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# A global climatology of boundary layer ventilation

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The general circulation pattern of the Earth's atmosphere is well known, however there has been relatively little effort to quantify the climatological effects of the buffer zone known as the atmospheric boundary layer. Turbulent motions in the atmospheric boundary layer act to mix the layer along with its constituent pollutants, below a temperature inversion which separates it from the free troposphere. Exchanges between the boundary layer and free troposphere can occur through the mechanisms of convection, isentropic uplift, and coastal and orographic venting. In particular the rate at which pollutants are removed from the atmosphere can be different depending on whether or not they are resident within the boundary layer or the free troposphere. Thus the limiting factor on the concentrations of, for example, certain eg $NO_x$, pollutants in the free troposphere will be the rate at which they are vented from the boundary layer.

A global climatology (spanning 10 years between 1995 and 2005) of boundary layer venting is presented here using the ERA-interim dataset which has a grid scale resolution of 0.7 degrees x 0.7 degrees. The boundary layer height is first calculated using a bulk Richardson number method and then an associated vertical velocity is found by linearly interpolating between the two model levels either side of the boundary layer height. This value along with the change in height of the boundary layer over a 3 hour period is used to give an estimate of the rate of venting. The climatology of this rate allows us to describe and quantify the areas of the globe that are responsible for boundary layer entrainment and boundary layer venting, which could be used as a basis for further comparisons with other suitable datasets. We will also present results for the climatology of the boundary layer height itself. [possibly? That could be attractive for a BL audience anyway] Furthermore we will present and discuss results from a method designed to isolate the venting due to mid-latitude cyclones, and compare that to venting more generally, and in particular to the venting due to the orography in order to show which is the more significant mechanism.