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Comparisons of tropopause definitions and in-situ trace gas measurements

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Based on airborne in-situ measurements during several airborne measurement campaigns we compare in-situ measurements with several definitions of the tropopause. We focus on vertical trace gas and temperature profiles which were measured in the extratropics. The in-situ measurements of various trace gases in particular ozone and CO are compared with different tropopause definitions namely the thermal and the dynamical tropopause. For the latter we use ECMWF-based PV as well as in-situ measured ozone as a proxy.
We investigate seasonal as well as latitudinal dependencies of tropopause positions in different coordinates. In most cases the 2 PVU surface serves as good proxy for the lower bound of the chemical transition from the troposphere to the stratosphere with the thermal tropopause above the PV- or ozone defined tropopause. In tracer-tracer space the thermal definition is found within the chemical transition regime as defined by the CO-O_3 correlation, but slightly shifted to the tropospheric end.