

# ***Interactive comment on “Development of turbulent scheme in the FLEXPART-AROME v1.2.1 Lagrangian particle dispersion model” by Bert Verreyken et al.***

## **Anonymous Referee #1**

Received and published: 8 May 2019

This manuscript presents a new development of the FLEXPART model to use the mesoscale AROME model. The main interest is the detailed attention paid to turbulent mixing and the development of schemes to correct problems that many users may not even be aware of. The work is thorough and useful, I am happy to recommend publication.

The main comment I would have concerns the treatment of mixing in convective clouds. Most of the paper appears to be written without this in mind, but some sections seem to suggest it is a dominant factor. Maybe this can be clarified in the text with an expanded discussion and some comparisons. Given the importance of clouds, should model

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comparisons not be shown with and without clouds?

Minor comments:

The captions of Figures 4 and 5 could be expanded. The explanation of the figures in the text could also be expanded for clarity.

I was not sure what the purpose of giving the input codes in Table 1 is. Maybe some useful information can be given to help the reader keep in mind the difference between the schemes?

Page 7, Line 5: The explanation of bottom-up and top-down could be made clearer. I even wonder about the terminology – maybe a better name could be found for these, and for the turbulence scheme. Section 3.3: As for the comment regarding bottom-up/top-down, the turbulence schemes could be better explained.

Writing comments:

The paper needs a more thorough round of proofreading, eg.:

“Provisional” not “provisionary”

“LPDM” not “LDPM” (1 instance).

Page 3, Line 6: The phrasing is odd: WRF-Flexpart did not exist at the time of the Thompson publications.

Page 3, Line 9: sentence fragment.

Capitalizations: “TKE” not “tke”. Please be consistent when referring to figures, either: “Figure 3” or “Fig. 3”, preferably capitalized.

“interpretations”

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-89>, 2019.