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

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

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Project title: Exploit observations to constrain land cover, vegetation and hydrology processes for improved near-term climate predictions over land

Project account: **SPITALES**

Additional computer resources requested for		**2022**
High Performance Computing Facility	(units)	16150000
Data storage capacity (total)	(Gbytes)	40000

Continue overleaf

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

Technical reasons and scientific justifications why additional resources are needed

One of the objectives of the special project SPITALES is to perform and analyze a set of decadal predictions with enhanced representation of land cover, vegetation and hydrology processes as resulting from the exploitation of the latest available observational data over land. This new set of decadal predictions must be compared with the official DCPP simulations performed within CMIP6 to effectively analyze the improvements in the representation of the land cover, vegetation and hydrology.

The decadal prediction system based on the version 3 of the EC-Earth ESM [developed in the framework of the Decadal Climate Prediction Project (DCPP) endorsed by CMIP6] will not be ported on Atos because of the decision to develop a new decadal prediction system based on EC-Earth4 (to be expected after 2023). This would prevent us to perform the planned hindcast sensitivity (DCPP-sens) to the improved representation of land surface to be compared with the EC-Earth3 control hindcasts (DCPP-ctrl) already performed on cca as part of BSC's contribution to DCPP (DCPP - Component A1).

However, the delayed switch-off of cca to the end of October 2022 has opened a favorable window of time to run the sensitivity DCPP experiment during the coming two months. According to this during June-July 2022 we have completed the setup and testing on cca in order to run the sensitivity experiment consisting of at least 23 start dates for 5 years, 10 members each. This means a total of at least 1150 years of simulation, of which we already performed 300 years (6 start dates that required ~6000kSBU, i.e. 20 kSBU per year with a new more expensive configuration averaging about one start date per day of simulation excluding postprocessing) [*] that together with testing, preliminary runs, and off-line simulations (altogether rounding to about 1780 kSBU) already almost exhausted the SPITALES budget previously allocated for 2022 (8000 kSBU). To complete the DCPP-sens experiment, the request for additional HPC resources for 2022 is therefore of 16150 kSBUs including 5% buffer to account for simulation failures and/or accidental loss of data (See simulation and resource cost summary reported in Table 1):

Experiment name	Description	Start dates	Ensemble members	Resource per year (kSBU/yr)	Total years	Total resource (kSBU)
DCPP-sens	Decadal prediction experiment with improved vegetation sensitivity	23	10	20	1150	23000
5% buffer						1150
Total						**24150**
Already used HPC resources						**7800**
Residual allocated HPC						**(-) 200**
Request for additional HPC resources for 2022						**16150**

Table 1: Summary explaining additional HPC resources needed for 2022 in order to complete DCPP-sens on cca by the Summer 2022. See text for details.

No additional resources are required for the storage compared to the original request for 2022. We'll manage the output of the DCPP-sens so that it can stay in the 40000 GB (total accumulated data storage) already allocated in the special project for 2022.

[*] Note that 20 kSBU is an update of what was previously estimated in the original special project request (16,9 kSBU). The increase in resources per year is mostly due to the more expensive configuration that we are using here to speed up simulations using 13 nodes (instead of 11), i.e. 468 total cores (instead of 396). In the new configuration, the processors are allocated such that 288 are for IFS, 144 for NEMO, 1 for XIOS and 1 for the runoff mapper.