Interactive comment on "Evaluation of the Lattice Boltzmann Method for wind modelling in complex terrain" *by* Alain Schubiger et al.

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Thank you very much for the comments

- "quite different cell numbers. . .":

Exactly, the Fluent mesh was created with the Fluent meshing tool and therefore there were more possibilities to implement local adjustments. It has been added to the paper.

- "Why not use mesh coarsening with Palabos":

Studies that apply the grid refinement capabilities of Palabos were not within the scope of this first study; however, this is will be tested in the future. It has been added to the set-up description.

- "From my point of view.......":

As previous studies have shown that Palabos works well for turbulent flows (Wissocq, Gauthier, et al. "Regularized characteristic boundary conditions for the Lattice-Boltzmann methods at high Reynolds number flows." Journal of Computational Physics 331 (2017): 1-18.), the aim of this study was to specifically test the applicability to wind energy. Bolund Hill was chosen for this due to the quality of available measurement data. It is correct to say that a simpler geometry may have been easier to start with, and we are considering further comparison cases.

- "....turbulence intensity profiles....":

A comparison of the turbulence has been added to the new version of the paper

- "Isn't it possible to account for terrain roughness":

Unfortunately it is not easily possible to account for different surface roughnesses in Palabos at this point. This mentioned on line 11 on page 6. This is a topic that we are planning to investigate in the future.

- "Is the use of a logarithmic profile sufficient?":

We were following the guidelines of the Bolund Hill Blind Test and used the provided logarithmic velocity profile, which were fitted to the measurements.

- "...collision model... The choice of Tau ":

The BGK model was chosen for simplicity in this first study. Tau respectively Nu were chosen so we could achieve a stable solution and eq. 6 is respected. This has been described in the new version of the paper

- "A small discussion on the non-dimensioning procedure...":

A reference has been added to the new version. Latt, Jonas. "Choice of units in lattice Boltzmann simulations." Freely available online at http://lbmethod.org/_media/howtos:

lbunits.pdf (2008).

- "Can the Palabos simulation setup be shared with the community":

The code is available on the git repository. The link has been added to the new version of the paper.

- "Page 1 Line 13: LBM is said to have a particular ability...":

It is true. With regard to mesh and geometry generation, the difference to cartesian-grid NS solver with immersed boundaries is not that great, as compared to wall-adapted NS solvers. However, the main advantages LBM like intrinsic massive parallelism or offering simplicity in development are present

- "Page 5, Line 12: Smagorinsky model":

The Smagorinksy constant was set to 0.14. This has been added to the new version of the paper

- "Page 6, Line 22: Is the same methology used in the NS solver?":

The Fluent setup uses the Synthetic Turbulence Generator scheme. For the LBM simulation we implemented a rudimentary transient inflow condition. The Fluent implementation is much more sophisticated. This is described on page 6 and 7 of the paper".

- "Page 7, Line 20: average results of the DES simulation should also be shown.":

This has been added to the new version of the paper

- "Page 13, Line 9: I think this conclusion should be argued, and, from my point of view, is not receivable.":

Parts of the conclusion have been adjusted and the difference in the simulation approaches have been made clearer. For example the summary: It can be summarised that LBM may be applicable to modelling wind flow over complex terrain accurately at relatively low costs if the challenges raised in this work are addressed. Further studies

on other sites are ongoing.

- "Page 13, Line 13: "Perhaps a comment on the mesh size reduction. . .":

An estimation on the mesh size reduction has been added.

- "would it be possible to have similar meshes between LBM and NS even using mesh refinment, and, have LBM solvers the same mesh size requierements than NS solvers?":

More or less this is possible and is part of a running follow-up project.

Figure text size and following comments: changed

Page 1 Line 15 : doubled dots

Page 2 Line 22 : a extremely fine –> an extremely fine

Page 4 Eq. 5 : "with" in italic and attached to "f_i"

Page 6 Line 40 : "to an total" –> "to a total"

Page 9 Line 12: a reference to the figure should be added

Page 11 Line 5: space between "et al." and parenthesis.

Page 11 Line 6: "summarise" –> "summarize"

Page 13 Line 2: "is far" –> "it is far" or "LES is far", or replace "; however" with something else to improve readability

Page 13 Line 8: "of cliff" –> "of the cliff"