

# ***Interactive comment on “Interactions between nocturnal turbulent flux, storage and advection at an ‘ideal’ eucalypt woodland site” by Ian D. McHugh et al.***

**Anonymous Referee #2**

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In the last years there is an increasing awareness on the need of a more complete, accurate and standardized measurement setup to provide more reliable eddy covariance based flux estimates of matter and energy. This study is timely in this perspective, and provides relevant technical and scientific advancements. It promotes the use of direct, profile-based measurements of the storage, which is a relevant but generally neglected term in the net ecosystem exchange computation.

The paper is well written, but there are still some inaccuracies in the use of terms (e.g., carbon at the place of CO<sub>2</sub>) and possibly a couple of too speculative argumentations. Some of the last graphs and a few paragraphs can be removed for sake of conciseness. I strongly recommend this paper for publication having considered the following specific

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indications.

Page (P) 3, Line (L) 16: ‘when the nocturnal  $u^*$  correction is applied’. There are some groups that apply the  $u^*$  correction at night only (a minority, to my knowledge), some others to the whole day. I recommend, for completeness of the information, to provide the carbon balance estimates with the use of the (uncommon) use of the night  $u^*$  correction, as it was already done, and with the 24 hours  $u^*$  correction.

P5 L19: ‘...change in carbon exchange...’  $\text{CO}_2$  is the main form with which carbon is exchanged from the ecosystem to the atmosphere, but it is not the only one; methane and VOCs are exchanged too. So please avoid this synecdoche here and elsewhere, including in some of the graphs (like Figure 13).

P6 L23: ‘...micrometeorological convention suggested by Chapin...’, I believe that the micrometeorological convention was established well before than the paper from Chapin.

P10 L4: ‘...much higher random error in storage...’. To avoid this large random error, in the current ICOS protocol on storage flux measurements it is recommended to add air receivers along the lines if sequential sampling is performed, and to add some ramifications at the lower levels of air intakes to sample a wider portion of the control volume. The same argument of uncertainties originated by profile measurements is repeated in the conclusion, with possibly a technical mistake there: It is not the profile-based storage measurement that induces large uncertainty, but probably the used set-up and maybe the applied computational procedure.

P10 L27: ‘Given...canopy’. A verb (are?) is missing in this sentence.

PP 11-14: the section 3.3 is very long and increasingly speculative; I lost progressively my interest and I have doubts about the argumentations. I recommend stopping at page 13, line 24, after ‘...in this study’.

Caption of Figure 4: ‘...LH axis) profile system...’ I cannot understand.

Figure 11: consider removing.

Figure 12: I cannot understand what the authors mean with ‘...are here baselined to the height integrated profile...’. In any case, also this figure is not essential, consider removing.

Figure 13. Also this figure is not essential and unnecessarily complicated in my view, consider removing.

Table 1: ‘*Cassinia arculeata*’->‘*Cassinia aculeata*’.

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