



## **Timescales of transport from the troposphere into the lowermost stratosphere**

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The lowermost stratosphere (LMS) as part of the extratropical UTLS can be divided into dynamically and chemically distinct regions. A layer of mixed tropospheric and stratospheric tracer characteristics in the proximity of the extratropical tropopause: the extratropical tropopause transition layer (ExTL). This chemically distinct layer roughly coincides with a layer of strongly enhanced thermal stratification: the tropopause inversion layer (TIL) (Birner, 2006). The LMS above the ExTL, also named the free LMS (Bönisch et al., 2009), is less coupled to the local extratropical troposphere. Simultaneous in-situ measurements of CO<sub>2</sub> and SF<sub>6</sub> have been used to calculate mean transport time from the troposphere to the measurement location in the free LMS (Bönisch et al., 2009) which is on the order of months.

In this study, we will use backward trajectories driven by operational ECMWF analyses wind fields to investigate the TST timescales into the LMS using the LAGRANTO scheme (Wernli and Davies, 1997). We applied a statistical data set of trajectories, which were initialized on isentropes above the 2 PVU surface up to 450K and calculated backward over 270 days (9 month) for our analysis.

The results will be compared with the results from mass balance studies based on in-situ observations (Hoor et al., 2005; Bönisch et al., 2009). Furthermore, a focus is on the role of timescales of TIL formation in the LMS.

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