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An alternative dynamical tropopause based on the meridional PV gradient on isentropes

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The cores of the jet streams on different middle world isentropes (300–380 K) are determined using the gradient of the potential vorticity (PV) with equivalent latitude. The jet cores represent at the same time a physical boundary on the isentropes between the troposphere at lower latitudes and the stratosphere at higher latitudes.
Thus, a 'PV gradient tropopause' related to the isentropic gradient of the potential vorticity is determined, which may represent the separation between the troposphere and stratosphere in a more appropriate manner than the use of a particular value of PV (dynamical tropopause) or a particular value of the lapse rate (thermal tropopause) for the entire hemisphere.
Using operational ECMWF data a climatology of the PV at the PV gradient tropopause is presented. Depending on season, the zonal and time mean PV at this tropopause varies between 2.0–3.5 PVU in the extratropics. In the zonal and time mean, the PV at the PV gradient tropopause decreases from lower to higher latitudes. This decrease is sharper in the southern hemisphere compared to the northern hemisphere.
The analysis indicates that the 2 PVU threshold commonly used as the dynamical tropopause is too low for most of the time. This value is most probably found during winter in the northern hemisphere, while in northern hemisphere summer the PV at the PV gradient tropopause is most probably between 3.0–3.5 PVU and in spring or autumn it is around 2.5 PVU.