

REVIEW REPORT

Manuscript: Faurès et al. (2026): Spectral versus co-spectral correction of eddy-covariance fluxes: a multi-site assessment across the ICOS network

Summary

This manuscript reports a novel comparison of multiple micrometeorological sites classified as Class 1 and 2 within the Integrated Carbon Observation System (ICOS). The study focuses on assessing the correction of high-frequency attenuation for CO₂ and H₂O flux data, and their effects under different atmospheric conditions, using two well-known approaches (one analytical and one theoretical). Based on this analysis, the authors reach the important conclusion that the correction factors for CO₂ are significantly lower compared to H₂O under humid and very stable conditions, particularly for low-height sites experiencing strong attenuation.

The manuscript is relatively well written, but I believe the analysis could benefit from a stronger discussion of the mechanisms behind high-frequency attenuation corrections. Additionally, the deployment of the open-source tool is a highly valuable contribution that can be tested by the micrometeorological community and potentially implemented in future versions of eddy covariance processing software like EddyPro. Overall, this work is a great contribution to *Atmospheric Measurement Techniques* and the micrometeorology community.

I recommend minor revisions and request that the authors address my questions and specific points below.

General Comments

- To complement Section 2.1, I recommend including a summary table (perhaps in the supplementary materials) detailing the specific sites used in the study. Even though the sites are listed in Figure 1, providing their respective EC heights, sampling rates, ecosystem types and characteristics, and location countries would be highly beneficial for context.
- While the paper focuses on enclosed-path gas analyzers as they are the standard in ICOS, do you intend to analyze other types of IRGAs (e.g., open-path or closed-path)? Since the type of gas analyzer directly impacts the necessary high-frequency attenuation corrections, and given that the enclosed-path setup is specifically designed to combine the benefits of open- and closed-path systems, discussing this would strengthen the text. I suggest mentioning the pros and cons of applying co-spectral corrections to these other types of IRGAs in the paragraph starting on Line 41.

Specific Comments and Technical Corrections

- **Line 45:** The word "Observation" is misspelled as "Obervation" within the network name.
- **Line 55:** There is a missing closing parenthesis.
- **Line 121:** The notation could be clarified here. Since this is the first formal introduction of the stability parameter, I suggest using a distinct symbol (e.g., $\zeta = z/L$) rather than z/L , or explicitly stating that this notation will be used for this parameter throughout the manuscript. Please explicitly define the parameter as a dimensionless quantity, use unambiguous notation for it, and make sure the same notation is used everywhere.
- **Line 127:** A reference is missing and appears as a "?".
- **Line 144:** As "*cof*" is used repeatedly, I recommend using "cut-off frequency (*cof*)" rather than "cut-off frequency – *cof* –" for clarity. The same applies to the abbreviation "CF".
- **Line 211:** A period is missing between "exchange" and "This".
- **Line 221:** Please ensure consistent formatting of CO₂ throughout the manuscript (e.g., it alternates between italics and standard text in Lines 206, 221, and 233).
- **Line 368:** I suggest replacing "data with WSs of 2 to 3 m s⁻¹" with "data with wind speeds (WSs) between 2 and 3 m s⁻¹".
- **Line 468:** Replace "compare" with "compared".
- **Lines 491–492:** I suggest replacing "lower CFs, again due to the shift of the shift of the reference co-spectrum towards higher frequencies" with "lower CFs, which is again attributed to the shift of the reference co-spectrum towards higher frequencies."
- **Line 627:** Please add the term "kinematic" when referring to the fluxes and use overbars and primes to distinguish averages and fluctuations, respectively. For example, the fluxes should be written as $\overline{w'T}$, $\overline{w'c}$, and $\overline{w'h}$, as appropriate.
- **Figures 5 and 6:** Please increase the font size of the labels and axes to improve readability.
- **Figures B1–B4:** Please increase the font size of the WS class labels to improve readability.