



Tracer mixing by clear air turbulence in the upper troposphere

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Clear air turbulence (CAT) is an often occurring phenomenon in the upper troposphere with severe implication for air traffic, mostly found in the vicinity of upper tropospheric jetstreams. As CAT is not associated with cloud processes it is difficult to observe both in flight and by remote sensing. In addition to the aviation impacts, the induced turbulence might lead to a mixing of trace species which are characterised by a vertical gradient in this region, which is usually not represented by large-scale models.

In this study we present a multi-seasonal distribution of CAT as deduced from chemistry climate model simulations with the help of the (extended) Ellrod-Knox index via both online and offline diagnostics. In a second step we have formulated a tracer mixing algorithm, based on a modified E-K index, which also takes the local vertical stability into account. This algorithm is applied to both passive tracers but also chemical reactive species and we can consequently analyse the impact of the CAT induced mixing on the vertical distribution of tracers in the UTLS region.