

## ***Interactive comment on “Boundary layer dynamics over London, UK, as observed using Doppler lidar” by J. F. Barlow et al.***

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1) “Features such as time shift between zMH and zAER are mentioned but not really explained. . .” It is interesting to see the time shift in another dataset, despite the 10km separation between ceilometer and sodar in the Emeis and Schäfer (2006) paper. This paper has now been referenced in section 4.2. A paragraph has been added to section 4.4 after the mixing timescales calculation to discuss potential mechanisms, as the calculated timescales (O(10-20mins)) do not explain the observed lag (O(1-2 hours)). Differences in algorithms used to derive the mixing height/aerosol layers don’t appear to explain the lag either, and therefore changes in the aerosol size distribution due to e.g. humidity changes during early morning may also affect backscatter profiles. A full investigation of the backscatter in light of observed aerosol characteristics was

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deemed outwith the scope of this paper, which is focused on boundary layer structure. 2) “The time-scale discussion is not really integrated into the paper. . .” See response to point 1 – an additional paragraph has been added to section 4.4, and the paragraph 3 in the conclusions section has been altered slightly to reflect the discussion. 3) “The reference to the paper Emeis et al. (2008) is incomplete. . .” This has been amended. 4) “The interpretation given in the fifth paragraph. . .” This is a little unclear: if it is meant that the reviewer thinks the mechanism for the formation of a jet is widespread regional stable conditions, as opposed to local stable conditions, we would probably agree – however this study does not consider formation mechanisms. It is likely that the jet forming regionally over the SE of England would be a weak feature, due to proximity to the coast. Then it may be the case that it is broken down by the turbulence present over London by night as the stable rural profile advects over the city. These are hypotheses on formation/evolution that require a different study to test them. However, in the present study we have observed an occasion where a jet seems to be present, and thus turbulence has been suppressed over the urban surface. The point of the reference to the jet in the fifth paragraph in the conclusions is thus only to highlight that stable conditions (evidenced by the jet) are rare within this data-set and the text has not been changed. 5) “The reference Emeis (2004a) should be complemented. . .” The paper has been referenced in the fourth paragraph of the introduction.

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