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Atmospheric Measurement Techniques Discussions
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Interactive comment on "An innovative eddy-covariance system with vortex intake for measuring carbon dioxide and water fluxes of ecosystems" *by* Jingyong Ma et al.

Anonymous Referee #3

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Review of Manuscript "An innovative eddy-covariance system with vortex intake for 1 measuring carbon dioxide and water fluxes of ecosystems" by Ma et al., for AMT

This manuscript presents a new type of intake system for closed-path eddy covariance systems. The new, vortex-based system filters the incoming stream of air and significantly reduces the maintenance burden of filter exchange relative to traditional systems. The need for such a system is evident from the paper's site choice – polluted airs of the Beijing Metropolis. The manuscript is convincing and clear and relevant to the readership of Atmospheric Measurement Techniques.

The vortex inlet system is clearly described and has nice figures presenting its operation. When compared to a traditional in-line filter, both systems have co-spectra which

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Discussion paper

line up nearly perfectly with the temperature flux signal, so there is no apparent loss in data quality from the new system. I suggest the manuscript for acceptance following a few improvements, described below.

Major comments:

1. Please present the CO2 flux – both its calculation method and its values – in Figs 5-6 so we can see what range of flux conditions this method has been tested. This calculation / presentation is important to give context for Fig 4 as well and should present the separation distance from the sonic anemometer in each set-up from the closed-path inlet. The type of logger used and method of logging (e.g., voltage signals, SDM) should also be presented as this may affect high frequency attenuation.

2. Is the pattern shown in Fig 4 consistent for other months of the test periods? Particularly since the manuscript shows how variable the air quality conditions are (Fig 1, 5, 6), it will be useful to have cospectra presented from different months and periods of time. A maximum signal attenuation should then be presented.

Minor comments:

Line 93: consider adding references to other landscapes that may benefit from such a system – e.g., measurements during or near fire/burn events (forests, croplands, or prairies), measurements at remote sites with infrequent access where filter changing should be minimized, etc.

Line 207 – quantify how well this system performs, rather than the “Very well” given here.

Figs 5-6 – is it possible or relevant to add a timeline of the haze index presented in Fig 1 to these graphs? Could we then relate the haziness to the filter replacement time? And/or we could normalize the performance under similar conditions? Rather than a time series a specific quantified range could replace “periods of very hazy conditions” and “periods of low haze” in the figure caption.

Technical/editing suggestions:

Line 125: convert from “study site is” to “study sites are”

Line 137: consider whether “restoration” is a better word than “recovering”

Line 212 etc – I would tend to use a subscript for the “s” in “Ts”

Line 220 change the position of the apostrophe from the plural “s”’ to the singular “’s” to follow “each”

Line 246 – probably “in” or “with” are better choices than “when the” for the size of frequencies

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