

Interactive
Comment

Interactive comment on “Regionalization of turbulent fluxes by combining aircraft measurements with footprint analysis” by T. El-Madany et al.

Anonymous Referee #1

Received and published: 12 August 2009

El Madany et al. present aircraft measurements of turbulent quantities. The observations are interesting but the paper seems to have been compiled in a rush and the presentation suffers from several weaknesses which need to be addressed. The analysis is too limited to warrant publication at this time.

The authors emphasize the importance of footprint analysis, yet the presented discussion is mostly limited to footprint models used for the surface layer. Some of the presented airborne observations were also conducted in the mixed layer. Specific footprint models that have been developed for mixed layer applications need to be addressed in more detail. It is questioned whether surface layer scaling can be applied in all cases.

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Interactive Discussion

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The concept of mapping measured fluxes on such a heterogeneous landscape seems to be significantly challenged by the fact that no significant correlation between measured fluxes and landsurface classes is observed (e.g. figure 9).

The analysis of separate small flux segments is questionable without further analysis to support the idea that these fluxes are meaningful for interpreting surface fluxes.

There is no discussion about stationary criteria, which can pose problems in such a heterogeneous landscape and at such low flight levels. In particular Fourier transformation can suffer because it is based on the ergodic hypothesis.

P 7023: Rather than speculating about appropriate length scales, co-spectral analysis is necessary to show over what length scales fluxes should be investigated. A periodogram of vertical wind speed (fig 11) is simply not sufficient. More detailed analysis on cospectra would be required.

P7023: here, the authors worry about artificial fluxes evoked from height gradients of scalars. If this is expected to be a significant issue, the authors need to investigate the influence of vertical flux divergence of various scalars (e.g. NO₂).

Minor comments:

P7031 (line 5). This sentence is confusing and somewhat misleading: if the same 70 km² are repeatedly sampled I don't see how it can be argued that the total sampled area is so much larger (e.g 4 times 1510 km²), since large scale flux contributions might still be comparably small.

Interactive comment on Biogeosciences Discuss., 6, 7017, 2009.

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