

## ***Interactive comment on “Wind speed deviations in complex terrain” by Christian Ingenhorst et al.***

### **Anonymous Referee #2**

Received and published: 21 July 2020

Synopsis: - Authors have proposed and investigated a new method for rapidly characterizing the three dimensional wind field above regions of complex terrain involving the use of an unmanned aerial vehicle, taking measurements of wind speed and wind direction and validating against stationary anemometer data. Initial results are promising, but as suggested by the authors, further work is required to develop a more robust method of compensating the UAV measurements against the stationary reference.

General comments: - While results of the field studies are reasonably well presented, further work is required to interpret the results in the context of the state of the art, including comparisons to other research efforts. More emphasis should be placed on describing how this work contributes to overcoming existing knowledge gaps. Recommendation is for reconsideration after significant revision - Spelling and grammar should be reviewed - some suggestions are provided below but manuscript would benefit from thorough proof-reading.

C1

Specific comments: - You indicate that limitations of the current measurement strategy are too significant to be considered valid (Line 258). It would be useful to describe what criteria are being used to evaluate the validity of the measurement strategy, and to provide additional details on what advancements are believed to be necessary to overcome this issue - Further to the above comment, you mention in Line 32 the notion of bankable site assessments for regions of complex terrain - can you comment on the extent to which UAV-based measurements need to be further developed to meet this benchmark? Is this a desired research outcome? Where do IEC standards fit in with respect to UAV measurements? - Line 201: If possible, it would be useful to indicate the elevation gain from the base of the hill to the peak, as this would give additional context in relation to the measurement plane height of 100m above ground level. It would also be valuable to supply the geographic co-ordinates of the test sites, and the source for the 3D terrain model if applicable - Title of the manuscript could be improved to be more reflective of content, e.g. "Detecting wind speed deviations in complex terrain through airborne measurement" or similar - It would be useful to compare the UAV measurements against CFD and LIDAR studies of the same site; this could possibly be suggested as an area of further work

Figures and tables: - Groups of similar figures (e.g. figs 6-9, 11-14, 15-18) could be combined using indicators a) to d) with a single caption - Figure 19 - would be beneficial to indicate location of stationary ultrasonic anemometer

Typos and spelling/grammar: - Line 31: Suggest replacing "aside of" with "in addition to" if this is the intended meaning - Line 46: The phrase "in opposite" is used here and in several other places in the text. Suggest replacing with "as opposed to" or "contrary to" - Line 52: Suggest replacing "challenges have to be met" with "criteria have to be met" or "challenges have to be overcome" - Lines 54-55: Suggest replacing "but at the same time working medium and disturbance..." with "but is also the working medium and is disturbed by the flying carrier system" - Line 84: Should be "than" not "then" - Line 95: Should be "its" not "it's" - Line 96: Suggest "at a rate" rather than "with a rate"

C2

- Line 105: Suggest "under zero-wind conditions" rather than "at zero-wind conditions"  
- Line 126: May want to use "orthogonal" or "perpendicular" instead of "rectangular" for improve clarity - Line 168: Should be "corresponding" - Line 169: Period missing after "speed". - Line 210: Suggest avoiding the use of future tense e.g. "going to be investigated" and "plane to be surveyed" and maintain consistency throughout the paper - Line 223: Suggest replacing "Aside of" with "Besides" - Line 231: Suggest replacing "making it" with "yielding" - Line 260: Suggest adding "produce" e.g. "...on the other hand to produce a spatial distribution." - Line 282: The word "to" should be removed: "This could make the WindLocator a potential alternative..."

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Interactive comment on Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2020-25>, 2020.