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Stratosphere-to-Troposphere-Transport (STT) along tropopause folds in midlatitude cyclones

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Tropospheric ozone is well known as an important oxidant and a precursor for highly reactive radicals. Although a large part of tropospheric ozone is produced photochemically, significant amounts of ozone have stratospheric origin and are transported to the troposphere along deep tropopause folds. These STT-events can lead to peaked ozone concentrations at ground level and hereby influence the long-term trend of tropospheric ozone. It is therefore important to quantify the impact of STT on surface ozone concentrations.
Because of their coarse resolution, global models are not able to simualte these STT-processes in detail. Therefore we use the global and regional atmospheric chemistry model system MECO(n) ("MESSy-fied ECHAM and COSMO models nested n-times"), which allows for very consistent, simultaneous simulations in different spatial resolutions. Since MECO(n) enables the release of artificial, passive tracers under certain conditions, we can distinguish between ozone with stratospheric origin and those which has been photochemical produced. We investigate the stratospheric origin of the airmasses penetrating to ground level, the location of crossing the tropopause and the distribution of startospheric ozone at ground level. Furthermore, we present a trajectory study, analysing the efficiency of transport along tropopause folds.