

Author's response to Editor's comments to the authors from 11 Oct 2021

ACPD article title: Mass of different snow crystal shapes derived from fall speed measurements

Author(s): Sandra Vázquez-Martín et al.

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Dear Tim Garrett,

Thank you for your valuable comment. We agree that the added text in the Abstract was too laborious risking to hide its important message. You have kindly proposed a new text:

For certain crystal habits, in particular columnar shapes, the Reynolds number and fall speed are more closely related to the diameter of the basal facet than the maximum dimension. Further improvements are obtained from using a modified Best number, that is a function of an area ratio.

We have changed the text considering your proposed new text and adding some more information trying to still stay concise. We have also included, as you suggested, a comment stating that the area ratio in this study considers a vertical viewing direction.

Changed text in the Abstract:

“The resulting mass–size relationships indicate that for certain shapes, in particular columns and related shapes, maximum dimension is not suitable to describe the size of snow particles when determining the Reynolds number. Consequently, mass derived from fall speed for these shapes is not reliable. A closure study done on a selection of simple columns, for which mass is determined geometrically, shows that for this shape a characteristic length, similar to the diameter of the basal facet, is superior to the maximum dimension, which is similar to the column length, as size parameter. Using a modified Best number, the Best number reduced as a function of area ratio, resulted in even better agreement in the closure study, confirming that the modified Best number approach adopted in this study represents an improvement for columns.”

REPLACED WITH:

“For certain crystal habits, in particular columnar shapes, the maximum dimension is unsuitable for determining Reynolds number. Using a selection of columns, for which the simple geometry allows the verification of an empirical Best number to Reynolds number relationship, we show that Reynolds number and fall speed are more closely related to the diameter of the basal facet than the maximum dimension. The agreement with the empirical relationship is further improved using a modified Best number, a function of an area ratio based on the falling particle seen in the vertical direction.”

Kind regards,

The authors