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Hydrology and Earth System Sciences Discussions

Interactive comment on "Aerodynamic roughness length estimation from very high-resolution imaging LIDAR observations over the Heihe basin in China" *by* J. Colin et al.

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Dear Referee, Please find below the answers to each of your comments and questions.

[Referee] Comments on "Aerodynamic roughness length estimation from very high-resolution imaging LIDAR observations over the Heihe basin in China" by J. Colin, R. Faivre, and M. Menenti, Hydrol. Earth Syst. Sci. Discuss., 7, 3397–3421, 2010 General comments Estimation of aerodynamic roughness length is an important aspect in the parameterization of land-atmosphere turbulent flux exchanges. The manuscript reports an attempt in this active research area and is of considerable interest to the

HESS readership. In general, the manuscript could be understood, however, every now and then, much guess work is needed. The authors show some results of the data processing but more detailed analysis and discussions are needed.

[J.COLIN] Dear Referee, I have to say that the results presented here would mainly require a comparison with ground measurements to allow for a very detailed analysis and discussion. This wasn't possible at the time of the writing of this manuscript. In the meantime we had the opportunity to improve our contact with the local Chinese team in charge of ground measurements, and we now plan to conduct a detailed validation of our approach. The combined use of eddy correlation and large aperture scintillometer systems in a footprint analysis is in progress, and will lead to adequate numerical comparisons of roughness length estimated from measurements and from the CFD approach. The amount of work needed, as well as constraints related to such a distant collaboration, will not allow us to include these results in this paper. This new study will be published separately and should adequately complement this first paper.

[R] Specific comments: 1. Paragraphs 4.1 and 4.2: Much more technical details need to be added here to enable a proper appreciation of the data processing. In particular, all the quantities in eqs. 1-9 must be explained and some table be added.

[JC] Every terms of every equation are defined in the text, and appropriate references were added if the reader wishes to access further details on the approaches published by Raupach et al. and MacDonald et al.

[R] 2. Table 1 is given but further there is no reference to the values listed there. What is the role of the PBL heights in the CFD method?

[JC] We have merged useful information of table 1 and 2 in a single table. The height of the top of the boundary layer is mainly useful in the CFD model in situations of non-neutral atmospheric stability. In such cases, the upper vertical boundary may be considered as an impervious slip wall for better results, according to the authors of the CFD model. In our case studies, as we always have neutral stability situations, this

parameters is not significant, but must still be provided.

[R] 3. Tables 2 and 3 could be merged into one table by adding the wind direction of Tab. 2 to Tab. 3.

[JC] The table 2 is presenting measurement used as initial conditions for the CFD, while the table 3 provides numerical comparisons between measurements and model outputs. We find confusing for the reader to merge these two tables.

[R] 4. There are too many typos and proper and coherent use of sentences. Some obvious ones are recorded below: - P3400: 'It as long been' -> 'It has long been' - P3401: 'Recommended values of 0.193, 0.003, 0.3 and 7.5 a, respectively used, as for ..' should refer specifically to the variables explicitly mentioned. - P3402: 'Therefore the Lettau's formulation of z0m is known to fail for plan area index higher than 0.2–0.25, because of mutual effects of high frontal area index and limited intervening spaces.' Is this a finding of the authors' work or cited from others. In the former, the reasons should be given, while the references are needed for the latter. - P3402L17: 'is expresses as:' -> 'is expressed as:' - P3408L6: 'signification variations' -> (maybe) 'significant variations' - P3408L9: 'and a related to the larger values' -> 'and related to the larger values' - P3409: 'to some extend on some corn fields' -> 'to some extent on some corn fields' - P3409L24: 'that in cases were roughness elements can reach such a height,' -> 'that in cases where roughness elements can reach such a height,' - P3410: 'either on vegetate or' -> 'either on vegetated or' - P3411L7: 'and do no account' -> 'and do not account' - P3411L17: 'both approaches is' -> 'both approaches are' - P3411L27: 'for is precious help' -> 'for his precious help' - P3417: 'the Popular Republic China;' -> 'the People's Republic of China;' 5. The manuscript needs a through English editing before it can be accepted after the technical revision.

[JC] I would like to apologize for the poor english of the paper. We carefully worked on the text again, and hope this new version will give satisfaction.

We wish to thank you for your interest in our paper and your detailed comments.

With our best regards,

J.Colin, R.Faivre and M.Menenti

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 3397, 2010.