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Dehydration and Lagrangian Cold Point in the extratropical Tropopause region

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The tropopause region of the tropics and extratropics is sensitive to modifications of the radiation budget through changes of radiatively active substances like ozone and water vapour. Both may also modify the temperature structure and the strengths of the tropopause inversion layer (TIL).
Stratospheric water vapour is mainly controlled by dehydration in the tropics. Ascending air masses encounter their minimum temperature in the TTL region (tropical tropopause layer) which determines the water vapour fraction which enters the stratosphere.
In the lowermost stratosphere of the extratropics however, the tropical signal might be lost due to mixing with airmasses which crossed the tropopause (TST: troposphere to stratosphere) at higher temperatures, therefore carrying more water vapour to the extratropical stratosphere.
We investigate statistical 90 day backward trajectories to investigate the role of dehydration at the extratropical tropopause for the water vapour budget at the tropopause at mid and high latitudes.
We use a set of 800000 trajectories for summer and winter, respectively, on the basis of ECMWF-T799L91 operational data (kinematic wind fields).
We analyze the trajectories for the time and locations of their cold point and TST.
Our results indicate that :
1) TST and dehydration occur at different locations
2) Dehydration occurs in general before trajectories enter the stratosphere
3) Dehydration of TST trajectories can occur in northern winter after TST in the region of high tropopauses over Siberia