

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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Other researchers: ~80 researchers from the HIRLAM countries.

Project title: HIRLAM-C phase 2 special project (2019-2020)

Project account: SPSEHLAM

Additional computer resources requested for	4/10/19
High Performance Computing Facility (units)	10 MSBUs
Data storage capacity (total) (Gbytes)	7.000

Continue overleaf

¹ The Principal Investigator is the contact person for this Special Project
Jun 2019

Technical reasons and scientific justifications why additional resources are needed

The resources in the spsehlam special project are used for the validation of new model components and pre-release testing of new Harmonie cycles on the deterministic Harmonie system configuration at ECMWF. This system is generally run on the so-called “DMI domain”, a domain with characteristics relevant for many HIRLAM services.

The run time costs for testing and tuning of the deterministic Harmonie system at ECMWF at 2.5km horizontal resolution and 90 vertical levels over the DMI domain, amount to ~18000 HPCF units per experiment day. The estimated needs for the testing of a new cycle of the deterministic Reference system therefore typically are:

- pre-release technical tests: 12 months in total
- parallel validation: 12 months total
- pre-operational impact and sensitivity tests evaluating individual components: 12 months
- debugging, problem detection and fixing activities: 12 months
- real time trunk suite, 12 months in total

So in total roughly 60 months or $60 * 30 * 18000$ units = 32 million HPCF units are estimated to be normally required per year for testing and experimentation with the deterministic Harmonie Reference System at ECMWF.

In the fall of 2019, testing has begun of a new Harmonie Reference Cycle, Cy43h2. This testing will require considerably more resources than has usually been the case, for several reasons:

In the first place, a set of changes has been introduced in the model physics with great promise to alleviate several serious problems seen in the forecasting of convection, fog and low clouds. In the previous model version, the behaviour of these quantities was seen to differ significantly between various parts of Europe, and therefore it was considered necessary to validate and test the new configuration against the old one for several domains covering different parts of Europe, not just the DMI one. Secondly, great changes are being introduced in the surface modules of the model (involving among other a change from a force-restore to a diffusion soil scheme). Validation experiments involving these new components need to take into account a significantly longer spinup time for soil properties, and thus larger computational costs, than was previously the case. Also, a new physiographic database, ECOCLIMAP-Second Generation, is being introduced and tested against its predecessor, ECOCLIMAP version2. The characteristics of ECOCLIMAP-SG appear to differ quite strongly from those of ECOCLIMAP-v2, much more so than the HIRLAM team had anticipated, and these differences turn out to both seriously affect near-surface behaviour and vary a lot across Europe. For this reason, to assess the impact of this significant change for all HIRLAM members, we again saw a need to test the model over a larger number of domains than the DMI one normally used.

All of these aspects together have resulted in a significantly greater amount of resources being needed for this Cy43h2 testing than was anticipated for 2019. To finalize the current battery of tests, additional resources are needed. This is the reason for this request for additional SBU resources for the spsehlam special project. (Additionally, several HIRLAM members have been found able and willing to use a larger-than-normal fraction of their national resources (at ECMWF and on their own HPC's) to help on the finalization of the Cy43h2 tests.) The requested additional resources would allow us to complete the testing as planned before the end of 2019, and thus make

a faster switch to a new model version with some long-awaited and urgently needed performance improvements.