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

Please email the completed form to special_projects@ecmwf.int.

MEMBER STATE: Netherlands

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Project title: Land Management for Climate Mitigation and Adaptation (LAMACLIMA)

Project account: **SP** NLCOUM

Additional computer resources requested for		**2021**
High Performance Computing Facility	(units)	10 MSBU
Data storage capacity (total)	(Gbytes)	

Continue overleaf

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

This form is available at:
http://www.ecmwf.int/en/computing/access-computing-facilities/forms

Technical reasons and scientific justifications why additional resources are needed

VU Amsterdam is partner in the new JPI-Climate/AXIS funded project LAMACLIMA (https://climateanalytics.org/projects/lamaclima/) that aims at advancing the scientific and public understanding of the coupled climate effects of land cover and land management (LCLM) options. The project aims at elaborating sustainable land-based adaptation and mitigation measures.

Planned Simulations

The interactions between LCLM and climate is quantified by conducting a set of sensitivity experiments using EC-Earth3-Veg. The output of these simulations will be analysed for (i) local climate impacts of changes in LCLM through biogeophysical effects such as changes in albedo or evapotranspiration, (ii) remote biogeophysical impacts through atmospheric teleconnections and (iii) biogeochemical impacts on the carbon cycle.

We generate simulations with the coupled-model EC-Earth3-Veg over the period 2014-2174 (160 years including 10 years of spin-up). We use the latest frozen version EC-Earth 3.2 at T255 resolution. Initially a set of 1 control and 4 scenario runs were planned. In a nutshell, these are the following (for the details of each run you can see the actual LAMACLIMA special request form):

1) Control Run: This is already successfully finalized.

2) 100% Natural Vegetation simulation. This is also already successfully finalized.

3) 100% Crop simulation without Irrigation. This run is ongoing.

4) 100% Crop simulation with Irrigation. This run is also ongoing.

5) 100% Natural Vegetation simulation including wood harvesting. This run shall begin shortly.

There are two main reasons why we would like to ask for additional resources.

The first reason is that simulation 4 had to be conducted twice. Although before starting those simulations they were thoroughly tested by running short versions and checking the outcomes, after the long simulation of this scenario was done, we found that the output had some imperfections in the set up that compromised the scientific quality of the run. Therefore, it had to be improved and was re-done with the unfortunate cost of extra resources.

The second reason for the additional resources requirement is that three New Scenario Logic simulations are added in LAMACLIMA consortium, to allow for a “bottom-up” approach (scenario construction) centred on local risk thresholds that is more appropriate for adaptation. The new land-use scenarios are developed together with stakeholders and the LCLM changes will be driven accordingly by MAgPIE model. The objectives on which the new scenarios are being built are the following:

1) Limitation of global temperature increase to 1.5C, without compromising the global food security.

2) Zero hunger level achieved without any depletion of water resources.

3) Minimizing the local climate risks of the biogeophysical effects of LCLM changes.

The three new LCLM-driven scenario runs in EC-Earth-Veg will be fully coupled (ocean-atmosphere-LPJ-GUESS) transient simulations of the 21st century, running for 85 years each (2014 - 2100).

In order to accurately estimate the computational requirements, a set of experiments has been specifically designed and performed using the same codes that will be used in the production phase. The aim is to verify the performance of the codes and determine the better processors configuration. Large scalability is not an issue in our case, since we plan to run different experiments at the same time. Therefore, we limited our tests to a maximum of 444 parallel tasks. We have performed several tests of 2 simulation years duration each to conclude on the optimum model setting in terms of SBU and runtime, with the model in coupled configuration. Based on the optimized outcome we estimate that the configuration uses about 26000 SBU per simulation year. With the total number of years to be run, the total estimate will be of about **10 million SBU** for the year 2021. The simulations will continue and will be concluded next year. For 2022 there is no need at them moment for any additional resources.