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Interactive comment on "Aerodynamic characterization of a soft kite by in situ flow measurement" *by* Johannes Oehler and Roland Schmehl

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There are additional reasons why we did not use phase averaging in this study. In general, harvesting wind energy with tethered flying devices has more degrees of freedom than harvesting with towered wind turbines. That is, because the tether provides only a maximum distance constraint in the radial direction, between ground station and wing. During a pumping cycle, the wing is actively steered and powered/depowered while the ground station actively controls the reeling speed of the tether. Because of its short response time, the ground station is generally used to control the maximum tether force, which is of particular importance when flying fast, with a relatively lightweight wing

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Discussion paper

trough a fluctuating wind environment.

On the other hand, the ability to adjust the harvesting altitude and flight maneuvers to the instantaneous wind resource is also one of the major advantages of airborne wind energy. Because of the strong dependency of the flight operation on the variable wind environment, the flight trajectories generally vary significantly. This was the case for the dataset that we acquired for the present study. The flight trajectories of the different pumping cycles differed to a degree that it was challenging to consistently determine a phase location. For a wind turbine, with rotor blades that are mechanically linked and comparatively large rotational inertia, this is much more straightforward. For this reason, we decided to present the data in the way that it is now implemented in the manuscript. At this stage of development of the measurement setup, a rigorous phase averaging would have introduced more uncertainties, in our opinion. What we did instead is to distinguish between the reel-in and reel-out phases, subdividing the crosswind maneuvers further into flying up (against gravity) and flying down down (with gravity). In our view this can already be regarded as a first step in the direction of phase averaging, but customized based on the specific physics of tethered flight in pumping cycles.

For practical reasons, our dataset covered only 5 separate pumping cycles, which was by far not sufficient to perform any meaningful statistical analysis. This was another reason for us to avoid a more thorough statistical analysis.

We will incorporate the above reasoning in the revised manuscript.

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