

PT AEVUS2 meeting 28 May 2020

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Agenda:

1. latest simulation results
2. how to structure the paper
3. management of external parameter files (.nc and grib)
4. double-counting effect: how to go on

Update from Edoardo, Mikhail and ARPAP about the results of the simulations to be included in the paper

- Edoardo ([presentation available in a separate file](#)) performed a battery of 8 runs following the indications sent by Valeria (about the mandatory simulations to be performed for the paper). Simulations also include the new external urban parameters sent by Massimo. Results reported are very preliminary, further validations will be performed in the next days. In the first CTRL simulation (with *terra_urb=false*, *turbulence scheme=old*, *itype_canopy=1*) the results are very different from previous analysis. Especially an improvement of minimum temperature is observed for the urban area of Naples (increasing the values), and also in the rural area (but in this case it results in a worsening of performances). This difference is mainly due to the usage of *oldtur=true* parameter.
 - Mikhail observed that it will be better to change the observations adopted for validation and to use data with higher temporal resolutions (for rural areas, currently Edoardo has only daily values). Mikhail sent to Edoardo some data for Italian sites available on Russian website with higher temporal resolution observation to be checked. Edoardo will use these data in the next days.
- Massimo ([presentation in a separate file](#)) reports some problems with the external parameters. Thanks to DWD support now the problem of grid definition has been solved and the new urban parameters are correctly considered in grib1/grib2. Massimo reports that if INT2LM runs including these new external parameters, it works fine only on 1 CPU but with more CPU the INT2LM doesn't read correctly the ext file. In any case even with 1 CPU the laf file is corrupted (both in grib or ncdf) and for this reason COSMO crashes. If the 3 external urban parameters are set to OFF and only 1 CPU is used it continue to crash (netcdf and grib). It seems that using only 1 CPU the LAF files is destroyed by INT2LM due to some interpolation problems. Bug is in the reading procedure of the NETCDF file. Mikhail suggested a patch by interpolating by hand the new fields and then attach them to a "good" laf.
- Mikhail focused his presentation on the results of the new simulations performed ([presentation in a separate file](#)) to be included in the common paper. Boundary and initial conditions come from ICON. Results with 1 km of resolution for COSMO are reported. TERRA_URB is always considered TRUE in the simulations performed; this is due to the Moscow city features that is quite big city; nevertheless, Mikhail is available to run this simulations with TERR_URB switched off for the paper.

In general, comparing the datasets available from Matthias and the original ones, it seems they are consistent (with exception of aspect ratio, but due the lack of a reference

is not possible to understand if this field is wrong or not in relation to the other parameters). Also, some differences are present for heat conductivity and heat capacity. About a second test case (wet and warm summer) in which results report overestimation of daytime temperature and precipitation (warm and dry bias) some improvements are reported by changing rooting depths parameters. Mikhail suggests including in the external parameters more realistic data for root depths.

Some formal verification reports that the best performances come using the Matthias external parameters (congratulations!!!!) (AEVUS5b with LCZ-based data for the urban canopy parameters from Matthias) during the summer test cases. Results need to be confirmed for winter test cases. New tests will be then performed on this.

Urban thermal parameters need to be better calibrated. Further discussion will be done with Matthias and Hendrik on this point.

About the paper submission, Massimo reports that it is necessary that all the partners run simulation with terra_urb switched off as CTRL reference. Valeria highlights that the focus of paper is to show that running simulation with no "urban approximation" provides in different test cases worst results. Based on the evidence reported by the three test cases (showing that the real pattern of UHIs in urban areas can be represented only including urban parameterization), our aim is to show that it is not recommended to avoid the consideration of urban parameterization. This is expected to push the community to work and improve the urban parameterizations, covering the already existing gaps.

The selection of "old way" vertical diffusion (itype_vdif = -1 instead of +1) is based on some personal communications with other COSMO colleagues, but it can be useful to ask Uli and Matthias Rashendorfer about the real difference, from the technical point of view, between the 2 schemes.

Mikhail highlights that perhaps some results obtained running with type_vdif=-1 (such as an additional heating over urban areas) are due to some inconsistencies still occurring in COSMO between urban parameterization and diffusion scheme. Mikhail will contact Matthias to verify if this can be a possible motivation for the bad performances still existing using itype_vdif = 1 and then to understand if this bug can be fixed.

However, these simulations will be not included in the paper. Of course, it is interesting to investigate this point and to run additional simulations, but only after an answer from Matthias R. or Uli, because if bugs are still existing in this parameterization, it has no sense to run simulations with it.

Mikhail asks to summarize the list of the simulations to be included in the paper. Mikhail thinks it is important to make more simulations changing the parameters, J.-P. says that some parameters really depend on the local context and then it is correct that some parameters are different, if different areas (geographical context) are considered. In any case, the focus of this first paper is to highlight the improvement by including the urban scheme and this improvement occurs over all the test cases. Then we will look at the relative improvements by including the new skin temperature scheme and the new turbulence scheme.

It is also important to define rural and urban stations and where the validation is performed.

Valeria gives some update about the work performed over the last months on the urban double counting problem. A script to avoid double counting inconsistencies has been developed that calculates for "urban land point" (URBAN>0 and FR_LAND>0.5) new external parameters based on Globcover land use classes, as ExtPar routines do, but excluding the urban contribution. The Rscript has been sent to Matthias, who pointed out some inconsistencies in the results. Valeria performed a verification to evaluate the script and some bugs have been found and fixed.

The verification process consisted in modifying the Rscript in order to obtain the external parameters as ExtPar do and compare the values. For many parameters the differences are negligible but for some of them (PLCOV_MX, PLCOV_MN, z0, SKC) this difference is not negligible and needs to be investigated. Valeria pointed out that these differences are associated to those pixels where FR_LAND is approximately 0.5. An inconsistency is found in ExtPar, since in these pixel the land use class equal to 21 (fraction lake) is equal to 0.49999 while the external parameter FR_LAKE is equal to 0.49: then for these pixels FR_LAND is 0.51 but seem to be considered water points. Valeria suggests applying the Rscript to pixels characterized by $FR_LAND > 0.51$, instead $FR_LAND > 0.5$, to avoid the inconsistencies. Valeria will send the new script to Matthias.

Another problem is reported for pixel with $FR_URBAN = 1$ and $ISA < 1$, because in this case it is impossible to calculate the new external parameters for the rural tile. Mikhail suggests taking the values from the nearest rural pixels, because from the experience performed over Moscow this can be a good approximation. Valeria will send her feedback on this point in the next days. Concerning the albedo, Mikhail says there is not much difference between rural and urban albedo within the city.

Regarding the selection of the journal for the paper submission, different proposals have been done and Valeria will take the final decision. All agree on deciding as soon as possible in order to have a clear deadline. The idea is to try to fit the deadline of the Atmosphere Special issue on COSMO-CLM (Edoardo is the editor), but if this will be not possible (deadline end of September with possible extension to the end of October), due to some delays, it can be decided to change journal. There are many opportunities, but it is important to have now a clear deadline for the work.

We will also investigate the possibility to ask for COSMO money to pay the submission fee, but as last chance, Edoardo can also use his wild card. Valeria and Massimo are going to prepare an abstract for the special issue as asked by Edoardo in the next few days. The first thing to be done is to prepare an outlook of the paper. ARPAP will send this outlook for a check to all the team. All the team agree on using Word for the drafting except J.-P. and M. M., because they are latex lovers, but they will adapt to the circumstances. It will also important to define a common template for the figures. This will be defined later on.