Progress report on CALMO Methodology Applied on eXtremes -CMAX Priority Project

This report summarizes the progress achieved at the framework of CMAX project until the end of 2018. The steps followed within individual Tasks are briefly described below. This documents should be considered with the To Do list.

Task 0: Administration and support

Regular web conferences have been performed within the team members (Greece, Switzerland, Israel and Italy), throughout the year to ensure the good information flow between all participants. A workshop was successfully organized in Athens, 7-9 January 2019. The minutes and the presentations of the workshop are online available on COSMO web site at http://www.cosmo-model.org/content/tasks/priorityProjects/calmoMax/meetings.htm . The existing mailing list of the project (http://mail.cosmo-model.org/mailman/listinfo/cosmo-calmo) (CALMO-ML, herein) has been widely used in order to support communication and information exchange within project participants.

Task 1: Consolidation of CALMO outcome

This sub-task aims at consolidating the knowledge gained through the application of CALMO.

1.1: Review of CALMO methodology

Review of the methodology has been performed, and adjustments on the MM (use FSS instead of ETS, different weights used in the performance score) have been implemented.

1.2: Preparation of the technical infrastructure

Computer resources allocated from CSCS are no longer available. Some additional resources have been secured by MeteoSwiss (at kesch).

Infrastructures (MM translated to OCTAVE, COSMO installation) for applying the methodology at ECMWF are under construction

As the suggested computing platform is the ECMWF HPC system available billing units from HNMS will be used and alternatively a request for a special project will be submitted.

Task 2: Optimization of the CALMO methodology

2.1: Calibration of COSMO-1 for a full year

Simulation with COSMO-1 for 5 parameters, are finished, more than 50 TB have been generated. Calibration with the MM is on-going

2.2: Find a way to optimize the computational cost of the method

The question of the minimal number of simulations to fit the meta-model, and how this affects the accuracy of the meta-model has been considered.
The best strategy to fit the meta-model is now under review, using in particular the ideas developed by E. Avgoustoglou during the CALMO project.
Additionally:
If there are tuning parameters which are not interacting with each other in order to save runs is it

possible to build 2 separate MM's?

Create an algorithm to select "typical" case studies and apply methodology?

Could one instead of running a full year, run only ~10 case studies (cold starts for 30 hour, including 6 hour for spin up)?

This is the action of the project whose result remain the most uncertain, in the sense that it is not guaranteed that a computationally cheap enough approach will be found.

Task 3: Establishment of a permanent CALMO platform

3.1: HPC framework
This Task is still pending

3.2: Data thinning policy and application
The amount of raw data produced by the calibration method is huge. The data thinning policy needs to be refined.

3.3: Meta-model

The updated version of the MM is available at Github, while the installation of it at B-TU will be investigated.

3.4: Database of unconfined model parameters
Part of the C-MAX workshop was devoted to this task. An exhaustive list of unconfined model parameters and their associated characteristics (default values, unconfined range, model sensitivity) has been prepared during CALMO. CLM community has an on-line namelist tool that could be extended to add internal model parameters, with a new attribute about model sensitivity. Andreas Will, who attended the workshop will support this action

Task 4: Adaptation of the methodology on Extremes
This task is still pending

Task 5: Documentation
A manuscript to contribute to COSMO Newsletter No 19 has been submitted. Part of the work has been presented at an International Conference and a scientific paper focused on preliminary results of on the work performed by CIRA colleagues has been submitted to Advances in meteorology and is currently under revision.

Additional information

Based on the experience gained so far it is recognized that the load of work performed as well as of the one remaining, requires more time and FTE's than initially scheduled. Therefore it might be needed to extend the project for the next year 09.2019-09.2020.