



Interactive
Comment

***Interactive comment on* “Simulations of the transport and deposition of ^{137}Cs over Europe after the Chernobyl NPP accident: influence of varying emission-altitude and model horizontal and vertical resolution” by N. Evangeliou et al.**

Anonymous Referee #2

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The authors present the simulations of the transport, wet and dry deposition of the Cs-137 released during the Chernobyl accident. The simulations were carried out with the coupled model LMDzORINCA at the European scale. Several configurations of the model were studied. Results were compared to the REM database and to other studies already published. The paper is interesting and addresses important questions to model the atmospheric dispersion of an accidental release. The reviewer recommends its publication after improvement.

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GENERAL COMMENTS

- To compute the wet deposition, it is essential to have realistic precipitation fields. The quality of the LMDz precipitations and more generally, the differences between the LMDz fields compared to the ERA-40 fields should be discussed. Does the vertical resolution of the simulations impact the precipitation fields (especially the convective precipitation fields) / the scavenging height?

- The uncertainties on the precipitation fields should be one of the reasons discussed in chapters 5.3 and 5.4 to explain the discrepancies between the observed and modeled deposition.

- The authors have to precise which parameterization they use for the horizontal and vertical diffusion processes. Do the vertical and horizontal resolutions impact the Cs-137 dilution? Does the choice of the parameterization for the diffusion may explain the differences between the simulations done with the different resolution?

- Chapter 4: Why the wet deposition is parameterized assuming the Cs-137 behaves as a soluble gas and not as a particle? The particule size should influence the wet deposition.

- Chapter 5: The text should be improved:

- o Information is repeated.

- o The impact of the release height is too highlighted compared to the impact of the horizontal and vertical resolution. It is true that the influence of the release height is very important but the test of only 2 release heights so different is a bit extreme.

- o You should give the fac2, fac5... scores to be able to better compare your results with those of Brandt et al., Quelo et al., 2007. . .

- o The statistical analysis should be improved.

INDIVIDUAL COMMENTS

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- The organization of the introduction should be improved in order to highlight the objectives of the study
- P7683 the sentence L9 “the absence of reliable. . .” should be clarified.
- P7685: “the already known patterns of the releases” is too strong as explain later the releases are highly uncertain.
- P7685 the last sentence is not useful.
- P7684 last paragraph: many studies have been performed in order to validate long range dispersion models with the Chernobyl accident: the Brand’s PhD work, the Quelo et al. 2007 (Atm. Env.) paper.
- Chapter 2: you need to indicate the met data you use to nudge LMDz and the temporal resolution.
- P7687 L10: the references should be ordered according to the year of the paper. - Chapter 4: which aerosol distribution do you use?
- P7691 first paragraph: you should compare your deposition velocities to the deposition velocities given in the Sportisse paper which are usually used to model the deposition of radioactive materials.
- Chapter5: you use fallout to refer to the plume. Fallout is ambiguous since it is often used for the deposition. You should use “the plume” instead.
- Chapter5.1: you should better highlight the similarity and the discrepancies between the different simulations.
- P7691 the sentence L9-10 is too reductive and unnecessary.
- P7693 L25: “the cyclone observed . . .”: was the cyclone really observed? Why it is not discussed before with the other simulations. Was it simulated?
- P7695 first paragraph: the description of the 3-D illustration is not clear enough. I do

not see the benefit. You should improve the analysis of the figure and try to give some possible explanations for the differences.

- Chapter 5.2: You should improve the statistical analysis and your conclusions.
- P7698 Add X, Y meaning.
- Chapter 5.3 P7700 L9-12 “It is unexpected. . .” You should remove this sentence or explain more precisely why you say that. What is usually done for crisis management?
- P7703 First paragraph: Do the other models have the same bias with the measurements? I have the feeling that the parameterization of the deposition and especially errors in the precipitation fields may explain those biases?
- Conclusions P7705: “e.g. using inverse modeling” you should add some references.
- P7705 “knowing the exact core. . .” I do not see why you add this point. It would be better to discuss what could be done to improve the scores of the model-to-data comparisons.
- Table1: you should give the layer thickness.
- Fig.7: You should plot the Brandt et al. Figure to help for the comparison. You should add a vertical scale

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 7681, 2013.

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