

Summary about PT AEVUS

Paola Mercogliano (CIRA)

The main aim of this PT is the testing the COSMO model configuration implementing the TERRA_URB scheme. An evaluation and a deep verification of the performances of the code using different case studies will be performed, in order to decide if (and how) to improve the calibration of the namelist parameters, or the parameterisation itself. It is expected to include a stable, efficient and reliable urban scheme in the official COSMO model code, with well-tested and documented impact of the scheme.

Preliminary tests were conducted in 2017 using the climate version of the model cosmo5.00_clm9 including a beta version of TERRA_URB. Results were promising, but some strange behaviors were detected in some cases.

The official beginning of the activities (originally scheduled for September 2017) has been delayed due to unavailability of a stable COSMO version including TERRA-URB. In fact, in January 2018, the COSMO version 5.04g_urb1 has been implemented on the CIRA supercomputer and several bugs have been detected.

In April 2018, a revised version of the PT has been defined, including a SubTask0 aimed to inform DWD about the status and presence of bugs. An array of runs has been performed, modifying the model configuration by varying some keys parameters. More specifically, a strange behavior of COSMO 5.04g was found, since it crashed (with CFL violation and NaN in the output) after a few time steps. In order to avoid such kind of numerical instabilities or even model crashes, an implicit formulation in the computation of the surface energy balance and the skin temperature was introduced (in the skin layer formulation). Successively (investigating the different crashes in the test cases), all traces lead back to the routine that computes the grid box averages of the tile variables. Especially for specific water vapor content (qv_s) the diagnosis gave unrealistic values, either negative or too high (for example larger than 100 kg/kg). The special computations was removed and changed with a usual averaging. Additional bugs were found and fixed when the model was forced by IFS. On the other side, the model ran properly when forced by ICON.

Finally, the debugging of the beta model version including TERRA-URB was successfully achieved. In June 2018, COSMO version 5.05 (including TERRA-URB) has been officially released. The first tests have shown that with the basic setup the model works properly, even if additional bugs have been recently highlighted by Russian colleagues, regarding the “restart” operations, and the usage of the skin layer formulation.

The activities of SubTask1, concerning the selection of case studies, are now ready to start. They will be planned in a detailed way during the COSMO GM 2018.

List of Sub Tasks:

Sub task 0: Debugging of the COSMO version including TERRA-URB

Sub task 1: Selection of case studies

Sub task 2: Simulation set-up and runs.

Sub task 3: Calibration of the TERRA-URB scheme

Sub task 4: Evaluation and verification of the case studies

Sub task 5: Writing of the final report

Gantt chart

		2018						2019							
	Time	04	05		09	10	11	12	01	02	03	04	05	06	
Task				Official release of COSMO5.04g_urb1, leading to the COSMO5.05_urb1											
0															
1															
2															
3															
4															
5															