



Boundary layer ventilation by baroclinic systems

V. Sinclair (1), S. Gray (1) and S. Belcher (1)

(1) University of Reading (v.a.sinclair@reading.ac.uk)

The vast majority of pollutants are emitted at or very near the surface. Whether they remain in the atmospheric boundary layer or are ventilated into the free troposphere has a large impact on air quality and on atmospheric chemistry. Midlatitude cyclones are known to be important contributors to boundary layer ventilation. Usually it is assumed that the amount of pollutants transported in midlatitude cyclones is dominated by the intensity of the warm conveyor belt. We have shown that this may not always be the case. Transport within the boundary layer by turbulence and horizontal Ekman motions has been found to be equally important. These processes determine how much pollution is available in the region of the boundary layer that is ventilated by the warm conveyor belt, and hence can control the amount of pollution ventilated into the troposphere. These results have been obtained by simulating idealised baroclinic systems in the presence of a boundary layer scheme. A passive tracer was included to represent pollutants emitted at the surface.