



Distribution of convective sources and their contribution to the TTL

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The tropical tropopause layer (TTL) is a key region that controls the exchanges between the troposphere and the stratosphere. Although it is well-known that deep convection is driving the renewal of compounds in the TTL, there exists no detailed study of the spatial and temporal distribution of these sources and their relative contribution.

This study combines the Lagrangian point of view with high-resolution data from cloud tops (CLAUS dataset). We obtain the ensemble of convective sources by determining the location in both time and space where each TTL parcel has been detrained from. By examining the relative importance of the sources, we find that these are not only highly-localized but also that a small sub-ensemble exhibits a strong signature lasting for a whole season. As parcels rise within the TTL, they also experience strong horizontal mixing within the tropical latitude band. The transport between the time of detrainment and the altitudes where the parcels are well-mixed is determined by a transit function that characterizes the distribution of life times of parcels within the TTL. We will discuss how the sources and transit function change with the seasonal cycle and interannual variability by ENSO.