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Boundary layer ventilation during a high pressure event

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The amount of pollution transported from the boundary layer to the free troposphere effects air quality on both regional and global scales. Ventilation of the boundary layer occurs through advection, convection and turbulent mixing processes. The relative importance of these processes depends on the synoptic system under consideration. It is often assumed that ventilation is weak in high pressure events due to suppression by large-scale subsidence. In the presence of convection (common over land in summer events) this assumption may not be valid. The aim of this work is to determine the importance of convection during these events.

In this study the UK Met Office Unified Model is used to simulate the transport of pollutants from the boundary layer to the free troposphere during a high pressure event that occurred during the AMPEP (Aircraft Measurements of chemical Processing and Export fluxes of Pollutants) field campaign in 2005. The transport processes are represented by the advection, convection and mixing schemes in the model. Passive tracers are initialized over land within the boundary layer and transported by different combinations of the transport schemes. Quantitative estimates of the proportion of a passive tracer transported to the free troposphere by each process are made and evaluated using observations from the AMPEP flight.