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Interactive comment on “Meteorological factors controlling low-level continental pollutant outflow across a coast” by D. L. Peake et al.

Anonymous Referee #2

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Meteorological factors controlling low-level continental pollutant outflow across a coast

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General Comment

The paper provides a good contribution to the analysis of the dynamical processes responsible for continental boundary layers ventilation through pollutant mass transport over ocean areas. This is an important determinant of the air quality in coastal areas,

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where human population tends to be concentrated. While in my opinion the paper addresses relevant scientific questions, I think that some aspects of the manuscript must be improved.

Specific comments

- 1) The work is somewhat uneven in that much attention is paid to discuss model results, but measurements collected during ICARTT field campaign are not much used to evaluate the model. For instance, the model must be evaluated, mainly when modelling outputs are used to build the box-model structure, as the vertical extension of the boxes depends of the boundary layer depth.
- 2) I do not agree with the definition of coastal outflow. A general definition must also include the horizontal advection of pollutants across a coastline within the marine boundary layer, as in the case of a cold front moving over warm water
- 3) Can you clarify the following sentence written in page 10858, line 5? An important aspect for this study is the diagnosis of boundary layer depth from the model. At each horizontal grid point, the boundary layer is defined by the number of turbulent mixing levels (NTML).
- 4) Authors highlight in the abstract and in the conclusion that the Met Office Unified Model (MetUM) showed that over a 4 week period in summer 2004, horizontal ventilation of the continental boundary layer by coastal outflow was similar to the magnitude by vertical ventilation by convective and vertical advection for the whole of the eastern USA. However I did not found a clear evidence or discussion of this result in the paper.
- 5) Are your results comparables to those found by others authors coupling different regional models as WRF-Chem or WRF-CMAQ?
- 6) I think that it will be useful for the reader to include a figure showing the time series of the relationship between horizontal to vertical ventilations.

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