Further development and optimization of Airborne Wind Energy Systems requires of advance characterization and monitorization of tethered aircrafts flight dynamics. However, this can result challenging specially for flexible soft kites, as they are highly susceptible to changes in wind speed and direction. The paper presents a sensor fusion technique which is an evolution of previous works based on EKFs, effectively estimating wind velocity at flying altitude using the kite as a sensor. Albeit there is no significant novelty in the theory of the methods used, the application of the EKF and the collected experimental data, in particular, the implementation of a model that accounts for both tether sag and kite control unit inertia and aerodynamics, should be interesting for the community.

Overall, the article is well written, figures are high quality and the mathematical formulations and the technical information are presented accordingly. However, I have one major concern for the publication of this paper. For me is very difficult to follow the reasoning about the EKF implementation/design, specially the sensors used and the observation model of both the V3 and V9 kites flight tests. For example:

> *175-"Overall, the sensors that are least susceptible to the intrinsic deformations of the soft kite and the high accelerations of the system, and thus more reliable, are the GPS, the load cell (for tether force), and the mechanism measuring the tether length and tether angles. These sensors can maintain their accuracy despite the flexible nature of the kite. Consequently, the proposed sensor fusion model primarily relies on these measurements, resulting in a* ***minimal sensor setup consisting of a GPS (for position and velocity), a load cell, and a tether length measurement****".*
>
> *311-"***The required minimum measurements are the position and velocity of the kite wing***"*
>
> *393-* "*In this section, we explore various sensor setups and model configurations. The different EKF models are detailed in Table 2. The additional measurements listed in the table are used alongside the* ***minimum required sensors for a system with a KCU, which include the position, velocity, acceleration of the kite wing, tether force, and reel-out speed.****"*

In my opinion, the paper should be optimized for increased clarity and conciseness. The authors should make an effort to facilitate the reader the matching between caps 4 and 5.

I also have some minor comments:

- Line 115-120, further discussion about direct measurement of in-situ aerodynamic angles of attack and sideslip is welcomed (Oehler and Schmehl, 2019). Using booms for isolating aerodynamic sensors from aircraft's perturbations is a well-known practice in the aerospace industry during development phases.
- Line 143 → Fig2. could be improved by showing a detailed view/scheme of the implementation of the load cell sensing the tension of the tether without interfering with the reel in-out system.
- Further detail about how airborne data is logged/transmitted to the ground and synchronized with in the ground measured data is also welcomed.

- Line 396, 405-410 → In my opinion, the output of the Px4 position and velocity estimations should not be used as measurements for the EKF as errors are not guaranteed to be zero mean and gaussian. Instead, raw GPS position and velocity from PixHawk Gps should be used, plus a measurement error model to guarantee that the measurement noise described in eq.24a and 24b is Gaussian white noise. (R.Borobia et al. 2018). This change will eliminate the dynamics of the PixHawk onboard estimator increasing the stability of the filter.
- Line 411 → In Fig9. The measured Euler angles are the estimated ones by Px4?
- Line 419 → Calculation of Yaw angle assuming alignment of the kite body axis with aerodynamic velocity vector assumes no side-slip during the flight. However, direct measurement of side-slip angle showed non zero values for a inflatable kite (R.Borobia et al. 2021)
- 520 -530 → The underpredicted side-force could be related to assuming zero-side slip angle?