to re-run RACMO at 5.5 km resolution over Greenland, driven by ERA5, for the last decade. We also request 1 M SBU to run a series of short RACMO runs at 2.5 km resolution over a small domain over the Arctic Ocean. Both sets of simulations are part of a PhD project funded after the submission of the SPNLBERG 2024 special project proposal. This project focuses on the simulation of clouds and the evaluation of clouds against remote sensing observations. The first simulation, the re-run of RACMO over Greenland, will be used to derive detailed cloud model data for comparison with ground-based remote sensing cloud observations from the ICECAPS project at Summit, Greenland. The second set of simulations is a series of short two-month runs in which we test the sensitivity of modelled cloud properties to, for example, prescribed aerosol concentrations and microphysical tuning parameters.

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