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Multi-year calculations of transport processes in the TTL

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Recent investigations of transport processes in the tropical tropopause region have shown that vertical and horizontal transport play an important role in dehydrating water vapour, while entering the stratosphere. Uncertainties in the formulation of vertical transport typically limit our understanding of the dynamical processes in the tropical tropopause layer (TTL).

In this paper we want to present preliminary results of a multi-year calculation covering the ERA40 and operational ECMWF analyses period. For this purpose we have developed a new approach to better constrain the vertical velocities in trajectory models of this region of the atmosphere: a reverse domain filling trajectory model coupled with the ECMWF's radiative transfer model to derive diabatic heating rates.

We will concentrate in our study on the northern hemispheric winter months which show a high variability in the tropical tropopause. The analysis will focus on water vapour variability and on interesting dynamical mechanisms both in the troposphere and in the stratosphere (e.g. ENSO and QBO) in driving this variability.