

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-434

Qiang Dai (Referee)

Referee comment on "3D trajectories and velocities of rainfall drops in a multifractal turbulent wind field" by Auguste Gires et al., Atmos. Meas. Tech. Discuss.,
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The manuscript by Gires et al., developed an approach to simulate the 3D trajectory of raindrops by considering the fluctuation of small-scale wind in both space and time and drift patterns of non-spherical raindrops. This study overcomes the limitations of traditional coarse wind data and effectively corrects the rainfall observation under wind drift effect. The objectives of the study clearly explained in the introduction section, as well as the contribution of work. However, some figures in the article lack elaboration, the text also has obvious formatting problems. My detailed comments are provided below:

Despite some minor issues raised below, I think the paper would be a useful addition to the literature and recommend publication after the authors address the comments/questions below.

It's not clear what is the difference between \dot{v}_{rel} and v_{rel} ? I cannot find any explanation about v_{rel} (v without underscore) in your manuscript. However, both appear frequently in subsequent equations (e.g. line 76, line 80, line135).

As for wind field generation part, there are still a few confusions. In line 222, what is the standard for distinguishing high and low wind speed? Is it the average speed of the three directions or something else? In line 232, what is the resolution of the 729 x 729 x 64 grid? Besides, what does 64 refer to? Time or altitude?

The manuscript lack of the description of study area and the 3D sonic anemometer instrument. Despite the author's citation of the data, I would still like to know how the instrument works and how the wind speed data is organized. Please improve this section by adding more detailed information.

Besides, I cannot find any description of Fig. 6 in the manuscript

Below are specific comments and suggestions:

Line 25: "km" in the brackets may be italicized.

Line 36-37: "for example" appears consecutively.

Line 73/79/87/104...: Please remove spaces before colon characters.

Line 96: Please add a period at the end of the sentence.

Figure 1c: What is the difference between abscissa and ordinate? Which is the retrieved one?

Figure 1d: Please add y-label.

Figure 1f: Please change "(e) Terminal fall velocity vs. equivolumic diameter" to "(f) Terminal fall velocity vs. equivolumic diameter".

Line 107: Does "SA" refer to surface area?

Line 119: I wonder if the drag coefficient is C_d , C_D or c_D (in Eq. 4, Fig. 1e and line 76)?

Line 140: "â□□" may be "â□□t".

Figure 2: Is D different from D_{eq} ? Please clarify.

Line 198: Do you refer to 0.1 mm?

Line 200: "For the 2 mm drop, the scaling is slightly degraded but remains good ($r^2 = 0.95$ for $q = 1.5$). $\alpha = 1.69$, $C_1 = 0.14$ and $H = 0.79$ is found." I prefer to combine the two sentences into one.

Figure 4: Please check the numbering order.

Line 221/225: Please check format of the citations.

Line 242: Do you mean "at any point (x,y,z,t) , a bi- or tri-linear interpolation..."¹/₄□

Line 258: Please list the specific parameter information of these 10 wind samples.

Line 275: Is the wind shift field here one of the 10 types of wind samples used in section 4.3? If yes, it is recommended to describe and highlight in Fig. 8 (e.g. in dot line); same recommend in Fig. 11.

Line 281: Please add units to the Δy numbers

Line 289: Please unify the number format, such as "1 500" or "1500"?

Line 295: "The increase ranges from 0.1 for 0.1 mm size drop to 0.8 for drops of size 1-1.5 mm." change to "The increase ranges from 0.1 for 0.1 mm size drops to 0.8 for 1-1.5 mm size drops."