

Interactive comment on “Overview of the Meso-NH model version 5.4 and its applications” by Christine Lac et al.

Anonymous Referee #1

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General comments :

The paper aims at gathering Meso-NH community model current status and recent developments since the general paper of Lafore et al. (1998) and will constitute an important reference for many users and for the future studies. A large number of developments and studies has been made available over the last 20 years but are summarized as regards the most recent scientific results. The paper presents Meso-NH components starting from the oldest components to the recent additional capabilities, from the core (dynamic), the physics, chemistry, diagnostics, couplings and evaluation. Although the scientific content to be covered is huge, the authors succeeded to make it relatively easy to read and to allow readers finding details on the atmospheric processes of interest but by being aware of the links between the different components

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and available tools.

The paper is well-written and concise. Some clarifications listed below could however help improving the paper.

Due to the large number of schemes and their dependencies, I would suggest that the authors could add a table (or a figure) summarizing the available options (scheme's name + main reference or section) for a process and the links between the schemes (it could replace or augment Table 4, which I think is not meaningful enough).

for example (as I understood the links), microphysics → ICE3 (single-moment) → ICE4 (hail) → CELLS (electricity and lightning)

/ or LIMA (double-moment)

and if there are retroactions (coupling) surface → SURFEX ↔ water ↔ NEMO ↔ sea salt emissions

/ or CROCO

for example, some additional links could be clarified. As stated in Table 4, there is some atmospheric chemistry research regarding electricity. I understand it is one-way coupling but it is not mentioned elsewhere.

Specific comments:

3.4 numerical diffusion | p.9, l.6. precise if it is CEN4TH.

3.6 Initial and boundary conditions | p.11, l.25: ceiling : are there some considerations to use above conditions from the LS grid instead of using an absorbing layer ?

4.1 surface | p.12, l.12: refer to section 7 for the use of the interface. p.13, l.9: you could name it slab instead of big leaf, which is commonly used for this type of model p.13, l.16- l.18: this sentence could be rewritten ...the TEB scheme approximates the real city 3D structure by resuming this landscape in the form of an urban canyon. ... p.13,

l.21: 'due to the larger surface in contact with the atmosphere' : please add: ... and to the city materials with large heat capacities... p.13, l.27: Is ice only considered over inland water ? Are glaciers considered as part of land surface processes with ISBA ? What about sea ice ? p.13, l.29: is it through a simple aerodynamic roughness length parametrization ? p.14, l.1: how was the 300-m urban local climate zones database created ?

4.2 turbulence | Some clarifications needed. Is it the user who specifies T1D or T3D ? Or is it depending on the grid spacing (T3D below grid spacings of 2 km) ? Is it the user who specifies mesoscale or LES ? Or is it depending on the grid spacing (LES automatic below grid spacings of 500 m) ? Are there clear recommendations from Meso-NH community experience or is it still an area of investigation ?

4.3 convection and dry thermals | please clarify. -p16, l. 13: The first statement is confusing it should be clarified. It says that shallow and deep convective clouds parametrization is needed for grid spacings larger than 5 km, but latter in the text it is stated that shallow convection with PMMC09 improves clouds up to 500 m- 1 km. So the authors recommend it for small grid spacings ? -p.16, l. 28 : the name PMMC09 is provided too late in the section. -p.17, l. 4: are those modifications to the grey zone already some options available for the users or is it still under investigation ?

4.7 electricity | p. 21, l. 22 / ICE4 is not mentioned in the microphysics section 4.4. Is it an extension developed only for electricity ? If not, it should be presented in section 4.4.

As this component do not appear in figure 2, it could be a sub-section of the micro-physics section.

5.1 emissions and dry deposition | p. 23, l. 18 / mention that a more detailed presentation of coupling over water is provided in section 7.1

7.5 Chemistry and aerosols | p.37, l.8-9: "The SO₂ concentration modelled for the

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plume is close to the observations". I believe the authors, but it is hard to see it in figure 14, we don't see rings colours for the aircraft location (or is it because the colours are the same than the background?)

10 outlook | p.43, 27: the sentence "in the near future..." would better be in section 9

Technical corrections:

table 4 / Turbulence: weather process studies; and Electricity: weather AND process studies ?

References Barthe et al. 2012A and 2012b are the same

7.2.1 urban studies p/32, l.16: replacing building by developing is preferred for this section

p.42, l.23 and p.43, l.1 : repetition of regarding, please change one of the sentences.

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